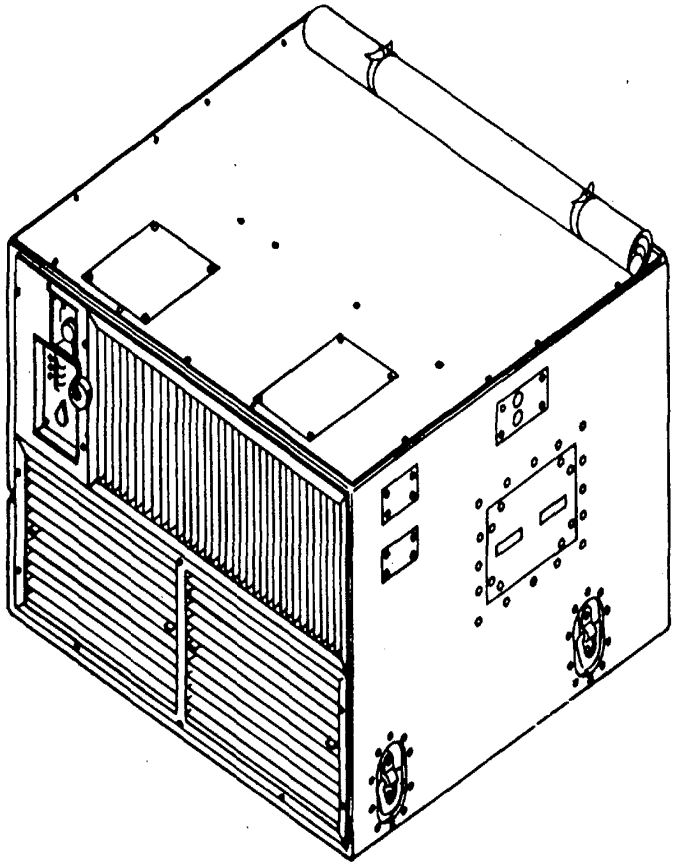
***TM 9-4120-389-14**

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

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



AIR CONDITIONER
HORIZONTAL, COMPACT,
36,000 BTU/HR, COOLING,
& 31,200 BTU/HR, HEATING
208 VOLT, 3 PHASE, 50/60-HERTZ
NSN 4120-01-219-8759

MODEL 3864

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HEADQUARTERS
DEPARTMENT OF THE ARMY
17 SEPTEMBER 1991

TM 9-4120-389-14
C 3

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 FEBRUARY 1994

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

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTU/HR, COOLING,
AND 31,200 BTU/HR, HEATING
208 VOLT, 3 PHASE, 50/60 HERTZ
NSN 4120-01-219-8759
MODEL 3864

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Remove pages	Insert pages
i and ii	i and ii
5-45 and 5-46	5-45 and 5-46
E-1 and E-2	E-1 and E-2

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

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CHANGE

NO. 2

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

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTU/HR, COOLING AND 31,200 BTU/HR, HEATING
208 VOLT, 3 PHASE, 50/60 HERTZ
NSN 4120-01-219-8759
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5-3 through 5-6	5-3 through 5-6
5-13 and 5-14	5-13 and 5-14
B-11 and B-12	B-11 and B-12

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NO. 1

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WASHINGTON, D.C., **16 January 1992**

Operator's, Unit, Direct Support and General Support
Maintenance Manual
for
AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTU/HR, COOLING
AND 31,200 BTU/HR, HEATING
208 VOLT, 3 PHASE, 50/60 HERTZ
NSN 4120-01-219-8759
MODEL 3864

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Remove pages	Insert pages
1-5 and 1-6	1-5 and 1-6
4-81 through 4-86	4-81 through 4-86
4-89 through 4-92	4-89 through 4-92
5-15 and 5-16	5-15 and 5-16
5-23 and 5-24	5-23 and 5-24

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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 208 volts ac input when installing or operating this equipment. Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all 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

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 tub 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.

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 form 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 form 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 deg. F to 138 deg. F (38 deg. C to 59 deg. C).

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

Be sure industrial process has been evaluated 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
TM 9-4120-389-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 17 September 1991

OPERATOR' S UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTU/HR, COOLING & 31,200 BTU/HR, HEATING 208 VOLT, 3 PHASE, 50/60 HERTZ NSN 4120-01-219-8759 MODEL NO. 3864

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-M P, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

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TABLE OF CONTENTS

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LIST OF FIGURES

LIST OF TABLES

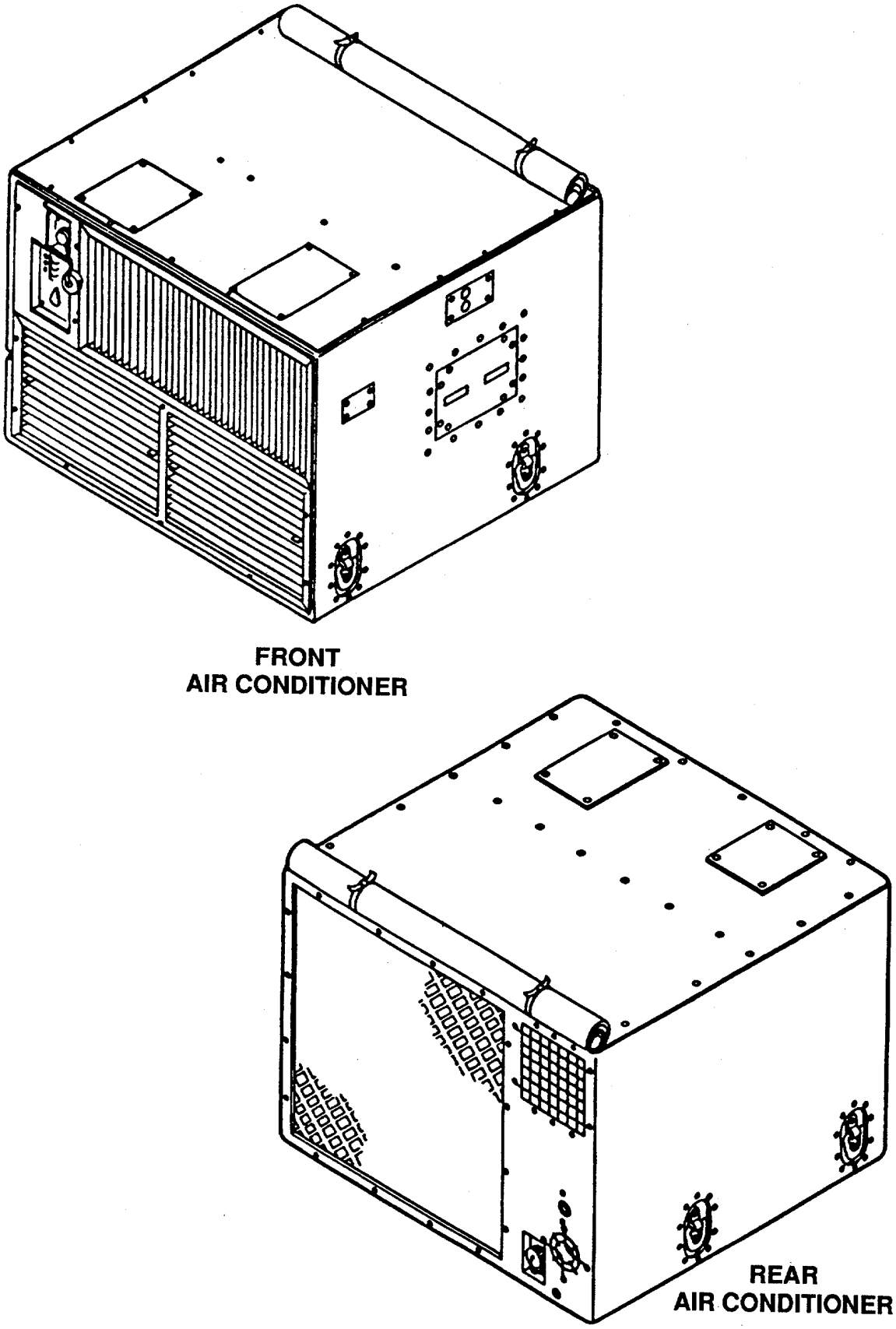


Figure 1-1. Air Conditioner

CHAPTER 1

INTRODUCTION

Section I GENERAL INFORMATION

1-1. SCOPE

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

b. Model Number and Equipment Name. Applied Companies Model 3864 Horizontal Compact, 36,000 BTU/HR, Cooling, 31,200 BTU/HR, Heating, 208 VAC, 3 Phase, 50/60 Hertz Air Conditioner.

c. Purpose of Equipment. Cools, heats ventilates, and circulates 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. WARRANTY INFORMATION. REFER TO TB 9-4120-389-24.

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's).

If your Air Conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (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.

1-5. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Refer to TM750-244-3 for instructions covering the destruction of the air conditioner to prevent enemy use.

1-6. PREPARATION FOR STORAGE OR SHIPMENT.

Contact unit maintenance for air conditioning unit preparation for storage or shipment (See para. 4-61.)

Section II EQUIPMENT DESCRIPTION

1-7. PURPOSE. CAPABILITIES, AND FEATURES.

a. Purpose of Model 3864 Air Conditioner. The Air Conditioner is designed to circulate, ventilate, cool or heat, and to filter air in rooms or enclosures.

b. Capabilities and features

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

(2)Has two stages of heat.

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

(4) Is self contained in a single cabinet that is ideally 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 locations to provide for a variety of installations.

(9) Designed for low-noise level operation.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Figure 1-2).

FABRIC COVER (1) - Shown in stowed (operational) position. When rolled down and snapped in position it protects the rear (exposed) surface of the unit.

EVAPORATOR OUTLET LOUVER (2) - Adjustable louvers allow directional control of conditioned air.

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

HEATER ELEMENTS (4) (HR1 through HR6) - 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.

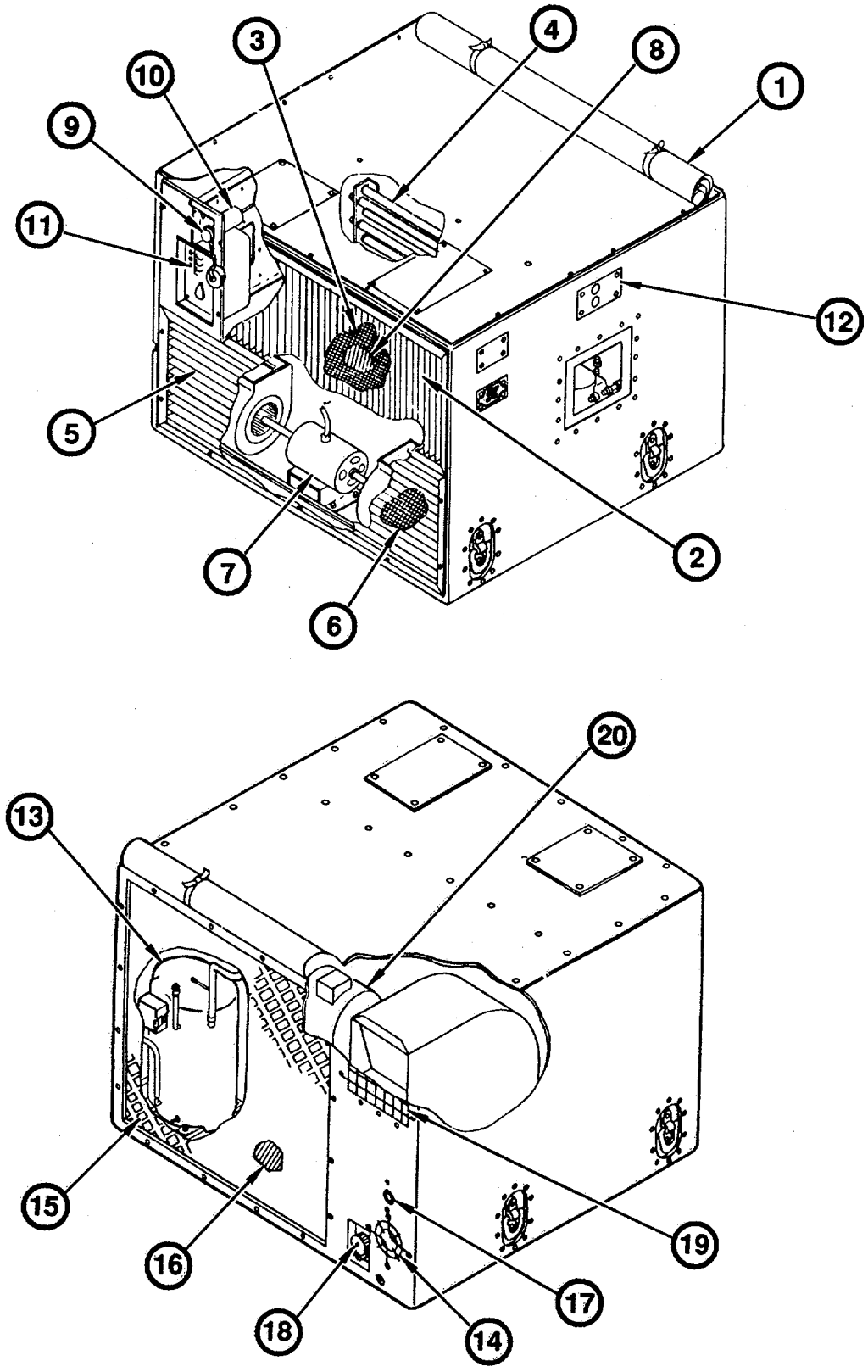


Figure 1-2. Location and Description of Major Components.

EVAPORATOR INLET LOUVER (5) - Adjustable louvers allow control of outside (fresh) and return (from room and enclosure) air.

AIR CONDITIONING FILTER (6) - Provides filtered return air.

EVAPORATOR MOTOR AND FANS (7) - Draw air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the room or enclosure.

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

INPUT POWER RECEPTACLE (9) - For connection of external power source cable.

JUNCTION BOX (10) - Contains and protects electrical system control devices.

CONTROL MODULE (11) - Contains a five position mode selector switch, a temperature control thermostat, a control circuit breaker switch and a compressor circuit breaker switch.

HIGH AND LOW REFRIGERANT PRESSURE CUTOUT SWITCHES (12) - Protects compressor from possible damage due to excessive high or low refrigerant pressures.

COMPRESSOR (13) - Pumps refrigerant through the system during cooling operations.

FRESH AIR FILTER AND DAMPER (14) - Provides filtered outside air.

CONDENSER GUARD (15) - Protects condenser coil from damage.

CONDENSER COIL (16) - Serves as a heat exchanger by transferring heat from the refrigerant passing through the tubing to the air passing over the tubing and fins.

REFRIGERANT SIGHT GLASS (17) (liquid sight indicator) - Allows visual inspection and indicates condition of liquid refrigerant when the unit is operating in cooling mode.

AUXILIARY POWER RECEPTACLE (18) - Alternate power connection.

CONDENSER DAMPER (19) - Linked to ACTUATOR. Modulates volume of exhaust air.

CONDENSER MOTOR AND FAN (20) - Draws outside ambient air over and through the condenser coil.

1-9. PERFORMANCE DATA.

OPERATING TEMPERATURE	
LOW	-15 deg F (-15 deg C)
HIGH	+120 deg F (+48.9 deg C)
PERFORMANCE (60HZ)	
COOLING CAPACITY	36,000 Btu/hr
HEATING CAPACITY	21,200 Btu/hr
PERFORMANCE (50HZ)	
COOLING CAPACITY	31,320 Btu/hr
HEATING CAPACITY	27,400 Btu/hr
POWER REQUIRED	
VOLTAGE (INPUT)	208 VAC
VOLTAGE (CONTROL)	24 VAC
PHASE	3
HERTZ	50/60
AMPERAGE (60 HERTZ)	28.3
AMPERAGE (50 HERTZ)	22.9
AIR FLOW (ZERO WATER GAGE)	
STANDARD CUBIC FEET PER MINUTE (SCFM)	1,400
REFRIGERANT	
TYPE	R-22
CHARGE	8.5 lb (3.9 Kg)
COMPRESSOR OIL CAPACITY	
INITIAL	55 oz.
RECHARGE	52 oz.
DIMENSIONS	
WIDTH	38.0 in. (965 mm)
DEPTH	35.0 in. (889 mm)
HEIGHT	27.0 in. (686 mm)
WEIGHT (MAX)	400 lb (182 Kg)
AIR FILTER	PERMANENT RE-USABLE

FIND NO.	PART NUMBER	QTY	DESCRIPTION
1	13218E7546	1	ACCUMULATOR
2	13216E6215-1	1	SWITCH, PRESSURE (LOW)
3	13229E6162	1	COMPRESSOR
4	13229E6191-3	2	VALVE, ACCESS
5	13229E6161	1	COIL, CONDENSER
6	13216E6215-3	1	SWITCH PRESSURE (HIGH)
7	13229E6163-1	1	PLUG, FUSIBLE
8	13214E3798-4	1	RECEIVER, LIQUID REFRIGERANT
9	13214E4209	1	DEHYDRATOR, DESICCANT, REFRIGERANT
10	13229E6193	1	VALVE, SOLENOID
11	13216E6155-2	1	INDICATOR, SIGHT, LIQUID
12	13229E6200	1	VALVE, EXPANSION
13	13216E6345-1	1	RESTRICTOR, FLUID FLOW
14	13216E6283	1	COIL, EVAPORATOR
15	13225E6187	1	CYLINDER, ACTUATING, LINEAR
16	13211E3800	1	VALVE, PRESSURE REGULATING
17	13229E6201	1	VALVE, QUENCH

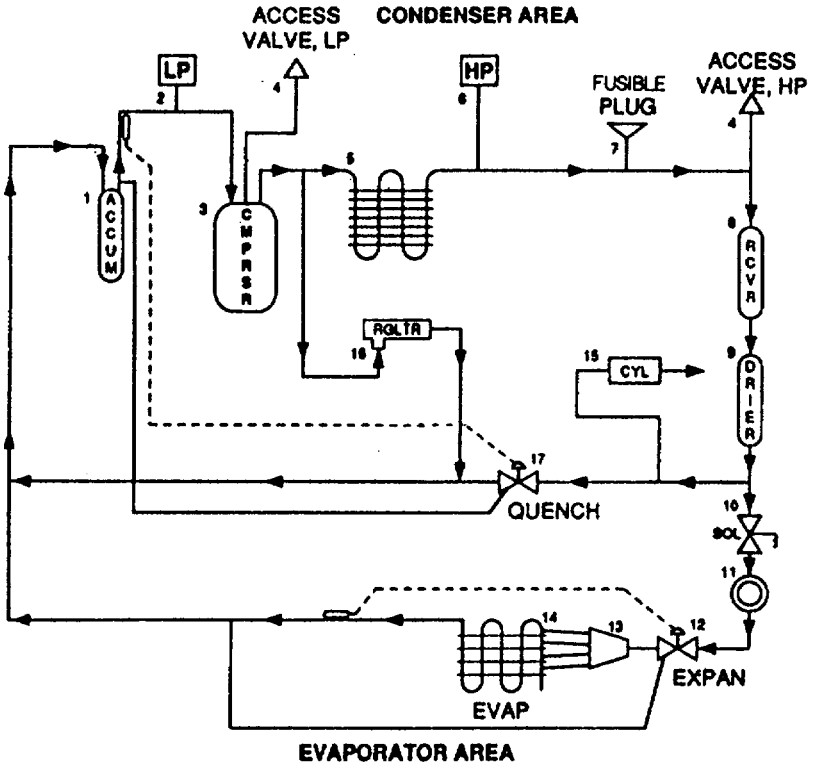


Figure 1-3. Refrigeration Schematic

SECTION III TECHNICAL PRINCIPLES OF OPERATION

1-10. REFRIGERATION CYCLE.

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

- Compressor (3) Figure 1-3 starts.

- The compressor (3) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows to the condensor. coil (5) and receiver (8).

- The condenser fan draws outside ambient air over and through the condenser coil (5). The high temperature, high pressure gas from the compressor (3) 's cooled by the flow of air and is changed into a high pressure liquid.

- The cooler, high pressure liquid refrigerant flows through the dehydrator (filter drier) (9) and removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant and to the sight glass (11), which indicates the presence of moisture and quantity of refrigerant in the system.

- The liquid line solenoid valve (10) 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 (12) controls the amount of pressure of liquid refrigerant to the restrictor (13) and evaporator coil (14). The expansion valve (12) senses the temperature and pressure of the frigerant 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 (14).

- As the liquid refrigerant leaves the expansion valve (12) it passes thru a restrictor (13) and enters the evaporator coil (14). 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 as (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 (14), the air is cooled.

- The low pressure refrigerant gas is then drawn back through the accumulate (1) to the compressor (3) and the cycle is repeated.

b. Bypass cycle. This unit has a bypass cycle which allows cooling operation at low cooling loads without cycling the compressor (3) 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 (14).

- 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 (10) to shut off refrigerant flow to the evaporator coil (14).

- As the compressor suction pressure starts to drop, the pressure regulating valve (16) opens to allow hot gas from the compressor to bypass the condenser (5) and evaporator (14).

- The expansion valve (quench) (17) 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) (17) opens to allow liquid refrigerant to mix with the hot gas.

- The cylinder assembly (15) actuates condenser damper which modulates the air flow across the condenser coil (5). During the hot gas bypass mode, the condenser damper closes, restricting airflow through the condenser coil (5). This action results in a condition whereby a minimum discharge pressure is maintained at the compressor.

- The charging valve (4) is provided for charging, and general servicing of the high and low pressure sides of the refrigerant system.

- The pressure switch (low) (2), the pressure switch (high) (6), and the fusible (7) are provided to protect the unit from damage due to pressure extremes.

1-11. 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 the 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 Model 3864 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-biological-radiological (CBR) environmental conditions. Operators must be aware of any peculiarities or operational limitations for their specific installation. See the appropriate shelter or system manual for instructions peculiar to your specific installation.

2-2. OPERATOR'S CONTROLS.

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.

2-3. INDICATORS.

The refrigerant sight glass is the only visual indicator used on the Model 3864 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 COOL mode. The unit must be operated 15 minutes in maximum cooling prior to checking condition of refrigerant at sight glass. The sight glass is equipped with a center indicator that is moisture sensitive. Dry refrigerant is indicated by green, it turns to chartreuse when the moisture content becomes undesirable, and to yellow when the level becomes unacceptable. Excessive moisture in the refrigerant may damage or possibly destroy the compressor.

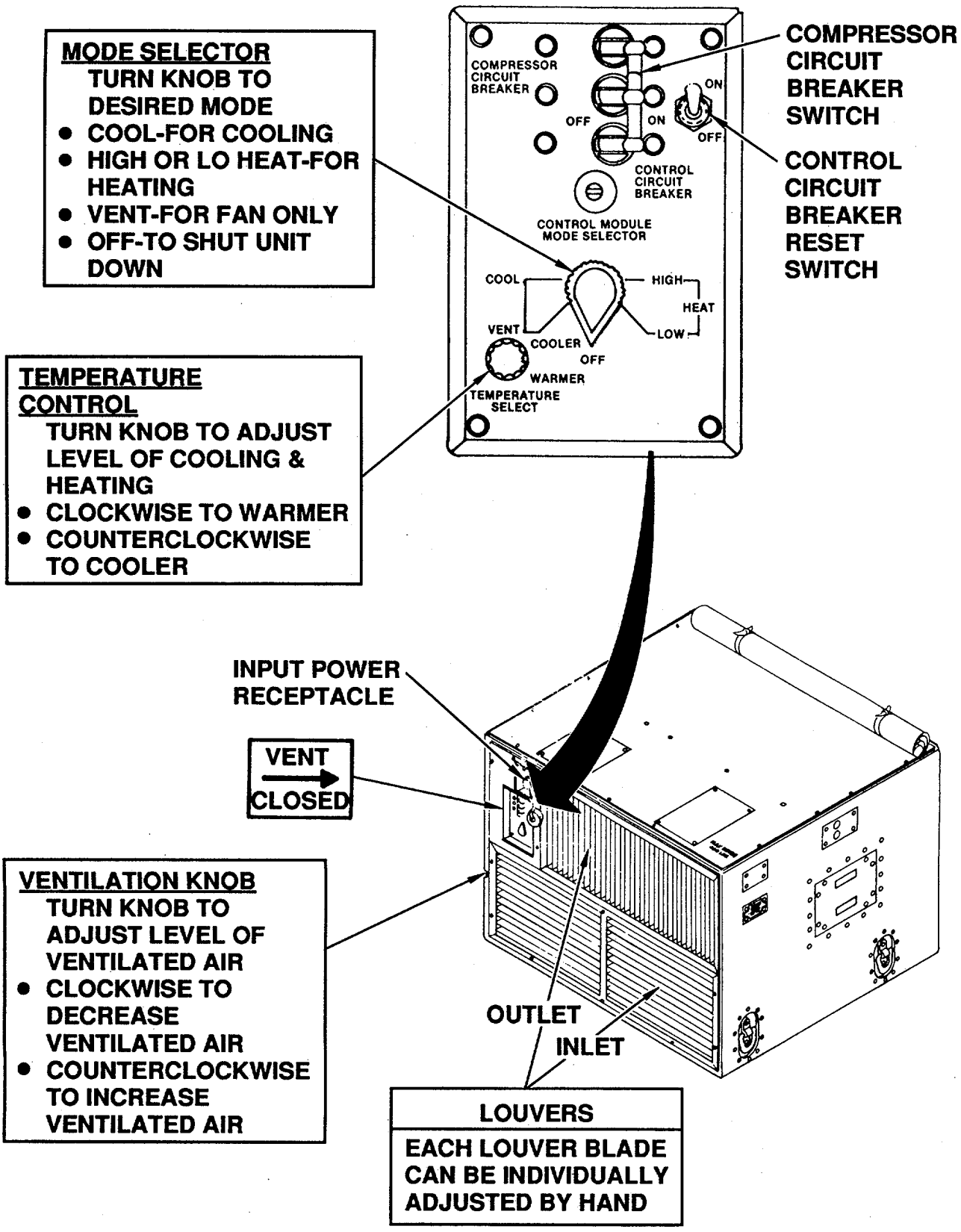


Figure 2-1. Operator's Controls Front

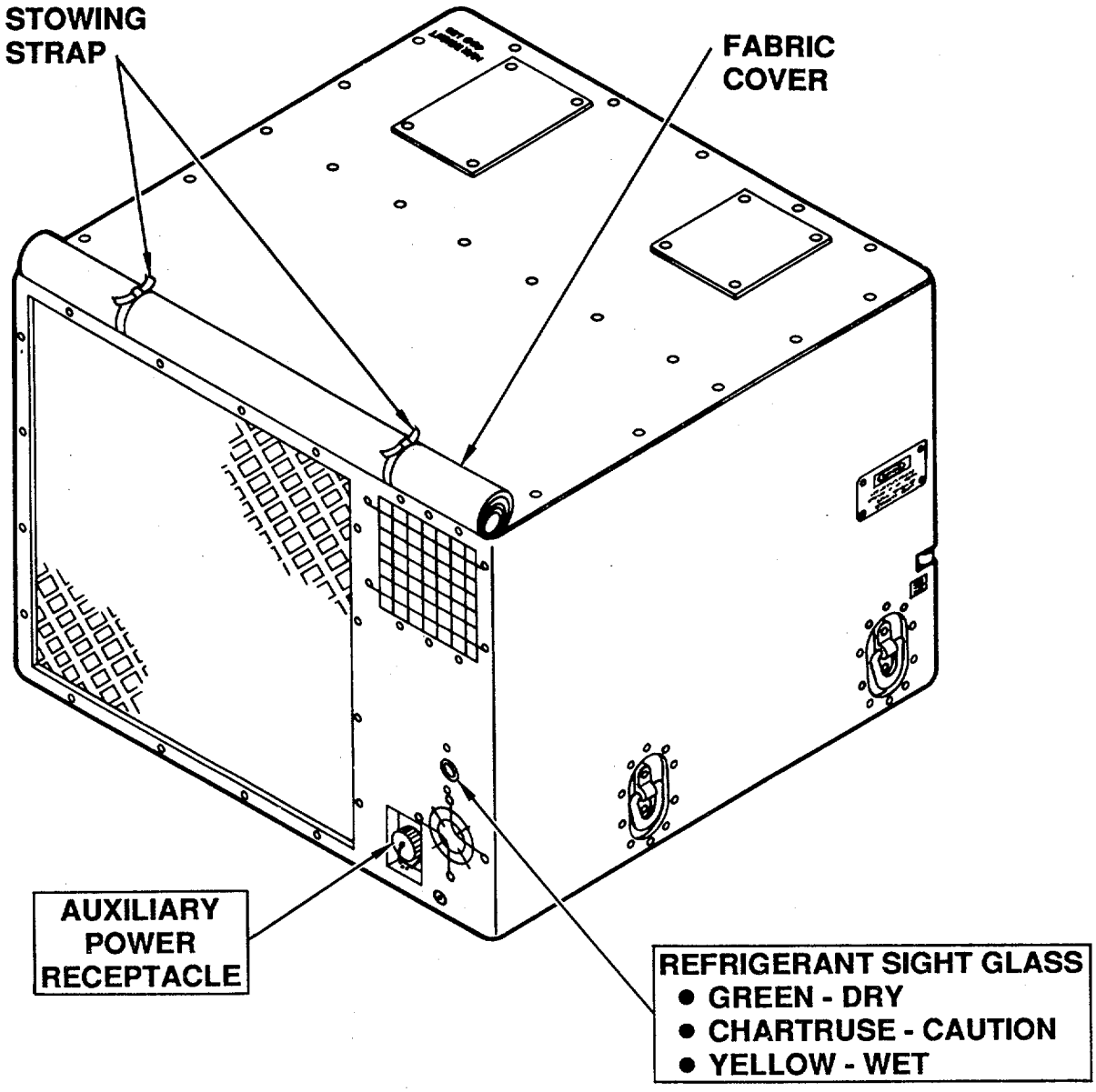


Figure 2-2. Operators Controls Rear

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 rechecked 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 (W) 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
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.	

FABRIC COVER SHOWN ROLLED UP (NORMAL OPERATING POSITION)

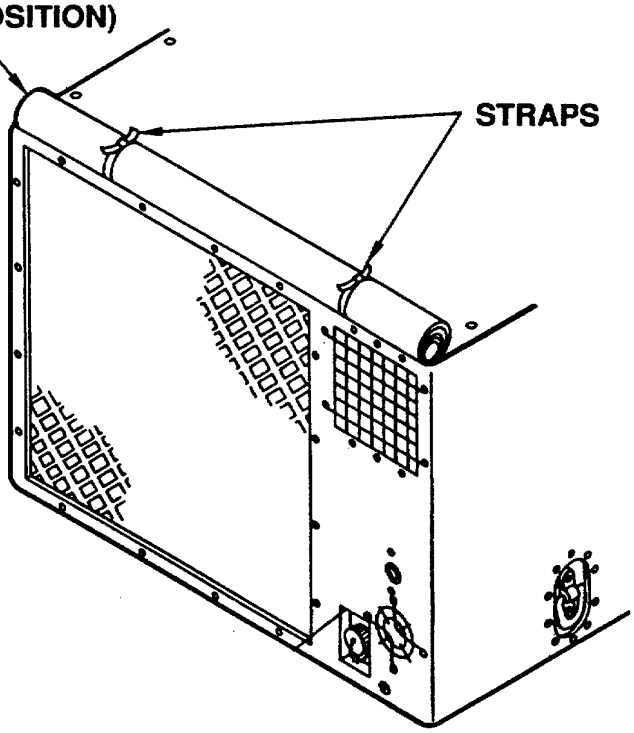


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
2		•				Outside Covers Check that covers are in place. Check covers for cracks dents, and missing hardware.	Covers missing or damage that would cause operating hazard.

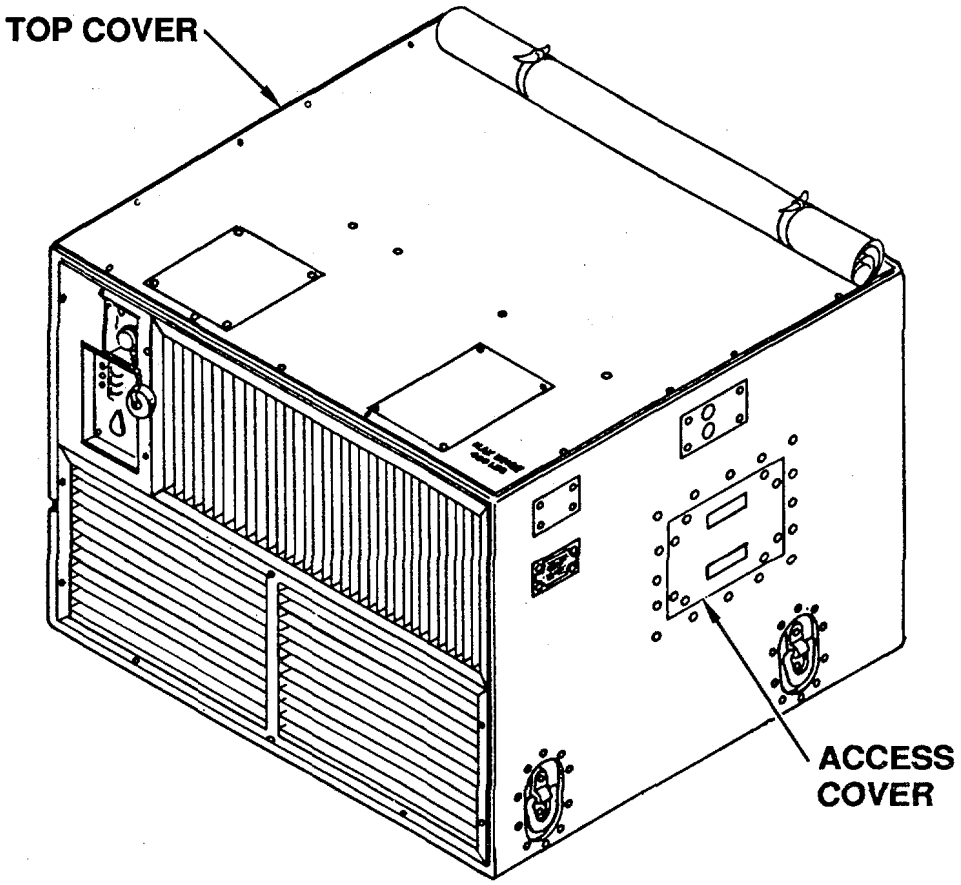


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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

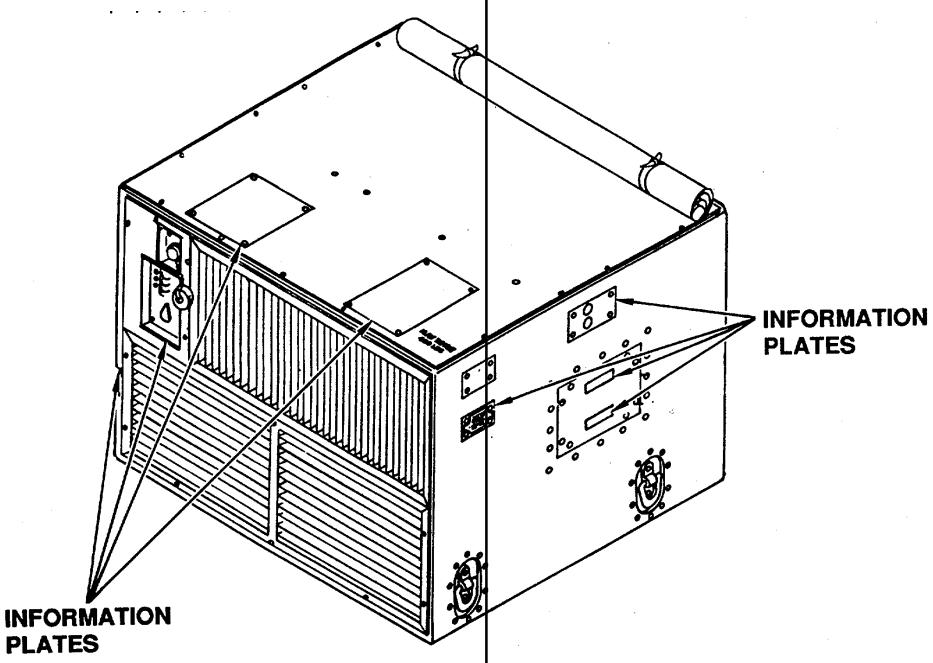
Item No.	B	D	A	W	M	Item To Be Inspected Procedure	Equipment Is Not Ready/Available
3	•					Information Plates Check for legibility and loose or missing hardware.  	

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
4						Evaporator Louvers Check for obstructions, damage, proper adjustments, loose, or missing hardware.	

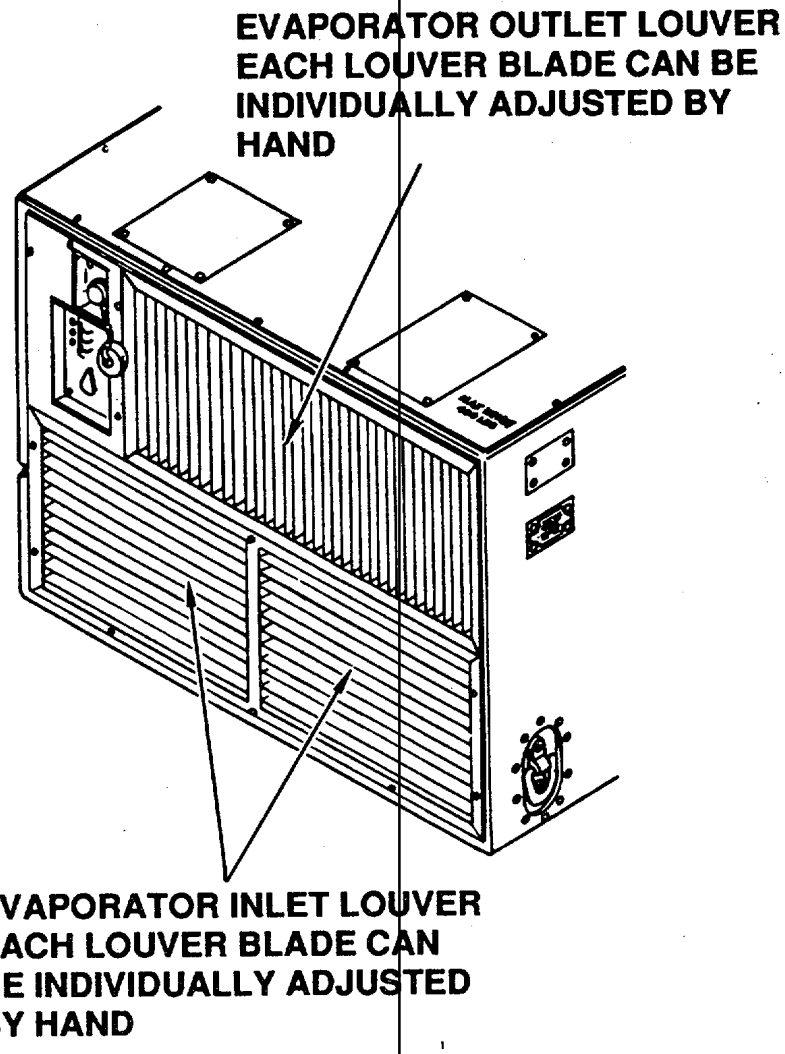


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
5						Protective 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.	

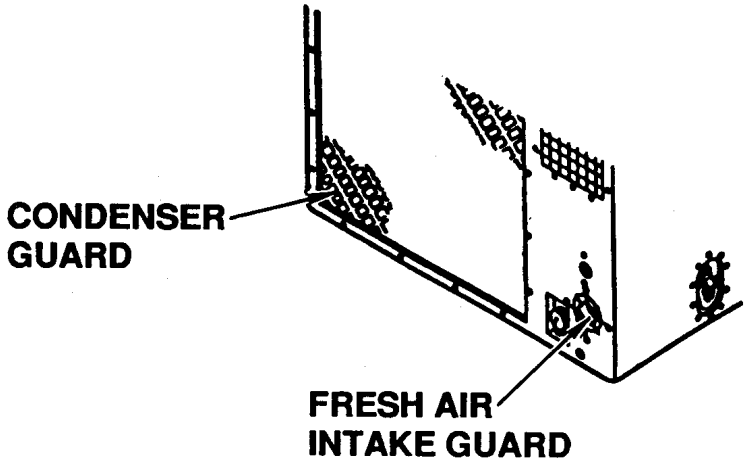


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
6						Ventilation Air Filter	
	•					Check that filter is in place.	If filter is missing.
				•		Check that filter is not clogged or dirty.	Filter is dirty or clogged.

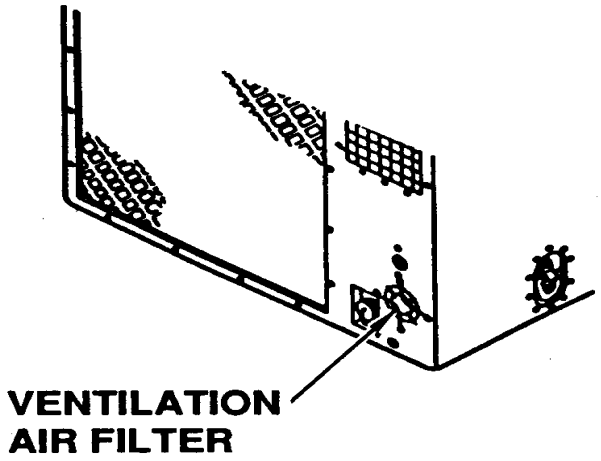


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
7						Ventilation Damper Control	Control broken, missing or inoperable.
	•			•		Check for proper adjustment.	
			•			Check for freedom of operation.	

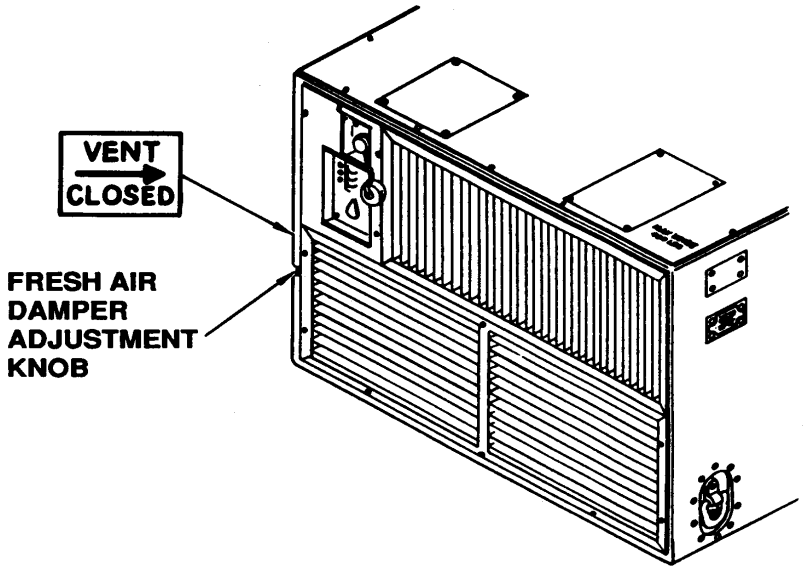


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
8	•					Control Module Check for obvious damage and missing knobs.	Control Module damaged.
		•				Check for proper operation.	Unit not operating properly.

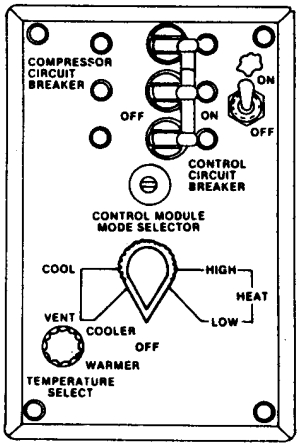
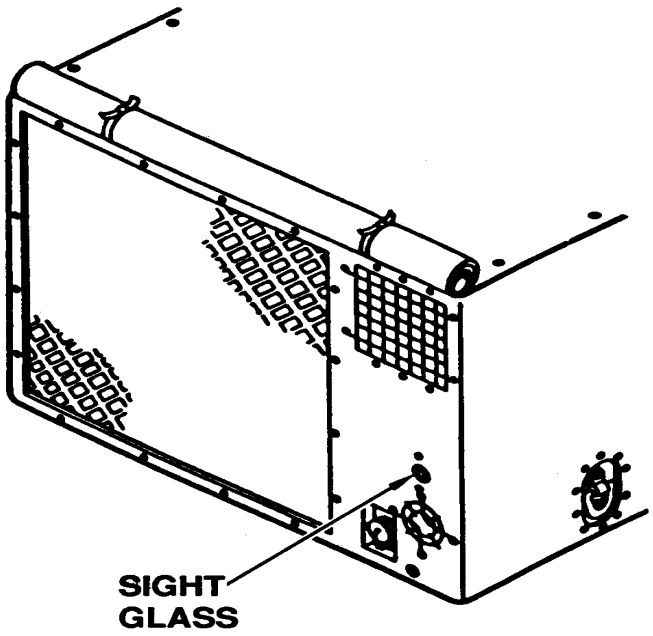


Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

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
9		•				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.



SECTION III OPERATION UNDER USUAL CONDITIONS.

2-5. ASSEMBLY AND PREPARATION FOR USE.

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

2-6. INITIAL ADJUSTMENTS AND CHECKS.

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

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

2-7. GENERAL OPERATING PROCEDURES.

a. Before operation

(1) Check to see that power cable has been connected to a source of 208 VAC, 3 phase, 4 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.

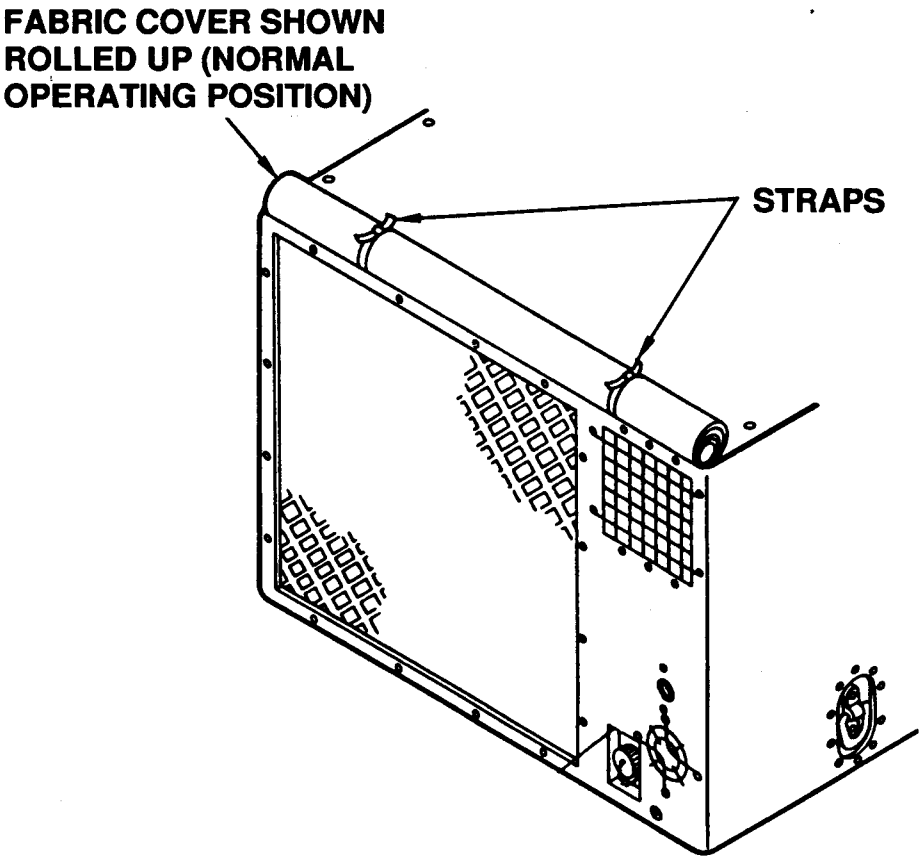


Figure 2-3. Fabric Cover

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 louvers and guards are in place and unobstructed.

NOTE

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.)

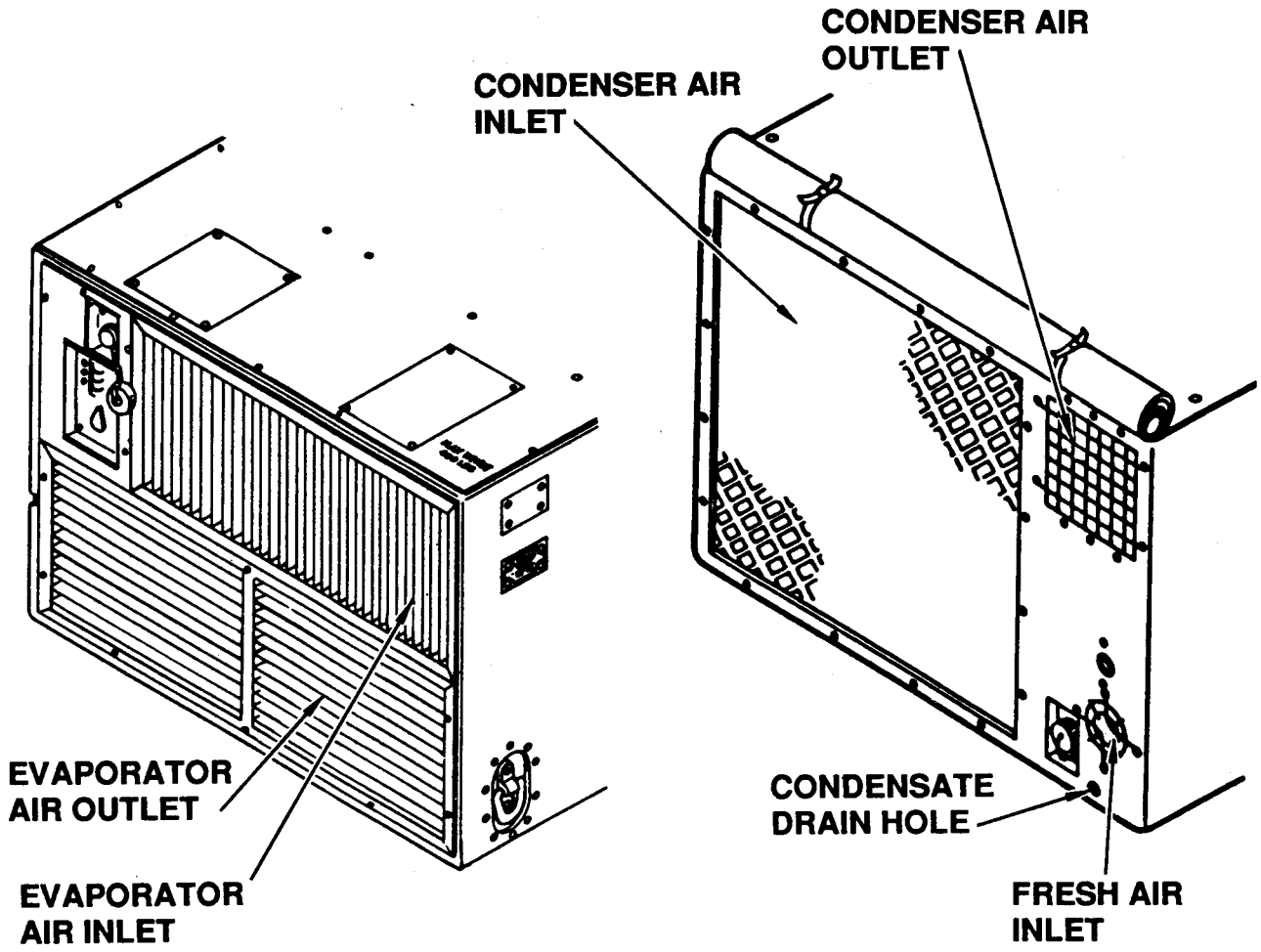


Figure 2-4. Air Openings and Drain

(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.

o 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 60 deg. F to 90 deg. F (16 deg. C to 32 deg. C). The centered position of the control knob would be approximately 75 deg. F (24 deg. C). The full WARMER would be 90 deg. F (32 deg. C). The full COOLER would be 60 deg. F (16 deg. C).

(2) During cold weather

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

(3) During hot weather

- Adjust shades, blinds, etc. (when applicable) to block out sunlight during day.
- Contact Unit Maintenance for upward adjustment of conditioned air outlet dampers.

Table 2-2. Operator Control Settings

Mode	Mode Selector Switch	Temperature Control Thermostat	Fresh Air Damper	Evapor-tor Louver	Evaporator Outlet Louver	Fabric Cover
Ventilate with 100% recir-culated air	VENTILATE	Does not operate	Closed	Open	Adjust to suit	Rolled up or snapped closed
Ventilate with make-up (fresh air)	VENTILATE	Does not operate	Open	Open	Adjust to suit	Rolled up and secured
Ventilate with 100% fresh air	VENTILATE	Does no operate	Open	Closed	Adjust to suit	Rolled up and secured
Heating with 100% recir-culated air	LO HEAT or HI HEAT	Desired temperature	Closed	Open	Slightly down for best results	Rolled up or snapped closed
Heating with make-up (fresh air)	LO HEAT or HI HEAT	Desired temperature	Open	Closed	Slightly down for best results	Rolled up and secured
Cooling with 100% recir-culated air	COOL	Desired temperature	Closed	Open	Slightly up for best results	Rolled up and secured
Cooling with make-up (fresh air)	COOL	Desired temperature	Open	Open	Slightly up for best results	Rolled up and secured
Any mode with make-up air through CBR filter	Desired mode	Desired temperature	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.

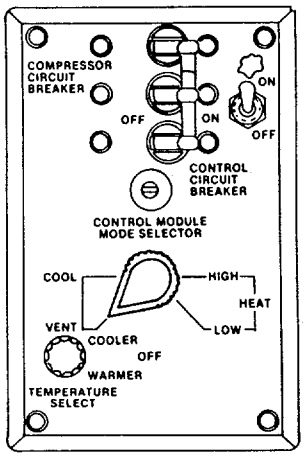


Figure 2-5. VENTILATE Control Setting

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

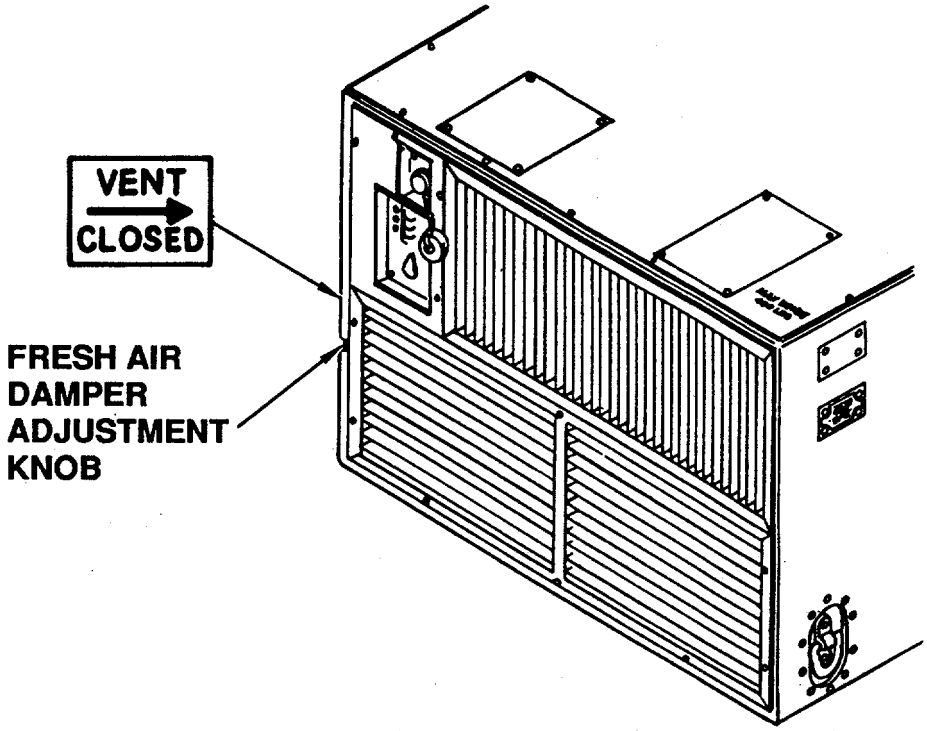


Figure 2-6. Fresh Air Damper (Door) Adjustment

c. Rollup and secure fabric cover if fresh air damper (door) is opened.

NOTE

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

d. Adjust louvers to suit.

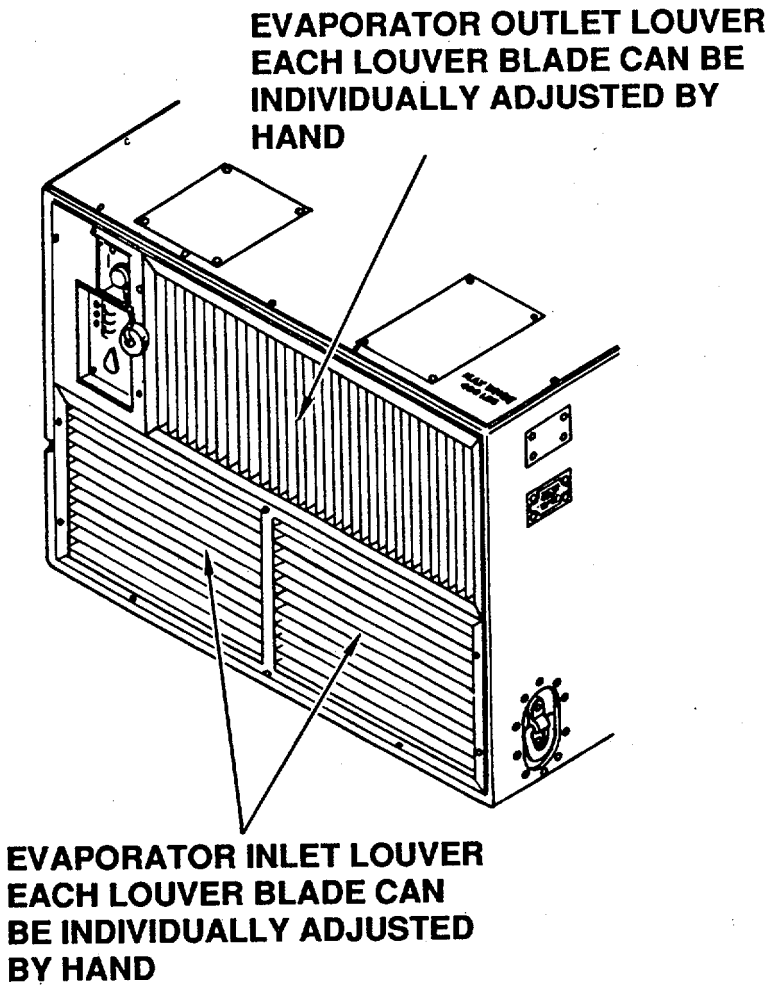


Figure 2-7. Louver Adjustment

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

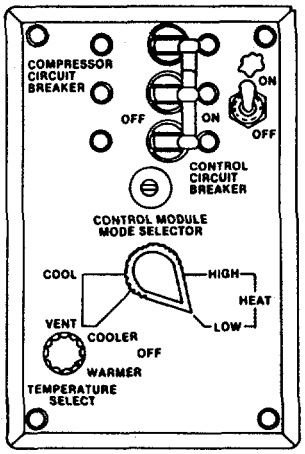


Figure 2-8. LO HEAT Control Setting

NOTE

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

c. When room or enclosure temperature reaches the desired level, slowly turn the temperature control thermostat knob toward COOLER. Heating will stop when you reach the approximate room temperature. Further adjustment can be made by turning the temperature control thermostat knob slightly toward WARMER (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 WARMER position, switch to HI HEAT.

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

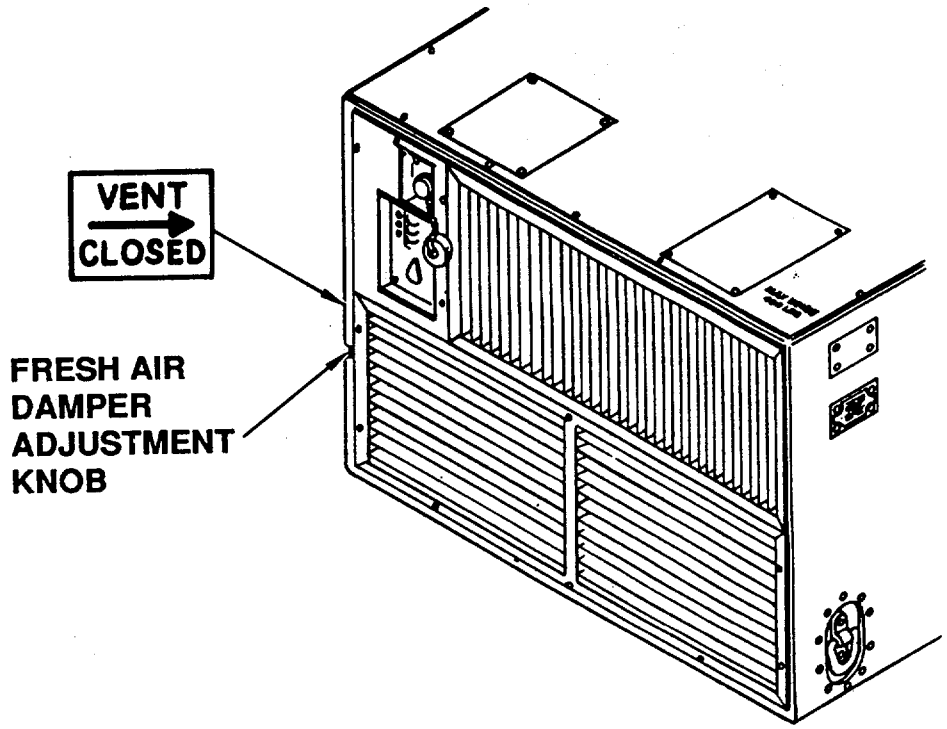


Figure 2-9. Fresh Air Damper (Door) Adjustment

e. Adjust louvers to suit. Since warm air tends to rise, it is normally better to adjust the evaporator outlet louvers slightly downward (contact Unit Maintenance). The evaporator inlet louvers should be full open.

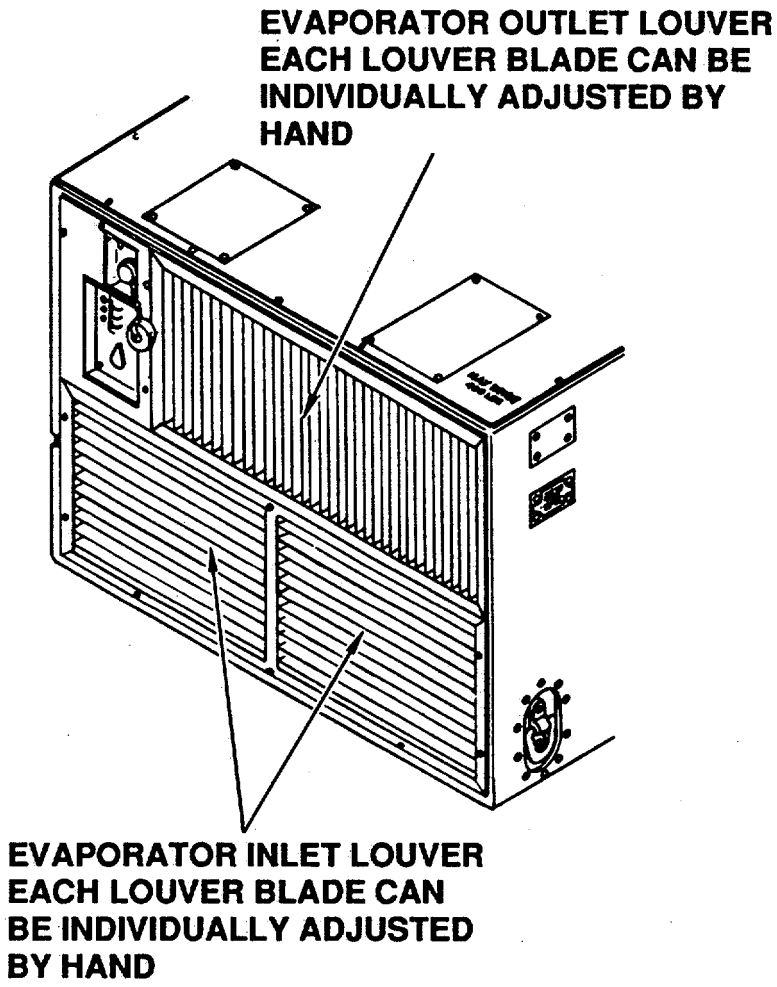


Figure 2-10. Louver Adjustment

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

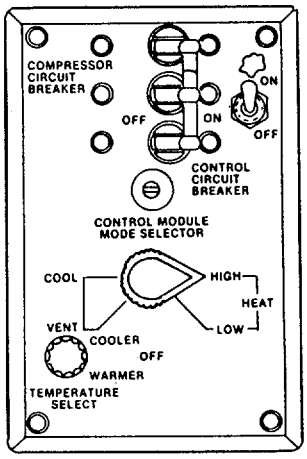


Figure 2-11. HI HEAT Control Setting

c. When room or enclosure temperature reaches the desired level, slowly turn the temperature control thermostat knob toward COOLER. 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 COOLER setting, switch to start LO HEAT.

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

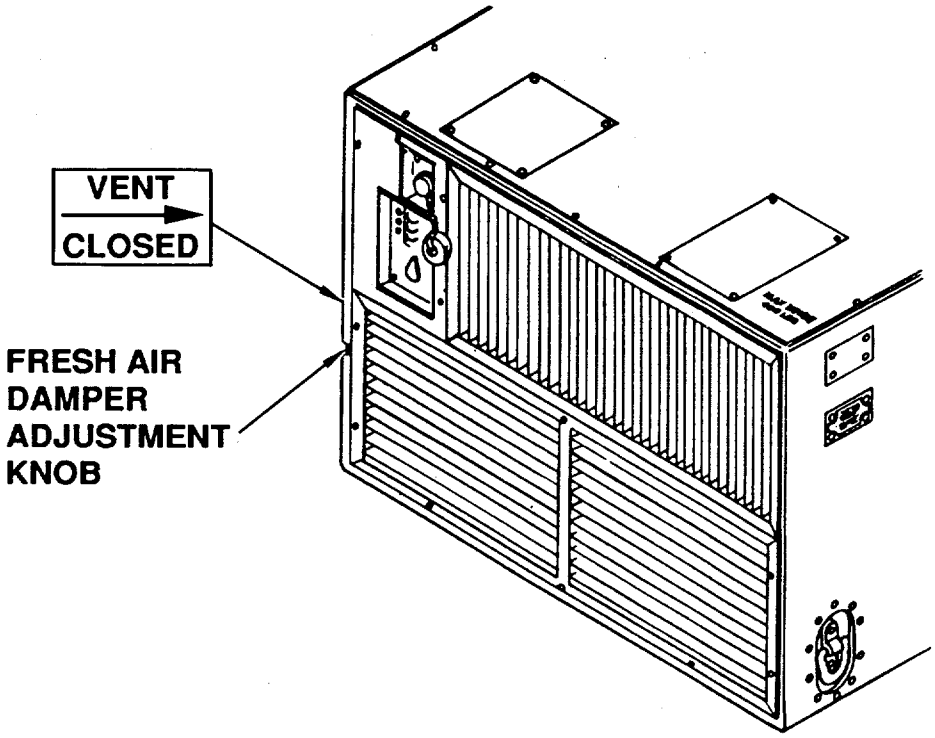


Figure 2-12 . Fresh Air Damper (Door) Adjustment

e. Adjust louvers to suit. Since warm air tends to rise it is normally better to adjust the conditioned air outlet louvers slightly downward (contact Unit Maintenance). The conditioned air inlet louvers should be full open.

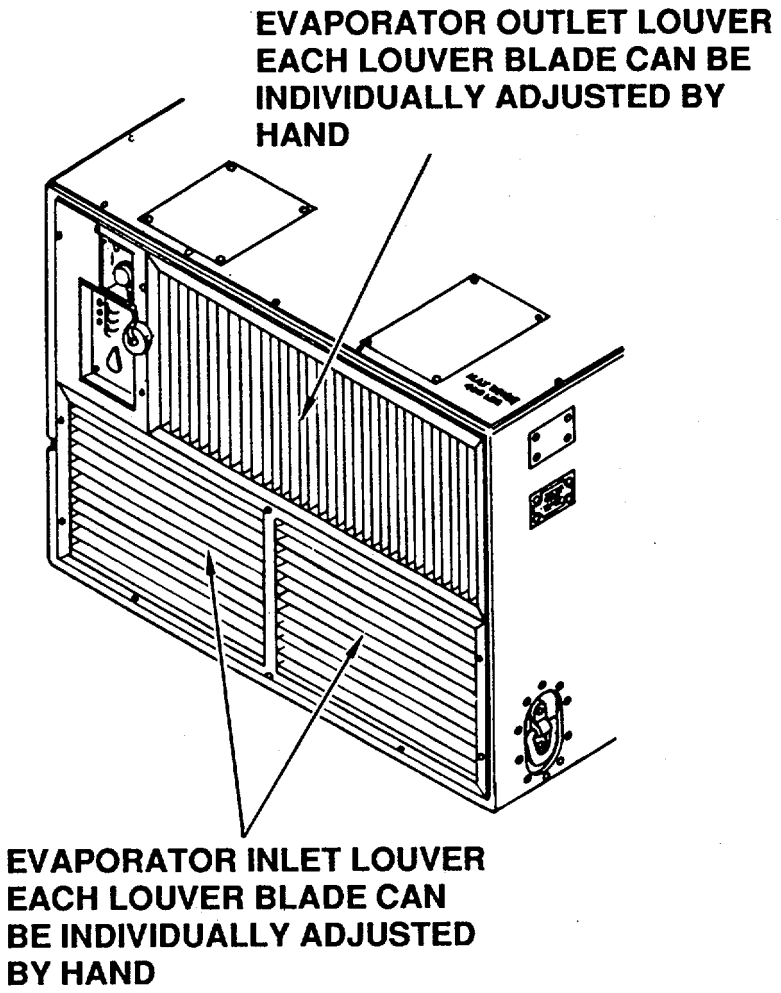


Figure 2-13. Louver Adjustment

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

NOTE

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

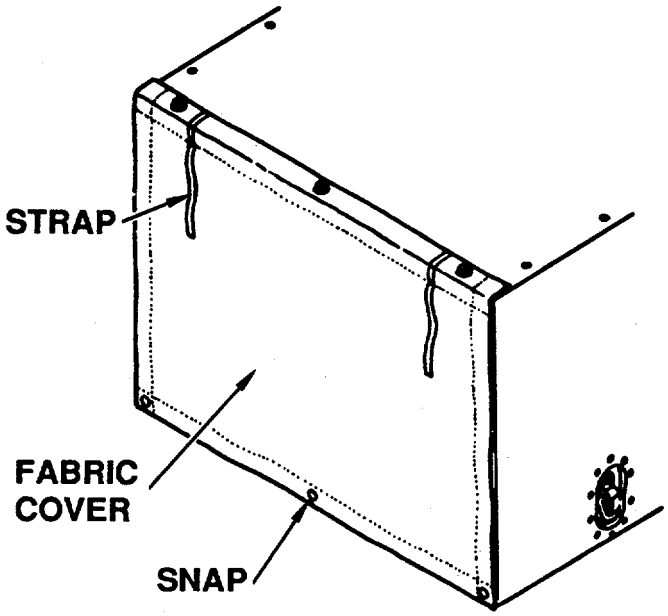


Figure 2-14. Fabric Cover (Rolled Down Position)

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 straps.

