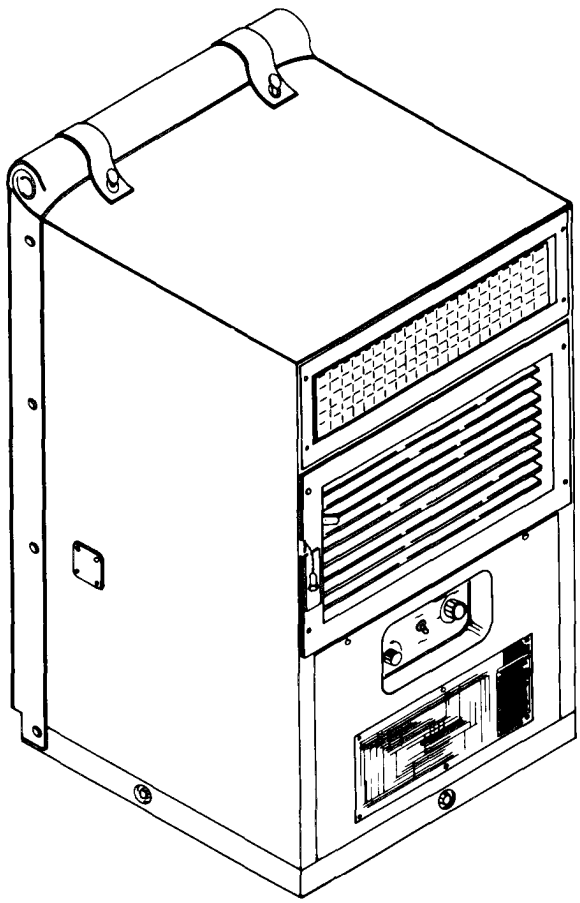
TM5-4120-387-14

TECHNICAL MANUAL

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



AIR CONDITIONER, VERTICAL, COMPACT, 6,000 BTU/HR 115 VOLT, SINGLE PHASE, 50/60 HERTZ

NSN 41 20-01-203-8656

HEADQUARTERS, DEPARTMENT OF THE ARMY
21 NOVEMBER 1986

CHANGE

NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 January 1993

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

AIR CONDITIONER, VERTICAL., COMPACT, 6,000 BTU/HR
115 VOLT, SINGLE PHASE, 50/60 HERTZ
NSN 4120-01-203-8656
NSN 4120-01-332-2392

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 5-4120-387-14, 21 November 1986 is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
4-17 and 4-18	4-17 and 4-18

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary oftheArmy:

GORDONR.SULLIVAN
General, UnitedStates Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
03641

DISTRIBUTION :

To be distributed in accordance with DA Form 12-25-E, block no. 2401, requirements for TM 5-4120-387-14.

CHANGE

NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 JULY 1992

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

AIR CONDITIONER, VERTICAL, COMPACT, 6,000 BTU/HR 115 VOLT, SINGLE PHASE, 50/60 HERTZ NSN 4120–01–203–8656 NSN 4120–01–332–2392

Approved for public release; Distribution is unlimited

TM 5–4120–387–14, 21 November 1986 is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
5–7 through 5–10	5–7 through 5–10
5–17 and 5–18	5–17 and 5–18
B–9 and B–10	B–9 and B–10
E–1 and E–2	E–1 and E–2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army

01660

DISTRIBUTION:

To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 2401).

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 August 1991

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

AIR CONDITIONER, VERTICAL, COMPACT, 6,000 BTU/HR
115 VOLT, SINGLE PHASE, 50/60 HERTZ
NSN 4120–01–203–8656
NSN 4120–01–332–2392

Approved for public release; distribution is unlimited

TM5–4120–387–14, 21 November 1986 is changed as follows:

1. Title is changed as shown above.

2. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
1–1 through 1–6	1–1 through 1–6
2–1 through 2–4	2–1 through 2–4
2–33 and 2–34	2–33 and 2–34
3–1 and 3–2	3–1 and 3–2
4–1 and 4–2	4–1 and 4–2
4–15 and 4–16	4–15 and 4–16
4–89 through 4–92	4–89 through 4–92
4–143 through 4–146	4–143 through 4–146
5–3 and 5–4	5–3 and 5–4
– – –	5–4.1/(5–4.2 blank)
5–39 through 5–44	5–39 through 5–44
5–49 through 5–52	5–49 through 5–52
– – –	5–52.1/(5–52 blank)

3. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
01639

DISTRIBUTION:
To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 2401)

CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 20 NOVEMBER1990

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

AIR CONDITIONER, VERTICAL, COMPACT, 6,000 BTU/HR
115 VOLT, SINGLE PHASE, 50/60 HERTZ
NSN 4120–01–203–8656

Approved for public release; distribution is unlimited

TM 5–4120–387–14, 21 November 1986 is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
2–33 and 2–34	2–33 and 2–34

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 2401).

CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *21 March 1988*

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

for

AIR CONDITIONER, VERTICAL, COMPACT,
6,000 BTU/HR
115 VOLT, SINGLE PHASE, 50/60 HERTZ
NSN 4120-01-203-8656

TM 5-4120-387-14, 21 November 1986, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i and ii	i and ii
1-0	1-0
1-3 and 1-4	1-3 and 1-4
4-5 and 4-6	4-5 and 4-6
6-1 and 6-2	6-1 and 6-2
B-9 and B-10	B-9 and B-10

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator, Organizational, Direct Support and General Support Maintenance requirements for Air Conditioner, Vertical Compact, 6,000 BTU/HR, (F6000T4-2: 208V, 400HZ, 3PH; F6000T-2, 115V, 50/60 HZ, 1 PH)

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

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

Whenever possible, input power supply to equipment must be shut off before beginning work. Take particular care to ground every capacitor likely to hold a dangerous charge. When working inside, after power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115 volts ac input when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard of current flowing through vital organs of body.

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

WARNING

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

WARNING

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

WARNING

Capacitors can retain a high electrical charge. Touching the terminals of a charged capacitor can result in severe electrical shock and skin burns. Always ground the terminals of a capacitor as soon as they are exposed.

WARNING

Do not attempt any disassembly of solenoid valve other than coil removal with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if screws that attach tube and plunger assembly to valve body are loosened.

WARNING

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

Do not operate unit with them off or open unless instructions tell you to. When necessary, do so with care.

WARNING

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

WARNING

Heating element is extremely hot. Severe burns can be caused by touching with bare skin.

DANGEROUS CHEMICAL
(R22)
is used in this equipment

DEATH

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

WARNING

Discharge refrigerant in an open area and not around an open flame.

WARNING

All refrigerant-22 must be discharged from system and entire system must be purged with dry nitrogen before beginning any debrazing operation.

WARNING

If compressor burnout is suspected, use care when handling compressor to avoid touching compressor sludge. Acid in sludge can cause burns.

WARNING

Avoid inhaling fumes and burns from 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.

WARNING

Polyurethane foam used as insulation in air conditioner will break down to form toxic gases if exposed to flame of a torch at brazing temperature.

WARNING

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

WARNING

DO NOT LIFT without holding unit in upright position. Otherwise, unit will fall over and could cause injury to personnel.

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, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

WARNING

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

WARNING

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) 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).

Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm^2).

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

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

WARNING

Solutions will be disposed of in accordance with local State Water Pollution Control Laws. Consult local Medical Services for guidance.

TECHNICAL MANUAL

TM5-4120-387-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 21 November 1986

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR AIR CONDITIONER, VERTICAL, COMPACT, 6,000 BTU/HR 115 VOLT, SINGLE PHASE, 50/60 HERTZ

NSN 4120-01-203-8656

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual, If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and blank forms) or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, Attention: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798. A reply will be furnished to you.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF FIGURES

LIST OF FIGURES (Cont.)

LIST OF FIGURES (Cont.)

LIST OF TABLES

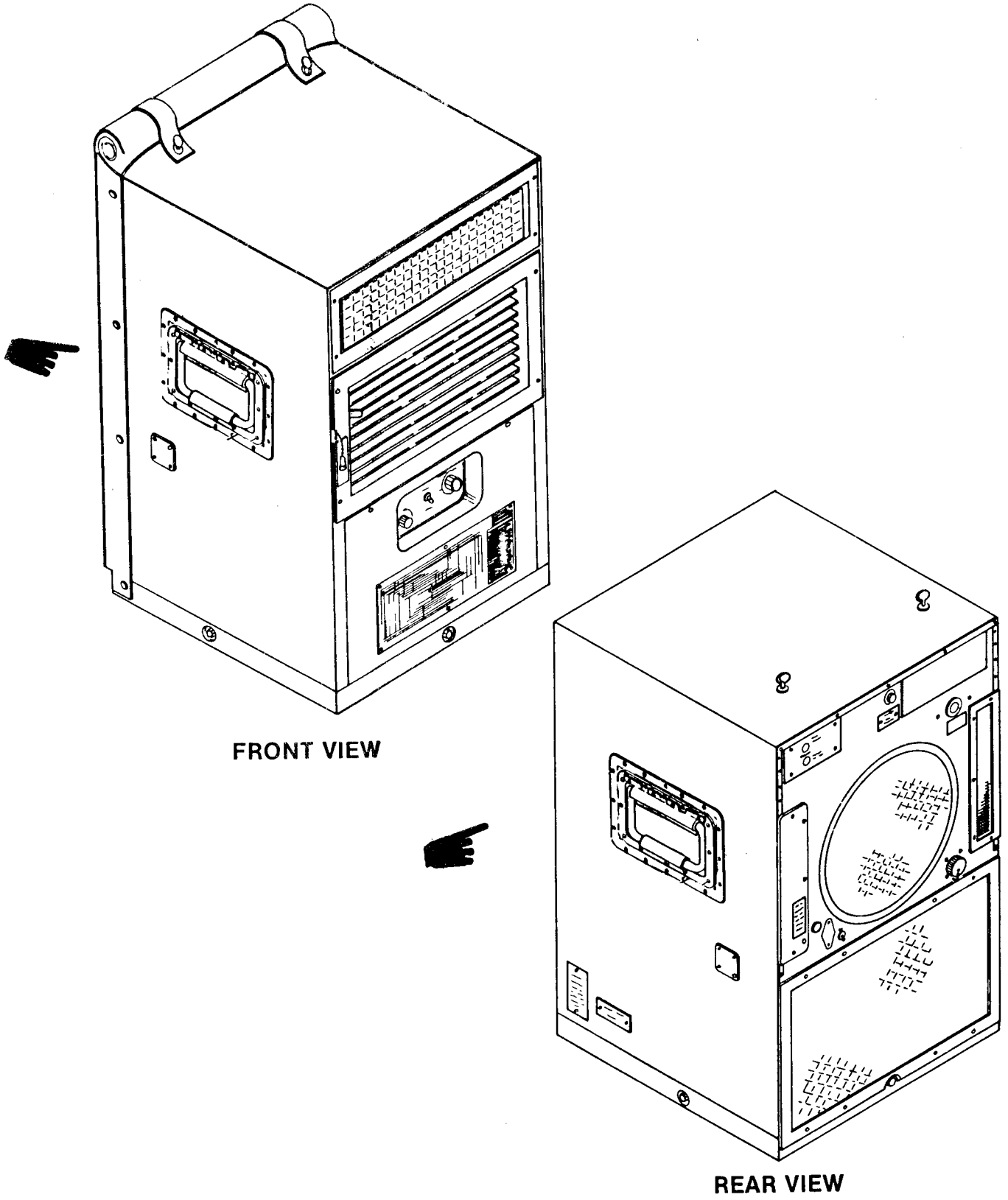


Figure 1-1. Air Conditioner

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

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

b. Model Numbers and Equipment Name. Applied Companies Models 3770 and 3873, Vertical Compact. 6,000 BTU/HR. 115 Volt, Single-Phase, 50/60 Hertz Air Conditioner.

c. Purpose of Equipment. Cools, heats, and ventilates enclosed spaces. The unit covered by this manual is designed for cooling and heating air to a desired predetermined range and circulating the conditioned air to provide heating and cooling of equipment or personnel within the conditioned area.

1-2. MAINTENANCE FORMS AND RECORDS

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

1-3. HAND RECEIPT MANUAL

This manual has a companion document with a TM number followed by HR (which stands for Hand Receipt). The TM 5-4120-387-14HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e. COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2:

The US Army Adjutant General Publications Center
2800 Eastern Blvd.
ATTN: AGDM-O-D
Baltimore, MD 21220-2896

1-4. WARRANTY INFORMATION

The Applied Companies and its wholly owned subsidiaries Applied Equipment Company and Applied Environments Corporation warrant every product we manufacture to be free from defects in material and workmanship under normal use and service. and will, within one year from date of original installation, or 18 months from shipping, whichever is first, repair or replace without cost to the original customer any part, assembly or portion thereof which shall be returned to our factory, with prepaid transportation charges and which our inspection shall show to be defective.

Under the terms of this warranty, The Applied Companies assume no responsibility for the labor cost involved in removing any defective part or installation of such part, or any service charges. Nor shall The Applied Companies be liable for any injury, loss or damage (direct, indirect or consequential) arising out of the use or inability to use the product. This warranty is in lieu of all other warranties, expressed or implied.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's)

If your Air Conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at Commander, Headquarters, U.S. Army Troop Support Command, Attention: AMSTR-MOF 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798. We will send you a reply.

1-6. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Command decisions, according to tactical situation, will determine when destruction of the air conditioning unit will be accomplished. A destruction p?an will be prepared by the using 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 organizational maintenance for air conditioning unit preparation for storage or shipment. (See para 4-64.)

Section II EQUIPMENT DESCRIPTION

1-8. PURPOSE, CAPABILITIES, AND FEATURES

a. Purpose of Air Conditioner. The Air Conditioner is designed to ventilate. cool or heat, and to filter air in rooms or enclosures.

b. Capabilities and features

(1) Provides a maximum of 6,000 BTU/HR of cooling or 4,500 BTU/HR of heating.

(2) Has two stages of heat.

(3) Provides source of outside (fresh) ventilation air.

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

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

(6) Is fully portable.

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

(8) Has alternate power input connection Iocations to provide for a variety of installations.

(9) Designed for low-noise level operation.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

(1) CONDITIONED AIR (EVAPORATOR) FAN - Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements Into the room or enclosure.

(2) HEATER ELEMENTS (HR 1 thru HR 6) - 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.

(3) MIST ELIMINATOR - Prevents condensate (water) from being blown from the coil into the room or enclosure.

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

(5) RETURN AIR FILTER - Provides filtered return air.

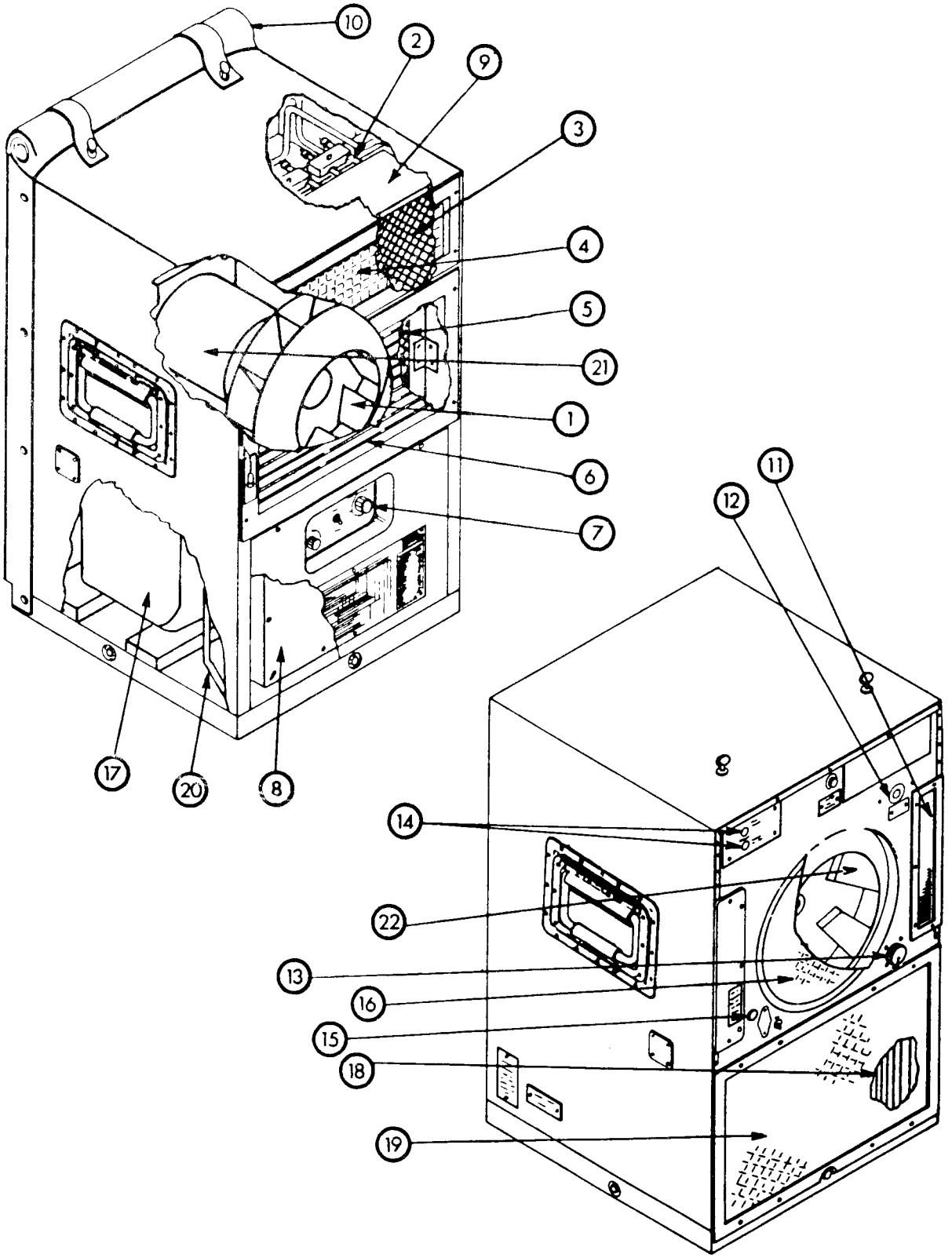


Figure 1-2. Location of Major Components

(6) INTAKE (RETURN) AIR GRILLE - Adjustable louvers allow control of outside (fresh) and return (from room or enclosure) air.

(7) CONTROL PANEL - Contains a five position mode selector switch, a temperature control thermostat and two position fan toggle switch.

(8) JUNCTION BOX - Contains and protects electrical system control devices.

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

(10) FABRIC COVER - Shown on rear view in stowed (operational) position. When rolled down and snapped it protects the rear (exposed) surface of the unit.

(11) FRESH AIR DAMPER - Provides outside air.

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

(13) INPUT POWER RECEPTACLE - For connection of external power source cable.

NOTE

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

(14) HIGH AND LOW REFRIGERANT PRESSURE CUTOUT SWITCHES (S5 AND S6) - Protects compressor from possible damage due to excessively high or low refrigerant pressures.

(15) COMPRESSOR CIRCUIT BREAKER (CB1) RESET KNOB - Actuates a push-pull type control cable for resetting compressor circuit breaker.

(16) CONDENSER AIR OUTLET GRILLE - Protects personnel from injury and fan from damage.

(17) COMPRESSOR (B1) - Pumps refrigerant through the system during cooling operations.

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

(19) CONDENSER COIL GUARD - Protects coil from damage.

(20) CONDENSATE WATER DRIP PAN AND DRAIN TRAP - 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 traps located inside the lower right and left hand front corners of the cabinet. The drain traps contain check valves that prevent air flow between the condenser and evaporator sections through the drain tubing.

(21) FAN MOTOR (B2) - Drives both the conditioned air (evaporator) fan and the condenser fan.

(22) CONDENSER FAN - Draws air through the condenser coil and discharges the heated air back to the outside during cooling operations.

1-10. DIFFERENCES BETWEEN MODELS

There are two primary differences between the Applied Companies, Models 3770 and 3873 Air Conditioner. The compressor unit and the evaporator/condenser fan motor used in the Model 3770 is different than those used in the Model 3873, Any relevant changes in any maintenance procedures have been noted,

1-11. PERFORMANCE DATA

OPERATING TEMPERATURES	
LOW	-50°F (-45°C)
HIGH	+120°F (+48.9°C)
PERFORMANCE	
COOLING CAPACITY	6,000 Btu/hr
HEATING CAPACITY	4,500 Btu/hr
POWER REQUIRED	
VOLTAGE	115
PHASE	Single
HERTZ	50/60
AMPERAGE	17.3
DIMENSIONS	
WIDTH	17.0 in. (432 mm)
DEPTH	17.5 in. (444 mm)
HEIGHT	28.25 in. (718 mm)
WEIGHT	171 lb (77.6 Kg)
REFRIGERANT	
TYPE	R-22
CHARGE	2.5 pounds (1.13 Kg)

Section III TECHNICAL PRINCIPLES OF OPERATION

1-12. REFRIGERATION CYCLE

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

- Compressor (1) starts.

- To prevent compressor overload and damage during startup, equalizer solenoid valve (6) is open at start of cooling cycle to equalize pressure on both sides of the compressor.

- The compressor (1) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing to the condenser coil (2) and receiver (3).

- The condenser fan draws outside ambient air over and through the condenser coil (2). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.

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

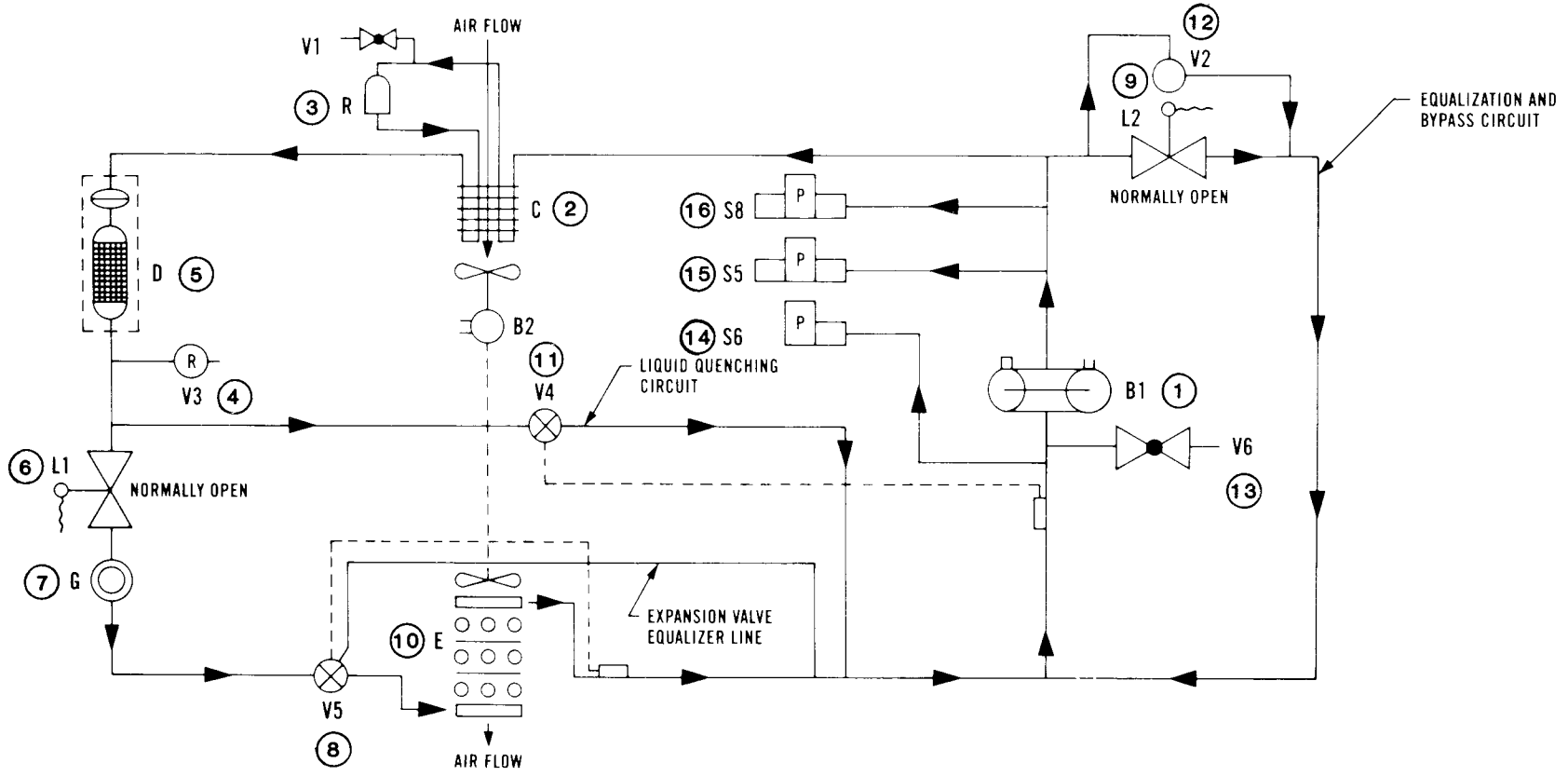
- The sight glass (liquid indicator) (7) indicates the presence of moisture and quantity of refrigerant in the system.

- The liquid line solenoid valve (6) 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.

- The expansion valve (8) controls the amount of pressure of liquid refrigerant to the distributor (9) and evaporator coil (10). The expansion valve (8) 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 (10).

- As the liquid refrigerant leaves the expansion valve (8) it passes thru a distributor and enters the evaporator coil (10). 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 fan circulates 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 (10), the air is cooled.

- The refrigerant gas is then drawn back to the compressor (1) and the cycle is repeated.



LEGEND					
B1	COMPRESSOR	1	E	EVAPORATOR COIL	10
C	CONDENSER COIL	2	V4	EXPANSION VALVE (QUENCH)	11
R	RECEIVER	3	V2	PRESSURE REGULATING VALVE	12
V3	PRESSURE RELIEF VALVE	4	V6	CHARGING VALVES (2)	13
D	DEHYDRATOR	5	S6	LOW PRESSURE SWITCH	14
L1	LIQUID LINE SOLENOID	6	S5	HIGH PRESSURE SWITCH	15
S	SIGHT GLASS	7	S8	PRESSURE CONTROL SWITCH	16
V5	EXPANSION VALVE	8			
L2	HOT GAS SOLENOID VALVE	9			

Figure 1-3. Refrigeration Schematic

b. Bypass cycle. This unit has a bypass cycle which allows cooling operation at low cooling loads without cycling the compressor (1) on and off. In bypass, the refrigerant is piped from the discharge (high side) to the suction (low side) of the compressor, bypassing the evaporator coil (10).

- When the temperature control thermostat on the control panel senses that cooling conditions have reached the set point, it closes the liquid line solenoid valve (6) to shut off refrigerant flow to the evaporator coil (10).

- As the compressor suction pressure starts to drop, the hot gas solenoid valve (9) closes and the pressure regulating valve (12) opens to allow flow of hot gas from the compressor.

- The expansion valve (quench) (11) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor, the expansion valve (quench) (11) opens to allow liquid refrigerant to mix with the hot gas.

- The charging valves (13) are provided for charging, and general servicing of the high and low pressure sides of the refrigerant system.

- The pressure switch (low) (14), the pressure switch (high) (15), and the pressure relief valve (4) are provided to protect the unit from damage due to pressure extremes.

- The pressure control switch (16) overrides the fan speed control switch to place the fan in either HI or LOW SPEED when preset pressures are reached.

1-13. HEATING

a. HI HEAT mode. When the mode selector switch is set for HI HEAT the six heating elements, located behind 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 remaining three are on all of the time.

b. LO HEAT mode. When the mode selector switch is set for LO HEAT, only the three thermostatically controlled 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 range 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-biolog ical-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

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

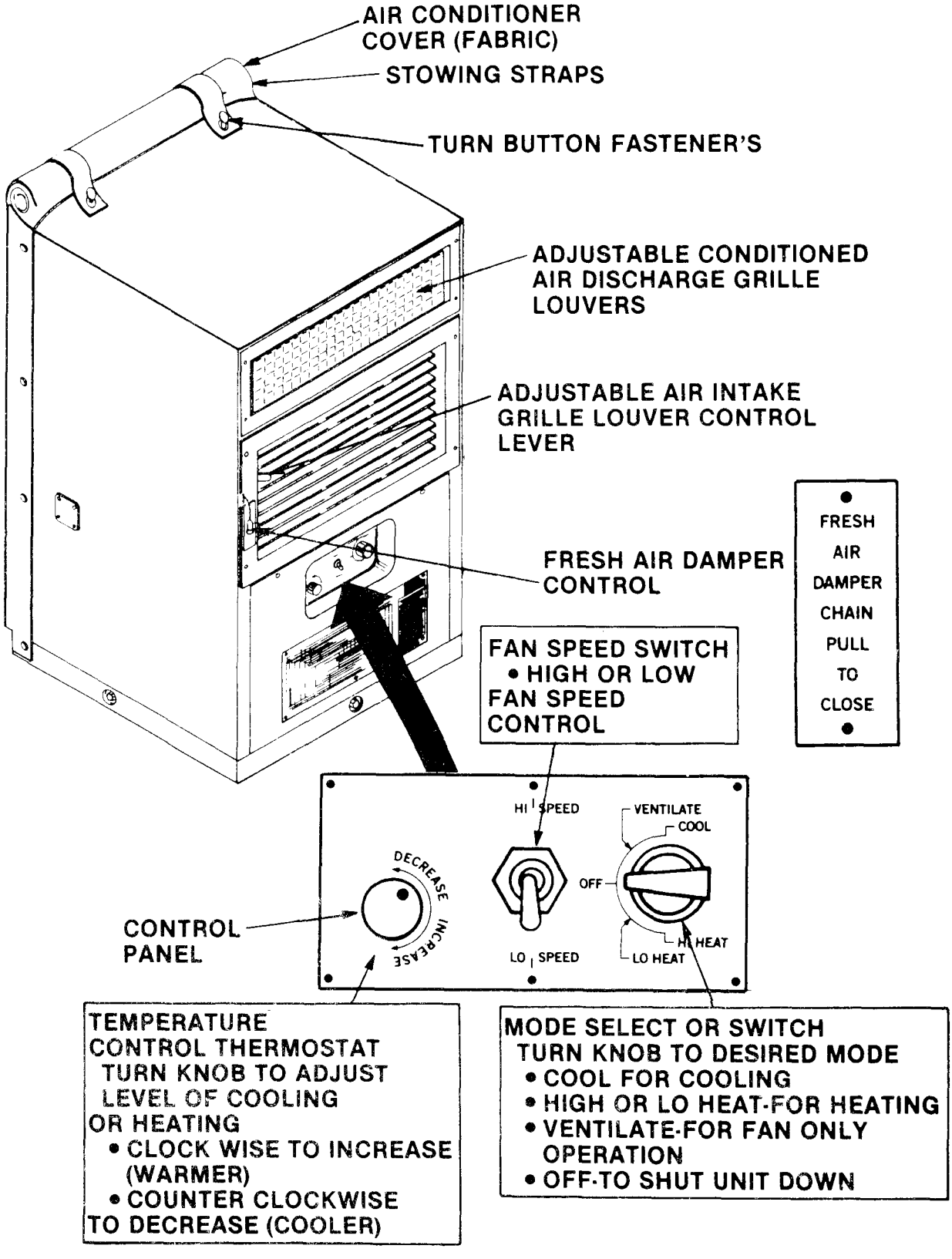


Figure 2-1. Operator's Controls Front

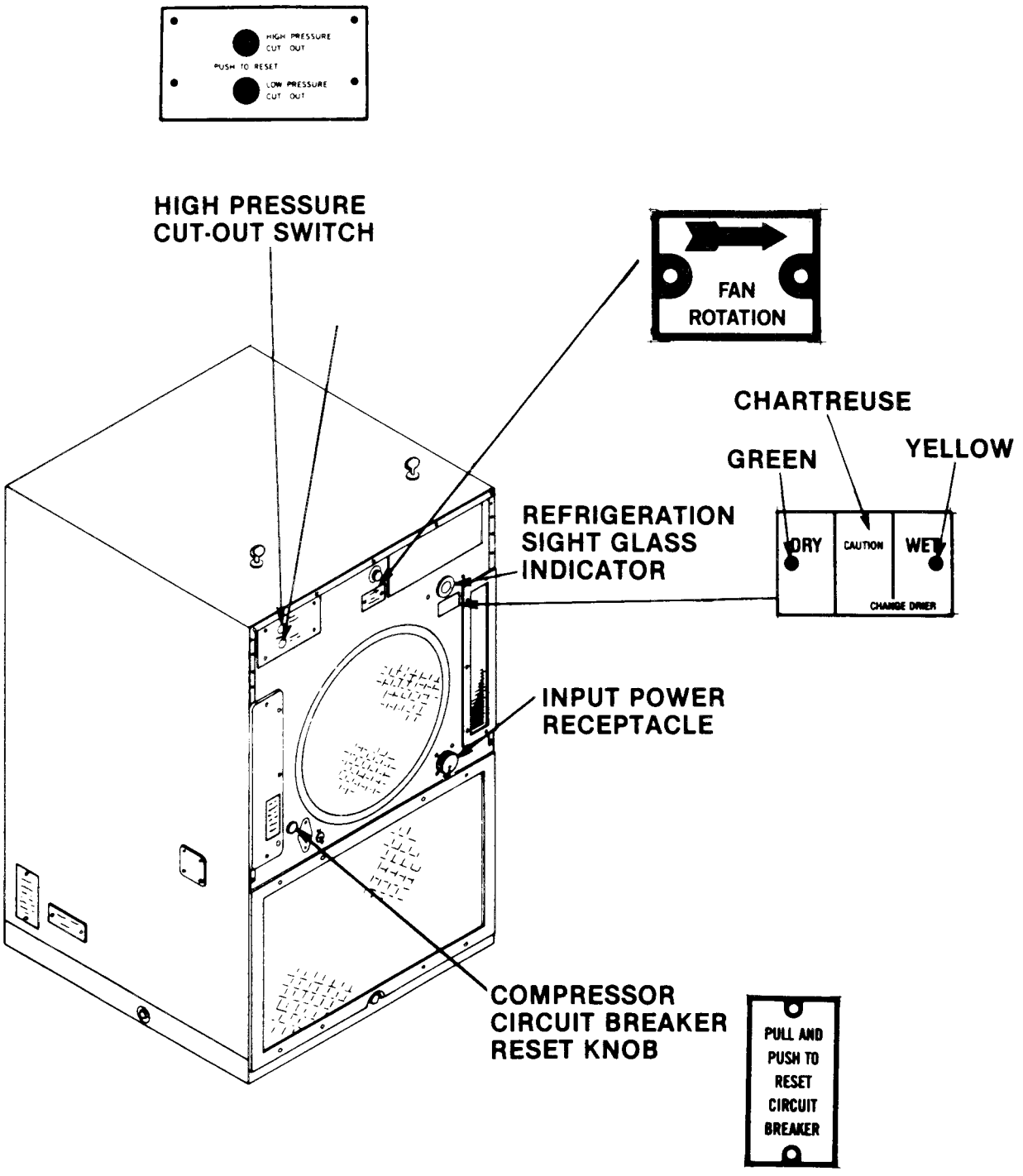


Figure 2-2. Operator's Controls Rear

2-3. INDICATORS

The refrigerant sight glass (fig. 2-2) is the only visual indicator used on the air conditioner. The sight glass is a port or window through which the refrigerant condition can be seen. 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 in maximum cooling prior to checking condition of refrigerant at sight glass. Dry refrigerant is indicated by green, it turns to chartreuse when the moisture content becomes undesirable, and to yellow when the level becomes unacceptable. Excessive moisture in the refrigerant may damage or possibly destroy the compressor. If the liquid refrigerant observed in the sight glass has an opaque, milky appearance, or frequent bubbles appear, the volume of refrigerant 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 the 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 window, but the sight glass should be re-checked after each four hours of operation to ensure that the condition has not become worse.

Section II OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-4. GENERAL

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

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

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

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

d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using DA form 2404. See DA PAM 738-750, the Army Maintenance Management System (TAMMS), for instructions.

e. Perform Weekly as well as BEFORE operations PMCS if:

(1) You are the assigned operator and have not operated the item since the last Weekly check.

(2) You are operating the item for the first time.

NOTE

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

TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	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.	

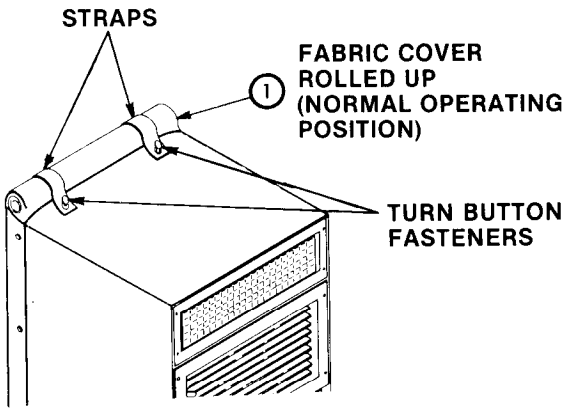


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
2		•				Information Plates Check for legibility and loose or missing hardware.	

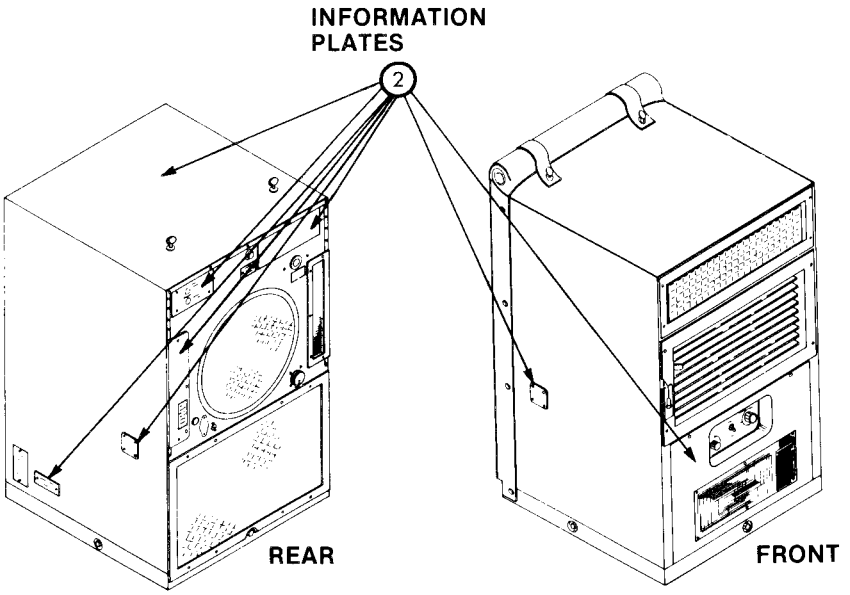


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	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.	

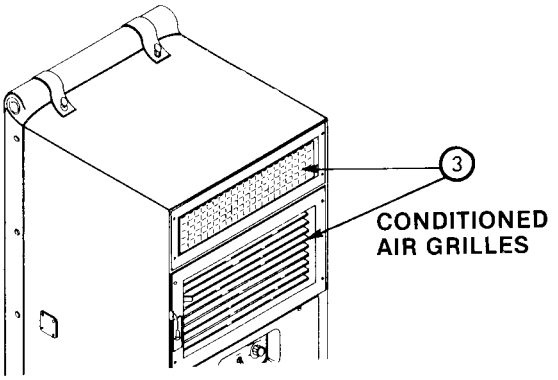


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
4						Guards	
	•					Check that guards are in place.	Missing parts or damage that would cause operating hazards.
	•			•		Check them for obstructions, damage, and loose or missing hardware.	

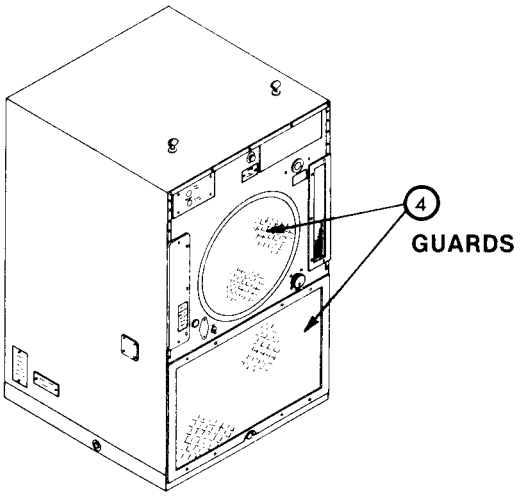


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
5						Screen	
	●					Check that screens are in place.	Missing parts or damage that would cause operating hazards.
	●			●		Check them for obstructions, damage, and loose or missing hardware.	

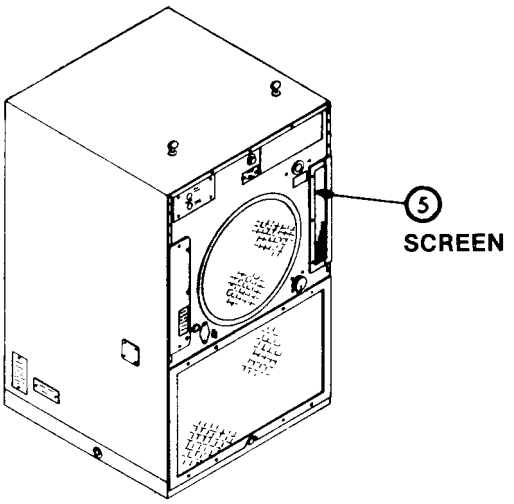


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
6						Panels	
	●					Check that panels are in place. Check panels for cracks, dents, and missing hardware.	Panels missing or damage that would cause operating hazard.

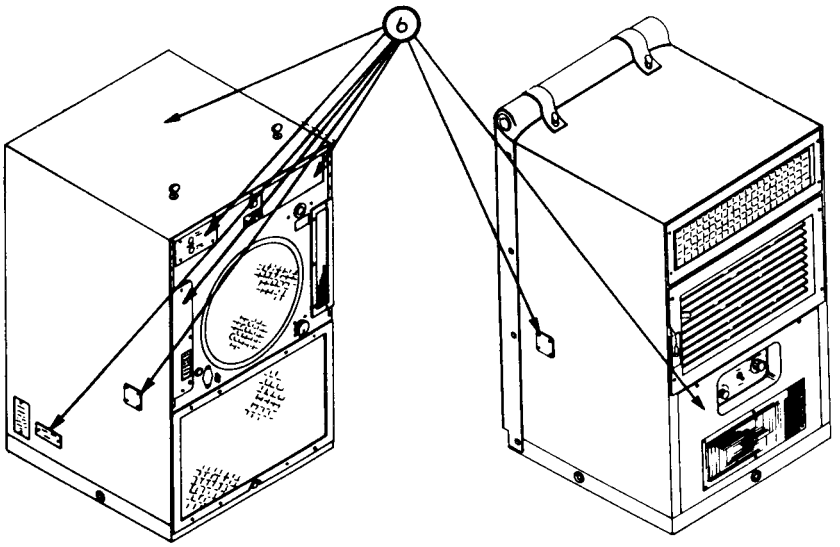
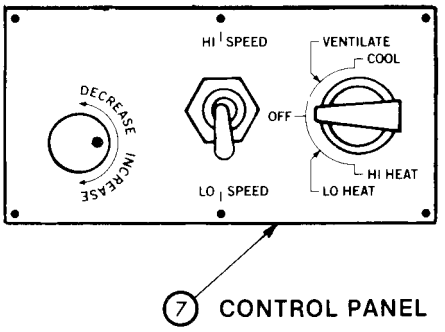


TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
7						Control Panel	
	●					Check for obvious damage and missing knobs.	Control panel damaged.
		●				Check for proper operation.	Unit not operating properly.



7 CONTROL PANEL

TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

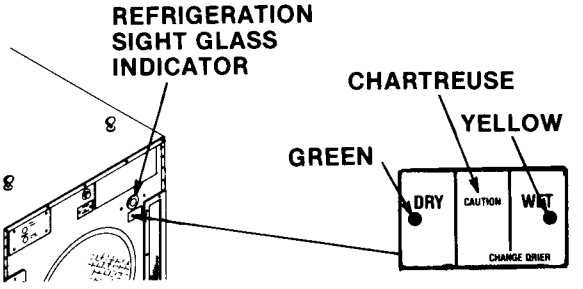
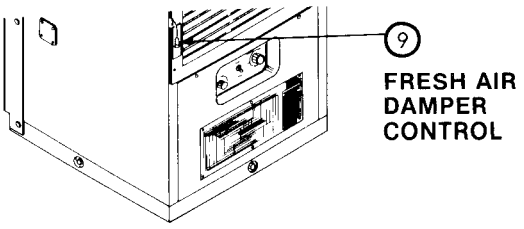
Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
8						Refrigerant Sight Glass	
		●				After 15 minutes of operation in maximum cooling, check for bubbles or milky flow indicating low refrigerant charge. Check for yellow color which indicates presence of moisture. 	Bubbles, milky flow, or yellow color is observed.

TABLE 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont.)

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

Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
9						Fresh Air Damper	
	●	●				Check for proper adjustment	
			●			Check for freedom of operation	Control chain broken, missing or inoperable.
							

Section III OPERATION UNDER USUAL CONDITIONS

2-5. ASSEMBLY AND PREPARATION FOR USE

Services of Organizational Maintenance should be employed for original unpacking, assembly installation, and preparation for use. See paragraphs 4-2 thru 4-9.

2-6. 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 preventive maintenance checks and services listed in table 2-1.

2-7. GENERAL OPERATING PROCEDURES

a. Before operation

(1) Check to see that power cable has been connected to a source of 115 volt, single phase, 3 wire, **50/60** hertz power, and to the input power connector on the unit.

CAUTION

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

(2) Check that fabric cover has been unsnapped, rolled up, and secured with both straps to the two turnbutton fasteners.

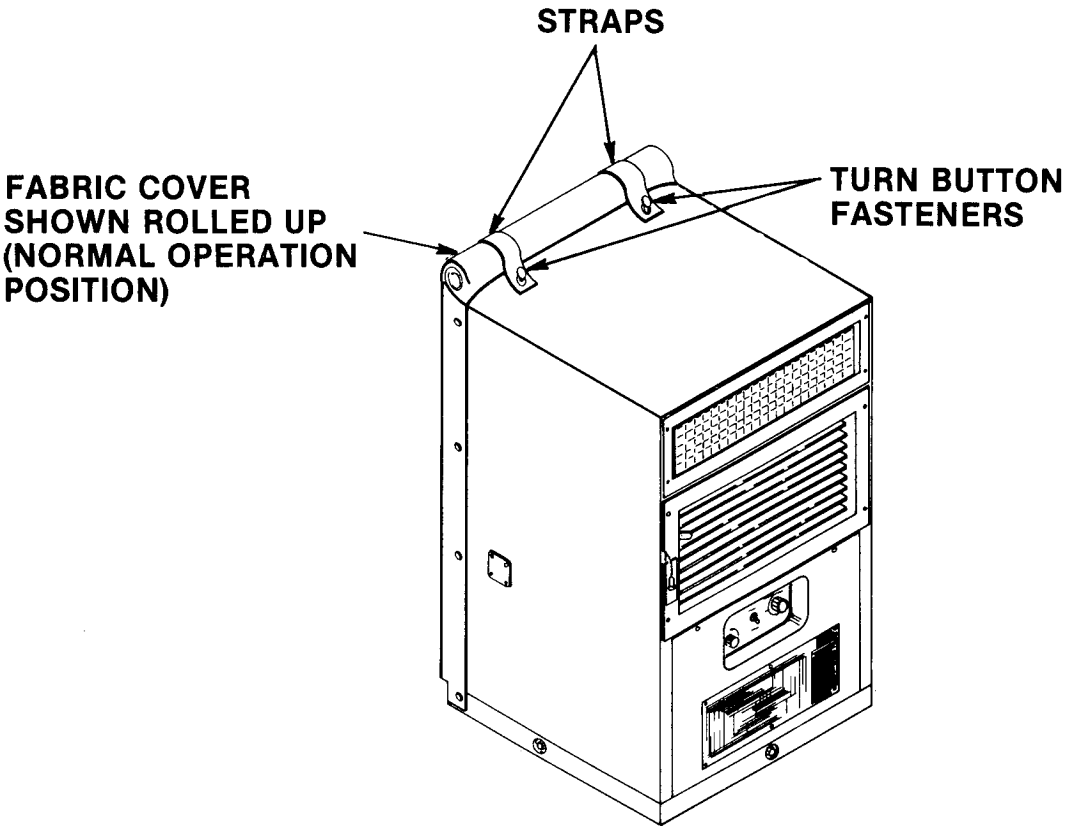


Figure 2-3. Fabric Cover

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 and guards are in place and unobstructed.

EXCEPTION:

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

(3) Check that all air inlet. and outlet openings are clear (fig. 2-4).

(4) Check that 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 and fresh air and the air flow patterns of conditioned air.

b. General Information (To increase comfort and save energy.)

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

- Limit traffic through doors as much as possible.
- Keep doors and windows tightly closed.
- 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 warmup or cooling is necessary.

- Do not adjust controls unnecessarily. Properly set the controls (See para 2-8 thru 2-11) and the unit will automatically control the temperature. The Temperature control thermostat on the control panel operates like a conventional room thermostat except that the temperature scale is not marked on the control panel. The thermostat has a control range of 40°F to 90°F (5° 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).

(2) During cold weather

- Adjust shades, blinds, etc. (when applicable) to admit sunlight during day. Close them at night.
- Adjust the conditioned air outlet dampers slightly downward.

(3) During hot weather

- Adjust shades, blinds, etc. (when applicable) to block out sunlight during day.
- Adjust the conditioned air outlet dampers slightly upward.

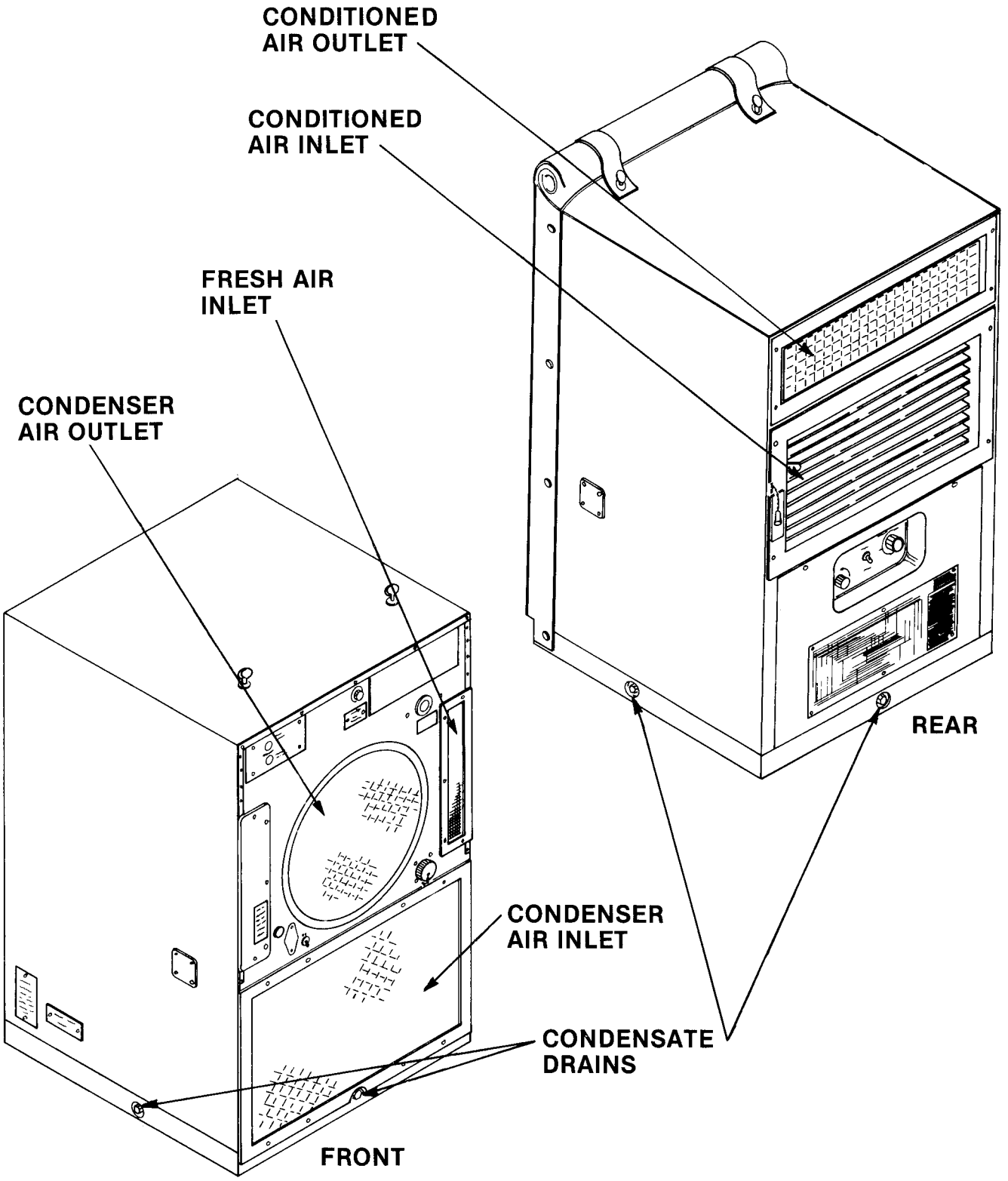


Figure 2-4. Openings and Drains

TABLE 2-2. OPERATOR CONTROL SETTINGS

Mode	Mode Selector Switch	Temperature Control Thermostat	Two Speed Fan Switch	Fresh Air Damper	Conditioned Air Intake Grille	Conditioned Air Discharge Grille	Fabric Cover
Ventilate with 100% recirculated air	VENTILATE	Does not operate	HI SPEED or LOW SPEED	Closed	Open	Adjust to suit	Rolled up or snapped closed
Ventilate with make-up (fresh air)	VENTILATE	Ooes not operate	HI SPEED or LOW SPEED	Open	Open	Adjust to suit	Rolled up and secured
Ventilate with 100% fresh air	VENTILATE	Does not operate	HI SPEED or LOW SPEED	Open	Closed	Adjust to suit	Rolled up and secured
Heating with 100% recirculated air	LO HEAT or HI HEAT	Desired temperature	HI SPEED then LOW SPEED on demand	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	HI SPEED then LOW SPEED on demand	Open	Closed	Slightly down for best results	Rolled up and secured
Cooling with 100% recirculated air	COOL	Desired temperature	HI SPEED then LOW SPEED on demand	Closed	Open	Slightly up for best results	Rolled up and secured
Cooling with make-up (fresh air)	COOL	Desired temperature	HI SPEEO then LOW SPEED on demand	Open	Open	Slightly up for best results	Rolled up and secured
Any mode with make-up air through CBR filter	Desired mode	Desired temperature	HI SPEED then LOW SPEED on demand	Closed and sealed	Partially closed	Adjust to suit	Rolled up and secured

2-8. OPERATION IN VENTILATE MODE (NO HEATING OR COOLING NEEDED

a. Turn mode selector switch to VENTILATE.

b. If maximum circulation is desired, turn fan speed switch to HIGH SPEED.

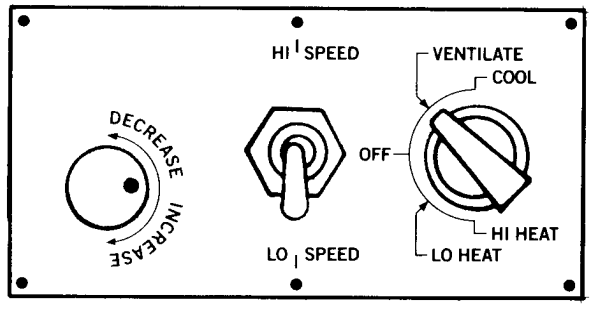


Figure 2-5. Ventilate Control Setting

c. 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.

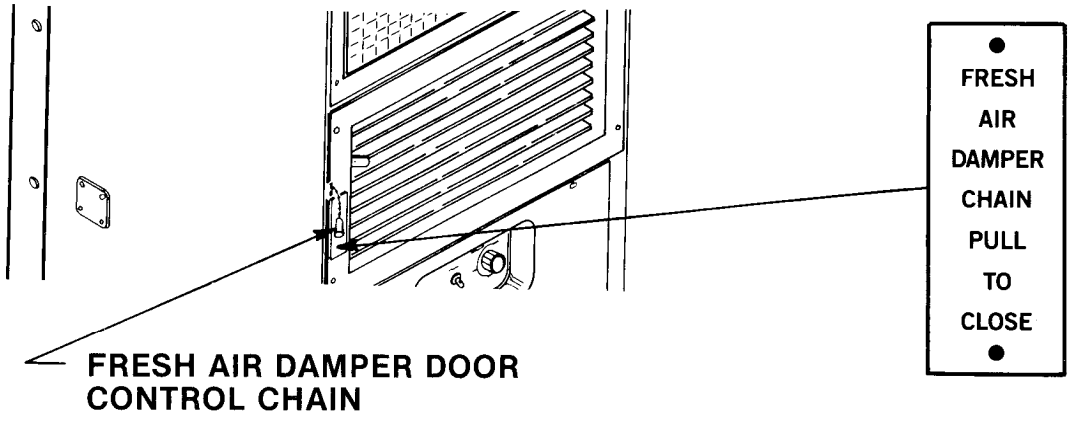


Figure 2-6. Fresh Air Damper (Door) Adjustment

NOTE

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

d. Adjust louvers to suit.

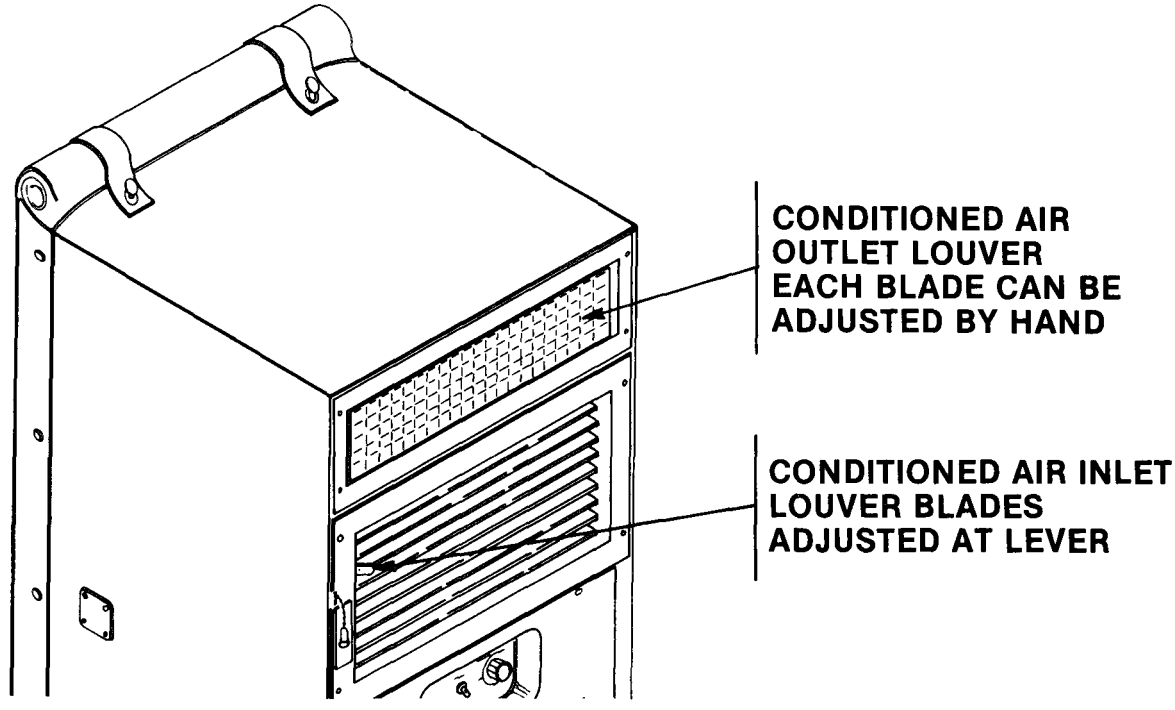


Figure 2-7. Louver Adjustment

NOTE

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

2-9. 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. Switch fan speed switch to HIGH SPEED.

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

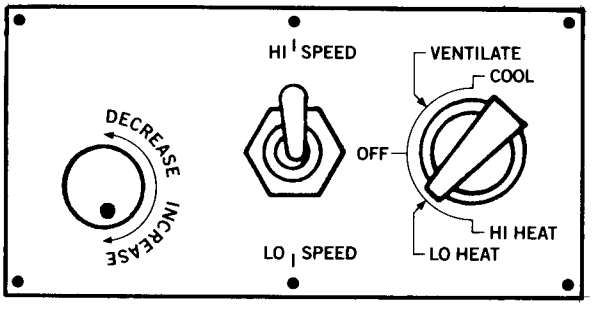


Figure 2-8. LO HEAT Control Setting

NOTE

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

d. When room or enclosure temperature reaches the desired level, slowly turn the Temperature control thermostat knob toward DECREASE and set fan speed switch to LO SPEED. 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.

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

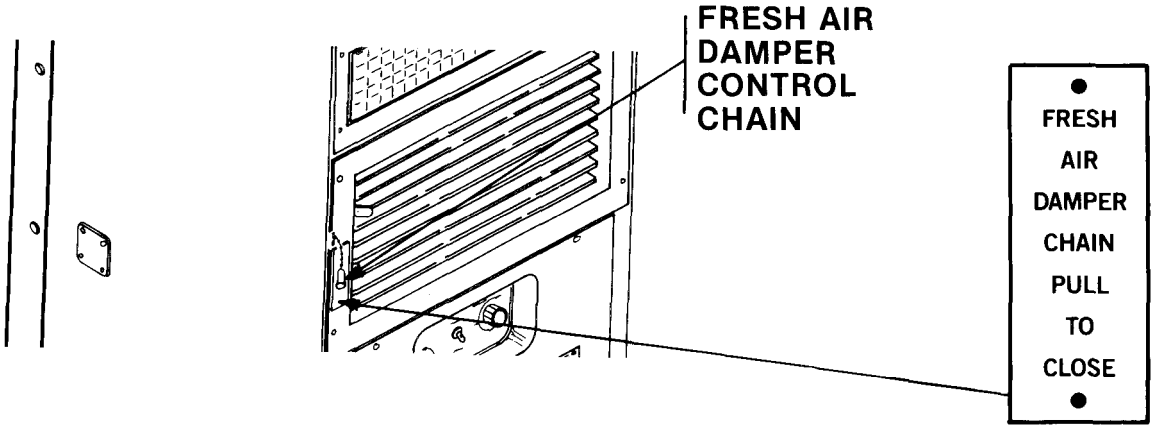


Figure 2-9. Fresh Air Damper (Door) Adjustment

f. 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.

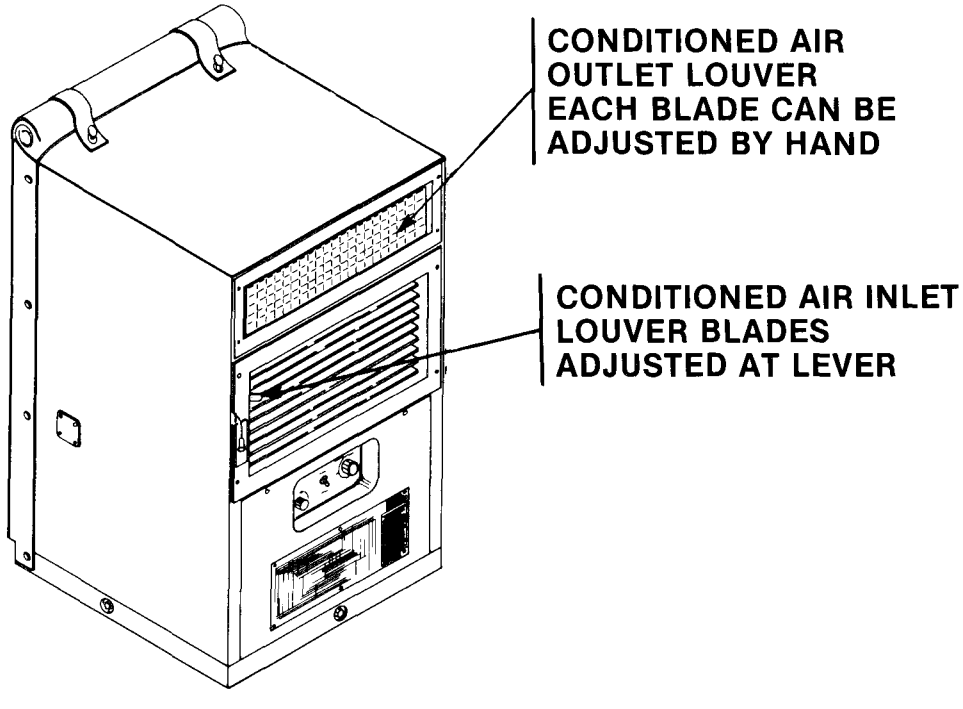


Figure 2-10. Louver Adjustment

NOTE

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

2-10. 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. Switch fan speed switch to HIGH SPEED.

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

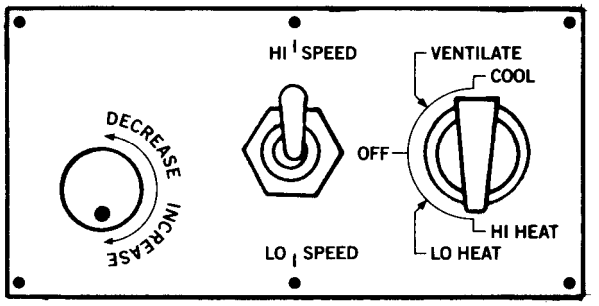


Figure 2-11. HI HEAT Control Setting

d. 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 and LO SPEED.

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

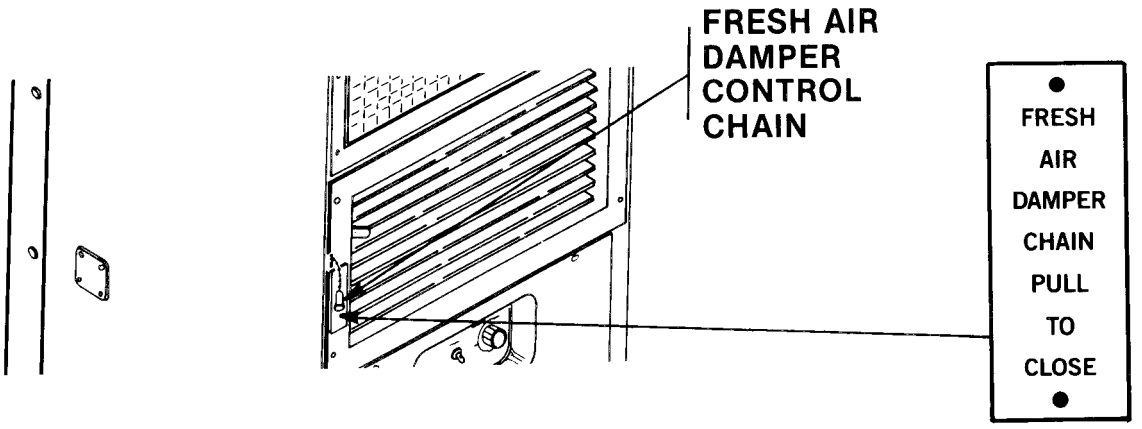


Figure 2-12. Fresh Air Damper (Door) Adjustment

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

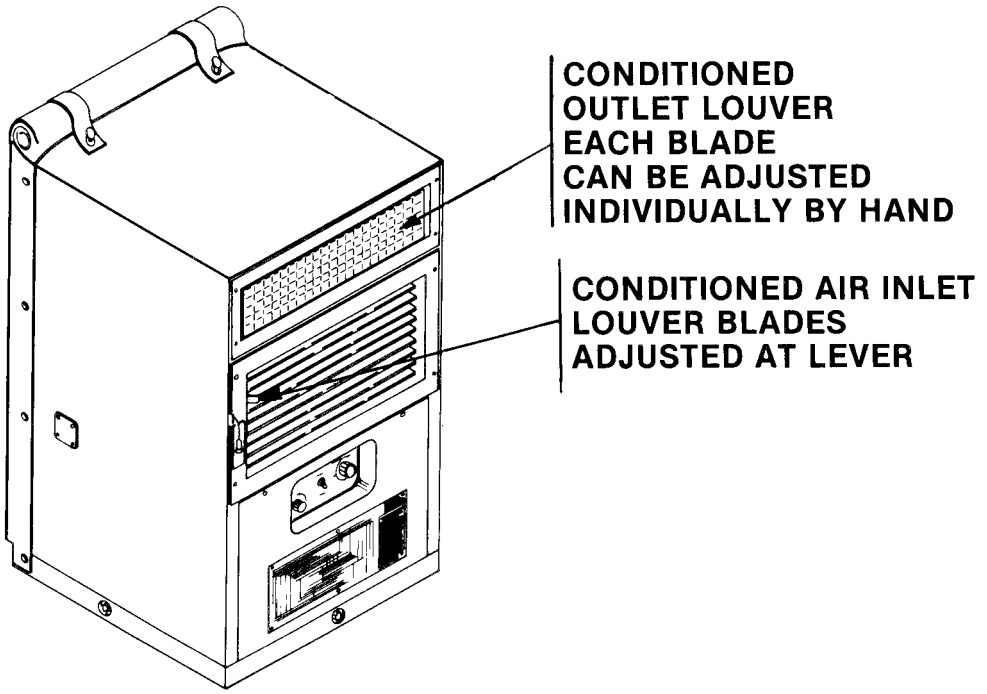


Figure 2-13. Louver Adjustment

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

NOTE

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

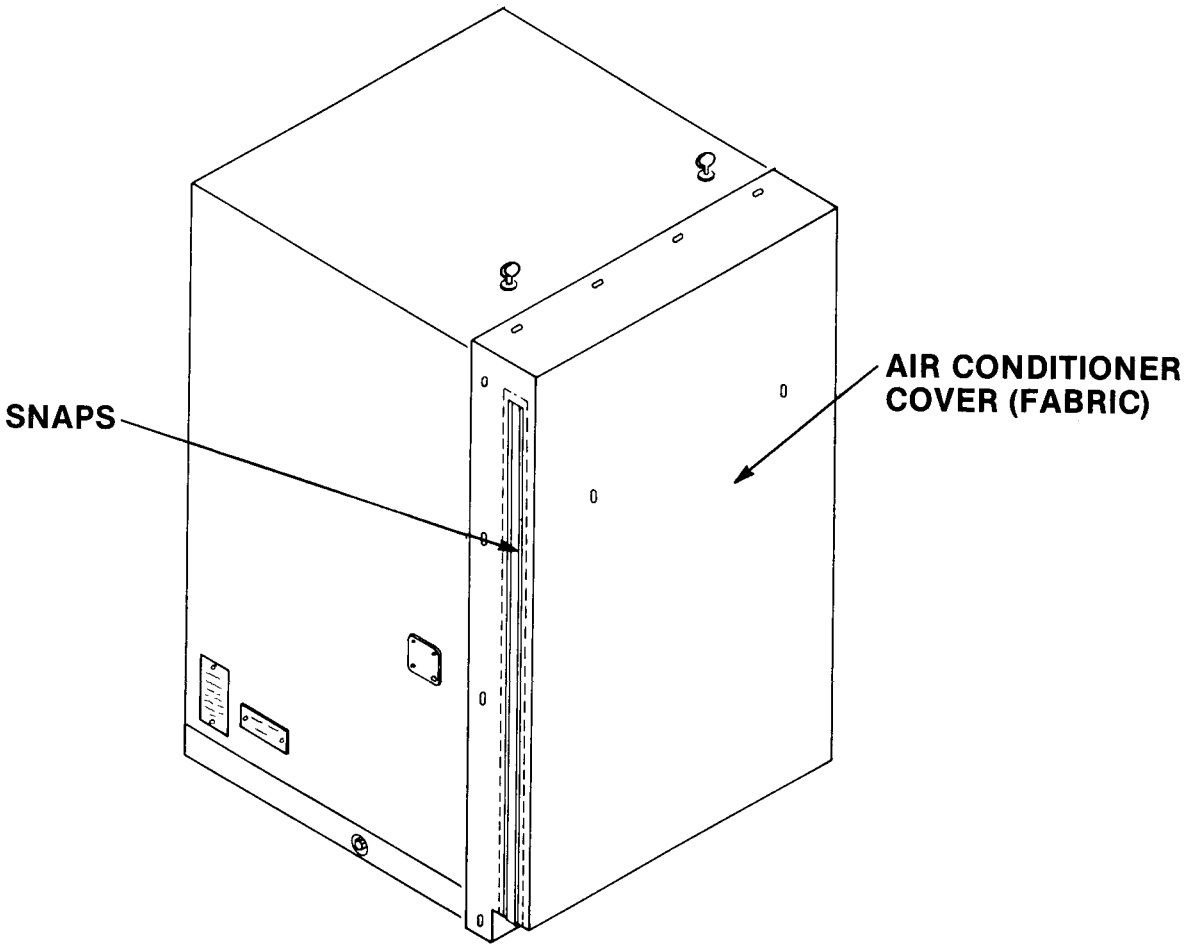


Figure 2-14. Fabric Cover

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 COOL MODE

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

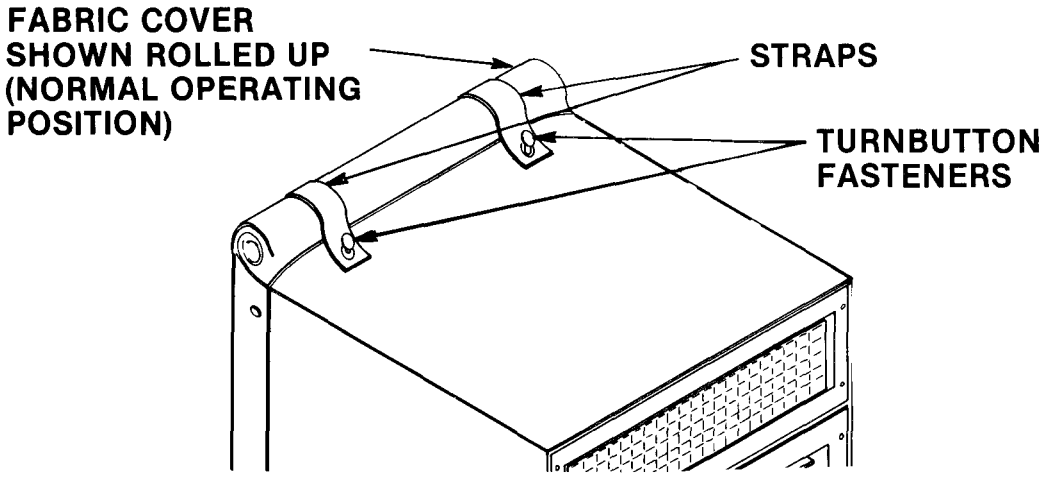


Figure 2-15. Fabric Cover

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. Set fan speed switch to HIGH SPEED.

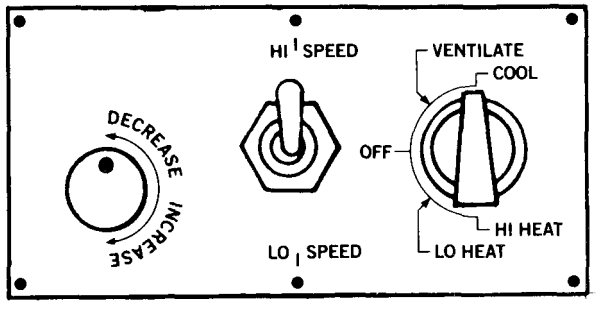


Figure 2-16. COOL Control Setting

e. For faster cooldown at initial startup 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.

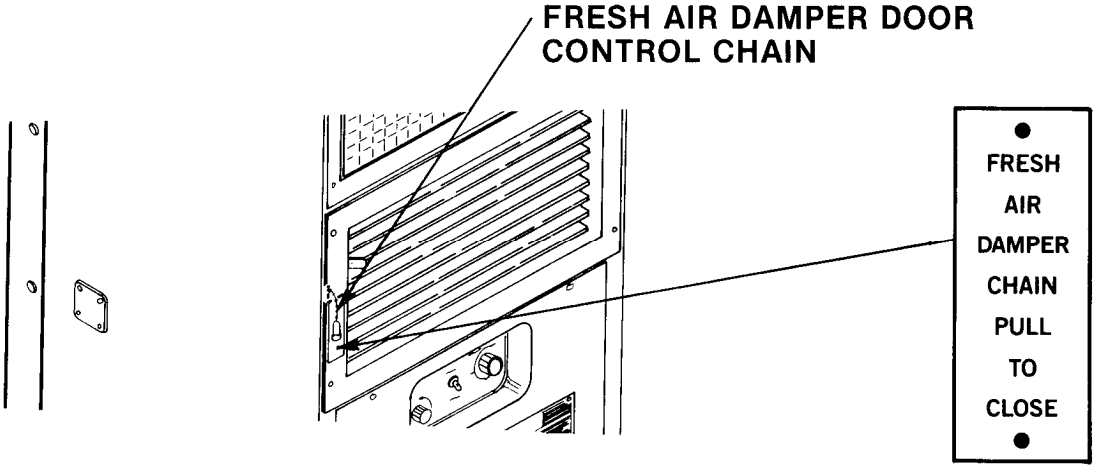


Figure 2-17. Fresh Air Damper (Door) Adjustment

f. When room or enclosure temperature reaches the desired level, slowly turn the temperature control thermostat knob toward INCREASE and set fan speed switch to LO SPEED. Cooling will stop when you reach the approximate room temperature. Further adjustment can be made by turning the Temperature control thermostat knob slightly toward DECREASE (cooler) or INCREASE (warmer) until desired temperature is controlled automatically.

g. 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.

