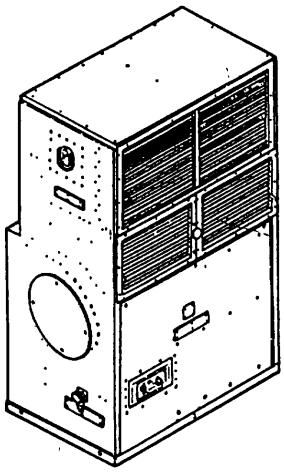
TECHNICAL MANUAL

OPERATOR, UNIT INTERMEDIATE DIRECT SUPPORT, AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE

This copy is a reprint which includes current pages from Changes 1 through 3



AIR CONDITIONER, COMPACT, VERTICAL, 208-VOLT, 3 PHASE, 50/60 HERTZ, 60, 000 BTU/HR

MODEL F60T-2S
NSN 4120-01-238-4277

Approved for public release. Distribution is unlimited.

HEADQUARTERS
DEPARTMENT OF THE ARMY

2 NOVEMBER 1987

CHANGE

NO 6

HEADQUARTERS DEPARTMENTS OF
THE ARMY AND THE AIR FORCE
WASHINGTON, D.C. 4 October 1996

Operator, Unit, Intermediate Direct Support
and Intermediate General Support Maintenance
For

AIR CONDITIONER, COMPACT, VERTICAL
208-VOLT, 3 PHASE, 50/60 HERTZ
60,000 BTU/HR
MODEL F60T-2S NSN 4120-01-238-4277
MODEL F60T-2HS NSN 4120-01-384-6922

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AIR CONDITIONER, COMPACT, VERTICAL,
208-VOLT, 3 PHASE, 50/60 HERTZ
60,000 BTU/HR
MODEL F60T-2S NSN 4120-01-238-4277
MODEL F60T-2HS NSN 4120-01-384-6922

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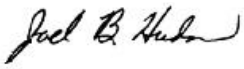

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AIR CONDITIONER, COMPACT, VERTICAL
208-VOLT, 3 PHASE, 50/60 HERTZ
60,000 BTU/HR

MODEL F60T-2S NSN 4120-01-238-4277
MODEL F60T-2HS NSN 4120-01-384-6922

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The US Air Force Number TO 35E9-289-1 is being added to this manual. All future changes or revisions will include the US Air Force. Title has been changed to add new Model Number as shown above.

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----------	4-148.1 and 4-148.2
4-149 and 4-150	4-149 and 4-150
----------	5-8.1 through 5-8.3/(5-8.4 blank)
5-9 and 5-10	5-9 and 5-10
5-79/(5-80 blank)	5-79 through 5-82
B-9 and B-10	B-9 and B-10
Index-1 through Index-4	Index-1 through Index-4

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Operator, Unit, Intermediate Direct Support, and Intermediate
General Support Maintenance

AIR CONDITIONER, COMPACT, VERTICAL
208 VOLT, 3 PHASE, 50/60 HERTZ,
60,000 BTU/HR MODEL F60T-2S
NSN 4120-01-238-4277

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Operator, Unit, Intermediate Direct Support, and Intermediate
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**AIR CONDITIONER, COMPACT, VERTICAL,
208 VOLT, 3 PHASE, 50/60 HERTZ,
60,000 BTU/HR MODEL F60T-2S
NSN 4120-01-238-4277**

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E-1 and E-2	E-1 and E-2

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Operator, Unit, Intermediate Direct Support, and Intermediate
General Support Maintenance

**AIR CONDITIONER, COMPACT, VERTICAL,
208-VOLT, 3 PHASE, 50/60 HERTZ,
60,000 BTU/HR MODEL F60T-2S
NSN 4120-01-238-4277**

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5-33 and 5-34	5-33 and 5-34

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WARNING

HIGH VOLTAGE

is used in the 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 the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the input power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the 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 the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Do not operate the equipment without all grilles, guards, louvers, and covers in place and tightly secured.

Warning:

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

Shutting the unit off at the control panel does not disconnect power to the various components of the air conditioner.

DANGEROUS CHEMICAL
(Refrigerant 22)
is used in this equipment.

Prevent contact of liquid refrigerant, or refrigerant gas discharged under pressure, with any part of the body. The extremely low temperature resulting from the rapid expansion of liquid refrigerant, or refrigerant gas released under pressure, can cause sudden and irreversible tissue damage through freezing. As a minimum, all personnel must wear thermal protective gloves and face shield or goggles when working in any situation where refrigerant contact with the skin or eyes is possible. Application of excessive heat to any component in a charged system will cause extreme pressure that may result in a rupture, possibly explosive in nature. Exposure of refrigerant 22 to an open flame or very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly poisonous and corrosive gas. In its natural state, refrigerant 22 is a colorless, odorless vapor with no toxic characteristics. It is heavier than air and in a well ventilated area will disperse rapidly. However, in an unventilated area it presents danger as a suffocant.

Be sure the refrigeration system is fully discharged and purged and that dry nitrogen is flowing through the system at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) before all brazing or debrazing operations.

Avoid skin contact or inhaling fumes from any acid formed by burnout of oil and refrigerant. Wear gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands. Use care to avoid spilling compressor burnout sludge. If sludge is spilled clean area thoroughly.

Clean parts in a well ventilated area.

Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.

Dry cleaning solvent (Fed. Spec. P-D-680), acetone, and methyl-ethyl ketone (MEK) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat.

Wear eye protection when using solvents or compressed air. Air pressure should not exceed 30 psig (2.1 kg/cm^2) except as specifically noted.

Assure the industrial process has been evaluated by the Medical Service Bioenvironmental Engineer.

Waste treatment/disposal must be approved by the Medical Service Bioenvironmental Engineer and Civil Engineer.

Solutions will be disposed of in accordance with local State Water Pollution Control Laws. Consult local Medical Services for guidance. Do not direct compressed air against the skin. Use goggle or full face shield.

Allow heaters to cool before touching. Severe burns can result from touching hot heaters.

Do not allow anyone under equipment suspended from a lifting device.

Do not allow the unit to swing while suspended from a lifting device.

Avoid injury by using adequate equipment and personnel to remove compressor from frame. The compressor weighs 85 pounds (38.6) kg).

The burning of polyurethane foam is dangerous. Toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation nearby, take care to ventilate the area thoroughly. An exhaust system like that of a paint spray booth should be used.

Air-supplied respirators, approved by the National Institute for Occupational Safety and Health Administration or the United States Bureau of Mines, should be used for all welding in confined spaces and in places where ventilation is inadequate. Persons who have chronic or recurrent respiratory conditions, including allergies and asthma, should not work in these areas.

TECHNICAL MANUAL

NO. 5-4120-393-14

HEADQUARTERS DEPARTMENTS OF
THE ARMY AND THE AIR FORCE
WASHINGTON, D C, 2 November 1987

Operator, Unit, Intermediate Direct Support
and Intermediate General Support Maintenance
For

AIR CONDITIONER, COMPACT, VERTICAL
208-VOLT, 3 PHASE, 50/60 HERTZ
60,000 BTU/HR
MODEL F60T-2S NSN 4120-01-238-4277
MODEL F60T-2HS NSN 4120-01-384-6922

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward to Commander, San Antonio Air Logistics Center, ATTN: SA-ALC/TIRTR, Kelly Air Force Base, TX 78241-5000.

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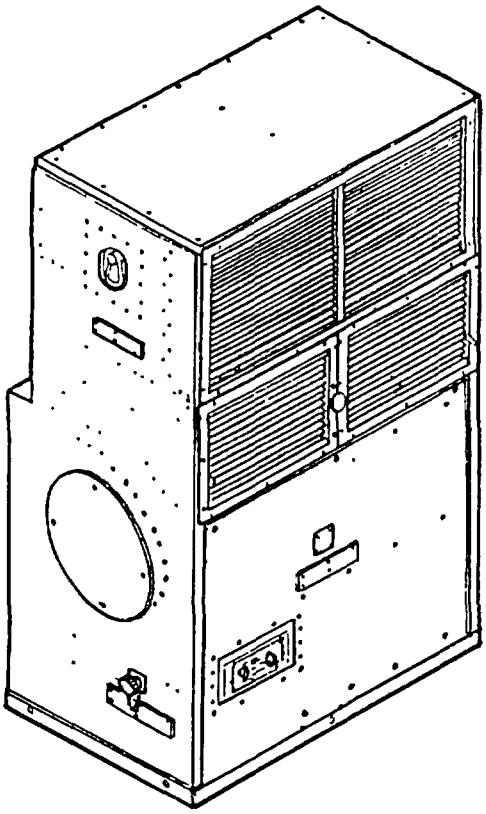
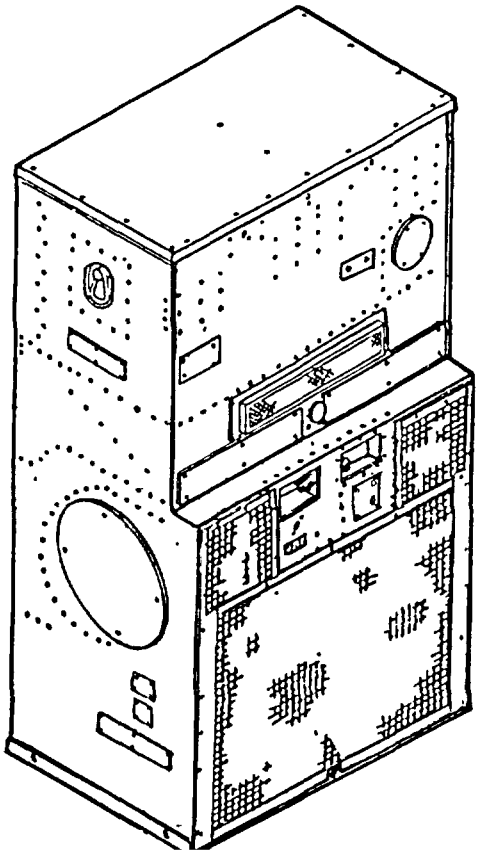


AIR CONDITIONER-FRONT AND LEFT SIDE VIEW



AIR CONDITIONER-REAR AND RIGHT SIDE VIEW (WITH FABRIC COVER REMOVED)

AIR CONDITIONER VIEWS

CHAPTER 1

INTRODUCTION

Section I GENERAL INFORMATION

1-1. Scope. This manual is for use by personnel responsible for the operation and maintenance of the F60T-2S and F60T-2HS air conditioners.

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

b. ***Model Number and Equipment Name.*** Keco Industries, Inc., Model F60T-2S and F60T-2HS Compact, Vertical 60,000 BTU/HR Cooling, 47,000 BTU/HR Heating, 208 Volt 3 Phase, 50/60 Hertz Air Conditioners.

1-2. Maintenance Forms and Records. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. 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 an SF 368 (Quality Deficiency Report). Mail it to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798. We'll send you a reply.

1-4. Warranty information. Air Conditioners, Model F60T-2S and F60T-2HS, are warranted by Keco Industries, Inc. for a period of one year from date of shipment when properly installed. Warranty starts on the date found on DA Form 2410 or DA Form 2408-16 in the logbook. Report all defects in material or workmanship to your supervisor who will take appropriate action.

1-5. List of Abbreviations.

ACU	Air Conditioning Unit
EIR	Equipment Improvement Recommendation
MAC	Maintenance Allocation Chart
MEK	Methylethylketone (Solvent)
MTOE	Modified Table of Organization and Equipment
PMCS	Preventive Maintenance Checks and Services
TMDE	Test, Measurement and Diagnostic Equipment

1-6. Destruction of Army Material to Prevent Enemy Use. Command decisions, according to tactical situation, will determine when destruction of the air conditioning unit will be accomplished. A destruction plan will be prepared by the user organization unless one has been prepared by higher authority. For general destruction procedures for this equipment refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

1-7. Preparation for Storage or Shipment. Contact unit maintenance for air conditioning unit preparation for storage or shipment. See para 4-66 for instructions.

1-8. Quality Assurance/Quality Control (QA/QC). See appropriate QA/QC technical manual for further information.

Section II EQUIPMENT DESCRIPTION AND DATA

1-9. Equipment Characteristics, Capabilities, and Features. The F60T-2S and F60T-2HS are designed to ventilate, cool or heat and to filter and circulate air in enclosures.

a. Provides a maximum of 60,000 BTU/HR of cooling and 47,000 BTU/HR of heating.

b. Has two stages of heat.

c. Provides a source of filtered outside (fresh) ventilation air.

d. Is self contained in a single cabinet that is suited for van, shelter or other enclosed areas.

e. Operates in environmental conditions from arctic to tropic.

f. Is fully portable.

g. Has connection point for CBR (chemical, biological, radiological) filter.

h. Is designed for low-noise level operation.

i. Has alternate power input connection locations to provide for a variety of installations.

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

NOTE

When control panel is remote mounted, a block off panel must be used on the air conditioner. The block off panel must be ordered separately. Interconnecting cables must also be fabricated. See installation instructions (para 4-7) for additional information.

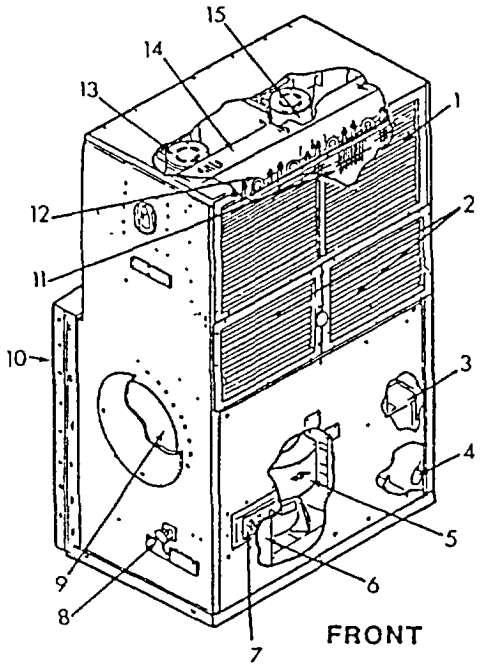
k. The F60T-2HS model is equipped with a high speed fan and motor that allows use with fixed or flexible ducts to distribute the conditioned air.

l. An accessory 16 inch flexible duct adapter is available for use with the model F60T-2HS.

NOTE

The 16 inch flexible duct adapter, when used, is mounted in the same location as the conditioned air inlet and outlet grilles.

1-10. Location and Description of Major Components.



CONDITIONED AIR DISCHARGE GRILLE (1). Adjustable louvers allow directional control of conditioned air

INTAKE (RETURN) AIR GRILLES (2). Adjustable louvers allow control of outside (fresh) and return (from enclosure) air.

JUNCTION BOX NUMBER ONE (3). Contains circuit breaker (CB) relays (K1, K2, K7, K8 and K9) and terminal boards (TB1 and TB2).

CONDENSATE WATER DRIP PAN AND DRAIN TRAP (4). The drip pan is located directly below the evaporator coil and mist eliminator and is built into the casing. Its purpose is to collect condensate that drips off the evaporator coil and mist eliminator during cooling operations. Condensate water then flows through tubing to the drain trap located inside the lower front of the cabinet. The drain trap has a check valve that prevents air flow between the condenser and evaporator sections through drain tubing.

COMPRESSOR (5). Pumps refrigerant through the system during cooling operations.

JUNCTION BOX NUMBER TWO (6). Contains fuses (F1, F2 and F3), transformer (T), relays (K6 and K10), rectifier (CR), and filters (FL1, FL2, FL3 and FL4).

NOTE

The control panel is shown in its location when the air conditioner is installed as a self-contained unit. The control panel is designed so that it may be removed from the cabinet and installed in a remote location. See installation instructions (para 4-8).

CONTROL PANEL (7) Contains a live position mode selector switch(s) and a temperature control thermostat (S1).

NOTE

The air conditioner is designed so that the input power receptacle may be used in the side panel location shown, or it may be moved to one of three other alternative locations. See installation instructions (para 4-9).

INPUT POWER RECEPTACLE (Primary Location) (8). For connection of external power source cable.

CONDENSER AIR FANS AND MOTOR ASSEMBLY (9). Draws air through the condenser coil and discharges the heated air back to the outside during cooling operations.

FABRIC COVER (10). When rolled down it protects the rear surface of the unit.

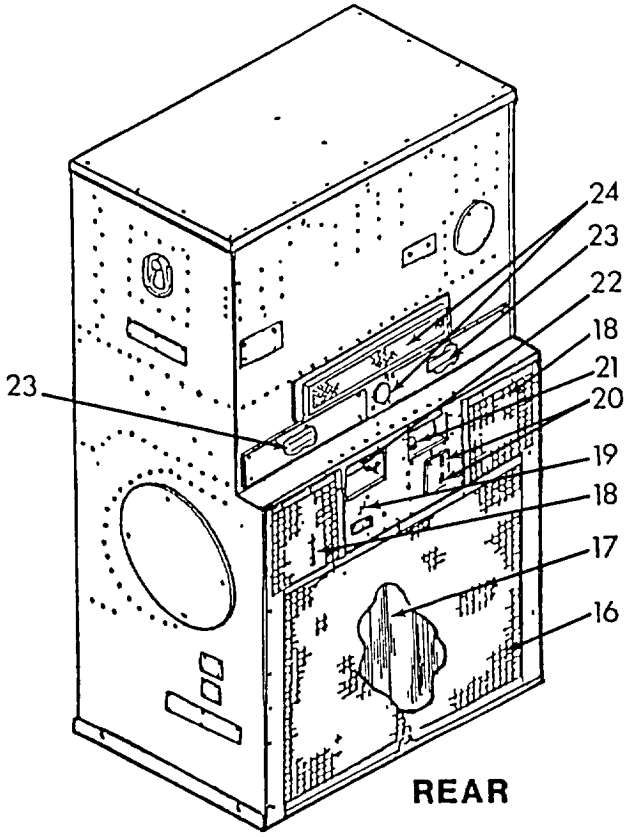
MIST ELIMINATOR (11). Prevents condensate (water) from being blown from the coil into the enclosure.

HEATER ELEMENTS (12). Consists of two banks of three elements each Only one bank operates in the LO HEAT mode. Both banks operate in the HI HEAT mode, however, the TEMPerature control thermostat controls only one bank.

LEFT EVAPORATOR FAN AND MOTOR (13). Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the enclosure.

EVAPORATOR COIL (14). Serves as a heat exchanger by transferring heat from the air passing over the tubing and fins to the refrigerant passing through the tubing.

RIGHT EVAPORATOR FAN AND MOTOR (15). Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the enclosure.



CONDENSER COIL GUARD (16). Protects coil from damage.

CONDENSER COIL (17). Serves as a heat exchanger by transferring heat from the refrigerant passing through the tubing to the air passing over the tubing and the fins.

CONDENSER AIR OUTLET GRILLES (18). Protects personnel from injury and fans from damage.

REFRIGERANT SIGHT GLASS (liquid sight indicator) (19). Allows visual inspection and indicates condition of liquid refrigerant when the unit is operating in the cool mode.

HIGH AND LOW PRESSURE CUTOUT SWITCHES (S5 and S6) (20). Safety switches that protect the refrigerant compressor.

CIRCUIT BREAKER (CB) RESET KNOB (21). Actuates a push-pull type control cable for resetting circuit breaker.

REFRIGERATION SERVICE VALVES (22). Provides connection points for refrigeration system servicing and testing.

CONDITIONED AIR FILTERS (23). Provides filtered return air.

FRESH AIR FILTER AND DAMPER (24). Provides filtered outside air.

1-11. Equipment Data.

Operating Temperatures:

Low	-50°F (-45°C)
High	+120°F (+49°C)

Performance:

Cooling Capacity	60,000 Btu/hr
Heating Capacity	47,000 Btu/hr

Power Required:

Voltage	208
Phase	3
Hertz	50/60
Amperage	42

Dimensions:

Width	34.75 in. (88.27 cm)
Depth	23.50 in. (59.69 cm)
Height	65.20 in. (165.61 cm)
Weight	600.00 lb. (272.16 kg)

Refrigerant:

Type	R-22
Charge	9.1 lbs (4.13 kg)

1-12. Safety, Care, and Handling. Read and understand all instructions relating to the specific function you are to perform before starting task.

a. Carefully read and understand all notes, cautions, and warnings contained in this manual that pertain to the task you are to perform.

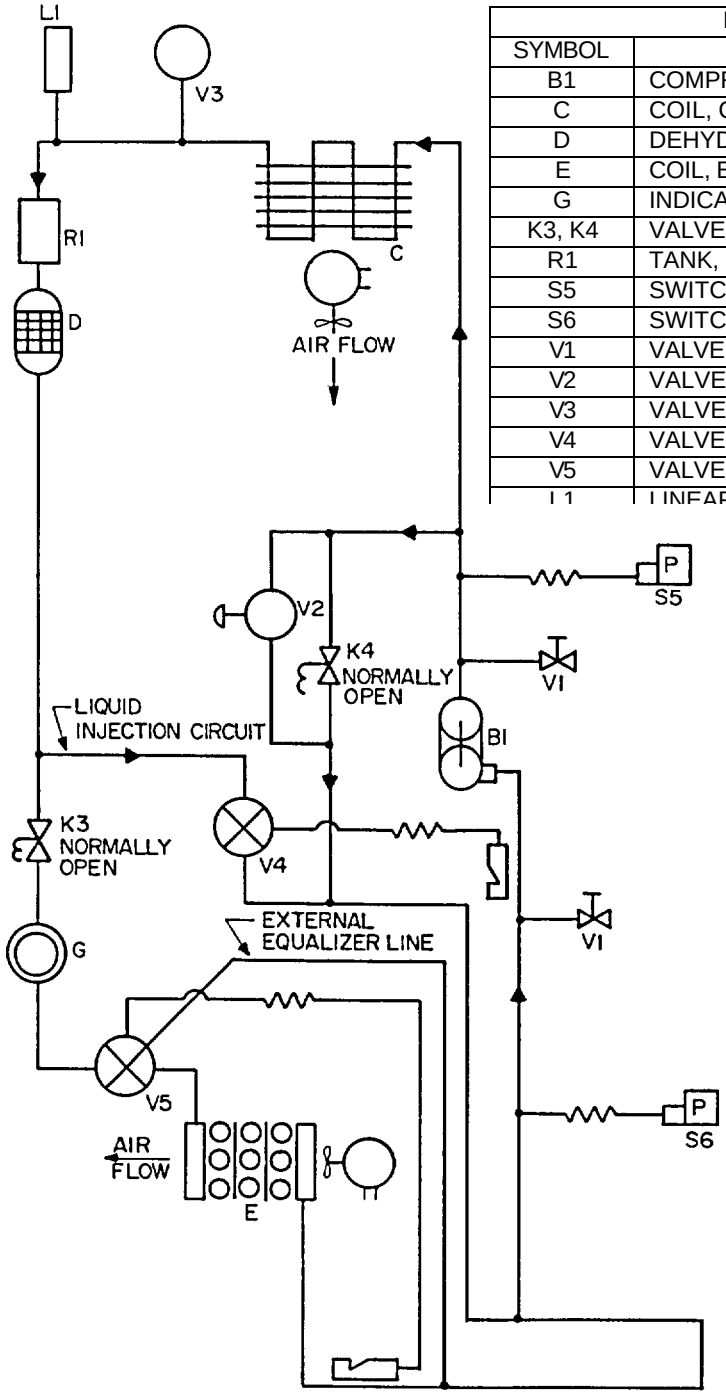
b. Carefully read and understand all WARNING and CAUTION plates located on the air conditioner.

c. Never operate the air conditioner with any cover, screen, or panel removed unless the instructions specifically instruct you to do so. Then do so only with extreme caution.

d. Carefully plan all maintenance tasks and never take unnecessary risks.

Section III PRINCIPLES OF OPERATION

1-13. Refrigeration Cycle.



LEGEND	
SYMBOL	DESCRIPTION
B1	COMPRESSOR, RECIP PDVN
C	COIL, CONDENSER
D	DEHYDRATOR, DESICCANT
E	COIL, EVAPORATOR
G	INDICATOR, SIGHT, LIQUID
K3, K4	VALVE, SOLENOID
R1	TANK, RECEIVER
S5	SWITCH, HIGH PRESS, CUTOUT
S6	SWITCH, LOW PRESS, CUTOUT
V1	VALVE, ANGLE
V2	VALVE, PRESS REGULATING
V3	VALVE, PRESSURE RELIEF
V4	VALVE, EXPANSION
V5	VALVE, EXPANSION
L1	LINEAR ACTUATING CYLINDER

REFRIGERATION SCHEMATIC

a. ***Cooling cycle***. Unit operation with mode selector switch set to COOL and the TEMPerature control thermostat set to DECREASE.

(1) Compressor (B1), condenser fans, and evaporator fans start

(2) To prevent compressor overload and damage during startup, solenoid valve (K4) is open prior to start of cooling cycle to equalize pressure on both sides of the compressor.

(3) The compressor (B1) takes 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 (C) and receiver (R1).

(4) The condenser fans draw outside ambient air over and through the condenser coil (C). The high temperature, high pressure gas from the compressor (B1) is cooled by the flow of air and is condensed into a high pressure liquid.

(5) The refrigerant desiccant dehydrator (filter drier) (D) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.

(6) The liquid indicator (sight glass) (G) indicates the presence of moisture and quantity of refrigerant in the system.

(7) The solenoid valve (K3) is controlled by the TEMPerature control thermostat on the control panel.

This valve will shut off the flow of refrigerant to the evaporator section when the temperature in the conditioned area reaches the set point.

(8) The expansion valve (V5) controls the amount and pressure of liquid refrigerant to the evaporator coil (E). The expansion valve (V5) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil By use of a sensing bulb and external equalizer line the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (E). The expansion valve (V5) allows the high pressure liquid to expand into a cool low pressure liquid.

(9) As the liquid refrigerant leaves the expansion valve (V5) it passes through a distributor and enters the evaporator coil (E). 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 (E), the air is cooled.

(10) The refrigerant gas is then drawn back to the compressor (B1) and the cycle is repeated.

b. ***Bypass cycle***. This unit has a bypass cycle which allows cooling operation at low cooling loads without cycling the compressor (B1) on and off. In bypass, the refrigerant is piped from the compressor discharge (high side) to the suction (low side) of the compressor, bypassing the evaporator coil (E).

(1) When the TEMPerature control thermostat on the control panel senses that cooling conditions have reached the set point, it closes the solenoid valve (K3) to shut off refrigerant flow to the evaporator coil (E).

(2) As the compressor suction pressure start to drop, the pressure regulating valve (V2) opens to allow flow of hot gas from the compressor.

(3) The liquid quench expansion valve (V4) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor, the liquid quench expansion valve (V4) opens to allow liquid refrigerant to mix with the hot gas.

(4) The linear actuating cylinder (L1) automatically controls the condenser air discharge louver assemblies to maintain an adequate discharge pressure.

(5) The service valves (V1) are provided for charging, and general servicing of the high and low pressure sides of the refrigerant system.

(6) The low pressure switch (S6), the high pressure switch (S5), and the pressure relief valve (V3) are provided to protect the unit from damage due to pressure extremes.

1-14. Heating.

a. ***Hi HEAT Mode***. When the mode selector switch is set for HI 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. Three of the elements are thermostatically controlled by the TEMPerature control thermostat, and the remaining three are on all the time.

b. ***LO HEAT Mode***. When the mode selector switch is set for LO HEAT, only the three thermostatically controlled heating elements are used.

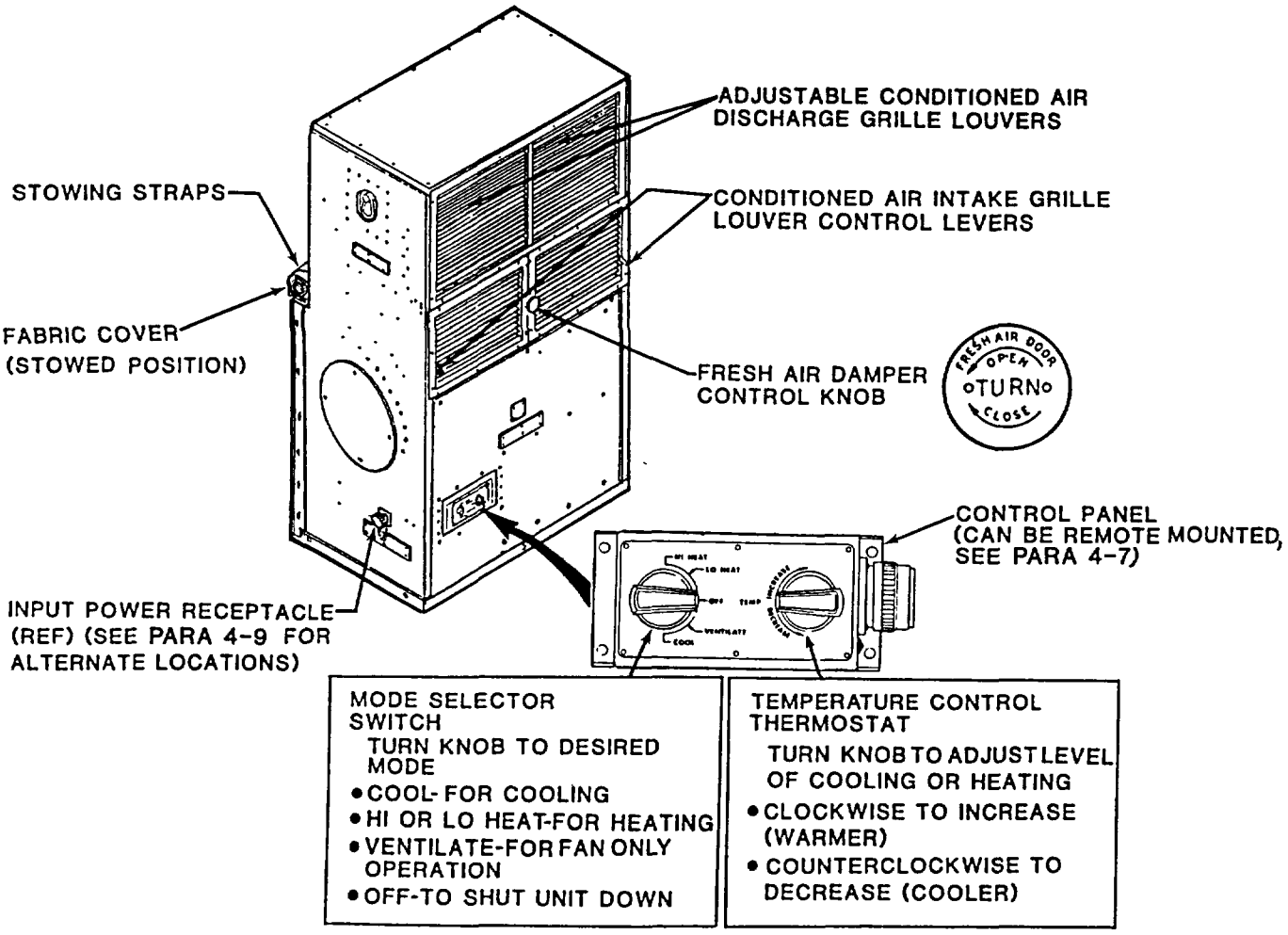
CHAPTER 2

OPERATING INSTRUCTIONS

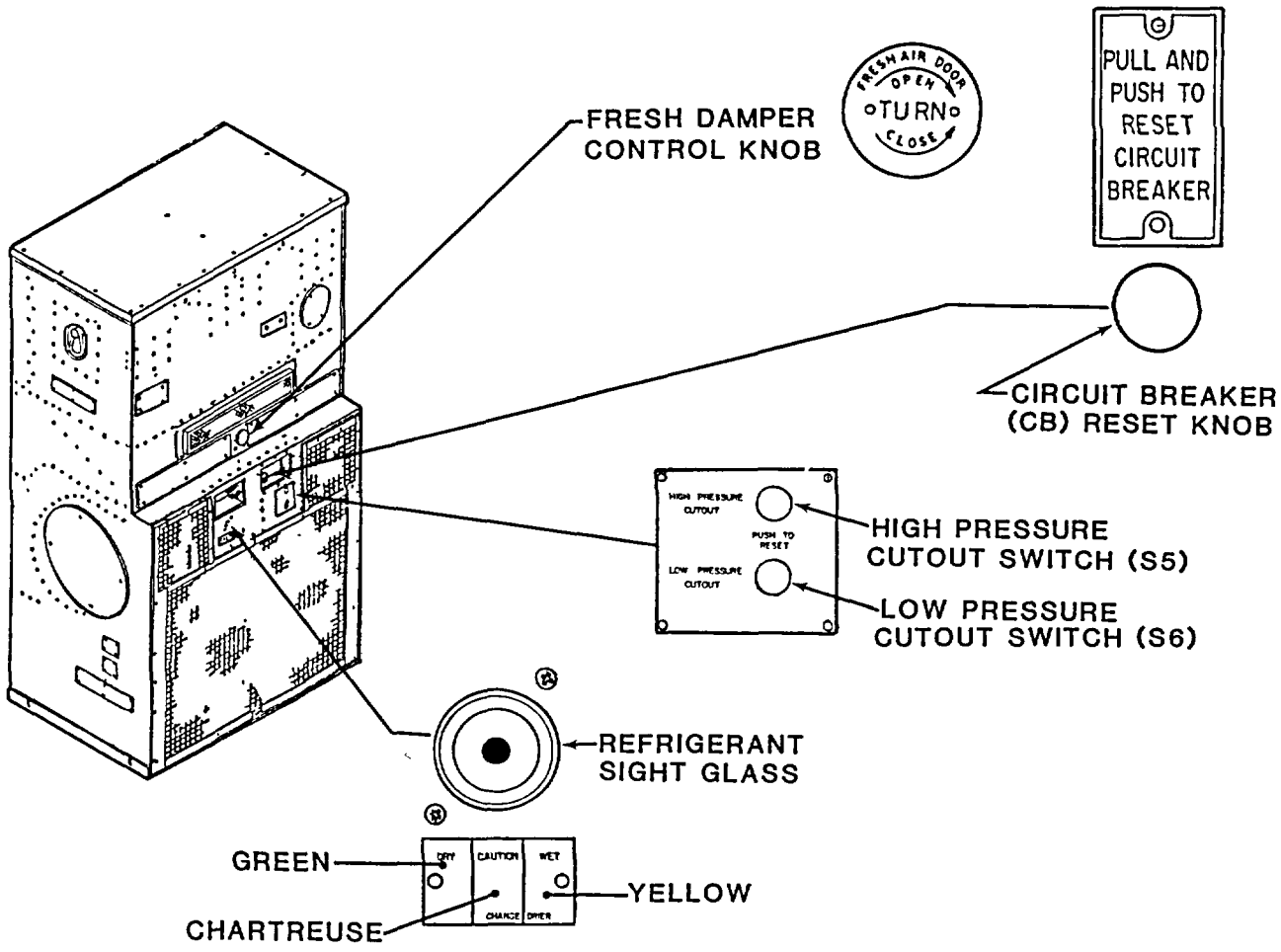
Section I DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. General. The Air Conditioner is designed for a variety of installations and for operation under a wide variety of climatic conditions. It is also designed for continuous or intermittent operation as a self-contained unit or may be connected to or used with external filtering equipment for operation under chemical-biological-radiological (CBR) environmental conditions. Operators must be aware of any peculiarities or operational limitations for their specific installation. See the appropriate shelter or system manual for instructions peculiar to your specific installation.

2-2. Operator's Controls.



OPERATOR'S CONTROLS FRONT



OPERATOR'S CONTROLS REAR

2-3. Indicators. The refrigerant sight glass is the only visual indicator used. 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 maximum cooling with an ambient temperature higher than 70°F (21°C) prior to checking the condition of the refrigerant at the sight glass. The sight glass is equipped with a center indicator that is moisture sensitive. Dry refrigerant is indicated by green, it turns chartreuse when the moisture content becomes undesirable, and 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 is low and the system should be charged. Either moisture or low charge indications should be reported to direct support maintenance.

CAUTION

Do not operate the air conditioner in the COOL mode if refrigerant color has reached the yellow band or if numerous bubbles appear in the sight glass. COOL mode operation may be continued with the refrigerant color in the chartreuse band or with only an occasional bubble appearing in the sight glass, but the sight glass should be checked every four hours to insure that the condition has not become worse.

Section II OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-4. General. Operator Preventive Maintenance Checks and Services (PMCS) are essential to the efficient operation of the air conditioner and to prevent possible damage that might occur through neglect or failure to observe warning symptoms in a timely manner. Checks and services performed by operators are limited to those functions which are described in table 2-1.

a. ***Before You Operate***. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. ***While You Operate***. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

c. ***After You Operate***. Be sure to perform your after (A) PMCS.

d. ***If Your Equipment Falls To Operate***. See para 3-2 and troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750 for instructions.

2-5. Weekly. Perform weekly as well as before operations PMCS if:

a. You are the assigned operator and have not operated the item since the last weekly.

b. You are operating the item for the first time.

Table 2-1. Operator Preventive Maintenance Checks and Services

NOTE

Within designated interval, these checks are to be performed in the order listed.

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.

B-Before A-After M-Monthly
D-During W-Weekly

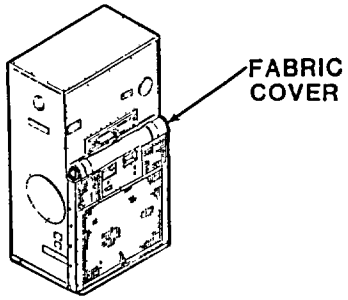
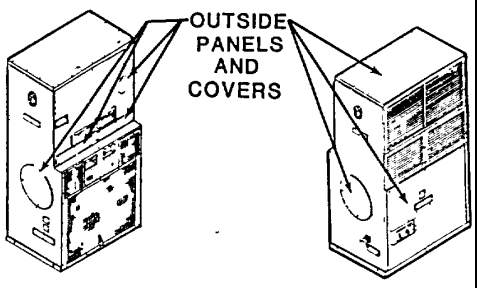
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures: Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available If:
1	•				•	Fabric Cover	Check that cover is rolled up for normal operation. Roll cover down and check for condition of snaps, tears or worn edges, and mildew. 	
2	•					Outside Covers and Panels	Check that panels are in place. Check panels for cracks, dents, and missing hardware. 	Panels missing or damage that would cause operating hazard.

Table 2-1. Operator Preventive Maintenance Checks and Services

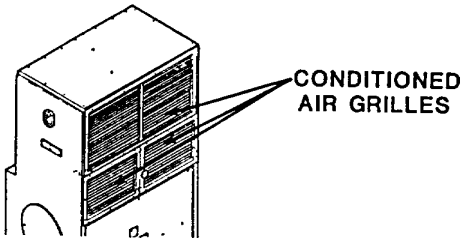
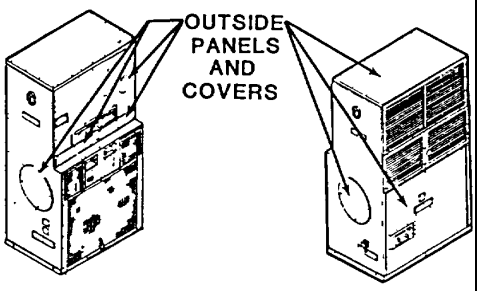
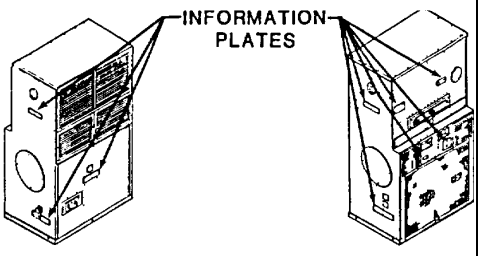
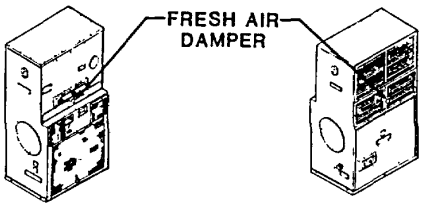
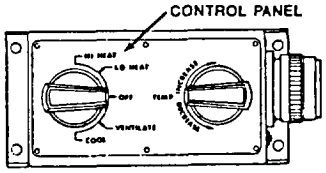
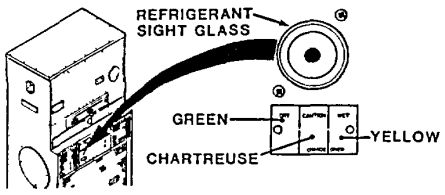
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures: Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available If:
3	•					Conditioned Air Grilles	Check for obstructions, damage, proper adjustment, loose or missing hardware.	
				•			Check louvers for freedom of operation.	
				•			Lubricate as required.	
								
4	•					Protective Grilles Guards, and Screens	Check that grilles, guards and screens are in place.	Missing parts or damage that would cause operating hazards.
	•			•			Check for obstructions, damage, and loose or missing hardware.	
								
5					•	Information Plates	Check for legibility and loose or missing hardware.	
								

Table 2-1. Operator Preventive Maintenance Checks and Services

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures: Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available If:
6	•	•				Fresh Air Damper	Check for proper adjustment.	
					•		Check for freedom of operation.	Control knobs missing or inoperable.
								
7	•					Control Panel	Check for obvious damage and missing knobs.	Control panel damaged.
		•					Check for proper operation.	Unit not operating properly.
								
8		•			•	Refrigerant Sight Glass	After 15 minutes of operation at maximum cooling with ambient temperature higher than 70°F (21°C), check for bubbles or milky flow indicating low refrigerant charge. Check for yellow color which indicates presence of moisture.	Bubbles, milky flow or yellow color is observed.
								

Section III OPERATION UNDER USUAL CONDITIONS

2-6. Assembly and Preparation for Use. Organizational Maintenance personnel should be employed for original unpacking, installation, and preparation for use. See paragraphs 4-2 through 4-12.

2-7. Initial Adjustments and Checks.

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

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

2-8. Operating Procedure.

a. ***Before Operation***.

(1) Check to see that the power cable has been connected to a source of 208 volt, 3 phase, 50/60 hertz power and to the input power connector on the unit.

NOTE

When possible, power should be connected to the unit at least 30 minutes prior to operating in the COOL mode. The compressor is equipped with a warm up heater and thermostat that will not allow the compressor to operate prior to complete warm up.

The unit will operate immediately (fans only) in the COOL mode. The refrigeration system (compressor) will operate only when warm up is complete (less than 30 minutes). If additional cooling is required the fresh air damper can be opened. When compressor reaches a safe operating temperature it will start automatically. The fresh air damper and TEMPerature control thermostat can then be adjusted to suit.

The compressor is also equipped with a heater that will keep it warm so long as unit remains connected to the power source.

(2) Check that fabric cover has been unsnapped, rolled up and secured.

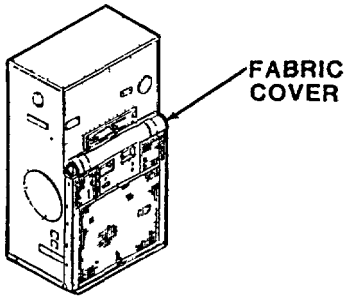
CAUTION

Under normal operating conditions, before starting the air conditioner in any mode, make sure that the fabric condenser cover on the back of the condenser section is rolled up and secured and that all screens are in place and unobstructed.

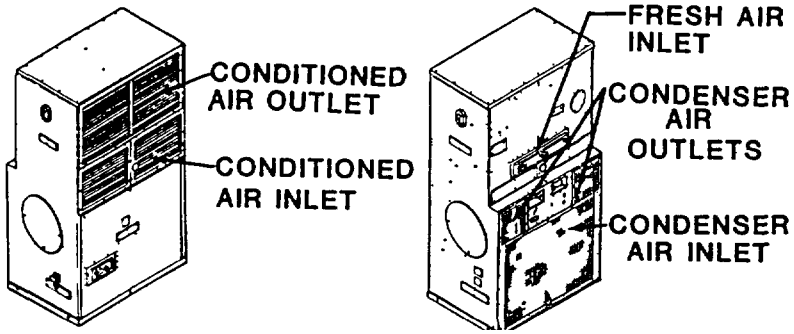
EXCEPTION

Under extreme cold climatic conditions, such as blowing snow, or freezing rain which might enter and damage the condenser section, the unit may be operated in the VENTILATE, LO HEAT, or HI HEAT modes with the cover rolled down and snapped in place.

DO NOT OPERATE IN THE COOL MODE WITH THE FABRIC COVER ROLLED DOWN.



(3) Check that all air inlet and outlet openings are clear.



(4) Be sure that some of the drains are either open or piped to a satisfactory location with a proper drain system.

(5) Table 2-2 lists the recommended control settings for the desired mode of operation. Minor adjustments may be made to get the desired mixture of recirculated fresh air and the air flow patterns of conditioned air.

Table 2-2. Operator Control Settings

Mode	Mode Selector	Temperature Control Switch	Fresh Air Damper Thermostat	Conditioned Air Intake	Conditioned Air Discharge Grille	Fabric Cover Grille
Ventilate with 100% recirculated air	VENTILATE	Does not operate	Closed	Open	Adjust to suit	Rolled up or snapped closed
Ventilate with make up (fresh air)	VENTILATE	Does not operate	Open	Open	Adjust to suit closed	Rolled up or snapped
Ventilate with 100% fresh air	VENTILATE	Does not operate	Open	Closed	Adjust to suit closed	Rolled up or snapped
Heating with 100% recirculated air	LO HEAT or HI HEAT	Desired temperature	Closed	Open	Slightly down for best results	Rolled up or snapped closed
Heating with make up (fresh air)	LO HEAT or HI HEAT	Desired temperature	Open	Closed results	Slightly down for best closed	Rolled up or snapped
Cooling with 100% recirculated air	COOL	Desired temperature	Closed	Open	Slightly up for best	Rolled up and secured results
Cooling with make up (fresh air)	COOL	Desired temperature	Open	Open	Slightly up for best results	Rolled up and secured
Any mode with make up air thru CBR filter	Desired Mode	Desired temperature	Closed and sealed	Partially closed	Adjust to suit	Rolled down and snapped closed in all modes except COOL

b. ***General Information***. To increase comfort and save energy:

(1) *During warm or cold weather.* Air conditioner in COOL or HEAT modes:

(a) Limit traffic through doors as much as possible.

(b) Keep doors and windows tightly closed.

(c) Limit use of fresh (outside) air.

NOTE

It is normally better to keep the fresh air damper slightly open. This will create a slight overpressure, provide replacement oxygen, and reduce room odors. Damper should be closed during extreme weather conditions and during periods when fast warm up or cooling is necessary.

(d) Do not adjust controls unnecessarily. Properly set the controls and the unit will automatically control the temperature.

(e) 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 40°F to 90°F (5°C to 32°C). The centered position of the control knob would be approximately 65°F (18°C). The full INCREASE would be 90°F (32°C). The full DECREASE would be 40°F (5°C).

(f) With the control panel mounted in the unit the control temperature is sensed at the conditioned air inlet.

(2) *During cold weather.*

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

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

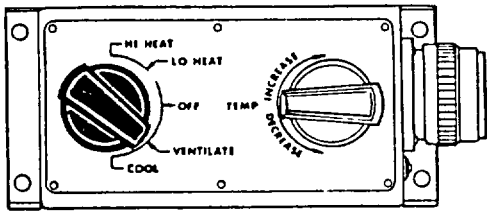
(3) *During hot weather.*

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

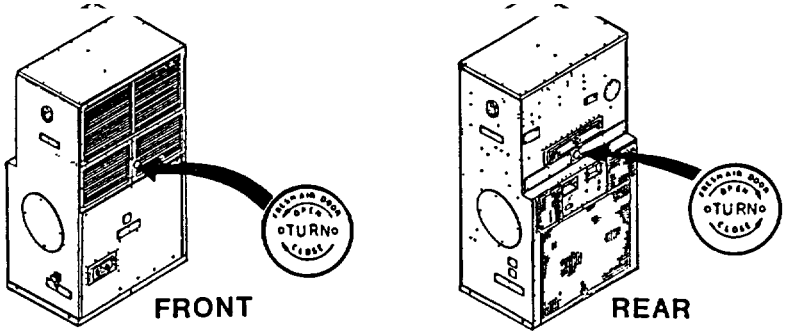
(b) Adjust the conditioned air outlet dampers slightly upward.

2-9. Operation In VENTILATE Mode.

a. Turn mode selector switch to VENTILATE.



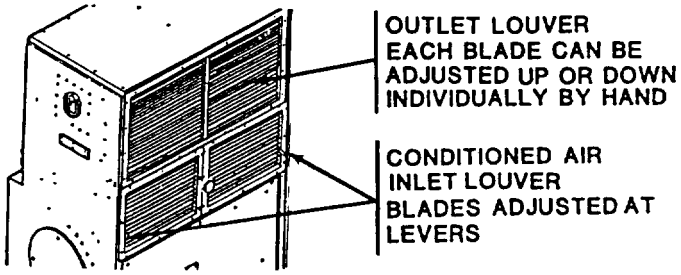
b. Adjust fresh air damper to desired setting. The unit can be operated in the VENTILATE mode with the fresh air damper (door) closed, open, or partially open.



NOTE

When using fresh air for ventilation a window, door, or vent should be opened If the room or enclosure is tightly closed, an overpressure will build up and decrease the volume of fresh air drawn in.

c. Adjust louvers to suit.

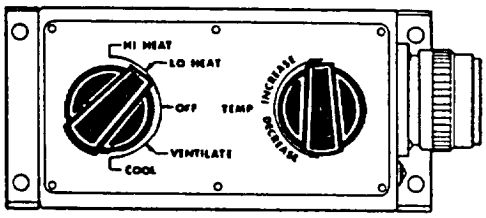


NOTE
To pull in maximum of fresh (outside) air, close conditioned air inlet louvers.

2-10. Operation In LO HEAT Mode. In the LO HEAT mode, three thermostatically controlled heaters are activated.

a. Turn mode selector switch to LO HEAT.

b. Turn TEMPerature control thermostat knob as far as it will go in the INCREASE (warmer) position.



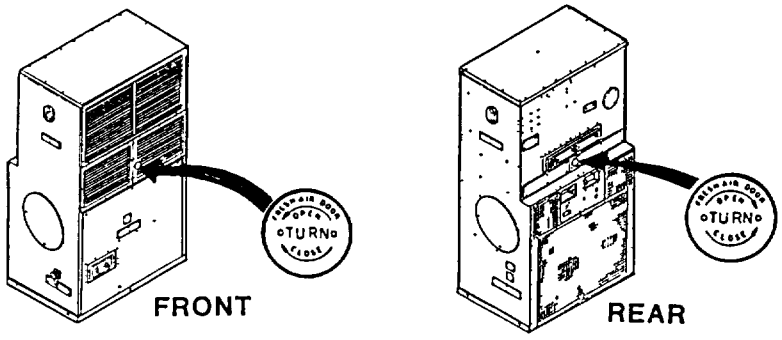
NOTE
For faster warm up, start unit in HI HEAT mode. In moderate temperatures, unit can then be switched back to LO HEAT.

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

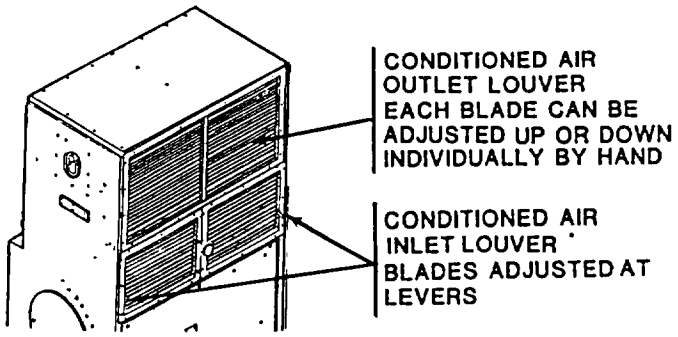
NOTE

Should unit fail to heat the room or enclosure to the desired temperature or fail to maintain the desired temperature with TEMPerature control thermostat set in maximum INCREASE position, switch to HI HEAT.

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 warm-up 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 full open.



CAUTION

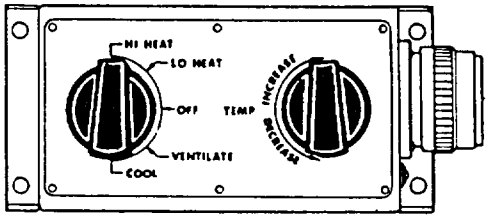
The unit should not be left unattended when using the HI HEAT mode. Three of the heaters are not thermostatically controlled and will continue to produce heat until the safety switch cuts them off at 194°F (90°C).

NOTE

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

2-11. Operation In HI HEAT Mode. In the HI HEAT mode, six heaters are activated. Three are thermostatically controlled. Three operate all of the time.

a. Turn mode selector switch to HI HEAT.



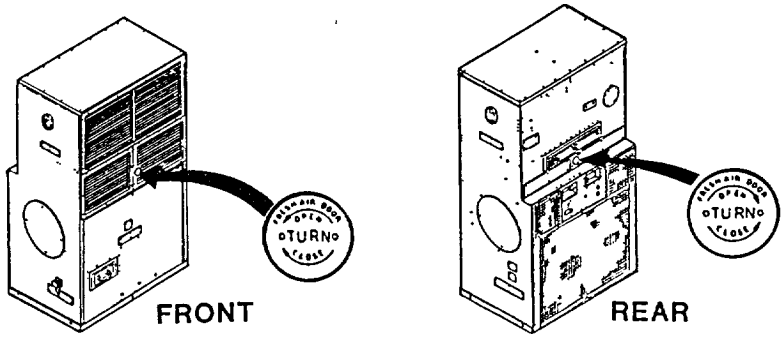
b. Turn TEMPerature control thermostat knob as far as it will go in the INCREASE (warmer) position.

c. When room or enclosure temperature reaches the desired level, slowly turn the TEMPerature control thermostat knob toward DECREASE. Make small adjustments until desired temperature is maintained automatically.

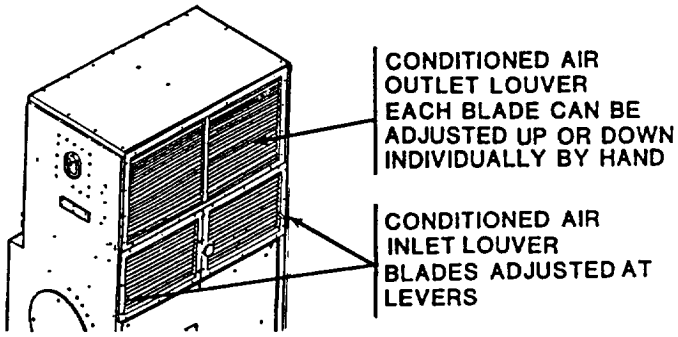
NOTE

Should unit continue to produce too much heat with TEMPerature control thermostat knob adjusted toward the decrease setting, switch to LO HEAT.

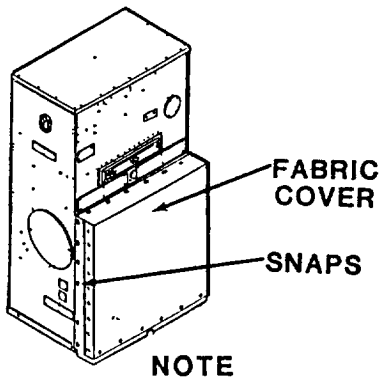
d. Adjust fresh air damper (door) to desired setting It is normally better to keep the fresh air damper slightly open. Damper should be closed during very cold weather and during the fast warmup periods.



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 full open.



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



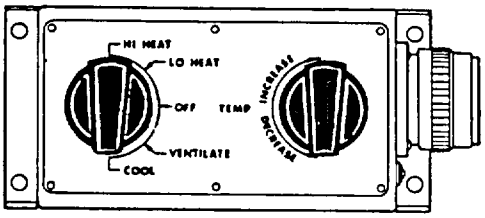
NOTE

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

2-12. Operation In COOL Mode.

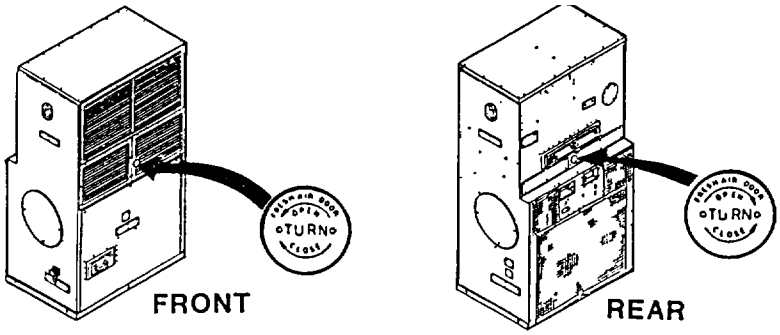
a. Fabric cover must be rolled up and secured with turnbutton fasteners

b. Turn mode selector switch to COOL.



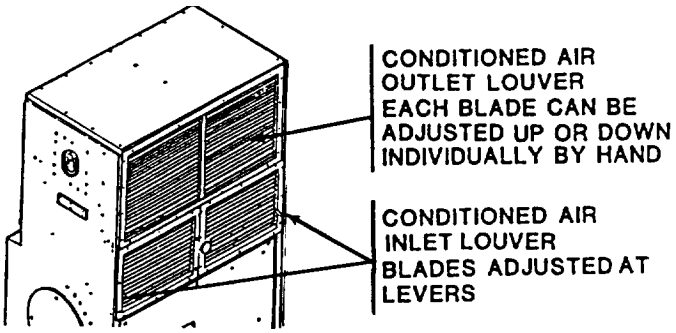
c. Turn TEMPerature control thermostat knob as far as It will go in the DECREASE (cooler) position.

d. 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.



e. When room or enclosure temperature reaches the desired level, slowly turn the TEMPerature control thermostat knob toward INCREASE. Cooling will stop when you reach the approximate room temperature. Further adjustments can be made by turning the TEMPerature control thermostat knob slightly toward DECREASE(cooler) or INCREASE (warmer) until desired temperature is controlled automatically.

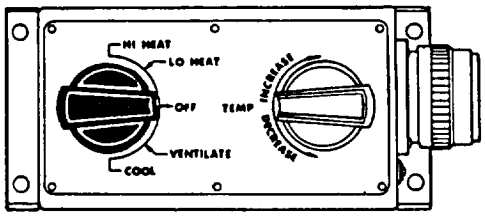
f. Adjust louvers to suit. Since cold air tends to flow downward, it is normally better to adjust the conditioned air outlet louvers slightly upward. The conditioned air inlet louvers should be full open.