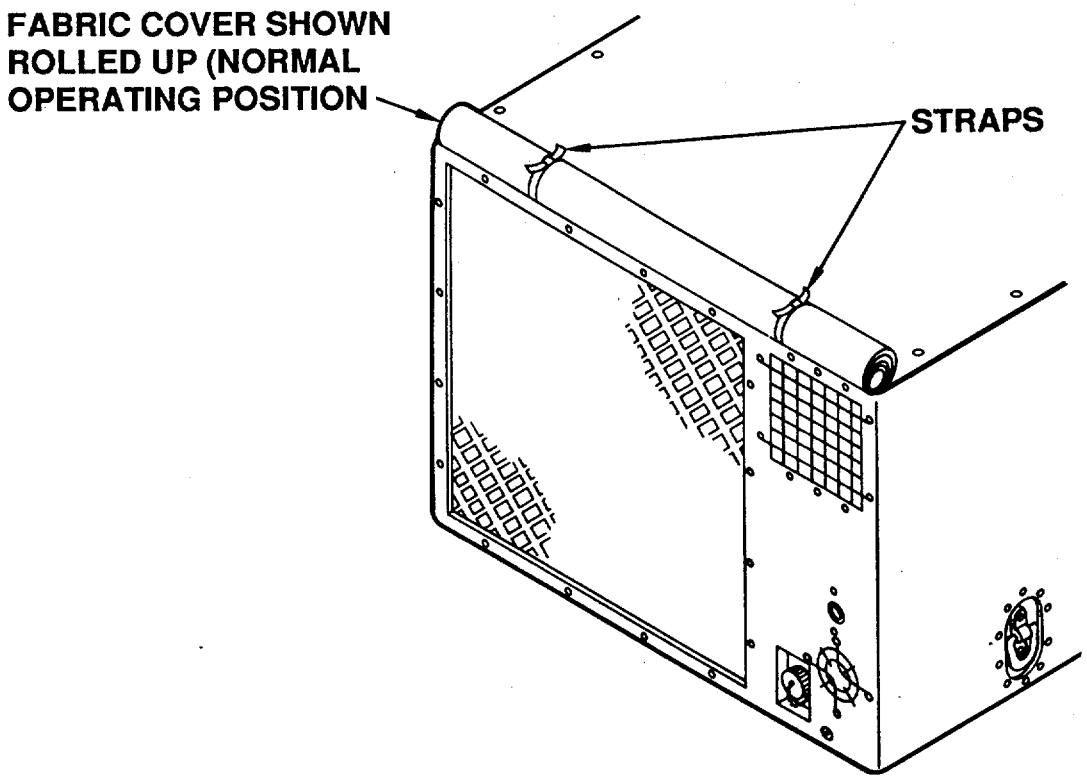


Figure 2-15. Fabric Cover (Rolled up Position)

b. Turn mode selector switch to COOL.
c. Turn temperature control thermostat knob as far as it will go in the (COOLER) position.

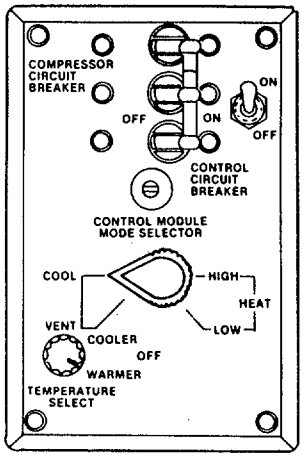


Figure 2-16. COOL Control Setting

d. 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.

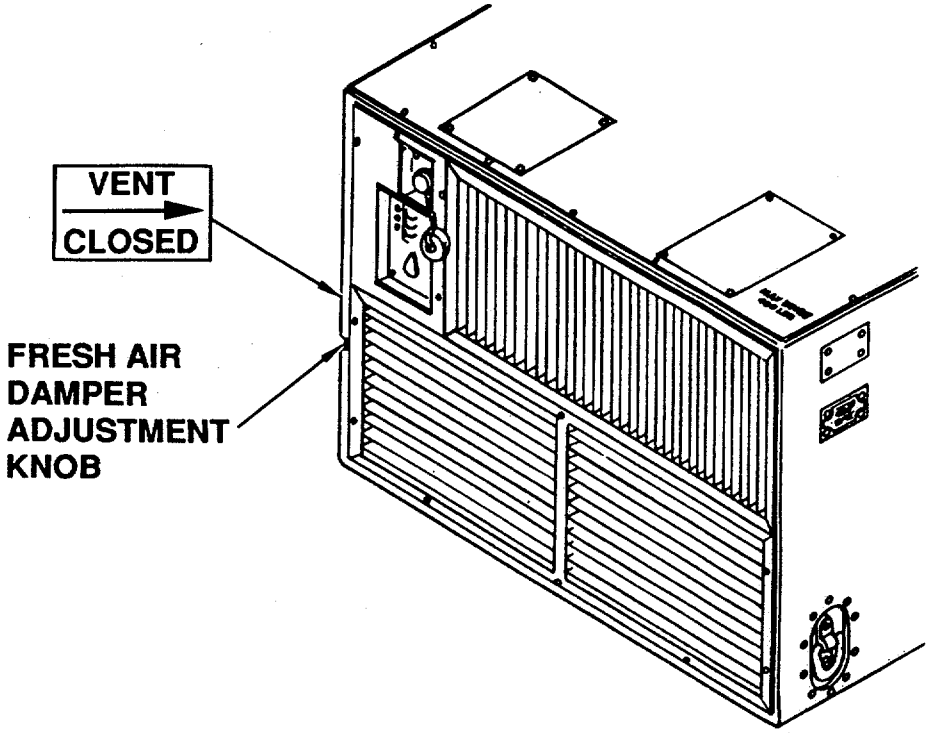


Figure 2-17. Fresh Air Damper (Door) Adjustment

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

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

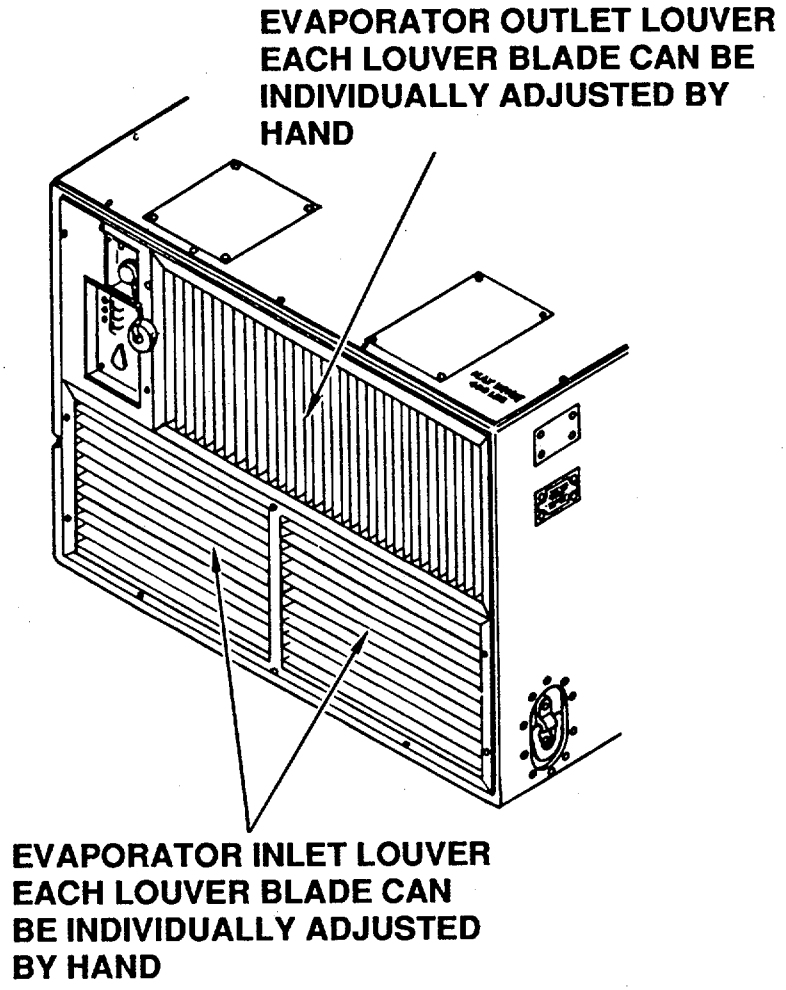


Figure 2-18. Louver Adjustment

2-12. SHUTDOWN (OFF).

a. Turn mode selector switch to OFF.

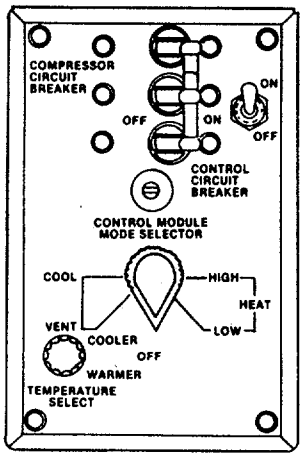


Figure 2-19. OFF Setting

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 Unit 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 figure 2-20 for external plates.

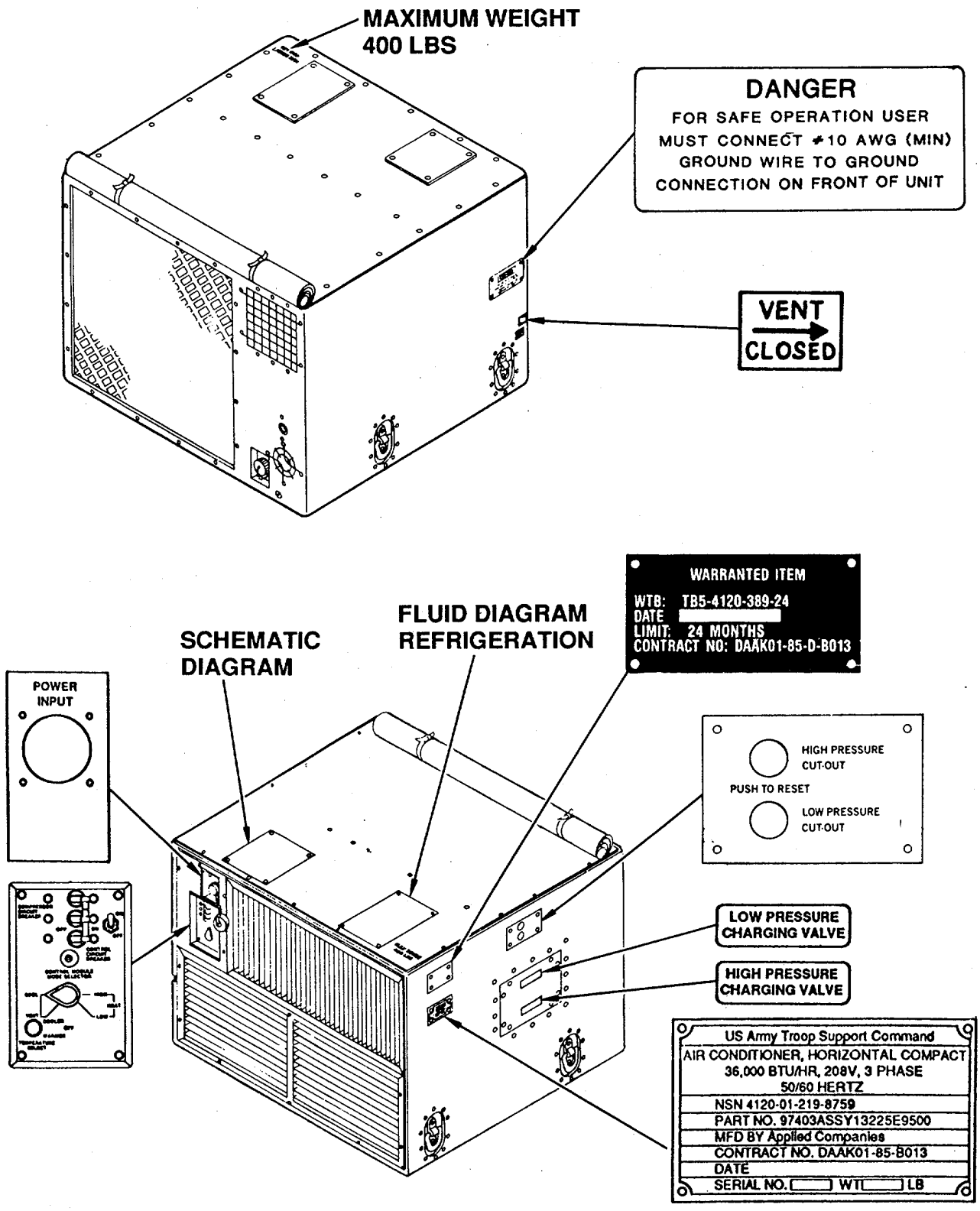


Figure 2-20. Information Plates

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-15. GENERAL.

The model 3864 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.

The air conditioner is designed to operate in temperatures up to 120 deg. F (48.9 deg. C). Extra care should be taken to minimize the cooling load when operating in extremely high temperatures. Some of the steps that may be taken are:

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

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

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

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

NOTE

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

2-17. OPERATION IN EXTREME COLD.

CAUTION

Do not disturb electrical wiring that has been exposed to extremely low temperatures. Both the wire and insulation become brittle when cold and are easily broken. The air conditioner is designed to operate in temperatures down to -15 deg. F (-45 deg. 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.

Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filters and thereby causing a restriction of the volume of airflow. Accumulation of dust or sand in the condenser coil and/or in the compressor compartment may cause overheating of the refrigeration system. Dust or sand may also clog the mist eliminator, condensate trap, and water drain lines. Some of the steps that may be taken are:

a. Frequent inspection of filters and all other areas of dust and sand accumulation. In extreme conditions, daily cleaning of filters may be necessary. Contact Unit Maintenance to clean filters.

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

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

2-19. OPERATION IN UNUSUALLY NET 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 of the mist eliminator, condensate trap, and drain lines to insure proper drainage and prevent accumulation of water inside the cabinet. If low air flow exists through evaporator air outlet, contact Unit Maintenance.

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.

NOTE

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.

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL.

No Operator Lubrication required.

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.

Table 3-1. OPERATOR TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

WARNING

Be careful when working with voltages. Failure to comply can result in serious injury or death.

1. AIR CONDITIONER FAILS TO OPERATE IN ANY MODE.

Step 1. Check to see if main power cord is plugged in.
Connect power cord to a source supplying 208 VAC, 3 phase, 50/60 Hertz power.

Step 2. Check to see that power supply circuit breaker is in the ON position.

Place circuit breaker in the ON position.

Step 3. Check to see if mode selector is in the VENT position.

Place mode selector in VENT position.

Step 4. Check to see if control circuit breaker is in the ON position.

Place control circuit breaker in the ON position.

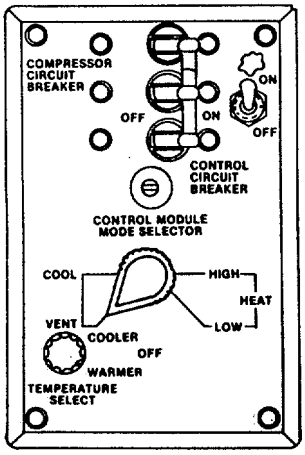


Table 3-1. OPERATOR TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 5. Check to see if compressor circuit breaker is in the ON position.	Place compressor circuit breaker in the ON position.
2. INSUFFICIENT COOLING.		
	Step 1. Check to see if mode selector is in COOL position.	Place mode selector in COOL position.
	Step 2. Check to see if temperature selector is in COOLER position.	Place temperature selector in COOLER position.
	Step 3. Check to see control circuit breaker is in the ON position.	Place control circuit in the ON position.

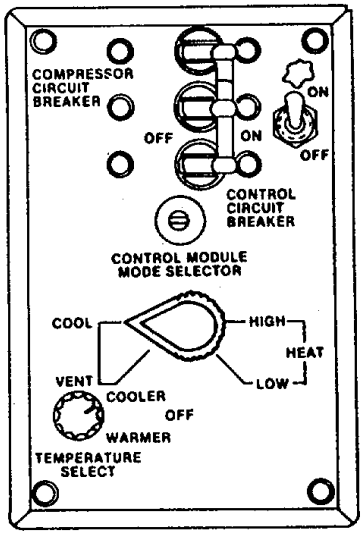


Table 3-1. OPERATOR TROUBLESHOOTING (Cont.)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 4.	Check to see air filter is not obstructed.	Notify your supervisor and Unit Maintenance.

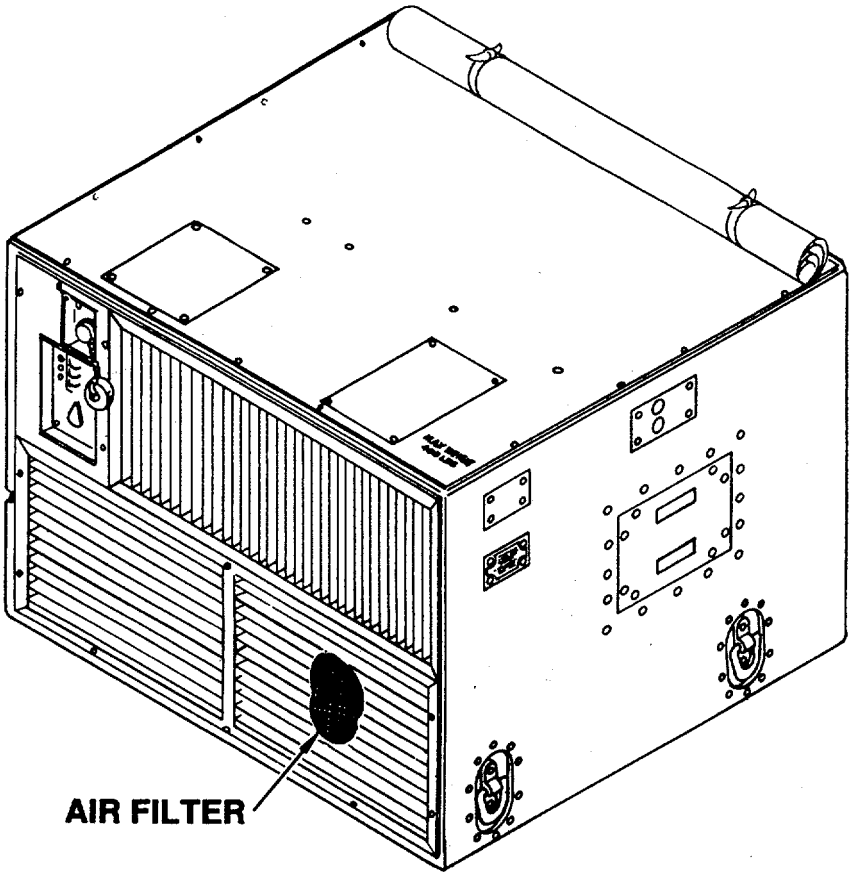
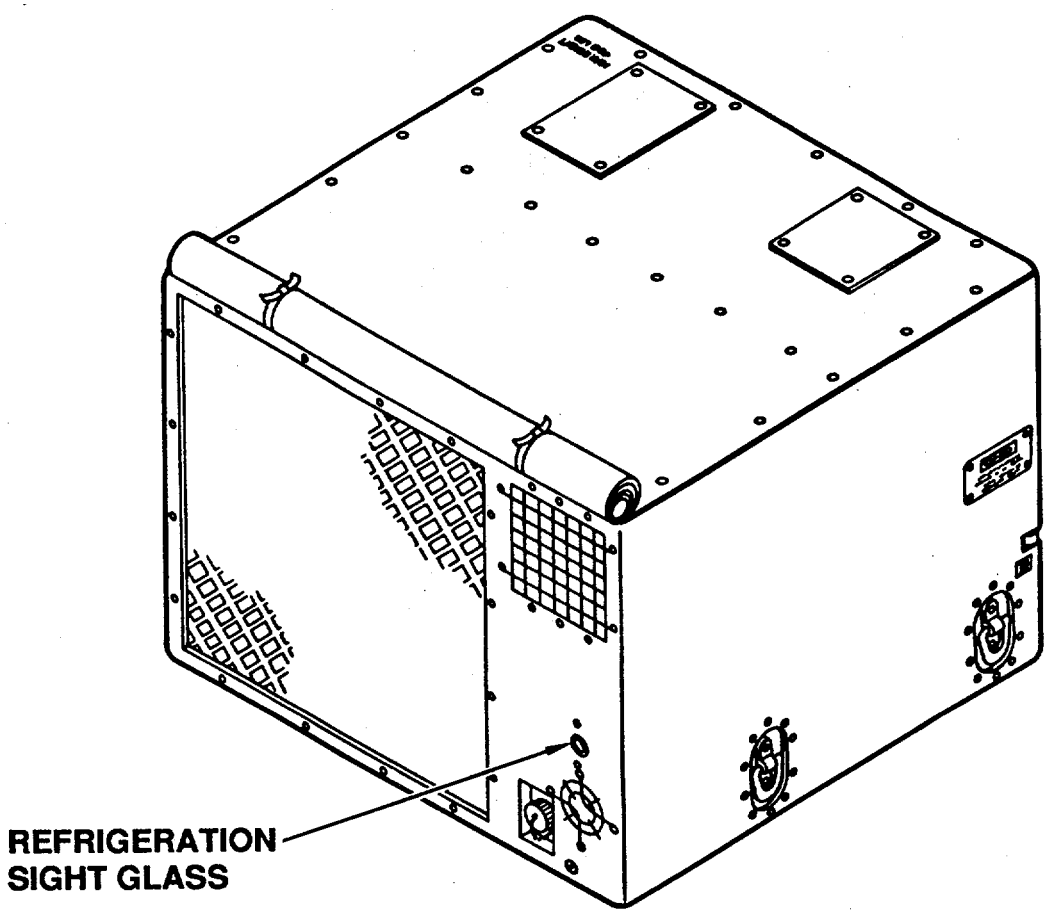


Table 3-1. OPERATOR TROUBLESHOOTING (Cont.)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

Step 5. Inspect sight indicator for bubbles or yellow color.



Notify your supervisor and Direct Support Maintenance.

Table 3-1. OPERATOR TROUBLESHOOTING (Cont.)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. INSUFFICIENT HEATING. (LOW HEAT)		
	Step 1. Check to see if mode selector is in LOW HEAT position.	Place mode selector in LOW HEAT position.
	Step 2. Check to see if control circuit breaker is in the ON position.	Place control circuit breaker in the ON position.
	Step 3. Check to see if compressor circuit breaker is in the ON position.	Place compressor circuit breaker in the ON position.
	Step 4. Check to see if temperature selector is in the WARMER position.	Place temperature selector in the WARMER position.

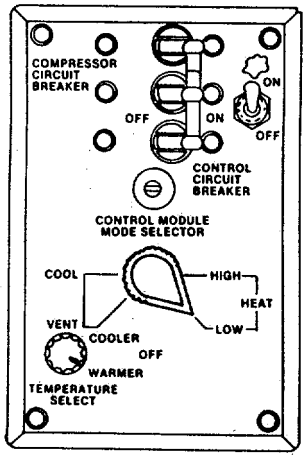


Table 3-1. OPERATOR TROUBLESHOOTING (Cont.)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

4. INSUFFICIENT HEATING (HIGH HEAT).

Step 1. Check to see if mode selector is in HIGH HEAT position.

Place mode selector in HIGH HEAT position.

Step 2. Check to see if control circuit breaker is in the ON position.

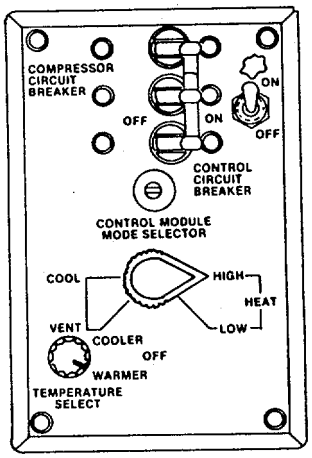
Place control circuit breaker in the ON position.

Step 3. Check to see if compressor circuit breaker is in the ON position.

Place the compressor circuit breaker in the ON position.

Step 4. Check to see if temperature selector is in the WARMER position.

Place temperature selector in the WARMER position.



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CHAPTER 4

UNIT MAINTENANCE INSTRUCTIONS

SECTION I. REPAIR PARTS, SPECIAL TOOLS, 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 Unit Maintenance shop.

c. Repair parts and special tools are listed and illustrated in the TM 9-4120-389-24P Repair Parts and Special Tools List (RPSTL), covering Unit, Direct Support, and General Support Maintenance for this equipment.

SECTION II. SERVICE UPON RECEIPT

4-2. UNLOADING.

The Model 3864 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.

WARNING

Do not allow unit to swing while suspended from a lifting device. Do not allow anyone under equipment suspended from a lifting device. Failure to observe warning may result in injury to personnel and damage to equipment.

CAUTION

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

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

14-3. 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.

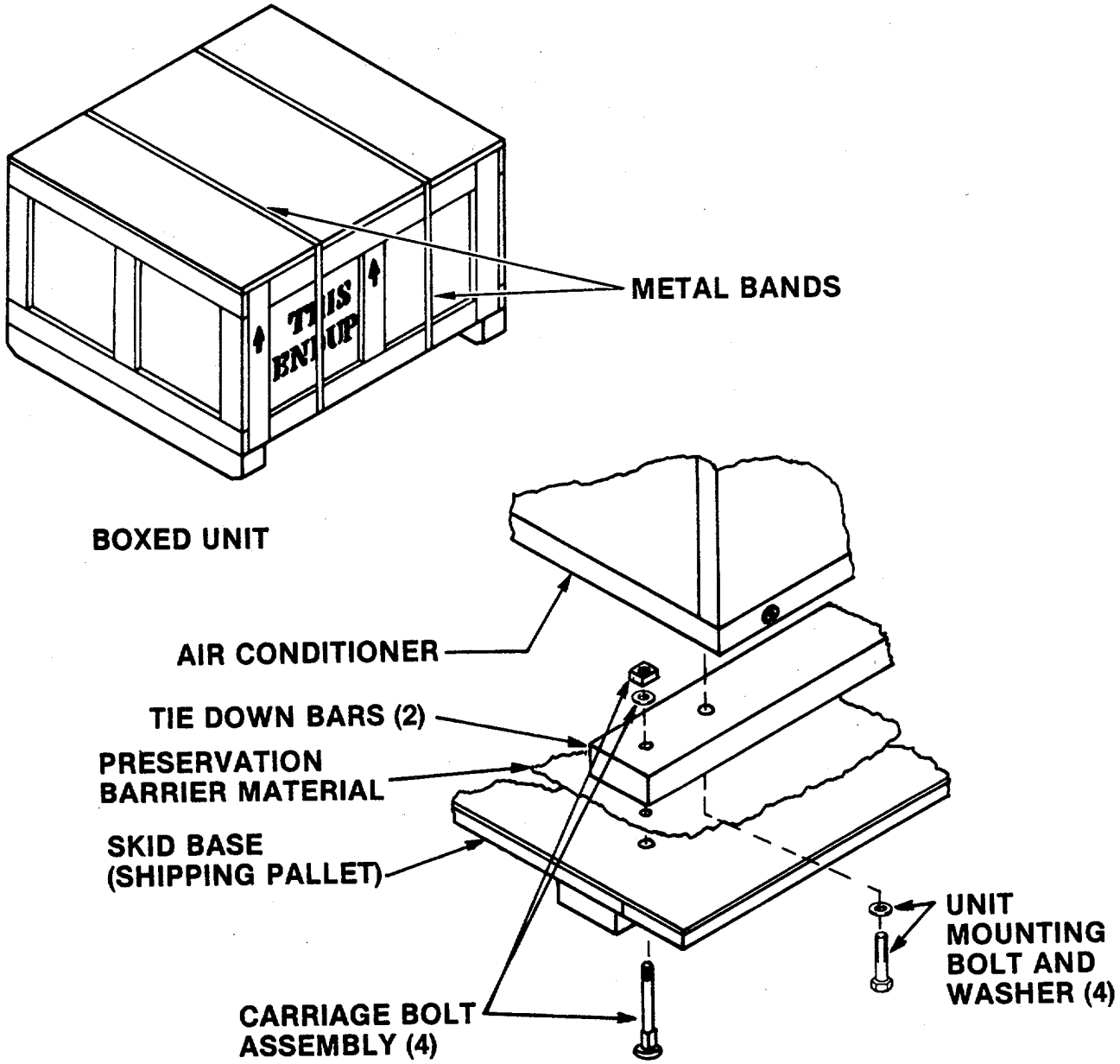


Figure 4-1. Unpacking

c. Removing 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.

WARNING

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

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.

d. Remove pallet. Raise the cabinet and remove the four carriage bolt assemblies that hold the tiedown bars to the pallet from the underside of the pallet. Remove the four bolts that hold the two tiedown bars to the unit base. Remove and retain the pallet and carriage bolt assemblies and the tiedown bars and bolts, if reuse is anticipated. Be sure to remove all remaining barrier material from the underside of the cabinet base. Lower the cabinet to the floor in the desired position and remove the sling and hoist.

4-4. RECEIVING INSPECTION

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

a. Inspect the equipment for damage incurred 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 shipment is complete. Report all discrepancies in accordance with the instruction of DA PAM 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. For installation into small shelters, refer to MIL-HDBK-116. 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 installation 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 within 5 degrees from front to back and side to side. See figure 4-2 for installation dimensions.

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

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

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

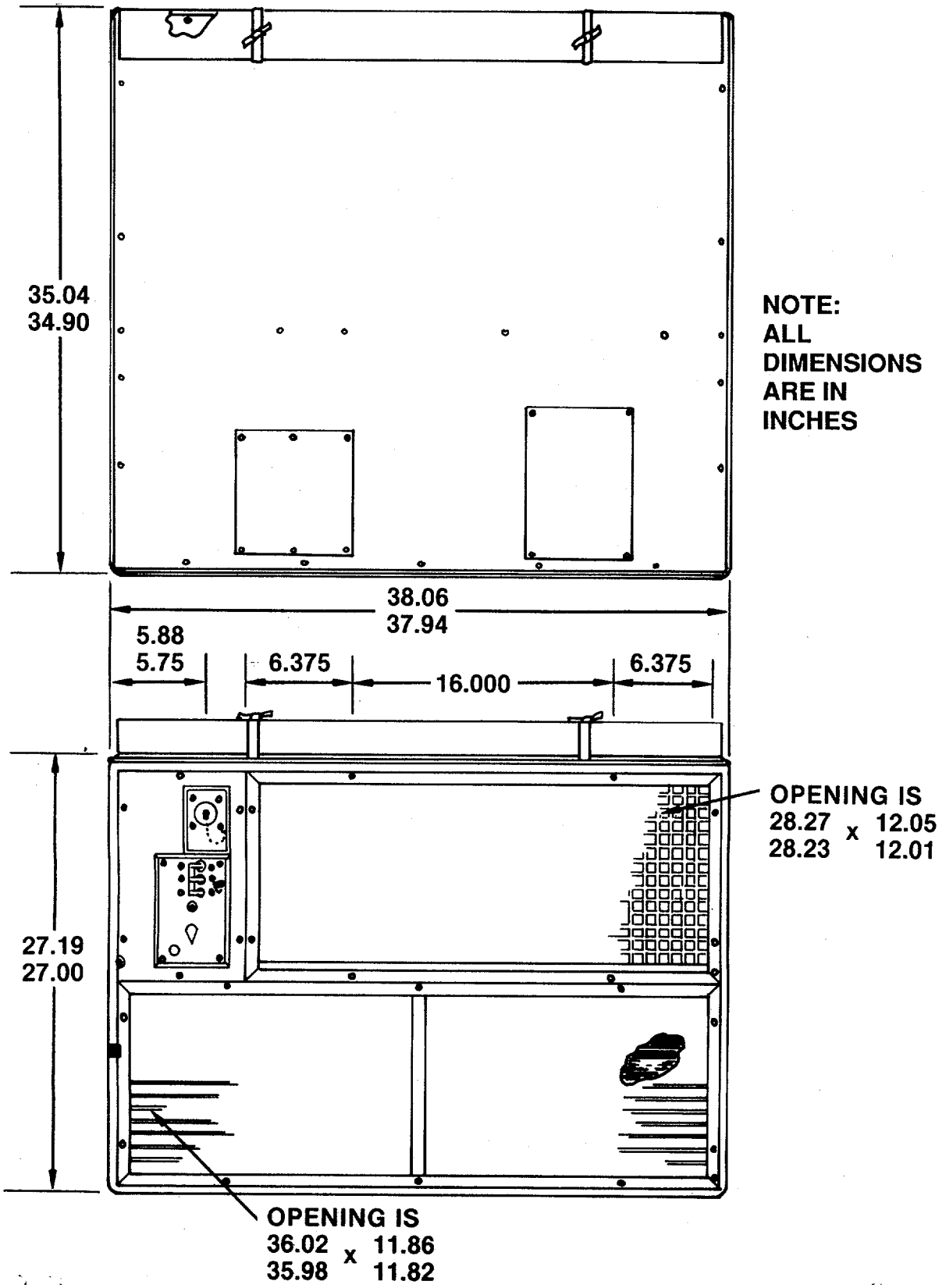


Figure 4-2. Installation Dimensions

(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 208 VAC, three phase, 50/60 hertz input power rated at 50.0 amps. The power source outlet should be located as near as possible to the installed location of the air conditioner. The power source wiring should include a disconnect switch. However, provisions should be made to insure that power is not disconnected during normal operation and that the disconnect is not used to turn off the air conditioner for normal shut-down.

WARNING

The air conditioner must be grounded prior to operation. Connect one end of a number 10 AWG (American Wire Gage) copper wire ground lead to an underground metallic cold water piping system or a driven metal ground rod or buried metal plate. Connect the other end of the ground lead to the grounding bolt on the upper left front cover of the unit.

(8). An earth ground capable of handling 50.0 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. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the condenser inlet guard and outlet louvers, and the fresh air screen. Prepare appropriate openings in an exterior wall for the ducts. Ducts may be designed to use the condenser inlet guard and outlet louvers, 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 evaporator inlet and outlet air. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the evaporator inlet and outlet louvers or some other arrangements may be made. Ducts may also be made for installation of the evaporator inlet and outlet louvers on the inside ends or replacements for these items may be used. Prepare appropriate openings in the appropriate wall for 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. For installation into small shelters, refer to MIL-HDBK-116. 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 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. Installations that require removal of the fabric cover (See para. 4-12).

4-7. INSTALLATION INSTRUCTIONS

WARNING

The air conditioner must be grounded prior to operation. Connect one end of a number 10 AWG (American Wire Gauge) copper wire ground lead to an underground metallic cold water piping system or a driven metal ground rod or buried metal plate. Connect the other end of the ground lead to the grounding bolt on the upper left front corner of the unit.

a. The unit may be supported by, or suspended from, any convenient part of the van or trailer capable of withstanding a concentrated load of approximately 400 pounds (182 kg.).

b. If the unit is to be mounted near a wall or partition, leave clearance to permit maintenance.

c. Use the base plan below for dimensions in selecting a suitable location or in constructing an installation base.

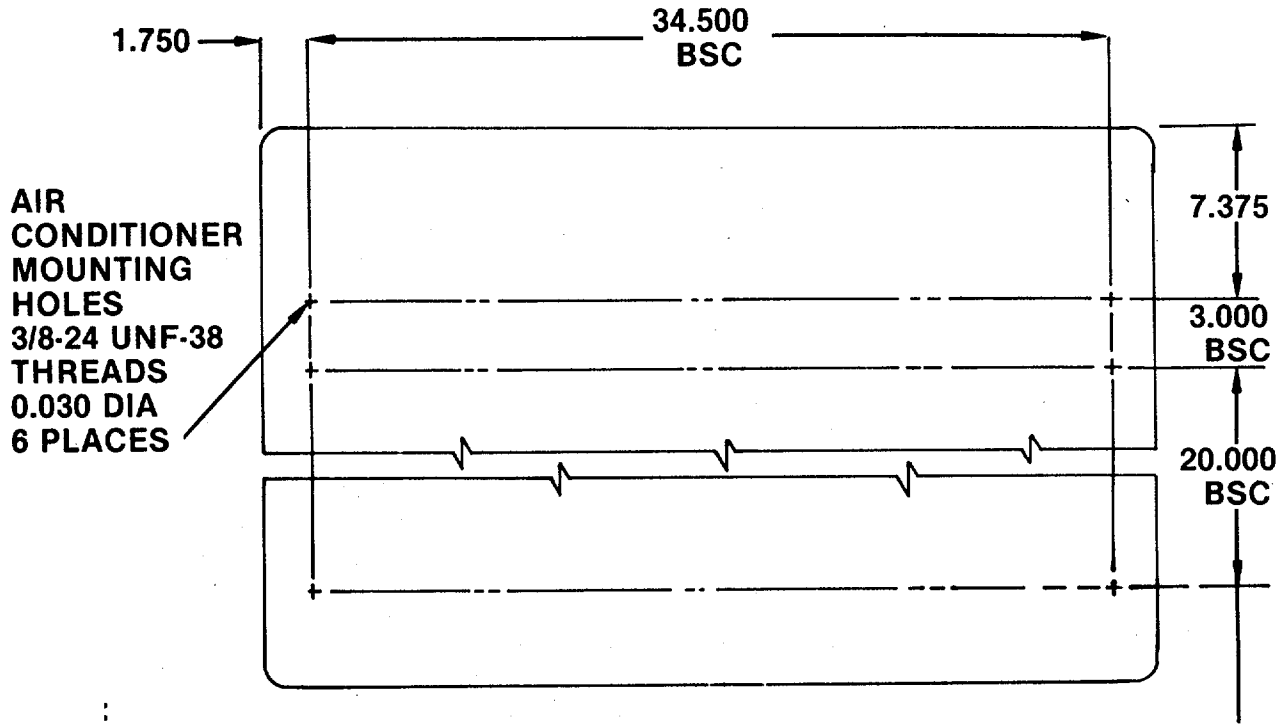


Figure 4-3. Base Mounting Dimensions

d. Lift unit by lifting rings.

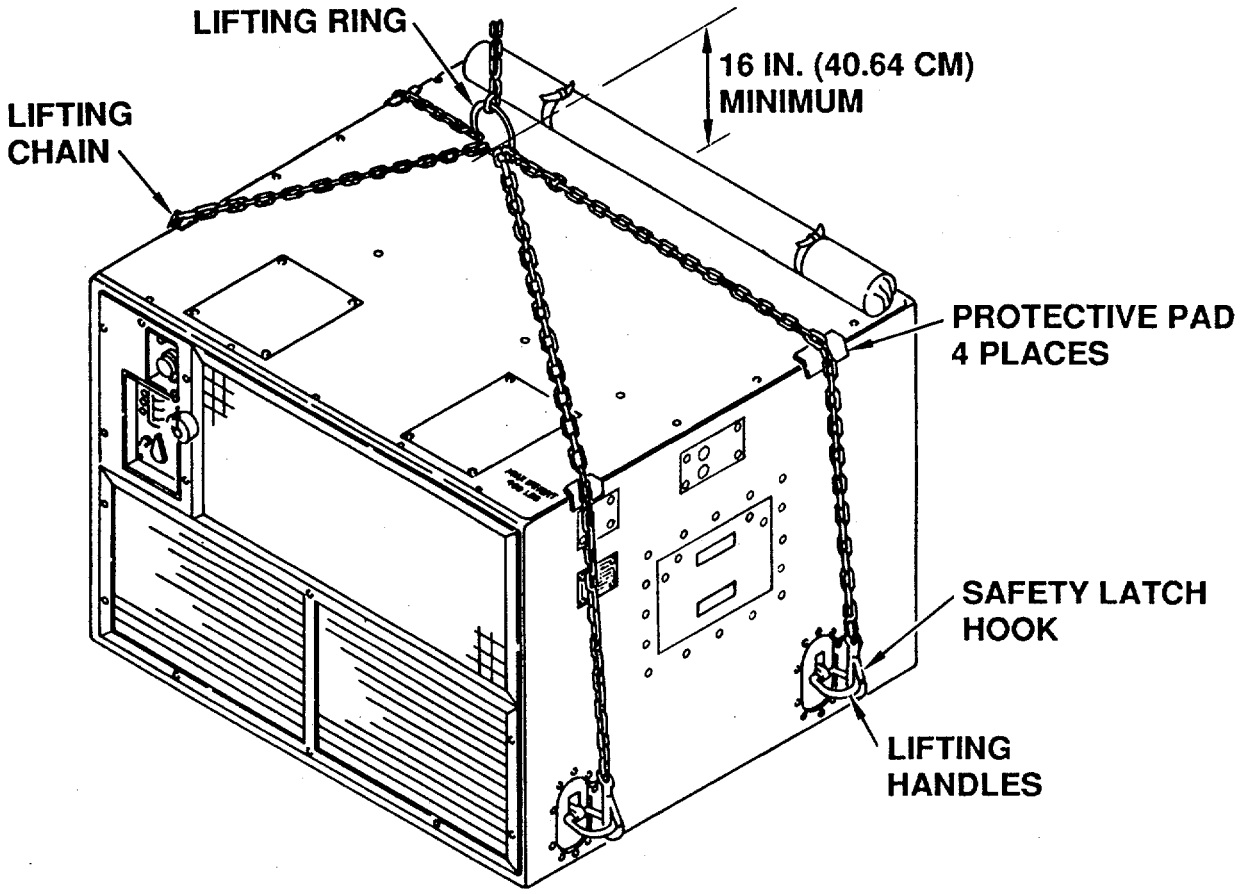


Figure 4-4. Lifting Instructions

e. Use mounting hardware supplied in the overpack kit (Appendix C, Items 11 thru 15).

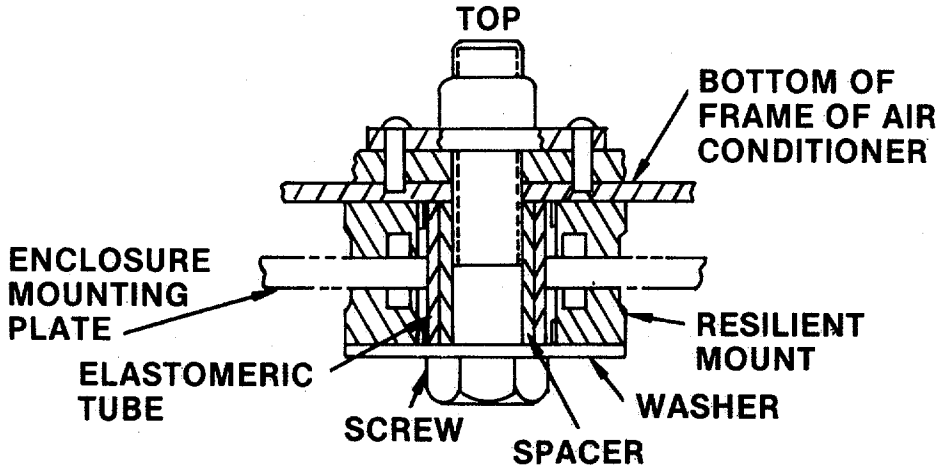


Figure 4-5. Mounting Instructions

f. Be sure the mode selector on the control module is in the OFF position and connect a 208 VAC, 50/60 cycle, 3 phase power to the input power connector (J-1) at the top left front corner of the unit.

g. The new unit should not require servicing, as it is shipped completely assembled and ready to operate when power is applied. However, if any defects have been found during the inspection of the equipment they should be corrected as necessary before the unit is placed into operation.

h. Remove condensate drain plug. Connect a 1/4-18 inch NPT threaded pipe to the drain connections on the bottom right rear of the unit to remove condensate water. Extend piping or hose to deposit water in a suitable location or container.

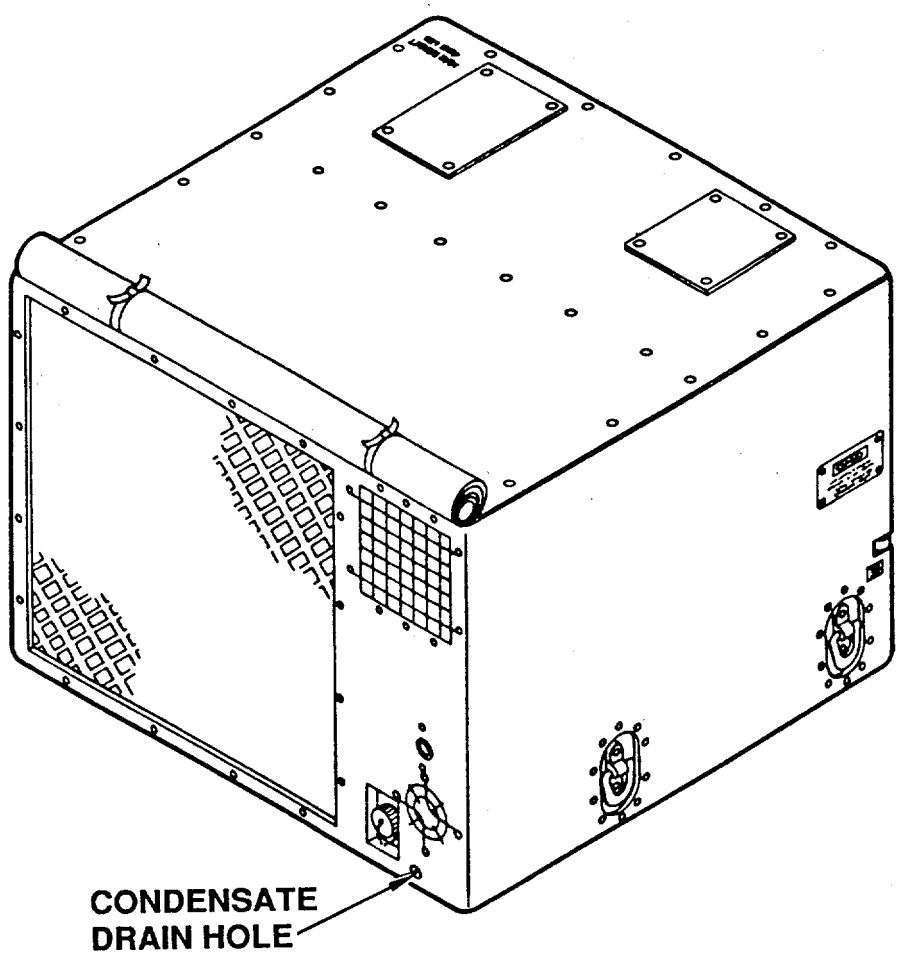


Figure 4-6. Drain Connection

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. For removal of fabric cover, see to para. 4-12.

NOTE

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

SECTION III. PREVENTIVE MAINTENANCE

CHECKS AND SERVICES (PMCS)

4-9. 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 seriously damage or cause complete failure of the equipment. Any effective preventive maintenance checks or actual operation to Unit Maintenance. All defects and deficiencies discovered during maintenance inspections must be recorded, together with corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

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

c. Table 4-1 lists the unit preventive maintenance checks and services that should be performed at quarterly 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.

COMPONENT REFERENCE LIST		
ELEC REF DES.	PART NUMBER	DESCRIPTION
B1	13229E6162	COMPRESSOR
B2	13229E6156	MOTOR, CONDENSER BLOWER
B3	13229E6155	MOTOR, EVAPORATOR BLOWER
CB1	13216E6205-5	CIRCUIT BREAKER, COMPRESSOR
CB2	13229E6209	CIRCUIT BREAKER, CONTROL
HR1 THRU HR6	13229E6167	HEATING ELEMENT, ELECTRICAL
HR7	PART OF B1	CRANKCASE HEATER
J1, J3	MS3100R24-22P	RECEPTACLE, POWER
J2	13216E6177	CONNECTOR, JUNCTION BOX
J3	MS3100R24-22P	RECEPTACLE, AUXILIARY POWER
K1	13229E6177	RELAY, TIME DELAY
K2	13229E6176-2	RELAY, HEATER
K3	13229E6176-2	RELAY, COMPRESSOR
K4	13229E6176-2	RELAY, CONDENSER BLOWER
K5	13229E6176-2	RELAY, HEATER
K6	13229E6176-2	RELAY, EVAPORATOR BLOWER
L1	13229E6193	VALVE, SOLENOID, BY-PASS
P2	13216E6209-3	CONNECTOR CONTROL MODULE
S1	13216E6201	SWITCH, ROTARY SELECTOR
S2	13216E6203-2	SWITCH, TEMPERATURE CONTROL
S3	13229E6203	SWITCH, HEATER CUTOUT
S4	13216E6215-3	SWITCH, HIGH PRESSURE CUTOUT
S5	13216E6215-1	SWITCH, LOW PRESSURE CUTOUT
S6	PART OF B3	SWITCH, THERMAL PROTECTOR
T1	13229E6211	TRANSFORMER, POWER DISTRIBUTION
TB1	13216E6454	TERMINAL BOARD, POWER INPUT

TO ENERGIZE THE UNIT FROM THE AUXILIARY POWER SOURCE (J3), THE POWER LEADS ON TB1-1, TB1-2 AND TB1-3 MUST BE CHANGED TO TB1-4, TB1-5 AND TB1-6 RESPECTIVELY.

Figure 4-7 . Schematic and Wiring Diagram Component Reference

COMPONENT REFERENCE LIST		
ELEC REF DES	PART NUMBER	DESCRIPTION
B1	13229E6162	COMPRESSOR
B2	13229E6156	MOTOR, CONDENSER BLOWER
B3	13229E6155	MOTOR, EVAPORATOR BLOWER
CB1	13216E6205-5	CIRCUIT BREAKER, COMPRESSOR
CB2	13229E6209	CIRCUIT BREAKER, CONTROL
HR1 THRU HR6	13229E6167	HEATING ELEMENT, ELECTRICAL
HR7	PART OF B1	CRANKCASE HEATER
J1	MS3100R24-22P	RECEPTACLE, POWER
J2	13216E6177	CONNECTOR, JUNCTION BOX
J3	MS3100R24-22P	RECEPTACLE, AUXILIARY POWER
J4	PART OF B1	CONNECTOR
K1	13229E6177	RELAY, TIME DELAY
K2	13229E6176-2	RELAY, HEATER
K3	13229E6176-2	RELAY, COMPRESSOR
K4	13229E6176-2	RELAY, CONDENSER BLOWER
K5	13229E6176-2	RELAY, HEATER
K6	13229E6176-2	RELAY, EVAPORATOR BLOWER
L1	13229E6193	VALVE, SOLENOID, BY-PASS
P2	13216E6209-3	CONNECTOR CONTROL MODULE
P4	MS106R24-115	CONNECTOR WIRING HARNESS
S1	13216E6201	SWITCH, ROTARY SELECTOR
S2	13216E6203-2	SWITCH, TEMPERATURE CONTROL
S3	13229E6203	SWITCH, HEATER CUTOUT
S4	13216E6215-3	SWITCH, HIGH PRESSURE CUTOUT
S5	13216E6215-1	SWITCH, LOW PRESSURE CUTOUT
S6	PART OF B3	SWITCH, THERMAL PROTECTOR
S7	PART OF B1	HEATER THERMOSTAT
S8	PART OF B1	THERMAL OVERLOAD
T1	13229E6211	TRANSFORMER, POWER DISTRIBUTION
TB1	13216E6454	TERMINAL BOARD, POWER INPUT
TB2	13229E6189	TERMINAL BOARD, HEATERS
TB3	13216E6232-6	TERMINAL BOARD, JUNCTION BOX
TB4	13229E6204-10	TERMINAL BOARD, CONDENSER SECTION
TB5	13229E6205-3	TERMINAL BOARD, COMPRESSOR POWER

TO ENERGIZE THE UNIT FROM THE AUXILIARY POWER SOURCE (J3), THE POWER LEADS ON TB1-1, TB1-2 AND TB1-3 MUST BE CHANGED TO TB1-4, TB1-5 AND TB1-6 RESPECTIVELY.

Figure 4-8. Schematic and Wiring Diagram Component Reference (Serial Numbers 990 through 1335)

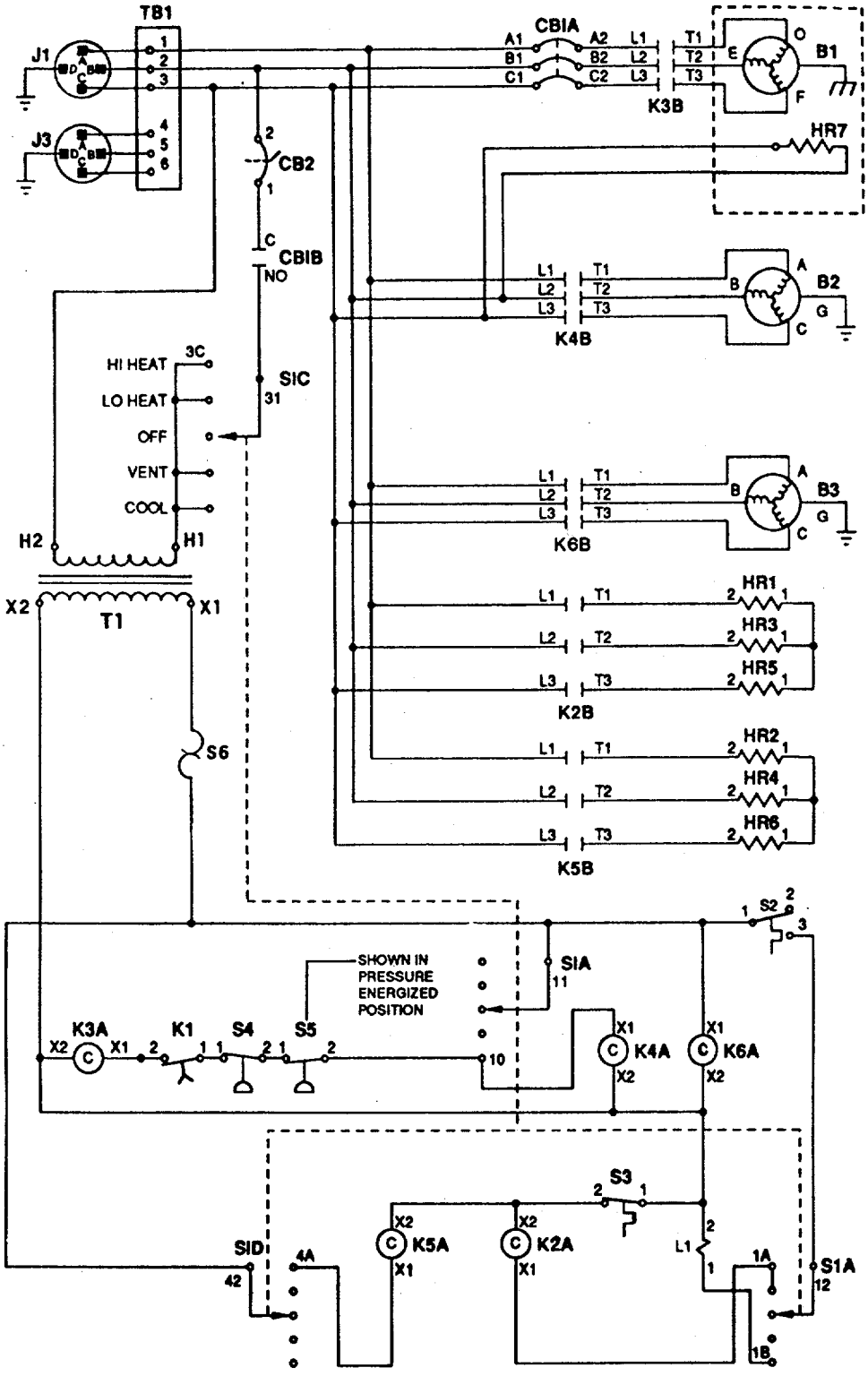


Figure 4-9. Electrical Schematic

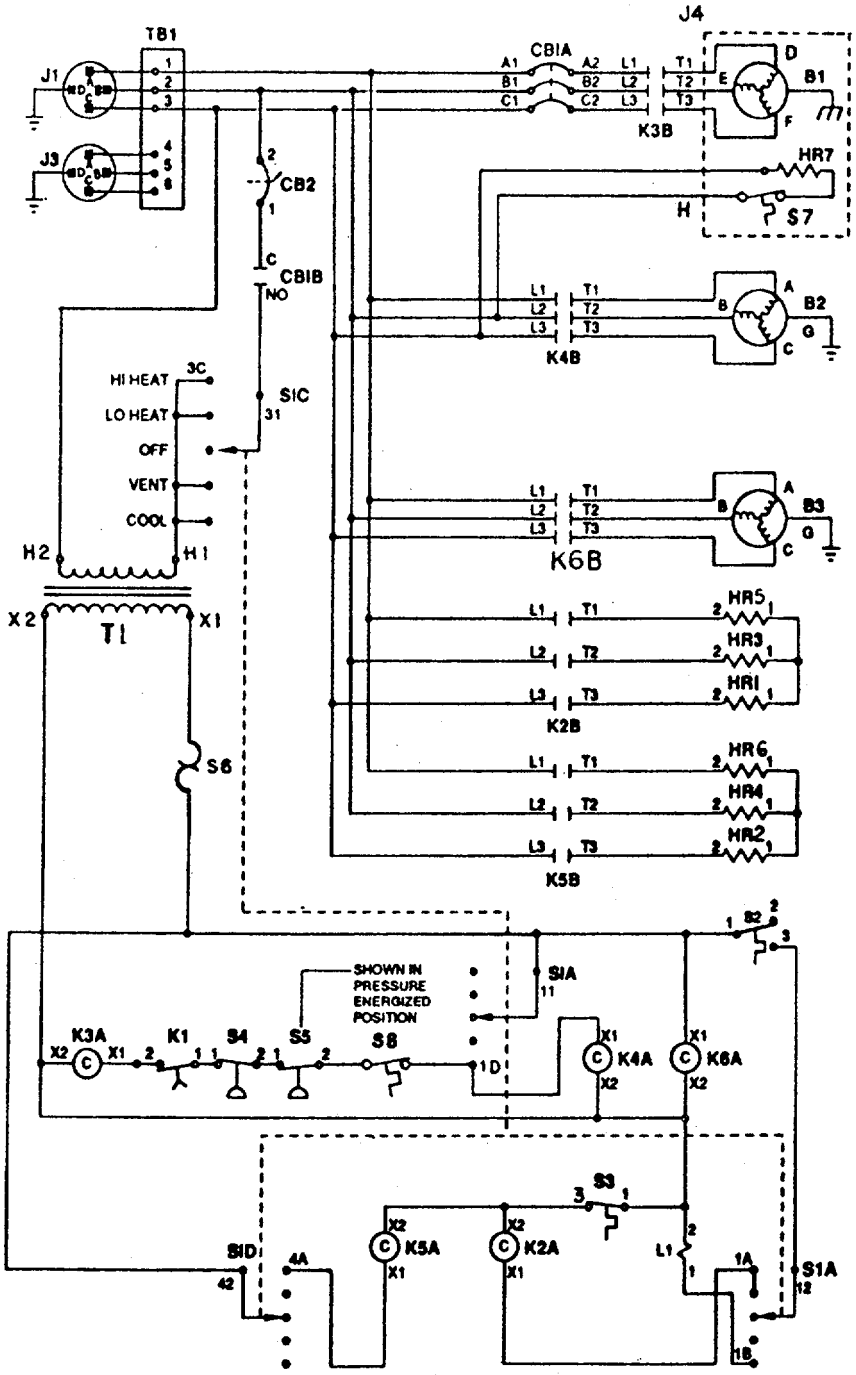


Figure 4-10. Electrical Schematic (Serial Numbers 990 through 1335)

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

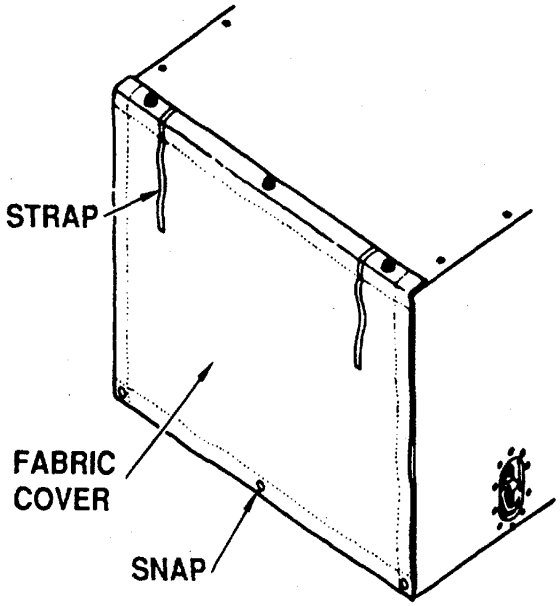
Item No.	Item To Be Inspected/Services	Procedures
1	Fabric Cover	a. Roll down the cover and inspect for tears, cracks, or any other sign of damage or deterioration. b. Using a clean cloth and clean water with a small amount of mild detergent in solution, wipe clean. 

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

Item No.	Item To Be Inspected/Services	Procedures
2	Metal Covers	a. Inspect covers for damaged or missing hardware. b. See para. 4-13 through 4-15 for repair and replacement.

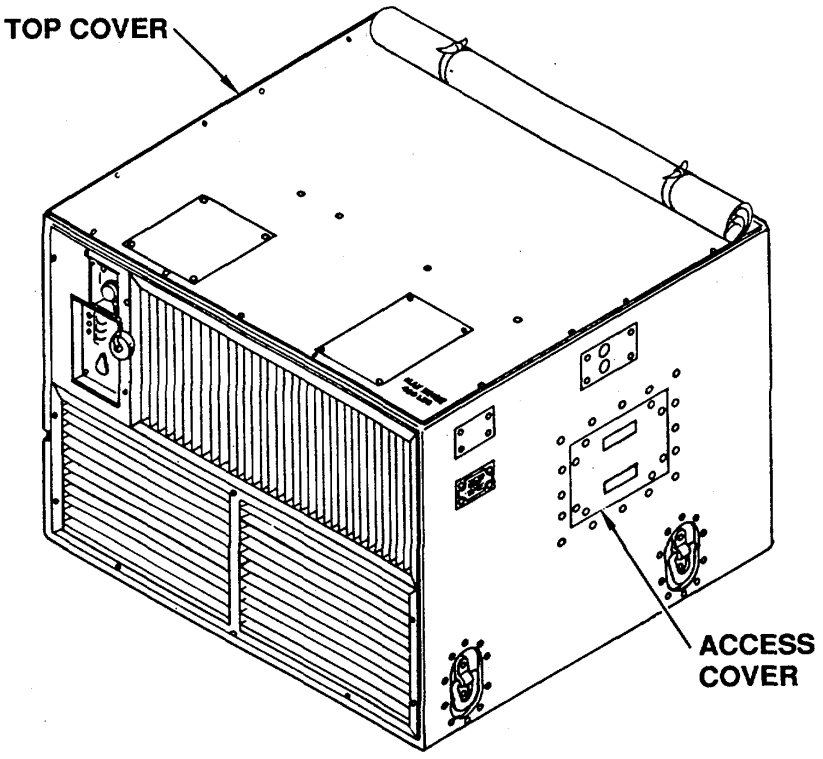


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

Item No.	Item To Be Inspected/Services	Procedures
3	Information Plates	a. Inspect for missing or damaged plates. b. Clean dirty plates, using a clean cloth and clean water with a small amount of mild detergent in solution. c. See para. 4-16 to replace damaged or missing plates and rivets.

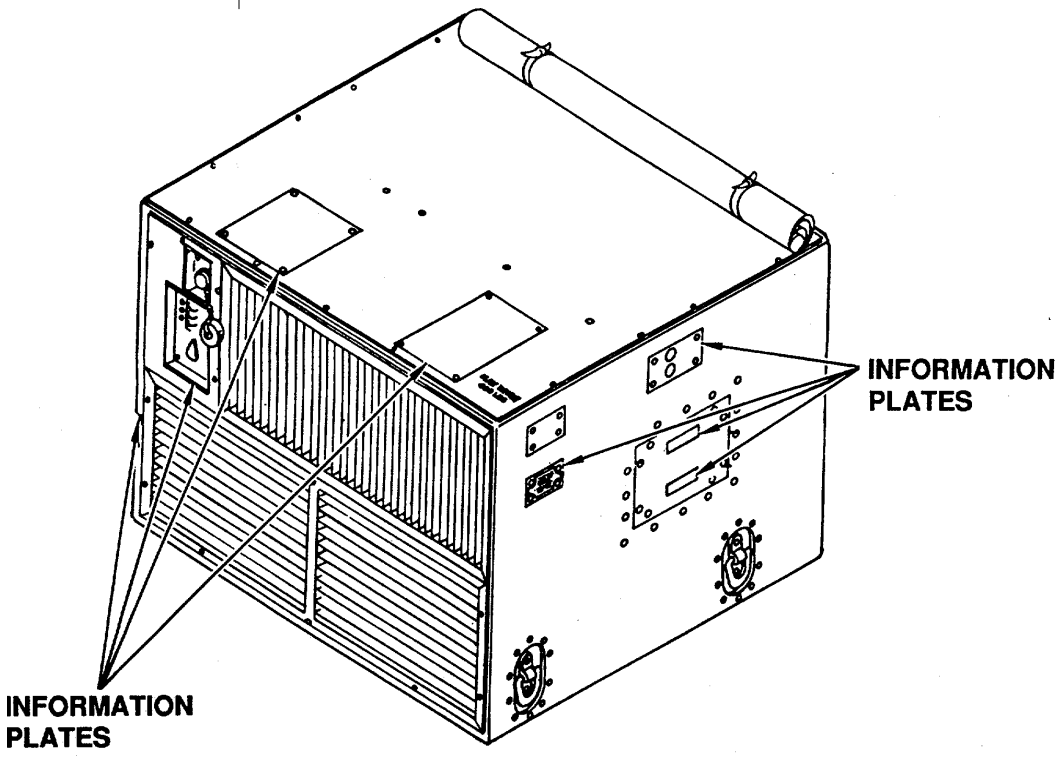


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

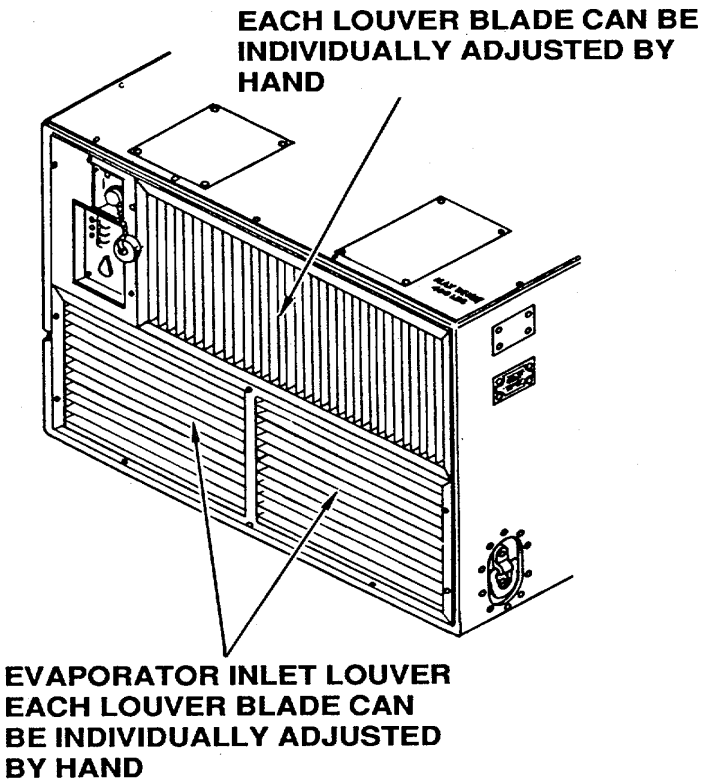
Item No.	Item To Be Inspected/Services	Procedures
4	Louvers	a. Inspect louvers for missing parts and hardware. b. Service louvers, refer to para. 4-17 and 4-18. c. See para. 4-17 and 4-18 to replace specific louver and hardware. 

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

Item No.	Item To Be Inspected/Services	Procedures
5	Air Conditioner Filter	a. See para. 4-19 to remove, inspect and clean filter. b. Discard filter and obtain replacement, if damaged.