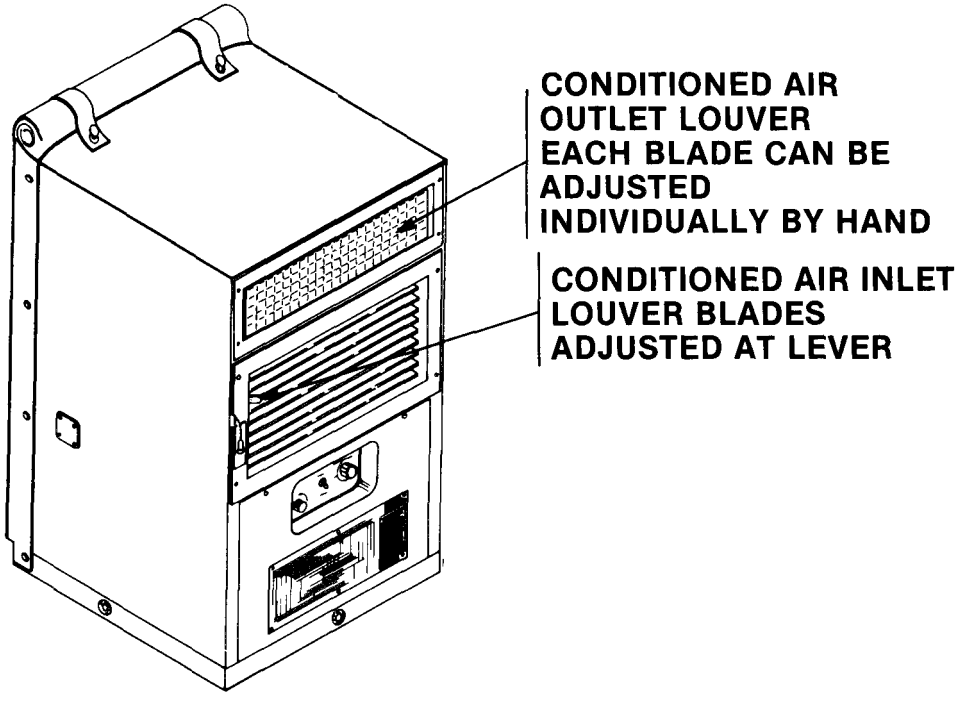


Figure 2-18. Louver Adjustment

2-12. SHUTDOWN (OFF)

a. Turn mode selector switch to OFF.

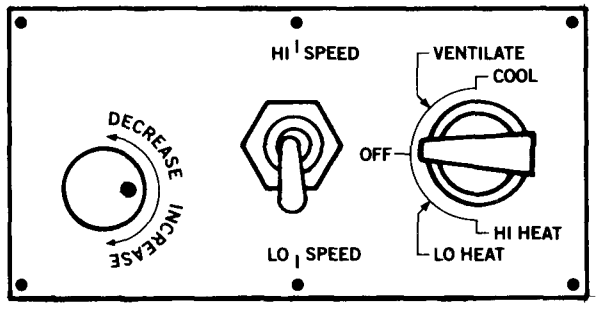


Figure 2-19. OFF Setting

CAUTION

To prevent possible damage to equipment 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 warmup period of compressor heaters.

2-13. PREPARATION FOR MOVEMENT

When the unit is to be moved, the services of organizational maintenance shall be employed for the necessary preparations. See Chapter 4, Section VI.

2-14. INFORMATION PLATES

A number of instruction and identification plates are provided with the unit. See figures 2-20 and 2-21 for external plates.

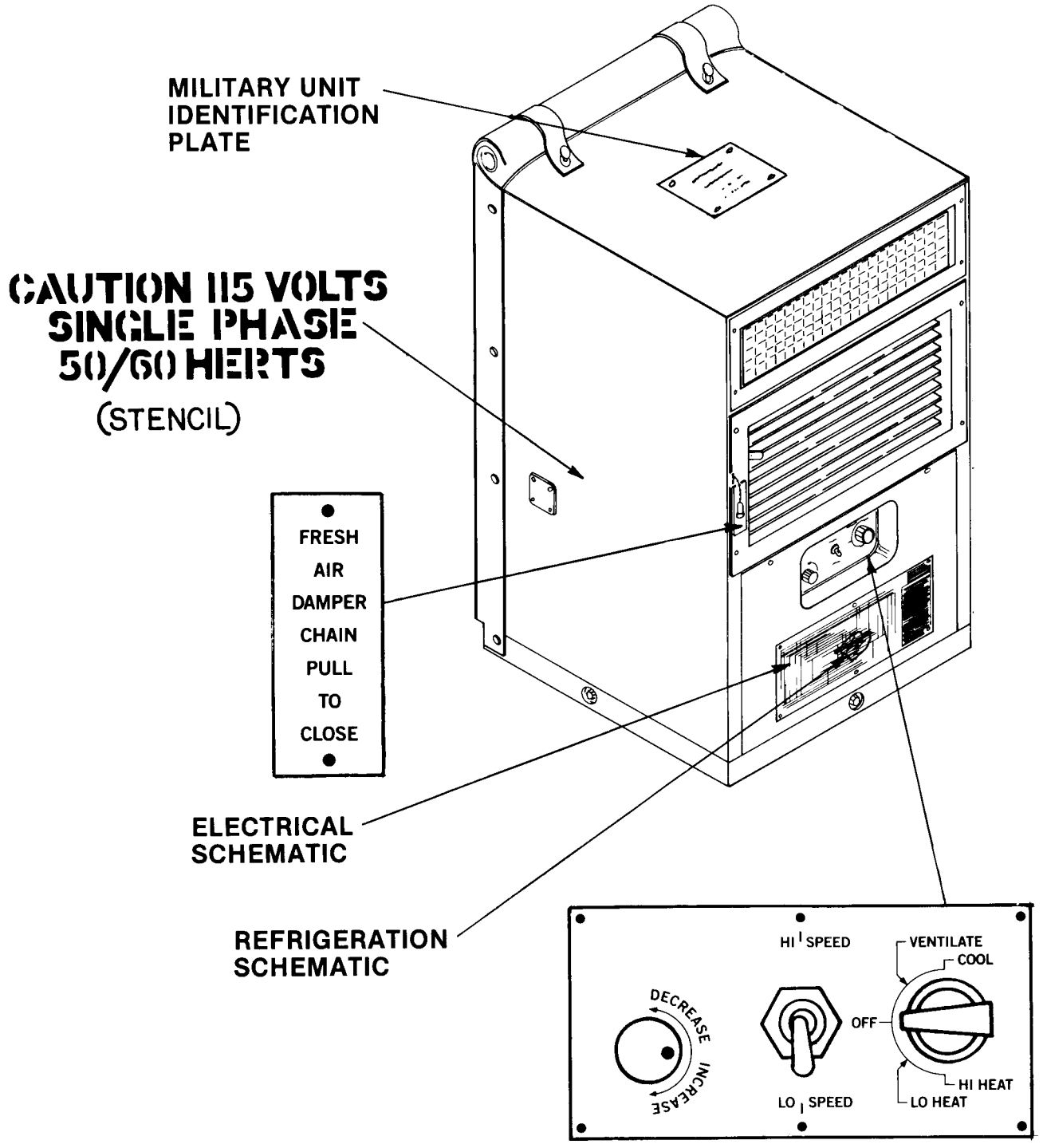


Figure 2-20. Information Plates, Front

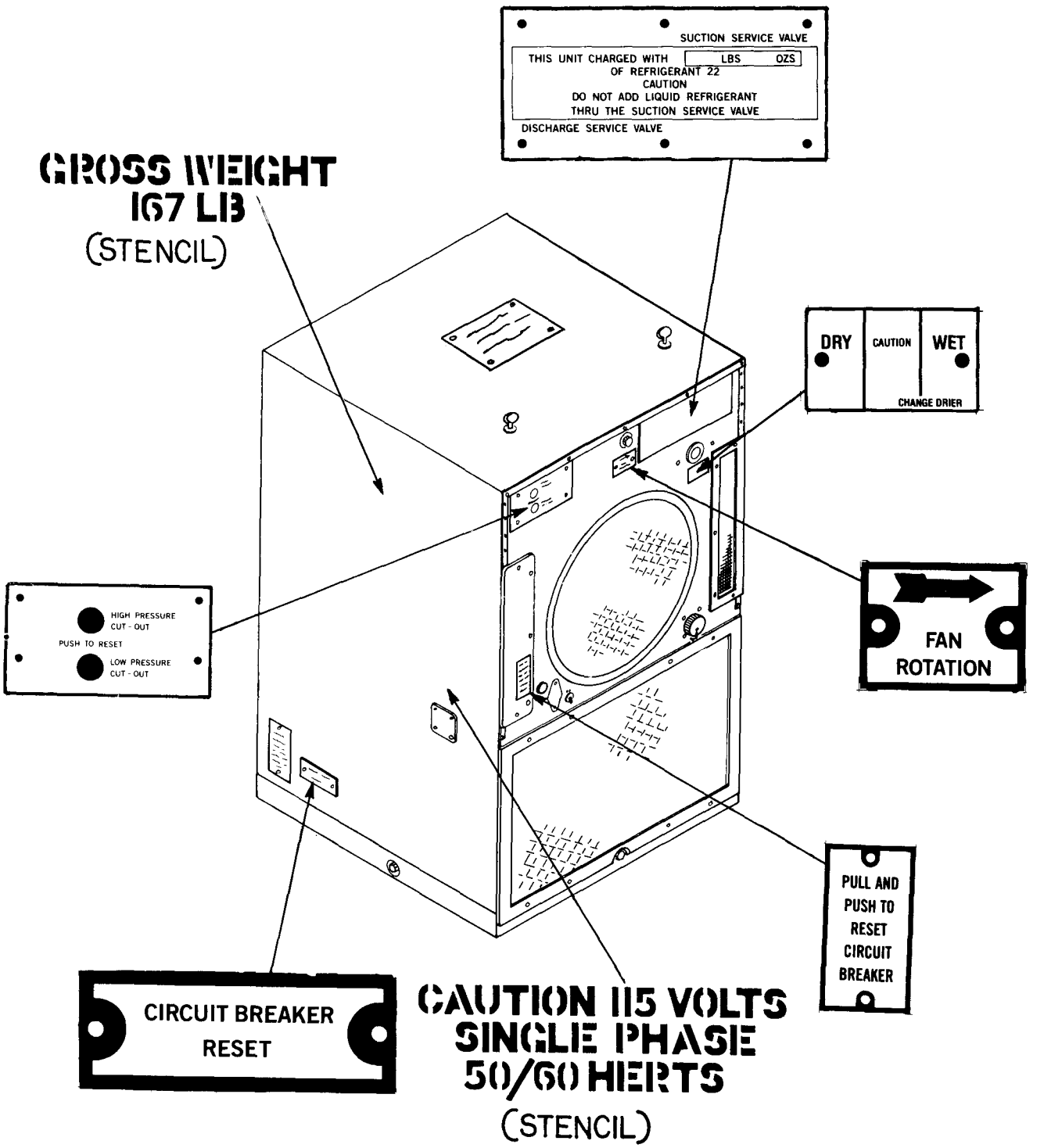


Figure 2-21. Information Plates, Rear

Section IV OPERATING UNDER UNUSUAL CONDITIONS

2-15. GENERAL

The air conditioner is designed to operate normally within a wide range of climatic conditions. However, some extreme conditions require special operating and servicing procedures to prevent undue loading and excessive wear on the equipment.

2-16. OPERATION IN EXTREME HEAT

NOTE

Unit Preventive Maintenance Checks and Services (PMCS) should be performed at daily intervals.

a. General. 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 extreme high temperatures,

b. Protection.

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

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

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

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

NOTE

Weatherstripping, 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.

c. Cleaning.

(1) Clean outside grilles, coils, filters, and mist eliminator more frequently

2-17. OPERATION IN EXTREME COLD

CAUTION

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

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:

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 operation at extremely low temperatures for extended periods is anticipated.

2-18. OPERATION IN DUSTY OR SANDY CONDITIONS

NOTE

Unit preventive Maintenance Checks and Services (PMCX) should be performed at daily intervals.

a. General. Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filter, mist eliminator, and coils. This will cause a restriction in the volume of airflow. Accumulation of dust or sand in the condenser coil and/or in the compressor compartment may cause overheating of the refrigeration system, Dust or sand may also clog the condensate trap and water drain lines.

CAUTION

Never operate the air conditioner without having the air filters in place

b. ProtectIon

(1) Shield the air conditioner from dust as much as possible

(2) Take advantage of any natural barriers which offer protection

(3) Limit the amount of dusty or sandy outside air introduced through the fresh air damper

(4) Roll down and secure the fabric cover on the back of the cabinet during periods of shutdown

c. Cleaning.

(1) Keep the air conditioner as clean as possible.

(2) Pay particular attention to the outside grilles, condenser, filters, mist eliminator, louvers, and electrical components

(3) In extreme conditions, daily cleaning of condenser, filters, and outside grilles may be necessary

2-19. 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.

2-20. OPERATION IN SALT AIR OR SEA SPRAY

Salt air or sea spray may cause many of the same clogging problems as encountered when operating in a dusty or sandy environment. In addition, the nature of salt presents serious corrosion problems. Frequent cleaning is necessary during which all exposed surfaces should be thoroughly 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.

2-21. 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.

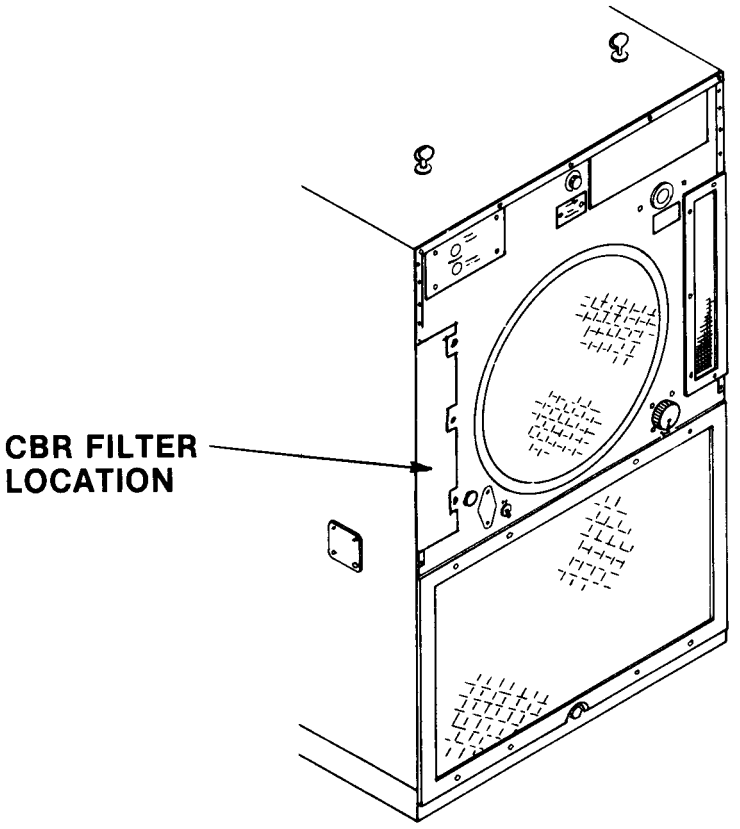


Figure 2-22. CBR Filter Connection Location

b. 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) chain may be taped over 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 115 volt, single phase, 50/60 hertz 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'S MAINTENANCE INSTRUCTIONS

Section I LUBRICATION INSTRUCTIONS

3-1. GENERAL

The air conditioner and its rnajor components are designed so that very little lubrication is required during their serviceable lifetime. The refrigerant compressor and its drive motor are hermetically sealed in a single container; sealed bearings are incorporated in the drive motor; and the compressor crankcase contains a lifetime charge of oil, Sealed bearings are incorporated in the evaporator and condenser fan motor.

The only operator lubrication required is that necessary to relieve stiffness or binding of the louver blades in the evaporator intake and discharge grilles or the turn button fasteners associated with the fabric cover on the back of the cabinet. Sparingly apply a light machine oil 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 organizational maintenance for appropriate action.

Section II TROUBLESHOOTING PROCEDURES

3-2. USE OF TABLE

Table 3-1 contains troubleshooting instructions designed to be useful in diagnosing and correcting unsatisfactory operation or failure of 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.

c. Report any trouble or corrective action beyond the scope of operator maintenance to your supervisor and Organizational Maintenance.

TABLE 3-1. 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 compressor circuit breaker is tripped.	Slowly PULL out AND PUSH in reset knob TO RESET CIRCUIT BREAKER.

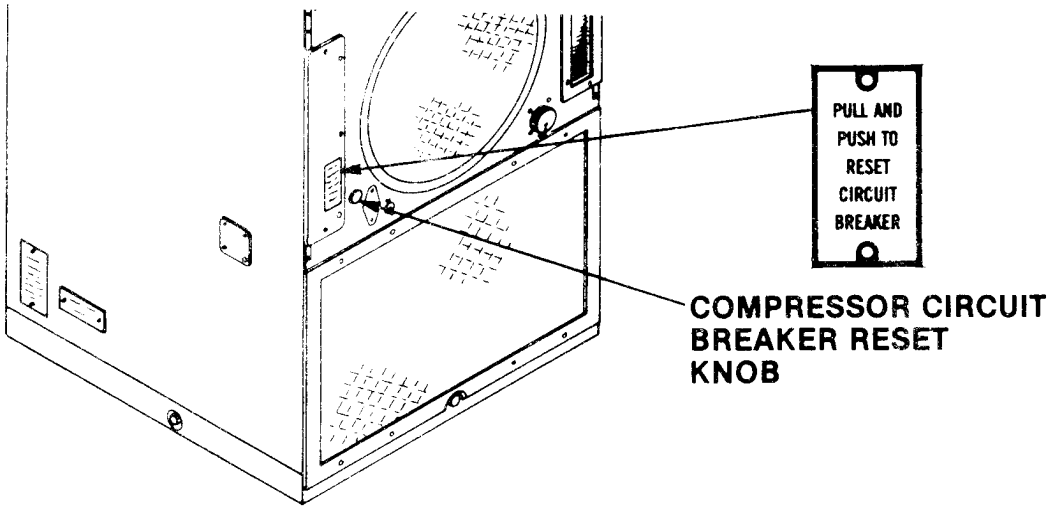


TABLE 3-1. TROUBLESHOOTING (Cont.)

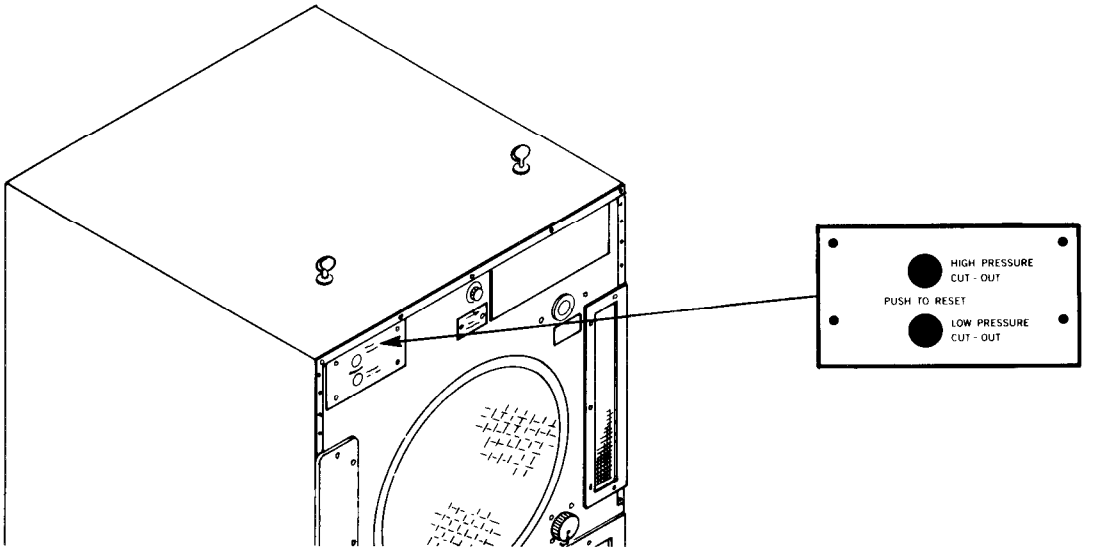
MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

NOTE

If circuit breakers continue to trip, contact your supervisor and Organizational Maintenance.

2. COMPRESSOR DOES NOT START IN COOL MODE.

Step 1. Check to see if HIGH or LOW PRESSURE CUT-OUT switch has tripped. PUSH and release TO RESET.



NOTE

If cut-out switch(es) continue to trip, contact your supervisor and Organizational Maintenance.

TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 2. Check operation of mode selector switch.	Turn switch to OFF, then reset to COOL.

NOTE

Allow 30 seconds time delay before compressor starts.

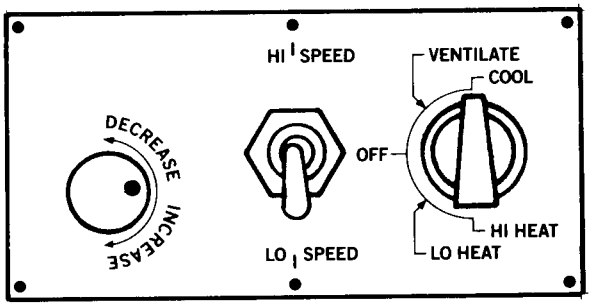


TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. COMPRESSOR STARTS NORMALLY, BUT HIGH OR LOW PRESSURE CUT-OUT SWITCH SOON TRIPS.

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

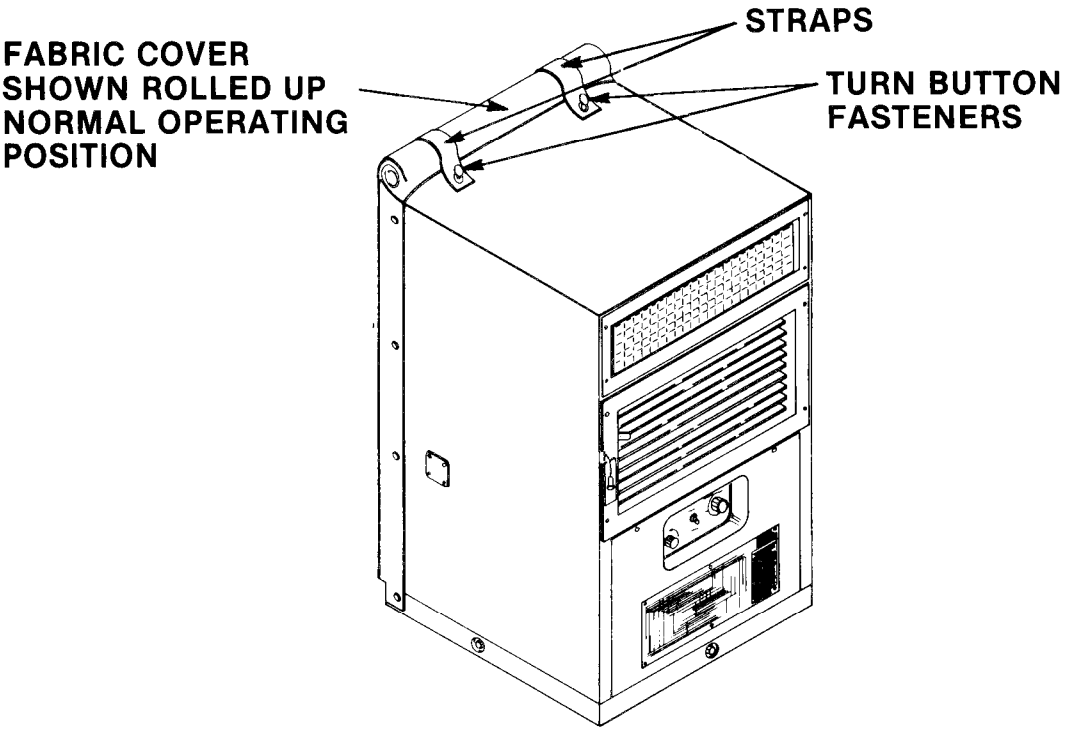
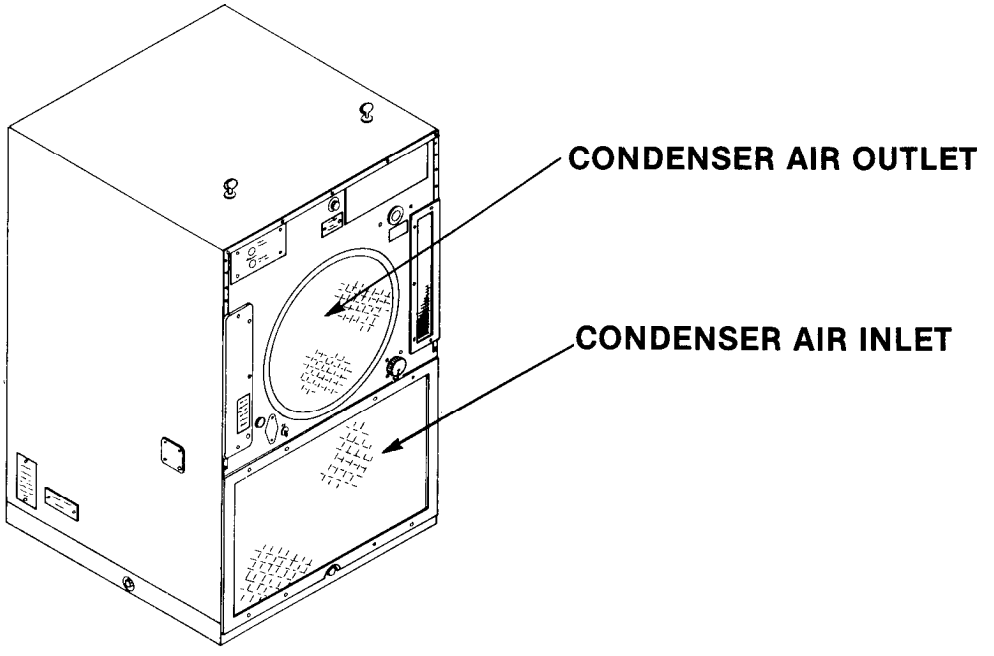


TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 2. Check to be sure condenser air inlet and outlet are not obstructed.
Remove obstructions.



Step 3. Reset (PUSH) PRESSURE CUT-OUT switch(es) and restart unit.
If unit does not start notify your supervisor and Organizational Maintenance.

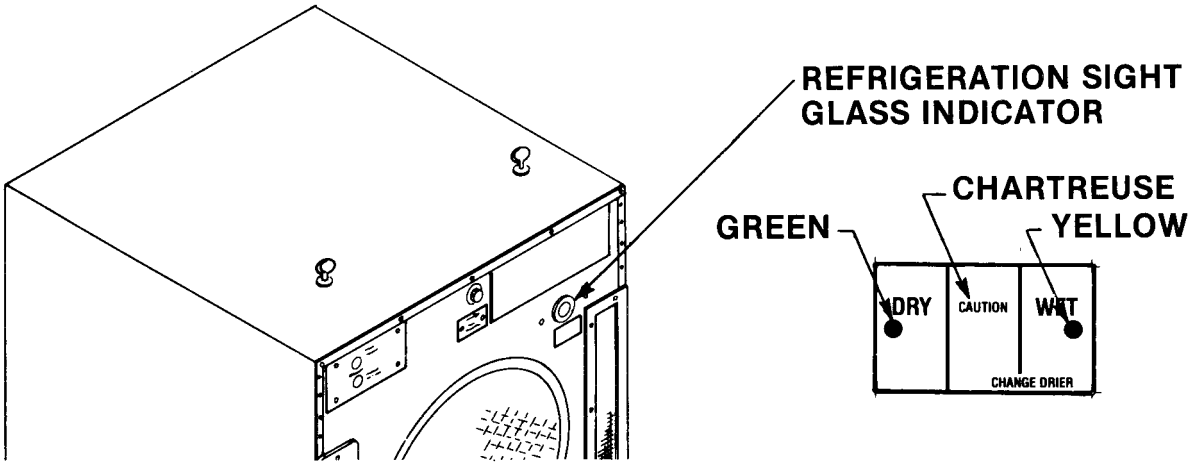
Step 4. Check to be sure that condenser fan is operating. (Air being discharged from condenser air outlet.)
If fan is not operating, shut unit off and notify your supervisor and Organizational Maintenance.

TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 5. With unit operating in COOL mode, check condition of refrigerant in sight glass.

If indicator color is in the yellow zone or numerous bubbles appear in the window, turn selector switch to OFF and notify your supervisor and Direct Support Maintenance.



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

Secure lower front panel.

4. **REDUCED COOLING CAPACITY.**

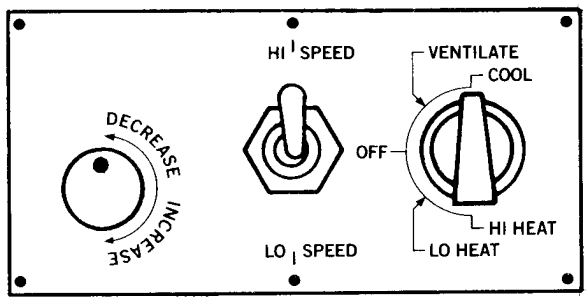
Step 1. Check that all doors, windows, and other openings in the room or enclosure are tightly closed.

Tightly close all openings.

TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check operation of Temperature control thermostat.
Set control at maximum DECREASE and fan speed switch to HI SPEED; then, if condition improves, adjust properly.



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

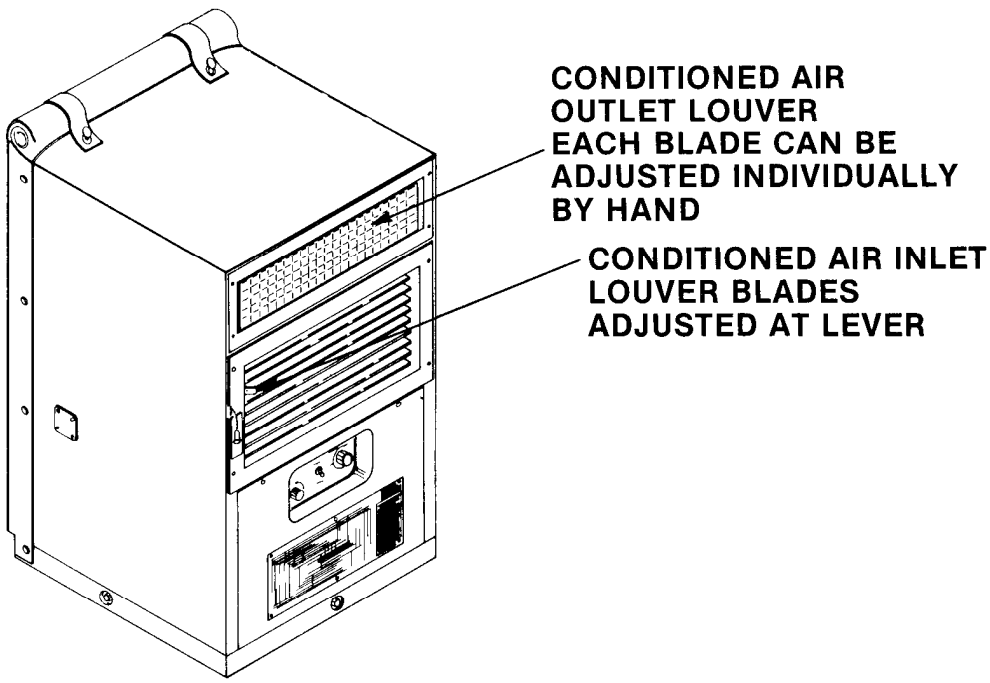


TABLE 3-1. TROUBLESHOOTING (Cont.)

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

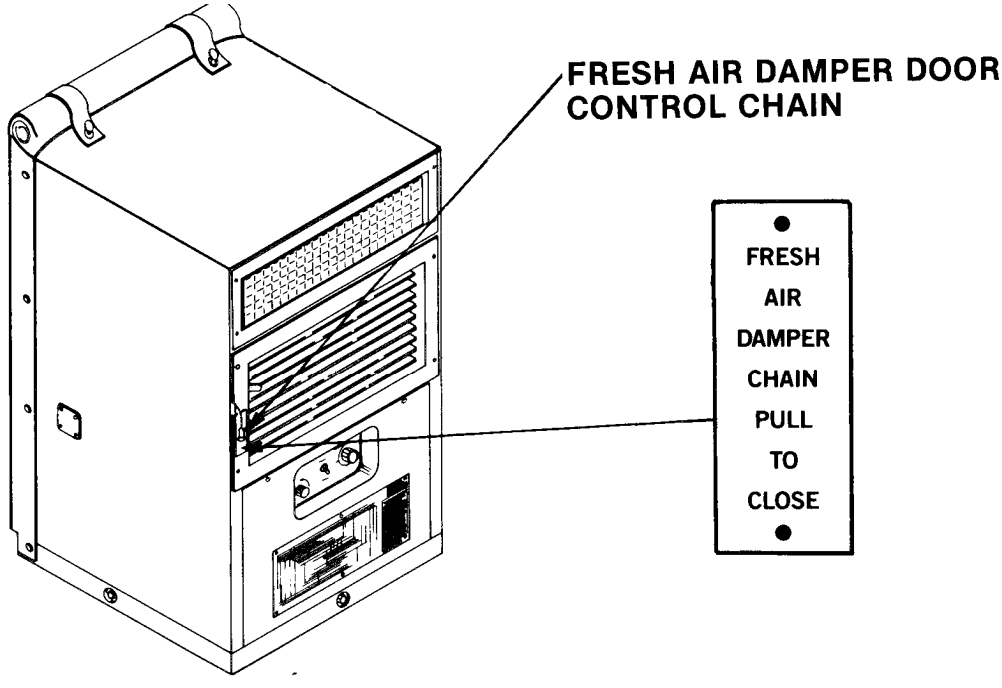


TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 5. Check to be sure condenser air inlet and outlet are not obstructed.	Remove obstructions.

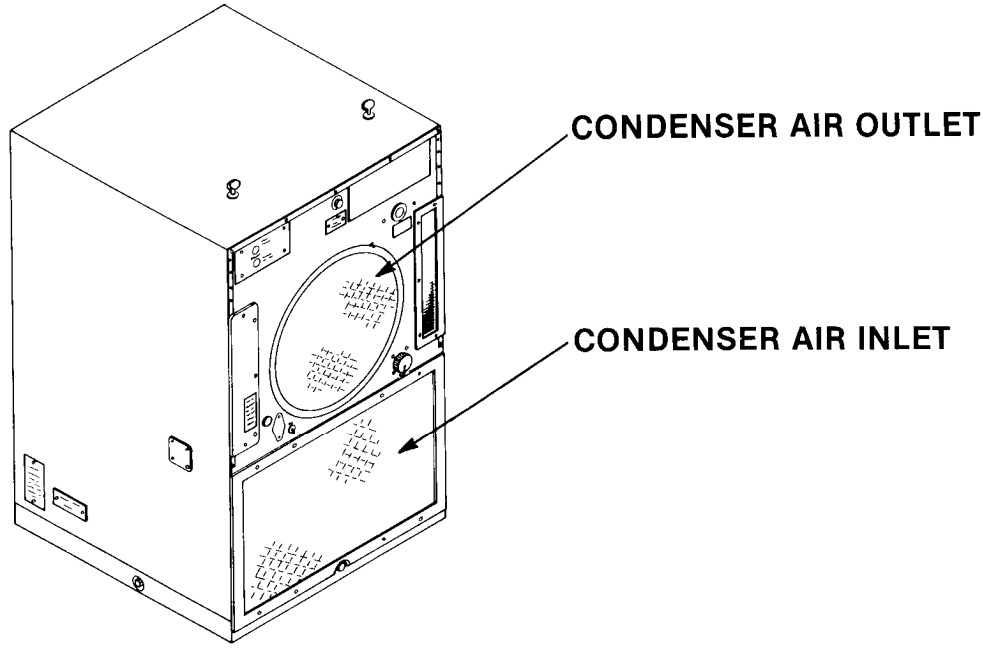
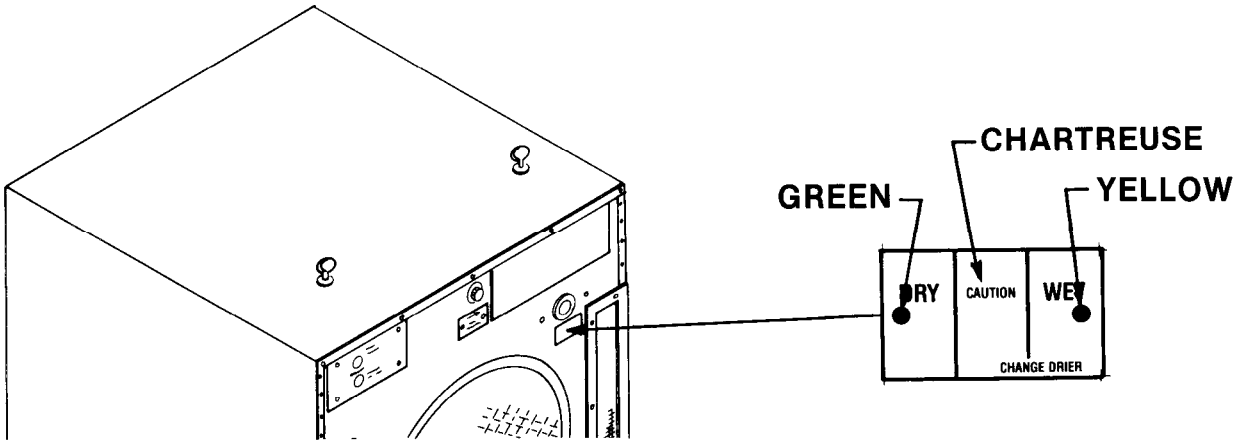


TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 6. With unit operating in COOL mode, check condition of refrigerant in sight glass.

If indicator color is in the yellow zone or numerous bubbles appear in window, turn selector switch to OFF and notify your supervisor and Direct Support Maintenance.



5. REDUCED HEATING CAPACITY.

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

Tightly close all openings.

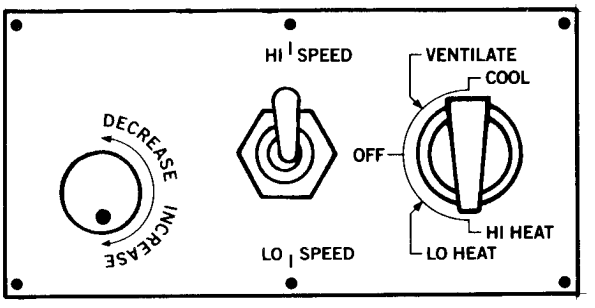
Step 2. Check operation of Temperature control thermostat.

Set control to fully INCREASE; then, if condition improves, adjust properly.

TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 3. Check to be sure fan switch is set properly.
Set switch to HI SPEED.



Step 4. Check that the louvers in the conditioned air inlet outlet grilles are properly adjusted.
Adjust louvers properly.

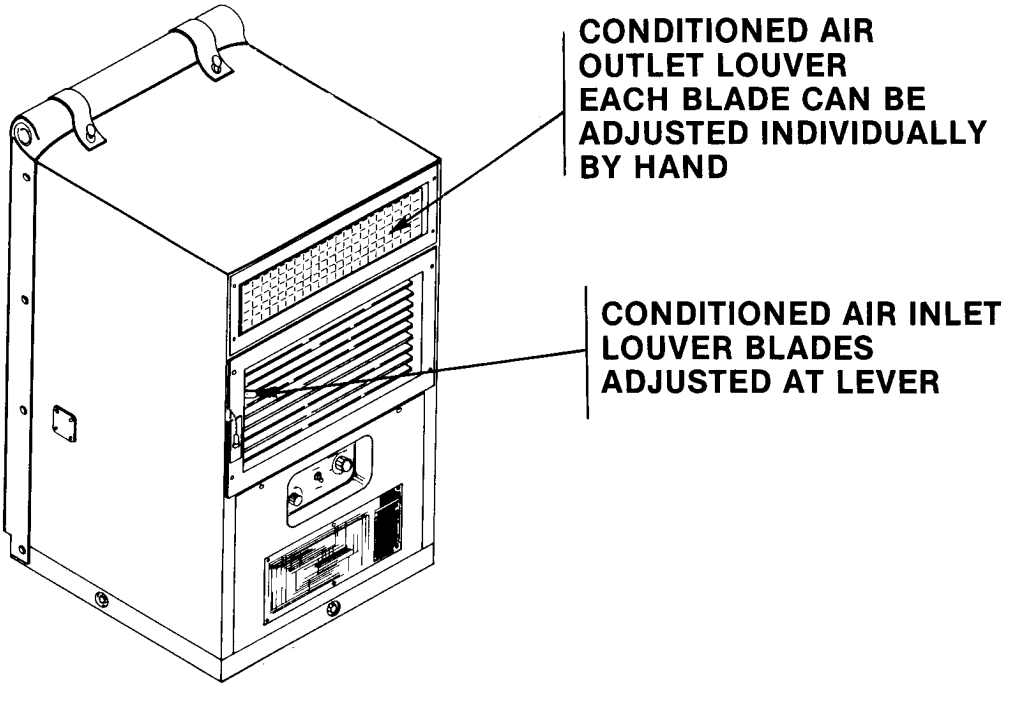
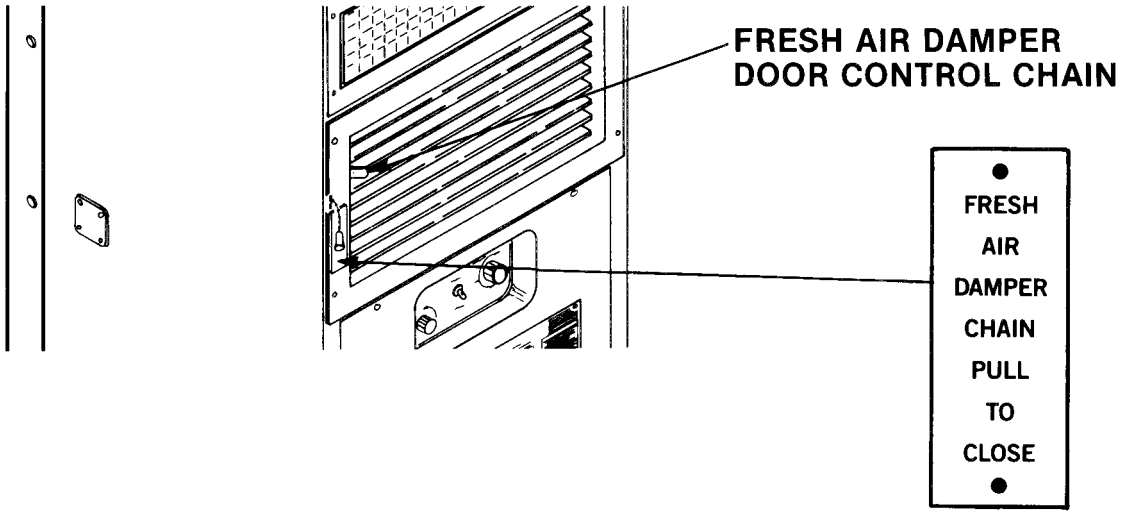


TABLE 3-1. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 5. Check to be sure that excessive cold, outside air is not being introduced through the fresh air damper.	Fully close damper; then, if condition improves, adjust properly.



CHAPTER 4
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. GENERAL

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

b. Test, Maintenance, and Diagnostic Equipment (TMDE) and support equipment include standard equipment found in any organizational maintenance shop.

c. Repair parts and special tools are listed and illustrated in the TM 5-4120-387-24P Repair Parts and Special Tools List (RPSTL), covering Organizational, Direct Support, and General Support Maintenance for this equipment.

Section II SERVICE UPON RECEIPT OF EQUIPMENT

4-2. UNLOADING

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

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

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

CAUTION

Injury to personnel or damage to equipment could occur from improper hoisting. Hoist the load slowly to avoid slipping slings or load shift. Do not jerk the load or swing it from side-to-side when hoisting. This places additional stress on hoisting components which can cause failure and loss of load. Be sure hoisting equipment is on solid footing and is suitable for the size of the load. Watch boom angle and overhead clearance when hoisting.

WARNING

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

4-3. UNPACKING

a. General. 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.

b. Remove shipping container. Cut metal bands that hold the top of container to pallet. Remove staples that secure fiber board container to pallet. Lift container vertically and remove it from the base and cabinet.

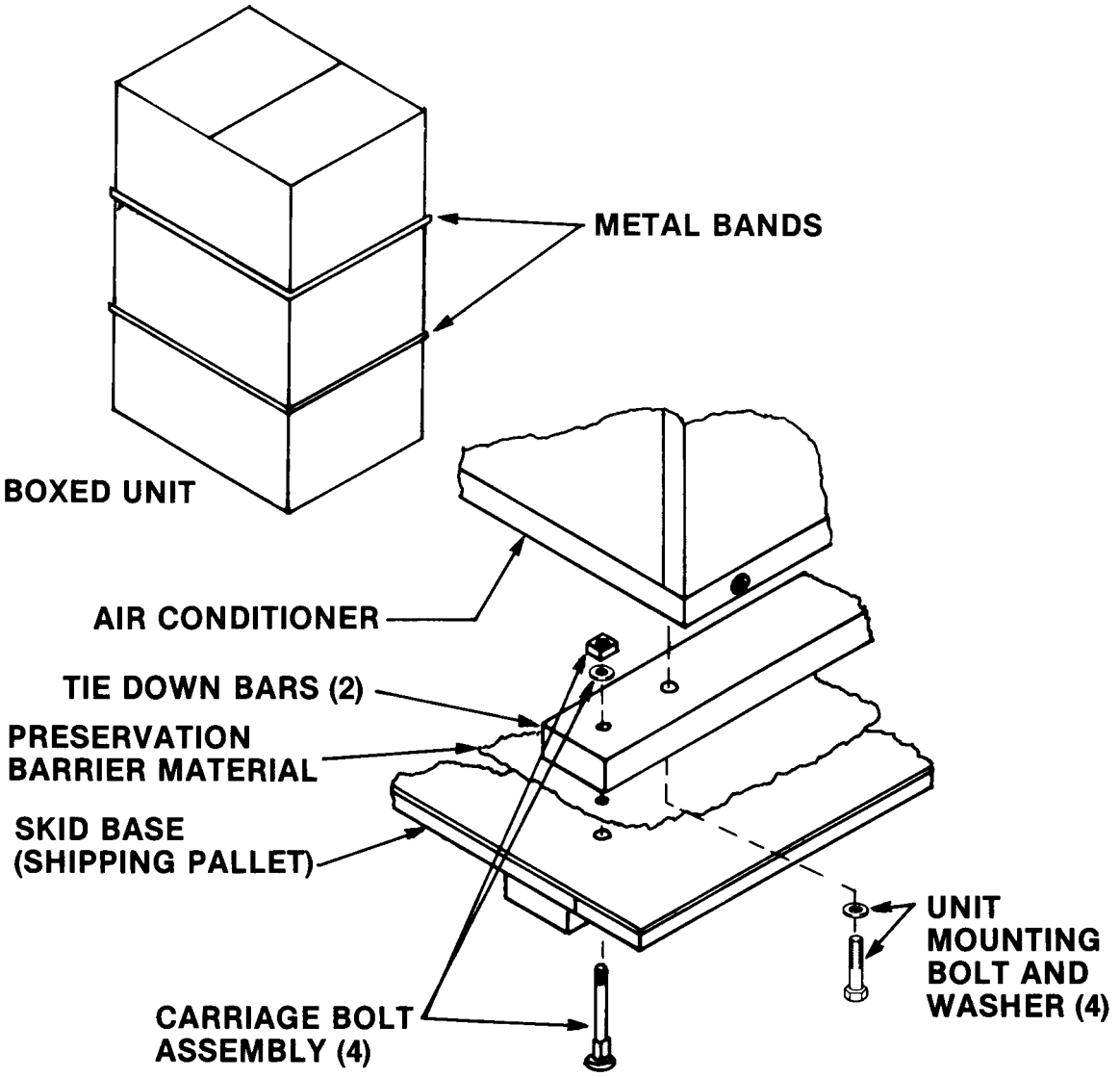


Figure 4-1. Unpacking

c. 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 and put them in a safe place.

NOTE

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

WARNING

DO NOT LIFT without hold ng unit in upright position. Other wise, unit will fall over and could cause injury to personnel.

d. Remove pallet. Raise the cabinet and remove the our 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.

4-4. RECEIVING INSPECTION

Perform receiving inspection of the air conditioner in the following manner:

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

b. Check the equipment against the packing slip to see if the shitment is complete. Report-all discrepancies in accordance with the instructions of TM 738-750.

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

4-5. INSTALLATION SITE PREPARATION

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

(1) A relatively level surface capable of bearing the weight of the air conditioner on which to set the base. To insure proper condensate drainage, the surface should be level with 5° from front to back and side to side. See figure 4-2 for installation dimensions.

(2) An unobstructed flow of air from outside the condoned area to the inlet and outlet of the condenser.

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

(4) An unobstructed flow of air from outside the conditioned area to the fresh air damper intake and/or CBR filter intake, if installed.

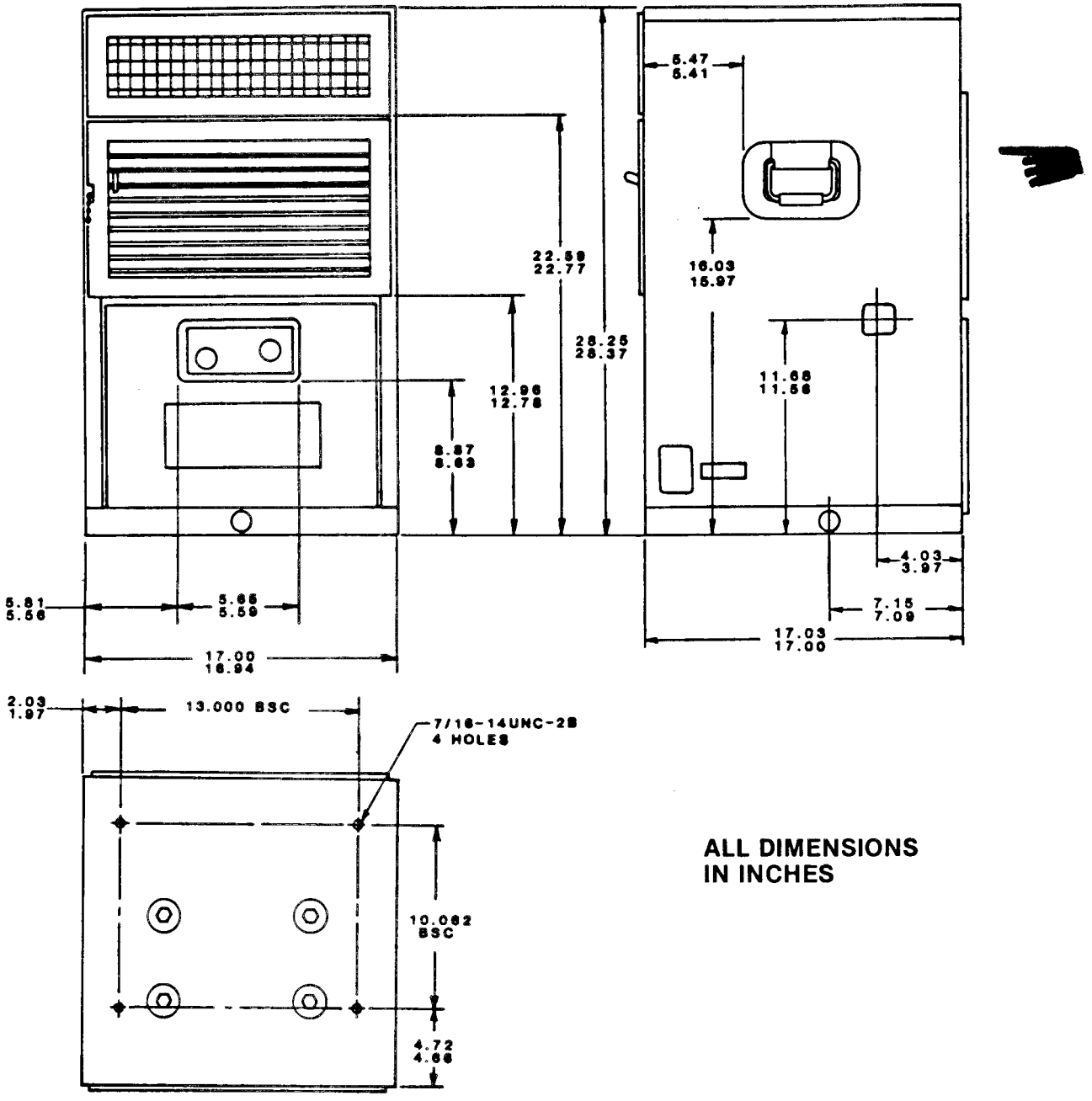


Figure 4-2. installation Dimensions

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

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

(7) A source of 115 volt, single phase, 50/60 hertz input power rated at 17.3 amps. The power source outlet should be located as near as possible to the installed location of the air conditioner. The power source wiring must include a disconnect switch. However, provisions should be made to insure that power is not disconnected durinq normal operation and that the disconnect is not used to turn off the air conditioner for normal shut-down.

(8) An earth ground capable of handling 17.3 amps.

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

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

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

b. Through the wall installation. Prepare an opening in the wall large enough to slide the air conditioner through. (See fig. 4-2.) Consideration should be given to service of internal components. All openings around air conditioner must be sealed air tight.

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

CAUTION

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 duct work) may require different size filters.

d. Outside installation. Manufacture an arrangement of ducts for the conditioned air intake and discharge air. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the conditioned air intake and discharge 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 appropriate openings in the appropriate 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. AIR CONDITIONER PREPARATION FOR INSTALLATION

a. General. No preparation is necessary if the air conditioner is to be installed by the typical exterior wall opening method and operated as a self-contained unit. For alternate installation methods, some preparation is necessary.

b. 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) Alternate input power cable connector locations. (See para 4-7.)

(2) Installations that require removal of the fabric cover. (See para 4-8.)

4-7. ALTERNATE INPUT POWER CABLE CONNECTOR (J1 LOCATIONS)

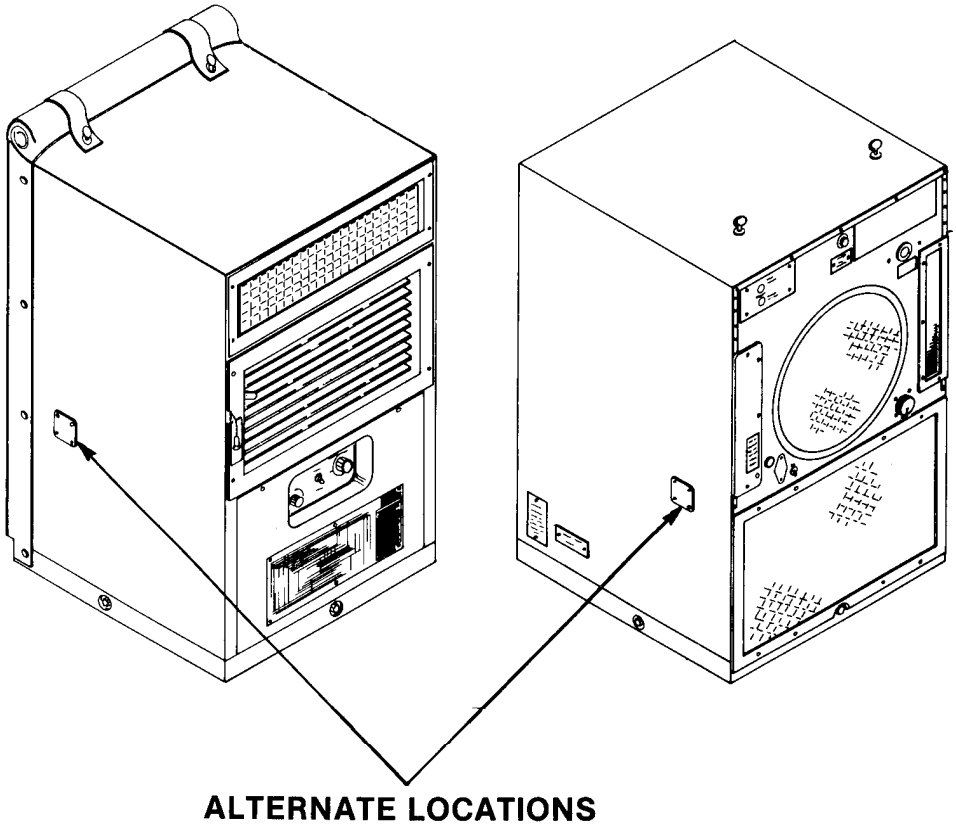


Figure 4-3. Alternate Input Power Locations

The following instructions apply only if relocation of the input power cable connector is required.

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Determine which alternate location is best.

b. Using screwdriver and wrench, remove four screws, lock washers, and nuts from cover plate.

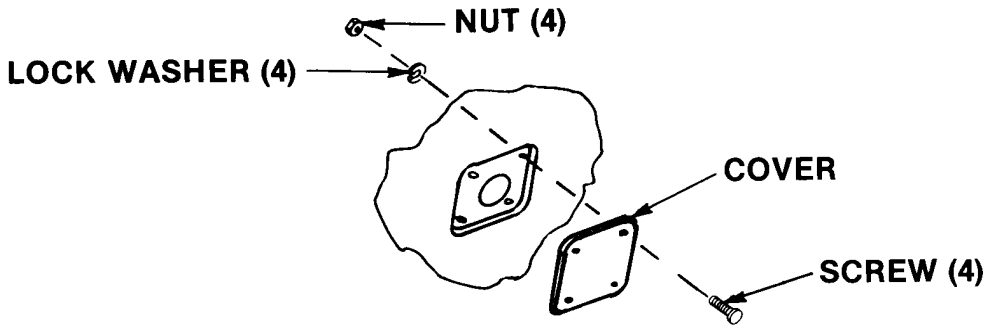


Figure 4-4. Cover Plate Removal/Installation

c. Remove cover plate and gasket if applicable.

d. Using screwdriver and wrench, remove four screws, lock washers, and nuts from receptacle (J1).

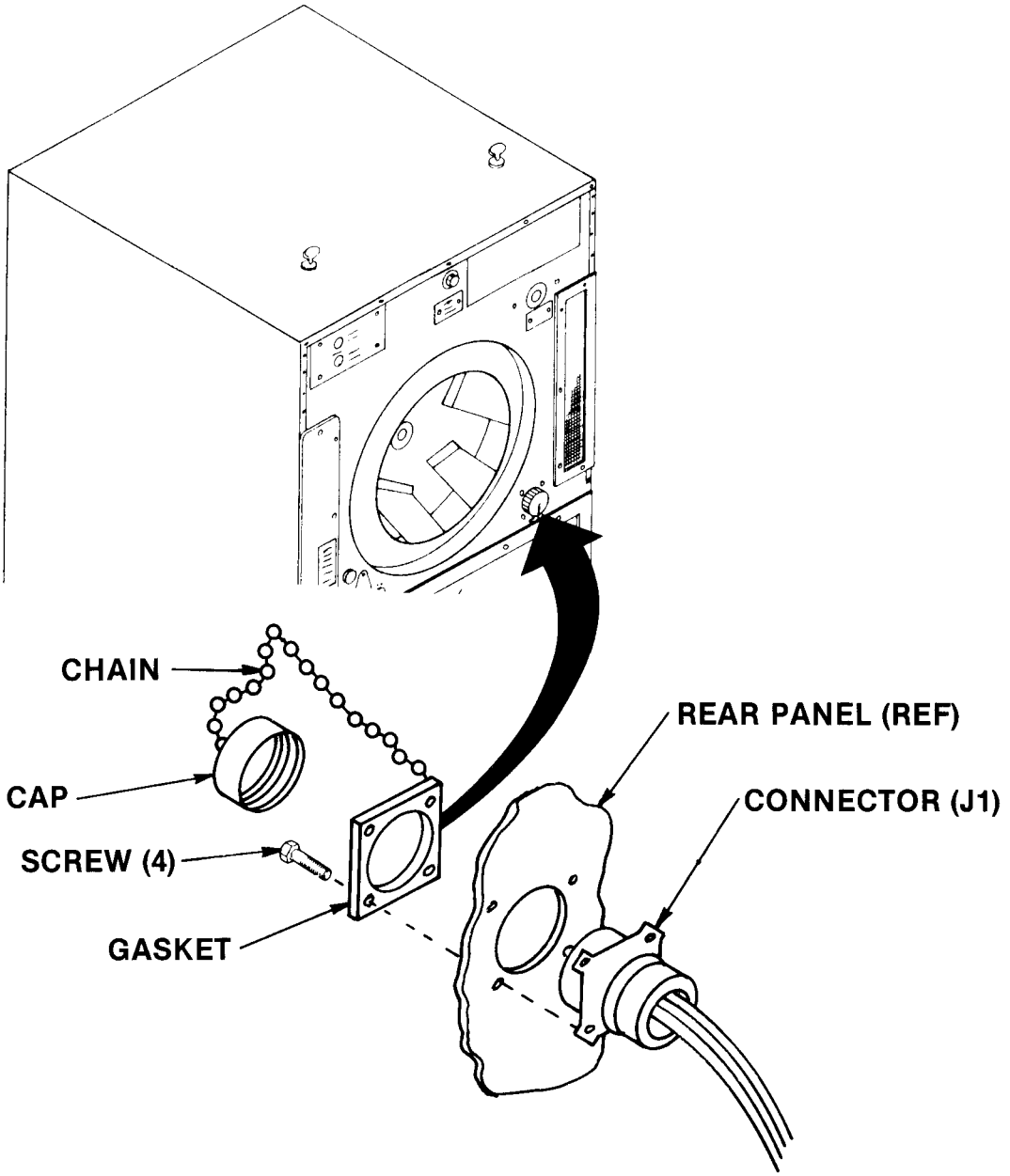


Figure 4-5. Receptacle (Jl)

e. Pull receptacle (Jl) down and out of bulkhead.

f. Using screwdriver and wrench, install receptacle J1 into the new connector location.

CAUTION

Be sure that the protective electrical connector cover which was removed from the rear panel is reinstalled at the new location.

g. Install gasket and cover plates over connector hole patterns at bulkhead and rear panel.

h. Coil loose excess harness so that it will not be damaged.

Follow-on procedure: Install junction box. (See para 4-29.)

4-8. INSTALLATIONS THAT REQUIRE REMOVAL OF FABRIC COVER

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

a. Using screwdriver, remove fourteen screws, four packing with retainer, and eighteen flat washers.

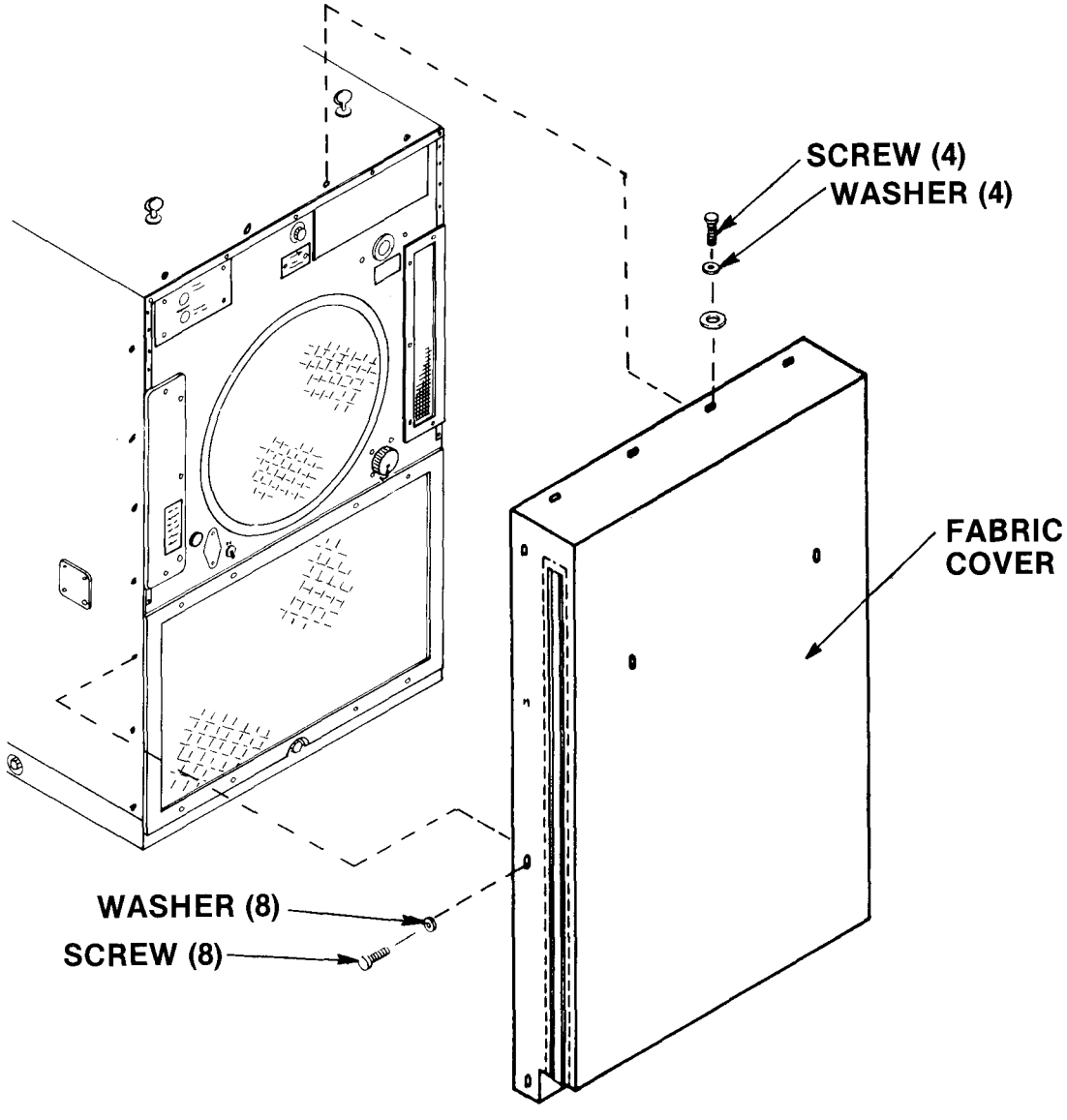


Figure 4-6. Fabric Cover Removal

b. Carefully remove the fabric cover. Store the cover in a safe place for future use.

4-9. INSTALLATION INSTRUCTIONS

All alterations to the shelter or facility into which the air conditioner is to be installed should be complete before installation of air conditioner.

Personnel required: **2**

WARNING

DO NOT LIFT without holding unit in upright position. Otherwise, unit will fall over and could cause injury to personnel.

a. Move air conditioner into position and aline mounting holes.

b. Secure unit with appropriate mounting hardware.

Base - .4375-14 UNC (4 holes)

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

d. The air conditioner is provided with four drain holes in base. (See figure 2-4.) Remove plugs from all drains possibly e 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. 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 at the same height, or lower than the base to ensure gravity drainage.

e. Install a 10 AWG minimum ground wire between frame ground (FR-GND) on air conditioner cabinet and an adequate earth ground.

Section III PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-10. INTRODUCTION, INSPECTION, AND SERVICE

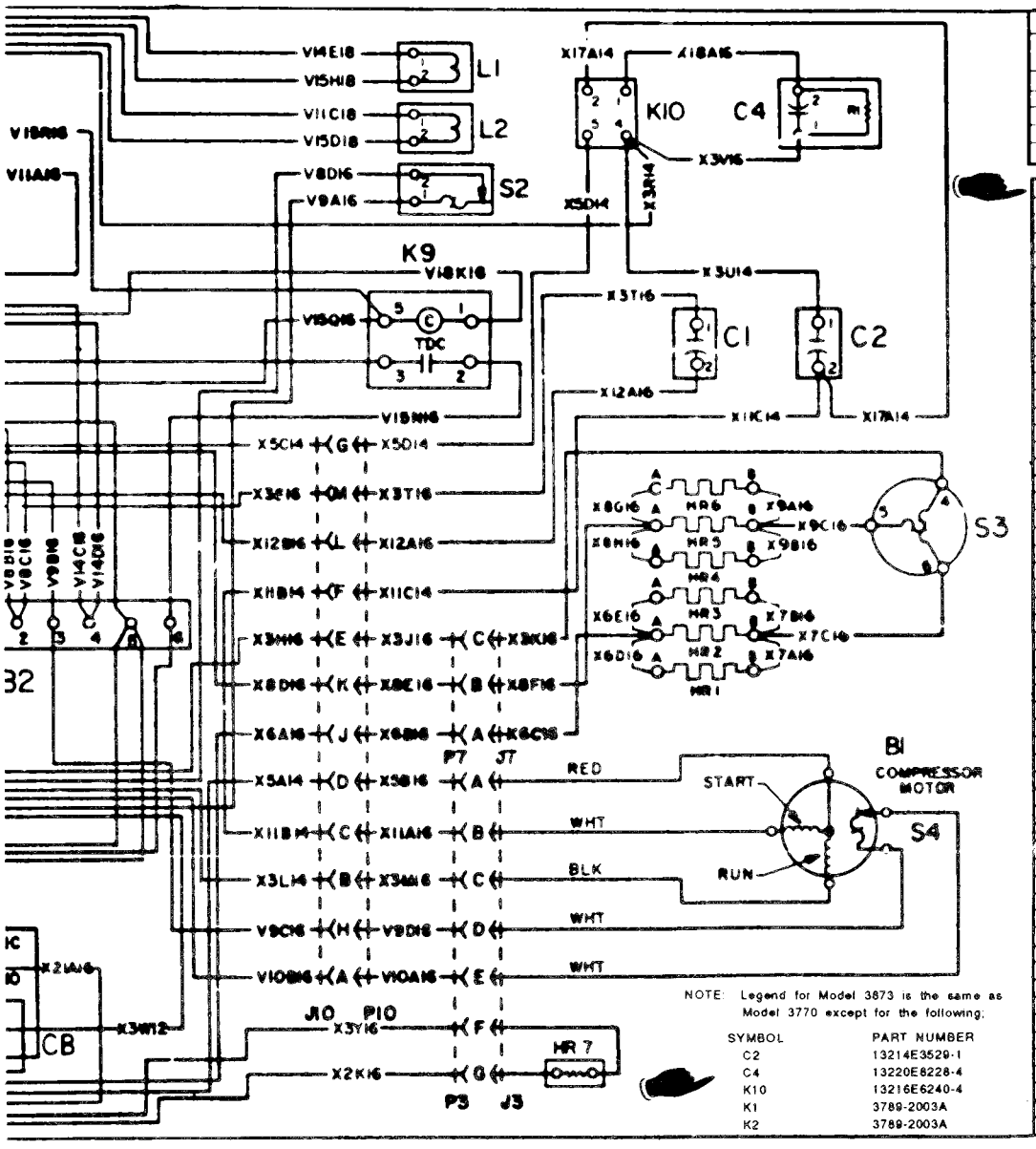
a. Systematic, periodic, Preventive Maintenance Checks and Services (PMCS) are essential to ensure that the air conditioner is ready for operation at all times. The purpose of a preventive maintenance program is to discover and correct defects and deficiencies before they can cause serious damage or 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 organizational 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 organizational 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 organizational preventive maintenance checks and services that should be performed at quarterly intervals (or otherwise stated in table 4-1). 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

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



SYMBOL	PART NUMBER
C2	13214E3529-1
C4	13220E8228-4
K10	13216E6240-4
K1	3789-2003A
K2	3789-2003A

S SWITCH POSITION					
CONTACT NO	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
12 & 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
12 & 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
11 & 1D	OEPN	OPEN	OPEN	OPEN	CLOSED
22 & 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
32 & 3A	CLOSED	OPEN	OPEN	OPEN	OPEN

LEGEND (For Model 3770)

SYMBOL	PART NUMBER	DESCRIPTION
B1	13214E3638 11	MOTOR, COMPRESSOR
B2	13214E3728 1	MOTOR, ALTERNATING CURRENT, FAN
C1	13214E3529 6	CAPACITOR, FAN MOTOR
C2	13214E3529 2	CAPACITOR, COMPRESSOR MOTOR RUN
C3	13219E9891	CAPACITOR ASSEMBLY
C4	13220E8228 2	CAPACITOR, COMPRESSOR MOTOR START
CB	13216E6206 4	CIRCUIT BREAKER
CR	13214E3652	RECTIFIER, SEMICONDUCTOR DEVICE
E1	MS 35207 267	GROUND, CONTROL PANEL
E2	MS 35207 267	GROUND, JUNCTION BOX
E3	MS 90726 5	GROUND, FRAME
E4	MS 35207 267	GROUND, EXTERNAL
F1	MIL F 15160	FUSE (TYPE F09A250V3A)
F2	13211E3785	FUSE
HR1 6	13214E3561	HEATING ELEMENT
HR7	F O 13214E3538 1	CRANKCASE HEATER, COMPRESSOR
J1	MS 3100R 20 4PX	CONNECTOR RECEPTACLE
J2	MS 3102R 14S 6P	CONNECTOR RECEPTACLE
J3	MS 3102R 16S 1P	CONNECTOR RECEPTACLE
J4	MS 3102R 32 7P	CONNECTOR RECEPTACLE
J7	MS 3100R 16 10P	CONNECTOR RECEPTACLE
J8	13211E8399C 29 17P	CONNECTOR RECEPTACLE
J10	MS 31025 28 9S	CONNECTOR RECEPTACLE
K1	MS 24192 D1	RELAY COMPRESSOR
K2	MS 24192 D1	RELAY, 25 AMP 3 PST N O
K6	13216E6182 3	RELAY, TIME DELAY, COMPRESSOR
K7	13215E9921	RELAY, FAN
K9	13216E6182 2	RELAY, TIME DELAY, FAN MOTOR
K10	1J216E6240	RELAY, ARMATURE
L1	13214E3524	VALVE, SOLENOID, LIQUID LINE
L2	13214E3524	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	MS 3106R 20 4SX	CONNECTOR PLUG
P2	MS 3106R 14S 6S	CONNECTOR PLUG
P3	MS 3106R 16S 1S	CONNECTOR PLUG
P4	MS 3106R 32 7S	CONNECTOR PLUG
P7	MS 3106R 16 10S	CONNECTOR PLUG
P8	MS 3100R 28 17S	CONNECTOR RECEPTACLE
P10	MS 3106R 28 9P	CONNECTOR PLUG
R1	P/O 13220E8228 1	RESISTOR, CAPACITOR BLEEDER
S	13216E6201	SWITCH ROTARY
S1	13211E8301 1	THERMOSTAT, TEMPERATURE CONTROL
S2	13211E8180	THERMOSTAT AMBIENT AIR TEMPERATURE
S3	13211E8265	THERMOSTAT HEATER
S4	P/O 13214E3538 1	THERMOSTAT COMPRESSOR
S5	13211E3404	SWITCH HIGH PRESSURE CUTOUT
S6	13214E3794	SWITCH LOW PRESSURE CUTOUT
S7	MS 24523 22	SWITCH, TOGGLE, FAN, HI LO SPEED
S8	13221E9273 2	SWITCH, PRESSURE CONTROL
T	13214E3818 2	TRANSFORMER
TB1	MIL T 55164/3	TERMINAL BOARD
TB2	13214E3804	TERMINAL BOARD
XF1	13211E3784	FUSEHOLDER, POWER INPUT AC
XF2	13214E3811	FUSEHOLDER, CONTROL VOLTAGE DC

Figure 4-7. Wiring Diagram (Sheet 1 of 2)

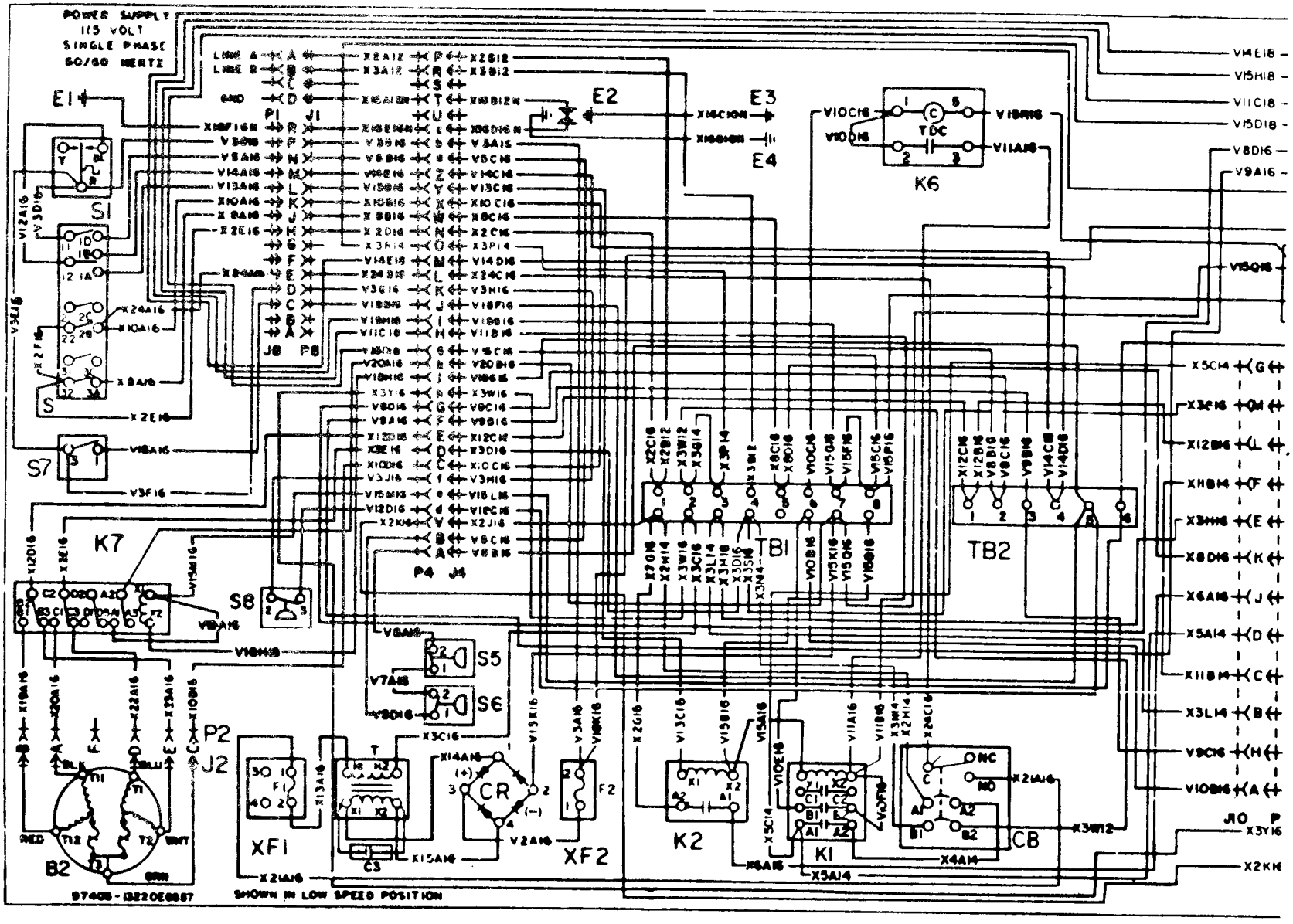
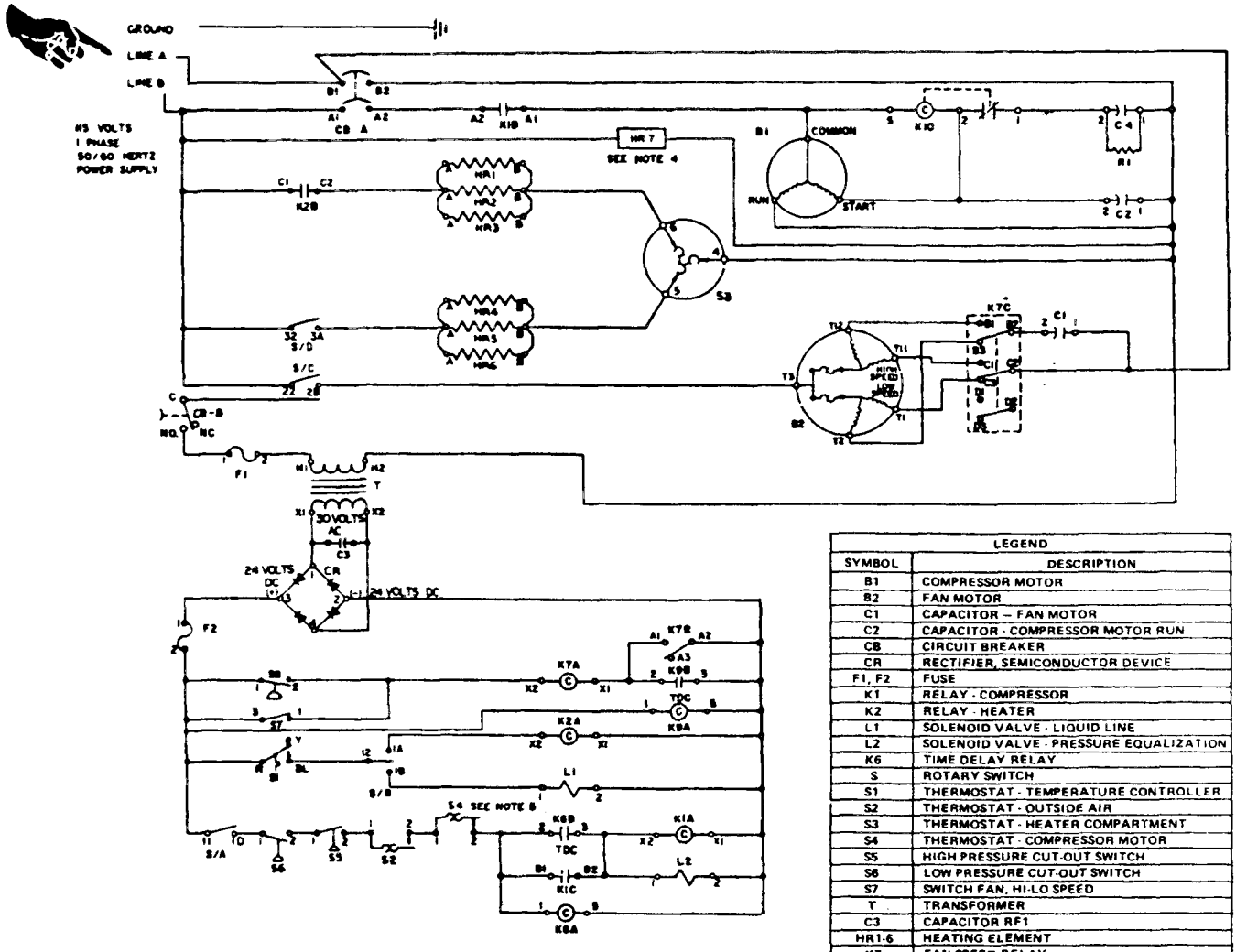


Figure 4-7. Wiring Diagram (Sheet 2 of 2)

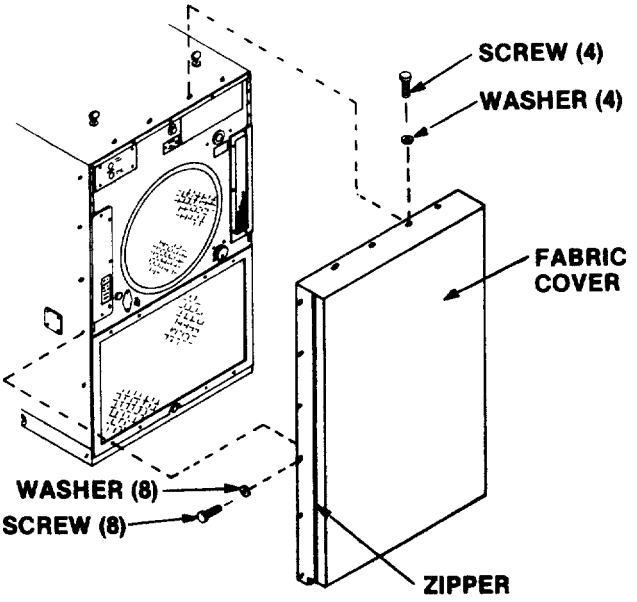


LEGEND	
SYMBOL	DESCRIPTION
B1	COMPRESSOR MOTOR
B2	FAN MOTOR
C1	CAPACITOR – FAN MOTOR
C2	CAPACITOR - COMPRESSOR MOTOR RUN
CB	CIRCUIT BREAKER
CR	RECTIFIER, SEMICONDUCTOR DEVICE
F1, F2	FUSE
K1	RELAY - COMPRESSOR
K2	RELAY - HEATER
L1	SOLENOID VALVE - LIQUID LINE
L2	SOLENOID VALVE - PRESSURE EQUALIZATION
K6	TIME DELAY RELAY
S	ROTARY SWITCH
S1	THERMOSTAT - TEMPERATURE CONTROLLER
S2	THERMOSTAT - OUTSIDE AIR
S3	THERMOSTAT - HEATER COMPARTMENT
S4	THERMOSTAT - COMPRESSOR MOTOR
S5	HIGH PRESSURE CUT-OUT SWITCH
S6	LOW PRESSURE CUT-OUT SWITCH
S7	SWITCH FAN, HI-LO SPEED
T	TRANSFORMER
C3	CAPACITOR RF1
HR1-6	HEATING ELEMENT
K7	FAN SPEED RELAY
S8	HIGH PRESS. FAN SPEED SW
K9	RELAY, TIME DELAY
K10	RELAY, ARMATURE
C4	CAPACITOR-COMPRESSOR MOTOR START
R1	RESISTOR, CAPACITOR BLEEDER

Figure 4–8. Electrical Schematic.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
1	Fabric Cover			 a. Roll down the cover and inspect for tears, cracks, or any other sign of damage or deterioration. b. If the necessity of washing is indicated, use fresh water with a small amount of a mild detergent.