NOTE

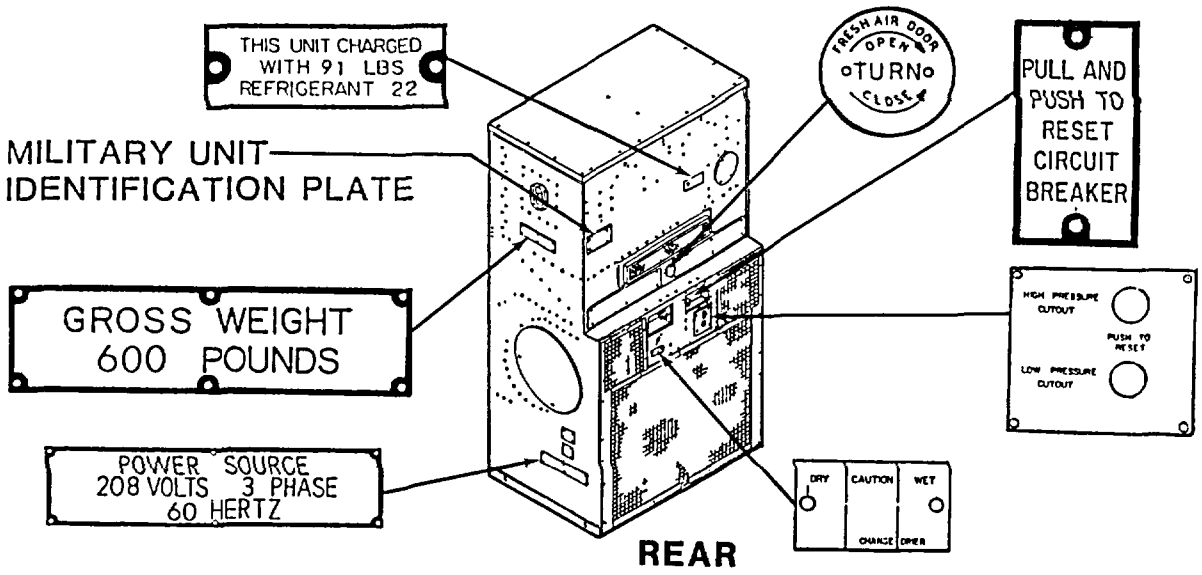
DO NOT disconnect or turn off power to the air conditioner during periods of normal shutdown. Power should be disconnected only if unit is to be serviced, during emergency conditions, or during periods of extended shutdown, due to warm up period of compressor heaters.

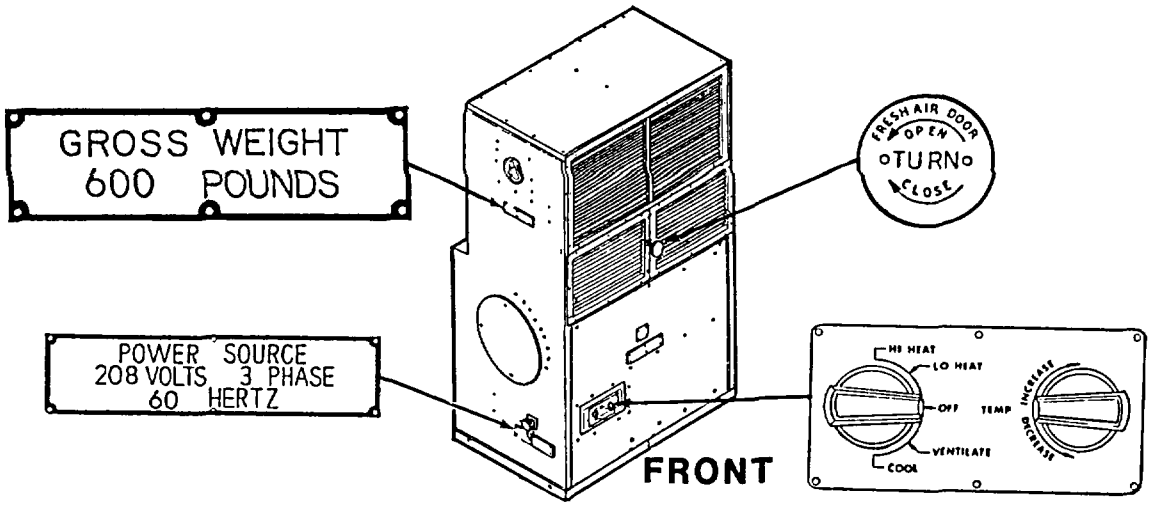
2-13. Shutdown (OFF). Turn the mode selector switch to OFF.



2-14. Preparation For Movement. When the unit is to be moved, the services of unit maintenance shall be employed for the necessary preparations. See para 4-66.

2-15. Information Plates. A number of instruction and identification plates are provided with the unit.





Section IV OPERATION UNDER UNUSUAL CONDITIONS

2-16. 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.

2-17. Operation In Extreme Heat. The air conditioner is designed to operate in temperatures up to 120°F(49°C). Extra care should be taken to minimize the cooling load when operating in extremely high temperatures. Some of the steps that may be taken are:

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 awnings to shut out direct rays of the sun.

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

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

NOTE

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

2-18. Operation In Extreme Cold. The air conditioner is designed to operate in temperatures down to 50°F (45°C). Extra care should be taken to minimize the heating load when operating in extremely low temperatures. Some of the steps that may be taken are:

CAUTION

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

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.

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.

NOTE

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

2-19. Operation In Dusty Or Sandy Conditions. Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filters and thereby causing a restriction of 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 mist eliminator, condensate trap, and water drain lines Some of the steps that may be taken are:

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 shut-down.

2-20. Operation In Unusually Wet Conditions. The air conditioner is designed for normal exposure to the elements, so it is reasonably waterproof. Some of the steps that should be taken in an extremely wet climate are:

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

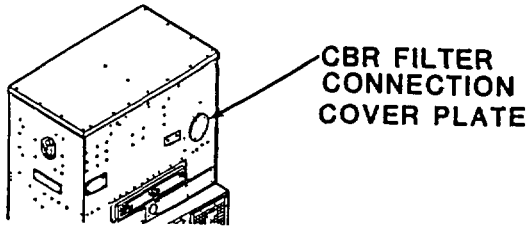
b. Roll down and secure the fabric cover on the back of the cabinet during periods of wet, windy weather when the air conditioner is not in operation.

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.

2-21. 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 spray 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.

2-22. Operation Under Emergency Conditions.

a. ***CBR (Chemical, Biological, Radiological) hazard***. This unit has provisions for connection to an external CBR filtering source. Should it be necessary to operate in conditions requiring use of CBR filtration equipment, see specific instructions for your shelter or facility installation.



b. ***General Suggestions***. The following are general suggestions and do not apply if they conflict with instructions for your shelter or facility installation.

(1) The fresh air damper (door) should be closed, the opening should be covered with a suitable material, and sealed air tight.

(2) Fresh air damper (door) knobs may be removed to prevent damper from being opened.

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

c. ***Power conservation***. During periods when full electrical power is in critically short supply, if the air conditioner cannot be turned off completely, it should be operated in VENTILATE mode only.

CHAPTER 3

OPERATOR MAINTENANCE

Section I LUBRICATION INSTRUCTIONS

3-1. General. The air conditioner and its major components are designed so that very little lubrication is required during their serviceable lifetime. The refrigerant compressor and its drive motor are hermetically sealed; sealed bearings are incorporated in the drive motor; and the compressor crankcase contains a lifetime charge of oil. Sealed bearings are also incorporated in the evaporator and condenser fan motors.

a. ***Lubrication***. The only operator lubrication required is that necessary to relieve stiffness or binding of the louver blades and discharge grilles. Sparingly apply a lubricating oil (Appendix E, item 14) and work it into the joints or pivots involved. Blot up all excess oil with a cloth or paper towel. Report stiffness or binding of all other operational controls to unit maintenance for appropriate action.

Section II TROUBLESHOOTING PROCEDURES

3-2. Use of Table. Table 3-1 contains operator troubleshooting information designed to be useful in diagnosing and correcting common malfunctions which may develop in the air conditioner.

a. The table 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.

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.

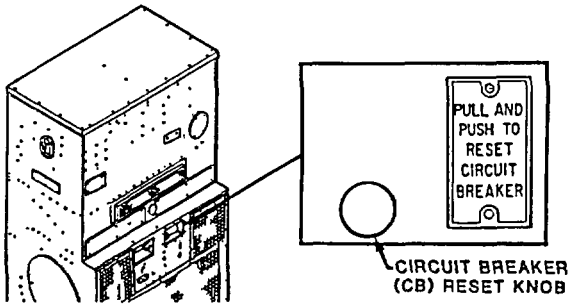
Table 3-1. Operator Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

Step 1. Check to see if input power has been disconnected.
Connect input power.

Step 2. Check to see if circuit breaker is tripped.
Pull then push circuit breaker reset knob.



NOTE
If circuit breaker continues to trip, contact unit maintenance.

2. AIR CONDITIONER STARTS BUT DOES NOT COOL.

Step 1. Check that mode selector switch is set to COOL and TEMPerature control thermostat is set to DECREASE.

Set mode selector switch to COOL and properly adjust TEMPerature control thermostat.

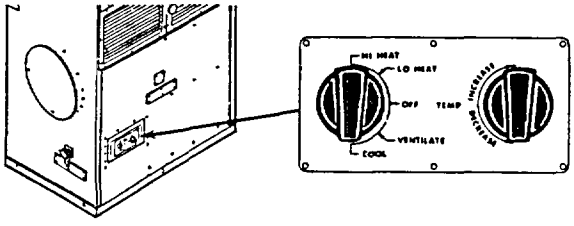


Table 3-1. Operator Troubleshooting

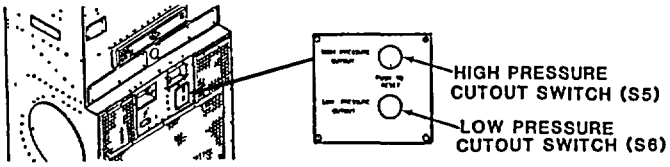
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. COMPRESSOR DOES NOT START IN COOL MODE. NO COOLING. CONDITIONED AIR FANS OPERATE, BUT CONDENSER AIR FANS DO NOT.

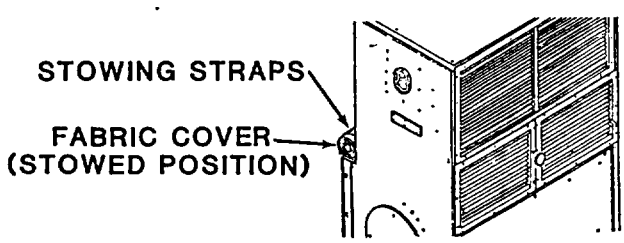
NOTE

If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector switch is in the COOL mode.

Step 1. Check to see if HIGH or LOW PRESSURE CUTOUT switch has tripped.
Push and release cutout PUSH TO RESET buttons.



Step 2. Check to be sure fabric cover is rolled up.
Roll up and secure fabric cover.



NOTE

If cutout switch(es) continue to trip, contact unit maintenance.

Step 3. Check operation of mode selector switch.
Turn switch to OFF, then reset to COOL.

NOTE

Allow 30 seconds time delay before compressor starts.

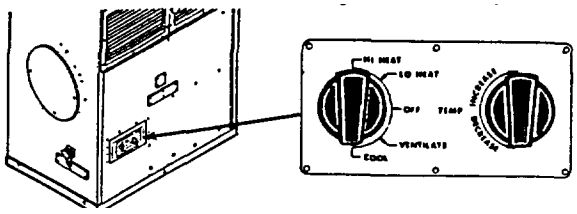
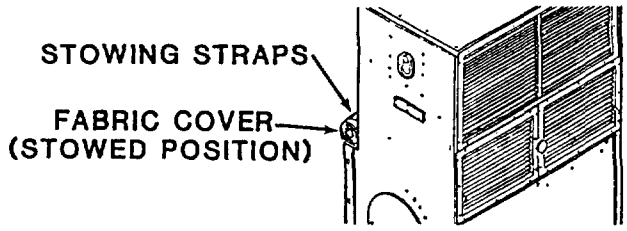


Table 3-1. Operator Troubleshooting

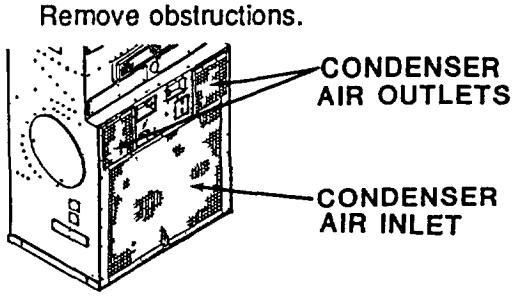
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. COMPRESSOR STARTS NORMALLY, BUT HIGH OR LOW PRESSURE CUTOUT SWITCH SOON TRIPS. COOLING STOPS.

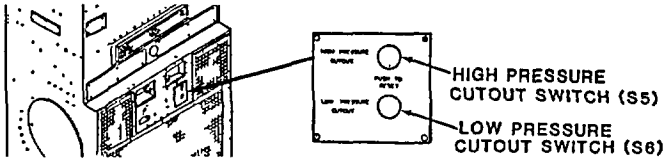
Step 1. Check to be sure fabric cover is rolled up.
Roll up and secure fabric cover.



Step 2. Check to be sure condenser air inlet and outlets are not obstructed.



Step 3. Reset PRESSURE CUTOUT switch(es) and restart unit.
If unit does not start contact unit maintenance.



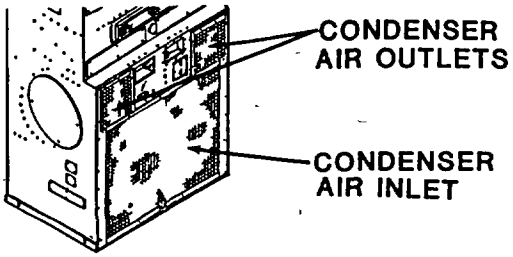
If cutout switch(es) continue to trip, contact unit maintenance.

Table 3-1. Operator Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

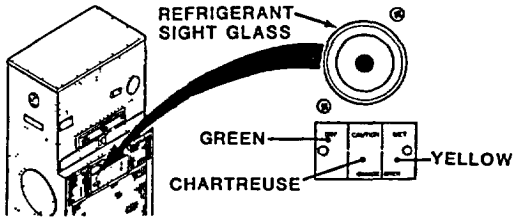
Step 4. Check to be sure that condenser fans are operating and that air is being discharged from condenser air outlets.

If fans are not operating, shut unit OFF and contact unit maintenance.



Step 5. With unit operating in COOL mode, check condition of refrigerant in sight glass. Check after 15 minutes of operation in full DECREASE and COOL mode.

If indicator color is in the yellow zone or numerous bubbles appear in the window, turn mode selector switch to OFF and contact unit maintenance.



Step 6. Check that lower front panel is not loose or missing.

Lower front panel must be secure.

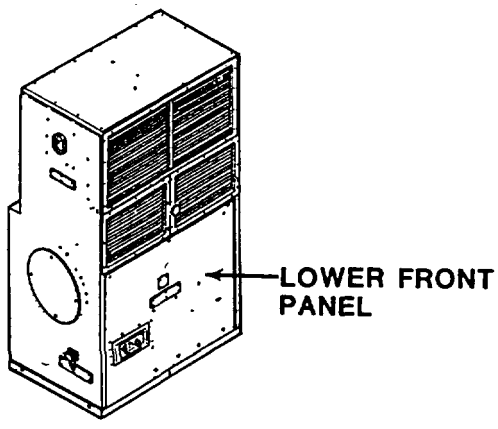


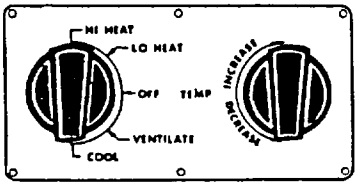
Table 3-1. Operator Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

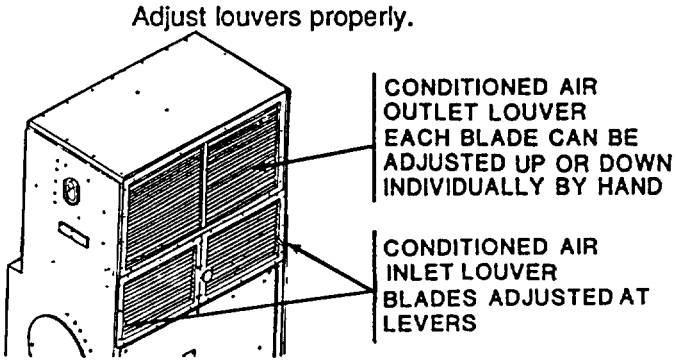
5. REDUCED COOLING CAPACITY.

Step 1. Check that all doors, windows, and other openings in the enclosure are tightly closed.
Tightly close all openings.

Step 2. Check operation of TEMPerature control thermostat.
Set control at maximum DECREASE; then, if condition improves, adjust properly to desired level.



Step 3. Check that the louvers in the conditioned air inlet and outlet grilles are properly adjusted.
Must be open.



Step 4. Check to be sure that excessive hot air is not being introduced through the fresh air damper.
Fully close damper; then, if condition improves, adjust properly.

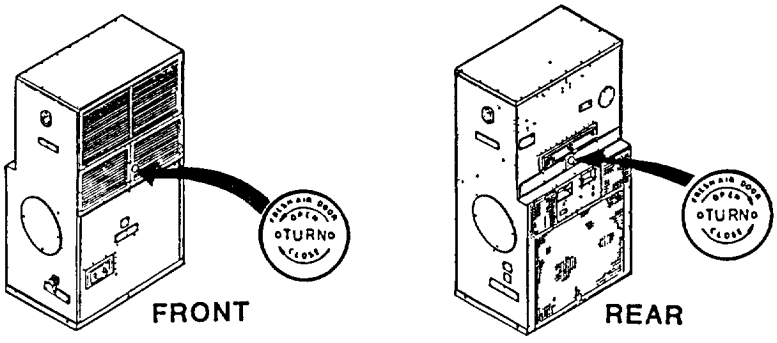
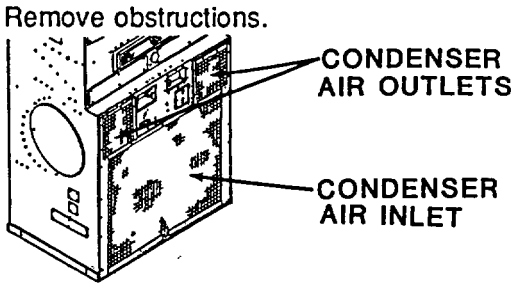


Table 3-1. Operator Troubleshooting

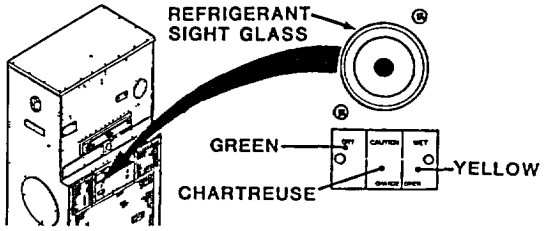
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 5. Check to be sure condenser air inlet and outlets are not obstructed.



Step 6. With unit operating in COOL mode, check condition of refrigerant in sight glass. Check after 15 minutes of operation in full DECREASE and COOL mode.

If indicator color is in the yellow zone or numerous bubbles appear in the window, turn mode selector switch to OFF and contact unit maintenance.



6. REDUCED HEATING CAPACITY.

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

Tightly close all openings.

Step 2. Check operation of TEMPerature control thermostat.

Set mode selector switch to HI HEAT and TEMPerature control thermostat to fully INCREASE; then, if condition improves, adjust properly to desired level. (See para 2-10 and 2-11.)

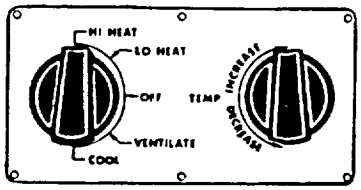
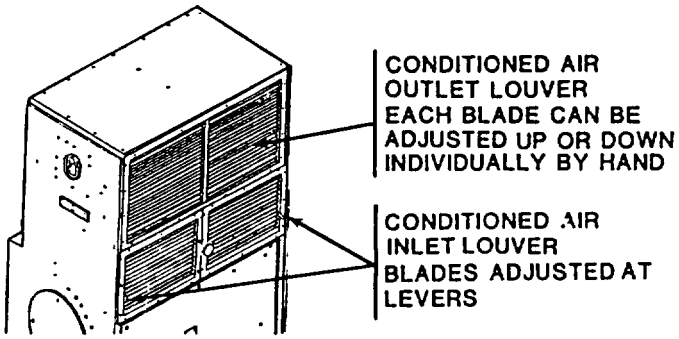


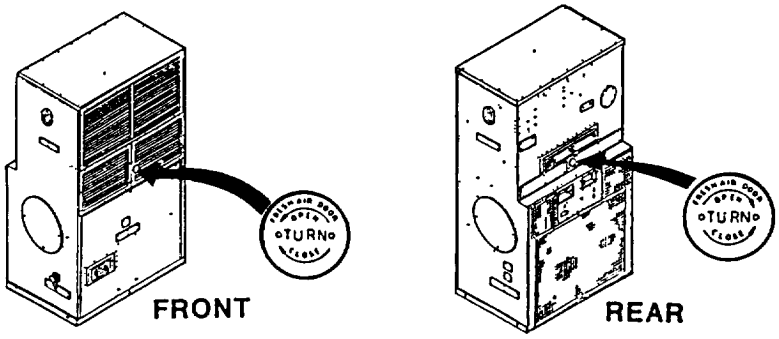
Table 3-1. Operator Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 3. Check that the louvers in the conditioned air inlet and outlet grilles are properly adjusted.
Adjust louvers properly.



Step 4. Check to be sure that excessively cold air is not being introduced through the fresh air damper.
Fully close damper; then, if condition improves, adjust properly.



CHAPTER 4

UNIT MAINTENANCE

Section I REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT

4-1. General.

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

b. ***Special Tools, Test, Measurement and Diagnostic Equipment (TMDE), and Support Equipment***. No special tools are required for maintenance of the equipment. Test, Maintenance, and Diagnostic Equipment (TMDE) and Support Equipment include standard equipment found in any unit maintenance shop. Appendix B, Section III contains a list of the tools.

c. ***Repair Parts.*** Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM5-4120-393-24P, covering unit direct support maintenance, and intermediate general support maintenance for this equipment.

Section II SERVICE UPON RECEIPT

4-2. Unloading. The air conditioner is shipped in a container designed for handling the unit in an upright position. The base of the container is constructed as a shipping pallet.

a. ***Remove Tie Downs***. Remove all blocking and tie downs that may have been used to secure the container to the carrier.

WARNING

Do not allow anyone under equipment suspended from a lifting device. 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.

b. ***Material Handling***. Use a forklift truck or other suitable material handling equipment to remove the unit from the carrier.

4-3. Unpacking. Normally, the packaged air conditioner should be moved into the immediate area in which it is to be installed before it is unpacked.

NOTE

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

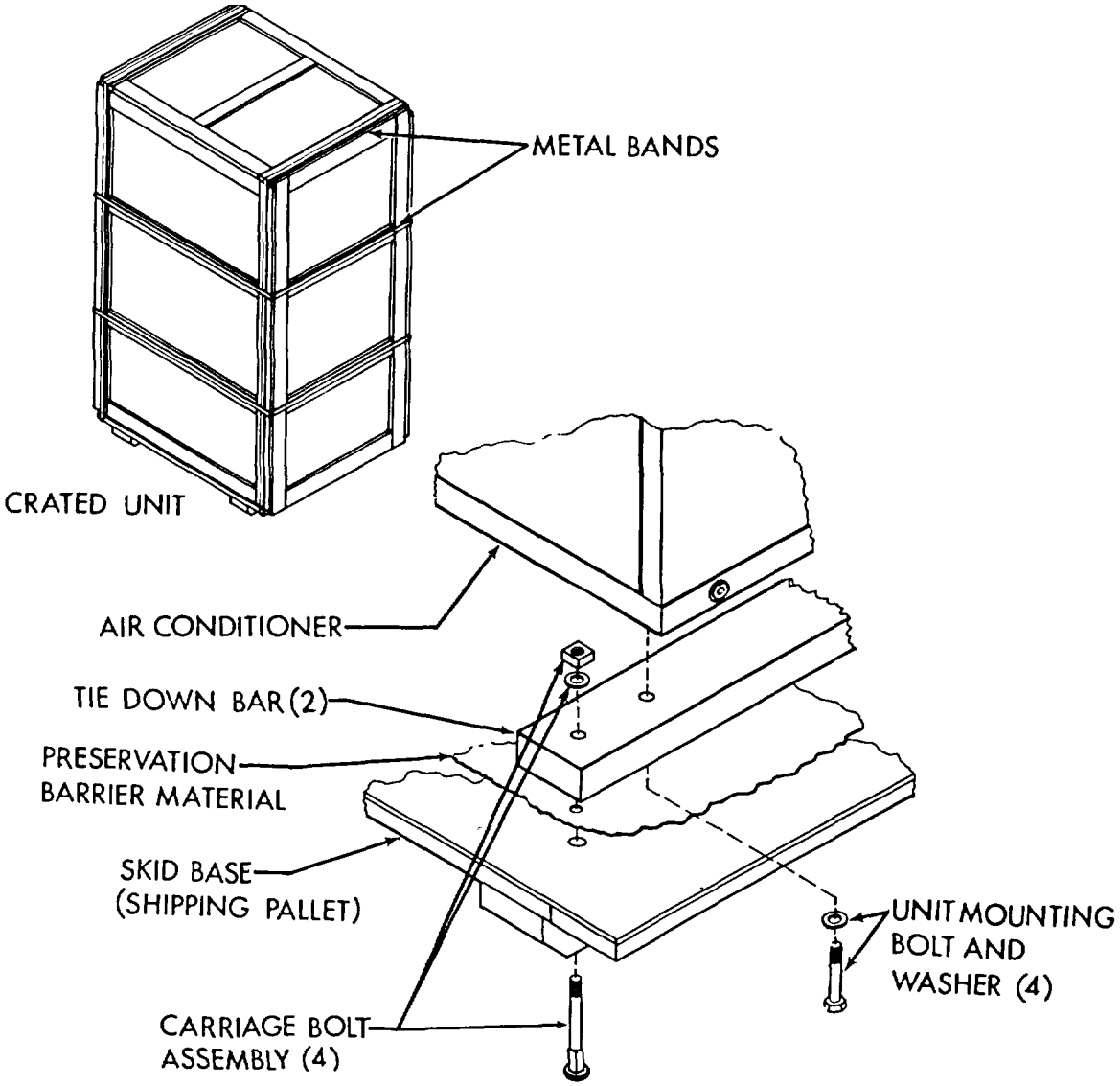
a. ***Remove shipping container***. Cut the metal bands that hold the top and sides of the container to the base. Lift the container vertically and remove it from the base and cabinet.

b. ***Remove packaging***. Remove the cushioning around the top of the cabinet and retain If reuse is anticipated. Remove the preservation barrier by tearing around the bottom of the cabinet. Remove the technical publications envelope and accessory sack that are taped to the cabinet.

WARNING

Do not allow anyone under equipment suspended from a lifting device. 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.

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



TYPICAL CRATED AIR CONDITIONER

NOTE

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

4-4. Receiving Inspection. Perform receiving inspection of the air conditioner as follows.

a. ***Inspect.*** Inspect the unit for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

b. ***Check.*** Check the unit against the packing slip to see if shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.

c. ***Modified.*** Check to see whether the equipment has been modified.

4-5. Installation Site Preparation. 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 enclosure to be conditioned and positioning the air conditioner so that the front of the cabinet is inside the enclosure and the back outside. Alternate installations may be made with the entire cabinet either inside or outside the conditioned area.

a. ***General.*** The following are minimum requirements for all installations.

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

(2) *Air flow.* An unobstructed flow of air from outside the conditioned area to

(a) the inlet and outlet of the condenser;

(b) the conditioned air intake and discharge;

(c) the fresh air damper intake and/or CBR filter intake, if installed.

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

(4) *Access, top.* Access to the top of the cabinet for removal of the top panel and sufficient headroom to allow maintenance and internal component removal and installation through the top panel opening.

(5) *Power source.* A source of 208 volt, 3 phase, 50/60 hertz input power rated at 42 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 ensure 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.

(6) *Drain Trap.* To ensure proper drainage of condensate water, a trapped drain line should be connected to one or more of the drain fittings. The drain trap should have a minimum vertical trap height of 2.5 inches (6.4 cm).

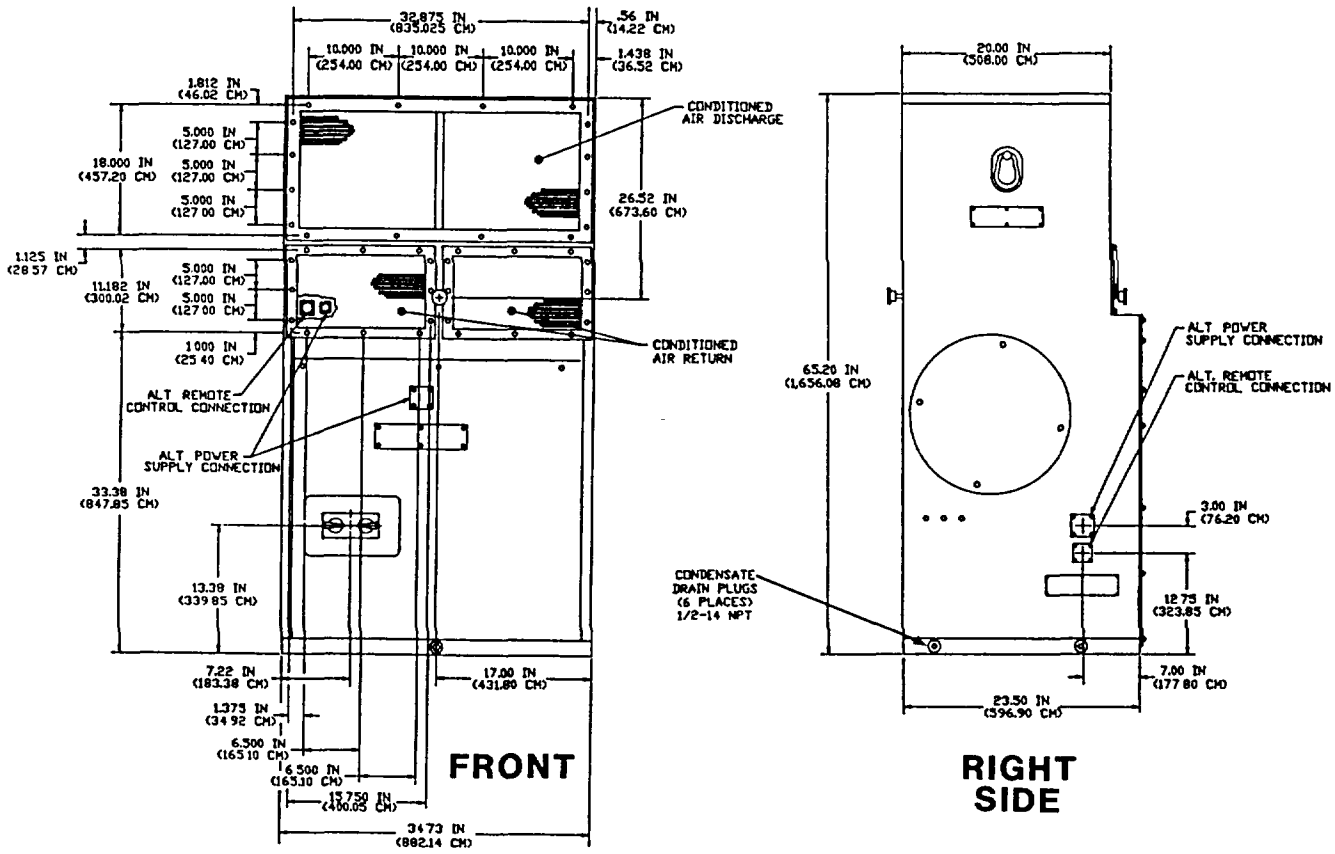
(7) *Ground.* An earth ground capable of handling 42 amps.

(8) *Fumes.* Check that no source of dangerous or objectionable fumes are located near the fresh air intake.

(9) *Terrain features.* 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.

(10) *Avoid problem areas.* If possible avoid locations where the condenser and fresh air intakes will be laden with dust, dirt, soot, smoke, and/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 servicing internal components. All openings around air conditioner must be sealed air tight.



INSTALLATION DIMENSIONS FRONT AND RIGHT SIDE

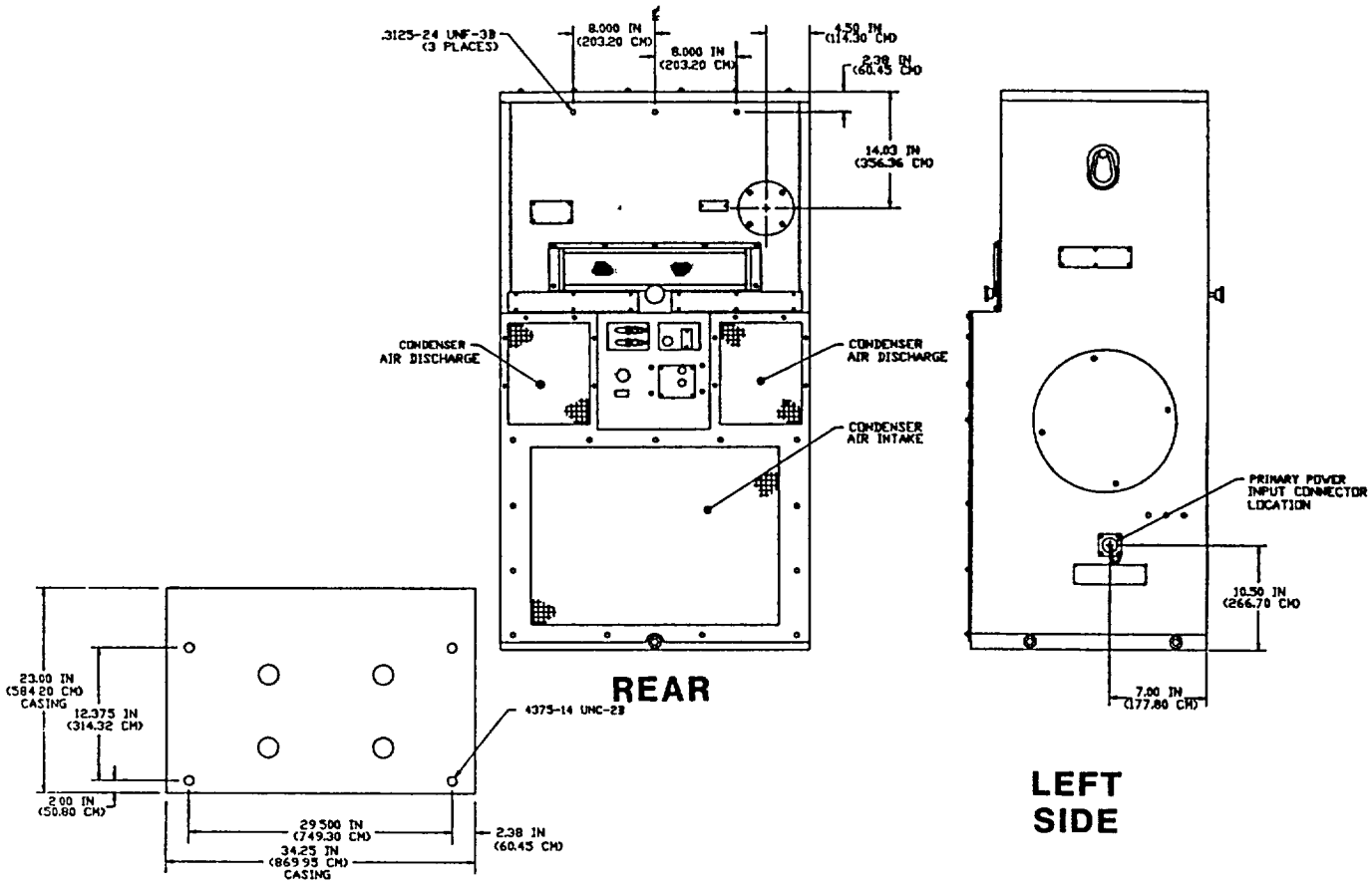
CAUTION

The addition of ductwork will degrade air conditioner performance. It should be carefully designed and installed to minimize loss of performance. Improperly designed/installed ductwork could eventually damage air conditioner and void warranty. A qualified design activity should be consulted prior to installation.

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

NOTE

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



INSTALLATION DIMENSIONS REAR, LEFT SIDE AND BOTTOM

NOTE

Easy access to fresh or return air filters must be provided. Filters may be left in position in unit or relocated in ductwork. Some installations (filters relocated in ductwork) 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 grilles or some other arrangement may be made. Ducts may also be made for installation of the conditioned air intake and discharge grilles on the inside ends or replacements for these items may be used. Prepare openings in the wall for the ducts.

NOTE

Retain all items removed from unit. Store in a safe place. Parts must be reinstalled prior to return to supply. For a list of required items see Appendix C.

4-6. Preparation of Air Conditioner for Installation. No preparation is necessary if the air conditioner is to be installed by the typical exterior wall method and operated as a self contained unit. For alternate installation methods, some preparation is necessary.

a. ***Instructions.*** 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 4-7.

(2) Cable connections through return air duct. See para 4-8.

(3) Alternate input power cable connections. See para 4-9.

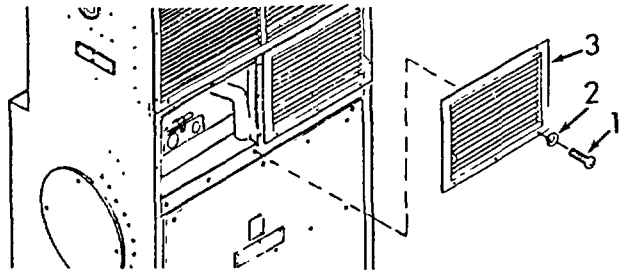
(4) Installations that require removal of fabric cover. See para 4-10.

4-7. Remote Mounting of Control Panel. This paragraph is only applicable if the control panel is to be removed from the unit and installed in a remote location.

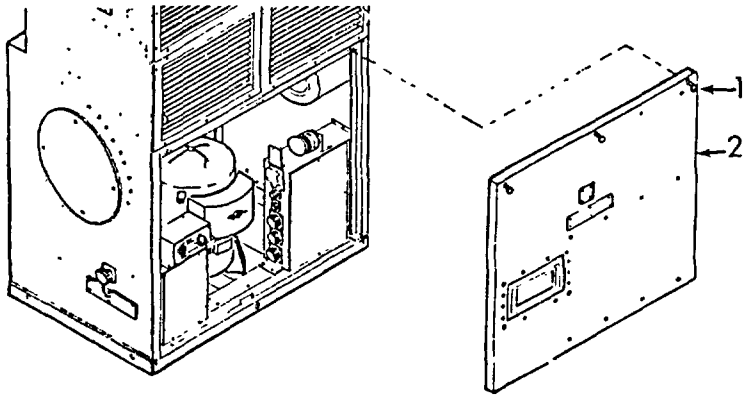
WARNING

Be sure input power is disconnected before doing any work inside the air conditioner cabinet. Voltages used can kill.

a. ***Remove Grille.*** Using screwdriver, remove twelve screws (1) and flat washers (2). Remove conditioned air intake grille (3). Be careful not to damage grille gaskets.



b. ***Remove Lower Panel.*** Using screwdriver loosen three captive screws (1). Tip top of panel (2) away from unit and lift panel up and away from unit. Be careful not to damage panel gaskets.

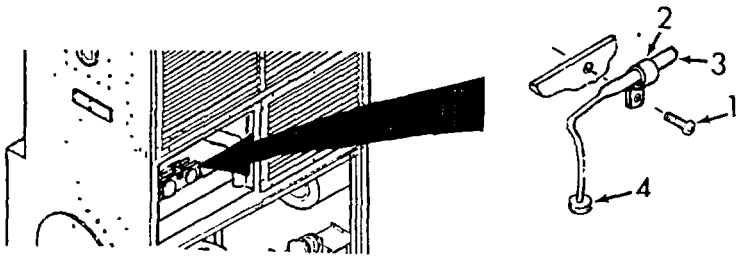


c. ***Sensing Bulb.*** Using screwdriver loosen screw (1) in clamp (2) that retains sensing bulb (3).

d. ***Remove Bulb.*** Slip sensing bulb (3) out of clamp (2).

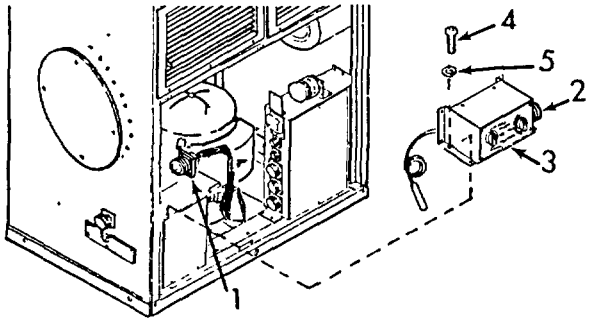
e. ***Remove Line.*** Remove grommet (4) and carefully guide capillary line and sensing bulb down into lower compartment.

f. ***Secure Clamp.*** Using screwdriver tighten screw (1) in retaining clamp (2) for possible future use.

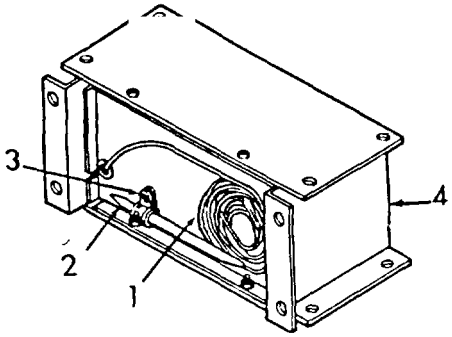


g. ***Disconnect Wiring.*** Disconnect wiring harness connector P8 (1) from connector J8 (2) on the control panel (3).

h. ***Remove Control Panel.*** Using a screwdriver, remove four screws (4) and washers (5) and remove control panel (3) from air conditioner.



i. ***Coil Capillary Line.*** Very carefully coil capillary line (1) and mount sensing bulb (2) in loop clamp (3) provided on the back of the control panel (4).



j. ***Mounting Holes.*** The control panel is provided with two sets of four holes. The control panel can be mounted using the bottom or rear face holes.

k. ***Locate Panel.*** Care should be taken to locate the control panel and sensing bulb where there will be an accurate temperature indication.

NOTE

Do not locate control panel on thin outside walls or near heat producing equipment or lights.

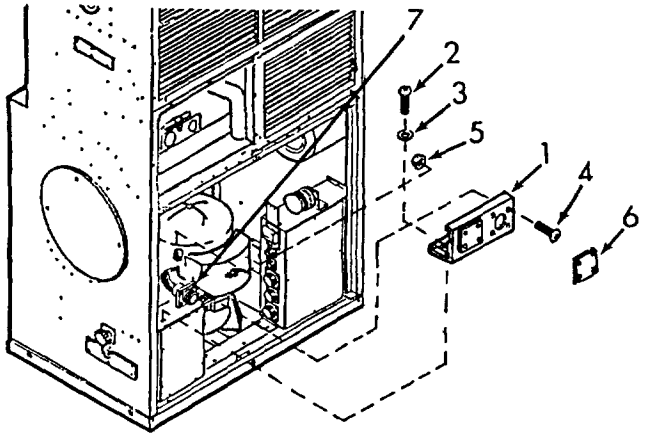
l. ***Mount Control Panel.*** Secure control panel using appropriate hardware in the remote location.

m. ***Install Block-off Panel.*** Using a screwdriver, install block-off panel (1) using the four mounting screws (2) and flat washers (3) removed from the control panel in step h.

NOTE

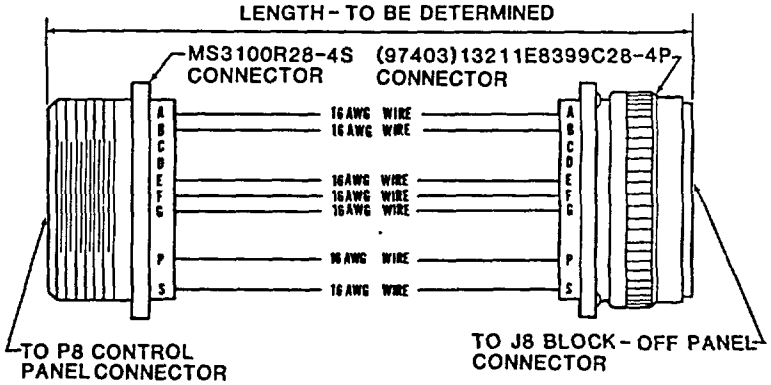
If your unit was not supplied with a block-off panel, order part no. (FSCM 97403) 13214E3865-2. This is an accessory item that is not supplied unless it is ordered.

n. ***Install Connector P8.*** Using screwdriver and wrench, remove four screws (4) and nuts from right-hand cover plate (6). Remove cover plate (6) and install the P8 connector (7) and harness to the block-off panel (1) using the four screws (4) and nuts (5) as removed from cover plate. Retain the cover plate (6) for possible future use.



o. ***Reinstall Panel.*** Reinstall conditioned air intake grille and lower front panel.

p. ***Install Interconnecting Cable.*** Fabricate an interconnecting cable/harness of the required length to connect the P8 block-off mounted connector and the J8 control panel connector. Install interconnecting cable.

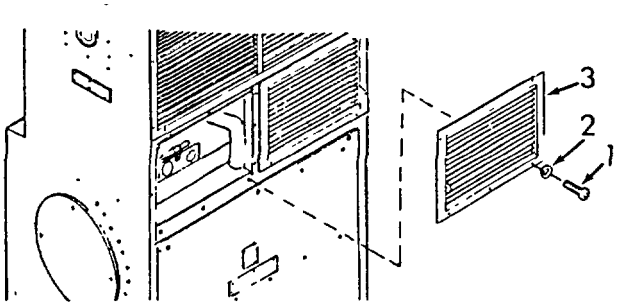


4-8. Cable Connections Through Return Air Duct. This paragraph is applicable only when the conditioned air intake grille is to be removed from the unit and one or both of the alternate cable locations are to be used. These alternate cable connection locations permit cables to be routed through the return air ducting to the air conditioner.

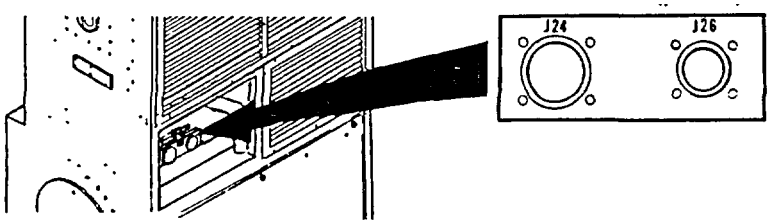
WARNING

Be sure input power is disconnected before doing any work inside the air conditioner cabinet. Voltages used can kill.

a. ***Remove Grilles.*** Using screwdriver, remove twenty four screws (1) and flat washers (2). Remove both conditioned air intake grilles. Be careful not to damage grille gaskets. Since they cannot be reinstalled with this application, store them in a safe place.

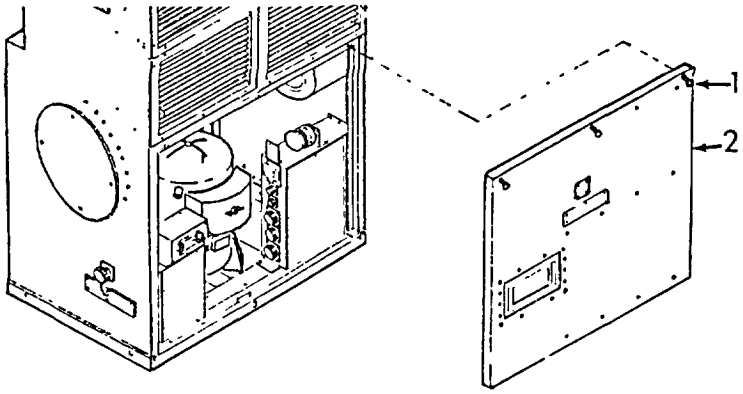


b. ***Return Air Duct Electrical Connector Location and Identification.*** The electrical power and control connectors located in the return air section are identified as J24 (power) and J26 (control).



c. ***Input Power Cable.*** If input power cable is to be connected through the return air duct:

(1) Using screwdriver loosen three captive screws (1). Tip top of lower front panel (2) away from unit and lift panel up and away from unit. Be careful not to damage panel gaskets.

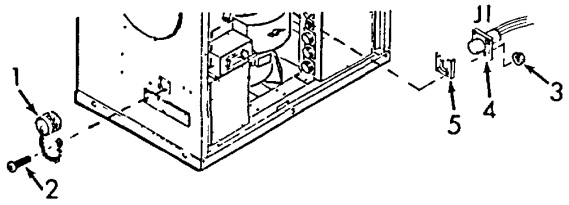


(2) Unscrew electrical connector cover (1).

(3) Using screwdriver and wrench, remove four screws (2) and nuts (3) from J1 connector (4).

(4) Pull J1 connector (4) free.

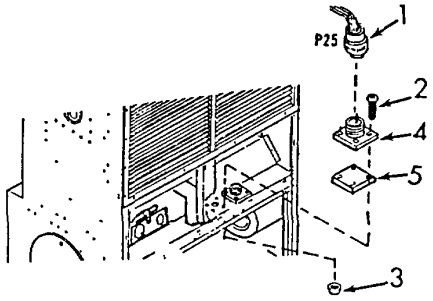
(5) Remove rubber gasket (5). Store electrical connector cover and chain (1) in a safe place for possible future use. All other parts will be reused.



(6) Remove P25 connector (1) from dummy storage connector (4).

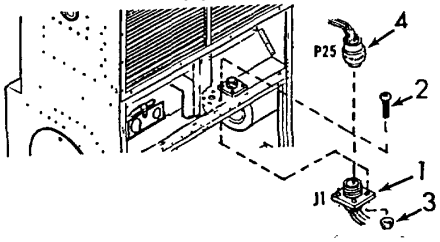
(7) Using screwdriver and wrench, remove four screws (2) and nuts (3) and remove dummy storage connector (4) and plate (5).

(8) Store dummy storage connector (4) in a safe place. All other parts will be reused.

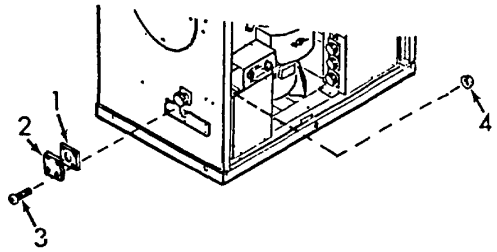


(9) Using screwdriver and wrench, install J1 connector (1) in old dummy connector location using four each screws (2) and nuts (3).

(10) Connect P25 connector (4) to J1 connector (1).



(11) Using screwdriver and wrench, install gasket (1) and plate (2) at old J1 connector location with four each screws (3) and nuts (4).



d. If control panel is to be mounted in a remote location and remote control cable connector is to be connected through air duct:

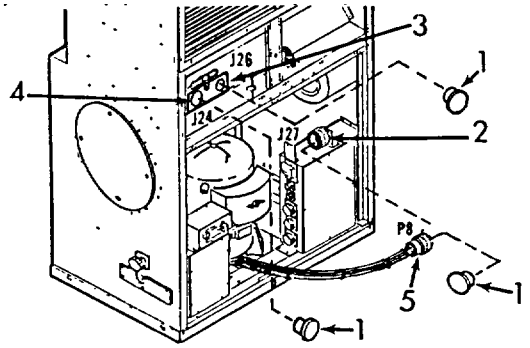
(1) See paragraph 4-7 for control panel relocation.

NOTE

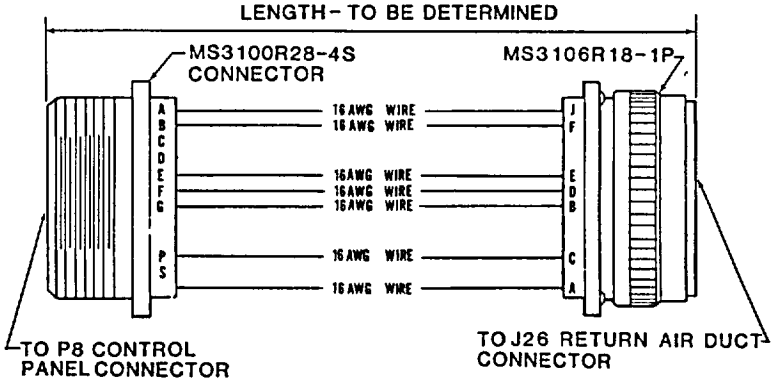
Fabrication of interconnecting remote control cable described in paragraph 4-7 will not apply to control cable for return air duct application using the J26 control cable connector. See para 4-8 for this cable.

(2) Remove plastic dust caps (1) from connectors J27(2), J26 (3) and J24 (5). Store caps in a safe place for possible future use.

(3) Connect P8 (4) to J27 (2) located on top of junction box.



(4) Install interconnecting cable from J26 to J8 on remote mounted control panel. This cable must be fabricated to the required length.



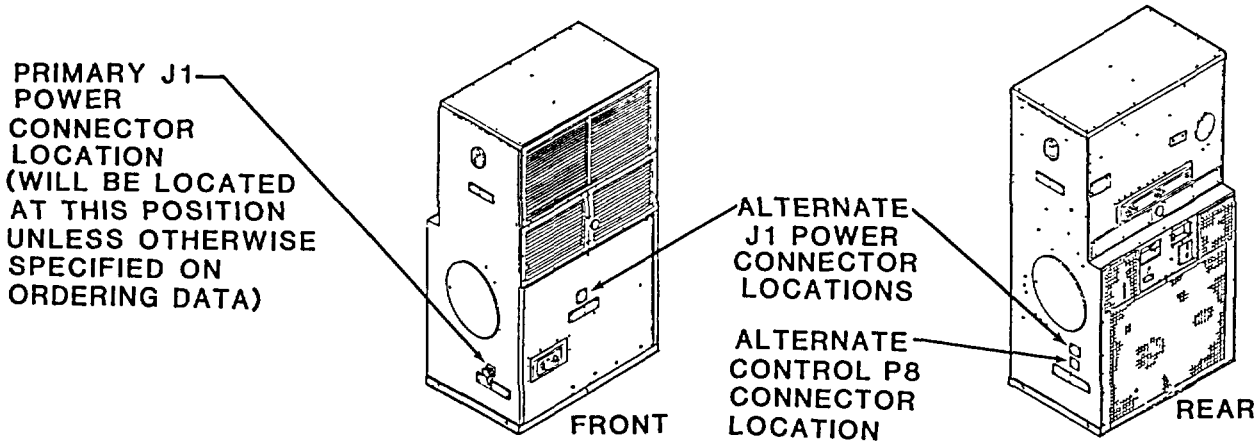
NOTE

This cable is applicable only to the remote control cable connection thru the return air duct J26 connector.

(5) Using screwdriver install lower front panel.

4-9. Alternate Input Power Cable Connector J1 Locations. See paragraph 4-8 for cable connections through return air duct.

a. ***Alternate Input Power Cable Connection Locations.***

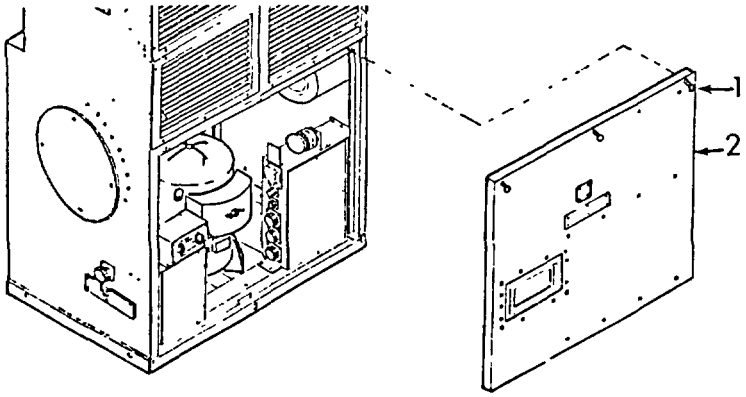


WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can kill. Shutting the unit off at the control panel does not disconnect unit power.

b. When input power cable connection J1 is to be relocated to one of the alternate locations:

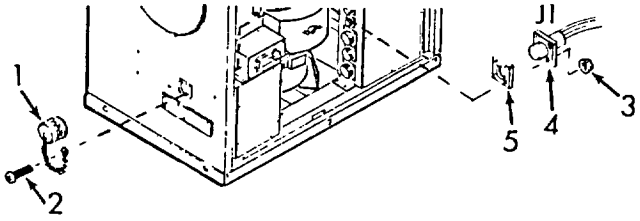
(1) Using screwdriver, loosen three captive screws (1). Tip top of lower front panel (2) away from unit and lift panel up and away from unit.



(2) Unscrew electrical connector cover (1) from connector.

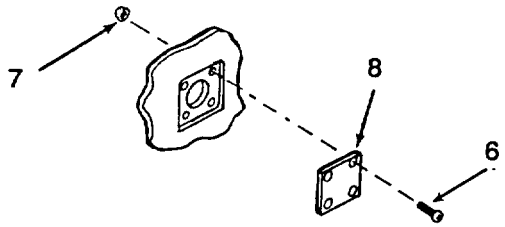
(3) Using screwdriver and wrench, remove four screws (2) and nuts (3) from J1 connector (4).

(4) Remove J1 connector (4) and harness, rubber gasket (5), and electrical connector cover and chain (1) from side panel.



(5) Using screwdriver and wrench, remove four screws (6), nuts (7), and cover plate (8) at alternate connector location.

(6) Using screwdriver and wrench, install cover plate (8) on mounting plate where J1 connector was removed with four screws (6) and nuts (7).



(7) Using screwdriver and wrench, install rubber gasket (5), connector J1 (4), electrical connector cover and chain (1) in new location with four screws (2) and nuts (3).

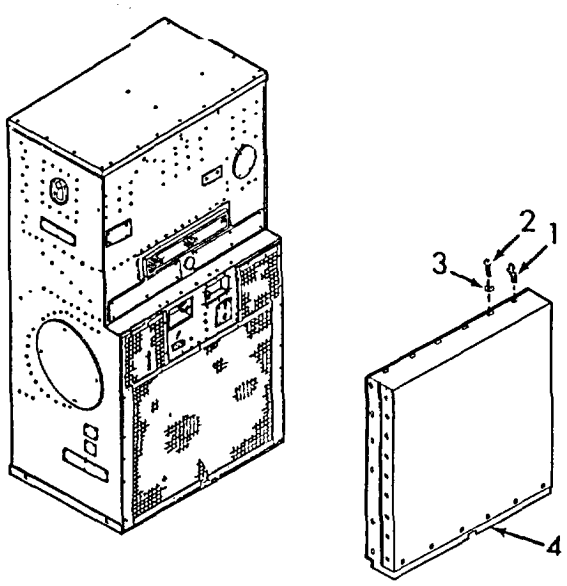
(8) Reinstall lower front panel.