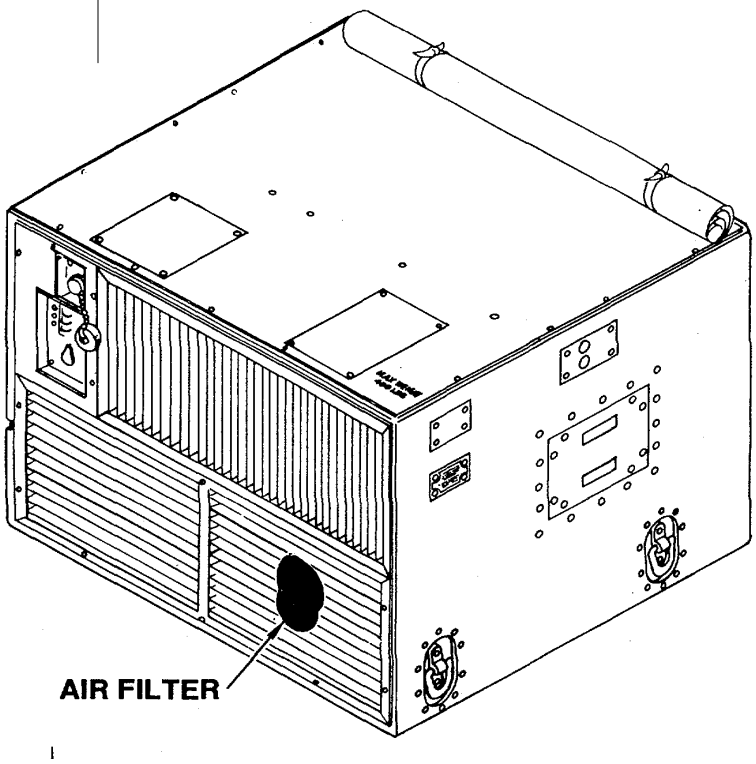


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

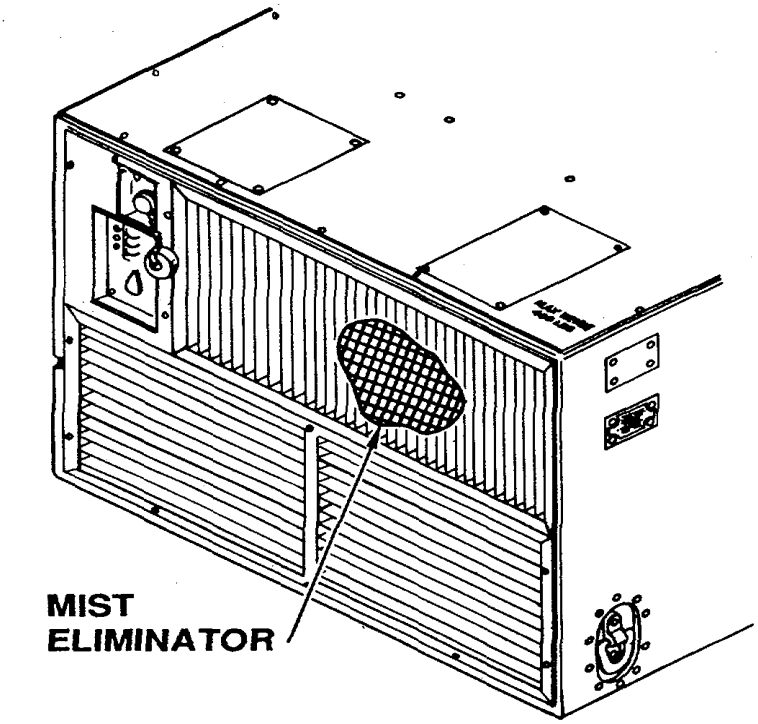
Item No.	Item To Be Inspected/Services	Procedures
6	Mist Eliminator	a. Inspect mist eliminator for damage and contaminants. b. Clean and service, see para. 4-20. c. Replace mist eliminator, see para. 4-20. 

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

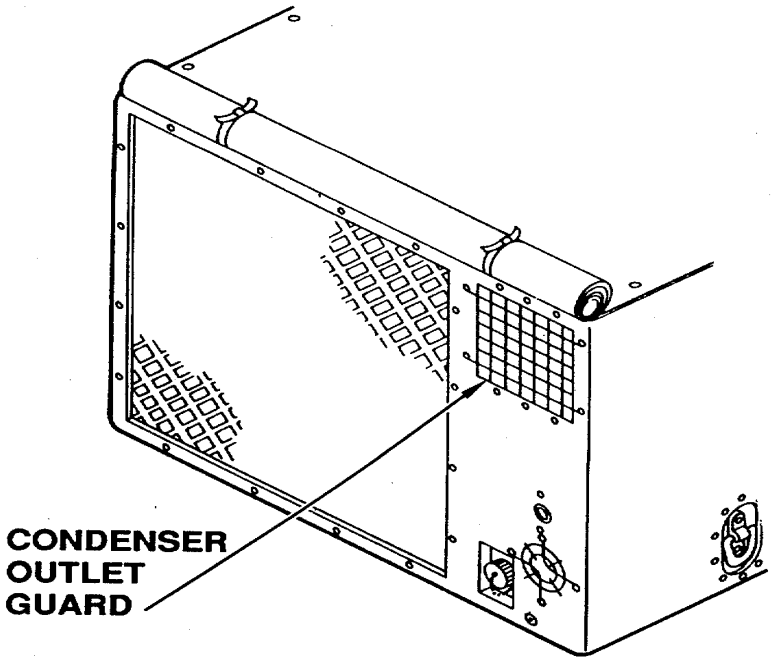
Item No.	Item To Be Inspected/Services	Procedures
7	Condenser Outlet Guard	a. Inspect outlet guard for damage or missing hardware. b. See para. 4-21 to replace outlet guard or hardware. 

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

Item No.	Item To Be Inspected/Services	Procedures
8	Ventilation Guard	a. Inspect guard for damage or missing hardware. b. See para. 4-22 to replace guard or hardware.

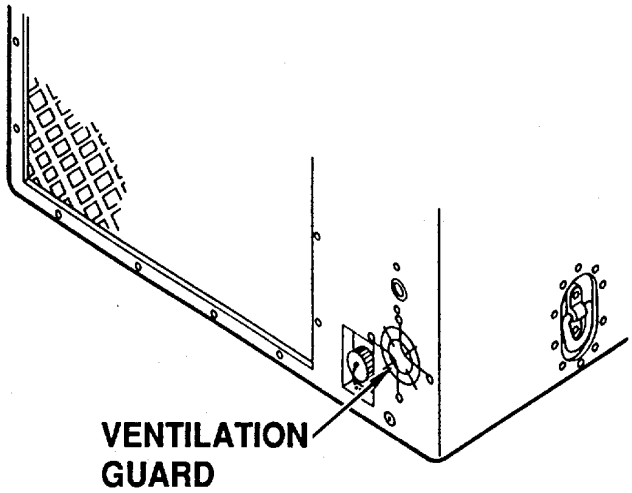


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

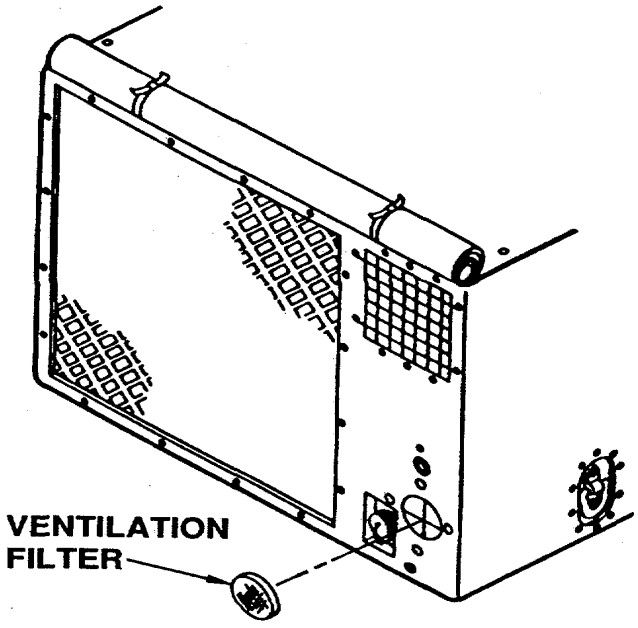
Item No.	Item To Be Inspected/Services	Procedures
9	Ventilation Filter	a. Remove filter from casing. b. Inspect filter for damage or contaminants. c. Replace damaged filter. d. Clean dirt filter per para. 4-23. 

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

Item No.	Item To Be Inspected/Services	Procedures
10	Lifting Rings and Clips	a Inspect ring and clips (4) for damage or missing hardware. b. See para. 4-24 to replace parts or hardware.

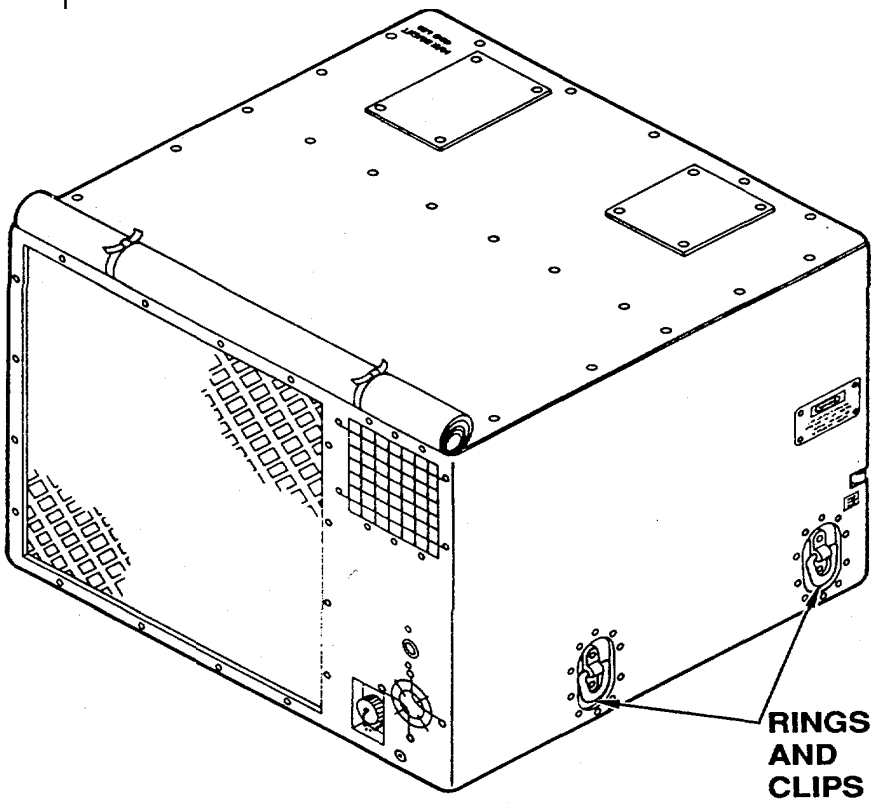


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

Item No.	Item To Be Inspected/Services	Procedures
11	Condenser Motor and Fan	a. Remove top cover, see para. 4-14. b. Inspect fans and motors for loose or missing hardware. c. Tighten or replace missing hardware as needed, see para. 4-25 and 4-26.

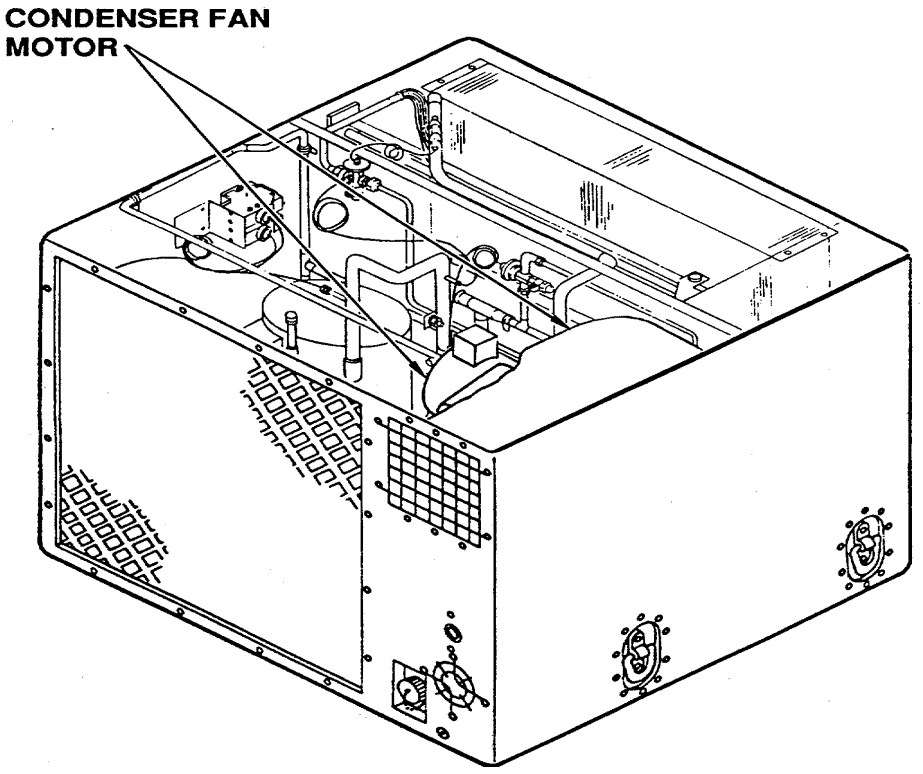


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

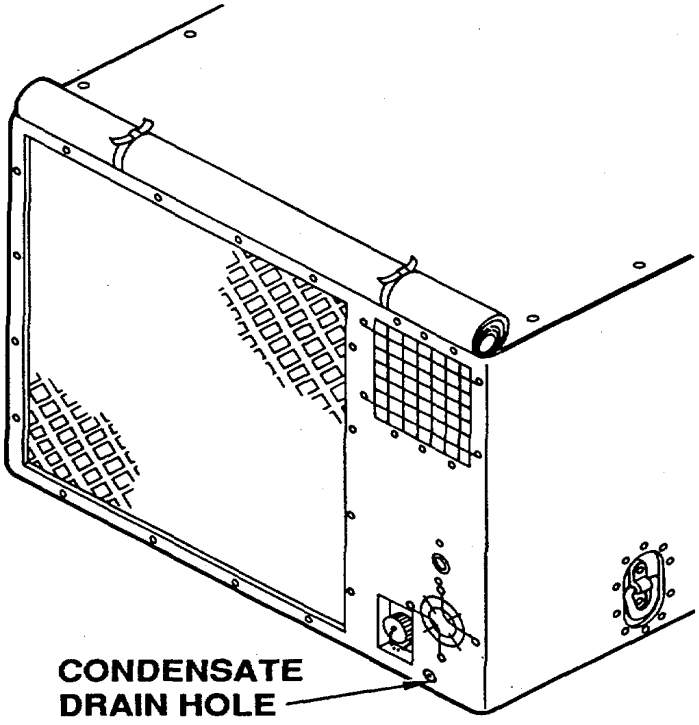
Item No.	Item To Be Inspected/Services	Procedures
12	Condensate Drain	a. Inspect condensate drain for clogging. b. Service per para. 4-30. 

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

Item No.	Item To Be Inspected/Services	Procedures
13	Evaporator Motor and Fans	a. Follow procedures of para. 4-18 to gain access to motor and fans. b. Inspect fans and motor for loose or missing hardware. c. Tighten or replace loose or missing hardware, refer to para. 4-31 thru 4-34.

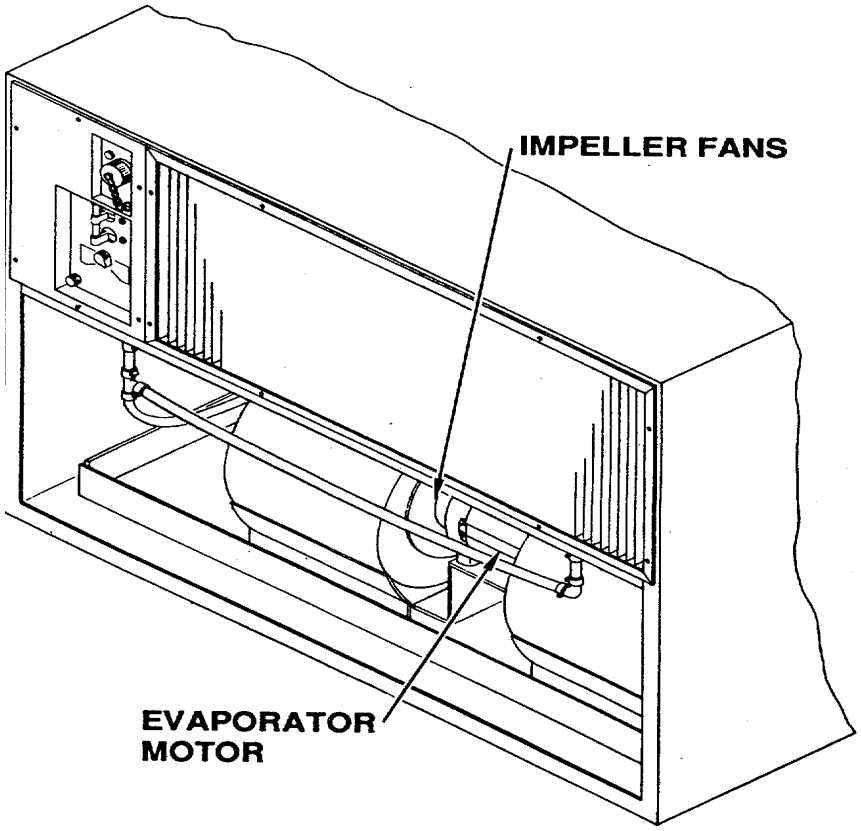


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

Item No.	Item To Be Inspected/Services	Procedures
14	Ventilation Damper and Actuator	a. Verify that damper fully opens and closes when ventilation air control is spun from clockwise to counter clockwise. b. Verify that there is no binding when control is actuated. c. Service and adjust if necessary per para. 4-35.

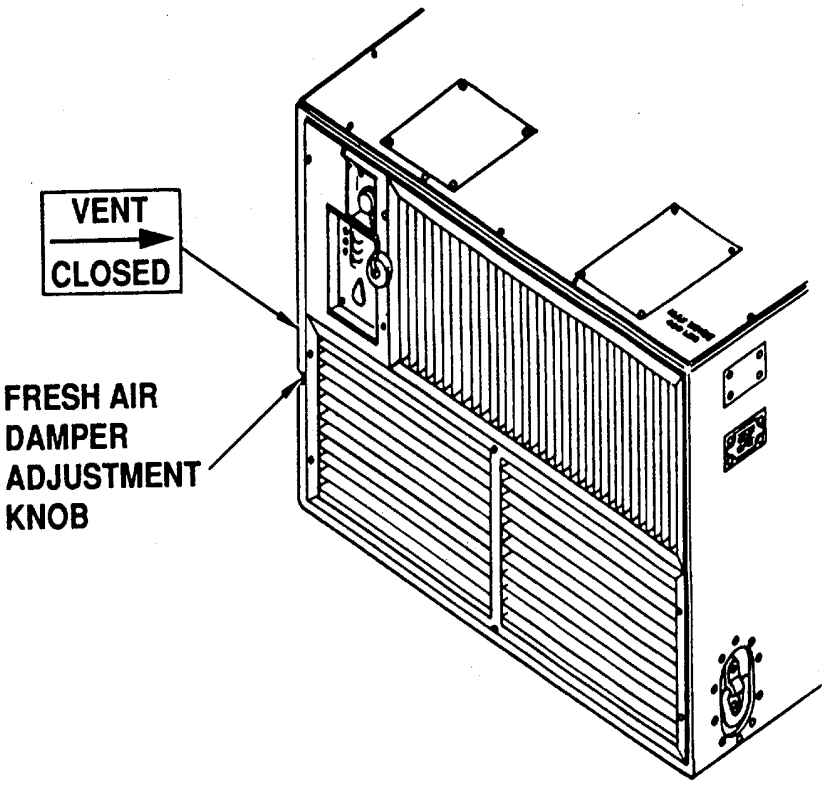


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

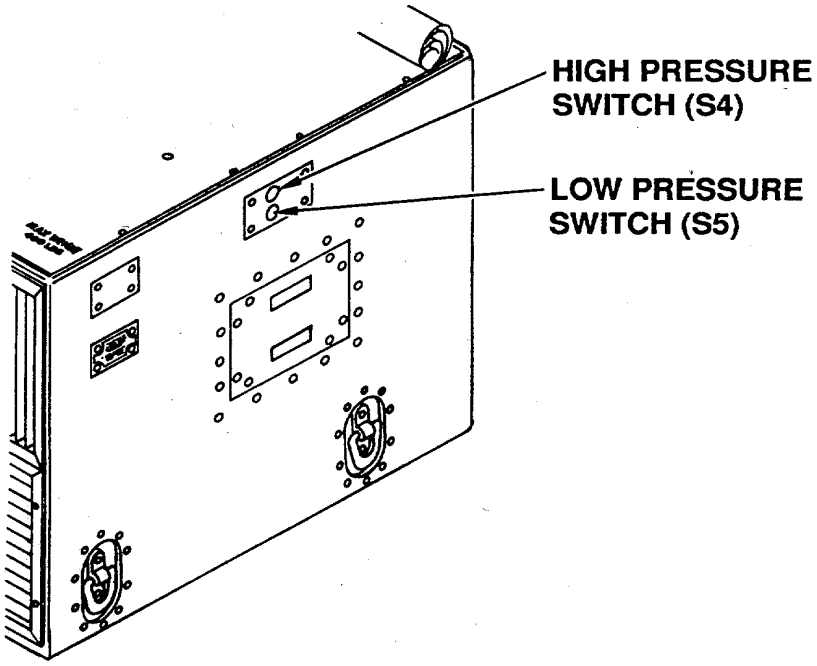
Item No.	Item To Be Inspected/Services	Procedures
15	Pressure Switches (S4) and (S5)	a. Start unit in COOL mode. b. Test by depressing high pressure switch (S4) button. Compressor must stop operating. c. Repeat step a and b to test pressure switch (S5). d. If either switch fails to stop compressor, contact Direct Support Maintenance. 

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

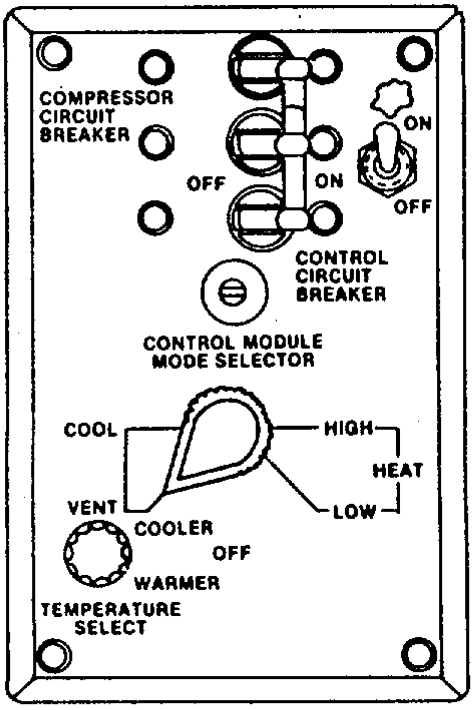
Item No.	Item To Be Inspected/Services	Procedures
16	Control Module	a. Inspect for missing knobs and loose set screws. b. Replace missing items and tighten screws as needed, see para. 4-41 and 4-43. 

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

Item No.	Item To Be Inspected/Services	Procedures
17	Junction Box	a. Disconnect incoming power before servicing J1 receptacle. b. Inspect J1 receptacle for loose or missing hardware and bent pins. c. Replace or tighten hardware and straighten pins as needed, see para. 4-47.

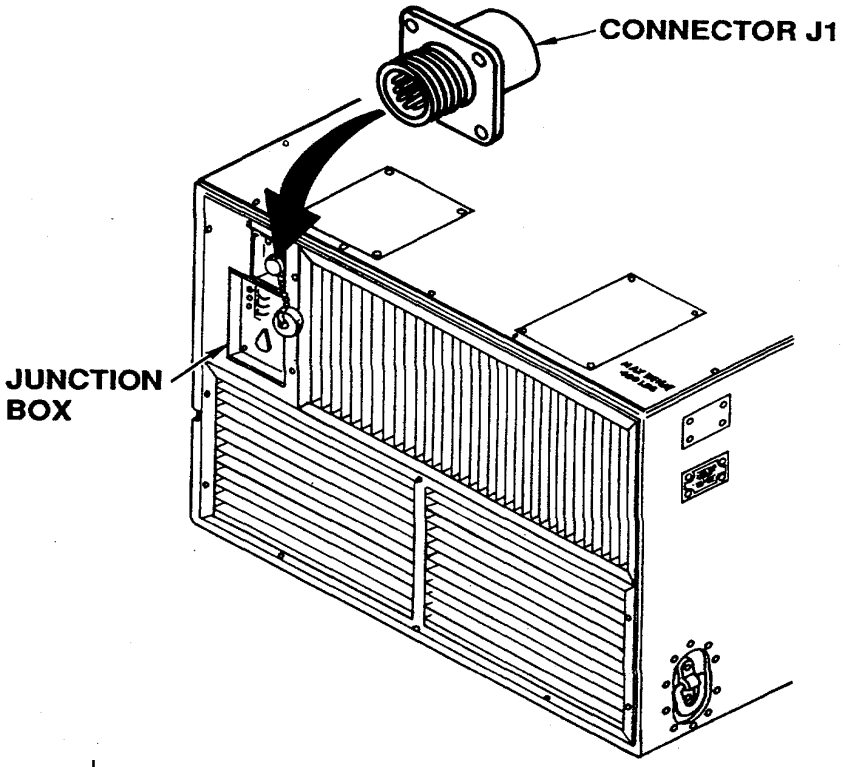


TABLE 4-1. UNIT QUARTERLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) - (cont.)

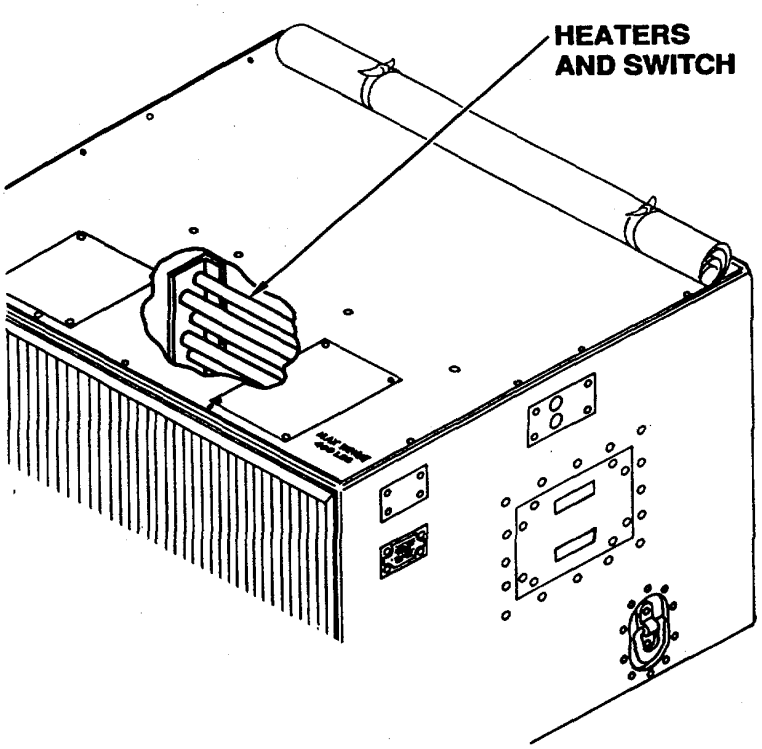
Item	Item To Be Inspected/Services	Procedures
18	Heater Elements and Thermostats Switch	a. Disconnect incoming power to unit. b. Remove top cover (see para. 4-14). c. Wipe or vacuum any remaining dust or dirt from the heating elements, the thermostat and all other components and surfaces in the area. d. Inspect heating elements and thermostat for obvious damage, and all mounting hardware for tightness and security. e. Inspect wiring harness for damage or chaffing and all electrical connections for tightness, tighten as needed. 

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

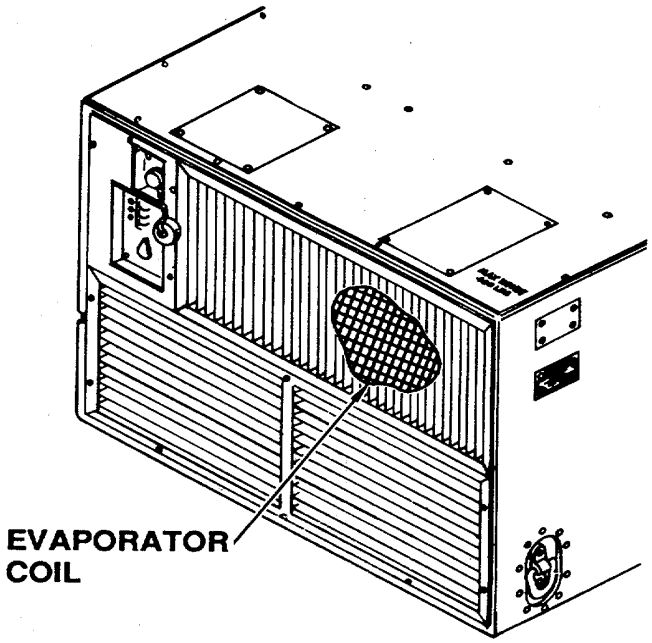
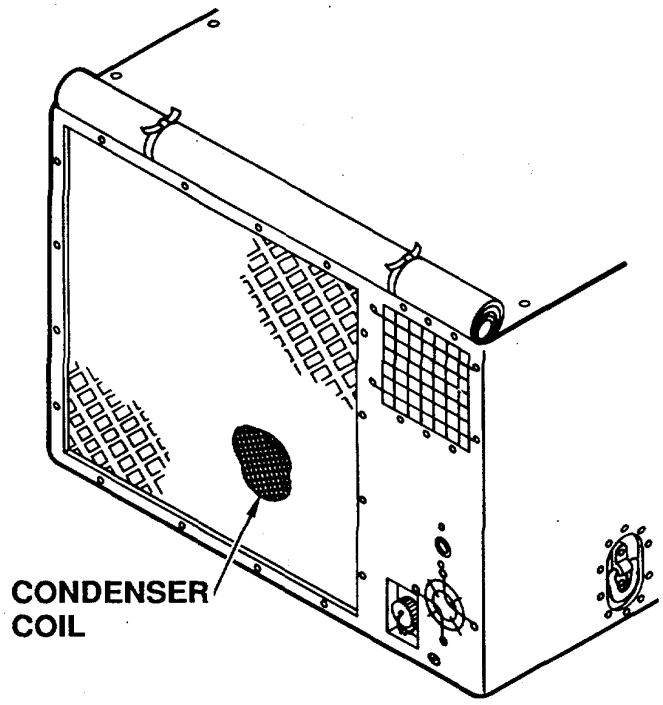
Item	Item To Be Inspected/Services	Procedures
19	Evaporator Coil	Inspect and service, see para. 4-58. 

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

Item	Item To Be Inspected/Services	Procedures
20	Condensor Coil	Inspect and service, see para. 4-59. 

Section IV TROUBLESHOOTING

4-10. 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 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.

WARNING

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.

WARNING

Whenever applicable, input power supply to equipment must be shut off before beginning work.

WARNING

Be careful not to contact high-voltage connections of 208 VAC input when installing or operating this equipment.

WARNING

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

WARNING

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

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 4-2. UNIT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR CONDITIONER FAILS TO OPERATE IN ANY MODE.

Step 1. Check to see if main power cord is plugged in.

Connect power cable to a source supplying 208VAC, three phase, 50/60 Hz. power.

Step 2. Check to see if main power supply circuit breaker is in the ON position.

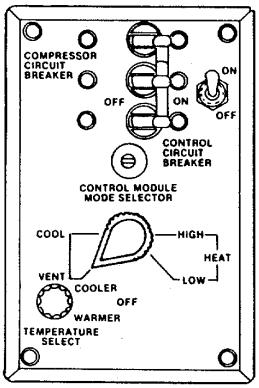
Place circuit breaker in the ON position.

Step 3. Check to see if mode selector is in the VENT position.

Place mode selector in the VENT position.

If the air conditioner will not operate, check for a defective switch in accordance with para.4-41.

Replace defective mode selector switch in accordance with para. 4-41.



4T2-1

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	

Step 4. Check to see if control circuit breaker is in the ON position.

Place control circuit breaker in the ON position.

If the air conditioner will not operate, check for a defective circuit breaker in accordance with para. 4-40.

Replace defective circuit breaker in accordance with para. 4-40.

Step 5. Check to see if compressor circuit breaker is in the ON position.

Place compressor circuit breaker in ON position.

If the air conditioner will not operate in the COOL position, check for defective compressor circuit breaker in accordance with para. 4-39.

Replace defective compressor circuit breaker in accordance with para. 4-39.

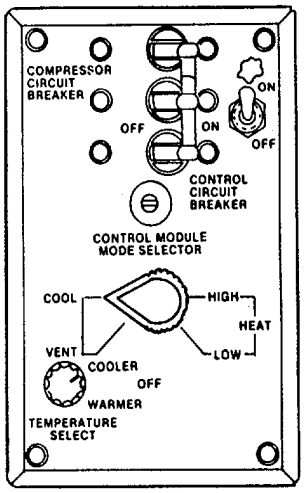


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 6. Check for loose electrical connections. Tighten electrical connections.

Step 7. See wiring diagram, FO-1 and check for defective wiring. Repair wires per para. 4-36.

2. 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.

Remove access cover per para. 4-17 and push reset button. If compressor fails to start, contact your supervisor and Direct Support Maintenance.

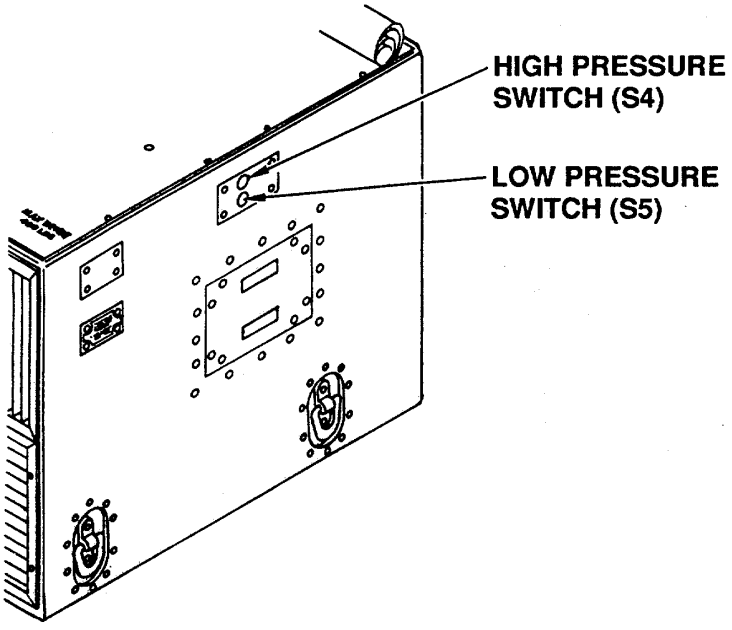


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 2.	Check operation of mode selector switch. Turn switch to VENT, then reset to COOL.
	NOTE Allow 30 seconds time delay before compressor starts.
Step 3.	Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses. Tighten or replace connectors, or repair damaged wires (See para. 4-36).
Step 4.	Check operation of time delay relay (K1). Test relay (See para. 4-50). Replace defective relay.
Step 5.	Check operation of compressor relay (K3). Test relay (See para. 4-49). Replace defective relay.
Step 6.	Check operation of compressor circuit breaker. Test circuit breaker (See para. 4-39). Replace defective circuit breaker.
Step 7	Check operation of compressor (B1). If not operating, contact your supervisor and Direct Support Maintenance.

Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

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.

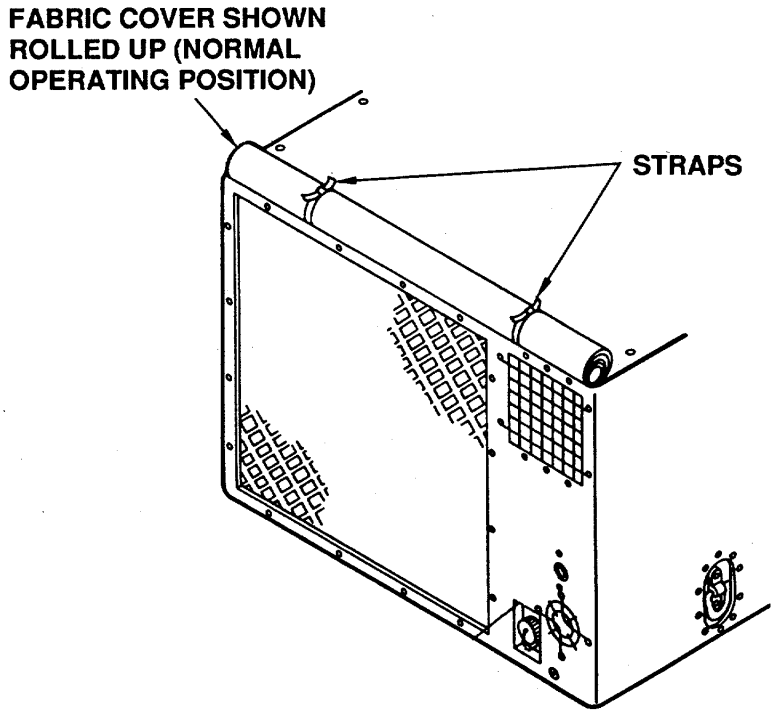


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

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.

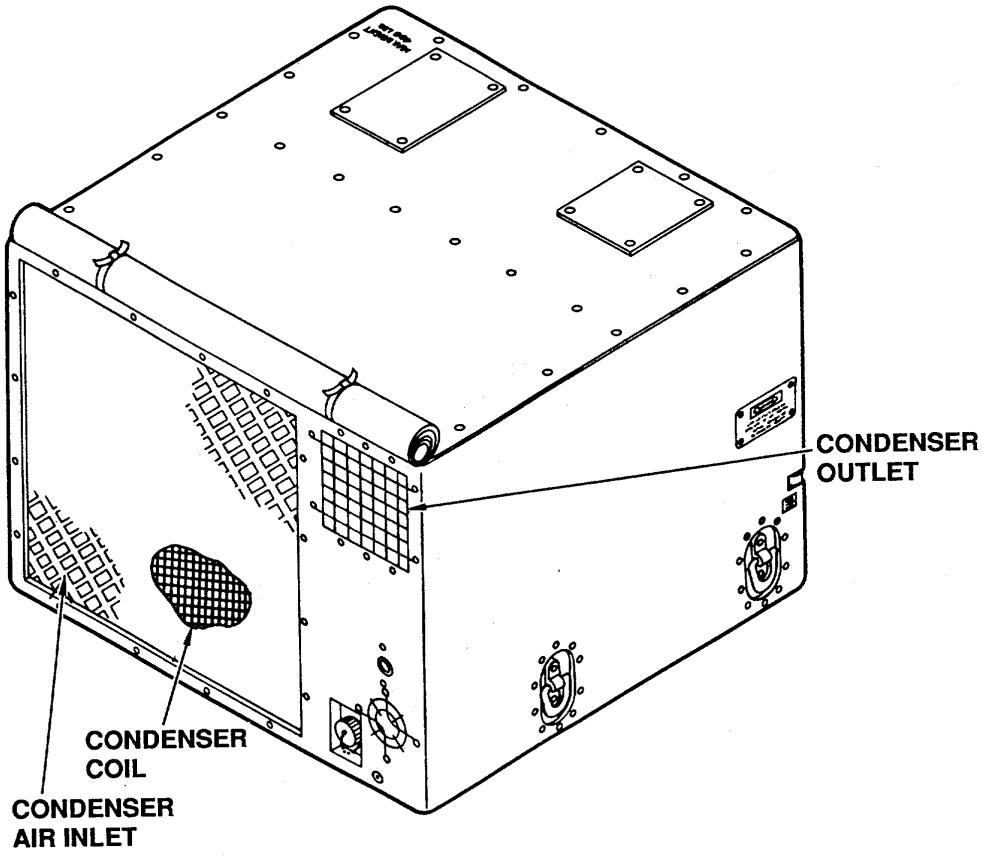


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 3.	Check to be sure that condenser fan is operating. Test fan motor. (See para. 4-26). Replace fan motor.
Step 4.	Check to be sure that condenser damper is operating properly. Contact your supervisor and Direct Support Maintenance if condenser damper fail to open and close as required.

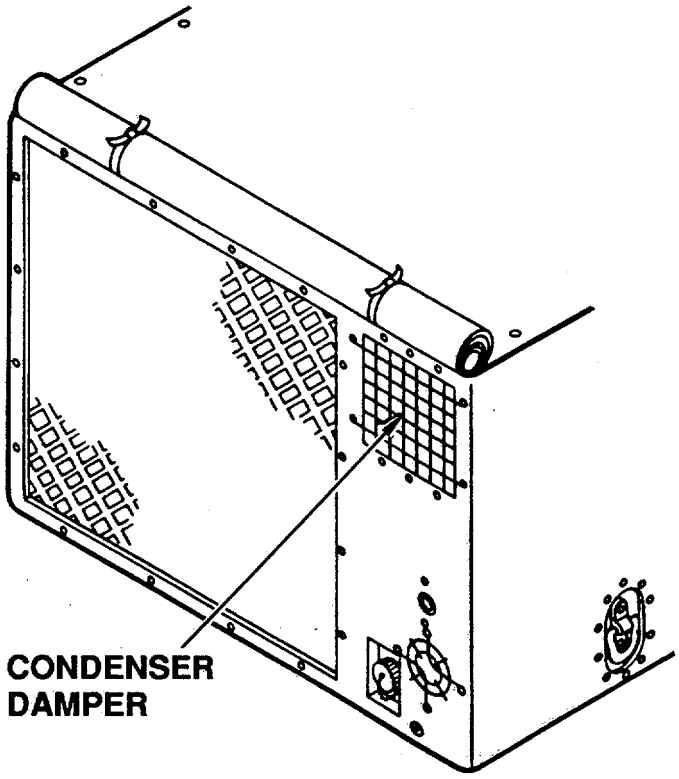


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

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.

Step 2. Check operation of temperature selector.

Set control at maximum COOLER; then, if condition improves, adjust properly.

If conditions do not improve, test mode selector switch. (See para. 4-41).

Replace defective mode selector switch.

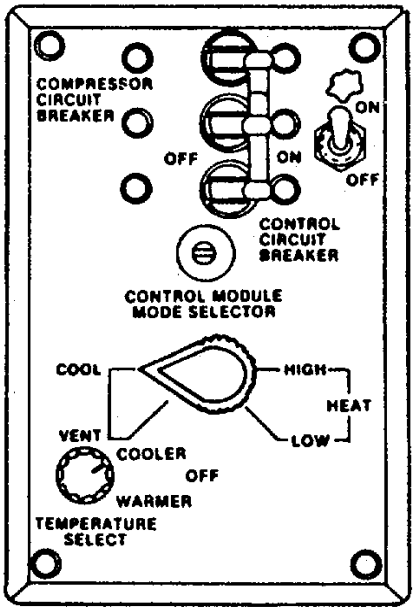


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 3. Check that evaporator inlet and outlet louvers are properly adjusted. (Must be open).

Adjust louvers properly.

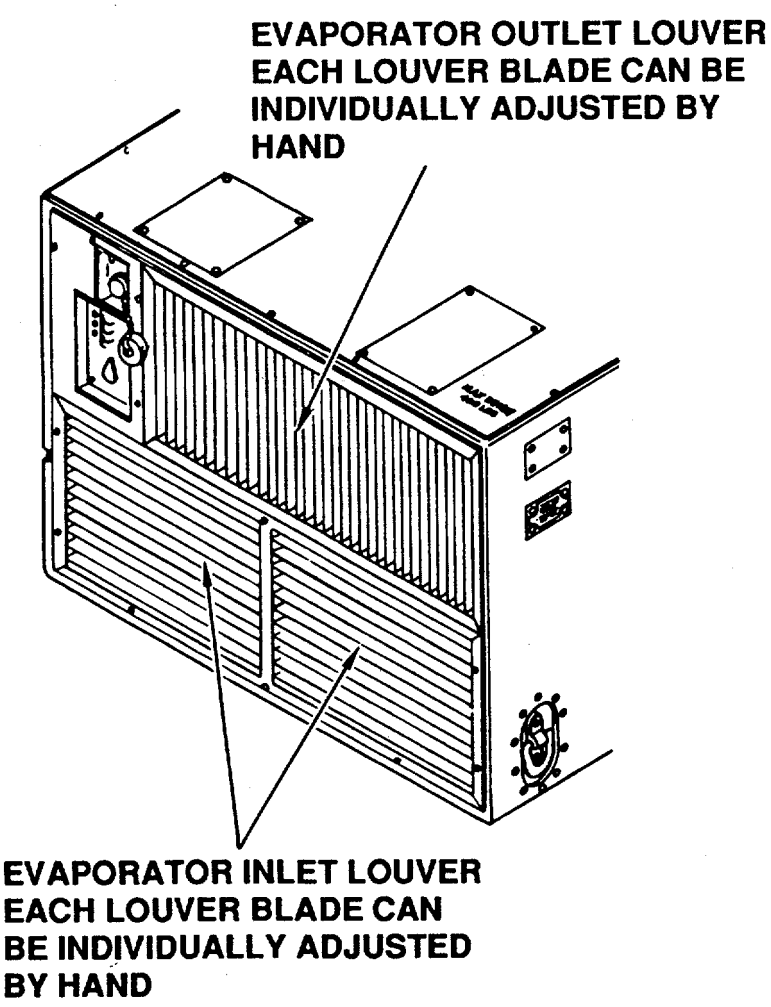


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

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 dampers.

Fully close ventilation damper; then, if condition improves, adjust properly.

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

Remove obstructions.

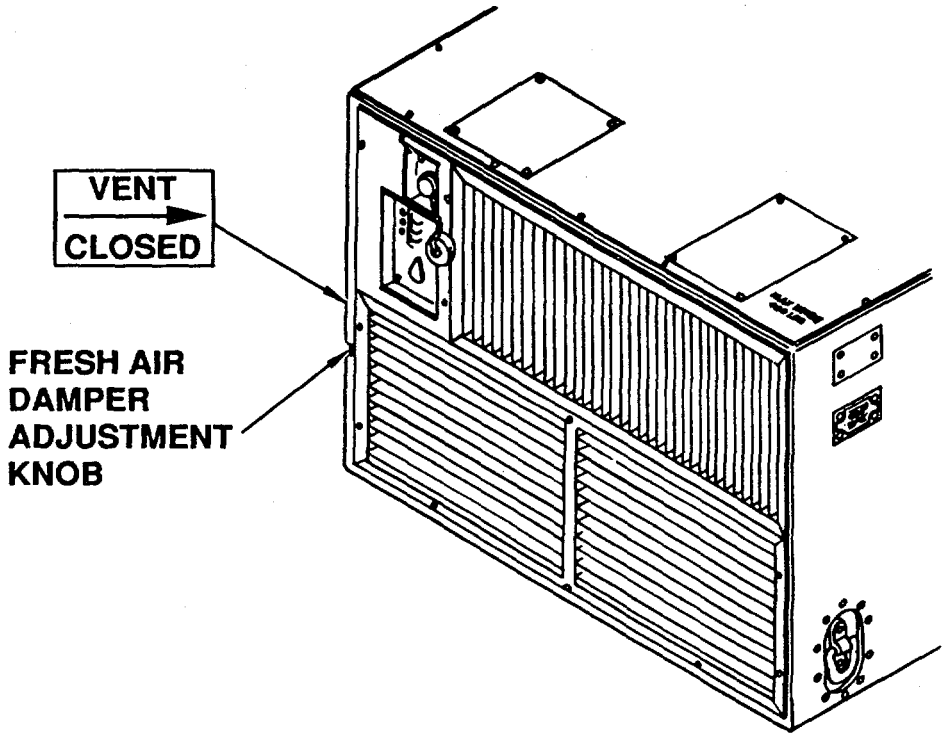


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 6. Check to be sure that condenser damper is operating properly.
Contact your supervisor and Direct Support Maintenance if louvers fail to operate property.

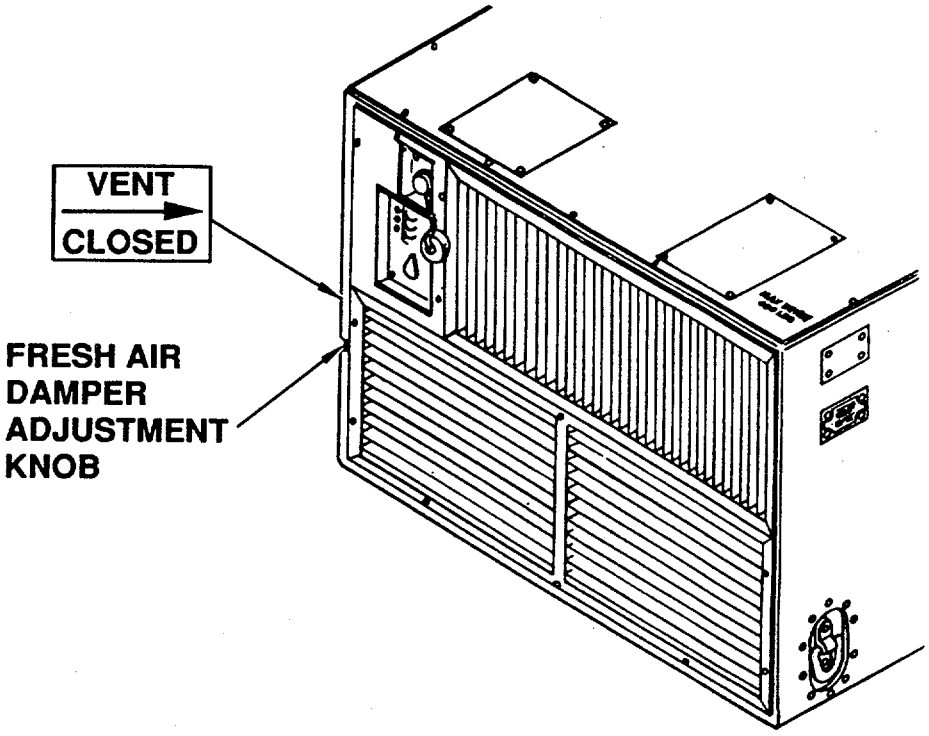


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 7. With unit operating in COOL mode, check the condition of refrigerant in sight glass.

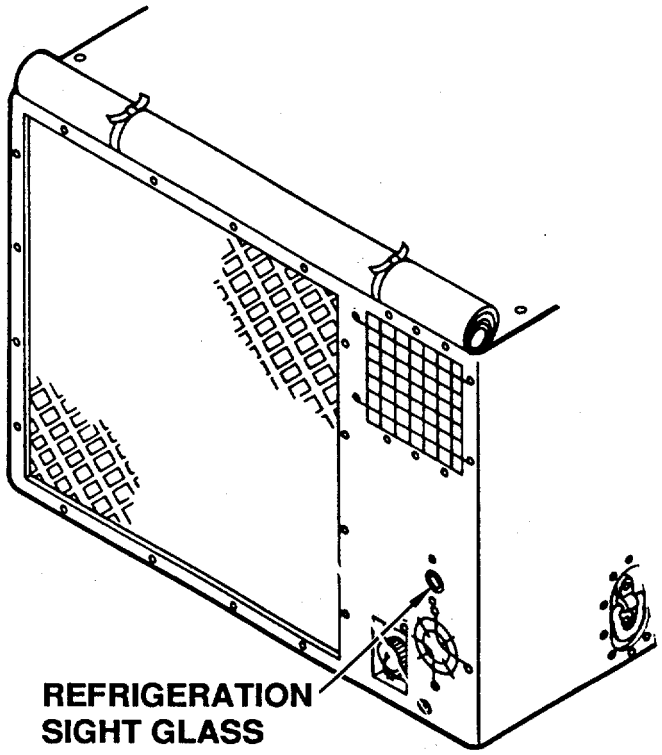


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

a. If color is yellow or a light hue of chartreuse, or if numerous bubbles appear, turn air conditioner OFF. Contact 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 entire condenser section.

Step 8. Check air flow out of evaporator louver. If air volume is low:

Adjust evaporator intake louvers.

Clean or replace air conditioner filter. (See para. 4-19).

Clean evaporator coil. (See para. 4-34) and entire evaporator system.

Step 9. Check operation of temperature control switch.

Inspect sensing bulb and capillary for damage or leakage. (See para. 4-43). Replace switch if damage or leakage is found.

Test temperature control switch (See para. 4-43). Replace defective switch.

Step 10. Check if unit is suspected to be stuck in by pass cycle.

Contact 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 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.

Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	

Step 3. Check operation of Temperature selector switch (S2). Set control to fully WARMER; then, if condition improves, adjust properly.

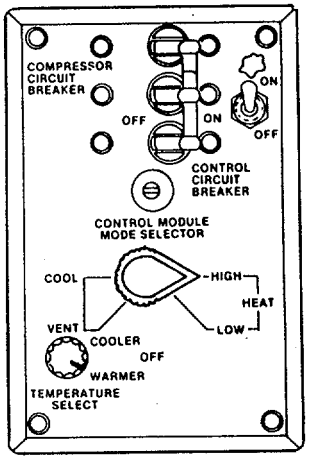


Table 4-2. UNIT TROUBLESHOOTING- (cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 4. Check that the evaporator inlet and outlet louvers are properly adjusted.

Adjust louvers properly.

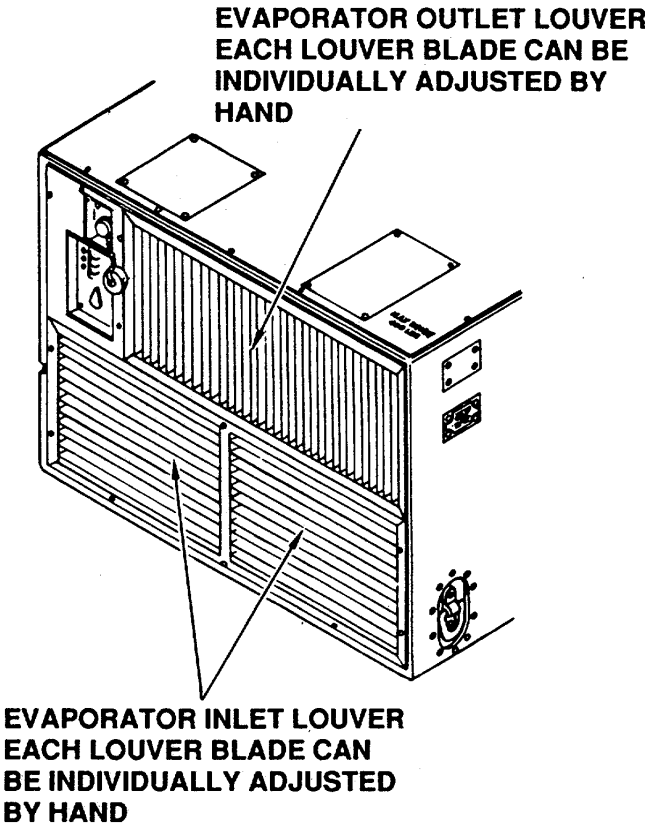


Table 4-2. UNIT TROUBLESHOOTING-(cont.)

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.
Step 6.	Check air flow out of evaporator outlet louver. If air flow volume is low: a. Adjust conditioned air (evaporator) intake louvers. b. Clean and service or replace air filter element. (See para. 4-19). c. Clean and service or replace mist eliminator. (See para. 4-20). d. Clean evaporator coil and entire evaporator section. (See para. 4-34).

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 7. Check for loose or damaged wires and terminals.

WARNING

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

Tighten loose or damaged terminals. Repair or replace damaged wires. (See para. 4-36).

Step 8. Check operation of heater cut-out switch (S3). Test switch (See para. 4-57).

Replace thermostat if defective.

Step 9. Check individual heating elements (HR1 through HR6). Test heaters. (See para. 4-56).

Replace defective heating element per para. 4-56.

6. NO HEAT IN EITHER HI HEAT OR LO HEAT MODE.

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

WARNING

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

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

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check operation of heater cut-out switch (S3). Test switch (See para. 4-57).

Replace if defective.

Step 3. Check operation of mode selector switch (S1). Test switch. (See para. 4-41).

Replace if defective.

7. 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

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

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

Step 2. Check operation of heater relays (K2 and KS). Test relays. (See para. 4-49). Replace relays if defective.

Step 3. Check operation of Temperature control switch (S2).

a. Inspect sensing bulb and capillary for damage or leakage. (See para. 4-43).

Replace entire temperature control switch if bulb is damaged or leaking.

b. Test switch in Temperature selector. (See para. 4-43). Replace entire control, if defective.

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 4.	Check operation of mode selector switch (S1). Test switch. (See para. 4-41). Replace switch if defective.

8. CONDENSER FAN MOTOR (B2) DOES NOT OPERATE.

WARNING

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

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

Step 1. Using wiring diagram (FO-1), check electrical connectors at TB4 and individual wires for tightness and continuity.

Tighten, repair or replace as indicated.

Step 2. Check operation of fan motor relay (K4).

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

Step 3. Check operation of fan motor (B2).

Test motor (See para. 4-25). Repair or replace as needed.

Step 4. Check operation of fan motor (B4).

Test motor (See para. 4-25). Repair or replace as needed.

Step 5. Check operation of mode selector switch (S1).

Test switch (See para. 4-41). Replace if defective.

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

9. EVAPORATOR FAN MOTOR (B3) DOES NOT OPERATE.

WARNING

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

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

Step 1. Using wiring diagram (FO-1), check individual wires for tightness and continuity.

Tighten, repair, or replace as indicated.

Step 2. Check operation of fan motor relay (K6).

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

Step 3. Check operation of fan motor (B3).

Test motor (See para. 4-34). Repair or replace as needed.

Step 4. Check operation of mode selector switch (S1).

Test switch (See para. 4-41).

Table 4-2. UNIT TROUBLESHOOTING-(cont.)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

10. EXCESSIVELY NOISY OPERATION.

CAUTION

If a knocking or hammering sound is heard when compressor starts, turn mode selector switch to OFF, immediately. Such noise is usually caused by liquid refrigerant in compressor, which can seriously damage or destroy compressor. Contact your supervisor and Direct Support Maintenance.

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 or adjust rotational clearance, or replace fans (See para. 4-26 and 4-32).

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

Tighten, adjust, and secure as necessary.

SECTION V. UNIT MAINTENANCE PROCEDURES

4-11. GENERAL.

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

4-12. FABRIC COVER

a. Removal

(1) Loosen two straps and roll down fabric cover.

(2) Remove three screws, lockwashers and flat washers.

(3) Carefully remove fabric cover.

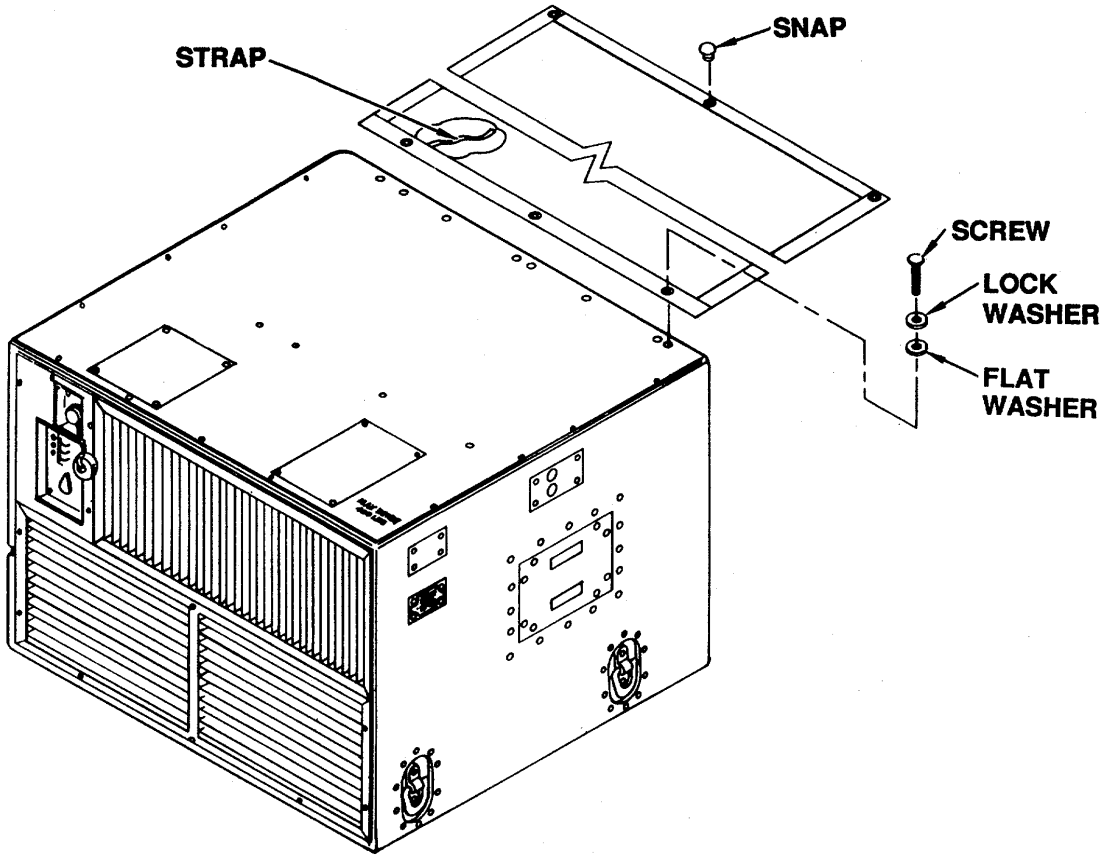


Figure 4-11. Fabric Cover Removal/Service

b. Service

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

(2) Thoroughly rinse with fresh water and dry.

c. Inspection/Repair

(1) Inspect for rips, cuts, tears or punctures in the fabric. Replace fabric cover if damaged.

(2) Inspect for damaged, loose or missing snaps, grommets or snap sockets. Replace fabric cover if deficiencies are found.

(3) Repair minor fabric rips, cuts, tears or punctures by applying a patch of duct tape (item 11, Appendix E) to inside surface.

d. Installation

(1) Align eyelets to three casing mounting holes.

(2) Secure top of fabric cover to rear panel using three screws, lockwashers and flat washers.

(3) Secure bottom of cover into snap fastener in bottom casing.

(4) If unit is to be returned to normal operation, unsnap cover, rollup the cover and secure with two (2) straps.

4-13. METAL COVERS, INFORMATION PLATES, LOUVERS AND GUARDS |

a. For removal, inspection, servicing and installation, see the following paragraphs:

- Top cover (see para. 4-14).
- Access (charging valve) cover (see para. 4-15).
- Information plates (see para. 4-16).
- Evaporator outlet louver (see para. 4-17).
- Evaporator inlet louver (see para. 4-18).
- Condenser outlet guard (see para. 4-21).
- Ventilation guard (see para. 4-22).

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:

(a) Drill old rivet using a drill bit slightly smaller than the diameter of old rivet body.

(b) Install replacement rivet.

(4) To replace or repair gasket or insulation:

(a) Remove as much old gasket or insulation material as possible by pulling or scraping it away from the metal surface.

WARNING

Methyl-ethyl ketone (MEK) is flammable, and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well-ventilated area, wear gloves, and keep away from sparks or flame.

(b) Soften and remove old adhesive name plates, gasket and insulation residue, using methyl-ethyl ketone (MEK) (Item 19, Appendix E) and a stiff brush.

(c) 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.

(d) 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.

(a) Drill rivets out using a drill but slightly smaller than the diameter of the rivet body.

(b) Secure new name plate with replacement rivets.

4-14. TOP COVER

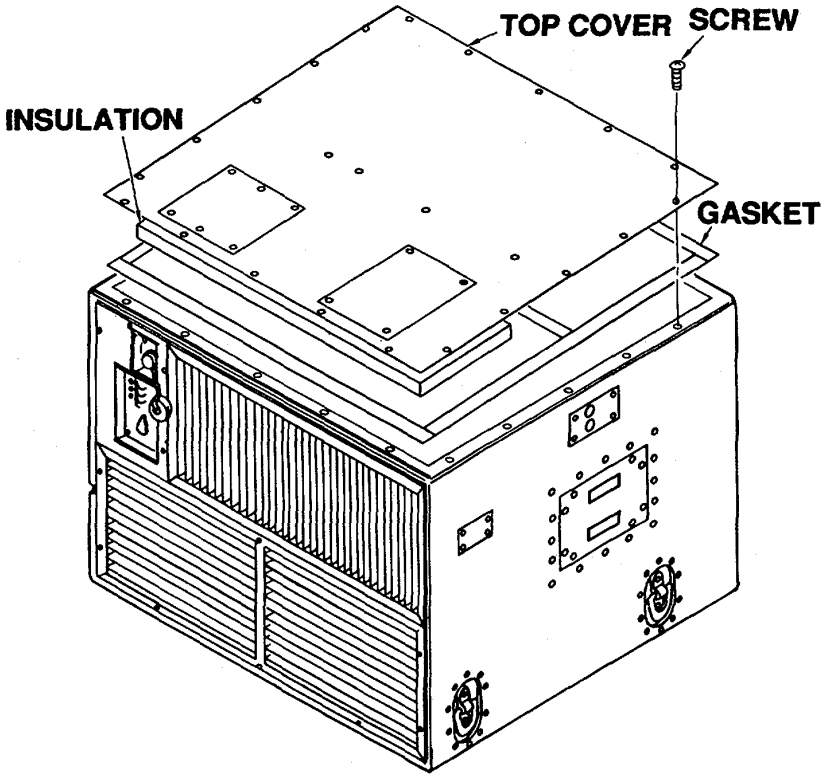


Figure 4-12. Top Cover Removal/Replacement

a. Removal

(1) Remove 24 screws from top cover and casing.

(2) Remove top cover.

b. Inspection

(1) Check that top cover is not bent, cracked or punctured. Replace severely damaged top cover.

(2) Check that insulation and gaskets are not torn loose or missing. Repair as needed. Refer to para. 4-13.

c. Installation

(1) Align 24 mounting holes in top cover with casing fasteners.

(2) Secure top cover to casing with 24 screws.

4-15. ACCESS (CHARGING VALVE) COVER I

a. Removal

(1) Remove 8 screws from access cover and casing.

(2) Remove access cover.

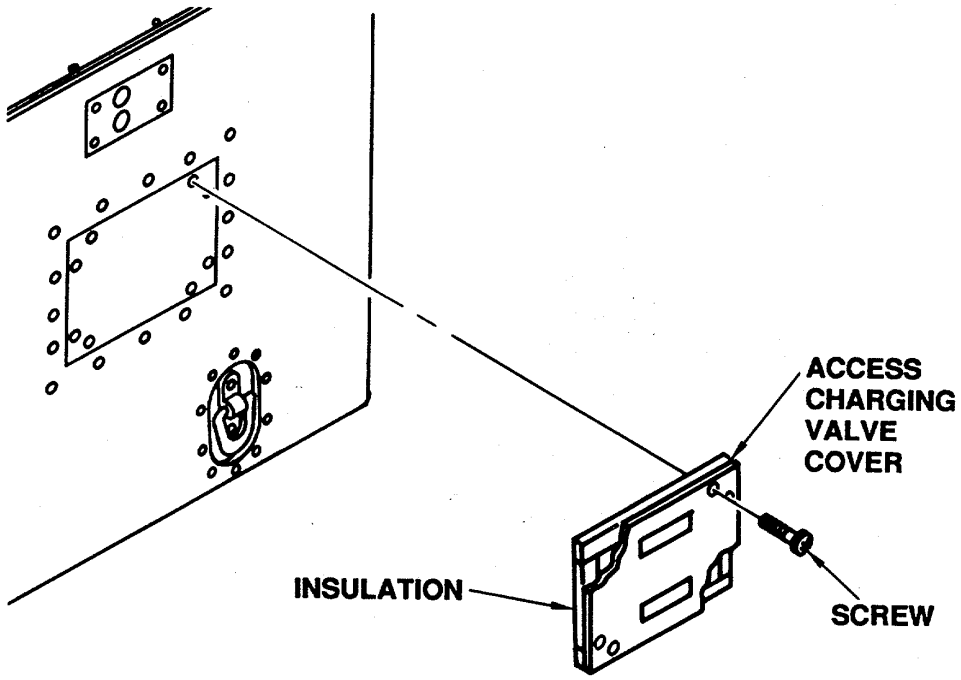


Figure 4-13. Access Charging Valve Cover Removal/Replacement

b. Inspection

(1) Check that access cover is not bent, cracked or punctured. Replace severely damaged access cover.

(2) Check that gaskets are not torn loose or missing. Repair as needed. Refer to para. 4-13.

(3) Check that information plates are not torn or missing. Check for readability. Replace as needed. Refer to para. 4-13.

c. Installation

(1) Align eight mounting holes in access cover with casing fasteners.

(2) Secure access cover to casing with eight screws.