☆U.S. GOVERNMENT PRINTING OFFICE: 1993 - 755-028/80136

PIN: 060930-005

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
				c. Reroll and secure the cover in the stowed position. If the cover was washed, be sure it is thoroughly dry before rerolling.

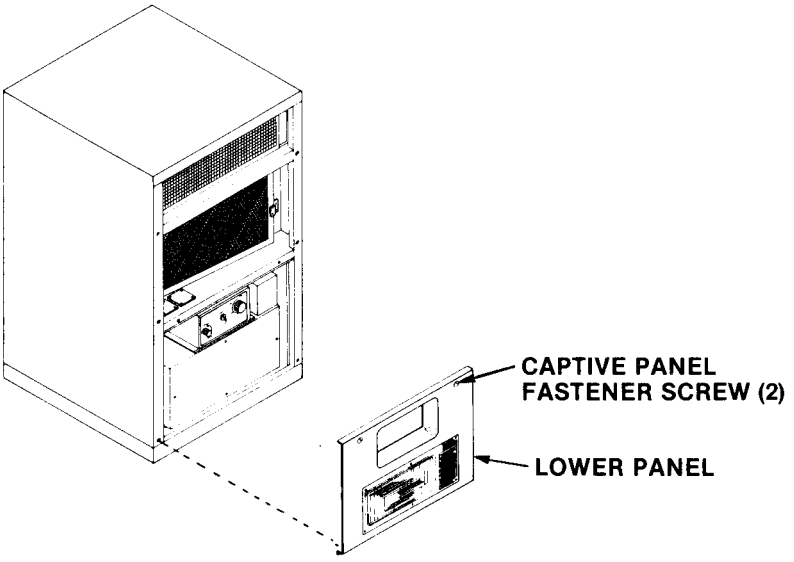


TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

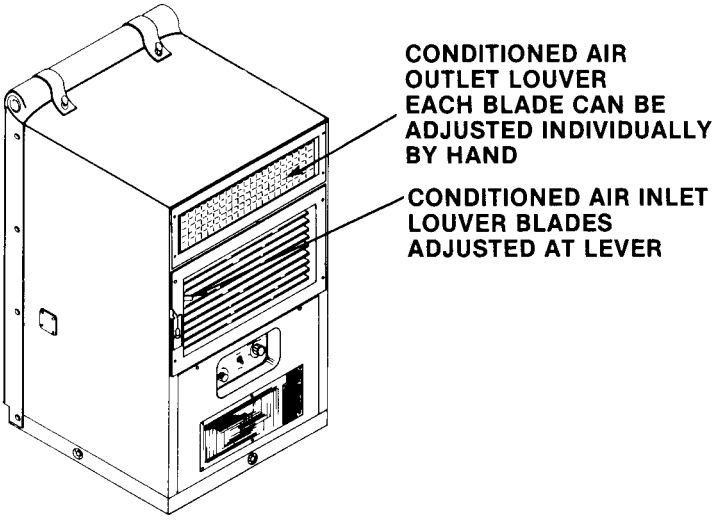
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
2	Lower Panel			Remove, clean, and inspect the lower panel. (See para 4-24.) 

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
3	Evaporator Air Intake Grille	•		a. Check operation of louvers for stiffness or binding. b. Remove, clean, inspect, repair, and lubricate grille as necessary. (See para 4-18.)
	Evaporator Air Discharge Grille	•		a. Check operation of louvers for stiffness or binding. b. Remove, clean, inspect, repair, and lubricate grille as necessary. (See para 4-18.)
4	Condenser Air Discharge Guard	•		Remove, clean, and inspect.

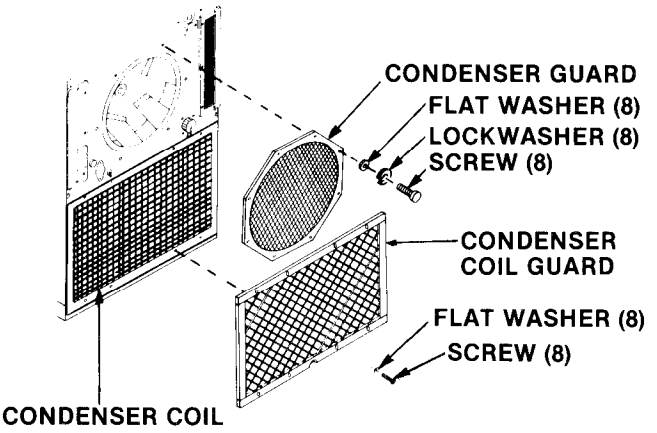


TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

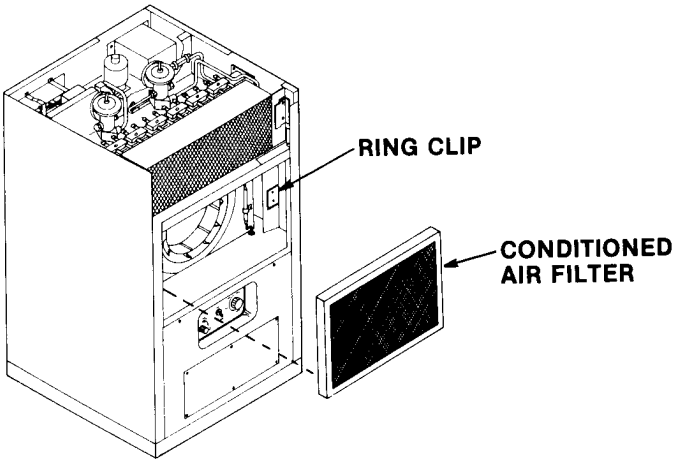
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
5	Condenser Coil Guard	•		Remove, clean, and inspect. 

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

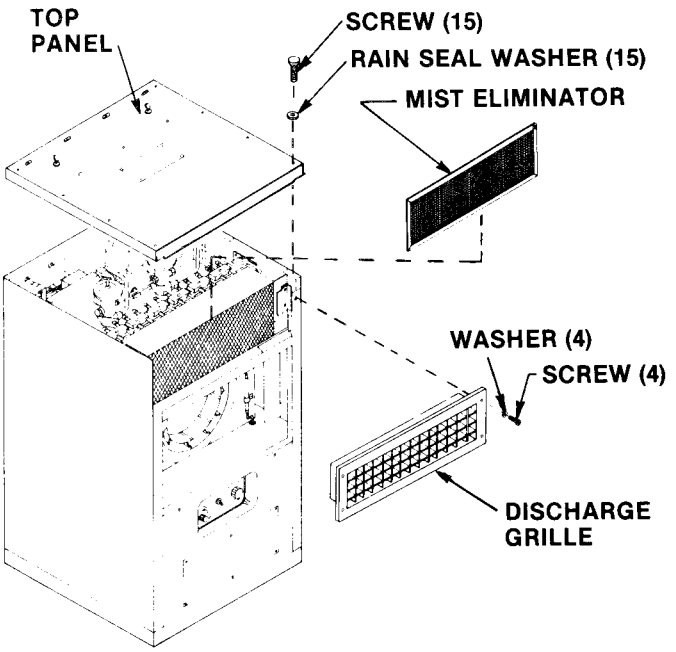
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
6	Conditioned Air Filter	•		a. Remove, clean, and inspect filter. (See para 4-25.) b. Discard filter and obtain replacement, if damaged. 

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

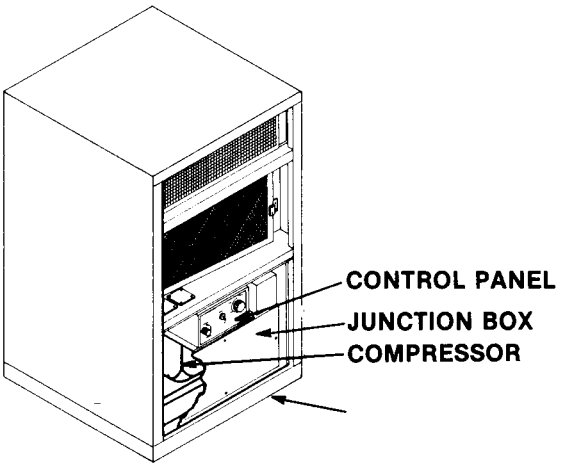
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
7	Mist Eliminator			a. Remove screws, flat washers, and packing with retainers from upper portion of fabric cover to gain access to top panel. b. Remove, clean, and inspect the top panel. c. Remove, clean, inspect, and service the mist eliminator. (See para 4-26.) 

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
8	Junction Box			a. Remove lower panel. (See para 4-24.) b. Check operation of circuit breaker and flexible cable to remote reset knob for stiffness and binding. c. Inspect all remaining wiring harnesses in the lower section of the cabinet for damage or chafing, and all electrical connections for tightness.
9	Control Panel			a. Remove lower panel and air filter. (See paras 4-24 and 4-25.) b. Check operation of controls for stiffness or binding. c. Inspect wiring harness for damage or chafing, and all electrical connections for tightness. d. Check capillary to temperature sensing bulb for damage or kinking.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

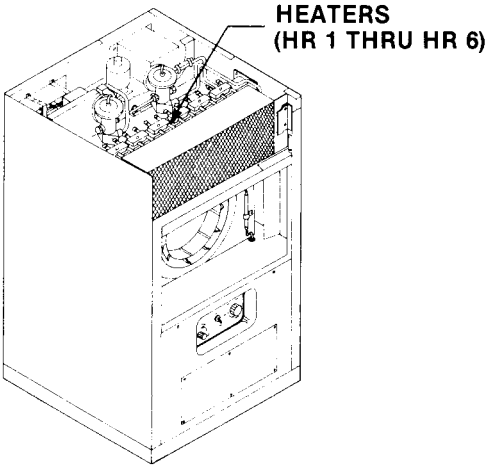
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
				e. Check all mounting hardware for tightness and security. 
10	Heating Elements			a. Wipe or vacuum any remaining dust or dirt from the heating elements, the heater thermostat, and all other components and surfaces in the area. **NOTE** Use a 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. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	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.
11	Evaporator Fan		•	a. Wipe or vacuum all dust or dirt from the fan and all other components and surfaces in the area. (See para 4-58.)
				b. Inspect the fan for damage or bent blades and all mounting hardware for tightness and security.
				c. Check that fan spins freely.
				d. Generally inspect refrigeration system components in the upper section for condition.
12	Condenser Fan and Evaporator/ Condenser Fan Drive Motor			a. Refer to paras 4-59 and 4-56 to gain access to the fan and motor.
				b. Wipe or vacuum all dust and dirt from fan and motor, and all other components and surfaces in the immediate area.
				c. Inspect the fan for damage or bent blades, the motor for signs of overheating, and all mounting hardware for tightness and security.
				d. Inspect the wiring harness for damage or chafing, and all electrical connections for tightness.
13	Evaporator Coil		•	a. Clean evaporator coil per para 4-61.
				b. Inspect coil for obvious damage and all mounting hardware for tightness and security.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
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. Check all compressor mounting hardware for tightness and security. c. Check all remaining refrigeration system components in the lower section of the cabinet for general condition.
15	Condenser Coil		•	a. Clean condenser coil per para 4-62.
			•	b. Inspect coil for obvious damage, and all mounting hardware for tightness and security.

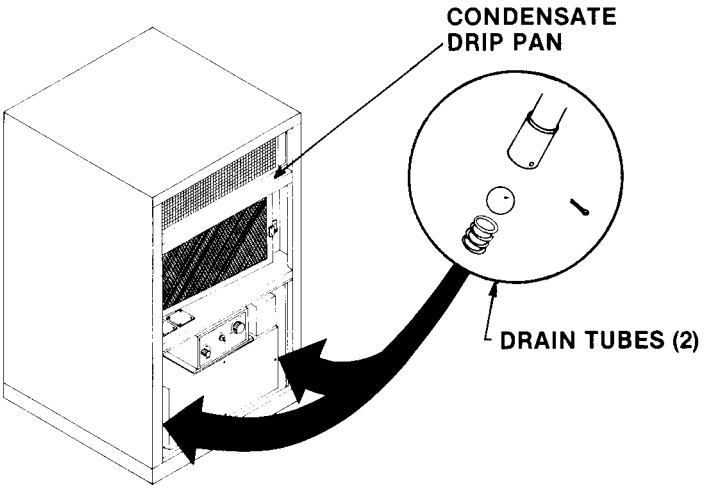


TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

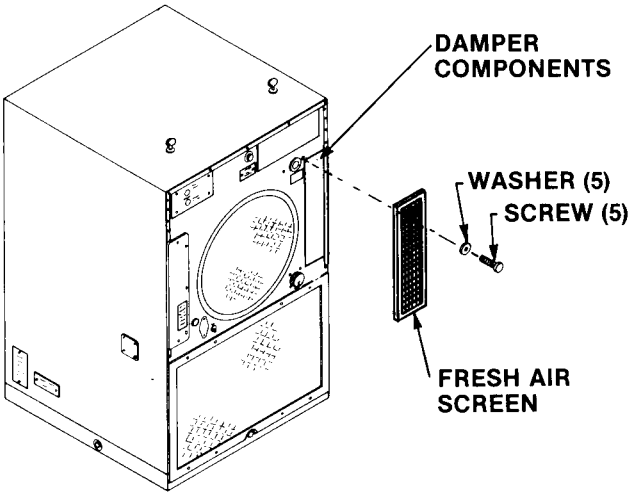
Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
16	Condensate Drip Pan, Drain Tubes, and Drain Traps			a. Wipe any dust or dirt out of the condensate drip pan. b. Pour about one cup of clean fresh water into the condensate drip pan and watch for it to flow through the drain traps at the bottom end of the drain tubes. 
17	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.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Cont.)

D - Daily W - Weekly

Item No.	Item To Be Inspected/ Serviced	D	W	Procedures
		O		c. Check to be sure the damper door seats properly to form a seal when in the closed position.
18	Bottom Panel			a. Wipe or vacuum all dust, dirt, sand, or other foreign matter from surfaces and water passages in the bottom panel assembly.
				b. Check that water flows freely through the installed condensate drain(s).

Section IV TROUBLESHOOTING

4-11. GENERAL

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

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

c. Table 4-2 lists the common malfunctions which you may find during the operation or maintenance of the air conditioner unit or its components. Before using this table, be sure you have performed all applicable checks and the tests/inspections and the corrective actions in the order listed.

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

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

Whenever possible, input power supply to equipment must be shut off before beginning work. Take particular care to ground every capacitor likely to hold a dangerous charge. When working inside, after power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115 volts ac input when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard of current flowing through vital organs of body.

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

TABLE 4-2. TROUBLESHOOTING

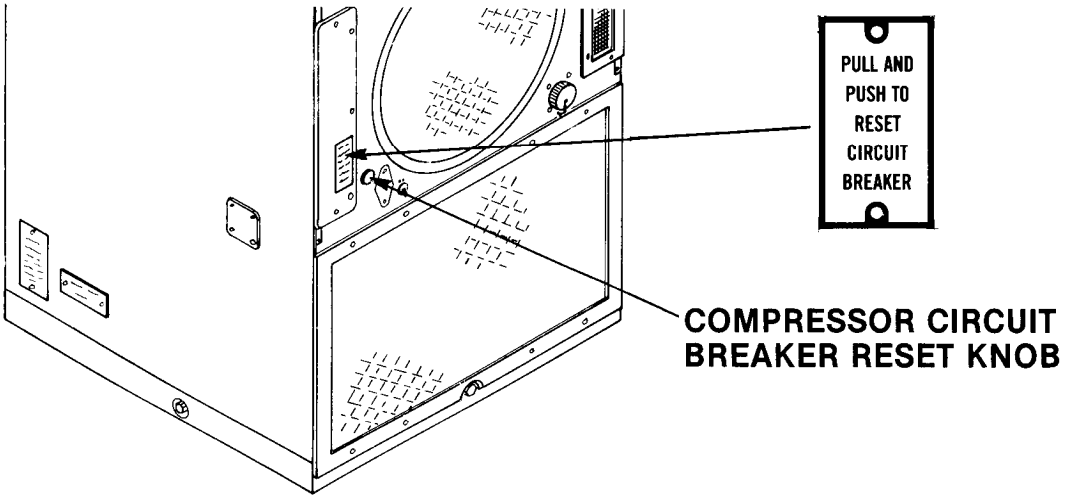
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

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

e phase, 50/60 hertz.

Step 3. Check to see if compressor circuit breaker is tripped.
Slowly PULL out AND PUSH in reset knob TO RESET Circuit Breaker.



Step 4. Check for loose or damaged electrical connectors or damaged wires in wiring harnesses. (See para 4-43.)
Tighten or replace connectors, or repair damaged wires.

Step 5. Check fuses. (See para 4-33.)
Replace bad fuse(s).

Step 6. Check operation of the auxiliary switch in circuit breaker (CB)
Test (CB1) auxiliary switch. (See para 4-32.) Replace circuit breaker if auxiliary switch is defective.

Step 7. Check operation of control power transformer (T) and capacitor assembly (C3).
Test transformer and capacitor assembly. (See para 4-30 and 4-31.) Replace transformer or capacitor assembly, if defective.

Step 8. Check operation of rectifier (CR).
Test rectifier. (See para 4-34.) Replace defective rectifier.

Step 9. Check all terminals and internal wiring within junction box for tightness and damage.
Tighten terminals, or repair wiring as necessary. (See para 4-27.)

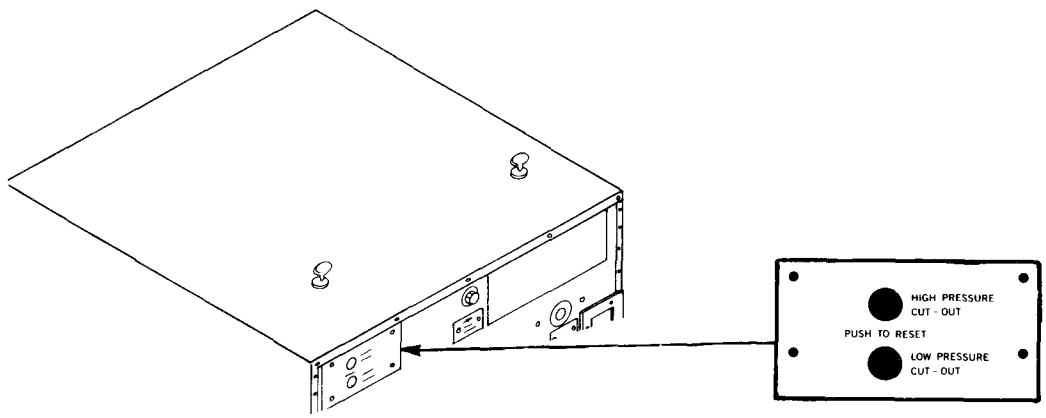
TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 10. Check operation of mode selector switch (S).
Test switch. (See para 4-47.) Replace switch, if defective.

Step 11. Check operating of fan toggle switch (S7).
Test switch. (See para 4-48.) Replace switch if defective.

Step 12. Check that high or low pressure cut-out switches (S6 and S7) are not open.
PUSH and release TO RESET.



Step 13. Reset (PUSH) PRESSURE CUT-OUT switch(es) and restart unit.
If unit does not start, notify your supervisor and Direct Support Maintenance.

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

Step 1. Check to see if HIGH or LOW PRESSURE CUT-OUT switch has tripped.
PUSH and release TO RESET.

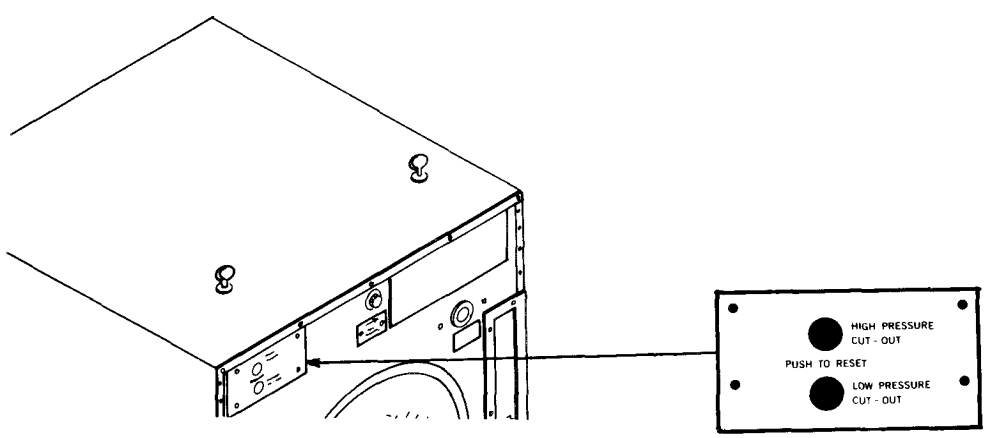


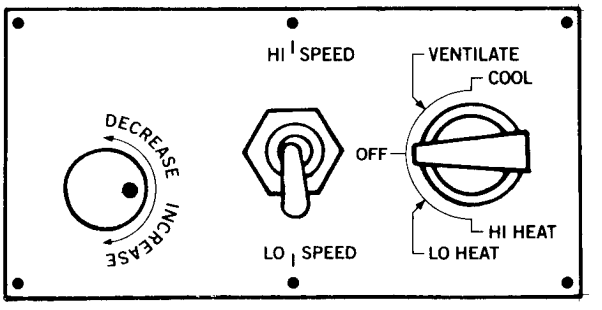
TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 2. Check operation of mode selector switch.
Turn switch to OFF, then reset to COOL.

NOTE

Allow 30 seconds time delay before compressor starts.



WARNING

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

Step 3. Check for loose or damaged electrical connectors, or damaged wires in harnesses.
Tighten or replace connectors, or repair damaged wires.

Step 4. Check operation of time delay relay (K6).
Test relay. (See para 4-35.)

Step 5. Check operation of time delay relay (K9).
Test relay. (See para 4-36.) Replace relay if defective.

Step 6. Check operation of compressor motor relay (Kl).
Test relay. (See para 4-37.) Replace relay if defective.

Step 7. Check operation of circuit breaker (CB) primary contacts.
Test circuit breaker. (See para 4-32.) Replace circuit breaker if defective.

Step 8. Check operation of compressor motor start relay (C4).
Test capacitor. (See para 4-50.) Replace if defective.

Step 9. Check operation of armature relay (K1O).
Test relay. (See para 4-53.) Replace if defective.

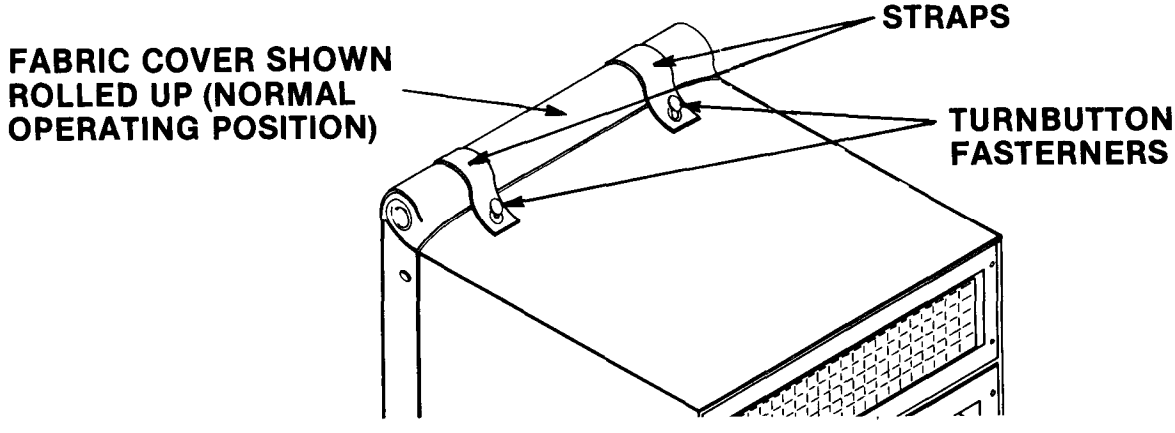
TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 10. Check operation of compressor run capacitor (C2).
Test capacitor. (See para 4-52.) Replace if defective.
Step 11. Check operation of compressor (Bl).
If not operating, notify your supervisor and Direct Support Maintenance.

3. COMPRESSOR STARTS NORMALLY, BUT COMPRESSOR CIRCUIT BREAKER SOON TRIPS.

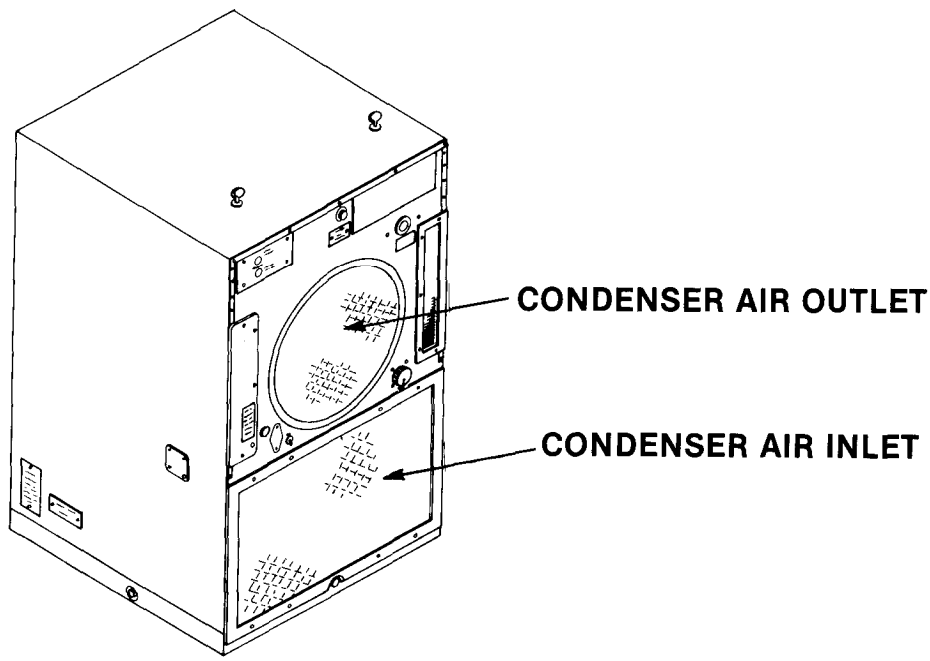
Step 1. Check to be sure fabric cover is rolled up.
Roll up and secure fabric cover.



Step 2. Check to be sure there is no restriction to air flow through condenser section.
Clean all obstructions from condenser inlet, outlet, and condenser coil.

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION



Step 3. Check to be sure that condenser fan is operating. (Air being discharged from condenser air outlet.)

NOTE

Condenser fan and conditioned air (evaporator) fan are both driven by the same motor. If one fan is operating and the other is not, check for loose fan on motor shaft. If both fans are not operating, check for loose electrical connections, defective motor relay (K7), or defective motor (B2).

Step 4. Check circuit breaker (CB1).
Test circuit breaker. (See para 4-32.) Replace circuit breaker if defective. Reset compressor circuit breaker and restart in COOL mode.

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CAUTION

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

4. COMPRESSOR STARTS NORMALLY, BUT HIGH OR LOW PRESSURE CUT-OUT SWITCH SOON TRIPS.

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

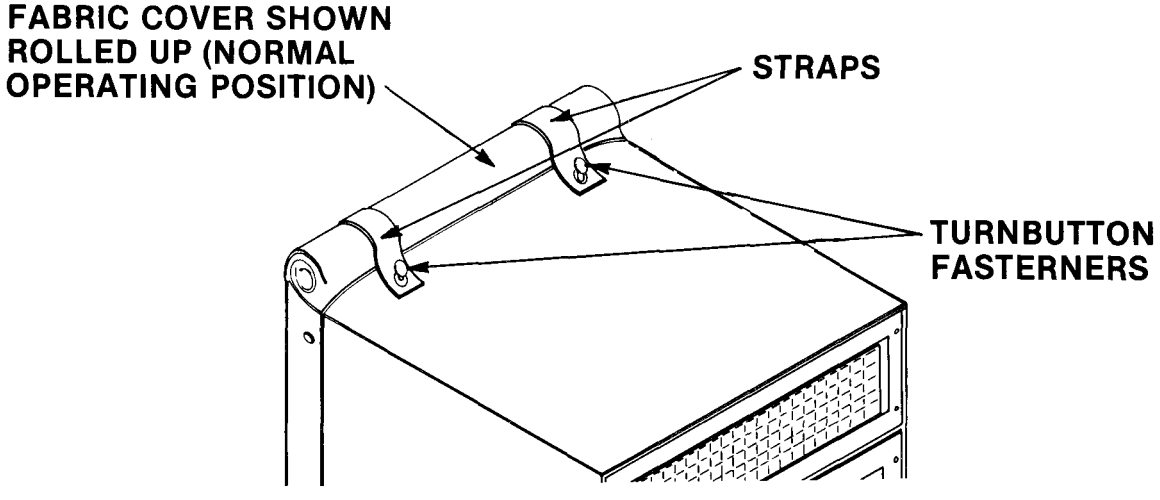
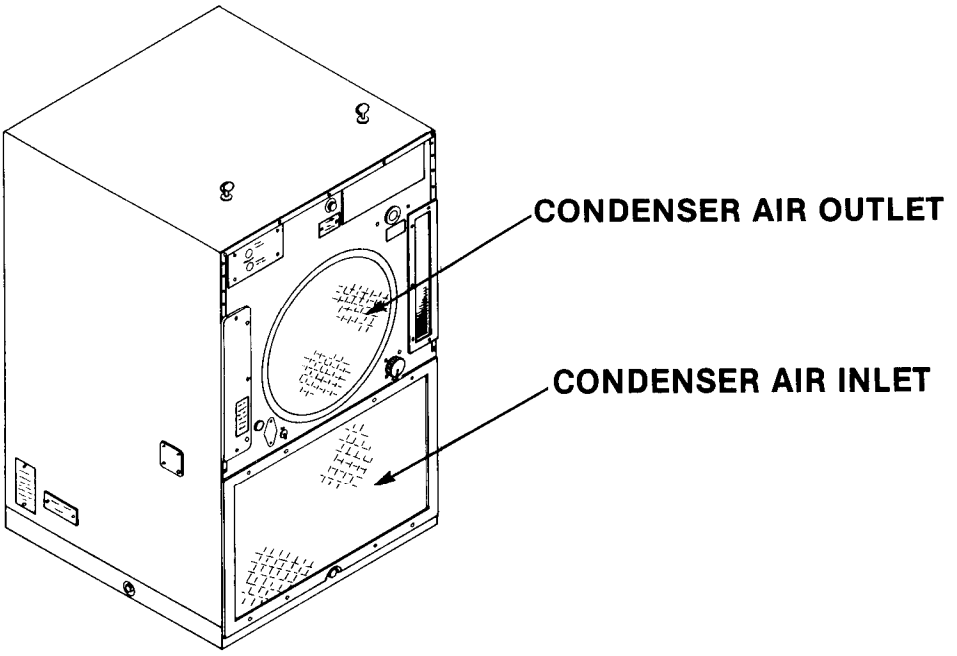


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 2. Check to be sure there is no restriction to air flow through condenser section.

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



Step 3. Check to be sure that condenser fan is operating. (Air being discharged from condenser air outlet.)

NOTE

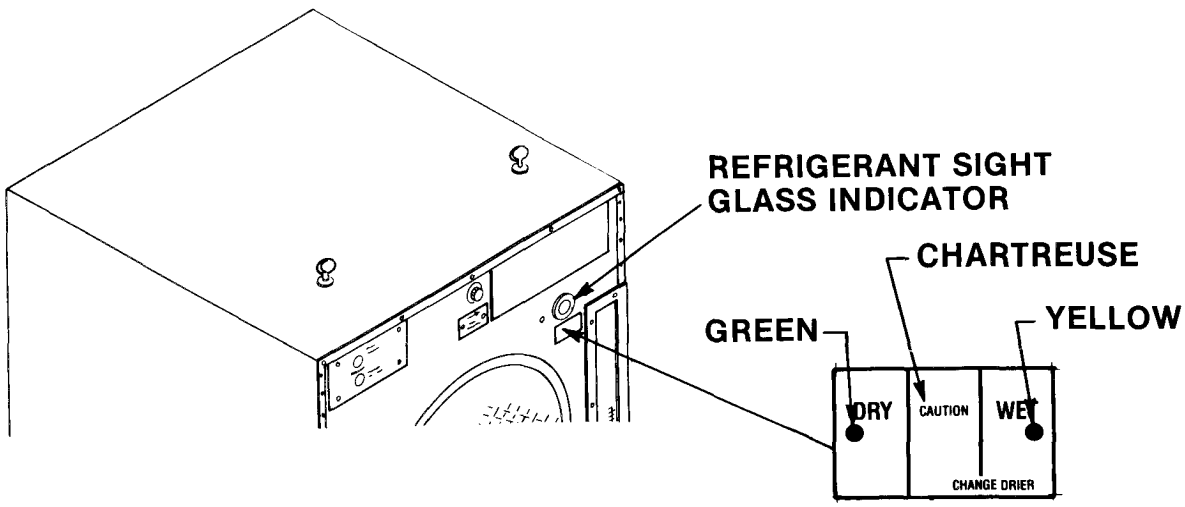
Condenser fan and conditioned air (evaporator) fan are both driven by the same motor. If one fan is operating and the other is not, check for loose fan on motor shaft. If both fans are not operating, check for loose electrical connections, defective motor relay (K7), or defective motor (B2).

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 4. With unit operating in COOL mode, check condition of refrigerant in sight glass.

If indicator color is in the yellow zone or numerous bubbles appear in the window, turn selector switch to OFF and notify your supervisor and Direct Support Maintenance.



Step 5. Reset (PUSH) PRESSURE CUT-OUT switch(es) and restart unit.

If unit does not start notify your supervisor and Direct Support Maintenance.

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. REDUCED COOLING CAPACITY.

Step 1. Check that all doors, windows, and other openings in the room or 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.

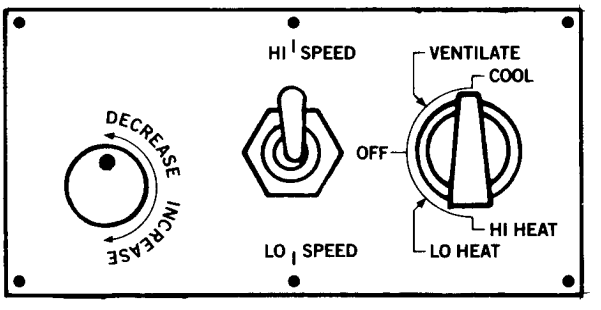


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 3. Check operation of fan toggle switch.	Switch from LO to HI SPEED. If no change results, test switch. (See para 4-48.) Replace bad switch.
Step 4. Check that the louvers in the conditioned air inlet and outlet grilles are properly adjusted. (Must be open.)	Adjust louvers properly.

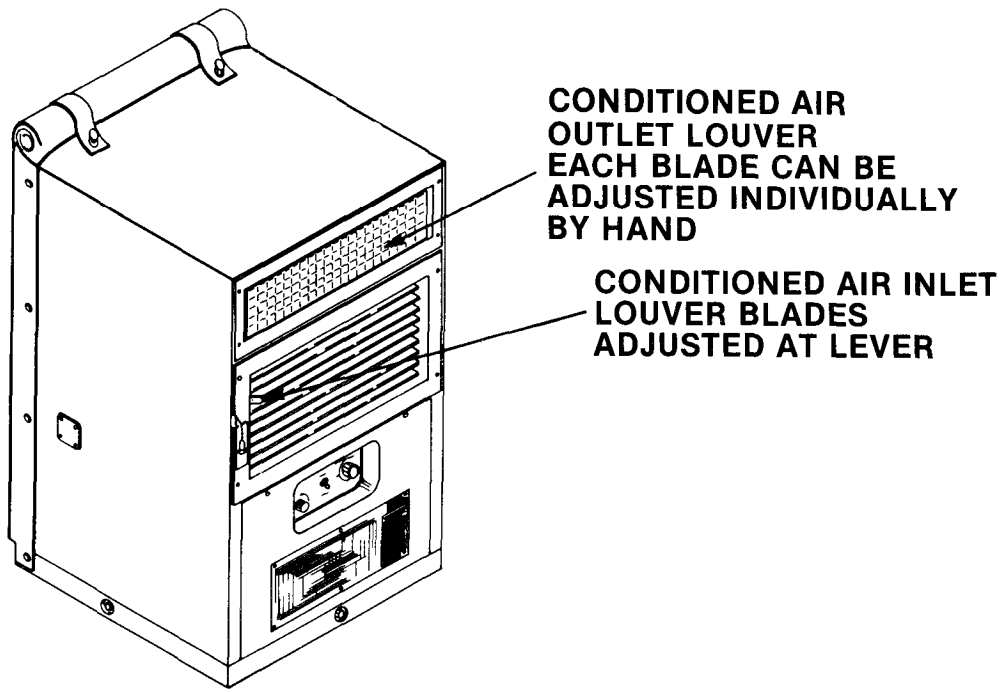


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 5. Check to be sure that excessive hot, outside air is not being introduced through the fresh air damper.	Fully close damper; then, if condition improves, adjust properly.

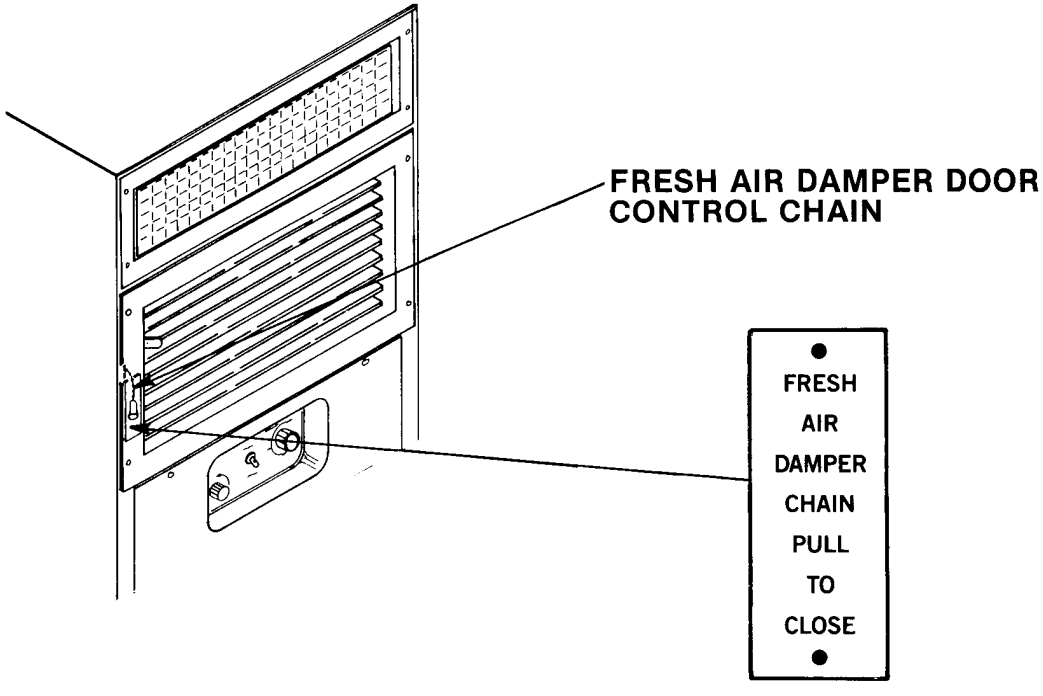


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 6. Check to be sure condenser air inlet and outlet are not obstructed.	Remove obstructions.

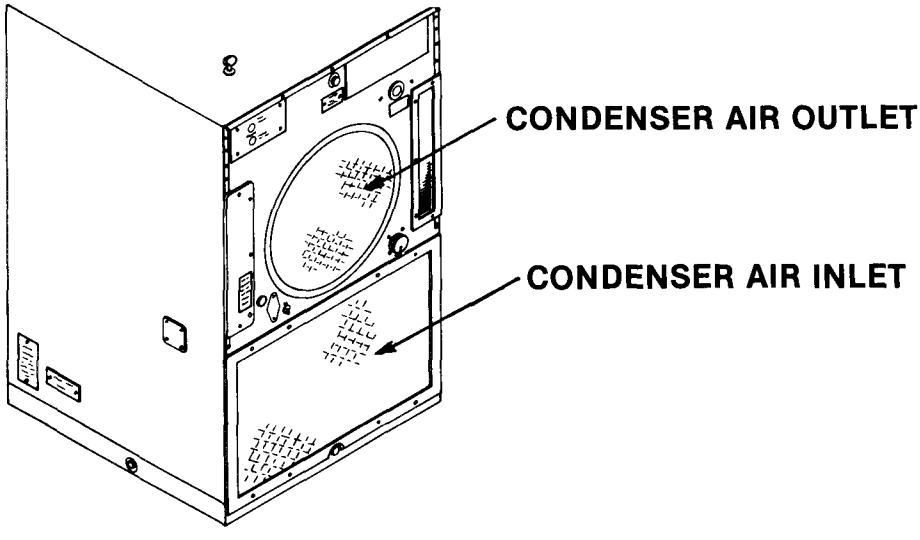
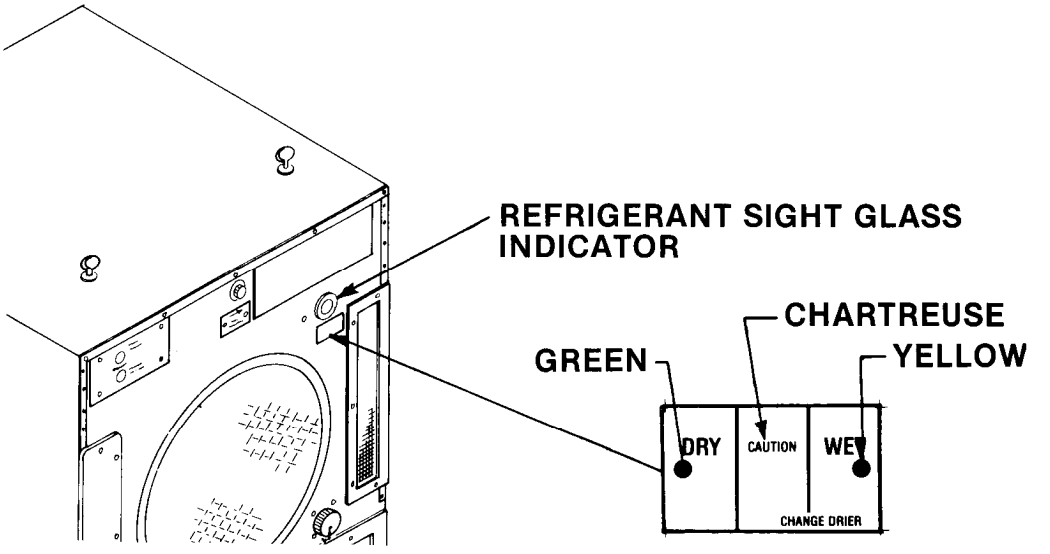


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 7. With unit operating in COOL mode, check condition of refrigerant in sight glass.	



a. If color is yellow or a light hue of chartreuse, or if numerous bubbles appear, turn air conditioner OFF, and notify your supervisor and Direct Support Maintenance.
b. If color is green or a dark hue of chartreuse, but 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.
c. Clean and service, or replace mist eliminator. (See para 4-26.)
d. Clean evaporator coil and entire evaporator section. (See para 4-61.)

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 8. 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 filter element. (See para 4-25.)

c. Clean and service, or replace mist eliminator. (See para 4-25.)

d. Clean evaporator coil and entire evaporator system. (See para 4-61.)

Step 9. Check operation of Temperature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. (See para 4-46.) Replace entire control if bulb is damaged or leaking.

b. Test switch in Temperature control thermostat. (See para 4-46.) Replace entire control if defective.

6. REDUCED HEATING CAPACITY.

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

Tightly close all openings.

Step 2. If control panel is remotely located, check to be sure that sensing bulb is not near a light bulb or some type of heat producing equipment.

Turn off or move heat source, or move the remote control panel.

Step 3. Check operation of Temperature control thermostat.

Set control to fully INCREASE and fan speed to HI SPEED then, if condition improves, adjust properly.

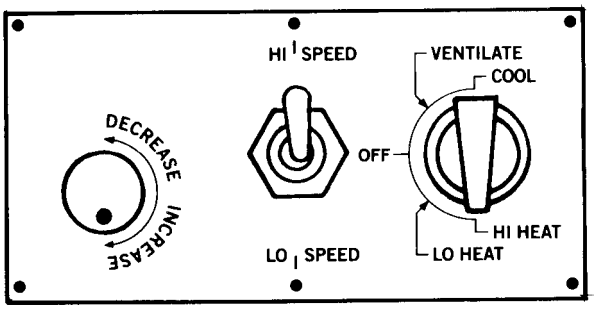
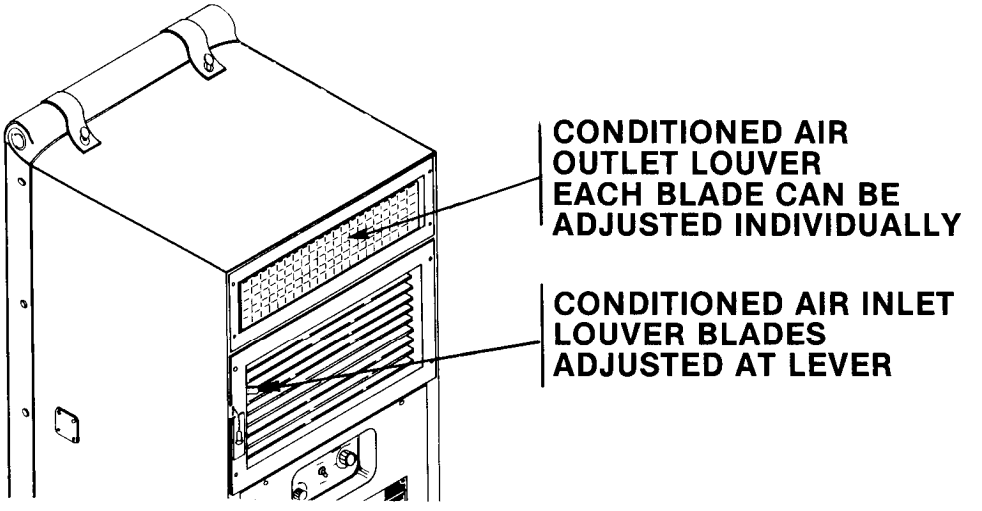


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 4.	Check that the louvers in the conditioned air inlet and outlet grilles are properly adjusted. Adjust louvers properly.



Step 5. Check to be sure that excessive cold, outside air is not being introduced through the fresh air damper.
Fully close damper; then if condition improves, adjust properly.

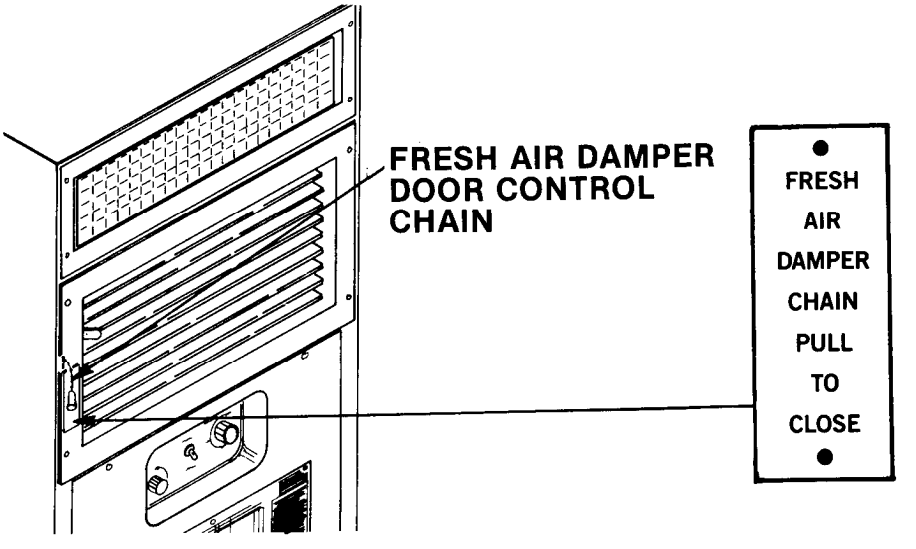


TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
Step 6. 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 filter element. (See para 4-25.) c. Clean and service or replace mist eliminator. (See para 4-26.) d. Clean evaporator coil and entire evaporator section. (See para 4-61.)
Step 7. Check for loose or damaged wires and terminals.	
	WARNING Voltages used can kill. Always disconnect power cord to air conditioner before performing any internal maintenance. Shutting unit off at its control panel does not disconnect unit power.
	Tighten loose or damaged terminals. Repair or replace damaged wires. (See para 4-27.)
Step 8. Check operation of heater thermostat (S3).	Test thermostat. (See para 4-56.) Replace thermostat if defective.
Step 9. Check individual heaters (HR1 thru HR6).	Test heaters. (See para 4-57.) Replace defective heaters.
Step 10. Check operation of fan toggle switch (S7).	Switch from LO to HI SPEED. If no change results, test switch. (See para 4-48.) Replace bad switch.
7. NO HEAT IN EITHER HI HEAT OR LOW HEAT MODE.	
Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses.	
	WARNING Voltages used can kill. Always disconnect power cord to air conditioner before performing any internal maintenance. Shutting unit off at its control panel does not disconnect unit power.
	Tighten or replace loose or damaged connectors or repair damaged wires.

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check operation of heater thermostat (S3).
Test thermostat. (See para 4-56.) Replace thermostat if defective.
Step 3. Check operation of mode selector switch (S).
Test switch. (See para 4-47.) Replace switch if defective.

8. 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 harnesses.

WARNING

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

Tighten or replace loose or damaged connectors, or repair damaged wires.
Step 2. Check operation of Temperature control thermostat (S1).
a. Inspect sensing bulb and capillary for damage or leakage. (See para 4-46.) Replace entire control if bulb is damaged or leaking.
b. Test switch in Temperature control thermostat. (See para 4-46.) Replace entire control, if defective.
Step 3. Check operation of mode selector switch (S).
Test switch. (See para 4-47.) Replace switch if defective.

9. FAN MOTOR (B2) DOES NOT OPERATE.

WARNING

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

Step 1. Using wiring diagram (fig. 4-7), check electrical connectors P2 and J2, P4 and J4, and individual wires for tightness and continuity.
Tighten, repair, or replace as indicated.

TABLE 4-2. TROUBLESHOOTING (Cont.)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

Step 2. Check operation of fan motor relay (K7).
Test relay. (See para 4-54.) Replace relay if defective.

Step 3. Check operation of fan motor capacitor (C4).
Test capacitor. See para 4-50.) Replace capacitor if defective.

Step 4. Check operation of fan motor (B2).
Test motor. (See para 4-60.) Notify your supervisor and Direct Support Maintenance if motor is defective.

Step 5. Check operation of mode selector switch (S).
Test switch. (See para 4-47.) Replace switch if defective.

10. EXCESSIVE NOISE WHEN COMPRESSOR STARTS.

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. Notify your supervisor and Direct Support Maintenance.

11. 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.

Step 2. Check fans for looseness or damage, and for rotational clearance.
Tighten loose fans, adjust for rotational clearance, or replace fans. (See para 4-58 and 4-59.)

Step 3. Check all internal components for looseness, vibration, and security.
Tighten, adjust, and secure as necessary.

Section V MAINTENANCE PROCEDURES

4-12. GENERAL

The procedures in this section have been arranged in the order in which the items appear in the organizational (0) 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 Organizational Maintenance in the order in which they appear on the MAC. Actions authorized to be performed by Direct Support and 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 unit are there for a purpose.

Do not operate unit with them off or open unless instructions tell you to. When necessary, do so with care.

4-13. AIR CONDITIONER (FABRIC) COVER

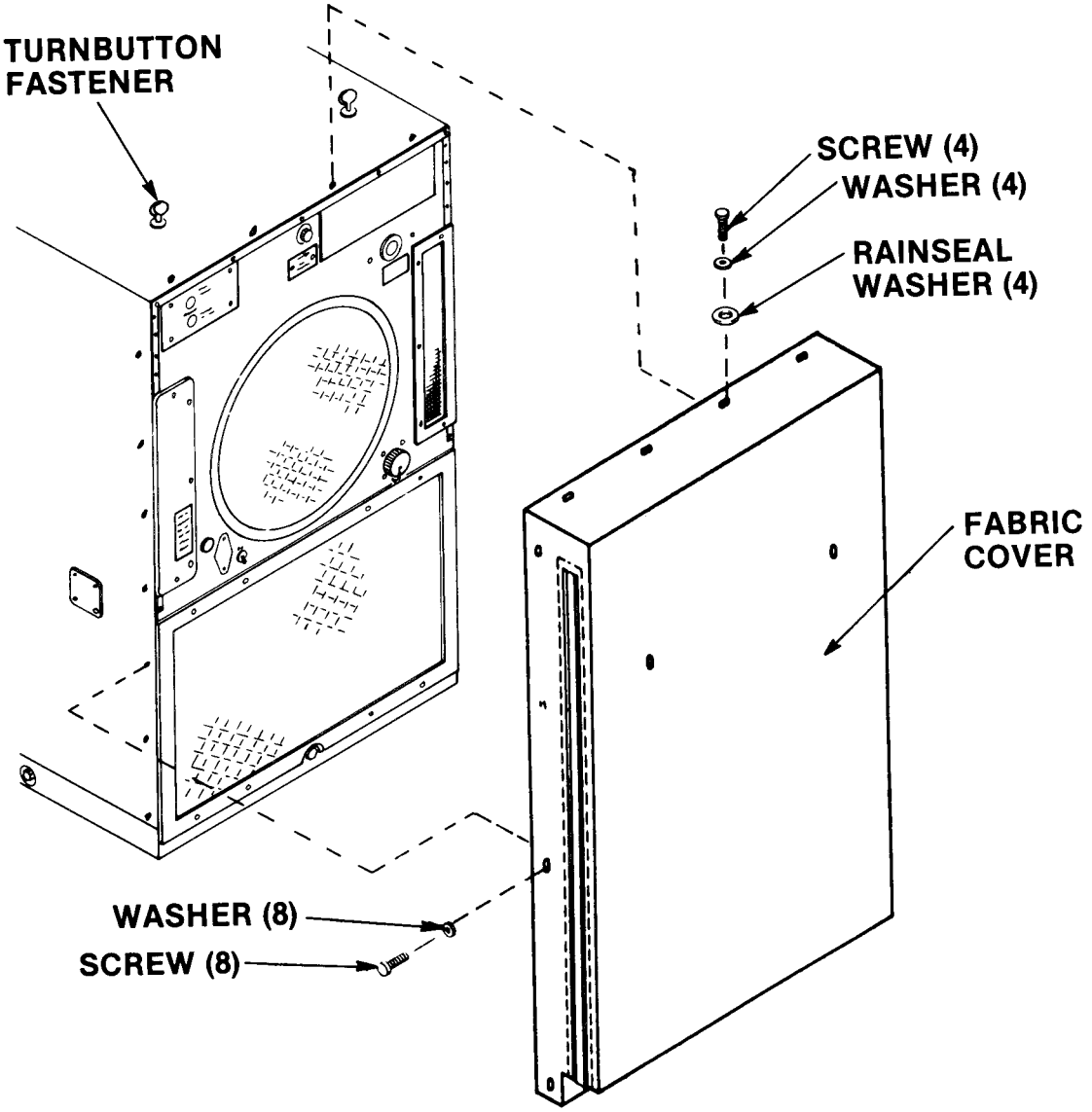


Figure 4-9. Fabric Cover

a. Removal

(1) Rotate turnbutton fasteners and remove two straps.

(2) Roll cover down and close zipper.

(3) Using screwdriver, remove eight screws and flat washers from the sides.

(4) Using screwdriver, remove four screws, four flat washers, and four rain seal washers from the top.

(5) Carefully remove the cover.

b. Cleaning

(1) Wipe clean with rag and mild detergent solution.

(2) Thoroughly rinse with fresh water and dry.

c. Lubrication

(1) Lubricate zipper with silicone type lubricant or a wax stick.

(2) Lubricate turnbutton fasteners with silicone type lubricant or light oil.

d. Inspection/Repair

(1) Inspect for rips, cuts, tears, or punctures in the fabric.

(2) Inspect for damaged, loose, or missing eyelets and snap fasteners.

(3) Refer repair to your supervisor.

e. Installation

(1) Aline eyelets to casing mounting holes.

(2) Using screwdriver, secure top of fabric cover with four screws, four flat washers, and four rain seal washers.

(3) Secure sides with ten screws and flat washers.

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

NOTE

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

4-14. CBR (CHEMICAL, BIOLOGICAL, RADIOLOGICAL) DUCT COVER

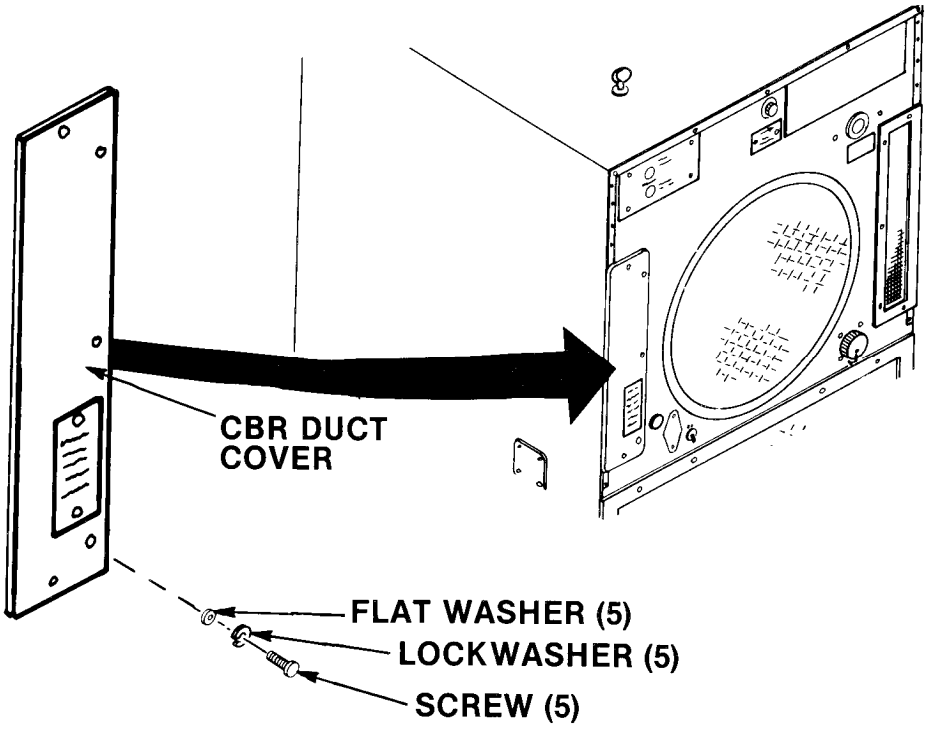


Figure 4-10. CBR Duct Cover

a. Removal

(1) Using screwdriver, remove five screws, five flat washers and five lock washers.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent, cracked, or punctured. If damaged, notify your supervisor and Direct Support Maintenance.

(2) Check that gasket is not torn, loose, or missing. Refer repair/replacement to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover to casing with five screws, five flat washers and five lockwashers.

4-15. ACCESS (CHARGING VALVES) COVER

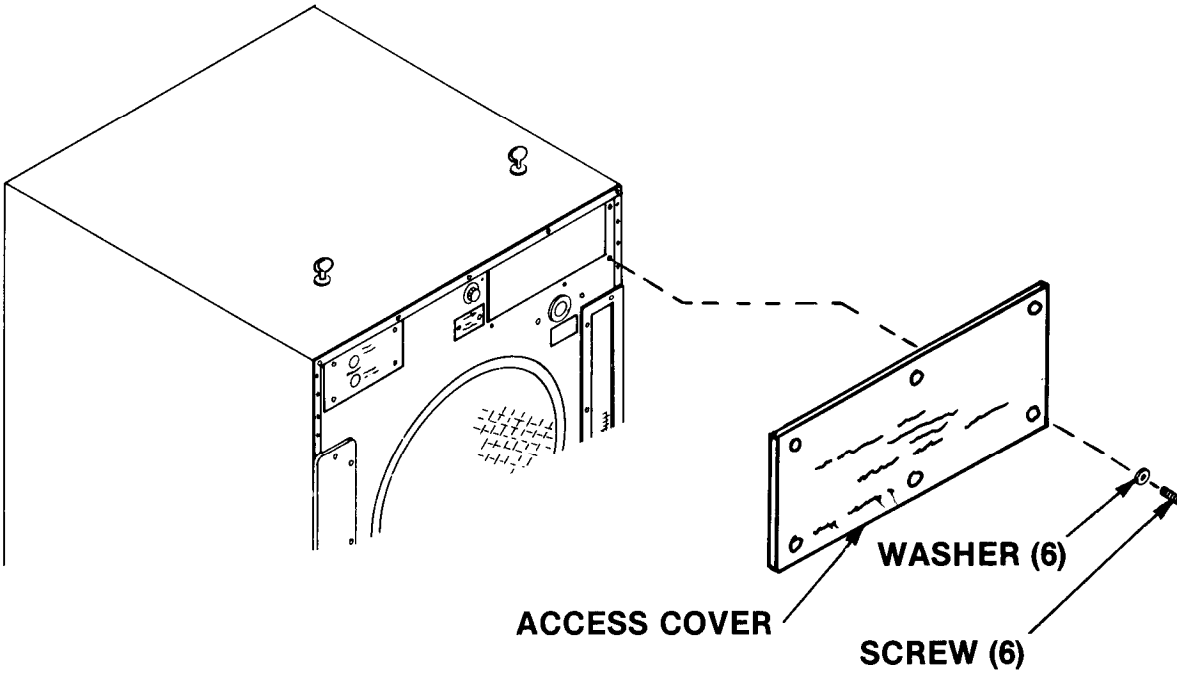


Figure 4-11. Access (Charging Valves) Cover

a. Removal

(1) Using screwdriver, remove six screws.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent, cracked, or punctured.

(2) Check that gasket is not torn, loose, or missing.

(3) Check that information plate is readable and in place.

(4) Refer all repairs to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover to casing with six screws.

4-16. CONNECTOR COVER PLATES

Preliminary procedure: Remove condenser fan. (See para 4-59.)

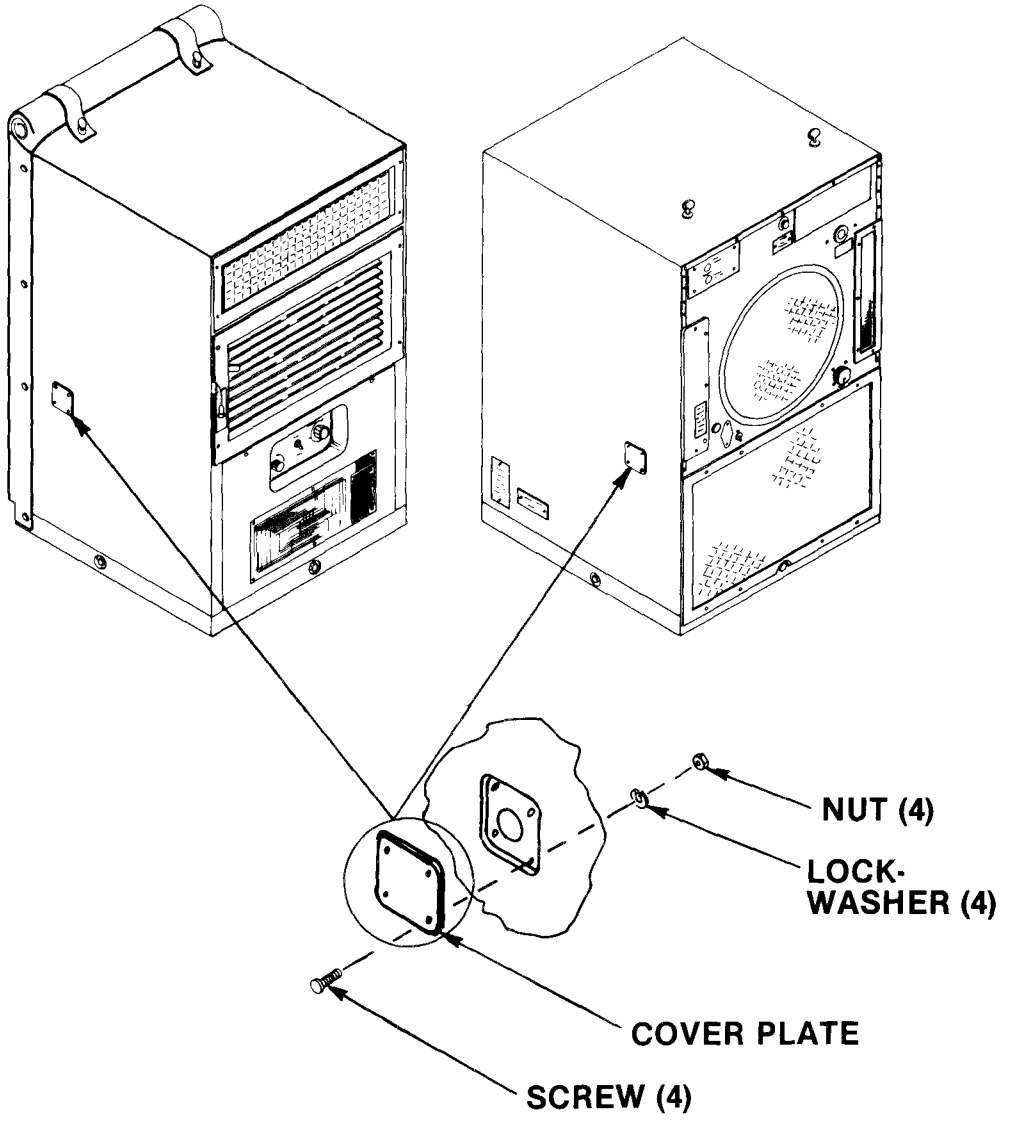


Figure 4-12. Connector Cover Plates

There are two connector cover plates on the air conditioner casing. See installation instructions (para 4-9) for additional information.

a. Removal

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

(2) Remove cover plate (and gasket if applicable.)

b. Inspection

(1) Check that cover is not bent, cracked, or punctured. If damaged, replace cover.

(2) Check that gasket (if applicable) is not torn or otherwise damaged. Replace gasket if damaged.

c. Installation

(1) Aline mounting holes.

(2) Using screwdriver and wrench, install cover plate (and gasket if applicable) with four screws, lockwashers, and nuts.

Follow-on procedure: Replace condenser fan. (See para 4-59.)

4-17. CIRCUIT BREAKER ACCESS PLATE

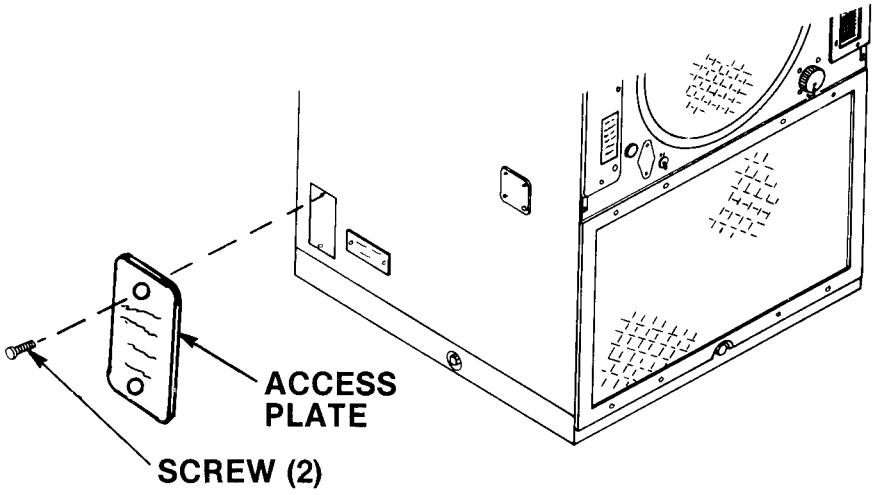


Figure 4-13. Circuit Breaker Access Plate

a. Removal

(1) Using screwdriver, remove two screws.

(2) Remove plate.

b. Inspection

(1) Check that plate is not bent, cracked, or punctured. If plate is damaged, notify your supervisor and Direct Support Maintenance.

(2) Check that gasket is not torn, loose, or missing. Refer repair/ replacement to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure plate to casing with two screws.

4-18. EVAPORATOR AIR DISCHARGE (OUTLET) GRILLE ASSEMBLY

WARNING

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

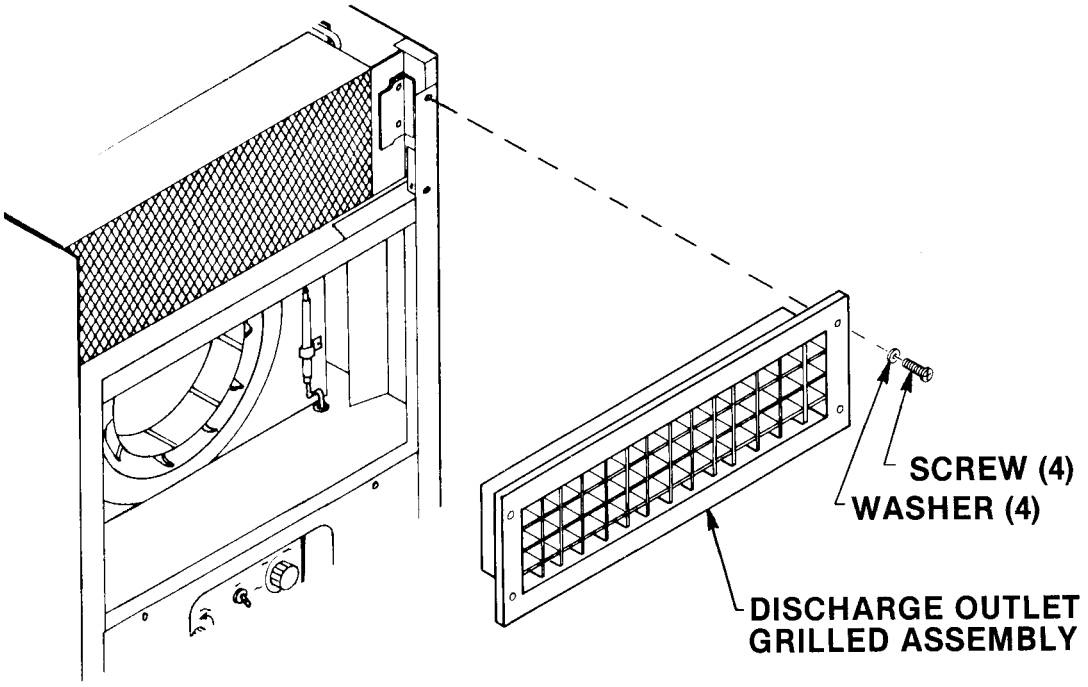


Figure 4-14. Evaporator Discharge (Outlet) Grille Assembly

a. Removal

(1) Using screwdriver, remove four screws and washers.

(2) Remove grille.

b. Cleaning. Wipe or vacuum all dust and dirt off louvers and inside of grille. Be careful not to damage gasket strips.

c. Inspection/Repair

(1) Inspect each grille for general condition and proper operation.

(2) Bent louvers can usually be straightened with fingers.

(3) Refer requirements for further repair to your supervisor and Direct Support Maintenance.

d. Lubrication

(1) Apply a few drops of light oil to all pivot points of the louvers.

(2) Wipe or blot up all excess oil with a cloth or paper towel.

e. Installation

(1) Aline mounting hole with casing fasteners.

(2) Using screwdriver, secure grille with four screws and washers.

Follow-on procedure: Connect power cord.