4-10. Installations That Require Removal of Fabric Cover. Some installations require the removal of the fabric cover. This generally applies only when the air conditioner is positioned inside with condenser and fresh air openings ducted to the outside.

NOTE

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

a. ***Remove Fabric Cover.*** Using a screwdriver, remove two turnbutton fasteners (1), twenty two screws (2) and washers (3). Carefully remove the fabric cover (4).



b. ***Store Cover.*** Store the cover in a safe place for future use.

c. ***Reinstall Hardware.*** Using screwdriver, reinstall all hardware removed in step a.

4-11. Installation Instructions. All alterations to the enclosure into which the air conditioner is to be installed should be complete before installation of the air conditioner.

WARNING

Do not allow anyone under equipment suspended from a lifting device. 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. ***Position Unit.*** Attach an overhead hoist, sling and spreader bar to the lifting rings on each side of the cabinet and move the air conditioner into position and align mounting holes.

b. ***Secure Unit.*** Secure unit with appropriate mounting hardware.

Base - 0.4375-14 UNC-2B (4 holes)

Rear - 0.3125-24 UNF-3B (3 holes)

c. ***Seal Unit.*** Seal all openings around cutouts for air conditioner, air and water tight. Use gasket, caulking, or other suitable material.

d. ***Prepare Drain Holes.*** The air conditioner is provided with six drain holes in the base. Remove plugs from all drains possible for most complete drainage of condensate water. If water from these drains will be objectionable or create a hazard, external overboard drains can be connected. Use standard 1/2-14 NPT male pipe fittings to connect base drains. Any type of hose or tubing may be used as a drain line. To ensure proper drainage a drain trap with a minimum vertical trap height of 2.5 inches (6.4 cm) should be added to all drains. If the installation allows, more than one drain line can be routed to a common trap. 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 slightly lower than the unit base and sloping away to ensure gravity drainage.

e. ***Install Ground.*** Install a 6 AWG minimum ground wire between the air conditioner cabinet and an adequate earth ground.

f. ***Fabricate a power cable.*** (See para 4-12.)

WARNING

The following test must be conducted with the power on. Use extreme caution. Death or serious injury may result.

CAUTION

Do not connect P1 connector to air conditioner before making following checks.

g. ***Connect Power Cable.*** Connect power cable to a power source of 208 volt, 3 phase, 50/60 hertz.

(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 P1 and a good 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 P1 connector, check voltages between remaining pins as shown on following chart.

P1 CONNECTOR

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

Voltages should be approximately as shown. If voltages are not within ten volts of those indicated on chart, disconnect power. Locate and correct problem.

CAUTION

Check that mode selector switch is OFF.

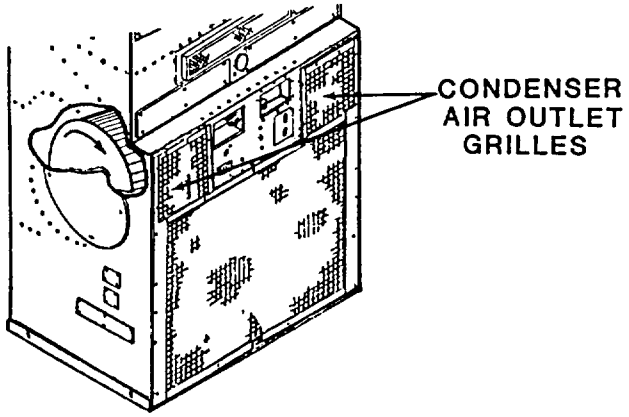
(5) After proper voltages are indicated on all pins of connector P1, turn power off at power source and connect P1 to connector J1 on air conditioner. Turn power back on at source after J1 has been connected to the ACU.

NOTE

The following steps require two people. One must be at control panel. The other must be in position at rear of air conditioner to see condenser fan rotation. (Condenser fans can be seen through condenser air outlet grilles.) Should dampers be closed, remove lower front panel to observe fans.

(6) The person at control panel should turn mode selector switch to COOL and immediately back to OFF.

(7) One person should observe the condenser fans to determine the direction of rotation.



(8) If fan rotation is backward, unit power cable is not wired properly. Disconnect power source and exchange wires connected to pins A and B at power source connection and repeat steps (6) and (7) above.

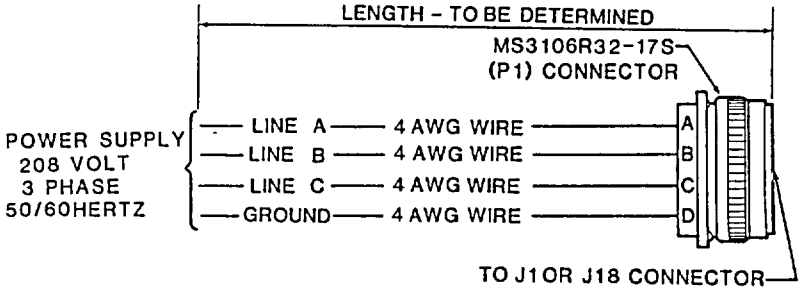
(9) Check unit operation in accordance with para 2-7 and 2-8.

h. See air conditioner wiring diagram, para 4-13, and electrical schematic, para 4-14, for additional wiring information.

4-12. Input Power Cable. The input power cable must be fabricated. The connector P1 is supplied with the ACU.

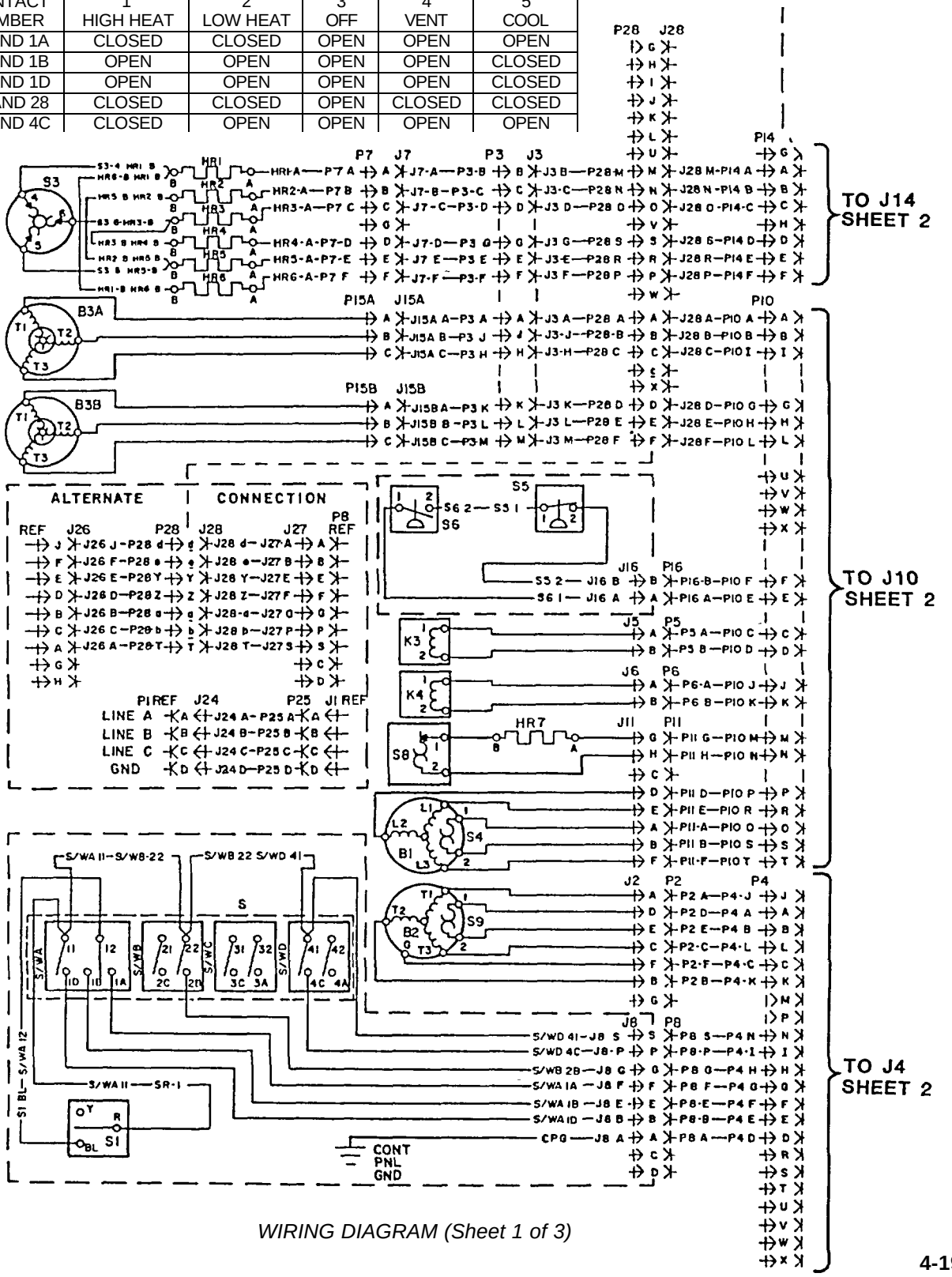
a. ***Determine length.***

b. ***Fabricate power cable.***

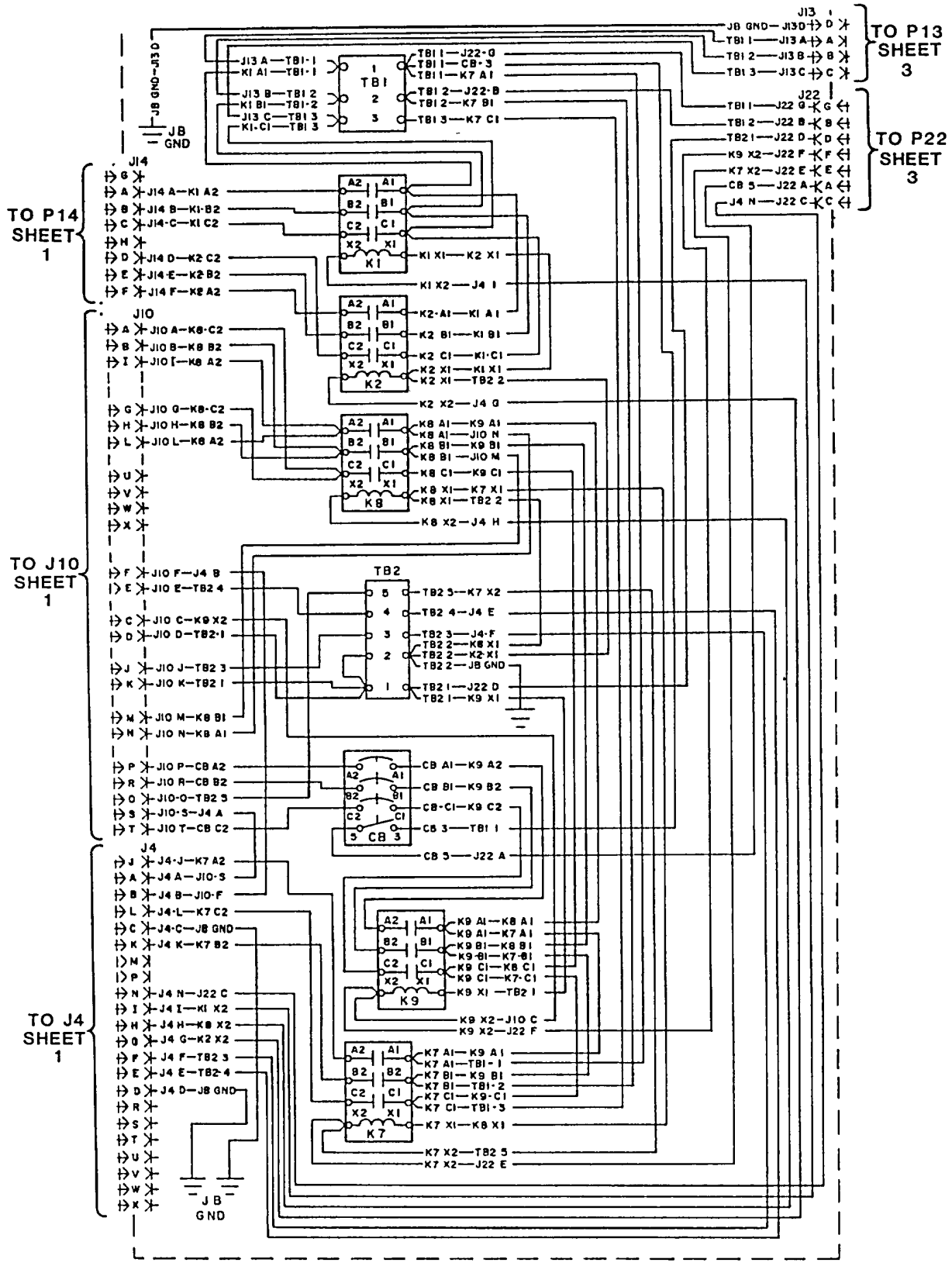


4-13. Wiring Diagram.

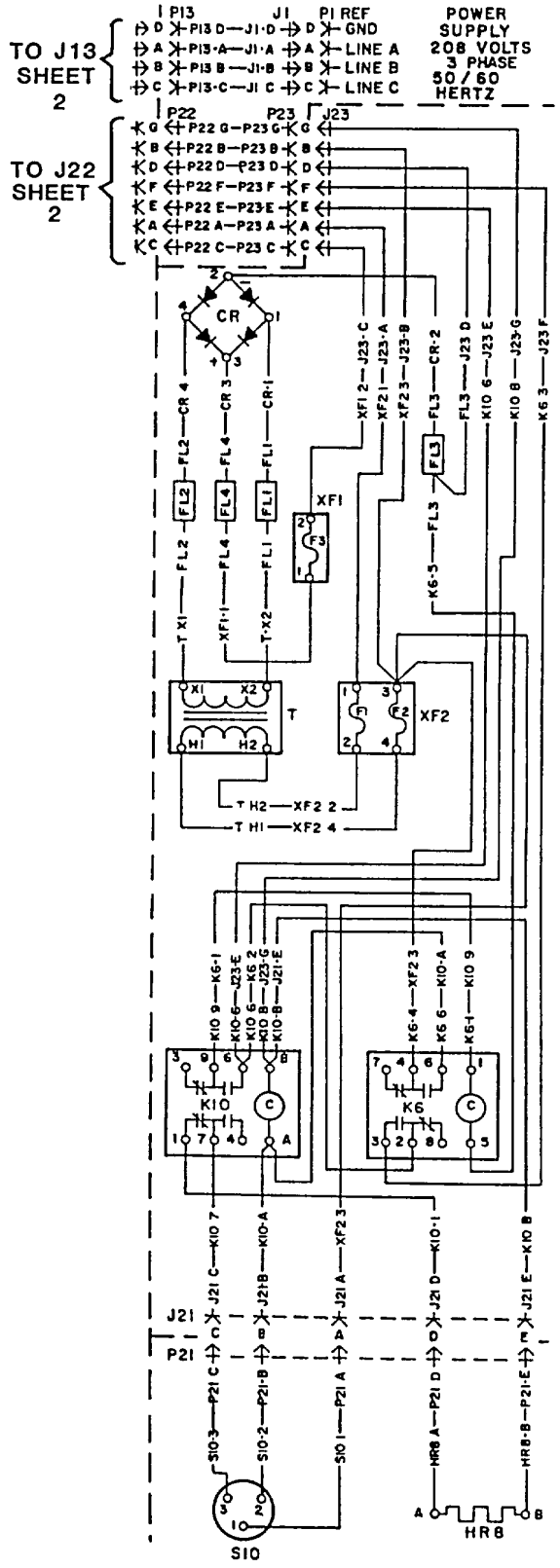
	SWITCH POSITION					
	CONTACT NUMBER	1 HIGH HEAT	2 LOW HEAT	3 OFF	4 VENT	5 COOL
S/WA	12 AND 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 AND 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 AND 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/WB	22 AND 28	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/WD	41 AND 4C	CLOSED	OPEN	OPEN	OPEN	OPEN



WIRING DIAGRAM (Sheet 1 of 3)



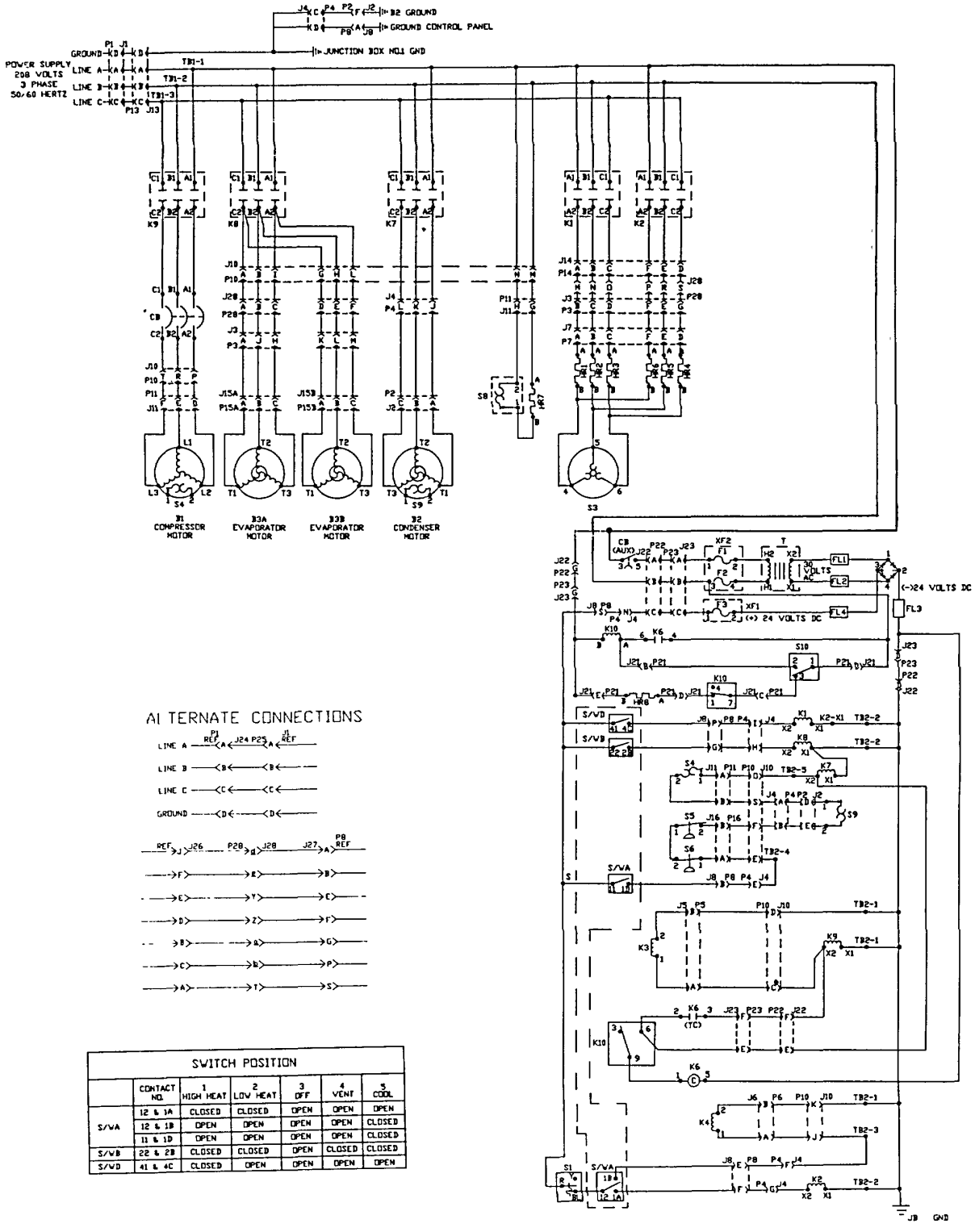
WIRING DIAGRAM (Sheet 2 of 3)



LEGEND	
SYM	DESCRIPTION
B1	MOTOR,COMPRESSOR
B2	MOTOR,CONDENSER
B3A	MOTOR,EVAPORATOR
B3B	MOTOR, EVAPORATOR
CB	CIRCUIT BREAKER
CR	RECTIFIER
FLI-4	FILTER
F1	FUSE
F3	FUSE
HRI-6	HEATING ELEMENT
HR7	HEATING ELEMENT,CPRSR
HR8	HEATING ELEMENT,CPRSR
J1	CONNECTOR, RECEPTACLE
J2	CONNECTOR, RECEPTACLE
J3	CONNECTOR, RECEPTACLE
J4	CONNECTOR, RECEPTACLE
J5	CONNECTOR RECEPTACLE
J6	CONNECTOR, RECEPTACLE
J7	CONNECTOR RECEPTACLE
J8	CONNECTOR,RECEPTACLE
J10	CONNECTOR RECEPTACLE
J11	CONNECTOR, RECEPTACLE
J13	CONNECTOR,RECEPTACLE
J14	CONNECTOR,RECEPTACLE
J15A	CONNECTOR, RECEPTACLE
J15B	CONNECTOR,RECEPTACLE
J16	CONNECTOR, RECEPTACLE
J21	CONNECTOR, RECEPTACLE
J22	CONNECTOR, RECEPTACLE
J23	CONNECTOR,RECEPTACLE
J24	CONNECTOR,RECEPTACLE
J26	CONNECTOR, RECEPTACLE
J27	CONNECTOR, RECEPTACLE
J28	CONNECTOR,RECEPTACLE
K1,2	RELAY, HEATER
K3,4	VALVE, SOLENOID
K6	RELAY,TIME DELAY
K7	RELAY,CONDENSER
K8	RELAY, EVAPORATOR
K9	RELAY,COMPRESSOR
K10	RELAY,CONTROL
P1	CONNECTOR,PLUG
P2	CONNECTOR, PLUG
P3	CONNECTOR,PLUG
P4	CONNECTOR, PLUG
P5	CONNECTOR,PLUG
P6	CONNECTOR ,PLUG
P7	CONNECTOR, PLUS
P8	CONNECTOR, PLUG
P10	CONNECTOR, PLUG
P11	CONNECTOR, PLUG
P13	CONNECTOR, PLUG
P14	CONNECTOR,PLUG
P15A	CONNECTOR, PLUG
P15B	CONNECTOR, PLUG
P16	CONNECTOR, PLUG
P21	CONNECTOR, PLUG
P22	CONNECTOR, PLUG
P23	CONNECTOR, PLUG
P25	CONNECTOR, PLUG
P28	CONNECTOR,PLUG
S	SWITCH, ROTARY
S1	THERMOSTAT
S3	THERMOSTAT, HEATER
S4	THERMOSTAT,CPRSR MOTOR
S5	SWITCH,HIGH PRESS CUTOUT
S6	SWITCH,LOW PRESS CUTOUT
S8	THERMOSTAT
S9	THERMOSTAT,COND MOTOR
S10	THERMOSTAT
T	TRANSFORMER
TB1	TERMINAL BLOCK
TB2	TERMINAL BLOCK
XF1	FUSEHOLDER
XF2	FUSEHOLDER

WIRING DIAGRAM (Sheet 3 of 3)

4-14. Electrical Schematic.



SWITCH POSITION							
	CONTACT NO.	1 HIGH HEAT	2 LOW HEAT	3 OFF	4 VENT	5 COOL
S/VA	12 & 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 & 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 & 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/VB	22 & 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/VD	41 & 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

ELECTRICAL SCHEMATIC (See prior page for legend)

Section III LUBRICATION

4-15. General. The refrigerant compressor and its drive motor are hermetically sealed in a canister. The compressor crankcase has a lifetime supply of oil and the drive motor has permanently lubricated, seated bearings The evaporator and condenser fan motors also have permanently lubricated, sealed bearings. No lubrication of these items is required.

4-16. Mechanical Lubrication. The only mechanical items which may require lubrication are the louvers in the conditioned air intake and discharge grilles 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 (Appendix E, item 14) 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 areas of high volume air flow and excess oil will tend to attract and accumulate dust particles from the passing air.

Section IV PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-17. 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 a very dusty or sandy environment, it may be necessary to reduce the interval to monthly or even less if conditions are extreme.

c. Table 4-1 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 greater personnel efficiency and least amount of required maintenance downtime.

WARNING

Disconnect input power before disassembly of the air conditioner for PMCS to prevent dangerous, possible fatal, electrical shock.

NOTE

Model F60T-HS may be equipped with a 16 inch adapter duct instead of the conditioned air outlet and inlet grilles.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE

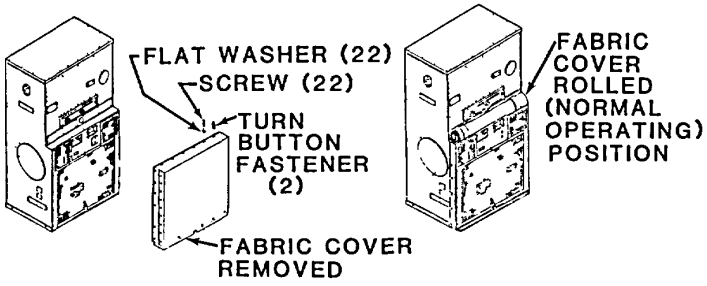
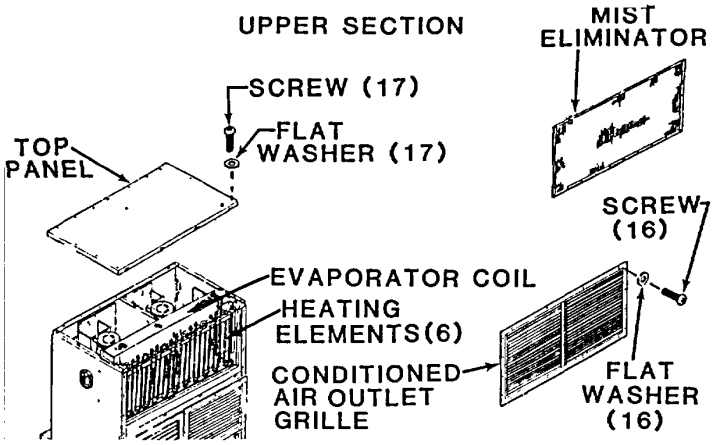
Item No.	Item To Be Inspected/Serviced	Procedures
1	Fabric Cover	a. Roll down the cover and inspect for tears, cracks, or any other sign of damage or deterioration. b. If dirty or mildewed, wash with fresh water and a small amount of mild detergent. If the cover was washed, be sure it is thoroughly dry before rerolling. c. Reroll and secure the cover in the stowed position. 
2	Conditioned Air Outlet Grille	a. Check operation of louvers for stiffness or binding. b. Remove, clean, inspect, repair, and lubricate grille as necessary. 

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

Item No.	Item To Be Inspected/Serviced	Procedures
3	Mist Eliminator	a. Remove, clean, and inspect the top panel. b. Remove, clean, inspect, and service the mist eliminator. c. Replace the mist eliminator If it is damaged. **WARNING** **Compressed air used for cleaning purposes will not exceed 30 psi (2.1kg/ cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.**
4	Evaporator Coil	a. Blow accumulated dust and dirt out of the air passages in the evaporator coil using compressed air or the discharge side of a portable vacuum cleaner. Blow from front to back in the opposite direction from operational airflow. b. Inspect coil for obvious damage and all mounting hardware for tightness and security. **WARNING** **Allow heaters to cool before touching. Severe burns can result from touching hot heaters**
5	Heating Elements	a. Wipe or vacuum any remaining dust or dirt from the heating elements, the heater thermostat, and all other components and surfaces in the area. **NOTE** **Use a clean dry cloth (or one slightly moistened with water) for all wiping operations. NEVER use an oily or greasy cloth. Any oily residue left on any surface will attract and accumulate much more dust and dirt than dry surfaces.**

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

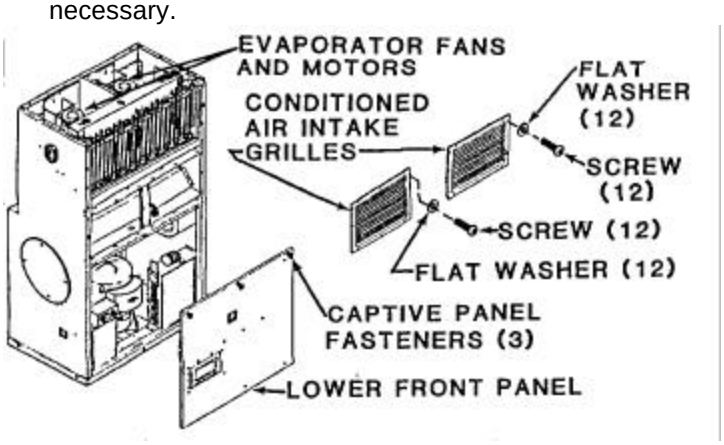
Item No.	Item To Be Inspected/Serviced	Procedures
		b. Inspect heating elements and thermostat for obvious damage, and all mounting hardware for tightness and security.
		c. Inspect wiring harness for damage or chafing and all electrical connections for tightness.
6	Evaporator Fans and Motors	a. Wipe or vacuum all dust or dirt from the fans, motors, and all other components and surfaces in the area.
		b. Inspect the fans for damage or bent blades, motors for signs of overheating, and all mounting hardware for tightness and security.
		c. Check that fans spin freely.
		d. Inspect wiring harness for damage or chafing and all electrical connections for tightness.
		e. Generally inspect refrigeration system components in the upper section for condition.
7	Conditioned Air Intake Grille	a. Check operation of louvers for stiffness or binding.
		b. Remove, clean, repair, and lubricate grille as necessary.
		
8	Lower Front Panel	a. Be sure input power has been turned off, then disconnect the input power connector if the optional front panel input location has been used.
		b. Remove, clean, and inspect the front panel.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

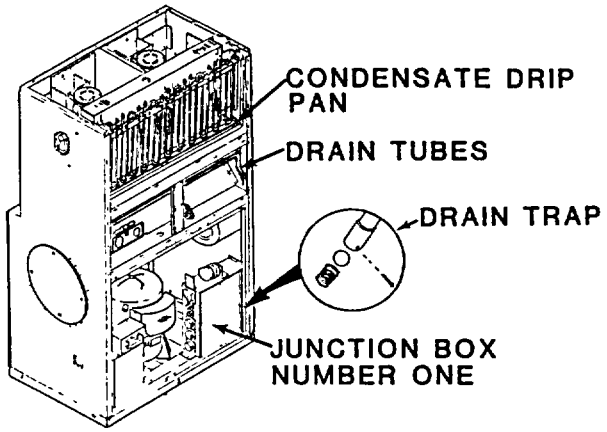
Item No.	Item To Be Inspected/Serviced	Procedures
9	Condensate Drip Pan, Drain Tubes, and Drain Trap	 a. Wipe any dust or dirt out of the condensate drip pan. **NOTE** **The drain trap is located between junction box number one and the casing wall. Use a mirror and flashlight, check waterflow. Remove junction box number one (para 4-40) if cleaning is necessary.** b. Pour about two cups of clean fresh water into the condensate drip pan and watch for it to flow through the drain trap at the bottom end of the drain tube. c. If the water does not flow through the trap, or if the discharged water has a muddy appearance, remove the cotter pin, spring, and ball from the bottom end of the drain tube and thoroughly flush the tube. If the tube is clogged, insert a flexible wire from either the top or bottom end and agitate until the clog is removed. Pour additional water in the drip pan until an unrestricted flow of clean water is achieved. Check that ball and spring are clean and in good condition. Reinstall the ball, spring, and cotter pin.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

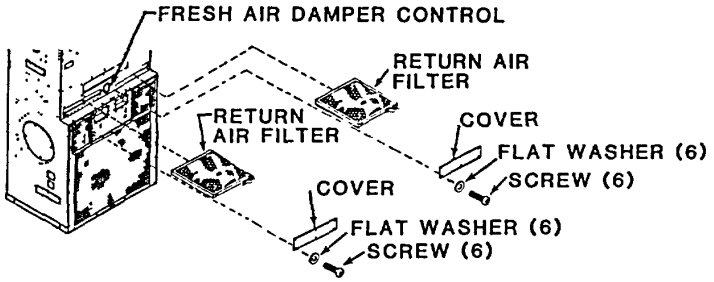
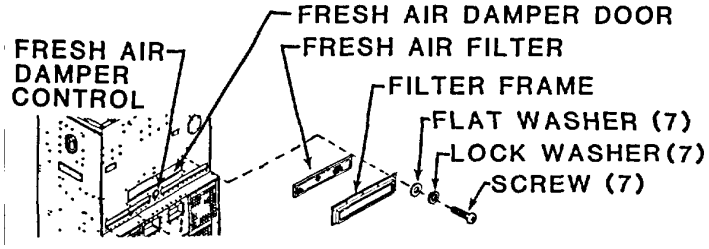
Item No.	Item To Be Inspected/Serviced	Procedures
10	Conditioned Return Air Filters	a. Remove, clean, inspect, and service filters. b. Discard filter and obtain replacement, if damaged. 
11	Fresh Air Filter	a. Remove, clean, inspect, and service filter. b. Discard filter and obtain replacement, if damaged. 
12	Fresh Air Damper	a. Wipe or vacuum all dust or dirt from the fresh air damper door and its operating mechanism, and all other surfaces in the area. b. Inspect components for condition, and all mounting hardware for tightness and security. c. Check operation of door and mechanism for stiffness and binding; lubricate as necessary. Be sure to wipe off all excess lubricant. d. Check to be sure the damper door seats properly to form a seal when in the closed position.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

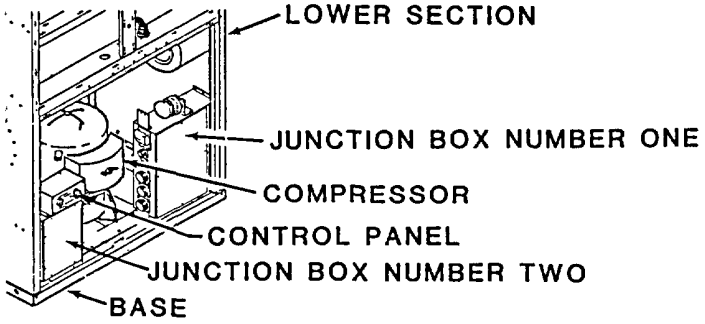
Item No.	Item To Be Inspected/Serviced	Procedures
		e. Inspect wiring harnesses which route through the area for damage or chafing.
		f. Generally inspect refrigeration system components for condition.
		
13	Control Panel	a. Check operation of controls for stiffness or binding.
		b. Inspect wiring harness for damage or chafing, and all electrical connections for tightness.
		c. Check capillary to temperature sensing bulb for damage or kinking.
		d. Check all mounting hardware for tightness and security.
14	Compressor	a. Wipe or vacuum all dust or dirt from the compressor canister, and all other remaining components and surfaces in the lower section of the cabinet.
		b. Inspect the compressor crankcase heating elements and associated thermostats for condition.
		c. Inspect wiring harness for damage or chafing, and all electrical connections for tightness.
		d. Check all compressor mounting hardware for tightness and security.
		e. Check all remaining refrigeration system components in the lower section of the cabinet for general condition.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

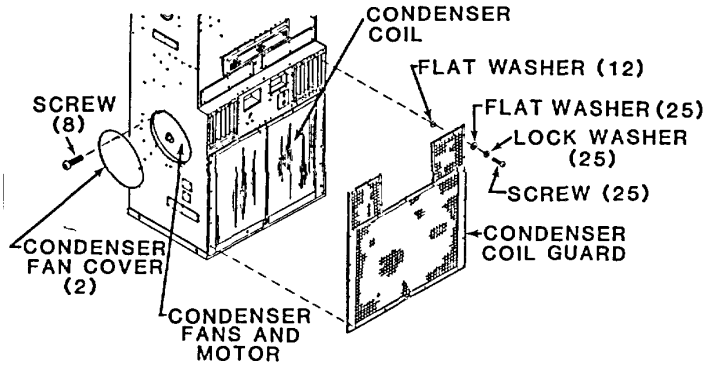
Item No.	Item To Be Inspected/Serviced	Procedures
15	Junction Boxes	a. Check operation of circuit breaker and flexible cable to remote reset knob for stiffness and binding. b. Inspect all remaining wiring harnesses in the lower section of the cabinet for damage or chafing, and all electrical connections for tightness.
16	Cabinet Base	a. Wipe or vacuum all dust, dirt, sand, or other foreign matter from surfaces and water passages in the base assembly. b. Check that water flows freely through the installed condensate drain(s) 
17	Condenser Coil Guard	a. Remove, clean, and inspect. **WARNING** **Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.**
18	Condenser Coil	a. Blow dust and dirt from the condenser coil in the same manner as used for the evaporator coil in item 4. In this case, blow from the inside for reverse airflow direction. b. Inspect coil for obvious damage, and all mounting hardware for tightness and security.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

Item No.	Item To Be Inspected/Serviced	Procedures
19	Condenser Fans and Motor	a. Wipe or vacuum all dust and dirt from fans and motor, and all other components and surfaces in the immediate area. b. Inspect the fans for damage or bent blades, the motor for signs of overheating, and all mounting hardware for tightness and security. c. Inspect the wiring harness for damage or chafing, and all electrical connections for tightness.
20	Operation Checks	REINSTALL THE FOLLOWING ITEMS: • Condenser Coil Guard • Fresh Air Filter and Frame • Conditioned Air Filters and Covers • Lower Front Panel • Conditioned Air Intake Grille • Mist Eliminator • Top Panel • Conditioned Air Outlet Grille • Fabric Cover Check to be sure that all items are back in place and secure. a. Be sure the mode selector switch is in the OFF position and reconnect input power. **NOTE** **If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required for COOL mode operation. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector is in the COOL mode.** b. Check that the fabric cover is rolled up and secured. c. Adjust conditioned air intake and outlet louvers to the full open position. d. Adjust fresh air damper to full closed position.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

Item No.	Item To Be Inspected/Serviced	Procedures
		e. Turn mode selector switch to VENTILATE. Evaporator fan should start.
		f. Use a paper streamer or smoke and note amount of air being discharged from conditioned air outlet grille.
		g. Open fresh air damper fully.
		h. Close conditioned air intake grille louvers fully.
		i. Again check air flow as in step f. above. Air flow should be approximately the same.
		j. Fully open louvers in conditioned air intake grille and fully close fresh air damper.
		k. Turn TEMPerature control thermostat knob to fully INCREASE (clockwise) position and then turn mode selector switch to LO HEAT. Place your hand in air flow at the center of the conditioned air outlet grille and feel for a temperature rise. When discharge air temperature has reached a relatively stable level, turn mode selector switch to HI HEAT and feel for a further temperature rise. Next, turn TEMPerature control thermostat knob to fully DECREASE (counterclockwise) position. Feel that discharge air temperature drops to approximately same relatively stable level previously noted in LO HEAT. Finally, turn mode selector switch to LO HEAT and feel discharge air temperature drop to ambient level. **NOTE** **The TEMPerature control thermostat has an effective functional range between 40°F and 90°F (5°C and 32°C). In extreme conditions when ambient air temperature is below 40°F (5°C) or above 90°F (32°C), operation in either LO HEAT or HI HEAT mode will vary from that described above.**

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) QUARTERLY SCHEDULE (cont)

Item No.	Item To Be Inspected/Serviced	Procedures
		l. Turn TEMPerature control thermostat knob to fully INCREASE (clockwise) position, then turn mode selector switch to COOL. Note that evaporator and condenser fans start immediately and that compressor starts approximately 30 seconds later. Hold your hand in air flow at the center of the conditioned air outlet grille; there should be no change in temperature. Now turn TEMPerature control thermostat knob to fully DECREASE (counterclockwise) position and feel outlet air temperature begin to drop almost immediately. Leave controls in present position and perform next check.
		m. After 15 minutes of operation, check the sight glass and compare refrigerant condition with the color coded information plate provided. (See para 2-3.) Ambient temperature should be above 70°F (21 °C).
		n. Turn mode selector switch to OFF and observe that all air conditioner functions cease.
		o. Set-up the air conditioner for the desired operational mode.
		p. Record performance of quarterly PMCS, including all corrective actions taken.

Section V TROUBLESHOOTING

4-18. General. This section contains unit troubleshooting information for locating and correcting most of the operating troubles which may develop in the air conditioner.

4-19. Troubleshooting. Each malfunction for an individual component is listed in table 4-2. The malfunction is followed by a list of tests or inspections which help to determine probable causes and corrective actions to take. The tests or inspections and corrective actions are to be performed in the order listed in the table. All malfunctions that may occur and all tests or inspections and corrective actions may not be listed. If a malfunction is not listed or is not corrected by corrective action, notify your supervisor.

NOTE

Before you use the table, be sure you have performed all applicable operating checks (Table 4-1, item 20).

WARNING

HIGH VOLTAGE

is used in the 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 the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the input power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the 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 the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Do not operate the equipment without all grilles, guards, louvers, and covers in place and tightly secured.

Warning: Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

Step 1. Check to see if input power has been disconnected.

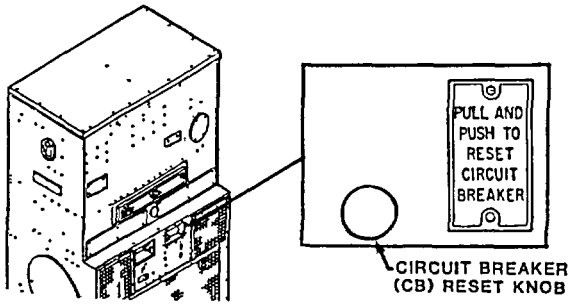
Connect input' power.

Step 2. Make sure that power is 208 volt; 3 phase, 50/60 hertz.

Connect correct input power.

Step 3. Check to see if compressor circuit breaker is tripped.

Slowly PULL AND PUSH TO RESET CIRCUIT BREAKER.



Step 4. Check for loose or damaged electrical connectors or damaged wires in wiring harnesses. (See para 4-54.)

Tighten or replace connectors, or repair damaged wires.

Step 5. Check operation of Circuit Breaker (CB).

Test Circuit Breaker (CB). (See para 4-42). Replace circuit breaker if defective.

Step 6. Check operation of control power transformer (T).

Test transformer. (See para 4-49.) Replace transformer if defective.

Step 7. Check operation of RFI filters (FL1 thru 4) and dc rectifier assembly (CR).

Test filters and rectifier. Replace defective filter(s) or rectifier. (See para 4-52 and 4-53.)

Step 8. Check all terminals and internal wiring in junction boxes for tightness and damage.

Tighten terminals or repair wiring as necessary. (See para 4-41 and 4-47.)

Step 9. Check operation of mode selector switch (S).

Test switch. (See para 4-38). Replace switch if defective.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

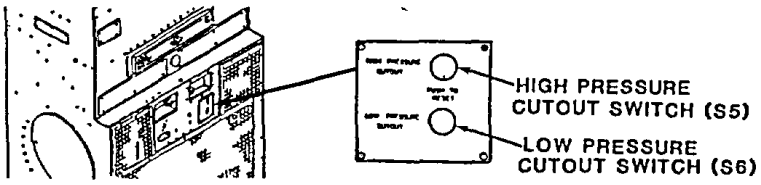
2. CONDITIONED AIR (EVAPORATOR) FAN STARTS IN COOL MODE, BUT CONDENSER FAN DOES NOT START AND COMPRESSOR DOES NOT START AFTER TIME DELAY.

NOTE

If power has been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if mode selector switch is in the COOL mode.

Step 1. Check to see if high or low pressure cutout switch (S5 and S6) is tripped.

Push then release reset buttons.



WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Step 2. Check for loose or damaged electrical connectors, or damaged wires in harness.

Tighten or replace connections, or repair damaged wires.

Step 3. Check operation of high and low pressure cutout switches (S5 and S6).

Test switch. (See para 5-27.) Replace switch(es) if defective.

Step 4. Check operation of compressor motor thermal overload, overcurrent protector.

Test protector. Contact Intermediate Direct Support Maintenance for compressor replacement if protector is open.

Step 5. Check operation of mode selector switch (S).

Test switch. (See para 4-38.) Replace switch if defective.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. CONDITIONED AIR (EVAPORATOR) AND CONDENSER FANS BOTH RUN, BUT COMPRESSOR DOES NOT START AFTER TIME DELAY.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in harness.

Tighten or replace connectors, or repair damaged wires.

Step 2. Check operation of time delay relay (K6).

Test relay. (See para 4-50.) Replace relay if defective.

Step 3. Check operation of circuit breaker (CB) primary contacts.

Test circuit breaker. (See para 4-42.) Replace circuit breaker if defective.

Step 4. Check operation of compressor motor relay (K9) contacts.

Test relay. (See para 4-44.) Replace relay if defective.

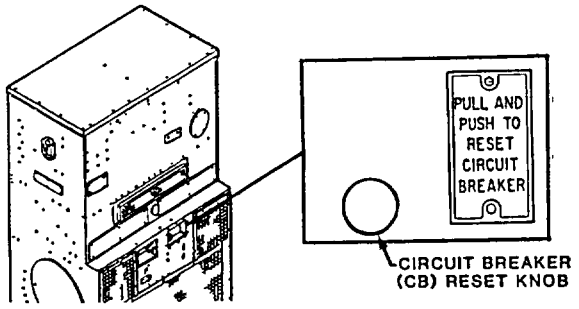
Step 5. Check operation of compressor.

If not operating, contact Intermediate Direct Support Maintenance.

4. AIR CONDITIONER STOPS COMPLETELY DURING COOL MODE OPERATION.

Step 1. Check to see if circuit breaker is tripped.

Reset circuit breaker.



Step 2. Check to be sure condenser fan starts immediately when a restart in COOL mode is made. If condenser fan does not start, test as follows:

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

a. Test condenser fan motor relay (K7). (See para 4-43). Replace if defective.

b. Test condenser fan motor (B2). (See para 4-60). Contact Intermediate Direct Support Maintenance if motor is defective.

Step 3. Check to be sure there is no restriction to air flow through the condenser section.

Clean all obstructions from condenser inlet, outlets, and condenser coil.

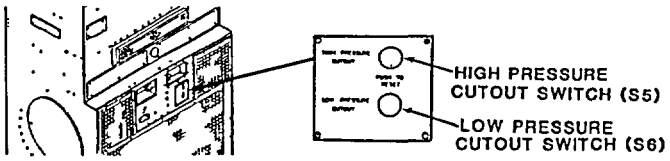
CAUTION

If circuit breaker trips again soon after restart in COOL mode, do not attempt another restart, and contact Intermediate Direct Support Maintenance for refrigeration system troubleshooting.

5. COMPRESSOR AND CONDENSER FAN STOP DURING COOL MODE OPERATION, BUT CONDITIONED AIR (EVAPORATOR) FAN CONTINUES TO RUN.

Step 1. Check to see if high or low pressure switch is tripped.

Press then release reset button.



CAUTION

Wait at least two minutes before restarting in COOL mode. If either pressure cutout switch trips soon after a restart is made, do not attempt another restart, and contact Intermediate Direct Support Maintenance for refrigeration system troubleshooting.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. CONDITIONED AIR (EVAPORATOR) FAN DOES NOT START, OR STOPS DURING OPERATION, IN ANY OPERATING MODE.

Step 1. Check operation of conditioned air (evaporator) fan motor relay (K8).

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Test relay. (See para 4-43.) Replace relay if defective.

Step 2. Check operation of conditioned air (evaporator) fan motors (B3A and B3B).

Test motors. (See para 4-56.) Contact Intermediate Direct Support Maintenance if motors are defective.

Step 3. Check operation of mode selector switch (S).

Test switch. (See para 4-38.) Replace switch if defective.

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. Contact Intermediate Direct Support Maintenance.

7. EXCESSIVE NOISE WHEN COMPRESSOR STARTS.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Step 1. Check for a defective compressor.

(Contact Intermediate Direct Support Maintenance.)

8. EXCESSIVELY NOISY OPERATION.

Step 1. Isolate source of noise as near as possible, both by ear and touch.

Listen and feel at both front and back of cabinet.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check fans for looseness or damage, and for rotational clearance.

Tighten loose fans, adjust for rotational clearance, or replace if damaged.

Step 3. Check all internal components for looseness, vibration, and security.

Tighten, adjust, and secure as necessary.

9. NO HEAT IN EITHER HI HEAT OR LOW HEAT MODE.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harness.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Tighten or replace loose or damaged connectors, or repair damaged wires.

Step 2. Check operation of heater thermostat (S3).

Test thermostat. (See para 4-57.) Replace thermostat if defective.

Step 3. Check operation of mode selector switch (S).

Test switch. (See para 4-38.) Replace switch if defective.

10. HEAT IN HI HEAT MODE, BUT NOT IN LO HEAT MODE.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harness.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Tighten or replace loose or damaged connectors, or repair damaged wires.

Step 2. Check operation of heater relay (K1).

Test relay. (See para 4-43.) Replace relay if defective.

Step 3. Check operation of TEMPerature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

b. Test switch in TEMPerature control thermostat. (See para 4-37.) Replace entire control if defective.

Step 4. Check operation of mode selector switch (S).

Test switch. (See para 4-38.) Replace switch if defective.

11. REDUCED HEATING CAPACITY.

Step 1. Check airflow out of conditioned air (evaporator) discharge grille. If airflow volume is low:

a. Adjust conditioned air (evaporator) intake grille louvers.

b. Clean and service, or replace, conditioned air filters. (See para 4-30.)

c. Clean and service, or replace, mist eliminator. (See para 4-32.)

d. Clean evaporator coil and entire evaporator section. (See para 4-62.)

Step 2. Check adjustment of fresh air damper and/or CBR filter, if installed

Adjust properly.

Step 3. Check operation of heater thermostat (S3).

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Test thermostat. (See para 4-57.) Replace thermostat if defective.

Step 4. Check operation of individual heater elements (HR1, 2, 3, 4, 5, 6).

Test each element. (See para 4-58.) Replace defective elements.

Step 5. Check operation of TEMPerature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking.

b. Test switch in TEMPerature control thermostat (S1). (See para 4-37.) Replace entire control if defective.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
12. REDUCED COOLING CAPACITY.
Step 1. Check condition of refrigerant displayed in sight glass. a. If indicator color is yellow or light chartreuse, or if numerous bubbles appear, turn air conditioner OFF, and contact Intermediate Direct Support Maintenance for refrigeration system servicing. b. If indicator color is green or a dark chartreuse, or if refrigerant has a milky appearance, or more than an occasional bubble appears, thoroughly clean the condenser intake screen, condenser fan guard, condenser coil, and entire condenser section to remove all obstructions.
Step 2. Check air flow out of conditioned air (evaporator) discharge grille. If air flow volume is low: a. Adjust conditioned air (evaporator) intake grille louvers. b. Clean and service, or replace, conditioned air filters. (See para 4-30.) c. Clean and service, or replace, mist eliminator. (See para 4-32.) d. Clean evaporator coil and entire evaporator section. (See para 4-62.)
Step 3. Check adjustment of fresh air damper and/or CBR filter if installed. Adjust properly.
Step 4. Check operation of TEMPerature control thermostat (S1). a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking. b. Test switch in TEMPerature control thermostat (S1). (See para 4-37.) Replace entire control if defective.
Step 5. Contact Intermediate Direct Support Maintenance for refrigeration system troubleshooting.

Section VI MAINTENANCE PROCEDURES

4-20. General. The procedures in this section have been arranged in the order in which the items appear in the unit (O) maintenance level column on the Maintenance Allocation Chart (MAC) which is provided in Appendix B. Step by step procedures have been provided for all actions authorized to be performed by Unit Maintenance in the order in which they appear on the MAC. Actions authorized to be performed by Intermediate Direct Support and Intermediate General Support Maintenance have been noted; step by step procedures for these actions may be found in Chapters 5 and 6 respectively.

WARNING

Panels, covers, screens, grilles, and guards installed on the unit are there for a purpose.

Do no operate unit with them off or open unless instructions tell you to. When necessary, do so with care.

4-21. Conditioned Air Outlet Grille

This task covers:

a. Removal	c. Inspection	e. Lubrication
b. Cleaning	d. Repair	f. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)
Oil (Appendix E, item 14)

Equipment condition:

Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

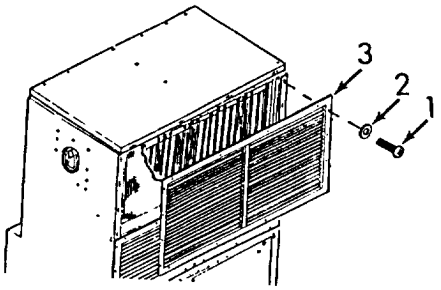
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove sixteen screws (1) and flat washers (2).
2. Remove grille (3).



CLEANING

Wipe or vacuum all dust and dirt off louvers and inside of grille. Be careful not to damage gaskets.

INSPECTION

Inspect grille for general condition and proper operation.

Table 4-2. Unit Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REPAIR

1. Bent louvers can usually be straightened with fingers.
2. Refer requirements for further repairs to Intermediate Direct Support Maintenance.

LUBRICATION

1. Apply a few drops of light oil to all pivot points and bearing surfaces of the louvers.
2. Wipe or blot up all excess oil with a cloth or paper towel.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver, secure grille (3) with sixteen screws (1) and flat washers (2).

NOTE

FOLLOW ON MAINTENANCE:

Connect power.

4-22. Conditioned Air Inlet Grilles

This task covers:

a. Removal	c. Inspection	e. Lubrication
b. Cleaning	d. Repair	f. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)
Oil (Appendix E, item 14)

Equipment condition:

Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

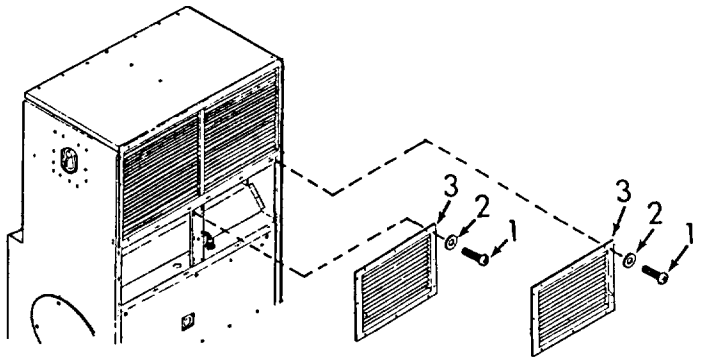
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove twenty four screws (1) and flat washers (2).
2. Remove grilles (3).



4-22. Conditioned Air Inlet Grilles (cont)

CLEANING

Wipe or vacuum all dust and dirt off louvers and inside of grilles. Be careful not to damage gaskets.

INSPECTION

Inspect grilles for general condition and proper operation.

REPAIR

1. Bent louvers can usually be straightened with fingers.
2. Refer requirements for further repairs to Intermediate Direct Support Maintenance.

LUBRICATION

1. Apply a few drops of light oil to all pivot points and bearing surfaces of the louvers.
2. Wipe or blot up all excess oil with a cloth or paper towel.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver, secure grilles (3) with twenty four screws (1) and flat washers (2).

NOTE

FOLLOW ON MAINTENANCE:

Connect power.

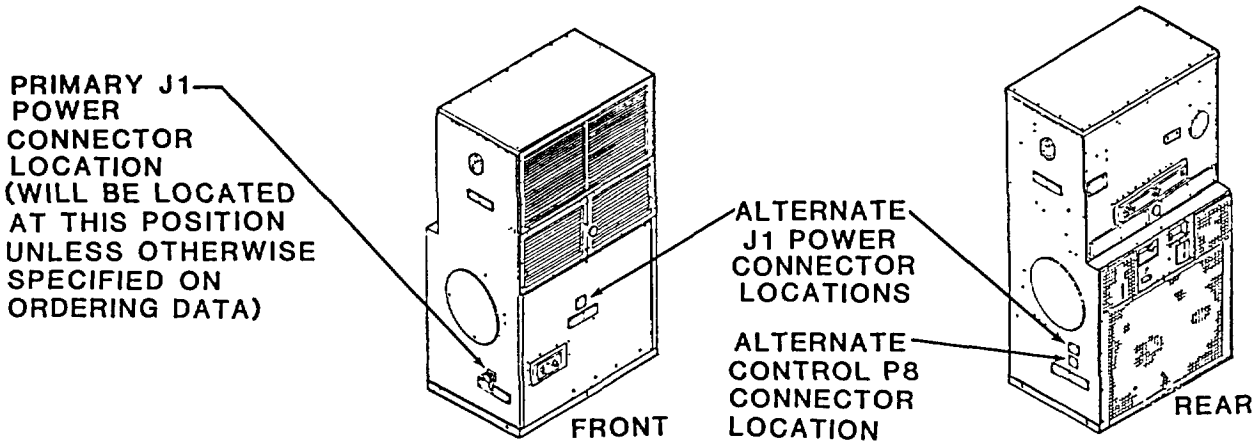
4-23. Connector Cover Plates

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

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

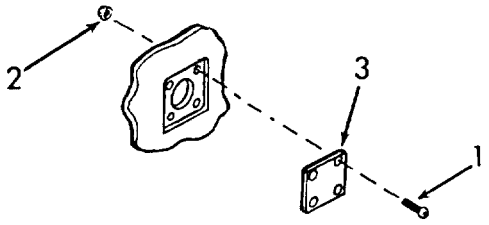
There are two power connector plates and one control connector cover plate on the air conditioner. See installation instructions, para 4-9, for access and additional information.



REMOVAL

1. Using screwdriver and wrench, remove four screws (1) and nuts (2).

2. Remove connector cover plate(s) (3).



4-23. Connector Cover Plates (cont)

INSPECTION

1. Check that cover plate is not bent, cracked, or punctured.
2. Replace If damaged.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver and wrench, secure cover (3) to casing with four screws (1) and nuts(2).

4-24. Lower Front Panel

This task covers:
a. Removal b. Inspection c. Replace d. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

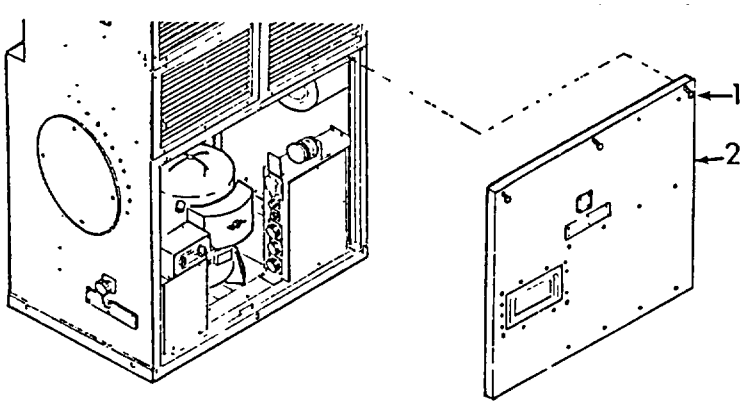
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, loosen three captive panel fasteners (1).
2. Remove panel (2). Tilt top of lower front panel out and lift panel up to remove.