4-16. INFORMATION PLATES

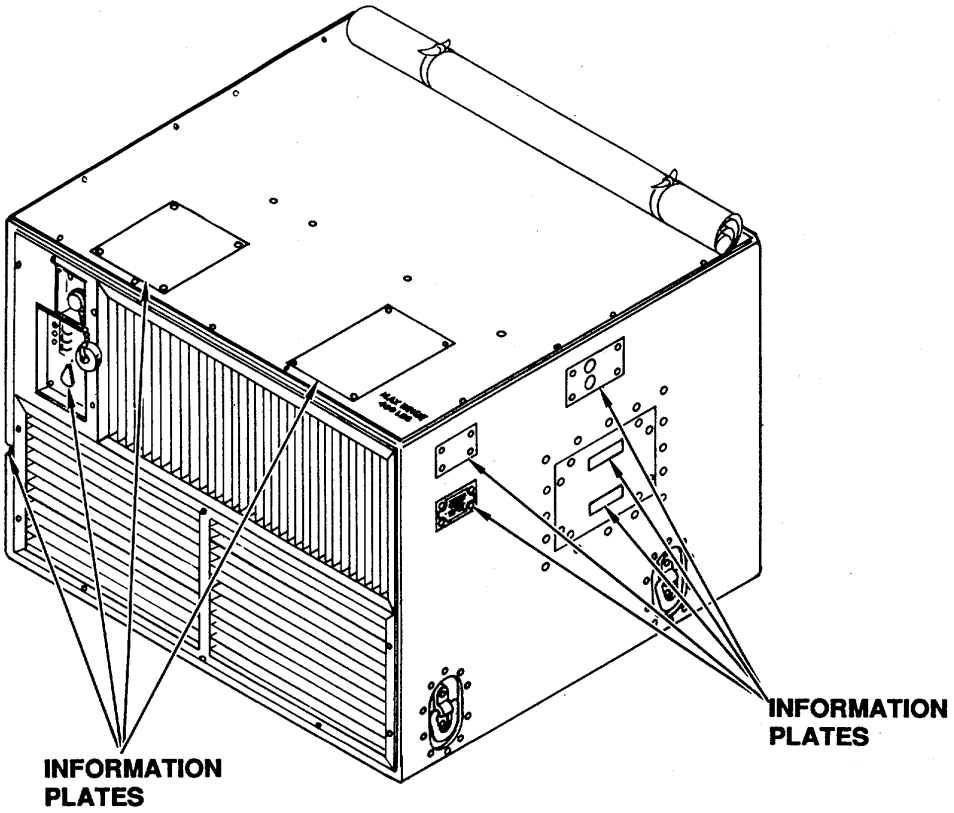


Figure 4-14. Information Plates

a. Inspection

(1) Check to see that information plates are readable.

(2) Check to see if information plates are in place and not damaged.

(3) Check for loose or missing rivets on information plates.

(4) Replace information plates that are unreadable or damaged.

(5) Follow procedures of para. 4-13 to repair and replace riveted and adhesive backed information plates.

4-17. EVAPORATOR OUTLET LOUVER

a. Inspection

(1) Inspect louvers for general condition and proper operation.

(2) Replace a severely damaged evaporator outlet louver.

(3) Louver blades with minor bends can usually be straightened by hand.

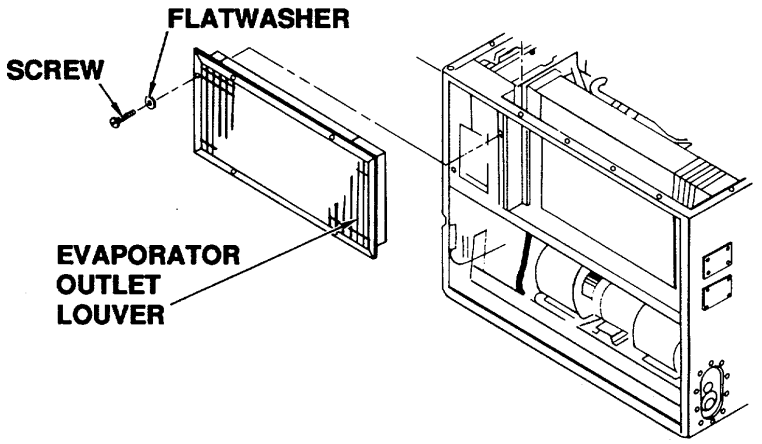


Figure 4-15. Evaporator Outlet Louver Removal/Replacement

b. Lubrication/Service

(1) Apply a few drops of general purpose lubricant (Item 24, Appendix E) to pivot points of the louvers.

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

c. Removal

(1) Remove eight screws, lockwashers and flat washers in evaporator outlet louver and casing.

(2) Remove louver.

d. Installation

(1) Align eight mounting holes in evaporator outlet louver with casing fasteners.

(2) Secure evaporator outlet louver to casing with eight screws, and lockwashers and flat washers.

4-18. EVAPORATOR INLET LOUVER

a. Inspection/Repair

(1) Inspect louvers for general condition and proper operation.

(2) Replace severely damaged evaporator inlet louver.

(3) Louver blades with minor bends can usually be straightened by hand.

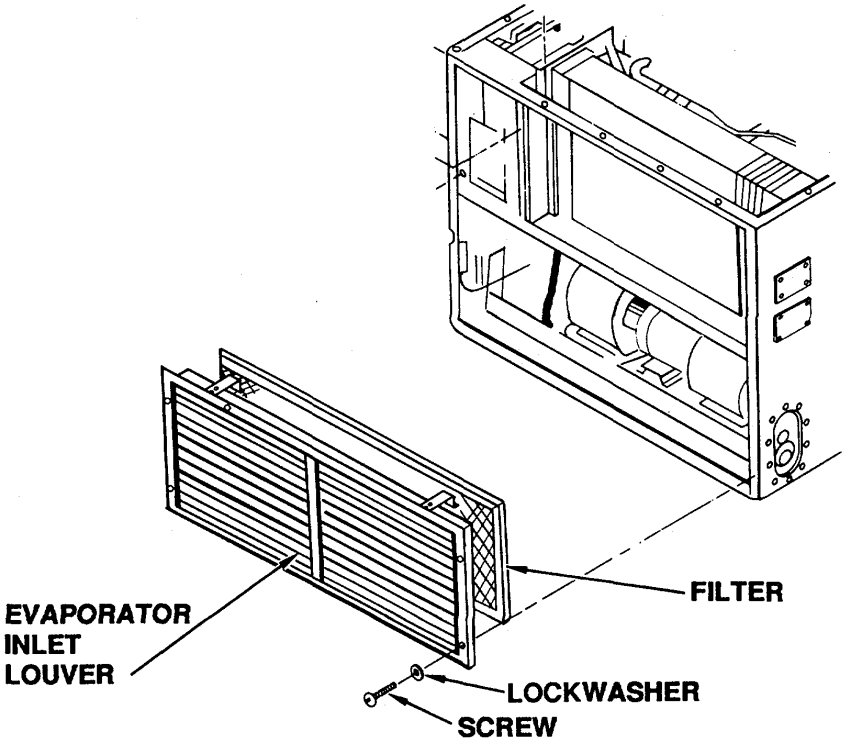


Figure 4-16. Evaporator Louver Removal/Replacement

b. Lubrication/Service

(1) Apply a few drops of general purpose lubricant (Item 24, Appendix E) to pivot points of the louvers.

(2) Wipe or blot up all access lubricant with cloth pr paper towel.

c. Removal

(1) Remove ten screws, lockwashers and flat washer in evaporator inlet louver and casing.

(2) Remove evaporator inlet louver.

(3) Remove air conditioning filter (See para. 4-19).

d. Installation

(1) Install filter (See para. 4-19).

(2) Align ten mounting holes in evaporator inlet louver with casing fasteners.

(3) Secure evaporator inlet louver to casing with ten screws, lockwashers and flat washers.

4-19. AIR CONDITIONING FILTER

Preliminary procedure: Remove evaporator inlet louver (see para. 4-18).

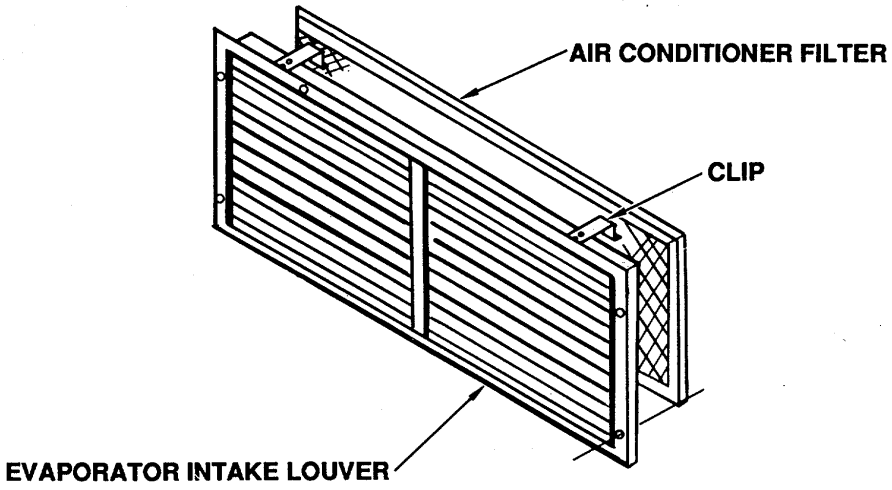


Figure 4-17. Air Conditioning Filter Removal/Replacement

a. Removal. Unclip air conditioning filter is from four clips in evaporator inlet louver and remove.

b. Inspection

(1) Check filter for puncture, cuts and damages that would allow passage of unfiltered air.

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

(3) Replace air conditioning filter if found defective.

c. Service

NOTE

The air filter consists of a shredded aluminum foil maze held between screens in an aluminum channel frame. The filter can be cleaned and re-used repeatedly. Airflow markings (arrows) printed on the frame make it easy to replace the filter in the correct position every time.

(1) Clean the filter with mild detergent (Item 26, Appendix E) and water and clean until dirt is removed.

(2) Rinse in clean water.

(3) Hold filter horizontal and lightly tap each edge on bench or floor to ensure all water is removed.

(4) Spray a very light coat of air filter lubricant (Item 14, Appendix E) on air inlet side of air filter.

(5) Wipe off excess oil.

d. Installation

(1) Install and clip filter into four clips of evaporator inlet louver.

(2) Verify that the orientation of the filter is such that arrows on top of filter are shown as required.

Follow-on procedure: Install evaporator inlet louver (See para. 4-18).

4-20. MIST ELIMINATOR

Preliminary procedure: Remove top cover (see para. 4-14).

a. Removal.

(1) Slide mist eliminator up and out of mist eliminator brackets.

(2) Remove mist eliminator brackets from evaporator coil by removing two screws and flat washers.

b. Inspection.

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

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

(3) Replace defective mist eliminator.

(4) Check mist eliminator brackets for damage and loose or missing hardware.

Replace as needed.

c. Service

(1) Wash mist eliminator in mild detergent (Item 26, Appendix E) and water solution.

(2) Rinse thoroughly in clean water.

(3) Shake out excess water prior to installation.

d. Installation.

(1) Install mist eliminator brackets on evaporator coil with two screws and flat washers.

(2) Slide mist eliminator straight down into brackets. Follow-on procedure: Install top cover (See para. 4-14).

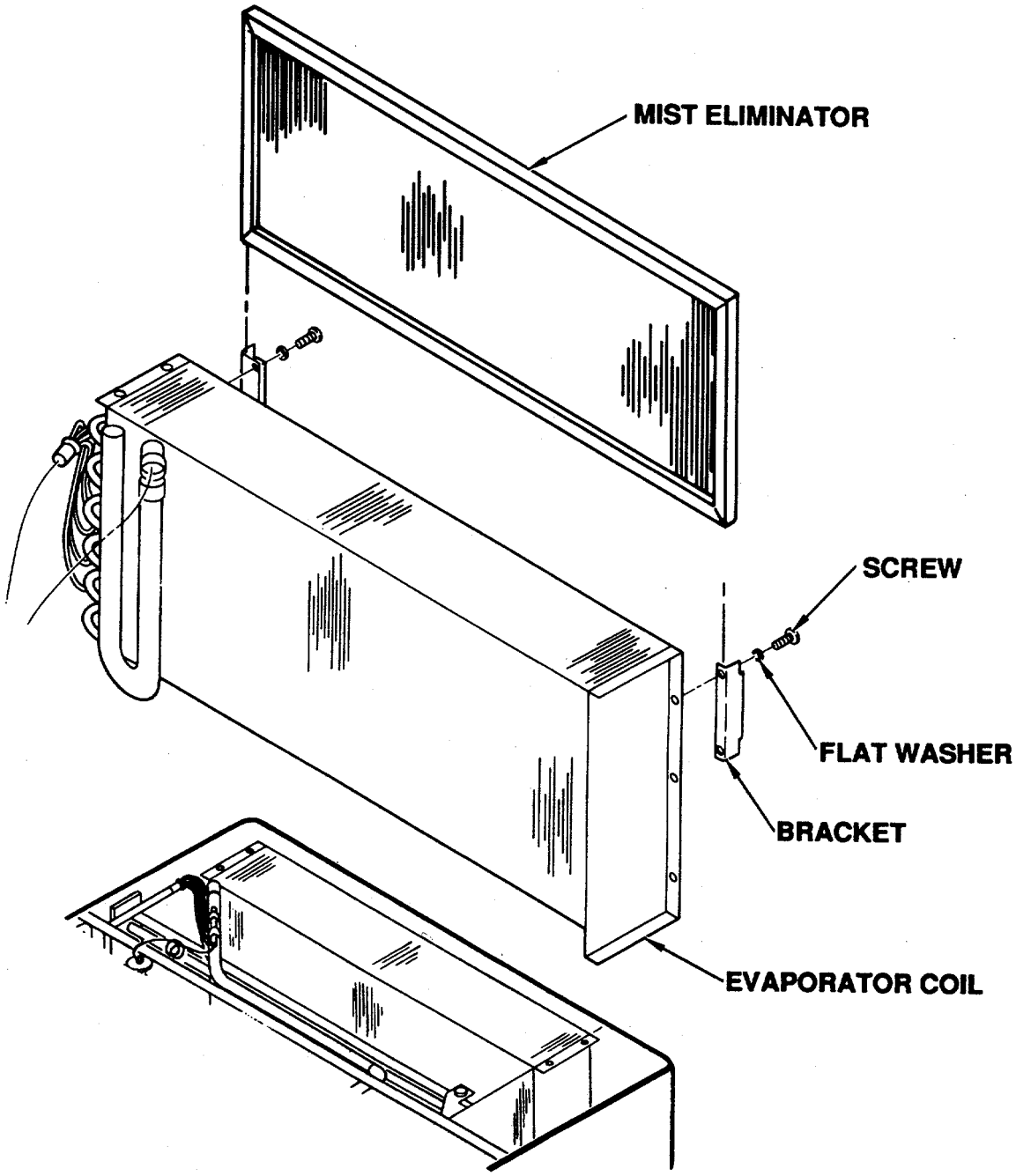


Figure 4-18. Mist Eliminator Removal/Replacement

4-21. CONDENSER OUTLET GUARD I

a. Inspection

(1) Check the condenser outlet guard for any damage that would inhibit performance.

(2) Replace damaged condenser outlet guard.

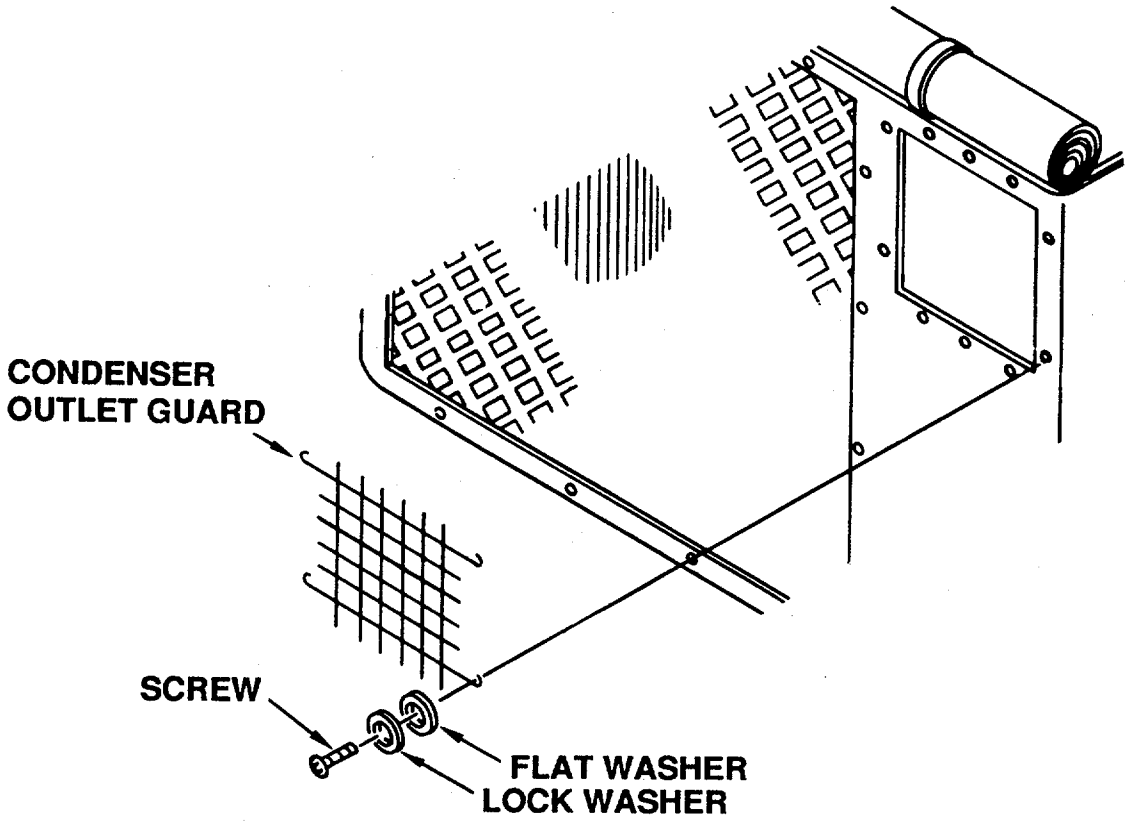


Figure 4-19. Condenser Outlet Guard Removal/Replacement

b. Removal

(1) Remove four screws, lockwashers and flat washers that secure the guard to casing.

(2) Remove condenser outlet guard.

c. Installation

(1) Align four through holes on guard with mounting hardware of casing.

(2) Secure condenser outlet guard to casing with four screws, lockwashers and flat washers.

4-22. VENTILATION GUARD

a. Inspection

(1) Check to see that ventilation guard is not bent, cracked or otherwise damaged.

(2) Replace severely damaged ventilation guard.

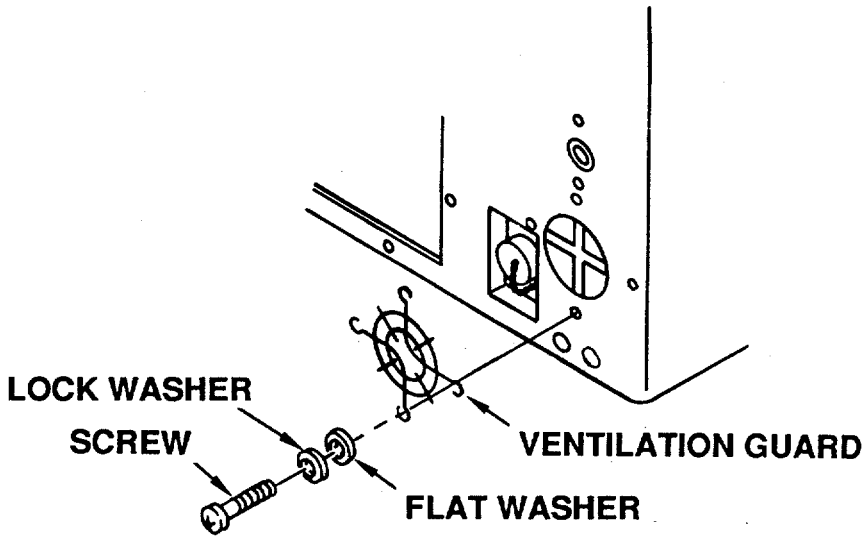


Figure 4-20. Ventilation Guard Removal/Replacement

b. Removal

(1) Remove four screws, lockwashers and flat washers from ventilation guard and casing.

(2) Remove ventilation guard.

c. Installation

(1) Align four holes in ventilation guard with casing fasteners.

(2) Secure ventilation guard to casing with four screws, lockwashers and flat washers.

4-23. VENTILATION FILTER

Preliminary procedure: Remove ventilation guard (See para. 4-22).

a. Removal. Pull ventilation filter out of casing.

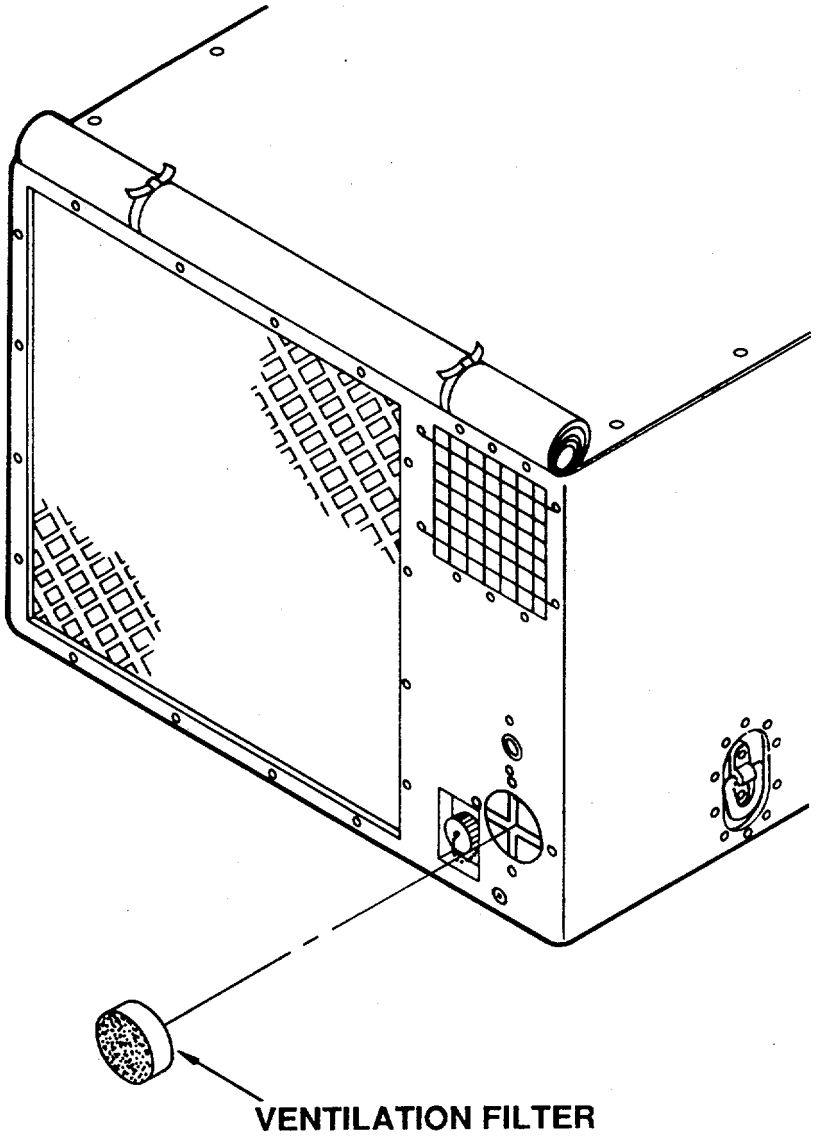


Figure 4-21. Ventilation Filter

b. Inspection

(1) Check filter for dirt, contamination and damage. Clean dirty or contaminated filter.

(2) Replace damaged ventilation filter.

c. Service

(1) Clean the ventilation air filter in mild detergent (Item 26, Appendix E) solution. Clean until dirt is removed.

(2) Rinse in clean water.

(3) Hold ventilation air filter horizontal and shake each edge on bench or floor to ensure all water is removed.

d. Installation. Slide ventilation filter in casing.

Follow-on procedure: Install ventilation guard (See para. 4-22).

4-24. RING AND CLIP

Preliminary procedures:

1. Remove evaporator inlet louver for front (See para. 4-18).
2. Remove condenser fan motor for lower rear leftside (See para. 4-25).
3. Remove condenser motor support for lower rear leftside (See para. 4-29).
4. Remove condenser scroll for lower rear leftside (See para. 4-28).

a. Inspection

(1) Check for damaged ring and clip.

(2) Check for loose or missing hardware. Secure and replace as needed.

b. Removal

(1) Remove two screws, lockwashers and nuts from ring and clip and casing.

(2) Remove ring and clip.

c. Installation

(1) Position ring and clip with thru holes in casing.

(2) Secure ring and clip to casing with two screws, lockwashers and nuts.

Follow-on procedures:

1. Install evaporator inlet louver for front (See para. 4-18).
2. Install condenser scroll for lower rear left side (See para. 4-28).
3. Install condenser motor support for lower rear left side (See para. 4-29).
4. Install condenser for motor for lower rear left side (See para. 4-25).

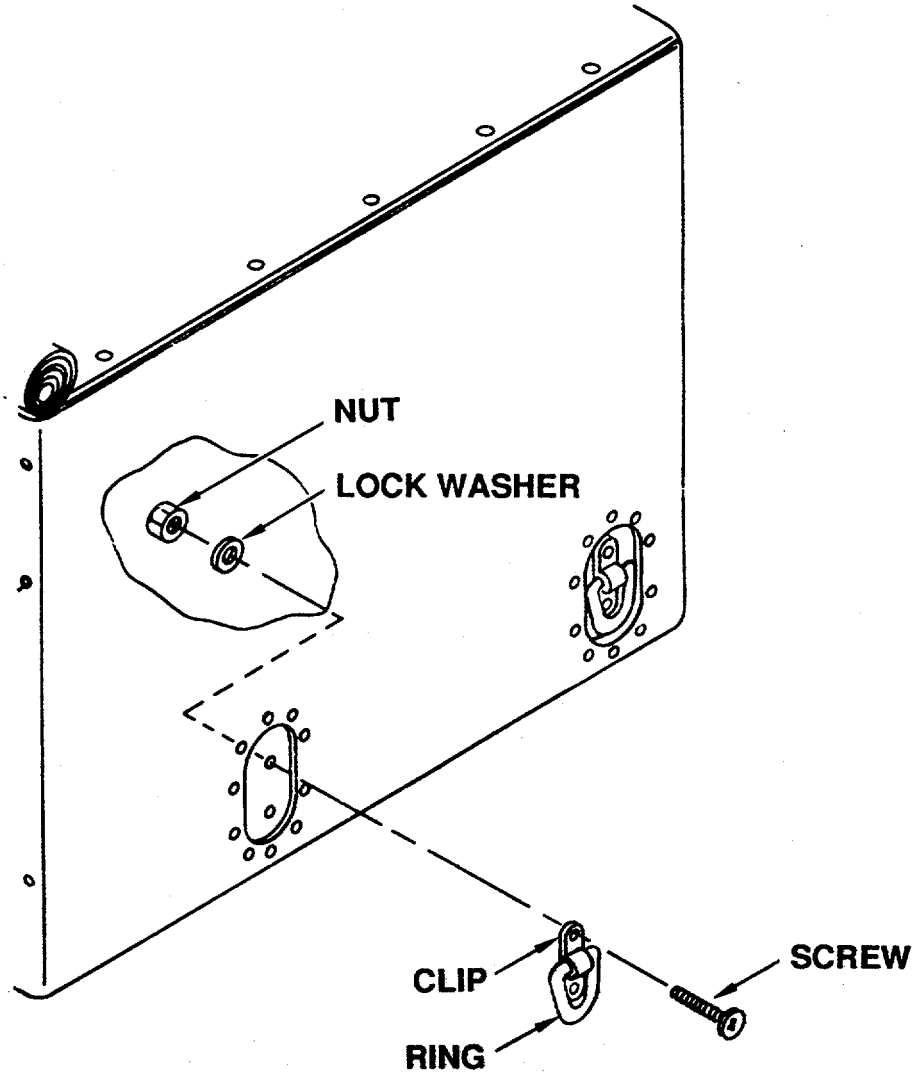


Figure 4-22. Ring and Clip removal/Replacement

4-25. CONDENSER FAN MOTOR (B2) I

Preliminary procedure: Remove top cover (See para. 4-14).

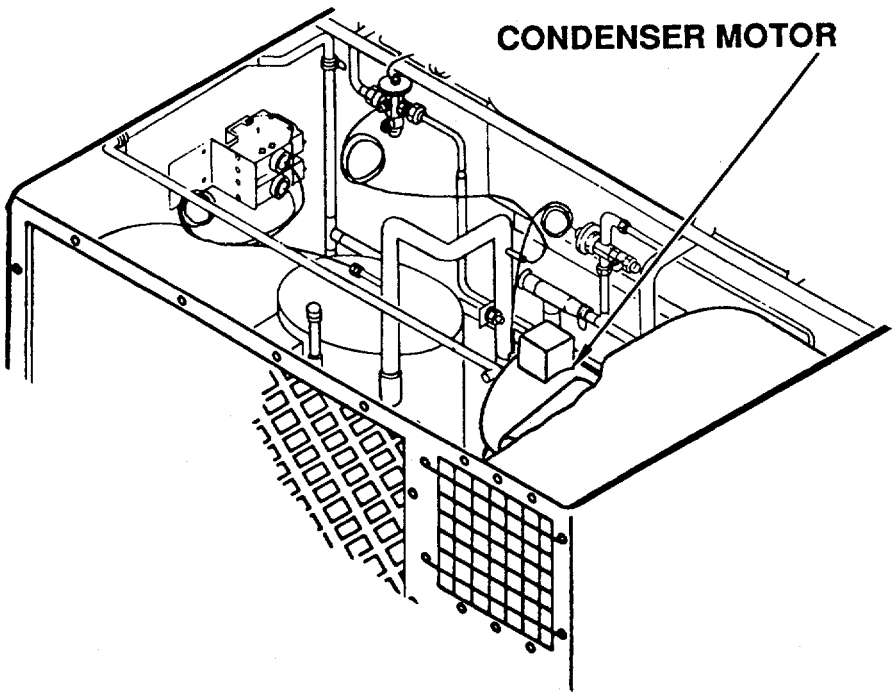


Figure 4-21. Condenser Motor (B2)

a. Inspection

(1) Check for missing or damaged name plates. Replace as needed.

(2) Check motor for rotational freedom by spinning fan.

(3) Check for evidence of stiffness or binding indicates bearing failure. Replace motor.

(4) Grasp motor shaft and move back and forth in direction in line with motor center line.

(5) Excessive end play indicates axial failure of bearings, bearing washers and bearing loading springs.

(6) Replace defective motor.

b. Test (Installed)

(1) Remove four screws in motor Junction box cover.

(2) Remove cover.

(3) Tag and disconnect motor leads1, 2, and 3 from harness leads B2-3, B2-2, and B2-1 respectively.

(4) Using an ohmmeter or multimeter, set on lowest ohms scale, check continuity between leads 1-2, 1-3 and 2-3. Continuity should be indicated. If continuity is not indicated replace motor.

(5) Check continuity between leads 1 and housing, 2 and housing and 3 and housing. Continuity should not be indicated. If continuity is indicated replace motor.

c. Removal

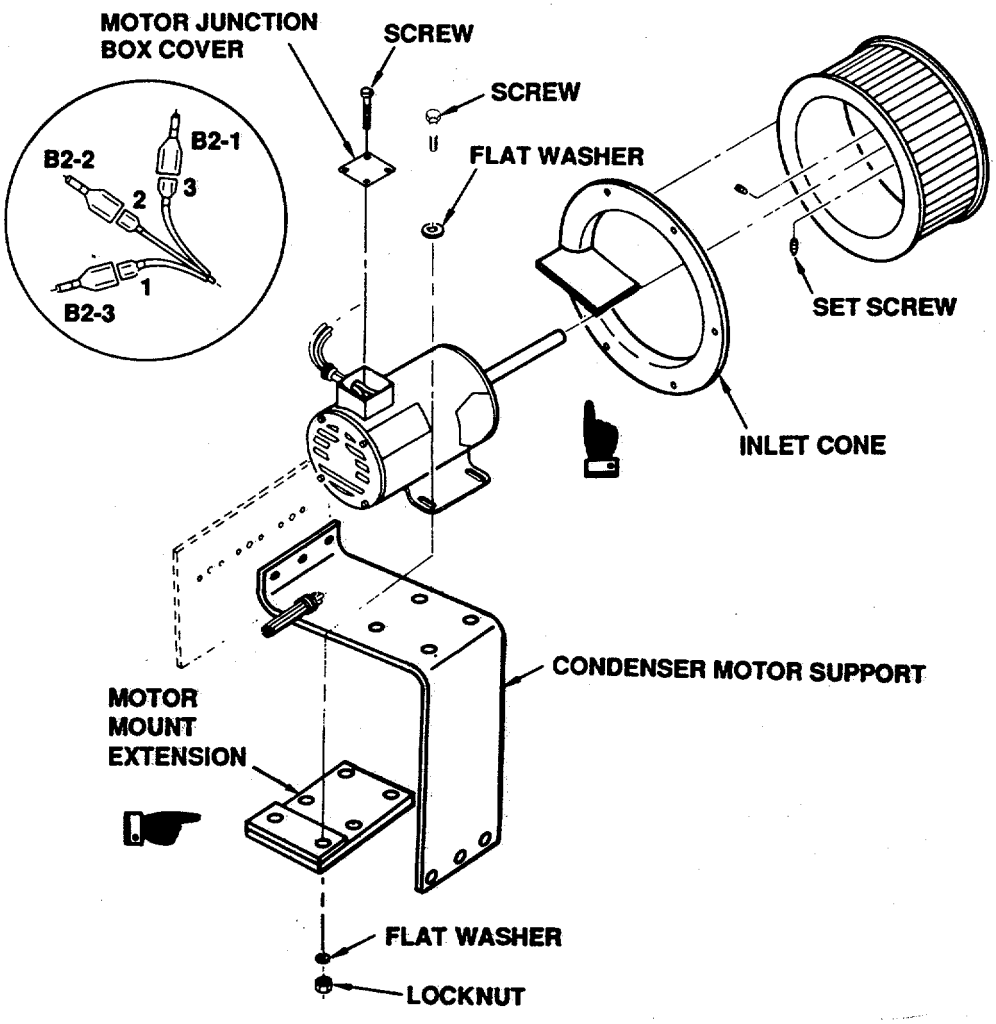


FIGURE 4-22. Condenser motor (B2) Removal/Replacement.

(1) Remove four screws in motor junction box cover and remove cover.

(2) Tag and disconnect motor leads 1, 2, and 3 from harness leads B2-3, B2-2, and B2-1 respectively.

(3) Loosen two set screws on condenser fan hub.

(4) Remove six screws, ten flat washers, and six lock nuts that secure condenser motor 5 and motor mount extension to the motor mount support.

(5) Separate the fan from the motor.

(6) Remove the motor from the unit.

d. Installation

(1) Place the motor and the motor mount extension on the motor support while loosely installing the fan hub on the motor shaft.

(2) Loosely install six lock nuts, ten flat washers, and six screws onto motor, motor mount extension, and the motor support.

(3) Reach into scroll and force the fan against the inlet cone to square the motor.

(4) Secure hardware installed in step (2) above.

(5) Retract the fan until the inboard surface of the fan is .125 inches (as measured by a feeler gage) from the inboard surface of the bell.

CAUTION

One of the two set screws must engage the flat of the motor shaft.

(6) Using allen wrench, secure the fan to the hub with two set screws.

(7) pin the fan to verify correct alignment.

(8) Loosen all hardware and repeat steps (5), (6) and (7) to correct any misalignment.

(9) Open junction box of replacement motor.

(10) Bring leads B2-1, B2-2 and B2-3 through grommet into motor junction box.

(11) See tags and connect leads. Remove tags.

(12) Secure motor junction box cover with four screws.

Follow-on procedure: Install top cover (See para. 4-14).

4-26. CONDENSER FAN I

Preliminary procedure:

1. Remove condenser fan motor (See para. 4-25).
2. Remove condenser scroll (See para. 4-28).

a. Removal

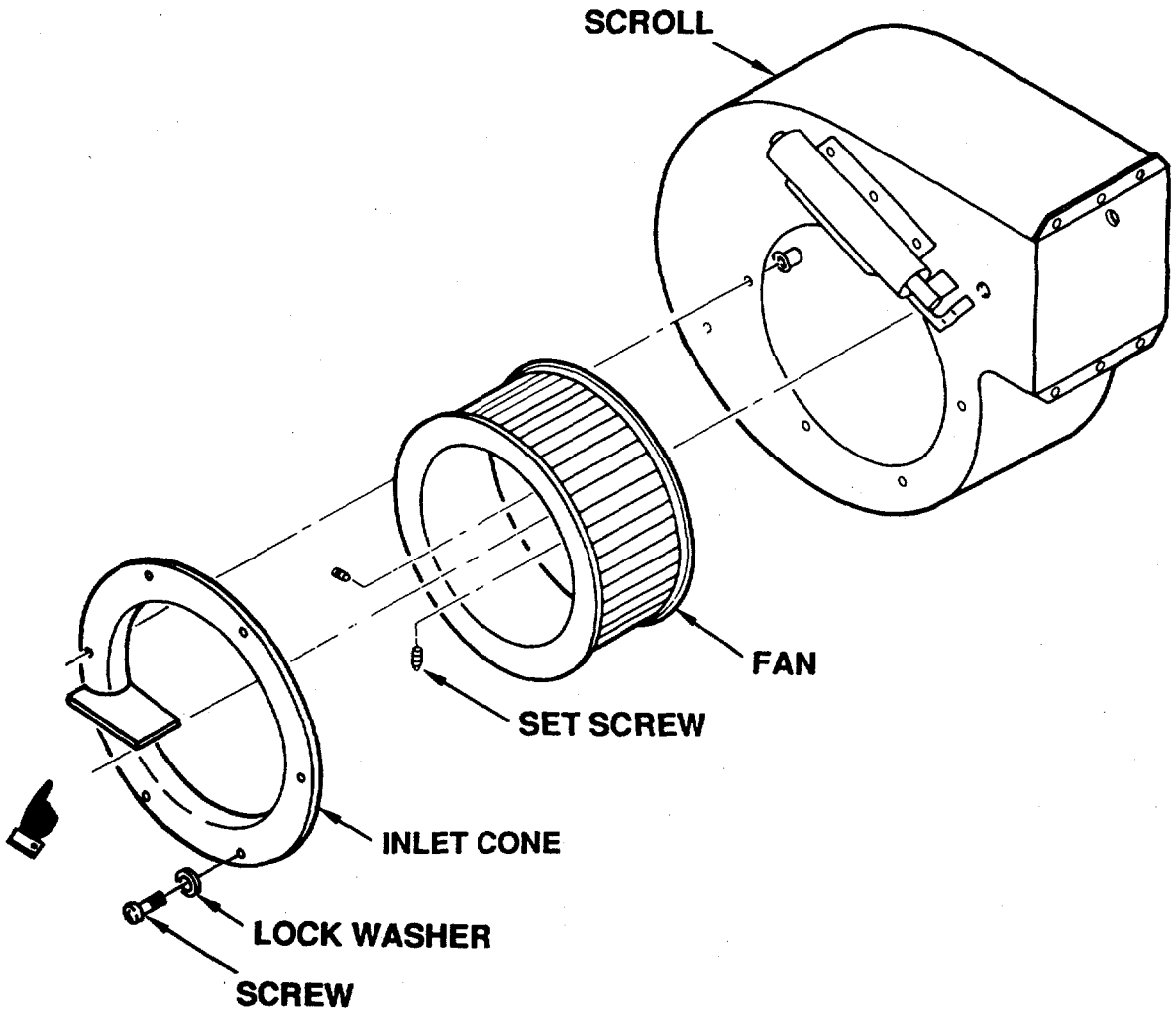


Figure 4-23. Condenser Fan Removal / Replacement.

(1) Remove six screws and six lock washers the secure inlet cone to scroll.

(2) Remove inlet cone.

(3) Maneuver condenser fan out of scroll cavity.

b. Inspection

(1) Check fan for dents, bent or loose fan blades.

(2) Verify that the fan blades are securely attached to the hub.

(3) Replace a damaged or defective fan.

c. Installation

(1) Maneuver condenser fan in scroll cavity.

(2) Secure the inlet cone to scroll with six screws and six lock washers.

Follow-on procedure: Install condenser scroll (See para. 4-28).
Install condenser fan motor (See para. 4-25).

4-27. DAMPER ASSEMBLY 1

Preliminary procedures:

1. Remove top cover (See para. 4-14).
2. Remove condenser outlet guard (See para. 4-21).

a. Inspection

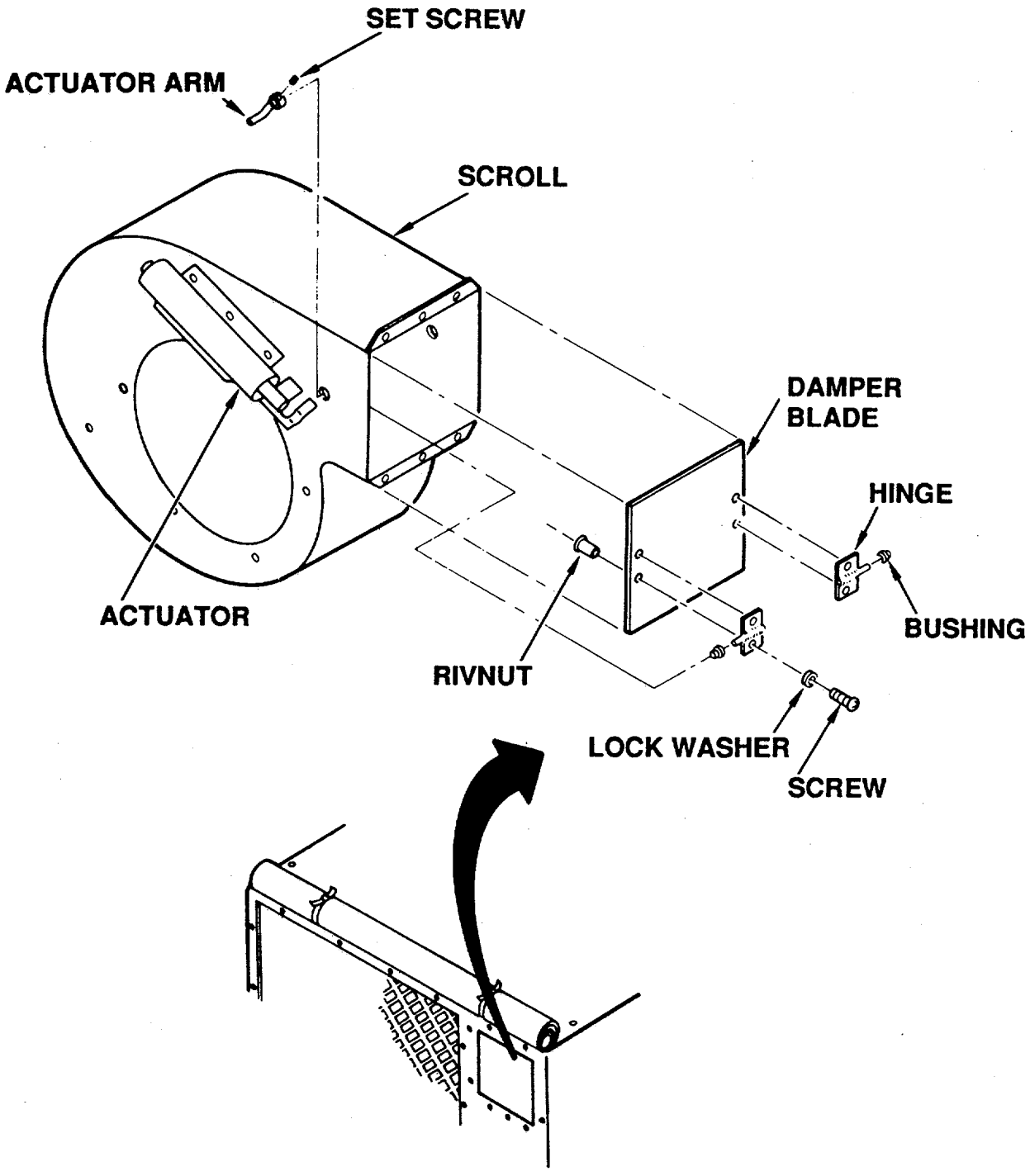


Figure 4-24. Damper Assembly Removal/Replacement

(1) Check for loose or missing hardware. Tighten or replace as needed.
(2) Check damper blade for dents and bends. Straighten or replace as needed.

b. Removal

(1) Loosen set screw on actuator arm.
(2) Remove actuator arm.
(3) Remove four screws and lockwashers that secure two hinges and two bushings to the damper blade.
(4) Remove damper blade and two bushings and two hinges.

c. Repair. Repair by component replacement.

d. Installation

(1) Place damper blade in scroll cavity.
(2) Install two bushings on two hinges.
(3) Align through holes in two hinges with hardware of damper.
(4) Secure two hinges to the damper blade with four screws and lockwashers.
(5) By hand, apply force to actuator plunger to verify that the actuator is in the fully retracted position.
(6) Fit the actuator arm to the hinge shaft and actuator.
(7) By hand position damper blade to fully closed position.
(8) Tighten set screw on actuator arm.

Follow-on procedures:

1. Remove condenser motor (See para. 4-21).
2. Install top cover (See para. 4-14).

4-28. CONDENSER SCROLL

Preliminary procedures:

1. Remove condenser fan (See para. 4-25).
2. Remove condenser outlet guard (See para. 4-21).

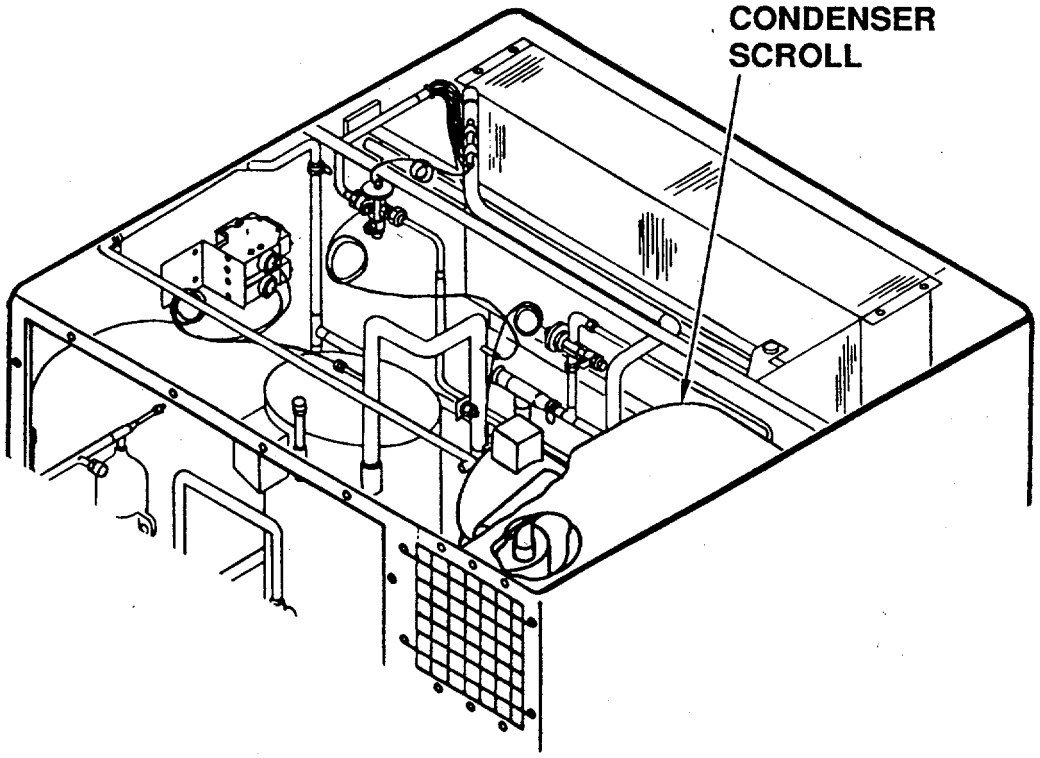


Figure 4-27. Condenser Scroll

a. Inspection

(1) Check condenser scroll for excessive dirt or contaminants. Service as needed.

(2) Check for loose or missing hardware. Tighten and replace as needed.

(3) Check for loose or missing nut-anchors. Replace as needed.

b. Service

WARNING

Dry cleaning solvent P-D-680 used to clean parts is potentially dangerous to personnel or property. Avoid repeated or prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 degrees F (38 degrees C).

(1) Brush off loose dirt or contaminants from condenser fan scroll.

(2) Wipe condenser fan scroll with cloth dampened with dry cleaning solvent (Item 14, Appendix E).

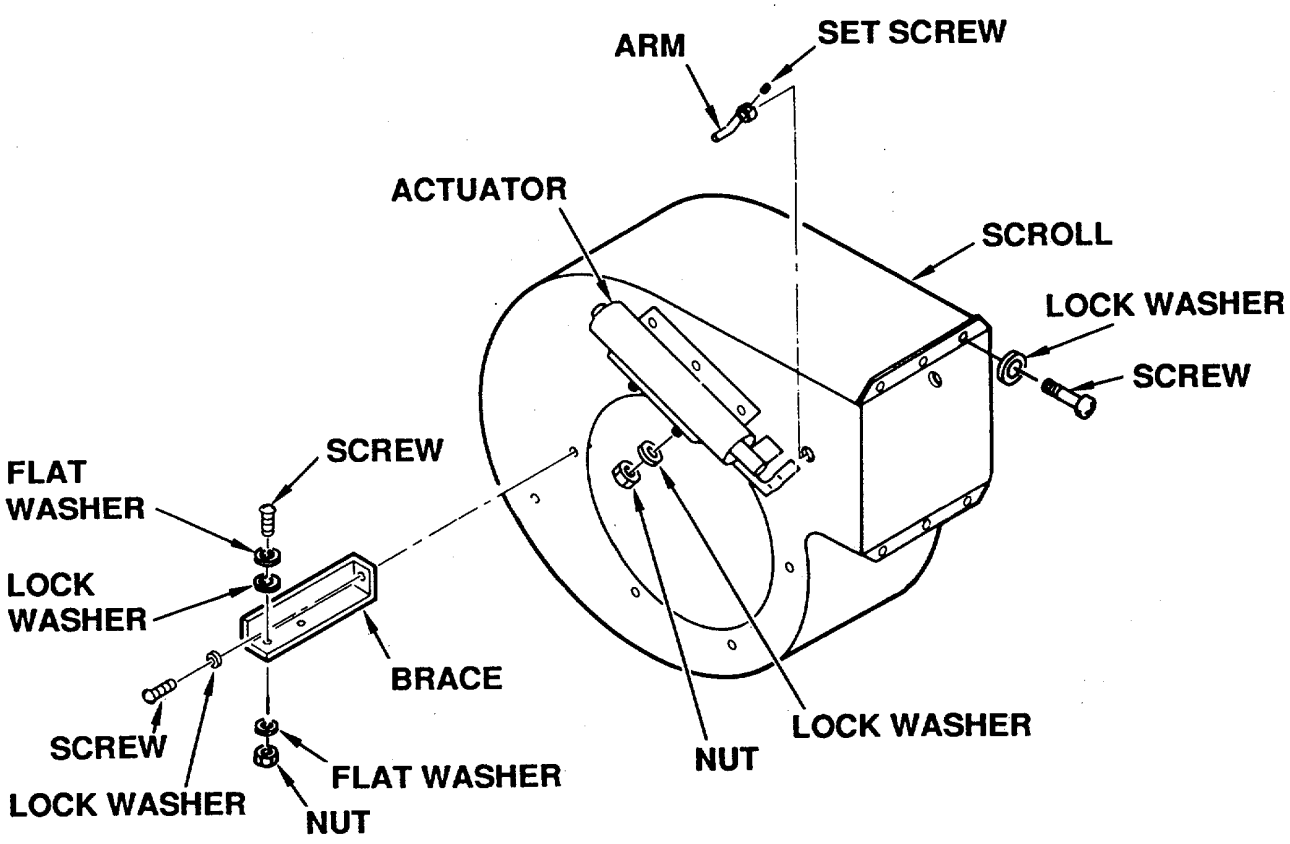


Figure 4-26. Condenser Scroll Removal/Replacement

c. Removal

(1) Loosen set screw or actuator arm. Remove arm.

(2) Remove two nuts and lockwashers from actuator.

WARNING

Do not kink cooper tubing. Serious injury may result if line ruptures.

(3) Swing actuator arm and tubing up and away from actuator bracket on scroll.

(4) Remove two screws, lockwashers, flat washers and nuts that secure the brace to condenser motor support.

(5) Remove screw and lockwasher that secure the brace to the scroll. Remove brace.

(6) Remove six screws and six lock washers that secure the scroll to the casing.

(7) Maneuver the scroll out of the unit.

d. Repair

(1) Follow procedures of para. 4-13 to transfer actuator bracket from damaged scroll to replacement scroll.

(2) Follow procedures of para. 4-27 to transfer the damper assembly from the damaged scroll to the replacement scroll.

e. Installation

(1) Maneuver scroll into unit.

(2) Align six through holes in casing with mounting hardware of scroll.

(3) Secure the scroll to the casing with six screws.

(4) Loosely secure brace to scroll with screw and lockwasher.

(5) Loosely secure brace to condenser motor mount support with two screws, two lock "< washers, flat washers, and nuts.

(6) Tighten hardware installed in steps (4) and (5).

WARNING

Do not link copper tubing. Serious injury may result if line ruptures.

(7) Install studs of actuator into through holes of bracket on scroll.

(8) By hand, restrain actuator.

(9) Secure actuator to bracket on scroll with two nuts and lockwashers.

(10) By hand, apply force to actuator plunger to verify that actuator is in the fully retracted position.

(11) Fit the actuator arm to the hinge shaft and actuator.

(12) By hand, position damper blade to fully closed position.

(13) Using hexagonal wrench, tighten set screw on actuator arm.

Follow-on procedures:

1. Install condenser motor (See para. 4-25).
2. Install condenser outlet guard (See para. 4-21).

4-29. CONDENSER MOTOR SUPPORT AND BRACE

Preliminary procedures: Remove condenser fan motor (See para. 4-25).

a. Inspection
   (1) Inspect condenser motor support for damage. Replace if damaged.

   (2) Inspect brace for damage. Replace if damaged.

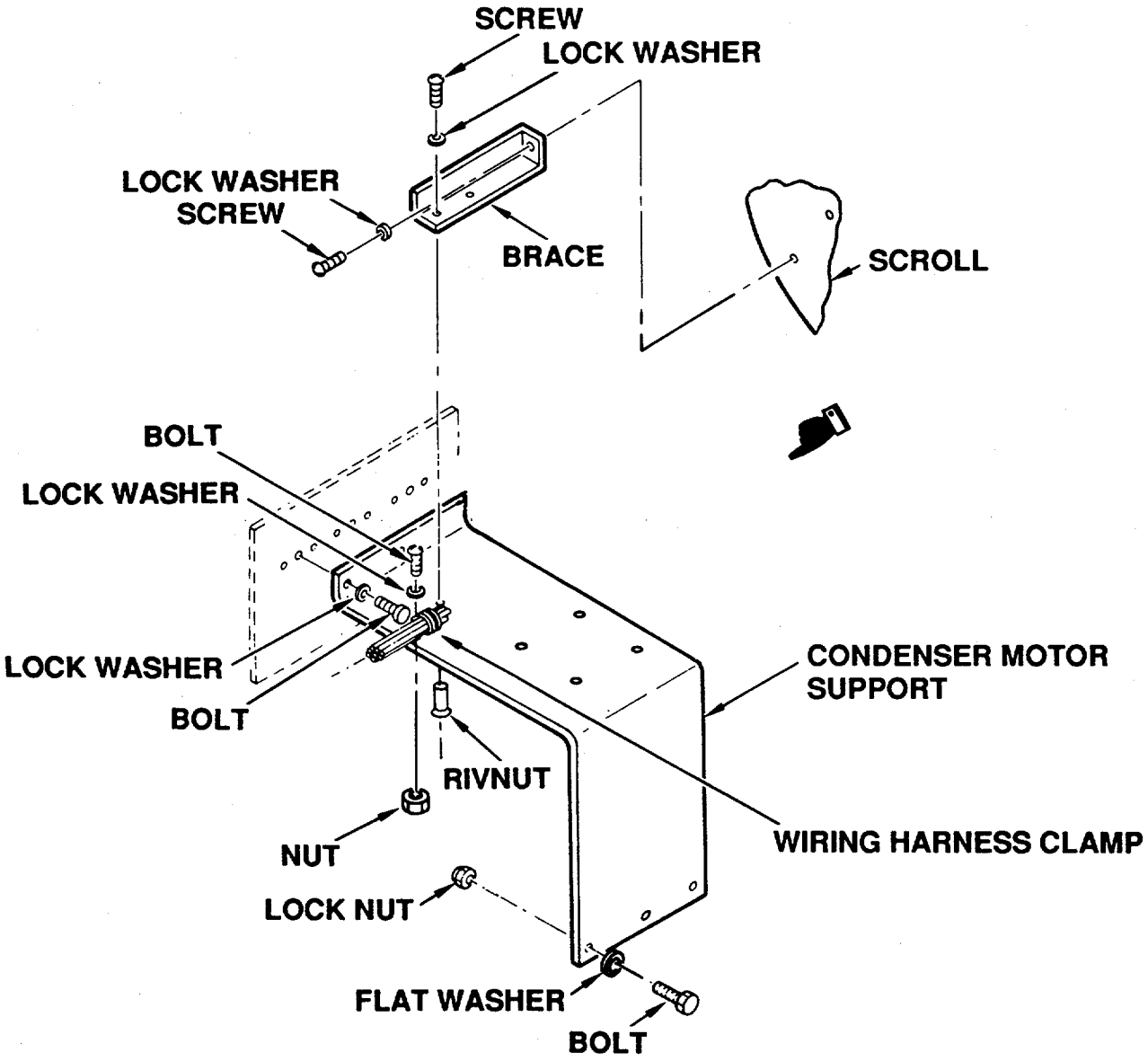


Figure 4-27. Condenser Motor Support and Brace Removal/Replacement

b. Removal

(1) Remove screw, lockwashers, flat washer and locknut that secure the wiring harness clamp to the condenser motor support.

(2) Move wiring harness and clamp out of the way.

(3) Remove screw and lockwasher that secure the brace to the scroll.

(4) Remove two screws, lockwashers, flat washers and nuts that secure the brace to the condenser motor support.

(5) Remove the brace.

(6) Remove three bolts and lockwashers that secure the top angle of the condenser motor support to the casing.

(7) Remove three bolts, flat washers and locknuts that secure the condenser motor support to the casing bottom angle.

(8) Remove the condenser motor support.

c. Installation

(1) Align two through holes of the top angle of condenser motor support with mounting hardware of casing.

(2) Loosely install three bolts and lockwashers that secure the top angle of the condenser motor support to the casing.

(3) Loosely install three bolts, flat washers and locknuts that secure the condenser motor support to the casing bottom angle.

(4) Tighten hardware installed in steps (2) and (3) above.

(5) Loosely install brace to the scroll with screw and lockwasher.

(6) Loosely install brace to condenser motor support with two screws, lockwashers, flat washers and nuts.

(7) With clamp install on wiring harness, align through hole of clamp with through hole on condenser motor support.

(8) Secure clamp to condenser motor support with screw and lockwasher, flat washer and locknut.

(9) Secure hardware installed in steps (5) and (6).

Follow-on procedure: Install condenser fan motor (See para. 4-25).

4-30. CONDENSATE DRAIN ASSEMBLY

Preliminary procedure:

1. Remove top cover (See para. 4-14).
2. Remove evaporator inlet louver (See para. 4-17).
3. Remove scroll (See para. 4-28).

a. Inspection

(1) Check for loose clamps. Tighten as needed.

(2) Inspect for damaged, blocked, punctured or torn clear tubes. Replace as needed.

(3) Inspect for damaged tee or elbow. Replace as needed.

b. Service (Assembled)

(1) Remove two clamps that attach the condensate drain assembly to the drain pan tubing.

(2) Separate the condensate drain assembly from the drain pan tubing.

(3) Plug either open clear tube ends of condensate drain assembly.

CAUTION

Use compressed air at 30 PSI, max (1.36 kg/cm2) or less. Hold compressor air nozzle at least 6 to 8 inches away from mouth of tubing.

(4) Using compressed air, blow through the open clear tube.

c. Removal

(1) Remove three clamps that secure the condensate drain assembly to the drain pan tubing and casing. Remove assembly.

(2) Separate the four clear tubes from the tee and elbow.

(3) Remove two clamps that secure the condenser side drain tube. Remove tube.

d. Service. (Disassembled) Clear tubing of any obstructions.-

e. Repair. Repair by component replacement.

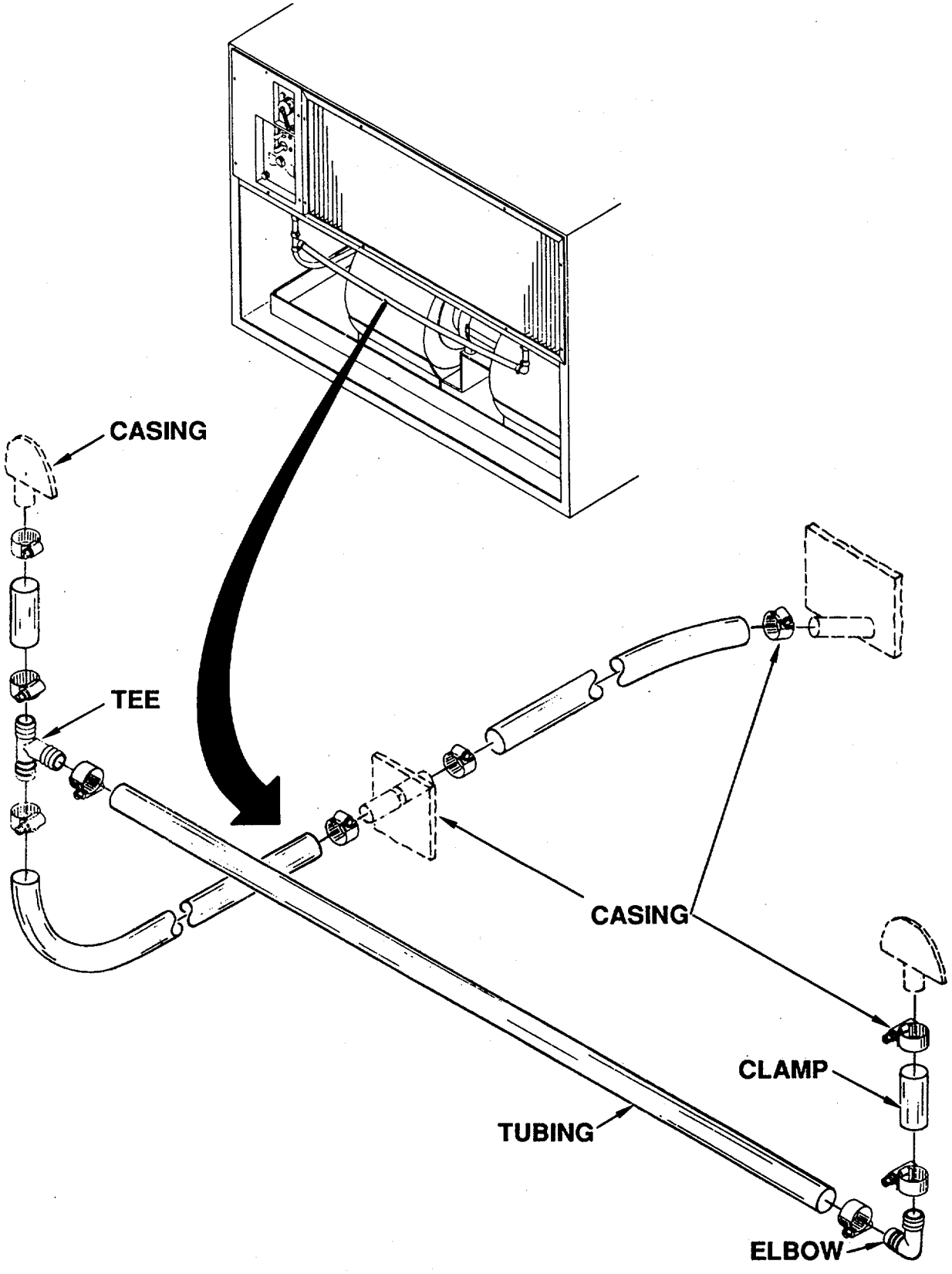


Figure 4-30. Condensate Drain Assembly

f. Installation

(1) Using figure 4-29 as a guide, assemble four clear tubes on tee and elbow.

(2) Secure two clear tubes, to drain pan tubing, with two clamps.

(3) Secure remaining clear tube to casing with clamp.

(4) Secure clear tube on condenser side with two clamps.

Follow-on procedures:

1. Install-scroll (See para. 4-28).
2. Install evaporator inlet louver (See para. 4-17).
3. Install top cover (See para. 4-14).

4-31. EVAPORATOR FAN ASSEMBLY REMOVAL/REPLACEMENT

Preliminary procedure: Remove condensate drain assembly (See para. 4-30).

WARNING

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

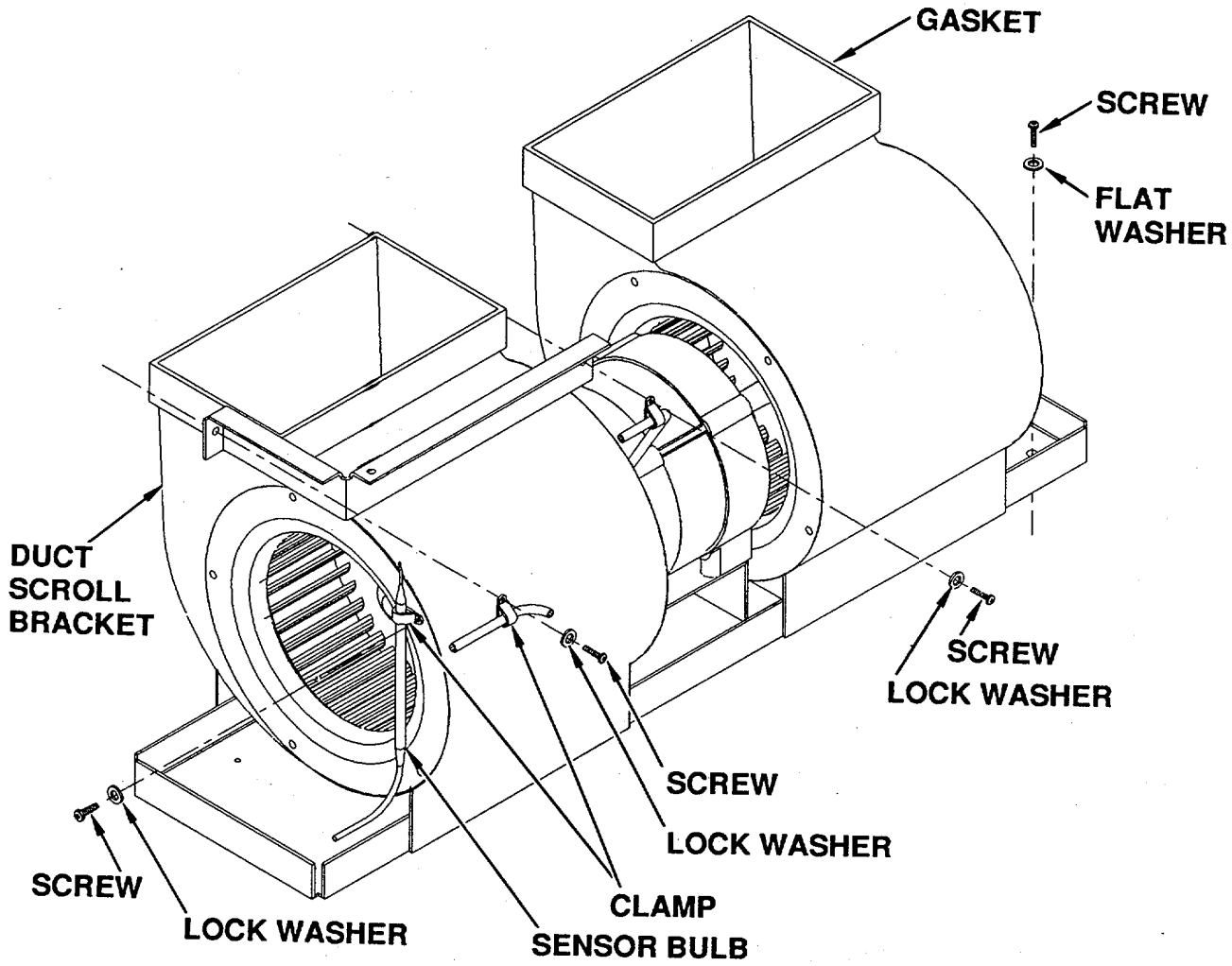


Figure 4-31. Evaporator Fan Assembly Removal/Replacement

a. Removal

(1) Tag and disconnect six evaporator fan (B3) push on leads from junction box wiring harness.

(2) Remove screw, flat washer, spacer and locknut that secures evaporator motor leads clamp and sensor bulb tubing clamp to unit casing.

(3) Remove two screws and lockwashers that secure the two motor cable clamps to duct scroll and casing. Remove clamps and left side duct scroll bracket.

(4 Remove screw and lockwasher in clamp that secures sensor bulb to left side scroll. Note position.

CAUTION

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

(5) With clamp in place, carefully set bulb aside.

(6) Remove two screws and lockwasher that secure the right hand duct scroll bracket to the casing bracket. Remove the right hand duct scroll bracket.

(7) Remove four screws and flat washers that secure the evaporator fan assembly chassis to the casing.

(8) Maneuver the evaporator fan assembly from the unit.

b. Inspection

(1) Check for loose or missing hardware. Tighten or replace as needed.

(2) Check that duct scrolls are not bent, cracked or punctured. Replace as needed (See para. 4-33).

(3) Check for damaged gaskets on scrolls. Replace damaged gaskets.

c. Repair. Repair by component replacement.

d. Installation

(1) Maneuver the evaporator fan assembly into the unit.

(2) Align four through holes in evaporator fan assembly chassis with mounting hardware in casing.

(3) Secure the evaporator fan chassis to casing with four screws and flat washers.

(4) Align through holes in right hand duct scroll bracket with mounting hardware in casing bracket.

(5) Secure the right hand duct scroll bracket to casing bracket with two screws, lockwashers and flat washers.

(6) Align through hole in left hand duct scroll bracket with mounting hardware in casing bracket.