4-19. EVAPORATOR AIR INTAKE GRILLE ASSEMBLY

WARNING

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

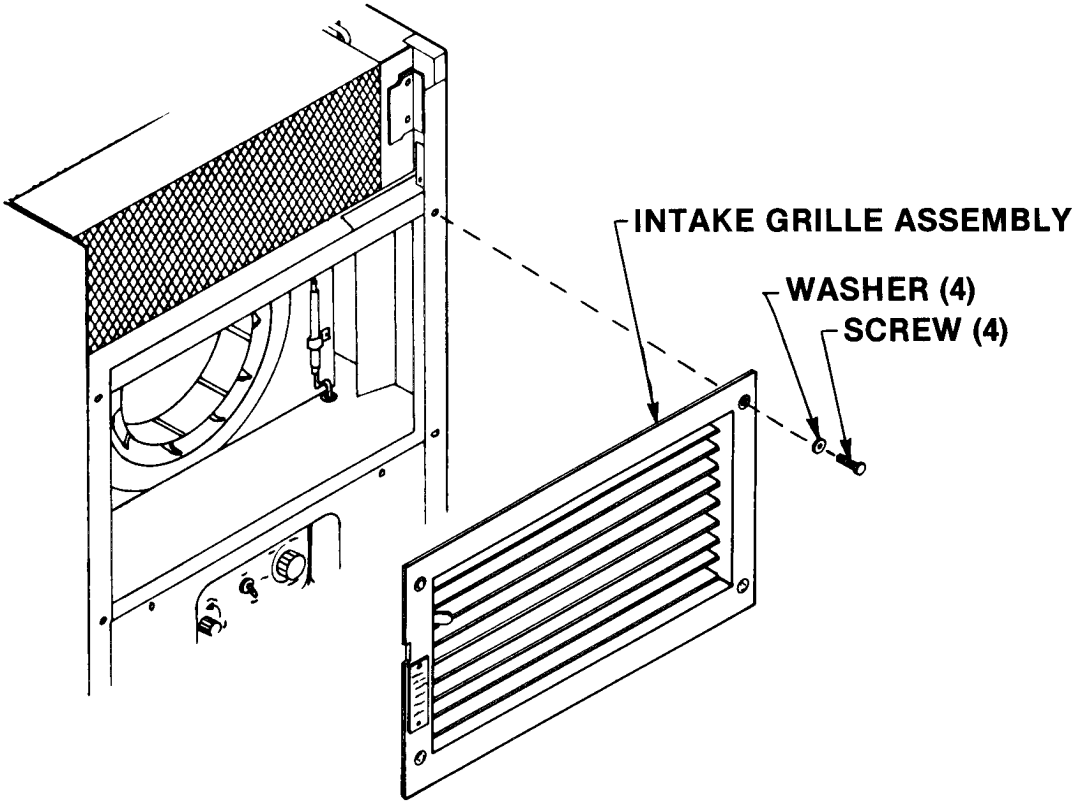


Figure 4-15. Evaporator Intake Grille Assembly

a. Removal

(1) Using screwdriver, remove four screws and washers in intake grille assembly.

(2) Remove grille.

b. Cleaning. Wipe or vacuum all dust and dirt off louvers and inside of grille. Be careful to not damage gasket strips.

c. Inspection/Repair

(1) Inspect each grille for general condition and proper operation.

(2) Bent louvers can usually be straightened with fingers.

(3) Check that information plate is readable and in place.

(4) Refer requirements for further repair to your supervisor and Direct Support Maintenance.

d. Lubrication

(1) Apply a few drops of light oil to all pivot points of the louvers.

(2) Wipe or blot up all excess oil with a cloth or paper towel.

e. Installation

(1) Aline screws with casing fasteners.

(2) Using screwdriver, secure grille with four screws and washers.

4-20. **CONDENSER** AIR DISCHARGE GUARD

WARNING

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

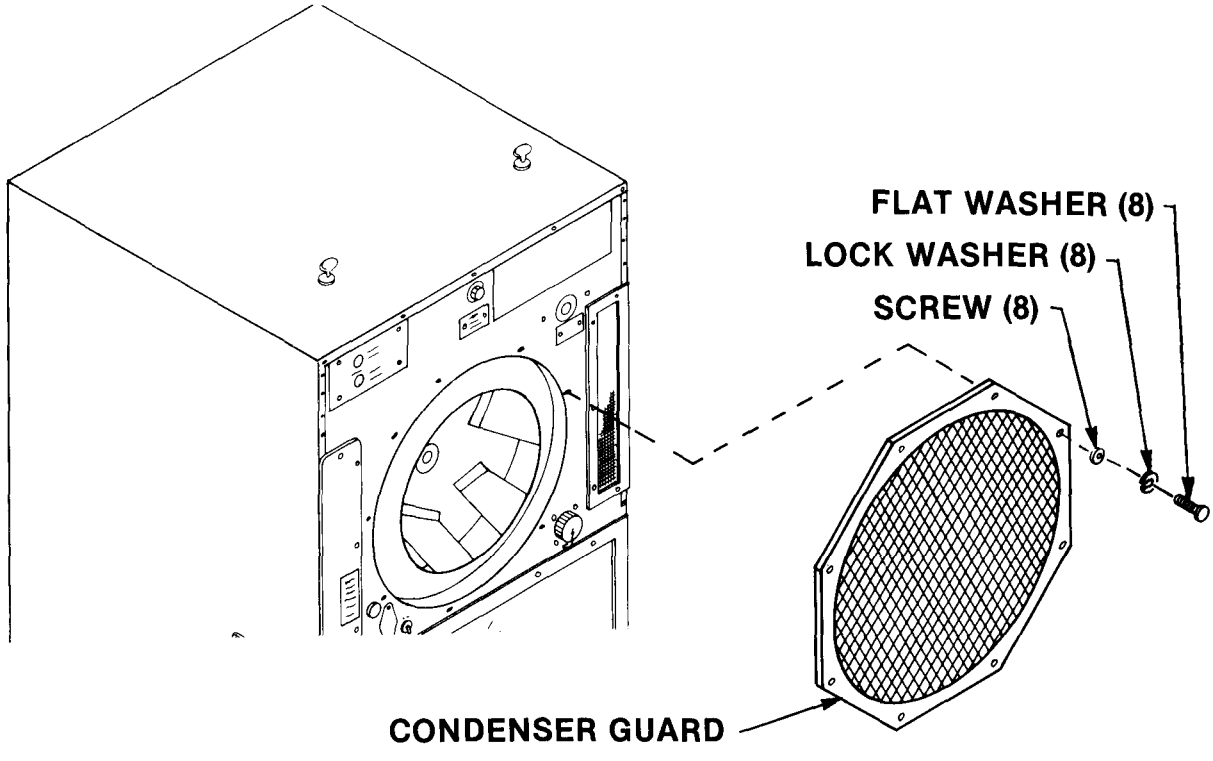


Figure 4-16. Condenser Air Discharge Guard

a. Removal

(1) Using screwdriver, remove eight screws, lockwashers and flat washers from guard.

(2) Remove guard.

b. Inspection. Check that guard is not bent or broken. If damaged. refer repair to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure guard to casing with eight screws, lockwashers and flat washers.

Follow-on procedure: Connect power cord.

4-21. CONDENSER COIL GUARD

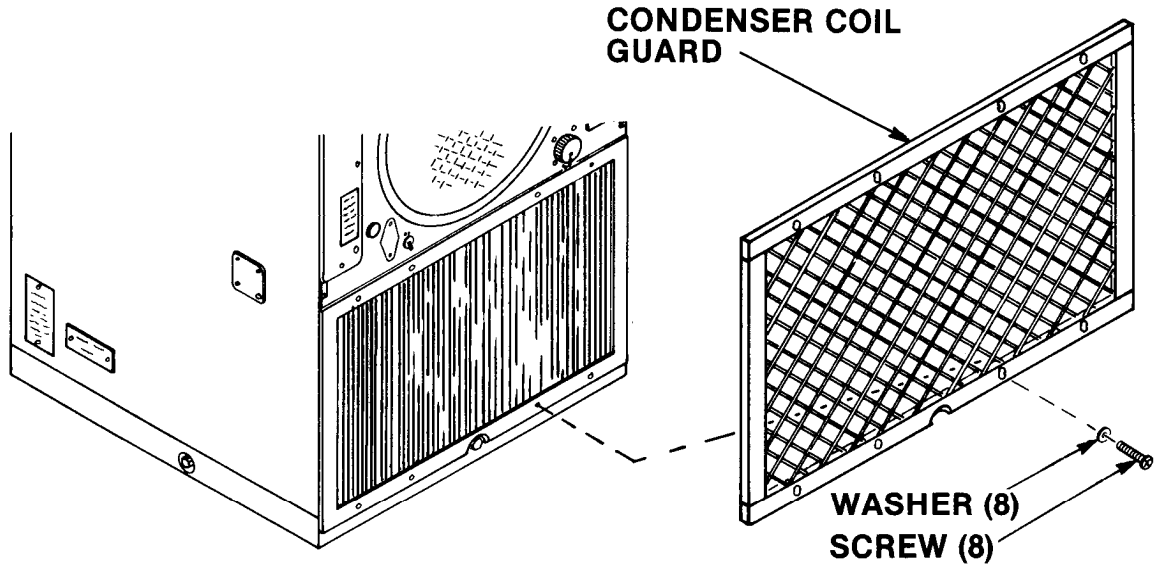


Figure 4-17. Condenser Coil Guard

a. Removal

(1) Using screwdriver, remove eight screws and flat washers from guard assembly.

(2) Remove guard.

b. Inspection. Check that guard is not bent, cracked, or otherwise damaged. If damaged, refer repair to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure guard assembly to casing with eight screws and flat washers.

4-22. FRESH AIR (INLET) SCREEN

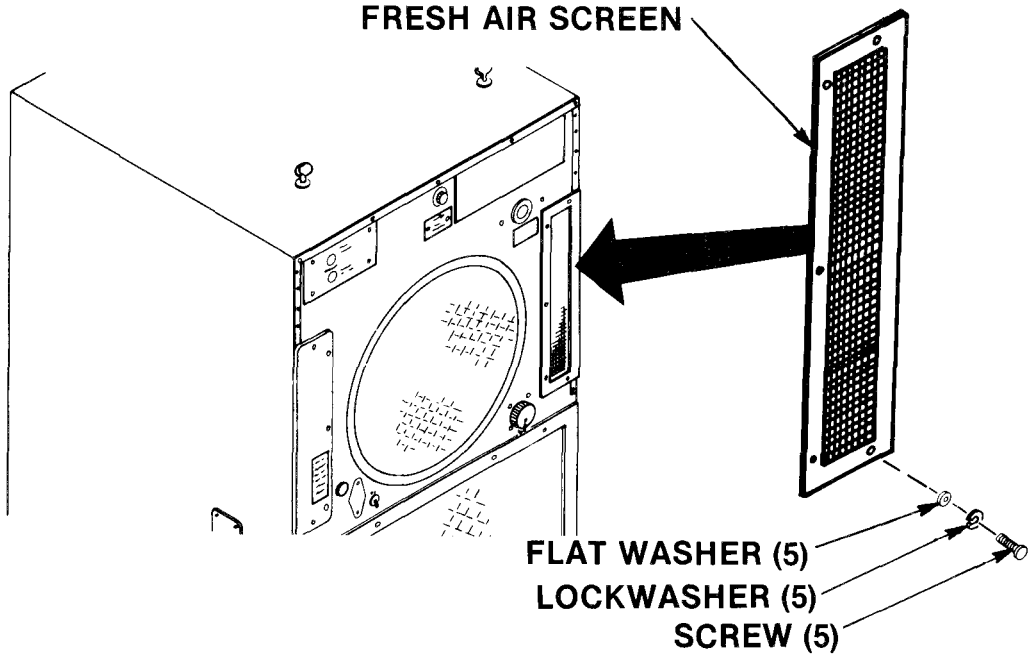


Figure 4-18. Fresh Air (Inlet) Screen

a. Removal

(1) Using screwdriver, remove five screws, lockwashers, and flat washers.

(2) Remove screen.

b. Inspection

(1) Check that screen is not bent, punctured, cracked, or otherwise damaged.

(2) If damaged, refer repair to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure screen to casing with five screws, lockwashers and flat washers.

4-23. TOP PANEL

Preliminary procedure: Remove air conditioner (fabric) cover. (See para 4-13.)

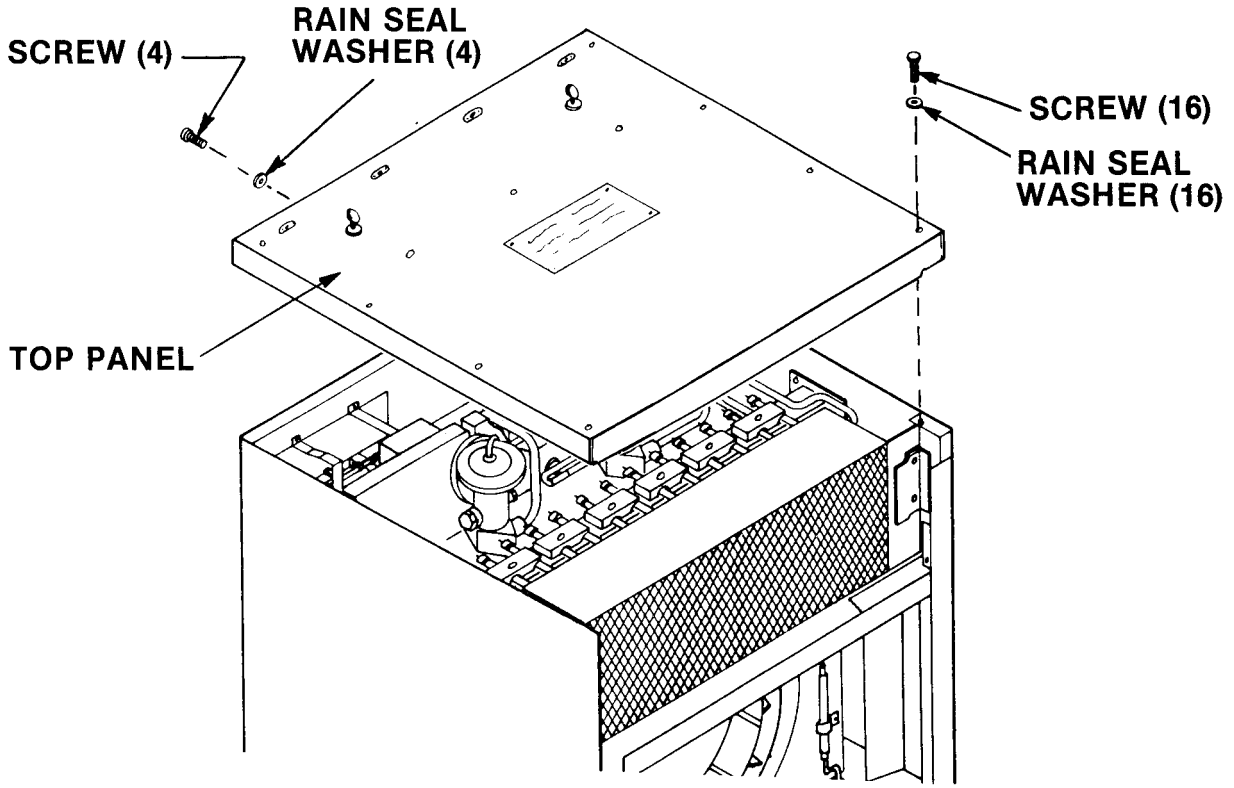


Figure 4-19. Top Panel

a. Removal

(1) Using screwdriver, remove sixteen screws and rain seal washers from top panel .

(2) Remove top panel.

b. Inspection

(1) Check that panel is not bent, cracked, or punctured.

(2) Check that gaskets and insulation are not torn, loose, or missing.

(3) Refer repairs/replacement of gaskets and insulation to your supervisor and Direct Support Maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, reinstall sixteen screws and flat washers in top panel .

Follow-on procedures: 1. Install air conditioner (fabric) cover. (See para 4-13.)

2. Connect power cord.

4-24. LOWER PANEL

WARNING

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

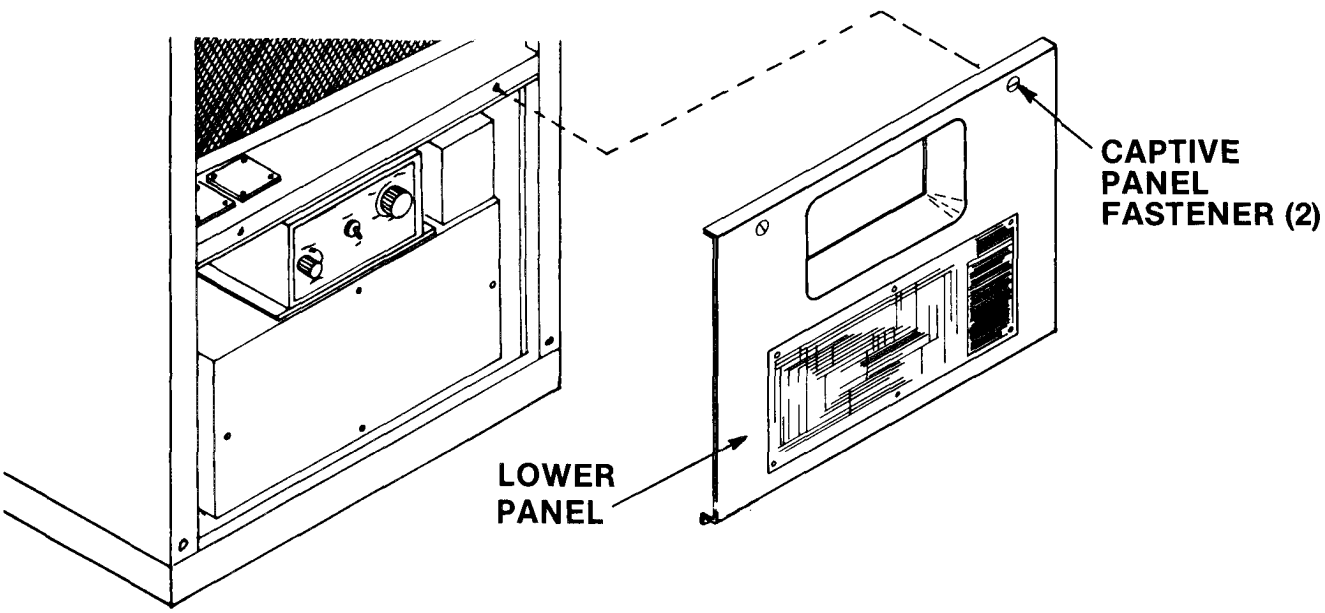


Figure 20. Lower Panel

a. Removal

(1) Using screwdriver, loosen two captive panel fasteners and remove lower front panel.

(2) Tilt top of lower front panel out and lift panel up to remove.

b. Inspect-ion

(1) Check that panel is not bent, cracked, or punctured.

(2) Check that gaskets are not torn, loose, or missing.

(3) Check that wiring diagram plate is readable and in place.

(4) Refer all repairs to your supervisor and Direct Support Maintenance.

c. Installation

(1) Set the bottom of the panel in position so that the flange is inside the lip on the cabinet base.

(2) Push the top of the panel back into position.

(3) Using screwdriver, secure panel to casing with two captive panel fastener screws.

Follow-on procedure: Connect power cord.

4-25. CONDITIONED AIR FILTER

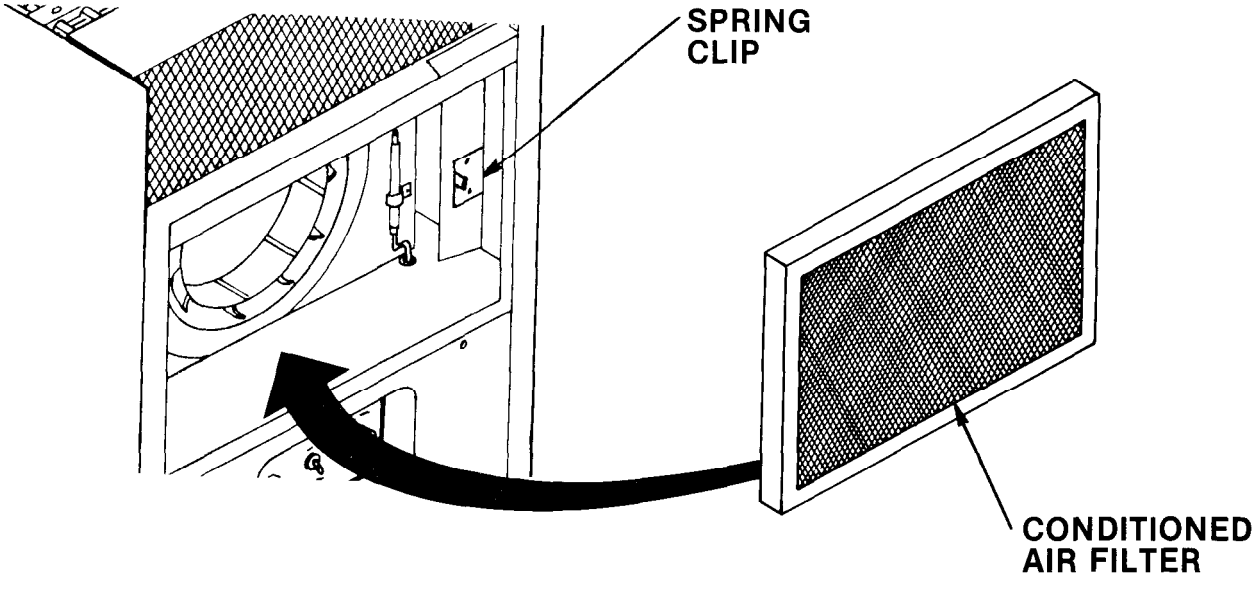


Figure 4-21. Conditioned Air Filter

a. Removal

(1) Using screwdriver, remove four screws and washers in intake grille assembly.

(2) Remove grille.

(3) Snap filter out of ring clip.

(4) Careful ly remove filter.

b. Clean filter

(1) Wash fi lter in a mild detergent and water solution.

(2) Rinse thoroughly in clean water.

(3) Shake out excess water prior to installation.

c. Inspection

(1) Check filter for punctures, cuts, and damaged edges that would allow passage of unfiltered air.

(2) Check filter for packed or mashed areas that would block air flow.

(3) Replace damaged filter.

d. Installation

NOTE

Be sure air flow arrow points to evaporator fan as shown in figure 4-21.

(1) Position left side of filter in bracket.

(2) Carefully push right side of filter to engage spring clip.

(3) Using screwdriver, secure intake grille assembly with four screws and washers.

4-26. MIST ELIMINATOR

Preliminary procedure: Remove top panel (See para 4-23.)

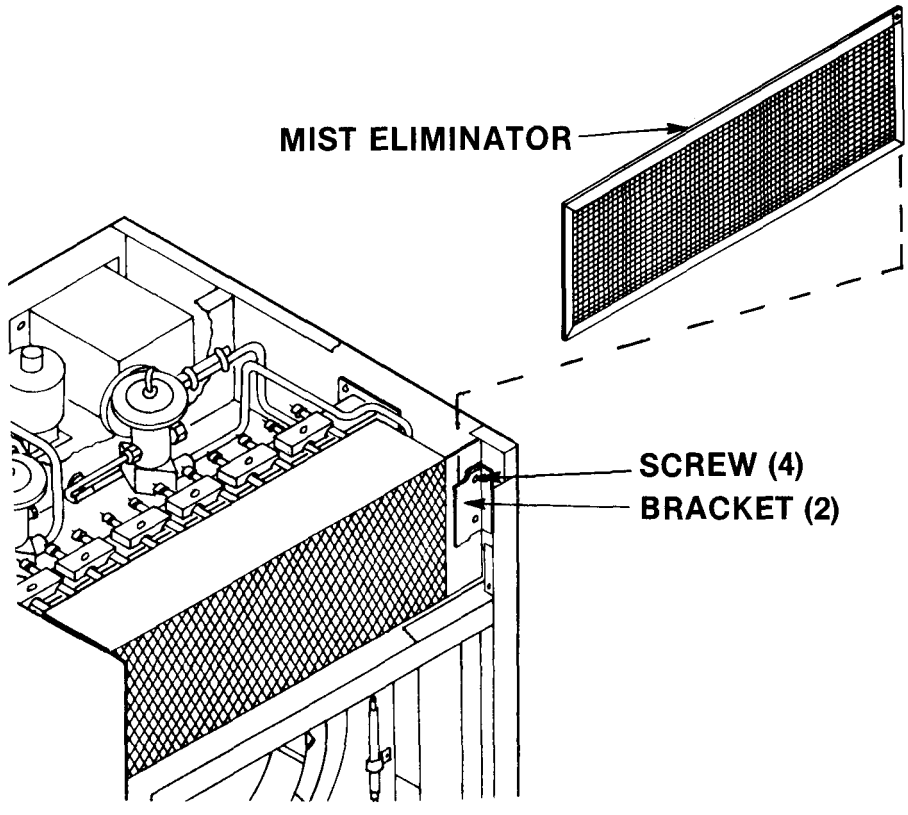


Figure 4-22. Mist Eliminator

a. Removal.

(1) Using screwdriver, loosen four screws on two brackets,

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

b. Cleaning

(1) Wash in mild detergent and water solution.

(2) Rinse thoroughly in clear water.

(3) Shake out excess water prior to installation.

c. Inspection

(1) Check for punctures, cuts, and other visible damage.

(2) Check for packed or mashed areas that would block air flow.

(3) Replace if defective.

d. Installation.

(1) Slide mist eliminator straight down into brackets.

(2) Using screwdriver, secure four screws on two brackets.

Follow-on procedure: Install top panel. (See para 4-23.)

4-27. ELECTRICAL WIRING REPAIR GENERAL

Preferred repair methods consist of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other make-shift procedures; although the latter may be appropriate for emergency field repairs. Determine the proper size and length of wire, or the terminal, or connector to be used for replacement by referring to table 4-3, "Wire List", and to the wiring diagram (figure 4-7).

a. 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 always be rosin-core electrical solder. If an uncored solder is used, it should be a lead-tin solder, item 2, 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.

b. 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 (13 mm) longer than the joint to be insulated, and slide the tubing over the wire before making the joint. After the joint is made, slide the tubing so that it covers the joint, and shrink in place with moderate heat.

c. Splicing wires. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced. A commercial butt splice can be crimped onto the end to join them, or a "Western Union" wire splice can be made. The latter is made by stripping 1/4 - 1/2 inch (0.6 - 13 mm) 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.

d. Crimping terminals. To install a terminal on the end of a wire, strip 1/4 - 1/2 inch (0,6 - 13 mm) 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.

4-28. JUNCTION BOX

The junction box is a protective enclosure that contains the compressor circuit breaker (CB), fuses (F1 and F2), time delay relays (K6 and K9), compressor start relay (K1), heater relay (K2) and terminal boards (TB1 and TB2). The transformer (T) and capacitor assembly (C3) are mounted outside of the junction box. See the following paragraphs for maintenance of junction box components.

- Junction box removal/installation. (See para 4-29.)
- Transformer (T). (See para 4-30.)
- Capacitor assembly (C3). (See para 4-31.)
- Compressor circuit breaker (CB). (See para 4-32.)
- Fuses (F1 and F2). (See para 4-33.)
- Rectifier (CR). (See para 4-34.)
- Time delay relay (K6). (See para 4-35.)
- Time delay relay (K9). (See para 4-36.)
- Compressor start relay (K1). (See para 4-37.)
- Heater relay (K2). (See para 4-38.)
- Junction box wiring harnesses. (See para 4-39.)
- Terminal boards (TB1 and TB2). (See para 4-40.)
- Junction box housing and cover. (See para. 4-41.)

4-29. JUNCTIONBOXREMOVAL/lNSTALLATION

WARNING

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

Preliminary procedure: Remove lower panel. (See para 4-24.)

a. Removal

(1) Place circuit. breaker actuator arm in up position.

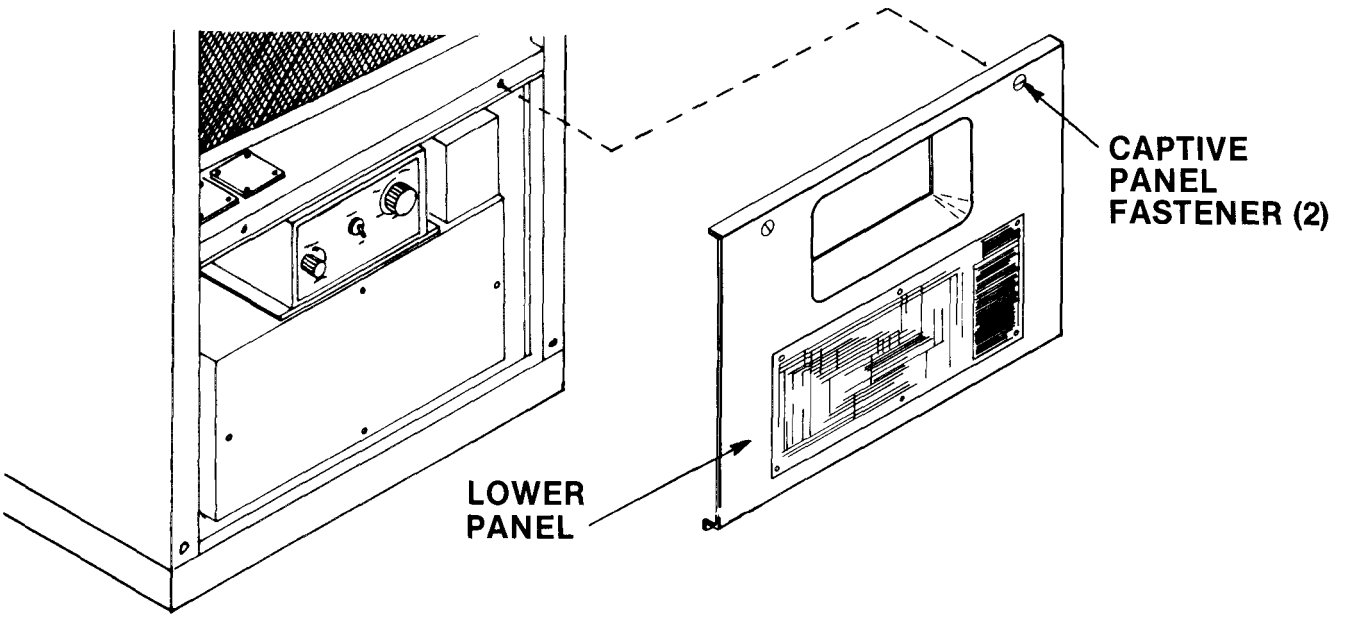


Figure 4-23. Lower Panel

(2) Using screwdriver, unscrew four panel mounting screws from flanges of casing.

(3) Carefully slide junction box outward.

(4) Using screwdriver, loosen screws in lower end fitting of circuit breaker control cable.

(5) Using screwdriver, remove two screws from loop clamp.

(6) Slide actuator cable up and out.

(7) Extend junction box out far enough to remove plugs P4, P8 and P1O.

(8) Using screwdriver, remove four screws at flanges of control panel.

(9) Support control panel so that capillary line and electrical harness will not be damaged.

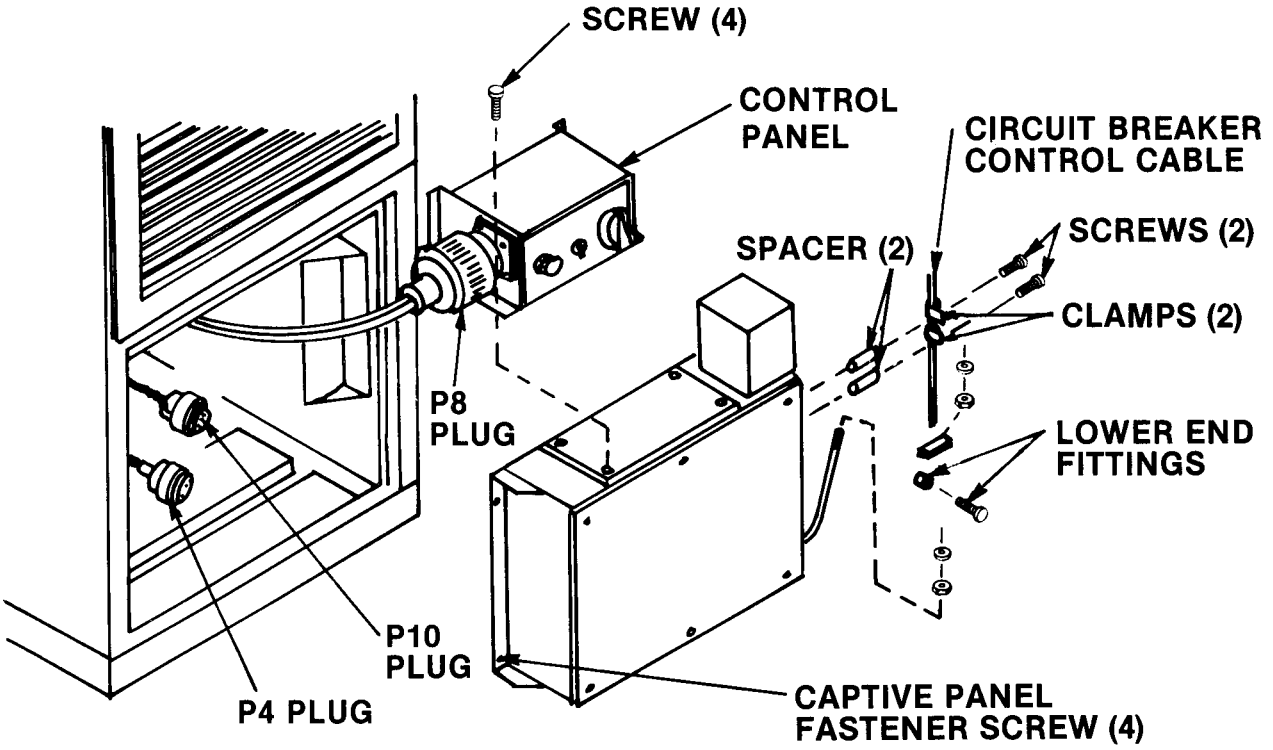


Figure 4-24. Junction Box Removal/installation

(10) Using screwdriver, loosen four panel fastener screws in junction box cover. Remove cover.

(11) Using wrench and screwdriver, remove nut and two washers from grounding stud.

(12) Tag and remove ground wires.

(13) Loosen two screws on two clamps holding capacitor C4 and remove capacitor.

(14) Using screwdriver, remove four screws that secure control panel to junction box.

(15) Remove junction box.

b. Installation

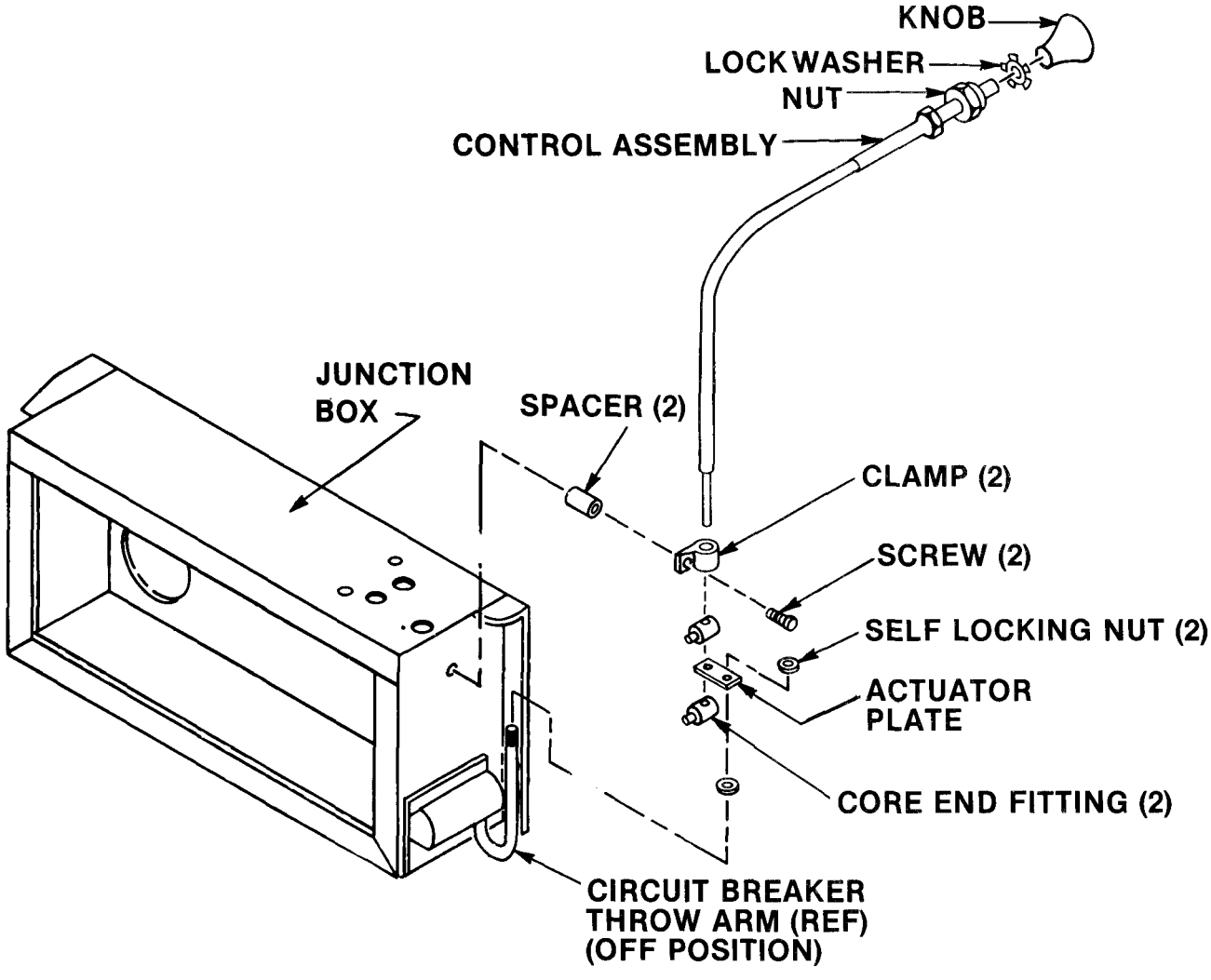


Figure 4-25. Reset Control

(1) Using screwdriver, mount and secure control panel to junction box with four screws.

(2) Slide capacitor C4 into two mounting clamps on junction box.

(3) With screwdriver, tighten two screws on two capacitor mounting clamps.

(4) Place junction box far enough in unit to attach ground wires.

(5) Using wrench and screwdriver, secure ground wires on grounding stud with two washers and nut.

(6) Using screwdriver, secure junction box cover to junction box with four panel fastener screws.

(7) Position loop clamps on cable assembly.

(8) Install lower end fitting on cable as shown in figure 4-25.

(9) Using screwdriver, secure loop clamps to junction box.

(10) Connect electrical plugs P4, P8 and P10.

(11) Position junction box in unit.

(12) Using screwdriver, secure four panel fastener screws in flanges of junction box.

Follow-on procedure: 1. Install lower panel. (See para 4-24.)

2. Connect power cord.

4-30. TRANSFORMER(T)

Preliminary procedure: Remove junction box.

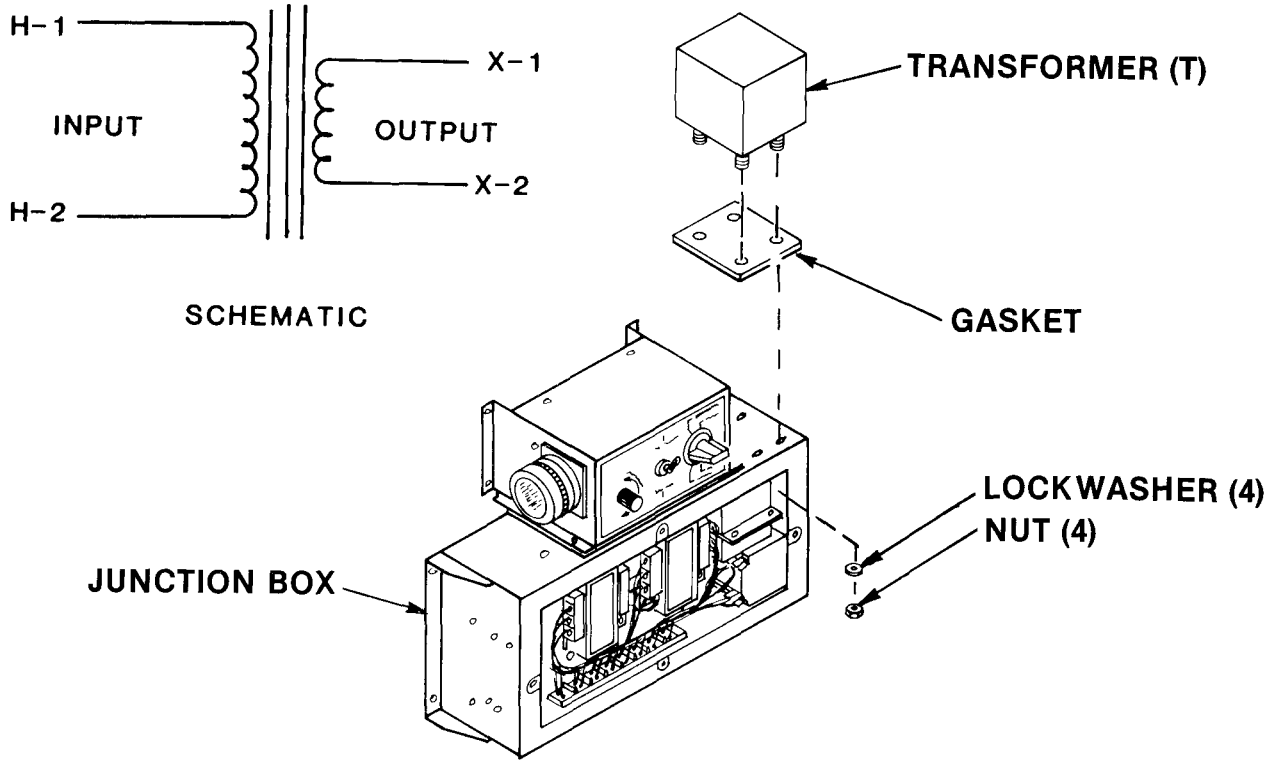


Figure 4-26. Transformer (T)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover. Tag and disconnect wire leads.

(2) Remove junction box cover.

b. Removal

(1) Tag and disconnect wire leads.

(2) Using wrench, remove four nuts and lock washers from transformer mounting studs.

(3) Remove transformer and gasket.

c. Test

(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 Xl 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 and 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 Xl and 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 stud Xl and X2. If resistance is less than 500,000 ohms, replace the transformer.

d. Installation

(1) Position transformer and gasket on outside rear of junction box.

(2) Using wrench, secure transformer with four nuts and lock washers.

(3) See tags and wiring diagram (fig. 4-7) and connect leads. Remove tags.

(4) Using screwdriver, install junction box cover and tighten captive panel fastener screws.

4-31. CAPACITOR ASSEMBLY (C3)

Preliminary procedure: 1. Remove junction box. (See para 4-29.)

2. Remove control panel. (See para 4-44.)

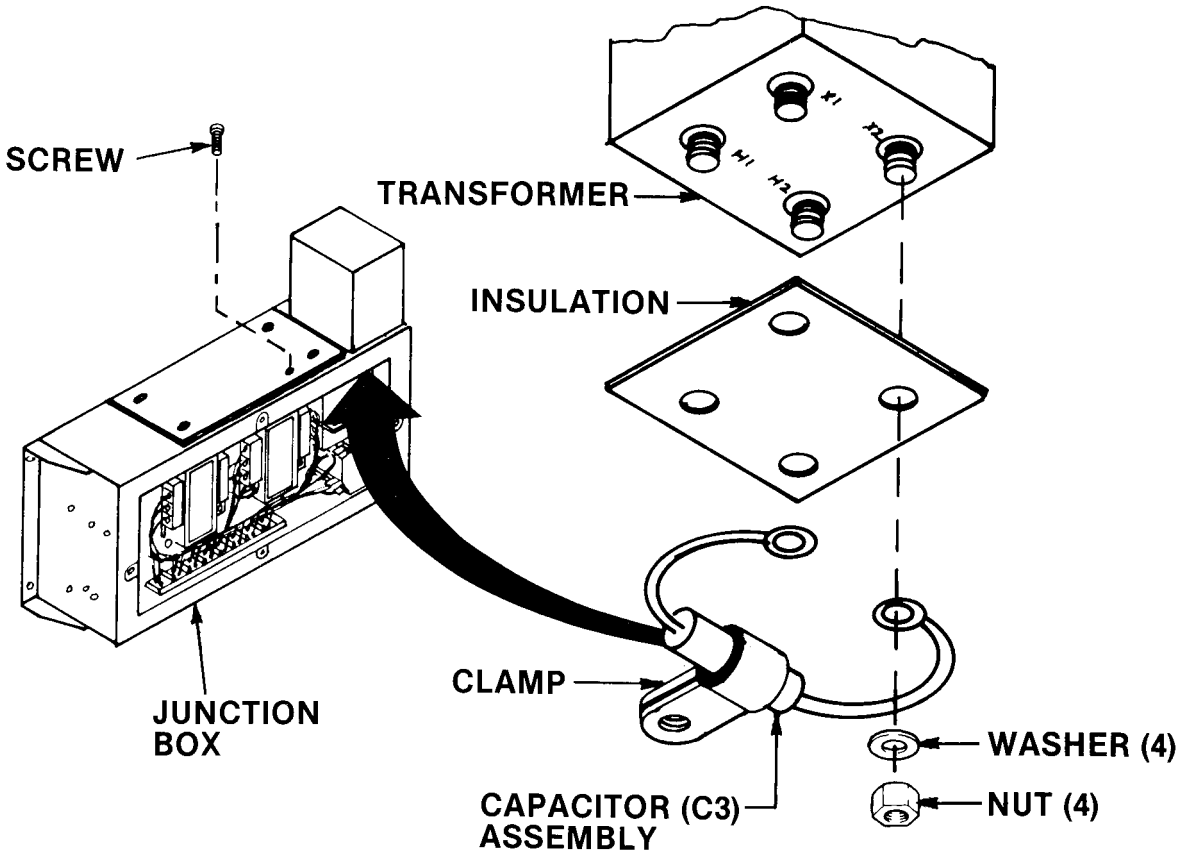


Figure 4-27. Capacitor

a. Removal

WARNING

Capacitors can retain a high electrical charge. Touching the terminals of a charged capacitor can result in severe electrical shock and skin burns. Always ground the terminals of a capacitor as soon as they are exposed.

(1) Using a jumper cable, ground the capacitor terminal to a suitable ground.

(2) Using screwdriver, remove screw from top of junction box that secures the clamp and C capacitor assembly.

(3) Tag leads.

(4) Using wrench, remove two nuts and washers that secure capacitors to terminals Xl and X2 of transformer.

(5) Remove C3 capacitor assembly and clamp.

b. Test

(1) Using capacitance tester, verify 250 picofarads, ±10%.

(2) Replace capacitor if not within test limits.

(3) If capacitance tester is not available, use ohmmeter to test for continuity.

(4) If continuity exists, replace capacitor assembly.

c. Installation

(1) Install capacitor assembly in clamp.

(2) Using screwdriver, loosely install clamp and capacitor assembly in junction box, using screw.

(3) See tags and install capacitor assembly leads on terminals Xl and X2 of transformer.

(4) Using wrench, install two nuts and washers on terminals Xl and X2 of transformer. Remove tags.

(5) Using screwdriver, tighten screw on top of junction box to secure clamp and capacitor assembly.

(6) Remove tags.

Follow-on procedure: 1. Replace control panel. (See para 4-44.)

2. Replace junction box. (See para 4-29.)

4-32. COMPRESSOR CIRCUIT BREAKER

Preliminary procedure: Remove junction box . (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four panel fastener screws in junction box cover.

(2) Remove junction box cover.

b. Inspection

(1) Check that mounting hardware, circuit breaker cover, actuator arm, and circuit breaker are in place and secure.

(2) Check that wire leads are properly connected to circuit breaker and are not damaged. See wiring diagram (fig. 4-7).

(3) Check circuit breaker for signs of overheating or other visible damage.

c. Test

(1) Set circuit breaker to OFF.

(2) Use multimeter set on lowest OHMS scale to check continuity between terminals Al and A2, B1 and B2, and auxiliary switch terminals C and NO. All contacts should be open. If there is continuity on any check, replace circuit breaker.

(3) Set reset bar to OFF, then set it to ON.

(4) Use a multimeter set on the lowest OHMS scale and repeat continuity checks between terminals Al and A2, B1 and B2, and auxiliary switch terminals C and NO. All contacts should be closed. If there is no continuity on any check, replace circuit breaker.

d. Removal

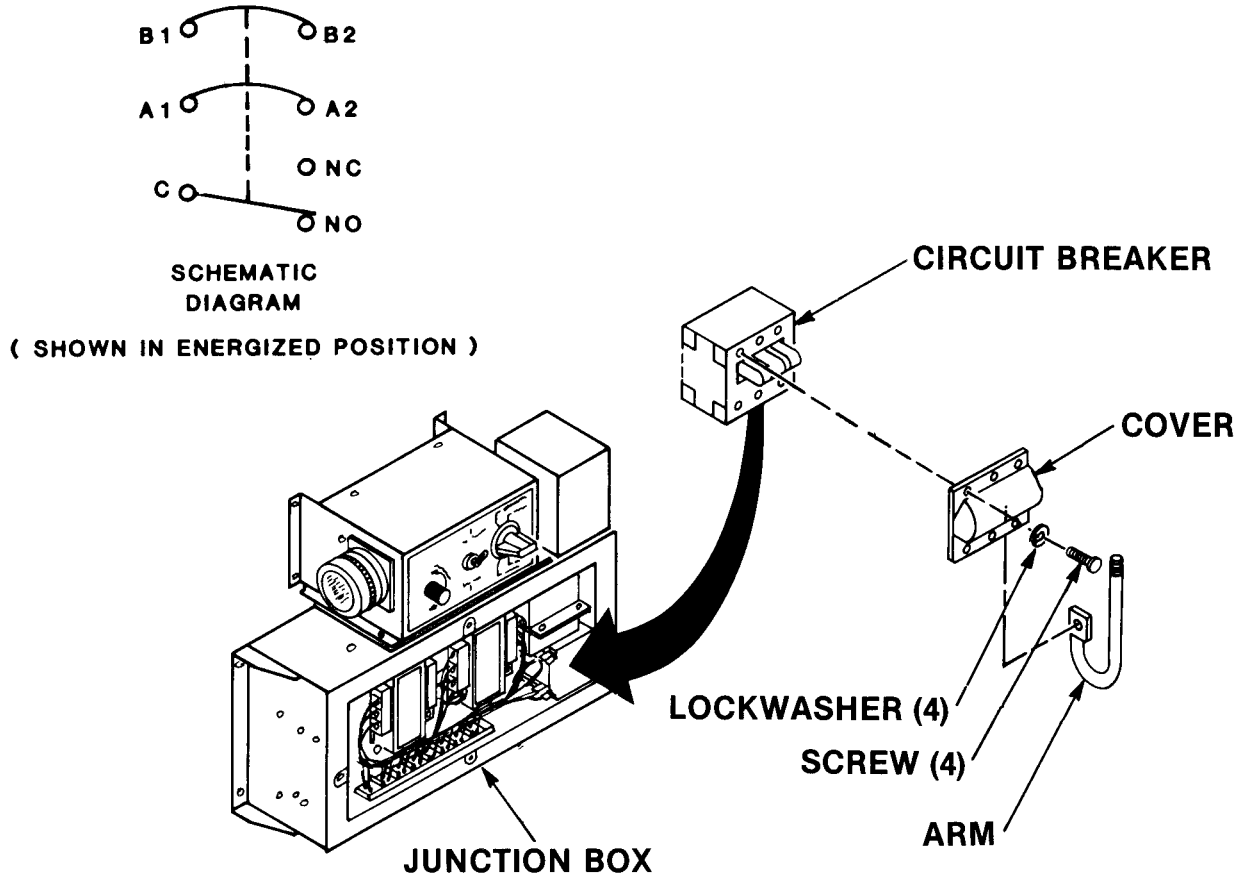


Figure 4-28. Circuit Breaker (CB)

(1) Using screwdriver, remove four screws and lockwashers securing circuit breaker and circuit breaker cover.

(2) Using pin punch, tap out shaft that holds reset toggles together and disconnect reset actuator arm.

(3) Tag and remove wires.

(4) Remove circuit breaker.

NOTE

See paragraph 4-42 for repairs on circuit breaker push-pull reset parts.

e. Installation

(1) Place actuator arm into position and insert toggle shaft.

(2) Using screwdriver, install circuit breaker and circuit breaker cover with four screws, lockwashers, and flat washers.

(3) Using tags and wiring diagram (fig. 4-7) connect leads with spade type terminals.

(4) Using screwdriver, install junction box cover with four panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-33. FUSES (F1 and F2)

Preliminary procedure: Remove junction box. (See para 4-29.)

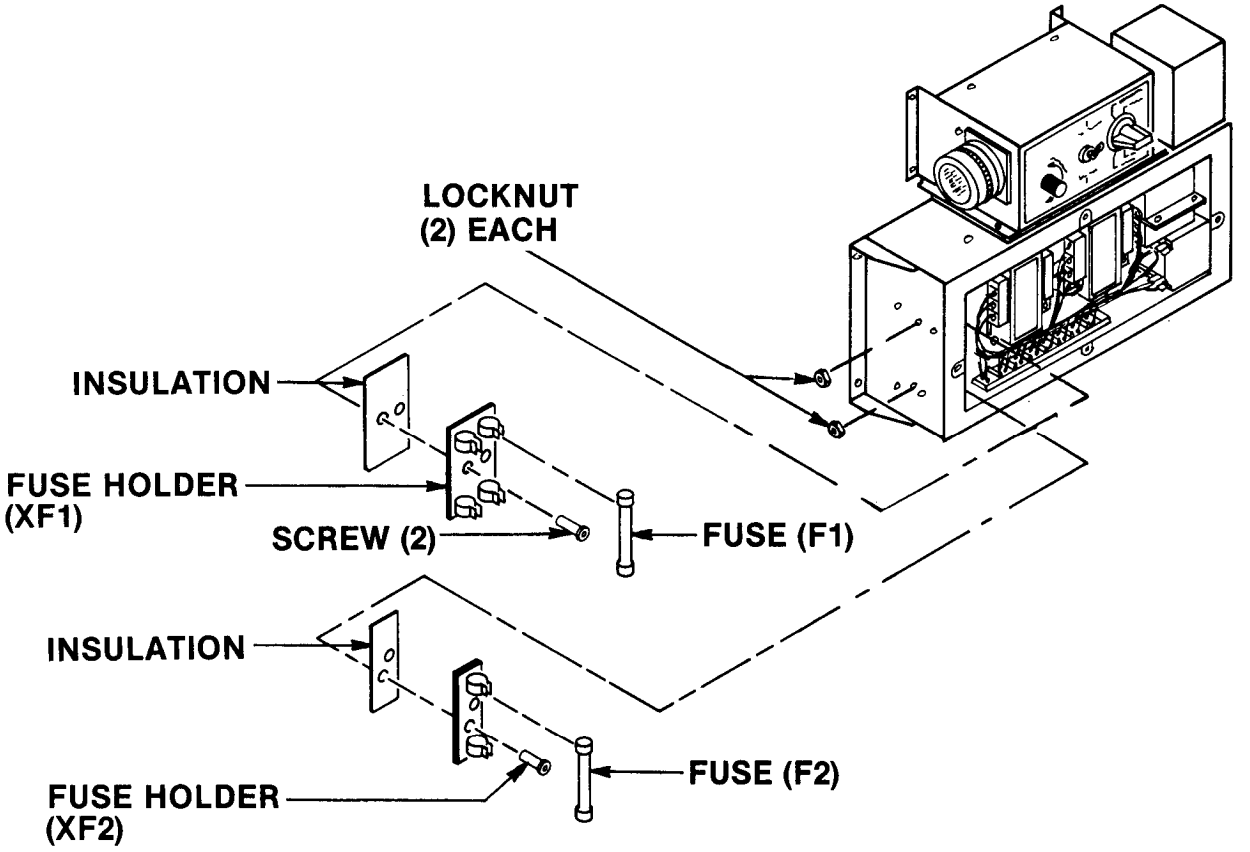


Figure 4-29. Fuses (F1 and F2)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box.

(2) Remove junction box cover.

b. Inspection/Test

(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.

c. Removal

(1) Pull fuses.

(2) If fuse block is to be replaced, tag and remove wire leads.

(3) Using screwdriver and wrench, remove two screws and locknuts.

(4) Pull fuse block and insulation from junction box.

d. Installation

(1) Place fuse block and insulation in junction box and aline holes.

(2) Using screwdriver, pliers, and wrench secure fuse block and insulation to junction box with two screws and lock nuts.

(3) See tags and wiring diagram (fig. 4-7) and connect leads. Remove tags.

(4) Place fuse(s) into fuse block clips.

(5) Using screwdriver, install junction box cover and tighten four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-34. RECTIFIER (CR)

Preliminary procedure: Remove lower panel. (See para 4-24.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

b. Inspection/Test

(1) Check that wire leads are properly connected to rectifier and are not damaged. See wiring diagram (fig. 4-7).

(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 mounting plate. If continuity is found between any rectifier terminal and mounting plate, replace rectifier.

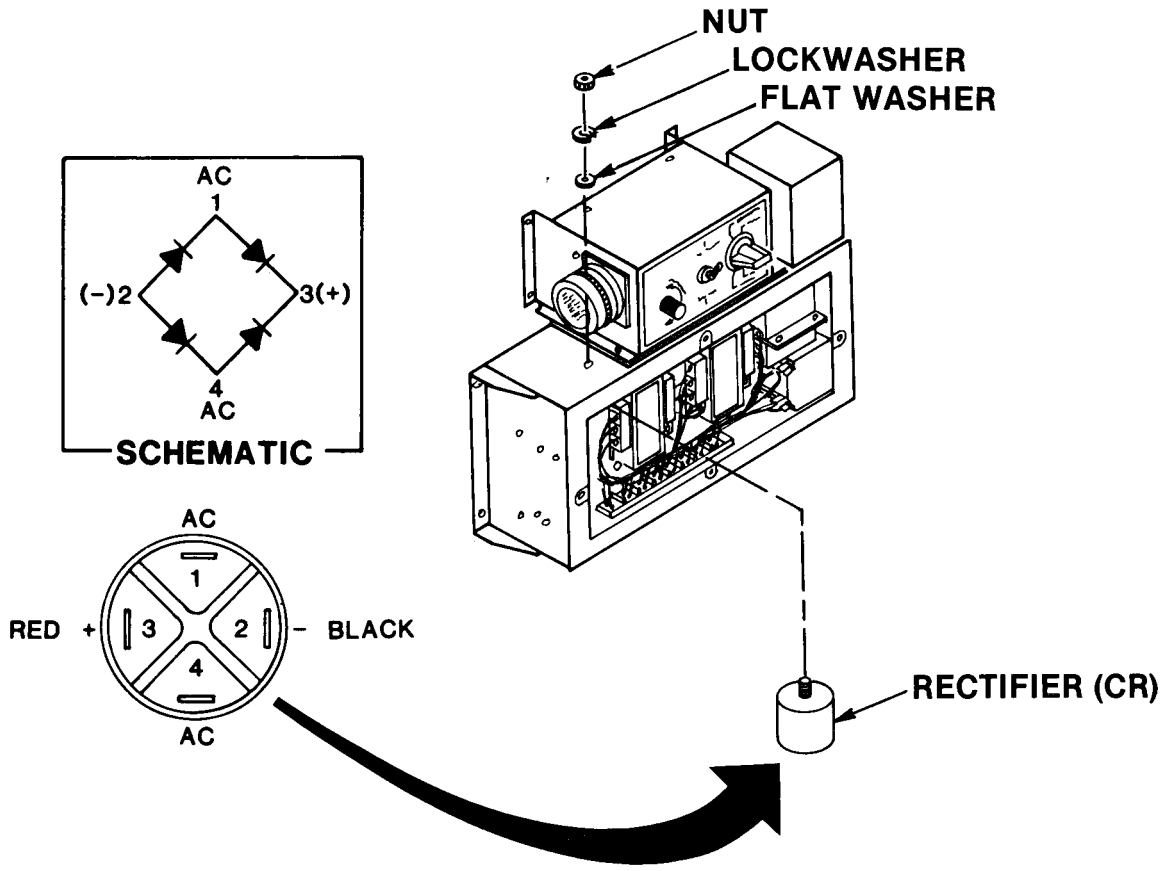


Figure 4-30. Rectifier (CR)

c. Removal

(1) Tag and remove rectifier leads.

(2) Using wrench, remove nut, lockwasher, and flat washer from rectifier stud .

(3) Remove rectifier.

d. Installation

(1) Insert rectifier mounting stud through hole in component mounting panel and secure with nut, lockwasher, and flat washer.

(2) Replace leads.

(3) Remove tags.

(4) Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install lower panel. (See para 4-24.)

4-35. TIME DELAY RELAY (K6)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

b. Removal

(1) With screwdriver, remove one screw on bracket on right side of junction box.

(2) With screwdriver, remove two screws on bracket in rear of junction box.

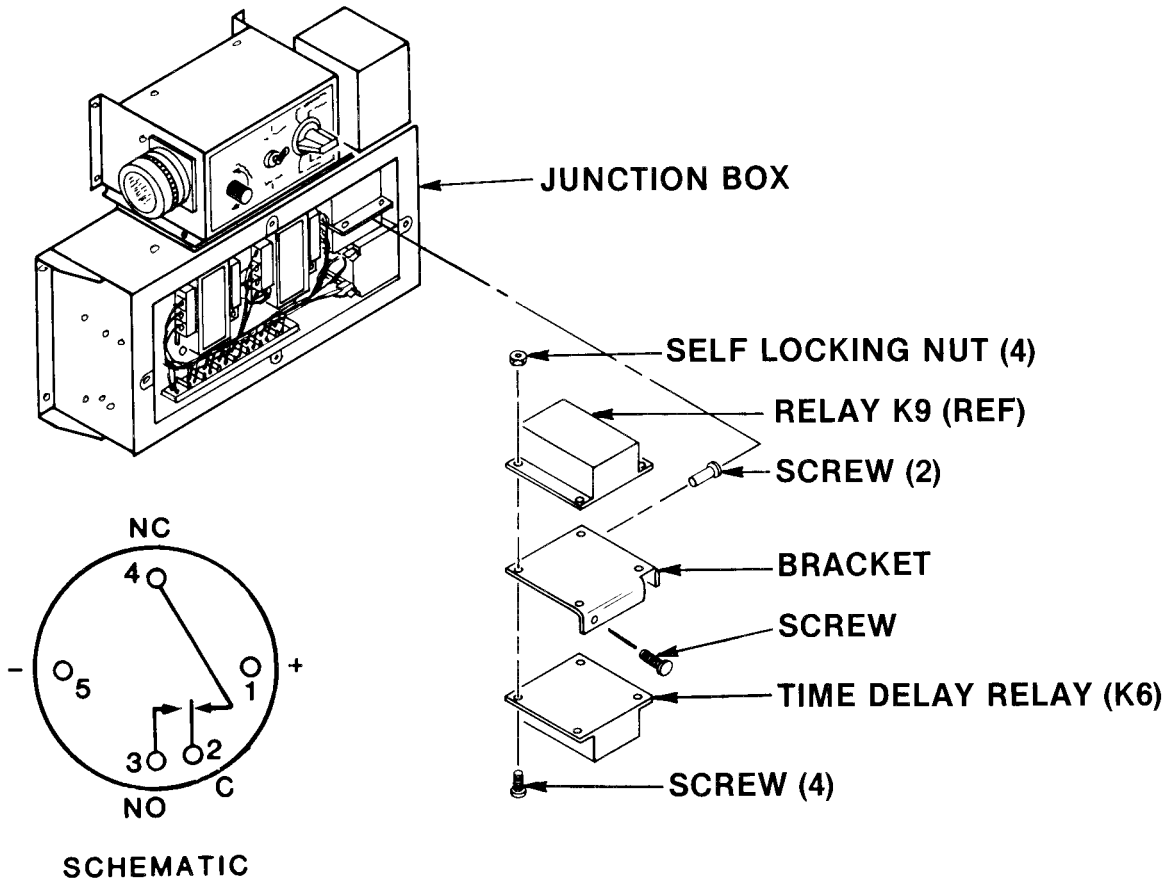


Figure 4-31. Time Delay Relay (K6)

(3) Extend relays and bracket from junction box, taking care not to damage leads.

(4) Remove and tag leads from relay (K6).

(5) With screwdriver and wrench, remove the four screws and self locking nuts on bracket.

(6) Remove relay (K6).

c. Inspection

(1) Check relay for cracks, evidence of overheating, and any other visible damage. Repair if damaged.

d. Test

(1) Using a multimeter, set on lowest OHMS scale, check continuity.

- Terminal 1 (+) to 5 (-) - Continuity should not be indicated.
- Terminal 2 to 3 - Continuity should be indicated.
- Terminal 3 to 4 - Continuity should be indicated.

(2) Set multimeter to appropriate dc voltage scale.

(3) Apply power across terminals 1 and 5. Voltage indicated should be 28 ±5 volts dc. After 30 ±3 second time delay, voltages should drop to less than two volts.

(4) Replace time delay relay (K6) if it fails any of the above tests.

e. Installation

(1) Install insulating heat shrink tubing over wires.

(2) Solder leads in place using tags and wiring diagram. (See fig. 4-7.)

(3) Slide heat shrink tubing over splices and remove tags.

(4) Using heat gun, shrink insulating tubing.

(5) Using wrench and screwdriver, install relay on bracket with four screws and lockwashers.

(6) Using screwdriver, secure bracket and relays with three screws.

(7) Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-36. COMPRESSOR RELAY (K9)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

b. Removal

(1) With screwdriver, remove one screw on bracket on right side of junction box .

(2) With screwdriver, remove two screws on bracket in rear of junction box.

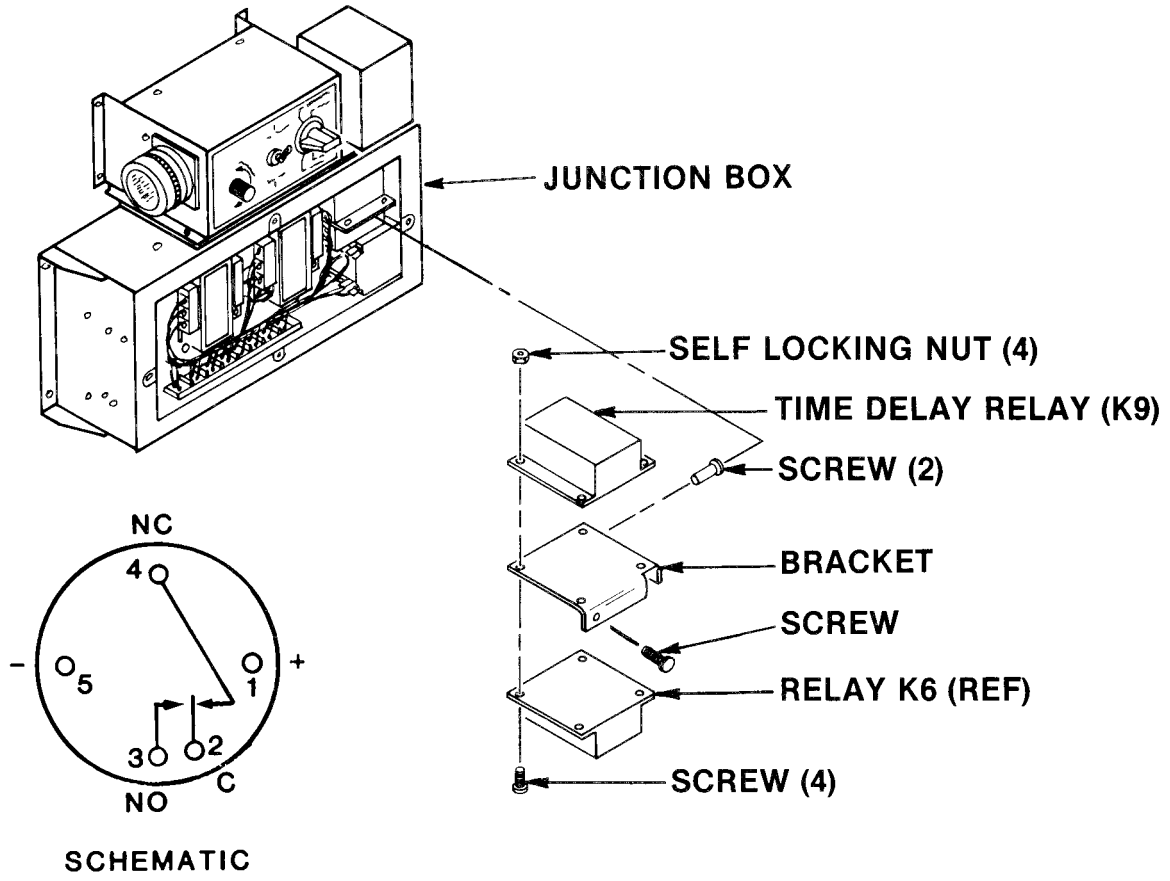


Figure 4-32. Time Delay Relay (K9)

(3) Extend relays and bracket from junction box, taking care not to damage leads.

(4) Tag and disconnect wire leads from relay (K9).

(5) With screwdriver and wrench, remove the four screws and self locking nuts on bracket.

(6) Remove relay (K9).

c. Inspection

(1) Check relay for cracks, evidence of overheating, and any other visible damage. Repair if damaged.

d. Test

(1) Using a multi meter, set on lowest OHMS scale, check continuity.

- Terminal 1 (+) to 5 (-) - Continuity should not be indicated.
- Terminal 2 to 3 - Continuity should be indicated.
- Terminal 3 to 4 - Continuity should be indicated.

(2) Set multimeter to appropriate dc voltage scale.

(3) Apply power across terminals 1 and 5. Voltage indicated should be 28 ±5 volts dc. After 15 ±1.5 second time delay, voltages should drop to less than two volts.

(4) Replace time delay relay (K9) if it fails any of the above tests.

e. Installation

(1) Install insulating heat shrink tubing over wires.

(2) Solder leads in place using tags and wiring diagram. (See fig. 4-7.)

(3) Slide heat shrink tubing over splices and remove tags.

(4) Using heat gun, shrink insulating tubing.

(5) Using wrench and screwdriver, install relay on bracket with four screws and lockwashers.

(6) Using screwdriver, secure bracket and relays with three screws.

(7) Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-37. COMPRESSOR RELAY (Kl)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

(3) With wrench, remove the four nuts and lockwashers that secure the terminal guards.

(4) Tag and disconnect wire leads.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use continuity tester or a multimeter set on the lowest OHMS scale to check continuity between terminals Al and A2, B1 and B2, and Cl and C2. All three contacts should be open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals Xl and X2. If there is no continuity, the coil is open. Replace the relay.

(3) Apply external 24 volts dc power across terminals Xl and X2 and repeat continuity checks between terminals A1 and A2, 131 and 132, and Cl and C2. All three contacts should be closed. If there is no continuity, replace the relay.

(4) Remove the external 24 volts dc power source from coil terminals Xl and X2.

d. Removal

(1) Remove junction box. (See para. 4-29.)

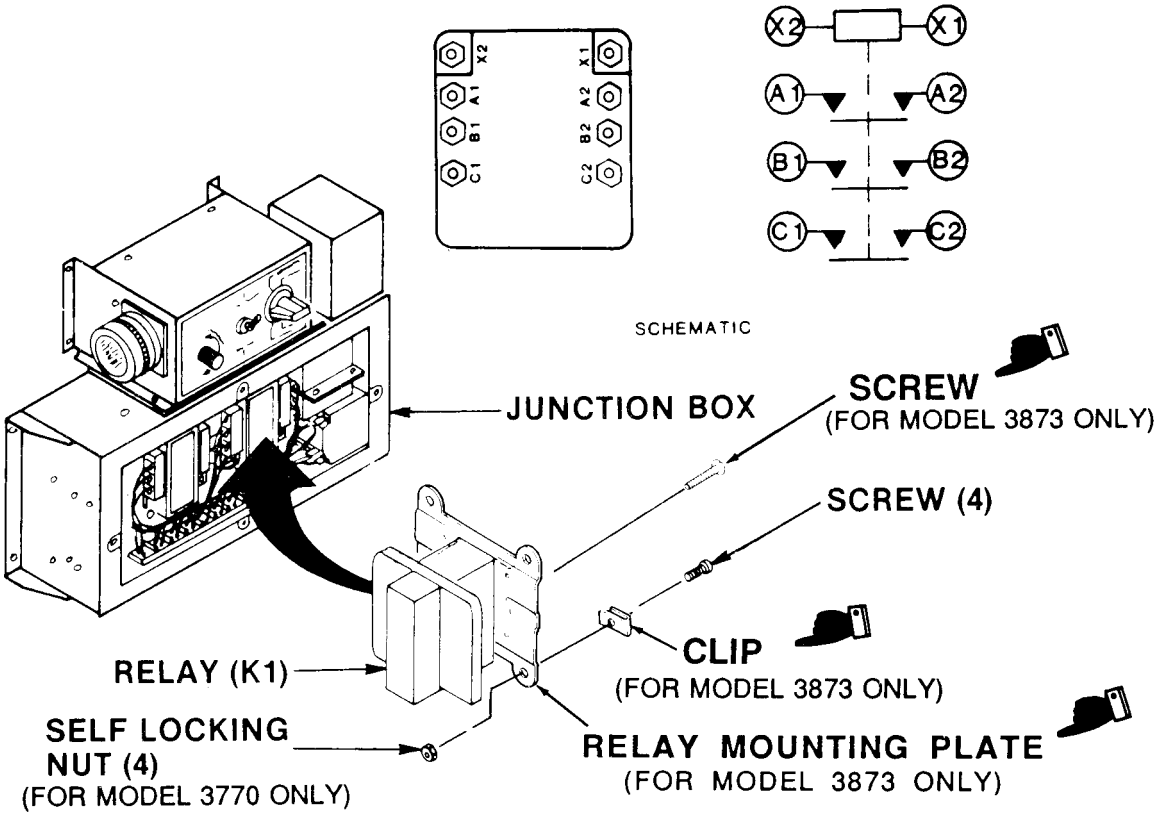


Figure 4-33. Compressor Relay (K1)

(2) For Model 3770, remove four screws, four locknuts, and relay,

(3) For Model 3873, remove four screws and four clips and relay assembly from junction box. Remove four screws and relay mounting plate from relay,

e. Installation

(1) For Model 3770, install relay, four screws and four locknuts,

(2) For Model 3873, install four screws and relay mounting plate onto relay and then install this relay assembly into junction box with four screws and four clips

(3) See tags and wiring diagram (fig. 4-7) and connect wiring leads,

(4) Remove tags.

(5) Using screwdriver, secure junction box cover with four captive panel fastener screws,

Follow-on procedure: Install junction box. (See para. 4-29.)

4-38. HEATER RELAY (K2)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

(3) with wrench, remove the four nuts and lockwashers that secure the terminal guards.

(4) Tag and disconnect wire leads.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use continuity tester or a 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 open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open. Replace the relay.

(3) Apply external 24 volts dc power across terminals Xl 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 external 24 volts dc power source from coil terminals Xl and X2.

d. Removal

(1) Remove junction box. (See para 4-29.)

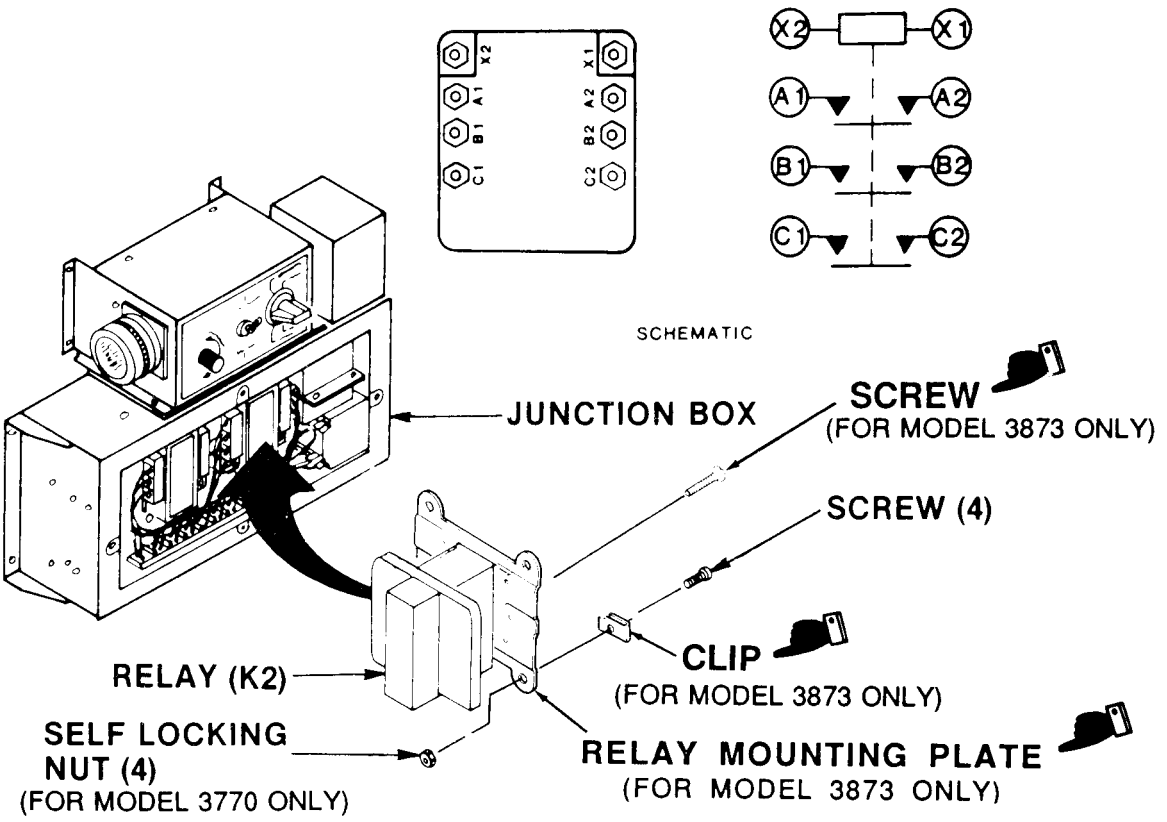


Figure 4-34. Heater Relay (K2)

(2) For Model 3770, remove four screws, four locknuts, and relay,

(3) For Model 3873, remove four screws and four clips and relay assembly from junction box, Remove four screws and relay mounting plate from relay,

e. Installation

(1) For Model 3770, install relay, four screws and four locknuts,

(2) For Model 3873, install four screws and relay mounting plate onto relay and then install this relay assembly into junction box with four screws and four clips,

(3) See tags and wiring diagram (fig. 4-7) and connect wiring leads,

(4) Remove tags.