INSPECTION

1. Check that panel is not bent, cracked, or punctured.
2. Check that gaskets and insulation are not tom, loose, or missing.
3. Check that information plates are readable and in place.
4. Refer repair of panel, gaskets, and insulation to Intermediate Direct Support Maintenance.

4-24. Lower Front Panel (cont)

REPLACE

For damage of greater extent, replace entire lower front panel.

INSTALLATION

Using screwdriver, secure panel (2) to casing with three captive panel fasteners (1).

NOTE

FOLLOW ON MAINTENANCE:

Connect power.

4-25. Top Panel

This task covers:
a. Removal b. Inspection c. Replace d Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove conditioned air outlet grille. (See para 4-21.)

General Safety Instructions:

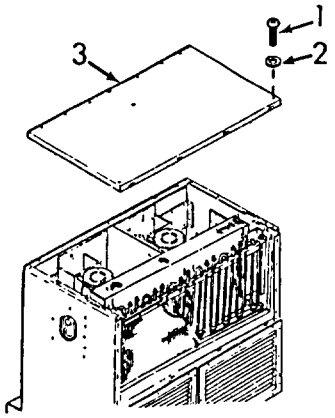
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove seventeen screws (1) and flat washers (2).

2. Remove top panel (3).



4-25. Top Panel (cont)

INSPECTION

1. Check that panel is not bent, cracked, or punctured.
2. Check that gaskets and insulation are not tom, loose, or missing.
3. Refer repair of panel, gaskets, and insulation to Intermediate Direct Support Maintenance

REPLACE

For damage of greater extent, replace entire top panel.

INSTALLATION

Using screwdriver, secure top panel (3) to casing with seventeen screws (1) and washers (2).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install conditioned air outlet grille. (See para 4-21.)**
2. **Connect power.**

4-26. Condenser Fan Cover(s)

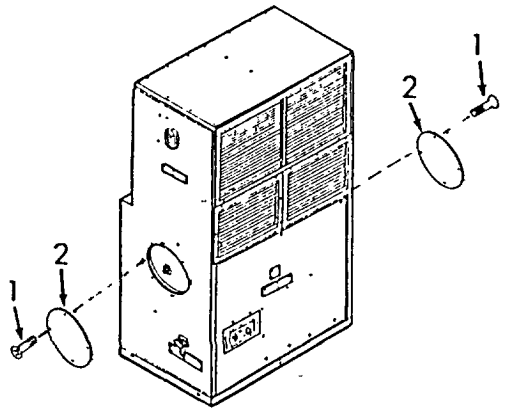
This task covers:
a. Removal b. Inspection c. Replace d. Installation

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

REMOVAL

1. Using screwdriver, remove four screws (1).
2. Remove cover (2).



INSPECTION

1. Check that cover (2) is not bent, cracked, or punctured.
2. Check that gasket is not torn, loose, or missing.
3. Refer repair to Intermediate Direct Support Maintenance.

REPLACE

For damage of greater extent, replace condenser fan cover.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver, secure cover (2) to casing with four screws (1).

4-27. Fabric Cover

This task covers:

a. Removal	c. Inspection	e. Replace
b. Cleaning	d. Lubrication	f. Installation

Initial setup.

Tools:

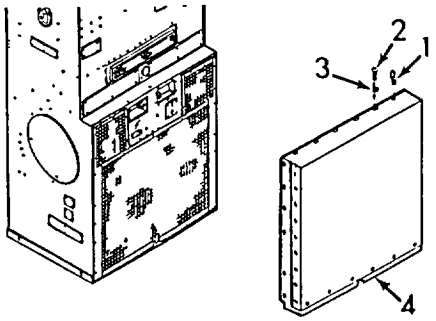
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)
Oil (Appendix E, item 14)
Silicone Spray (Appendix E, item 18)

REMOVAL

1. Roll cover down and secure snap fasteners.
2. Using wrench remove two turn button fasteners (1).
3. Using screwdriver remove twenty six screws (2) and washers (3).
4. Carefully remove the fabric cover (4).



CLEANING

1. Wipe clean with rag and mild detergent solution.
2. Thoroughly rinse with fresh water and dry.

INSPECTION

1. Check for rips, cuts, tears, or punctures in the fabric.
2. Check for damaged, loose, or missing eyelets and snap fasteners.

4-27. Fabric Cover (cont)

LUBRICATION

1. Snaps may be lubricated with a silicone type lubricant .

2. Turn button fasteners may be lubricated with a silicone type lubricant or light oil.

REPLACE

For damage of greater extent, or missing eyelets or snap fasteners, replace the entire fabric cover.

INSTALLATION

1. Align eyelets to casing mounting holes

2. Using screwdriver, secure fabric cover (4) with twenty six screws (2) and flat washers (3).

3. Using wrench, install two turn button fasteners (1).

4. If the air conditioner is to be returned to normal operation, open the snap fasteners, roll up the back flap, and secure it with the stowing straps and turnbutton fasteners.

NOTE

If the air conditioner installation requires removal of cover, reinstall the mounting screws and washer. This will protect the threads in the casing and prevent air leaks.

4-28. Condenser Coil Guard

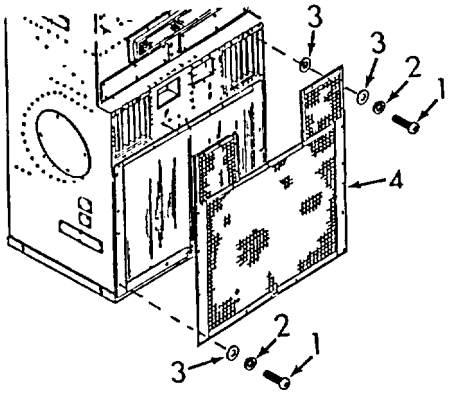
This task covers:
a. Removal b. Inspection c. Replace d. Installation

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

REMOVAL

1. Using screwdriver, remove twenty five screws (1), twenty five lock washers (2), and thirty seven flat washers (3).
2. Remove guard (4).



INSPECTION

Check that guard is not bent, cracked or otherwise damaged. Refer repairs to Intermediate Direct Support Maintenance.

REPLACE

Replace if damage is extensive.

INSTALLATION

1. Align mounting holes with casing fasteners.

NOTE

Twelve of the flat washers (3) are used as spacers at the two upper condenser air outlet locations.

2. Using screwdriver, secure guard to casing with twenty five screws (1), twenty five lock washers (2) and thirty seven flatwashers (3).

4-29. CBR (Chemical, Biological, Radiological) Cover

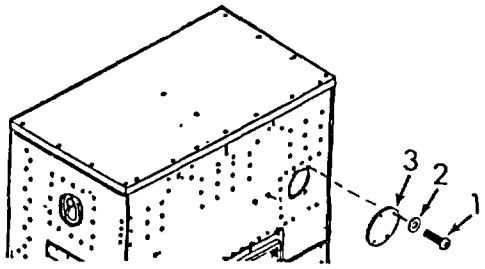
This task covers:
a. Removal b. Inspection c. Replace d. Installation

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

REMOVAL

1. Using screwdriver, remove four screws (1) and flat washers (2).
2. Remove cover (3).



INSPECTION

1. Check that cover (3) is not bent, cracked, or punctured.
2. Check that insulation is not torn, loose, or missing.
3. Refer repair to Intermediate Direct Support Maintenance.

REPLACE

Replace if damage is extensive.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver, secure cover (3) to casing with tour screws (1) and flat washers (2).

4-30. Conditioned Air Filters

This task covers:

a. Removal	c. Inspection	e. Servicing
b. Cleaning	d. Replace	f. Installation

Initial setup.

Tools:

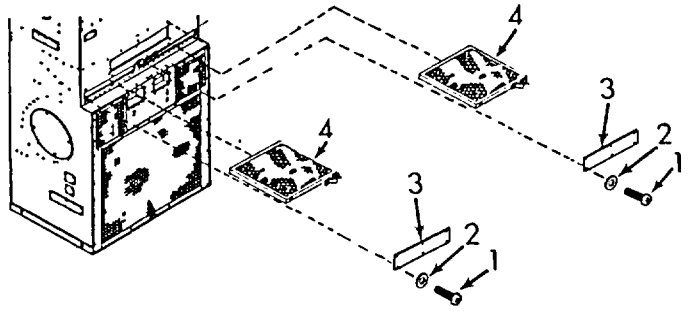
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Coater, air filter (Appendix E, item 1)

REMOVAL

1. Using screwdriver, remove twelve screws (1) and flat washers (2), from filter covers (3).
2. Remove filters (4) from filter support frame in unit.



CLEANING

1. Wash filters in a mild detergent and water solution.
2. Rinse thoroughly in clear water.
3. Shake out excess water prior to installation.

INSPECTION

1. Check filter(s) for punctures, cuts, and damaged edges that would allow the passage of unfiltered air.
2. Check filter(s) for packed or mashed areas that would block air flow.

REPLACE

Replace filter(s) if found to be bad.

4-30. Conditioned Air Filters (cont)

SERVICING

1. Apply coater to filter media.
2. Wipe excess coater from filter(s).

INSTALLATION

1. Place filters (4) in filter support frame with directional arrow pointing up.
2. Using screwdriver, secure filters (4) and filter cover (3) to unit with twelve screws (1) and washers (2).

4-31. Fresh Air Filter

This task covers:

a. Removal	c. Inspection	e. Servicing
b. Cleaning	d. Replace	f. Installation

Initial Setup.

Tools:

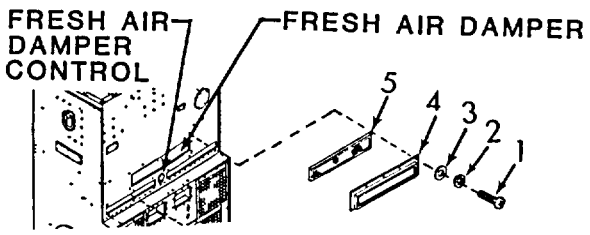
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Coater, air filter (Appendix E, item 1)

REMOVAL

1. Using screwdriver, remove seven screws (1), flat washers (3), and lock washers (2).
2. Remove filter (5) and frame (4) from unit.
3. Slip filter (5) out of frame (4).



CLEANING

1. Wash filter in a mild detergent and water solution.
2. Rinse thoroughly in clear water.
3. Shake out excess water prior to installation.

INSPECTION

1. Check filter for punctures, cuts, and damaged edges that would allow the passage of unfiltered air.
2. Check filter for packed or mashed areas that would block air flow.

4-31. Fresh Air Filter (cont)

REPLACE

Replace filter if found to be bad.

SERVICING

1. Apply coater to filter media.
2. Wipe excess coater from filter.

INSTALLATION

1. Place filter (5) in filter frame (4) with directional arrow pointing toward air conditioner.

2. Using screwdriver, secure filter (5) and frame (4) to unit with seven screws (1), lock washers (2) and flat washers (3).

4-32. Mist Eliminator

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Replace
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove top panel. (See para 4-25.)

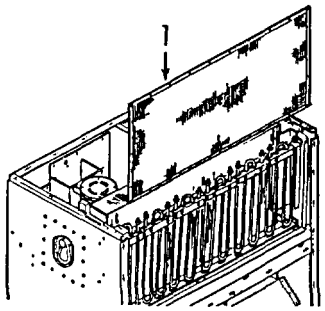
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

Lift mist eliminator (1) straight up and out of guides.



CLEANING

1. Wash in a mild detergent and water solution.
2. Rinse thoroughly in clear water.
3. Shake out excess water prior to installation.

4-32. Mist Eliminator (cont)

INSPECTION

1. Check for punctures, cuts, damaged edges and other visible damage.
2. Check for packed or mashed areas that would block air flow.

REPLACE

Replace mist eliminator if found to be bad.

INSTALLATION

Slide mist eliminator (1) straight down into guides.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install top panel. (See para 4-25.)**
2. **Connect power.**

4-33. Fresh Air Damper

This task covers:

a. Removal	c. Cleaning	e. Replace	g. Installation
b. Disassembly	d. Inspection	f. Reassembly	

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)
Dry Cleaning Solvent (Appendix E, item 19)

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove conditioned air intake grille(s). See para 4-22.
3. Remove conditioned air filter(s). See para 4-30.
4. Remove fresh air filter and frame. See para 4-31.

General Safety Instructions:

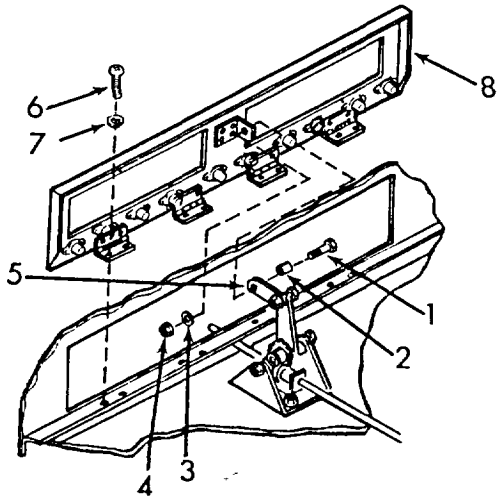
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

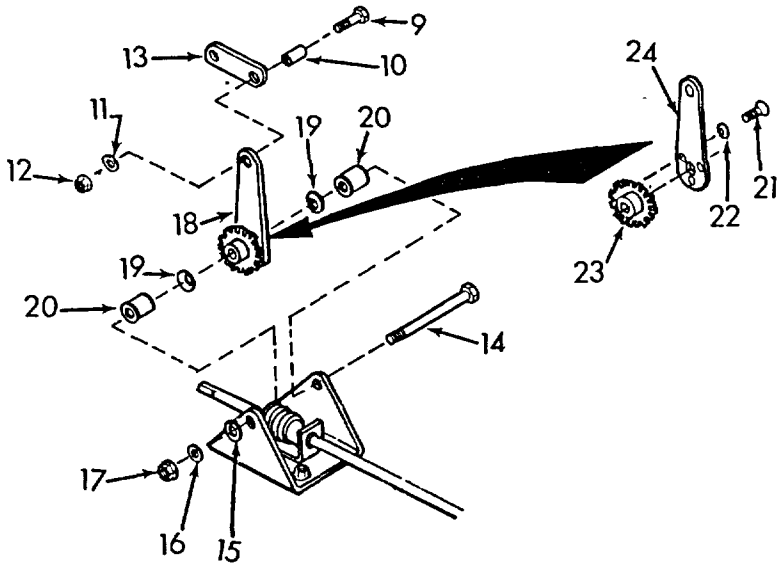
1. Using two wrenches, remove cap screw (1), bushing (2), washer (3), and nut (4) from actuator link arm (5).
2. Using screwdriver, remove eight screws (6) and lock washers (7), from damper door (8) hinges.
3. Remove fresh air damper door (8).
4. Using two wrenches, remove cap screw (9), bushing (10), washer (11), and nut (12) from link arm (13).
5. Remove link arm (13).
6. Using two wrenches, remove cap screw (14), flat washer (15), lock washer (16), and nut (17).
7. Remove gear arm assembly (18), spring washers (19), and spacers (20).

4-33. Fresh Air Damper (cont)



8. Using allen wrench loosen setscrews (25) in adjusting knobs (26), and remove knobs (26).

9. Using punch and hammer, remove spring pin (29) from worm gear (30).



10. Using alien wrench, loosen setscrews (31) and remove extension rod (32).

11. Pull rod (33) from rear of unit.

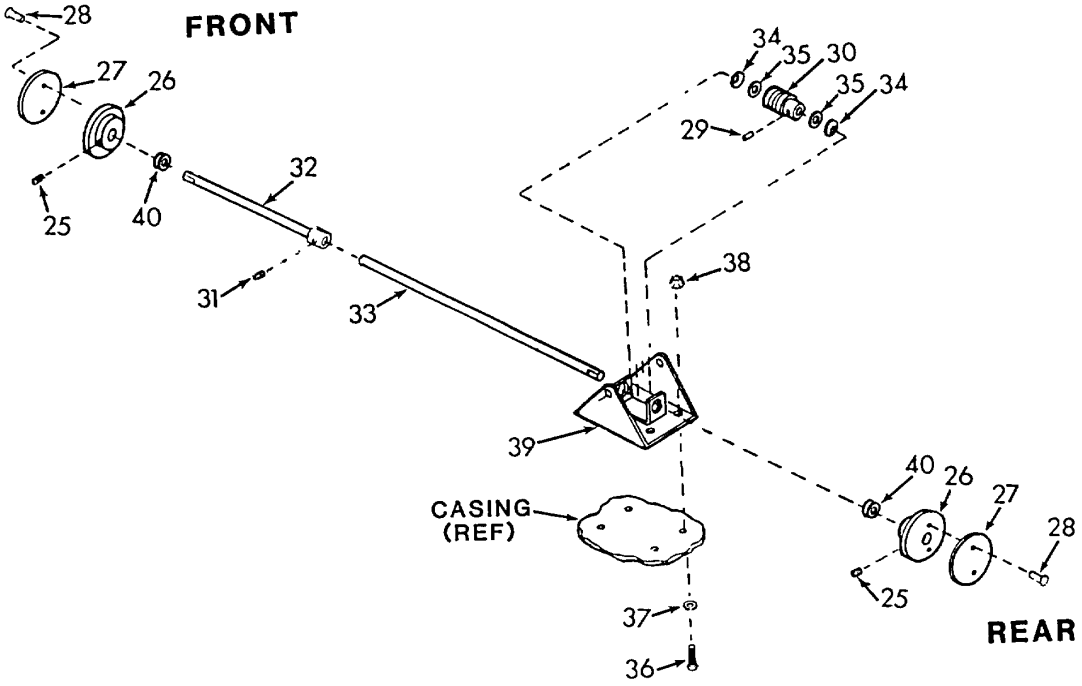
12. Remove two spring washers (34), two flat washers (35) and worm gear (30).

13. Using screwdriver and wrench, remove four screws (36), flat washers (37), and nuts (38) from bracket (39).

14. Remove bracket (39).

15. Remove grommets (40).

4-33. Fresh Air Damper (cont)



DISASSEMBLY

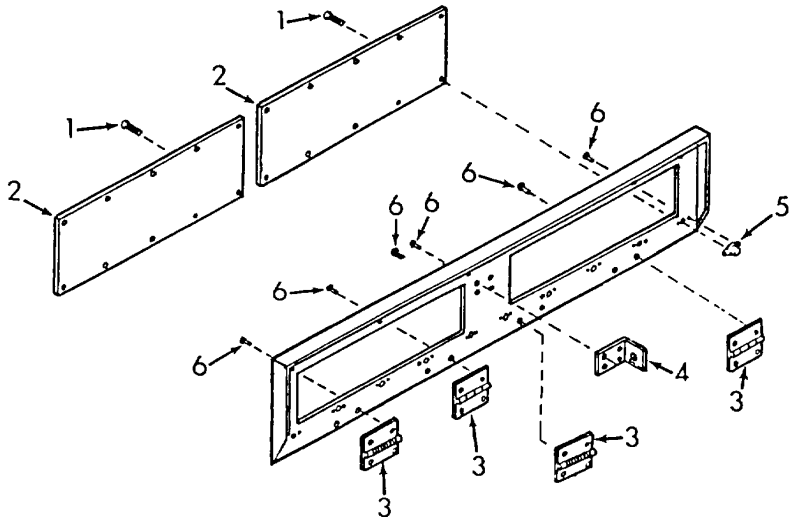
1. Using screwdriver, remove ten screws (1) from each cover (2).

2. Remove covers (2).

3. If hinges (3), bracket (4), or nut plates (5) need to be removed, drill out the old rivets (6) using a drill bit slightly smaller than the body of the rivet.

4. If gear arm assembly (page 4-67, 18) is to be disassembled, remove three screws (21) and lock washers (22) and separate worm wheel gear (23) from arm (24).

5. If plates (27) are to be removed, drive screws (28) must be drilled out to remove plates (27).



4-33. Fresh Air Damper (cont)

CLEANING

1. Use a rag or soft brush to remove dust from damper door and linkages.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

2. If necessary wash gears, and associated hardware in dry cleaning solvent.

INSPECTION

1. Check all parts for wear and obvious damage.

2. Check for loose or missing hardware.

REPLACE

Replace all missing or damaged parts.

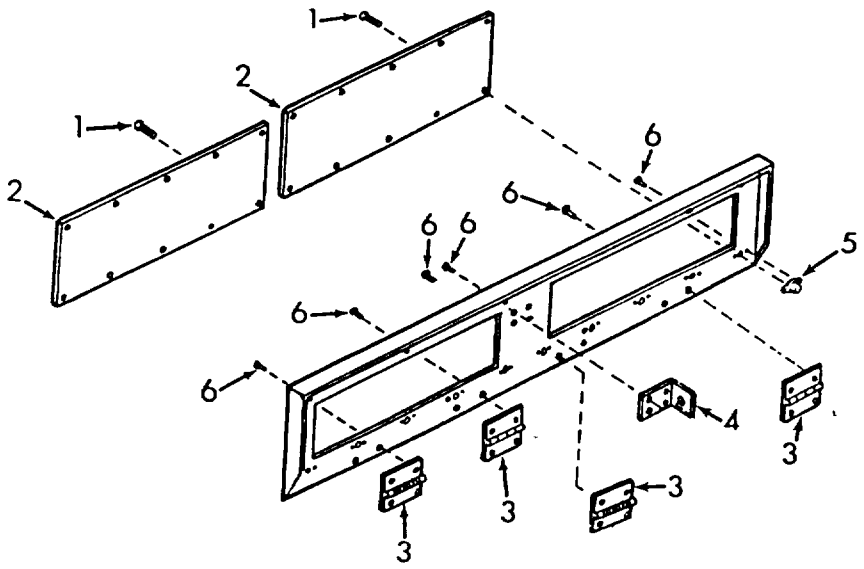
REASSEMBLY

1. If hinges (3), bracket (4), or nut plates (5) were missing, install replacement parts with new rivets (6).

2. Using screwdriver, secure covers (2) with ten screws (1) in each cover.

3. If gear arm assembly (page 4-67, 18) was disassembled, install three screws (21) and lock washers (22) and install worm wheel gear (23) to arm (24).

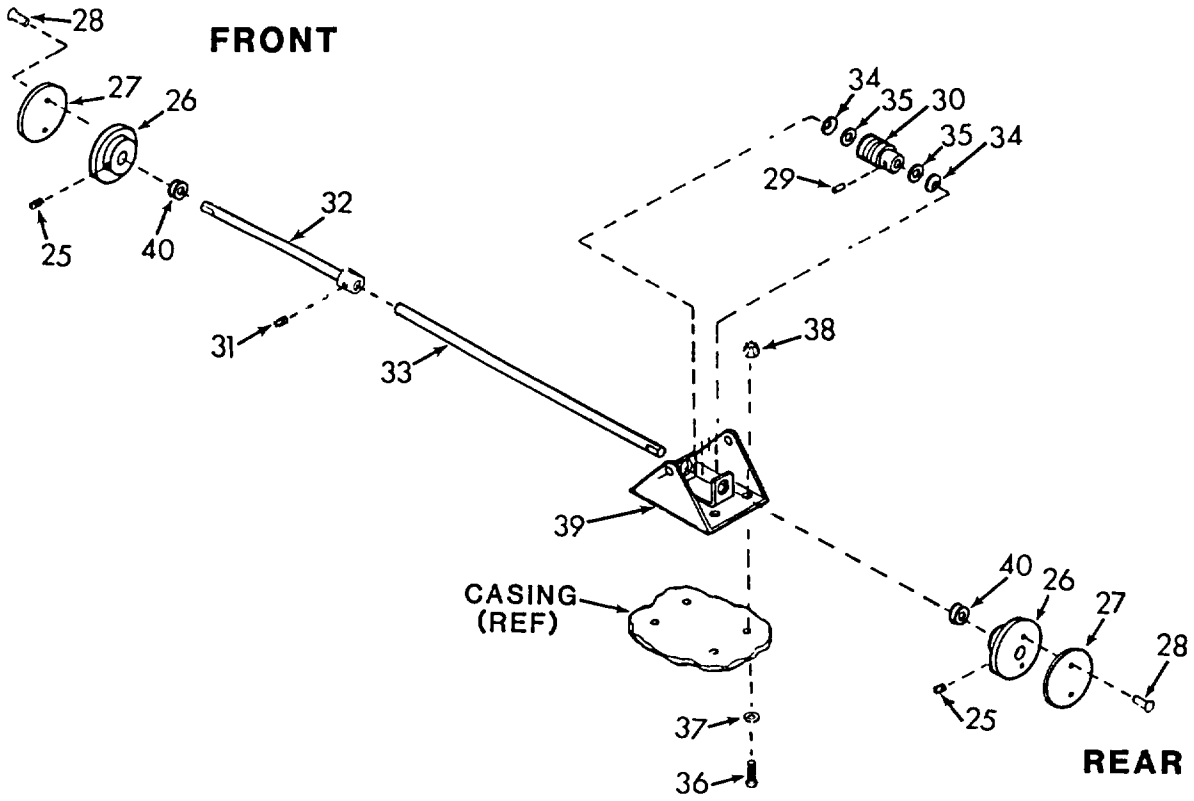
4. If plates (pages 4-68, 27) were removed, install plates (27) with drive screw (28).



4-33. Fresh Air Damper (cont)

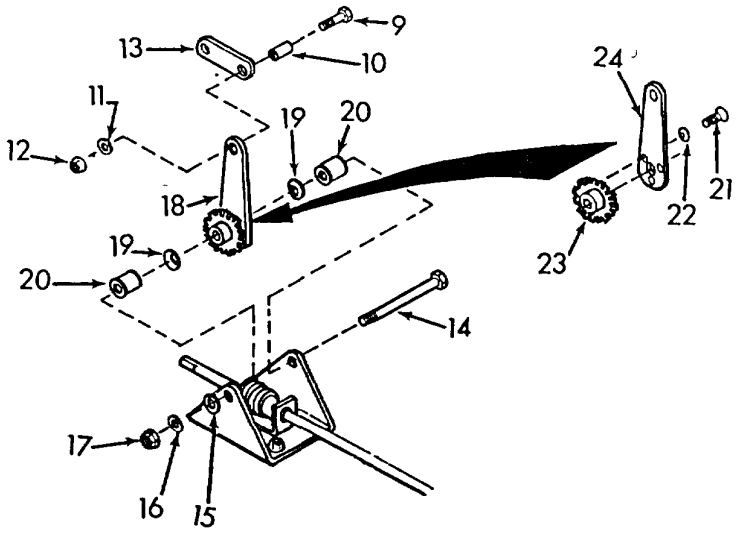
INSTALLATION

1. Using screwdriver and wrench, secure bracket (39) to casing with four screws (36), flat washers (37) and nuts (38).
2. Reinstall rubber grommet (40) in front and rear of casing, if they were removed or missing.
3. Install knob (26) on rod end (33), if it was removed.
4. Insert rod (33) through grommet (40) in rear of casing and through first hole in bracket (39).



5. Install spring washers (34), flat washers (35), and worm gear (30) and insert rod (33) through remaining bracket (39) hole.
6. Align holes in worm gear (30) and rod (33) and install spring pin (29).
7. Slip extension rod (32) onto end of rod (33), align setscrew (31) with flat on end of rod (33) and tighten setscrew (31) with allen wrench.
8. Using two wrenches, install spacers (20), spring washers (19), and gear arm assembly (18) with cap screw (14), flat washer (15), lock washer (16), and nut (17).

4-33. Fresh Air Damper (cont)

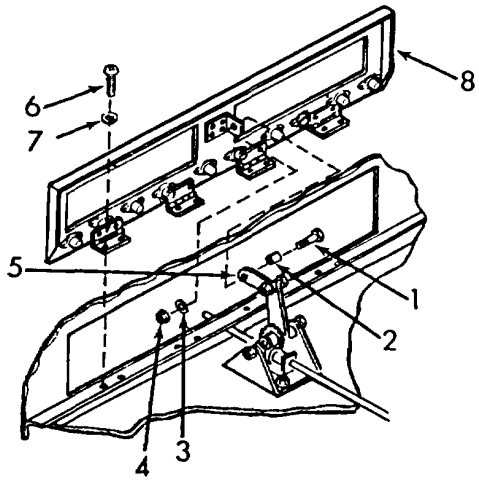


9. Using two wrenches, secure link arm (13) to gear arm assembly (18) with a cap screw (9), spacer (10), flat washer (11), and nut (12).

10. Using screwdriver, secure damper door (8) hinges to casing with eight screws (6) and lock washers (7).

11. Using two wrenches, connect link arm (5) to bracket on damper door (8) with a cap screw (1), bushing (2), flat washer (3), and nut (4).

12. Using alien wrench, tighten setscrew (25) in adjusting knobs (26) on rod (32).



NOTE

FOLLOW ON MAINTENANCE:

1. **Install fresh air filter and frame. See para 4-31.**
2. **Install conditioned air filter(s). See para 4-30.**
3. **Install conditioned air intake grille(s). See para 4-22.**
4. **Connect power.**

4-34. Electrical Wiring Repair

This task covers:
a. Repair

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Material: Solder (Appendix E, item 3)
Flux (Appendix E, item 16)

Equipment condition:
Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REPAIR

1. ***General***. Preferred repair methods consist of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other makeshift procedures. Although the latter may be appropriate for emergency field repairs. Determine the proper size and length of wire, or the terminal, or connector to be used for replacement by referring to table 4-3, "Wire List", and to the wiring diagram (see para 4-13).

2. ***Soldering Connections***. Wire connections must be made mechanically sound before they are soldered. Solder alone does not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification MIL-F-14256 rosin base flux, item 16, Appendix E and should be brushed onto the joint before soldering. If a flux-core solder is used it should be rosin core electrical solder. If uncored solder is used it should be lead-tin solder, item 3, Appendix E, conforming to specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive build up of solder "gobs" on the joint should be avoided or removed.

3. ***Insulating Joints***. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. To apply, cut a piece of heat-shrink tubing of suitable diameter to a one inch length for covering joints at terminals or connectors, or to a length about 1/2 inch (1.3cm) 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.

4-34. Electrical Wiring Repair (cont)

4. ***Splicing Wires***. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced. A commercial butt splice can be crimped onto the ends to join them, or a "Western Union" wire splice can be made. The latter is made by stripping 1/4 - 1/2 inch (0.6 - 1.3cm) of insulation from the wire ends, holding the ends parallel and facing opposite directions, then twisting each end around the other wire at least three turns. Solder and apply insulation as described above.

5. ***Crimping Terminals***. To install a terminal on the end of a wire, strip 1/4 -1/2 inch (0.6 - 1.3cm) 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 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		LOOSE WIRE				
HR8-C	MS25036-108	HR8-D	MS25036-108	16	3.0	7.6
S/WA-12	(97403) 13211 E828	IS1-BL	MS25036-153	16	6.0	15.2
HR4-B	MS25036-112	HR3-B	MS25036-112	12	9.0	22.9
HR2-B	MS25036-112	HR5-B	MS25036-112	12	17.0	43.2
HR6-B	MS25036-112	HR1-B	MS25036-112	12	29.0	73.7
S5-1	MS25036-153	S6-1	MS25036-153	16	4.0	10.2
		LOOSE WIRE JUNCTION BOXES				
TB2-2	MS25036-108	K8-X1	MS25036-153	16	13.5	34.3
TB2-2	MS25036-108	TB2-1	MS25036-108	16	8.0	20.3
TB2-1	MS25036-108	K9-X1	MS25036-153	16	9.5	24.1
TB2-2	MS25036-108	K2-X1	MS25036-153	16	8.0	20.3
TB2-2	MS25036-108	JB-GND	MS25036-157	16	16.0	40.6
TB2-5	MS25036-108	K7-X2	MS25036-153	16	13.5	34.3
TB1-1	MS25036-154	CB-3	SOLDER	16	17.0	43 2
K1-X1	MS25036-153	K2-X1	MS25036-153	16	8.0	20.3
K7-X1	MS25036-153	K8-X1	MS25036-153	16	7.0	17.8
K9-A1	MS25036-154	K8-A1	MS25036-154	16	10.0	25.4
K9-B1	MS25036-154	K8-B1	MS25036-154	16	10.0	25.4
K9-Cl	MS25036-154	K8-Cl	MS25036-154	16	10.0	25.4
K1-Al	MS25036-157	K2-A1	MS25036-157	12	6.5	16.5
K1-B1	MS25036-157	K2-B1	MS25036-157	12	6.5	16.5
K1-C1	MS25036-157	K2-C1	MS25036-157	12	6.5	16.5
K9-A2	MS25036-116	CB-A1	SOLDER	8	12.0	30.5
K9-B2	MS25036-116	CB-B1	SOLDER	8	11.5	29.2
K9-C2	MS25036-116	CB-C1	SOLDER	8	11.0	27.9
K9-A1	MS25036-116	K7-A1	MS25036-116	8	12.5	31.8
K9-B1	MS25036-116	K7-B1	MS25036-116	8	13.0	33.0
K9-Cl	MS25036-116	K7-C1	MS25036-116	8	13.5	34.3
K1-Al	MS25036-120	TB1-1	MS25036-120	6	6.5	16 5
K1-B1	MS25036-120	TB1-2	MS25036-120	6	8.5.	21.6
K1-Cl	MS25036-120	TB1-3	MS25036-120	6	10.5	26.7
K7-A1	MS25036-120	TB1-1	MS25036-120	6	10.5	26.7
K7-B1	MS25036-120	TB1-2	MS25036-120	6	10.5	26.7
K7-C1	MS25036-120	TB1-3	MS25036-120	6	10.5	26.7
		WIRING HARNESS J1- P13				
J1-A	MS3106R32-17SX	P13-A	MS3100R32-17P	4	36.0	91.4
J1-B	MS3106R32-17SX	P13-B	MS3100R32-17P	4	36.0	91.4
J1-C	MS3106R32-17SX	P13-C	MS3100R32-17P	4	36.0	91.4
J1-D	MS3106R32-17SX	P13-D	MS3100R32-17P	4	36.0	91.4

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS P2, P4, AND P8					
P2-A	MS3106R20-11S	P4-J	MS3106R28-11P	12	29.0	73.7
P2-B	MS3106R20-11S	P4-K	MS3106R28-11P	12	29.0	73.7
P2-C	MS3106R20-11S	P4-L	MS3106R28-11P	12	29.0	73.7
P2-D	MS3106R20-11S	P4-A	MS3106R28-11P	16	29.0	73.7
P2-E	MS3106R20-11S	P4-B	MS3106R28-11P	16	29.0	73.7
P2-F	MS3106R20-11S	P4-C	MS3106R28-11P	16	29.0	73.7
P8-A	MS3100R28-4S	P4-D	MS3106R28-11P	16	29.0	73.7
P8-B	MS3100R28-4S	P4-E	MS3106R28-11P	16	29.0	73.7
P8-E	MS3100R28-4S	P4-F	MS3106R28-11P	16	29.0	73.7
P8-F	MS3100R28-4S	P4-G	MS3106R28-11P	16	29.0	73.7
P8-G	MS3100R28-4S	P4-H	MS3106R28-11P	16	29.0	73.7
P8-P	MS3100R28-4S	P4-I	MS3106R28-11P	16	29.0	73.7
P8-S	MS3100R28-4S	P4-N	MS3106R28-11P	16	29.0	73.7
	WIRING HARNESS P3, J7, J15A AND J15B					
J7-A	MS3100R20-15SZ	P3-B	MS3106R28-9P	12	28.0	71.1
J7-B	MS3100R20-15SZ	P3-C	MS3106R28-9P	12	28.0	71.1
J7-C	MS3100R20-15SZ	P3-D	MS3106R28-9P	12	28.0	71.1
J7-F	MS3100R20-15SZ	P3-F	MS3106R28-9P	12	28.0	71.1
J7-E	MS3100R20-15SZ	P3-E	MS3106R28-9P	12	28.0	71.1
J7-D	MS3100R20-15SZ	P3-G	MS3106R28-9P	12	28.0	71.1
J15A-A	MS3100R14S-7S	P3-A	MS3106R28-9P	16	28.0	71.1
J15A-B	MS3100R14S-7S	P3-J	MS3106R28-9P	16	28.0	71.1
J15A-C	MS3100R14S-7S	P3-H	MS3106R28-9P	16	28.0	71.1
J15B-A	MS3100R14S-7S	P3-K	MS3106R28-9P	16	28.0	71.1
J15B-B	MS3100R14S-7S	P3-L	MS3106R28-9P	16	28.0	71.1
J15B-C	MS3100R14S-7S	P3-M	MS3106R28-9P	16	28.0	71.1
	WIRING HARNESS J3, J26, AND P28					
J3-B	MS3102R28-9S	P28-M	MS3106R32-8P	12	19.0	48.3
J3-C	MS3102R28-9S	P28-N	MS3106R32-8P	12	19.0	48.3
J3-D	MS3102R28-9S	P28-0	MS3106R32-8P	12	19.0	48.3
J3-F	MS3102R28-9S	P28-P	MS3106R32-8P	12	19.0	48.3
J3-E	MS3102R28-9S	P28-R	MS3106R32-8P	12	19.0	48 3
J3-G	MS3102R28-9S	P28-S	MS3106R32-8P	12	19.0	48.3
J3-A	MS3102R28-9S	P28-A	MS3106R32-8P	16	19.0	48.3
J3-J	MS3102R28-9S	P28-B	MS3106R32-8P	16	19.0	48.3
J3-H	MS3102R28-9S	P28-C	MS3106R32-8P	16	19.0	'48.3
J3-K	MS3102R28-9S	P28-D	MS3106R32-8P	16	19.0	48.3
J3-L	MS3102R28-9S	P28-E	MS3106R32-8P	16	19.0	48.3
J3-M	MS3102R28-9S	P28-F	MS3106R32-8P	16	19.0	48.3

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS J3, J26, AND P28 (cont)					
J26-J	MS3106R18-1S	P28-d	MS3106R32-8P	16	32.0	81.3
J26-F	MS3106R18-1S	P28-e	MS3106R32-8P	16	32.0	81 3
J26-E	MS3106R18-1S	P28-y	MS3106R32-8P	16	32.0	81.3
J26-D	MS3106R18-1S	P28-z	MS3106R32-8P	16	32.0	81.3
J26-B	MS3106R18-1S	P28-a	MS3106R32-8P	16	32.0	81.3
J26-C	MS3106R18-1S	P28-b	MS3106R32-8P	16	32.0	81.3
J26-A	MS3106R18-1S	P28-T	MS3106R32-8P	16	32.0	81.3
	WIRING HARNESS J4					
J4-J	MS3102R28-11S	K7-A2	MS25036-112	12	17.0	43.2
J4-K	MS3102R28-11S	K7-B2	MS25036-112	12	18.0	45.7
J4-L	MS3102R28-11S	K7-C2	MS25036-112	12	19.0	48.3
J4-C	MS3102R28-11S	JB-GND	MS25036-153	16	16.0	40.6
J4-D	MS3102R28-11S	JB-GND	MS25036-153	16	16.0	40.6
J4-E	MS3102R28-11S	TB2-4	MS25036-153	16	13.0	33.0
J4-F	MS3102R28-11S	TB2-3	MS25036-153	16	13.0	33.0
J4-G	MS3102R28-11S	K2-X2	MS25036-153	16	13.0	33.0
J4-H	MS3102R28-11S	K8-X2	MS25036-153	16	12.0	30.5
J4-1	MS3102R28-11S	K1-X2	MS25036-153	16	11.0	27.9
J4-N	MS3102R28-11S	J22-C	MS3102R20-15S	16	14.0	35.6
J4-A	MS3102R28-11S	J10-S	MS3102R32-6S	16	6.0	15.2
J4-B	MS3102R28-11S	J10-F	MS3102R32-6S	16	6.0	15.2
	WIRING HARNESS P5, P6 P10, P11, P14, P16, J27, AND J28					
J28-M	MS3102R32-8S	P14-A	MS3106R22-36P	12	26.0	66.0
J28-N	MS3102R32-8S	P14-B	MS3106R22-36P	12	26.0	66.0
J28-O	MS3102R32-8S	P14-C	MS3106R22-36P	12	26.0	66.0
J28-P	MS3102R32-8S	P14-F	MS3106R22-36P	12	26.0	66.0
J28-R	MS3102R32-8S	P14-E	MS3106R22-36P	12	26.0	66.0
J28-S	MS3102R32-8S	P14-D	MS3106R22-36P	12	26.0	66.0
J28-A	MS3102R32-8S	P10-A	MS3106R32-6P	16	38.0	96.5
J28-B	MS3102R32-8S	P10-B	MS3106R32-6P	16	38.0	96.5
J28-C	MS3102R32-8S	P10-1	MS3106R32-6P	16	38.0	96.5
J28-D	MS3102R32-8S	P10-G	MS3106R32-6P	16	38.0	96.5
J28-E	MS3102R32-8S	P10-H	MS3106R32-6P	16	38.0	96.5
J28-F	MS3102R32-8S	P10-L	MS3106R32-6P	16	38.0	96.5
P6-A	MS3106R12S-3S	P10-J	MS3106R32-6P	16	38.0	96.5
P6-B	MS3106R12S-3S	P10-K	MS3106R32-6P	16	38.0	96.5
P5-A	MS3106R12S-3S	P10-C	MS3106R32-6P	16	38.0	96.5
P6-B	MS3106R12S-3S	P10-D	MS3106R32-6P	16	38.0	96.5
P16-A	MS3106R12S-3SY	P10-E	MS3106R32-6P	16	46.0	116.8

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS P5, P6, P10, P11, P14, P16, J27, AND J28 (cont)					
P16-B	MS3106R12S-3SY	P10-F	MS3106R32-6P	16	46.0	116.8
P11-G	MS3106R24-11S	P10-M	MS3106R32-6P	16	22.0	55.9
P11-H	MS3106R24-11S	P10-N	MS3106R32-6P	16	22.0	55.9
P11-A	MS3106R24-11S	P10-0	MS3106R32-6P	16	22.0	55.9
P11-B	MS3106R24-11S	P10-S	MS3106R32-6P	16	22.0	55 9
P11-D	MS3106R24-11S	P10-P	MS3106R32-6P	8	22.0	55.9
P11-E	MS3106R24-11S	P10-R	MS3106R32-6P	8	22.0	55.9
P11-F	MS3106R24-11S	P10-T	MS3106R32-6P	8	22.0	55.9
J28-d	MS3102R32-8S	J27-A	(97403) 13211E8399C28-4P	16	46.0	116.8
J28-e	MS3102R32-8S	J27-B	(97403) 13211E8399C28-4P	16	46.0	116.8
J28-Y	MS3102R32-8S	J27-E	(97403) 13211E8399C28-4P	16	46.0	116.8
J28-Z	MS3102R32-8S	J27-F	(97403) 13211E8399C28-4P	16	46.0	116.8
J28-a	MS3102R32-8S	J27-G	(97403) 13211E8399C28-4P	16	46.0	116 8
J28-b	MS3102R32-8S	J27-P	(97403) 13211E8399C28-4P	16	46.0	116 8
J28-T	MS3102R32-8S	J27-S	(97403) 13211E8399C28-4P	16	46.0	116.8
	WIRING HARNESS P7					
P7-A	MS3106R20-15PZ	HR1-A	MS25036-112	12	27.0	68.6
P7-B	MS3106R20-15PZ	HR2-A	MS25036-112	12	33.0	83.8
P7-C	MS3106R20-15PZ	HR3-A	MS25036-112	12	40.0	101.6
P7-D	MS3106R20-15PZ	HR4-A	MS25036-112	12	43.0	109.2
P7-E	MS3106R20-15PZ	HR5-A	MS25036-112	12	47.0	119.4
P7-F	MS3106R20-15PZ	HR6-A	MS25036-112	12	49.0	124.5
	WIRING HARNESS J8					
J8-A	(97403) 13211 E8399C28-4P	GND	MS25036-108	16	4.0	10.2
J8-B	(97403) 13211E8399C28-4P	S/WA-1D	(97403) 13211E8288	16	3.5	8.9
J8-E	(97403) 13211E8399C28-4P	S/WA-1B	(97403) 13211E8288	16	3.5	8.9
J8-F	(97403) 13211E8399C28-4P	S/WA-1A	(97403) 13211E8288	16	3.5	8.9
J8-G	(97403) 13211E8399C28-4P	S/WB-2B	(97403) 13211E8288	16	3.5	8.9
J8-P	(97403) 13211E8399C28-4P	S/WD-4C	(97403) 13211E8288	16	3.5	8.9
J8-S	(97403) 13211E8399C28-4P	S/WD-41	(97403) 13211E8288	16	6.5	16.5
S/WD-41	(97403) 13211E8288	S/WB-22	(97403) 13211E8288	16	4 0	10.2
S/WB-22	(97403) 13211E8288	S/WA-11	(97403) 13211E8288	16	3.0	7.6
S/WA-11	(97403) 13211E8288	S1-R	MS25036-153	16	6.5	16.5
	WIRING HARNESS J10					
J10-A	MS3102R32-6S	K8-C2	MS25036-108	161	4.0	35.6
J10-B	MS3102R32-6S	K8-B2	MS25036-108	16	14.0	35.6
J10-C	MS3102R32-6S	K9-X2	MS25036-153	16	11.0	27.9

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS J10 (cont)					
J10-D	MS3102R32-6S	TB2-1	MS25036-153	16	11.0	27.9
J10-E	MS3102R32-6S	TB2-4	MS25036-153	16	13.0	33.0
J10-G	MS3102R32-6S	K8-C2	MS25036-108	16	14.0	35.6
J10-H	MS3102R32-6S	K8-B2	MS25036-108	16	15.0	38.1
J10-1	MS3102R32-6S	K8-A2	MS25036-108	16	15.0	38.1
J10-J	MS3102R32-6S	TB2-3	MS25036-153	16	13.0	33.0
J10-K	MS3102R32-6S	TB2-1	MS25036-153	16	14.0	35.6
J10-L	MS3102R32-6S	K8-A2	MS25036-108	16	15.0	38.1
J10-M	MS3102R32-6S	K8-B1	MS25036-108	16	9.0	22.9
J10-N	MS3102R32-6S	K8-A1	MS25036-108	16	10.0	25.4
J10-O	MS3102R32-6S	TB2-5	MS25036-153	16	13.0	33.0
J10-P	MS3102R32-6S	CB-A2	MS25036-115	8	18.0	45.7
J10-R	MS3102R32-6S	CB-B2	MS25036-115	8	19.0	48.3
J10-T	MS3102R32-6S	CB-C2	MS25036-115	8	21.0	53.3
J10-F	MS3102R32-6S	J4-B	MS3102R28-11S	16	6.0	15.2
J10-S	MS3102R32-6S	J4-A	MS3102R28-11S	16	6.0	15.2
	WIRING HARNESS J13					
J13-A	MS3102R32-17PX	TB1-1	MS25036-123	4	10.0	25.4
J13-B	MS3102R32-17PX	TB1-2	MS25036-123	4	10.0	25.4
J13-C	MS3102R32-17PX	TB1-3	MS25036-123	4	9.0	22.9
J13-D	MS3102R32-17PX	JB-GND	MS25036-123	4	14.0	35.6
	WIRING HARNESS J14					
J14-A	MS3102R22-36S	K1-A2	MS25036-112	12	13.0	33.0
J14-B	MS3102R22-36S	K1-B2	MS25036-112	12	13.0	33.0
J14-C	MS3102R22-36S	K1-C2	MS25036-112	12	12.0	30.5
J14-D	MS3102R22-36S	K2-C2	MS25036-112	12	15.0	38,1
J14-E	MS3102R22-36S	K2-B2	MS25036-112	12	14.0	35.6
J14-F	MS3102R22-36S	K2-A2	MS25036-112	12	13.0	33.0
	WIRING HARNESS J16 TO S5 AND S6					
J16A	MS3102R12S-3PY	S6-1	MS25036-153	16	4.5	11.4
J16B	MS3102R12S-3PY	S5-2	MS25036-153	16	4.5	11.4
	WIRING HARNESS J21					
J21-A	MS3102R16S-8S	XF2-3	MS25036-153	16	9.0	22.7
J21-B	MS3102R16S-8S	K10-A	MS25036-107	16	8.0	20.3
J21-C	MS3102R16S-8S	K10-7	MS25036-107	16	8 0	20 3

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS J21 (cont)					
J21-D	MS3102R16S-8S	K10-1	MS25036-107	16	6.0	15.2
J21-E	MS3102R16S-8S	K10-B	MS25036-107	16	9.0	22.9
	WIRING HARNESS P21 TO S10 AND HR8					
P21A	MS3106R16S-8P	S10-1	(97403) 13225E8168	*	40.0	101.6
P21B	MS3106R16S-8P	S10-2	(97403) 13225E8168	*	40.0	101.6
P21C	MS3106R16S-8P	S10-3	(97403) 13225E8168	*	40.0	101.6
P21D	MS3106R16S-8P	HR8-A	MS25036-108	16	24.0	60.9
P21E	MS3106R16S-8P	HR8-B	MS25036-108	16	24.0	60.9
			*COMPONENT LEAD			
	WIRING HARNESS J22					
J22-A	MS3102R20-15S	CB-5	SOLDER	16	16.0	40.6
J22-B	MS3102R20-15S	TB1-2	MS25036-153	16	13.0	33.0
J22-D	MS3102R20-15S	TB2-1	MS25036-153	16	8.0	20.3
J22-E	MS3102R20-15S	K7-X2	MS25036-153	16	16.0	40.6
J22-F	MS3102R20-15S	K9-X2	MS25036-153	16	9.0	22.9
J22-G	MS3102R20-15S	TB1-1	MS25036-154	16	12.0	30.5
J22-C	MS3102R20-15S	J4-N	MS3102R28-11S	16	14.0	35.7
	WIRING HARNESS P22 AND P23					
P22-A	MS3106R20-15P	P23-A	MS3106R20-15S	16	20.0	50.8
P22-B	MS3106R20-15P	P23-B	MS3106R20-15S	16	20.0	50.8
P22-C	MS3106R20-15P	P23-C	MS3106R20-15S	16	20.0	50.8
P22-D	MS3106R20-15P	P23-D	MS3106R20-15S	16	20.0	50.8
P22-E	MS3106R20-15P	P23-E	MS3106R20-15S	16	20.0	50.8
P22-F	MS3106R20-15P	P23-F	MS3106R20-15S	16	20.0	50.8
P22-G	MS3106R20-15P	P23-G	MS3106R20-15S	16	20.0	50.8
	WIRING HARNESS J23					
J23-A	MS3102R20-15P	XF2-1	MS25036-153	16	11.0	27.9
J23-B	MS3102R20-15P	XF2-3	MS25036-153	16	14.0	35.6
J23-C	MS3102R20-15P	XF1-2	MS25036-153	16	12.0	30.5
J23-D	MS3102R20-15P	FL-3	SOLDER	16	11.0	27.9
J23-E	MS3102R20-15P	K10-6	MS25036-107	16	8.0	20.3
J23-F	MS3102R20-15P	K6-3	SOLDER	16	8.0	20.3
J23-G	MS3102R20-15P	K10-B	MS25036-107	16	8.0	20.3

Table 4-3. Wire List (cont)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
	WIRING HARNESS J24 TO P25					
J24-A	MS3102R32-17P	P25-A	MS3106R32-17S	4	28.0	71.1
J24-B	MS3102R32-17P	P25-B	MS3106R32-17S	4	28.0	71.1
J24-C	MS3102R32-17P	P25-C	MS3106R32-17S	4	28.0	71.1
J24-D	MS3102R32-17P	P25-D	MS3106R32-17S	4	28.0	71.1
	WIRING HARNESS S3 TO HR1, 3, AND 5					
S3-6	(97403) 13214E4036	HR3-B	MS25036-112	10	10.0	25.4
S3-4	(97403) 13214E4036	HR1-B	MS25036-112	10	12.0	30.5
S3-5	(97403) 13214E4036	HR5-B	MS25036-112	10	13.0	33.0

4-35. Control Panel

This task covers:
a. Removal
b. Inspection, Testing, Repair, and Replacement
c. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove left conditioned air inlet grille. See para 4-22.
3. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

NOTE

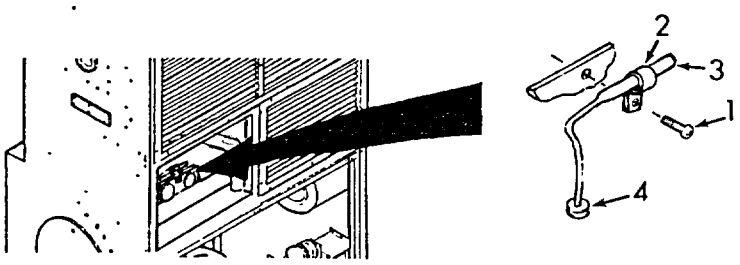
If control panel is remote mounted see para 4-8.

1. Using screwdriver and wrench, loosen screw (1) in loop clamp (2) that holds sensing bulb

CAUTION

Take care that sensing bulb capillary line is not kinked and that bulb and capillary are not cut or damaged during removal.

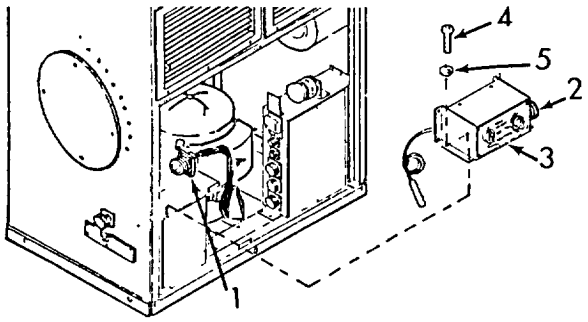
2. Slip sensing bulb (3) out of clamp and remove rubber grommet (4) to carefully guide capillary line and sensing bulb down into lower compartment.



4-35. Control Panel (cont)

3. Disconnect wiring harness connector P8 (1) from connector J8 (2) on the control panel.

4. Using screwdriver remove four screws (4) and lock washers (5) and remove control panel (3) from air conditioner.



INSPECTION, TESTING, REPAIR, AND REPLACEMENT

See the following paragraphs for individual component inspection, testing, repair, and replacement.

1. Wiring harness and electrical leads. See para 4-36.

2. TEMPerature control thermostat (S1). See para 4-37.

3. Mode selector (rotary) switch (S). See para 4-38.

4. Control panel housing. See para 4-39.

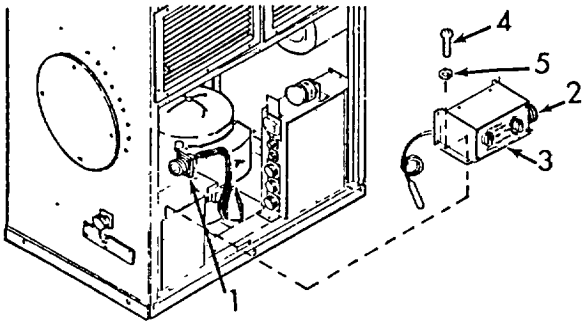
INSTALLATION

CAUTION

Take care that sensing bulb capillary line is not kinked and that bulb and capillary are not cut or damaged during installation.

1. Using screwdriver, secure control panel (3) in position with four screws (4) and lock washers (5).

2. Connect P8 connector (1) and harness to connector J8 (2) on the control box.

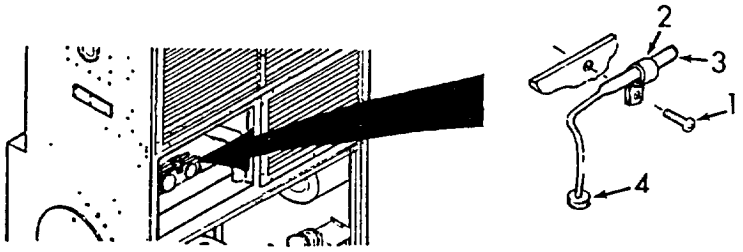


4-35. Control Panel (cont)

3. Carefully feed sensing bulb (3) and capillary up and into conditioned air intake compartment.

4. Position rubber grommet (4) between two compartments and slide sensing bulb (3) into loop clamp (2). Tighten clamp screw (1).

5. Coil excess capillary tubing behind control panel.



NOTE

FOLLOW ON MAINTENANCE:

1. **Install lowerfront panel. See para 4-24.**
2. **Install conditioned air inlet grille. See para 4-22.**
3. **Connect power.**

4-36. Control Panel Wiring Harness and Electrical Leads

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474.
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove control panel. See para 4-35.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

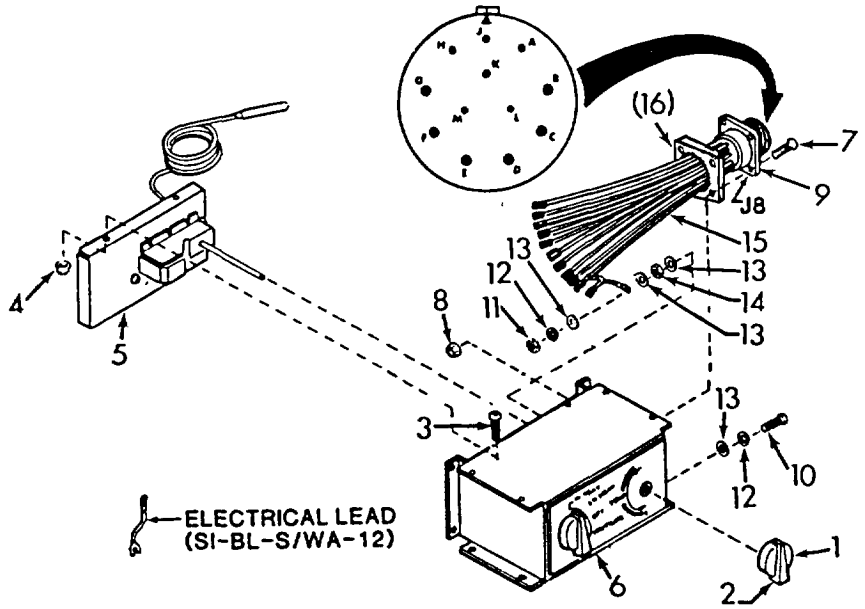
1. Using allen wrench, loosen TEMPerature control thermostat knob (1) setscrew (2).
2. Remove knob (1).
3. Using screwdriver and wrench, remove four screws (3) and nuts (4) that secure rear panel (5).
4. Pull rear panel (5) away from box (6) as far as harness will allow.

NOTE

Inspection (installed) can be done at this point.

5. Using screwdriver and wrench, remove four screws (7) and nuts (8) from J8 connector (9).
6. Tag and disconnect leads from switches.
7. Remove grounding screw (10), lock nut (11), two lock washers (12), four flat washers (13), and nut (14).
8. Remove harness (15).
9. Remove bevelled spacer (16) from harness (15).