(7) Secure two clamps to left hand duct scroll bracket and casing bracket with two screws, lockwashers and flat washers.

CAUTION

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

(8) Noting position, align clamp (sensor bulb installed) with screw and flat washer in left hand scroll.

(9) Install screw, flat washer, spacer and locknut that secure evaporator motor leads clamp and sensor bulb tubing clamp to unit casing.

(10) See tags and wiring diagram (FO-1) and connect six evaporator fan motor (B3) leads to junction box wiring harness. Remove tags. Follow-on procedure: Install condensate drain assembly (See para. 4-30).

4-32. EVAPORATOR IMPELLER FANS (LH AND RH)

WARNING

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

NOTE

The following procedures are applicable to both left hand and right hand fans.

Preliminary procedure: Remove evaporator fan assembly (See para. 4-31).

a. Removal

(1) Remove five screws and lockwashers (four each for LH scroll) that secure the outboard bell to scroll. Remove outboard bell.

(2) Reach into large opening (outlet) of scroll and loosen two set screws on hub of fan.

(3) Pull fan out of scroll cavity.

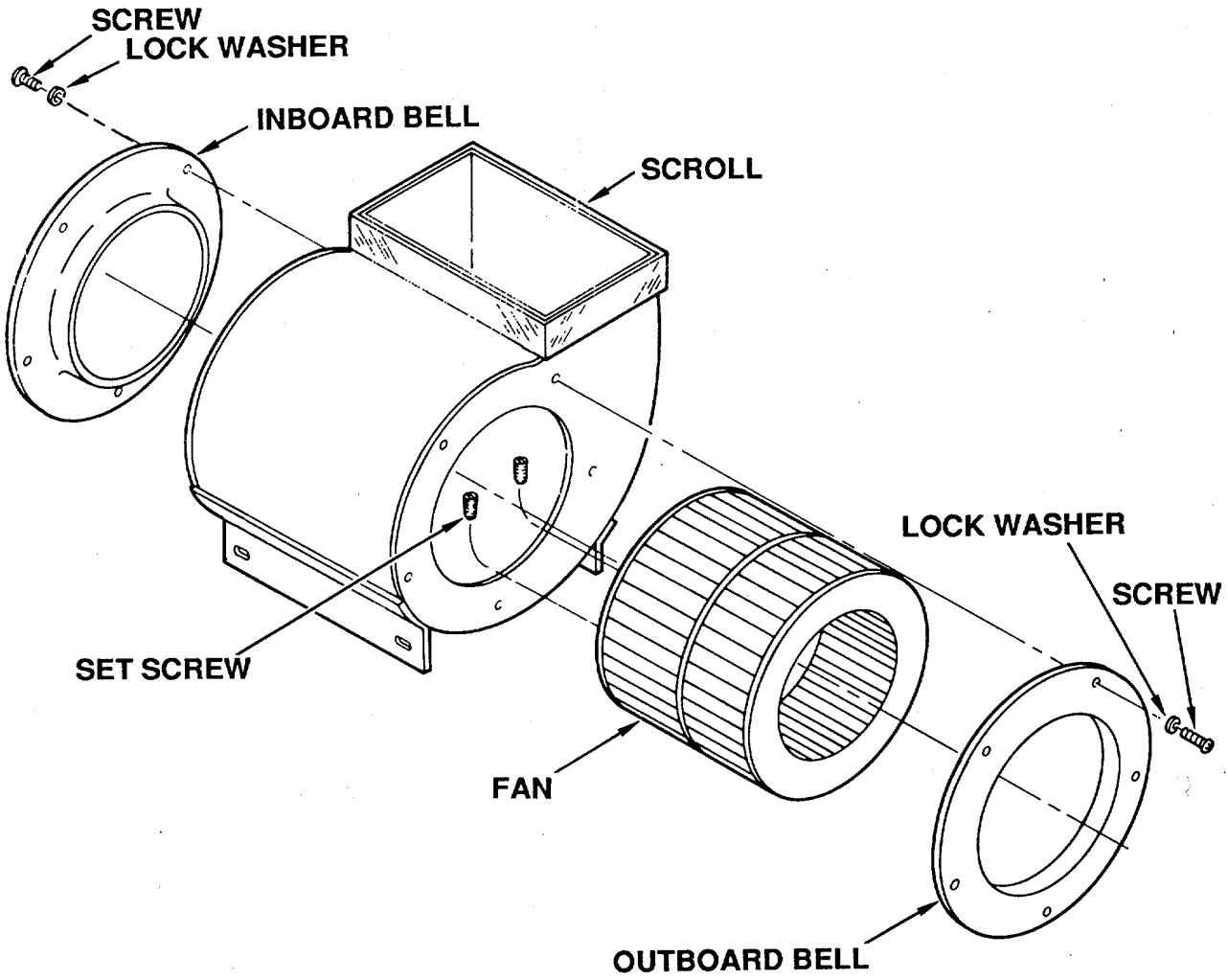


Figure 4-32. Evaporator Impeller Fans (LH and RH) Removal/Replacement

b. Inspection

(1) Check for missing set screw. Replace as needed.

(2) Check fans for bent or missing blades. Replace fan if damaged.

c. Service

WARNING

Dry cleaning solvent P-D-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 deg F (38 deg C).

(1) Brush off loose dirt or foreign matter from fan.

(2) Wipe fan with a cloth dampened with dry cleaning solvent (Item 19, Appendix E).

(3) Dress machined surfaces on motor shaft and fan hub (if fan was replaced) using fine emery (Item 27, Appendix E).

d. Installation

(1) Slip fan hub on motor shaft.

(2) Center fan in scroll and slightly tighten set screw on flat of motor shaft.

(3) Spin fan to verify connect alignment. If not aligned repeat steps.

(4) Reach into large opening (outlet) of scroll and tighten two set screws.

CAUTION

One of either set screws must engage flat of motor shaft.

(5) Install five screws and lockwashers (four each LH scroll) that secure the outboard bell to scroll.

Follow-on assembly: Install evaporator fan assembly (See para. 4-31).

4-33. EVAPORATOR SCROLLS (LH AND RH)

WARNING

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

NOTE

The following procedures are applicable to both left hand and right hand scrolls.

Preliminary procedure: Remove evaporator impeller fans (LH or RH) (See para. 4-32).

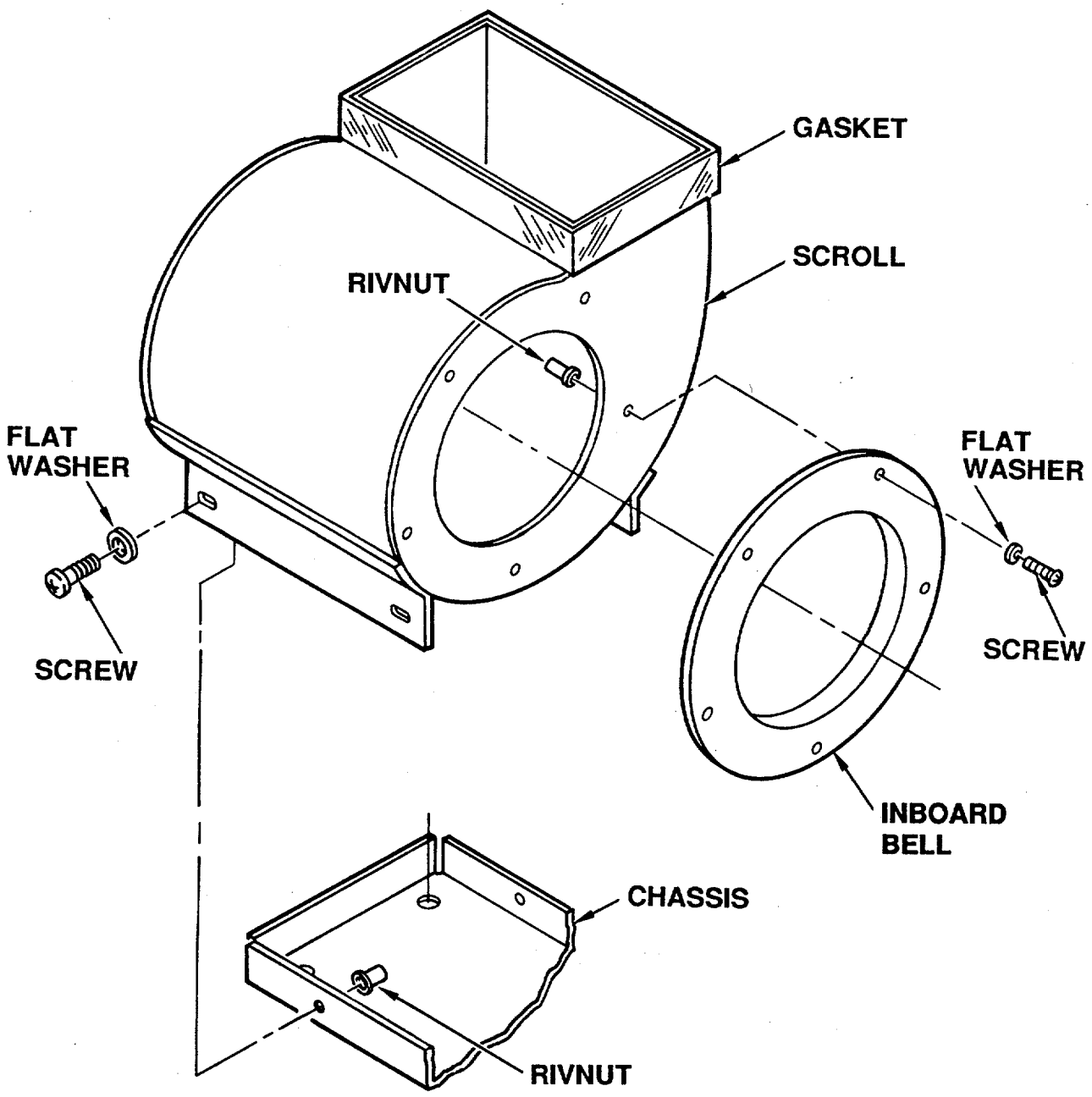


Figure 4-33. Evaporator Scrolls (LH and RH) Removal/Replacement

a. Removal

(1) Remove four, screws and flat washers that secure the evaporator scroll to the chassis.

(2) Remove the evaporator scroll.

(3) Remove five screws and flat washers that secure the inboard bell to the evaporator scroll. Remove the inboard bell.

b. Inspection

(1) Check the bells for punctures, cracks or bends. Replace severely damaged bell.

(2) Check the evaporator scrolls for punctures or cracks. Replace damaged scroll.

(3) Check evaporator scrolls for damaged or missing hardware. Replace as needed (See para. 4-13).

(4) Check for damaged gasket. Replace as needed (See para. 4-13).

c. Service

WARNING

Dry cleaning solvent P-D-680 used to clean parts is potentially dangerous to personnel or property. Avoid repeated or prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 degrees F (38 degrees C).

(1) Brush off loose dirt or contaminants from evaporator scroll.

(2) Wipe evaporator scroll with cloth dampened with dry cleaning solvent. (Item 19, Appendix E).

d. Installation

(1) Secure the inboard bell to the evaporator scroll with five screws and flat washers.

(2) Align the four through holes of evaporator scroll with mounting hardware on chassis.

(3) Secure the evaporator scroll to the chassis with four screws and flat washers.

Follow-on procedure: Install evaporator impeller fans (See para. 4-32).

4-34. EVAPORATOR FAN MOTOR (B3) AND BRACKET

WARNING

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

Preliminary procedure: Remove evaporator scrolls (LH and RH) (See para. 4-33).

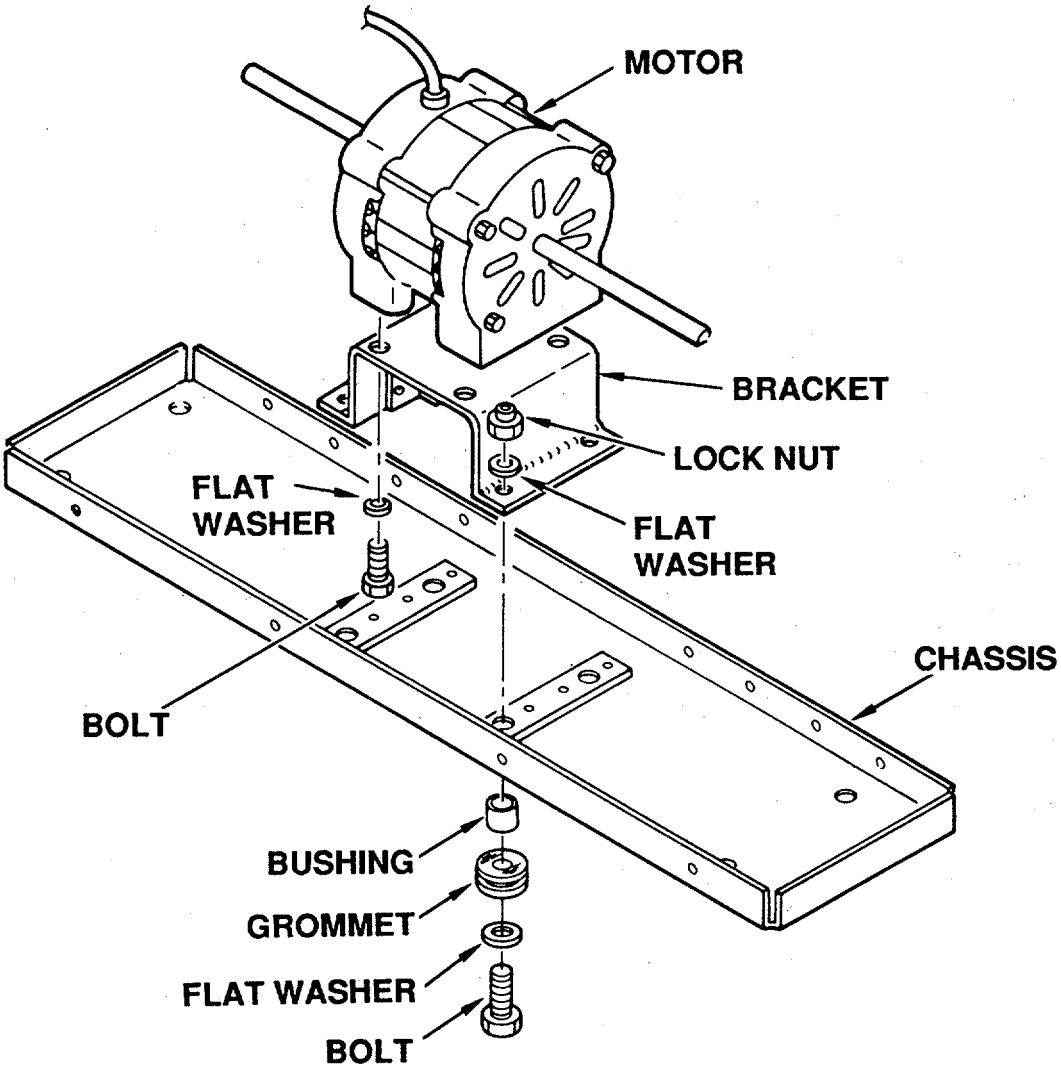


Figure 4-34. Evaporator Fan Motor (B3) and Bracket

a. Inspection

(1) Inspect motor bracket for damage. Replace if damaged.

(2) Inspect chassis for damage. Replace if damaged.

(3) Check motor B-3 for rotational freedom by spinning shaft.

(4) Evidence of stiffness or binding indicates bearing failure. Replace motor with failed bearing.

(5) Grasp motor B-3 shaft and move back and forth in direction in line with motor shaft.

(6) Excessive end play indicates axial failure of bearings, bearing washers and bearing load spring. Replace motor with excessive end play.

b. Test

NOTE

This test must be conducted when motor is cool.

(1) Using an ohmmeter set on lowest ohms scale, check continuity between wire leads El (black ground wire) and BLUE, WHITE and RED. Continuity must not be indicated between ground and each wire lead.

(2) If continuity is found, replace motor B3.

(3) Using an ohmmeter set on lowest ohms scale, check continuity between wire leads VIOLET and YELLOW (thermo protector). Continuity must be indicated.

(4) If continuity is not indicated, is not met, replace motor B3.

(5) Using an OH meter set on lowest OHMS scale, check continuity between wire leads BLUE, WHITE, and RED. Continuity must be indicated.

(6) If continuity is not indicated, replace motor B3.

c. Removal

(1) Remove four bolts and flat washers that secure the motor B-3 to thebracket.

(2) Remove motor B 3.

(3) Remove four bolts, eight flat washers, four bashings and four locknuts that secure the bracket to the chassis.

(4) Remove the bracket.

(5) Check the grommets for damage. Replace damaged grommet.

d. Installation

(1) Verify that all four grommets are properly seated in chassis.

(2) Insert four brushings in four grommets.

(3) Align through holes in the bracket with bushings.

(4) Secure the bracket to the chassis with four bolts, eight flat washers and four locknuts.

(5) Secure motor B 3 to the bracket with four bolts and flat washers.

Follow-on procedure: Install evaporator scrolls (LH and RH) (See para. 4-33).

4-35. VENTILATION DAMPER AND ACTUATOR

WARNING

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

Preliminary Procedures: Remove evaporator inlet louver (See para. 4-18).

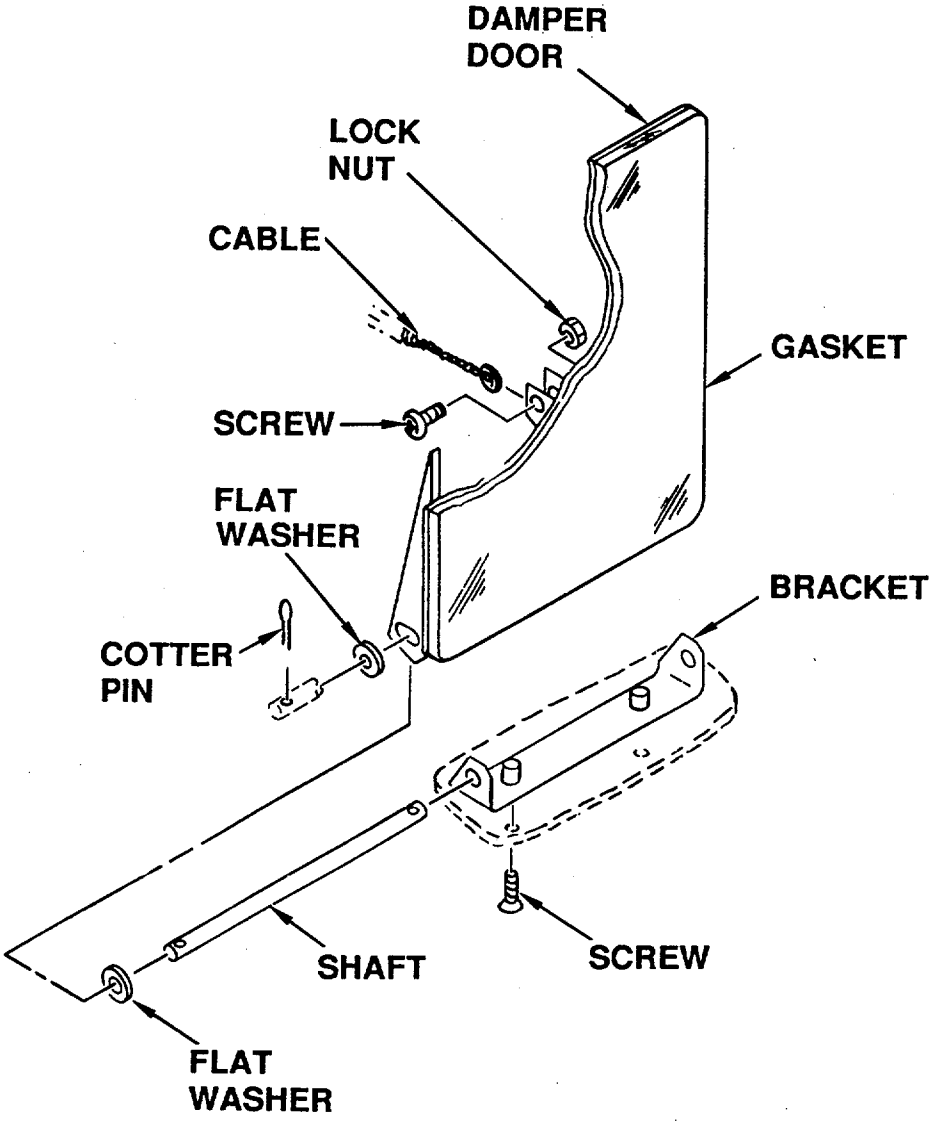


Figure 4-35. Damper Door Assembly

a. Removal (damper door)

(1) Remove screw and locknut that secure the push-pull cable to the damper door.

(2) Remove two cotter pins from damper door shaft. Set cotter pins aside.

(3) Push shaft through holes in door bracket and damper door.

(4) Set two flat washers aside.

(5) Remove damper door.

(6) To remove bracket proceed as follows:

WARNINGI

Ensure that unit is stable on blocks to avoid injury.

(a) Raise the unit and place it on blocks at least four inches high. Be sure that blocks do not obstruct access to two screws that secure the door bracket to base of casing.

(b) Remove two screws that secure the door bracket to the casing.

(c) Remove the door bracket.

Disassembly (actuator)

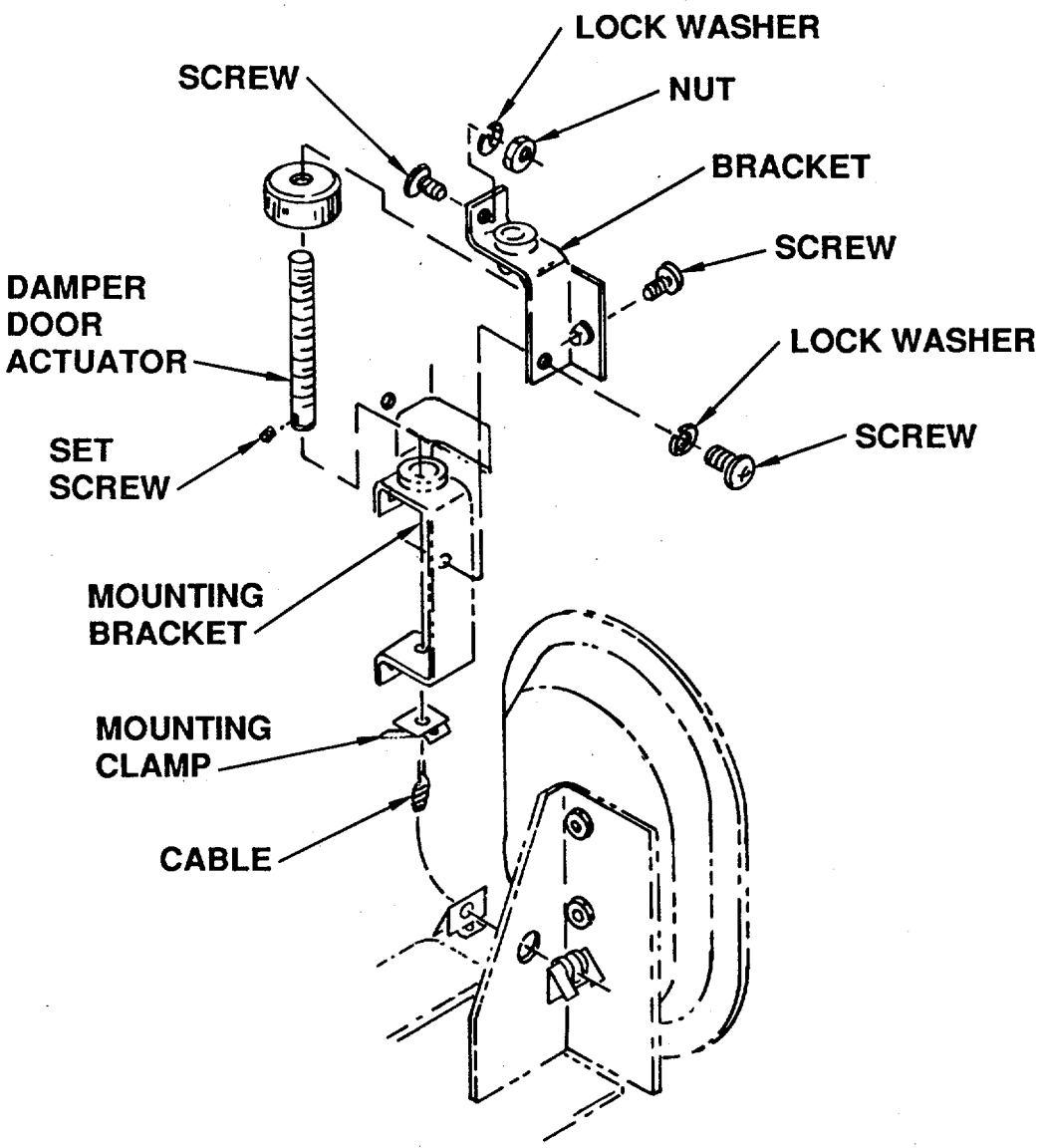


Figure 4-36. Actuator and Hardware

(1) Loosen set screw on damper door actuator.

(2) Pull cable through damper door actuator, three mounting clamps and casing. Set cable aside.

(3) Remove screw from top of actuator bracket and casing.

(4) Remove screw and lockwasher from actuator bracket and casing.

(5) Remove screw and lockwashers from actuator bracket and actuator mounting bracket.

(6) Remove actuator bracket.

(7) Remove damper door actuator and nut from actuator mounting bracket.

(8) Unscrew nut from damper door actuator.

c. Inspection

(1) Check all components for loose or missing hardware. Replace as needed.

(2) Check damper door for loose or missing gasket. Repair as needed.

(3) Check actuator bracket and door bracket for damaged and/or missing rivets. Repair as needed.

(4) Check cable for damage. Replace as needed.

(5) Check damper door actuator and nut for damage. Replace as needed.

d. Service

(1) Brush off loose dirt or foreign matter

(2) Apply thin layer of grease (Item 25, Appendix E) to inner cable and actuator threads.

e. Assembly

(1) Secure the door bracket to the casing bottom with two screws.

2) Install one cotter pin in hole in shaft.

(3) Thread one washer on shaft.

(4) Thread shaft through hole in one end of damper door until approximately one-quarter inch of shaft is exposed.

(5) Align door bracket to damper door.

(6) Thread shaft through two holes in doorbracket and damper door.

(7) Back shaft up until shaft end is flush with door bracket.

(8) Match inside diameter of washer to shaft outside diameter.

(9) Install washer on shaft end.

(10) Install cotter pin.

(11) Install one mounting clamp on cable.

(12) Thread cable through casing.

(13) Install cable "eye" to damper door, using screw and locknut.

(14) Install second and third mounting clamp on cable.

(15) Install nut and damper door actuator on actuator mounting bracket.

(16) Align actuator bracket to casing.

(17) Secure top of actuator bracket to casing with screw, lockwasher and nut.

(18) Install screw in actuator bracket and casing.

(19) Install screw and lockwashers in actuator bracket and actuator mounting bracket.

(20) Turn nut on actuator counter-clockwise until it "bottoms-out".

(21) Thread free end of cable in hole of actuator until cable "bottoms-out".

(22) Tighten set screw on actuator.

f. Damper Door Adjustment

(1) Turn nut clockwise to fully close damper door.

(2) If damper door does not fully close, go to step (3).

(3) Depress springs on two mounting clamps.

(4) Pull cable until damper door is fully closed.

(5) Run nut fully counter clockwise to verify damper door open position.

(6) Run nut fully clockwise to verify damper door fully closed position.

(7) Repeat steps (3), (4), (5) and (6) until damper door fully opens and closes.

Follow-on procedure: Install evaporator inlet louver (See para. 4-18).

4-36. ELECTRICAL HIRING REPAIR GENERAL.

Preferred repair method consists 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.

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, and should be brushed into the joint before soldering. If a slux-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 for covering joints at terminals or connectors, or to a length about 1/2 inch (1.3 cm) longer than the joint to be insulated, and slide the tubing over the wire before making the joint. After the joint is made, slide the tubing so that it covers the joint, and shrink in place with heatgun (Item 5, Appendix B).

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 (.06 - 1.3 cm) 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 - 1.3 cm) of insulation from the end of the wire, apply a one-inch piece of heat-shrink tubing (if the terminals are of the uninsulated type), and insert wire end into the shank of the terminal. Crimp the shank, and install heat-shrink tubing, if necessary.

Table 4-3. Wire List

From	Terminal Type	To	Terminal Type	AWG Wire Size	Length Inches
	Junction Box Wiring Harness--13229E6183				
J2A-16	13216E6177	TB1-3	MS25036-157	10	7.00
J2A-17	13216E6177	TB1-2	MS25036-157	10	7.00
J2A-20	13216E6177	TB1-1	MS25036-157	10	7.00
J2A-11	13216E6177	K3-L1	MS25036-156	10	10.00
J2A-13	13216E6177	K3-L2	MS25036-156	10	10.00
J2A-15	13216E6177	K3-L3	MS25036-156	10	10.00
J2B-4	13216E6177	TB4-1	13229E6187-2	16	48.00
J2B-13	13216E6177	K5-X1	MS25036-101	20	34.00
J2B-5	13216E6177	K2-X1	MS25036-101	20	32.00
J2B-27	13216E6177	K6-L2	MS25036-153	16	15.00
J2B-3	13216E6177	TB3-2	MS25036-149	20	10.00
J2B-10	13216E6177	TB3-6	MS25036-149	20	10.00
J2B-11	13216E6177	TB3-1	MS25036-153	16	10.00
J2B-15	13216E6177	TB3-4	MS25036-153	16	10.00
	Wiring Harness, Junction Box--13229E6222,				
K1-l	13216E6191-1	TB4-4	13229E6187-1	20	49.00
K1-2	13216E6191-1	K3-X1	MS25036-101	20	21.00
K2-X2	MS25036-101	K5-X2	MS25036-101	20	3.00
K2-X2	MS25036-101	TB2-2	MS25036-101	20	52.50
K2-L1	MS25036-156	K5-L1	MS25036-156	10	5.50
K2-L1	MS25036-156	K6-L1	MS25036-156	10	5.50
K2-L2	MS25036-156	K5-L2	MS25036-156	10	5.50
K2-L2	MS25036-156	K6-L2	MS25036-156	10	5.50
K2-L3	MS25036-156	K5-L3	MS25036-156	10	5.50
K2-L3	MS25036-153	T1-H2	MS25036-107	16	21.00
K2-L3	MS25036-156	K6-L3	MS25036-156	10	5.50
K2-T1	MS25036-153	TB2-7	MS25036-107	16	47.00
K2-T2	MS25036-153	TB2-6	MS25036-107	16	47.00
K2-T3	MS25036-153	TB2-5	MS25036-107	16	47.00
K3-X2	MS25036-101	K4-X2	MS25036-101	20	3.00
K3-T1	MS25036-156	TB5-1	MS25036-156	10	40.00
K3-T2	MS25036-156	TB5-2	MS25036-156	10	40.00
K3-T3	MS25036-156	TB5-3	MS25036-156	10	40.00
K4-X1	MS25036-101	TB3-2	MS25036-149	20	23.00
K4-X2	MS25036-101	TB3-5	MS25036-149	20	17.50
K4-X2	MS25036-101	K6-X2	MS25036-101	20	3.00
K4-L1	MS25036-153	K6-L1	MS25036-153	16	5.00
K4-L2	MS25036-153	K6-L2	MS25036-153	16	5.00
K4-L3	MS25036-153	K6-L3	MS25036-153	16	5.00
K4-L3	MS25036-153	TB4-5	13229E6187-2	16	38.00
K4-L2	MS25036-153	TB4-6	13229E6187-2	16	38.00

Table 4-3. Wire List

From	Terminal Type	To	Terminal Type	AWG Wire Size	Length Inches
	Junction Box Wiring Harness--13229E6183				
K4-T1	MS25036-153	TB4-7	13229E6187-2	16	43.00
K4-T2	MS25036-153	TB4-8	13229E6187-2	16	43.00
K4-T3	MS25036-153	TB4-9	13229E6187-2	16	43.00
K5-T1	MS25036-153	TB2-10	MS25036-107	16	57.00
K5-T2	MS25036-153	TB2-9	MS25036-107	16	55.00
K5-T3	MS25036-153	TB2-8	MS25036-107	16	55.00
K6-X2	MS25036-101	TB4-2	13229E6187-1	20	41.00
K6-X1	MS25036-101	TB3-6	MS25036-149	20	19.50
K6-TI	MS25036-153	B3-BLU	13229E6187-2	16	38.50
K6-T2	MS25036-153	B3-WHT	13229E6187-2	16	38.50
K6-T3	MS25036-153	B3-RED	13229E6187-2	16	38.50
B3-BLK	13229E6187-2	E1	MS25036-108	16	40.50
TB2-1	MS25036-107	TB3-5	MS25036-153	16	48.00
TB3-2	MS25036-149	TB4-3	13229E6187-1	20	47.00
TB3-3	MS25036-149	B3-YEL	13229E6187-2	20	30.00
TB3-6	MS25036-149	B3-VIO	13229E6187-2	20	28.00
	Wiring Harness, Junction Box--13229E6186				
CB1-C	13216E6192	CB2-1	MS25036-101	20	5.75
CB1-NO	13216E6192	S1-31	13229E6187-1	20	8.50
S1-12	13229E6187-1	S2-3	MS25036-149	20	5.50
TB2-1	13229E6181-1	S3-1	13229E6187-1	20	16.00
TB2-2	13229E6187-1	S3-3	13229E6187-1	20	15.00
S4-2	13229E6187-1	S5-1	13229E6187-1	20	2.50
E3	MS25036-103	E4	MS25036-103	10	20.00
K5-L1	MS25036-156	TB1-1	MS25036-157	10	6.50
K5-L2	MS25036-156	TB1-2	MS25036-157	10	8.00
K5-L3	MS25036-156	TB1-3	MS25036-157	10	7.50
TB3-1	MS25036-156	E1	MS25036-112	10	6.00
TB3-3	MS25036-149	T1-X1	MS25036-101	20	9.00
TB3-4	MS25036-153	T1-H1	MS25036-107	16	9.50
TB3-5	MS25036-149	T1-X2	MS25036-101	20	9.50

Table 4-3. Wire List

From	Terminal Type	To	Terminal Type	AWG Wire Size	Length Inches
		Hiring Harness, Condenser Section 13229E6185			
TB3-4	MS25036-101	S5-2	13229E6187-1	20	58.00
TB4-4	MS25036-101	S4-1	13229E6187-1	20	60.50
TB4-5	MS25036-107	B1-1	13229E6187-2	16	42.00
TB4-6	MS25036-107	B1-2	13229E6187-2	16	41.50
TB4-7	MS25036-107	B2-1	13229E6187-2	16	23.50
TB4-8	MS25036-107	B2-2	13229E6187-2	16	23.00
TB4-9	MS25036-107	B2-3	13229E6187-2	16	22.50
TB5-1	MS25036-112	B1-T1	MS25036-112	10	41.50
TB5-2	MS25036-112	B1-T2	MS25036-112	10	41.50
TB5-3	MS25036-112	B1-T3	MS25036-112	10	41.50
TB4-1		L1-1	13229E6213		41.50
TB4-2		L1-2	13229E6213		41.50
		Hiring Harness, Auxiliary Power 13229E6184			
J3-A		TB1-4	MS25036-116	8	55.00
J3-B		TB1-5	MS25036-116	8	55.00
J3-C		TB1-6	MS25036-116	8	55.00
J3-D		E3	MS25036-116	8	55.00
E3	MS25036-116	E5	MS25036-115	8	60.00
		Hiring Harness, Power Input 13229E6210			
J1-A		TB1-1	MS25036-116	8	17.00
J1-B		TB1-2	MS25036-116	8	16.75
J1-C		TB1-3	MS25036-116	8	16.50
J1-D		E1	MS25036-115	8	18.00
		Hiring Harness, Control Module 13229E6207			
P2A-11		CB1-A2	13216E6191-3	10	5.00
P2A-13		CB1-B2	13216E6191-3	10	4.50
P2A-15		CB1-C2	13216E6191-3	10	4.00
P2A-16		CB1-C1	13216E6191-3	10	5.25
P2A-17		CB1-B1	13216E6191-3	10	5.75
P2A-20		CB1-A1	13216E6191-3	10	6.00
P2B-27		CB2-2	MS25036-101	20	6.00

Table 4-3. Wire List

From	Terminal Type	To	Terminal Type	AWG Wire Size	Length Inches
		Wiring Harness, Condenser Section 13229E6563, Serial Number 990 thru 1335			
TB4-3	MS25036-101	S5-2		20	74.50
TB4-4	MS25036-101	P4-A		20	42.50
TB4-5	MS25036-107	P4-G		16	42.00
TB4-6	MS25036-107	P4-H		16	41.50
TB4-7	MS25036-107	B2-1	13229E6187-2	16	23.50
TB4-8	MS25036-107	B2-2	13229E6187-2	16	23.00
TB4-8	MS25036-107	B2-3	13229E6187-2	16	22.50
TB5-1	MS25036-112	P4-D		10	38.50
TB5-2	MS25036-112	P4-E		10	38.50
TB5-3	MS25036-112	P4-F		10	38.50
TB4-1		L1-1	13229E6213		41.50
TB4-2		L1-2	13229E6213		41.50
P4-B		S4-1	13229E6187-1	20	32.00

4-37. CONTROL MODULE

The control module is the protected enclosure that contains the compressor circuit breaker (CB1), control circuit breaker (CB2), mode selector switch (S1), temperature selector (S3), plug P2 with leads. See the following para. for control module parts.

a. Control module removal installation. (See para. 4-38).

b. Compressor circuit breaker. (See para. 4-39).

c. Control circuit breaker. (See para. 4-40).

d. Mode selector switch. (See para. 4-41).

e. Connector (P2) with leads. (See para. 4-42).

f. Temperature control switch. (See para. 4-43).

g. Control module housing. (See para. 4-44).

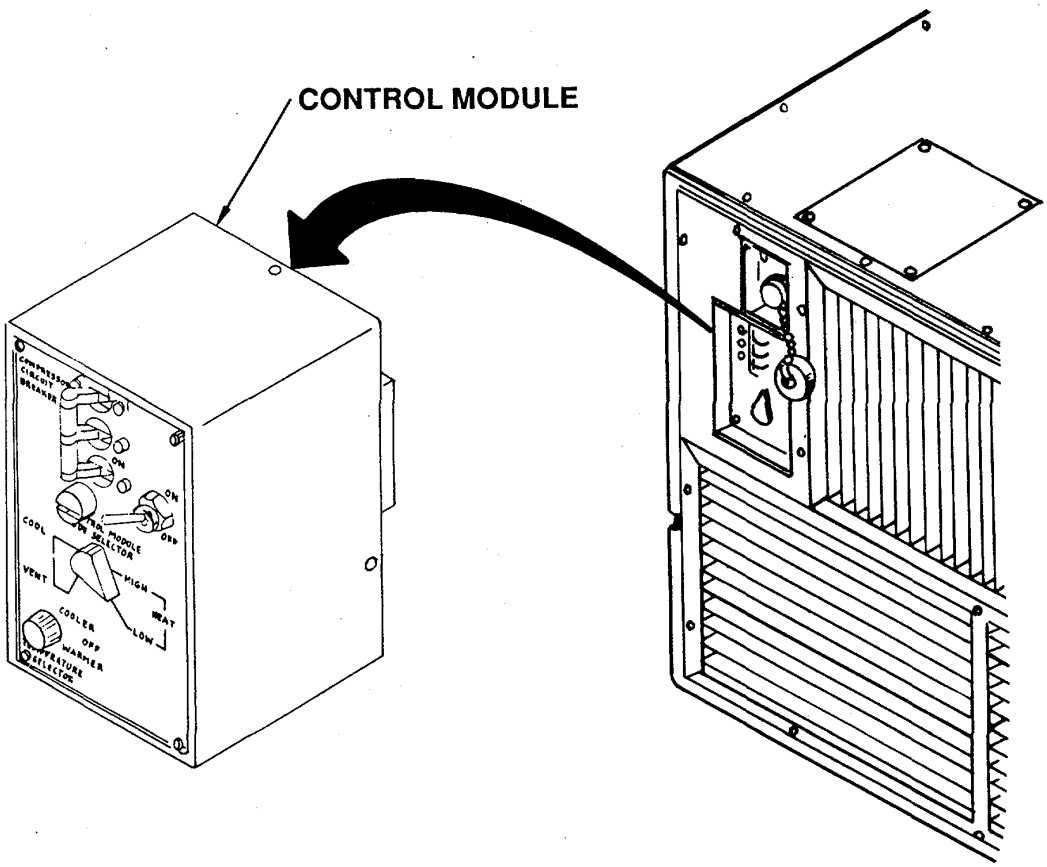


Figure 4-37. Control Module

4-38. CONTROL MODULE REMOVAL/INSTALLATION

WARNING

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

Preliminary Procedure: Remove evaporator inlet louver. (See para. 4-18).

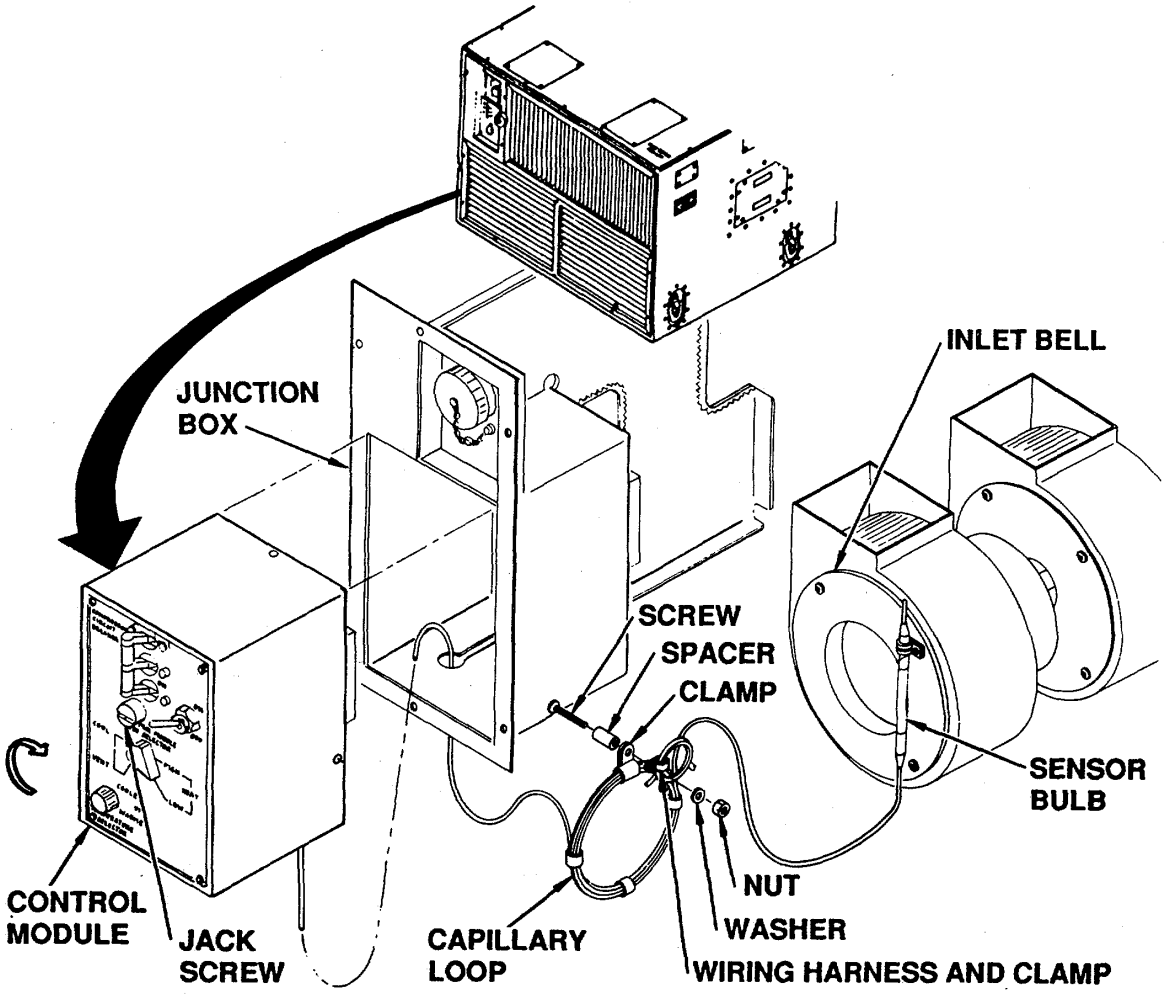


Figure 4-38. Control Module Removal/Installation

a. Removal

CAUTION

Take care that sensing bulb capillary tube is not kinked and that bulb and capillary tube is not damaged during removal.

(1) Remove nut, washer and two clamps that secure sensor bulb capillary line and wiring harness to casing.

(2) Remove screws and lockwashers and clamp attaching sensor bulb capillary tube to evaporator blower inlet bell.

(3) Loosen jack screw until control module is free from junction box.

(4) Cut tie wrap on capillary tube loop and unwind.

(5) Carefully pull control module out of junction box while carefully threading capillary tube and bulb through slot in junction box.

CAUTION

Take care that sensing bulb capillary tube is not kinked and that bulb and capillary tube is not damaged during removal.

b. Inspection

(1) Inspect for loose or missing hardware. Tighten and replace as needed.

(2) Inspect for loose or damaged terminals. Tighten and replace as needed.

c. Service. Vacuum to remove dirt and contaminants.

d. Installation

(1) Align cover holes with mounting hardware in mounting frame while threading the capillary tube in bottom slots of cover and frame.

CAUTION

Take care that sensing bulb capillary tube is not kinked and that bulb and capillary tube is not damaged during installation.

(2) Carefully thread sensor bulb and capillary tube through the slot inthe junction box while at the same time, placing the control module in the junction box cavity.

CAUTION

Take care that sensing bulb capillary tube is not kinked and that bulb and capillary tube is not damaged during installation.

(3) Maneuver the control module in junction box cavity to engage P2 to J2.

(4) Tighten jackscrew until positive engagement of P2 and J2 is achieved.

(5) Coil capillary tube to produce 10 loops.

(6) Install clamp on sensor bulb.

(7) Install clamp and bulb in evaporator inlet bell with screw and washer.

(8) Install wiring harness clamp and clamp and capillary tube loop with spacer, screw, washer and nut.

Follow-on procedure: Install evaporator inlet louver (See para. 4-18).

4-39. COMPRESSOR CIRCUIT BREAKER (CB1)

Preliminary procedures:
1. Remove control module (See para. 4-38).
2. Remove junction box (See para. 4-46).

WARNING

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

a. Inspection

(1) Check for loose or missing hardware and wire leads. Tighten and replace as needed.

(2) Check that terminals are not loose, broken or corroded. See para. 4-36 for repair and replacement instructions.

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

(4) Replace damaged or defective circuit breaker.

b. Test (Installed)

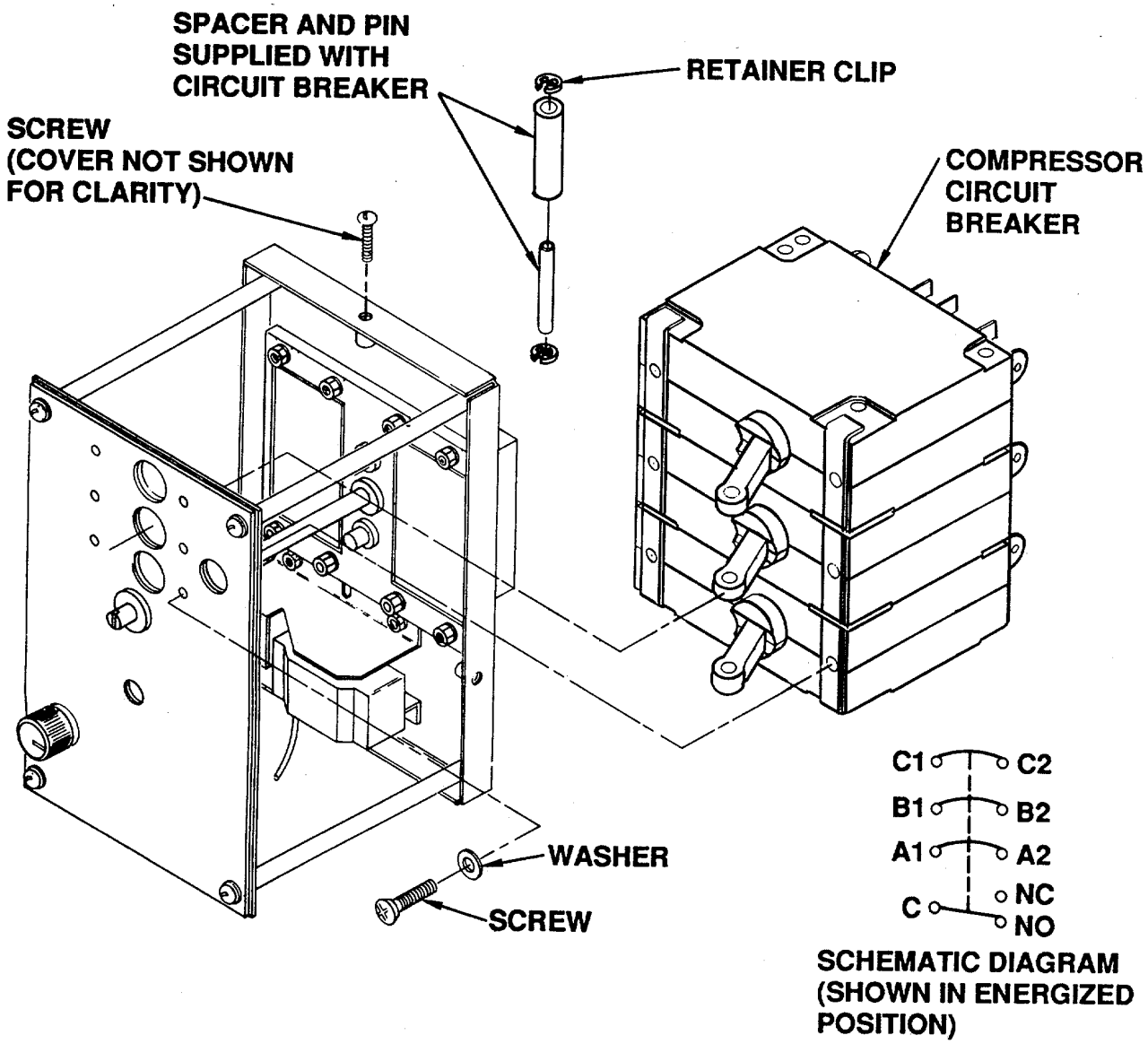


Figure 4-39. Compressor Circuit Breaker (CB1)

(1) Tag and remove wire leads.

(2) Set circuit breaker to OFF position.

(3) Use multimeter set on lowest OHMS scale to check continuity between terminals Al and A2, B1 and B2, C1 and C2, and auxiliary switch terminals C and NO. All contacts should be open. If there is continuity on any check, replace circuit breaker.

(4) Set circuit breaker to ON position.

(5) Use a multimeter set on the lowest OHMS scale and repeat continuity checks between terminals Al and A2, B1 and B2, C1 and C2, and auxiliary switch terminals C and NO. All four contacts should be closed. If there is no continuity on any check, replace circuit breaker.

c. Removal

(1) Remove four screws that secure cover to control module.

(2) Tag and disconnect wire leads to circuit breakers.

(3) Remove retainer clips and press out one pin and two spacers on three circuit breaker toggles.

(4) Remove six screws and washers in circuit breaker.

(5) Remove circuit breaker.

d. Installation

(1) Install replacement circuit breaker in housing.

NOTE

Verify that the OFF-ON designation of circuit breaker switches correspond to OFF-ON designation of housing identification plate.

(2) Secure circuit breaker to housing with six screws and washers.

(3) Install retainer clips, two spacers, and one pin in toggles.

(4) See tags and wiring diagram. (FO-1) and reconnect wire leads. Remove tags.

(5) Secure cover to control module with four screws.

Follow-on procedures: 1. Install control module (See para. 4-38).

2. Install junction box (See para. 4-46).

4-40. CONTROL CIRCUIT BREAKER (CB2)

Preliminary procedures: 1. Remove control module (See para. 4-38).

WARNING

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

a. Inspection

(1) Check for loose or missing hardware and leads. Tighten and replace as needed.

(2) Check that terminals are not loose, broken or corroded.

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

(4) Replace damaged or defective circuit breaker.

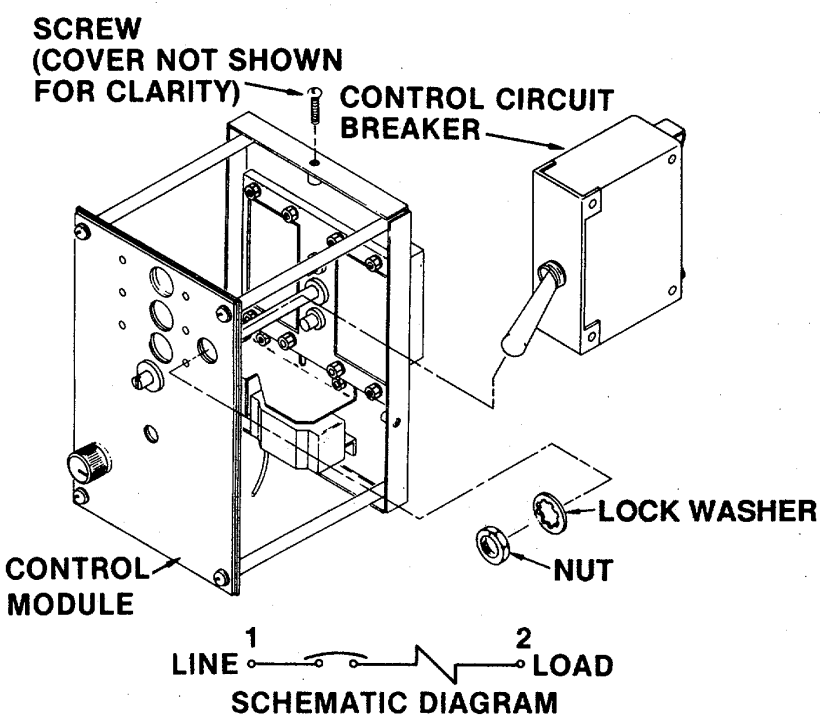


Figure 4-40. Control Circuit Breaker (CB2)

b. Test (Installed)

(1) Tag and remove leads.

(2) Using multimeter and switch set to OFF, conduct a continuity test across the two switch terminals. A continuity reading indicates a defective circuit breaker that must be replaced.

(3) Using multimeter and switch set to ON, conduct a continuity test across the two switch terminals. No continuity indicates a defective circuit breaker that must be replaced.

c. Removal

(1) Tag and disconnect leads.

(2) Remove screw and lockwasher from circuit breaker and remove circuit breaker.

d. Installation

(1) Remove screw and lockwasher from replacement circuit breaker.

(2) Install circuit breaker in housing.

(3) Use multimeter to verify orientation of ON-OFF of breaker switch corresponds to ON-OFF designation on housing identification plate.

(4) Secure circuit breaker to housing using nut and lockwasher.

(5) See tags and wiring diagram (FO-1) and reconnect leads. Remove tags.

Follow-on procedures: 1. Install cover (See para. 4-44).

2. Install control module (See para. 4-38).

4-41. MODE SELECTOR SWITCH (S1)

Preliminary procedure: Remove control module (See para. 4-38).

a. Inspection

(1) Check for loose or missing hardware and leads. Tighten and replace as needed.

(2) Check that switch terminals are not loose, broken or corroded.

(3) Check switch for evidence of overheating or visible damage.

(4) Replace damaged or defective switch.

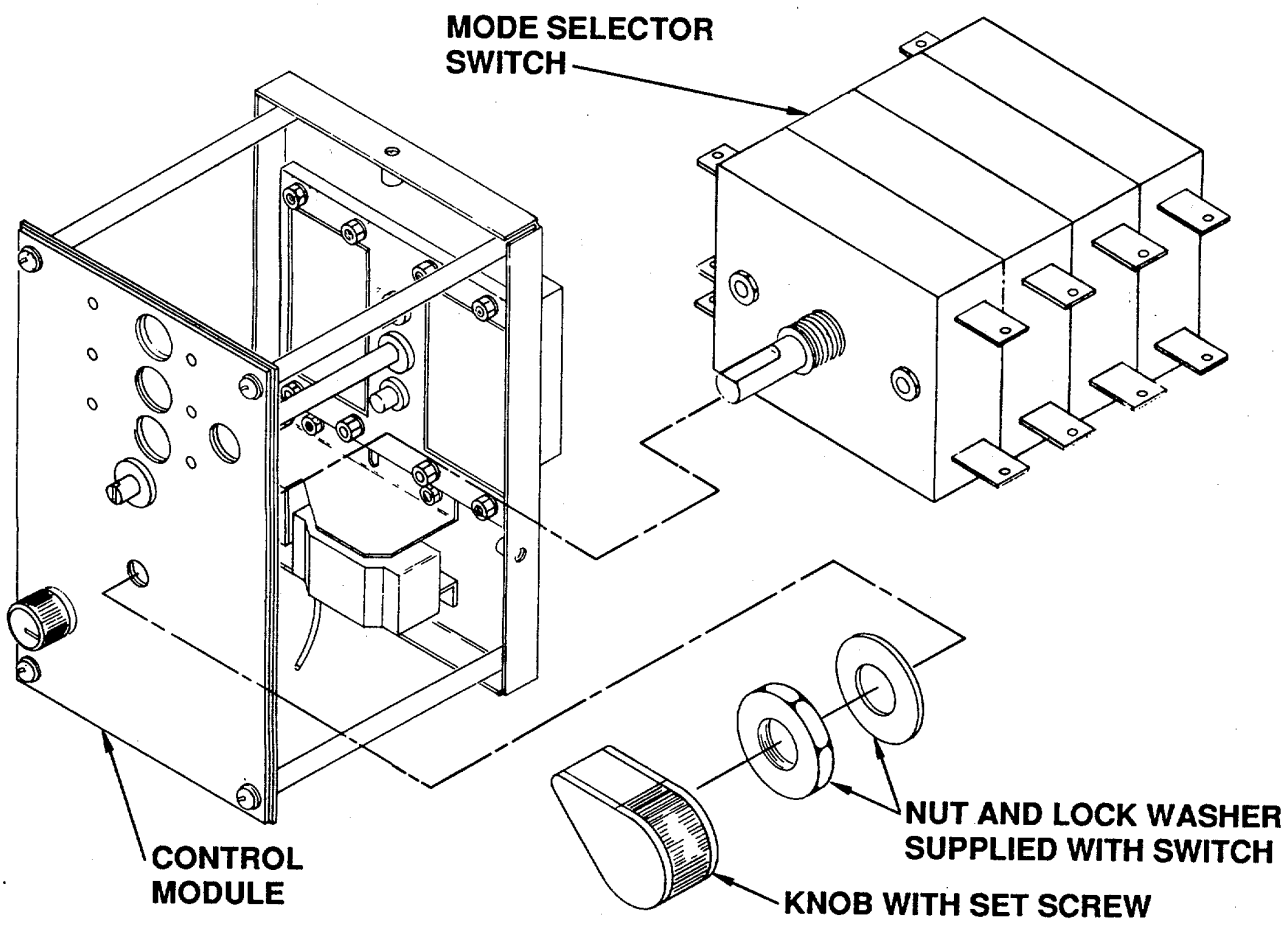


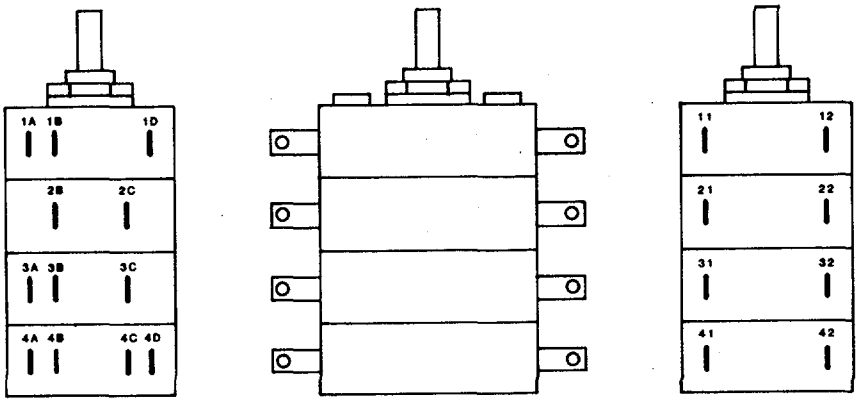
Figure 4-41. Mode Selector Switch (S1)

b. Test (Installed)

(1) Tag and remove leads.

(2) Using multimeter and switch position chart shown in figure 4-41. 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.

(3) If continuity requirements are not met, replace mode selector switch.



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 4-42. Switch Position and Terminal Location

c. Removal

(1) Remove four screws that secure cover to control module.

(2) Loosen set screw on knob. Remove knob.

(3) Tag and disconnect leads.

(4) Remove nut and lockwasher from switch shaft. Remove switch from control module.

d. Installation

(1) Remove nut and lockwasher from replacement switch.

(2) Slip switch into control module and place shaft through hole.

(3) Holding backside of switch, secure switch to housing with lockwasher and nut.

(4) Place knob on shaft and align setscrew on shaft.

(5) Tighten setscrew.

(6) See tags and wiring diagram (FO-1) and reconnect wire leads. Remove tags.

Follow-on procedures: 1. Install cover (See para. 4-44).

2. Install control module (See para. 4-38).

4-42. CONNECTOR (P2) WITH LEADS

Preliminary procedure: Remove control module (See para. 4-38).

WARNING

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

a. Inspection

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

(2) Check individual wire leads for loose solder connections, loose terminal lug connections, cut or frayed insulation and cut or broken wires.

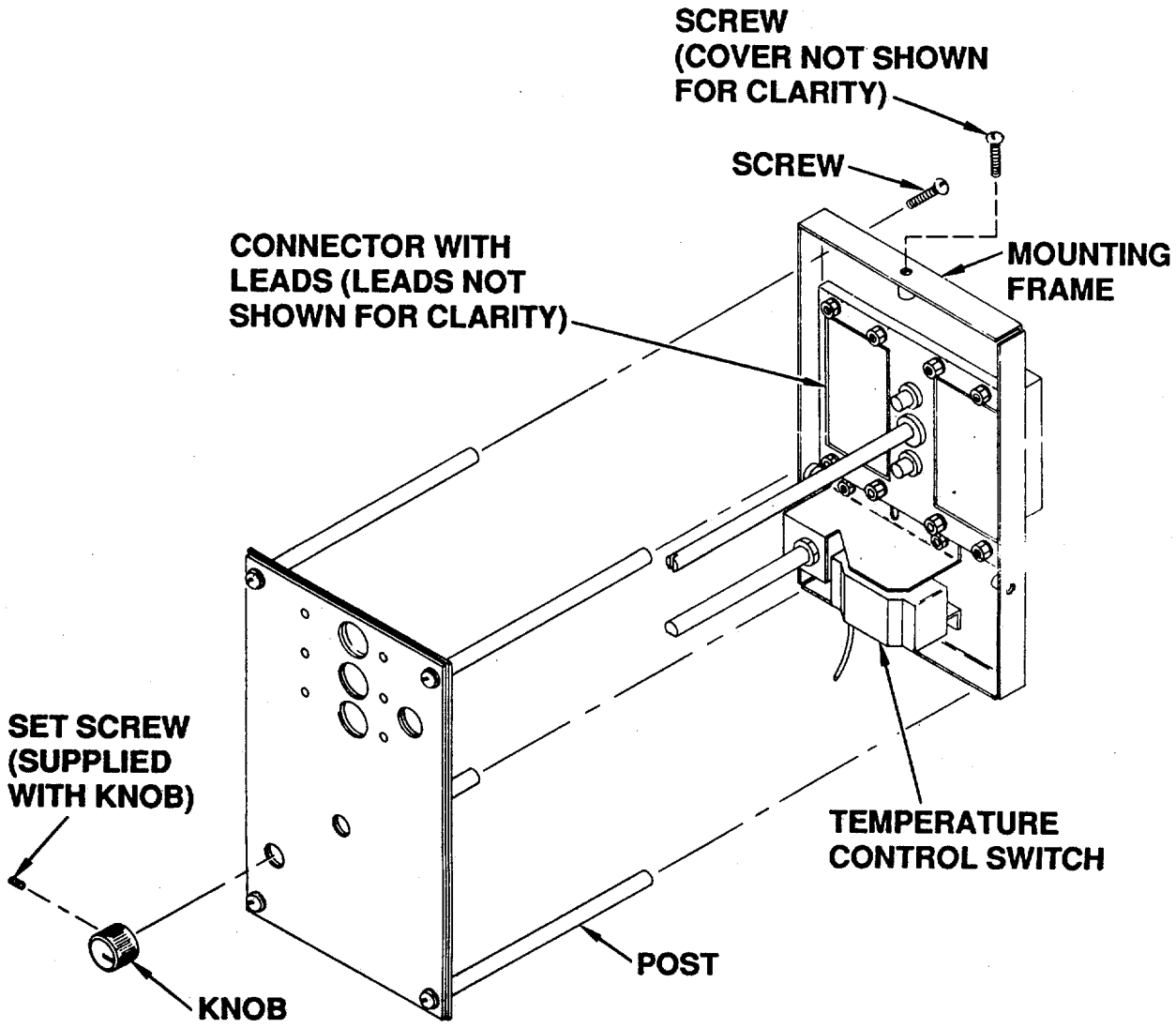


Figure 4-43. Control Module Disassembly

b. Test

(1) See wiring diagram (FO-1) and wire list (Table 4-3) and continuity test individual wires.

(2) Repair or replace wires with no continuity.

c. Removal

(1) Remove four screws that secure housing to control module.

(2) Tag and remove wire leads.

(3) Remove setscrew in temperature control knob. Remove knob.

(4) Remove four screws that secure mounting frame.

CAUTION

Take care that temperature control switch capillary tube is not kinked or mashed.

(5) Slide frame (with connector and temperature control switch) out of control module.

(6) Remove eight screws, and self-locking nuts that secure connector onto frame.

(7) Remove connector.

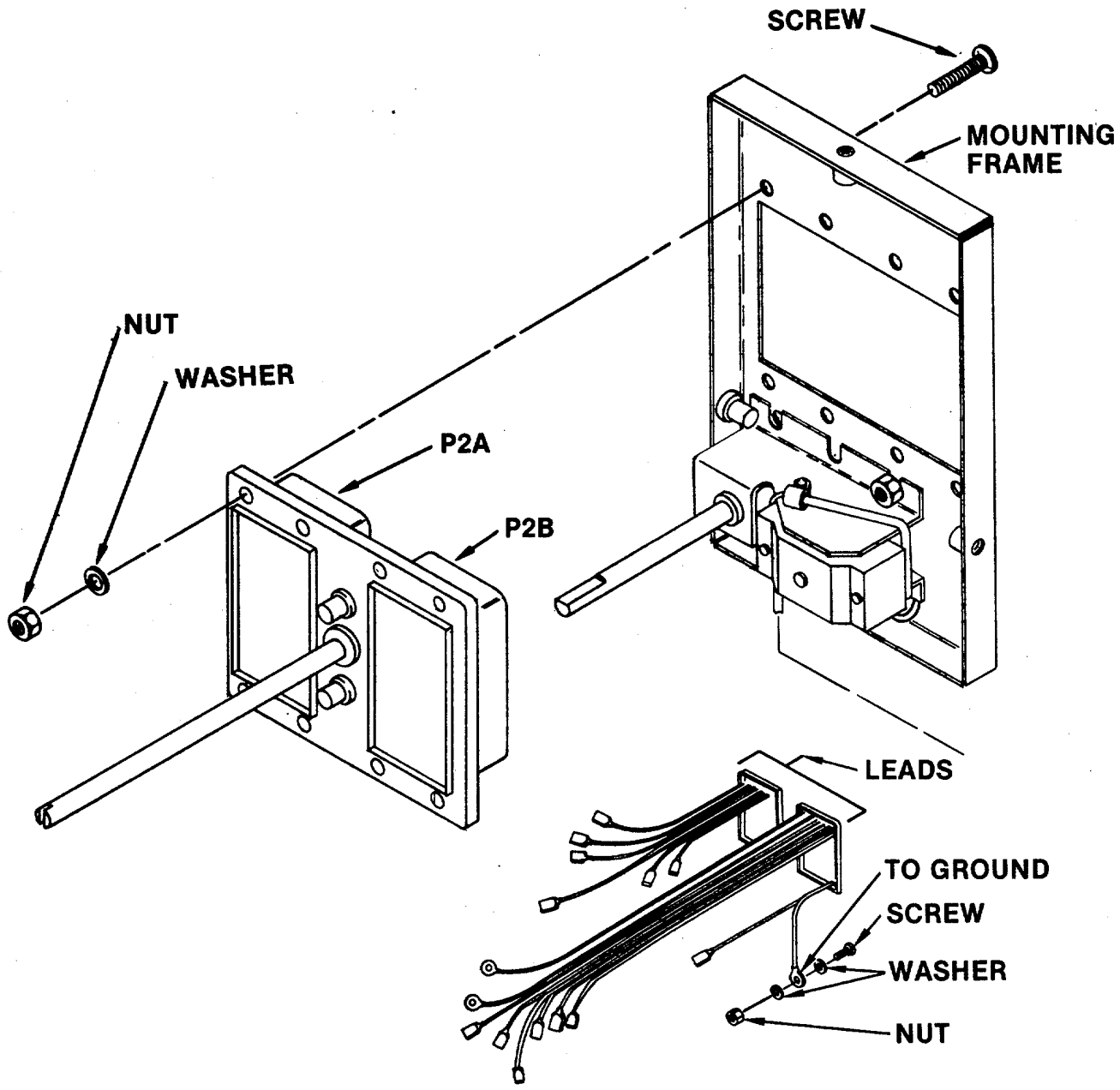


Figure 4-44. Connector (P2) with Leads

d. Repair

(1) See para. 4-36 for general wire repair instructions.