(5) Using screwdriver, secure junction box cover with four captive panel fastener screws,

Follow-on procedure: Install junction box, (See para. 4-29.)

4-39. JUNCTION BOX WIRING HARNESSES

Preliminary procedure: Remove junction box. (See para 4-29.)

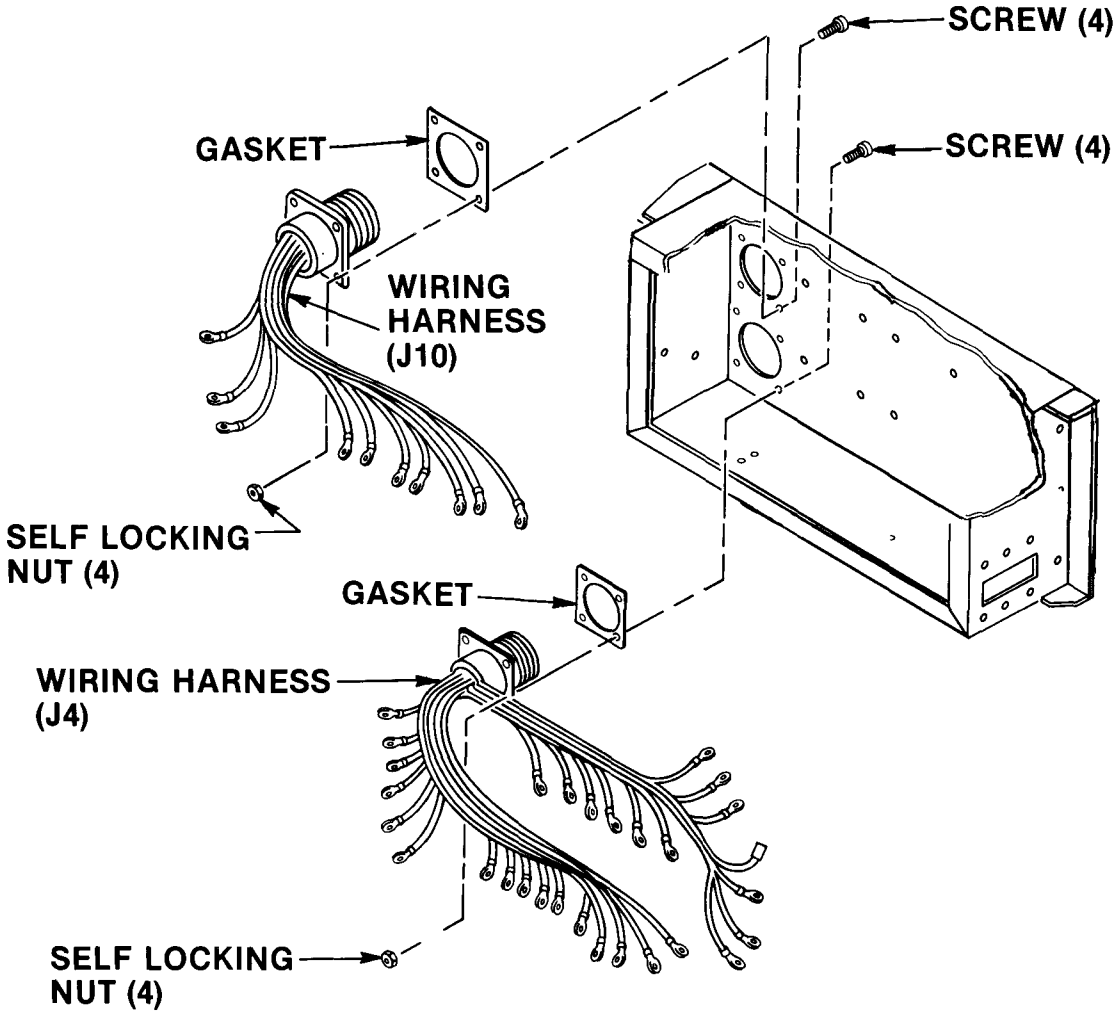


Figure 4-35. Junction Box Wiring Harnesses

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove junction box cover.

b. Inspection/test

(1) Check connectors for general condition and loose, broken or missing contacts. Replace connector if damaged.

(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 (fig. 4-7) and continuity test individual wires. Repair or replace wires with no continuity.

c. Removal

(1) Using screwdriver and wrench, remove four screws and nuts from J4 and J10 connectors. (See fig. 4-36.)

(2) Tag and disconnect leads from parts.

(3) Remove harness.

d. Repair

(1) See paragraph 4-27 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal information when individual wires are replaced.

e. Installation

(1) See tags and wiring diagram (fig. 4-7) and reconnect leads.

(2) Remove tags.

(3) Using screwdriver and wrench, secure J4 and J10 connectors and gaskets, with four each screws and locknuts.

(4) Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-40. TERMINAL BOARDS (TB1 AND TB2)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

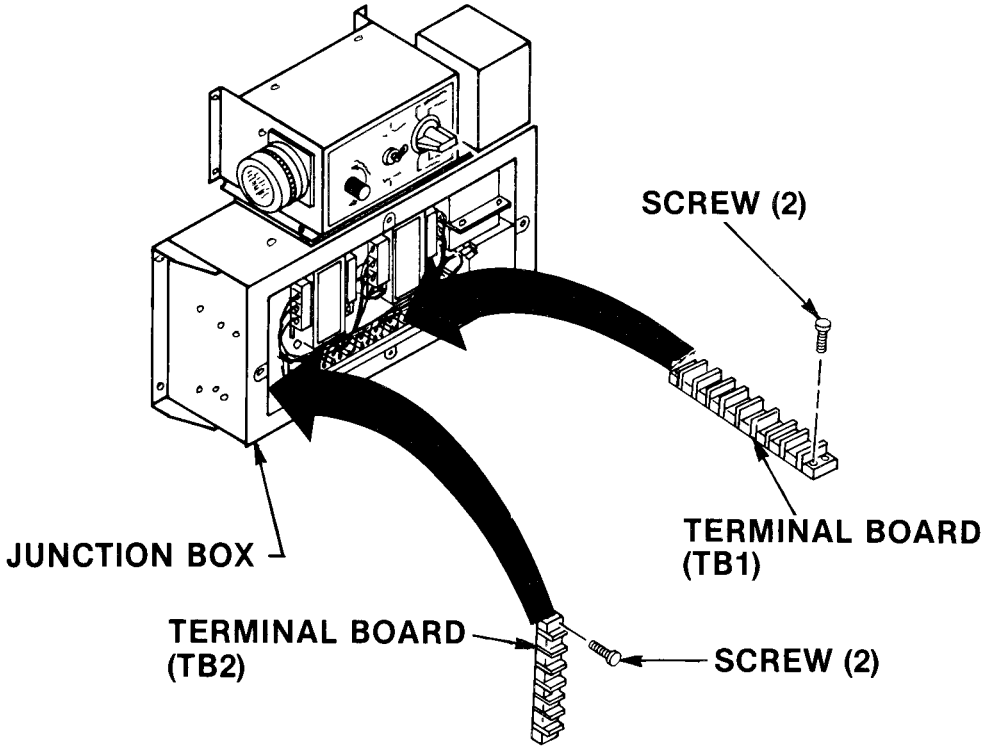


Figure 4-36. Terminal Boards (TB1 and TB2)

b. Inspection

(1) Check terminal boards for loose or corroded terminals, cracks, and obvious damage.

(2) Check that wire leads are secure and properly located. (See fig. 4-7.)

c. Removal

(1) Remove junction box. (See para 4-29.)

(2) Tag and disconnect wire leads.

(3) Using screwdriver and wrench, remove four screws and nuts from terminal board (TB1).

(4) Using screwdriver and wrench, remove two screws and nuts from terminal board (TB2).

(5) Remove terminal boards (TB1 and TB2).

d. Installation

(1) See tags and wiring diagram (fig. 4-7) and connect wire leads.

(2) Remove tags.

(3) Using screwdriver and wrench, secure terminal board (TB2) with two screws and nuts.

(4) Using screwdriver and wrench, secure terminal board (TB1) with four screws and nuts.

(5) Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-41. JUNCTION BOX HOUSING AND COVER

Preliminary procedure: Remove junction box. (See para 4-29.)

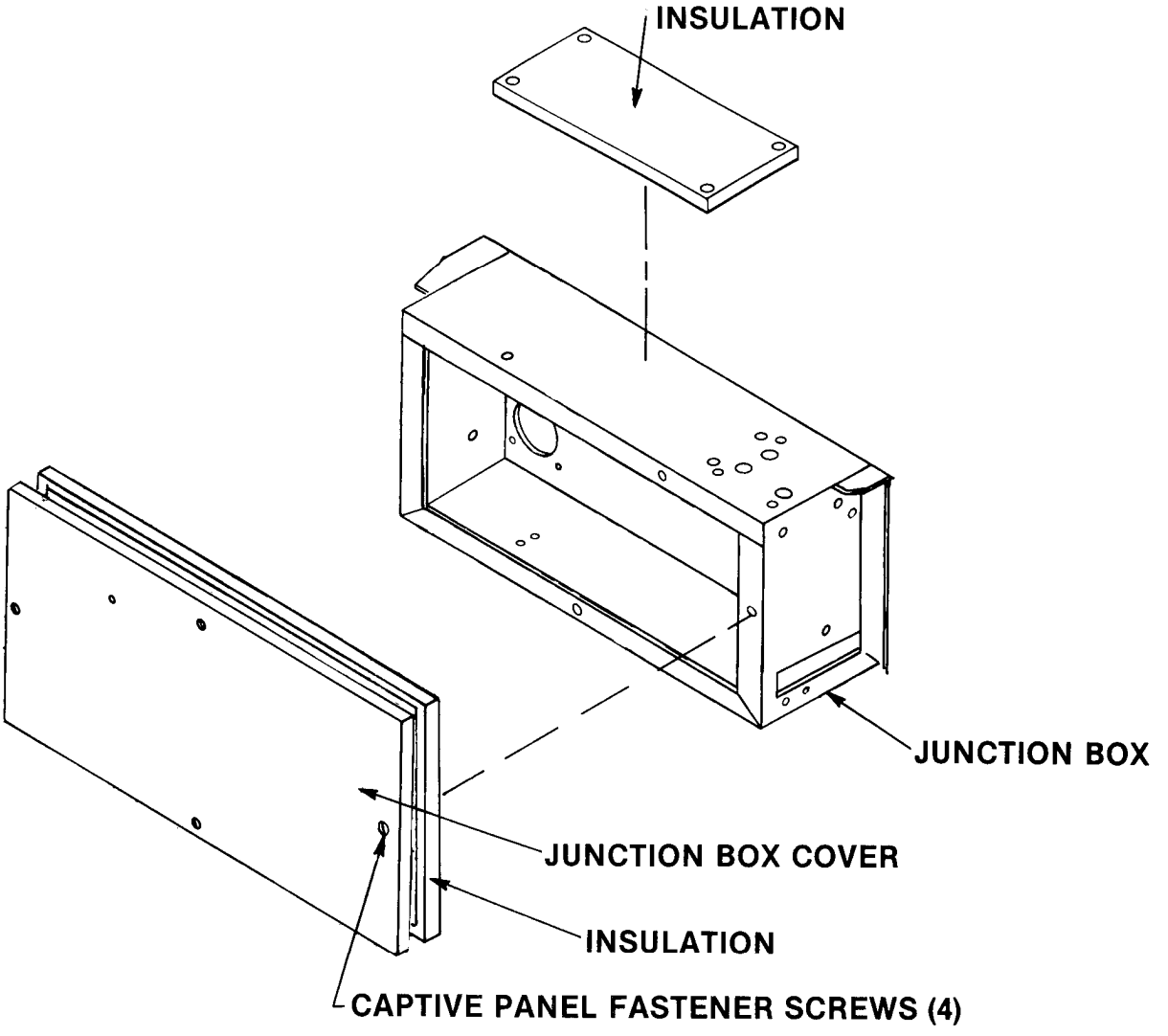


Figure 4-37. Junction Box Housing and Cover

a. Access

(1) Using screwdriver, loosen four captive panel fastener screws in junction box cover.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent or punctured. Replace if damaged.

(2) Check that gaskets are not cracked, loose, or missing and the plate is in place and legible. Replace gasket as required.

(3) Check junction box housing for cracked welds and loose or missing hardware. Replace or repair as required.

c. Disassembly/Reassembly. See paragraphs 4-29 thru 4-41 for removal/installation of parts.

d. Installation. Using screwdriver, secure junction box cover with four captive panel fastener screws.

Follow-on procedure: Install junction box. (See para 4-29.)

4-42. CIRCUIT BREAKER EXTERNAL RESET CONTROL

Preliminary procedure: 1. Remove condenser air discharge guard. (See para 4-20.)

2. Remove junction box. (See para 4-29.)

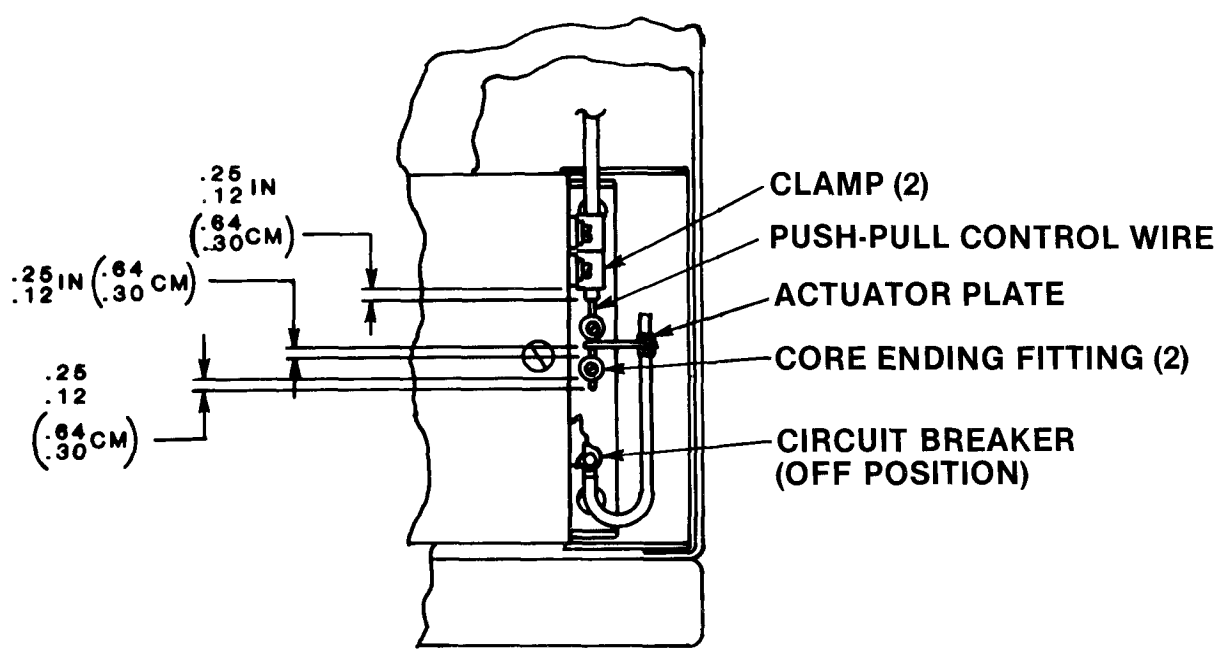


Figure 4-38. Circuit Breaker External Reset

a. Inspection

(1) Check that parts are in place and that wires move freely in cable.

b. Removal

(1) Using hex head wrench, loosen two screws on hub of condenser fan.

(2) Remove condenser fan and key.

(3) Remove knob, lockwasher and nut from cable.

(4) Using needle nose pliers, reach into condenser fan cavity and restrain cable.

(5) Using wrench, remove control assembly nut.

(6) Pull cable out of unit through junction box side.

c. Installation

(1) From junction box side, thread cable through rear panel opening.

(2) Using needle nose pliers, reach into condenser fan cavity and restrain cable.

(3) Using wrench, install control assembly nut.

(4) Install nut, lockwasher and knob.

(5) Install condenser fan and key flush to shaft of motor shaft.

(6) Using torque wrench with hex head socket, torque two screws to 82 inch pounds.

Follow-on procedure: 1. Install junction box. (See para 4-29.)

2. Install condenser air discharge guard. (See para 4-20.)

4-43. WIRING HARNESSES

WARNING

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

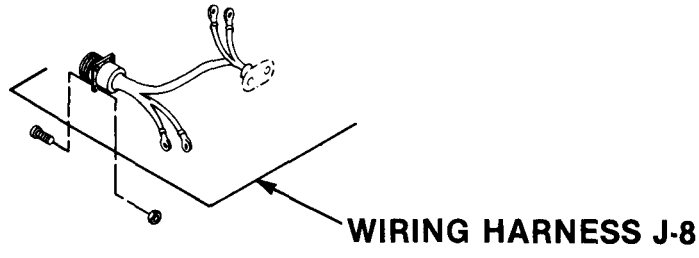
Preliminary procedures: 1. Remove top panel. (See para 4-23.)

2. Remove air intake grille. (See para 4-19.)

3. Remove air filter. (See para 4-25.)

4. Remove junction box. (See para 4-29.)

5. Remove condenser air discharge guard. (See para 4-20.)



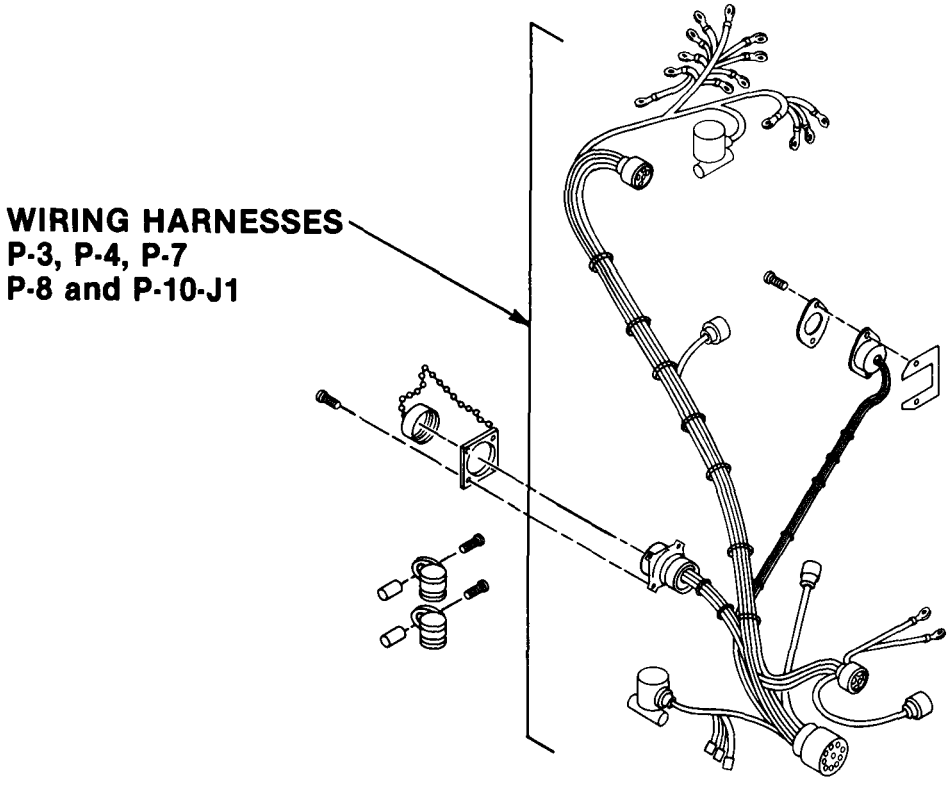


Figure 4-39. Wiring Harness

a. Inspection/Test

(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 (fig. 4-7) and continuity test individual wires. Repair or replace wires with no continuity.

b. Repair

(1) See paragraph 4-27 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal/connector information.

c. Removal/Installation. See figure 4-39 for removal/installation information.

Follow-on procedures:
1. Install top panel. (See para 4-23.)
2. Install air intake grille. (See para 4-19.)
3. Install air filter. (See para 4-25.)
4. Install junction box. (See para 4-29.)
5. Install condenser air discharge guard. (See para 4-20.)

TABLE 4-3. WIRE LIST

TERMINATION		TERMINATION		WIRE SIZE	LENGTH IN INCHES
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		
		LOOSE WIRE			
TB1-1	MS25036-153	K2-L1	MS25036-108	16	7.25
TB1-1	MS25036-153	CB-A1	13216E6191-2	14	11.12
TB1-2	MS25036-153	T-2	MS25036-106	16	17.50
TB1-2	MS25036-153	TB1-3	MS25036-153	14	4.00
CB-B1	13216E6191-3	TB1-4	MS25036-156	12	4.00
CB-B2	13216E6191-3	TB1-2	MS25036-156	12	10.00
K1-A2	MS25036-108	CB-A2	13216E6191-2	14	7.25
HR2-A	MS25036-108	HR1-A	MS25036-108	16	4.25
HR2-A	MS25036-108	HR3-A	MS25036-108	16	4.25
HR2-B	MS25036-108	HR1-B	MS25036-108	16	4.25
HR2-B	MS25036-108	HR3-B	MS25036-108	16	4.25
HR5-A	MS25036-108	HR6-A	MS25036-108	16	4.25
HR5-A	MS25036-108	HR4-A	MS25036-108	16	4.25
HR5-B	MS25036-108	HR6-B	MS25036-108	16	4.25
HR5-B	MS25036-108	HR4-B	MS25036-108	16	4.25
XF1-2	MS25036-153	T-1	MS25036-106	16	15.00
T-3	MS25036-106	CR-1	13216E6191-2	16	12.00
T-4	MS25036-106	CR-4	13216E6191-2	16	12.00
E2	MS25036-112	E3	MS25036-157	10	24.00
XF1-1	MS25036-153	CB-NO	13216E6192	16	13.00
CR-3	13216E6191-2	XF2-1	MS25036-153	16	6.50
S1-R	MS25036-153	S-11	13211E8288	16	6.00
S1-R	MS25036-153	S7-3	MS25036-106	16	5.12
S5-1	MS25036-153	S6-2	MS25036-153	16	5.25
TB1-6	MS25036-153	K6-1	--	16	7.00
K6-1	--	K6-2	--	16	3.00
TB1-6	MS25036-153	K1-B1	MS25036-108	16	8.50
K1-B2	MS25036-108	K1-X2	MS25036-153	16	5.00
K6-3	--	K1-X2	MS25036-153	16	4.00
S1-B1	MS25036-153	S-12	13211E8288	16	7.75
K1-X1	MS25036-153	K2-X2	MS25036-153	16	7.50
K2-X2	MS25036-153	TB1-8	MS25036-153	16	10.00
TB1-8	MS25036-153	TB1-7	MS25036-153	16	3.00
TB1-7	MS25036-153	CR-2	13216E6191-2	16	8.00
TB2-6	MS25036-106	K9-2	--	16	12.00
TB1-8	MS25036-153	K9-3	--	16	6.00
TB1-7	MS25036-153	K9-5	--	16	6.50
K6-5	--	K9-5	--	16	5.00
XF2-2	MS25036-153	K9-1	--	16	12.00
E2	MS25036-112	E4	MS25036-112	10	27.00
C2-1	13216E6191-2	K10-4	MS25036-153	14	28.00
K10-4	MS25036-153	C4-1	13216E6191-2	16	9.00
K10-2	MS25036-153	C2-2	13216E6191-2	14	28.00
K10-1	MS25036-153	C4-2	13216E6191-2	16	9.00

TABLE 4-3. WIRE LIST (Cont.)

TERMINATION		TERMINATION		WIRE SIZE	LENGTH IN INCHES
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		
		WIRE HARNESS J10			
J10-A	MS3102R-28-9S	TB1-6	MS25036-153	16	9.75
J10-B	MS3102R-28-9S	TB1-3	MS25036-153	14	8.00
J10-C	MS3102R-28-9S	J10-F	--	14	3.00
J10-D	MS3102R-28-9S	K1-A1	MS25036-108	14	12.50
J10-E	MS3102R-28-9S	TB1-3	MS25036-153	16	6.25
J10-G	MS3102R-28-9S	K1-A1	MS25036-108	14	12.50
J10-H	MS3102R-28-9S	TB2-3	MS25036-153	16	5.00
J10-J	MS3102R-28-9S	K2-L2	MS25036-108	16	7.50
J10-K	MS3102R-28-9S	TB1-5	MS25036-153	16	7.50
J10-L	MS3102R-28-9S	TB2-1	MS25036-106	16	6.50
J10-M	MS3102R-28-9S	TB1-4	MS25036-153	16	7.00
		WIRE HARNESS J4			
J4-A	MS3102R-32-7P	TB2-2	MS25036-106	16	5.00
J4-B	MS3102R-32-7P	J4-a	--	16	3.00
J4-C	MS3102R-32-7P	J4-X	--	16	3.00
J4-D	MS3102R-32-7P	TB1-4	MS25036-153	16	7.50
J4-E	MS3102R-32-7P	TB2-1	MS25036-106	16	4.00
J4-F	MS3102R-32-7P	TB2-3	MS25036-106	16	5.00
J4-G	MS3102R-32-7P	TB2-2	MS25036-106	16	5.00
J4-H	MS3102R-32-7P	K1-X2	MS25036-153	16	11.00
J4-I	MS3102R-32-7P	TB1-7	MS25036-153	16	8.25
J4-J	MS3102R-32-7P	TB2-5	MS25036-106	16	6.00
J4-K	MS3102R-32-7P	J4-f	--	16	6.00
J4-L	MS3102R-32-7P	CB-C	13216E6192	16	12.00
J4-M	MS3102R-32-7P	TB2-4	MS25036-106	16	6.00
J4-N	MS3102R-32-7P	TB1-1	MS25036-153	16	6.25
J4-P	MS3102R-32-7P	TB1-1	MS25036-156	12	7.50
J4-R	MS3102R-32-7P	TB1-4	MS25036-156	12	9.25
J4-T	MS3102R-32-7P	E2	MS25036-112	12	12.00
J4-W	MS3102R-32-7P	TB1-5	MS25036-153	16	9.00
J4-Y	MS3102R-32-7P	K2-X1	MS25036-108	16	7.00
J4-Z	MS3102R-32-7P	TB2-4	MS25036-106	16	6.00
J4-b	MS3102R-32-7P	XF2-2	MS25036-153	16	4.00
J4-c	MS3102R-32-7P	E2	MS25036-108	16	12.00
J4-d	MS3102R-32-7P	TB2-5	MS25036-106	16	6.00
J4-e	MS3102R-32-7P	TB2-6	MS25036-106	16	6.50
J4-g	MS3102R-32-7P	TB1-8	MS25036-153	16	11.00
J4-j	MS3102R-32-7P	TB2-5	MS25036-106	16	6.00
J4-k	MS3102R-32-7P	TB1-7	MS25036-153	16	11.00
J4-0	MS3102R-32-7P	TB1-3	MS25036-153	14	7.50
J4-V	MS3102R-32-7P	TB1-1	MS25036-153	16	7.50
J4-h	MS3102R-32-7P	TB1-2	MS25036-153	16	7.50

TABLE 4-3. WIRE LIST (Cont.)

TERMINATION		TERMINATION		WIRE SIZE	LENGTH IN INCHES
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		
		WIRE HARNESS J7			
J7-A	MS3100R-16-10P	HR2-A	MS25036-108	16	16.00
J7-B	MS3100R-16-10P	HR5-A	MS25036-108	16	7.00
J7-C	MS3100R-16-10P	S3-4	13211E8265	16	9.00
S3-5	13211E8265	HR5-B	MS25036-108	16	4.81
S3-6	13211E8265	HR2-B	MS25036-108	16	8.00
		WIRE HARNESS P3, P4, P7, P8 AND P10-J1			
P4-A	MS3106R-32-7S	S5-2	MS25036-153	16	33.00
P4-B	MS3106R-32-7S	S6-1	MS25036-153	16	33.00
P4-C	MS3106R-32-7S	P2-C	MS3106R-14S-6S	16	38.50
P4-D	MS3106R-32-7S	K7-7	MS25036-153	16	84.00
P4-E	MS3106R-32-7S	K7-4	MS25036-153	16	84.00
P4-F	MS3106R-32-7S	S2-1	13211E8180	--	25.50
P4-G	MS3106R-32-7S	S2-2	13211E8180	--	35.50
P4-H	MS3106R-32-7S	L2-1	13214E3524	--	69.00
P4-I	MS3106R-32-7S	L1-2	13214E3524	--	44.00
P4-J	MS3106R-32-7S	P8-C	MS3100R-28-17S	16	12.50
P4-K	MS3106R-32-7S	P8-D	MS3100R-28-17S	16	12.50
P4-L	MS3106R-32-7S	P8-E	MS3100R-28-17S	16	12.50
P4-M	MS3106R-32-7S	L1-1	13214E3524	--	44.00
P4-N	MS3106R-32-7S	P8-H	MS3100R-28-17S	16	12.50
P4-O	MS3106R-32-7S	K10-4	MS25036-153	14	14.06
P4-P	MS3106R-32-7S	J1-A	MS3100R-20-4PX	12	23.00
P4-R	MS3106R-32-7S	J1-B	MS3100R-20-4PX	12	23.00
P4-T	MS3106R-32-7S	J1-D	MS3100R-20-4PX	12	23.00
P4-V	MS3106R-32-7S	P3-G	MS3106R-16S-1S	16	20.50
P4-W	MS3106R-32-7S	P8-J	MS3100R-28-17S	16	14.50
P4-X	MS3106R-32-7S	P8-K	MS3100R-28-17S	16	14.50
P4-Y	MS3106R-32-7S	P8-L	MS3100R-28-17S	16	14.50
P4-Z	MS3106R-32-7S	P8-M	MS3100R-28-17S	16	14.50
P4-a	MS3106R-32-7S	P8-N	MS3100R-28-17S	16	14.50
P4-b	MS3106R-32-7S	P8-P	MS3100R-28-17S	16	14.50
P4-c	MS3106R-32-7S	P8-R	MS3100R-28-17S	16	14.50
P4-d	MS3106R-32-7S	S8-3	MS25036-107	16	14.50
P4-e	MS3106R-32-7S	K7-2	MS25036-153	16	84.00
P4-f	MS3106R-32-7S	S8-2	MS25036-107	16	74.00
P4-g	MS3106R-32-7S	L2-2	13214E3524	--	69.00
P4-h	MS3106R-32-7S	P3-F	MS3106R-16S-1S	16	21.50
P4-j	MS3106R-32-7S	K7-1	MS25036-153	16	84.00
P4-k	MS3106R-32-7S	K7-15	MS25036-153	16	84.00
P2-A	MS3106R-14S-6S	K7-6	MS25036-153	16	84.00
P2-B	MS3106R-14S-6S	K7-3	MS25036-153	16	84.00
P2-D	MS3106R-14S-6S	K7-8	MS25036-153	16	84.00
P2-E	MS3106R-14S-6S	K7-5	MS25036-153	16	84.00

TABLE 4-3. WIRE LIST (Cont.)

TERMINATION		TERMINATION		WIRE SIZE	LENGTH IN INCHES
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		
		WIRE HARNESS P3, P4, P7, P8, AND P10-J1 (cont.)			
P10-A	MS3106R-28-9P	P3-E	MS3106R-16S-1S	16	21.50
P10-B	MS3106R-28-9P	P3-C	MS3106R-16S-1S	16	21.50
P10-C	MS3106R-28-9P	P3-B	MS3106R-16S-1S	16	21.50
P10-D	MS3106R-28-9P	P3-A	MS3106R-16S-1S	16	21.50
P10-E	MS3106R-28-9P	P7-C	MS3106R-16S-10S	16	41.00
P10-F	MS3106R-28-9P	C2-2	13216E6191-2	14	19.00
P10-G	MS3106R-28-9P	K10-5	MS25036-153	14	13.50
P10-H	MS3106R-28-9P	P3-D	MS3106R-16S-1S	16	21.50
P10-J	MS3106R-28-9P	P7-A	MS3106R-16S-10S	16	41.00
P10-K	MS3106R-28-9P	P7-B	MS3106R-16S-10S	16	41.00
P10-L	MS3106R-28-9P	C1-1	13216E6191-2	16	21.56
P10-M	MS3106R-28-9P	C1-2	13216E6191-2	16	3.88
K7-2	MS25036-153	K7-16	MS25036-153	16	3.88
		WIRE HARNESS J8			
J8-C	13211E8399C28-17P	S7-1	MS25036-100	16	5.00
J8-D	13211E8399C28-17P	S7-3	MS25036-100	16	5.00
J8-E	13211E8399C28-17P	S-2B	--	16	12.31
J8-H	13211E8399C28-17P	S-32	--	16	12.31
J8-J	13211E8399C28-17P	S-3A	13211E8288	16	11.81
J8-K	13211E8399C28-17P	S-2B	13211E8288	16	12.31
J8-L	13211E8399C28-17P	S-1A	13211E8288	16	13.31
J8-M	13211E8399C28-17P	S-1B	13211E8288	16	13.31
J8-N	13211E8399C28-17P	S-1D	13211E8288	16	13.31
J8-P	13211E8399C28-17P	S1-R	MS25036-153	16	8.88
J8-R	13211E8399C28-17P	E1	MS25036-108	16	4.50
S-32	13211E8288	S-22	13211E8288	16	3.25

4-44. CONTROL PANEL

Preliminary procedures: 1. Remove junction box. (See para 4-29.)

2. Remove air filter. (See para 4-25.)

a. Removal

(1) Using screwdriver, remove screw, lockwasher, flat washer, and clamp from remote sensing bulb.

(2) Disconnect plug (P8) from receptacle (J8).

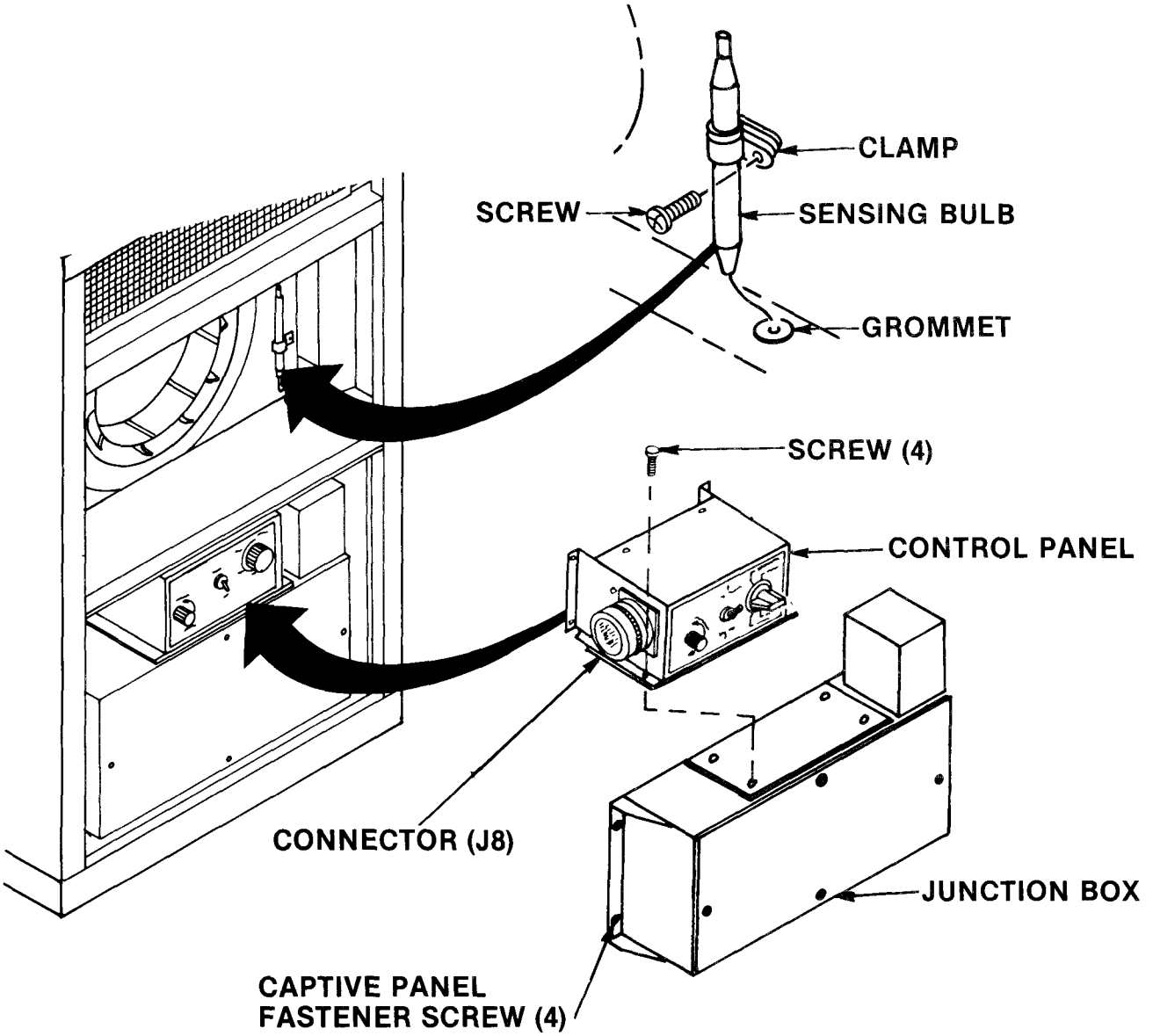


Figure 4-40. Control Panel

(3) Remove grommet from bulkhead.

CAUTION

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

(4) Carefully slip remote sensing bulb down through bulkhead.

(5) Using screwdriver, remove four screws that secure control panel to junction box and remove control panel.

b. Test/Replace/Repair. See the following paragraphs for individual component test, replacement, and repair.

(1) Wiring harness. (See para 4-45.)

(2) Temperature control thermostat (S1). (See para 4-46.)

(3) Mode selector (rotary) switch (S). (See para 4-47.)

(4) Two-speed fan (toggle) switch (S7). (See para 4-48.)

(5) Control panel housing. (See para 4-49.)

c. Installation

(1) Using screwdriver, secure control panel to junction box with four screws.

CAUTION

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

(2) Carefully feed sensing bulb and capillary up and into conditioned air intake compartment. (See fig. 4-42.)

(3) Using screwdriver, secure remote sensing bulb with clamp, flat washer, lockwasher, and screw.

(4) Install grommet in bulkhead.

(5) Coil excess capillary tubing in recess behind control panel.

(6) Connect P8 plug and harness to receptacle J8 on the control panel.

Follow-on procedures: 1. Install junction box. (See para 4-29.)

2. Install air filter. (See para 4-25.)

4-45. WIRE HARNESS, CONTROL PANEL

Preliminary procedure: Remove control panel. (See para 4-44.)

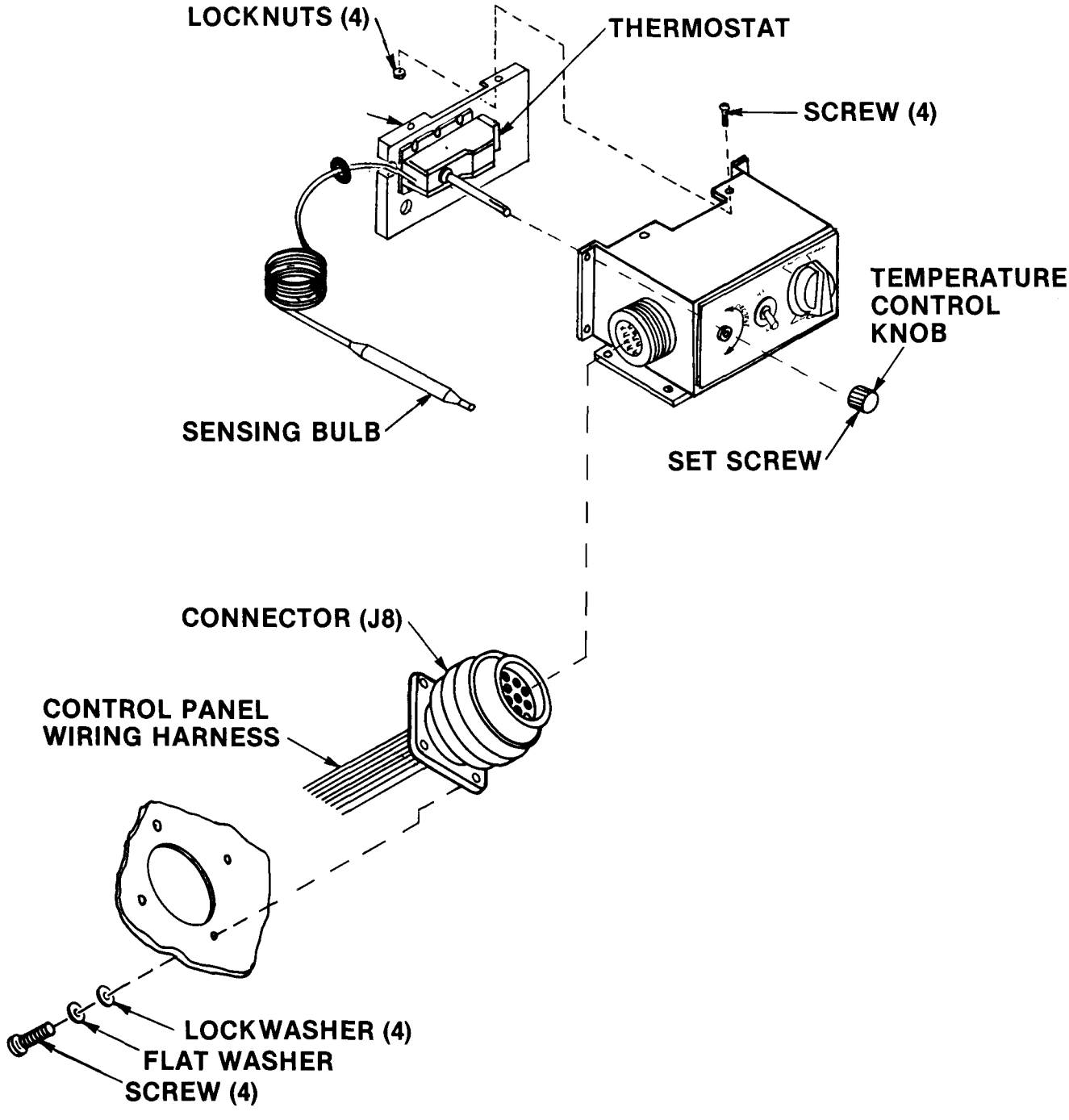


Figure 4-41. Wiring Harness, Control Panel

a. Access

(1) Using hex head wrench, loosen Temperature control thermostat knob setscrew.

(2) Remove temperature control knob.

(3) Using screwdriver and wrench, remove four screws and locknuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

b. Inspection/Test

(1) Check connector for general condition and loose, broken, or missing contacts. Replace connector if damaged.

(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 (fig. 4-7) and continuity test individual wires. Repair or replace wires with no continuity.

c. Removal

(1) Using offset screwdriver, remove four screws and nuts from J8 connector.

(2) Using screwdriver and wrench, remove locknut, lockwasher, and flat washer from ground stud.

(3) Tag and disconnect leads from switches.

(4) Remove harness.

d. Repair

(1) See paragraph 4-27 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal information when individual wires are replaced.

e. Installation

(1) See tags and wiring diagram (fig. 4-7) and reconnect leads.

(2) Using screwdriver and wrench, secure ground wire to ground stud with flat washer, lockwasher, and locknut.

(3) Remove tags.

(4) Using offset screwdriver, secure connector J8 to box with four screws and nuts.

(5) Insert rear panel Into box and aline holes.

(6) Using screwdriver and wrench, secure rear panel with four screws and locknuts.

(7) Place Temperature control thermostat knob on shaft and aline setscrew with flat on shaft.

(8) Using hex head wrench, tighten setscrew.

Follow-on procedure: Install control panel. (See para 4-44.)

4-46. TEMPERATURE CONTROL THERMOSTAT (S1)

Preliminary procedure: Remove control panel. (See para 4-44.)

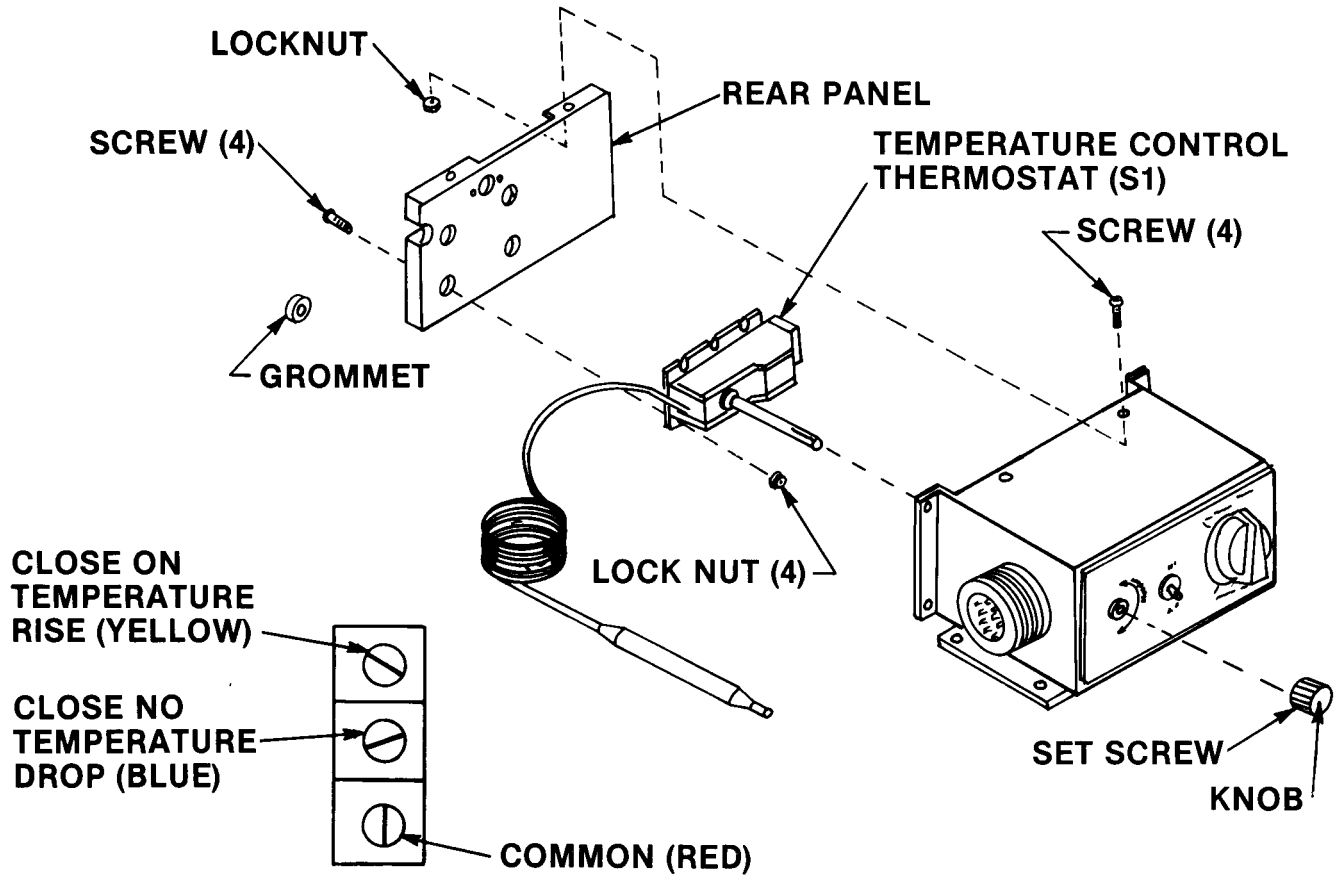


Figure 4-42. Temperature Control Thermostat (S1)

a. Access

(1) Using hex head wrench, loosen Temperature control thermostat knob setscrew.

(2) Remove knob.

(3) Using screwdriver and wrench, remove four screws and locknuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

b. Inspection

(1) Check that leads are properly connected. (See wiring diagram, fig. 4-7.)

(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.

c. Test

(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) Place multimeter 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.

d. Removal

(1) Tag and disconnect leads.

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

(3) Remove Temperature control thermostat.

e. Installation

(1) Using screwdriver and wrench, secure Temperature control thermostat to rear panel with four screws and locknuts.

(2) Place capillary line through notch and split grommet in rear panel.

(3) See tags and wiring diagram (fig. 4-7) and connect leads.

CAUTION

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

(4) Insert rear panel into box and aline holes.

(5) Using screwdriver and wrench, secure rear panel with four screws and locknuts.

(6) Place Temperature control thermostat knob on shaft and aline setscrew with flat on shaft.

(7) Using hex head wrench, tighten setscrew.

Follow-on procedure: Install control panel. (See para 4-44.)

4-47. MODE SELECTOR (ROTARY) SWITCH (S)

Preliminary procedure: Remove control panel. (See para 4-44.)

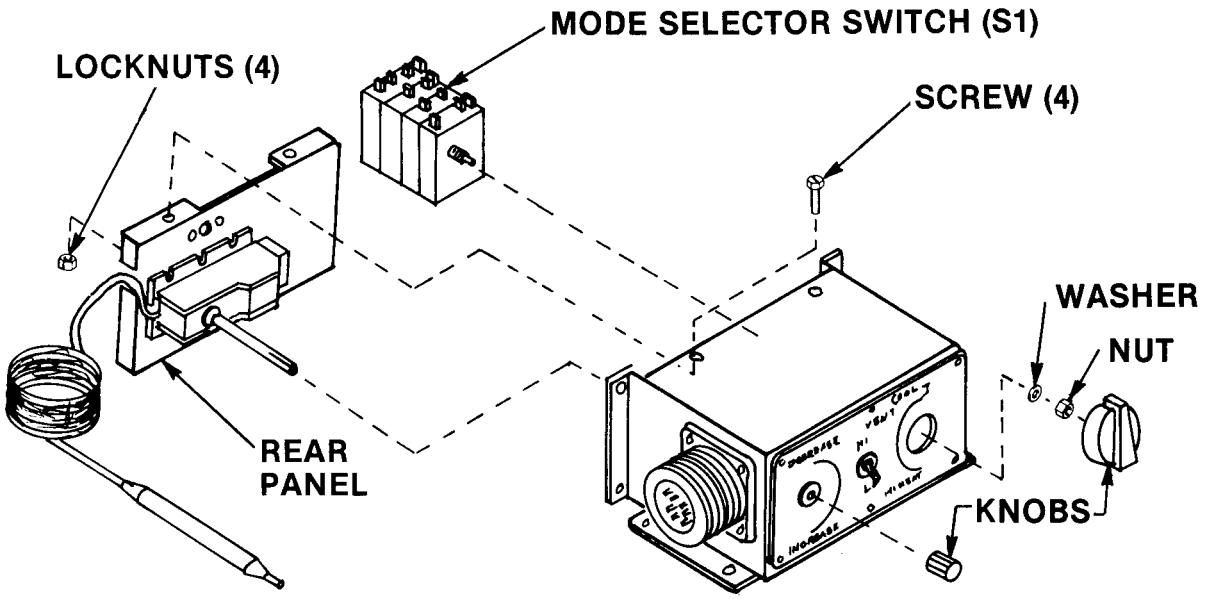


Figure 4-43. Mode Selector (Rotary) Switch (S)

a. Access

(1) Using hex head wrench, loosen setscrews in both knobs.

(2) Remove knobs.

(3) Using screwdriver and wrench, remove four screws and locknuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

(5) Using wrench and holding rear of mode selector switch, remove nut and lockwasher from shaft face.

b. Inspection

(1) Check switch to see that all leads are properly connected. (See wiring diagram, fig. 4-7).

(2) Repair or replace all loose or broken leads.

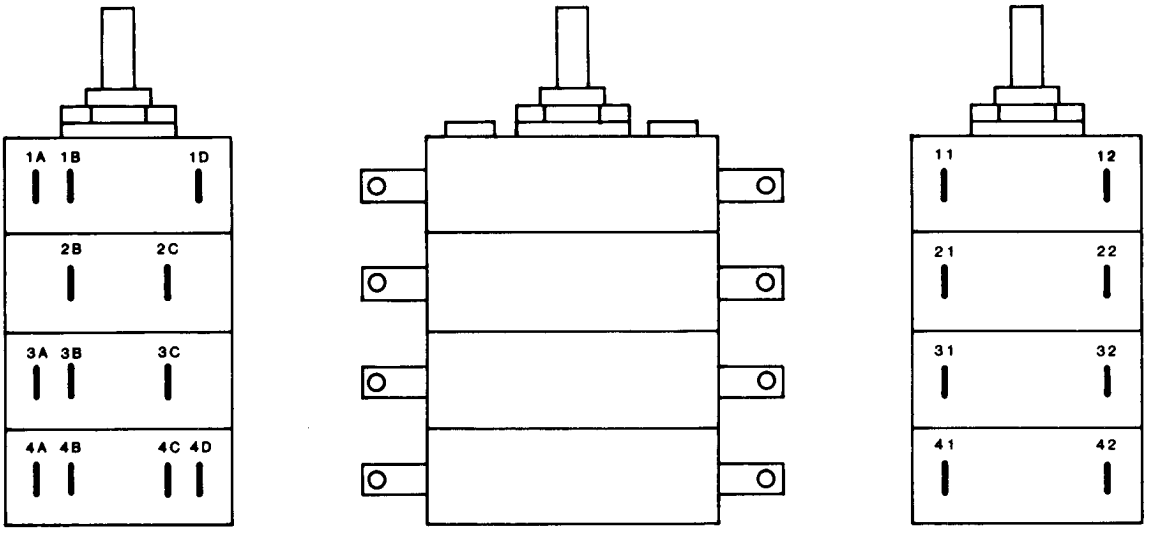
(3) Check that switch terminals are not loose, broken, or corroded.

(4) Check switch for evidence of overheating or other visible damage.

(5) Replace switch if damaged.

c. Test

(1) Using multimeter and switch position chart shown on figure 4-46, 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.



SELECTOR SWITCH POSITION	SWITCH FUNCTION	SWITCH WAFERS AND TERMINALS CONNECTED			
		A	B	C	D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3A	41 AND 4C 42 AND 4A
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C	
3	OFF				
4	VENT		21 AND 2C 22 AND 2B	31 AND 3C	
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3B	41 AND 4D 42 AND 4B

Figure 4-44. Switch Position and Terminal Location

(2) Replace switch if it falls above test.

d. Removal. (Assuming switch has been pulled from box for above test.)

(1) Tag and disconnect wire leads.

(2) Remove switch.

e. Installation

(1) See tags and wiring diagram and connect leads. (See fig. 4-7.)

(2) Remove tags.

(3) Slip switch into control box and place shaft through hole.

(4) Using wrench and holding backside of switch, secure switch to box with lockwasher and nut. Be sure that switch positions match front plate.

(5) Insert rear panel into box and aline holes.

(6) Using screwdriver and wrench, secure rear panel with four screws and locknuts.

(7) Place knobs on switch shafts and aline setscrews with flats on shafts.

(8) Using hex head wrench, tighten setscrews in both knobs.

Follow-on procedure: Install control panel. (See para 4-44.)

4-48. TWO-SPEED FAN (TOGGLE) SWITCH (S7)

Preliminary procedure: Remove control panel. (See para 4-44.)

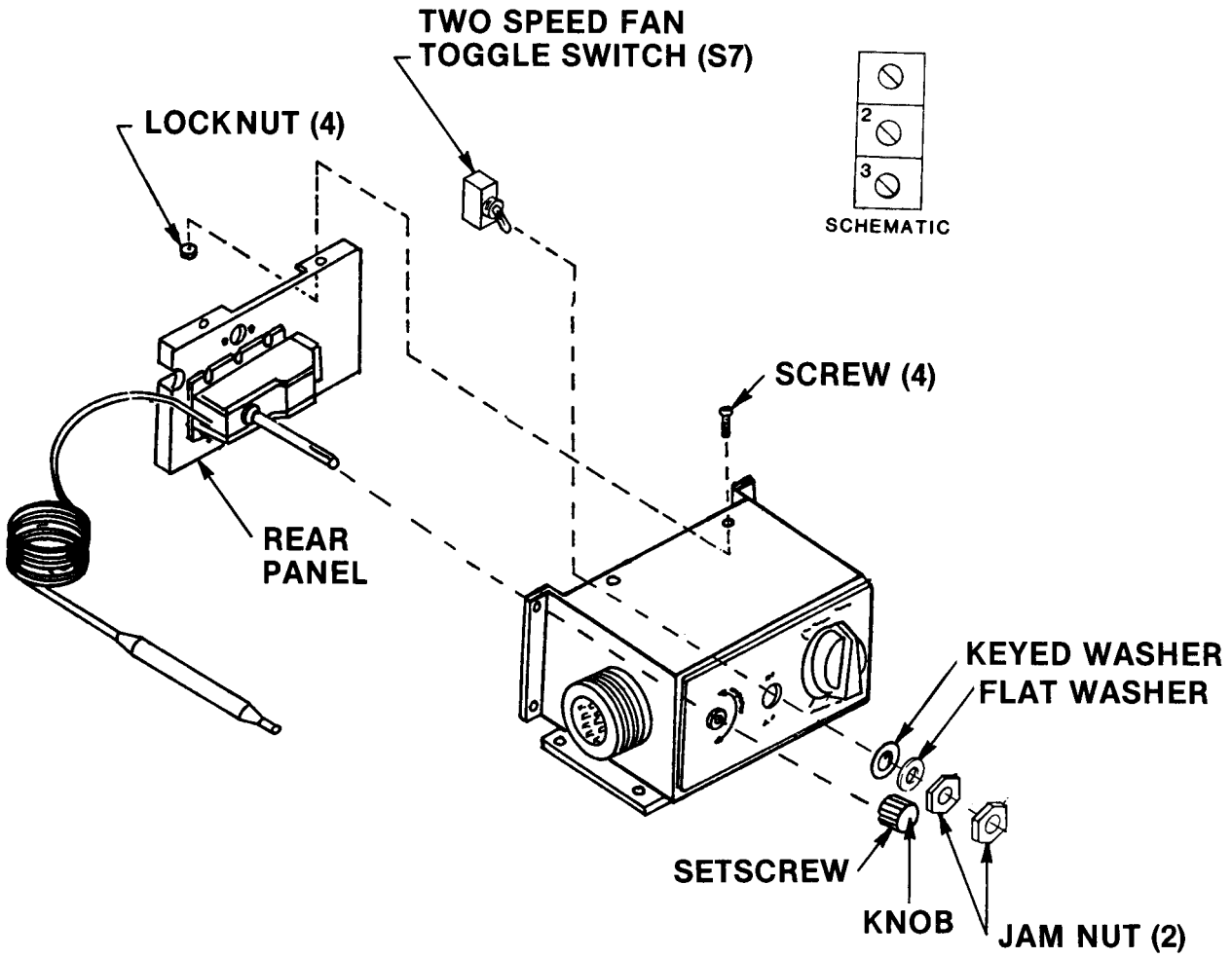


Figure 4-45. Two-Speed Fan (Toggle) Switch

a. Access

(1) Using hex head wrench, loosen setscrews in thermostat knob.

(2) Remove knob.

(3) Using screwdriver and wrench, remove four screws and locknuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

b. Removal

(1) Using wrench and holding rear of switch, remove two jam nuts, lockwasher and locking ring from thread face.

(2) Tag and disconnect wire leads.

c. Inspection

(1) Check switch to see that the leads are properly connected. (See wiring diagram fig. 4-7.)

(2) Repair or replace loose or broken leads.

(3) Check that switch terminal is not loose, broken, or corroded.

(4) Check switch for evidence of overheating or other visible damage.

(5) Replace switch if damaged.

d. Test

(1) Using multimeter, place probes on terminals 1 and 3.

(2) Place switch in up position (HI SPEED). Continuity should be indicated.

(3) Place switch in down position (LO SPEED). Continuity should be indicated.

(4) If the switch fails any of the above tests, replace switch.

e. Installation

(1) Install switch in control panel fitting keyway of switch to keyed hole in control panel.

(2) Slip keyed locking ring on threaded shaft.

(3) Using wrench and holding rear of switch, secure washer and two jam nuts on switch.

(4) Install wire leads and remove tags.

(5) Insert rear panel and aline holes.

(6) Using screwdriver and wrench, secure rear panel with four screws and locknuts.

(7) Place knob on thermostat switch shaft and aline setscrews with flats on shaft.

(8) Using hex head wrench, tighten setscrew on shaft.

Follow-on procedure: Install control panel. (See para 4-44.)

4-49. CONTROL PANEL HOUSING

Preliminary procedures:
1. Remove control panel wiring harness. (See para 4-45.)
2. Remove Temperature control thermostat. (See para 4-46.)
3. Remove mode selector switch. (See para 4-47.)
4. Remove two-speed fan switch. (See para 4-48.)

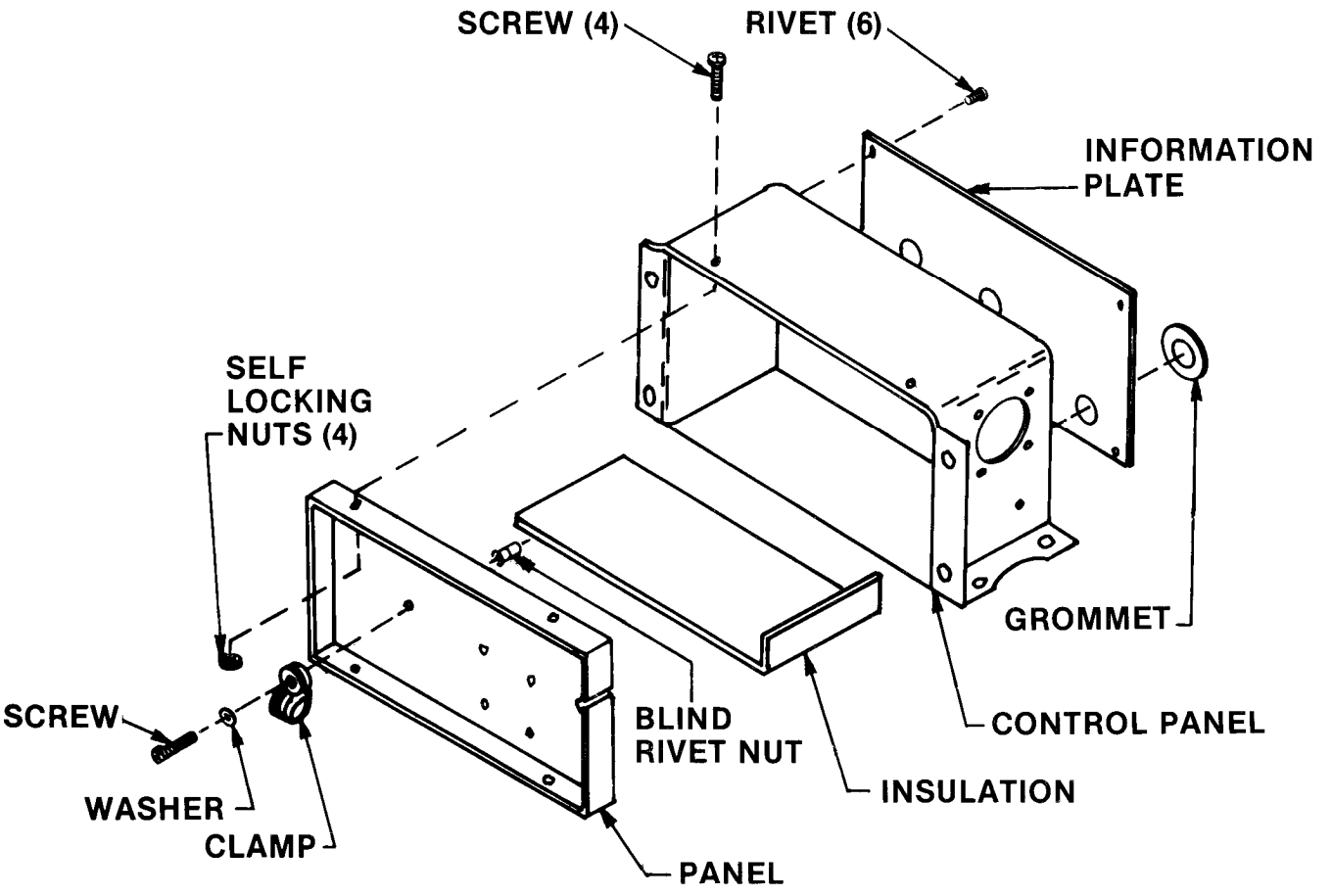


Figure 4-46. Control Panel Housing

a. Inspection

(1) Check control panel for dents, cracks, or punctures. Replace if damage creates a hazard or interferes with operation.

(2) Check that insulation, blind rivet nut, clamp, and grommets are in place and secure. Repair or replace as needed.

(3) Check that information plate is legible and securely riveted to control panel .

(4) Check support for cracks or dents that create a hazard or interfere with operation.

b. Repair

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

(2) Refer replacement of information plate to Direct Support Maintenance.

Follow-on procedures: 1. Install mode selector switch. (See para 4-47.)

2. Install Temperature control thermostat. (See para 4-46.)

3. Install two-speed fan switch. (See para 4-48.)

4. Install control panel wiring harness. (See para 4-45.)

4-50. COMPRESSOR MOTOR START CAPACITOR (C4)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Inspection

WARNING

A capacitor can retain a high electrical charge. Touching the terminals of a charged capacitor can result in severe electrical shock and skin burns. Always ground the terminals of a capacitor as soon as they are exposed.

(1) Using jumper cable, make contact with capacitor terminal and any convenient ground.

(2) Check for loose, corroded, missing, or broken terminal connections.

(3) Check capacitor for cracks, evidence of overheating, and any other visible damage. Replace if damaged.

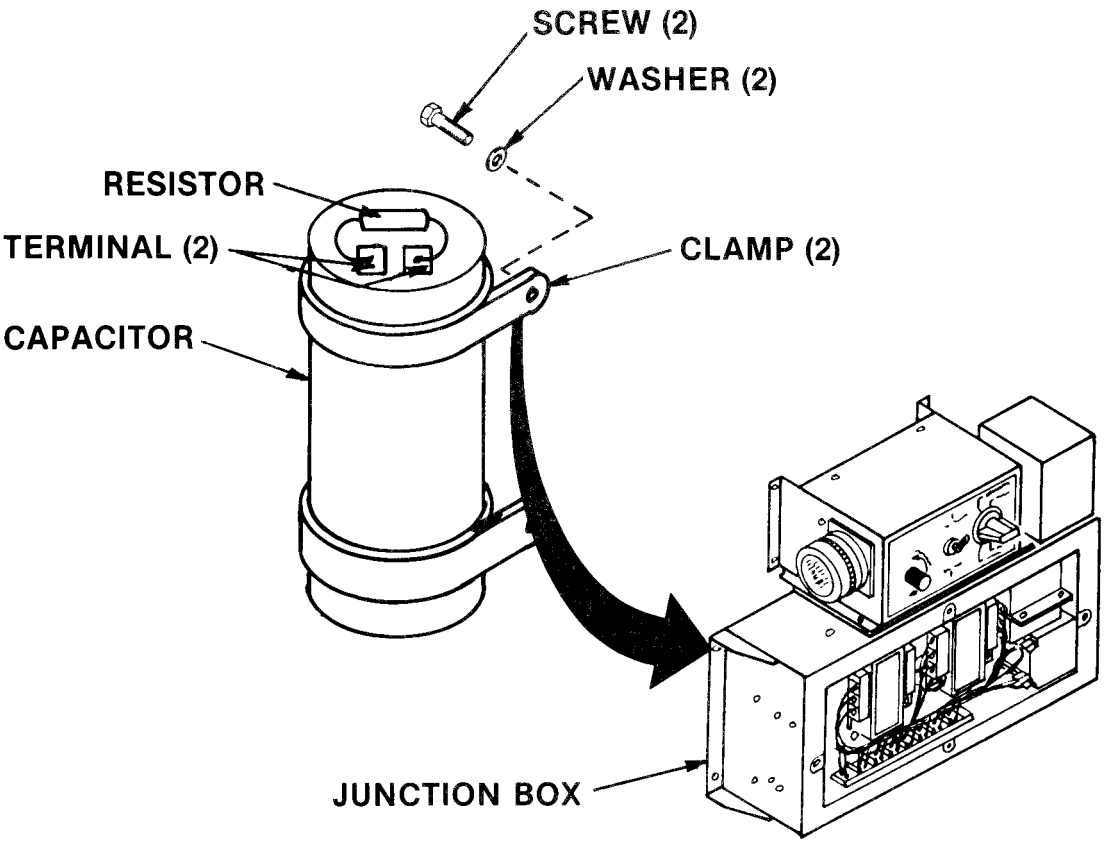


Figure 4-47. Compressor Motor Start Capacitor

b. Test

(1) Using a capacitance tester, check capacitance across terminals.

(2) If capacitance does not read between 124 and 149 microfarads, the capacitor is faulty and must be replaced.

(3) If a capacitance tester is not available, conduct the following test using a multimeter:

- Set meter to highest OHMS scale.
- Connect positive (+) meter lead to positive (+) capacitor terminal.
- Connect negative (-) meter lead to negative (-) capacitor terminal.
- Engage meter

(4) A good capacitor will be shown by meter quickly registering high resistance, then slowly backing off to zero resistance.

(5) If meter displays high resistance and remains there, the capacitor is internally shorted and must be replaced.

(6) If the meter does not show any resistance, the capacitor is open and must be replaced.

c. Removal

(1) Tag and disconnect wire leads.

(2) Using screwdriver, loosen two screws and washers from two capacitor clamps.

(3) Remove capacitor from clamps.

(4) Unsolder resistor from capacitor terminals. Discard resistor.

d. Installation

(1) Solder new resistor to capacitor terminals.

(2) Install capacitor in clamps.

(3) With screwdriver, secure two screws in clamps.

(4) See tags and wiring diagram (fig. 4-7) and connect wire leads.

Follow-on procedure: Install junction box. (See para 4-29.)

4-51. FAN MOTOR CAPACITOR (C1)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Inspection

WARNING

A capacitor can retain a high electrical charge. Touching the terminals of a charged capacitor can result in severe electrical shock and skin burns. Always ground the terminals of a capacitor as soon as they are exposed.

(1) Remove capacitor boots from capacitor bodies.

(2) Using jumper cable, make contact with capacitors and casing.

(3) Check capacitor for cracks, evidence of overheating, and any other visible damage. Replace if damaged.

(4) Check that top of capacitor is flat. If the top is “ballooned”, it has failed and must be replaced.

b. Test

(1) Tag and disconnect wire leads on capacitor (C1).

(2) Using a capacitance tester, check capacitance across terminals.

(3) If capacitance does not read 50.00 ±5.O microfarads, the capacitor is faulty and must be replaced.

(4) If a capacitance tester is not available, conduct the following test using a multimeter:

- Set meter to highest OHMS scale.
- Connect positive (+) meter lead to positive (+) capacitor terminal.
- Connect negative (-) meter lead to negative (–) capacitor terminal.
- Engage meter.

(5) A good capacitor will be shown by meter quickly registering high resistance, then slowly backing off to zero resistance.

(6) If meter displays high resistance and remains there, the capacitor is internally shorted and must be replaced.

(7) If the meter does not show any resistance, the capacitor is open and must be replaced.

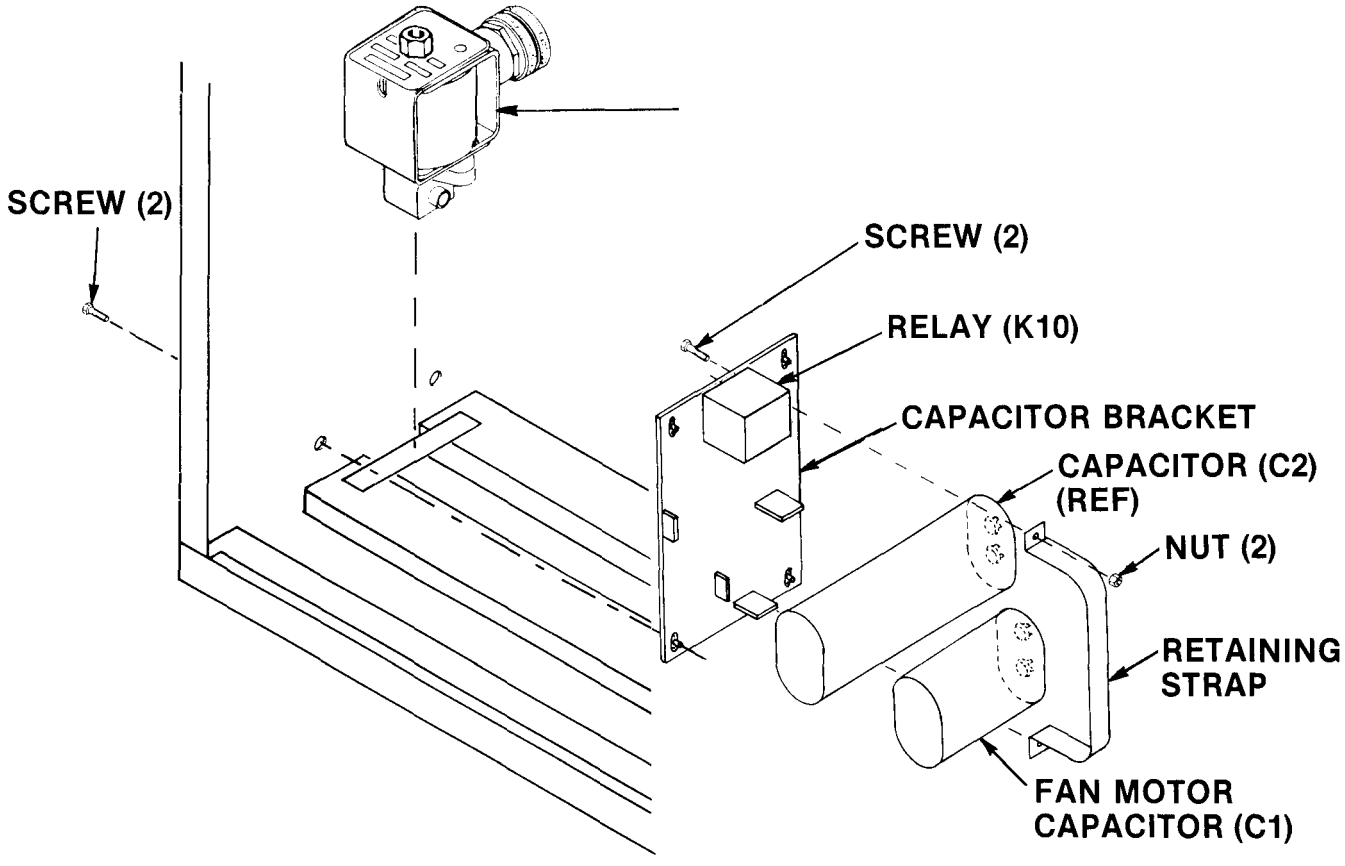


Figure 4-48. Fan Motor

c. Removal

(1) Using socket wrench, remove nut and data plate from solenoid valve L1.

(2) Remove L1 coil assembly and set aside.

(3) Tag and disconnect wire leads on capacitor (C1).

(4) Using screwdriver, remove four screws in casing that secure capacitor bracket.

(5) Remove bracket.

(6) Using screwdriver and wrench, remove screw and nut that secure retaining strap to bracket.

(7) Remove strap.

(8) Note position of (Cl) and (C2) capacitors.

(9) Remove capacitor (Cl).

d. Installation

(1) Position capacitors (Cl) and (C2) on bracket as noted during removal.

(2) Aline retaining strap on bracket.

(3) Using screwdriver and wrench, secure retaining strap to bracket with two screws and nuts.

(4) See tags and wiring diagram (fig. 4-7) and connect leads. Remove tags.

(5) Aline bracket on inside casing.

(6) Using screwdriver, secure bracket to casing with four screws.

(7) Install boots on capacitors.

(8) Using socket wrench, install L1 coil assembly, data plate and nut on L1 valve plunger.

Follow-on procedure: Install junction box. (See para 4-29.)

4-52. COMPRESSOR MOTOR RUN CAPACITOR (C2)

Preliminary procedure: Remove junction box. (See para 4-29.)

a. Inspection

WARNING

A capacitor can retain a high electrical charge. Touching the terminals of a charged capacitor can result in severe electrical shock and skin burns. Always ground the terminals of a capacitor as soon as they are exposed.

(1) Remove capacitor boots from capacitor bodies.

(2) Using jumper cable, make contact with capacitors and casing.

(3) Check capacitor for cracks, evidence of overheating, and any other visible damage. Replace if damaged.

(4) Check that top of capacitor is flat. If the top is “ballooned”, it has failed and must be replaced.

b. Test

(1) Tag and disconnect wire leads on capacitor (C2) .

(2) Using a capacitance tester, check capacitance across terminals.

(3) If capacitance does not read 25.00 ±2.5 microfarads, the capacitor is faulty and must be replaced.

(4) If a capacitance tester is not available, conduct the following test using a multimeter:

- Set meter to highest OHMS scale.
- Connect positive (+) meter lead to positive (+) capacitor terminal.
- Connect negative (-) meter lead to negative (-) capacitor terminal.
- Engage meter.

(5) A good capacitor will be shown by meter quickly registering high resistance, then slowly backing off to zero resistance.

(6) If meter displays high resistance and remains there, the capacitor is internally shorted and must be replaced.

(7) If the meter does not show any resistance, the capacitor is open and must be replaced.