4-36. Control Panel Wiring Harness and Electrical Leads (cont)



INSPECTION

1. Check connector for general condition and loose, broken, or missing contacts. Replace connector if damaged.
2. Check individual wires for loose solder connections, terminal lug connections, cut or frayed insulation, and cut or broken wires.
3. See wiring diagram (para 4-13) and continuity test individual wires. Repair or replace wires with no continuity.

REPAIR

1. See paragraph 4-34 for general wire repair instructions.
2. See table 4-3, Wire List, for wire lengths and terminal information when individual wires are replaced.

INSTALLATION

1. Slip beveled spacer (16) over harness (15) leads and insert harness (15) in box (6).
2. See tags and wiring diagram, para 4-13, and reconnect harness (15) leads.
3. Install grounding wire with grounding screw (10), lock nut (11), two lock washers (12), four flat washers (13), and nut (14).
4. Remove tags.
5. Using screwdriver and wrench, secure connector J8 (9) to box (6) with four screws (7) and nuts (8).
6. Insert rear panel (5) into box (6), align holes, and, using screwdriver and wrench, secure rear panel (5) with four screws (3) and nuts (4).

4-36. Control Panel Wiring Harness and Electrical Leads (cont)

7. Place TEMPerature control thermostat knob (1) on shaft. Align setscrew (2) with flat on shaft and, using alien wrench, tighten setscrew (2).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install control panel. See para 4-35.**
2. **Connect power.**

4-37. TEMPerature Control Thermostat (S1)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove control panel. (See para 4-35.)

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

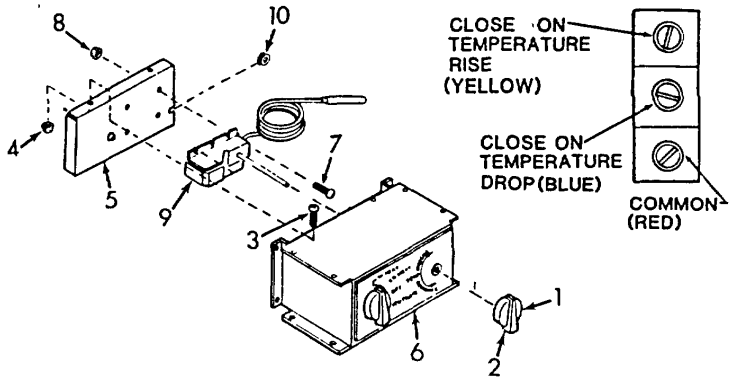
REMOVAL

1. Using allen wrench, loosen TEMPerature control thermostat knob setscrew (2) and remove knob (1).
2. Using screwdriver and wrench, remove four screws (3) and nuts (4) that secure rear panel (5).
3. Pull rear panel (5) away from box (6) as far as harness will allow.

NOTE

Inspection/Testing (installed) can be done at this point.

4. Tag and disconnect leads.
5. Using screwdriver and wrench, remove four screws (7) and nuts (8) and remove TEMPerature control thermostat (9) and grommet (10).



4-37. TEMPerature Control Thermostat (S1) (cont)

INSPECTION

1. Check that leads are properly connected. See wiring diagram, para 4-13.
2. Check that capillary line and sensing bulb are not damaged.
3. Check TEMPerature control thermostat for signs of overheating or other obvious damage. Replace if damaged.

TESTING

1. Using multimeter, place probes on the red and blue terminals.
2. Turn TEMPerature control thermostat shaft fully clockwise.
3. Check continuity. If temperature at sensing bulb is above 40°F (5°C), there should be no continuity.
4. Slowly turn shaft counterclockwise until continuity is indicated. Turn shaft back and forth slightly to check that switch contacts open and close on a very narrow band.
5. Using multimeter, place probes on the red and yellow terminals.
6. Turn TEMPerature control thermostat shaft fully counterclockwise.
7. Check continuity. If temperature at sensing bulb is below 90°F (32°C), there should be no continuity.
8. Slowly turn shaft clockwise until continuity is indicated. Turn shaft back and forth slightly to check that switch contacts open and close on a very narrow band.
9. Replace TEMPerature control thermostat if it fails any of the above tests.

INSTALLATION

CAUTION

Take care that sensing bulb capillary line is not kinked or mashed.

1. Using screwdriver and wrench, secure TEMPerature control thermostat (9) to rear panel (5) with four screws (7) and nuts (8).
2. See tags and wiring diagram, para 4-13, and connect leads.
3. Place capillary line through notch and split grommet (10) in rear panel.
4. Insert rear panel (5) into box (6) and align holes.
5. Using screwdriver and wrench, secure rear panel (5) with four screws (3) and nuts (4).
6. Place TEMPerature control thermostat knob (1) on shaft and align setscrew (2) with flat on shaft.

4-37. TEMPerature Control Thermostat (SI) (cont)

7. Using allen wrench, tighten setscrew (2).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install control panel. See para 4-35.**
2. **Connect power.**

4-38. Mode Selector (Rotary) Switch (S)

This task covers:
a. Removal
b. Inspection
c. Testing
d. Replace
e. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-597-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove control panel. See para 4-35.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using allen wrench, loosen setscrews (2) in both knobs (1) and remove knobs (1).

2. Using screwdriver and wrench, remove four screws (3) and nuts (4) that secure rear panel (5) and pull rear panel away from box (9) as far as harness will allow.

3. Using wrench and holding rear of mode selector switch (8), remove nut (6) and lock washer (7) from the shaft face.

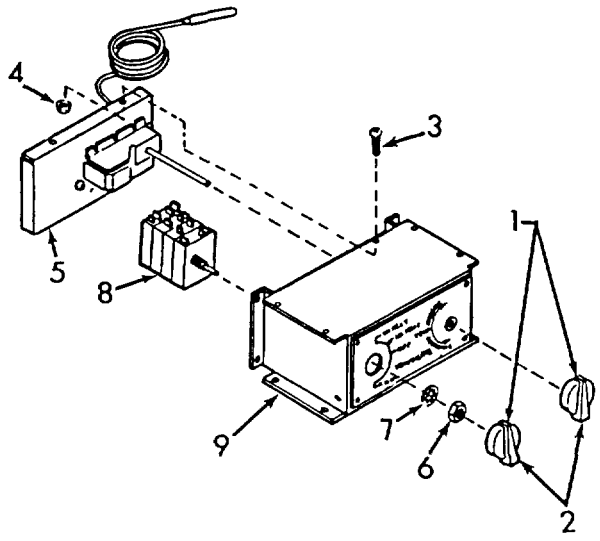
NOTE

Inspection/Testing (installed) can be done at this point.

4. Tag and disconnect leads.

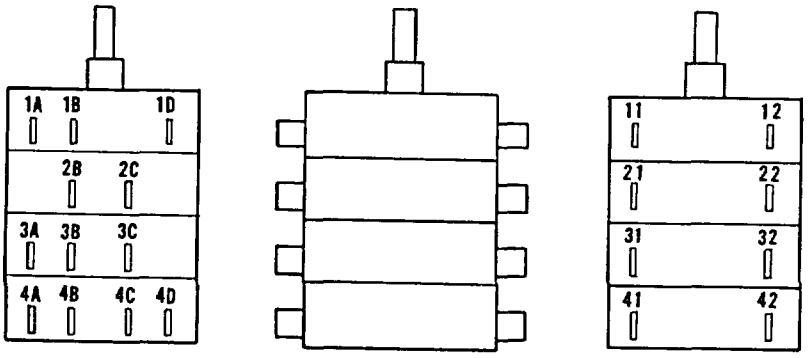
5. Remove switch (8).

4-38. Mode Selector (Rotary) Switch (S) (cont)



INSPECTION

1. Check switch to see that all leads are properly connected. See wiring diagram, para 4-13.
2. Repair or replace all broken leads.
3. Check that switch terminals are not loose, broken, or corroded.
4. Check switch for evidence of overheating or other visible damage.



SWITCH POSITION						
	CONTACT NO.	1 HIGH HEAT	2 LOW HEAT	3 OFF	4 VENT	5 COOL
S/WA	12 & 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 & 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 & 1D	OPEN	OPEN	OPEN	CLOSED	CLOSED
S/WB	22 & 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/WD	41 & 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

4-38. Mode Selector (Rotary) Switch (S) (cont)

TESTING

Using multimeter and switch position chart, check continuity at contacts indicated. With switch position closed, continuity should be indicated. With switch position open, no continuity should be indicated. Check between each set of contacts and at each switch position.

REPLACE

Replace switch if it fails above test or damaged.

INSTALLATION

1. See tags and wiring diagram, para 4-13, and connect leads.
2. Slip switch (8) into control box (9) and place shaft through hole.
3. Using wrench and holding backside of switch, secure switch (8) to box (9) with lock washer (7) and nut (6). Be sure that switch positions match front plate.
4. Insert rear panel (5) into box (9) and align holes.
5. Using screwdriver and wrench, secure rear panel (5) with four screws (3) and nuts (4).
6. Place knobs (1) on switch shafts and align setscrews with flats on shafts and, using allen wrench, tighten setscrews (2) in both knobs (1).

NOTE

FOLLOW ON MAINTENANCE:

1. Install control panel. See para 4-35.
2. Connect power.

4-39. Control Panel Housing

This task covers:
a. Inspection
b. Repair

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove control panel wiring harness and electrical leads. (See para 4-36.)
3. Remove TEMPerature control thermostat. (See para 4-37.)
4. Remove mode selector switch. (See para 4,38.)

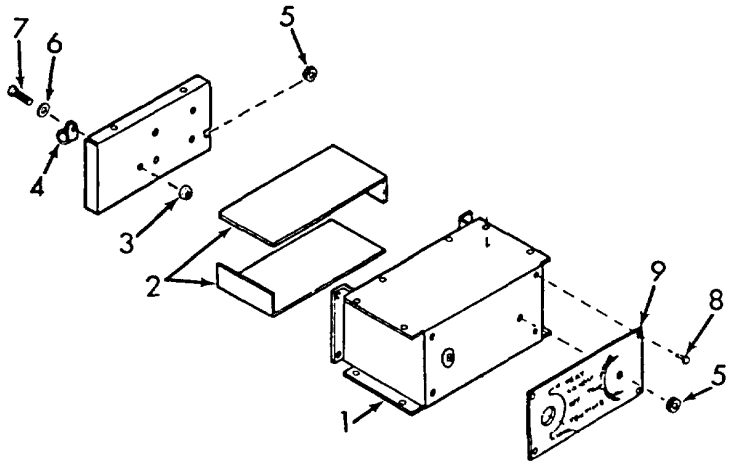
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check control panel (1) for dents, cracks, or punctures. Replace if damage creates a hazard or interferes with operation.
2. Check that insulation (2), swage nut (3), clamp (4), and grommets (5) are in place and secure. Repair or replace as needed.
3. Check that information plate (9) is legible and securely riveted to control panel (1).



4-39. Control Panel Housing (cont)

REPAIR

1. Repairs are limited to replacement of damaged or missing parts and tightening of mounting hardware.

2. Refer replacement of information plate to Intermediate Direct Support Maintenance.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install mode selector switch. (See para 4-36.)**
2. **Install TEMPerature control thermostat. (See para 4-37.)**
3. **Install control panel wiring harness. (See para 4-38.)**
4. **Connect power.**

4-40. Junction Box Number One

This task covers:
a. Removal
b. Inspection, Testing, Repair, and Replacement
c. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

General Safety Instructions:

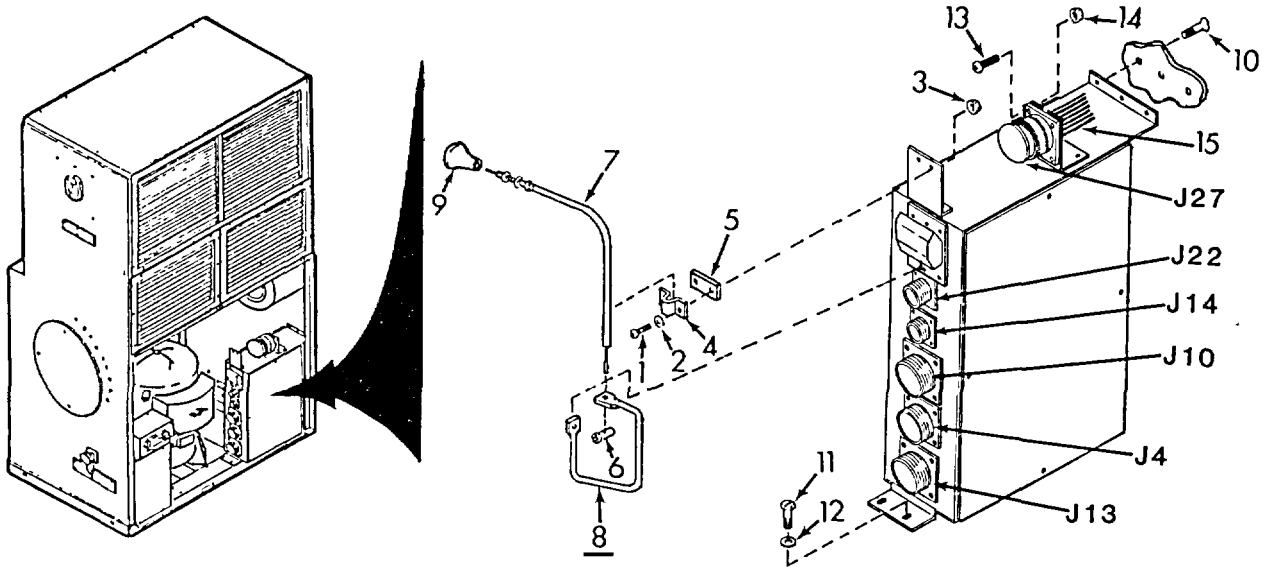
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Disconnect P22, P14, P10, P4, and P13 harness connectors from J22, J14, J10, J4 and J13 box.
2. Using screwdriver, remove screw (1), washer (2), and nut (3) from circuit breaker push-pull control wire clamp (4).
3. Remove clamp (4) and plate (5).
4. Loosen screw in core end fitting (6) and remove core end fitting (6).
5. Pull push-pull control wire (7) end free of actuator arm (8).
6. Using screwdriver, remove three screws (10) from side of junction box.
7. Using screwdriver, remove two screws (11) and flat washers (12) from lower junction box mounting foot.
8. Using screwdriver and wrench remove four each screws (13) and nuts (14) and slip connector J27 and harness (15) from top of junction box.
9. Carefully lift junction box up and out of air conditioner.

4-40. Junction Box Number One (cont)



INSPECTION, TESTING, REPAIR, AND REPLACEMENT

See the following paragraphs for individual component inspection, testing, repair, and replacement.

1. Junction Box Number One Harnesses and Leads. See para 4-41.
2. Circuit Breaker. See para 4-42.
3. Heater Relays (K1 and K2). See para 4-43.
4. Condenser Fan Motor Relay (K7). See para 4-43.
5. Evaporator Fan Motor Relay (K8). See para 4-43.
6. Compressor Relay (K9). See para 4-44.

INSTALLATION

1. Using screwdriver and wrench install connector J27 and harness (15) to angle mount on top of junction box with four each screws (13) and nuts (14).
2. Place junction box in air conditioner and align mounting holes.
3. Using screwdriver, secure junction box with two screws (11) and flat washers (12) in lower junction box mounting foot and three screws (10) in the side of the junction box.
4. Check that circuit breaker reset knob (9) on rear of air conditioner is pushed in all the way.
5. Insert push-pull control (7) wire end through hole in top of actuator arm (8).
6. Flip circuit breaker to OFF (down) position.
7. Slip core end fitting (6) on push-pull control (7) wire end and use screwdriver to tighten screw.

4-40. Junction Box Number One (cont)

8. Using screwdriver, secure push-pull control (7) wire casing with spacer plate (5), clamp (4) and two screws (1) and washers (2).

9. Check that circuit breaker is turned on when knob on rear of air conditioner is pulled out and pushed in. (Pushing knob in should not turn circuit breaker off.)

10. Connect the following harness connectors: P13 to J13, P4 to J4, P10 to J10, P14 to J14, and P22 to J22.

NOTE

FOLLOW ON MAINTENANCE:
1. Install lower front panel. See para 4-24.
2. Connect power.

4-41. Junction Box Number One Harnesses and Leads

This task covers:

a. Removal
b. Inspection
c. Testing
d. Repair
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

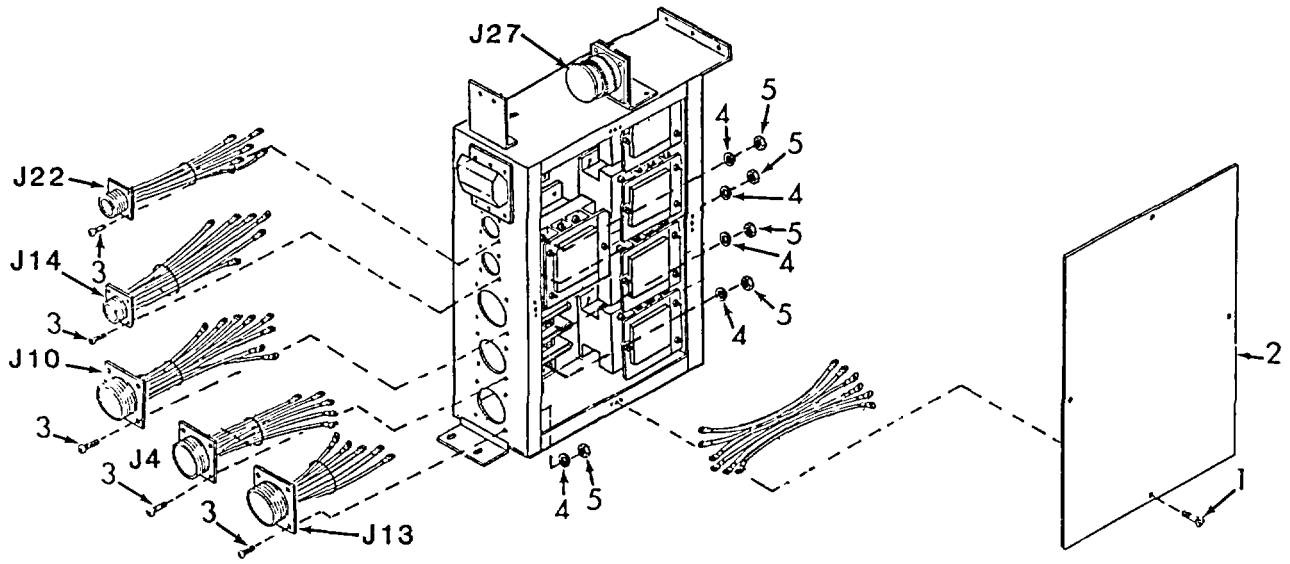
REMOVAL

1. Using a screwdriver, remove four screws (1) from junction box cover (2). Remove junction box cover.

NOTE

Inspection/Testing (installed) can be done at this point.

2. Using screwdriver and wrench, remove four screws (3), washers (4), and nuts (5) to remove connector from junction box.



4-41. Junction Box Number One Harnesses and Leads (cont)

INSPECTION/TESTING

1. Check connectors for general condition and loose, broken, or missing contacts.
2. Replace damaged connectors.
3. Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.
4. See wiring diagram, para 4-13, and continuity test individual wires.
5. Repair or replace wires with no continuity.

REPAIR

1. See para 4-34 for general wire repair instructions.
2. See Wire List, table 4-3, for wire lengths and terminal/connector information.

INSTALLATION

1. Using screwdriver and wrench, secure connectors to junction box with four screws (3), washers (4), and nuts (5).
2. Using a screwdriver, install cover (2) with four screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. Install lower front panel. See para 4-24
2. Connect power.

4-42. Circuit Breaker (CB)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-597-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using a screwdriver, remove four screws (1) from junction box cover (2). Remove junction box cover.

NOTE

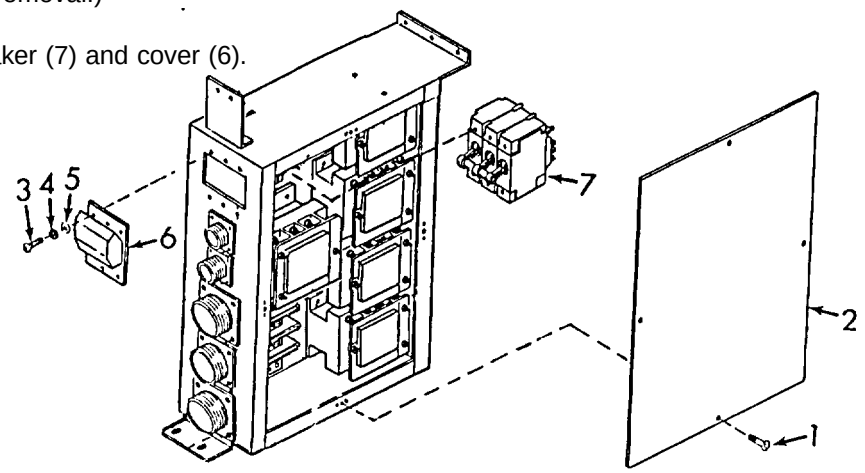
Inspection/Testing (installed) can be done at this point.

2. Tag and disconnect wire leads.

3. Using screwdriver, remove six screws (3), flat washers (4), and lock washers (5).

4. Pull cover down. Using pliers, pull shaft that holds reset toggles together and disconnect reset actuator arm. (See para 4-40 for reset removal.)

5. Remove circuit breaker (7) and cover (6).



4-42. Circuit Breaker (CB) (cont)

INSPECTION

1. Check that mounting hardware on push-pull (reset) control and circuit breaker is in place and secure. (See para 4-40.)
2. Check that wire leads are properly connected to circuit breaker and are not damaged.
3. Check circuit breaker for signs of overheating and/or other visible damage.

TESTING

NOTE

Steps 1 and 6 apply if circuit breaker (CB) not removed.

1. Disconnect junction box connectors P22, P14, P10, P4, and P13.
2. Set circuit breaker reset bar in OFF position.
3. Use multimeter set on lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2, and terminals 5 and 3. All contacts should be open If there is continuity on any check, replace the circuit breaker.
4. Press reset bar toward the OFF stop, then place it in the ON position.
5. Use multimeter set on lowest OHMS scale to repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2, and terminals 5 and 3. All contacts should be closed. If there is no continuity on any check, replace the circuit breaker.
6. Reconnect P13, P4, P10, P14, and P22 junction box connectors.

INSTALLATION

1. Using pliers, pull shaft that holds reset toggles together on circuit breaker.
2. Place circuit breaker, actuator arm, and cover into position and reinsert reset toggle shaft.
3. Using screwdriver, secure circuit breaker (7) and cover (6) with six screws (3), flat washers (5), and lock washers (4).
4. Check that circuit breaker reset knob on rear of air conditioner is pushed in all the way.
5. Using tags and wiring diagram, para 4-13, connect leads.
6. Remove tags.
7. Using screwdriver, install junction box cover (2) with four screws (1).

4-42. Circuit Breaker (CB) (cont)

NOTE

FOLLOW ON MAINTENANCE:

1. **Install lower front panel. See para 4-24.**
2. **Connect power.**
3. **Reset circuit breaker;**

4-43. Relays (K1, K2, K7, and K8)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove four screws (1) from junction box cover (2). Remove cover (2).

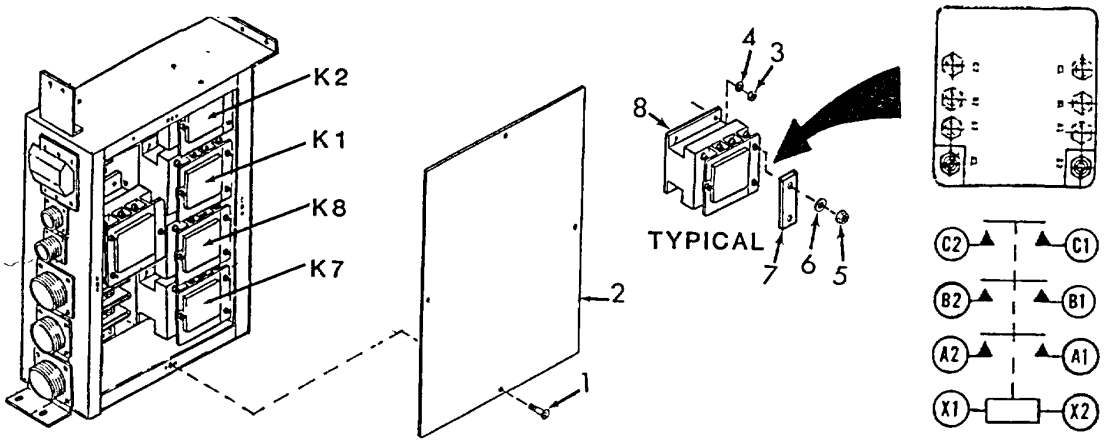
2. Remove nut (5), washer (6), and terminal cover (7) from relay (8).

NOTE

Inspection/Testing (installed) can be done at this point.

3. Tag and disconnect wire leads.

4. Using wrench, remove four nuts (3) and washers (4) and remove relay (8).



4-43. Relays (K1, K2, K7, and K8) (cont)

INSPECTION

1. Check for loose, corroded, missing, or broken terminal connections.
2. Check relay for cracks, evidence of overheating, and other visible damage and replace if damaged.

TESTING

1. Use a continuity tester or multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be opened. If there is continuity, replace relay.
2. Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open, replace relay.
3. Apply 24 volts dc across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.
4. Remove the 24 volts dc from the coil terminals X1 and X2.

INSTALLATION

1. Using wrench, secure relay (8) with four washers (4) and nuts (3).
2. See tags and wiring diagram, para 4-13, and connect wire leads.
3. Remove tags.
4. Install nut (5), washer (6), and terminal cover (7) to relay (8).
5. Using screwdriver, install junction box cover (2) with four screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. Install lower front panel. See para 4-24.
2. Connect power.

4-44. Relay (K9)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove four screws (1) from junction box cover (2). Remove cover (2).

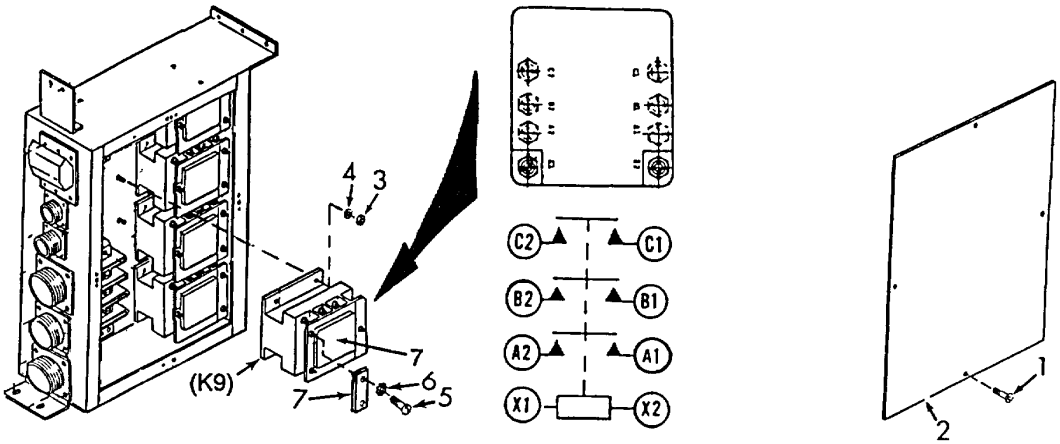
2. Remove screw (5), washer (6), and terminal cover (7) from relay (8).

NOTE

Inspection/Testing (installed) can be done at this point.

3. Tag and disconnect wire leads.

4. Using wrench, remove four nuts (3) and washers (4) and remove relay (8).



4-44. Relay (K9) (cont)

INSPECTION

1. Check for loose, corroded, missing, or broken terminal connections.
2. Check relay for cracks, evidence of overheating, and other visible damage and replace if damaged.

TESTING

1. Use a continuity tester or multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be opened. If there is continuity, replace relay.
2. Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open, replace relay.
3. Apply 24 volts dc across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.
4. Remove the 24 volts dc from the coil terminals X1 and X2.

INSTALLATION

1. Using wrench, secure relay (8) with four washers (4) and nuts (3).
2. See tags and wiring diagram, para 4-13, and connect wire leads.
3. Remove tags.
4. Install terminal cover (7), washer (6) and screws (5).
5. Using screwdriver install junction box cover (2) with four screws (1).

NOTE

FOLLOW ON MAINTENANCE:
1. Install lower front panel. See para 4-24.
2. Connect power.

4-45. Terminal Boards (TB1 and TB2)

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

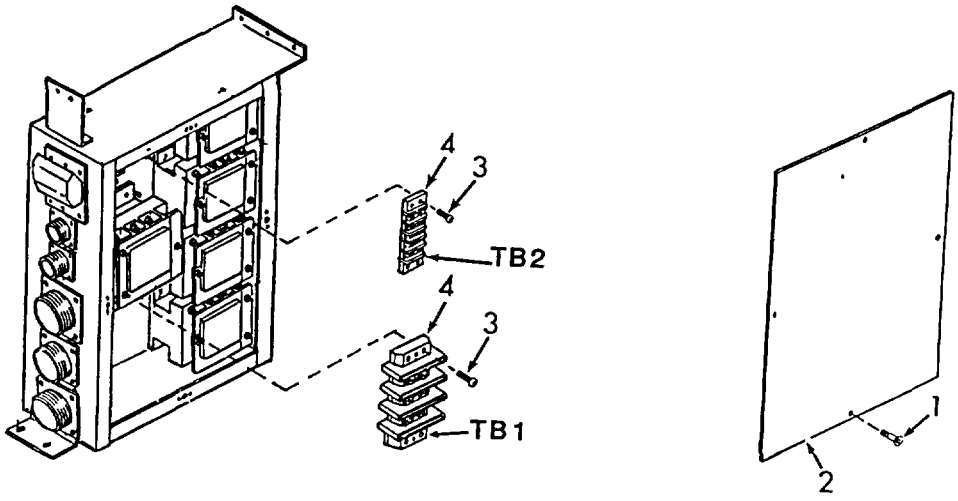
1. Using screwdriver, remove four screws (1) from junction box cover (2). Remove cover (2).

NOTE

Inspection/Testing (installed) can be done at this point.

2. Tag and disconnect wire leads.

3. Using screwdriver, remove four screws (3) from each terminal board and remove terminal board (4).



4-45. Terminal Boards (TB1 and TB2) (cont)

INSPECTION

1. Check terminal boards for loose or corroded terminals, cracks, and obvious damage. Replace if cracked or broken.
2. Check that wire leads are secure and properly located.

INSTALLATION

1. Using screwdriver, secure terminal boards (4) with four screws (3).
2. See tags and wiring diagram (para 4-13) and connect wire leads.
3. Remove tags.
4. Using a screwdriver, secure cover (2) with four screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install lower front panel. See para 4-24.**
2. **Connect power.**

4-46. Junction Box Number Two

This task covers:
a. Removal
b Inspection, Testing, Repair, and Replacement
c. Installation

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove control panel. See para 4-35.

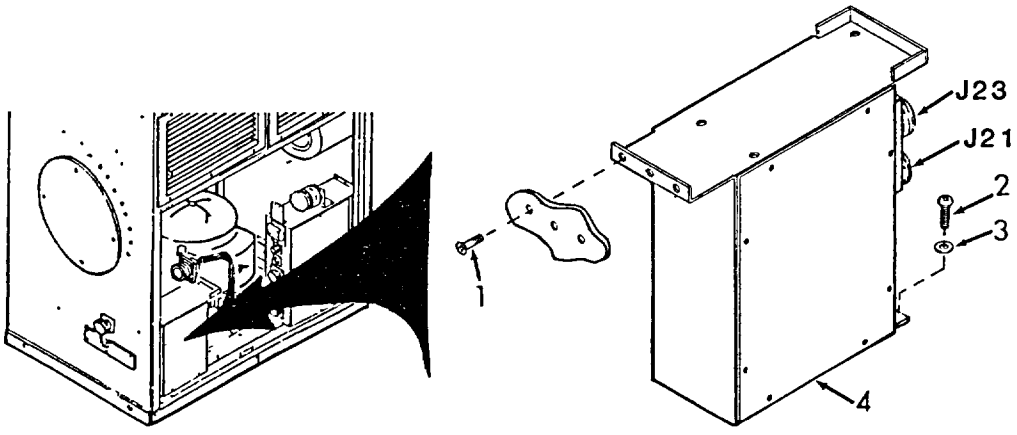
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Disconnect P21 and P23 harness connectors from junction box connectors J21 and J23.
2. Using screwdriver, remove three screws (1) from side of junction box (4).
3. Using screwdriver, remove two screws (2) and flat washers (3) from lower junction box mounting foot.
4. Carefully lift junction box (4) up and out of air conditioner.



4-46. Junction Box Number Two (cont)

INSPECTION, TESTING, REPAIR, AND REPLACEMENT

See the following paragraphs for individual component inspection, testing, repair, and replacement.

1. Junction Box Number Two wiring Harnesses. See para 4-47.
2. Fuses (F1, F2, and F3). See para 4-48.
3. Transformer (T). See para 4-49.
4. Time Delay Relay (K6). See para 4-50.
5. Control Relay (K10). See para 4-51.
6. Rectifier (CR). See para 4-52.
7. RFI (Radio Frequency Interference) Filters FL1, FL2, FL3, and FL4. See para 4-53.

INSTALLATION

1. Place junction box (4) in air conditioner and align mounting holes.
2. Using screwdriver, secure junction box with two screws (2) and flat washers (3) in lower junction box mounting foot and three screws (1) in the side of the junction box.
3. Connect the following harness connectors: P21 to J21 and P23 to J23.

NOTE

FOLLOW ON MAINTENANCE:
1. **Install lower front panel. See para 4-24.**
2. **Connect power.**

4-47. Junction Box Number Two Wiring Harnesses

This task covers:

a. Removal
b. Inspection
c. Testing
d. Repair
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove junction box number two. See para 4-26.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

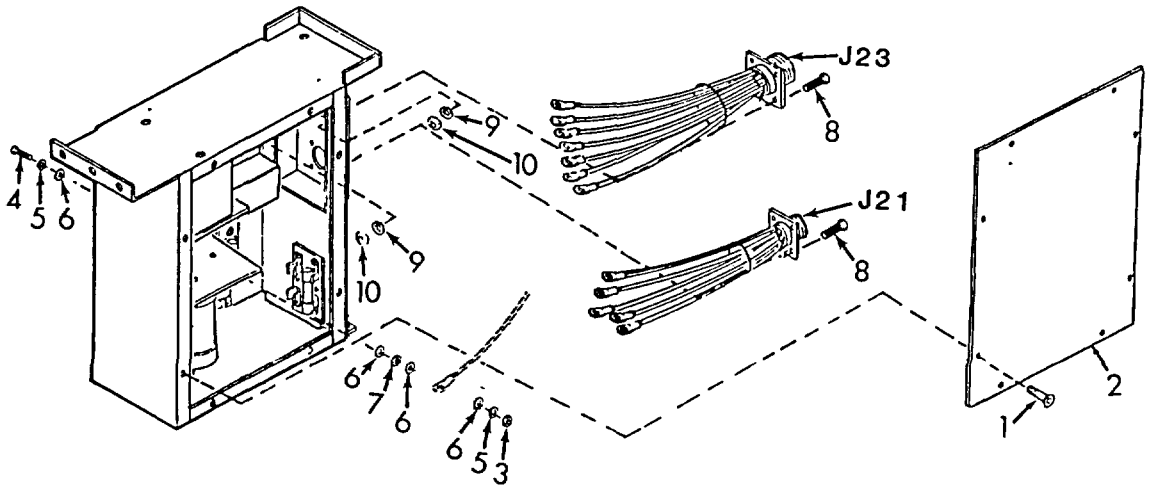
REMOVAL

1. Using screwdriver, remove eight screws (1) from junction box cover and remove cover (2).

2. Using screwdriver and wrench, remove grounding stud hardware items 3 through 7. (One nut (3), one screw (4), two lock washers (5), four flat washers (6) and one nut (7).)

3. Tag and disconnect wire leads.

4. Using screwdriver and wrench, remove four screws (8), washers (9), and nuts (10) to remove connector and harness from junction box.



4-47. Junction Box Number Two Wiring Harnesses (cont)

INSPECTION

1. Check connectors for general condition and loose, broken, or missing contacts.
2. Replace damaged connectors.
3. Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.
4. See wiring diagram, para 4-13, and continuity test individual wires.
5. Repair or replace wires with no continuity.

REPAIR

1. See para 4-34 for general wire repair instructions.
2. See Wire List, table 4-3, for wire lengths and terminal/connector information.

INSTALLATION

1. Using screwdriver and wrench install ground stud hardware (3), (4), (5), (6), and (7).
2. See tags and wiring diagram, para 4-13 and connect leads. Remove tags.
3. Using screwdriver and wrench, secure connectors to junction box with four screws (8), washers (9) and nuts (10).
4. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Connect power.**

4-48. Fuses (F1, F2 and F3)

This task covers:

a. Removal
b. Inspecting
c. Testing
d. Replace
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

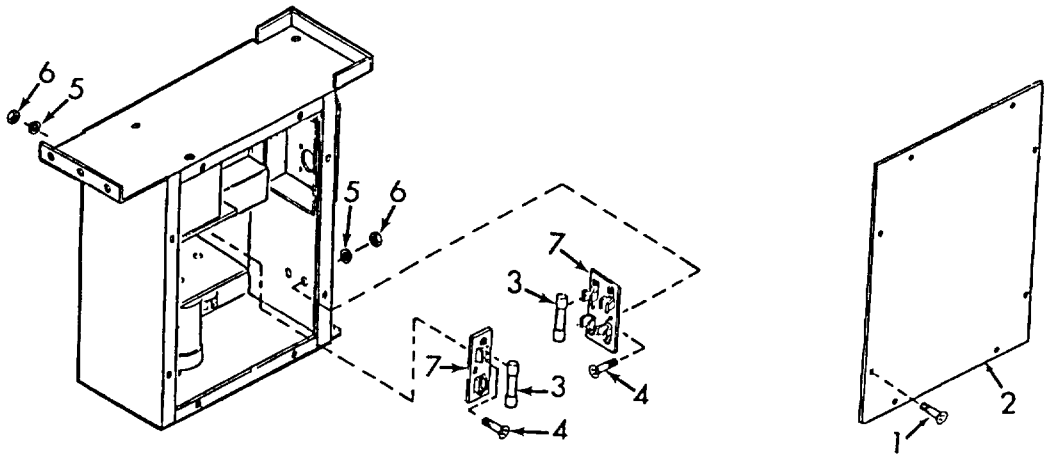
1. Using screwdriver, remove eight screws (1) from junction box cover (2) and remove cover (2).

2. Pull fuses (3).

3. If fuse block (7) is to be replaced, tag and remove wires.

4. Using screwdriver and wrench, remove two screws (4), washers (5) and nuts (6).

5. Pull fuse block (7) from junction box.



4-48. Fuses (F1, F2 and F3) (cont)

INSPECTION

1. Inspect for cracks, corrosion, loose electrical connections, and loose mounting hardware. Repair and tighten loose electrical connections and tighten loose mounting hardware. Replace fuse block if it is cracked, broken, or badly corroded.

2. If a fuse is suspected to be bad, pull it from the fuse block and look for broken or melted element.

3. Using a multimeter, check continuity. If there is no continuity, replace fuse.

INSTALLATION

1. Place fuse block (7) in junction box number two and align holes.

2. Using screwdriver and wrench secure fuse block (7) to junction box with two screws (4), washers (5), and nuts (6).

3. See tags and wiring diagram, para 4-13, and connect leads. Remove tags.

4. Place fuses (3) into fuse block clips.

5. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:
1. **Install junction box number two. See para 4-46.**
2. **Connect power.**

4-49. Transformer (T)

This task covers:

a. Removal
b. Inspection
c. Testing
d. Replacement
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

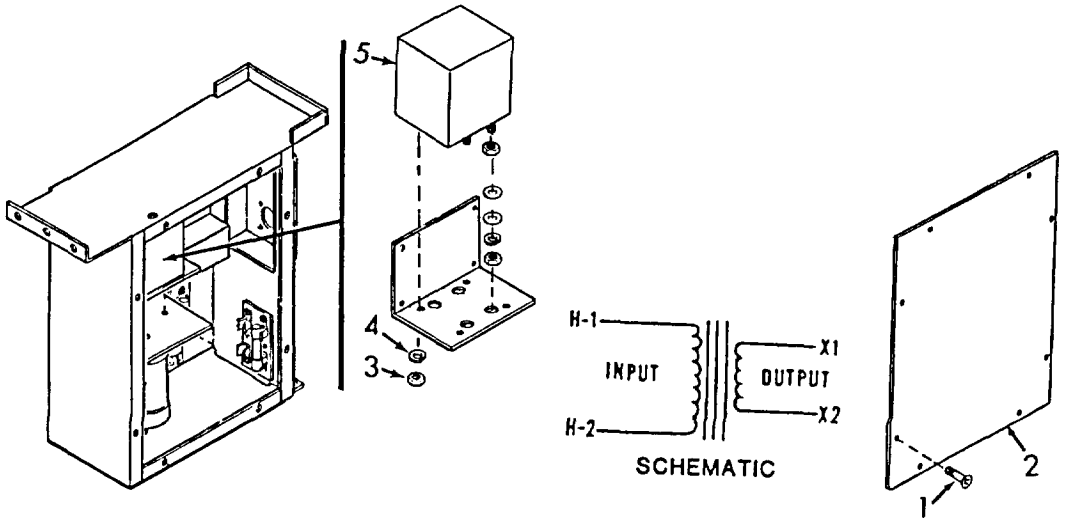
REMOVAL

1. Using screwdriver, remove eight screws (1) from junction box cover (2) and remove cover (2).

2. Tag and disconnect wire leads.

3. Using wrench, remove four nuts (3) and lock washers (4) from transformer mounting studs.

4. Remove transformer (5).



4-49. Transformer (T) (cont)

TESTING

1. Connect the probes of a continuity tester or a multimeter set on the lowest OHMS scale to terminal studs H1 and H2. If the primary winding is open, replace the transformer.

2. Connect the probes of a continuity tester or a multimeter set on the lowest OHMS scale to terminal studs X1 and X2. If the secondary winding is open, replace the transformer.

3. Connect one probe of a multimeter set on high OHMS scale to either terminal stud H1 or H2 and the other probe to the transformer case. If resistance is less than 500,000 ohms, replace the transformer.

4. Connect one probe of a multimeter set on high OHMS scale to either terminal stud X1 or X2 and the other probe to the transformer case. If resistance is less than 500,000 ohms, replace the transformer.

5. Connect one probe of a multimeter set on high OHMS scale to either terminal stud H1 or H2 and the other probe to either terminal X1 or X2. If resistance is less than 500,000 ohms, replace the transformer.

INSTALLATION

1. Position transformer (5) on transformer bracket and secure with four washers (4) and nuts (3).

2. See tags and wiring diagram, para 4-13, and connect leads. When installing terminal lugs on transformer terminals, hold bottom nut with wrench while tightening outer nuts.

3. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. Install junction box number two. See para 4-46.
2. Connect power.

4-50. Time Delay Relay (K6)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

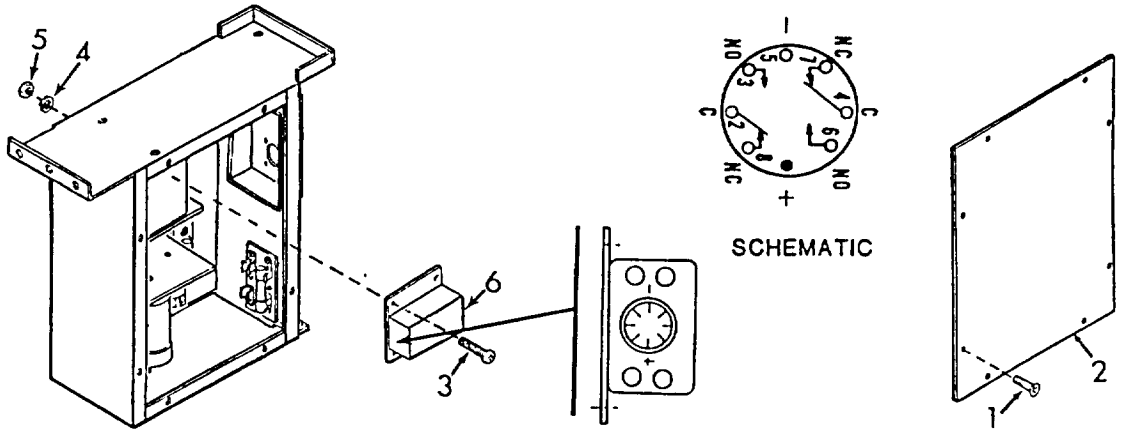
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove eight screws (1) from junction box cover (2) and remove cover (2).

2. Tag and disconnect wire leads.

3. Using screw driver and wrench, remove four screws (3), nuts (5) and washers (4) and remove relay (6).



4-50. Time Delay Relay (K6) (cont)

INSPECTION

1. Check for loose, corroded, missing, or broken terminal connections.
2. Check relay for cracks, evidence of overheating, and other visible damage and replace if damaged.

TESTING

1. Using a multimeter, check continuity.
   a. Terminal 1 to 5 - continuity should be indicated.
   b. Terminal 2 to 3 - continuity should not be indicated.
   c. Terminal 4 to 6 - continuity should not be indicated.
2. Apply 24 volts dc to terminals 1 (+) and 5(-) and check continuity across terminals 2 and 3 and terminals 4 and 6. After a 30 second time delay continuity should be indicated.
3. Replace time delay relay if it fails any of the above tests.

INSPECTION

1. Using screwdriver and wrench, secure relay (6) with four screws (3), lock washers (4) and nuts (5).
2. See tags and wiring diagram, para 4-13, and connect wire leads.
3. Remove tags.
4. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:
1. Install junction box number two. See para 4-46.
2. Connect power.

4-51. Control Relay (K10)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

2. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

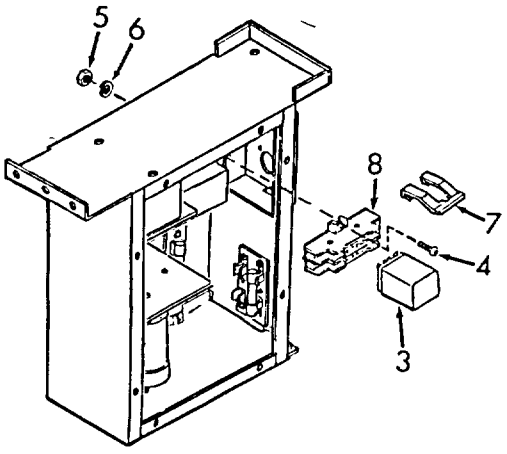
REMOVAL

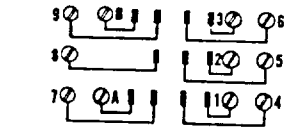
1. Using screwdriver, remove eight screws (1) from junction box cover and remove cover (2).

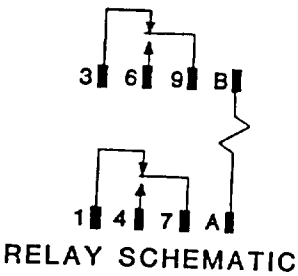
2. Release relay hold down spring (7) ends from relay (3).

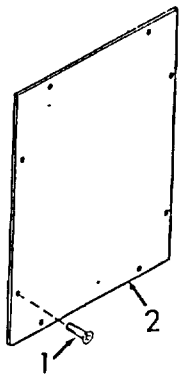
3. Pull control relay (3) from socket (8).

4. Using screwdriver and wrench, remove two screws (4), washers (6), nuts (5) and relay hold down springs (7) from socket.









4-51. Control Relay (K10) (cont)

5. Tag and remove leads.

6. Remove socket (8).

INSPECTION

1. Check that relay and socket are not cracked or broken.

2. Check that contacts are not corroded, loose, bent, or missing.

3. Check that wire leads to socket are not damaged, loose, or missing and that they are properly connected. See wiring diagram, para 4-13.

TESTING

1. Using a multimeter set on lowest OHMS scale, check continuity.

   a. Continuity should be indicated across the following contacts-A to B, 1 to 7, 3 to 9.

   b. Continuity should not be indicated across the following contacts-1 to 4, 3 to 6.

   c. Apply 208 VAC, 60 HZ across terminals A and B.

   d. Continuity should be indicated across contacts-4 to 7, 6 to 9.

   e. Continuity should not be indicated across contacts-1 to 4, 3 to 6.

2. Replace relay if it fails above tests.

3. Using a multimeter and relay base schematic, check continuity between contacts and terminals of control relay socket.

INSTALLATION

1. See tags and wiring diagram, para 4-13, and connect leads to relay socket.

2. Clip relay hold down springs (7) onto relay socket (8).

3. Using screwdriver and wrench, secure relay socket (8) and hold down springs (7) with two screws (4), washers (6) and nuts (5).

4. Align relay and socket contacts and push relay (3) firmly into socket (8) and hold down springs (7).

5. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. Install junction box number two. See para 4-46.
2. Connect power.

4-52. Rectifier (CR)

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove junction box number two. See para 4-46.

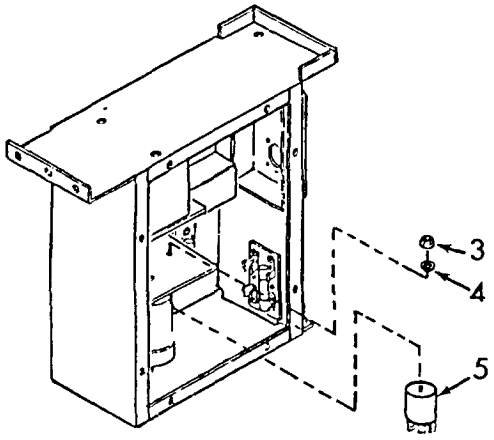
General Safety Instructions:

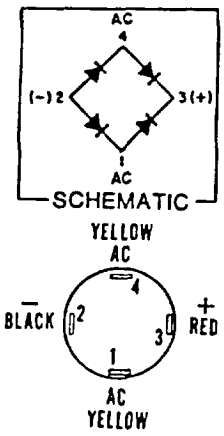
WARNING

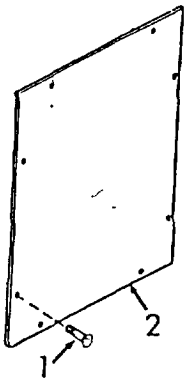
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove eight screws (1) from junction box cover and remove cover (2).
2. Tag and remove rectifier leads.
3. Using wrench, remove nut (3) and lock washer (4) from rectifier stud and remove rectifier (5).







4-52. Rectifier (CR) (cont)

INSPECTION/TESTING

1. Check that wire leads are properly connected to rectifier and are not damaged. See wiring diagram, para 4-13.

2. If rectifier is suspected bad, tag and remove rectifier leads.

3. Use a continuity tester or a multimeter set on the lowest OHMS scale to test for continuity between each of the four rectifier terminals and the mounting plate. If continuity is found between any rectifier terminal and the mounting plate, replace the rectifier.

4. Use a multimeter set on lowest OHMS scale to test resistance across rectifier bridge in accordance with the following table. If resistance is different from that indicated in table, replace rectifier.

Table 4-4. Rectifier Test

Meter Lead		Resistance
Neg	Pos	
Term. 1	Term. 2	20 ohms or less
Term. 1	Term. 3	1000 ohms or more
Term. 2	Term. 1	1000 ohms or more
Term. 2	Term. 4	1000 ohms or more
Term. 4	Term. 2	20 ohms or less
Term. 4	Term. 3	1000 ohms or more
Term. 3	Term. 1	20 ohms or less
Term. 3	Term. 4	20 ohms or less
Term. 1	Term. 4	1000 ohms or more
Term. 4	Term. 1	1000 ohms or more
Term. 2	Term. 3	1000 ohms or more
Term. 3	Term. 2	80 ohms or less

NOTE

A diode bridge will sometimes act differently under a power test than resistance tests indicate. To perform a power test, apply 28 volts ac across terminals 1 and 4 to test output voltage. The meter should read 24 ± 5 volts do across terminals 2 and 3. If output voltage is not within limits, replace rectifier.

INSTALLATION

1. Insert rectifier (5) mounting stud through hole in rectifier bracket and secure with nut (3) and lock washer (4).

2. Replace leads and remove tags.

3. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:
1. Install junction box number two. See para 4-46.
2. Connect power.

4-53. RFI (Radio Frequency Interference) Filters (FL1, FL2, FL3 and FL4)

This task covers:

a. Removal
b. Inspection/Testing
c. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove junction box number two. See para 4-46.

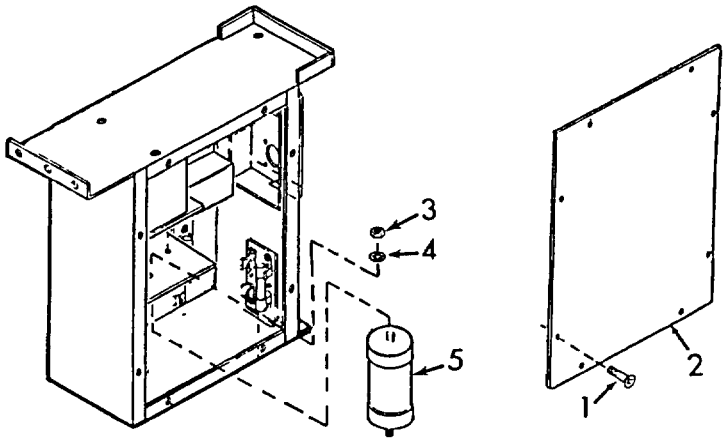
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove eight screws (1) from junction box cover and remove cover (2).
2. Tag and unsolder electrical leads.
3. Using wrench, remove four nuts (3) and lock washers (4) which hold the four filters (5) to the filter bracket.



4-53. RFI (Radio Frequency Interference) Filters (FL1, FL2, FL3 and FL4) (cont)

INSPECTION/TESTING

1. Check wire leads for cut or frayed insulation and cut or broken wires.
2. Use a continuity tester or a multimeter set on the lowest OHMS scale to test each filter. If continuity is not found, replace the affected filter.

INSTALLATION

1. Using wrench, secure filter (5) to bracket with four washers (4) and nuts (3).
2. Using tags and wiring diagram, para 4-13, solder leads to filters.
3. Using screwdriver, install cover (2) with eight screws (1).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Connect power.**

4-54. Unit Wiring Harnesses

This task covers:
a. Inspection/Testing
b. Repair

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove top panel. See para 4-25.
3. Remove conditioned air inlet grilles. See para 4-22.
4. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION/TESTING

1. Check connectors for general condition and loose, broken, or missing contacts. Replace damaged connectors.

2. Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.

3. See wiring diagram, para 4-13, and continuity test individual wires. Repair or replace wires with no continuity.

REPAIR

1. See paragraph 4-34 for general wire repair instructions.

2. See table 4-3 for wire lengths and terminal/connector information.

NOTE

FOLLOW ON MAINTENANCE:
1. **Install top panel. See para 4-25.**
2. **Install conditioned air inlet grilles. See para 4-22.**
3. **Install lower front panel. See para 4-24.**
4. **Connect power.**

4-55. Evaporator Fans

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 2

Materials: Rags (Appendix E, item 9)

Equipment condition:

1. Turn unit power off at power source. if there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove top panel. See para 4-25.
3. Remove conditioned air filters. See para 4-30.
4. Remove conditioned air inlet grilles. See para 4-22.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Disconnect motor cable connector (1).

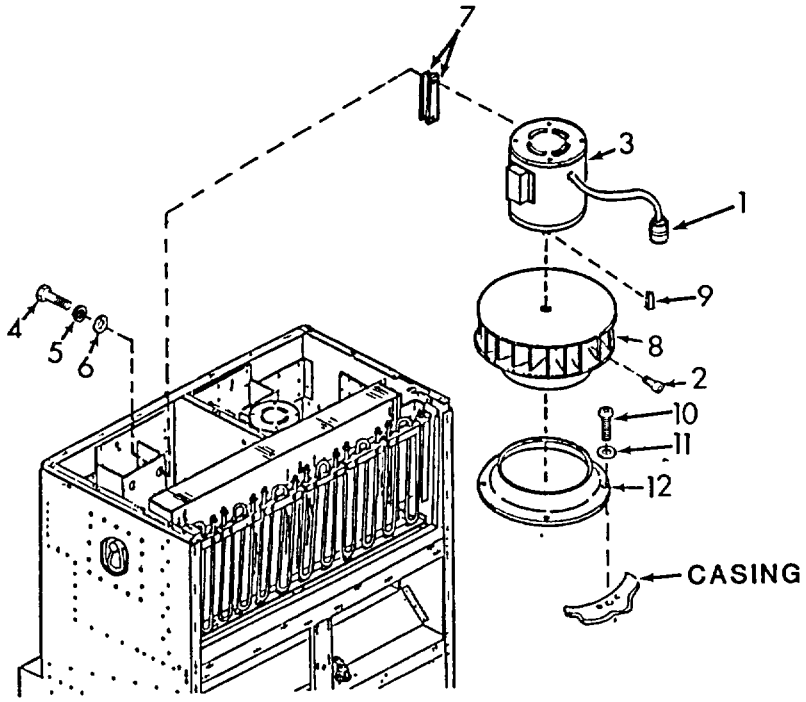
NOTE

Fan and motor cannot be removed together as an assembly. Take care that fans and coil are not damaged.

2. Using wrench, loosen two setscrews (2) in fan hub.
3. Support or hold motor (3) as hardware is removed.
4. Note the number and location of shims prior to removing hardware in next step.
5. Remove four screws (4), four flat washers (6), four lock washers (5), and shims (7) from each motor (3) to be removed.
6. Carefully lift motor (3) from unit.
7. Carefully lift fan (8) from unit.

4-55. Evaporator Fans (cont)

8. If necessary to remove inlet bell (12), using screwdriver, remove four screws (10) and washers (11) and inlet bell.



CLEANING

1. Use a clean dry cloth and a soft brush to remove dirt from fans.
2. If fans and inlet bells are excessively dirty, wash them with a mild detergent and water solution.

INSPECTION

1. Check fans for dents, bent or loose fan blades, and that hub is securely attached. Replace if damaged.
2. Check inlet bell for dents or any distortion that would cause interference with fans. Replace if damaged.
3. If a motor problem is suspected, inspect or test motors in accordance with para 4-56.

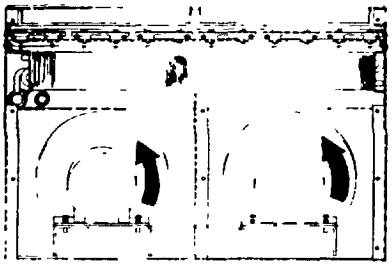
INSTALLATION

1. Using screwdriver, secure evaporator inlet bell (12) with four screws (10) and washers (11).
2. Check to see that key (9) is in place on motor shaft (3).