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

e. Installation

(1) Align connector to mounting frame with "P2A" and "P2B" markings on top.

(2) Secure connector to frame with eight screws, and self-locking nuts.

(3) Align connector and switch shafts with two grommeted holes in mounting plate.

(4) Secure mounting frame with four screws.

(5) Reconnect wire leads and remove tags.

(6) Secure housing to control module with four screws.

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

4-43. TEMPERATURE CONTROL SWITCH (S2)

Preliminary Procedures: Remove control module (See para. 4-38).

WARNING

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

a. Inspection (Installed)

(1) Check that leads are properly connected (See wiring diagram FO-1).

(2) Check that capillary tube and sensing bulb are not damaged.

(3) Check temperature control switch for signs of overheating or other obvious damage. Replace if damaged.

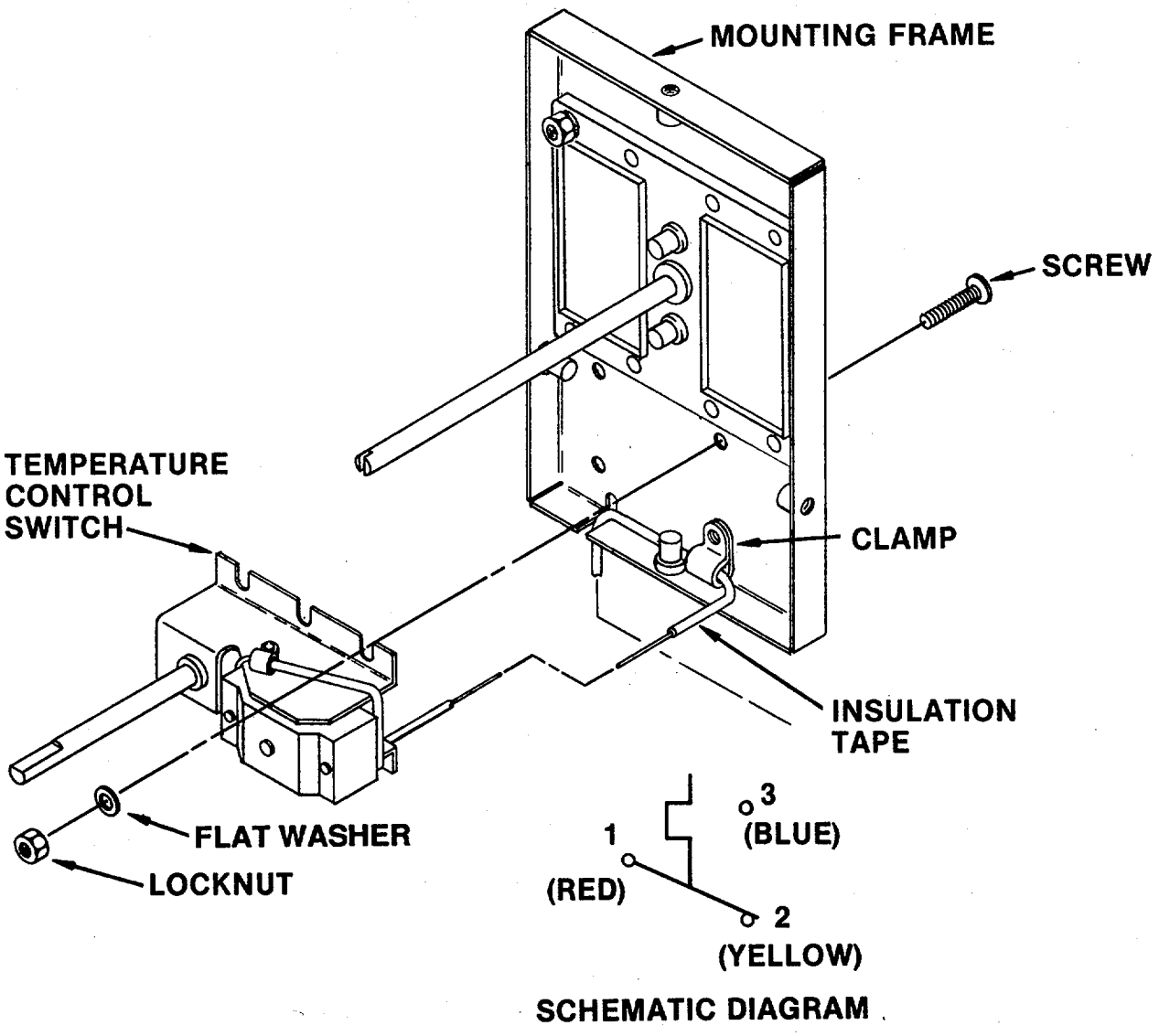


Figure 4-45. Temperature Control Switch (S3)

b. Test (Installed)

(1) Tag and remove leads.

(2) Using multimeter, place probes on the red and blue terminals.

(3) Turn temperature control switch shaft fully clockwise.

(4) Check continuity. If temperature at sensing bulb is above 45 degrees F (7 degrees C), there should be no continuity.

(5) 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.

(6) Place multimeter probes on the red and yellow terminals.

(7) Turn temperature control switch shaft fully counterclockwise.

(8) Check continuity. If temperature at sensing bulb is below 90 degrees F (32 degrees C) there should be no continuity.

(9) 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.

(10) Replace temperature control switch if it fails any of the above tests.

c. Removal

(1) Remove four screws that secure cover to control module.

(2) Tag and disconnect wires.

(3) Remove mounting frame (See para. 4-42).

(4) Loosen set screw and remove temperature select knob from temperature control switch shaft.

(5) Remove four screws, flat washers and self-locking nuts. Remove switch.

(6) Remove and retain clamp for installation of replacement switch. (Note location of clamp).

d. Replacement

(1) Install clamp on capillary tube.

(2) Align hole pattern of switch to hole pattern on inside of frame.

(3) Secure switch and clamp to frame with four screws, flat washers and self-locking nuts.

(4) Install temperature select knob on shaft of temperature control switch shaft and tighten set screw.

(5) Reconnect wires and remove tags.

(6) Secure cover to control module with four screws.

Follow-up procedures: 1. Install mounting frame (See para. 4-42).

2. Install control module (See para. 4-38).

4-44. CONTROL MODULE HOUSING

Preliminary Procedures:

1. Remove control module (See para. 4-38).
2. Remove control circuit breaker (See para. 4-40).
3. Remove compressor circuit breaker (See para. 4-39).
4. Remove mode selector (See para. 4-41).
5. Remove connector (P2) with leads (See para. 4-42).
6. Remove temperature control switch (See para. 4-43).

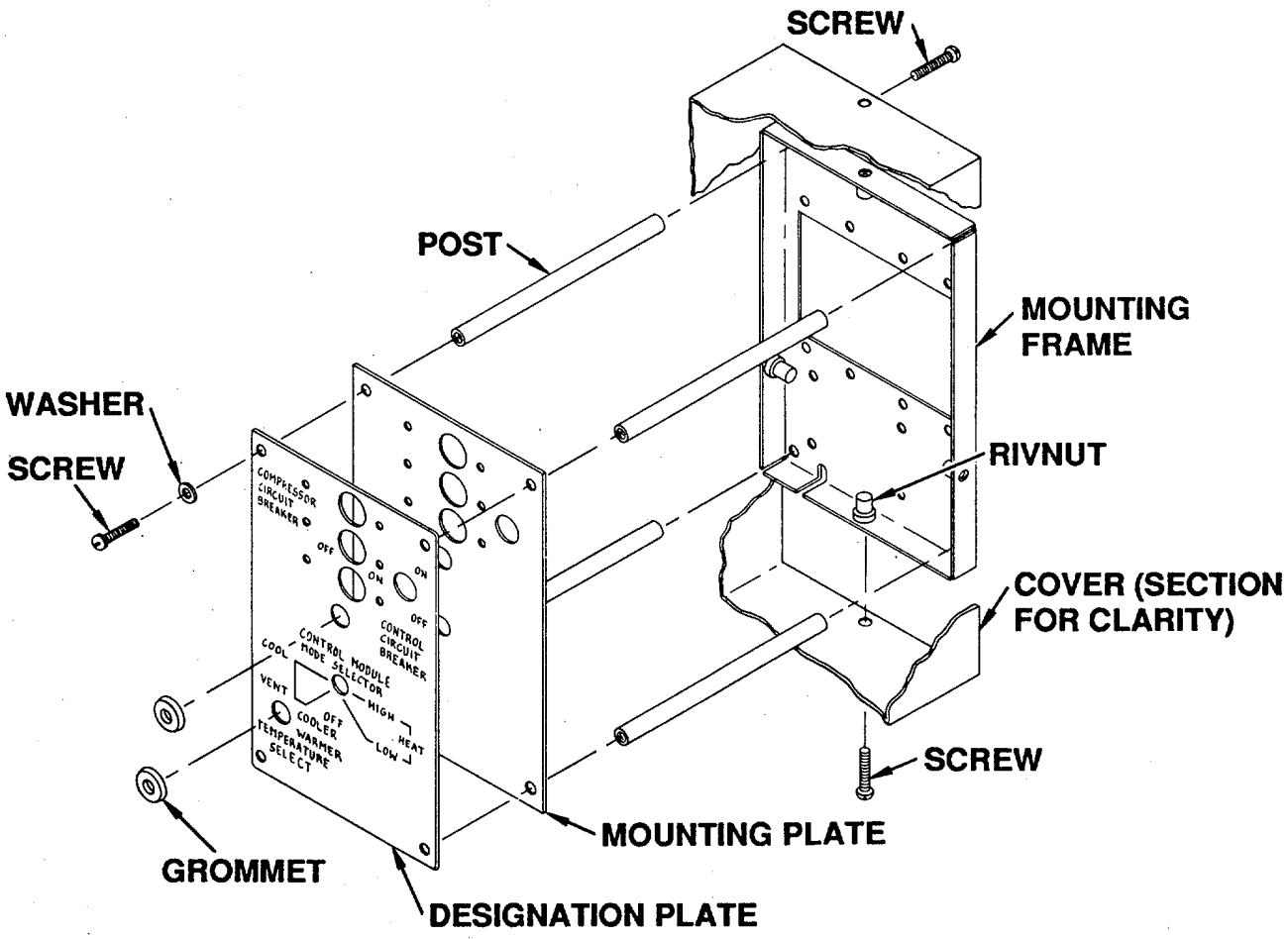


Figure 4-46. Control Module Housing

a. Inspection

(1) Check frame, cover and mounting plate for dents, cracks or punctures. Replace if damage creates a hazard or interferes with operation.

(2) Check that grommets are in place and not damaged. Replace as needed.

(3) Check that information plate is readable.

(4) Check information plate for dents, cracks or punctures. Replace as needed.

(5) Check four posts for straightness and thread damage. Replace any defective post.

b. Repair. Repairs are limited to replacement of damaged or missing parts.

Follow-on procedures:
1. Install temperature selector switch (See para. 4-43).
2. Install connector (P2) with leads (See para. 4-42).
3. Install mode selector switch (See para. 4-41).
4. Install compressor circuit breaker (See para. 4-39).
5. Install control circuit breaker (See para. 4-40).
6. Install control module (See para. 4-38).

4-45. JUNCTION BOX

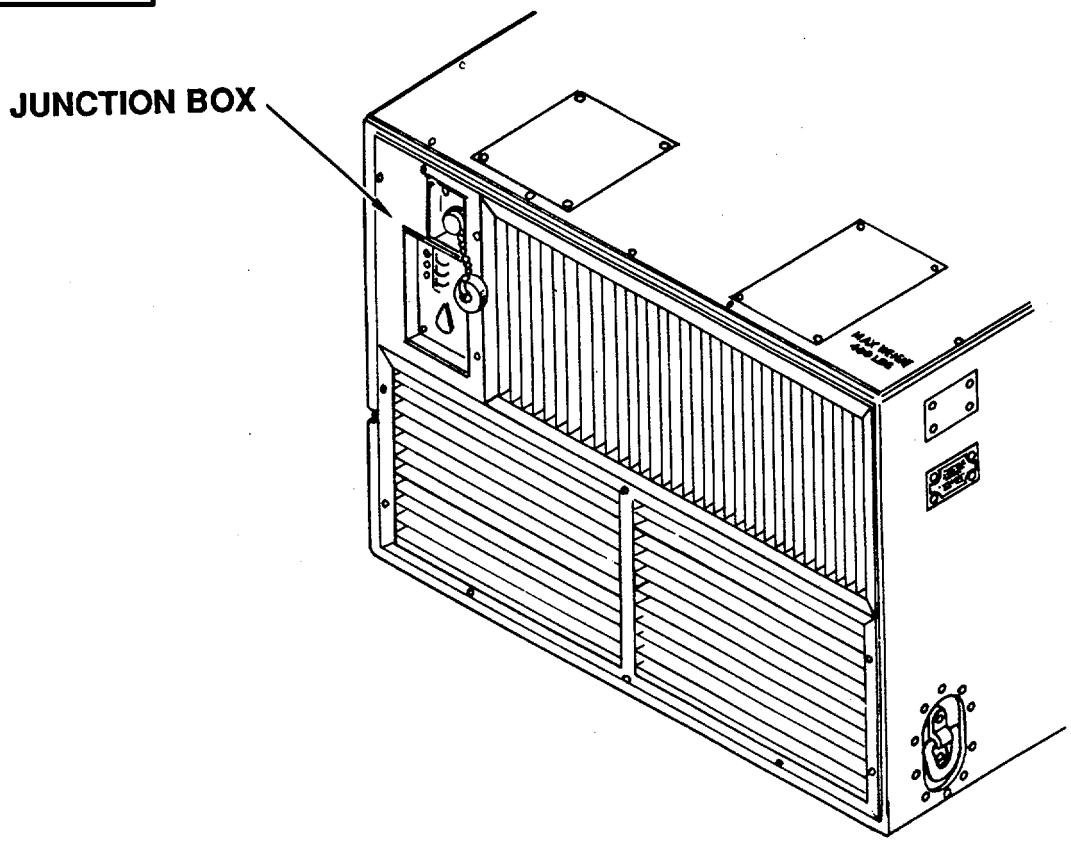


Figure 4-47. Junction Box

The junction box contains the majority of relays and terminal boards. Contained therein are the electrical connector (J1) with leads, terminal boards TB1 and TB2, condenser fan relay (K4), evaporator fan relay (K6), heater relays (K2 and K5), compressor relay (K3), time delay (K1), transformer (T1), junction box wiring harness and junction box (housing). See the following paragraphs for junction box parts.

a. Junction box removal/installation (See Para. 4-46).

b. Electrical connector (J1) with leads (See para. 4-47).

c. Terminal boards (TB1 and TB3) (See para. 4-48).

d. Compressor relay (K3), Condenser fan relay (K4), evaporator fan relay (K6) and heater relays (K2 and K5) (See para. 4-49).

e. Time delay relay (K1) (See para. 4-50).

f. Transformer (T1) (See para. 4-51).

g. Junction box wiring harness (See para. 4-52).

h. Junction box housing (See para. 4-53).

4-46. JUNCTION BOX REMOVAL/INSTALLATION

Preliminary Procedures:

1. Remove top cover (See para. 4-14).
2. Remove control module (See para. 4-38).

WARNING

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

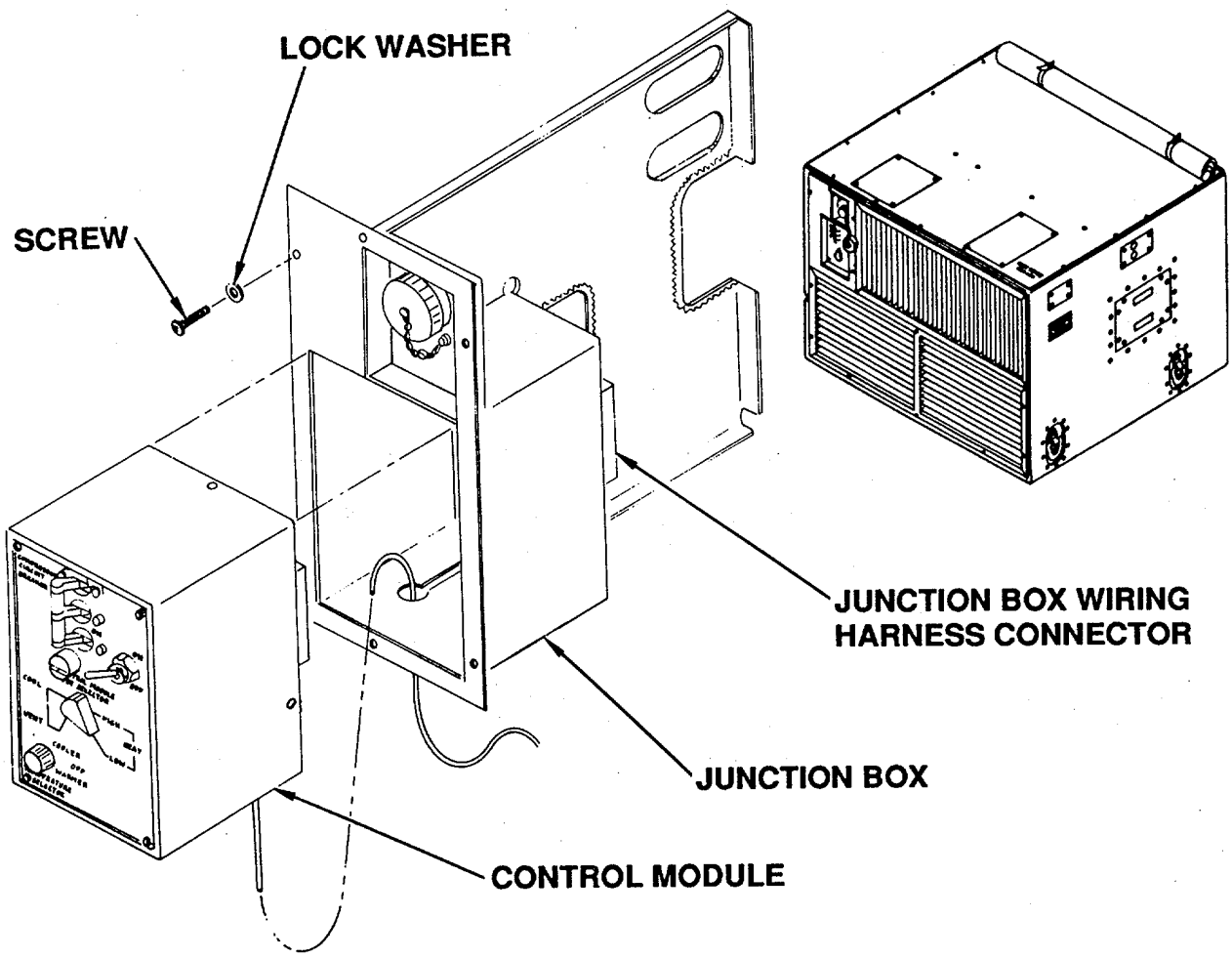


Figure 4-48. Junction Box Removal/Replacement

a. Removal

(1) Remove six screws and lockwashers that secure the junction box to casing.

(2) Pull junction box from unit until far enough to access TB1 and E5.

(3) See wiring diagram (FO-1), tag and remove leads as follows:

(a) J3-A, J3-B and J3-C from TB1 and E3 from ground E5.

(b) All leads from terminals on TB2, terminals 3 and 4 excepted.

(c) Leads from terminals 1 through 9 on TB4.

(d) Leads from terminals 1, 2 and 3 of TB5.

(e) Separate six push-on leads from evaporator blower motor B3.

(4) Pull junction box from unit.

b. Repair. Repair by component replacement.

c. Installation

(1) Push junction box in unit far enough to allow installation of leads.

(2) See tags and wiring diagram (FO-1) and connect leads removed in step a.(3) above.

(3) Align two pins in casing with two mating holes in junction box.

(4) Push junction box to engage with casing.

(5) Secure junction box to casing with six screws and lockwashers.

Follow-on procedures: 1. Install top cover (See para. 4-14).

2. Install control module. (See para. 4-38).

4-47. ELECTRICAL CONNECTOR (J1) HITH LEADS

Preliminary procedure: Remove junction box. (See para. 4-46).

WARNING

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

a. Inspection (Installed)

(1) Conduct continuity check on pins A, B, and C to ground (connector shell). Infinity reading on all tests must be shown. Any reading other than infinity means the connector is shorted and must be replaced.

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

(3) Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires. Replace and repair as needed (See para. 4-36).

(4) Check designation plate for readability. Replace if damaged.

(5) Check cover for damage. Replace if defective.

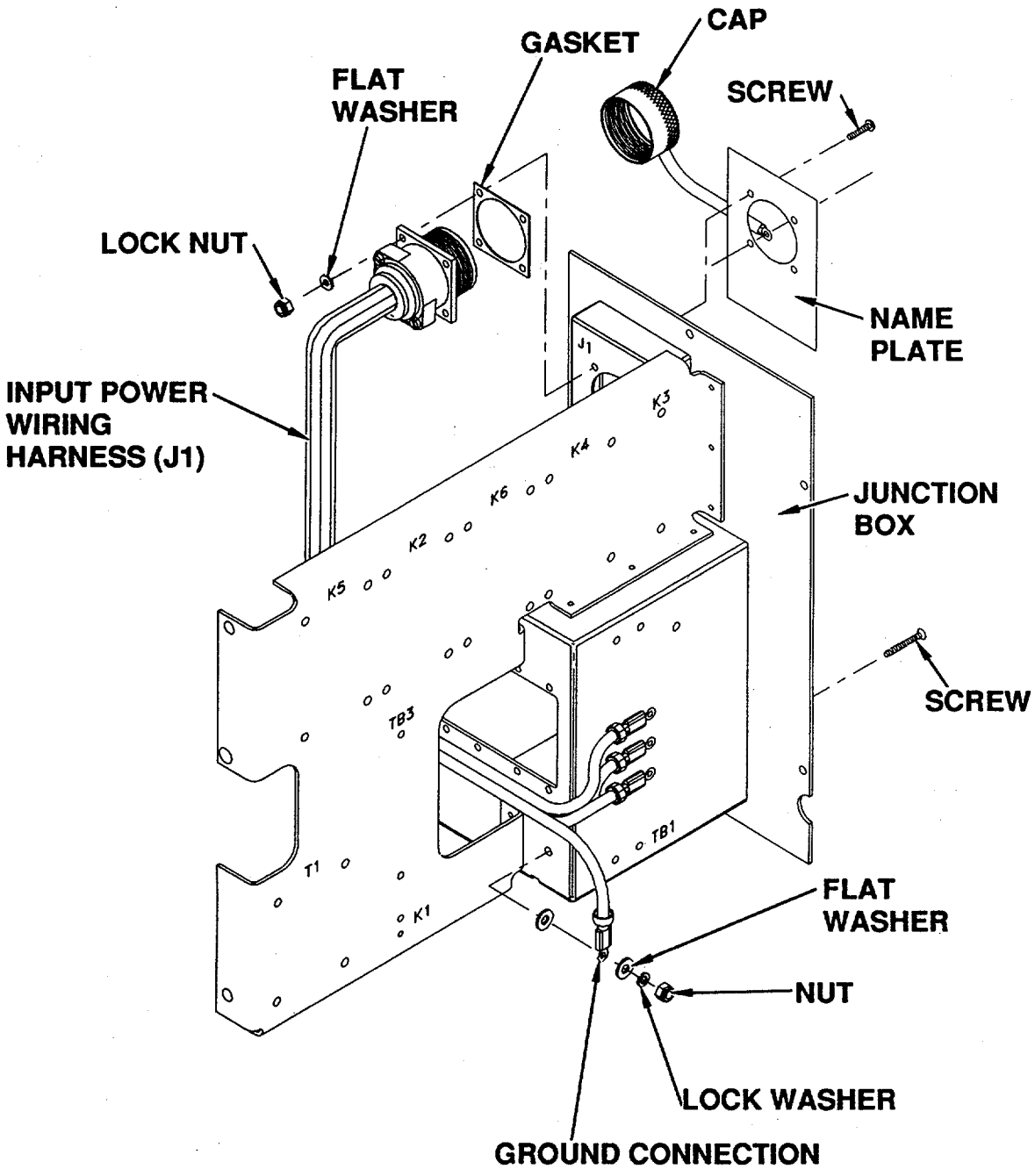


Figure 4-49. Electrical Connector (J1) with Leads

b. Removal

(1) Remove four screws, flat washers and lock nuts that secure connector and designator plate to junction box.

(2) Tag and disconnect wires.

(3) Remove connector, cover and designation plate.

c. Inspection.

(1) Check insulation for damage. Replace if defective.

(2) See wiring diagram (FO-1) and continuity test individual wires. Repair or replace wires with no continuity.

d. Repair

(1) See paragraph 4-36 for general wire repair instructions.

(2) See table 4-3 (wire list) for lengths and terminals/connector information.

e. Installation

(1) Using tags and wiring diagram (FO-1) connect leads.

(2) Align connector, cover and designate plate hole pattern with pattern of junction box.

(3) Secure the connector to junction box with three screws flat washers and lock nuts. (Upper two and lower left).

(4) Secure cover with screw, flat washers and self locking nut.

Follow-on procedure: Install junction box (See para. 4-46).

4-48. TERMINAL BOARDS (TB1 AND TB3)

Preliminary procedure: Remove junction box (See para. 4-46).

WARNING

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

a. Inspection

(1) Check terminal (TB1 and TB3) for loose or corroded terminals, cracks and obvious damage. Replace if cracked or broken.

(2) Check that wire leads are secure and properly located (See fig. 4-8).

(3) Check marker strips for damage. Replace as needed.

b. Removal

(1) Tag and remove wire leads.

(2) Remove four screws, flat washers and self locking nuts in terminal board (TB1).

(3) Remove two screws, flat washers and self locking nuts in terminal board (TB3).

(4) Remove terminal boards (TB1 and TB3) and two marker strips.

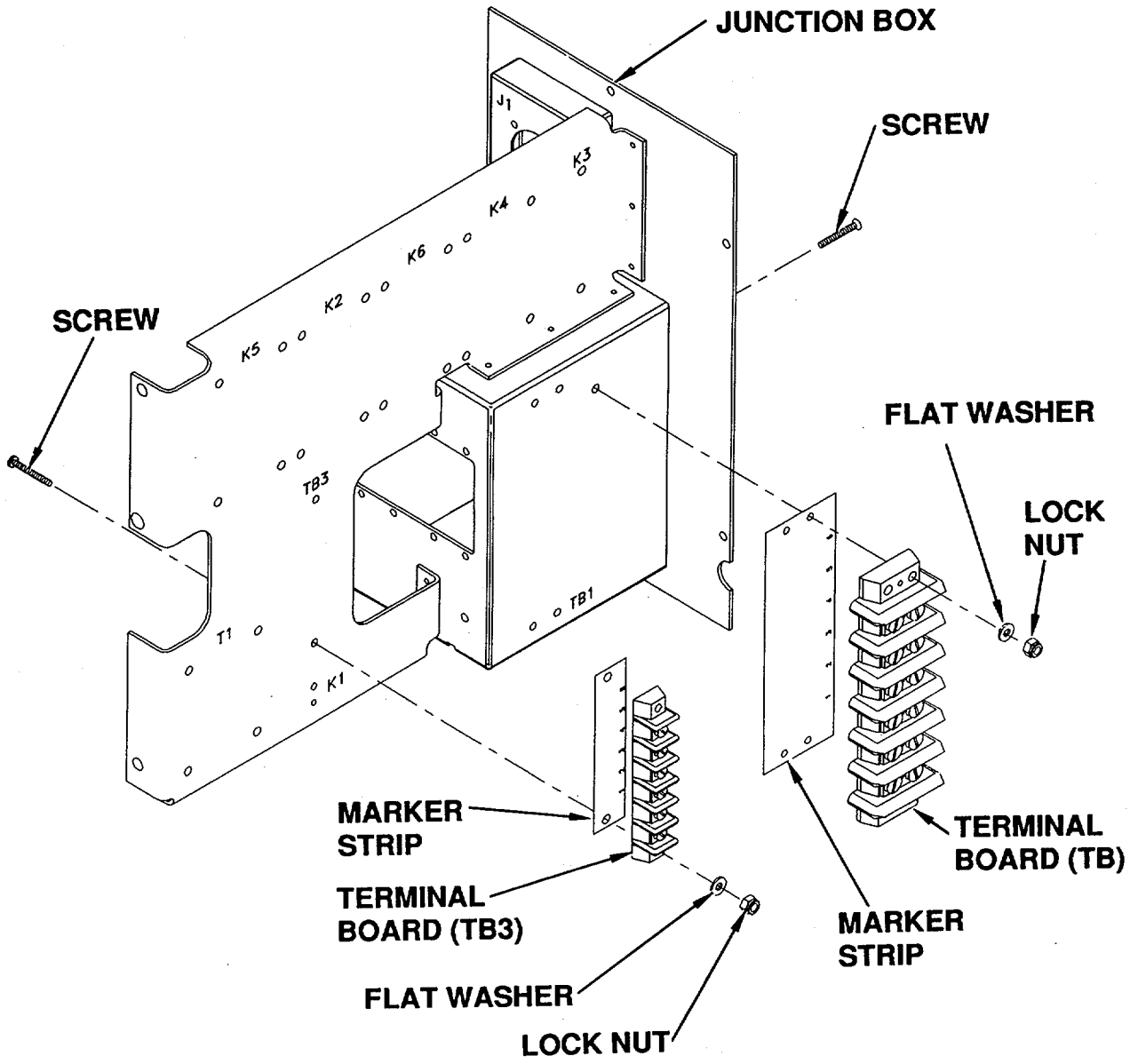


Figure 4-50. Terminal Boards (TB1 and TB3)

c. Installation

(1) Secure terminal board (TB3) and marker strip with two screws, washers and nuts.

(2) Secure terminal board (TB1) and market strip with four screws, washers and nuts.

(3) See tags and wiring diagram (FO-1) and connect wire leads. Remove tags.

Follow-on procedure: Install junction box. (See para. 4-46).

4-49. COMPRESSOR RELAY (K3), CONDENSER FAN RELAY (K4), EVAPORATOR FAN RELAY (K6) AND HEATER RELAYS (K2 AND K5)

WARNING

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

NOTE

The following procedures shall apply to relays K3, K4, K6, K2 and K5. Replacement parts are identical.

Preliminary procedure: Remove junction box (See para. 4-46).

a. Inspection

(1) Check for loose, corroded, or broken terminal connections. Replace defective relay.

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

b. Removal

(1) Tag and remove wire leads.

(2) Remove four screws, flat washers and self locking nuts in relay.

(3) Remove relay.

c. Test

(1) Using a continuity or a multimeter set on the lowest OHMS scale to check continuity between terminals L1 and T2, L2 and T2, L3 and T3. All three contacts should be open. If there is continuity, replace the relay.

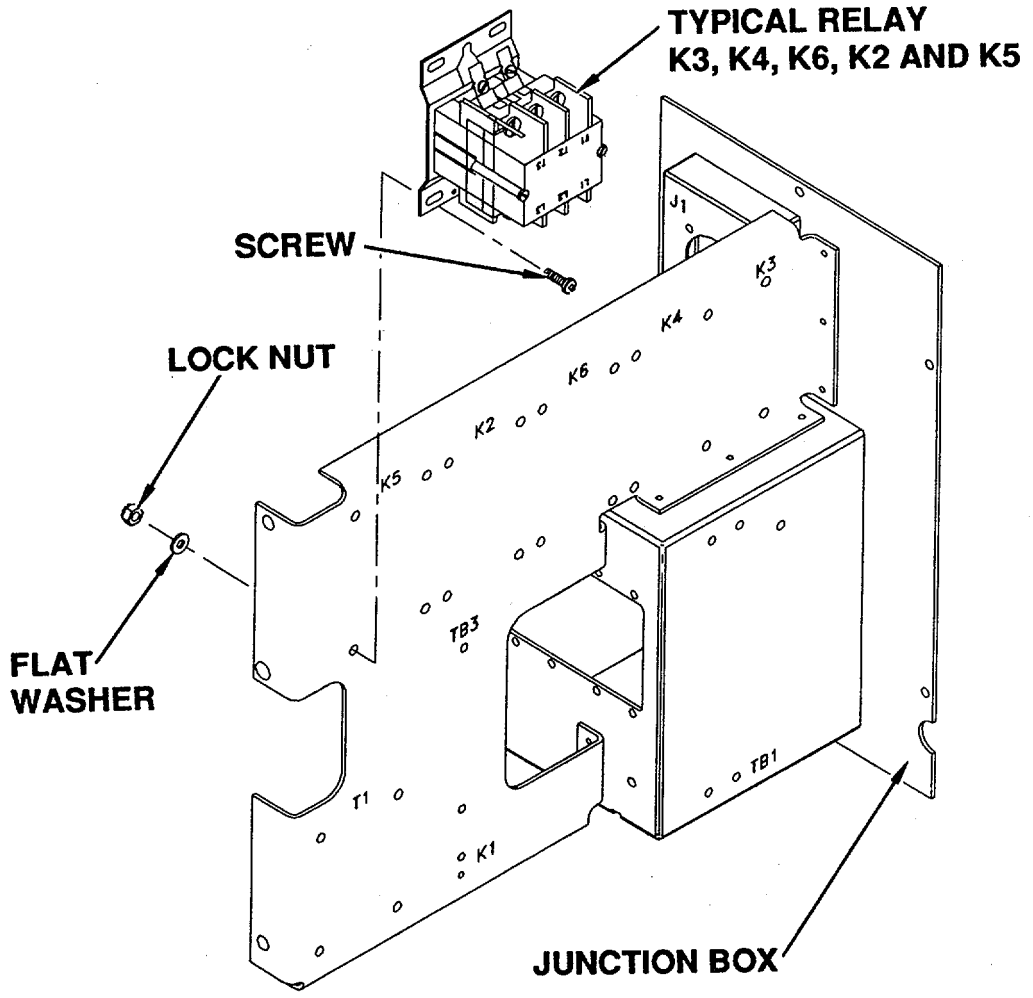


Figure 4-51. Relays K4, K6, K2 and K5

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

d. Installation

(1) Secure relay to junction box with four screws, flat washers and self locking nuts.

(2) See wiring diagram (FO-1) and tags and connect leads.

(3) Remove tags.

Follow-on procedure: Install junction box (See para. 4-46).

4-50. TIME DELAY RELAY (KI)

Preliminary procedure: Remove junction box (See para. 4-46).

WARNING

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

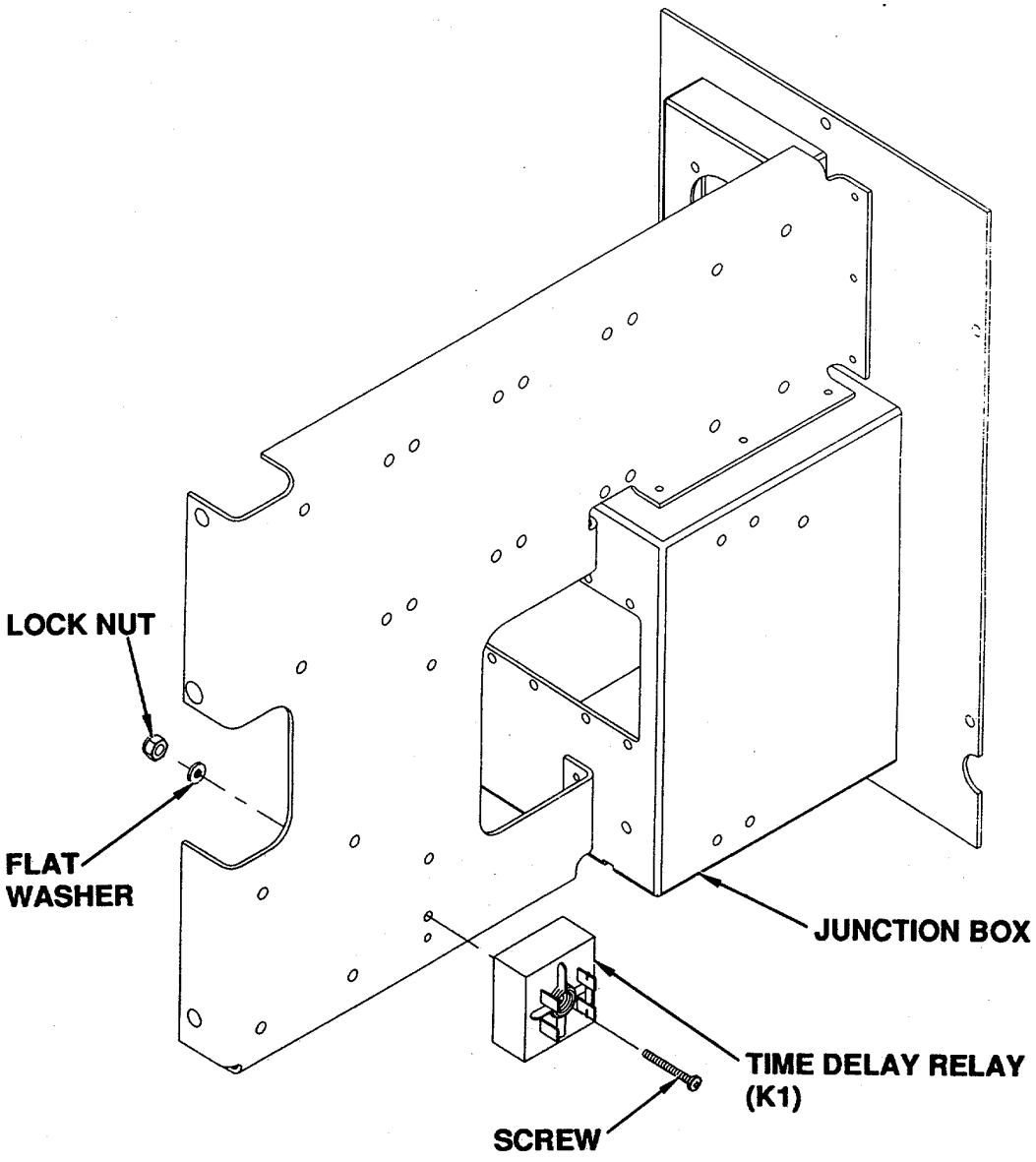


Figure 4-52. Time Delay (K1)

a. Inspection

(1) Check for loose wire connections.

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

b. Test

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

Terminal 1(+) to 2(-) - Continuity should not be indicated

Terminal 3 to 4 - Continuity should be 432K OHMS + 5%

(2) Set multimeter at appropriate voltage scale to measure 32 volts ac.

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

c. Removal

(1) Tag and disconnect wire leads.

(2) Remove screw, flat washer and selflocking nut from time delay relay.

(3) Remove relay.

d. Installation

(1) Align antirotation pin and mounting hole on time delay with holes in junction box.

(2) Secure relay to junction box with screw, flat washer and selflocking nut.

(3) See tags and wiring diagram (FO-1) and connect leads.

(4) Remove tags.

Follow-on procedure: Install junction box (See para. 4-46).

4-51. TRANSFORMER (T1)

Preliminary Procedure: Remove junction box (See para. 4-46).

WARNING

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

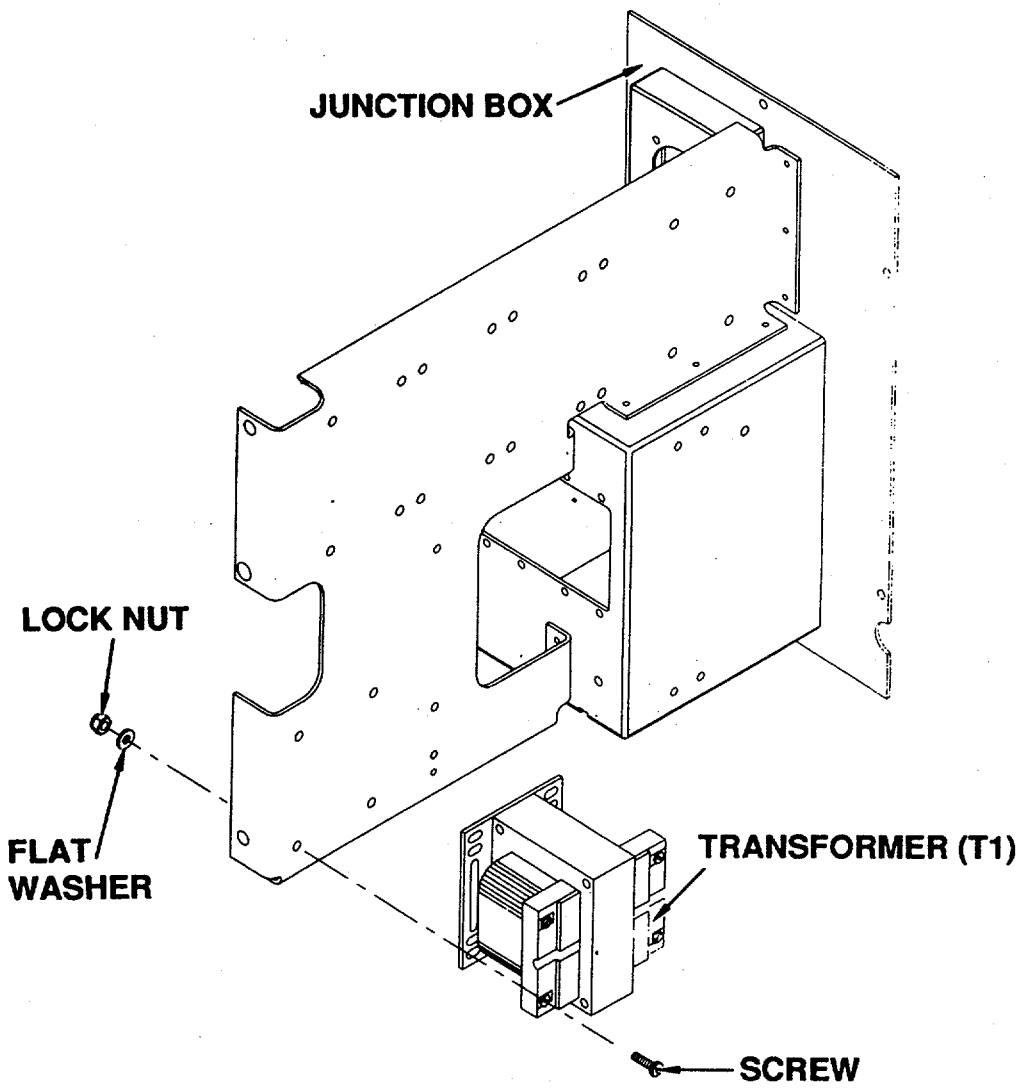


Figure 4-53. Transformer (T1)

a. Inspection

(1) Check for loose, missing or frayed insulation on leads. Solder or replace as needed.

(2) Check for burnt or damaged transformer. Replaced transformer if burnt or damaged.

b. Test

(1) Tag and remove transformer leads.

(2) Using a multimeter set on lowest OHMS scale probe terminal X1 to H1.

(3) If resistance is less than infinity (no continuity) the transformer is shorted. Replace transformer.

(4) Using a multimeter set on lowest OHMS scale, probe terminal H1 to H2. 5.

(5) Resistance reading should be 0.5 OHMS + 0.2. Replace transformer if criteria is not met.

(6) Using a multimeter set on lowest OHMS scale, probe terminal X1 to X2.

(7) Resistance reading should be 9 OHMS + 3 OHMS. Replace transformer if criteria is not met.

c. Removal

(1) Tag and disconnect the wires.

(2) Remove four screws, flat washers and selflocking nuts from transformer. Remove transformer.

d. Installation

(1) Align four holes in transformer to mounting hardware in housing.

(2) Using screwdriver, secure transformer to housing with four screws, four flat washers and four selflocking nuts.

(3) See tags, electrical wiring diagram (FO-1) and electrical wiring instructions (para. 4-36) and connect leads to transformer. Remove tags.

Follow-on procedure: Install junction box (See para. 4-46).

4-52. JUNCTION BOX WIRING HARNESS

Preliminary procedure: Remove junction box. (See para. 4-46).

WARNING

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

a. Inspection

(1) Check connector J1 for general condition and loose, brokenor missing contacts. Replace if damaged.

(2) Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation and cut or broken wires. Replace and repair as needed.

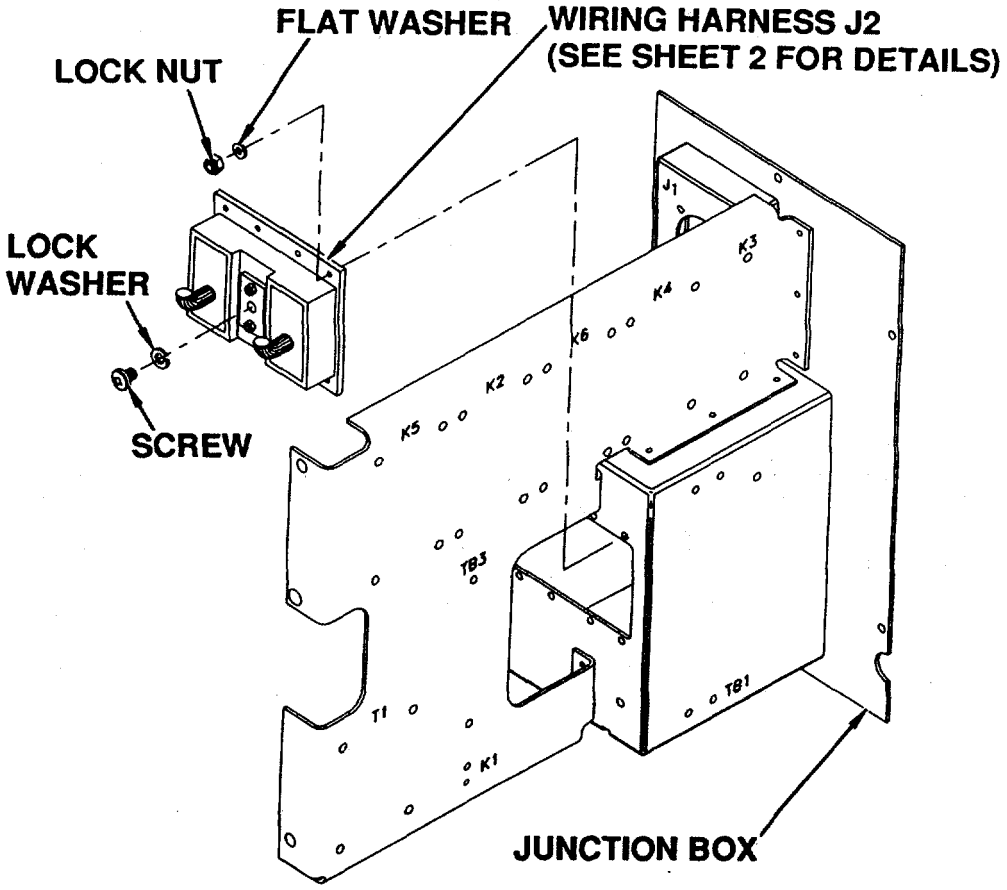


Figure 4-54. Junction Box Wiring Harness (Sheet 1 of 3)

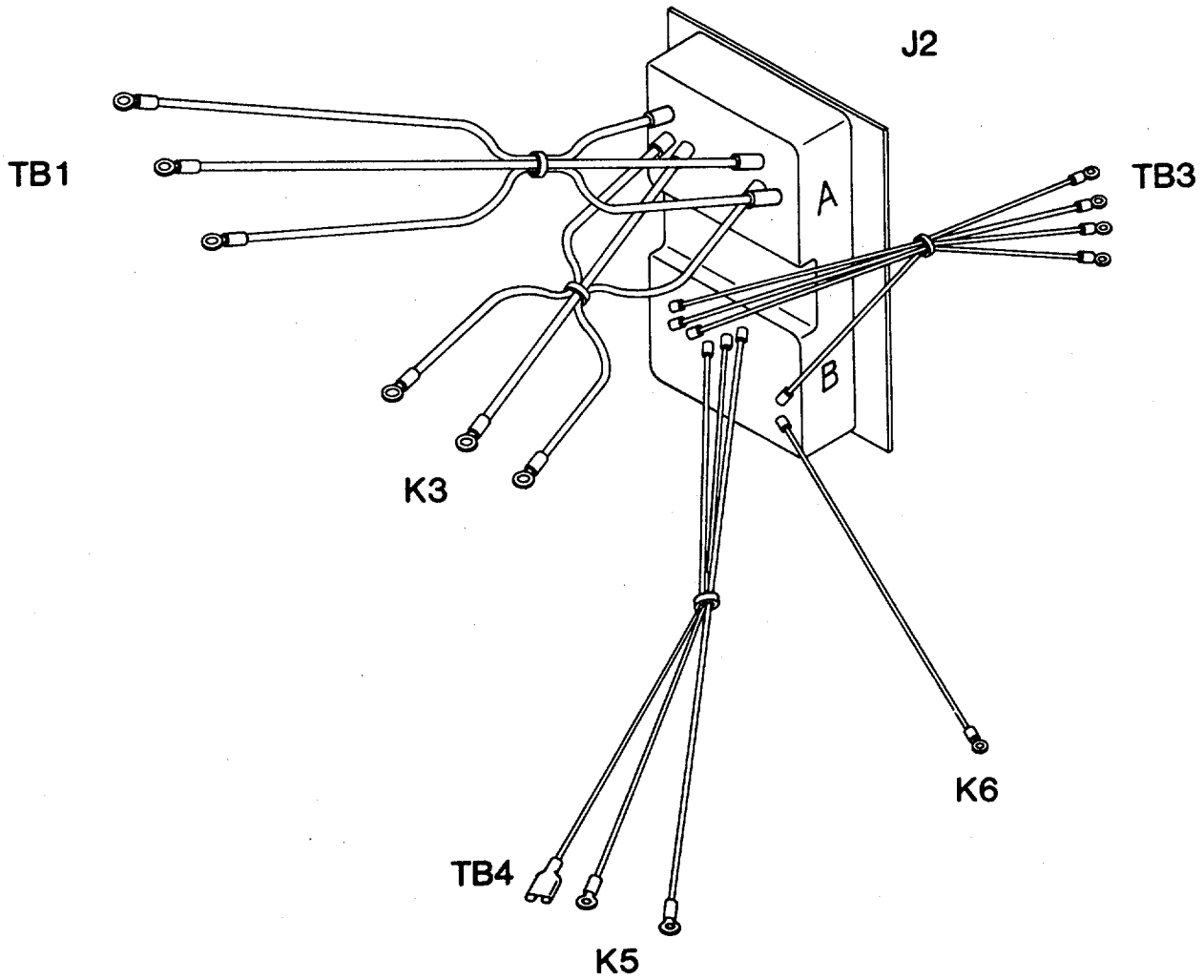


Figure 4-54. Junction Box Wiring Harness (Sheet 2 of 3)

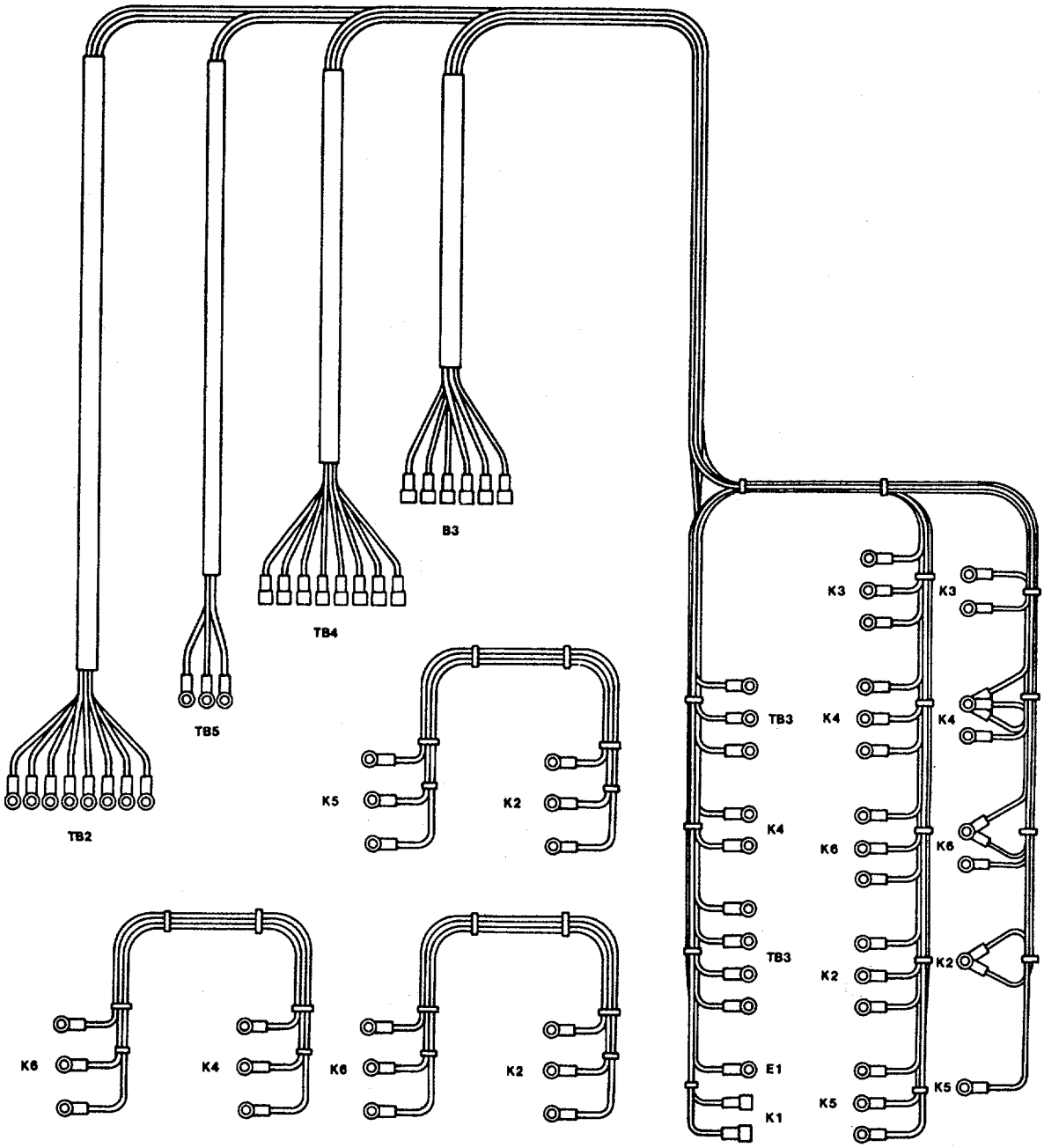


Figure 4-54. Junction Box Wiring Harness (Sheet 3 of 3)

b. Removal

(1) Using wrench and screwdriver, remove eight locknuts and screws that secure connector J1 to junction box.

(2) Cut ties as needed.

(3) Tag and disconnect all wire leads.

c. Test

(1) See wiring diagram (FO-1) and continuity test individual wires.

(2) Repair or replace wires with no continuity.

d. Repair

(1) See para. 4-36 for general wire repair instructions.

(2) See table 4-3 (wire list) for length and terminal connector information.

e. Installation

(1) Align eight holes in connector J1 to mounting hole in junction box.

(2) Secure connector J1 to junction box with eight screws and locknuts.

(3) See tags and wiring diagram (FO-1) and connect all wire leads. Remove tags.

(4) Install ties as needed.

Follow-on procedures: Install junction box (See para. 4-46).

4-53. JUNCTION BOX HOUSING

Preliminary procedures.

1. Remove junction box (See para. 4-46).
2. Remove electrical connector (J31) with leads (See para. 4-47).
3. Remove terminal boards (TB1 and TB3) (See para. 4-48).
4. Remove relays (K3, K6, K2 and K5) (See para. 4-50).
5. Remove time delay relay (K1) (See para. 4-50).
6. Remove transformer (T1) (See para. 4-51).
7. Remove junction box wiring harness (See para. 4-52).

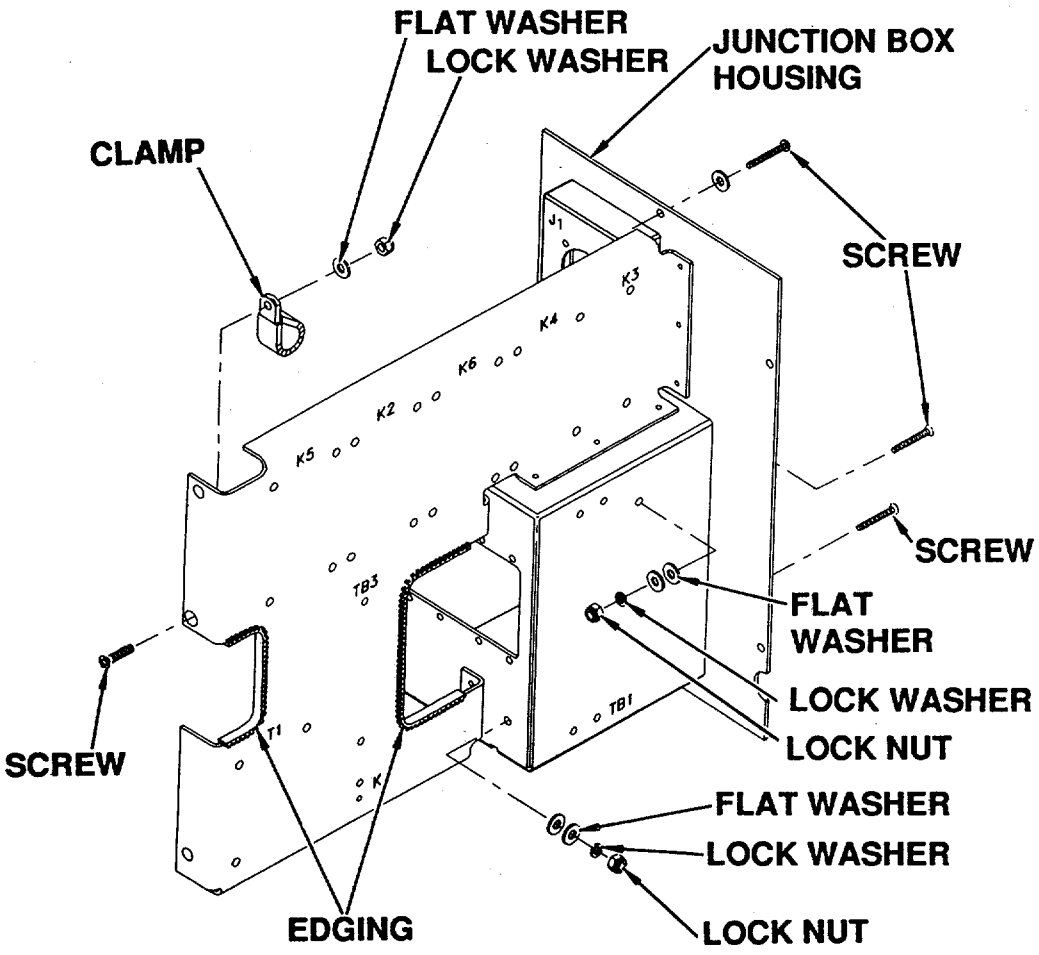


Figure 4-55. Junction Box Housing

a. Inspection

(1) Check junction box for dents, cracks, or punctures. Replace if damage creates a hazard or interferes with operation.

(2) Check for loose or missing edging (grommets).

(3) Check for loose or missing rivets.

(4) Check for bent, loose or missing clamps. Tighten or replace as needed.

b. Repair

(1) Repairs are limited to replacement of damaged or missing parts and tightening of clamps.

Follow-on procedures: Install junction box. (See para. 4-46).

1. Install junction box wiring harness (See para. 4-52).
2. Install transformer (T1) (See para. 4-51).
3. Install time delay relay (K1) (See para. 4-50).
4. Install relays (K3, K6, K2 and K5) (See para. 4-50).
5. Install terminal boards (TB1 and TB3) (See para. 4-48).
6. Install electrical connector (Jl) with leads (See para. 4-47).
7. Install junction box (See para. 4-46).

4-54. CONDENSER SECTION WIRING HARNESS

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

a. Inspection

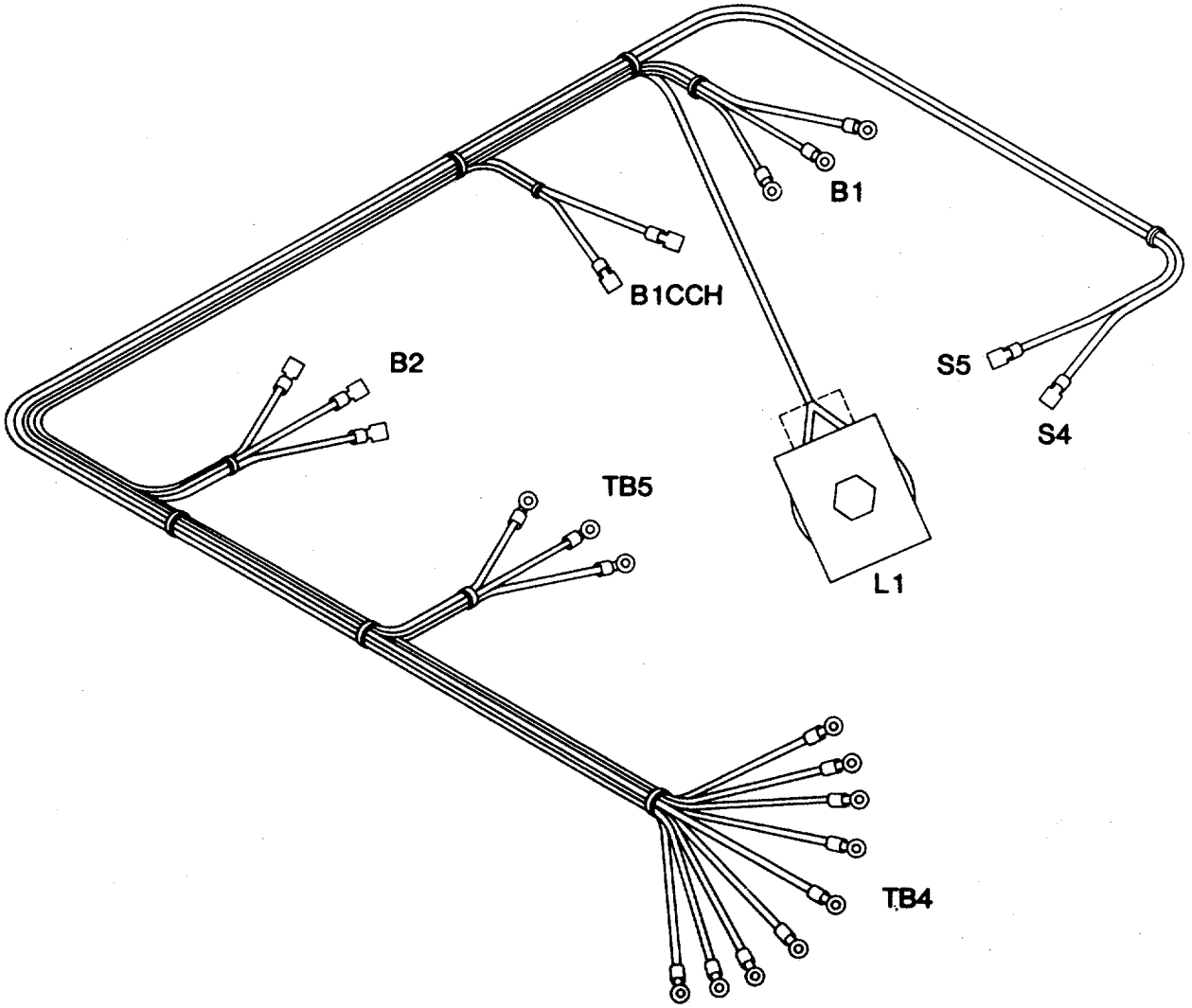


Figure 4-56. Condenser Section Wiring Harness

(1) Check individual wires for loose solder connections, loose terminal connections and cut or broken wires. Replace as needed.

(2) Check clamps for loose or missing hardware. Tighten and replace as needed.

b. Removal

(1) Tag and disconnect all wire leads.

(2) Cut ties as needed.

(3) Remove clamps as needed.

c. Test

(1) See wiring diagrams (FO-1) and continuity test individual wires with no continuity.

(2) Repair or replace wires with no continuity.

d. Repair

(1) See para. 4-36 for generalwire repair instructions.

(2) See Table 4-3 (wire list) for length and terminal lug connection information.

e. Installation

(1) See tags and wiring diagram (FO-1) and connect all wire leads. Remove tags.

(2) Install ties as needed.

(3) Install clamps as needed.

Follow-on procedure: Install top cover (See para. 4-14).

4-55. TERMINAL BOARDS (TB2, TB4 AND TB5)

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

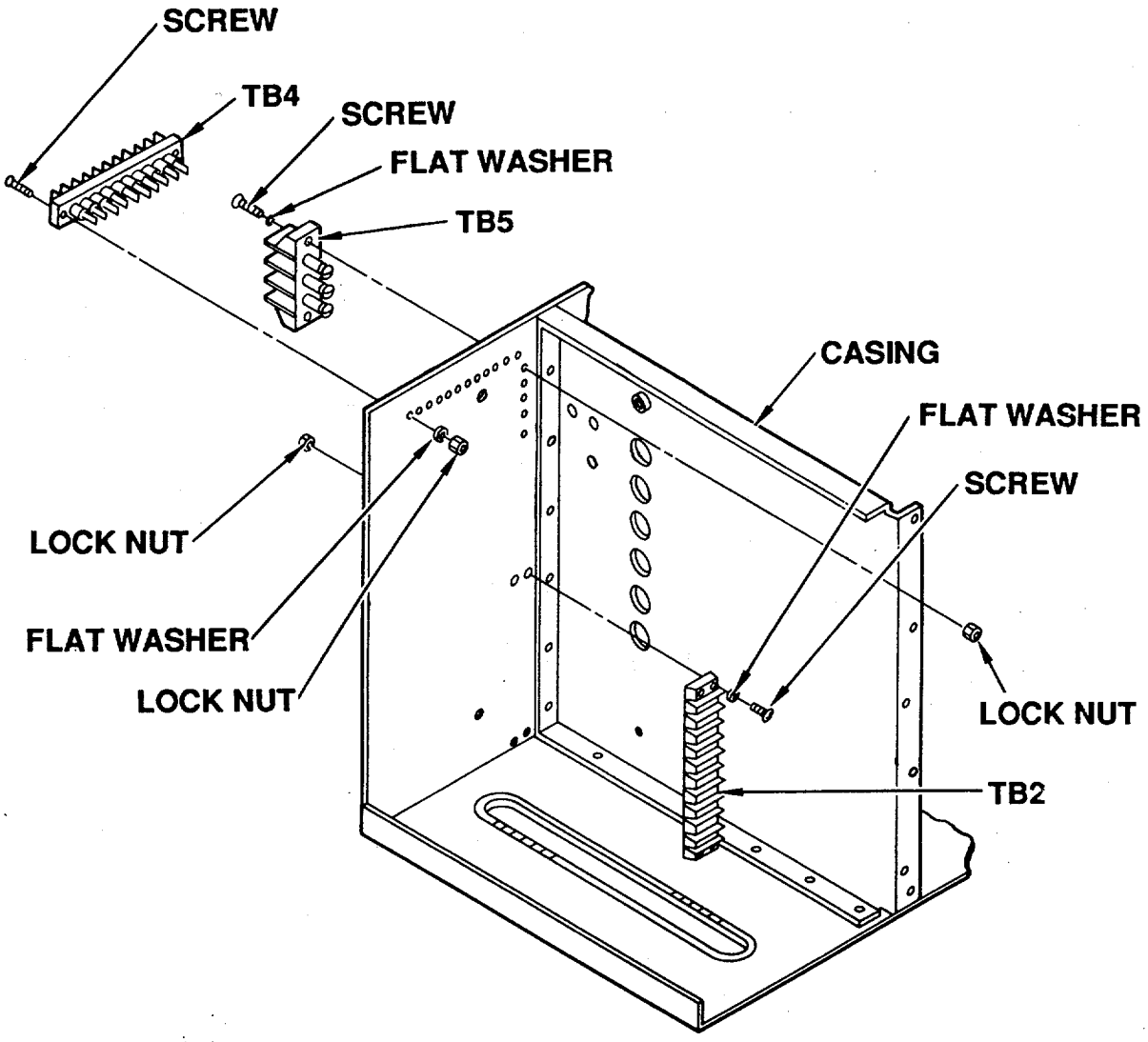


Figure 4-57. Terminal Boards (TB2, TB2 and TB5)

a. Inspection

(1) Check terminal boards (TB2, TB4 and TB5) for loose or corroded terminals, cracks and obvious damage. Replace if cracked or damaged.

(2) Check that wire leads are secure and properly located (see fig. 4-8).

b. Removal

(1) Remove six screws and washers, and slide junction box out (See para. 4-46).

(2) Tag and remove leads.

(3) Remove four screws, flat washers and lock nuts in terminal board TB2.

(4) Remove TB2 and marker strip.

(5) Remove two screws, flat washers, and lock nuts in terminal board TB4.

(6) Remove TB4.

(7) Remove two screws, flat washers, and lock nuts from terminal board TB5.

(8) Remove TB5.

c. Installation

(1) Secure TB2 and with four screws, flat washers and lock nuts.

(2) Secure TB4 with two screws, flat washers, and lock nuts.

(3) Secure TB5 with two screws, flat washers, and lock nuts.

(4) See tags and wiring diagram (FO-1) and connect wire leads. Remove tags.

(5) Slide junction box in and secure with six screws and washers (See para. 4-46).

Follow-on procedure: Install top cover (See para. 4-18).

4-56. HEATING ELEMENTS (HR1 THROUGH HR6)

Preliminary procedures: 1. Remove top cover (See para. 4-14).

2. Remove junction box (See para. 4-46).

WARNING

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

a. Inspection

(1) Check heating elements for deformation, damaged terminals, loose or missing nuts and cracked or broken outside covering.