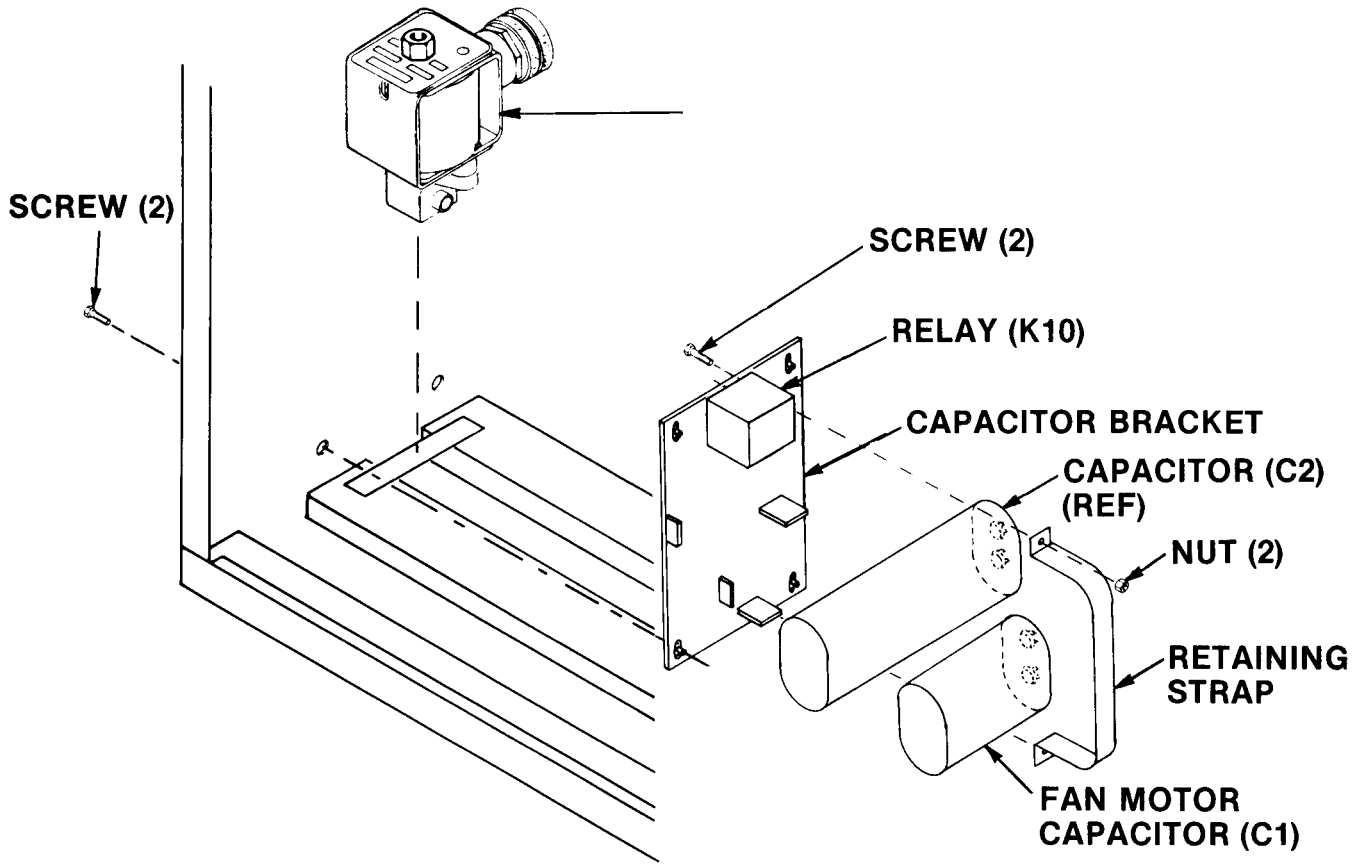


Figure 4-49. Compressor Motor Run Capacitor (C2)

c. Removal

(1) Using socket wrench, remove nut and data plate from solenoid valve L1.

(2) Remove L1 coil assembly and set aside.

(3) Tag and disconnect wire leads on capacitor (C2).

(4) Using screwdriver, remove four screws in casing that secure capacitor bracket.

(5) Remove bracket.

(6) Using screwdriver and wrench, remove screw and nut that secure retaining strap to bracket.

(7) Remove strap.

(8) Note position of (C1) and (C2) capacitors.

(9) Remove capacitor (C2).

d. Installation

(1) Position capacitors (C1) and (C2) on bracket as noted during removal.

(2) Aline retaining strap on bracket.

(3) Using screwdriver and wrench, secure retaining strap to bracket with two screws and nuts.

(4) See tags and wiring diagram (fig. 4-7) and connect leads. Remove tags.

(5) Aline bracket on inside casing.

(6) Using screwdriver, secure bracket to casing with four screws.

(7) Install boots on capacitors

(8) Using socket wrench, install L1 coil assembly, data plate and nut on L1 valve plunger.

Follow-on procedure: Install junction box. (See para 4-29.)

4-53. ARMATURE RELAY (K10)

Preliminary procedures: 1. Remove junction box. (See para 4-29.)

2. Remove capacitor bracket. (See para 4-51.)

a. Inspection

(1) Check relay for cracks, evidence of overheating, and any other visible damage. Replace if damaged.

b. Test

(1) Using a multimeter set on lowest OHMS scale, check continuity between terminals 2 and 1 and 4 and 5. Both contacts should be closed. If there is no continuity, replace relay.

WARNING

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

(2) Apply external 115 VAC, 50/60 hertz power to terminals 4 and 5.

(3) Test voltage across terminals 1 and 2.

(4) If voltage is found, replace relay.

(5) Remove external 115 VAC power source from terminals 4 and 5.

c. Removal

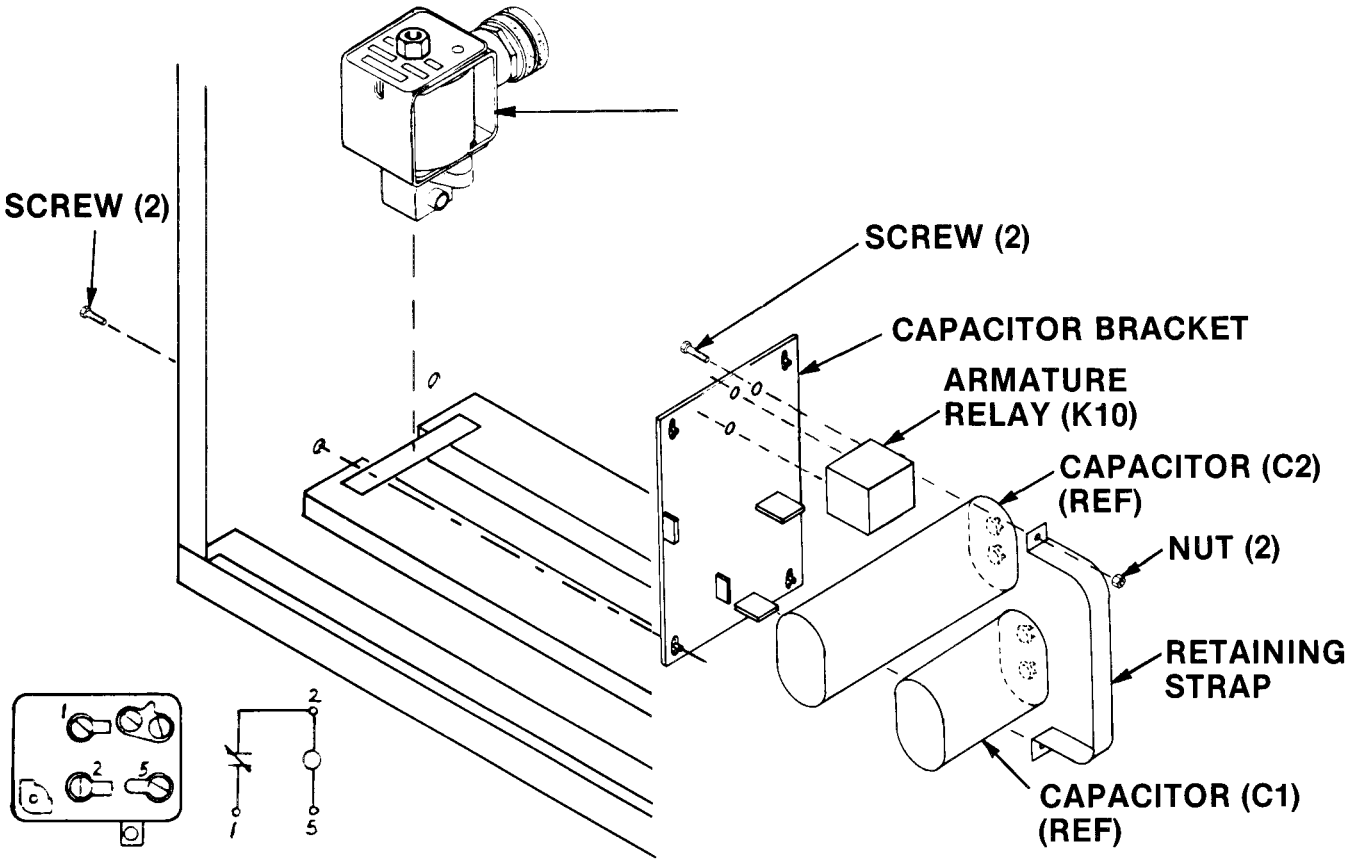


Figure 4-50. Armature Relay (K10)

(1) Remove bracket, capacitor (Cl), capacitor (C2), and relay (K10). (See para 4-51.)

(2) With screwdriver and wrench, remove the screw, washer and nut in relay and bracket.

(3) Remove relay.

d. Installation

(1) With screwdriver and wrench, secure the screw, washer and nut in relay and bracket.

(2) Install retaining strap, capacitor (C1), capacitor (C2), and relay (K10). (See para 4-51.)

Follow-on procedures: 1. Install capacitor bracket. (See para 4-51.)

2. Install junction box. (See para 4-29.)

4-54. FAN RELAY (K7)

Preliminary procedures: 1. Remove top panel. (See para 4-23.)

2. Remove condenser air discharge guard. (See para 4-20.)

a. Removal

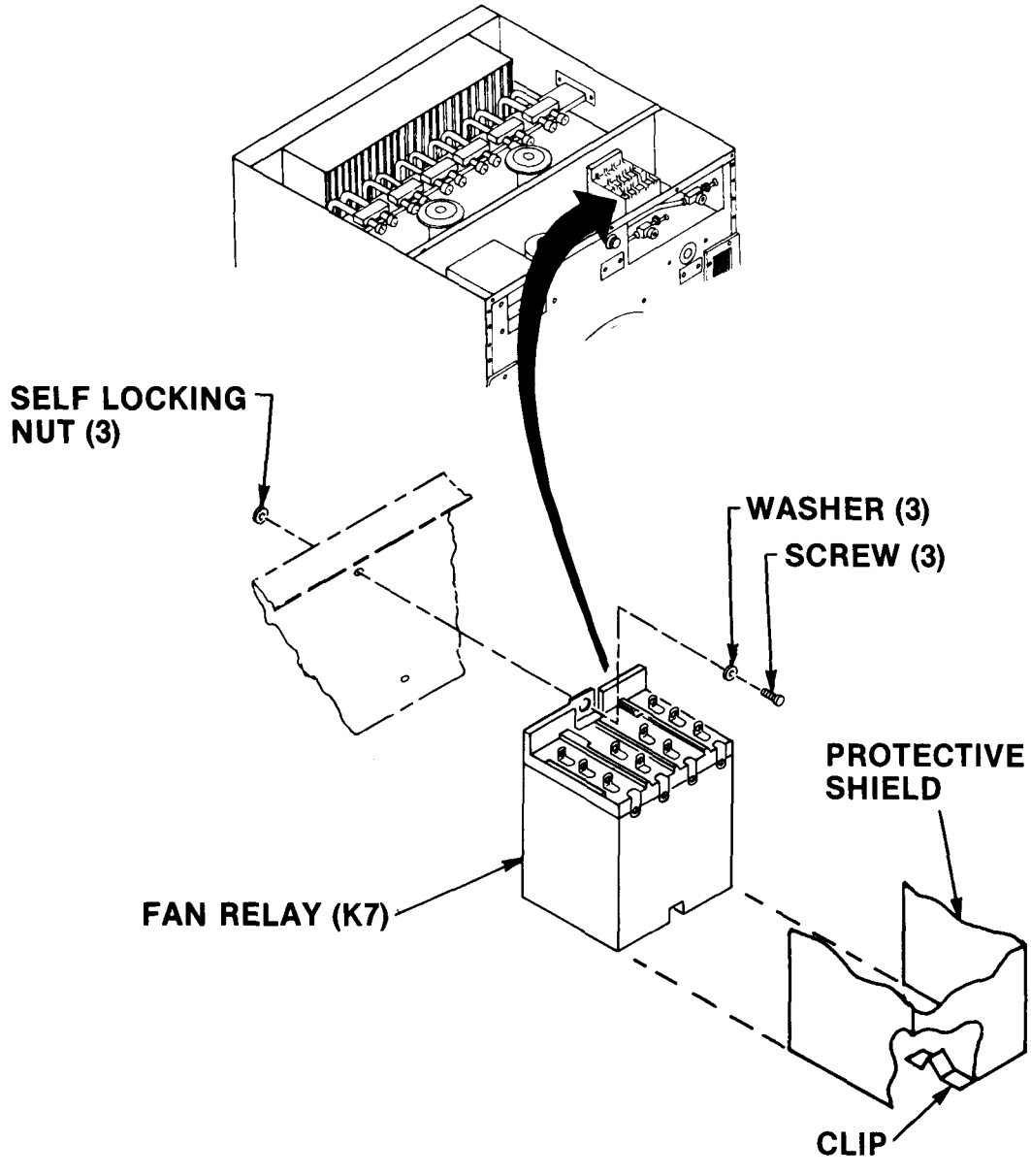


Figure 4-51. Fan Relay (K7)

(1) Tag and disconnect wire leads.

(2) Using hex head socket wrench, loosen two setscrews in condenser fan hub. Remove condenser fan and key.

(3) Remove protective body covering from relay.

(4) With wrench and screwdriver, remove the three screws, washers, and self-locking nuts in relay.

(5) Remove relay.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and any other visible damage. Replace if damaged.

c. Test

(1) Use continuity tester or multimeter set on lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, C1 and C2, and D1 and D2. All four contacts should be open. If there is continuity, replace relay.

(2) Check continuity between terminals A3 and A2, B3 and B2, C3 and C2, and D3 and D2. All four contacts should be closed. If there is no continuity, replace relay.

(3) Apply external 28 volts dc power across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, C1 and C2 and D1 and D2. All three contacts should be closed. If there is no continuity, replace relay.

(4) Remove external 28 volts dc power source from terminals X1 and X2.

d. Installation

(1) Using wrench and screwdriver, secure relay with three screws, washers and self–locking nuts.

(2) Install protective body covering on relay.

(3) Install condenser fan and key flush to motor shaft.

(4) Using torque wrench fitted with hex head socket, torque two setscrews to 82 inch-pounds.

(5) See tags and wiring diagram (fig. 4-7) and connect leads.

(6) Remove tags.

Follow-on procedures: 1. Install condenser air discharge guard. (See para 4-20.)

2. Install top panel. (See para 4-23.)

4-55. AMBIENT AIR THERMOSTAT (S2)

Preliminary procedure: 1. Remove junction box. (See para 4-29.)

2. Remove condenser air discharge guard. (See para 4-20.)

3. Remove lower panel. (See para 4-24.)

a. Inspection

(1) Check thermostat for cracks or evidence of other visible damage. Replace if damaged.

b. Test

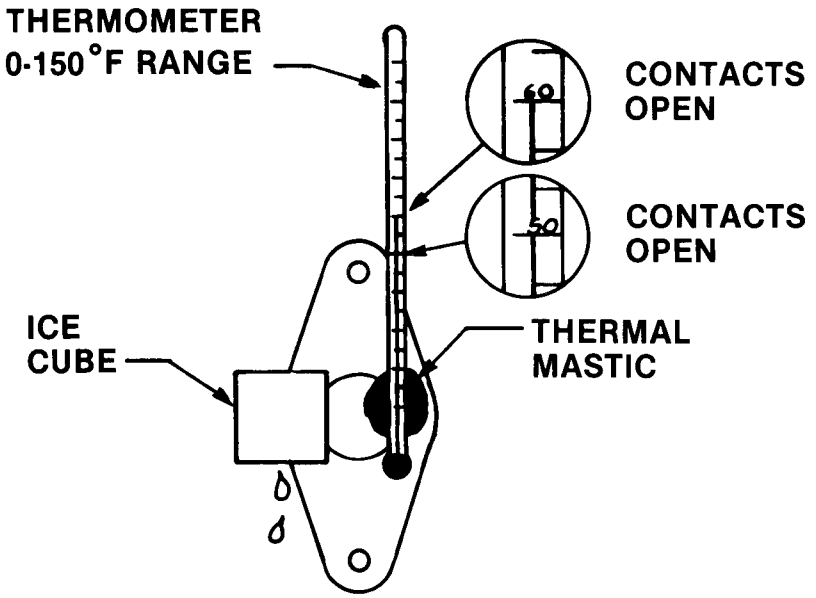


Figure 4-52. Thermostat Test Set-Up

(1) Disconnect P10 wiring harness plug.

(2) Using a multimeter set on lowest OHMS scale, check continuity at pins D and E on P10 wiring harness plug. Contacts should be closed when the surrounding temperature is above 50°F (10°C). If there is no continuity, replace thermostat.

(3) Tape the bulb of a thermometer to the thermostat gasket. Use a blob of thermal mastic to improve conductivity.

(4) Place an ice cube to the face of the thermostat gasket.

(5) When the temperature of the thermostat reaches approximately 50°F (10°C) the contacts should open.

(6) Remove the ice cube.

(7) When the temperature reaches approximately 60°F (16°C) the contacts stay close.

(8) If the thermostat fails any of the above tests, replace thermostat.

c. Removal

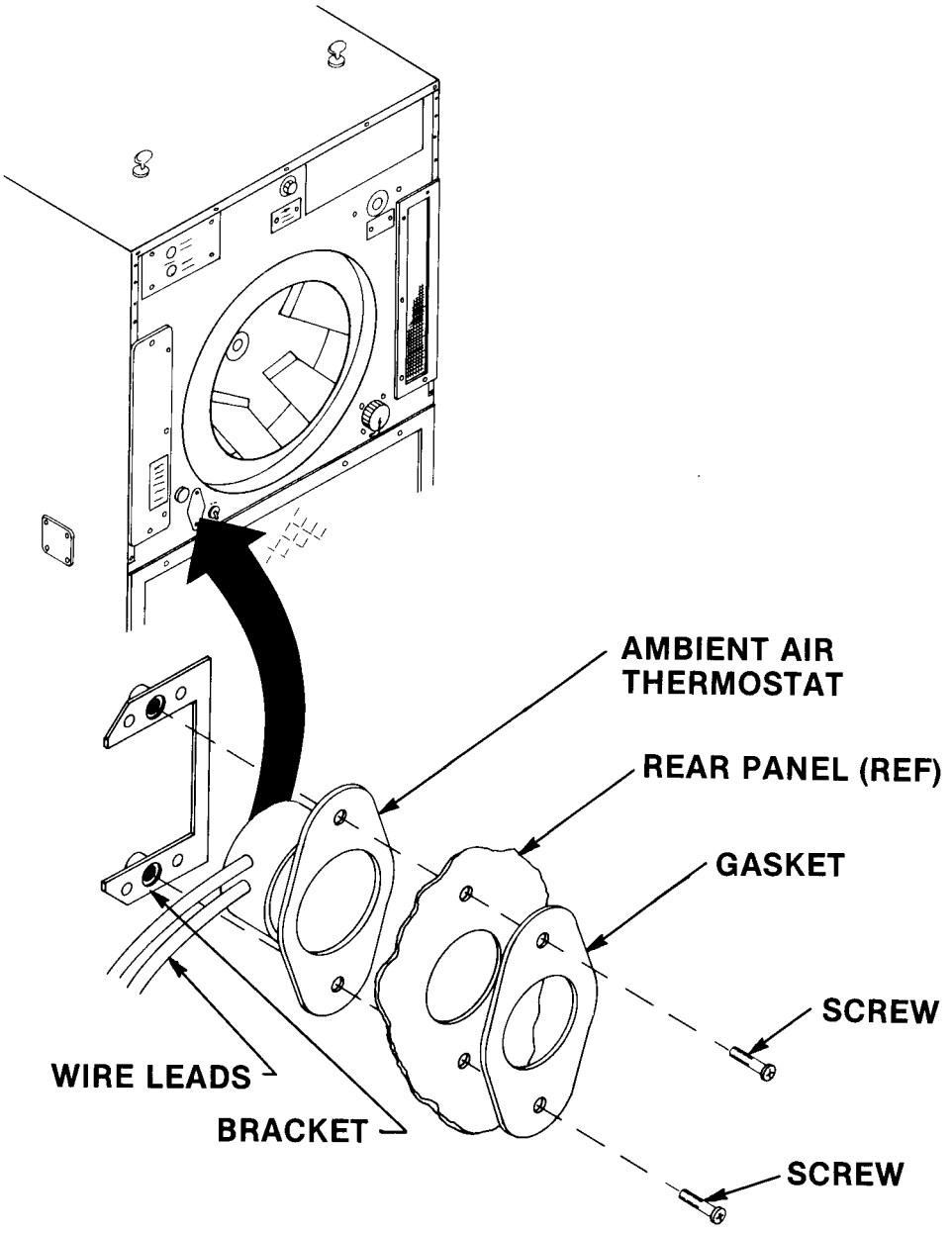


Figure 4-53. Ambient Air Thermostat

(1) Using hex head wrench, loosen two setscrews on hub of condenser fan.

(2) Remove condenser fan and key.

(3) With screwdriver, remove two screws in thermostat.

(4) Remove and put aside gasket and bracket.

(5) Remove thermostat leads from plug P1O. (See para 4-27.)

d. Installation

(1) See paragraph 4-27 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal/connector information.

(3) Using screwdriver, secure bracket, thermostat and gasket with two screws.

(4) Connect P1O to connector J10.

(5) Install condenser fan and key flush to motor shaft.

(6) Using torque wrench fitted with hex head socket, torque two setscrews to 82 inch-pounds.

Follow-on procedures: 1. Install lower panel. (See para 4-24.)

2. Install condenser air discharge guard. (See para 4-20.)

3. Install junction box. (See para 4-29.)

4-56. HEATER CUTOUT (THERMOSTAT) SWITCH (S3)

Preliminary procedure: Remove top panel. (See para 4-23.)

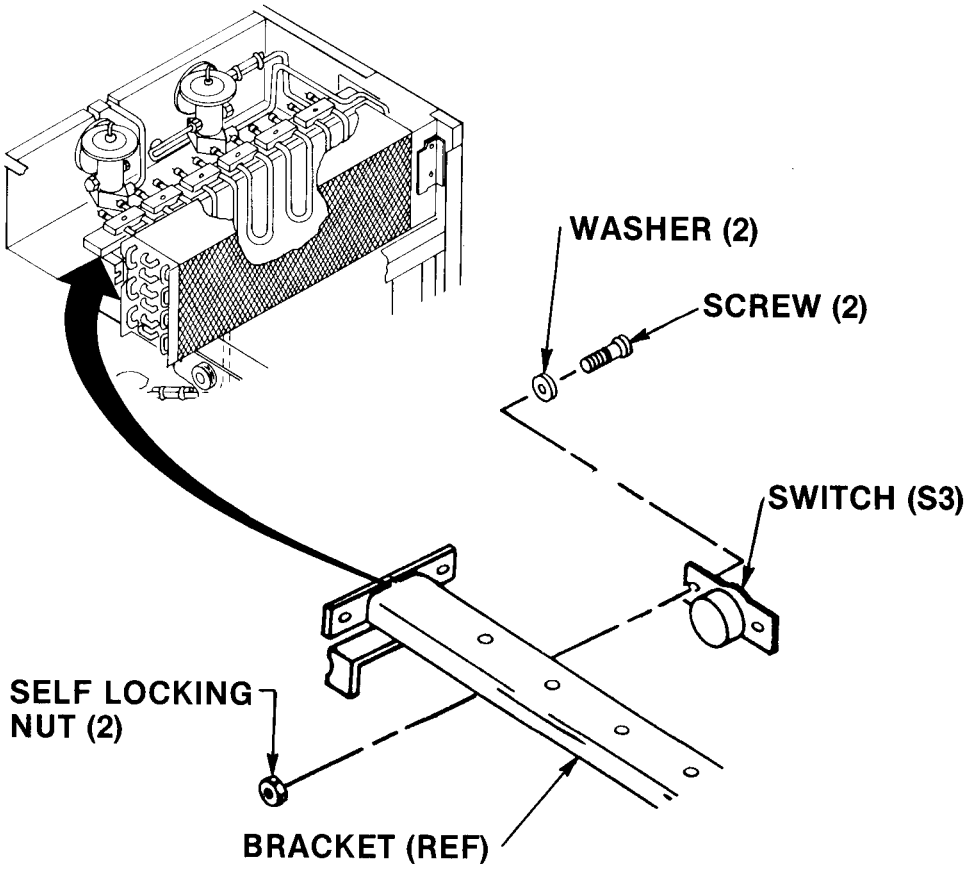


Figure 4-54. Heater Cutout (Thermostat) Switch (S3)

WARNING

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

a. Removal

(1) Tag and disconnect wire leads.

(2) Disconnect connector J7.

(3) Using screwdriver and wrench, remove two screws and locknuts in thermostat.

(4) Remove heater cutout (thermostat) switch.

b. Test. 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). If continuity is not indicated between all contacts, replace the thermostat.

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°).

c. Installation

(1) Using screwdriver and wrench, secure thermostat to bracket with two screws and locknuts.

(2) See tags and wiring diagram (fig. 4-7) and solder wire leads.

(3) Remove tags.

(4) Connect J7 to P7.

Follow-on procedure: Install top panel. (See para 4-23.)

4-57. ELECTRIC HEATER (ELEMENTS) (HR1 THRU HR6) AND SUPPORT

Preliminary procedure: Remove top panel. (See para 4-23.)

WARNING

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

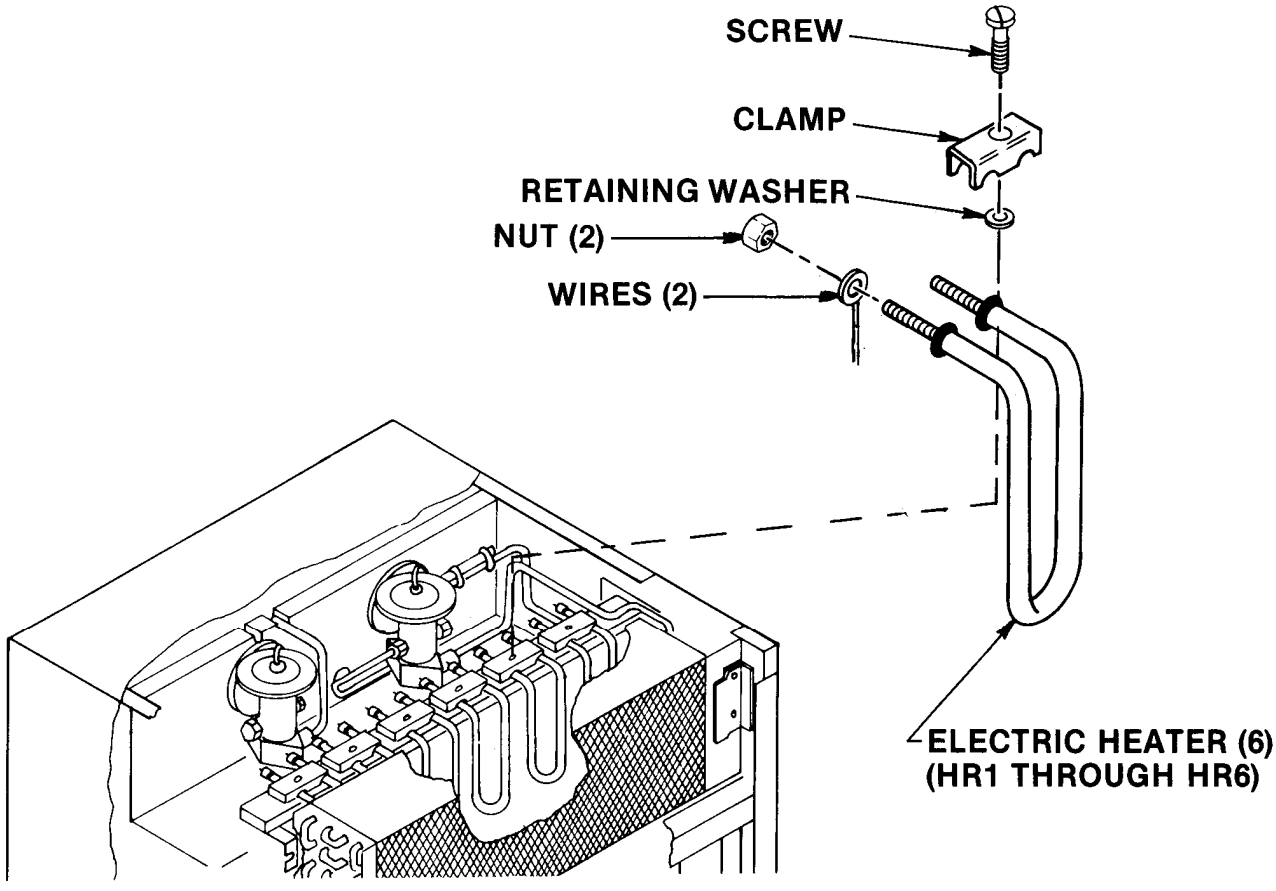


Figure 4-55. Electric Heater (Elements) (HR1 thru HR6)

a. Inspection/Testing

(1) Check heater elements for deformation, damaged terminals, threads, cracked, or broken 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.

b. Heater removal

(1) Tag and disconnect the wire leads from the heater that is being removed.

(2) Using a screwdriver, remove the screw and retaining washer in the retainer clamp.

(3) Pull heater element free of lower mounting clip and remove heater.

c. Heater support and bracket removal

(1) Remove heater cutout switch. (See para 4-56.)

(2) Remove all six heaters.

(3) Using screwdriver, remove two screws, lockwashers, and flat washers each, in" casing-sides.

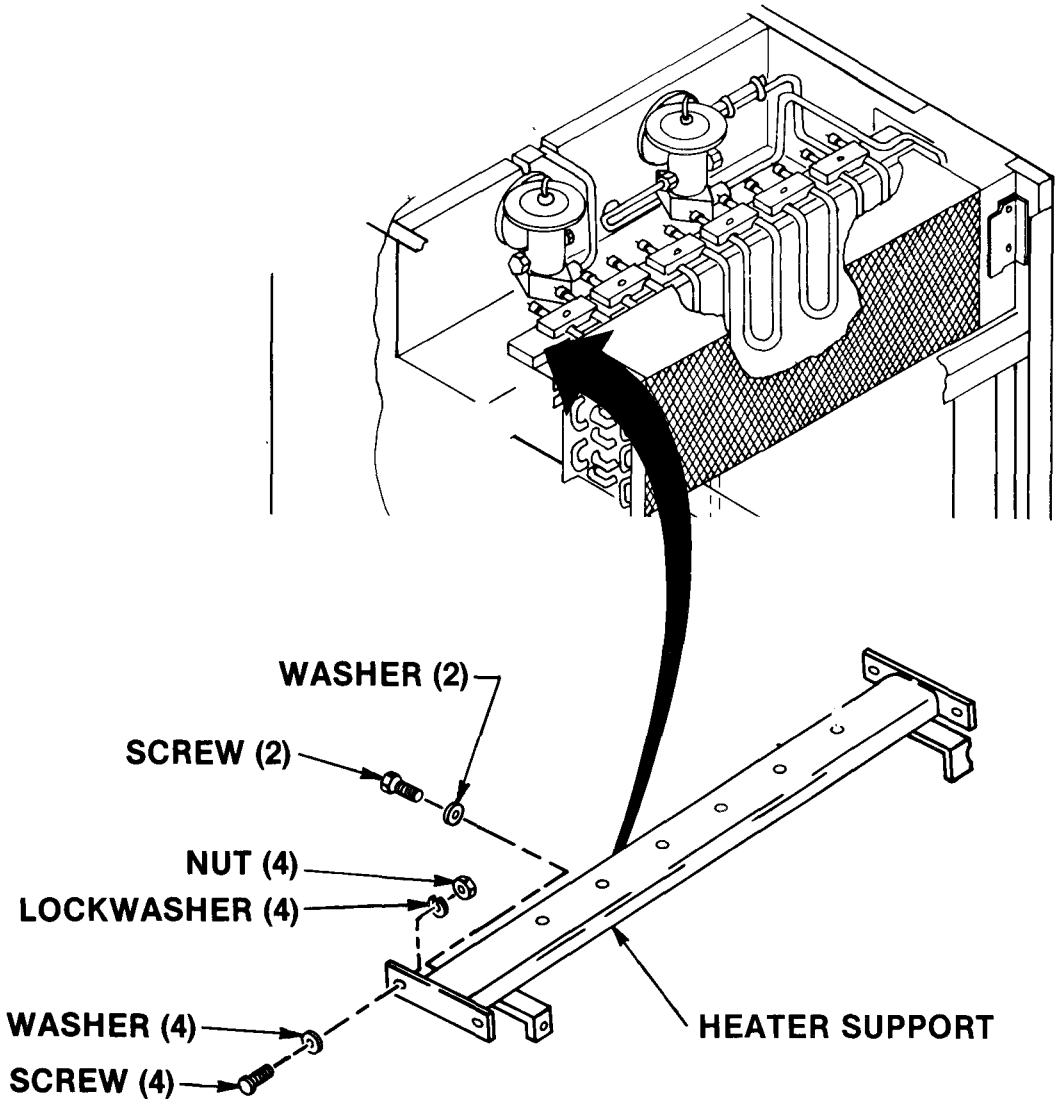


Figure 4-56. Heater Support

(4) Using screwdriver, remove two screws and washers in evaporator coil.

(5) Remove heater support.

d. Heater support Installation

(1) Using screwdriver, install two screws and washers in evaporator coil,

(2) Using screwdriver, secure support to bracket with two screws, lock-washers, and flat washers each in casing sides.

(3) Install heater cutout switch. (See para 4-56.)

e. Heater installation

(1) Aline heater over threaded inserts on bracket,

(2) Using screwdriver, secure top of heater with retainer clamp and retaining washer by tightening screw.

(3) See tag and wiring diagram (fig. 4-7) and connect wire leads.

(4) Remove tags.

Follow-on procedure: Install top panel. (See para 4-23.)

4-58. EVAPORATOR FAN

Preliminary procedures: 1. Remove evaporator intake grille assembly. (See para 4-19.)

2. Remove air filter. (See para 4-25.)

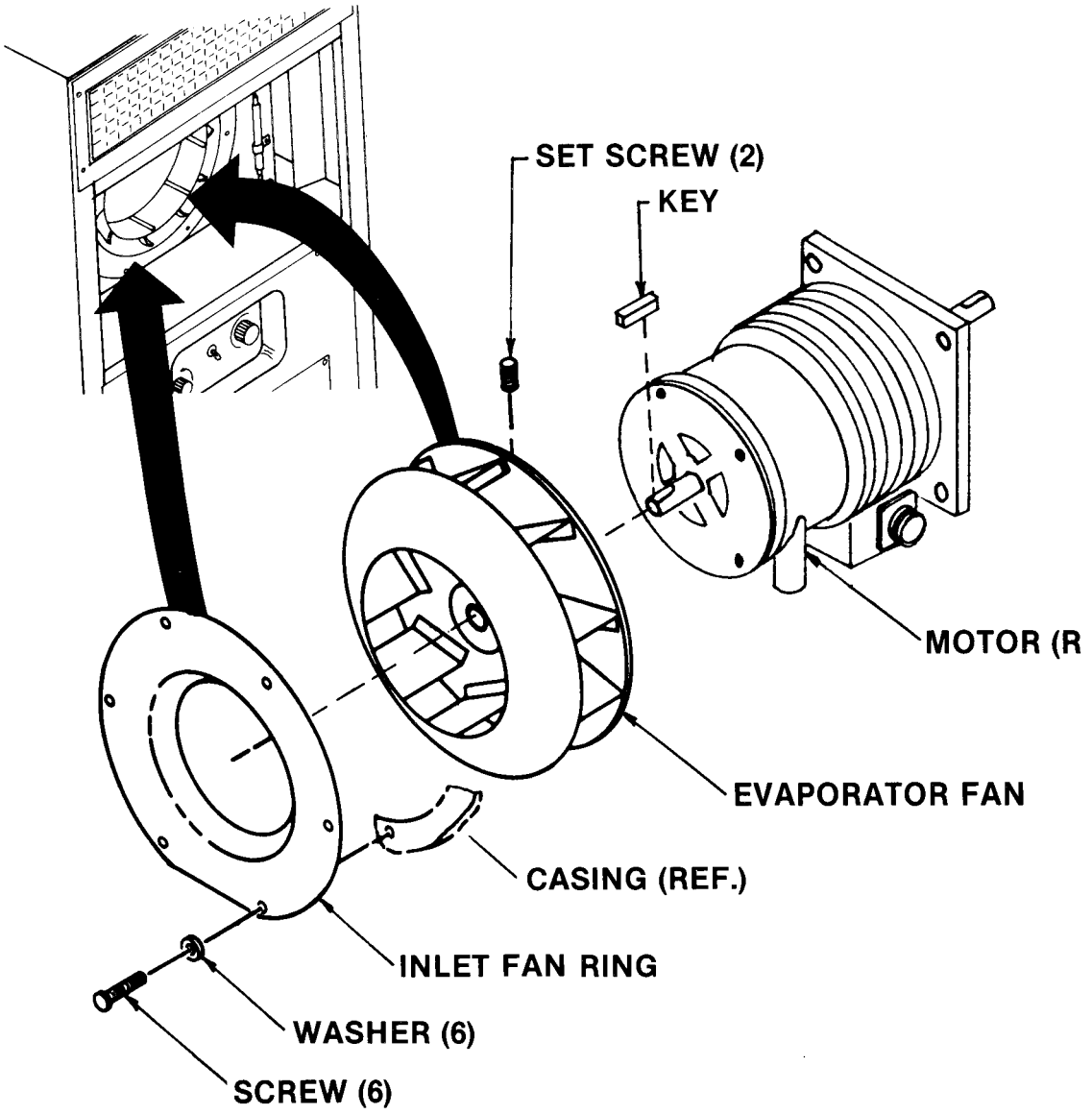


Figure 4-57. Evaporator Fan

WARNING

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

a. Removal

(1) With screwdriver, remove six screws and washers in evaporator inlet ring.

(2) Remove ring.

(3) With hex head wrench, loosen setscrew in fan hub.

(4) Carefully pull evaporator fan off of motor shaft.

(5) Remove shaft key and shims (if applicable) and tape in place so that they will not be lost.

b. Inspection

(1) Check fan for dents, bent or loose fan blades, and that hub is securely attached. Replace if damaged.

(2) Check inlet ring for dents or any distortion that would cause interference with fan. Replace if damaged.

(3) If a motor problem is suspected, inspect or test motor in accordance with paragraph 4-60.

c. Clean

(1) Use a clean dry cloth and a soft brush to remove dirt from fan.

(2) If fan and inlet bell are excessively dirty, wash therewith a mild detergent and water solution.

d. Installation

(1) Check that shaft key is in place. If it is taped in place, remove tape.

(2) Aline keyway and shaft key and slip fan onto motor shaft.

(3) Aline fan hub flush with end of motor shaft.

(4) With torque wrench, tighten two setscrews to a torque of 82 inch-pounds.

(5) With screw driver, secure inlet ring with six screws and washers.

(6) Spin fan by hand and check for any interference between fan and ring. Adjust fan if necessary.

Follow-on procedures: 1. Install air filter. (See para 4-25.)

2. Install evaporator intake grille assembly. (See para 4-19.)

4-59. CONDENSER FAN

Preliminary procedure: Remove condenser air discharge guard. (See para 4-20.)

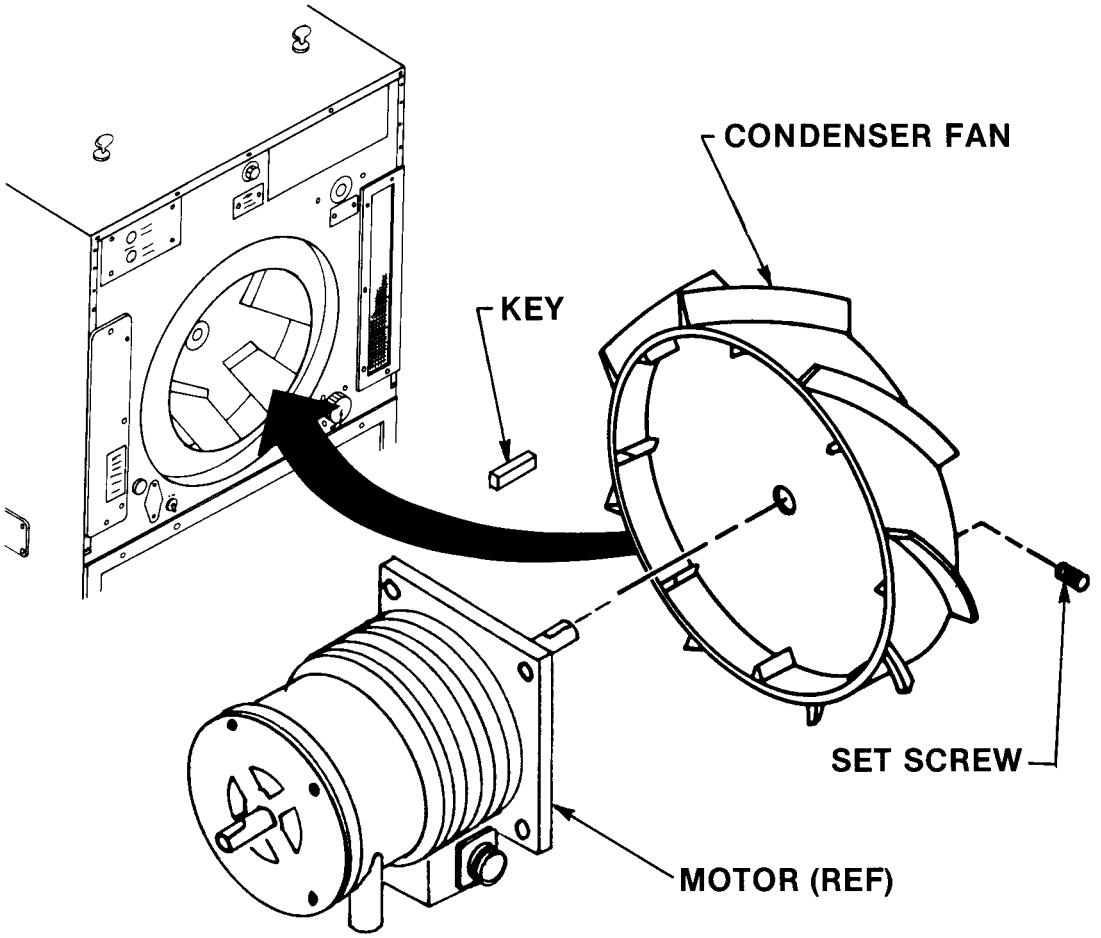


Figure 4-58. Condenser Fan

a. Removal

(1) With hex head wrench, loosen set screw in fan hub.

(2) Carefully pull condenser fan off of motor shaft.

(3) Remove shaft key and shims (if applicable) or tape in place so they will not be lost.

b. Inspection

(1) Check fan for dents, bent or loose blades, and that the hub is securely attached. Replace if damaged.

(2) If motor problem is suspected, inspect or test motor per paragraph 4-60.

c. Clean

(1) Use a clean dry cloth and a soft brush to remove dirt from fan.

(2) If fan is excessively dirty, wash with mild detergent and water solution.

d. Installation

(1) Check that shaft key is in place. If it is taped in place, remove tape.

(2) Aline keyway and shaft key and slip fan onto motor shaft.

(3) Aline fan hub flush with end of motor shaft.

(4) Using torque wrench, tighten setscrew to a torque of 82 inch-pounds.

Follow-on procedure: Install condenser air discharge guard. (See para 4-20.)

4-60. EVAPORATOR AND CONDENSER FAN MOTOR (B2)

Preliminary procedures: 1. Remove evaporator fan and ring. (See para 4-58.)

2. Remove condenser fan. (See para 4-59.)

Personnel required: Two

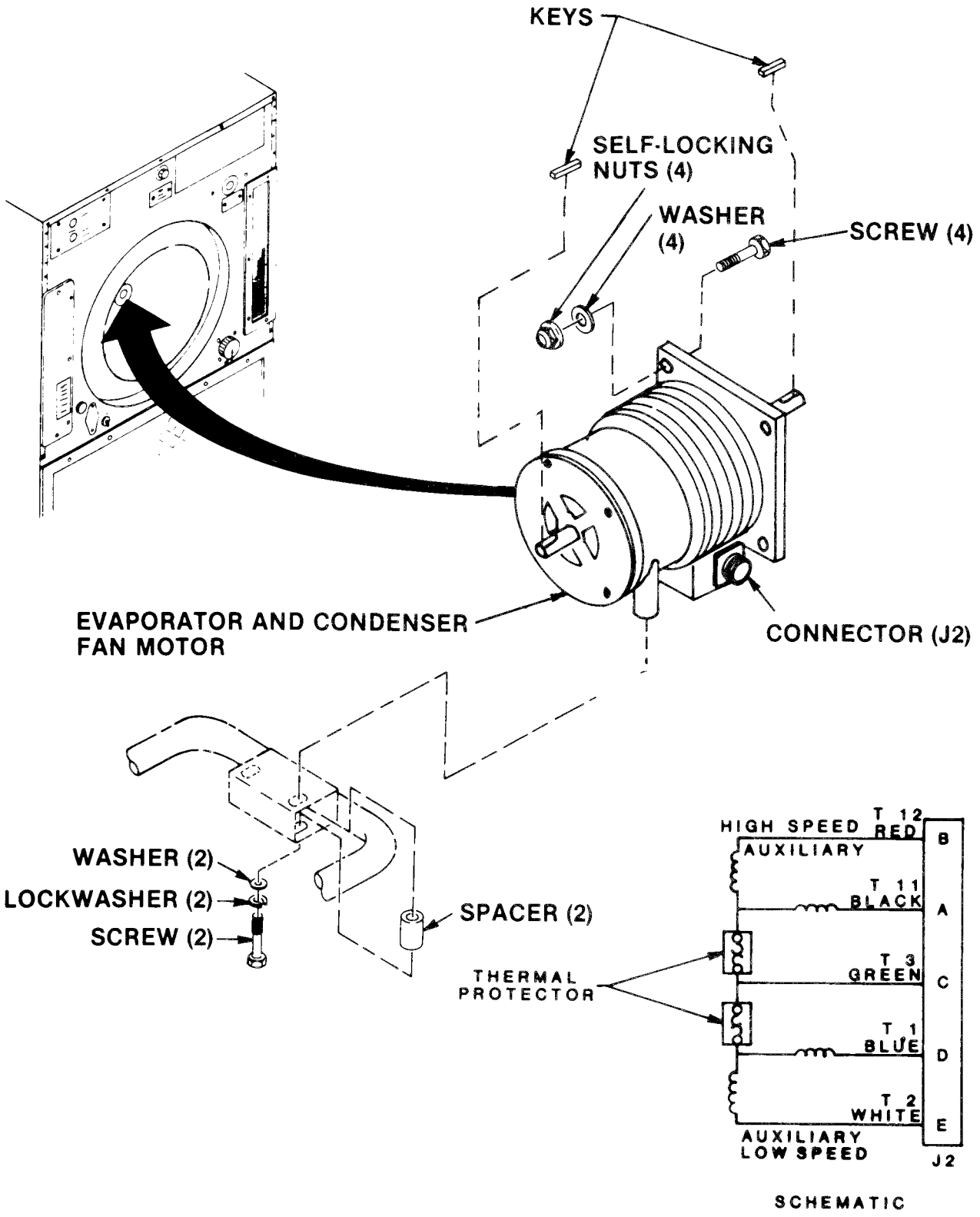


Figure 4-59. Evaporator and Condenser Fan Motor

a. Inspection

(1) Check motor for rotational freedom by spinning shaft by hand. If there is any stiffness or binding, contact direct support maintenance.

(2) Pull and push shaft axially to check for end play. If there is excessive end play, contact direct support maintenance.

b. Test

(1) Using a multimeter set on lowest OHMS scale, check continuity between pins in connector J2 as follows: (See fig. 4-7.)

- Pin G to pin H
- Pin J to pin E
- Pin O to pin F

(2) If there is no continuity between any pair of pins, the motor winding is open. Replace motor.

(3) Using a multimeter set on high OHMS scale, check continuity between pins G, H, J and ground. If continuity-is found, replace motor.

NOTE

If all the above inspections and tests are satisfactory, but the motor will still not operate properly, notify your supervisor and Direct Support Ma" ntenance.

c. Remova 1

(1) Using two wrenches, (one holding **the** self-locking nuts and the other rotating the screws) remove the four screws, washers, and self-locking nuts in motor mounting flange.

(2) Using wrench, remove two screws, lockwashers, and flat washers in support legs of motor.

(3) Remove two spacers from motor bracket.

(4) **Remove eight screws holding motor bracket to housing.**

(5) Pull motor through condenser fan cavity for enough to access J2 connector.

(6) Disconnect plug P2 from connector J2.

(7) **Rotate motor bracket 90° clockwise, pull motor out slightly away from insulation, rotate motor 90° clockwise and remove motor from unit.**

d. Installation.

(1) Rotate motor bracket and motor in opposite direction until motor and motor junction box clear motor bracket and place motor into unit.

(2) Install eight screws to install motor bracket to housing.

(3) Connect P2 to connector J2.

(4) Aline motor flange hole pattern to motor mount flange hole pattern.

(5) Install the four screws and washers in the motor mount flanges,

(6) BY hand, tighten the four self-locking nuts on the four screws,

(7) Insert the two spacers in motor bracket and aline with holes,

(8) By hand, tighten two screws, lock washers and flat washers in motor bracket.

(9) Using two wrenches, tighten the four screws, washers, and self-locking nuts in motor flange,

(10) Using wrench, tighten the two screws, lock washers and flat washers in motor bracket.

Follow-on procedure: 1. Install condenser fan. (See para. 4-59.)

2. Install evaporator and ring, (See para 4-58.)

4-61. EVAPORATOR COIL CLEANING

Preliminary procedure: Remove mist eliminator. (See para 4-26.]

WARNING

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

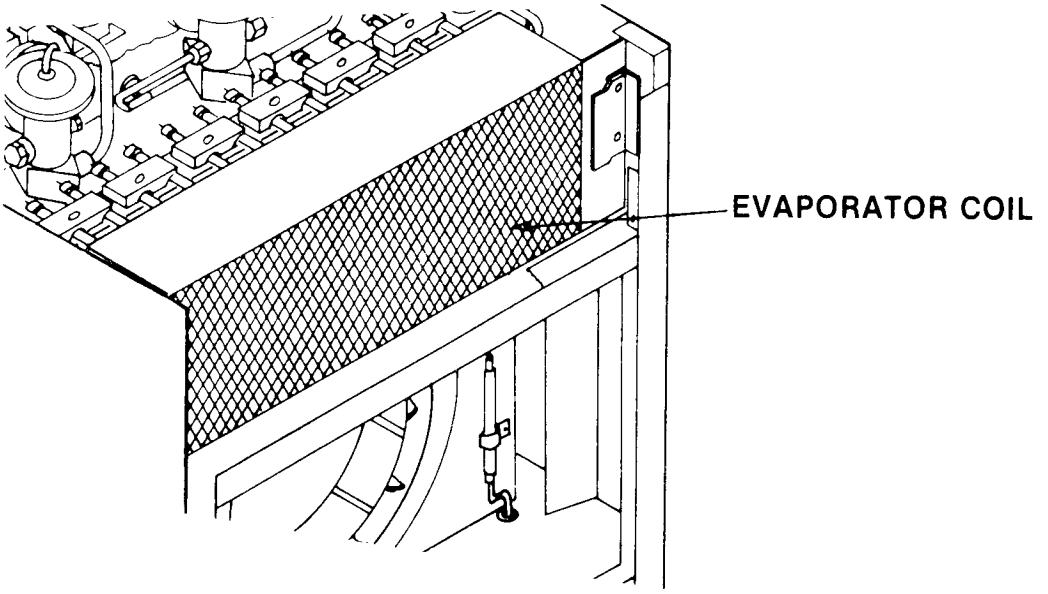


Figure 4-60. Evaporator Coil

a. Inspection of installed coil

(1) Check for accumulated dirt. Clean if an accumulation of 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.

WARNING

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

CAUTION

DO NOT USE STEAM TO CLEAN COIL.

Steam cleaning of coil may raise the temperature of refrigeration-22 to a degree where resulting pressures in the refrigeration system could damage refrigeration components.

b. Cleaning. Clean coil 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.

c. Repair/Replacement. Should a leak or major damage be evident, notify your supervisor and Direct Support Maintenance.

Follow-on procedures: Install mist eliminator. (See para 4-26.)

4-62. CONDENSER COIL CLEANING

Preliminary procedures: 1. Remove junction box. (See para 4-29.)

2. Remove condenser coil guard. (See para 4-21.)

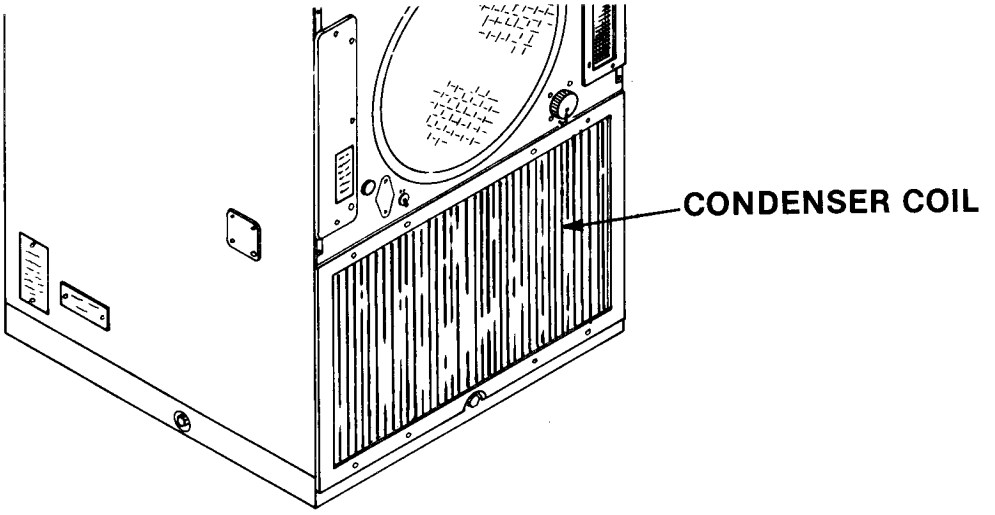


Figure 4-61. Condenser Coil

a. Inspection of installed coil

(1) Check to be sure that power is disconnected.

(2) Check for accumulated dirt. Clean if an accumulation of dirt is evident.

(3) 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.

WARNING

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

CAUTION

DO NOT USE STEAM TO CLEAN COIL.

Steam cleaning of coil may raise the temperature of refrigeration-22 to a degree where resulting pressures in the refrigeration system could damage refrigeration components.

b. Cleaning. Clean coil 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.

c. Repair/Replacement. Should a leak or major damage be evident, refer to direct support maintenance.

Follow-on procedure: 1. Install condenser coil guard. (See para 4-21.)

2. Install junction box. (See para 4-20.)

4-63. CONDENSATE TRAPS

Preliminary procedure: 1. Remove junction box. (See para 4-29.)

2. Remove mist eliminator. (See para 4-26.)

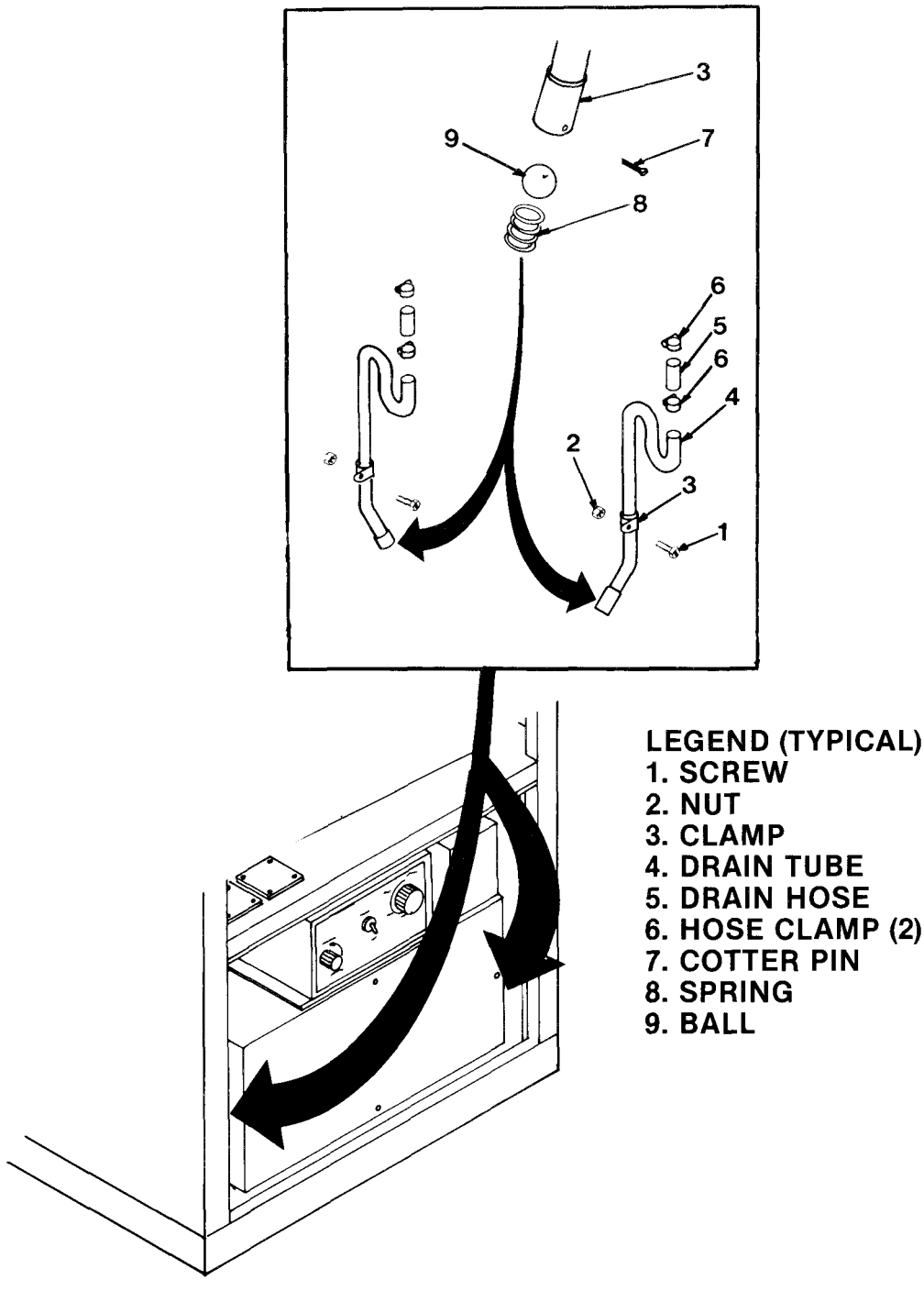


Figure 4-62. Condensate Traps

a. Accessing for left drain removal .

(1) Remove capacitor bracket. (See para 4-51.)

b. Accessing for right drain removal.

(1) Using screwdriver, remove dehydrator bracket mounting screw and lock washer from right side of unit. (See fig. 5-10.)

(2) Using screwdriver and wrench, remove screw, lockwasher, and nut from bracket.

(3) Remove bracket.

c. Removal of left or right drains.

(1) Using screwdriver and wrench, remove nut, clamp and screw in lower drain tube and junction box mounting bracket.

(2) With screwdriver, loosen two hose clamps on drain hoses.

(3) Slip hoses down and off of drain tubes.

(4) Using pliers, remove cotter pins.

(5) Remove springs and balls from drain ends.

d. Inspection

(1) Check balls, springs, and cotter pins for nicks and wear.

(2) Replace balls if they are nicked or have any damage that would keep them from sealing properly.

(3) Replace springs if they are worn or have any damage that would keep them from applying pressure to balls.

e. Cleaning

(1) Pour some clean fresh water into condensate drip pan.

(2) If water does not flow out of the ends of the drain tubes 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 ends of the drain tubes.

(4) Be sure the springs, balls, and ball seats (end of drains where balls and springs are inserted) are clean.

f. Installation of left or right drains

(1) Insert balls and springs. Be sure that balls are above springs.

(2) Depress springs with screwdriver far enough to install cotter pins.

(3) Secure cotter pins.

(4) Slip drain hoses up and in place on casing drain tubes.

(5) Using screwdriver, secure clamps.

(6) Using screwdriver and wrench, secure screw, nut and clamp in lower tube and junction box mounting bracket.

g. Replacing capacitor bracket (left drain removal)

(1) Refer to para 4-51 to replace capacitor bracket.

h. Replacing filter drier bracket (right drain removal)

(1) Assemble bracket on dehydrator. (See fig. 5-10.)

(2) Loosely assemble bracket with screw, lock washer and nut on dehydrator.

(3) Using screwdriver, install bracket with screw and lockwasher.

(4) Using screwdriver and wrench, tighten bracket on dehydrator.

Follow-on procedure: 1. Install junction box. (See para 4-29.)

2. Install mist eliminator. (See para 4-26.)

Section VI PREPARATION FOR STORAGE OR SHIPMENT

4-64. PREPARATION FOR STORAGE

a. Administrative storage of equipment. See TM 740-90-1. Administrative storage is short term storage - 1 to 45 days. It covers a 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 storage site should provide required protection from the elements and allow access for visual inspection when applied.

(1) Roll down 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

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-1. GENERAL

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

b. 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.

c. Repair parts are listed and illustrated in the TM 5-4120-387-24P, Repair Parts and Special Tools List, (RPSTL), covering organizational, direct support, and general support maintenance for this equipment.

d. Tool Kit, Service, Refrigeration Unit, NSN 5180-00-596-1474, 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.

Description	National Stock Number
Soldering Gun Kit	3439-00-930-1638
Vacuum Pump	4310-00-098-5272

Section II MAINTENANCE PROCEDURES

5-2. AIR CONDITIONER (FABRIC) COVER

For removal, inspection, lubrication, cleaning, and installation, see paragraph 4-13 and figure 4-6.

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, GUARDS, AND INFORMATION PLATES

a. For removal, inspection, cleaning, and installation, see the following paragraphs:

- CBR (Chemical, Biological, Radiological) duct cover. (See para 4-14.)
- Access (charging valves) cover. (See para 4-15.)
- Connector cover plates. (See para 4-16.)
- Circuit breaker access plate. (See para 4-17.)
- Evaporator air discharge (outlet) grille assembly. (See para 4-18.)
- Evaporator air intake grille assembly. (See para 4-19.)
- Condenser air discharge guard. (See para 4-20.)
- Condenser coil guard. (See para 4-21.)
- Fresh air (inlet) screen. (See para 4-22.)
- Top panel. (See para 4-23.)
- Lower panel. (See para 4-24.)

b. 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) Repair minor dents using standard sheet metal repair practices.

(2) Repair broken welds using standard weld repair practices.

(3) To replace loose or missing rivets:

• Drill old rivet out using a drill bit slightly smaller than the diameter of old rivet body.

• Install replacement rivet.

(4) To replace or repair gasket or insulation:

• 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, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

• Soften and remove old adhesive and gasket and Insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

• Coat the mating surfaces of the metal and gasket or insulation (if applicable) with adhesive, item 3, Appendix E. Let both surfaces air dry until the adhesive is tacky but will not stick to fingers.

• Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

(5) Should touch up or refinishing be necessary, see TM 43-0139, Painting Instructions for Field Use.

(6) To replace damaged or missing name plates:

• Drill rivets out using a drill bit slightly smaller than the diameter of the rivet body.

• Secure new name plate with replacement rivets.

5-4. EVAPORATOR AND CONDENSER FAN MOTOR (B2) REPAIR

Preliminary procedure: Remove motor. (See para 4-60.)

See paragraph 4-60 for testing (installed), removal, and installation.

a. Authorized repairs. Direct support maintenance repair of the fan motor is limited to the replacement of electrical plug, bearings, rotor with shaft, and hardware items.

b. Disassembly- Disassembly motor only as necessary to do required repair. (See Figures 5-1 and 5-1.1.)

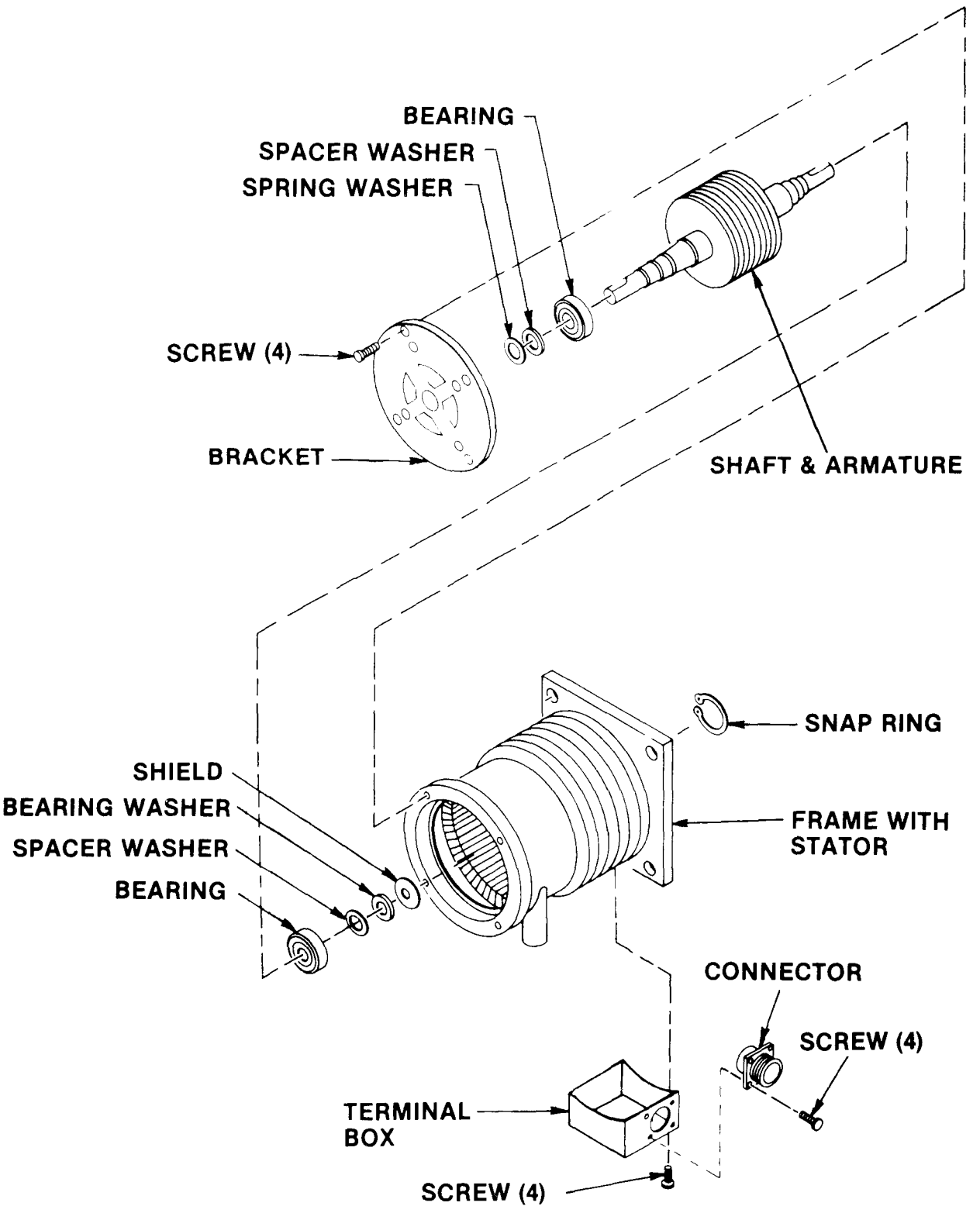


Figure 5-1. Evaporator and Condenser Fan Motor (For Model 3770 Only)

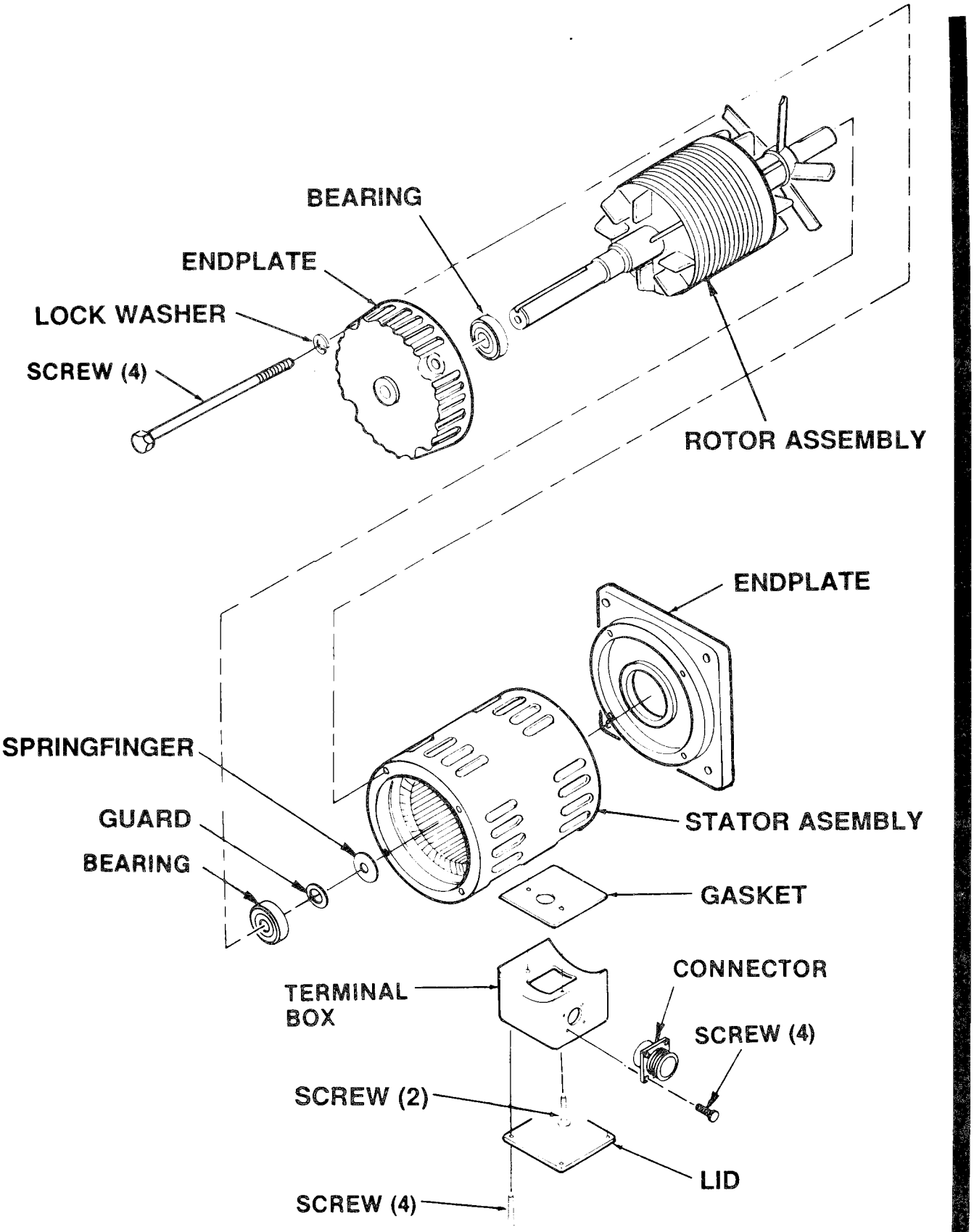


Figure 5-1.1. Evaporator and Condenser Fan Motor (For Model 3873 Only)

(1) To replace connector (J2):

(a) Using screwdriver, remove four screws from connector (J2).

(b) Using screwdriver, remove four screws from terminal box.

(c) Pull connector away from terminal box as far as wires will allow.

(d) Tag and unsolder wire leads.

(e) Remove old connector.

(f) See wiring diagram (fig. 4-7) and tags and solder leads to new connector.

(g) Remove tags.

(h) Using screwdriver, secure connector to terminal box with four screws.

(i) Using screwdriver, secure terminal box to motor with four screws.

(2) To replace bearings:

(a) Match-mark motor frame and bracket (end bell) to ease reassembly.

(b) Using screwdriver, remove four screws from bracket (end bell).

(c) Carefully separate bracket (end bell) from motor frame.

(d) Carefully pull rotor with shaft from the frame with stator.

CAUTION

Bearings are permanently lubricated and sealed at the time of manufacture. Do not attempt to clean or relubricate them. Keep bearings in plastic bags or wrap securely in grease-proof paper until needed for assembly.

(e) Remove bearings.

(f) Examine rotor, stator, and shafts for nicks, gouges, deformations, and evidence of overheating.

(g) Dress high metal defects in shafts with a fine file or stone. If shaft is beyond repair, replace rotor and shaft.

(h) Examine motor frame with stator for broken flange, stripped threads, visible damage, shorted windings (para 4-62) and evidence of overheating. If motor frame with stator is beyond repair, replace motor.

(i) Coat shaft surfaces with oil (MIL-L-2104, Grade 20) or equal.

(j) Coat the bearing cavity of bracket (end bell) and frame cavity with oil (MIL-L-2104, Grade 20) or equal and insert bearings.

(k) Carefully work bracket (end bell) onto shaft end keeping the match-marks made at time of disassembly in alinement.

(1) Using screwdriver, secure bracket (end bell) with four screws. Before final tightening, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Correct as necessary and tighten screws. Check again for binding and drag.

Follow-on procedure: Install motor. (See para 4-60.)

5-5. REFRIGERATION SYSTEM REPAIRS GENERAL

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.

WARNING

DANGEROUS CHEMICAL
(R22)
is used in this equipment

DEATH

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

WARNING

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.

5-6. DISCHARGING THE REFRIGERANT SYSTEM

a. Using screwdriver, remove six screws and six washers from charging valve access cover.

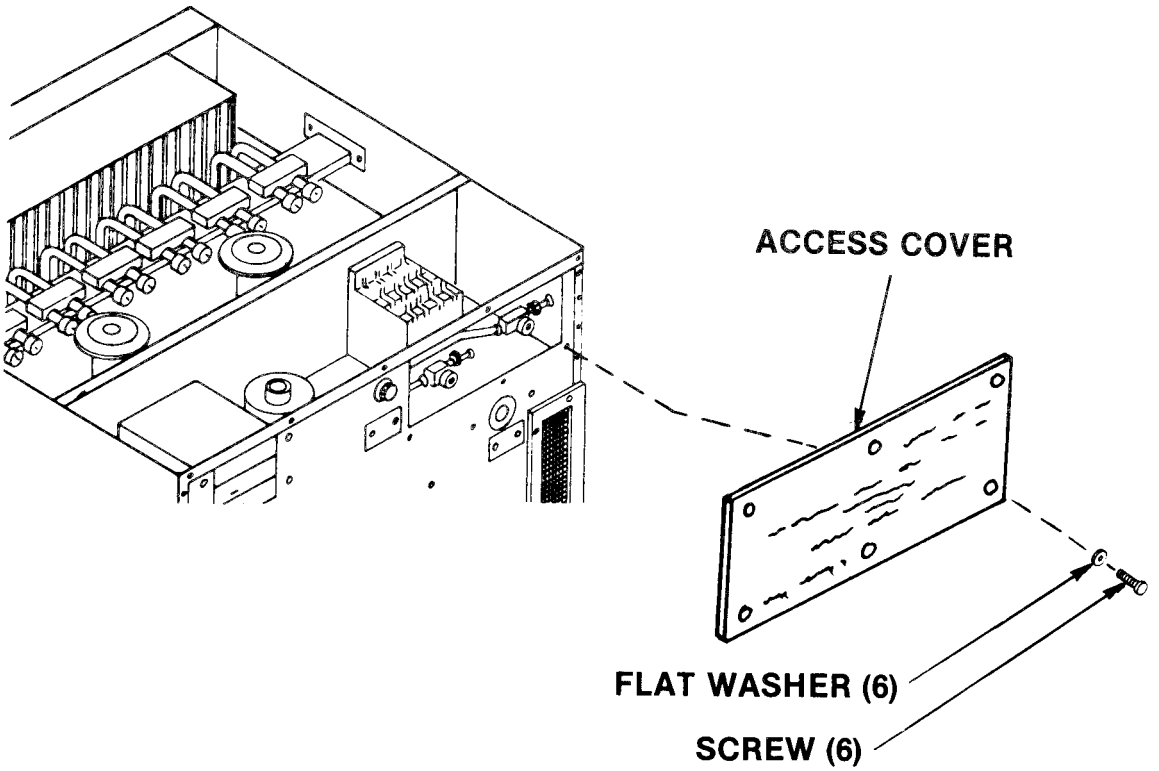


Figure 5-2. Access (Charging Valves) Cover

b. Remove service valve access cover.

c. Unscrew hose connection protective caps.