4-55. Evaporator Fans (cont)

CAUTION

The fans are identical parts. They rotate in the same direction. (Similar units have counter rotating fans). Check rotation arrow on fan.



3. Place fan (8) in unit and slip motor (3) shaft down and into fan (8).
4. Align motor mounting holes and reinstall shims (7) in same location as noted in step 4 of REMOVAL.
5. Using wrench, secure motor (3) with four screws (4), lock washers (5), flat washers (6), and shims (7).
6. Adjust fan (8) so that there is 0.03 inches of clearance between fan (8) and inlet bell (12).
7. Tighten setscrews (2).
8. Check that fan (8) is centered on inlet bell (12). If it is not, loosen mounting hardware and adjust as necessary. Retighten mounting hardware.
9. Spin fan (8) and check that there is no interference with inlet bell (12).
10. Connect motor cable connector (1).

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

11. Connect power and turn mode selector switch to VENT. Check that fans are rotating in the proper direction.
12. Turn unit OFF.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install top panel. See para 4-25.**
2. **Install conditioned air filters. See para 4-30.**
3. **Install conditioned air inlet grilles. See para 4-22.**

4-56. Evaporator Fan Motors (B3A and B3B)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 2

Materials: Rags NSN 7920-00-205-1711

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove top panel. See para 4-25.
3. Remove conditioned air filters. See para 4-30.
4. Remove conditioned air inlet grilles. See para 4-22.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

TESTING (INSTALLED)

1. Check to see that power has been disconnected.

2. Check motor for rotational freedom by spinning fan. If there is any stiffness or binding, contact Intermediate Direct Support Maintenance.

3. Check motor bearing for lateral or end play. If there is excessive lateral or end play, contact Intermediate Direct Support Maintenance.

4. Electrically test motor as follows.

   (a) Disconnect motor cable connector.

   (b) Use a multimeter set on lowest OHMS scale to check continuity between A and B, A and C, and B and C in connector. If there is no continuity between any pairs of pins, the motor winding is open. Replace motor.

   (c) Use a multimeter set on lowest OHMS scale to check for continuity between each pin in connector (A, B, and C) and the motor housing. If there is continuity between any pin and the motor housing, the motor winding is shorted, replace motor.

4-56. Evaporator Fan Motors (B3A and B3B) (cont)

(d) Use a multimeter set on high OHMS scale to test stator insulation by checking between each pin in connector (A, B, and C) and the motor housing. A reading of less than 500,000 ohms indicates insulation failure. Replace motor.

NOTE

If all the above inspections and tests are satisfactory, but the motor will still not operate properly, notify Intermediate Direct Support Maintenance, who may desire to make further tests before it is removed.

REMOVAL/INSTALLATION

Go to para 4-55 for installation and removal of motors and fans.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install top panel. See para 4-25.**
2. **Install conditioned air filters. See para 4-30.**
3. **Install conditioned air inlet grilles. See para 4-22.**

4-57. Heater Thermostat (S3)

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove mist eliminator. See para 4-32.

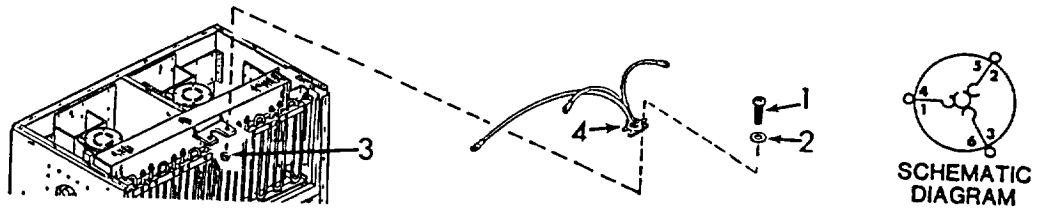
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Tag and disconnect leads.
2. Using screwdriver and wrench, remove two screws (1), washers (2), and nuts (3).
3. Remove thermostat (4).



TESTING

1. With thermostat at room temperature, use a multimeter set on the lowest OHMS scale to check for continuity between each pair of contacts (4 and 6, 4 and 5, and 5 and 6).
2. If continuity is not indicated between all contacts, replace the thermostat.

4-57. Heater Thermostat (S3) (cont)

NOTE

For full operational test of thermostat use an external heat source. Thermostat should open (no continuity across contacts) at temperature increase of 194° F ± 9° (90°C ± 5°) and close at temperature decrease at 142° F ± 16° (61°C ± 9°).

INSTALLATION

1. Using screwdriver and wrench, secure thermostat (4) to bracket with two screws (1), washers (2), and nuts (3).
2. See tags and wiring diagram, para 4-13, and connect wire leads.
3. Remove tags.
4. Carefully tie wires so that they cannot contact heaters.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install mist eliminator. See para 4-32.**
2. **Connect power.**

4-58. Heater Elements (HR1 thru HR6)

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove mist eliminator. See para 4-32.

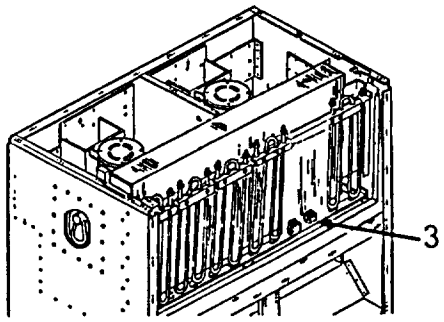
General Safety Instructions:

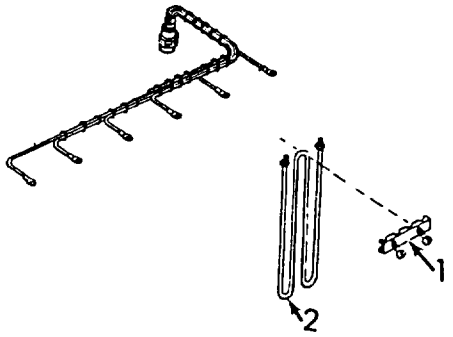
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Tag and disconnect the leads from the heater that is being removed.
2. Using screwdriver, loosen the two captive fasteners in the retainer channel (1).
3. Pull heater element (2) free of lower mounting clip (3) and remove heating element.





4-58. Heater Elements (HR1 thru HR6) (cont)

INSPECTION/TESTING

1. Check heater elements for damaged terminal threads and cracked or deformed outside covering. Replace if damaged.

2. Using a multimeter set on lowest OHMS scale, check for continuity between the two terminal studs. Replace heater if no continuity is indicated.

INSTALLATION

1. Insert heater element (2) into lower mounting clip (3).

2. Using screwdriver, secure top of heater with retainer channel (1) by tightening the two captive fasteners.

3. See tag and wiring diagram, para 4-13, and connect wire leads.

4. Remove tags.

5. Carefully tie wires so they cannot contact heaters.

NOTE

FOLLOW ON MAINTENANCE:

1. Install mist eliminator. See para 4-32.
2. Connect power.

4-59. Condenser Fans

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Material:

Rags (Appendix E, item 9)

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove condenser fan covers. See para 4-26.

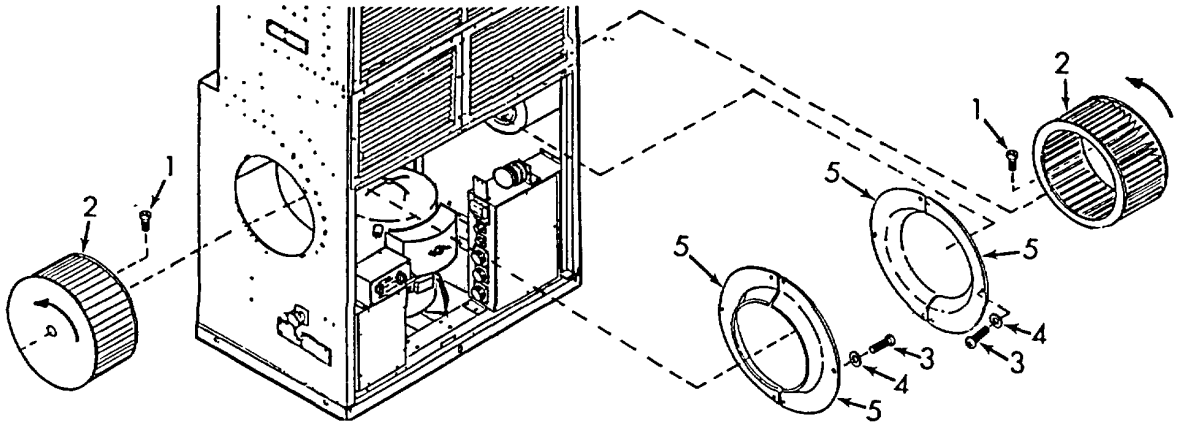
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using allen wrench, loosen two setscrews (1) in each fan (2).
2. Remove fans (2).
3. Using screwdriver, remove six screws (3) and washers (4) from each set of inlet rings (5)
4. Remove inlet rings (5).



4-59. Condenser Fans (cont)

CLEANING

1. Use a clean dry cloth and a soft brush to remove dirt from fans.
2. If fans and inlet rings are excessively dirty, wash them with a mild detergent and water solution.

INSPECTION

1. Check fans for dents, bent or loose blades, and that hub is securely attached. Replace if damaged.
2. Check inlet rings for dents or any distortion that would cause interference with fans. Replace if damaged.
3. If a motor problem is suspected, inspect or test motors in accordance with paragraph 4-60.

INSTALLATION

NOTE

The fans are not identical parts. Take care that fans are installed on correct side. See rotation arrow on fan.

1. Align setscrews (1) with flats on motor shaft and slip fans (2) onto motor shaft.
2. Center fans (2) in fan housings.
3. Using alien wrench, tighten two setscrews (1) in each fan hub.
4. Using screwdriver, secure inlet rings (5) with six screws (3) and washers (4).

NOTE

FOLLOW ON MAINTENANCE:
1. Install condenser fan covers. See para 4-26.

4-60. Condenser Fan Motor (B2)

This task covers:

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

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Multimeter NSN 6625-00-553-0142

Personnel: 2

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove condenser fans. See para 4-59.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION/TESTING (INSTALLED)

1. Check motor for rotational freedom by spinning fans. If there is any stiffness or binding, contact Intermediate Direct Support Maintenance.

2. Check motor bearings for lateral or end play. If there is excessive lateral or end play, contact Intermediate Direct Support Maintenance.

3. Electrically test motor at connector J2 as follows.

   a. Disconnect motor cable connector P2.

   b. Use a multimeter set on lowest OHMS scale to check continuity between pins A and B, A and C, and B and C in the connector. If there is no continuity between any pair of pins, the motor winding is open. Replace motor.

   c. Use a multimeter set on lowest OHMS scale to check for continuity between each pin in connector (A, B, and C) and the motor housing. If there is continuity between any pin and motor housing, the motor winding is shorted. Replace motor.

   d. Use a multimeter set on high OHMS scale to test stator insulation by checking between each pin in connector (A, B, and C) and the motor housing. A reading of less than 500,000 ohms indicates insulation failure. Replace motor.

   e. Check continuity between pins D and E. If there is no continuity, this indicates an open thermostat. Contact Intermediate Direct Support Maintenance.

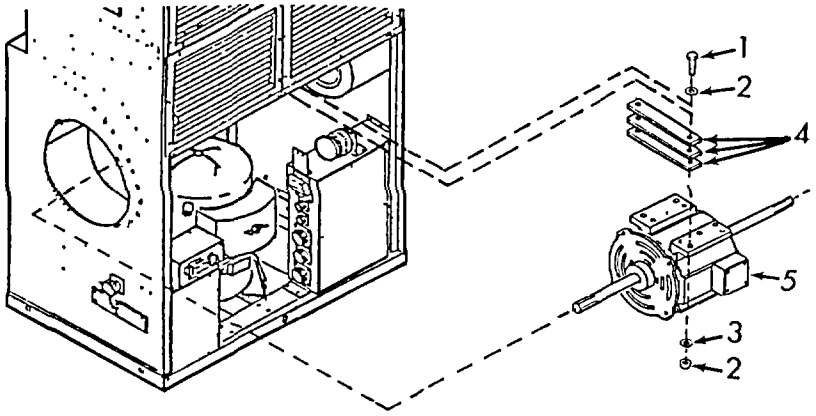
4-60. Condenser Fan Motor (B2) (cont)

NOTE

If all of the above inspections and tests are satisfactory, but the motor will still not operate properly, notify Intermediate Direct Support Maintenance, who may desire to make further tests before the motor is removed.

REMOVAL

1. Disconnect motor cable connector.
2. Support or hold motor (5) in place.
3. Note quantity and location f shims prior to removing hardware in net step
4. Using two wrenches, remove four cap screws (1), washers (3), nuts (2), and shims (4) from the motor (5) mount.
5. Lift motor (5) through one of the condenser fan openings.



INSTALLATION

1. Lift motor (5) into position through one of the condenser fan openings.
2. Align motor mounting holes and reinstall shims (4) in same location as noted in step 3 of REMOVAL.
3. Using two wrenches, secure motor (5) and shim (4) to mount with four cap screws (1), washers (3), and nuts (2).
4. Install fans. See para 4-59.
5. Spin fans and check for interference. Adjust fans in or out on shaft. Adjust motor front to rear by loosening mounting screws.
6. Connect P2 harness connector to motor.

4-60. Condenser Fan Motor (B2) (cont)

NOTE

FOLLOW ON MAINTENANCE:

1. **Install condenser fan covers. See para 4-26.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

4-61. Solenoid Valve (K3 and K4) Coil Removal

This task covers:
a. Testing
b. Repair/Replace

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Material: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

The following instructions apply to both solenoid valves.

TESTING

1. Disconnect wiring harness connector from connector on solenoid valve.

2. Using a continuity tester or a multimeter set on lowest OHMS scale to check for continuity between pins 1 and 2 on solenoid valve. If continuity is not found, coil is open and must be replaced.

3. Use continuity tester or multimeter to check for continuity between each pin in connector and the coil casing. If continuity is found between either pin and the case, coil is grounded and must be replaced.

4. If continuity checks are satisfactory, apply 24 volts dc from an external power supply across pins 1 and 2 in connector, and listen for a sharp click when valve changes position. If a click is not heard, internal valve problems are indicated. Contact Intermediate Direct Support Maintenance for further action.

REPAIR/REPLACE

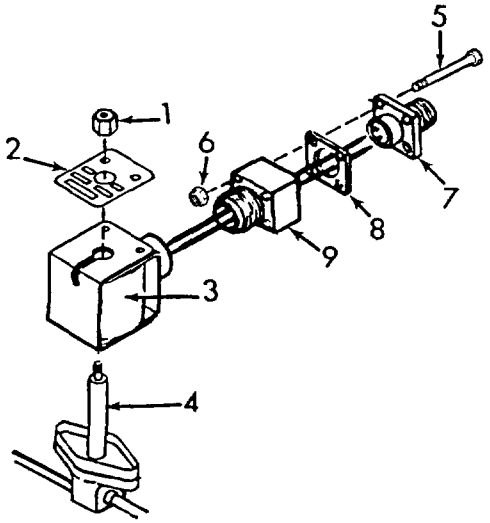
The repairs are limited to coil replacement only. Refer all other solenoid repair replacement to Intermediate Direct Support Maintenance.

4-61. Solenoid Valve (K3 and K4) Coil Removal (cont)

WARNING

Do not attempt any disassembly of the solenoid valve, other than coil removal, with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if the screws that attach the tube and plunger assembly to the valve body are loosened.

1. Remove wiring harness connector from connector or solenoid valve.
2. Remove nut (1) that attaches nameplate (2) and coil (3) to valve body (4), and remove coil and connector assembly.
3. Remove four screws (5) and nuts (6) that attach connector (7) to adapter (9) on coil.
4. Pull connector (7) away from adapter (9), unsolder coil leads from pins in connector (7) and remove connector (7) and gasket (8).
5. Remove adapter (9) from coil casing (3).
6. Feed leads of new coil through adapter (9), and then install adapter on coil casing (3).
7. Feed coil leads through gasket (8), solder them to pins in connector (7), then install gasket (8), connector (7), and four attaching screws (5) and nuts (6) on adapter (9).
8. Install coil and connector assembly, nameplate (2) and attaching nut (1) on valve body (4).



NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Connect power.**

4-62. Evaporator Coil Cleaning

This task covers:
a. Inspection
b. Cleaning

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Brush, Bristle NSN 7520-00-223-8000

Personnel: 1

Material: Rags, (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove mist eliminator. See para 4-32.

General Safety Instructions:

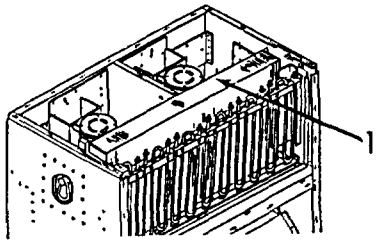
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check for accumulated dirt. Clean if dirt is evident.

2. Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb. If a leak or major damage is evident, refer to Intermediate Direct Support Maintenance.



4-62. Evaporator Coil Cleaning (cont)

CLEANING

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2).
Do not direct compressed air against the skin. Use goggles or full face shield.

CAUTION

Do not use steam to clean coil.

Clean coil (1) with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install Mist Eliminator. See para 4-32.**
2. **Connect power.**

4-63. Condenser Coil Cleaning

This task covers:
a. Inspection
b. Cleaning

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Brush, Bristle NSN 7520-00-223-8000

Personnel: 1

Material: Rags, (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove condenser coil guard. See para 4-28.

General Safety Instructions:

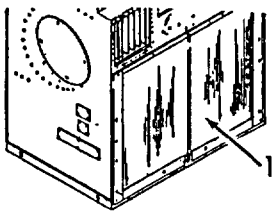
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check for accumulated dirt. Clean If dirt is evident.

2. Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb. If a leak or major damage is evident, refer to Intermediate Direct Support Maintenance.



4-63. Condenser Coil Cleaning (cont)

CLEANING

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2).
Do not direct compressed air against the skin. Use goggles or full face shield.

CAUTION

Do not use steam to clean coil.

Clean coil (1) with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes. Clean if dirt is evident.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install condenser coil guard. See para 4-28.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

4-64. Condensate Trap and Drain Tubes

This task covers:

a. Removal
b. Inspection
c; Cleaning
d. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Material: Rags, (Appendix E, item 9)

Equipment condition:

1. Turn unit power off at power source. If there is a chance that It will be turned on, also disconnect power cable to air conditioner.
2. Remove junction box number one. See para 4-40.
3. Remove mist eliminator. See para 4-32.

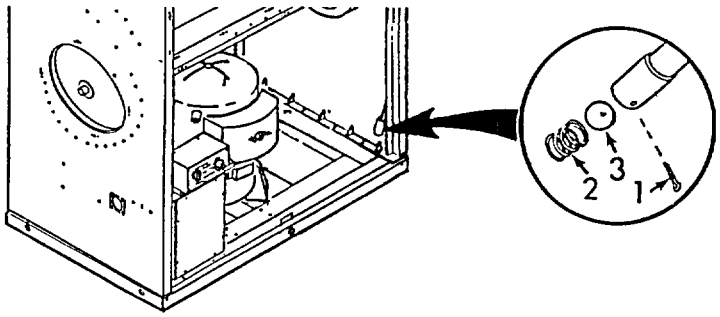
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using pliers, remove cotter pin (1).
2. Remove spring (2) and ball.



INSPECTION

1. Check ball, spring,} and cotter pin for nicks and wear.
2. Replace ball if it is nicked or has any damage that would keep it from sealing properly.
3. Replace spring if it is worn or has any damage that would keep it from applying pressure to ball.

4-64. Condensate Trap and Drain Tubes (cont)

CLEANING

1. Pour some clean fresh water into condensate drip pan.
2. If water does not flow out of the end of the drain tube or has a muddy appearance, insert a flexible wire up the drain tube. Agitate until clog and accumulated debris are loose.
3. Pour additional water in the drip pan until an unrestricted flow of clean water pours from the end of the drain tube.
4. Be sure that the ball seat (end of drain tube where ball and spring are inserted) are clean.

INSTALLATION

1. Insert ball (3) and spring (2). Be sure that ball is above spring.
2. Depress spring (2) with screwdriver far enough to install cotter pin (1).
3. Secure cotter pin (1).

NOTE

FOLLOW ON MAINTENANCE:

1. **Install mist eliminator. See para 4-32.**
2. **Install junction box number one. See para 4-40.**
3. **Connect power.**

4-65. Block Off Assembly

NOTE

This part is supplied only when specified on air conditioner ordering information.

NOTE

This paragraph is applicable only to units with remote mounted control panels. See paragraph 4-7, installation instructions, and your facility or shelter manual.

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-597-1474

Personnel: 1

Material: Rags, (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

General Safety Instructions:

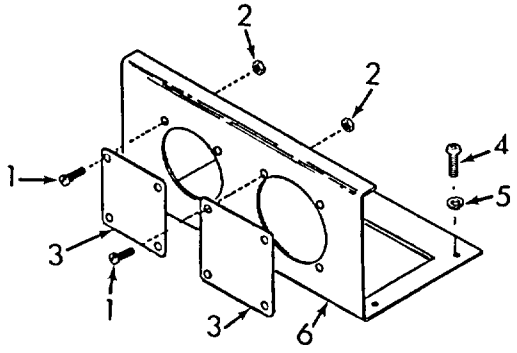
WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. If connectors are installed, use a screwdriver and wrench to remove four screws and nuts from each connector.

2. Pull connectors from block off panel.



4-65. Block Off Assembly (cont)

3. Using a screwdriver, remove four screws (4) and lock washers (5) from block off panel.

4. Remove block off panel (6).

INSPECTION

1. Check block off for missing parts, loose hardware, and crack or dents that would create a hazard or interfere with operation.

NOTE

If the alternate power and control connector locations in the conditioned air intake are used, both cover plates should be installed on block off.

2. Replace all missing or damaged parts.

INSTALLATION

1. If applicable, use screwdriver and wrench to secure P8 connector and harness with four screws and nuts.

2. If applicable install power connector.

3. Using screwdriver secure block off (6) to air conditioner with four screws (4) and lock washers (5).

NOTE

FOLLOW ON MAINTENANCE:
1. Install lower front panel. See para 4-24.
2. Connect power.

4-65.1. 16 Inch Adapter Duct (Model F60T-2HS Only)

NOTE

This part is supplied only when specified on air conditioner ordering information.

NOTE

This paragraph is applicable only to model F60T-2HS units.

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Replace
e. Installation

Initial setup.

Tools:

Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:

Turn unit power off at power source. If there is a chance that It will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver, remove twenty eight screws (1) and flat washers (2).
2. Remove adapter duct (3).

CLEANING

Wipe or vacuum all dust and dirt off duct and inside surfaces. Be careful not to damage gaskets and insulation.

4-65.1. 16 Inch Adapter Duct (Model F60T-2HS Only) (cont)

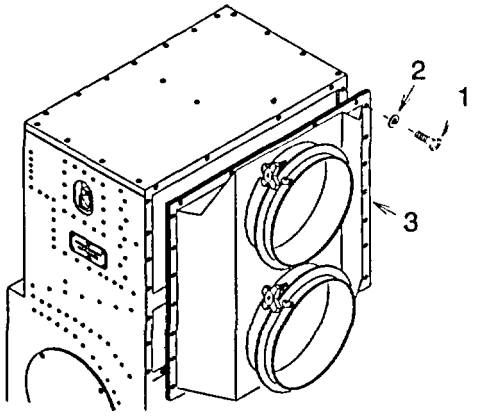


Figure 4-65.1. 16 Inch Adapter Duct

INSPECTION

1. Check that duct is not bent, cracked, or punctured.
2. Check that gaskets and insulation are not torn, loose, or missing.
3. Check that duct connector catches are in place and in good condition.
4. Refer repair of panel, gaskets, catches, and insulation to Intermediate Direct Support Maintenance.

REPLACE

For damage of greater extent, replace entire duct adapter.

INSTALLATION

1. Align mounting holes with casing fasteners.
2. Using screwdriver, secure adapter duct (3) with twenty eight screws (1) and flat washers (2). The center top two screws may be replaced with 10-32 x 0.75 lg hex head screws (MS51849-66 or equal) to ease installation.

NOTE

FOLLOW ON MAINTENANCE:
Connect power.

Section VII PREPARATION FOR STORAGE OR SHIPMENT

4-66. Preparation for Storage or Shipment.

a. ***Administrative storage of equipment.*** See TM740-90-1. Administrative storage is short term storage - 1 to 45 days. It covers storage of equipment which can be readied for mission performance within 24 hours. Before placing an item in administrative storage, the next scheduled preventive maintenance checks and services should be performed, all known deficiencies corrected, and all current modification work orders applied. The administrative storage site should provide protection from the elements and allow access for visual inspection when applicable.

(1) Unroll the fabric cover.

(2) Snap the cover in place.

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.*** There is no time limit for this type of storage.

(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 per standard Army procedures.

CHAPTER 5

INTERMEDIATE DIRECT SUPPORT MAINTENANCE

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-1. General. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

a. ***Special Tools.*** Test, Maintenance, and Diagnostic Equipment (TMDE) and support equipment include electrical test equipment, standard pressure and vacuum gages, vacuum pumps, and charging manifolds found as standard equipment in any direct support refrigeration shop.

b. ***Repair Parts.*** Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 5-4120-393-24P, covering Unit, Intermediate Direct Support, and Intermediate General Support Maintenance for this equipment.

c. ***Refrigeration Unit Tool Kit.*** Tool Kit, Service, Refrigeration Unit, NSN 5180-00-597-1474, contains hand tools and equipment used for air conditioner maintenance. The following common items not contained in the refrigeration unit tool kit are also required for air conditioner maintenance: Soldering Gun Kit (NSN 3439-00-930-1638) and Vacuum Pump (NSN 4310-00-098-5272).

Section II MAINTENANCE PROCEDURES

5-2. Fabric Cover. For removal, inspection, lubrication, cleaning and installation, see para 4-27.

a. ***Repair.*** Minor rips, cuts, tears, or punctures may be repaired by applying a patch to the inside surface.

b. ***Replace.*** For damage of greater extent, or missing eyelets, or snap fasteners, replace the entire cover.

5-3. Outside Covers, Panels, Grilles, Screens, and Information Plates. For removal, inspection, cleaning, and installation, see the following paragraphs.

a. ***CBR (Chemical, Biological, Radiological) Cover.*** See para 4-29.

b. ***Condenser Fan Covers.*** See para 4-26.

c. ***Connector Cover Plates.*** See para 4-23.

d. ***Top Panel.*** See para 4-25.

e. ***Lower Front Panel.*** See para 4-24.

f. ***Condenser Coil Guard.*** See para 4-28.

g. ***Conditioned Air Outlet Grille.*** See para 4-21.

h. ***Conditioned Air Intake Grilles.*** See para 4-22.

i. ***Repair.*** Repairs are limited to straightening of minor dents, rewelding of broken welds, installation of loose or missing rivets, replacement of loose or missing gaskets and insulation, paint touch up, and replacement of damaged or missing name plates.

(1) *Minor Dents.* Repair minor dents using standard sheet metal repair practices.

(2) *Broken Welds.* Repair broken welds using standard weld repair practices.

(3) *Rivets.* To replace loose or missing rivets, drill old rivet out using a drill bit slightly smaller than the diameter of old rivet body, and install replacement rivet.

(4) *Gasket/Insulation.* To replace or repair gasket or insulation:

(a) Remove as much old gasket or insulation material as possible by pulling or scraping it away from the metal surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

(b) Soften and remove old adhesive and gasket and insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

(c) Coat the mating surfaces of the metal and gasket or insulation (if applicable) with adhesive (Appendix E, item 2). Let both surfaces dry until the adhesive is tacky but will not stick to fingers.

(d) Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

(5) *Touch Up*. Should touch up or refinishing be necessary, see TM 43-0139, Painting Instructions for Field Use.

(6) *Name Plates*. To replace damaged or missing name plates, drill rivets out using a drill bit slightly smaller than the diameter of the rivet body, and secure new name plate with replacement rivets.

5-4. Evaporator Fan Motors (B3A and B3B) (Keco Industries Model)

This task covers:
a. Disassembly
b. Repair

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Material:
Solder (Appendix E, item 3)
Oil, (Appendix E, item 14)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove motor. See para 4-56.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

For testing, removal, and installation see para 4-56.

REPAIR

Intermediate Direct Support Maintenance repair of the evaporator fan motor is limited to the replacement of the electrical plug, thermostat, and bearings.

DISASSEMBLY

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

2. To replace electrical plug (1):

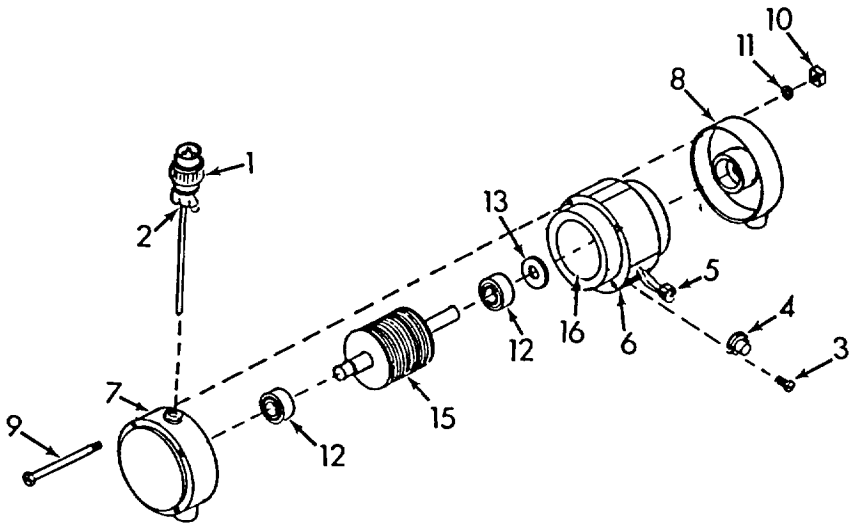
   a. Loosen cable clamp (2).

   b. Tag and unsolder leads.

   c. Remove old connector (1).

   d. See wiring diagram (para 4-13) and tags and solder leads to new connector.

5-4. Evaporator Fan Motors (B3A and B3B) (Keco Industries Model) (cont)



e. Remove tags.

f. Secure cable clamp (2).

3. To replace thermal protector:

a. Using screwdriver, remove two screws (3) from cover (4).

b. Remove cover (4).

c. Pull thermostat (5) away from motor.

d. Tag and disconnect leads to the thermostat (5).

e. Remove old thermostat (5).

f. See tags and connect leads to new thermostat (5).

g. Remove tags.

h. Position thermostat.

i. Using screwdriver, secure cover (4) with two screws (3).

4. To replace bearings:

a. Match-mark motor frame (6) and both end shield assemblies (7) and (8) to ease reassembly.

b. Using screwdriver and wrench, remove four screws (9), nuts (10), and lock washers (11) from each end shield assembly.

c. Carefully separate end shields (7) and (8) from motor frame (6). Use a brass or plastic bar and hammer and tap end shields away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end shields loose.

d. Remove end shield assemblies.

5-4. Evaporator Fan Motors (B3A and B3B) (Keco Industries Model) (cont)

e. Pull or carefully drive bearings (12) off of rotor assembly. Note location and retain wavy spring washer(s) (13) and thrust washers (14) for use at reassembly if not damaged.

f. Examine rotor (15), stator (16), and shafts for nicks, gouges, deformations, and evidence of overheating.

g. Dress high metal defects in shafts with a fine file or stone. If rotor or stator is beyond repair, replace motor.

h. Coat shaft surfaces with oil.

i. Coat the bearing cavity of each end shield, (7) and (8), with oil and insert thrust washers (14), wavy spring washers (13), and bearings (12) in same locations as removed from in step (e) above.

j. Carefully work end shield assemblies (7) and (8) onto shaft ends keeping the match-marks made at time of disassembly in alignment.

k. Carefully align mounting holes.

l. Using screwdriver, secure end shields (7) and (8) with four screws (9), nuts (10) and lock washers (11). Before final tightening of screws, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

m. Check end play of shaft. End play should be 0.003 inch. If end play is not within limits, disassemble motor and add or remove bearing thrust washers to adjust.

n. Install motor. See para 4-56.

NOTE: Pages 5-7 through 5-8.1 have been deleted.

5-5. Evaporator Fan Motors (B3A and B3B) (Welco Industries Model)

This task covers:
a. Repair
b. Disassembly

Initial setup.

Tools
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials:
Solder (Appendix E, item 3)
Oil (Appendix E, item 14)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove motor. See para 4-56.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

For testing, removal, and installation see para 4-56.

REPAIR

Intermediate Direct Support Maintenance repair of the evaporator fan motor is limited to the replacement of the electrical plug, thermostat, and bearings.

DISASSEMBLY

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

2. To replace electrical plug (1):

   a. Loosen cable clamp (2).

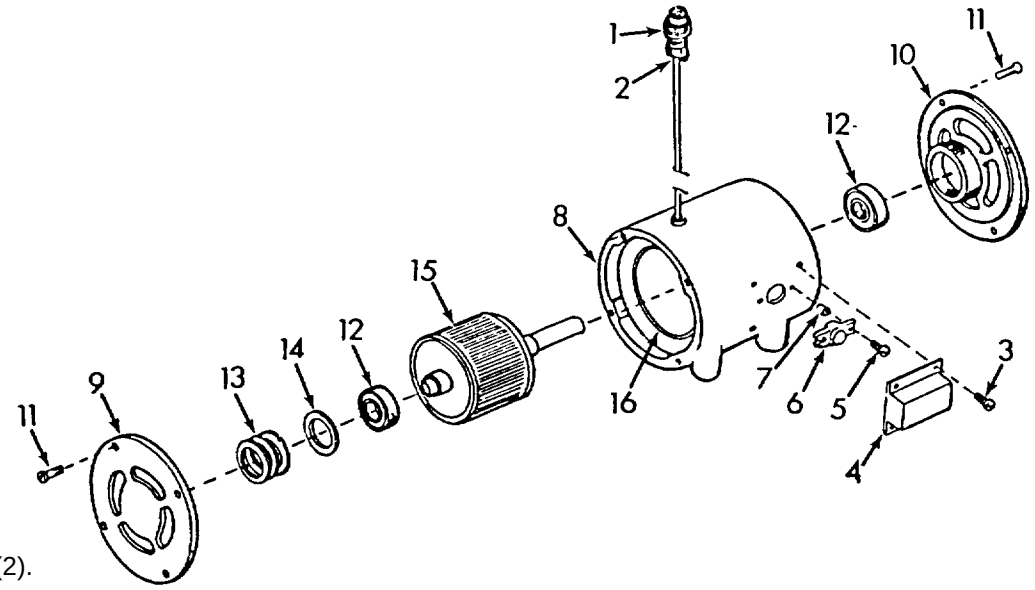
   b. Tag and unsolder leads.

   c. Remove old connector (1).

   d. See wiring diagram (para 4-13) and tags and solder leads to new connector (1).

   e. Remove tags.

5-5. Evaporator Fan Motors (B3A and B3B) (Welco Industries Model) (cont)



f. Secure cable clamp (2).

3. To replace thermostat:

   a. Using screwdriver, remove four screws (3) from cover (4).

   b. Remove cover (4).

   c. Using screwdriver, remove two screws (5) and spacers (7).

   d. Pull thermostat (6) away from motor.

   e. Tag and disconnect leads to the thermostat (6).

   f. Remove old thermostat (6).

   g. See tags and connect leads to new thermostat (6).

   h. Remove tags.

   i. Using screwdriver, secure thermostat (6) with two screws (5) and spacer (7).

   j. Using screwdriver, secure cover (4) with four screws (3).

4. To replace bearings:

   a. Match-mark motor frame (8) and both end brackets (9) and (10) to ease reassembly.

   b. Using screwdriver, remove four screws (11) from each end bracket (9) and (10).

   c. Carefully separate end brackets (9) and (10) from motor frame. Use a brass or plastic bar and hammer and tap end brackets away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end brackets loose.

5-5.1. Evaporator Fan Motors (B3A and B3B) (Reliance Electric Model) (F60T-2HS Only)

This task covers:
a. Repair
b. Disassembly

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials:
Solder (Appendix E, item 3)
Oil, (Appendix E, item 14)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove motor. See para 4-56.

General Safety Instructions

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

For testing, removal, and installation see para 4-56.

REPAIR

Intermediate Direct Support Maintenance repair of the evaporator fan motor is limited to the replacement of the electrical plug, thermostat, and bearings.

DISASSEMBLY

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

2. To replace connector (1):

   a. Loosen cable clamp (2).

   b. Tag and unsolder leads.

   c. Remove old connector (1).

   d. See wiring diagram (para 4-13) and tag and solder leads to new connector.

5-5.1. Evaporator Fan Motors (B3A and B3B) (Reliance Electric Model) (F60T-2HS Only) (cont)

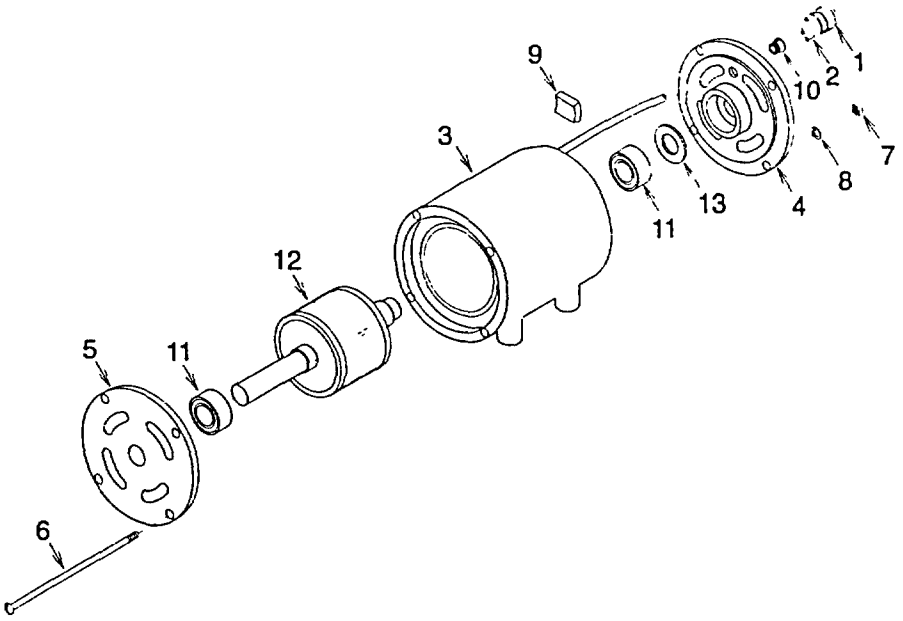


Figure 5-5.1. Evaporator Fan Motor

e. Remove tags.

f. Secure cable clamp (2).

3. To replace thermostat:

a. Match-mark motor frame and stator (3) and both end shields (4) and (5) to ease reassembly.

b. Using screwdriver and wrench, remove four studs (6), nuts (7), and lock washers (8).

c. Carefully separate end shield (4) from motor frame (3). Use a brass or plastic bar and hammer and tap end shield away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end shield loose.

d. Pull end shield (4) away from motor far enough to gain access to thermostat (9).

e. Pull thermostat (9) away from motor.

f. Tag and disconnect leads to the thermostat (9).

g. Remove old thermostat (9).

h. See tags and connect leads to new thermostat (9).

i. Remove tags.

j. If bearings are to be replaced, go to step 4, c., if they are not, go to step 4, k.

5-5.1. Evaporator Fan Motors (B3A and B3B) (Reliance Electric Model) (F60T-2HS Only) (cont)

4. To replace bearings (11):

   a. Match-mark motor frame and stator (3) and both end shields (4) and (5) to ease reassembly.

   b. Using screwdriver and wrench, remove four studs (6), nuts (7), and lock washers (8).

   c. Carefully separate end shields (4) and (5) from motor frame (3). Use a brass or plastic bar and hammer and tap end shields away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end shields loose,

   d. It may be necessary to remove cord bushing (10).

   e. Pull end shields (4) and (5) away from motor frame (3) far enough to gain access to bearings (11).

   f. Pull or carefully drive bearings (11) off of rotor assembly (12). Note location and retain load spring washers(s) (13) for use at reassembly if not damaged.

   g. Examine rotor (12), motor frame and stator (3), and shafts for nicks, gouges, deformations, and evidence of overheating.

   h. Dress high metal defects in shafts with a fine file or stone. If rotor or stator are beyond repair, replace motor.

   i. Coat shaft surfaces with oil.

   j. Coat the bearing cavity of each end shield, (4) and (5), with oil and insert load spring washers (13), and bearings (11) in same locations as removed from in step (f) above.

   k. Carefully work end shield assemblies (4) and (5) onto shaft ends keeping the match-marks made at time of disassembly in alignment.

   l. Carefully align mounting holes.

   m. Using screwdriver and wrench, secure end shields (4) and (5) with four studs (6), nuts (7) and lockwashers (8). Before final tightening of screws, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

   n. Check end play of shaft. End play should be 0.003 inch. If end play is not within limits, disassemble motor and add or remove bearing thrust washers to adjust.

   o. Install motor. See para 4-56.

5-6. Condenser Fan Motor (B2) (Keco Industries Model)

This task covers:
a. Repair
b. Disassembly

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials:
Solder (Appendix E, item 3)
Oil (Appendix E, item 14)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove motor. See para 4-60.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

For testing, removal, and installation see para 4-60.

REPAIR

Intermediate Direct Support Maintenance repair of the evaporator fan motor is limited to the replacement of the electrical plug, thermostat, and bearings.

DISASSEMBLY

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

2. To replace connector (1):

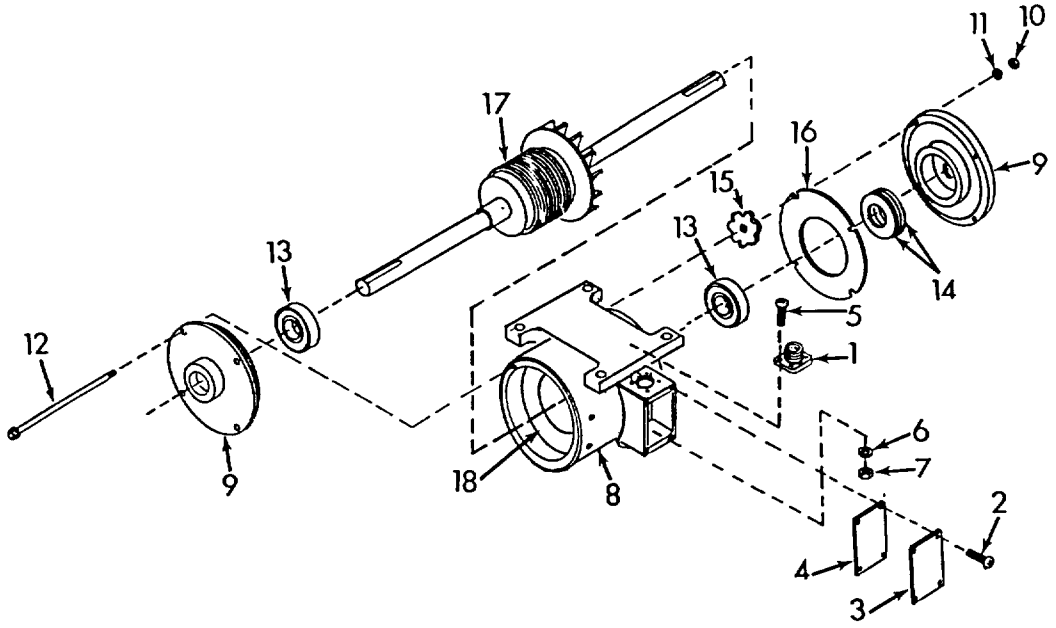
   a. Using screwdriver, remove four screws (2) from terminal box cover (3).

   b. Remove cover (3) and gasket (4).

   c. Remove four screws (5), nuts (7) and washers (6) from connector (1).

   d. Pull connector (1) away from terminal box as far as wires will allow.

5-6. Condenser Fan Motor (B2) (Keco Industries Model) (cont)



e. Tag and unsolder leads.

f. Remove old connector (1).

g. See wiring diagram (para 4-13) and tags and solder leads to new connector (1).

h. Remove tags.

i. Using screwdriver, secure connector to terminal box with four screws (5), washers (6) and nuts (7).

j. Using screwdriver, secure terminal box cover (3) and gasket (4) to box with two screws.

2. To replace bearings:

a. Match-mark motor frame (8) and both end shields (9) to ease reassembly.

b. Using wrenches, remove four nuts (10), washers (11), and motor bolts (12).

c. Remove end shields (9).

d. Remove bearing (13) from rear end shield.

e. Press out or carefully drive bearings (13) out of front end shield. Note locations and quantities of bearing spacer washers (14) and wavy spring washers (15) for use at reassembly if they are not damaged. They should be replaced if they are broken, nicked, or worn.

f. Remove air baffle (16) from front end shield.

g. Examine rotor (17), stator (18), and shafts for nicks, gouges, deformations, and evidence of overheating

5-6. Condenser Fan Motor (B2) (Keco Industries Model) (cont)

h. Dress high metal defects in shafts with a fine file or stone. If rotor or stator are beyond repair, replace motor.

i. Coat shaft surfaces with oil.

j. Coat the bearing cavity of each end shield (9) with oil and insert bearing spacer washers (14), wavy spring washers (15), and bearings (13) in same locations as removed from in step (e) above.

k. Install air baffle (16) on front end shield.

l. Carefully work end shields (9) onto shaft ends keeping the match-marks made at time of disassembly in alignment.

m. Loosely assemble bolts (12), washers (11), and nuts (10).

n. Using a wrench, retain bolts (12) and evenly tighten the nuts (10) on to bolt ends. Before final tightening, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

o. Check end play of shaft. End play should be 0.003 inch. If end play is not within limits, disassemble motor and add or remove shims to adjust.

p. Install motor. See para 4-60.

5-7. Condenser Fan Motor (B2) (Welco Industries Model)

This task covers:
a. Repair
b. Disassembly

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials:
Solder (Appendix E, item 3)
Oil (Appendix E, item 14)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove motor. See para 4-60.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

For testing, removal, and installation see para 4-60.

REPAIR

Intermediate Direct Support Maintenance repair of the evaporator fan motor is limited to the replacement of the electrical plug, thermostat, and bearings.

DISASSEMBLY

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

2. To replace connector (1):

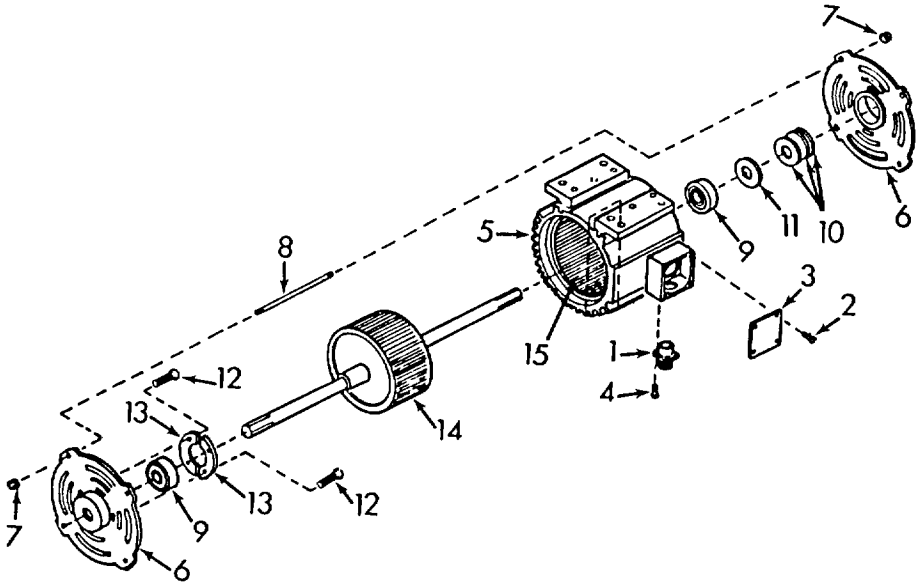
   a. Using screwdriver, remove four screws (2) from terminal box cover (3).

   b. Remove cover (3).

   c. Remove four screws (4) from connector (1).

   d. Pull connector (1) away from terminal box as far as wires will allow.

5-7. Condenser Fan Motor (B2) (Welco Industries Model) (cont)



e. Tag and unsolder leads.

f. Remove old connector (1).

g. See wiring diagram (para 4-13) and tags and solder leads to new connector (1).

h. Remove tags.

i. Using screwdriver, secure connector (1) to terminal box with four screws (4).

j. Using screwdriver, secure terminal box cover (3) to box with four screws (2).

2. To replace bearings:

a. Match-mark motor frame (5) and both end brackets (6) to ease reassembly.

b. Using wrench, remove four nuts (7) from one end of motor studs (8). Retain motor stud with vice grips or pliers.

c. Remove end brackets (6).

d. Press out or carefully drive bearing (9) out of front end bracket. Note locations and quantities of bearing spacer washers (10) and bearing loading springs (11) for use at reassembly If they are not damaged. They should be replaced if they are broken, nicked, or worn.

e. Using screwdriver, remove four screws (12) and two bearing retainers (13) from rear end bracket.

f. Remove bearing (9) from rear end bracket.

g. Examine rotor (14), stator (15), and shafts for nicks, gouges, deformations, and evidence of overheating.

5-7. Condenser Fan Motor (B2) (Welco Industries Model) (cont)

h. Dress high metal defects in shafts with a fine file or stone. If rotor or stator are beyond repair, replace motor.

i. Coat shaft surfaces with oil.

j. Coat the bearing cavity of each end bracket (6) with oil and insert spacer washers (10), bearing loading springs (11), and bearing (9) in same locations as removed from in step (e) above.

k. Insert bearing (9) in rear end bracket (6) and secure it with four screws (12) and two bearing retainer halves (13).

l. Carefully work end brackets (6) onto shaft ends keeping the match-marks made at time of disassembly in alignment.

m. Check that a nut (7) is in place on the end of each stud (8).

n. Using a wrench and vice grips or pliers, retain studs (8)and evenly tighten the nuts (7) on to stud ends (8). Before final tightening, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

o. Check end play of shaft. End play should be 0.003 inch. If end play is not within limits, disassemble motor and add or remove shims to adjust.

p. Install motor. See para 4-60.

5-8. Refrigeration System, General Repairs

WARNING

DANGEROUS CHEMICAL (R22) is used in this equipment.

DEATH

or severe damage may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

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.

NOTE

The refrigeration system must be totally discharged before any maintenance action that requires opening of the pressurized system. 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.

5-9. Discharging Refrigeration System

This task covers
a. Service

Initial setup
Tools:
Tool kit, service, refrigeration, unit NSN 5180-00-596-1474
Bucket NSN 7240-00-137-1609
Rubber gloves NSN 8415-00-266-8677
Safety goggles NSN 4240-00-052-3776
Recovery and recycling unit, refrigerant NSN 4130-01-338-2707

Personnel: 1

General Safety Instructions-

WARNING

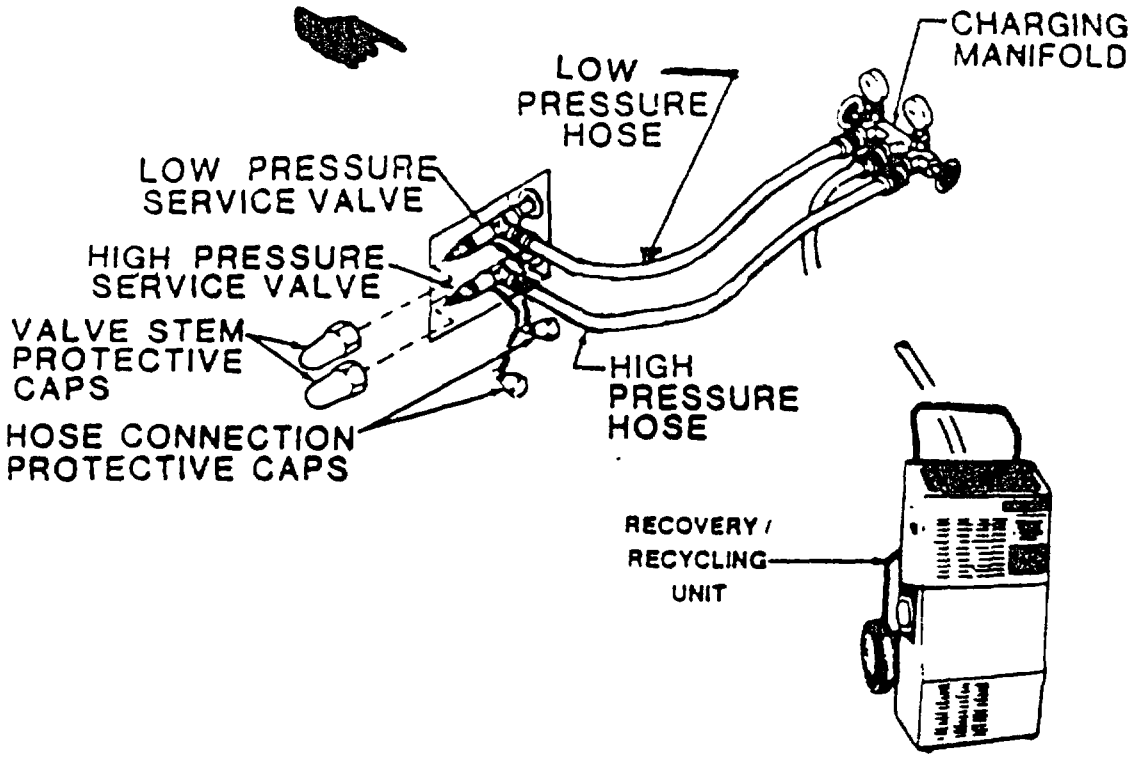
Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible.

Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

SERVICE

1. Remove valve stem protective caps. Take care that they are not lost.
2. Unscrew hose connection protective caps
3. Connect the charging manifold hoses to the manifold and air conditioner service valves
4. Attach a hose assembly to the center connection of the manifold.

5-9. Discharging Refrigeration System (cont)



NOTE

In accordance with Environmental Protection Agency regulations refrigerants cannot be discharged into the atmosphere. A refrigerant recovery & recycling unit must be used whenever discharging the refrigerant system.

Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY

5. Connect and operate a recovery/recycling unit In accordance with the manufacturer's Instructions.

5-10. Purging Refrigerant System

This task covers:
a. Service

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Safety goggles NSN 4240-00-052-3776

Personnel: 1

Materials:
Nitrogen (Appendix E, item 4)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Discharge the refrigerant system. See para 5-9.

General Safety Instructions:

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

CAUTION

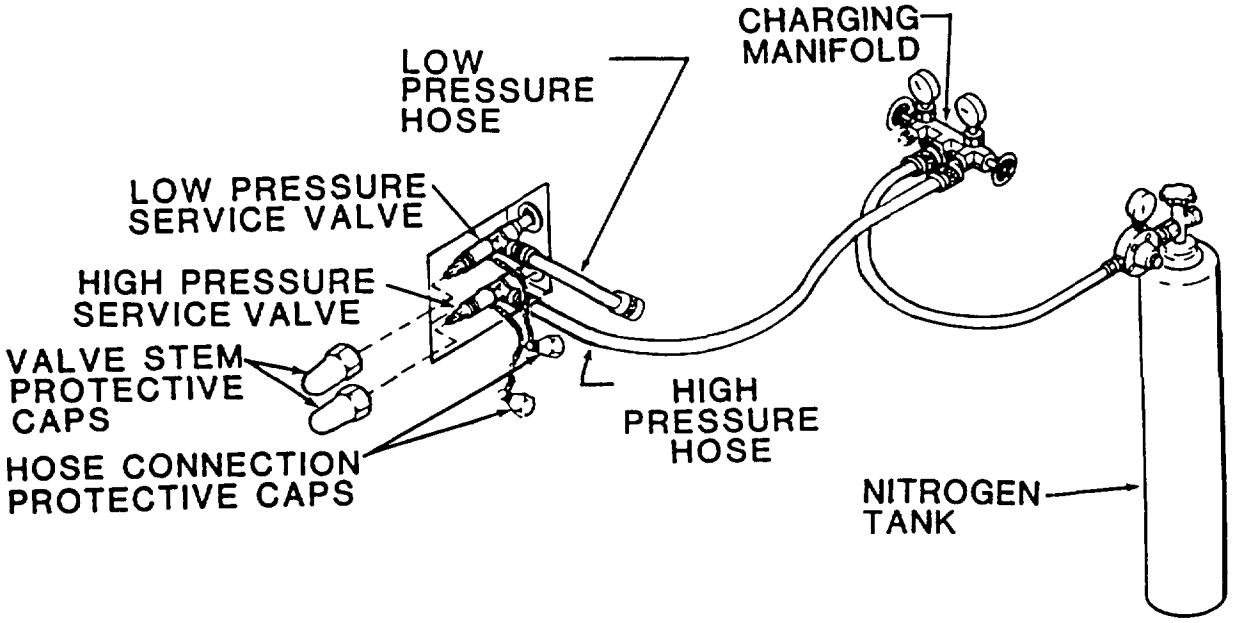
Nitrogen cylinders are pressurized containers. The pressure in the cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times when nitrogen is used for leak check or purge operations. Do not allow nitrogen pressure regulator setting to exceed 200 psig during purging.

Nitrogen is an inert gas. However, it also presents danger as a suffocant and, therefore, must also be discharged in a ventilated location.

NOTE

The refrigeration system must be purged with dry nitrogen, item 4, Appendix E, before any brazing or debrazing is performed on any component. A flow of dry nitrogen at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) should be continued during all brazing or debrazing operations to minimize internal oxidation and scaling.

5-10. Purging Refrigerant System (cont)



SERVICE

Purge System. Assuming that the system has been discharged using a manifold as described in paragraph 5-9, proceed as follows.

a. See specific component removal/repair instructions.

b. Be sure that refrigerant has been discharged. See para 5-9.

c. Connect the center hose from the charging manifold to a nitrogen regulator and dry nitrogen tank.

d. Connect the hose from the high pressure service valve to the charging manifold.

e. Disconnect the hose from the low pressure service valve and from the charging manifold.

f. Open both service valves on the unit.

g. Close the unused valve on the charging manifold, and open the one with the nitrogen tank hook up.

h. Open the nitrogen cylinder valve and adjust the regulator so that less than 1-2 cfm (0 028-0.057 m^3/minute) of nitrogen flows through the system.

i. Check discharge from hose attached to the low pressure charging valve to be sure that no oil is being forced out of the system.

j. Allow nitrogen to sweep through the system at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) for a minimum of 5 minutes before starting any brazing or debrazing operation. Then allow it to continue to flow at the same rate until brazing or debrazing operations are completed. (See paragraph 5-11 for brazing or debrazing procedures.)