(2) Check wires and terminals for frayed or broken wires and damaged terminals.

(3) Replace and repair as needed.

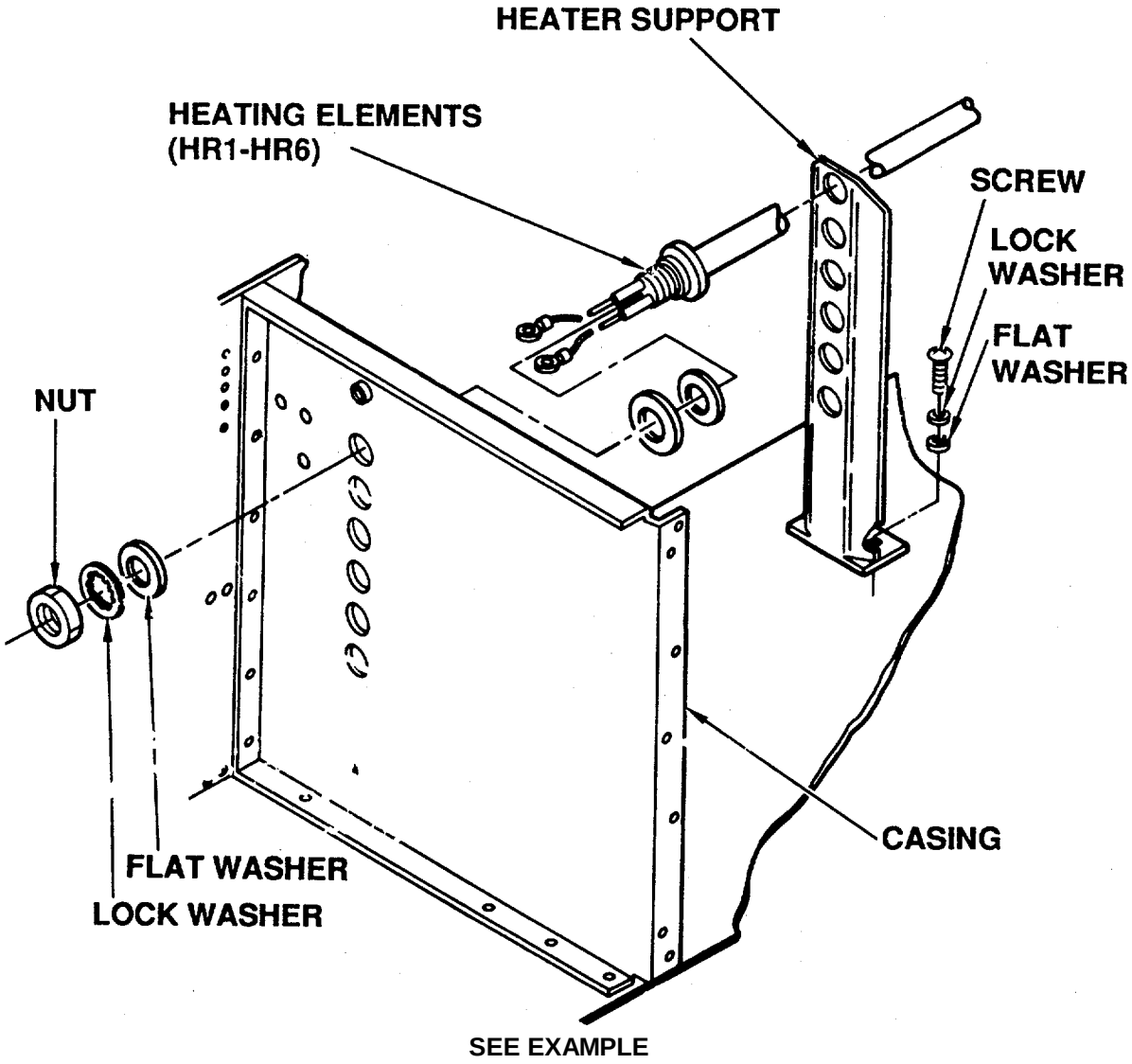


Figure 4-58. Heating Elements (HR1 through HR6)

b. Test

(1) Tag and remove wire leads of HR1 from TB2.

(2) Using a multimeter set on lowest OHMS scale, check continuity between two wire leads. Replace heating element if no continuity is indicated.

(3) Repeat steps (1) and (2) for HR2 through HR6.

(4) See tags and wiring diagram (FO-1) and reconnect leads of heater elements showing continuity to TB2.

c. Heater Removal

(1) Cut ties as needed.

(2) Disconnect wire leads from TB2.

(3) Remove two screws, washers and lockwashers from heater support.

(4) Separate the heater support from the six installed heating elements.

(5) Using wrench, remove mounting nut, flat washer and lockwasher (supplied with element) of the defective element.

(6) Remove defective heater element from casing.

d. Installation

(1) Remove nut, flat washer and lockwasher from replacement heater element.

(2) Thread two wire leads through element mounting hole in casing.

(3) Install heater element in mounting hole in casing.

(4) Loosely install washer, lockwasher and nut on replacement heater element.

(5) Install the heater support on six heater elements.

NOTE

It may be necessary to loosen nuts on all elements in order to more easily install heater support.

(6) Align two mounting holes in heater support with mounting hardware in casing.

(7) Secure heater support to casing with two screws, lockwashers and flat washers.

(8) Using wrench, tighten nuts on heater elements.

(9) See wiring diagram (FO-1) and connect wire leads.

(10) Install ties as needed.

Follow-on procedures: Install junction box (See para. 4-46).

Install top cover (See para. 4-14).

4-57. HEATER CUTOUT (THERMOSTAT) SWITCH (S2)

Preliminary procedure: Remove top cover (See para. 4-14).

WARNING

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

a. Inspect. Inspect for burned, broken or cut wires.

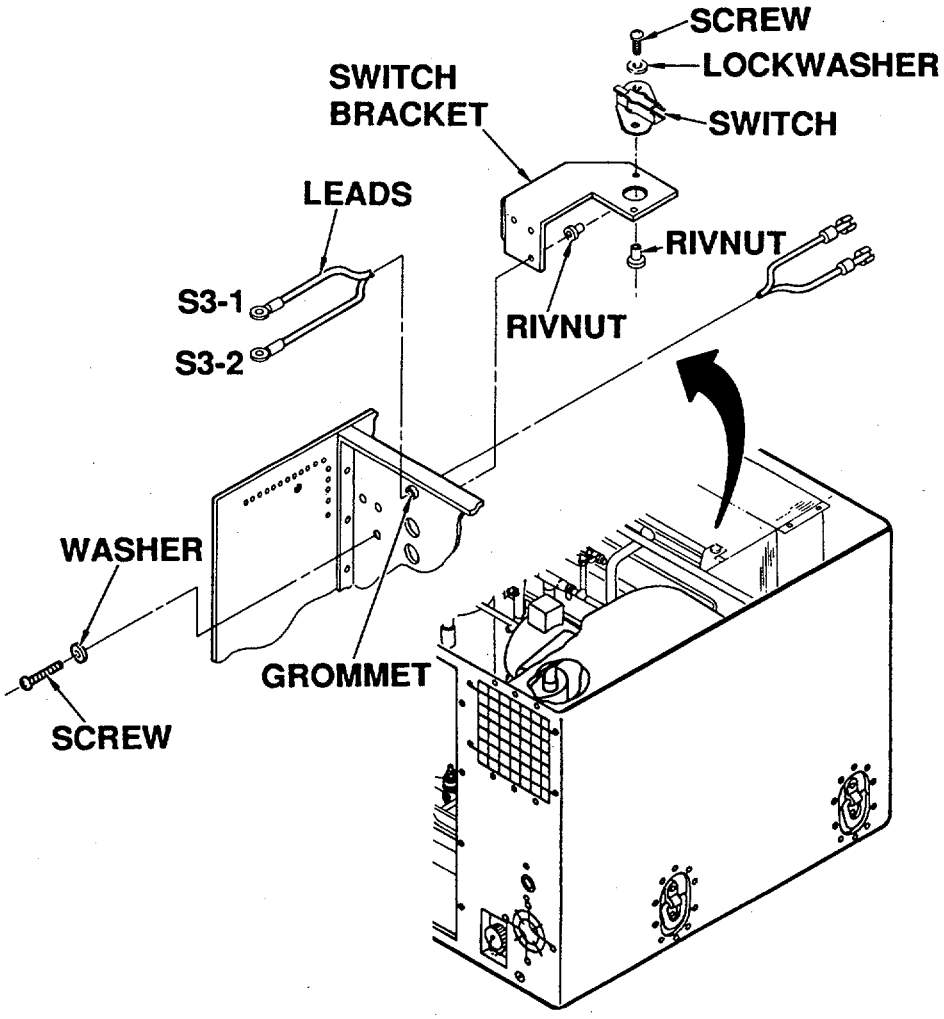


Figure 4-59. Heating Cutout (Thermostat) Switch (S3)

b. Removal.

(1) Tag and disconnect wire leads.

(2) Remove two screws and lockwashers from switch and switch bracket.

(3) Remove switch.

c. Test with switch at room temperature, use a multimeter set on lowest OHMS scale to check for continuity between contacts 1 and 3. If continuity is not indicated between contacts, replace the switch.

d. Installation

(1) Align holes in switch with mounting hardware of switch bracket.

(2) Secure switch to bracket with two screws and lockwashers.

(3) See tags and wiring diagram (FO-1) and connect leads. Remove tags.

Follow-on procedure: Install top cover (See para. 4-14).

4-58. AUXILIARY POWER CONNECTOR ASSEMBLY AND UNIT GROUND (E3)

WARNING

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

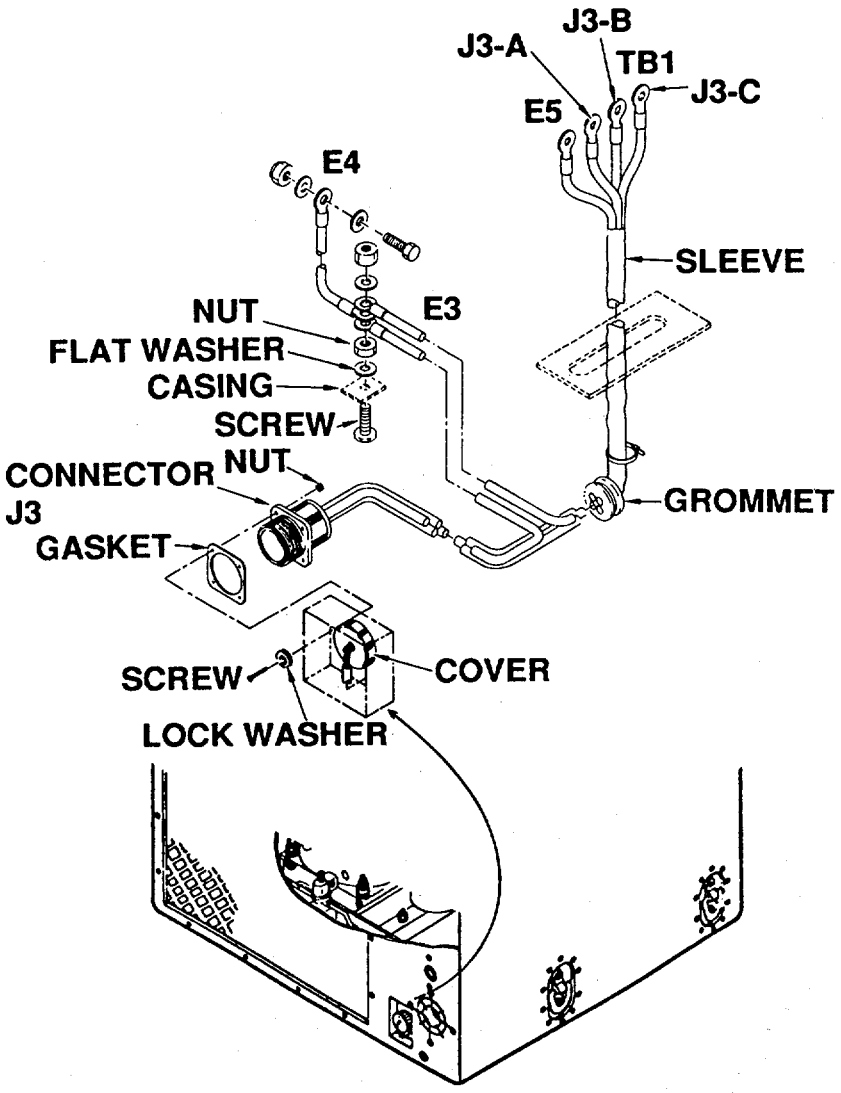


Figure 4-60. Auxiliary Connector Assembly and Unit Ground

Preliminary procedure: 1. Remove top cover (See para. 4-14).
2. Remove junction box (See para. 4-46).

a. Inspection/Test

(1) Conduct continuity check on each pin to ground (connector shell). Infinity reading on all tests must be shown. Any reading other than infinity means that connector is shorted and must be replaced.

(2) Check connector J3 for general condition and loose or missing contacts. Replace defective connector.

(3) Check individual wires for loose solder connections, and cut or broken wires.

(4) Check connection on TB1 for loose or missing hardware. Tighten or replace as needed.

(5) Check individual wires for loose or damaged terminal lugs. Repair as needed.

(6) Check ground connections E5 and E3 for loose or missing hardware. Tighten and replace as needed.

(7) See wiring diagram (FO-i) and continuity test individual wires.

(8) See para. 4-36, electrical wiring repair general and table 4-3, wire list.

(9) Repair and replace wires that do not meetcontinuity requirements.

b. Removal

(1) Remove two flat washers, two nuts and screw from E3 on casing. Tag leads.

(2) Cut cable ties.

(3) Remove four screws, lockwashers, and nuts that secure connector J3 (with cover) and gasket to casing.

(4) Remove grommet on bulkhead.

(5) Remove connector J3, cover and gasket.

(6) Remove sleeve.

(7) Pull bare leads through grommet hole and out of unit.

(8) Remove grommet.

c. Installation

(1) Thread leads J3-A, J3-B, J3-C and E5 into grommet.

(2) Push leads through grommet hole in bulkhead.

(3) Install sleeve on leads E5, J3-A, J3-B and J3-C.

(4) Align four mounting holes in casing with four holes in gasket.

(5) Secure cover, connector J3 and gasket to casing with four screws, lockwashers and nuts.

(6) Bundle leads and secure with cable ties.

(7) Install grommet in bulkhead.

(8) Apply sealant (Item I, Appendix E) at grommet/bulkhead interface and leads/grommet interface.

Follow-on procedures: 1. Install top cover (See para. 4-14).
2. Install junction box (See para. 4-46).

4-59. EVAPORATOR COIL INSPECTION/SERVICE

WARNING

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

Preliminary procedures: 1. Remove evaporator outlet louver (See para. 4-17).
2. Remove mist eliminator (See para. 4-20).

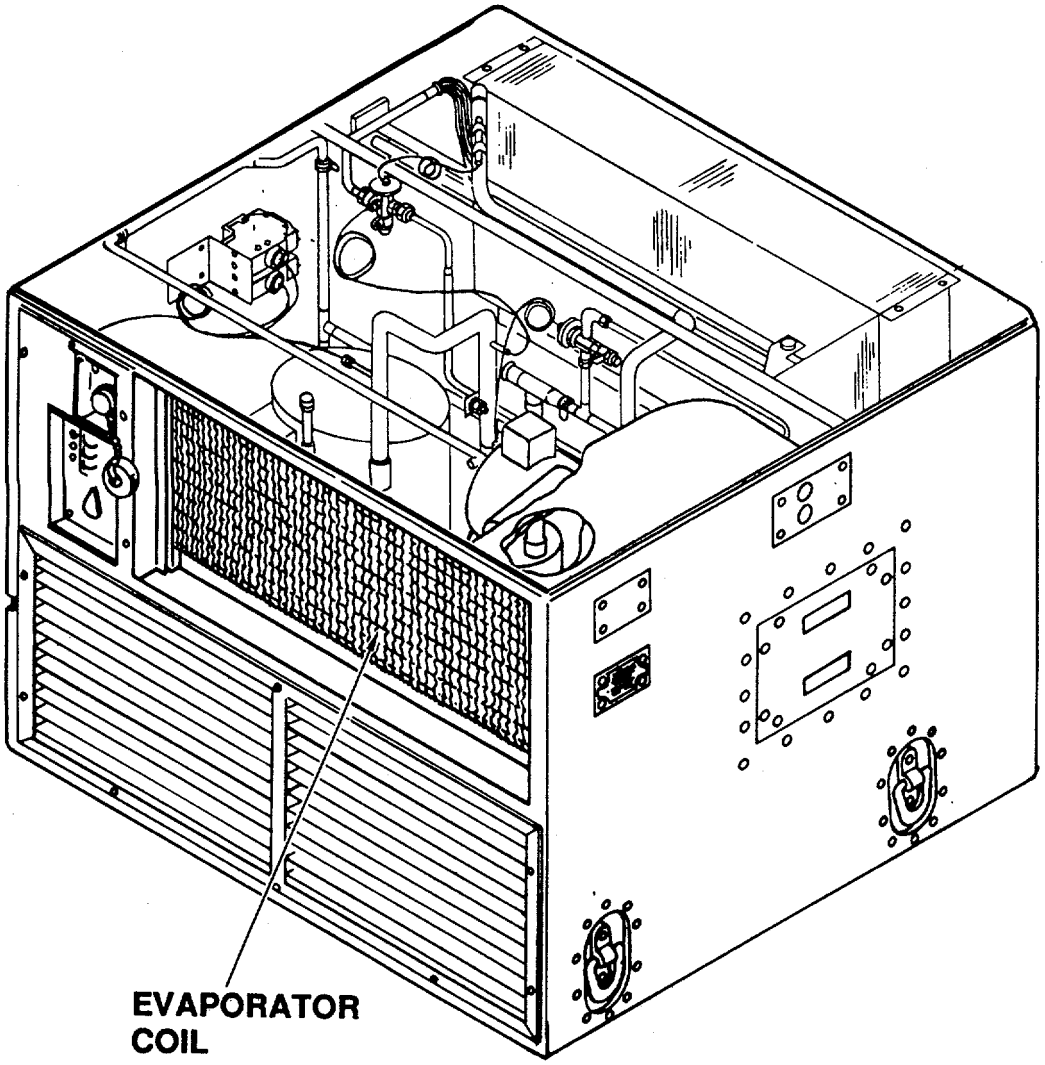


Figure 4-61. Evaporator Coil Inspection/Service

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 (Item 7, Appendix B).

WARNING

When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.

CAUTION

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm2).

CAUTION

Do not steam clean coil. Damage to coil may occur. Take care to avoid fin damage.

b. Cleaning. Clean coil with a soft bristle brush or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out.

c. Repair/Replacement. Should a leak or major damage be evident, contact your supervisor and Direct Support Maintenance.

Follow-on procedures: 1. Install mist eliminator (See para. 4-20).

2. Install evaporator outlet louver (See para. 4-17).

4-60. CONDENSER COIL INSPECTION/SERVICE

Preliminary procedure: Remove top cover. (See para. 4-14).

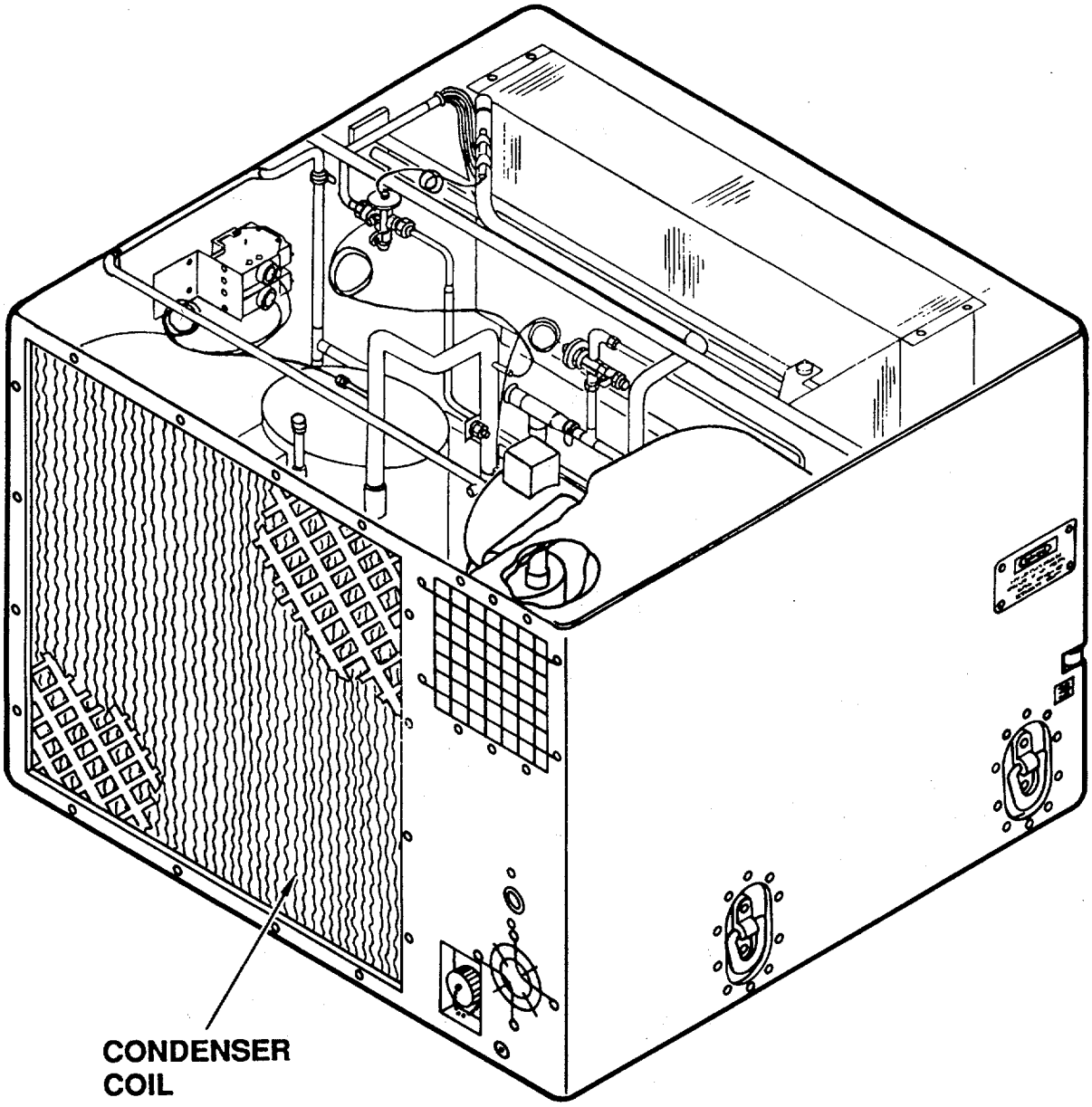


Figure 4-62. Condenser Coil Inspection/Service

a. Inspection of installed coil.

(1) Check for accumulated dirt.

(2) Clean if an accumulation of dirt is evident.

WARNING

When using compressed air wear safety goggles. Dirt can be blown in eyes.

CAUTION

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kb/cm2).

CAUTION

Do not steam clean coil. Damage to coil may occur, take care to avoid fin damage.

b. Cleaning. Clean coil with a soft bristle brush or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out.

c. Repair/Replacement. Should a leak or major damage be evident, contact your supervisor and Direct Support Maintenance.

Follow-on procedure: 1. Install top cover (para. 4-14).

SECTION VI PREPARATION FOR STORAGE OR SHIPMENT

4-61 PREPARATION FOR STORAGE

a. Administrative storage of equipment. See TM 740-901. 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 administrative storage site should provide required protection from the elements and allow access for visual inspection when applicable.

(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 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 9-4120-389-24P Repair Parts and Special Tools List (RPSTL), covering unit, direct support, and general support maintenance for this equipment.

SECTION II MAINTENANCE PROCEDURES

5-2. 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 form 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.

5-3. DISCHARGING THE REFRIGERANT SYSTEM

Preliminary procedure. Remove access cover (See para. 4-15).

a. Unscrew hose connection protective caps.

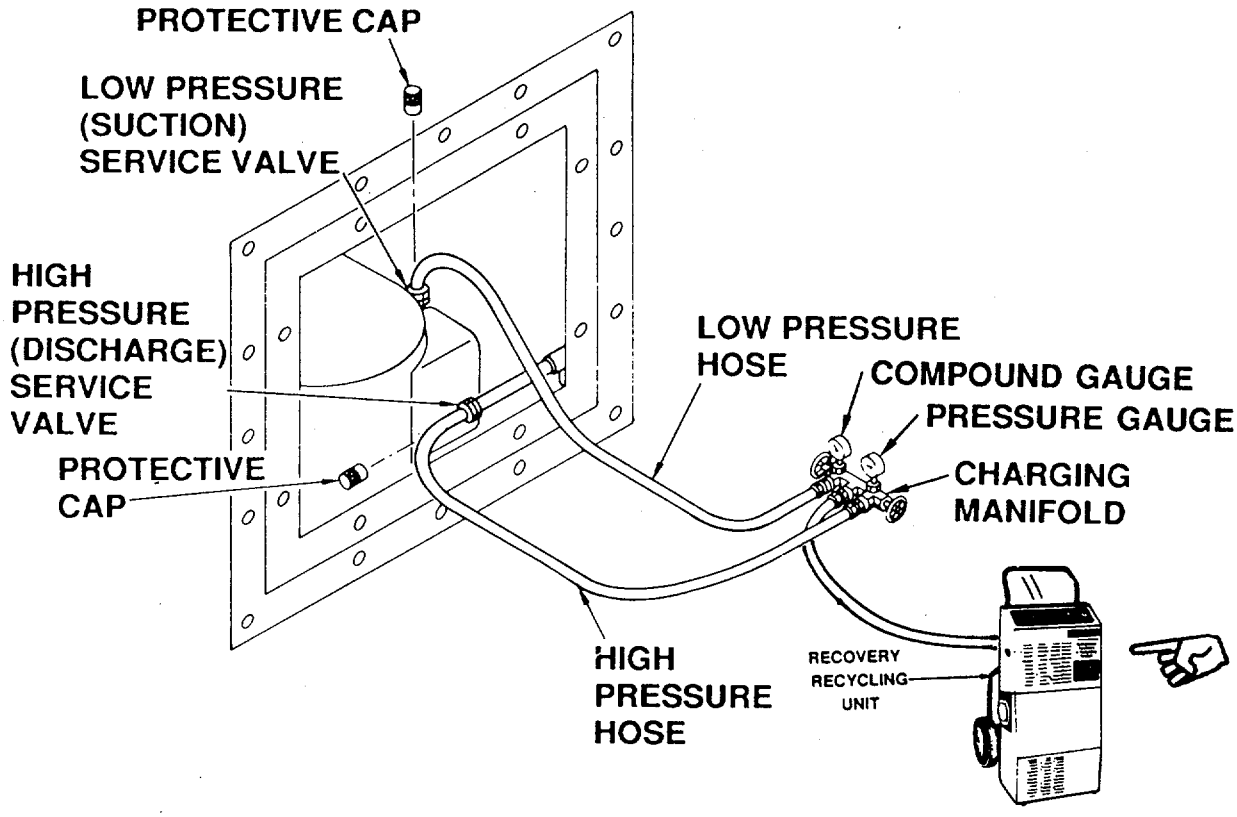


Figure 5-1. Discharging Refrigerant

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.

WARNING

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.

b. Connect the charging manifold hoses to the manifold and air conditioner service valves.

c. Attach a hose assembly to the center connection of the manifold.

d. Connect and operate a recovery/recycling unit in accordance with the manufacturer's instructions.

WARNING

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

NOTE

In accordance with Environmental Protection Agency regulations, refrigerants cannot be discharged into the atmosphere. A recovery/recycling unit must be used whenever discharging the unit.

Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

5-4. PURGING THE REFRIGERANT SYSTEM

Preliminary procedure: Discharge the refrigerant system. (See para. 5-3).

Supplies: Nitrogen cylinder (item 4, Appendix E)

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.

NOTE

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 between I and 2 cfm (0.028-0.057) m3/minutes) should be continued during all brazing operations to minimize internal oxidation and scaling.

a. Discharge system (See para. 5.3).

b. Connect the center hose from the charging manifold to a nitrogen regulator (Item 5, Appendix B) and dry nitrogen tank (Item 4, Appendix E).

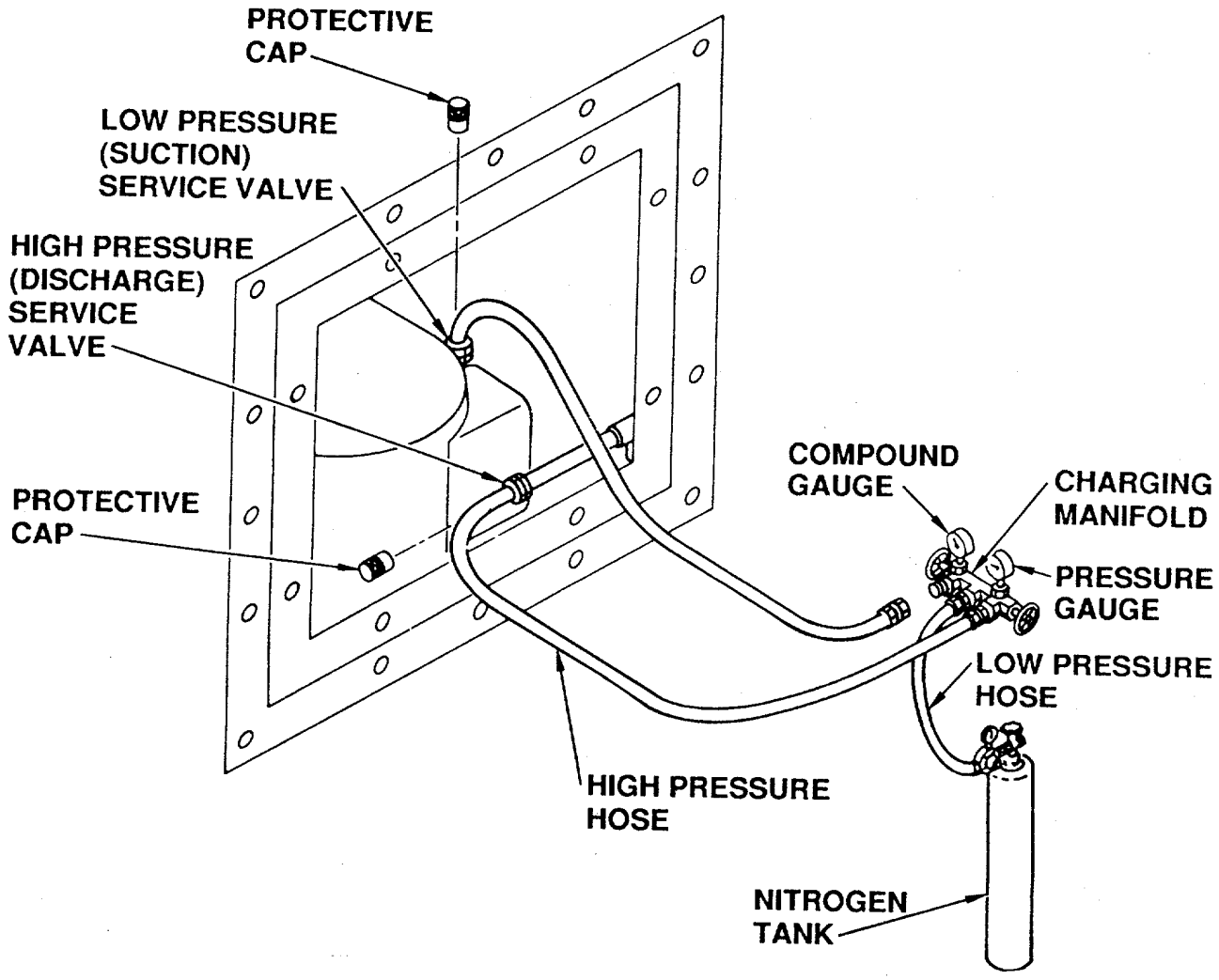


Figure 5-2. Nitrogen Purging Connection

c. The hose from the high pressure service valve to the charging manifold must beconnected.

d. The hose from the low pressure service valve must be disconnected from the charging manifold.

e. Close the unused valve on the charging manifold, and open the one with the nitrogen tank hook up.

f. Open the nitrogen cylinder valve and adjust the regulator so that I to 2 cfm (0.028-0.057 m3/minute) of nitrogen flows through the system.

g. Check discharge from hose attached to the low pressure charging valve to be sure that no oil is being forced out of the system.

h. Allow nitrogen to sweep through the system at the rate of less than 1 - 2 cfm (0.028-0.057 m3minute) 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 para. 5-5 for brazing/debrazing procedures).

i. After installation brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes.

j. Close nitrogen cylinder valve, nitrogen regulator and charging manifold valve.

k. Disconnect the hose from the nitrogen tank.

l. Replace filter dryer (See para. 5-10).

m. Leak test system (See para. 5-6).

5-5. 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 apply heat sink (Item 28, Appendix E) to all but joint. (If heat sink is not available a wet rag may be used).

WARNING

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

(3) Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of 1 to 2 cfm (0.028-0.057 m31minute).

(5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted. Remove heat as soon as the joint separates.

d. Cleaning debrazed joints. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a damp cloth. Be sure no filler alloy or other debris are left inside any tubing, fitting, or component.

e. Reassembly. If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.

f. Brazing. Braze joints within the air conditioner as follows:

(1) Position the component to be installed.

(2) To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then apply heat (Item 28, Appendix E) sink to all but the joint. (If heat sink is not available a wet rag may be used).

(3) Protect insulation, wiring harnesses, and surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of 1 to 2 cfm (0.028-0.057 m3/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.

5-6. 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 by 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 re-charge 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 charging manifold valves.

(e) Open the nitrogen tank valve and pressurize the system to 350 psi (24.7 kg/cm2).

(f) Perform leak tests.

(g) If a leak is 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. 5-8).

(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.

CAUTION

Connect the refrigerant -22 drum so that only gas will be used for pressurization.

(c) Connect a drum of refrigerant -22 to the center hose connection of the charging manifold.

(d) Open 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/cm2).

(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/cm2).

(j) Perform leak tests, then discharge and purge the system, in accordance with para.graphs 5-3 and 5-4 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.

5-7. EVACUATING THE REFRIGERANT SYSTEM

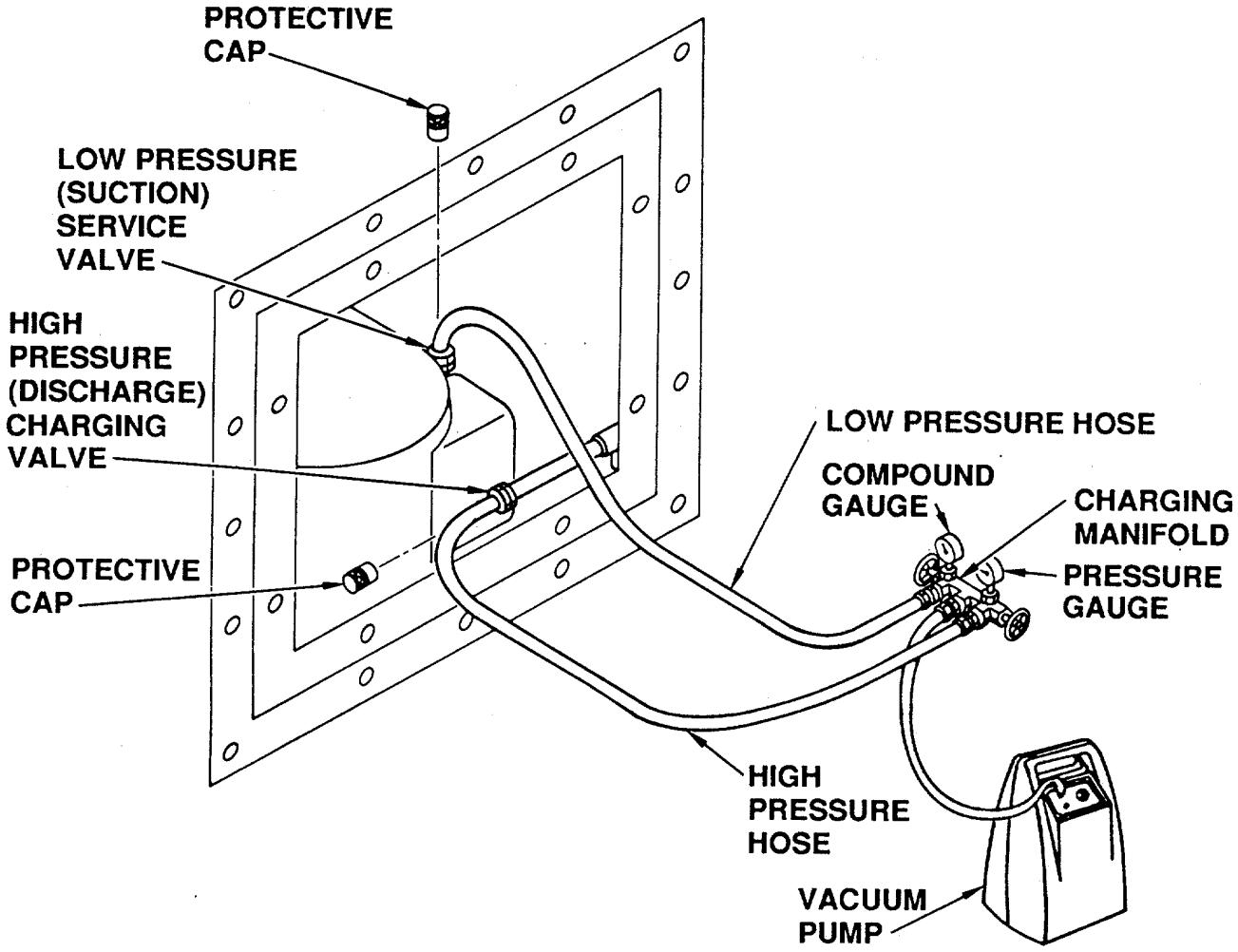


Figure 5-3. Evacuation of Refrigeration System

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. 5-6).

b. Check that new filter-drier was installed. If not, install one (See para. 5-10).

c. Check that both 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. 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.

i. 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.

j. Close charging manifold valves.

k. Stop vacuum pump.

l. Disconnect pump from center hose connection.

m. Charge the refrigeration system per para. 5-8.

5-8. CHARGING THE REFRIGERATION SYSTEM

Supplies: Dehydrator
Refrigerant-22 (Drum) (item 10, Appendix E)

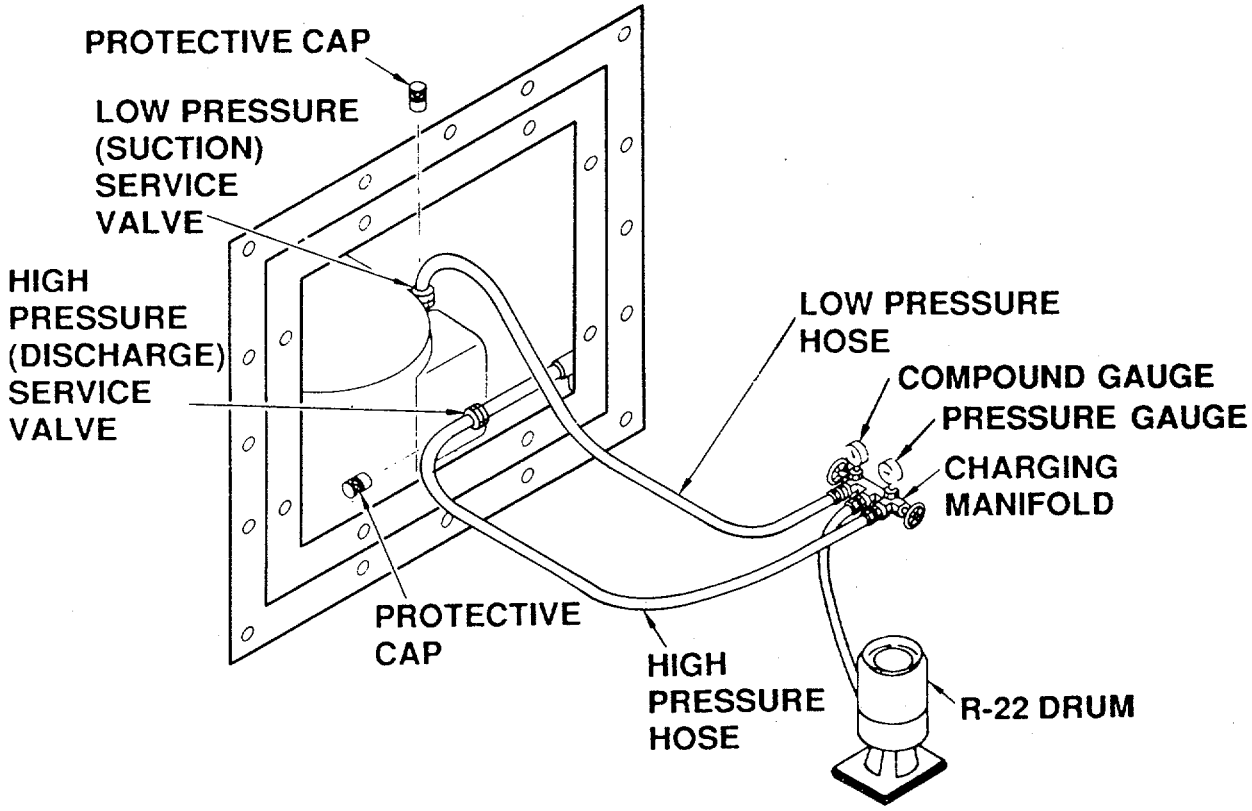


Figure 5-4. Refrigerant Charging

After the system has been satisfactorily evacuated, it must be fully charged with refrigerant-22.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) service valve.

NOTE

The system must be evacuated before charging. Use only refrigerant-22 to charge the unit. If available, use recycled refrigerant.

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.

c. 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 valve 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. Allow liquid refrigerant to enter the system until the drum weight has decreased by 8.5 pounds (3.9 kg) or until system pressure has equalized.

k. Close the refrigerant drum valve and the high pressure (discharge) manifold valve.

l. Connect power.

m. Be sure circuit breakers are on.

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.

p. If the 8.5 pounds(3.9 kg) full charge was obtained, skip steps q thru s. If I the system pressure equalized prior to obtaining a full charge of 8.5 pounds (3.9 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 and the low (suction) pressure charging manifold valve.

s. Monitor the weight of the refrigerant drum as the air conditioner compressor pulls additional refrigerant gas into the system until the full '8.5 pound (3.9 kg) m charge is obtained. When the system is fully charged, immediately close the refrigerant drum valve.

t. Run the air conditioner in COOL mode (with temperature control thermostat in full COOLER position) 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.

NOTE

Milky white or bubbly liquid means the system has a low charge. Clear bubble-free liquid around the center means the system is fully charged.

v. If charge is low, add gas refrigerant.

(1) Be sure that drum is switched to gas position. Open the drum valve.

(2) Continue to charge until sight glass is clear and bubble-free.

(3) Close the refrigerant drum valve.

w. Check air conditioner for proper cooling. There should be at least a 15 deg. F temperature difference between evaporator discharge air and the inlet air. Turn the mode selector switch to OFF.

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 form 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.

x. Remove the charging manifold hoses from the air conditioner charging valves.

y. Install service valve protective caps.

z. Using screwdriver, secure charging valve access cover with eight screws.

5-9. REFRIGERANT PRESSURE CHECK

Preliminary procedure. Remove access cover (See para. 4-15).

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. Remove protective caps from charging valves.

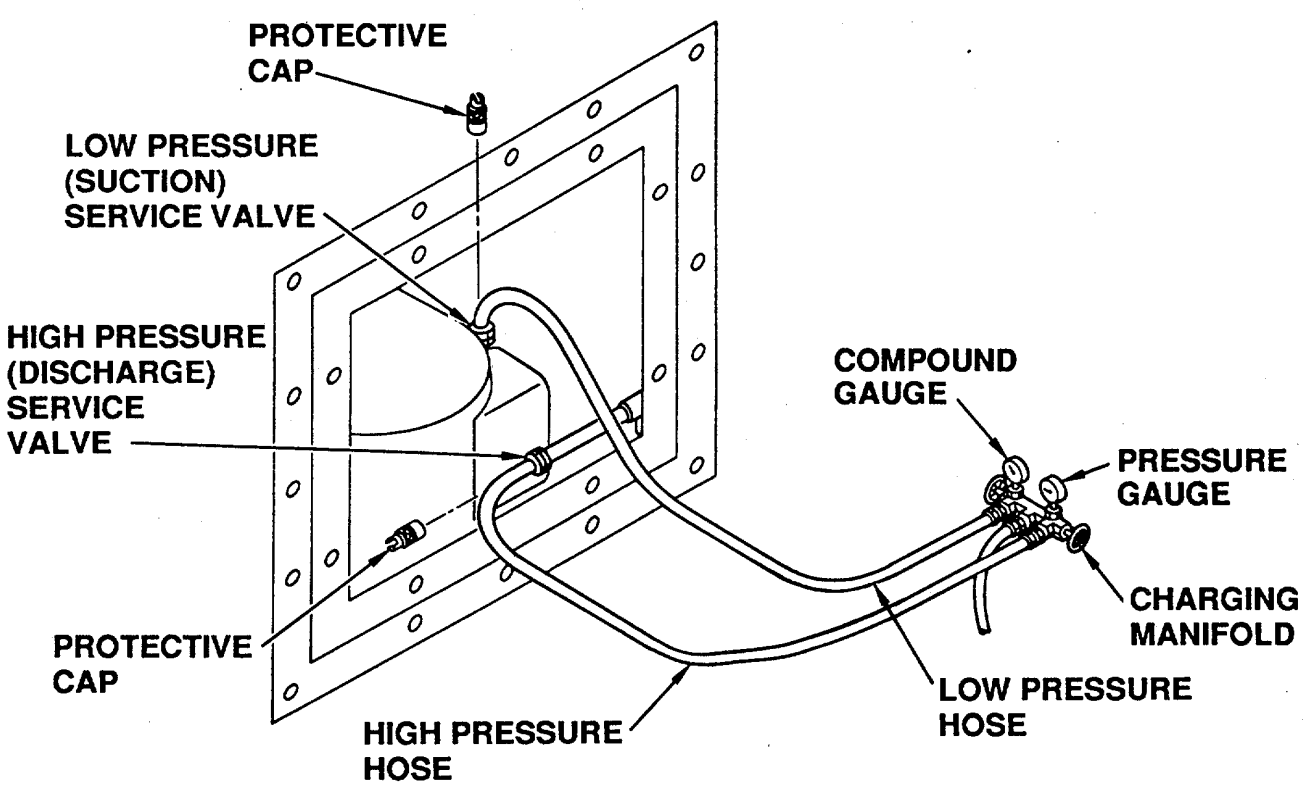


Figure 5-5. Pressure Test Connection

c. 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.

d. Loosen hose connections at gages or charging manifold.

e. Open high (discharge) high pressure manifold valve slightly to purge air from hose. Tighten low pressure hose connection at gage fitting as soon as a hissing sound is heard.

f. Open low (suction) pressure manifold 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 the low (suction) and high (discharge) manifold valves.

h. 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.

i. Turn the mode selector switch to the COOL mode with the temperature control thermostat in the full DECREASE setting for a few minutes.

j. With the unit operating, allow gages-to stabilize. Take readings of the two gages.

k. Refer to Section III Troubleshooting Table to isolate malfunction.

l. When pressure tests are completed, proceed with the maintenance action indicated.

m. Turn unit OFF.

n. Close manifold valves.

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 form 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.

o. Remove gages or service manifold hoses from charging valves.

p. Install charging valve protective caps.

Follow-on procedure. Secure service valve access cover (See para. 4-15).

SECTION III
TABLE 5-1. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. DISCHARGE PRESSURE TOO HIGH

Step 1. Check for dirty or clogged condenser coil.
Clean condenser coil per paragraph 5-29.

Step 2. Check for refrigerant overcharge.
See paragraph 5-3.

Step 3. Check sight glass for air in refrigerant system.
See paragraph 2-4.
Leak check per paragraph 5-16.
Follow procedure of paragraph 5-16 and continue specific repair.

Step 4. Check operation of condenser fan motor per paragraph 4-25.
Replace defective fan motor per paragraph 4-25.

Step 5. Check to see if condenser fan is loose on shaft.
Follow procedures of paragraph 4-25 to tighten condenser fan on shaft.

2. DISCHARGE PRESSURE TOO LOW

Step 1. Check too see that cold outside air is not entering the room.
Follow instructions of paragraph 2-7 to limit cold outside air.

Step 2. Check sight glass for low refrigerant charge.
Charge the refrigerant system per paragraph 5-3.

Step 3. Check pressure regulating valve per paragraph 5-18.
Follow procedures of paragraph 5-18 to replace pressure regulating valve.

Step 4. Check compressor operation per paragraph 5-24.
Replace defective compressor per paragraph 5-24.

SECTION III
TROUBLESHOOTING TABLE 5-1. (continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. SUCTION PRESSURE TOO HIGH

Step 1. Check for dirty air conditioner filter.
Clean filter per paragraph 4-19.

Step 2. Check to see if evaporator inlet and outlet louvers are closed.
Adjust louvers.

Step 3. Check for dirty evaporator coil.
Clean evaporator coil per paragraph 4-67.

Step 4. Check sight glass for low refrigerant charge.
Charge the refrigerant system per paragraph 5-8.

Step 5. Check to see if solenoid valve is stuck closed.
Follow procedures of paragraph 5-14 to replace valve.

Step 6. Check operation of evaporator fan motor per paragraph 4-34.
Replace motor per paragraph 4-34.

Step 7. Check to see if evaporator impeller fans are loose on shafts.
Tighten evaporator impeller fans on shafts per paragraph 4-32.

Step 8. Test the liquid quench expansion valve per paragraph 5-17.
Replace faulty valve per paragraph 5-17.

Step 9. Check distributor and evaporator coil tubings for kinks and restrictions.
Follow procedures of paragraph 5-28 to repair and replace tubing.

Step 10. Check sight glass for evidence of bubbles and refrigeration level that indicate severe refrigerant blockage.
Follow procedures of paragraph 5-28 to repair and replace tubing.

Follow procedures of paragraph 5-10 to replace clogged dehydration.

Step 11. Check the sight glass for moisture in the system (Yellow indications).
Replace filter per paragraph 5-10.

SECTION III
TROUBLESHOOTING TABLE 5-1. (continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
4. SUCTION PRESSURE TOO HIGH	
Step 1. Check operation of compressor per paragraph 5-24. Replace faulty compressor per paragraph 5-24.	
Step 2. Check condition of liquid quench expansion valve bulb. Check to see that it is properly contacted to suction line. Replace liquid quench expansion valve with damaged bulb (see paragraph 5-17). Secure bulb to suction line.	
Step 3. Check performance of liquid quench expansion valve per paragraph 5-17. Replace defective liquid quench expansion valve (see para. 5-17).	

Table 5-2. 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	0.0	57.83	4.066	88	31.1	164.9	11.594
34	1.1	60.51	4.254				
36	2.2	63.27	4.448	90	32.2	170.1	11.960
38	3.3	66.11	4.648	92	33.3	175.4	12.332
				94	34.5	180.9	12.719
40	4.4	69.02	4.853	96	35.6	186.5	13.113
42	5.5	71.99	5.062	98	36.7	192.1	12.506
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	120	48.9	262.5	18.456

Table 5-3. NORMAL TEMPERATURE-PRESSURE RELATIONSHIPS

deleted

5-10. DESICCANT REFRIGERANT DEHYDRATOR (FILTER DRIER)

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

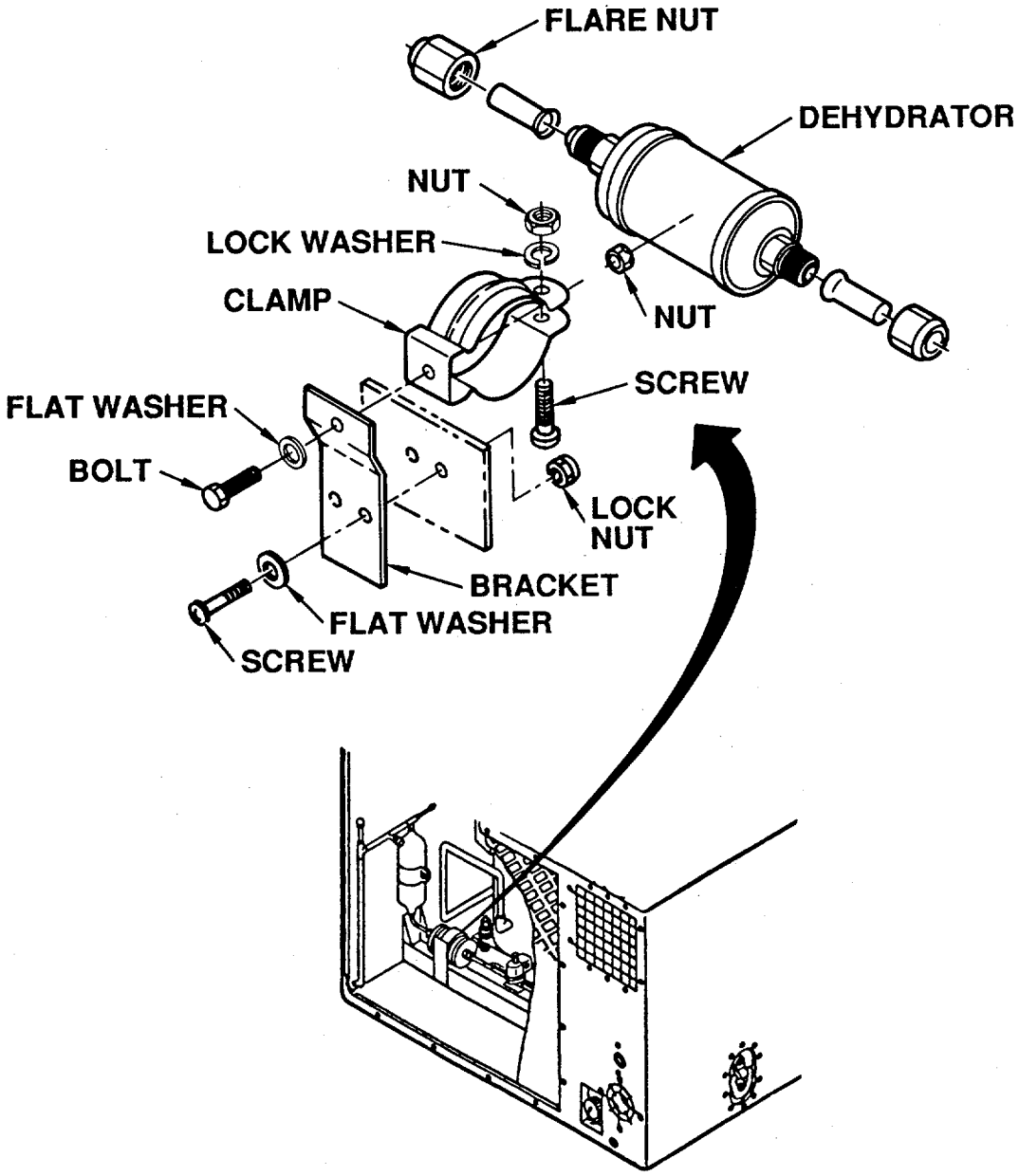


Figure 5-6. Desiccant Refrigerant Dehydrator (Filter Drier)

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 5-6.

(2) Check that mounting clamp is secure. Secure as needed.

b. Removal

NOTE

Steps (3) and (4) are only applicable to serial numbers 1 thru 989.

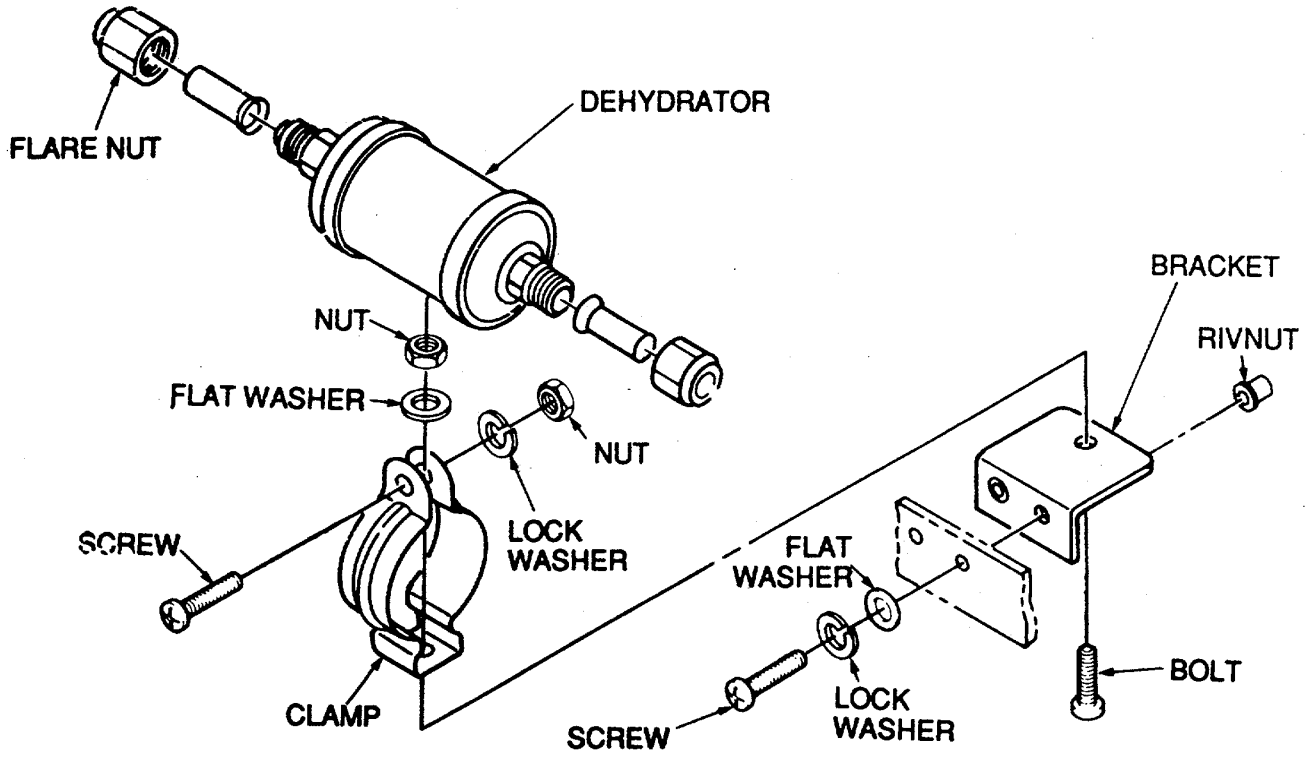


Figure 5-7. Desiccant Refrigerant Dehydrator (Serial Numbers 990 through 1335)

(1) Discharge the refrigeration system per para. 5-3.

(2) Disconnect two flare nuts.

(3) Loosen nut and washer that secures clamp to bracket.

(4) Pivot dehydrator and clamp to gain access to clamp hardware.

(5) Remove nut, screw and lockwasher that secure clamp and dehydrator. Remove dehydrator.

(6) If bracket needs to be replaced on serial number 1 thru 989, remove two screws, flat washers and locknuts. Remove two screws, two lock washers and two flat washers on serial numbers 990 thru 1335.

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) If bracket was replaced secure with two screws, flat washers and locknuts,

(2) Install dehydrator in clamp.

(3) Pivot dehydrator and clamp into position.

(4) Secure two flare nuts to dehydrator.

(5) Secure clamp to dehydrator with screw, lockwasher and nut.

(6) Secure clamp to bracket with nut, screw and flat washer.

(7) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(8) Evacuate the refrigeration system (See para. 5-7).

(9) Charge the refrigeration system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-11. HIGH PRESSURE SERVICE VALVE

Preliminary procedure: Remove top cover (See para. 4-14).

a. Inspection

(1) Check that cap is in place and that threaded connection is not damaged. Replace cap if missing or damaged.

(2) Check for signs of leakage. Leak test per para. 5-6, if leak is suspected.

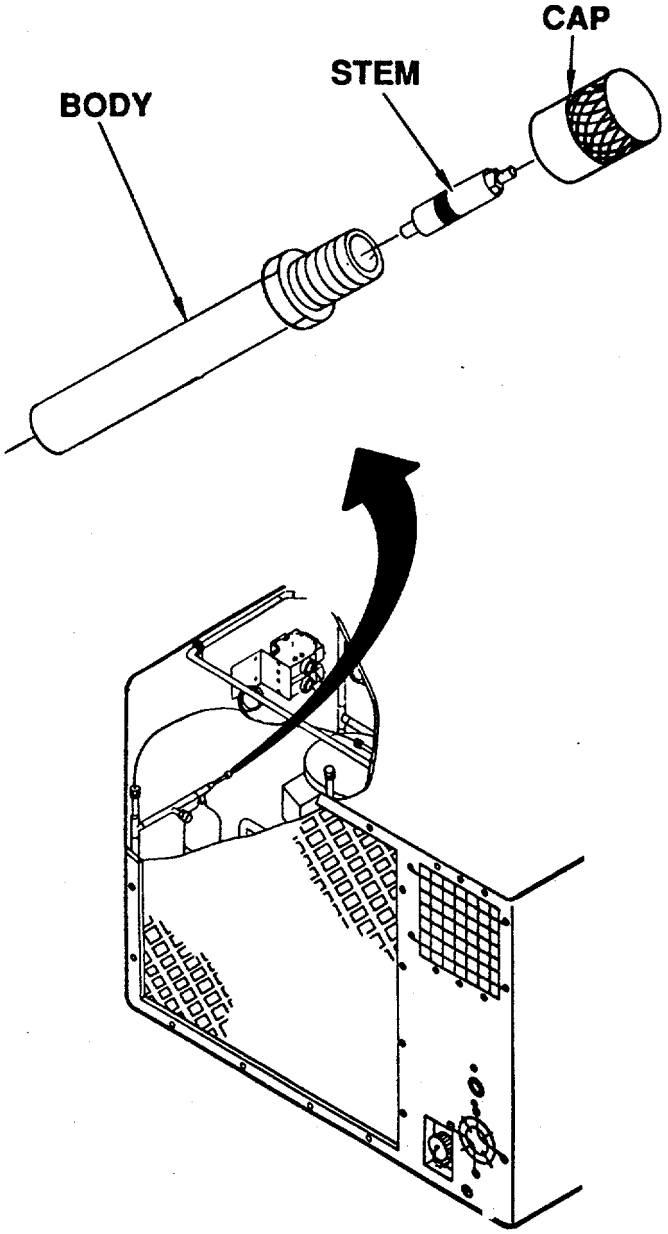


Figure 5-8. High Pressure Service Valve

NOTE

The most logical cause of failure to service valve will be due to loose or damaged valve stem.

b. Repair. If leak is indicated, proceed as follows:

(1) Tighten valve stem.

(2) Leak check per para. 5-6.

(3) If leak persists, discharge the system per para. 5-3.

(4) Remove valve stem.

(5) Install replacement stem.

(6) Leak check the valve stem/body area per para. 5-6.

(7) If leak persists, replace valve.

c. Removal.

(1) Discharge the refrigeration system per para. 5-3.

(2) Purge the system with nitrogen (See para. 5-4).

(3) Debraze the valve (See para. 5-5).

(4) Remove valve from tube connection.

d. Installation.

(1) Remove valve stem from replacement valve.

(2) Place replacement valve on tube connection.

(3) Braze valve to tube connection (See para. 5-5).

(4) Install stem in valve body. Install cap.

(5) Replace dehydrator (See para. 5-10).

(6) Leak test newly connected joints and the repair area. (See para. 5-6).

(7) Evacuate the system (See para. 5-7).

(8) Charge the system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-12. FUSIBLE PLUG

Preliminary procedure: Remove top cover (See para. 4-14).

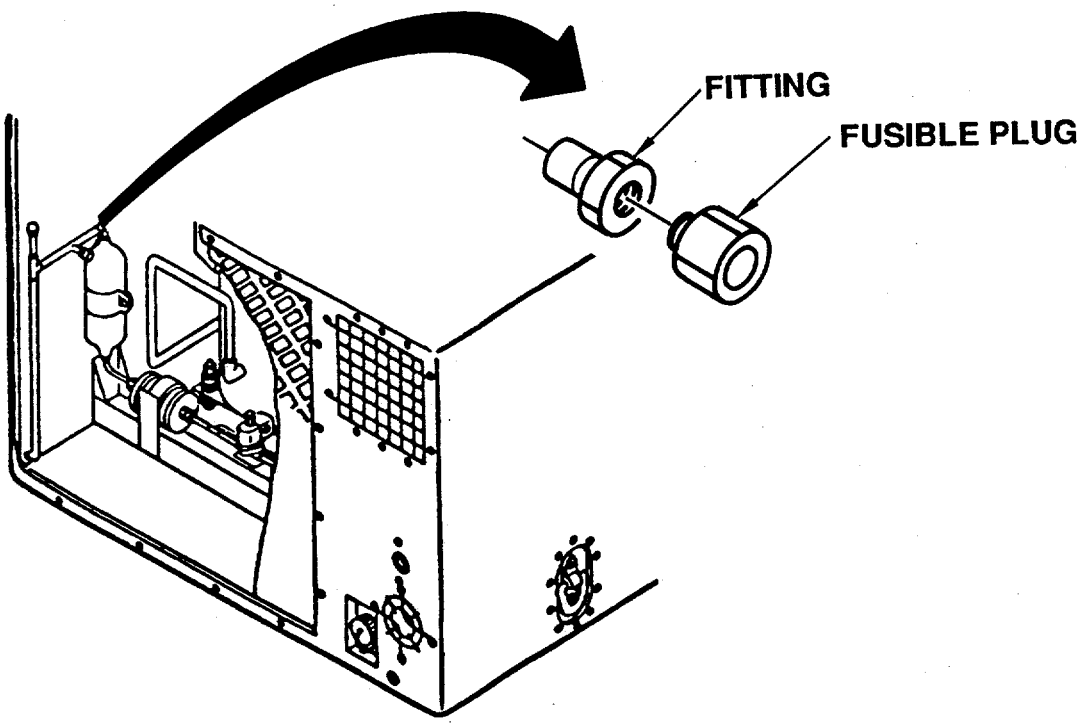


Figure 5-9. Fusible Plug

a. Inspection

(1) Check for evidence of leakage. Leak test per para. 5-6, if leak is suspected.

(2) Check for damage. Replace if damaged.

b. Removal

(1) Discharge the refrigerant system per para. 5-3.

(2) Hold fitting so that it is not twisted and unscrew fusible plug.

c. Installation

(1) Apply antisieze tape (Item 13, Appendix E) to threads of plug.

(2) Screw fusible plug in place while holding adapter fitting.

(3) Replace the dehydrator (See para. 5-10).

(4) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(5) Evacuate the system per para. 5-7.

(6) Charge the system per para. 5-8.

Follow-on procedure: Install top cover (See para. 4-14).

5-13. RECEIVER

Preliminary procedure: Remove top cover (See para. 4-14).

a. Inspection

(1) Check for general condition and signs of leakage. If leak is suspected, leak test per para. 5-6.

(2) Check that mounting hardware is secure. Replace and secure as needed.

b. Removal

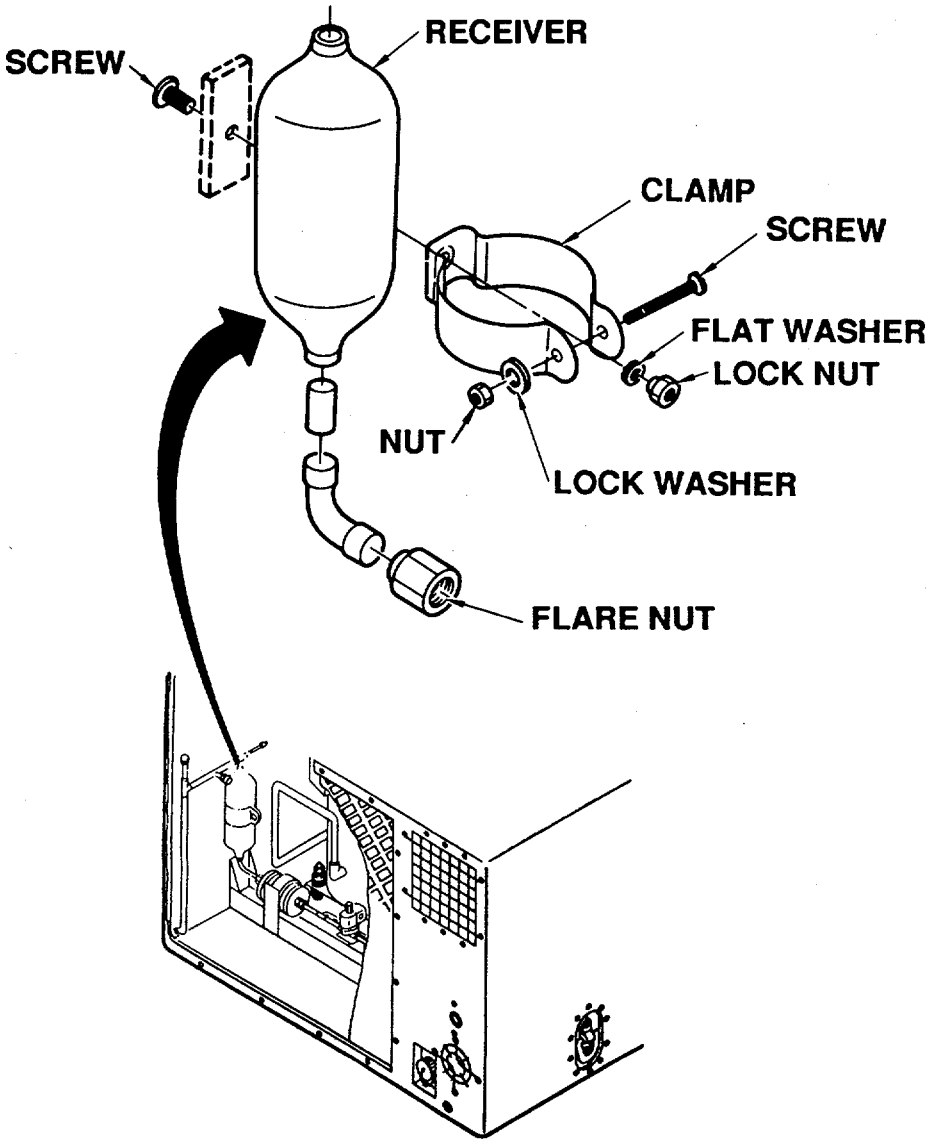


Figure 5-10. Receiver Removal/Replacement

(1) Discharge the refrigeration system (See para. 5-3).