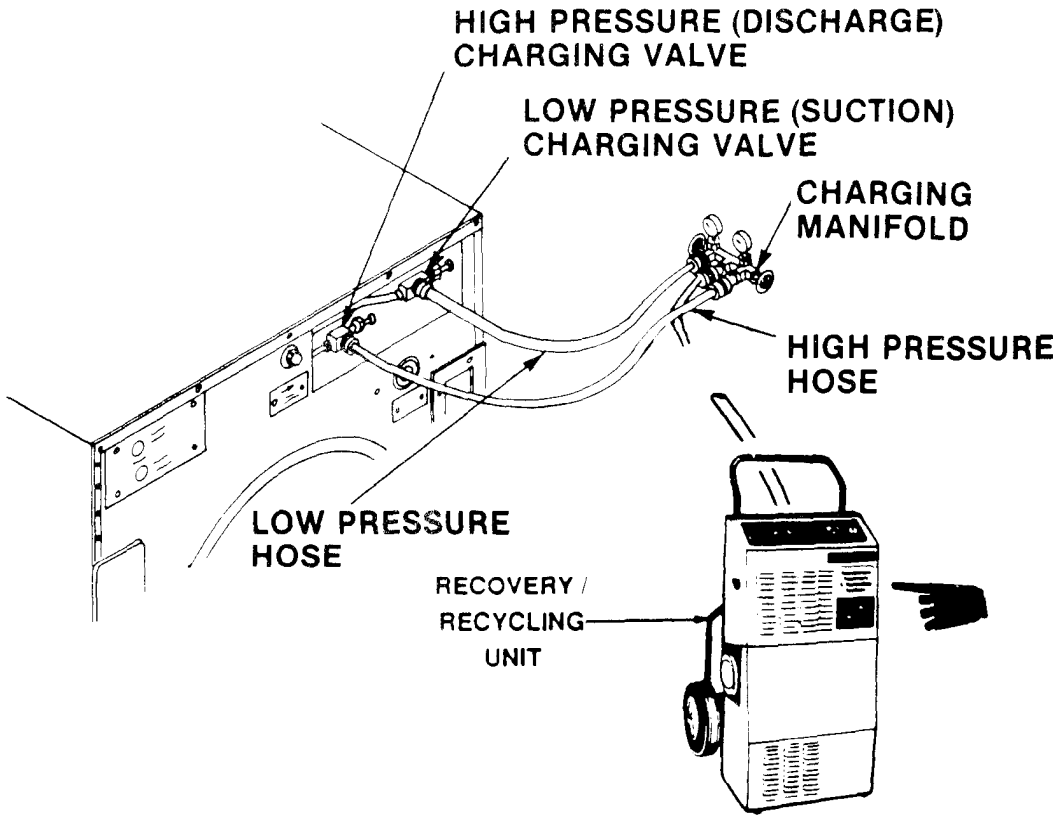


Figure 5-3. Discharging Refrigerant

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.

d. Connect the charging manifold hoses to the manifold and air conditioner service valves.

e. Attach a hose assembly to the center connection of the manifold.

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

f. Connect and operate a recovery/recycling unit in accordance with the manufacturer's instructions.

5-7. PURGING THE REFRIGERANT SYSTEM

Preliminary procedure: Discharge the refrigerant system. (See para 5-6.)

Supplies: Nitrogen cylinder (item 4, Appendix E)

The refrigeration system must be purged with dry nitrogen, item 4, Appendix E, before any brazing 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 operations to minimize internal oxidation and scaling.

WARNING

Nitrogen is an inert gas. However, it also presents danger as a suffocant and, therefore, must also be discharged in a ventilated location,

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.

Assuming that the system has been discharged using a manifold as described in paragraph 5-6, proceed as follows:

a. See specific component removal/repair instructions.

b. Be sure that refrigerant has been discharged. (See paragraph 5-6.)

c. Connect the center hose from the charging manifold to a nitrogen regulator and dry nitrogen tank.

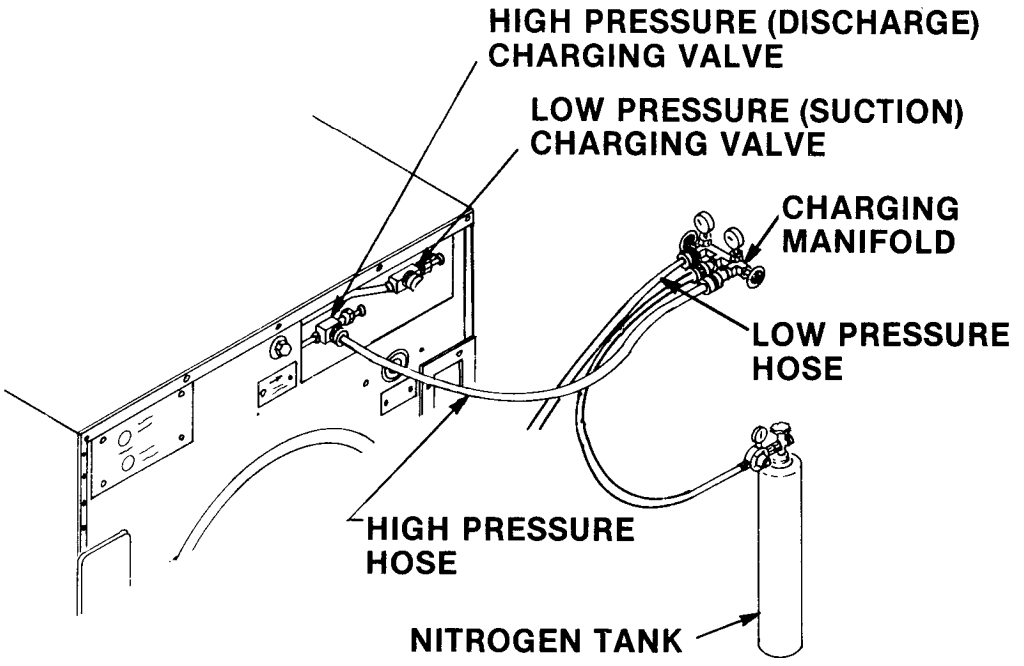


Figure 5-4. Nitrogen Purging Connection

d. The hose from the high pressure service valve to the charging manifold must be connected.

e. The hose from the low pressure service valve must be disconnected 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 m3/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 m3/minute) for a minimum of 5 minutes, before starting any brazing operation. Then allow it to continue to flow at the same rate until all brazing operations are completed. (See paragraph 5-8 for brazing/debrazing procedures.)

k. After installation brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes.

1. 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 paragraph 5-9.

5-8. BRAZING/DEBRAZING PROCEDURES

Supplies: Brazing alloy (silver) (items 5 and 6, Appendix E)

Nitrogen cylinder (item 4, Appendix E)

Brazing flux (item 7, Appendix E)

Abrasive cloth (item 8, Appendix E)

Rags (item 9, Appendix E)

a. General. All tubing in the refrigeration system is seamless copper with a bright internal finish that permits thorough cleaning and prevents entrapment of moisture or other impurities. Rigid grade copper is used for straight sections and soft grade for sections that must be bent. All interconnecting fittings, such as elbows, tees, etc., are also copper. The bodies of all valves and all connections on other components are brass. All joints, except those provided with flare fittings, are made by brazing in accordance with MIL-B-7883, except that radiographic examination is not required.

b. Filler Alloy. 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.

c. Debrazing. Debraze joints for removal of refrigeration system components as follows:

WARNING

All refrigerant -22 must be discharged from system and entire system must be purged with dry nitrogen before beginning any debrazing operation.

(1) Determine which joints are to be debrazed. Due to the limited work space inside the air conditioner, it may be more convenient to remove a part of the interconnecting tubing with the component rather than debrazing the joints on the component itself.

(2) Before debrazing a joint on a valve, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

WARNING

Polyurethane foam used as insulation in air conditioner will break down to form toxic gases if exposed to flame of a torch at brazing temperature.

(3) Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1 - 2 cfm (0.028-0.057 m^3/minute).

(5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted. Remove heat as soon as the joint separates.

d. Cleaning debrazed joints. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a damp cloth.

Be sure no filler alloy or other debris are left inside any tubing, fitting, or component.

e. Reassembly. If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.

f. Brazing. Braze joints within the air conditioner as follows:

(1) Position the component to be installed.

(2) To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then wrap all but the joint with a wet rag to act as a heat sink.

(3) Protect insulation, wiring harnesses, and surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1 - 2 cfm (0.028-0.057 m^3/minute).

(5) Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove heat as soon as brazing is completed.

5-9. LEAK TESTING THE REFRIGERANT SYSTEM

Supplies: Nitrogen cylinder (item 4, Appendix E)

Refrigerant -22 (item 10, Appendix E)

a. 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.

b. Testing Method. There are two acceptable methods for leak testing the refrigeration system.

(1) Refrigerant gas leak detector. If an electronic refrigerant gas leak detector is available it should be used in accordance with the procedures contained in TM 9-4940-435-14, "Leak Detector, Refrigerant Gas".

NOTE

The electronic refrigerant gas leak detector is highly sensitive to the presence of a minute quantity of gas in the air, and due to this factor is quite effective in the detection of small leaks. However, due to the rapid dispersion of refrigerant gas into the surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well ventilated but draft-free area.

(2) Soap solutions. In this method, a strong solution of a liquid detergent and water is brushed onto all points of possible leakage while closely watching for the formation of bubbles.

CAUTION

If the soap solution testing method is used, thoroughly rinse with fresh water after testing is completed: A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.

c. Testing procedures. To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas. To perform leak testing by use of the soap solution method, the system may be pressurized with dry nitrogen alone.

(1) To pressurize a system that has some refrigerant charge, for either leak testing method:

(a) Remove the hose connection protective caps from the high and low pressure service valves.

(b) 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 this test is completed.

(c) Connect a nitrogen pressure regulator and nitrogen bottle to the center hose connection of the charging manifold.

(d) Open the unit service valves and the charging manifold valves.

(e) Open the nitrogen tank valve and pressurize the system to 350 psi (24.7 kg/cm^2).

(f) Perform leak tests.

(g) If a leak if found, discharge and purge the system and repair leak. See specific instructions for components to be removed.

(h) If a leak was not found and refrigerant -22 was used to pressurize the system, see charging instructions. (See para 5-11.)

(2) To pressurize a system that has been discharged and purged for leak testing with an electronic detector:

(a) Remove the hose connection protective caps from the high and low pressure service valves.

(b) Connect the hoses from a charging manifold to the service valves.

(c) 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.

(d) Open both unit service valves and the charging manifold valves.

(e) 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).

(f) Close the charging manifold valves and the refrigerant drum valve.

(g) Remove the refrigerant -22 drum from the center hose connection.

(h) Connect a nitrogen regulator and cylinder of dry nitrogen to the center hose connection.

(i) 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).

(j) Perform leak tests, then discharge and purge the system, in accordance with paragraphs 5-6 and 5-7 before performing maintenance, or before evacuating and charging the system, as appropriate.

(3) Final leak testing. 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.

5-10. EVACUATING THE REFRIGERANT SYSTEM

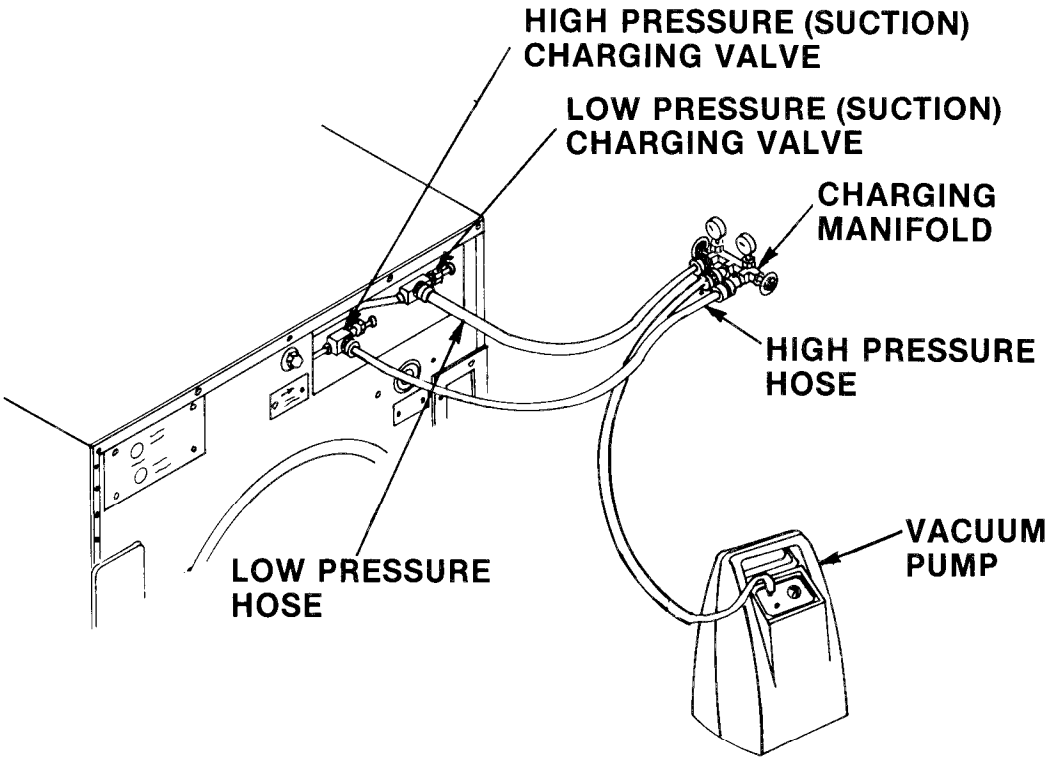


Figure 5-5. Evacuation of Refrigeration System

The refrigeration system must be evacuated to remove all moisture before it is charged with refrigerant -22.

CAUTION

Don't evacuate a leaking system. The vacuum created can cause air, moisture, and dirt to enter system.

a. Check that system was leak tested and has NO LEAKS. (See para 5-9.)

NOTE

In the event that the compressor was replaced as a result of a burn out, check that compressor burn out procedures were followed. (See para 5-21.)

b. Check that new filter-drier was installed. If not, install one.

c. Check that both service valves and charging manifold valves are closed.

d. Attach hose assemblies to service valves and charging manifold valves.

e. Attach center hose assembly to vacuum pump.

f. Start vacuum pump.

g. Open charging manifold valves.

h. Open both unit service valves.

i. 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.

j. 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.

k. Close both unit service valves.

1. Close charging manifold valves.

m. Stop vacuum pump.

n. Disconnect pump from center hose connection.

o. Go to paragraph 5-11, charging the refrigeration system.

5-11. CHARGING THE REFRIGERATION SYSTEM

Supplies: Dehydrator

Refrigerant -22 (Drum) (item 10, Appendix E)

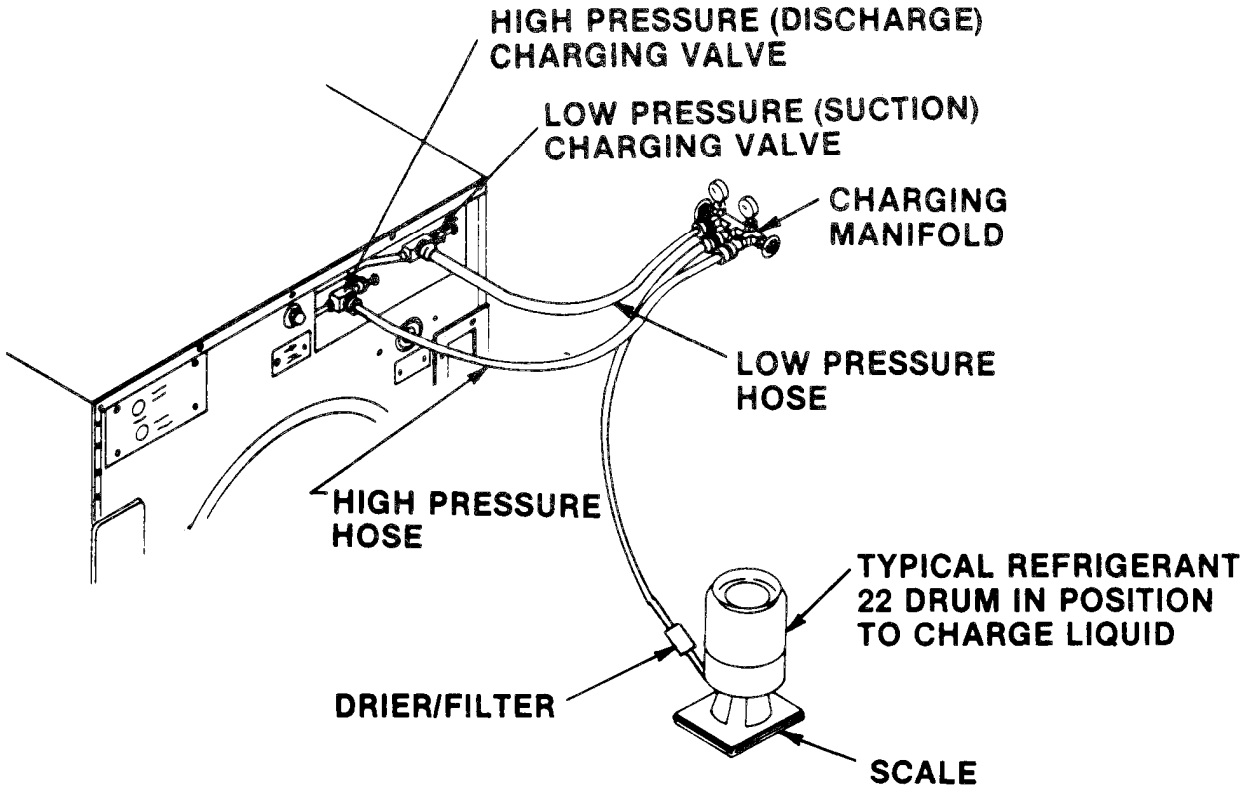


Figure 5-6. Refrigerant Charging

After the system has been satisfactorily evacuated, it must be fully charged with refirgerant-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.

a. Check that the hose from the low pressure charging valve is connected to the compound gage side of the charging manifold. The hose from the high pressure charging valve should be connected to the pressure gage side of the charging manifold.

b. Connect the center hose from the charging manifold to a well charged drum of refrigerant-22.

Loosen the hose connections to the two air conditioner charging valves slightly.

d. Open the two charging manifold valves.

e. Open the refrigerant -22 drum value slightly to allow a small amount of refrigerant to purge-air from the hoses. Tighten-the hose connections at the air conditioner charging valves.

f. Close the low pressure (suction) charging manifold valve. Never introduce liquid refrigerant into the low pressure (suction) charging valve.

g. 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.)

h. Using accurate scales, measure and record the weight of the refrigerant -22 drum.

i. Open the refrigerant -22 drum valve.

j. Open the high pressure charging valve on the air conditioner. Allow liquid refrigerant to enter the system until the drum weight has decreased by 2.3 pounds (1.05 kg) or until system pressure has equalized.

k. Close the refrigerant drum valve and the high pressure (discharge) manifold valve.

1. Connect air conditioner to a remote control module assembly.

m. Connect power.

n. Press and release both pressure switch reset buttons.

o. Turn air conditioner on and operate in the COOL mode with the Temperature control thermostat set at a maximum DECREASE position and fan speed set to HI SPEED.

p. **If the 2.3 pound (1.05 kg) full charge was obtained, skip steps q thru s.** If the system pressure equalized prior to obtaining a full charge of 2.3 pounds (1.05 kg), proceed with step q.

q. Switch the refrigerant drum to the gas only position.

r. 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 charging valve on the air conditioner.

s. Monitor the weight of the refrigerant drum as the air conditioner compressor pulls additional refrigerant gas into the system until the full 2.2 pound (1.0 kg) charge is obtained. When the system is fully charged, immediately close the air conditioner low pressure charging valve and the refrigerant drum valve.

t. Run the air conditioner in COOL mode (with Temperature control thermostat in full DECREASE position and fan speed set at LO SPEED) for 15 minutes.

CAUTION

Do not skip the next step.

u. After 15 minutes, observe the sight glass on back of condenser section.

Green center means the refrigerant moisture content is acceptable.

Yellow center means there is too much moisture in the system. It must be discharged, evacuated, and charged again.

Milky white or bubbly liquid means the system has a low charge.

Clear bubble-free liquid around the center means the system is fully charged.

v. **If** charge is low, add gas refrigerant.

(1) Be sure that drum is switched to gas position. Open the drum valve and the air conditioner low pressure service valve.

(2) Continue to charge until sight glass is clear and bubble-free.

(3) Close the air conditioner low pressure charging valve and refrigerant drum valve.

w. Check air conditioner for proper cooling. There should be at least a 15°F temperature difference between evaporator discharge air and the inlet air. Turn the mode selector switch to OFF.

x. Assure that the high and low pressure air conditioner charging valves are closed and remove the charging manifold hoses from the air conditioner charging valves.

y. Install service valve protective caps.

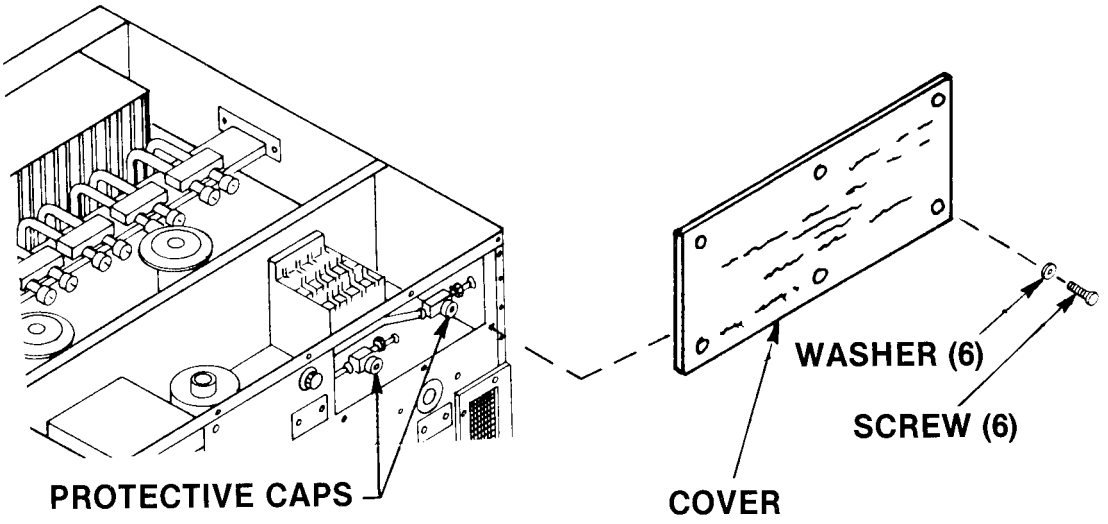


Figure 5-7. Charging Valves Caps and Cover

z. Using screwdriver, secure charging valve access cover with six screws and six flat washers.

5-12. REFRIGERANT PRESSURE CHECK

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. Check pressures as follows:

a. Turn the mode selector switch to OFF.

b. Using screwdriver, remove six screws and six flat washers from charging valve access cover.

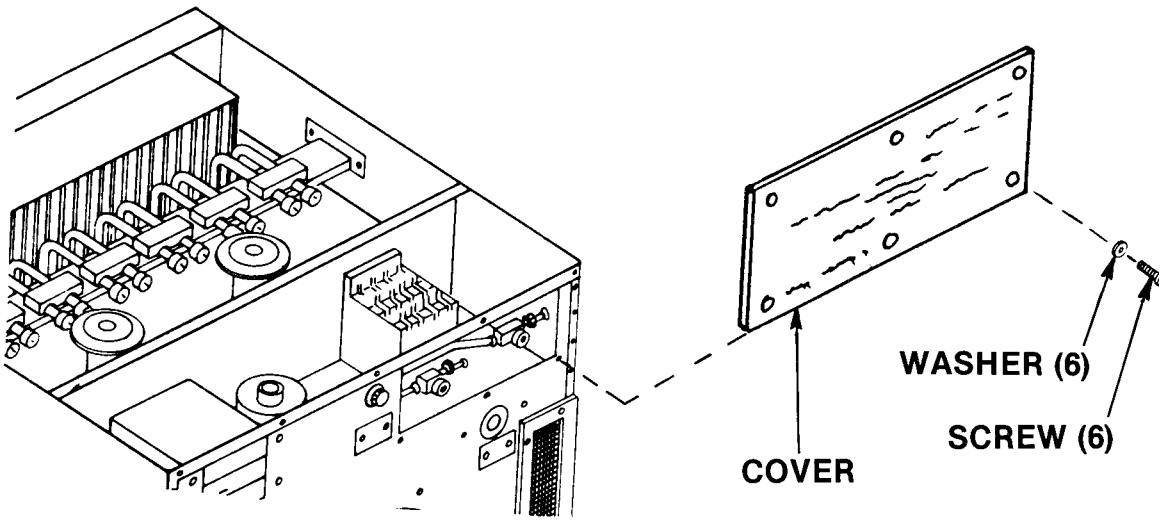


Figure 5-8. Access (Charging Valves) Cover

c. Remove protective caps from charging valves.

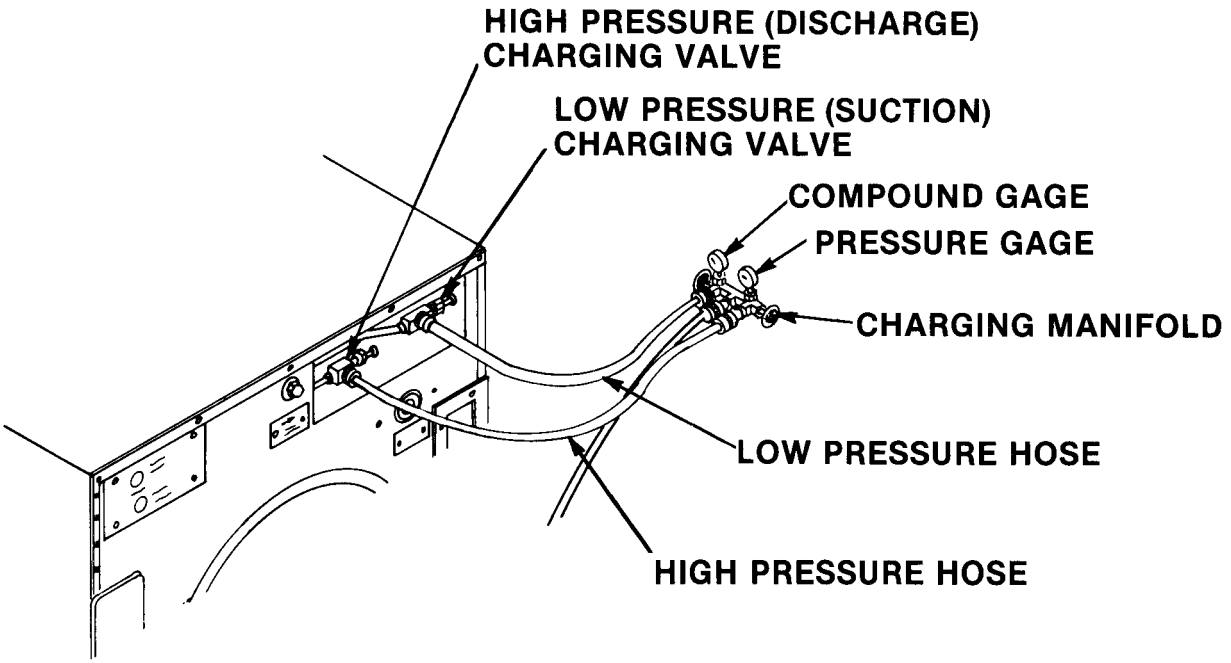


Figure 5-9. Pressure Test Connection

d. Connect individual pressure gages, or a refrigeration charging manifold and hoses to the high (discharge) and low (suction) charging valves.

CAUTION

Take care that only a very small amount of refrigerant is allowed to escape during hose purging.

e. Loosen hose connections at gages or charging manifold.

f. Open high (discharge) high pressure charging valve slightly to purge air from hose. Tighten low pressure hose connection at gage fitting as soon as a hissing sound is heard.

g. Open low (suction) pressure charging valve slightly to purge air from hose. Tighten low pressure hose connection at gage fitting as soon as a hissing sound is heard.

h. Open the low (suction) and high (discharge) charging valves.

i. 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.

j. Turn the mode selector switch to the COOL mode with the Temperature control thermostat in the full DECREASE setting for a few minutes.

k. With the unit operating, allow gages to stabilize. Take readings of the two gages.

(1) Discharge pressure too high.

Possible causes:

- o Dirty or partially blocked condenser coil. (See para 4-62.)
- o Partially blocked condenser fan discharge. (See para 4-20.)
- o Loose or missing lower panel (see para 4-24), connector cover plate (see para 4-16), or circuit breaker access plate (see para 4-17).
- o Excessive recirculation of hot condenser discharge air back into condenser intake.
- o Overcharge of refrigerant. (See para 5-7.)
- o Air in refrigerant system. (See para 2-3.)
- o High suction pressure - See (4) below.
- o Fan motor not operating. (See para 4-60.)

- **Condenser fan loose** on shaft. (See para 4-53.)
- Too much oil in refrigerant system. (See para 5-21.)

(2) Discharge pressure too low.

Possible causes:

- Cold outside air. (See para 2-7.)
- Low refrigerant charge. (See para 5-7.)
- Compressor not operating. (See para 5-21.)
- Problem with equalizing solenoid valve (L2). (See para 5-18.)
- Problem with pressure regulating valve.(See para 5-25.)
- Internal compressor damage. (See para 5-21.)

(3) Suction pressure too low.

Possible causes:

- Dirty return air filter. (See para 4-25.)
- Discharge or return air louvers closed. (Adjust louvers.)
- Dirty evaporator coil. (See para 4-61.)
- Low refrigerant charge. (See para 5-11.)
- Liquid solenoid valve (Ll) closed. (See para 5-18.)
- Fan motor not operating. (See para 4-60.)
- Evaporator fan loose on motor shaft. (See para 4-58.)
- Problem with expansion valve operation. (See para 5-23.)
- Expansion valve superheat too high. (See para 5-23.)
- Plugged or kinked distributor tube. (See para 5-23.)
- Suction line or evaporator coil tubing restriction. (See paras 5-24 and 5-29.)
- Clogged dehydrator (filter-drier). (See para 5-13.)
- Moisture in refrigerant system. (See para 5-7, step u.)

(4) Suction pressure too high.

Possible causes:

- Open equalizing solenoid valve (L2). (See para 5-7.)
- Compressor not running. (See para 5-21.)
- Expansion valve bulb damage or poor contact with suction line. **(See** para 5-23.)
- Internal compressor failure. (See para 5-21.)
- Problem with liquid quench expansion valve. (See para 5-20.)
- Problem with regulating valve. (See para 5-25.)
- Problem with expansion valve. (See para 5-23.)

l. When pressure tests are completed, proceed with the maintenance action indicated.

m. Turn unit OFF.

n. Close charging valves on unit.

o. Remove gages or service manifold hoses from charging valves.

p. Install charging valve protective caps.

q. Using screwdriver, secure service valve access cover with six screws and six flat washers.

TABLE 5-1. PRESSURE-TEMPERATURE RELATIONSHIP OF SATURATED REFRIGERANT -22

Temperature		Pressure		Temperature		Pressure	
Deg F	Deg C	Psig	kg/em^2	Deg F	Deg C	Psig	kg/em^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	41.4	216.0	15.187
52	11.1	88.10	6.257	108	42.2	222.3	15.630
54	12.2	91.5	6.433				
56	13.3	95.1	6.686	110	43.3	228.7	16.080
58	14.5	98.8	6.947	112	44.4	235.2	16.537
				114	45.6	241.9	17.008
60	15.6	102.5	7.206	116	46.7	248.7	17.486
62	16.7	106.3	7.474	118	47.8	255.6	17.971
64	17.8	110.2	7.748				

TABLE 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)	52-62 Suction 175-195 Discharge	57-67 Suction 235-255 Discharge	66-76 Suction 300-320 Discharge	74-84 Suction 370-390 Discharge
80°F (27°C) Return Air to Unit (Dry Bulb)	47-57 Suction 165-185 Discharge	53-63 Suction 215-235 Discharge	60-70 Suction 290-310 Discharge	70-80 Suction 360-380 Discharge
70°F (21°C) Return Air to Unit (Dry Bulb)	45-55 Suction 140-160 Discharge	45-55 Suction 205-225 Discharge	49-59 Suction 285-305 Discharge	57-67 Suction 365-385 Discharge

NOTE: Wet bulb temperature uncontrolled (dry coil)
Pressure ranges are ±5 (Suction) and ±10 (Discharge) psig about the tested nominal.

TABLE 5-3. NORMAL OPERATING PRESSURES (In By-Pass Cycle)

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	47-57 Suction 105-125 Discharge	47-57 Suction 147-167 Discharge	47-57 Suction 208-228 Discharge	47-57 Suction 284-304 Discharge
80°F (27°C) Return Air to Unit	47-57 Suction 105-125 Discharge	47-57 Suction 146-166 Discharge	47-57 Suction 208-228 Discharge	47-57 Suction 284-304 Discharge
70°F (21°C) Return Air to Unit	47-57 Suction 105-125 Discharge	47-57 Suction 142-162 Discharge	47-57 Suction 205-225 Discharge	47-57 Suction 280-300 Discharge

5-13. DESICCANT REFRIGERANT DEHYDRATOR (FILTER DRIER)

Preliminary procedure: Remove junction box. (See para 4-29.)

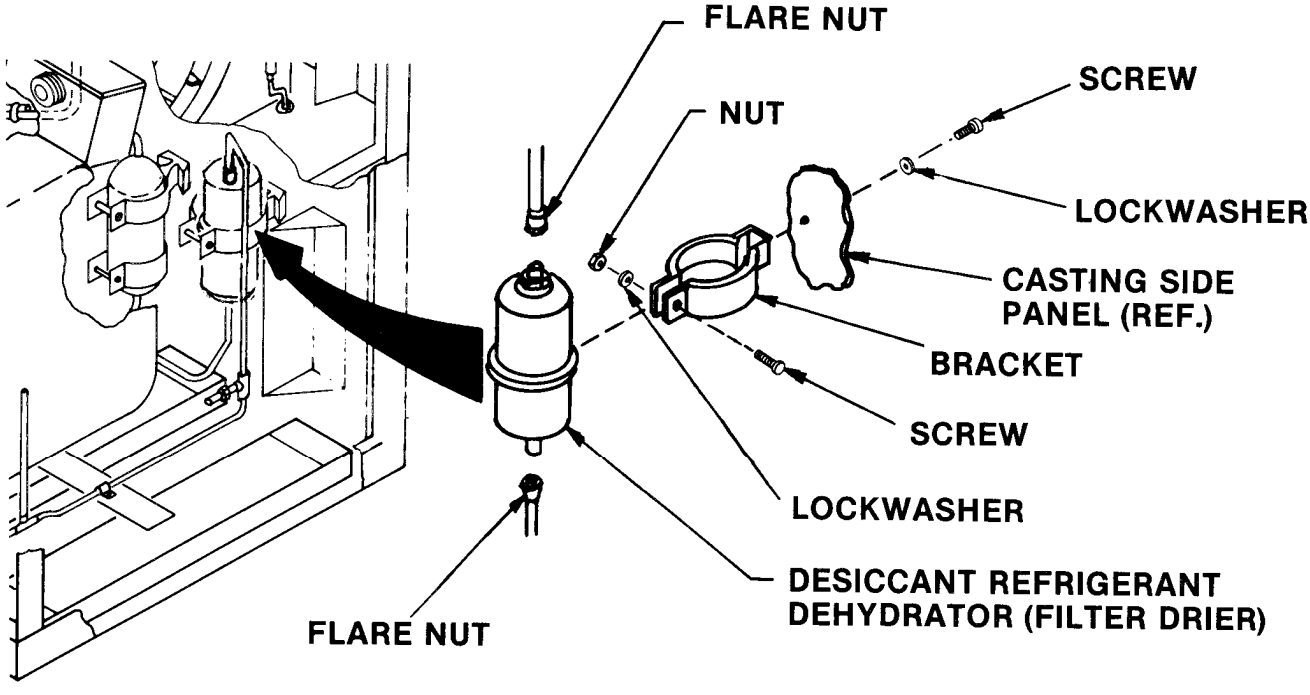


Figure 5-10. Desiccant Refrigerant Dehydrator (Filter Drier)

NOTE

The dehydrator must be replaced each time the refrigeration system has been opened. It should be installed just before unit is leak tested.

a. Inspect

(1) Check for general condition and signs of leakage. If leakage is suspected, leak test per paragraph 5-9.

(2) Check that mounting bracket is secure.

b. Remove

(1) Discharge the refrigerant system per paragraph 5-6.

(2) Using two wrenches, loosen and disconnect flare nuts.

(3) Using screwdriver, remove bracket mounting screw and lockwasher from right side of air conditioner.

(4) Slip dehydrator and bracket from air conditioner.

(5) Using screwdriver and wrench, remove screw, lockwasher, and nut from bracket.

(6) Remove dehydrator from bracket.

c. Installation

CAUTION

Replacement dehydrators are packaged with sealing caps on the flare fittings to prevent moisture contamination of the desiccant filtering media. Remove these caps immediately prior to installation. Never install a dehydrator from which caps have been removed for an extended or unknown period of time.

(1) Place dehydrator in bracket.

(2) Loosely assemble bracket with screw, lockwasher, and nut on dehydrator.

(3) Slip dehydrator and bracket into place.

(4) Be sure that flow arrow is pointing up.

(5) Using two wrenches, tighten both flare nuts.

(6) Using screwdriver, install bracket with screw and lockwasher.

(7) Using screwdriver and wrench, tighten bracket on dehydrator.

(8) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(9) Evacuate and charge the refrigerant system. (See para 5-10 and 5-11.)

Follow-on procedure: Install junction box. (See para 4-29.)

5-14. LOW PRESSURE CUT-OUT SWITCH (S6)

Preliminary procedure: Remove top panel. (See para 4-23.)

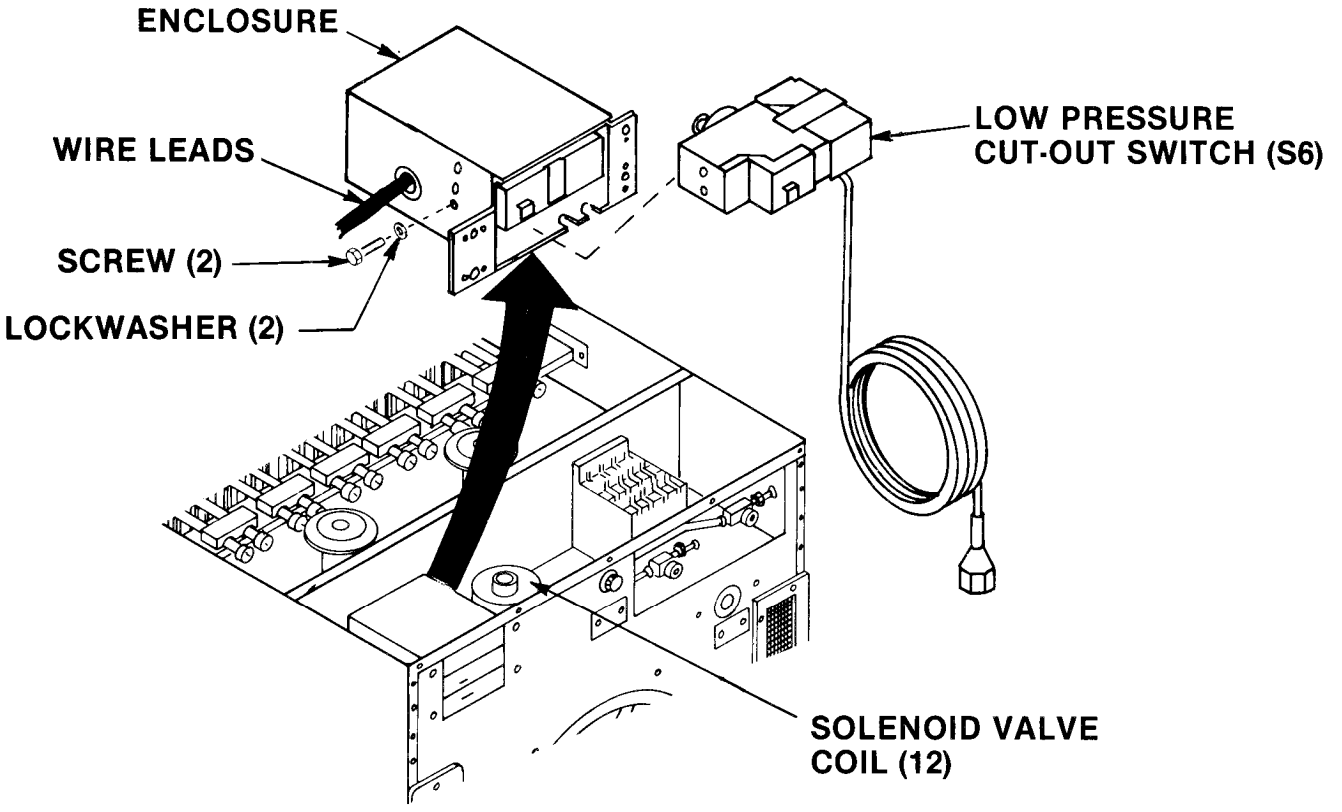


Figure 5-11. Low Pressure Cul-Out Switch (S6)

WARNING

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

a. Access

(1) Using screwdriver, remove four screws in pressure switch nameplate that secure switch enclosure.

(2) Carefully pull switch enclosure far enough from unit to gain access to attachment screws.

(3) Using screwdriver, remove two screws and lockwashers from switch.

(4) Carefully pull switch from box far enough to gain access to terminals.

b. Inspection/Test

(1) Check that wire leads and terminal attachment screws are in place. Tighten if loose. Replace if missing or frayed.

(2) Check that capillary line is not kinked, mashed or broken. Replace switch if capillary line is damaged.

NOTE

Check that refrigerant line is properly charged. (See para 5-12.)

(3) Press and release the reset button to be sure that switch is not tripped.

(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 there is no continuity, switch must be replaced.

c. Removal

(1) Discharge the refrigerant per paragraph 5-6.

(2) Remove evaporator fan. (See para 4-58.)

(3) Remove condenser fan. (See para 4-59.)

(4) Remove evaporator and condenser fan motor. (See para 4-60.)

(5) Tag and disconnect wire leads from switch.

(6) Using two wrenches, loosen and disconnect switch capillary tubing flare nut from pressure tap.

(7) Remove pressure switch and capillary with flare nut from unit.

d. Installation

(1) Insert capillary with flare nut through hole in back of rear panel.

(2) See tags and wiring diagram (see fig. 4-7) and connect wire leads. Remove tags.

(3) Using two wrenches, connect flare nut to pressure tap.

(4) Using screwdriver, secure pressure switch to enclosure with two screws and lockwashers.

(5) Install enclosure and switches in unit.

(6) Aline the enclosure and switch nameplate with unit mounting holes.

(7) Using screwdriver, secure enclosure and nameplate with four screws.

(8) Carefully coil excess capillary tubing and tape in place to eliminate vibration.

(9) Replace the dehydrator. (See para **5-13.)**

(10) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(11) Evacuate and charge the refrigeration system. (See para 5-10 and 5-11.)

Follow-on procedure: 1. Install fan motor. (See para 4-60.)

2. Install condenser fan. (See para 4-59.)

3. Install evaporator fan. (See para 4-58.)

4. Install top panel. (See para 4-23.)

5. Press and release pressure switch reset buttons to be sure they are not tripped.

5-15. HIGH PRESSURE CUT-OUT SWITCH (S5)

Preliminary procedure: Remove top panel. (See para 4-23.)

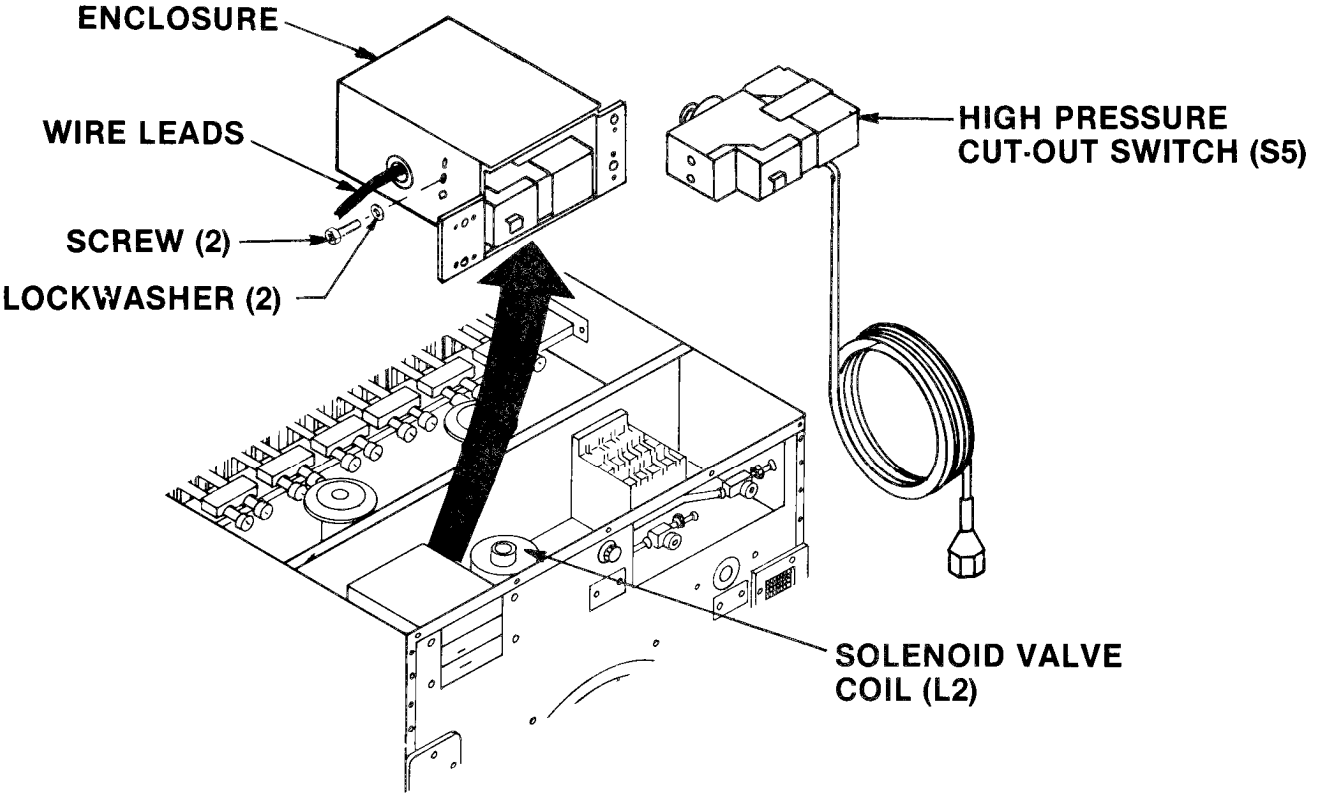


Figure 5-12. High Pressure Cut-Out Switch (S-5)

WARNING

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

a. Access

(1) Using screwdriver, remove four screws in pressure switch nameplate that secure switch enclosure.

(2) Carefully pull switch enclosure far enough from unit to gain access to attachment screws.

(3) Using screwdriver, remove two screws and lockwashers from switch.

(4) Carefully pull switch from box far enough to gain access to terminals.

b. Inspection/Test

(1) Check that wire leads and terminal attachment screws are in place. Tighten if loose. Replace if missing.

(2) Check that capillary line is not kinked, mashed or broken. Replace switch if capillary line is damaged.

NOTE

Check that refrigerant line is properly charged. (See para 5-12.)

(3) Press and release the reset button to be sure that switch is not tripped.

(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.

c. Removal

(1) Discharge the refrigerant per paragraph 5-6.

(2) Remove evaporator fan. (See para 4-58.)

(3) Remove condenser fan. (See para 4-59.)

(4) Remove evaporator and condenser fan motor. (See para 4-60.)

(5) Tag and disconnect wire leads from switch.

(6) Using two wrenches, loosen and disconnect switch capillary tubing flare nut from pressure tap.

(7) Remove pressure switch and capillary with flare nut from unit.

d. Installation

(1) Insert capillary with flare nut through hole in back of rear panel.

(2) See tags and wiring diagram (see fig. 4-7) and connect wire leads.

(3) Using two wrenches, connect flare nut to pressure tap.

(4) Using screwdriver, secure pressure switch to enclosure with two screws and lockwashers.

(5) Install enclosure and switches in unit.

(6) Aline the enclosure and switch nameplate with unit mounting holes.

(7) Using screwdriver, secure enclosure and nameplate with four screws,

(8) Carefully coil excess capillary tubing and tape in place to eliminate vibration.

(9) Replace the dehydrator. (See para 5-13.)

(10) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(11) Evacuate and charge the refrigeration system. (See para 5-10 and 5-11.)

Follow-on procedure: 1. Install fan motor. (See para 4-60.)

2. Install condenser fan. (See para 4-59.)

3. Install evaporator fan. (See para 4-58.)

4. Install top panel. (See para 4-23.)

5. Press and release pressure switch reset buttons to be sure they are not tripped.

5-16. FAN SPEED PRESSURE CONTROL SWITCH (SB)

Preliminary procedure: Remove top panel. (See para 4-23.)

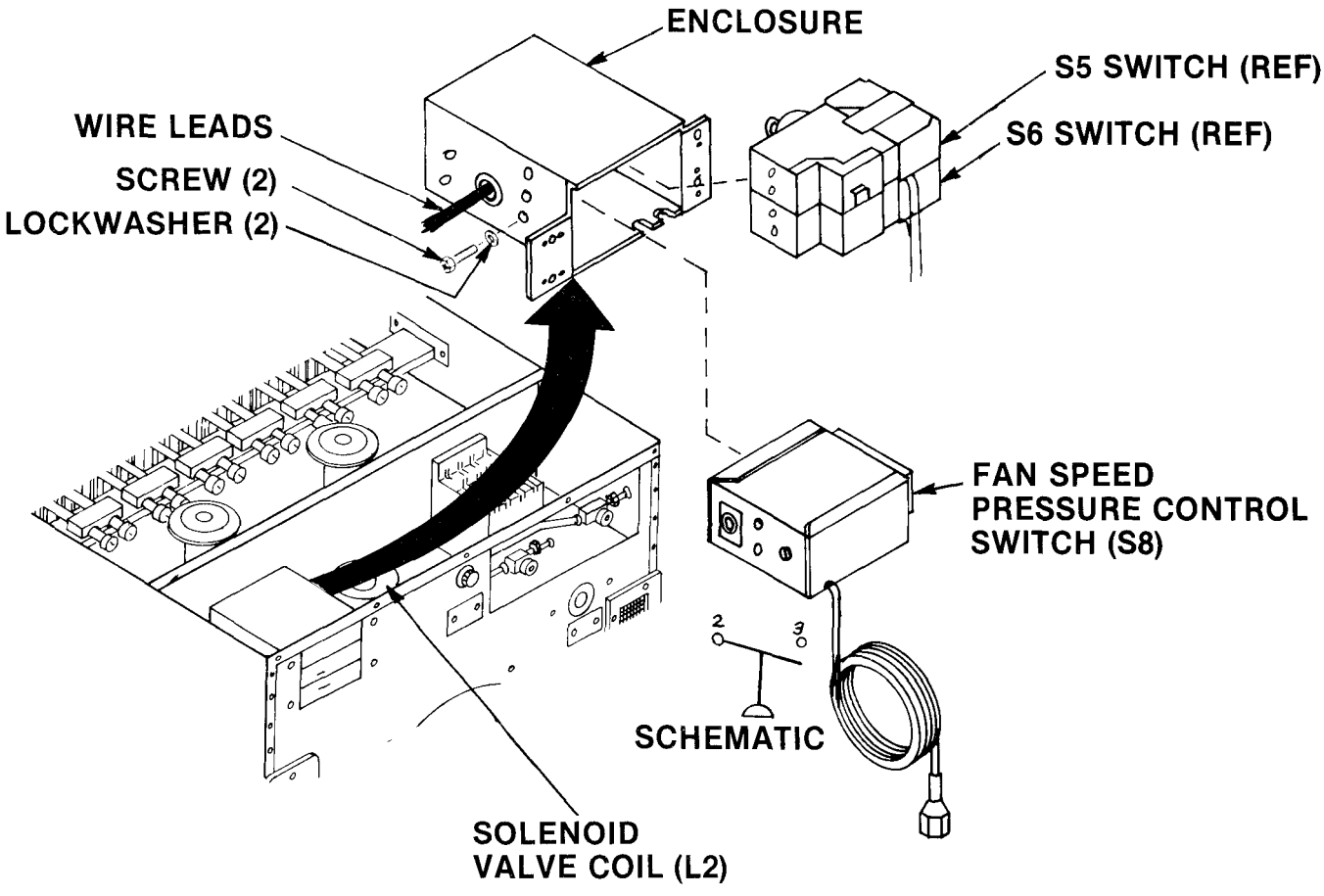


Figure 5-13. Fan Speed Pressure Control Switch

WARNING

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

a. Access

(1) Using screwdriver, remove four screws in pressure switch nameplate that secure switch enclosure.

(2) Carefully pull switch enclosure far enough from unit to gain access to attachment screws.

(3) Using screwdriver, remove two screws and lockwashers each from pressure switches (S6) and (S5).

(4) Carefully pull switches (S6) and (S5) from enclosure far enough to gain access to switches (S6) and (S5) terminals.

(5) Tag and remove wire leads on switches (S5) and (S6),

(6) Using screwdriver, remove two screws and lockwashers from pressure switch (S8).

(7) Carefully pull switch (S8) from enclosure far enough to gain access to switch terminals.

(8) Tag and remove wire leads from switch (S8).

b. Inspection/Test

(1) Check that wire leads and terminal attachment screws are in place. 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) Use a continuity tester or multimeter to check continuity between terminals 2 and 3 on switch. If there is no continuity, the switch is properly open. If continuity is found, switch must be replaced.

c. Removal

(1) Discharge the refrigerant per paragraph 5-6.

(2) Remove evaporator fan. (See para 4-58.)

(3) Remove condenser fan. (See para 4-59.)

(4) Remove evaporator and condenser fan motor. (See para 4-60.)

(5) Using two wrenches, loosen and disconnect switch capillary tubing flare nut from pressure tap.

(6) Remove pressure switch and capillary with flare nut from unit.

d. Installation

(1) Insert capillary with flare nut through hole in back of rear panel.

(2) See tags and wiring diagram (see fig. 4-7) and connect wire leads. Remove tags.

(3) Using two wrenches, connect flare nut to pressure tap.

(4) Using screwdriver, secure pressure switch (S8) to enclosure with two screws and lockwashers.

(5) Using screwdriver, secure pressure switches (S6) and (S5) to enclosure with two screws and lockwashers, each.

(6) Install enclosure and switches in unit.

(7) Aline the enclosure and switch nameplate with unit mounting holes.

(8) Using screwdriver, secure enclosure and nameplate with four screws.

(9) Carefully coil excess capillary tubing and tape in place to eliminate vibration.

(10) Replace the dehydrator. (See para 5-13.)

(11) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(12) Evacuate and charge the refrigeration system. (See para 5-10 and 5-11.)

Follow-on procedure: 1. Install fan motor. (See para 4-60.)

2. Install condenser fan. (See para 4-59.)

3. Install evaporator fan. (See para 4-58.)

4. Install top panel. (See para 4-23.)

5. Press and release pressure switch reset buttons to be sure they are not tripped.

5-17. CHARGING VALVES

Preliminary procedure: 1. Remove service valves cover. (See para 4-15.)

2. Remove top panel. (See para 4-23.)

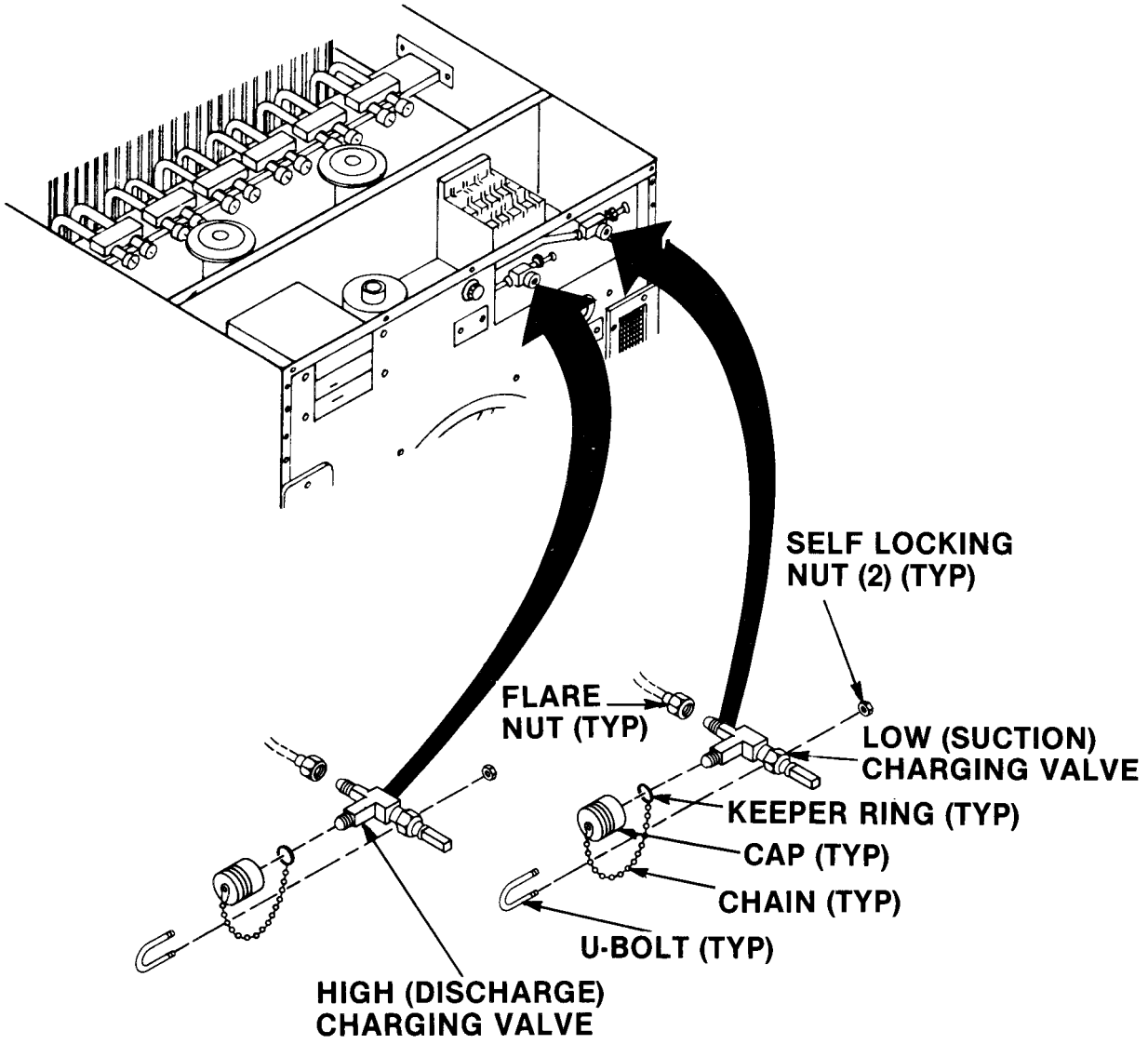


Figure 5-14. Charging Valves

a. Inspection

(1) Check that caps are in place and that keeper rings are not damaged. Replace if missing or damaged.

(2) Check for signs of leakage. Leak test per paragraph 5-9, if leak is suspected.

b. Removal

(1) Discharge the refrigerant system. (See para 5-6.)

(2) Using two wrenches, loosen and disconnect tubing flare nut from charging valve.

(3) Using wrench, remove two self-locking nuts on U-bolts.

(4) Observe position of valve for proper installation.

(5) Remove charging valve.

c. Installation

(1) Position valve in unit as noted during disassembly.

(2) Using two wrenches, restrain valve body and tighten flare nut.

(3) Using two wrenches, secure valve and cap and chain with two self-locking nuts and U-bolt.

(4) Replace the dehydrator. (See para 5-13.)

(5) Leak test the newly connected joints and all connections in those areas. (See para 5-9.)

(6) Evacuate and charge the system. (See para 5-10 and 5-11.)

Follow-on procedure: 1. Install top panel. (See para 4-23.)

2. Install service valve cover. (See para 4-15.)

5-18. SOLENOID VALVES (L1 AND L2) TEST AND COIL REPLACEMENT

Preliminary procedure: 1. Remove top panel. (See para 4-23.)

2. Remove junction box. (See para 4-29.)

WARNING

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

a. Test

NOTE

The following basic instructions apply to both the equalizing solenoid (L2) and the liquid line solenoid (L1).

(1) Use a multimeter set on lowest OHMS scale to check for continuity between cortacts I and M on L1 (connector P4) and contacts H and g on L2 (connector P4). If continuity is not found, coil is open and must be replaced.

(2) Use multimeter to check for continuity between each contact in connector P4 and coil casing. If continuity is found between either contact (I and M, L1 or H and g, L2), the coil is grounded and should be replaced.

(3) If continuity checks are satisfactory, apply 28 volts dc from an external power source across contacts I and M on L1 (connector P4). Listen for a sharp click when valve changes position. If click is not heard, internal valve problems are indicated and entire valve should be replaced. (Go to para 5-19.)

(4) Repeat the above test on valve L2. Apply 28 volts dc to contacts H and g (P4). Replace entire valve if click is not heard. (Go to para 5-19.)

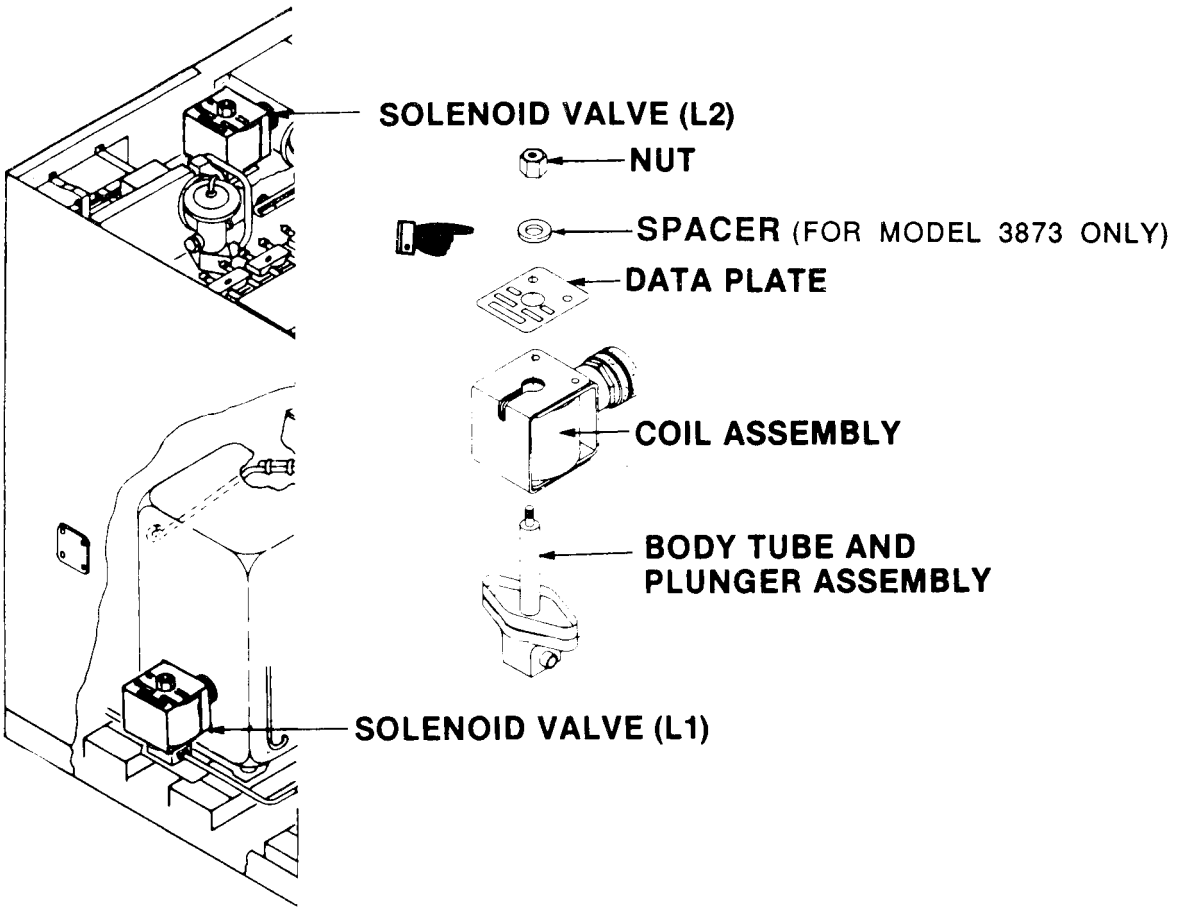


Figure 5-15. Solenoid Valve Coil Replacement

Coil replacement. The coil can be replaced without opening the refrigera- pressure system.

WARNING

Do not attempt any disassembly of solenoid valve other than coil removal with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if screws that attach tube and plunger assembly to valve body are loosened.

(1) Using wrench, remove nut that attaches coil to valve body.

(2) Remove coil, nut and data plate.

(3) Tag and cut solenoid coil leads at a convenient distance from the coil.

(4) Cut leads on replacement coil to match length of coil to be replaced.

(5) Refer to paragraph 4-27 and splice replacement coil to wiring harness. (See table 4-3.) Remove tags.

(6) Install coil on valve body tube and plunger assembly.

(7) With wrench, secure data plate, and nut, For Model 3873, also install spacer.

Follow-on procedure: 1. Install junction box. (See para 4-29.)

2. Install top panel. (See para 4-23.)

5-19. SOLENOID VALVES(L1 AND L2)

For testing and replacement of coils, see paragraph 5-18.

Preliminary procedure: 1. Remove junction box. (See para 4-29.)

2. Remove top panel. (See para 4-23.)

a. Removal

WARNING

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

(1) Discharge the refrigeration system in accordance with paragraph 5-6.

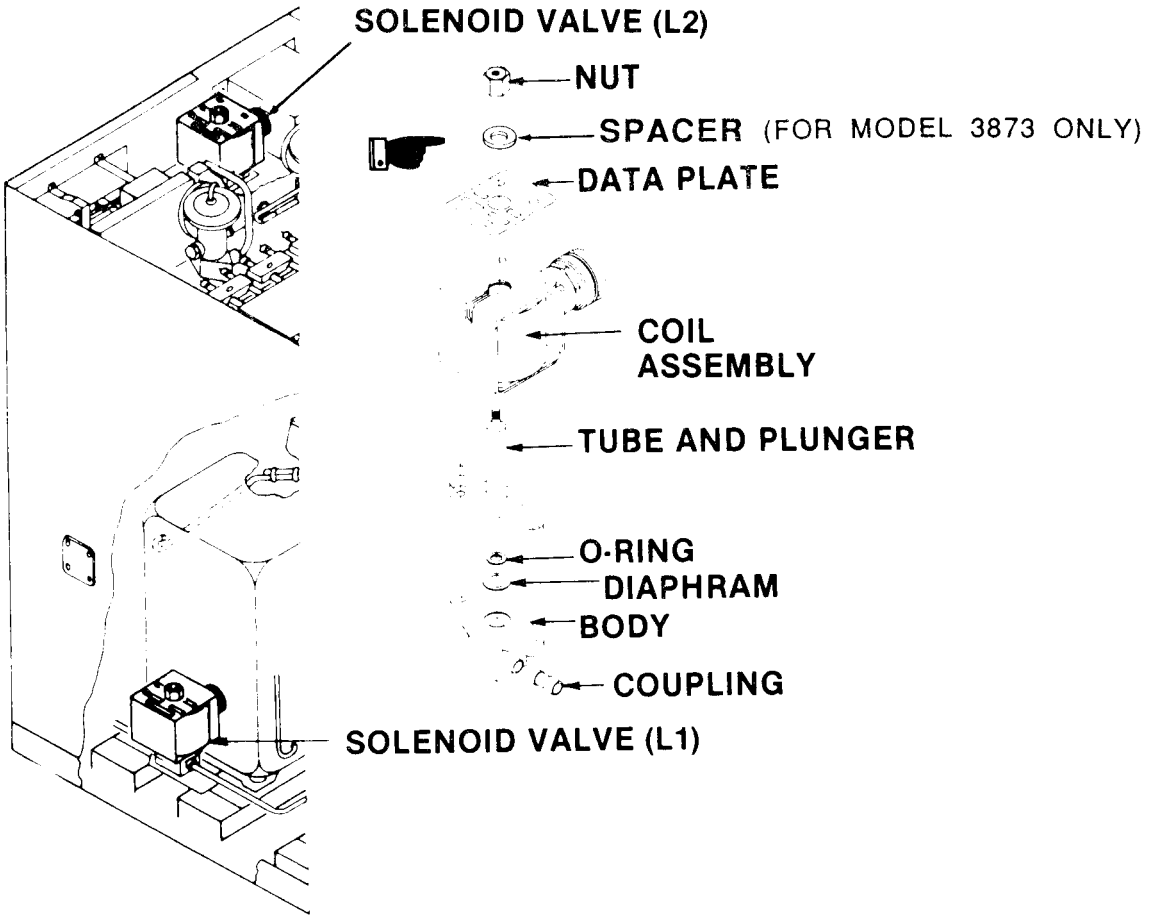


Figure 5-16. Solenoid Valves (L1 and L2)

(2) Remove nut that attaches coil to valve body. For Model 3873, also remove spacer,

(3) Remove coil assembly and data plate.

(4) Remove two screws that attach tube and plunger assembly to valve body. Remove tube and plunger assembly, and all other removable internal components from valve body.

(5) Check valve body for visible damage. Normally valve body replacement is unnecessary, If valve body is in good condition, skip steps (7) thru (9).

(6) Using screwdriver, remove two screws and lockwashers that attach base of valve body to unit.

(7) Purge the system with nitrogen and debraze the tube connections. (See para 5-7 and 5-8.)

(8) Remove the valve body.

b. Installation. If valve body was not removed, go to step (3).

(1) Place the valve body on the tube ends, purge the system with nitrogen and braze the tube joints. (See para 5-7 and 5-8.)

(2) Using a screwdriver, secure the valve body to unit with two screws and lockwashers.

(3) Check internal surfaces of valve body to he sure it is clean.

(4) Carefully install diaphragm, O-ring, and tube and plunger. Secure to valve body with two screws.

(5) place coil assembly and data plate onto tube and plunger and secure with nut. For Model 3873, also install spacer onto coil assembly.

(6) Replace the dehydrator. (See para 5-13)

(7) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(8) Evacuate and charge the refrigerant system. (See para 5-10 and 5-11.)

Follow-on procedures: 1. Install junction box. (See para 4-29.)

2. Install top panel. (See para 4-23.)

5-20. LIQUID QUENCH EXPANSION VALVE (V4)

Preliminary procedure: 1. Remove top panel. (See para 4-23.)

2. Remove fan motor. (See para 4-60.)

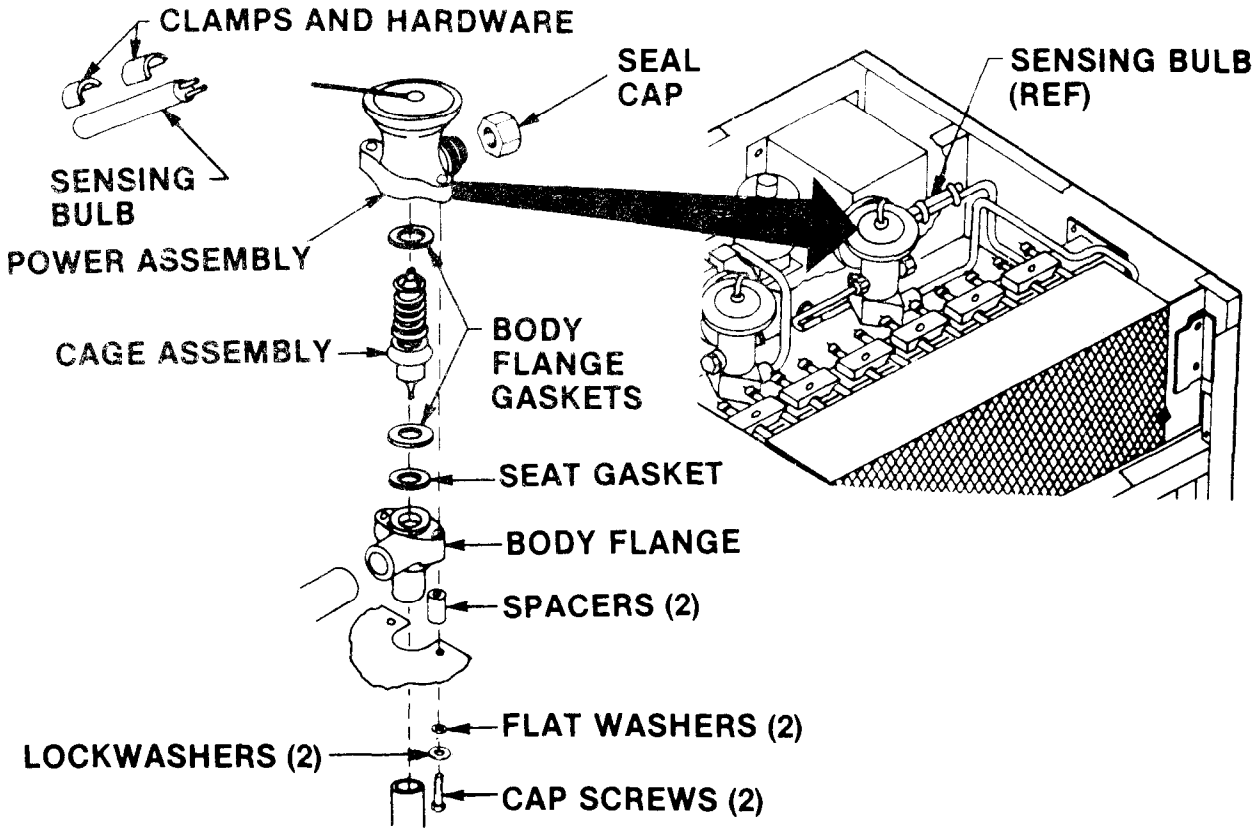


Figure 5-17. Liquid Quench Expansion Valve

a. 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 5-9.

b. Test

(1) Performs refrigerant pressure check on unit in accordance with paragraph 5-12. Leave gages or service manifold attached.

(2) Unwrap insulation tubing from compressor suction line so that sensing bulb and an adjacent section of the suction line is exposed.

(3) Attach an accurate thermometer to an exposed surface to suction line adjacent to the sensing bulb; use a small gob of thermal mastic, to improve conductivity.

(4) Check that service valve and gage connection to low (suction) side are open. Note pressure indicated on gage and temperature indicated on thermometer.

(5) Set the Temperature control thermostat knob to full INCREASE (clockwise). Start the air conditioner in COOL mode. Note that suction pressure drops to 58 ±2 psig (4.0 ±O.2 kg/cm^2). Allow compressor to run for at least 20 minutes. If pressure is not within above limits, test operation of pressure regulating valve (para 5-25) before proceeding with quench valve test.

NOTE

Except in a very hot. climate, with room air 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°F (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. For example: With a 40° saturation temperature, the thermometer should read 65 ±5°F. If indicated temperature is not within above limits, quench valve is not functioning properly and should be adjusted.

NOTE

If valve does not need adjustment, skip (8) below.

(8) If the superheat setting is not within the limits shown above, adjust the liquid quench expansion valve as follows:

(a) Remove the hexagonal seal cap from the side of the power assembly.

(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. If valve cannot be properly adjusted, replace the valve.

(c) When the proper setting is obtained, install the seal cap.

(9) Turn unit OFF.

(10) Remove thermometer.

(11) Cover the sensing bulb and suction line with insulation tubing that was removed in step (2) above. Secure tubing in place using tape, item 11, Appendix E.

(12) Close charging valves on unit.

(13) Remove gages or service manifold from charging valves.

(14) Install hose connection protective caps.

(15) Using screwdriver, secure charging cover with four screws and flat washers.

c. Removal

(1) Discharge the refrigerant system per paragraph 5-6.

(2) Unwrap insulation tubing from suction line so that sensing bulb is exposed. Note location and position of bulb for reinstallation. Loosen screws and nuts in clamps. Pull bulb out of clamps.

(3) Using wrench, remove two cap screws, lockwashers, flat washers, and spacers that attach valve body to bracket and power assembly.

(4) Carefully remove the power assembly, cage assembly, and gaskets.

NOTE

If valve body flange is not damaged, do not remove (debraze) it from the system.

(5) If valve body flange is to be removed, purge the system with nitrogen and debraze the two tubes. (See para 5-7 and 5-8.)

d. Installation

(1) If valve body flange was removed, purge the system with nitrogen and braze the two tubing joints. (See para 5-7 and 5-8.)

(2) See figure 5-17 for valve component arrangement.

(3) Place cap screws, lockwashers, flat washers, and spacers through bracket and valve body flange.

(4) Be sure that valve components are properly assembled and alined. Secure power assembly to body flange.

(5) Insert sensing bulb into its mounting loop clamps in its original position, and tighten the screws and nuts. Be sure sensing bulb is installed in the original position and is making good metal-to-metal contact with suction line.

(6) Reinstall insulation tubing that was removed from sensing bulb and liquid quench expansion valve connections. Secure insulation tubing with tape, item 11, Appendix E.

(7) Replace the dehydrator. (See para 5-13.)

(8) Leak test all newly connected joints and those in the repaired area. (See para 5-9.)

(9) Evacuate and charge the refrigerant system. (See para 5-10 and 5-11.)

Follow-on procedures: 1. Install fan motor. (See para 4-60.)

2. Install top panel. (See para 4-23.)

5-21. COMPRESSOR(B1)

Preliminary procedure: Remove junction box. (See para 4-29.)

The compressor and motor assembly are hermetically sealed in a metal canister and are not repairable. The heater may be replaced without opening the refrigerant pressure system.

a. Preliminary Inspection/Test

(1) Electrically test the heater element, heater thermostat, wiring harness, and motor as follows.

(2) Disconnect wiring harness at connectors P3 and J3 (located on the compressor junction box).

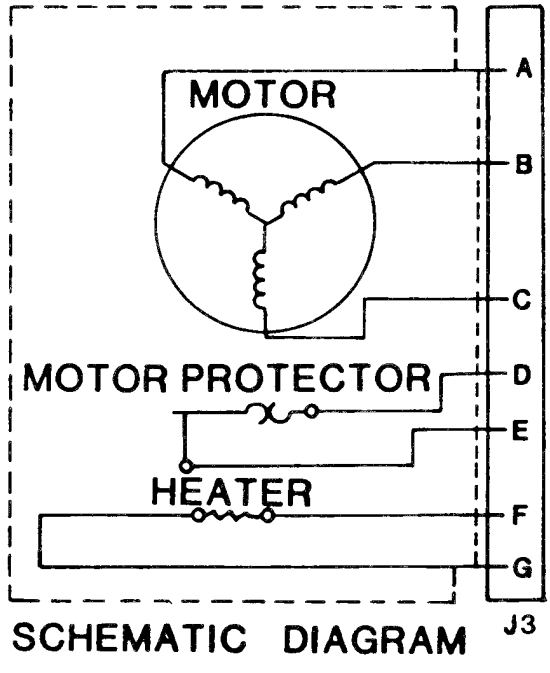


Figure 5-18. Compressor Schematic

WARNING

Heating element is extremely hot. Severe burns can be caused by touching with bare skin.