5-10. Purging Refrigerant System (cont)

k. After brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes.

l. Close nitrogen cylinder valve, nitrogen regulator, charging manifold valve, and both high and low pressure service valves on the unit.

m. Disconnect the hose from the nitrogen tank.

n. Assuming that all repairs are completed, go to Leak Testing the Refrigerant System, para 5-12.

5-11. Brazing/Debrazing Procedures

This task covers:
a. Service

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Safety goggles NSN 4240-00-052-3776

Personnel: 1

Materials:
Rags (Appendix E, item 9)
Nitrogen (Appendix E, item 4)
Brazing alloy, silver, (Appendix E, items 5 and 6)
Brazing flux (Appendix E, item 7)
Abrasive cloth (Appendix E, item 8)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Discharge the refrigerant system. See para 5-9.

General Safety Instructions:

WARNING

All refrigerant-22 must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any debrazing operation.

The polyurethane foam used as insulation in the air conditioner will break down to form toxic gases if exposed to the flame of a torch at brazing temperature.

SERVICE

NOTE

Grade IV or VI brazing alloy and Type B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints.

All tubing in the refrigeration system is seamless copper with a bright internal finish that permits thorough cleaning and prevents entrapment of moisture and 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.

5-11. Brazing/Debrazing Procedures (cont)

1. Debrazing. Debraze joints for removal of refrigeration system components as follows:

   a. 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 joint on the component itself.

   b. Before debrazing a joint on a valve, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

   c. Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.

   d. Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute).

   e. 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.

2. 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.

3. 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.

4. Brazing.

   Braze joints within the air conditioner as follows:

   a. Position the component to be installed.

   b. To prepare a joint on a valve for brazing, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

   c. Protect insulation, wiring harnesses, and surrounding components with appropriate shields.

   d. Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute).

   e. Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove the heat as soon as brazing is completed.

5-12. Leak Testing Refrigerant System

This task covers:
a. Service

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Leak detector NSN 4940-00-531-0362
Rubber gloves NSN 8415-00-266-8677
Safety goggles NSN 4240-00-052-3776

Personnel: 1

Materials:
Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

SERVICE

NOTE

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.

1. 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 9-4840-435-14, "Leak Detector, Refrigerant Gas".

NOTE

The electronic 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.

5-12. Leak Testing Refrigerant System (cont)

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 complete. A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.

2. Testing Procedures.

NOTE

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.

a. To pressurize a system that has some refrigerant charge, for either leak testing method.

(1) Remove the hose connection protective caps from the high and low pressure service valves.

(2) Connect the hoses from a charging manifold to the service valves.

NOTE

If it is possible that the problem may not be a leak and that you may not have to replace a refrigeration system component, refrigerant-22 may be substituted for the nitrogen in the following test. If nitrogen is used, you will have to discharge, evacuate, and recharge the system after the test is completed.

(3) Connect a nitrogen pressure regulator and nitrogen bottle to the center hose connection of the charging manifold.

(4) Open the unit service valves and the charging manifold valves.

(5) Open the nitrogen tank valve and pressurize the system to 350 psi (24.7 kg/cm^2).

(6) Perform leak tests.

(7) If a leak is found, discharge and repair the system and repair leak. See specific instructions for components to be removed.

(8) If a leak was not found and refrigerant-22 was used to pressurize the system, see charging instructions, para 5-14

b. To pressurize a system that has been discharged and purged for leak testing with an electronic detector.

(1) Remove the hose connection protective caps from the high and low pressure service valves.

(2) Connect the hoses from a charging manifold to the service valves.

5-12. Leak Testing Refrigerant System (cont)

(3) Connect a drum of refrigerant-22 to the center hose connection of the charging manifold.

CAUTION

Connect the refrigerant-22 drum so that only gas will be used for pressurization.

(4) Open both unit service valves and the charging manifold valves.

(5) Open the refrigerant drum valve slightly and adjust as necessary to prevent formation of frost, and allow system pressure to build up until the gages read 40-50 psi (2.8-3.5 kg/cm^2).

(6) Close the charging manifold valves and the refrigerant drum valve.

(7) Remove the refrigerant-22 drum from the center hose connection.

(8) Connect a nitrogen regulator and cylinder of dry nitrogen to the center hose connection.

(9) Open the charging manifold valves and the nitrogen cylinder and regulator valve. Allow system pressure to build up until gages read 350 psi (24.7 kg/cm^2).

(10) Perform leak tests, then discharge and purge the system, in accordance with paragraphs 5-9 and 5-10 before performing maintenance, or before evacuating and charging the system, as appropriate.

3. 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.

5-13. Evacuating Refrigerant System

This task covers:
a. Service

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Pump, vacuum NSN 4310-00-289-5962

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

CAUTION

Do not evacuate a leaking system. The vacuum created can cause air, moisture, and dirt to enter the system.

SERVICE

NOTE

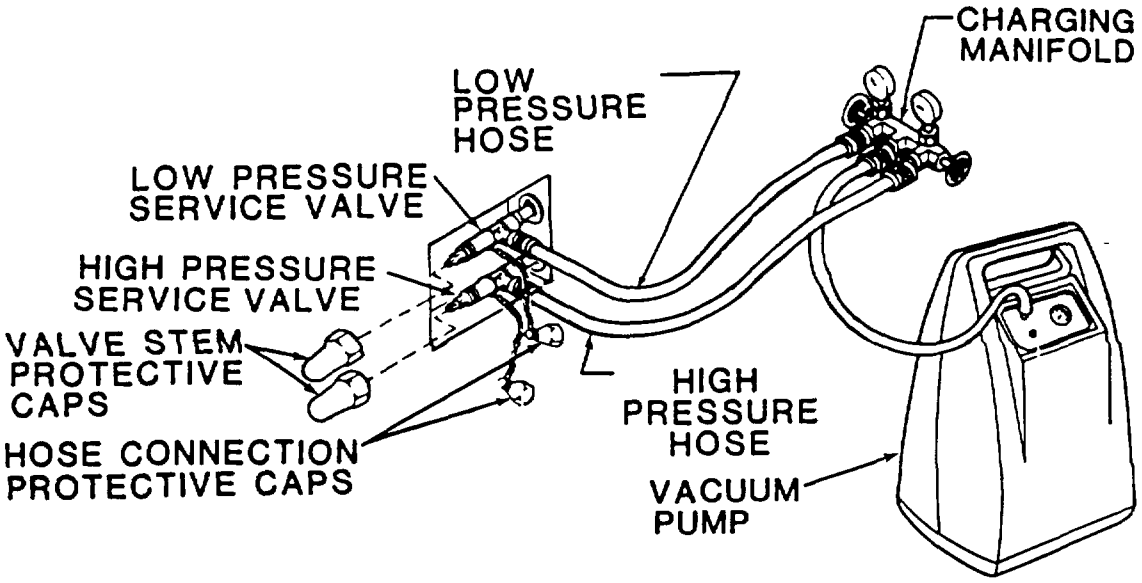
The refrigeration system must be evacuated to remove all moisture before it is charged with refrigerant-22.

Check that system was leak tested and has NO LEAKS.

If the compressor was replaced as a result of a burn out, check that compressor burn out procedures were followed. (See para 5-28).

1. Check that new filter-drier was installed. If not, install one. See para 5-16.
2. Check that both service valves and charging manifold valves are closed.
3. Attach hose assemblies to service valves and charging manifold valves.
4. Attach center hose assembly to vacuum pump.

5-13. Evacuating Refrigerant System (cont)



5. Start vacuum pump.

6. Open charging manifold valves.

7. Open both service valves.

8. Run the vacuum pump until at least 29 inches of mercury, measured on the gage, is reached.

NOTE

Inability to reach 29 inches of mercury may indicate either a leak or a problem with the pump.

9. Continue running the pump for one more hour, while observing the gage. If the gage needle moves back and forth, you have a leak which must be located and corrected first.

10. Close both unit service valves.

11. Close charging manifold valves.

12. Stop vacuum pump.

13. Disconnect pump from center hose connection.

14. Go to paragraph 5-14, charging the refrigeration system.

5-14. Charging Refrigerant System

This task covers:
a. Service

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Rubber gloves NSN 8415-00-266-8677
Safety goggles NSN 4240-00-052-3776

Personnel. 1

Materials;
Refrigerant cylinder (Appendix E, item 10)
Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

SERVICE

1. After the system has been satisfactorily evacuated, it must be fully charged with refrigerant-22.

CAUTION

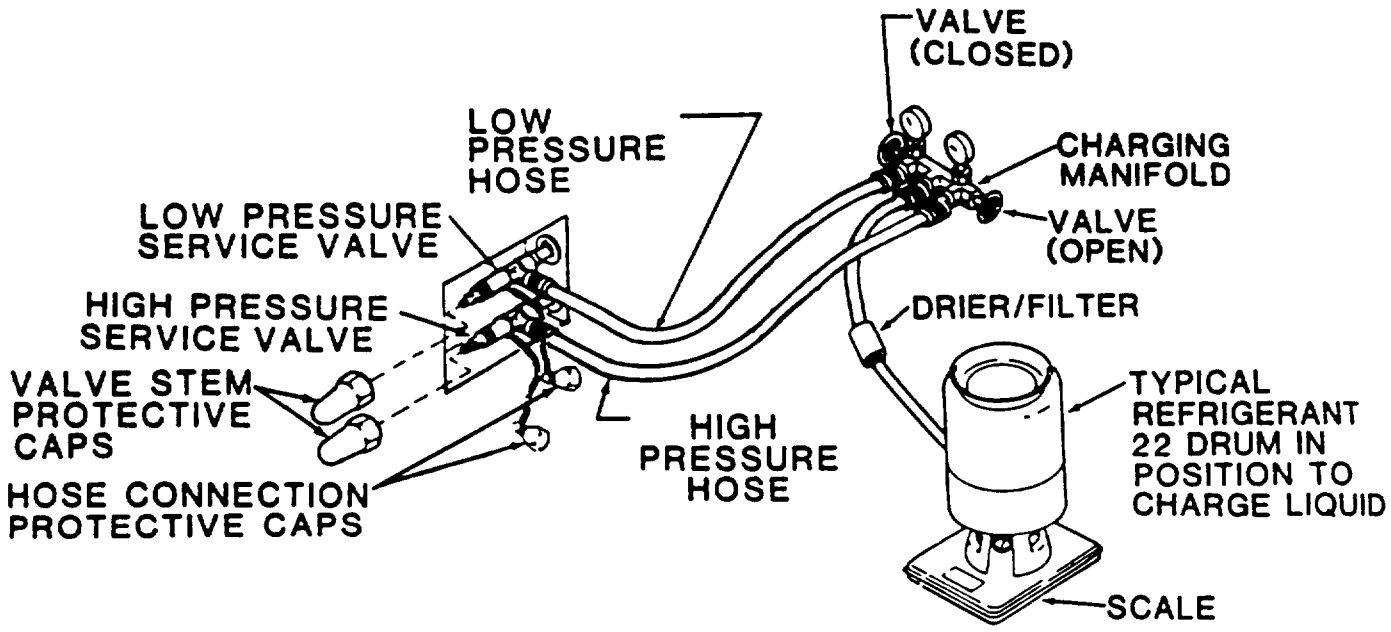
Never introduce liquid refrigerant into the low pressure (suction) service valve.

NOTE

The system must be evacuated before charging. Use only refrigerant-22 to charge the unit. If available, use recycled refrigerant.

2. Check that the hose from the low pressure service valve is connected to the compound gage side of the charging manifold. The hose from the high pressure service valve should be connected to the pressure gage side of the charging manifold.

5-14. Charging Refrigerant System (cont)



3. Connect the center hose from the charging manifold to a well charged drum of refrigerant-22.

4. Loosen the hose connections to the two air conditioner service valves slightly.

5. Open the two charging manifold valves.

6. Open the refrigerant-22 drum valve slightly to allow a small amount of refrigerant to purge air from the hoses. Tighten the hose connections at the air conditioner service valves.

7. Close the low pressure (suction) charging manifold valve. Never introduce liquid refrigerant into the low pressure (suction) service valve.

8. Position the refrigerant-22 drum so that liquid will be used for charging. (Some drums must be inverted and some are equipped with a selector valve)

9. Using accurate scales, measure and record the weight of the refrigerant-22 drum.

10. Open the refrigerant-22 drum valve.

11. Open the high pressure service valve on the air conditioner. Allow liquid refrigerant to enter the system until the drum weight has decreased by 9.1 pounds (4.13 kg) or until system pressure has equalized.

12. Close the refrigerant drum valve and the high pressure (discharge) manifold valve.

13. Close high (discharge) pressure service valve.

14. Connect power.

15. Press and release both pressure switch reset buttons.

5-14. Charging Refrigerant System (cont)

NOTE

If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector switch is in the COOL mode.

16. Turn air conditioner on and operate in the COOL mode with the TEMPerature control thermostat set at a maximum DECREASE position.

17. If the 9.1 pound (4.13 kg) full charge was obtained, skip steps 18 through 20. If the system pressure equalized prior to obtaining a full charge of 9.1 pounds (4.13 kg) proceed to step 18.

18. Switch the refrigerant drum to the gas only position.

19. Be sure that the refrigerant drum has been switched to the gas position and open the refrigerant drum valve, the low (suction) pressure charging manifold valve, and the low (suction) pressure service valve on the air conditioner.

20. Monitor the weight of the refrigerant drum as the air conditioner compressor pulls additional refrigerant gas into the system until the full 9.1 pound (4.13 kg) charge is obtained. When the system is fully charged, immediately close the air conditioner low pressure service valve and refrigerant drum valve.

21. Run the air conditioner in COOL mode (with TEMPerature control thermostat in full DECREASE position) for 15 minutes. The ambient temperature should be between 75° and 95° F (24° and 35° C).

CAUTION

Do not skip the next step. This is a necessary preparation inspection to insure procedures were carried out correctly.

22. After 15 minutes, observe the sight glass on back of condenser section.

    a. Green center means the refrigerant moisture content is acceptable.

    b. Yellow center means there is too much moisture in the system. It must be discharged, evacuated, and charged again.

    c. Milky white or bubbly liquid means the system has a low charge.

NOTE

Bubbles may be visible at temperatures less than 70° F (21° C) or greater than 1000 F (38° C).

    d. Clear bubble-free liquid around the center means the system is fully charged.

23. If charge is low, add gas refrigerant.

    a. Be sure that drum is switched to gas position. Open the drum valve and the air conditioner low pressure service valve.

5-14. Charging Refrigerant System (cont)

b. Continue to charge until sight glass is clear and bubble free.

c. Close the air conditioner low pressure service valve and the refrigerant drum valve.

24. Check air conditioner for proper cooling. There should be at least a 15° temperature difference between evaporator discharge air and inlet air. Turn the mode selector switch to OFF.

25. Assure that the high and low pressure air conditioner service valves are closed, and remove the charging manifold hoses from the air conditioner service valves.

26. Install the valve stem and hose connection protective caps.

5-15. Refrigerant Pressure Check

This task covers:
a. Service

Initial setup.
Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Rubber gloves NSN 8415-00-266-8677
Safety goggles NSN 4240-00-052-3776

Personnel: 1

General Safety Instructions:

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or 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 the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

SERVICE

1. Except in cases where it is obvious that the refrigerant charge has been lost, the first step in troubleshooting problems in the refrigeration system should be to check discharge and suction pressures under operating conditions.

2. Check pressures as follows:

   a. Turn the mode selector switch to OFF.

   b. Remove valve stem and hose connection protective caps from service valves. Take care that valve stem caps are not lost.

   c. Connect individual pressure gages, or a refrigeration charging manifold and hoses to the high (discharge) and low (suction) service valves.

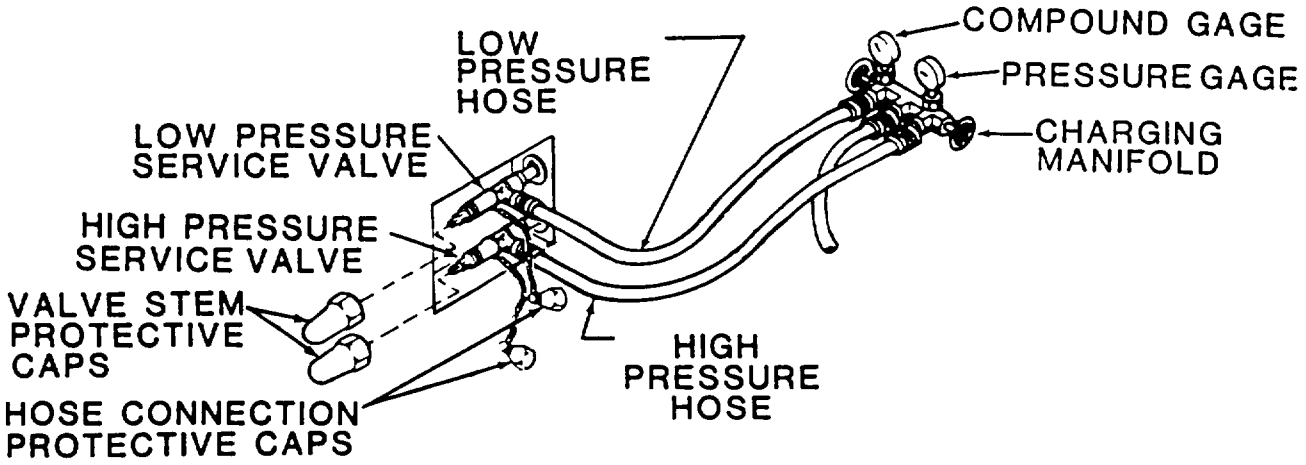
CAUTION

Take care that only a very small amount of refrigerant is allowed to escape during hose purging.

   d. Loosen hose connections at gages or charging manifold.

   e. Open high (discharge) pressure service valve slightly to purge air from hose. Tighten high pressure hose connection at gage fitting as soon as a hissing sound is heard. Repeat procedure with low (suction) pressure service valve.

5-15. Refrigerant Pressure Check (cont)



f. Open the low (suction) and high (discharge) service valves.

g. Both gages should read the same. Check the reading with the appropriate column in table 5-1. If the system is even partially charged, the pressure should be approximately equal to that shown in the table for the appropriate ambient temperature. If the pressure is considerably less than shown in the table, the system does not contain enough refrigerant to continue the pressure check; go to leak testing. See para 5-12.

h. Turn the mode selector switch to the COOL mode with the TEMPerature control thermostat in the full DECREASE setting for a few minutes.

i. With the unit operating, allow gages to stabilize. Take readings of the two gages

(1) If the discharge and suction pressures are at, or near, the same value, a pressure equalizer solenoid valve malfunction or an internal compressor failure is indicated.

(2) If discharge pressure is low and suction pressure is normal, (see table 5-2), a low refrigerant charge is indicated.

(3) If discharge pressure is normal and suction pressure is either high or low, failure or maladjustment of the pressure regulator valve or expansion valve is indicated.

(4) If discharge pressure is high and suction pressure is normal, a malfunction of the condenser fan, refrigerant overcharge, or clogged filter drier is indicated.

j. When pressure tests are completed, proceed with the maintenance action indicated.

k. Turn unit OFF.

l. Close both service valves on unit.

m. Remove gages or service manifold hoses from service valves.

n. Install the valve stem and hose connection protective caps.

Table 5-1. Pressure-Temperature Relationship of Saturated Refrigerant-22

Temperature		Pressure		Temperature		Pressure	
Deg F	Deg C	Psig	kg/cm^2	Deg F	Deg C	Psig	kg/cm^2
10	-12.3	32.93	2.315	66	18.9	114.2	8.029
12	-11.1	34.68	2.439	68	20.0	118.3	8.318
14	-10.0	36.89	2.593				
16	- 8.9	38.96	2.739	70	21.1	122.5	8.612
18	- 7.8	41.09	2.889	72	22.2	126 8	8.915
				74	23.3	131.2	9.225
20	- 6.6	43.28	3.043	76	24.4	135.7	9.541
22	- 5.5	45.23	3.180	78	25.6	140.3	9.864
24	- 4.3	47.85	3.364				
26	- 3.4	50.24	3.532	80	26.7	145.0	10.195
28	- 2.2	52.70	3.705	82	27.8	149.8	10.522
				84	28.9	154.7	10.877
30	- 1.1	55.23	3.883	86	30.0	159.8	11.236
32		57.83	4.066	88	31.1	164.9	11.594
34	1.1	60.51	4.254				
36	2.2	63.27	4.448	90	32.2	170.1	11.960
38	3.3	66.11	4.648	92	33.3	175.4	12.332
				94	34.5	180.9	12.719
40	4.4	69.02	4.853	96	35.6	186.5	13.113
42	5.5	71.99	5.062	98	36.7	192.1	13.506
44	6.6	75.04	5.276				
46	7.7	78.18	5.497	100	37.8	197.9	13.914
48	8.8	81.40	5.723	102	38.9	203.8	14.329
				104	40.0	209.9	14.758
50	10.0	84.70	5.955	106	41.1	216.0	15.187
52	11.1	88.10	6.257	108	42.2	222.3	15.630
54	12.2	91.50	6.443				
56	13.3	95.10	6.686	110	43.3	228.7	16.080
58	14.5	98.80	6.947	112	44.4	235.2	16.537
				114	45.6	241.9	17.008
60	15.6	102.5	7.206	116	46.7	248.7	17.486
62	16.7	106.3	7.474	118	47.8	255.6	17.971
64	17.8	110.2	7.748				

Table 5-2. Normal Operating Pressures (in full cooling DECREASE mode)

Temperatures	Pressure Range (psig)			
Outdoor ambient	50°F (10°C)	75°F (24°C)	100°F (38°C)	120°F (49°C)
90°F (32°C) Return Air to Unit (Dry Bulb)	55-65 Suction 125-160 Discharge	59-70 Suction 175-210 Discharge	60-75 Suction 255-295 Discharge	75-90 Suction 370-440 Discharge
80°F (27°C) Return Air to Unit (Dry Bulb)	58-65 Suction 120-155 Discharge	58-70 Suction 170-205 Discharge	60-75 Suction 250-290 Discharge	65-75 Suction 370-440 Discharge

5-16. Dehydrator (Filter-Drier)

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

The dehydrator must be replaced each time the refrigeration system has been opened. It should be installed just before unit is leak tested.

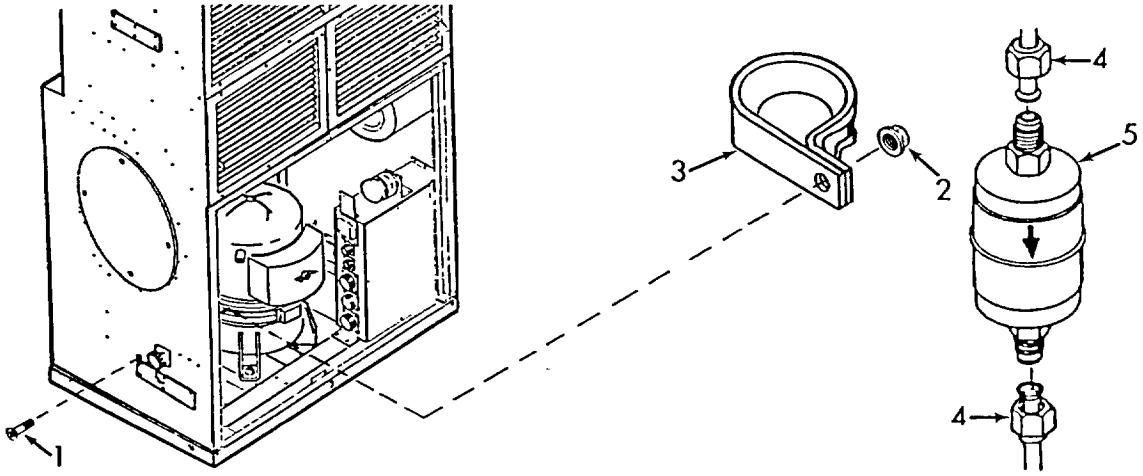
INSPECTION

1. Check for general condition and signs of leakage.
2. If leakage is suspected, leak test per para 5-12.
3. Check that mounting clamp is secure.

REMOVAL

1. Discharge the refrigerant system per para 5-9.
2. Using wrench, loosen and disconnect flare nuts (4).
3. Using screwdriver and wrench, remove screw (1), nut (2), and clamp (3).
4. Remove dehydrator (5). Note direction of flow arrow for installation.

5-16. Dehydrator (Filter-Drier) (cont)



INSTALLATION

CAUTION

Replacement dehydrators are packed 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.

1. Place clamp (3) on dehydrator (5).
2. Place clamp (3) and dehydrator (5) in unit. Be sure that flow arrow is pointing down.
3. Using screwdriver, secure clamp (3) with screw (1) and nut (2).
4. Using wrench, tighten both flare nuts (4).
5. Leak test all newly connected joints and those in the repair area. See para 5-12.
6. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-17. Solenoid Valves (K3 and K4)

This task covers:
a. Test
b. Replace
c. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

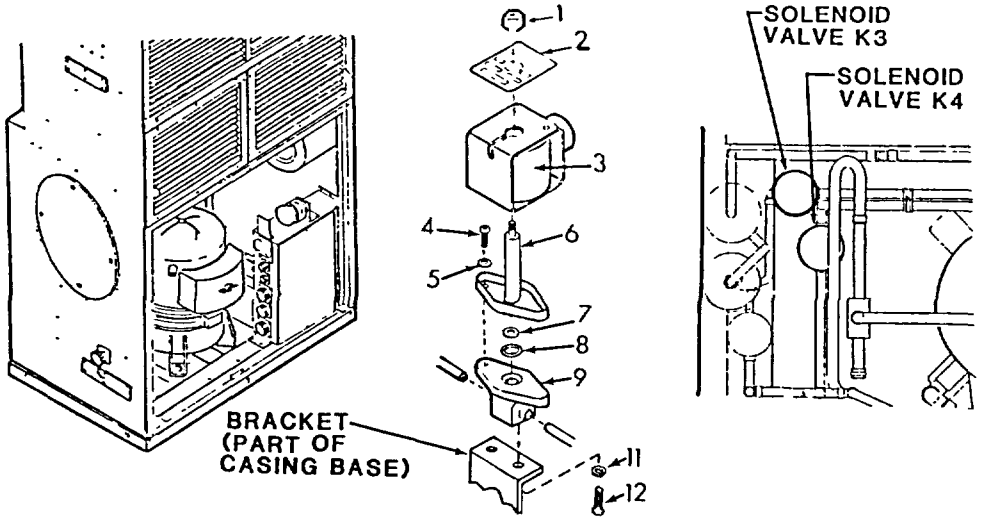
NOTE

The following basic instructions apply to both the equalizing solenoid valve (K4) and the liquid line solenoid valve (K3).

TEST

1. Check to be sure power has been disconnected.
2. Disconnect wiring harness connector P5 from connector J5 on solenoid valve K3 and /or wiring harness connector P6 from connector J6 on solenoid valve K4.
3. Use a multimeter set on lowest OHMS scale to check for continuity between contacts A and B in solenoid valve connector. If continuity is not found, coil is open and must be replaced.
4. Use multimeter to check for continuity between each contact in solenoid valve connector and coil casing. If continuity is found between either contact and case, the coil is grounded and should be replaced.
5. If continuity checks are satisfactory, apply 24 volts dc from an external power supply across contacts A and B in solenoid valve connector, and listen for a sharp click when the valve changes position. If a click is not heard, internal valve problems are indicated and entire valve should be replaced.

5-17. Solenoid Valves (K3 and K4) (cont)



REMOVAL

1. Check to be sure power has been disconnected.
2. Discharge the refrigeration system. See para 5-9.
3. Disconnect wiring harness connector P5 from connector J5 on solenoid valve K3 and /or wiring harness connector P6 from connector J6 on solenoid valve K4.
4. Remove nut (1) that attaches coil (3) to tube and plunger assembly (6).
5. Remove coil (3) and name plate (2) assembly.
6. Remove two screws (4) and washers (5) that attach tube and plunger assembly (6) to valve body (9). Remove tube and plunger assembly (6) and all other removable internal components from valve body (9).
7. Check valve body (9) for visible damage. Normally valve body replacement is unnecessary. If valve body is not to be replaced skip steps 8 though 10.
8. Using screwdriver, remove two screws (10) and lock washers (11) from base of valve body.
9. Purge the system with nitrogen and debraze the tube connections. See para 5-10 and 5-11.
10. Remove valve body.

5-17. Solenoid Valves (K3 and K4) (cont)

INSTALLATION

NOTE

If valve body was not removed go to step 3.

1. Place the valve body (9) on the tube ends, purge the system with nitrogen and braze the tube joints. See para 5-10 and 5-11.
2. Using a screwdriver, secure the valve body (9) to the bracket with two screws (10) and lock washers (11).
3. Check internal surfaces of valve body to be sure it is clean.
4. Carefully install diaphragm (8), O-ring (7), and tube and plunger assembly (6). Secure to valve body with two screws (4) and washers (5).
5. Place coil assembly (3) and name plate (2) onto tube and plunger assembly (6) and secure with nut (1).
6. Reconnect connector and harness.
7. Replace the dehydrator. See para 5-16.
8. Leak test all newly connected joints and those in the repair area. See para 5-12.
9. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-18. Liquid Indicator

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check that glass window is clean and not cracked or broken. Clean if dirty. Replace liquid indicator if cracked or broken.

2. Check for evidence of leakage. Leak test if leak is suspected. See para 5-12. Repair or replace as indicated.

REMOVAL

1. Using screwdriver, remove two screws (1) and washers (2) from rear while holding bracket (3) so that it does not drop down into unit.

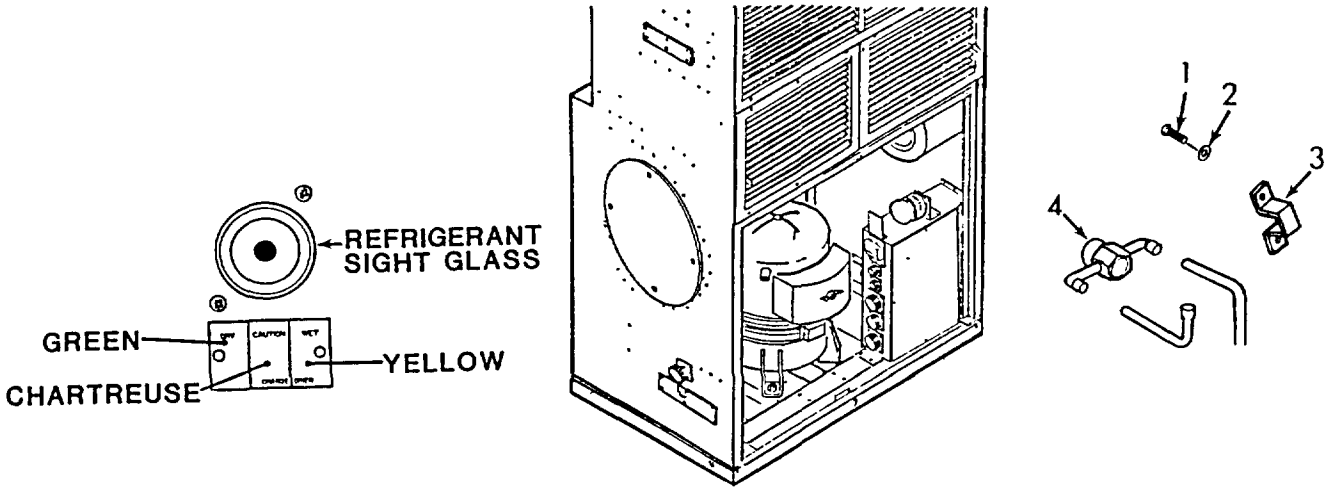
2. Remove bracket (3).

3. Discharge refrigerant system. See para 5-9.

4. While purging the system with nitrogen, debraze the tubing See para 5-10 and 5-11.

5. Remove liquid indicator (4).

5-18. Liquid Indicator (cont)



INSTALLATION

1. Position liquid indicator in unit.
2. While purging the system with nitrogen, braze the tubing joints. See para 5-10 and 5-11.
3. Replace the dehydrator. See para 5-16.
4. Leak test all newly connected joints and those in the repair area. See para 5-12.
5. Position bracket (3) and secure with two washers (2) and screws (1).
6. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:
1. Install lower front panel. See para 4-24.
2. Connect power.

5-19. Expansion Valve (Primary)

This task covers:

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove top panel. See para 4-25.
3. Remove conditioned air filters. See para 4-30.
4. Remove right conditioned air inlet grille. See para 4-22.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Inspect for evidence of leaks, kinked, or otherwise damaged capillary line, and loose or missing mounting hardware.
2. Check thermal bulb to see that it is securely clamped to the suction line.
3. If a leak is suspected or indicated, test per paragraph 5-12.

ADJUSTMENT

NOTE

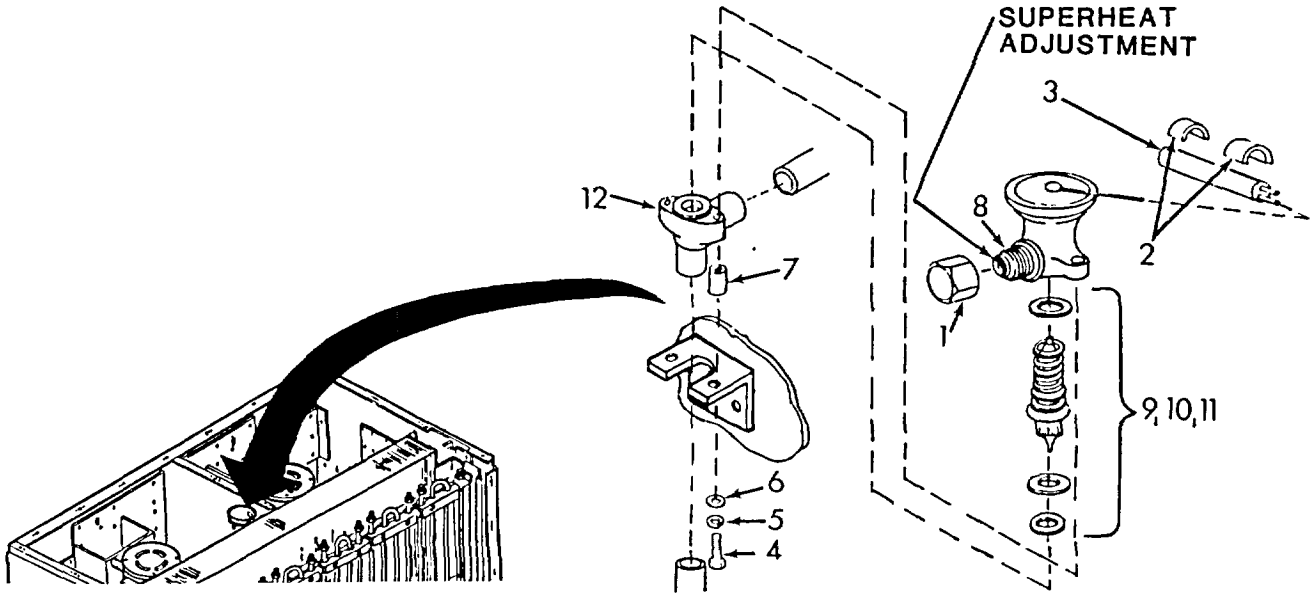
The expansion valve as supplied with the unit is preset at the factory. This valve should not be adjusted unnecessarily.

1. Perform a refrigerant check on unit in accordance with para 5-15. Leave gages or service manifold attached.
2. Remove the suction line insulation from the area of the sensing bulb (3). Observe location and position of bulb for reinstallation.

CAUTION

Use care to not damage or kink the capillary line.

5-19. Expansion Valve (Primary) (cont)



3. Loosen the screws and nuts in the bulb straps (2) that attach the sensing bulb to the suction line, and pull the bulb out of the straps.

WARNING

The following test must be conducted with the power on. Use extreme caution.

4. Place the sensing bulb (3) in a container of ice water or crushed ice so that it is reduced to a temperature near 32°F (0°C).

5. Set the TEMPerature control thermostat knob fully DECREASE (counterclockwise), place one hand on the exposed suction return line, and start the air conditioner in COOL mode. If a drop in temperature is felt on the suction return line, the expansion valve is not closing fully and should be replaced. if the return line temperature remains constant, check the pressure gage; it should indicate approximately 58 ± 2 psi (4.0 ± 0.14kg/cm^2). If the pressure is not within the above limits, test the operation of the quench valve (see para 5-20) and the pressure regulator valve (see para 5-24) before attempting adjustment of the evaporator expansion valve.

CAUTION

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. 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.

6. With one hand still on the suction return line, remove the sensing bulb from the container and warm it in the other palm. If a temperature drop is not felt in the suction return line by the time the sensing bulb no longer feels cold to the hand, the expansion valve is not opening and should be replaced. As soon as a temperature drop is felt, turn the air conditioner to OFF.

5-19. Expansion Valve (Primary) (cont)

NOTE

The optimum superheat setting for the evaporator expansion valve is 10°F (5.55°C) above the saturation temperature of the refrigerant at operating suction line pressure. This setting will provide maximum efficiency of the evaporator coil.

7. Install the sensing bulb in its original position. Be sure the sensing bulb (3) is making metal to metal contact with the suction line.

8. Attach an accurate thermometer to an exposed surface of the suction return line adjacent to the sensing bulb; use a small amount of thermal mastic, if available, to improve conductivity.

9. Rewrap insulation on suction return line being sure to cover sensing bulb.

10. Start the air conditioner in the COOL mode with the thermostat set at fully DECREASE (counterclockwise) and allow it to run about 30 minutes, then check to be sure the temperature in the suction line has stabilized and the thermometer reading remains unchanged for at least 2 minutes.

11. Note the pressure on the gage connected to the low pressure (suction) service valve. Find the saturation temperature for the pressure gage reading (see table 5-1) and compare with the thermometer reading. The thermometer temperature should be 10 ± 1°F (5.55 ± 0.55°C) higher than the saturation temperature found on the chart.

12. If the superheat setting is not within the limits shown above, adjust the expansion valve as follows:

    a. Remove the hexagonal seal cap (1) from the side of the power assembly (8).

    b. Turn the adjusting stem two complete turns to change the superheat setting by 1°F (0.55°C). Turn the stem clockwise to increase superheat span; counterclockwise to decrease it. Do not change more than two full turns at one time, then wait at least 2 minutes for temperature to stabilize and recheck pressure and temperature before further adjustment.

13. When the proper setting is obtained:

    a. Turn unit OFF.

    b. Replace hexagonal seal cap (1).

    c. Remove thermometer.

    d. Cover the bulb and suction line with two layers of insulation tape, item 12 Appendix E. Apply in spiral with overlapping edges.

    e. Close service valves on unit.

    f. Remove gages or service manifold from service valves.

    g. Install valve stem and hose connection protective caps.

5-19. Expansion Valve (Primary) (cont)

REMOVAL

1. Discharge the refrigerant system. See para 5-9.
2. Unwrap insulation from suction line so that sensing bulb (3) is exposed.
3. Disconnect flare nut on external equalizer line from expansion valve.
4. Using a wrench, remove the two screws (4), flat washers (6), lock washers (5), and spacers (7) that attach the body flange (12) to its mounting bracket.
5. Remove remaining valve components (9, 10, and 11) except for body flange (12).

NOTE

If valve body flange (12) is not damaged, do not remove (debraze) it from the system.

6. If valve body flange (12) is to be removed, purge the system with nitrogen and debraze the two tubes. See para 5-10 and 5-11.

INSTALLATION

1. If valve body flange (12) was removed, purge the system with nitrogen and braze the two tubing joints. See para 5-10 and 5-11.
2. Place screws (4), lock washers (5), flat washers (6), and spacers (7) through bracket and valve body flange (12).
3. Be sure that valve components (9, 10, and 11) are properly assembled and aligned, and secure power assembly (8) to body flange (12).
4. Place the sensing bulb (3) in its original position. Be sure the sensing bulb is making good metal-to metal contact with the suction line.
5. Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation item 17, Appendix E.
6. Replace the dehydrator. See para 5-16.
7. Leak test all newly connected joints and those in the repair area. See para 5-12.
8. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install conditioned air filters. See para 4-30.**
2. **Install top panel. See para 4-25.**
3. **Install right conditioned air- inlet grille. See para 4-22.**
4. **Connect power.**

5-20. Expansion Valve (Liquid Quench)

This task covers:

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:

1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Inspect for evidence of leaks, kinked, or otherwise damage capillary line, and loose or missing mounting hardware.
2. Check thermal bulb to see that it is securely clamped to the suction line.
3. If a leak is suspected or indicated, test per paragraph 5-12.

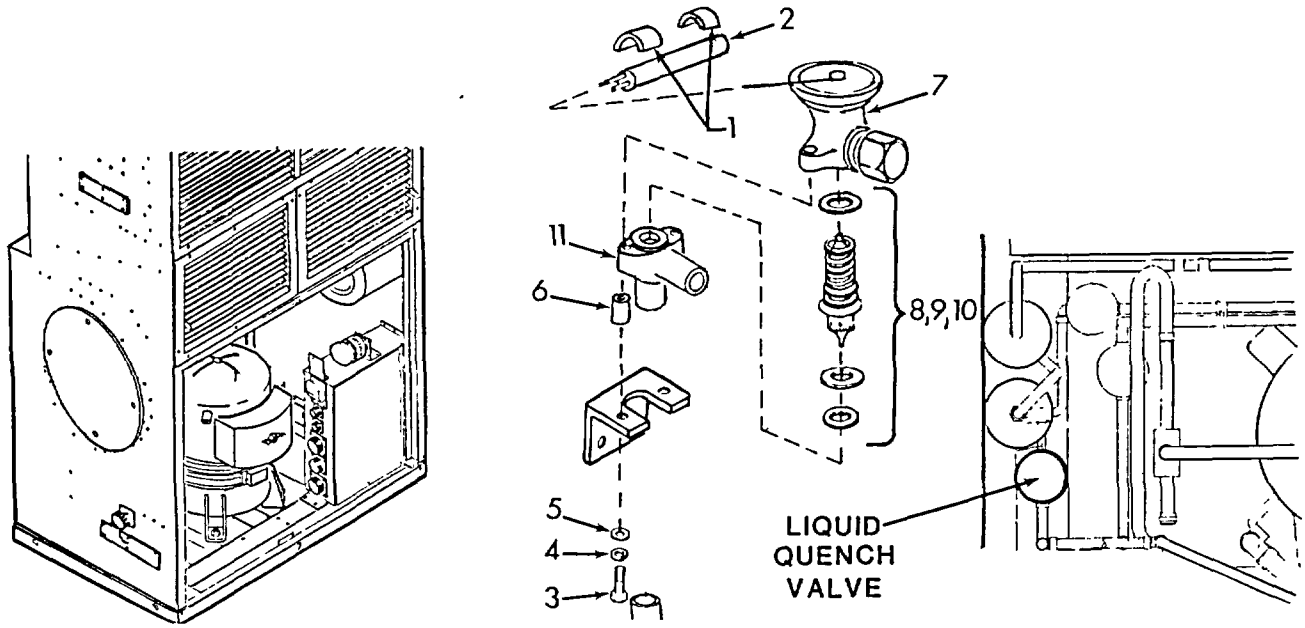
TEST

NOTE

The expansion valve as supplied with the unit is preset at the factory. This valve should not be adjusted unnecessarily.

1. Perform a refrigerant check on unit in accordance with para 5-15. Leave gages or service manifold attached.
2. Unwrap insulation from compressor suction line so that sensing bulb and an adjacent section of the line is exposed.
3. Attach an accurate thermometer to an exposed surface of suction line adjacent to the sensing bulb; use a small amount of thermal mastic, if available, to improve conductivity.
4. Check that service valve and gage connection to low (suction) sides are open. Note pressure indicated on gage and temperature indicated on thermometer.

5-20. Expansion Valve (Liquid Quench) (cont)



5. Set the TEMPerature control thermostat knob fully INCREASE (clockwise). Start the air conditioner in COOL mode. Note that suction pressure drops to 58 ± 2 psi (4.0 ± 0.14kg/cm^2). Allow compressor to run for at least 20 minutes. If the pressure is not within the above limits, test the operation of the pressure regulator valve (see para 5-24) before proceeding with quench valve test.

NOTE

Except in a very hot climate, with room temperature above 90°F (32.2°C), the refrigeration system will be in a bypass cycle with a maximum volume of hot discharge vapor being recirculated back to suction side of compressor through pressure regulator valve and quench valve.

6. Observe that temperature indicated remains stable for a minimum of two minutes, then find saturation temperature for pressure indicated on gage, using table 5-1. For example, the saturation temperature for a refrigerant pressure of 69 psig (4.85 kg/cm^2) is 40° (4.4°C).

7. Compare the saturation temperature with indicated temperature. The indicated temperature should be 25 ± 5°F (13.9 ± 2.2°C) higher than the saturation temperature. If indicated temperature is not within above limits, quench valve is not functioning properly and should be replaced.

8. Turn unit OFF.

9. Remove thermometer.

10. Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

11. Close service valve on unit.

12. Remove gages or service manifold from service valves.

13. Install valve stem and hose connection protective caps.

5-20. Expansion Valve (Liquid Quench) (cont)

REMOVAL

1. Discharge the refrigerant system. See para 5-9.
2. Unwrap insulation from suction line so that sensing bulb (2) is exposed. Loosen screw and nut in clamp. Pull bulb out of clamp.
3. Using a wrench, remove the two screws (3), flat washers (5), lock washers (4), and spacers (6) that attach the flange body (11) to its mounting bracket.
4. Remove remaining valve components (8,9,10) except for body flange (11).

NOTE

If valve body flange (11) is not damaged, do not remove (debraze) it from the system.

5. If valve body flange (11) is to be removed, purge the system with nitrogen and debraze the two tubes. See para 5-10 and 5-11.

INSTALLATION

1. If valve body flange (11) was removed, purge the system with nitrogen and braze the two tubing joints. See para 5-10 and 5-11.
2. Place screws (3), lock washers (4), flat washers (5), and spacers (6) through bracket and valve body flange (11).
3. Be sure that valve components (8, 9, and 10) are properly assembled and aligned, and secure power assembly (7) to body flange (11).
4. Place the sensing bulb (2) in its original position. Be sure the sensing bulb is making good metal to metal contact with the suction line.
5. Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation item 17, Appendix E.
6. Replace the dehydrator. See para 5-16.
7. Leak test all newly connected joints and those in the repair area. See para 5-12.
8. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-21. Evaporator Coil

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 2

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove heater elements. See para 4-58.
3. Remove mist eliminator. See para 4-32.
4. Remove conditioned air filters. See para 4-30.
5. Remove right conditioned air inlet grille. See para 4-22.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

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

NOTE

For inspection and cleaning of installed coil. See para 4-62.

REMOVAL

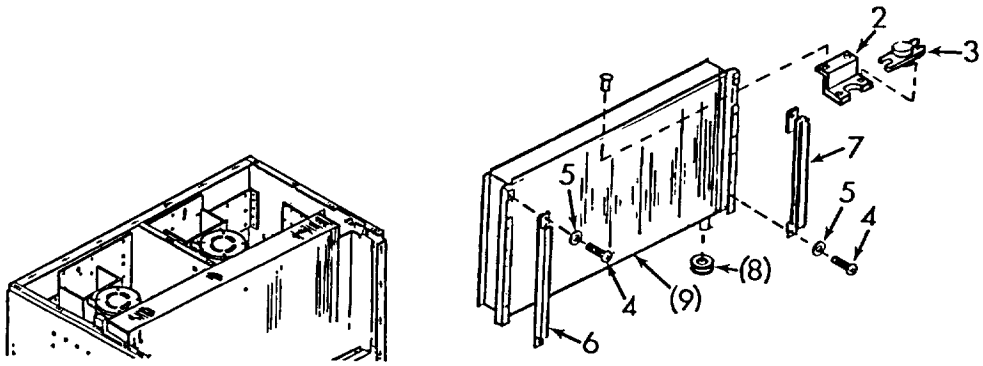
1. Discharge the refrigerant system per para 5-9.
2. Using a drill bit smaller than the rivet body, drill out the two rivets that secure the heater thermostat bracket.
3. Remove the heater thermostat (S3) and bracket. See para 4-57.
4. Using a screwdriver, remove the twelve screws (1) and washers (2) in the left hand (3) and right hand (4) channel assembly and remove channels.

CAUTION

To prepare a joint on a valve for debrazing/brazing, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

5. Remove grommet (5) from outlet evaporator tube.

5-21. Evaporator Coil (cont)



6. Remove tubing insulation and sensing bulb from suction line. See para 5-12.

7. While purging the system with nitrogen debraze the tube joints at the evaporator. See para 5-11.

8. Carefully lift the coil (6) up and out of the unit.

REPLACE

When replacing evaporator coil, mark on new coil location of rivet points for the heater top support by copying from the old coil. Remove old heater top support from old coil and rivet in place on new coil.

WARNING

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

INSTALLATION

1. Carefully slide evaporator coil (5) down into unit and align holes.

2. Using screwdriver, secure evaporator coil (5) with twelve screws (1) and washers (2) to channel assemblies (3) and (4).

CAUTION

To prepare a joint on a valve for debrazing/brazing, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

3. While purging the system with nitrogen braze the tube joints. See para 5-11.

4. Replace the dehydrator. See para 5-16.

5. Leak test all newly connected joints and those in the repair area. See para 5-12.

6. Install grommet (5) on outlet tube.

7. Reinstall and tape in place tubing insulation that was removed from the suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

5-21. Evaporator Coil (cont)

8. Secure heater thermostat and bracket with two rivets.

9. Evacuate and charge the refrigeration system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install heaters. See para 4-58.**
2. **Check that all wire leads are connected and tags removed prior to installing mist eliminator and top panel. See paragraph 4-32.**
3. **Install conditioned air filter. See para 4-30.**
4. **Install right conditioned air inlet grille. See para 4-22.**

5-22. Condenser Coil

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 2

Equipment condition:
1. Turn unit power off at power source. lf there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number one. See para 4-40.
4. Remove condenser coil guard. See para 4-28.

General Safety Instructions:

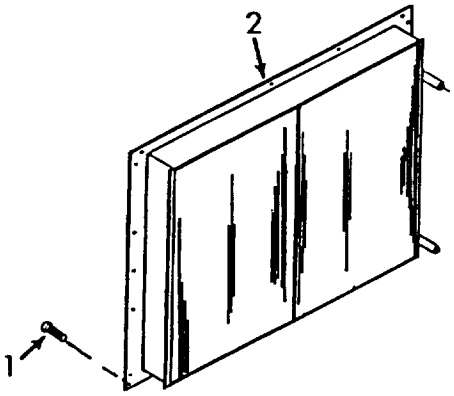
WARNING

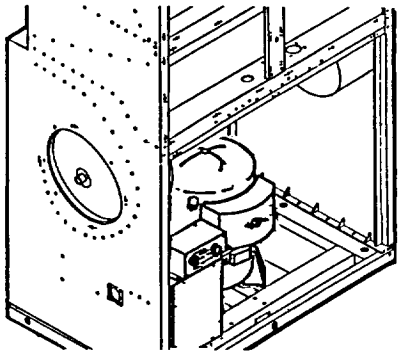
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

When handling coils wear gloves to avoid cuts and to reduce coil fin damage.

REMOVAL

1. Discharge the refrigeration system. See para 5-9.
2. While purging the system with nitrogen, debraze the tube joints to the condenser. See para 5-10 and 5-11.
3. Using screwdriver, remove six screws (1) while supporting the condenser coil (2).
4. Using gloves to protect your hands and coil fins, carefully slide the coil out of unit.





5-22. Condenser Coil (cont)

REPAIR/REPLACE

1. Repairs are limited to straightening of mashed fins, for other damage replace coil.
2. If fins are mashed or dented so that air flow across coil would be blocked, straighten the fins using a plastic fin comb.

INSTALLATION

1. Carefully slide condenser coil (2) into unit and align mounting holes.
2. Using screwdriver, secure condenser coil with six screws (1).
3. While purging the system with nitrogen braze the tube joints. See para 5-10 and 5-11.
4. Replace the dehydrator. See para 5-16.
5. Leak test all newly connected joints and those in the repair area. See para 5-12.
6. Evacuate and purge the refrigeration system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number one. See para 4-40.**
2. **Install lower front panel. See para 4-24.**
3. **Install condenser coil guard. See para 4-28.**
4. **Connect power.**

5-23. Pressure Relief Valve

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Antisieze tape (Appendix E, item 3)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number one. See para 4-40.

General Safety Instructions:

WARNING

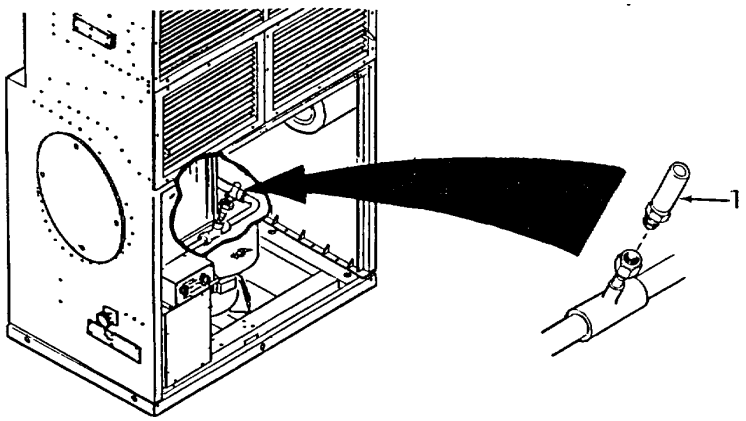
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check for evidence of leakage. If leak suspected perform leak test. See para 5-12.
2. Check for damage. Replace if damaged.

REMOVAL

1. Discharge the refrigerant system. See para 5-9.
2. Using two wrenches, hold fitting so that it is not twisted and unscrew pressure relief valve (1).



5-23. Pressure Relief Valve (cont)

INSTALLATION

1. Apply antisieze tape (item 13, Appendix E) to threads of valve.
2. Using two wrenches, screw pressure relief valve (1) in place while holding adapter fitting.
3. Replace dehydrator. See para 5-16.
4. Leak test all newly connected joints and those in the repair area. See para 5-12.
5. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number one. See para 4-40.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-24. Pressure Regulator

This task covers:

a. Adjustment
b. Removal
c. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

ADJUSTMENT

NOTE

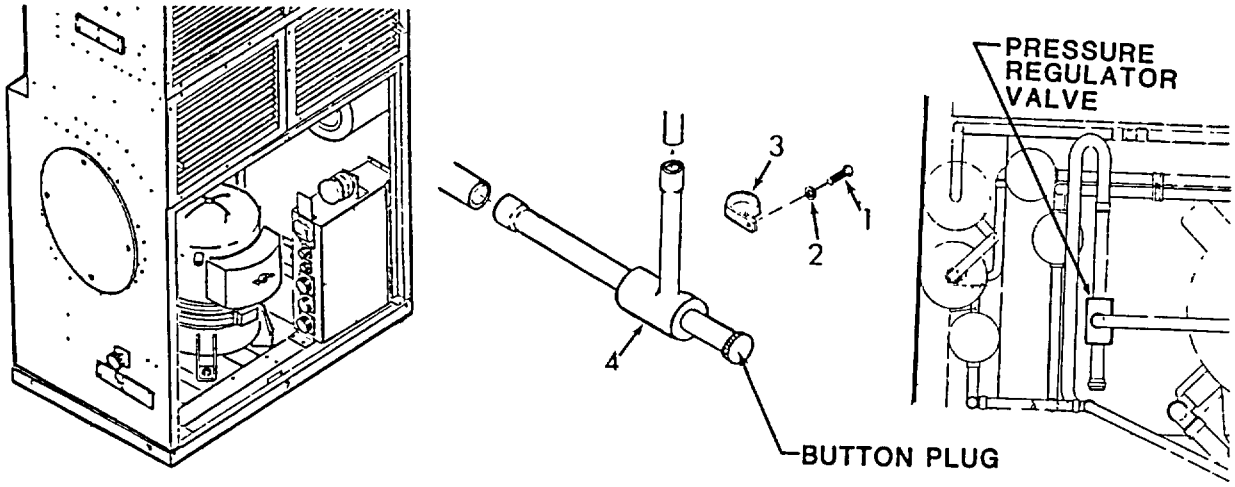
Valves are factory set to start opening when suction pressure decreases to 58 psig. Do not adjust unless you are sure adjustment is necessary.

1. Perform refrigeration pressure check on unit. See para 5-15. Leave gages or service manifold attached.

2. Set TEMPerature control thermostat knob fully INCREASE (clockwise), start air conditioner in COOL mode, and observe pressure gages. Suction pressure should drop to 58 ± 2 psi (4.0 $\pm$ 0.14 kg/cm^2) shortly after compressor starts, and then remain constant.

3. To adjust suction pressure, remove button plug from top of pressure regulator valve and turn adjusting stem clockwise to raise (increase) pressure, or counterclockwise to lower (decrease) pressure. If pressure is low (below 56 psi) and cannot be raised by adjustment, pressure regulator valve must be replaced. If pressure is high (above 60 psi) and cannot be lowered by adjustment, test operation of the quench valve (para 5-20) before replacing pressure regulator valve.

5-24. Pressure Regulator (cont)



REMOVAL

1. Discharge refrigerant system. See para 5-9.
2. Using screwdriver, remove screw, flat washer and clamp from pressure regulator valve.
3. Purge the system with nitrogen and debraze the tube connections. See para 5-10 and 5-11.
4. Remove the pressure regulator valve.

INSTALLATION

1. Place the pressure regulator (4) on tube ends, purge system with nitrogen and braze the tube joints. See para 5-10 and 5-11.
2. Using a screwdriver, secure pressure regulator valve (4) to bracket with screw (1), washer (2) and clamp (3).
3. Replace dehydrator. See para 5-16.
4. Leak test all newly connected joints and those in the repair area. See para 5-12.
5. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number two. See para 4-46.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-25. Service Valves

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

INSPECTION

1. Check that caps are in place and that threaded connection ends are not damaged. Replace if missing or damaged.
2. Check for signs of leakage. Leak test if leak is suspected. See para 5-12.