(3) Carefully feel lower part of compressor:

- If air conditioner has been connected to power supply for at least four hours, compressor should feel warm (100 to 120°F). If not warm, test crankcase heater for continuity.
- If air conditioner has not been connected to power supply for at least four hours, compressor temperature should be the same as surrounding air temperature.

(4) Using multimeter, test crankcase heater:

- Using multimeter, test resistance from pin F to pin G. Resistance should be 264 to 396 ohms. Lower reading indicates short, and infinite reading indicates an open. Replace faulty or open crankcase heater.

(5) Using multimeter, test compressor motor windings:

- Check continuity between pins A, B, and C and the compressor body. No continuity should exist. If continuity exists, the compressor is bad.
- Test single phase windings at J3:

  A to B

  B to C

  A to C

  All resistances should be above zero and less than 2 ohms.

- Test resistance between pin D and pin E. Resistance should be zero indicating motor protector is closed.
- Compressor containing shorted, open or grounded winding or open motor protector, should be replaced.
- If compressor windings are bad, check for compressor burn out prior to installing a new compressor. (See instructions in compressor removal.)

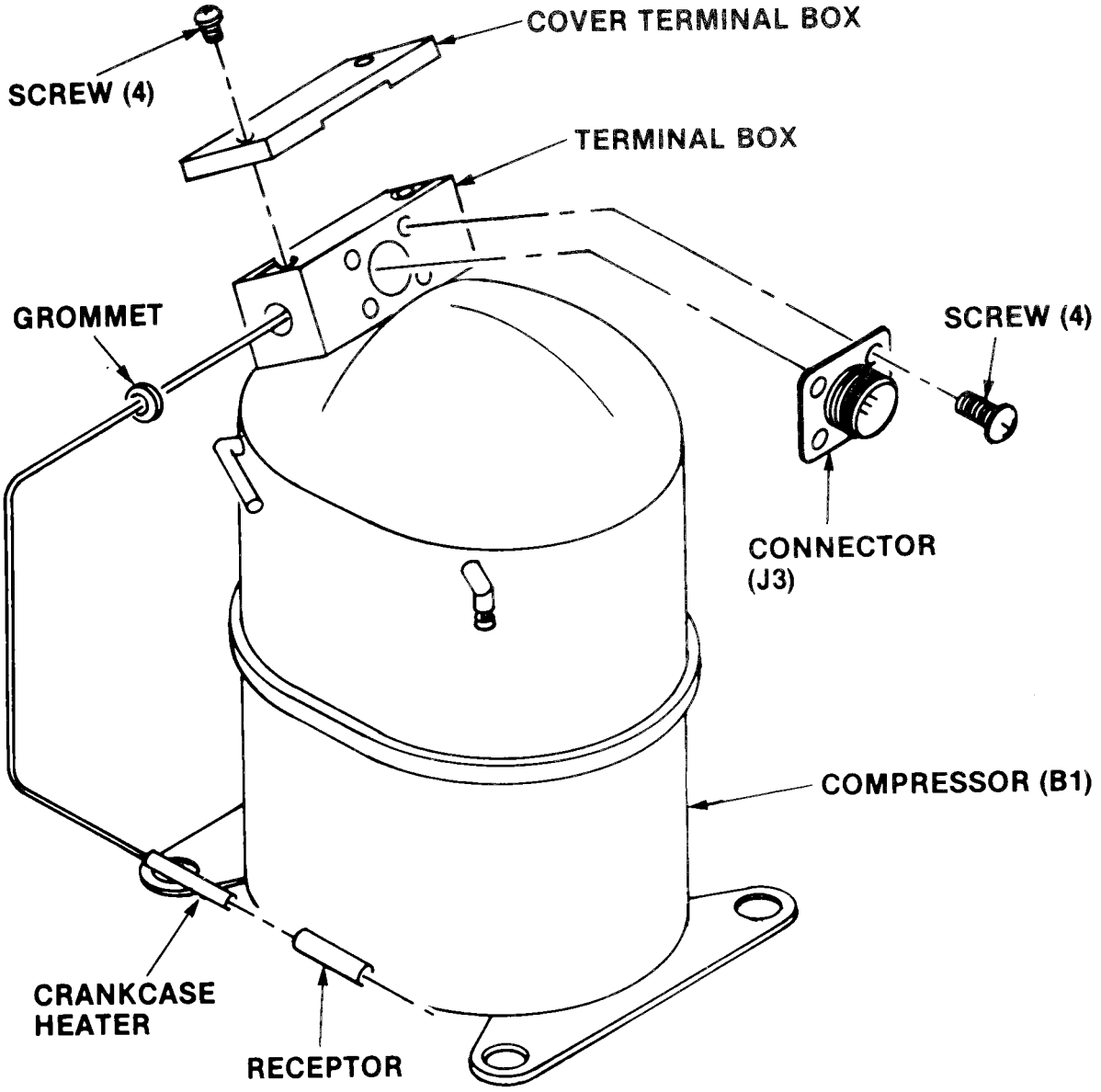


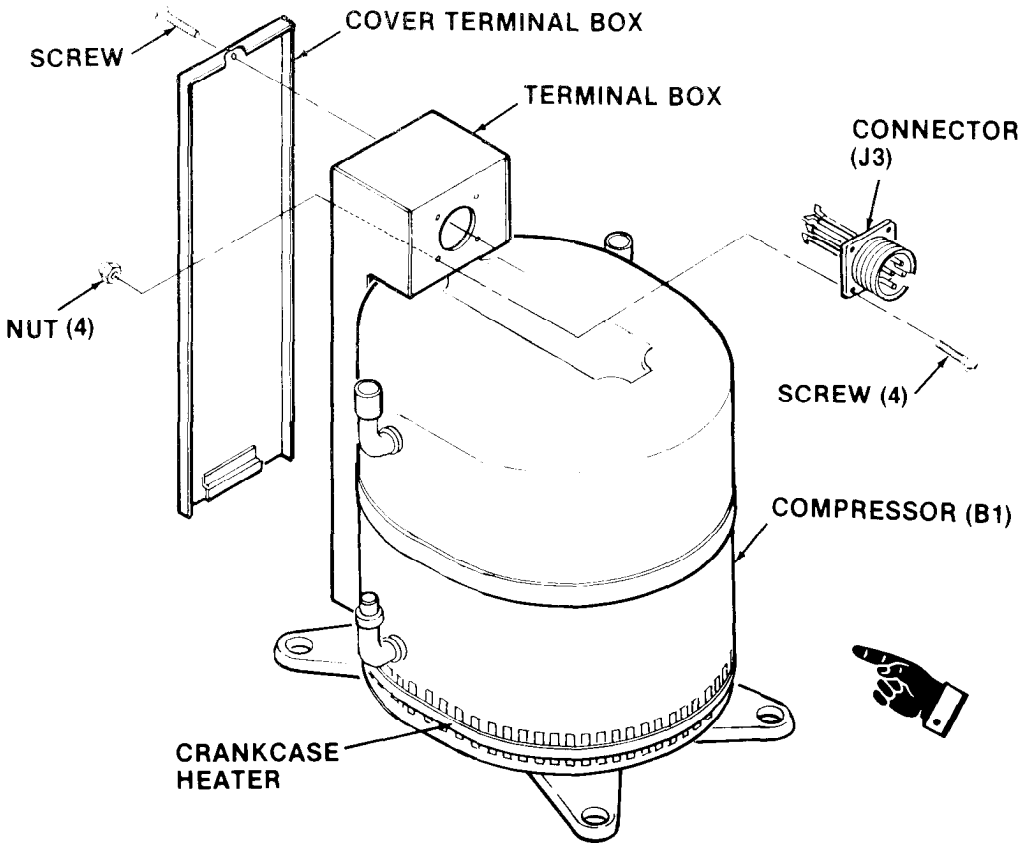
Figure 5-19. Compressor Replaceable Items
(For Model 3770 Only.)

b. Heater/test/removal

(1) Remove condenser fan. (See para. 4-59.)

(2) For Model 3783, remove compressor (See para. 5-21d.)

(3) For Model 3770, loosen screw on lower receiver clamp. (See fig. 5-25.)



5-19.1. Compressor Replaceable Items (For Model 3873 Only)

(4) For Model 3770, remove screw and lock washer on receiver clamp from casing. Slide clamp down and away. (See fig. 5-25.)

(5) For Model 3770, remove heater from receptor. For Model 3783, loosen heater clamp screw and remove heater from compressor.

(6) Disconnect plug P3 from connector J3 in compressor terminal box,

(7) Using ohmmeter, test resistance from pin F to pin G on J3. Resistance should be 264 to 396 ohms. Lower reading indicates short, and infinite reading indicates open. Replace faulty or open heater,

(8) Tag and cut wire leads close to heater element.

(9) Using ohmmeter, check for continuity of cut wires from connector J3 pins F and G.

(10) If continuity exists (wires circuit not open), see tags and splice new heater per instructions of para. 4-27. Remove tags.

(11) If no continuity exists in step (8) test (wires circuit open), follow the procedures of step f.

c. Heater Installation

(1) For Model 3770, install heater element into receptor. For Model 3873, place heater onto compressor crankcase and tighten heater clamp screw,

(2) For Model 3770, install plug P3 in connector J3 on compressor junction box.

(3) For Model 3770, slide bottom receiver clamp up to aline with through hole in casing. (See fig. 5-25.)

(4) For Model 3770, secure bottom receiver clamp to casing with screw and lock washer.

(5) For Model 3770, tighten bottom receiver clamp.

(6) For Model 3873, install compressor. (See para. 5-21g.)

d. Compressor replacement

WARNING

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

NOTE

Conduct an inspection of the bottom panel each time the compressor is removed. Refer to paragraphs 6-2 and 6-3 for maintenance actions.

(1) 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 shoulder screws must be removed.

(2) Discharge the refrigerant system per paragraph 5-6.

(3) Unwrap the insulation from the suction tube so that the joint on the compressor is exposed.

(4) While purging the system with nitrogen, debraze the tubing. (See paras 5-7 and 5-8.)

(5) Using wrenches, remove four locknuts and flat washers from top of mounting feet and four shoulder bolts, eight flat washers, and four rubber washers from underneath side of unit.

(6) Slide compressor back approximately six inches to gain access to the sensing bulb.

(7) Unwrap the insulation surrounding sensor bulb.

(8) Using screwdriver and wrench, remove two screws and nuts from bulb clamps.

(9) Remove bulb and stow away from compressor tubing.

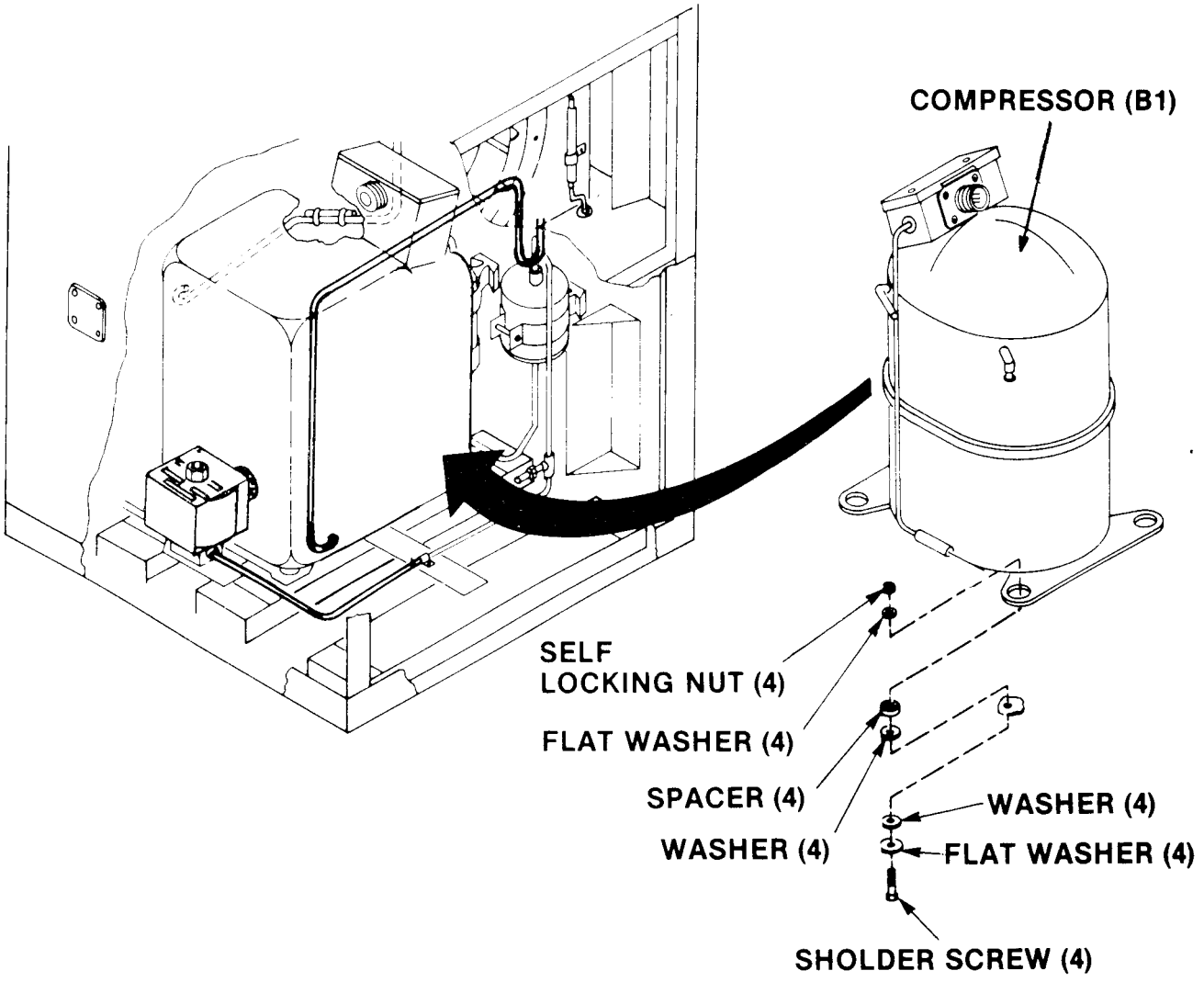
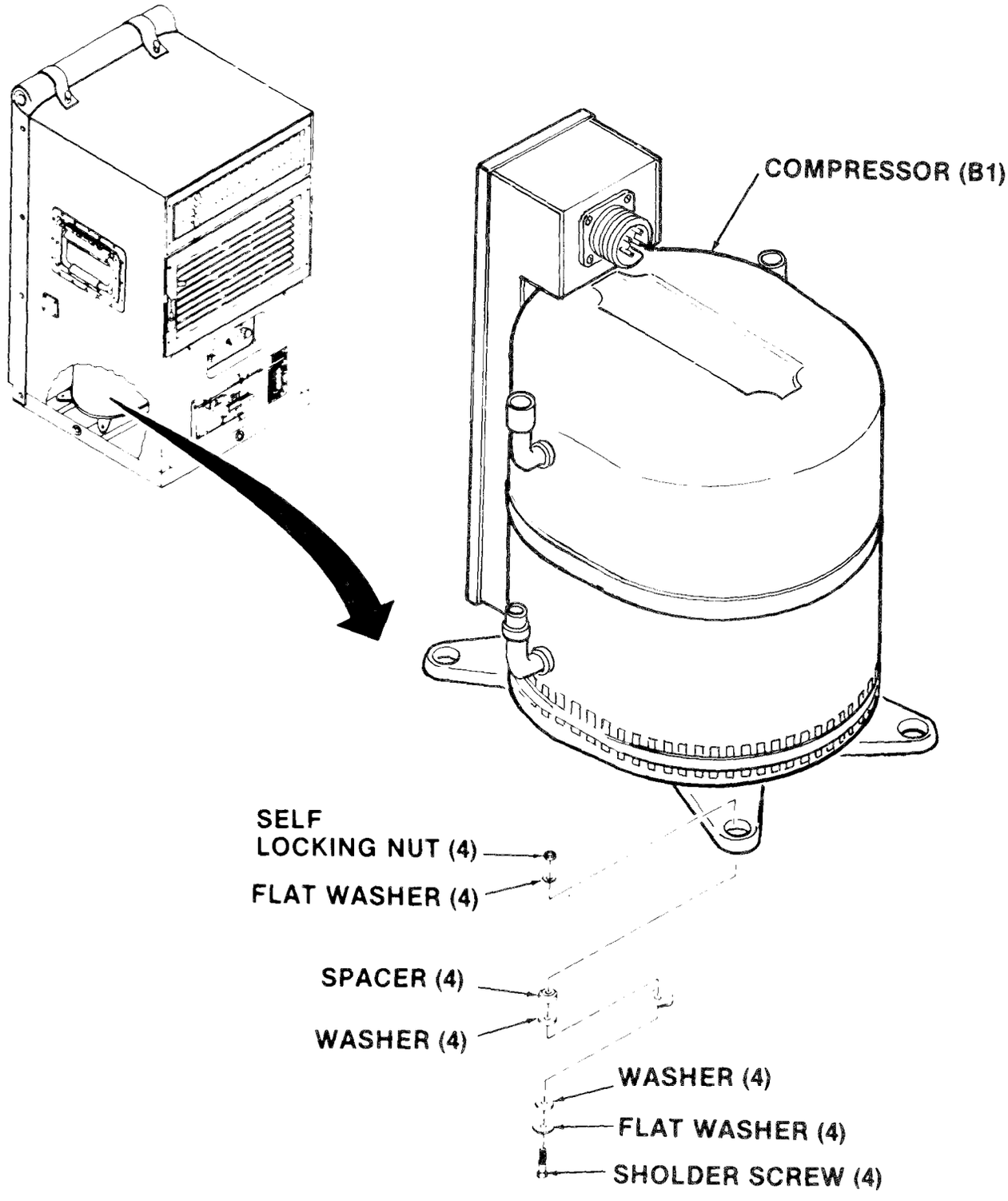


Figure 5-20. Compressor (Bl)
(For Model 3770 Only)

(10) Lever or tilt the compressor and remove rubber washer and bushing from under each of the four mounting feet.

WARNING

If compressor burnout is suspected, use care when handling compressor to avoid touching compressor sludge. Acid in sludge can cause burns.



5-20.1. Compressor (B1)
(For Model 3873 Only)

U.S. GOVERNMENT PRINTING OFFICE: 1992 - 654-028/60209

(11) Carefully slide compressor from air conditioner.

(12) Check the compressor to see if a motor burnout is indicated

e. Compressor motor burnout.

(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.

WARNING

Avoid inhaling fumes and burns 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.

(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 f.

(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 burnouts.

(5) Remove the dehydrator (filter-drier), and blow down each leg of the refrigeration system. To do this, 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 (item 12, Appendix E) 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 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 inhaling fumes and burns from 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.

(12) Fill reservoir with fluorocarbon refrigerant, R11, and start the pump. Continue filling the reservoir with refrigerant, R11, 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, filter, and dehydrator jumper. Place an empty container below the compressor connections, and connect a cylinder of dry nitrogen to each filter–drier connection in turn. Blow down each leg of the system at 50 psig (3.5 kg/cm^2) for at least 30 seconds.

(15) Disconnect the dry nitrogen cylinder. Cap or plug open connections if compressor and filter-drier are not to be installed immediately.

f. Connector and wires replacement

(1) Remove the retaining hardware from the connector. Pull the connector out of the box to gain access to the solder connections.

(2) Tag and unsolder wire leads.

(3) Using tags and wiring schematic (fig. 5-18), solder wire leads to new connector. Remove the tags.

(4) Secure the connector to the compressor junction box with four screws, lockwashers, nuts and a gasket.

g. Compressor installation

CAUTION

The compressor is supplied with a complete charge of oil. Be sure 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 a heater, if not, remove heater from old compressor or replace with new one.

(1) Lift compressor through the lower front panel opening and position it on base pane.

(2) Install sensor bulb on tubing with two clamps. Using screwdriver, tighten hardware on bulb clamps.

(3) Using insulation removed during disassembly, install on sensor bulb.

(4) Lever or tilt the compressor and install the rubber washer and bushing between each of the four compressor mounting feet and the base pan.

(5) Install two flat washers and a rubber washer on each of the four mounting shoulder screws, then insert the shoulder screws from beneath the base. Secure with four flat washers and locknuts on top of mounting feet.

(6) Wrap wet rags around compressor at connection points and while brazing direct flame away from compressor.

(7) While purging the system with nitrogen, braze the tubing joints. (See paras 5-7 and 5-8.)

(8) Replace the dehydrator. (See para 5-13.)

(9) Connect electrical connector plug (P3) to connector (J3) on compressor terminal box.

(10) Leak test all newly connected joints and those in the repaired area. (see para 5-9.)

(11) Using insulation removed during disassembly, install on suction tube compressor joint area.

(12) Install junction box. (See para 4-29.)

(13) Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

5-22. LIQUID SIGHT INDICATOR (SIGHT GLASS)

Preliminary procedure: 1. Remove top panel. (See para 4-23.)

2. Remove fan relay (K7). (See para 4-54.)

a. Inspection

(1) Check that glass window is clean and not cracked or broken. Clean if dirty. Replace liquid sight indicator if cracked or broken.

(2) Check for evidence of leakage. Leak test per paragraph 5-9 if leak is suspected. Repair or replace as indicated.

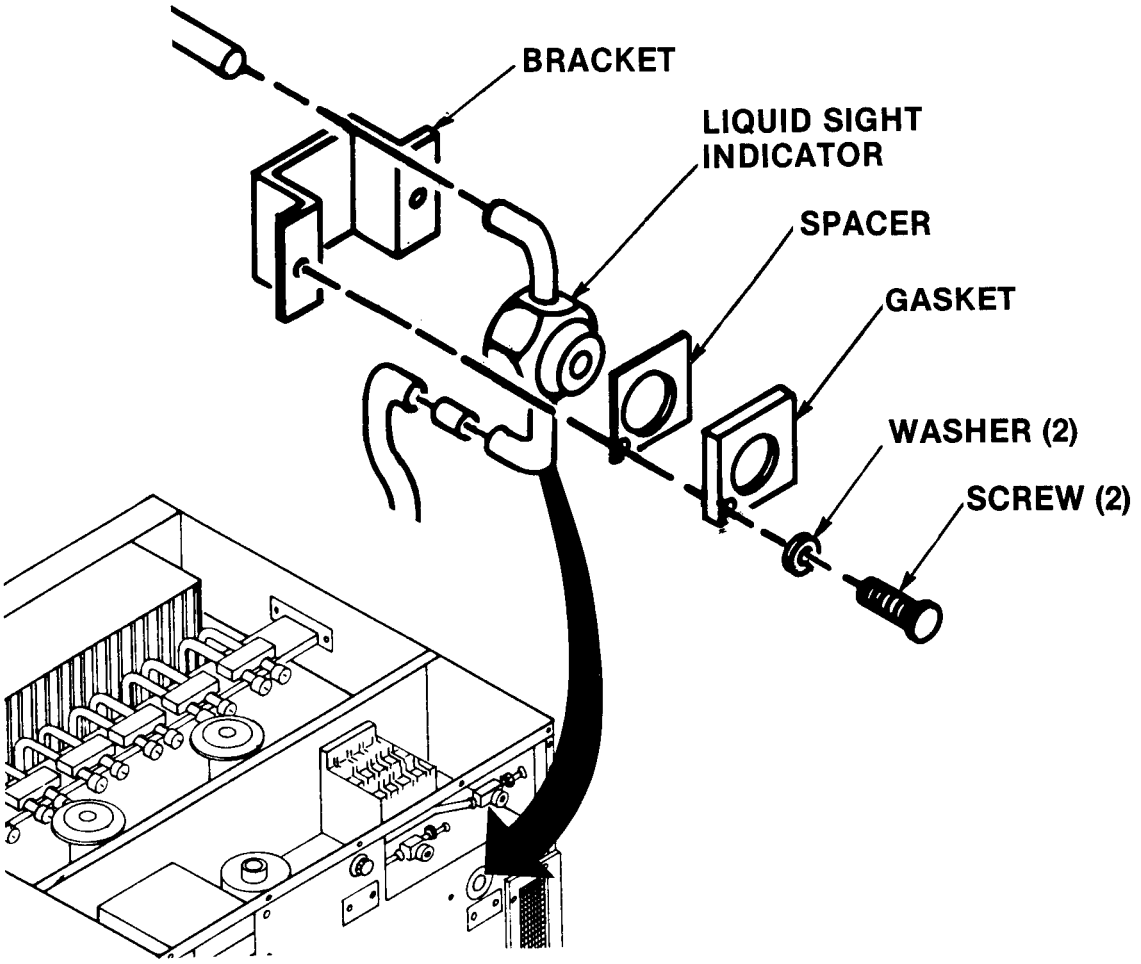


Figure 5-21. Liquid Sight Indicator (Sight Glass)

b. Removal

(1) Discharge the refrigerant system per paragraph 5-6.

(2) Remove the charging valves. (See para 5-19.)

(3) With screwdriver, remove two screws and washers in indicator bracket.

(4) Remove bracket, spacer and gasket.

(5) While purging the system with nitrogen, debraze the tubing. (See para 5-7 and 5-8.)

(6) Remove liquid sight indicator.

c. Installation

NOTE

Do not disassemble liquid sight indicator.

(1) Position liquid sight indicator on tubing.

(2) While purging the system with nitrogen, braze the tubing joints. (See para 5-7 and 5-8.)

(3) With screwdriver, install bracket, spacer and gasket with two screws and washers.

(4) Replace the dehydrator. (See para 5-13.)

(5) Replace charging valves. (See para 5-17.)

(6) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(7) Evacuate and charge the refrigerant system. (See para 5-10 and 5-11.)

Follow-on procedure: 1. Install fan relay (K7). (See para 4-54.)

2. Install top panel. (See para 4-23.)

5-23. EXPANSION VALVE

Preliminary procedure: Remove top panel. (See para 4-23.)

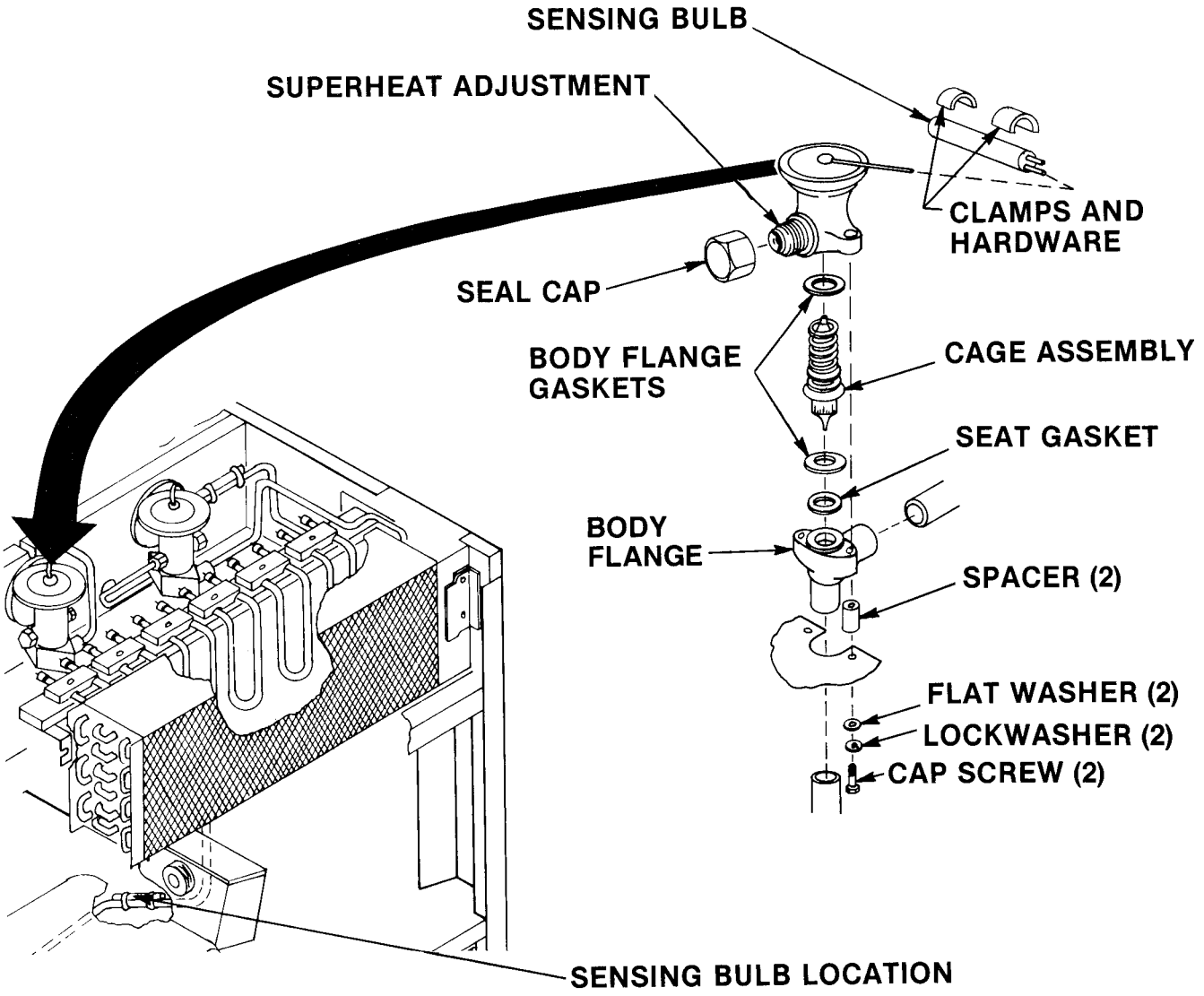


Figure 5-22. Expansion Valve

a. 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 5-9.

b. Testing and superheat adjustment. The expansion valve as supplied with the unit is preset at the factory. This valve should not be adjusted unnecessarily.

(1) Performs refrigerant pressure check on unit in accordance with paragraph 5-12. Leave gages or service manifold attached.

(2) Remove the suction line insulation from the area of the sensing bulb. Observe location and position of bulb for reinstallation.

(3) Loosen the screws and nuts in the bulb straps that attach the sensing bulb to the suction line, and pull the bulb out of the straps.

CAUTION

Use care to not damage or kink the capillary.

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

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

(4) Place the sensing bulb 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 (counter-clockwise), fan speed to LO SPEED, 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 ±0.14 kg/cm^2). If the pressure is not within the above limits, test the operation of the quench valve (para 5-20) and the pressure regulator valve (para 5–25) 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.

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) Slip the sensing bulb into its mounting loop clamps. Be sure the bulb is installed in its original position and tighten the nuts and screws. Be sure the sensing bulb 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 gob of thermal mastic to improve conductivity.

(9) Rewrap insulation on the suction return line, being sure to cover the 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 ±l°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 from the side of the power assembly.

(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.

(c) Remove thermometer.

(d) Cover the bulb and suction line with insulation tubing. Secure insulation tubing with tape, item 11, Appendix E.

(e) Close charging valves on unit.

(f) Remove gages or service manifold from charging valves.

(g) Install hose connection protective caps.

(h) Using screwdriver, secure charging valve cover with four screws and flat washers.

c. Removal

(1) Discharge the refrigerant system per paragraph 5-6.

(2) Unwrap insulation from suction line so that sensing bulb is exposed. Loosen screws and nuts in clamps. Pull bulb out of clamps.

(3) Disconnect flare nut on external equalizer line from expansion valve.

(4) Remove the two screws, flat washers, lockwashers, and spacers that attach the valve body to its mounting bracket.

(5) Remove remaining valve components except for body flange. (See figure 5-20).

NOTE

If valve body flange is not damaged, do not remove (debraze) it from the system.

(6) If valve body flange is to be removed, purge the system with nitrogen and debraze the two tubes. (See paras 5-7 and 5-8.)

d. Installation

(1) If valve body flange was removed, purge the system with nitrogen and braze the two tubing joints. (See paras 5-7 and 5-8.)

(2) See figure 5-22 for valve component arrangement.

(3) Place cap screws, lockwashers, flat washers, and spacers through bracket and valve body flange.

(4) Be sure that valve components are properly assembled and alined and secure power assembly to body flange.

(5) Connect flare nut on external equalizer line to expansion valve.

(6) Insert the sensing bulb into its mounting loop clamps in its original position and tighten the screws and nuts. Be sure the sensing bulb is making good metal-to-metal contact with the suction line.

(7) Replace the insulation tubing that was removed from the sensing bulb and expansion valve connections. Secure with tape, item 11, Appendix E.

(8) Replace the dehydrator. (See para 5-13.)

(9) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(10) Install top panel. (See para 4-23.)

(11) Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

5-24. EVAPORATOR COIL

For inspection and cleaning of installed coil, see para 4-61.

Preliminary procedure: 1. Remove top panel. (See para 4-23.)

2. Remove evaporator air discharge grille. (See para 4-18.)

3. Remove mist eliminator. (See para 4-26.)

4. Remove heating elements HR1 and HR6. (See para 4-57.)

a. Removal

(1) Discharge the refrigeration system per paragraph 5-6.

NOTE

Tubes at bottom of evaporator header and elbow at bulkhead are most likely disconnect points. See para 5-22 for disassembly of expansion valve.

(2) While purging the system with nitrogen, debraze the tube joints to the evaporator. (See paras 5-7 and 5-8.)

(3) Using screwdriver, remove four screws and washers in right and left hand coil/casing brackets while supporting the coil.

WARNING

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

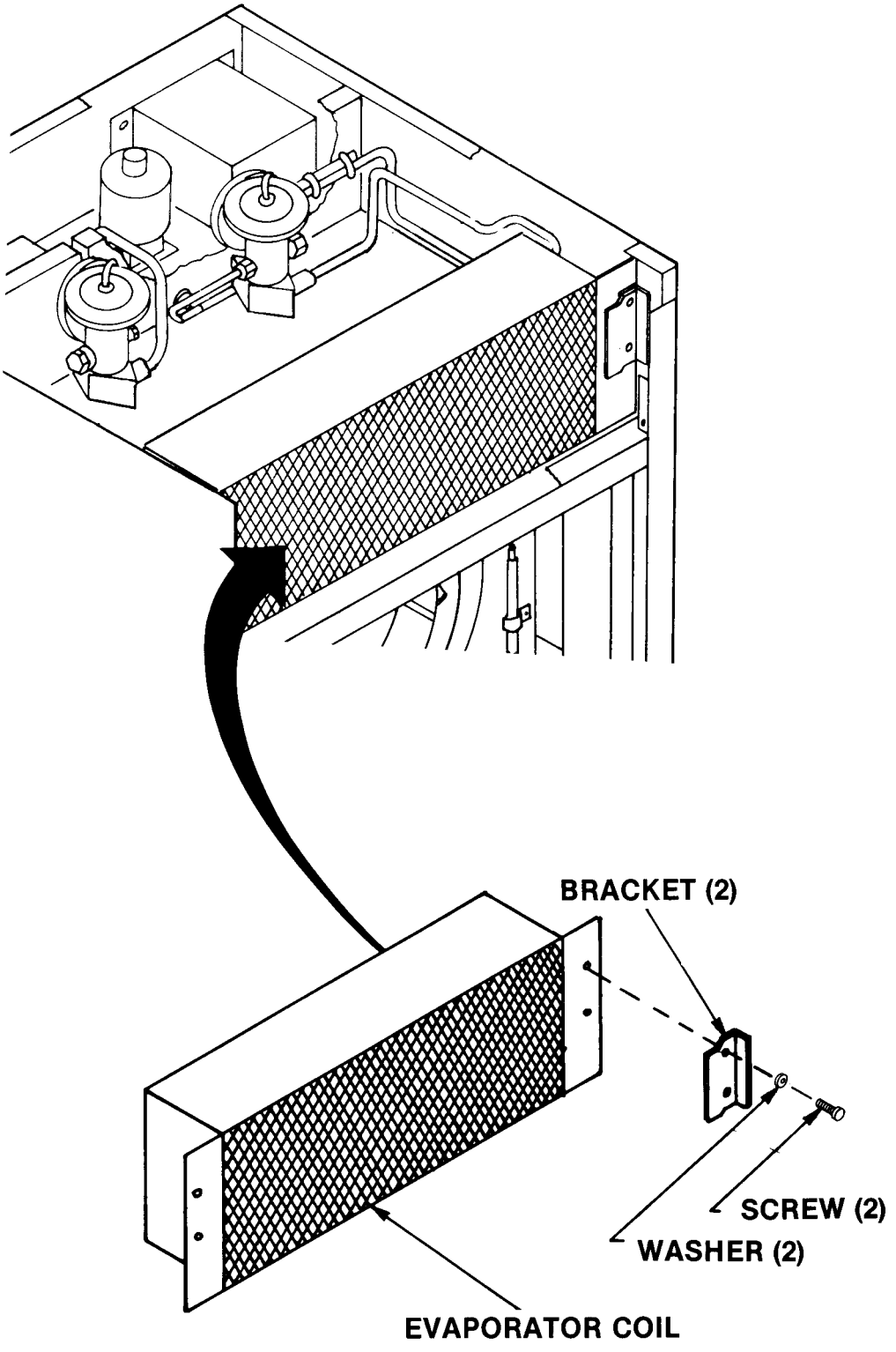


Figure 5-23. Evaporator Coil

(4) Using screwdriver, remove two screws and washers each that attach heater element support to coil while supporting the coil.

(5) Remove mist eliminator brackets.

(6) Using gloves to protect your hands and coil fins, carefully lift the coil up and out of the unit.

b. Repair

(1) Repairs are limited to replacement of rivets, plate nuts, and straightening of mashed fins.

(2) Plate nuts may be removed by drilling out old rivets using a drill bit slightly smaller than the diameter of the rivet.

(3) Install new plate nut(s) and rivets.

(4) If fins are mashed or dented so that air flow across coil would be blocked, straighten them using a plastic fin comb.

c. Installation

WARNING

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

(1) Carefully slide evaporator coil down into unit.

(2) Aline and loosely install two screws and washers that attach heater element support.

(3) Aline and loosely install remaining four screws and washers in right and left hand coil/casing brackets and mist eliminator brackets.

(4) Using screwdriver, tighten all evaporator mounting hardware.

(5) While purging the system with nitrogen, braze the tube joints. (See paras 5-7 and 5-8.)

(6) Replace the dehydrator. (See para 5-13.)

(7) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(8) Install heater elements HR1 and HR6 (See para 4-57.)

(9) Install mist eliminator. (See para 4-26.)

(10) Install evaporator air discharge grille. (See para 4-18.)

(11) Install top panel. (See para 4-23.)

(12) Evacuate and charge the refrigeration system. (See para 5-10 and 5-11.)

5-25. FLUID PRESSURE REGULATING VALVE (V2)

a. Test

NOTE

Valves are factory set and sealed to start opening when suction pressure decreases to 58 psig. Do not break seal.

(1) Perform a refrigeration pressure check on unit in accordance with paragraph 5-12. Leave the gages on service manifold attached.

(2) Set Temperature control thermostat knob to fully INCREASE.

(3) Place fan speed switch in HI SPEED.

(4) Start unit in COOL mode.

(5) Observe pressure gages.

(6) Suction pressure should drop to 58 ±2 psi (4.0 ±0.14 kg/cm^2) shortly after compressor starts, and then remain constant.

(7) If unit fails the above test, the valve must be replaced.

(8) Turn unit OFF.

b. Removal

Preliminary procedures: 1. Discharge the refrigerant per paragraph 5-6.

2. Remove top panel. (See para 4-23.)

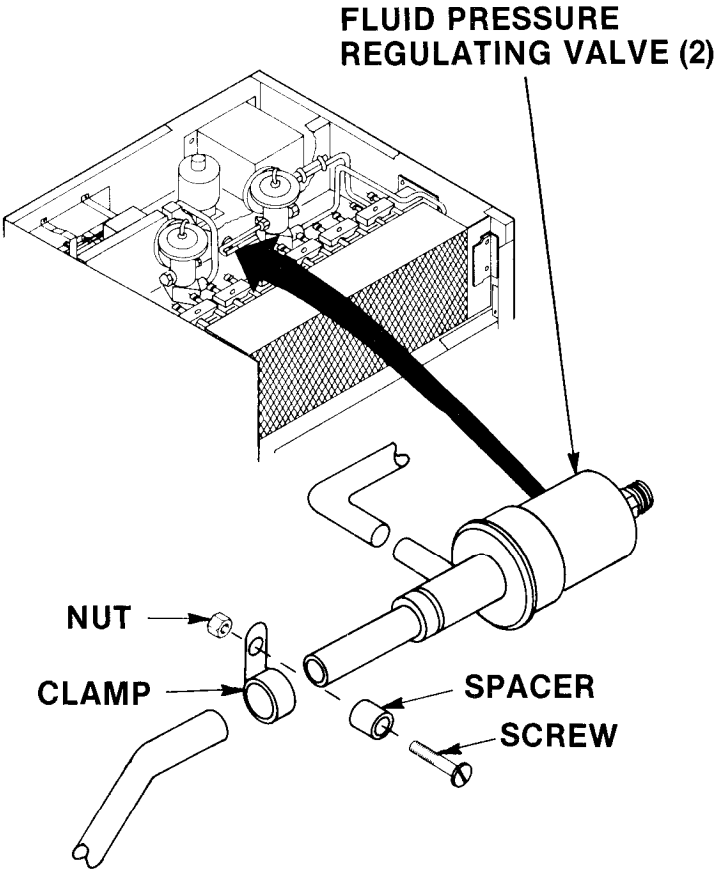


Figure 5-24. Fluid Pressure Regulating Valve

(1) Using two wrenches, remove nut that secures coil to plunger on solenoid valve (L2).

(2) Remove data plate and coil from plunger.

(3) Place coil in a supporting place as far as the leads will allow.

(4) Using screwdriver and wrench, remove screw, nut, spacer and clamp that secure valve to casing.

(5) Using wet rags or asbestos cloth, insulate tubing and valves in the area of the fluid pressure relief valve.

(6) Purge the system with nitrogen and debraze the tube connections. (See paras 5-7 and 5-8.)

(7) Remove the fluid pressure regulating valve.

c. Installation

(1) Place the fluid pressure regulating valve on tube ends.

(2) Wrap a wet rag around valve to insulate.

(3) Using wet rags or asbestos cloth, insulate tubing and valves in the area of the fluid pressure relief valve.

(4) Purge the system with nitrogen and braze the tube joints. (See para 5-7 and 5-8.)

(5) Using screwdriver and wrench, secure fluid pressure relief valve to casing with clamp, spacer, nut and screw.

(6) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(7) Install coil and data plate on plunger of solenoid valve (L2).

(8) Using wrench, secure data plate and coil on solenoid valve (L2) with nut.

(9) Replace the dehydrator. (See para 5-13.)

Follow-on procedures: 1. Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

2. Install top panel. (See para 5-23.)

5-26. RECEIVER

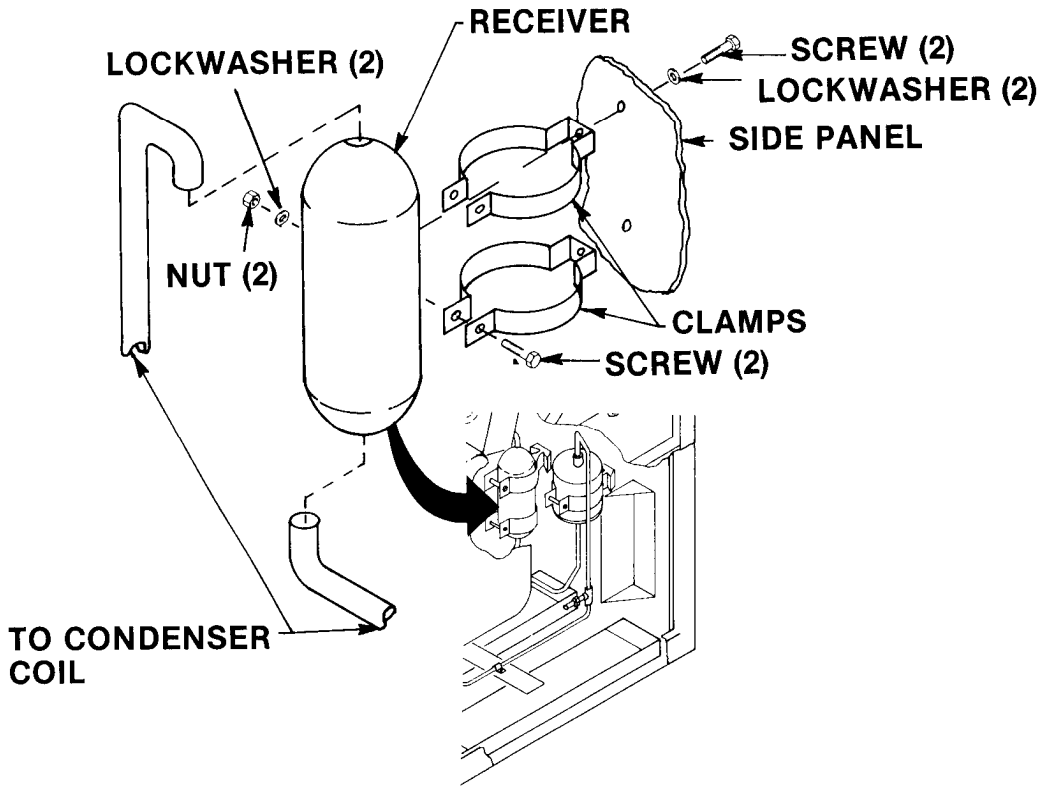


Figure 5-25. Receiver

a. Inspection

Preliminary procedure: Remove junction box. (See para 4-29.)

(1) Check for general condition and signs of leakage. If leakage is suspected, leak test per paragraph 5-9.

(2) Check that mounting hardware is secure.

b. Removal

(1) Discharge the refrigeration system in accordance with paragraph 5-6.

(2) Using screwdriver, remove two screws and two lockwashers in two clamps.

(3) Using screwdriver and wrench, remove two screws, lockwashers and nuts on the two receiver clamps.

(4) Remove receiver clamps.

(5) Purge the system with nitrogen and debraze the tube connections. (See paras 5-7 and 5-8.)

(6) Remove the receiver.

c. Installation

(1) Using wrench and screwdriver, loosely secure receiver with two screws, lockwashers and nuts each on two receiver clamps.

(2) Place the receiver on the tube ends, purge the system with nitrogen, and braze the tube joints. (See paras 5-7 and 5-8.)

(3) Using a screwdriver, secure the two receiver clamps to the casing side panel with two screws and lockwashers each clamp

(4) Using screwdriver and wrench, tighten two clamps on receiver.

(5) Replace the dehydrator. (See para 5-13.)

(6) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(7) Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

Follow-on procedure: Install junction box. (See para 4-29.)

5-27. PRESSURE RELIEF VALVE

Preliminary procedure: Remove junction box. (See para 4-29.)

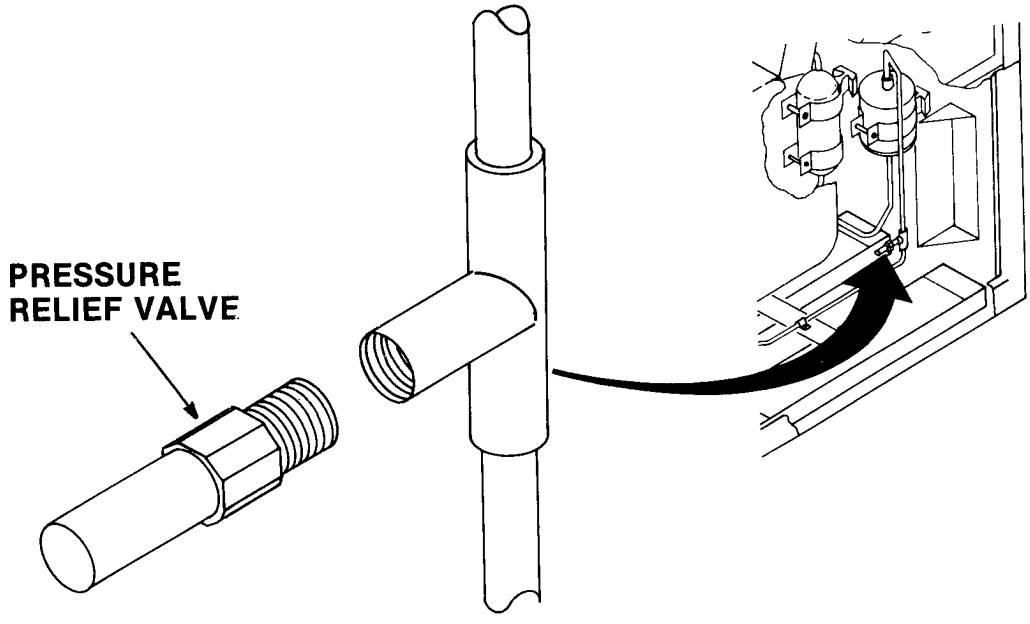


Figure 5-26. Pressure Relief Valve

a. Inspection

(1) Check for evidence of Leakage. Leak test per paragraph 5-9, if leak is suspected.

(2) Check for damage. Replace if damaged.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-6.

(2) Using two wrenches, hold fitting so that it is not twisted and unscrew pressure relief valve.

c. Installation

(1) Apply antiseize tape, item 13, Appendix E, to threads of valve.

(2) Using two wrenches, screw pressure relief valve in place while holding adapter fitting.

(3) Replace the dehydrator. (See para 5-13.)

(4) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(5) Install junction box. (See para 4-29.)

(6) Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

5-28. CONDENSER COIL

For inspection and cleaning of installed coil, see paragraph 4-62.

Preliminary procedures: 1. Remove junction box. (See para 4-29.)

2. Remove compressor. (See para 5-21.)

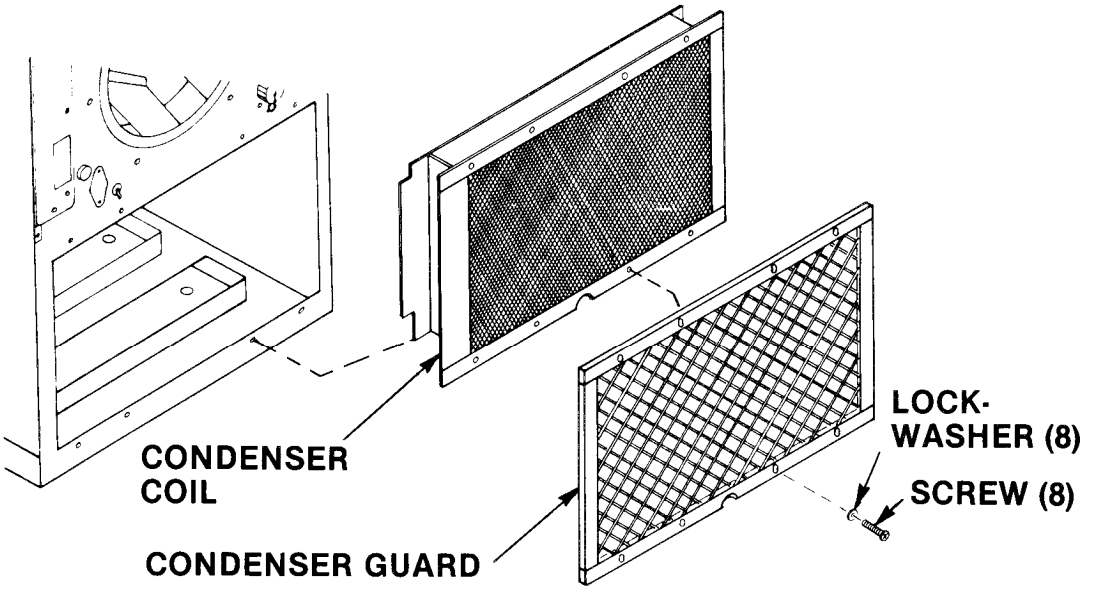


Figure 5-27. Condenser Coil

a. Removal

(1) Observe position of tubing from condenser for ease of reassembly.

(2) While purging the system with nitrogen, debraze the remaining tube joints to the condenser. (See paras 5-7 and 5-8.)

WARNING

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

(3) Supporting the condenser coil, remove condenser coil guard. (See para 4-21 .)

(4) Using gloves to protect your hands and coil fins, carefully slip the coil from unit.

b. Repair

(1) Repairs are limited to straightening of mashed fins and repair or replacement of brackets.

(2) If fins are mashed or dented so that air flow across coil would be blocked, straighten them using a plastic fin comb.

c. Installation

WARNING

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

(1) Aline condenser coil and coil guard to screw holes in rear casing.

(2) Using screwdriver, secure condenser coil and guard with eight screws and washers.

(3) While purging the system with nitrogen, braze the tube joints in positions noted at disassembly. (See paras 5-7 and 5-8.)

Follow-on procedures: 1. Install the compressor. (See para 5-21.)

2. Install junction box. (See para 4-29.)

5-29. TUBING AND FITTINGS

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:

Preliminary procedure: Remove covers and panels as necessary to have access to repair area.

a. Removal

(1) Discharge the refrigeration system in accordance with paragraph 5-6.

(2) Purge the system with nitrogen and debraze the tube connections. (See paras 5-7 and 5-8.)

(3) Remove the part.

b. Installation

(1) Replace the replacement part on the tube ends, purge the system with nitrogen, and braze the tube joints. (See paras 5-7 and 5-8.)

(2) Replace the dehydrator. (See para 5-13.)

(3) Leak test all newly connected joints and those in the repair area. (See para 5-9.)

(4) Evacuate and charge the refrigerant system. (See paras 5-10 and 5-11.)

5-30. INSULATION, CASING

a. Inspection

(1) Check for broken welds, badly bent or dented parts, and cracked or broken parts.

(2) Check that plate nuts and blind nuts are in place and secure.

(3) Refer repairs to general support maintenance.

(4) Check that insulation is not loose, missing, burnt, or otherwise damaged. Replace if missing or damaged. Reglue if loose.

b. Insulation/Removal

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(1) Remove as much old 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, and keep away from sparks or flame. Use goggles, gloves and apron when appropriate.

(2) Soften and remove old adhesive and insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

c. Installation

(1) Cut to size.

(2) Be sure that the surface to which the insulation is to be applied is clean and free of paint and old adhesive material.

(3) Coat the mating surfaces of the metal and the insulation with adhesive (item 2, Appendix E). Let both surfaces air dry until the adhesive is tacky, but will not stick to the fingers.

(4) Starting with an end, carefully attach the insulation to the metal. Press into firm contact all over.

5-31. FRESH AIR DAMPER

Preliminary procedures: 1. Remove conditioned air filter. (See para 4-25.)

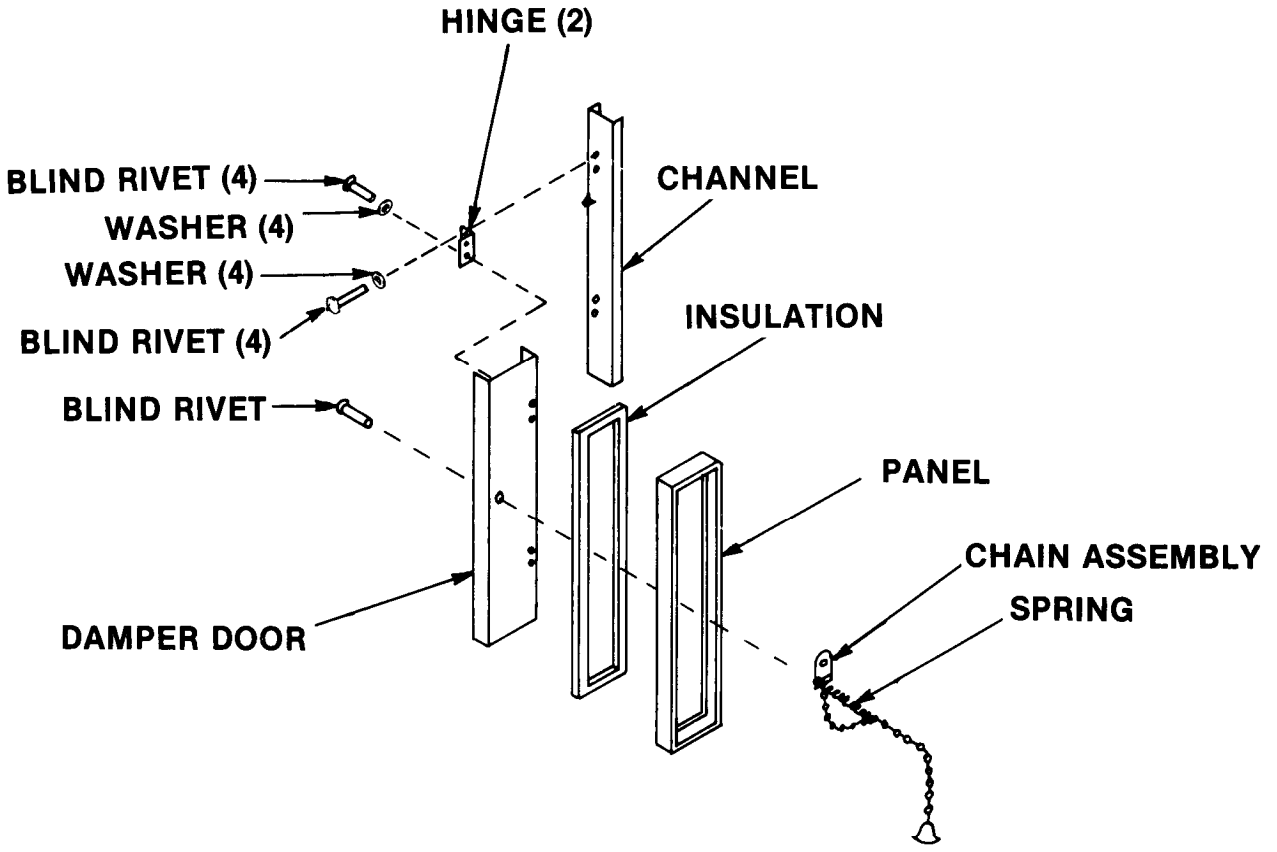


Figure 5-28. Fresh Air Damper

a. Inspection

(1) Check that chain and pendant are in place and not broken.

(2) Check that spring loaded hinges are secure and that they cause door to close when chain is released.

(3) Check that gasket is not loose, split, or missing.

(4) Check that pulley and retaining bracket are in place and that chain works properly around pulley.

(5) Repair or replace parts as indicated.

b. Hinge and door replacement

(1) Use a drill bit slightly smaller than the rivet body to drill old rivets out.

(2) Rivet replacement hinges and door in place.

(3) Check that door springs closed when chain is released.

c. Gasket replacement

(1) Remove as much old gasket 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, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

(2) Soften and remove old adhesive and gasket residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

(3) 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.

NOTE

An initial supply of adhesive is supplied as item 3, Section II, Expendable Supplies and Material List. (See Appendix E.)

(4) Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

d. Chain assembly

(1) If chain or spring is deformed or broken, replace as needed.

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-1. GENERAL

Repair parts are listed and illustrated in TM 5-4120-387-24P, Organizational, Direct Support, and General Support Maintenance Repair Parts, and Special Tools List. 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 servicing manifolds found in any general support maintenance refrigeration facility.

Section II AUTHORIZED GENERAL SUPPORT MAINTENANCE ACTIONS

6-2. GENERAL

The only Items restricted to general support maintenance level by the Maintenance Allocation Chart (MAC) are the repair of cracked or broken welds, repair or replacement of blind nuts, nut plates, and lifting handles In casing, and blind nuts and nut plates in base. However, general support maintenance may be called upon, at times, to perform any or all of the MAC Items listed for organizational and direct support maintenance for rehabilitation or overhaul of an air conditioner.

6-3. BLIND NUTS AND NUT PLATES

a. To replace blind nuts (rivnuts) use a drill slightly smaller than the body of the blind nut.

(1) Carefully drill the old blind nut out.

(2) Install replacement part.

b. To replace nut plates, use a drill slightly smaller than the body of the rivets securing the nut. plate.

(1) Carefully drill the rivets loose.

(2) Remove the old nut plate.

(3) Install new nut plate with properly sized rivets.

6-4. LIFTING HANDLES

a. Removal

(1) Using a drill bit slightly smaller than the rivet diameter, drill out 12 blind rivets that secure each lifting handle to adapter plates.

(2) Remove handle(s).

(3) If adapter plate is to be replaced:

Use a drill bit slightly smaller than the diameter of the rivet body to drill out 16 blind rivets.

Remove adapter plate(s).

b. Installation

(1) Aline 16 holes of adapter plate with 16 holes in side panel.

(2) Secure each adapter plate with 16 blind rivets.

(3) Aline 12 holes of lifting handle with 12 holes in adapter plate.

(4) Secure each lifting handle to adapter plate with 12 blind rivets.

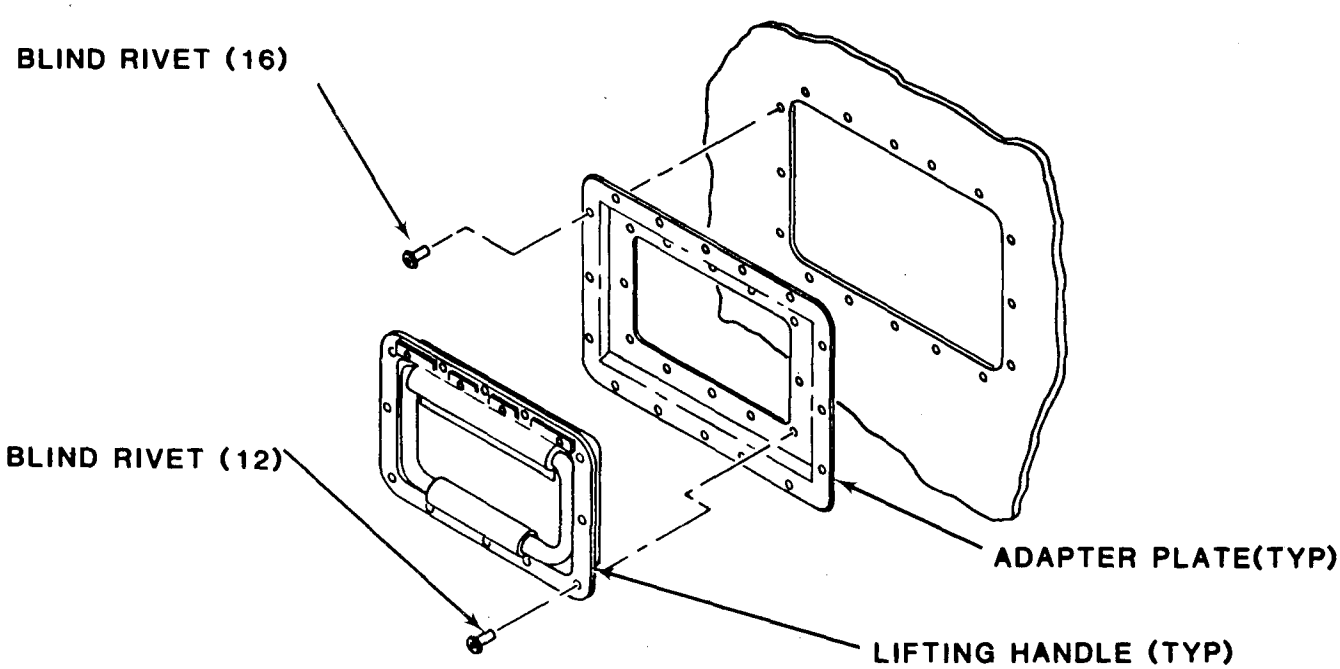


Figure 6-1. Lifting Handles

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 DA Publications	DA Form 2028-2
Equipment Inspection and Maintenance Work Sheet	DA Form 2404
Quality Deficiency Report	SF 368

A-3. FIELD MANUALS

Electric Motor and Generator Repair	FM20-31

A-4. MANUALS

Hand Portable Fire Extinguishers Approved for Army Users	TB5-4200-200-10
Radio Interference Suppression	TM11-483
The Army Maintenance Management System (TAMMS)	DA Pam 738-750
Painting Instructions for Field Use	TM43-0139
Hand Receipt Manual	TM5-4120-387-14HR
Organizational, Direct Support, and General Support Maintenance Repair Parts, and Special Tools List	TM5-4120-387-24P
Administrative Storage of Equipment	TM740-90-1
Procedures for Destruction of Equipment to Prevent Enemy Use	TM750-244-3
Leak Detector, Refrigerant Gas	TM9-4940-435-14

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section 1 INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section 111 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. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on Instruments or test, measuring, and diagnostic 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.

i. Repair. The application of maintenance services[1], including fault location/troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

---

[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]Disassembly/assemble - encompasses the step-by step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category or maintenance under consideration.

[4]Actions - welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00".

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field oper–sting 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 task identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C	Operator or Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-4. EXPLANATION OF COLUMNS IN 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.

APPENDIX B

Section II MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Category C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
01	COVERS, PANELS, GRILLES, SCREENS, AND INFORMATION PLATES, GUARDS								
	Covers	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace		0.5					
	Information Plates	Inspect	0.1						
		Service	0.1						
		Replace			0.3				
	Grilles	Inspect	0.1						
		Adjust	0.1						
		Service	0.2	0.2					
		Repair			2.0				B
		Replace		0.5					
	Guards	Inspect	0.1						
		Service	0.1	0.1					
		Repair			2.0				
		Replace		0.5					
	Screens	Inspect	0.1						
		Service	0.1	0.1					
		Replace		0.5					
	Panels	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace		0.5					

APPENDIX B

Section II MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Category C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
02	FILTER AND MIST ELIMINATOR								
	Air Filter	Inspect		0.5					
		Service		1.0					
		Replace		0.5					
	Mist Eliminator	Inspect		0.7					
		Service		1.0					
		Replace		0.7					
03	ELECTRICAL								
	Junction Box and Components	Inspect		0.5					
		Service		0.2					
		Test		2.0					
		Repair		4.0					
		Replace		2.0					
	Control Panel and Components	Inspect	0.1						
		Adjust	0.1						
		Test		1.0					
		Repair		2.0					
		Replace		1.0					
	Capacitors and Relays	Inspect		1.0					
		Test		1.0					
		Replace		3.0					
	Wiring Harnesses	Inspect		1.0					
		Test		1.0					
		Repair		2.0					
		Replace		4.0					

APPENDIX B

Section II MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Category C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
04	HEATERS, EVAPORATOR FAN, CONDENSER FAN, AND MOTOR								
	Heater Thermostat	Inspect		1.0					
		Test		0.3					
		Replace		0.5					
	Heater Element	Inspect		1.0					
		Test		0.3					
		Replace		1.0					
	Evaporator Fan	Inspect		1.0					
		Service		0.1					
		Replace		1.0					
	Condenser Fan	Inspect		1.0					
		Service		0.2					
		Replace		1.0					
	Motor	Inspect							
		Service							
		Replace							
05	REFRIGERATION SYSTEM								
	Dehydrator	Inspect			1.0				
		Replace			6.0				
	Pressure Switches	Test			1.0				
		Replace			6.0				
	Charging Valves	Inspect			0.1				
		Replace			6.0				

APPENDIX B

Section II MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Category C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
	Solenoid Valves	Test			1.0				
		Repair			1.0				D
		Replace			6.0				
	Quench Valve	Test			1.0				
		Adjust			2.0				
		Replace			6.0				
	Compressor	Test			1.0				
		Repair			2.0				C
		Replace			8.0				
	Liquid Sight Indicator	Inspect	0.1						
		Service	0.1						
		Replace			6.0				
	Expansion Valve	Test			1.0				
		Adjust			2.0				
		Replace			6.0				
	Evaporator Coil	Inspect		1.0					
		Service		2.0					
		Replace			7.0				
	Pressure Regulator Valve	Test			0.5				
		Adjust			1.0				
		Replace			6.0				
	Receiver	Inspect			0.3				
		Replace			6.0				
	Pressure Relief Valve	Inspect			0.3				
		Replace			6.0				
	Condenser Coil	Inspect		1.0					
		Service		1.0					
		Replace			1.0				

APPENDIX B

Section II MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Category C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
	Tubing and Fittings	Inspect			1.0				
		Test			2.0				
		Replace			6.0				
06	CASING AND BOTTOM PANEL								
	Condensate Traps	Inspect		0.5					
		Service		0.8					
		Replace		0.7					
	Bottom Panel	Inspect		0.3					
		Repair				2.			E
	Casing	Inspect				0.			E
		Repair				2.			E
	Insulation	Inspect			1.0				
		Replace			1.0				
	Fresh Air-Damper	Adjust	0.1						
		Service		0.5					
		Repair			1.0				
		Replace			1.0				
	Lifting Handles	Inspect				0.			
		Replace				0.			

APPENDIX B

Sectim III TOOL AND TEST EQUIPMENT REQUIREMENTS
MAINTENANCE ALLOCATION CHART

(1) Tool or Test Equip Ref. Code	(2) Mainten-ance Category	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
		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, Refrig-eration Unit (SC 5180-90-CL-N18)	5180-00-596-1474	(19099) SC 5180-90-CL-N18
2	O-F-H	Solder Gun Kit	3439-00-930-1638	(11103) 450K4
3	F-H	Pump, Vacuum	4310-00-098-5272	(64484) 1400B
4	F-H	Recovery and Recycling Unit, Refrigerant	4130-01-338-2707	(07295) 17500B
		SPECIAL TOOLS		
5	O-F-H	Hex "L" Type Key, 6" Long Arm Series (5/32 Allen Wrench)	5120-00-189-2988	(70276) 72009
6	O-F-H	Heat Gun		(16327) 2Z045B

Section IV REMARKS MAINTENANCE ALLOCATION CHART

Reference code	REMARKS
A	Replace gasket and insulation only
B	Replace gasket only
C	Replace external components only
D	Replace coil only
E	Replace blind nuts, plate nuts, and lifting handles only.
	Other than those items listed above there are no supplemental instructions or explanatory remarks required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner in off-equipment position.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists components of end item and basic issue items for the air conditioner to help you inventory items required for safe and efficient operation,

C-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the air conditioner in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the air conditioner during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

co 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 operation/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II COMPONENTS OF END ITEMS

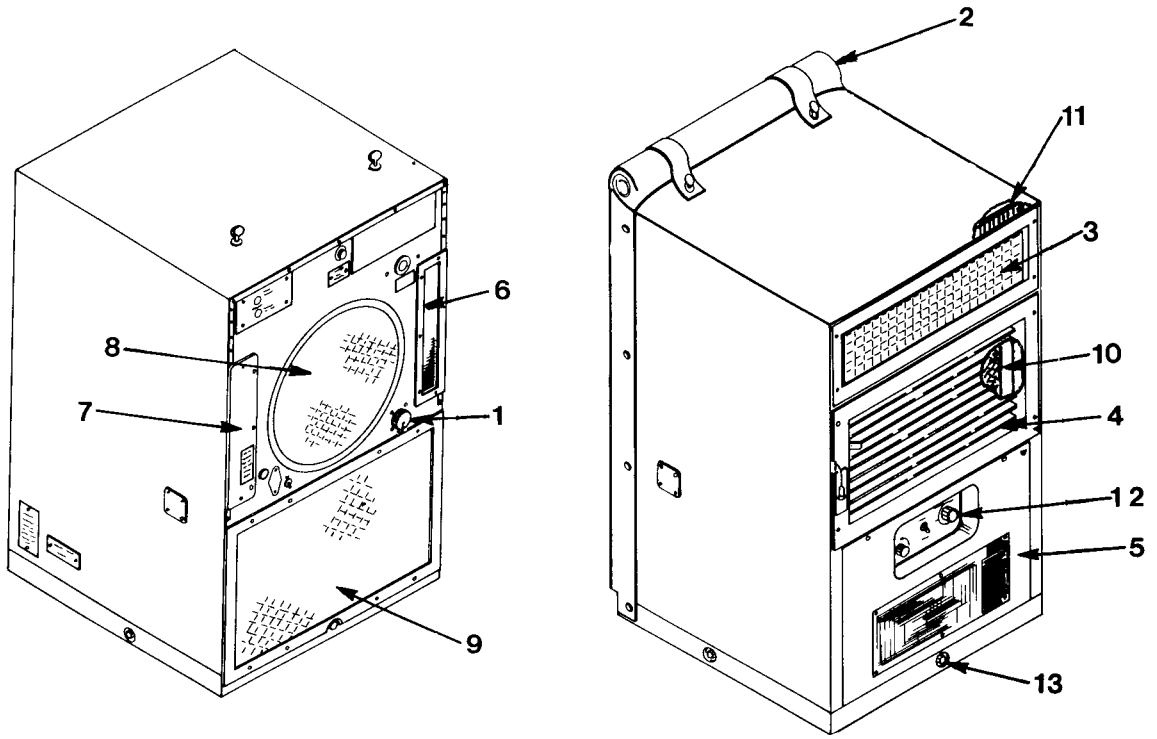


Figure C-1. Components of End Item

(1) Illus. Number	(2) National Stock number	(3) Description FSCM and Part number	Usable On Code	(4) U/M	(5) Qty rqr
1		COVER, ELECTRICAL CONNECTOR (96906) MS25043-20DA		EA	
2		COVER, AIR CONDITIONER (97403) 13214E3534		EA	1
3		GRILLE ASSY DISCHARGE (97403) 13214E3477		EA	1
4		GRILLE ASSY INTAKE (97403) 13214E3478		EA	1

Section II COMPONENTS OF END ITEMS (Cont.)

(1) Illus. Number	(2) National Stock number	(3) Description FSCM and Part number	Usable On Code	(4) U/M	(5) Qty rq
5		PANEL, LOWER (97403) 13220E6562		EA	1
6		SCREEN, FRESH AIR (97403) 13214E3544		EA	1
7		COVER, CBR DUCT (97403) 13214E3551		EA	1
8		GUARD, FAN (97403) 13214E3556		EA	1
9		GUARD, CONDENSER COIL (97403) 13216E9517		EA	1
10		FILTER, AIR CONDITIONER (97403) 13214E3669-2		EA	1
11		MIST ELIMINATOR (97403) 13220E5413-1		EA	1
12		CONTROL PANEL ASSEMBLY (97403) 13219E2934		EA	1
13		PLUG, PIPE (97403) 13211E8178		EA	4

Section III BASIC ISSUE ITEMS

(1) Illus. Number	(2) National Stock number	(3) Description FSCM and Part number	Usable On Code	(4) U/M	(5) Qty rq
		Department of Army Technical Manual Operator's Organizational Direct Support and General Support Maintenance Manual, TM5-4120-387-14 (54080)		EA	1
		Department of Army Technical Manual Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List, TM5-4120-387-24P (54080)		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, TOA, or JTA.

D-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorized the item(s) to you.

Section II ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description FSCM & Part Number	Usable On Code	(3) U/M	(4) Qty Auth
7520-00-559-9618	Cotton Duct Case		EA	1

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I INTRODUCTION

E-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Air Conditioner. These items are authorized to you by CTA50-970. Expendable items (except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., “Use silicone adhesive sealant, item 1, Appendix “E”).

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

0- Organizational Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the 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		Silicone Adhesive Sealant RTV General Purpose MIL-A-46106, Type I	
2	O		Solder, Lead-Tin, QQ-S-571 Type SN60WRP2	
3	F	3040-00-664-0439	Adhesive, General Purpose 1 pint container	ea
4	F	6830-00-292-0732	Nitrogen	cy
5	F	3439-00-224-3573	Brazing alloy, silver QQ-B-654, grade O, or II	
6	F	3439-00-853-9276	Brazing alloy, silver QQ-B-654, grade III	
7	F	3439-00-640-3713	Flux, brazing O-F-499, type B	
8	F	5350-00-192-5047	Abrasive cloth	pg
9	F	7920-00-205-1711	Rags	
			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		Tape PPP-T-60, type IV, Class I	roll
12	F	6830-00-872-5120	Trichloromonofluoromethane Technical: w/cylinder 50 lb. (Refrigerant-11) BB-F-1421 type II (81348)	cy

U.S. GOVERNMENT PRINTING OFFICE: 1992 - 654-028/60208

PIN: 060930-0

EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
13	F	8030-00-889-3534	Tape, Antisieze, Polytetrafluoroethylene MIL-T-27730, size I	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, Soldering, Liquid Rosin Base, MIL-F-14256	qt

ALPHABETICAL INDEX

ALPHABETICAL INDEX (Cont.)

ALPHABETICAL INDEX (Cont.)

ALPHABETICAL INDEX (Cont.)

ALPHABETICAL INDEX (Cont.)

ALPHABETICAL INDEX (Cont.)

ALPHABETICAL INDEX (Cont.)

GLOSSARY

COMPRESSOR	- Compresses low pressure refrigerant vapor from the evaporator into high pressure, high temperature vapor.
CONDENSER	- Cools the hot, high pressure refrigerant gas causing it to condense into high pressure liquid refrigerant.
CRANKCASE HEATER	- Prevents migration of liquid refrigerant into the compressor in cold weather.
EVAPORATOR	- Cools and dehumidifies air before it enters the room.
FILTER-DRYER	- Removes any traces of moisture from the refrigerant system.
HIGH PRESSURE CUTOUT	- Interrupts power to the compressor when the refrigerant system pressure becomes too high.
LIQUID LINE SOLENOID	- Opens or closes the liquid refrigerant line from the condenser coil to the evaporator coil expansion valve.
LOW PRESSURE CUTOUT	- Interrupts power to the compressor when the refrigerant system pressure becomes too low.
LIQUID THERMAL EXPANSION VALVE	- Meter liquid refrigerant into the evaporator coil distributor.
RECEIVER	- A reservoir for liquid refrigerant which tends to stabilize operation of the refrigeration system.
SERVICE VALVES	- Valves for suction and discharge when air conditioner refrigerant is being tested and serviced.
SIGHT INDICATOR	- A diagnostic tool to observe refrigerant flow and refrigerant level.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United Statea Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distribution in accordance with DA Form 12-25A, 0perator, Organizational, Direct Support, and General Support Maintenance requirements for, Air Conditioner, Vertical Compact, 6,000 BTU/HR, (F6000T4-2: 208V, 400HZ, 3PH; F6000T-2: 115V, 50/60 HZ, 1 PH)

*U.S. GOVERNMENT PRINTING OFFICE: 1987 754-030/60215

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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 5-4120-387-14	21 Nov 86	AIR CONDITIONER, VERTICAL, COMPAC, NSN 4120-01-203-8656

BE EXACT. . . PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 1, 1 Nov 80

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

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)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-4120-387-14	21 Nov 86	AIR CONDITIONER, VERTICAL, COMPACT NSN 4120-01-203-8656

BE EXACT. . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 2, 1 Nov 80.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

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 = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 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
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 060930-005