REMOVAL

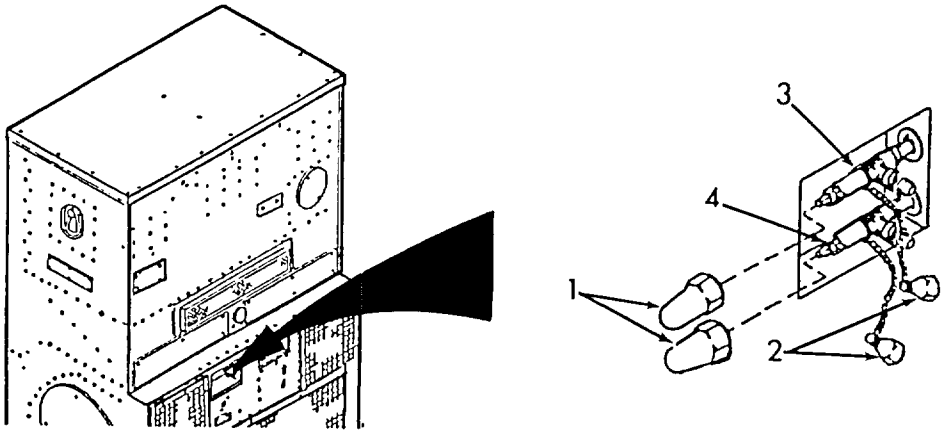
1. Discharge the refrigerant system. See para 5-9.

NOTE

If valve is to be reused, internal parts should be removed prior to debrazing.

2. While purging the system with nitrogen, debraze valves (3) and (4) from the tubing. See para 5-10 and 5-11.
3. Remove valve.

5-25. Service Valves (cont)



INSTALLATION

1. Position valve in unit.

NOTE

New valves are normally shipped with internal parts loosely assembled. Remove internal parts prior to brazing. Be sure that valve is reassembled after brazing is complete.

2. While purging the system with nitrogen, braze the tubing joints. See para 5-10 and 5-11.

3. Replace dehydrator. See para 5-16.

4. Leak test the newly connected joints and all connections in those areas. See para 5-12.

5. Evacuate and charge the system. See para 5-13 and 5-14.

6. Check that valve stem and hose connection protective caps (1) and (2) are in place on valves.

NOTE

FOLLOW ON MAINTENANCE:
1. **Install lower front panel. See para 4-24.**
2. **Connect power.**

5-26. Actuating Cylinder

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.
3. Remove condenser fans and motor. See para 4-60.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

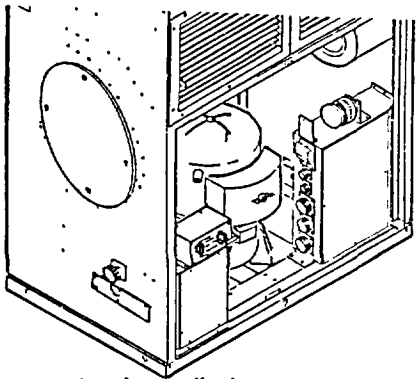
INSPECTION

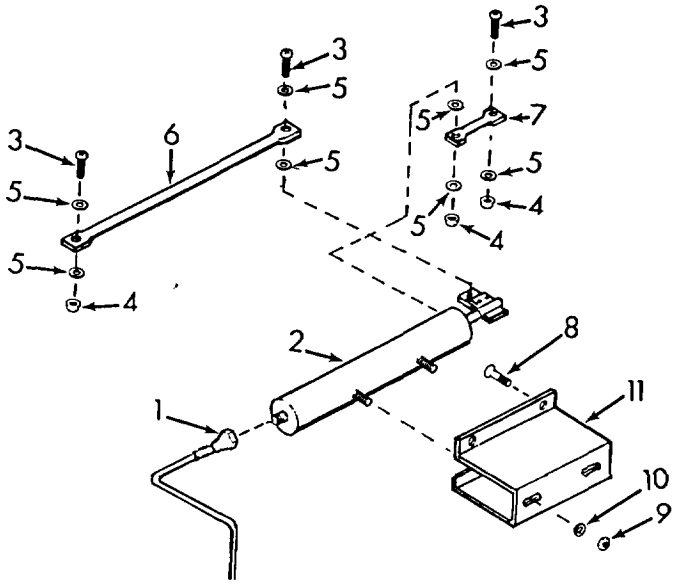
1. Check actuating cylinder for signs of leakage. If leakage is suspected, leak test per paragraph 5-12.
2. Check that attaching nuts, linkage connection, and flare nut are in place and secure. Tighten loose parts and replace if missing.
3. Check that capillary tubing is not kinked or mashed closed. Replace if damaged.

REMOVAL

1. Discharge the refrigerant system. See para 5-9.
2. Using wrench, loosen flare nut (1) and slip away from cylinder (2) flare connection.
3. Using screwdriver and wrench, remove three screws (3), eight washers (5), and three nuts (4) from linkage arms (6) and (7).
4. Using screwdriver remove four screws (8) and remove cylinder (2) and mounting bracket (11) from unit.
5. Using wrench, remove two nuts (9) and washers (10) from actuator (2) mounting studs.

5-26. Actuating Cylinder (cont)





6. Remove actuating cylinder.

INSTALLATION

1. Position actuating cylinder (2) and insert mounting studs through bracket (11).
2. Using wrench, secure cylinder (2) to bracket (11) with two washers (10) and nuts (9).
3. Using screwdriver, secure bracket to unit with four screws (8).
4. Using wrench, connect and tighten flare nut (1).

NOTE

The linkage arms used on opposite sides of the unit are not the same. Take care that correct part is ordered and properly installed when replacement is necessary.

5. Using screwdriver and wrench, secure linkage arms (6) and (7) in place with three screws (3), eight washers (5), and three nuts (4).
6. Replace the dehydrator. See para 5-16.
7. Leak test all newly connected joints and those in the repair area. See para 5-12.
8. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install condenser fan and motor. See para 4-60.**
2. **Install lower front panel. See para 4-24.**
3. **Connect power.**

5-27. Low (S6) and High (S5) Pressure Cutout Switches

This task covers:

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24.

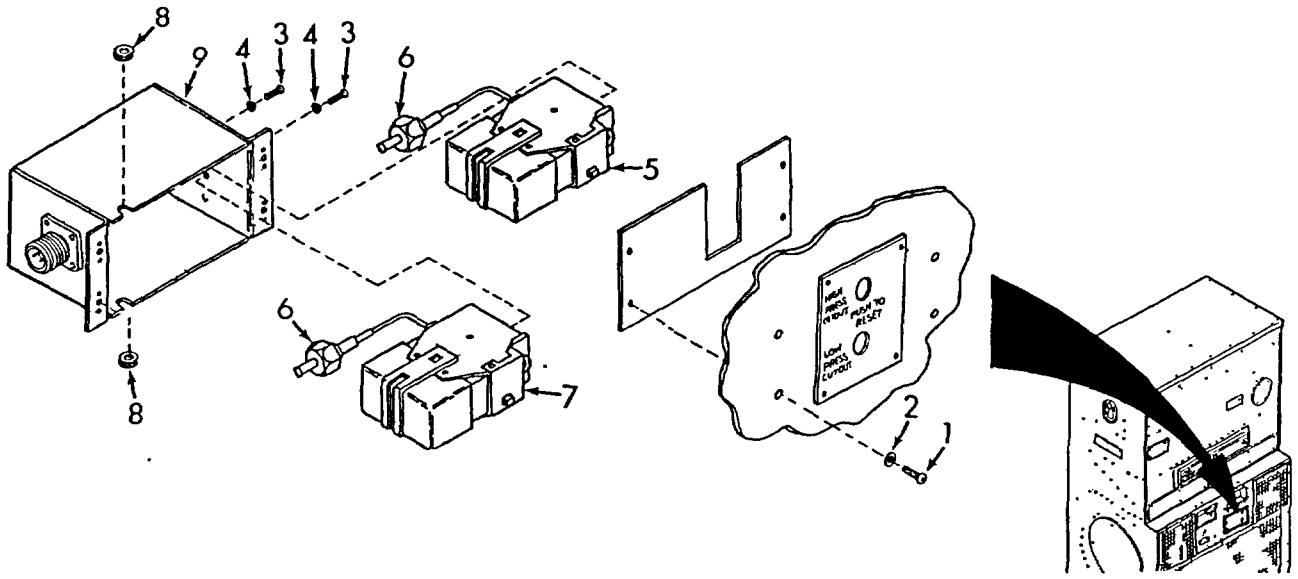
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Check to see that power has been disconnected.
2. Discharge the refrigerant system. See para 5-9.
3. Using screwdriver, remove four screws (1) and washers (2) from switch assembly enclosure (9).



5-27. Low (S6) and High (S5) Pressure Cutout Switches (cont)

4. Using wrench, loosen and disconnect high pressure switch (5) capillary tubing flare nut (6) from compressor discharge line and low pressure switch (7) capillary tubing flare nut (6) from compressor suction line.

5. Remove plug P16 from connector.

6. Using screwdriver, remove screw, washer, and clamp holding capillary line to the fan housing.

7. Carefully work capillary lines and switch assembly enclosure out of unit.

INSPECTION

NOTE

The following procedures apply to both switches.

1. Check that mounting screws and terminal attachment screws are in place and secure. Tighten if loose. Replace if missing.

2. Check that capillary line is not kinked, mashed, or broken. Replace switch if capillary line is damaged.

3. Press and release the reset button to be sure switch is not tripped.

NOTE

The low pressure switch is normally open, therefore a pressure greater than 35 psig must be in the system or used for bench testing before checking (S6) for continuity.

4. Use a continuity tester or multimeter to check for continuity between terminals 1 and 2 on switch. If there is continuity the switch is properly closed. If no continuity is found, switch must be replaced.

DISASSEMBLY

1. Using screwdriver, remove two screws (3) and washers (4) (from each switch).

2. Tag and disconnect wire leads from pressure switch.

3. Remove pressure switch (5) or (7), grommet (8), and capillary with flare nut (6) from unit.

INSTALLATION

1. Using screwdriver, secure pressure switch (5) or (7) to box with two screws (3) and washers (4).

2. Insert capillary through opening in box and position grommet (8).

3. See tags and wiring diagram, para 4-13, and connect wire leads.

4. Remove tags.

5. Carefully feed capillary tubing down to flare connection on discharge line for high pressure cutout switch and to flare connection on suction line for low pressure cutout switch.

5-27. Low (S6) and High (S5) Pressure Cutout Switches (cont)

6. Using wrench, connect flare nut (6).
7. Using screwdriver, attach capillary line to fan housing with clamp, washer, and screw.
8. Carefully coil excess capillary tubing and tape in place to eliminate vibration.
9. Replace dehydrator. See para 5-16.
10. Leak test all newly connected joints and those in the repaired area. See para 5-12.
11. Using screwdriver, secure switch assembly enclosure to unit with four screws (1) and washers (2).
12. Connect P16 connector to J16 connector on enclosure. See para 5-13 and 5-14.
13. Evacuate and charge refrigerant system.
14. Connect power.
15. Press and release pressure switch reset buttons to be sure that they are not tripped.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install lower front panel. See para 4-24.**
2. **Connect power.**

5-28. Compressor (B1)

This task covers:
a. Inspection
b. Replacement
c. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Leak detector NSN 4940-00-531-0362

Personnel: 1

Material: Tubing, insulation (Appendix E, item 17)
R-11 (Appendix E, item 11)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove lower front panel. See para 4-24. Remove junction box number one. See para 4-40.
3. Remove junction box number two. See para 4-46.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

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 (J11), Heater (HR7), Thermostat (S4), Heater (HR8), Thermostat (S10), and Connector (P21) and Harness.

INSPECTION

1. Check to be sure power has been disconnected from air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

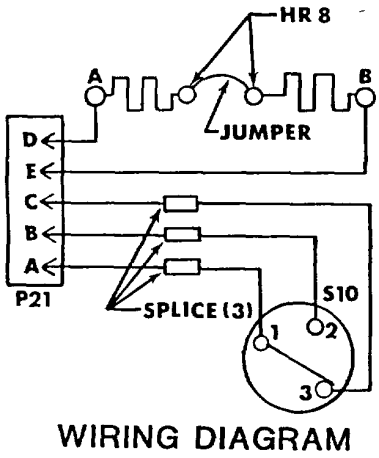
2. Allow heaters to cool before touching.

3. Check quick warm up heater (HR8) and thermostat (S10) as follows:

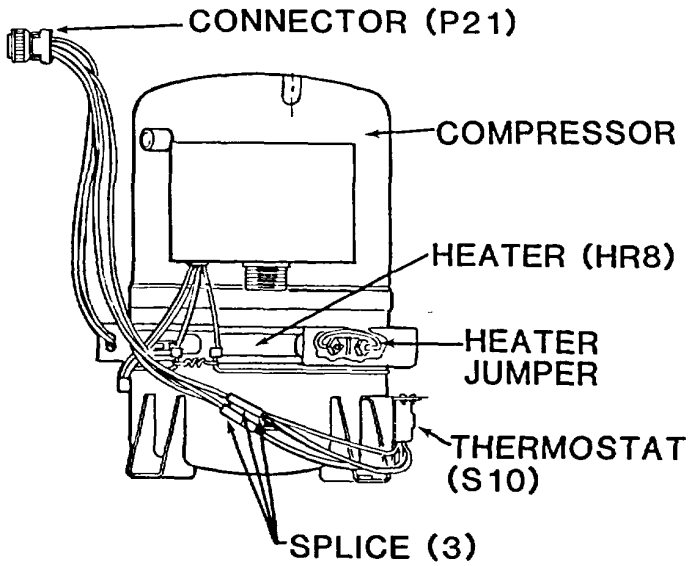
   a. Using a multimeter, check continuity between contacts D and E on P21 connector. Continuity should be indicated. If continuity was indicated got to step e.

   b. Check that jumper between heater valves is secure. Check jumper for continuity. If continuity is not indicated, repair or replace jumper.

5-28. Compressor (B1) (cont)



WIRING DIAGRAM



c. Check continuity between P21 contact D and heater terminal A and contact E and terminal B. If continuity is not indicated, repair or replace wire leads.

d. Check continuity between heater half terminals. If continuity is not indicated, replace heater.

e. Check heater (HR8) for visible damage, missing terminals or terminal covers, and secure attachment of clamping hardware.

f. Continuity check thermostat (S10) at connector P21 in accordance with following chart.

TEMPERATURE AT S10 THERMOSTAT	CONTACT A to B	CONTACT A to C
Above 70 ± 8°F (21.1 ± 4.4°C)	CLOSED	OPEN
Below 50 ± 5°F (10 ± 2.8°C)	OPEN	CLOSED
Thermostat actuates at 70 ± 8°F (21.1 ± 4.4°C) and resets at 50 ± 5°F (10 ± 2.8°C)		

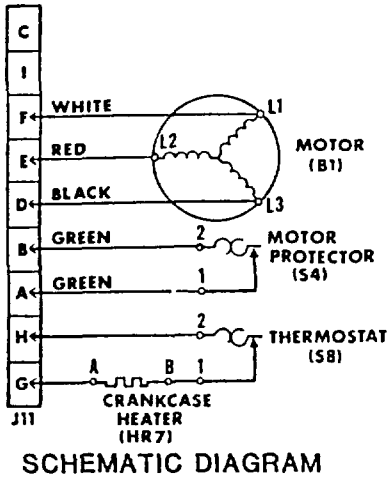
NOTE

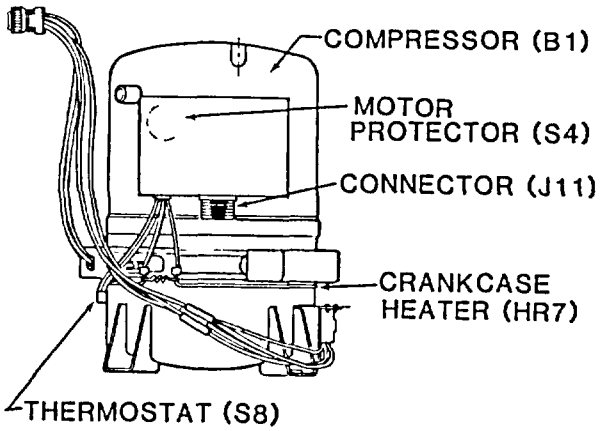
If the thermostat fails any of the above tests check that splices are properly installed. Repeat above test. Replace thermostat (S10) if bad.

4. Check compressor (B1), motor protector (S4), heater (HR7), and thermostat (S8) as follows:

a. Disconnect P11 connector and harness from J11 connector located on compressor junction box.

5-28. Compressor (B1) (cont)





b. Remove wing nut from compressor junction box cover and pull junction box cover from compressor.

c. Check that all wire connections are secure and in good condition.

d. Using multimeter, check continuity between connector (J11) contacts D to E, D to F, and E to F. Continuity should be indicated. If continuity is not indicated, check that wires are properly connected. If wires are properly connected and continuity is still not indicated, replace compressor.

e. Check continuity between J11 contacts A and B. If there is no continuity and wires are properly connected, the motor protector (internal thermostat) is open. Replace the compressor.

f. Check continuity between J11 contacts A, B, D, E, and F and compressor canister. If wires are properly connected and there is continuity indicated, there is an internal short. Replace the compressor.

g. Check continuity between J11 contacts G and H. If there is continuity between these pins, both the heater element and thermostat are all right. If there is no continuity between the pins, bare the splice between the heater lead and thermostat lead, and separately check for continuity between pin G and the splice, but not between pin H and the splice, the heater element is all right and the thermostat is bad. If there is continuity between pin H and the splice but not between pin G and the splice, the thermostat is all right and the heater element is bad. If there is no continuity between either pin and the splice, both the element and the thermostat are bad.

REPLACE CONNECTOR J11

NOTE

Refrigerant system discharge is not required.

1. Check to see that the power has been disconnected at the power source, and covers have been removed during access and testing.

2. Remove the retaining hardware from the connector. Pull the connector out of the box to gain access to the solder connections.

5-28. Compressor (B1) (cont)

3. Tag and unsolder wires.
4. Using tags and wiring diagram (para 4-13) solder wires to new connector. Remove tags.
5. Secure the connector to the compressor junction box with four screws, lock washers, and nuts.

REPLACE HEATER HR7

NOTE

Refrigerant system discharge is not required.

1. Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

WARNING

Allow heater to cool before touching. Severe burns can result from touching hot heater.

2. Tag and disconnect two heater leads.
3. Using pliers, remove retaining spring on heater.
4. Spread the heater ends to clear junction box.
5. Lift heater up and off compressor crankcase.
6. Install new heater as follows:
   a. Spring heater ends apart and place heater down and around compressor in position on crankcase. Secure heater on crankcase with retaining spring.
   b. Run leads through the grommet in the compressor junction box.
   c. See tags on the removed heater. Connect heater leads.
   d. If this completes the repair, install terminal box cover.

REPLACE THERMOSTAT S8

NOTE

Refrigerant system discharge is not required.

1. Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.
2. Tag and disconnect two thermostat leads.
3. Using pliers, bend retaining tabs back.

5-28. Compressor (B1) (cont)

4. Remove thermostat.

5. Install new thermostat as follows:

   a. Insert thermostat and carefully bend retaining tabs back to secure thermostat.

   b. See tags on removed thermostat. Connect thermostat leads.

   c. If this completes the repair, install terminal box cover.

REPLACE HEATER HR8

NOTE

Refrigerant system discharge is not required.

1. Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

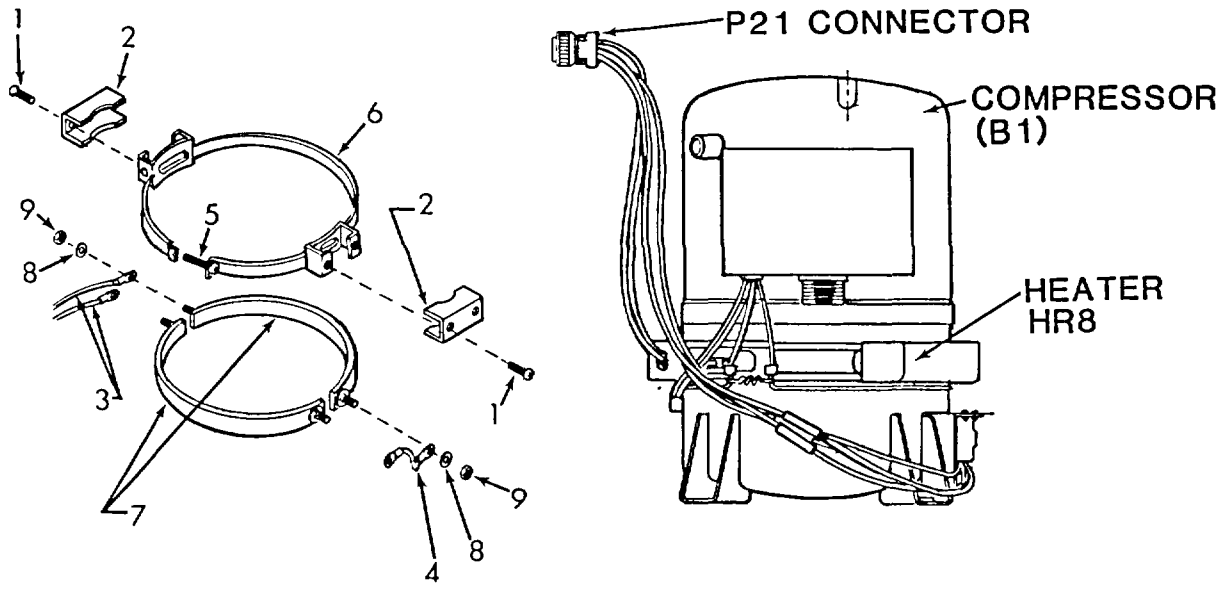
WARNING

Allow heater to cool before touching. Severe burns can result from touching hot heater.

2. Using screwdriver, remove two screws (1) from each of the two heater terminal covers (2).

3. Remove two terminal covers (2).

4. Tag and disconnect wire leads (3) and jumper (4).



5-28. Compressor (B1) (cont)

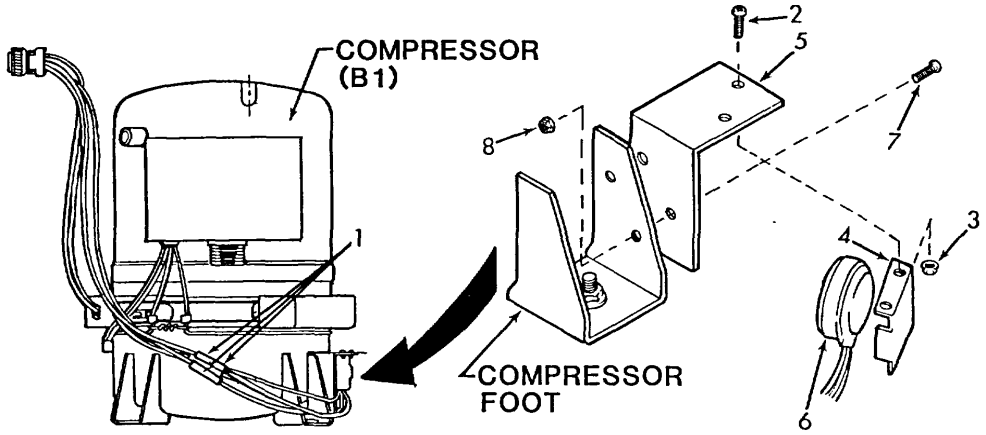
5. Using screwdriver, loosen screw (5) in heater band clamp (6).
6. Remove band clamp (6) and two heater halves (7).
7. Install new heater as follows:
   a. Position heater halves (7) and heater band clamp (6) on compressor.
   b. Using screwdriver, tighten screw (5) in band clamp.
   c. See tags and wiring diagram (para 4-13) and connect wire leads (3) and jumpers (4).
   d. Remove tags.
   e. Using screwdriver, secure the two terminal covers (2) with four screws.

REPLACE THERMOSTAT S10

NOTE

Refrigerant system discharge is not required.

1. Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.
2. Tag and disconnect three thermostat leads at splices (1).
3. Using screwdriver, remove two screws (2) and nuts (3) that secure support (4) to angle (5).
4. Remove support (4) and thermostat (6).
5. Install new thermostat as follows:
   a. Using screwdriver, install support (4) and thermostat (6) with two screws (2) and nuts (3). Be sure thermostat (6) face is making good contact with side of compressor.
   b. See tags on old thermostat and wiring diagram, para 4-13, install new splices and connect leads.



5-28. Compressor (B1) (cont)

REPLACE COMPRESSOR

1. Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

2. Disconnect the P2 connector from the condenser fan motor.

NOTE

The compressor is mounted to the cabinet base by four bolts that are inserted from the underside of the base. In order to remove the compressor, it is necessary that the entire air conditioner be raised and placed on blocks of sufficient height to allow for removal of these bolts from below the base.

3. Using sling and spreader bar, attach overhead hoist to lifting rings on each side of cabinet.

4. Raise the cabinet and place it on blocks at least four inches high. Be sure the blocks do not obstruct the holes in the base through which the compressor mounting bolts must be removed.

5. Unwrap the insulation from the suction line so that the joint on the compressor is exposed.

6. Discharge the refrigerant system. See para 5-9.

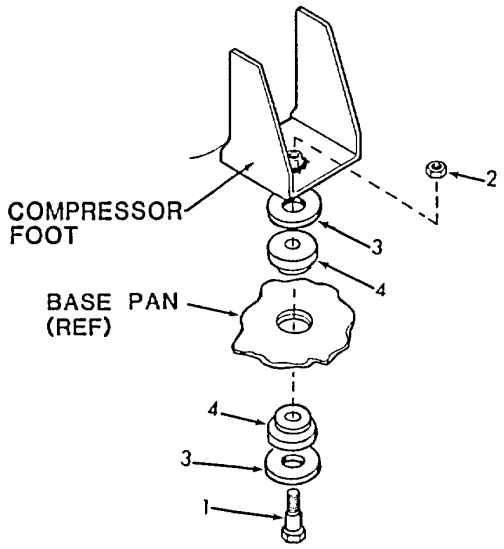
7. While purging the system with nitrogen, debraze the tubing. See para 5-10 and 5-11.

8. Using two socket and ratchet wrenches, remove four nuts (2) and washers (3) from top of mounting foot and four bolts (1), flat washers (3), and washers (4) from bottom of unit.

WARNING

If compressor burnout is suspected, use care when handling compressor to avoid touching compressor sludge. Acid in sludge can cause burns.

9. Lift or tilt compressor and remove washer (4) from under each of the four mounting feet.



5-28. Compressor (B1) (cont)

10. Carefully slide compressor from air conditioner.

11. Check the compressor to see if motor bum out is indicated.

COMPRESSOR MOTOR BURN OUT INSPECTION

WARNING

Avoid skin contact or inhaling fumes from any acid formed by burnout of oil and refrigerant. Wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.

1. After removal of a bad compressor from the refrigeration system, remove all external tubing and tip the compressor toward the discharge port to drain sample of oil into a clear glass container.

2. If the oil is clean and clear, and does not have a burnt acid smell, the compressor did not fail because of motor burnout. If a burnout is not indicated, proceed to step INSTALL COMPRESSOR.

3. If the oil is black, contains sludge, and has a burnt acid odor, the compressor failed because of motor burnout.

4. You must clean the entire refrigeration system after a burnout has occurred, since contaminants will have been carried to many corners and restrictions in the piping and fittings. These contaminants will soon mix with new refrigerant gas and compressor oil to cause repeated burn outs.

5. Remove the dehydrator. Connect a cylinder of dry nitrogen to each dehydrator connection in turn and open the cylinder shutoff valve for at least 30 seconds at 50 psig (3.5 kg/cm^2) pressure.

6. Connect the two dehydrator fittings with a jumper locally manufactured from refrigerant tubing and fittings.

7. Clean system by back flushing with liquid R-11 from pressurized cylinder or circulating pump and reservoir with pressure of at least 100 psig.

8. If pump is used, connect the discharge line of the refrigerant system to the discharge side of the pump.

9. Connect a line containing a filter to the suction line in the unit.

NOTE

An unused dehydrator or other suitable medium may be used as a filter.

10. The other end of the temporary suction line should be connected to a small drum or suitable reservoir.

11. A line should be run from the bottom of the reservoir to the inlet of the pump.

WARNING

Avoid skin contact or inhaling fumes from any acid formed by burnout of oil and refrigerant. Wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.

5-28. Compressor (B1) (cont)

12. Fill reservoir with fluorocarbon refrigerant, R-1 1, and start the pump. Continue filling the reservoir with refrigerant, R-11, until it begins to pour out of the return line. Continue flushing for at least 15 minutes.

13. Reverse the pump connections, replace the filter with a new filtering medium, and backflush the system for an additional 15 minutes.

14. Remove the pump, reservoir and filter and dehydrator jumper. Place an empty container below the compressor connections, and connect a cylinder of dry nitrogen to each dehydrator connection in turn. Blow down each leg of the system at 50 psig (3.5 kg/cm^2) for at least 30 seconds.

INSTALL COMPRESSOR

CAUTION

The compressor is supplied with a complete charge of oil. Take care that oil is not lost when handling and installing compressor.

NOTE

If any refrigeration piping was disconnected with the compressor being replaced, transfer the piping to the replacement compressor before installing it in the air conditioner. Check to see that replacement compressor is equipped with the same type of heaters as were on the old compressor. If not, remove heaters and related parts from old compressor or replace with new ones. Locate parts and mount using old compressor as a guide. Installation of the thermostat mounting angle will require drilling of two holes. Match drill from angle.

1. Lift compressor through the lower front panel opening and position it on base pan.

2. Lift or tilt compressor and install washer and flat washer between each of the four compressor mounting feet and the base pan.

3. Install a flat washer and a washer on each of the four bolts, then install the bolts beneath the pan base and install nuts on bolt.

4. Wrap wet rags around compressor at connection points and while brazing direct flame away from compressor.

5. While purging the system with nitrogen, braze the tubing joints. See para 5-10 and 5-11.

6. Replace dehydrator. See para 5-16.

7. Connect electrical connector plug (P11) to connector (J11) on compressor terminal box.

8. Leak test all newly connected joints and those in the repair area. See para 5-12.

9. Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation.

10. Connect electrical connection plug P2 to connector J2 on condenser fan motor.

11. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

5-28. Compressor (B1) (cont)

NOTE

FOLLOW ON MAINTENANCE:

1. **Install junction box number one. See para 4-40.**
2. **Install junction box number two. See para 4-46.**
3. **Install lower front panel. See para 4-24.**

5-29. Tubing and Fittings

This task covers:
a. Removal
b. Installation

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474
Leak detector NSN 4940-00-531-0362

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

NOTE

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.

Remove covers and panels as necessary to have access to repair area.

REMOVAL

1. Discharge the refrigeration system. See para 5-9.
2. Purge the system with nitrogen (para 5-10) and debraze (para 5-11) the tube connections.
3. Remove the part.

5-29. Tubing and Fittings (cont)

INSTALLATION

1. Place the replacement part on the tube ends.
2. Purge the system with nitrogen and braze the tube joints. See para 5-10 and 5-11.
3. Replace the dehydrator. See para 5-16.
4. Leak test all newly connected joints and those in the repair area.
5. Install all covers and panels that were removed.
6. Evacuate and charge the refrigerant system. See para 5-13 and 5-14.

NOTE

FOLLOW ON MAINTENANCE:
1. Connect power.

5-30. Condenser Air Discharge Louvers and Linkage

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

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove condenser coil. See para 5-22.

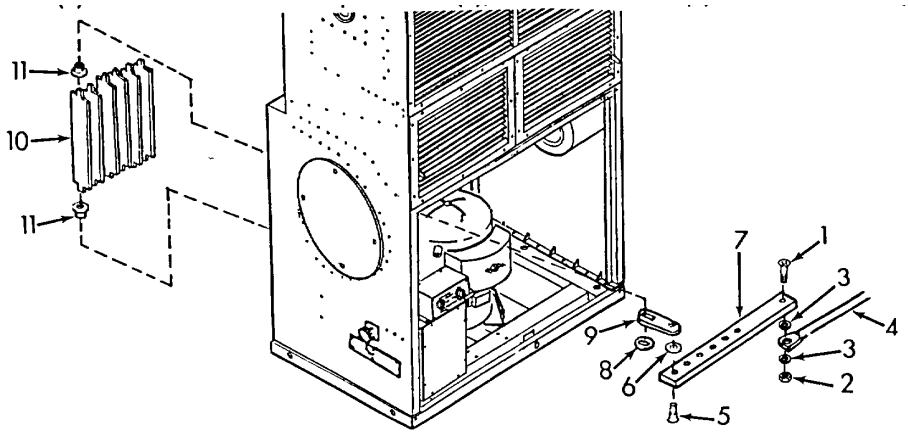
General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REMOVAL

1. Using screwdriver and wrench, remove screw (1), nut (2), and two flat washers (3) from actuator linkage (4).
2. Remove push on nut (8) and remove linkage assembly (5), (6), (7), and (9) as an assembly from unit.
3. Carefully flex the damper blades (10) enough to free the shorter (top) tab and remove damper blades (10).
4. Remove bearings (11).
5. If disassembly of the linkage parts is required, use a drill bit slightly smaller than the body diameter of the rivet (5). Drill the rivet (5) out and remove the damper control (7), louver arm blades (9), and flat washers (6).



5-30. Condenser Air Discharge Louvers and Linkage (cont)

INSPECTION

1. Check for loose, missing, or broken parts. Repair loose parts and replace missing or broken parts.

2. Check that damper blades are not bent, dented, or otherwise damaged. Straighten or replace damaged blades.

INSTALLATION

1. If linkage parts were disassembled, bench assemble items (5), (6), (7), and (9). If these items were not disassembled, skip steps 2 thru 3.

2. Insert rivet (5) thru damper control (7), flat washer (6), and louver arm blade (9) and carefully head the rivet. The louver arm blade (9) must swing freely on the pivot point.

3. Attach remaining louver arm blades, repeating step 2.

4. Insert bearings (11).

5. Carefully flex damper blades (10) and install them with the longer tab down.

6. Secure louver arm blades (9) to damper blades (10) with push on nuts (8).

7. Using screwdriver and wrench, attach damper control (7) to actuator linkage (4) with screw (1), nut (2), and two flat washers (3). Take care that nuts are not too tight to prevent damper movement.

NOTE

FOLLOW ON MAINTENANCE:

1. **Install condenser coil. See para 5-22.**
2. **Connect power.**

5-31. 16 Inch Adapter Duct (Model F60T-2HS Only)

This task covers:
Repair

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Materials: Rags (Appendix E, item 9)

Equipment condition:
1. Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.
2. Remove adapter duct. See para 4-65.1.

General Safety Instructions

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REPAIR

Repairs are limited to straightening of minor dents, rewelding of broken welds, installation of loose or missing rivets, replacement of loose or missing gaskets and insulation, paint touch up, and replacement of damaged or missing catches.

1. *Minor Dents.* Repair minor dents using standard sheet metal repair practices.

2. *Broken Welds.* Repair broken welds using standard weld repair practices.

3. *Rivets.* To replace loose or missing rivets (1), drill old rivet out using a drill bit slightly smaller than the diameter of old rivet body, and install replacement rivet.

4. *Gasket/Insulation.* To replace or repair gasket (2) or insulation (3):

   a. Remove as much old gasket or insulation material as possible by pulling or scraping it away from the metal surface.

5-31. 16 Inch Adapter Duct (Model F60T-2HS Only) (cont)

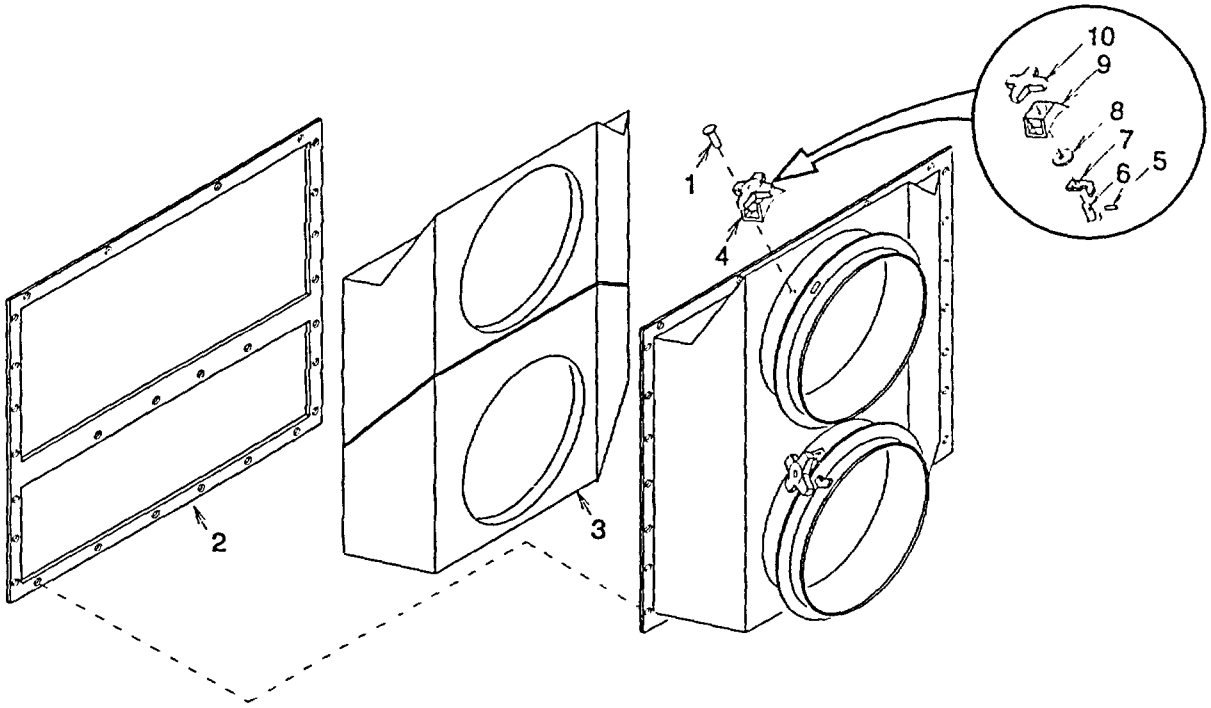


Figure 5-31. 16 Inch Adapter Duct

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

b. Soften and remove old adhesive, gasket, and insulation residue using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

c. Coat the mating surfaces of the metal and gasket or insulation (if applicable) with adhesive (Appendix E, item 2). Let both surfaces dry until the adhesive is tacky but will not stick to fingers.

d. Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

5. *Touch Up.* Should touch up or refinishing be necessary, see TM 43-0139, Painting Instructions for Field Use.

6. *Catches.* To replace damaged or missing catches (4), drill rivets out using a drill bit slightly smaller than the diameter of the rivet body, and secure catch plate with replacement rivets.

5-31. 16 Inch Adapter Duct (Model F60T-2HS Only) (cont)

7. *Catches.* Catches (4) may be repaired by removing pin (5) and replacing any damaged component.

   a. To reassemble, slip cam (6), hook (7), washer (8), body (9), and knob (10) together.

   b. Insert pin (5) through knob (10) and cam (6).

   c. Install the assembled catch with rivets (1).

NOTE

FOLLOW ON MAINTENANCE:
1. Install adapter duct. See para 4-65.1.
2. Connect power.

CHAPTER 6

INTERMEDIATE GENERAL SUPPORT MAINTENANCE

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-1. General. Repair parts are listed and illustrated in TM 5-4120-393-24P. No special tools are required for general support maintenance of the air conditioner. Test, Maintenance, and Diagnostic Equipment (TMDE), and support equipment includes standard electrical test equipment, and standard pressure and vacuum gages, vacuum pumps, and servicing manifolds found in any general support maintenance refrigeration facility.

Section II MAINTENANCE PROCEDURES

6-2. General. The only items restricted to intermediate general support maintenance level by the Maintenance Allocation Chart (MAC) are to repair and replace elements of the air conditioner housing. However, intermediate general support maintenance may be called upon, at times, to perform any or all of the MAC Items listed for unit and intermediate direct support maintenance for rehabilitation or overhaul of an air conditioner.

6-3. Sheet-Metal Parts.

a. Disassemble the air conditioner to the extent necessary to gain access to damaged area for repair.

b. Remove insulation from area to be repaired. (See para 5-3.)

c. Repair damage using standard sheet-metal repair procedures. Rivet or weld patches to the inside surface when required.

WARNING

Toxic fumes are emitted by burning or overheated insulation. Heated refrigeration piping can burst with explosive force. Shield wiring and piping, and remove insulation in the area if weld repair is necessary.

d. Prepare surface for priming and painting, using wet abrasive paper to remove dead paint. Paint as directed in TM 43-0139.

e. Replace insulation as necessary and reassemble the air conditioner.

6-4. Housing

This task covers:
a. Repair b. Replace

Initial setup.

Tools:
Tool kit, service, refrigeration unit NSN 5180-00-596-1474

Personnel: 1

Equipment condition:
Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

General Safety Instructions:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

REPAIR

1. Repairs are limited to rework of broken or cracked welds, straightening of bent or dented sheet metal, and replacement of handles, gaskets, insulation, and rivnuts and some small sheet metal parts by drilling out rivets and installation of replacement parts.

2. Disassemble unit as necessary and make repairs as indicated.

3. Gasket and insulation replacement.

   a. Use only gaskets, insulation, or name plates identified in TM 5-4120-393-24P.

   b. Remove as much old gasket or insulation material as possible by pulling or scraping it away from the metal surface.

   c. Soften and remove old adhesive and gasket residue using acetone or methyl-ethyl (MEK) and a stiff brush.

   d. Coat the mating surfaces of the metal and gasket with adhesive. Let both surfaces air dry until the adhesive is tacky but will not stick to fingers.

   e. Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

   f. Minor dents and bent edges can be straightened using common sheet metal repair procedures.

   g. Should touch up or refinishing be necessary, see TM 43-0139.

6-4. Housing (cont)

REPLACE

1. Housing replacement requires total unit disassembly. Normally if the unit is damaged to this extent it should be replaced.

2. If housing replacement is attempted see individual installation instructions of components for reinstallation of items removed.

NOTE

FOLLOW ON MAINTENANCE
1. Connect power.

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.

Recommended Changes to Publications On Blank Forms DA-2028
Recommended Changes to Equipment Technical Publications DA-2028-2
Quality Deficiency Report SF-368
Packaging Improvement Report DD-Form-6

A-3. Department of the Army Pamphlets.

The Army Maintenance Management System (TAMMS) .....DA PAM 738-750

A-4. Technical Manuals.

Repair Parts and Special Tools List .....TM 5-4120-393-24P
Destruction of Equipment to Prevent Enemy Use .....TM 750-244-3
Painting Instructions for Field Use .....TM 43-0139

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 catagories.

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 catagories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. Maintenance Functions. Maintenance functions will be limited to and 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 third position code of the SMR code.

B-2. MAINTENANCE FUNCTIONS. - Continued.

i. ***Repair***. The application of maintenance services[1], including fault location/trouble-shooting[2], removal/ installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. ***Overhaul.*** That maintenance effort (service/actions) 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 equipments/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 the maintenance function at the indicated level 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.

---

[1]Services - inspect, test, service, adjust, aline, calibrate, and/or replace.

[2]Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3]Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SM R code) for the category of maintenance under consideration.

[4]Actions - welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

B-3. Explanation of Columns in the MAC, Section II. (cont)

C .....Operator or Crew
O .....Unit Maintenance
F .....Intermediate Direct Support Maintenance
H .....Intermediate 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 alphabetical 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

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
01	COVERS, PANELS, GRILLES, SCREENS AND INFORMATION PLATES								
	Grilles	Inspect	0.1	0.1					
		Adjust	0.1						
		Service		0.2					
		Repair		0.2	0.2				A B
		Replace		0.3					
	Information Plates	Inspect	0.1						
		Service	0.1						
		Replace			0.3				
	Covers	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace		0.5					
	Panels	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace		0.5					
	Screens and Guards	Inspect	0.1						
		Service	0.1						B
		Replace		0.5					
02	AIR CIRCULATING SYSTEM								
	Air Filters	Inspect		0.5					
		Service		1.0					
		Replace		0.5					
	Mist Eliminator	Inspect		0.7					
		Service		1.0					
		Replace		0.7					

Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
	Fresh Air Damper	Inspect		0.5					
		Service		0.5					
		Adjust	0.1	1.0					
		Replace		2.0					
03	ELECTRICAL								
	Control Module	Inspect	0.1						C
		Adjust	0.1						
		Repair		2.0					D
		Replace		1.0					
	Control Module Wiring Harness	Inspect		0.5					
		Test		1.0					
		Repair		1.0					
		Replace		1.0					
	Temperature Control (Thermostat)	Inspect		0.5					
		Adjust	0.1						
		Test		0.5					
		Replace		0.5					
	MODE SELECTOR Switch	Inspect		0.5					
		Adjust	0.1						
		Test		0.5					
		Replace		0.5					
	Junction Box No. One	Inspect		0.5					
		Repair		4.0					D
		Replace		1.0					
	Wiring Harness	Inspect		0.5					
		Test		1.0					
		Repair		1.0					
		Replace		1.0					
	Circuit Breaker	Inspect		0.3					
		Test		0.5					
		Replace		0.5					

Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
	Relays	Inspect		0.3					
		Test		0.5					
		Replace		0.5					
	Junction Box No. Two	Inspect		0.5					
		Repair		4.0					D
		Replace		1.0					
	Wiring Harnesses	Inspect		0.5					
		Test		1.0					
		Repair		1.0					
		Replace		1.0					
	Fuses	Inspect		0.2					
		Test		0.1					
		Replace		0.2					
	Transformer	Inspect		0.3					
		Test		0.5					
		Replace		0.5					
	Relays	Inspect		0.3					
		Test		0.5					
		Replace		0.5					
	Rectifier	Inspect		0.3					
		Test		0.5					
		Replace		0.5					
	Filters	Inspect		0.3					
		Test		0.5					
		Replace		0.5					
	Unit Wiring Harness	Inspect		0.5					
		Test		1.0					
		Repair		1.0					
		Replace		1.0					

Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
04	EVAPORATOR FANS, MOTORS, AND HEATERS								
	Fan and Housing	Inspect		1.0					
		Service		0.1					
		Replace		1.0					
	Motor	Inspect		1.0					
		Test		0.2					
		Repair			2.0				E
		Replace		1.0					
	Heater Thermostat	Inspect		0.3					
		Test		0.3					
		Replace		0.5					
	Heater Elements	Inspect		0.3					
		Test		0.3					
		Replace		1.0					
05	CONDENSER FANS, AND MOTOR								
	Fans and Housing	Inspect		0.2					
		Service -		0.2					
		Replace		1.0					
	Motor	Inspect		0.3					
		Test		0.3					
		Repair			2.0				E
		Replace		1.0					
06	REFRIGERATION SYSTEM								
	Dehydrator	Inspect			0.7				
		Replace			6.0				
	Solenoid Valves	Test		1.0					
		Repair		1.0					F
		Replace			6.0				

Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
	Liquid Indicator	Inspect	0.1						
		Replace			6.0				
	Expansion Valves	Test			1.0				
		Adjust			2.0				
		Replace			6 0				
	Evaporator Coil	Inspect		1.0					
		Service		2.0					
		Replace			6.0				
	Condenser Coil	Inspect		1.0					
		Service		2.0					
		Replace			6.0				
	Pressure Relief Valve	Inspect			0.3				
		Replace			6.0				
	Pressure Regulator	Test			0.5				
		Adjust			1.0				
		Replace			6.0				
	Service Valves	Inspect			0.1				
		Replace			6.0				
	Actuating Cylinder	Inspect			0.5				
		Adjust			1.0				
		Replace			6.0				
	Pressure Switches	Inspect			0.5				
		Test			1.0				
		Replace			6.0				
	Compressor	Test			1.0				
		Repair			2.0				G
		Replace			8.0				
	Tubing and Fittings	Test			1.0				
		Replace			6.0				

Section II MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARK
			Unit		Intermediate		Depot		
			C	O	F	H	D		
07	HOUSING, INSULATION AND CONDENSATE DRAIN TRAP								
	Condenser Air Discharge Louver and Linkage	Inspect			1.0				
		Replace			8.0				
	Condensate Traps and Drain Tubes	Inspect		1.0					
		Service		1.5					
		Replace		0.5					
	Housing	Inspect		0.5					
		Service		0.5					
		Repair				2.0			
		Replace				40.0			
08	ACCESSORY ITEMS								
	Block Off Assembly	Inspect	0.1						
		Service	0.1						
		Replace		1.0					
	16 Inch Adapter Duct	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace		0.5					

Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

MAINTENANCE ALLOCATION CHART

(1) Tool/Test Equipment Ref Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
	NOTE **No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II:**			
1	O-F-H	Tool kit, service, refrigeration unit	5180-00-596-1474 (50980) SC 5180-90-CL-N18	
2	F-H	Pump, Vacuum	4310-00-289-5967 (64484) 1400B	
3	O-F-H	Soldering Gun Kit	3439-00-930-1638 (11103) 450K4	
4	O-F-H	Heat Gun	4940-01-042-4855	
5	O-F-H	Pliers, Long Round Nose	5120-00-268-3579	
6	O-F-H	Screwdriver, Dross Tip No. 2 One Inch Long Blade	5120-00-227-7293	
7	O-F-H	Screwdriver, Offset, Cross Tip No. 1	5120-00-256-9014	
8	F-H	Recovery and Recycling Unit, Refrigerant	4130-01-338-2707 (07295) 17500B	

Section IV REMARKS

MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
A	Replace gasket insulation and information plates.
B	Straighten bent blades.
C	External components only (knobs and switches).
D	Replace components.
E	Replace bearings, thermal overloads or connector.
F	Replace solenoid valve coil only.
G	Replace external components only.
	Other than those items listed above there are no supplemental instructions or explanatory remarks required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner in off-equipment position.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I INTRODUCTION

C-1. Scope. This Appendix lists components of end item and basic issue items for the air conditioner to help you inventory items required for safe and efficient operation.

C-2. General. The Components of End Item List and Basic Issue List are divided into the following sections:

a. ***Section II. Components of End Item***. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. ***Section III. Basic Issue Items***. These are the minimum essential items required to place the air conditioner in operation, to operate it, and to perform emergency repairs. Although shipped separately, Basic Issue Items must be with the air conditioner during operation and whenever it is transferred between property accounts. The illustration will assist you with hard to identify items. This manual is your authority to request/requisition replacement Basic Issue Items, based on TOE/MTOE authorization of the end item.

C-3. Explanation of Columns. The following provides an explanation of columns found in the tabular listings.

a. ***Column (1) Illustration Number (Illus Number).*** This column indicates the number of the illustration in which the item is shown.

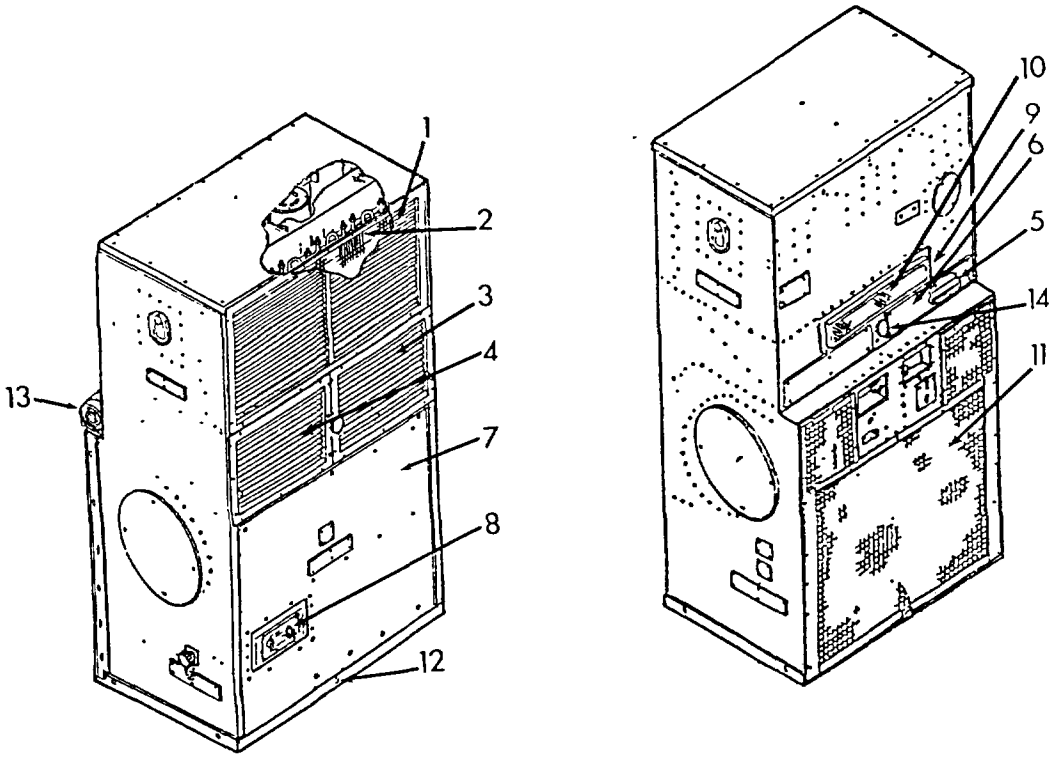
b. ***Column (2) National Stock Number***. This column indicates the national stock number assigned to the item and will be used for requisitioning purposes.

c. ***Column (3) Description***. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. ***Column (4) Unit of Measure (U/M)***. Indicates the measure used in performing the actual function. This measure is expressed by a two-character alphabetical abbreviation (e.g , ea, in, pr).

e. ***Column (5) Quantity required (0ty rqr).*** Indicated the quantity of the item authorized to be used with/on the equipment.

Section II COMPONENTS OF END ITEM



Section II Components of End Item (cont)

(1) Illus Number	(2) National Stock Number	(3) Description, FSCM, and Part Number Usable On Code	(4) U/M	(5) QTY rqr
1		Grille, Metal (97403) 13214E4237	ea	1
2		Mist Eliminator (97403) 13228E4011	ea	1
3		Grille, Metal (97403) 13214 E4238-1	ea	1
4		Grille, Metal (97403) 13214E4238-2	ea	1
5		Filter, Air Conditioning (97403) 13228E4005	ea	2
6		Cover, Filter (97403) 13228E4041	ea	2
7		Panel, Lower (97403) 13228E4038	ea	1
8		Control Panel Assembly (97403) 13218E9964	ea	1
9		Frame, Filter (97403) 13225E8106	ea	1
10		Filter, Air Conditioning (97403) 13214E3972-1	ea	1
11		Guard, Condenser Coil (97403) 13228E4046	ea	1
12		Plug, Pipe (97403) 13211E8178	ea	8
13		Cover, Canvas (97403) 13228E4071	ea	1
14		Knob (97403) 13214E3889	ea	2

Section III BASIC ISSUE ITEMS

(1) National Stock Number	(2) Description, FSCM, and Part Number Usable On Code	(3) U/M	(4) Qty Auth
7520-00-559-9618	Cotton Duck Case	ea	1
7240-00-137-1609	Bucket	ea	1
8415-00-266-8677	Rubber Gloves	pr	1
4240-00-052-3776	Safety Goggles	ea	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I INTRODUCTION

D-1. Scope. This appendix lists additional items you are authorized for the support of the 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 Listings. 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 under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorized the item(s) to you.

Section II ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I INTRODUCTION

E-1. Scope.

Section II of this appendix lists expendable supplies and materials you will need to operate and maintain the air conditioner.

E-2. Explanation of Columns in Section II.

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.

b. ***Column (2), Level***. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Intermediate Direct Support Maintenance
H - Intermediate General Support Maintenance

c. ***Column (3), National Stock Number.*** This is the National Stock Number assigned to the item; use it to requisition or request the item.

d. ***Column (4), Description.*** Indicates the federal item name and , if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. ***Column (5), Unit of Measure (U/M).*** Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two character alphabetical abbreviation (e.g., ea, in pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II Expendable Supplies and Materials List

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O	4130-00-860-0042	Coater, Air Filter, 1 pint container	ea
2	F	3040-00-664-0439	Adhesive, General Purpose, 1 pint container	ea
3	F		Solder, Lead-Tin, QQ-S-571, Type SN60WRP2	
4	F	6830-00-292-0732	Nitrogen	cy
5	F	3439-00-224-3573	Brazing alloy, silver, QQ-B-654, grade O, I, or II	oz
6	F	3439-00-853-9276	Brazing alloy, silver, QQ-B-654, grade III	oz
7	F	3439-00-640-3713	Flux, brazing, O-F-499, type B	oz
8	F	5350-00-192-5047	Abrasive cloth	pg
9	F	7920-00-205-1711	Rags	pg
			NOTE **Whenever available, use recycled refrigerant for charging the refrigeration system.**	
10	F	6850-00-837-9927	Monochlorodifluoromethane, Technical: w/cylinder 22 lb (Refrigerant-22) BB-F-1421 Type 22 (81348)	cy
11	F	6830-00-872-5120	Trichloromonofluoromethane, Technical: w/cylinder 50 lb (Refrigerant-11) BB-F-1421 Type 11 (81348)	cy
12	F	5640-00-580-6276	Tape, Insulation 13219E9543 (97403) 165 (77464)	roll
13	F	8030-00-889-3534	Tape, Antiseize, Polytetrafluroethylene MIL-T-27730, size 1	roll
14	F		Lubricating Oil VV-L-825, type IV	qt
15	F	9150-00-058-2301	Oil, Vacuum pump, Duo-seal	qt
16	O	3439-01-045-7940	Flux, Solder, Liquid, Rosin Base MIL-F-14256	qt
17	F ft		Plastic Material, Form T, 3/4 ID x 1/2 Wall (Tubing insulation) MIL-P-15280	
18	F	9150-00-823-7860	Silicone spray, Aerosol, Can, 16 oz	ea
19	F	6850-00-264-9037	Solvent, Dry Cleaning PD-680	ea

APPENDIX F

ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I Introduction

F-1. Scope. This appendix includes complete instructions for making items authorized to be manufactured or fabricated by organizational maintenance.

F-2. General. This list identifies items that organizational maintenance is authorized to manufacture or fabricate.

Section II ILLUSTRATED LIST OF MANUFACTURED ITEMS

NOT APPLICABLE

ALPHABETICAL INDEX

ALPHABETICAL INDEX (cont)

ALPHABETICAL INDEX (cont)

ALPHABETICAL INDEX (cont)

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ALPHABETICAL INDEX (cont)

ALPHABETICAL INDEX (cont)

By Order of the Secretary of the Army:

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TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN . JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT. FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

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 5-4120-393-14	2 Nov 87	Air Conditioner, Vertical, Model F60T-2S

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	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 2 910-00-762-3001. 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

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE

DRSTS-M Overprint 1, 1 Nov 80

PS--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

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FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U S ARMY TROOP SUPPORT COMMAND
ATTN: AMSTR-MCTS
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter= 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 Meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = 0.35 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 fluid ounce
1 deciliter = 10 centiliters = 3.38 fluid ounces
1 liter = 10 deciliters = 33.81 fluid ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 27.42 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 = 125.5 sq. inches
1 sq. meter (centare) = 100 sq decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 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. decimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square 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
pounds-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit Temperature	5/9 (after subtracting 32)	Celsius Temperature	°C

PIN: 063493-006