(2) Remove fusible plug (See para. 5-12).

(3) Loosen flare nut.

(4) Purge the system with nitrogen (See para,. 5-4).

(5) Debraze tube connections (See para. 5-5).

(6) Remove screw, lockwasher and nut from clamp.

(7) Remove receiver.

c. Installation

(1) Place receiver in clamp.

(2) Loosely install screw, lockwasher and nut in clamp.

(3) Place receiver on tube ends.

(4) Purge the system with nitrogen (See para. 5-4).

(5) Using wrench, tighten flare nut.

(6) Braze the tube joints (See para. 5-5).

(7) Using screwdriver and wrench, tighten hardware installed in (2).

(8) Install fusible plug (See para. 5-12).

(9) Replace dehydrator (See para. 5-10).

(10) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(11) Evacuate the system (See para. 5-7).

(12) Charge the system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-14. SOLENOID VALVE (L1) TEST AND COIL REPLACEMENT

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

a. Test

(1) Tag and disconnect leads L1-1 and L1-2 from TB4.

(2) Using multimeter set on lowest OHMS scale, check for continuity between leads L1-1 and L1-2. If continuity is not found, coil is open and must be replaced.

(3) Using multimeter set on lowest OHMS scale, check for continuity between each lead and coil casing. If continuity is found between either lead and the casing, the coil is grounded and must be replaced.

(4) If continuity checks are satisfactory, power up unit and turn mode selector to COOL and temperature select to COOLER.

(5) Listen for a sharp click when the valve should change position.

(6) If a click is not heard, internal valve problems are indicated.

(7) Go to paragraph 5-15 to repair or replace valve.

b. Coil removal. The coil can be replaced without opening the refrigeration system.

WARNING

Do not attempt any disassembly of solenoid valve, other than coil removal, when the refrigeration system is under pressure. Refrigeration will be sprayed out dangerously.

(1) Remove screw, flatwasher, lockwasher and nut from clamp on condenser motor support. Remove clamp.

(2) Remove screw and lockwasher from clamp on condenser scroll. Remove clamp.

(3) Remove nut that secures coil.

(4) Remove nameplate.

(5) Cut ties sufficient to remove leads.

(6) Remove solenoid coil from valve.

c. Coil installation

(1) Install coil and nameplate on valve.

(2) Secure coil to valve with nut.

(3) Install ties as needed.

(4) Install two clamps over wire leads.

(5) Secure clamp to condenser motor support with screw, flatwasher, lockwasher and nut.

(6) Secure clamp to condenser scroll with screw and lockwasher.

(7) See tags and connect leads L1-1 and L1-2 to TB4. Remove tags.

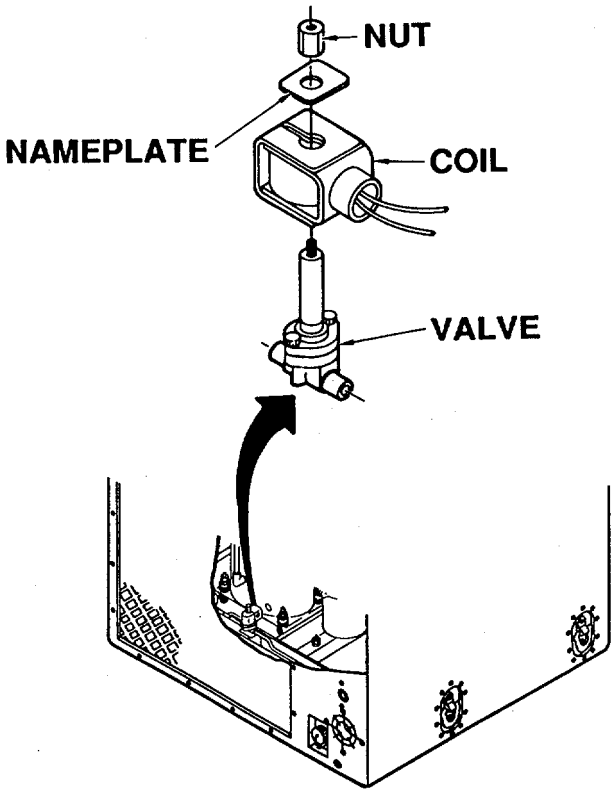


Figure 5-11. Solenoid Valve Coil Replacement

Follow-on procedure: Install top cover (See para. 4-14).

5-15. SOLENOID VALVE (L1)

For testing and replacement of coil, see para. 5-14.

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

a. Removal

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.

(1) Discharge the refrigerant system (See para. 5-3).

(2) Remove nut from valve.

(3) Remove and set aside nameplate and coil from valve.

(4) Remove two screws that secure the plunger assembly to the valve body.

(5) Remove the plunger assembly, diaphram and o-ring.

(6) Check valve body for visible damage. Normally valve body replacement is not unnecessary.

(7) If valve body is in good condition, skip steps (8) through (14).

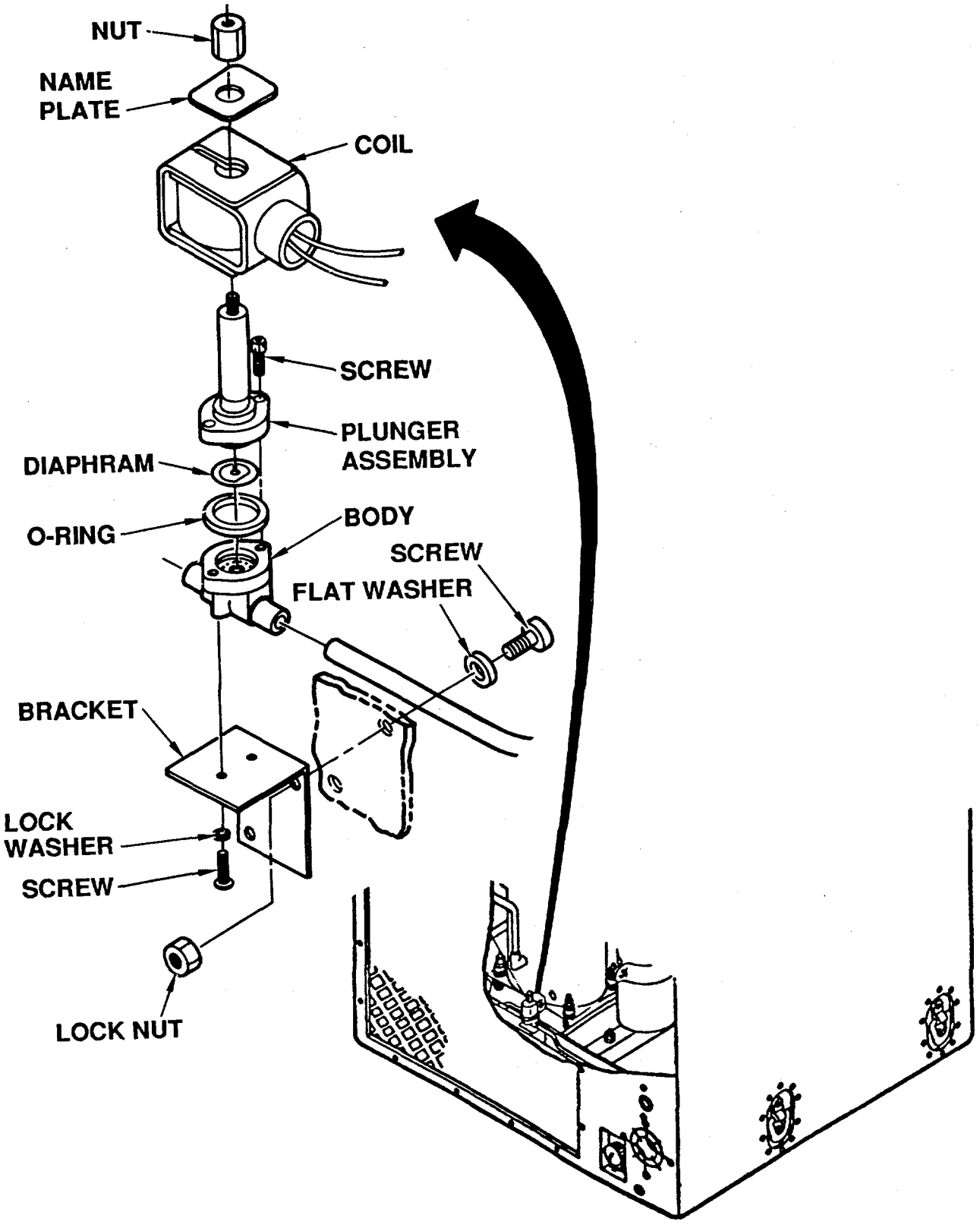


Figure 5-12. Solenoid Valve (L1)

(8) Remove dehydrator (See para. 5-10).

(9) Purge the system with nitrogen (See para. 5-4).

(10) Debraze tube connections (See para. 5-5).

(11) Remove two screws, and flat washers and locknuts that secure the bracket to casing.

(12) Remove bracket and valve body.

(13) Remove two screws and lockwashers that secure the valve body to bracket.

(14) Remove valve body.

b. Installation. If valve body was not removed, go to step (8).

(1) Secure valve body to bracket with two screws and flatwashers and locknuts.

(2) Fit tube ends to valve body and align mounting hardware of bracket to through holes in casing.

(3) Secure bracket to casing with two screws and flat washer and locknut.

(4) Purge the system with nitrogen (See para. 5-4).

(5) Apply heat sink or wrap wet rags around valve body.

(6) Braze the tube connections (See para. 5-5).

(7) Remove heat sink (Item 28, Appendix E) or rags.

(8) Install diaphragm in valve body.

(9) Install o-ring in plunger assembly.

(10) Align through holes in plunger assembly to threaded holes in valve body.

(11) Secure plunger assembly to valve body with two screws.

(12) Replace dehydrator (See para. 5-10).

(13) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(14) Evacuate the system (See para. 5-7).

(15) Charge the system (See para. 5-8).

(16) Install coil and nameplate on valve.

(17) Secure coil to valve with nut.

Follow-on procedure: Install top cover (See para. 4-14).

5-16. LIQUID SIGHT INDICATOR (SIGHT GLASS)

Preliminary procedures: Remove top cover (See para. 4-14).

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 para. 5-6 if leak is suspected. Replace liquid sight indicator if leak is detected.

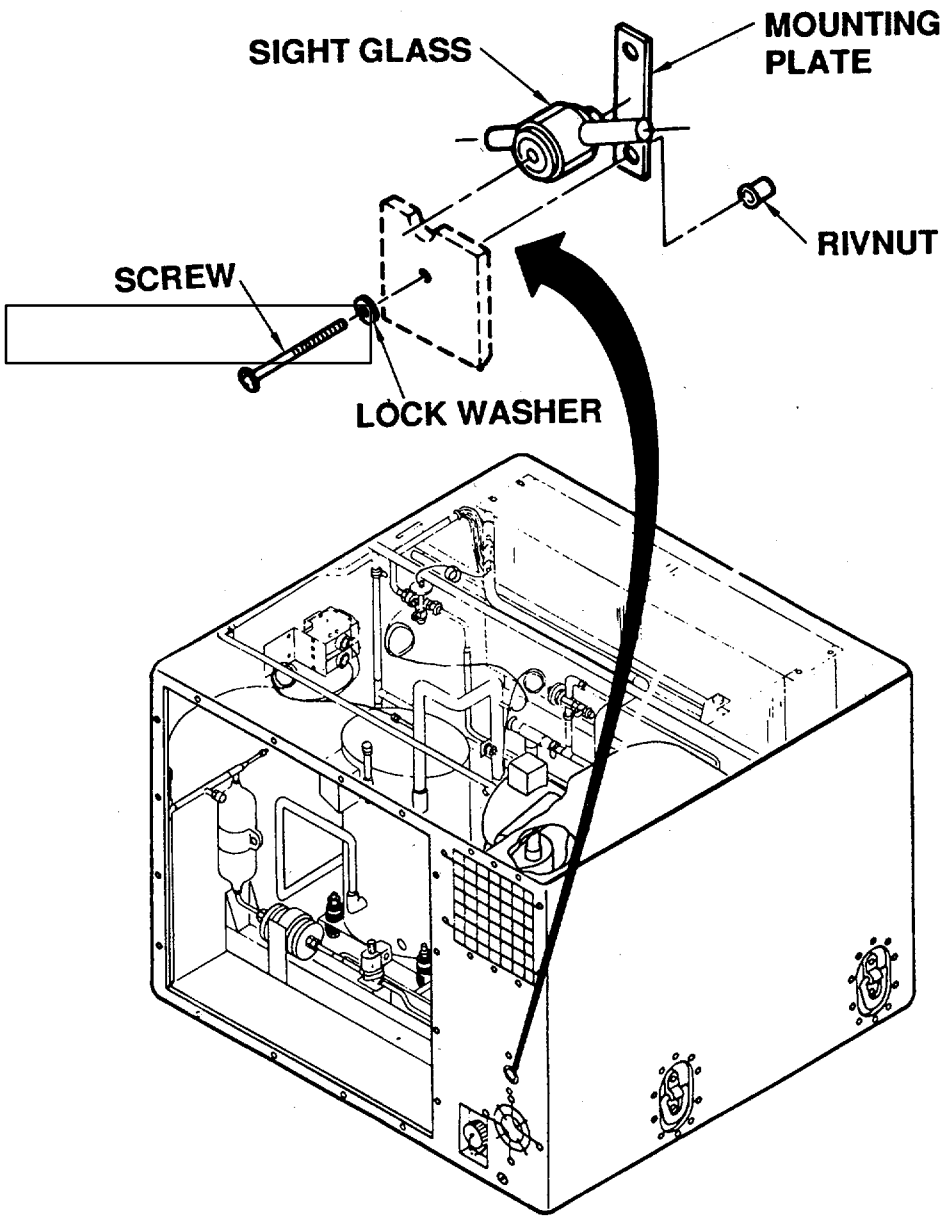


Figure 5-13. Liquid Sight Indicator (Sight Glass)

b. Removal

(1) Discharge the refrigerant system per para. 5-3.

(2) Purge the system per para. 5-4.

(3) Debraze the tube connections per para. 5-5.

(4) Remove two screws and lockwashers that secure the liquid sight indicator and mounting plate to casing.

(5) Remove liquid sight indicator and mounting plate.

c. Installation

NOTE

Do not disassemble liquid sight indicator

(1) Position liquid sight indicator on tubing.

(2) Purge the system per para. 5-4.

(3) Braze the tube connections per para. 5-5.

(4) Replace the dehydrator (See para. 5-10).

(5) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(6) Evacuate the refrigerant system (See para. 5-7).

(7) Charge the system per para. 5-8.

(8) Secure mounting plate and liquid sight indicator to casing with two screws and lockwashers.

Follow-on procedure: Install top cover (See para. 4-14).

5-17. LIQUID QUENCHER EXPANSION VALVE.

Preliminary procedure: Remove top cover (See para. 4-14).

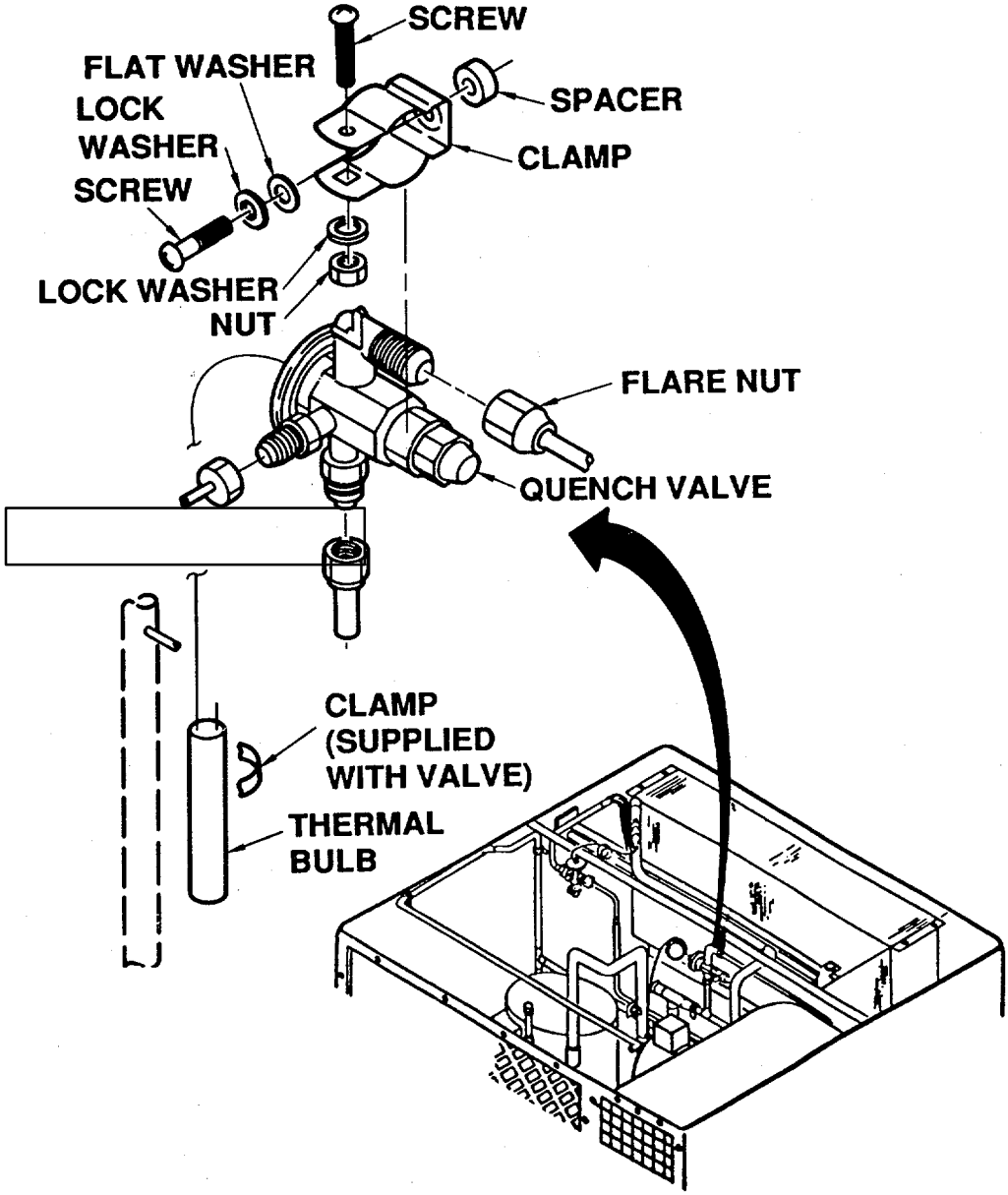


Figure 5-14. Liquid Quench Expansion Valve

a. Inspection

WARNING

All refrigerant -22 must be discharged from system before attempting to remove liquid quench expansion valve.

(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 sealed on clamps.

(3) If a leak is suspected or indicated, test per para. 5-6.

b. Test

(1) Perform a refrigerant pressure check on unit in accordance with paragraph 5-9. 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 of the suction line adjacent to the sensing bulb; use a small gob of thermal mastic (Item 17 Appendix E) to improve conductivity.

(4) Check that gage connection to low (suction) side is open. Note pressure indicated on gage and temperature indicated on thermometer.

(5) Set the Temperature control thermostat knob to full WARMER (clockwise). Start the air conditioner in COOL mode. Note that suction pressure drops to 58 ± 2 psig (4.0 ± 0.2 kg/cm^2). Allow compressor to run for at least 20 minutes. If pressure is not within above limits, test operation hot gas bypass valve (para. 5-18) before proceeding with quench valve test.

NOTE

Except in a very hot climate, with room temperature above 90 deg. F (32.2 deg. 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.deg. F (4.4 deg. C).

(7) Compare the saturation temperature with indicated temperature. The indicated temperature should be 16 + .5 deg. F (8.9 + .3 deg. C) higher than the saturation temperature. For example: With a 40 deg. saturation temperature, the thermometer should read 65 + 5 deg. F (18 + 2.7 deg. F). If indicated temperature is not within above limits, quench valve is not functioning properly and must be replaced.

c. Removal

WARNING

All refrigerant -22 must be discharged from system before attempting to remove liquid quench expansion valve.

(1) Discharge the refrigerant system per paragraph 5-3.

(2) Unwrap insulation from suction line to expose sensing bulb.

(3) Loosen three flare nutsthat secure tubing to quench valve.

(4) Remove screw, lockwasher and nut from clamp.

(5) Remove two screws and nuts from clamps that secure the sensing bulb. Discard clamps.

(6) Note position of bulb on suction line.

(7) Remove quench valve from clamp.

d. Installation

(1) Install quench valve in clamp.

(2) Tighten three flare nuts on the quench valve.

(3) Secure quench valve to clamp with screw, lockwasher and nut.

(4) Coil sensing bulb capillary in two loops.

(5) Noting position, place the thermo bulb on suction line.

(6) Secure thermo bulb to suction line with two clamps supplied with valve, with two screws and two nuts (also supplied with valve).

(7) Wrap bulb and capillary with tape. (Item 29, Appendix E).

(8) Replace the dehydrator (See para. 5-10).

(9) Leak check all newly connected joints and those in the repair area (See para. 5-6).

(10) Evacuate the system (See para. 5-7).

(11) Charge the system (See para. 5-8).

(12) Reinstall insulation.

Follow-on procedure: Install top cover (See para. 4-14).

5-18. PRESSURE REGULATING VALVE

Preliminary procedure: Remove top cover.

a. Adjustment/Test

(1) Valves are factory set to start opening when suction pressure decreases to 58 psig. Do not adjust.

(2) Perform a refrigeration pressure check on unit in accordance with para. 5-9. Leave the service manifold attached.

NOTE

To test, ensure that unit is in bypass cycle.

(3) Set temperature control thermostat knob fully WARMER (clockwise), start air conditioner in COOL mode, and observe pressure gauges. Suction pressure should drop to a minimum 50-60 psig (13 deg. F) shortly after compressor starts, and then remain constant.

(4) If suction pressure remains below 50-60 psig replace pressure regulating valve.

b. Removal

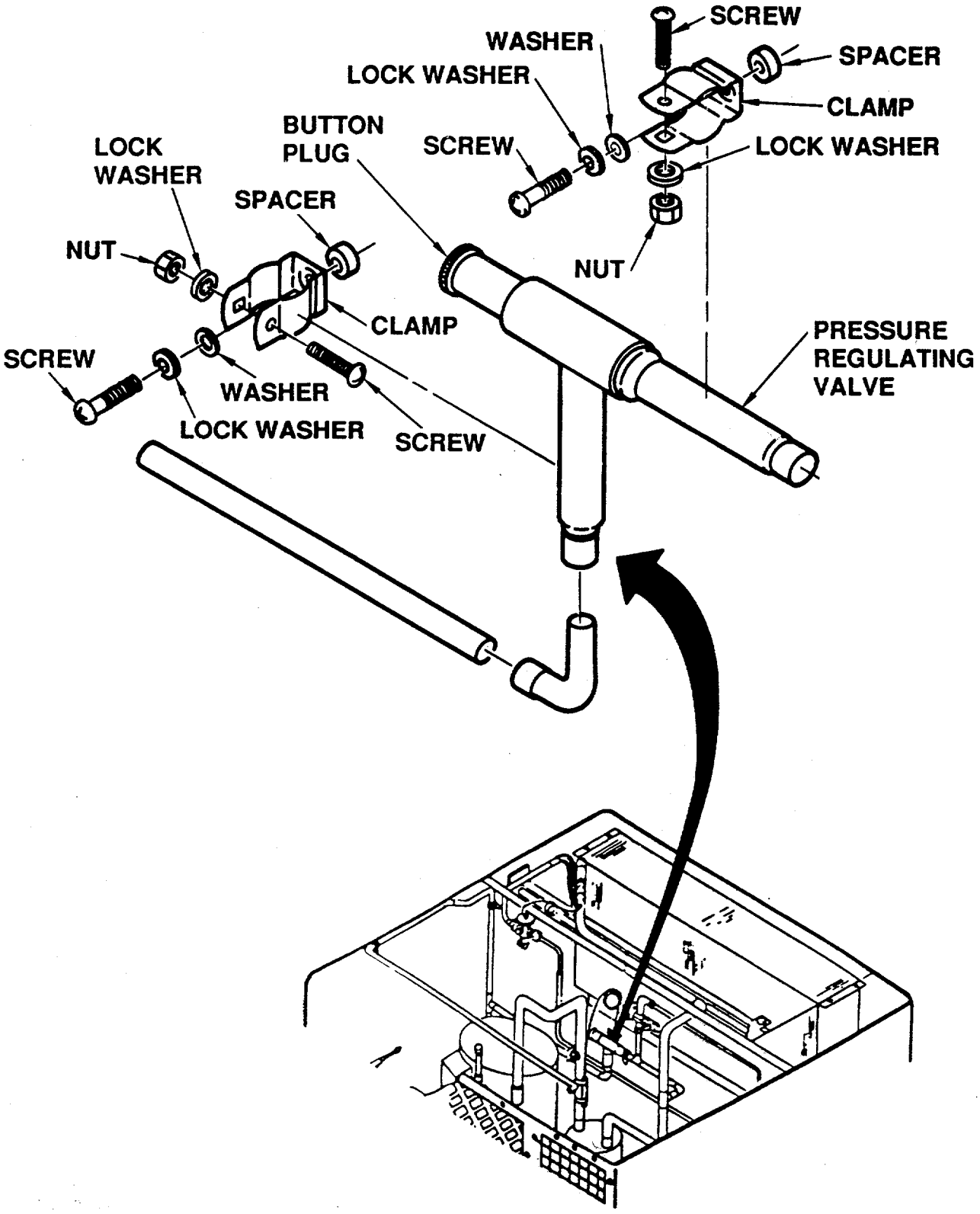


Figure 5-15. Pressure Regulating Valve

WARNING

All refrigerant -22 must be discharged from system before attempting removal of pressure regulating valve.

(1) Discharge the refrigerant system per para. 5-3.

(2) Purge the system per para. 5-4.

(3) Puncture small hole in valve housing to relieve internal pressure.

(4) Debraze the tube connections per para. 5-5.

(5) Remove two screws, lockwashers and two nuts on the two clamps that secure the valve.

(6) Remove the pressure regulating valve.

c. Installation

(1) Install the hot gas bypass valve in two clamps.

(2) Assemble valve on tube ends.

(3) Purge the system with nitrogen per para. 5-4.

(4) Braze the tube connections per para. 5-5.

(5) Install two screws, lockwashers and nuts in two clamps.

(6) Replace the dehydrator per para. 5-10.

(7) Leak test all newly connected joints and those in the repair area per para. 5-6.

(8) Evacuate the system per para. 5-6.

(9) Charge the system per para. 5-8.

Follow-on procedure: Install top cover (See para. 4-14).

5-19. DAMPER ACTUATOR

Preliminary procedures: 1. Remove top cover (See para. 4-14).

2. Remove condenser outlet guard (See para. 4-21).

a. Removal

WARNING

All refrigerant must be discharged from system before attempting to remove damper actuator.

(1) Discharge the system per para. 5-3.

(2) Loosen set screw on actuator arm.

(3) Remove actuator arm.

(4) Loosen flare nut on actuator.

(5) Remove two nuts and lockwashers that secure the damper actuator to the bracket.

(6) Remove damper actuator.

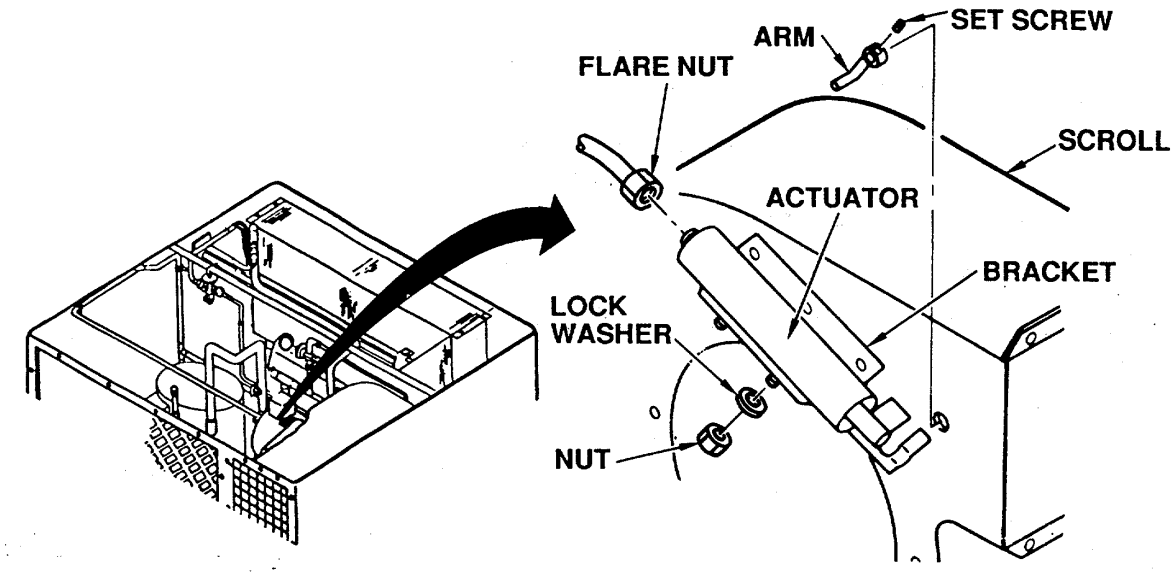


Figure 5-16. Damper Actuator Removal/Replacement

b. Installation

(1) Install damper actuator on bracket.

(2) Secure damper actuator to bracket with two lockwashers and nuts.

(3) Secure flare nut to damper actuator.

(4) Install actuator arm on damper shaft and actuator.

(5) Place damper in fully closed position.

(6) Tighten set screw on arm.

(7) Leak test area around flare nut (See para. 5-6).

(8) Replace dehydrator per para. 5-10.

(9) Evacuate the system per para. 5-7.

(10) Charge the system per para. 5-8.

Follow-on procedures: 1. Replace condenser outlet guard (See para. 4-21).

2. Replace top cover (See para. 4-14).

5-20. PRESSURE SNITCHES (S4 AND S5)

Preliminary procedure: Remove top cover (See para. 4-14).

a. Test

(1) Press and release reset button to be sure that switch is not tripped.

(2) Tag and disconnect leads on pressure switch.

(3) Using multimeter set on lowest OHMS scale, check for continuity between terminals 1 and 2 on pressure switch (S4 or S5). Be sure reset is pressed in.

(4) If there is no continuity, replace pressure switch.

b. Removal

WARNING

All refrigerant -22 must be discharged from system before attempting to remove pressure switches (S4 and S5).

(1) Tag and remove jumper lead between S4 and S5.

(2) Discharge the refrigeration system (See para. 5-3).

(3) Restrain tube and fitting.

(4) Loosen flare nut.

(5) Remove screw and lock nut from clamp that secures capillary tubing.

(6) Remove clamp.

(7) Remove two screws and lockwashers from switch. (S4 or S5).

(8) Remove pressure switch (S4 or S5).

c. Installation (S4 or S5)

(1) Coil capillary tube of replacement pressure switch.

(2) Install pressure switch on bracket using two screws and lockwashers.

(3) Restrain tube and fitting.

(4) Tighten flare nut on fitting.

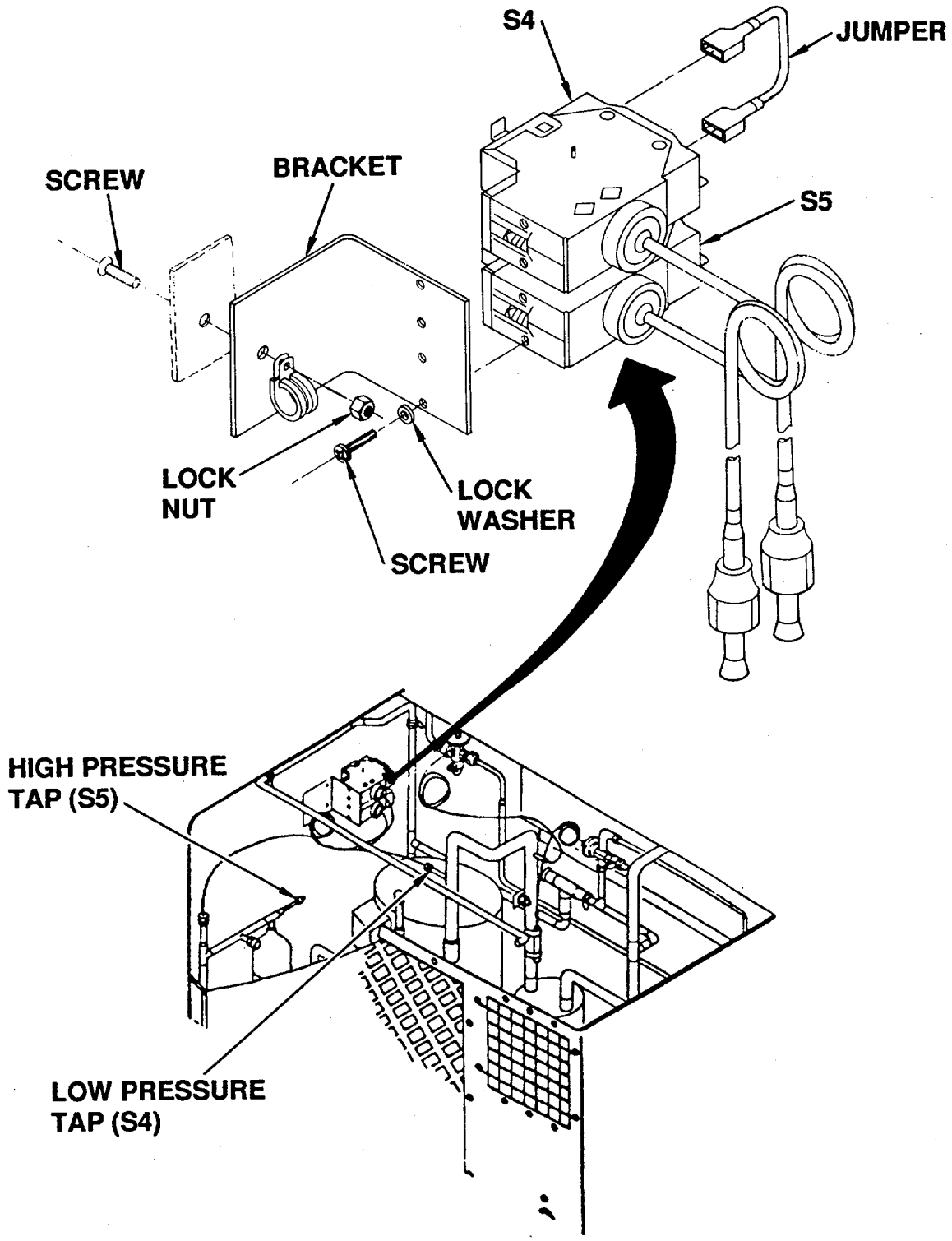


Figure 5-17. Pressure Switches (S4 and S5)

(5) Install clamp on capillary tubes.

(6) Install clamp on casing with screw and lock nut.

(7) See tags and wiring diagram (FO-1) and connect wire leads. Remove tags.

(8) Replace dehydrator (See para. 5-10).

(9) Leak check the flare nut connection (See para. 5- 6).

(10) Evacuate the system (See para. 5-7).

(11) Charge the system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-21. EVAPORATOR COIL REPLACEMENT

Preliminary procedures: 1. Remove mist eliminator (See para. 4-20).

2. Remove evaporator outlet louver (See para. 4-17).

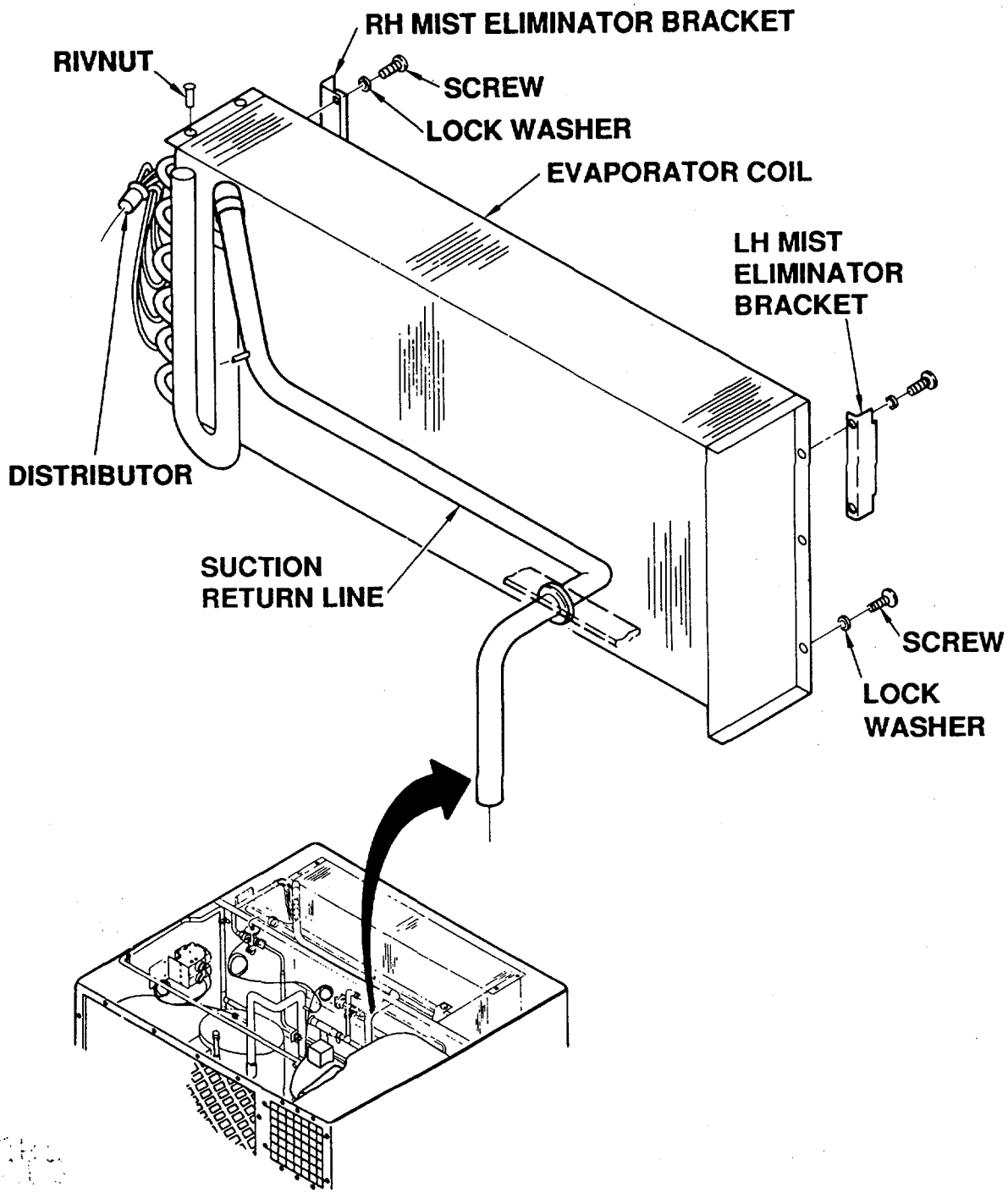


Figure 5-18. Evaporator Coil Removal/Replacement

a. Removal

WARNING

All refrigerant -22 must be discharged from system before attempting removal of evaporator coil.

(1) Discharge the system per para. 5-3.

(2) Purge the system with nitrogen (See para. 5-4).

(3) Debraze the distributor from expansion valve per para. 5-5.

(4) Repeat steps (2) and (3) to debraze suction return line from evaporator coil.

(5) Remove two screws and lockwashers from right hand mist eliminator bracket.

(6) Set bracket aside.

(7) Remove two screws and lockwashers from the left hand mist eliminator bracket.

(8) Set bracket aside.

(9) Remove two screws and lockwashers that secure the evaporator coil to casing.

(10) Remove the evaporator coil.

(11) Debraze the distributor lines from evaporator coil.

b. Installation

(1) Braze the distribution lines to new evaporator coil.

(2) Place evaporation coil in unit and align mounting hardware of coil with through holes in casing.

(3) Secure left hand mist eliminator bracket and evaporation coil to casing with two screws and two lockwashers.

(4) Secure right hand mist eliminator bracket and evaporator coil to casing with two screws and two lockwashers.

(5) Secure the evaporator coil to casing with two screws and two lockwashers.

(6) Purge the system with nitrogen. (See para. 5-4).

(7) Braze distributor to expansion valve and suction return line to evaporator coil (See para. 5-5).

(8) Replace dehydrator (See para. 5-10).

(9) Leak test all new connected joints and those in the repair area (See para. 5-6).

(10) Evacuate the system (See para. 5-7).

(11) Charge the system (See para. 5-8).

Follow-on procedures: 1. Install mist eliminator (See para. 4-20).

2. Install evaporator outlet louver (See para. 4-17).

5-22. EXPANSION VALVE (PRIMARY)

Preliminary Procedure: Remove top cover (See para. 4-14)

WARNING

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

a. Inspection

(1) Inspect for evidence of leaks, kinked, or otherwise damaged capillary line, and loose or missing mounting hardware.

(2) Check sensing bulb to see that it is securely clamped.

(3) If a leak is suspected or indicated, test per para. 5-6.

b. Testing. The expansion valve as supplied with the unit is preset at the factory. This valve cannot be adjusted.

(1) Perform a refrigerant pressure check on unit in accordance with para. 5-9. 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) Remove two screws and nuts from two clamps on sensing bulb.

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

CAUTION

Use care to not damage or kink the capillary.

(4) Place the sensing bulb in a container of ice water or crushed ice so that it is reduced to a temperature near 32 deg. F (O deg. C).

(5) Set the temperature control thermostat knob to fully COOLER (counter clockwise), 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 + kg/cm^2). If the pressure is not within the above limits, ,test the operation of the quench valve (para. 5-17) and the hot gas bypass valve (para. 5-18).

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 12 deg. F (35 psig) above the saturation temperature of the refrigerant at operating suction line pressure. This setting will provide maximum efficiency of the evaporator coil.

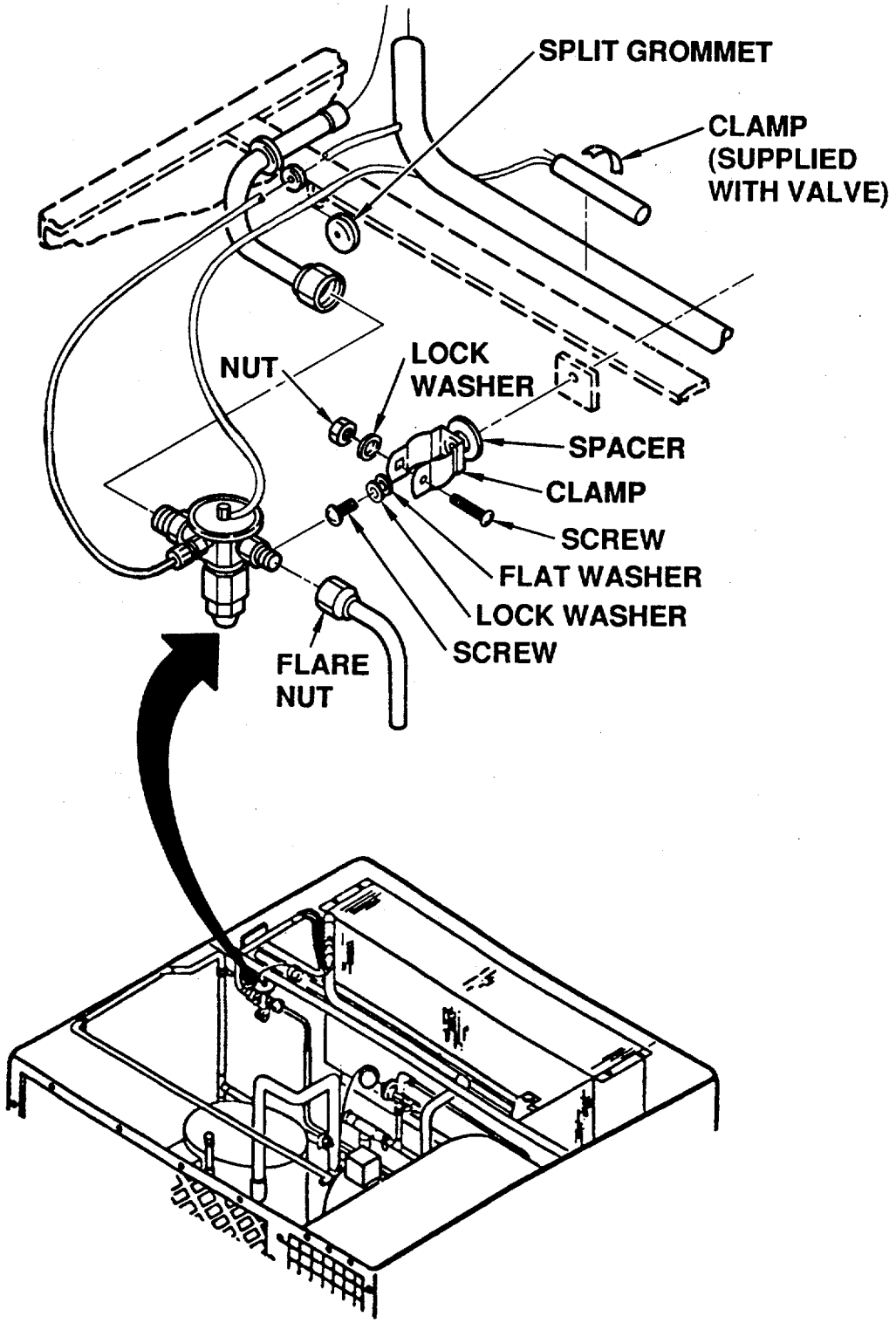


Figure 5-19. Expansion Valve Removal/Replacement

WARNING

All refrigerant -22 must be discharged from system before removal of expansion valve.

(1) Discharge the refrigeration system (See para. 5-3).

(2) Remove split grommet from casing and capillary line.

(3) Restrain valve with wrench.

(4) Loosen three flare nuts on valve.

(5) Remove screw, lockwasher and nut from clamp.

(6) Remove valve from clamp.

(7) Pull sensing bulb through hole in bulkhead and remove valve from unit.

d. Installation

CAUTION

Use care not to damage or kink capillary.

(1) Coil capillary into two loops.

(2) Thread sensing bulb through hole in bulkhead.

(3) Secure sensing bulb to suction line with clamp (supplied with valve) and screw.

(4) Place valve in clamp.

(5) Restrain valve.

(6) Tighten three flare nuts on valve.

(7) Install screw, lockwasher and nut in clamp.

(8) Install split grommet on capillary and in casing.

(9) Install suction line insulation around sensing bulb.

(10) Replace the dehydrator (See para. 5-10).

(11) Leak test newly connected joints and those in the repair area (See para. 5-6).

(12) Evacuate the system (See para. 5-7).

(13) Charge the system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-23. LOW PRESSURE SERVICE VALVE

Preliminary procedure: Remove top cover (See para. 4-14).

a. Inspection

(1) Check that cap is in place and that threaded connection is not damaged. Replace cap if missing or damaged.

(2) Check for signs of leakage. Leak test per para. 5-6, if leak issuspected.

b. Repair. The most logical cause of failure to service valve will be due to loose or damaged valve stem. If leak is indicated, proceed as follows:

(1) Tighten valve stem.

(2) Leak check per para. 5-6.

(3) If leak persists, discharge the system per para. 5-3.

(4) Remove valve stem.

(5) Install replacement stem.

(6) Leak check the valve stem/body area per para. 5-6.

(7) If leak persists, replace valve assembly.

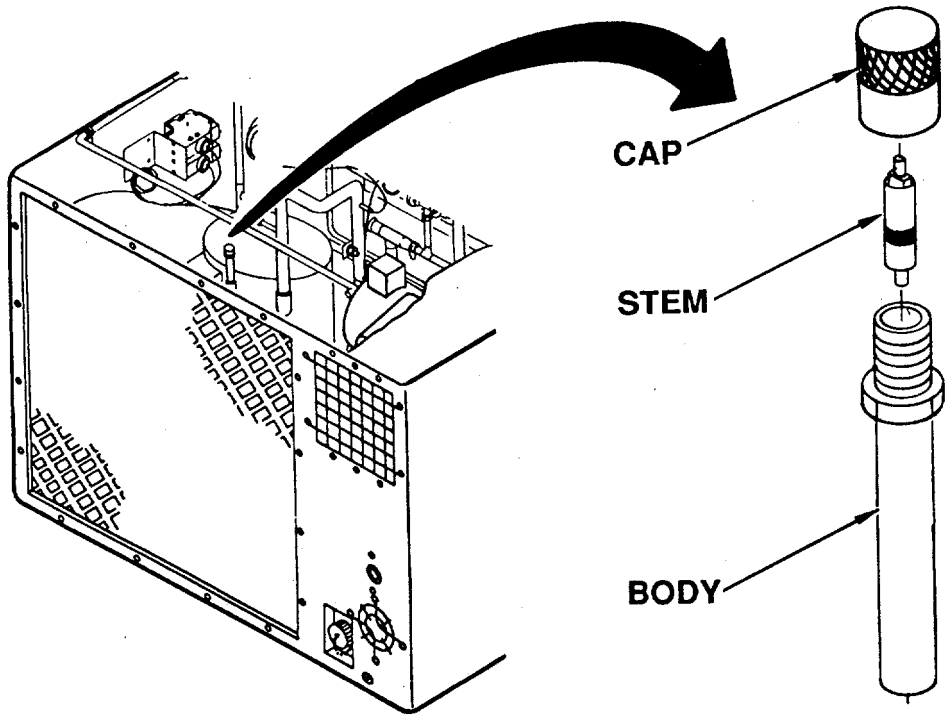


Figure 5-20. Low Pressure Service Valve

c. Removal

WARNING

All refrigerant -22 must be discharged from system before attempting removal of low pressure service valve.

(1) Discharge the refrigeration system per para. 5-3.

(2) Purge the system with nitrogen (See para. 5-4).

(3) Debraze the valve (See para. 5-5).

(4) Remove valve from tube connection.

d. Installation

(1) Remove valve stem from replacement valve.

(2) Place replacement valve on tube connection.

(3) Braze valve to tube connection. (See para. 5-5).

(4) Install stem in valve body.

(5) Install cap on valve.

(6) Replace dehydrator (See para. 5-10).

(7) Leak test newly connected joint and the repair area (See para. 5-6).

(8) Evacuate the system (See para. 5-7).

(9) Charge the system (See para. 5-8).

Follow-on procedure: Install top cover (See para. 4-14).

5-24. COMPRESSOR (B1)

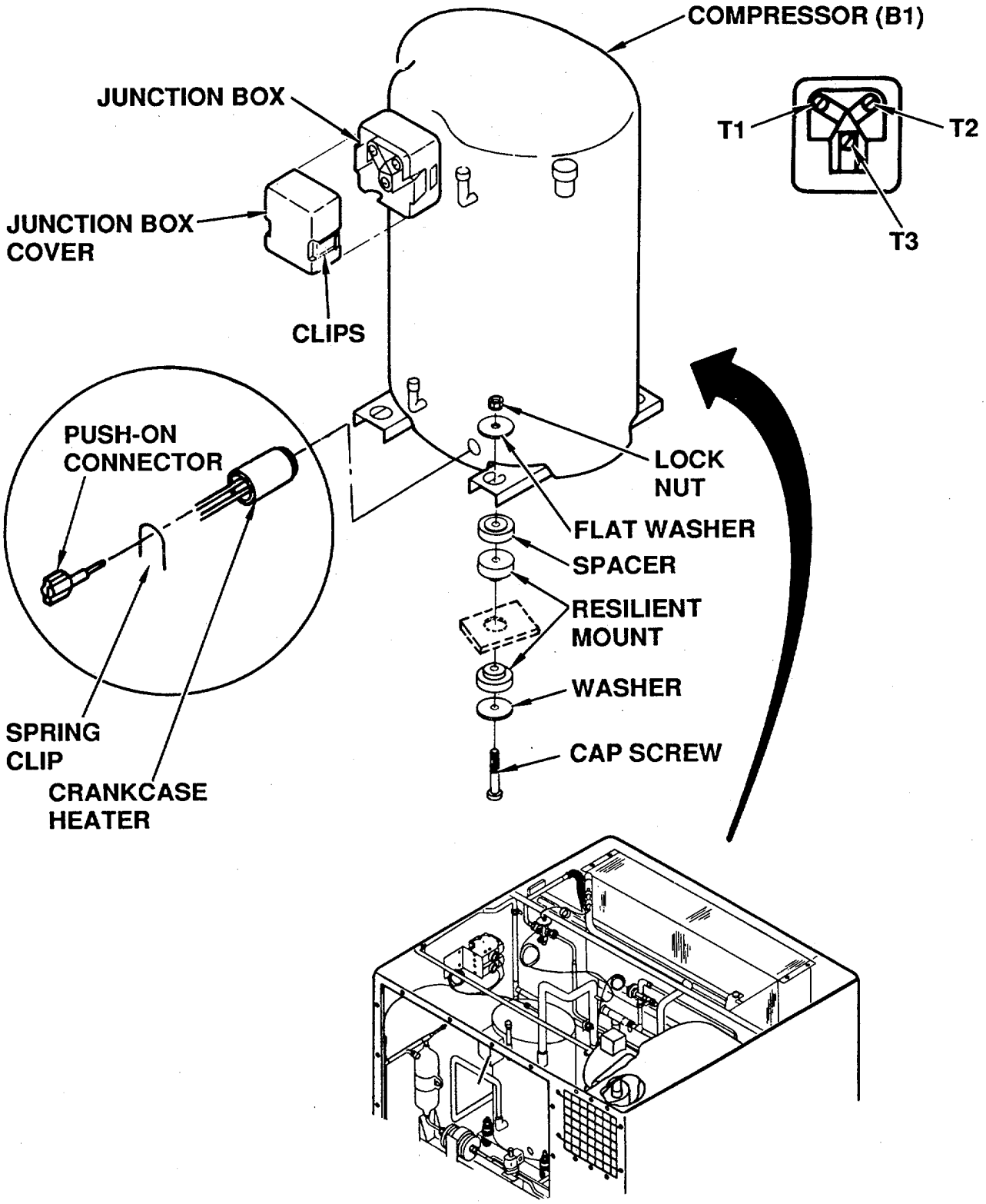


Figure 5-21. Compressor (B1)

WARNING

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

Preliminary procedure: Remove top cover (See para. 4-14).

NOTE

The compressor and motor assembly are hermetically sealed in a metal canister and are not repairable. The crankcase heater may be replaced without opening the refrigerant system.

a. Crankcase heater

(1) Inspection

(a) Check heater wire leads for burns or damage. Replace if damaged.

(b) Check for loose push-on connection. Tighten as needed.

(c) Check for cut or broken wire leads.

(d) Replace heater with damaged leads.

(2) Test

(a) Tag and disconnect leads B1-1 and B1-2 at push-on connection.

(b) Check continuity of heater wires.

(c) Replace open heater.

(3) Removal

(a) Cut ties as needed and remove thermal mastic from heater.

(b) Remove spring clip that secures heater in receptacle.

(c) Remove crankcase heater from receptacle.

(4) Installation

(a) See table 4-3 (wire list) for terminal connection information.

(b) See para. 4-36 for general wire repair instructions.

(c) Install crankcase heater in receptacle.

(d) Install spring clip in receptacle.

(e) Install thermal mastic (Item 17 of Appendix E) to heater.

(f) See tags and wiring diagram (FO-1) and install push-on leads B1-1 and B1-2. Remove tags.

(g) Install ties as needed.

b. Compressor motor windings test.

(1) With hand, depress clips on side of junction box cover. Remove cover.

(2) Tag and disconnect leads at terminals T1, T2 and T3.

(3) Check continuity between terminals T1, T2, T3 and the compressor body.

(4) If continuity exists at any terminal, the compressor is bad and must be replaced.

(5) Test three phase windings as follows: T1 to T2, T1 to T3 and T2 to T3.

(6) If all resistances are not above zero and less than 1 ohm, replace compressor.

(7) See tags and connect leads. Remove tags.

(8) Replace junction box cover.

NOTE

Steps a. and b. are applicable to serial numbers 1 thru 989. See steps c., d., e. and f. for serial numbers 990-1335. Steps g., h. and i. are applicable to serial numbers 1 thru 1335.

5.25. COMPRESSOR (B1) (SERIAL NOS. 0990-1335)

The compressor and motor assembly are hermetically sealed in a metal canister and are not repairable. The following items may be replaced without opening the refrigerant system.

- Connector (J4)
- Heater (HR7)
- Thermostat (S7)

WARNING

HIGH VOLTAGE
is used in the operation of this equipment.
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

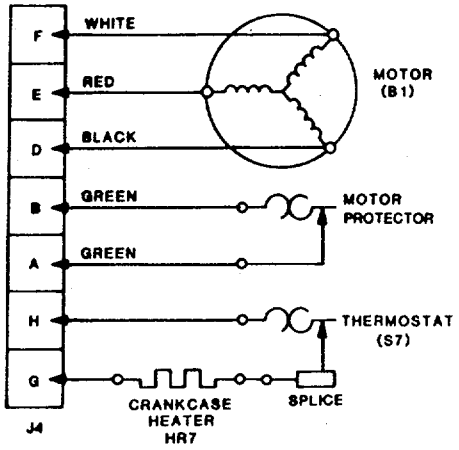
Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

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

Be careful not to contact high-voltage connections of 208 volts ac input when installing or operating this equipment.

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

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



SCHEMATIC DIAGRAM

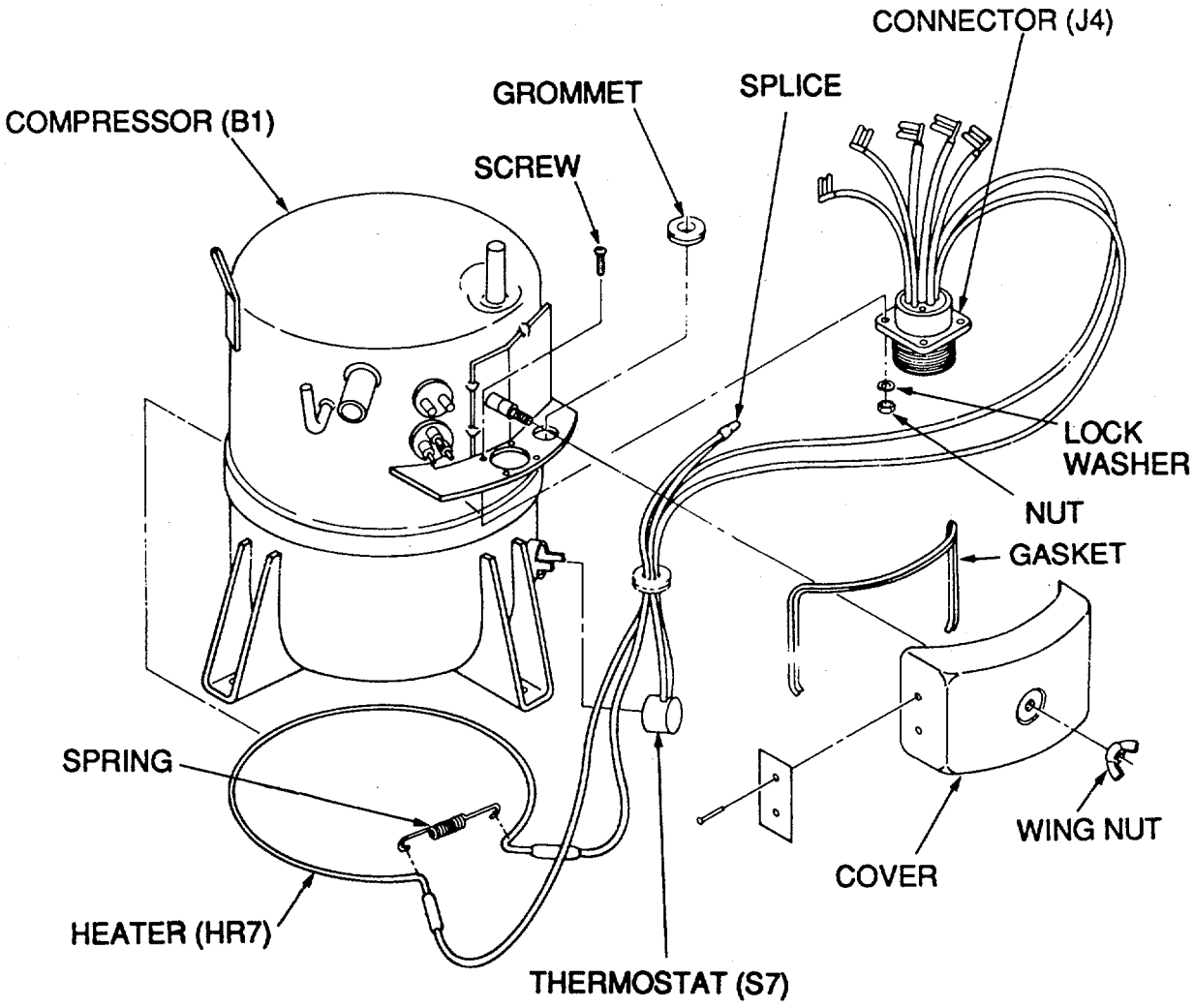


Figure 5-22. Compressor (B1) (Serial Numbers 990 through 1335)

c. Test.

(1) Allow heaters to cool before touching.

(2) Check compressor (B1), motor protector, heater (HR7), and thermostat (S7) as follows:

(a) Disconnect P4 connector and harness from J4 connector located on compressor junction box.

(b) Remove wing nut from compressor junction box cover and gasket and pull junction box cover from compressor.

(c) Check that all wire connections are secure and in good condition.

(d) Using multimeter, check continuity between connector J4 contacts to E, D to F, and E to

F. Continuity should be indicated. If continuity is not indicated, check that wires are properly connected. If wires are properly connected and continuity is still not indicated, replace compressor.

(e) Check continuity between J4 contacts A and B. If there is no continuity and wires are properly connected and there is continuity indicated, there is a internal short. Replace the compressor.

(f) Check continuity between J4 contacts A, B, D, E, and F, and compressor canister. If wires are properly connected and there is continuity indicated, there is an internal short. Replace the compressor.

(g) Check continuity between J4 contacts G and H. If there is continuity between these pins, both the heater element and thermostat are all right. If there is no continuity between pins, bare the splice between the heater lead and thermostat lead, and separately check for continuity between pin G and the splice, and pin H, and the splice. If there is continuity between pin G and the splice, but not between pin H and the splice, the heater element is all right and the thermostat is bad. If there is continuity between pin H and the splice, but not between pin G and the splice, the thermostat is all right and the heater element is bad. If there is no continuity between either pin and the splice, both the element and the thermostat are bad. If thermostat is bad, replace thermostat. If heater is bad, replace heater.

d. Connector J4 Replacement. (Refrigerant system discharge is not required.)

(1) Removal

WARNING

Be sure that the power has been disconnected at the power source.

(a) Remove wing nut, cover and gasket.

(b) Remove four nuts, four lock washers and four screws from connector J4. Pull the connector out of the box to gain access to the solder connections.

(c) Tag and unsolder wires.

(2) Installation

(a) Using tags and wiring schematic, solder wires to new connector. Remove the tags.

(b) Secure the connector with four screws, four lockwashers and four nuts.

(c) Install gasket cover and wing nut.

e. Heater (HR7) Replacement. (Refrigerant system discharge is not required.)

(1) Removal.

WARNING

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

(a) Tag and disconnect two heater leads.

(b) Remove retaining spring on heater.

(c) Lift heater up and off compressor crankcase.

(2) Installation.

(a) Spread heater ends apart and place heater down and around compressor in position on crankcase.

(b) Secure heater on crankcase with retaining spring.

(c) Connect two heater leads to heater.

f. Thermostat (S7) Replacement. (Refrigerant system discharge is not required.)

(1) Removal.

(a) Tag and disconnect two thermostat leads.

(b) Bend back retaining tabs on connector.

(c) Remove thermostat

(2) Installation.

(a) Insert thermostat and carefully bend in retaining tabs on connector to secure thermostat.

(b) See tags on removed thermostat and connect new thermostat leads.

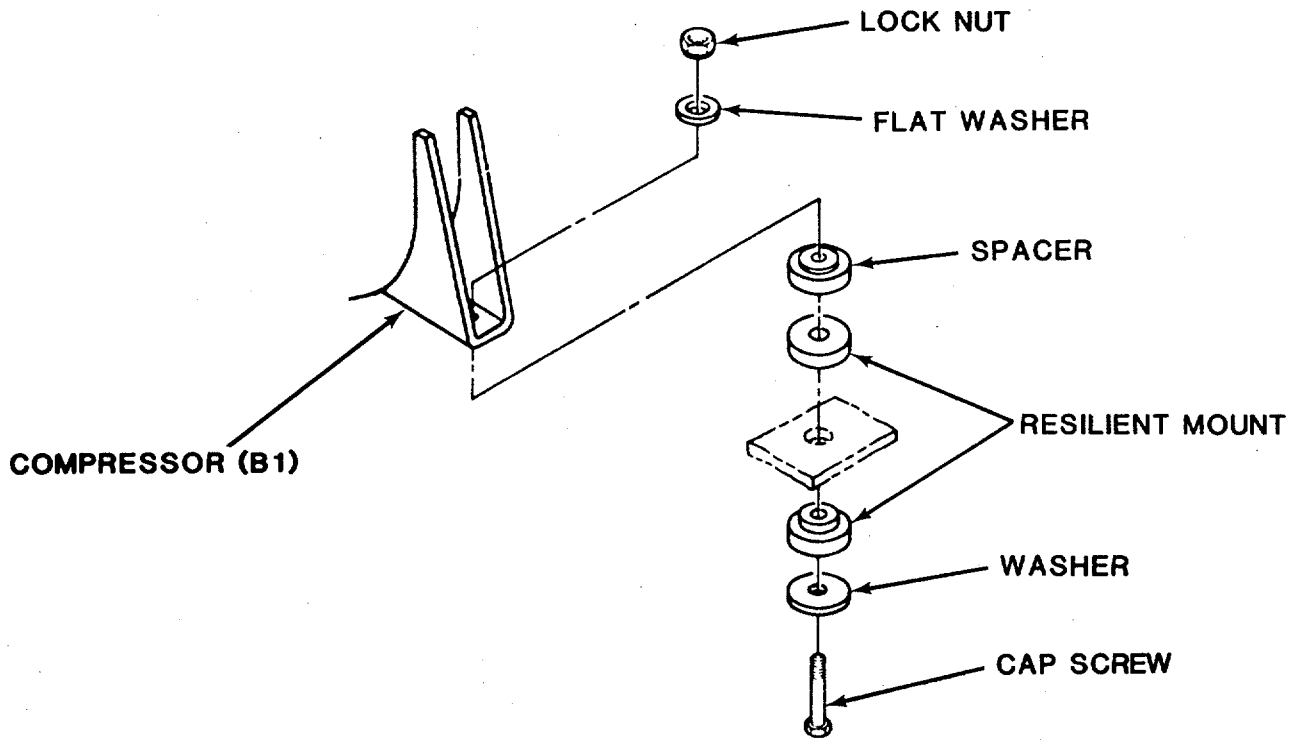


Figure 5-23. Compressor (B1) Mounting for Serial Numbers 990 through 1335

g. Compressor removal

(1) Tag and remove leads.

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.

NOTE

The compressor is mounted to the casing base by four cap screws that are inserted from the underside of the base. In order to remove the compressor, it is necessary that the entire air conditioner be raised and placed on blocks of sufficient height to allow access to these bolts from below the base.

(2) Attach an overhead hoist to the four lifting rings on each side of the cabinet, using two slings and a spreader bar.

(3) 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 cap screws must be accessed.

WARNING

All refrigerant -22 must be discharged from system before attempting to remove compressor.

(4) Discharge the refrigeration system per para. 5-3.

(5) Unwrap the insulation from the suction tube so the joint at the compressor is exposed.

(6) Purge the system with nitrogen per para. 5-4.

(7) Debraze the tubing sufficient to clear the compressor (See para. 5-5).

(8) Remove four locknuts and washers from cap screws.

(9) Carefully maneuver compressor from unit. Leave spacers and resilient mounts in place for installation.

WARNING

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

(10) Check to see if motor burn out is indicated.

h. Servicing system after compressor motor burnout

WARNING

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

(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 burn out of oil and refrigerant.

(2) If the oil is clean and clear, and does not have a burnt acid smell, the compressor did not fail because of motor burn out. If a burn out is not indicated, proceed to installation procedures.

(3) If the oil is black, contains sludge, and has a burnt acid odor, the compressor failed because of motor burn out.

(4) You must clean the entire refrigeration system after a burn out has occurred, since contaminants will have been carried to many corners and restrictions in the piping and fittings. These contaminants will soon mix with new refrigerant gas and compressor oil to cause repeated burn outs.

WARNING

When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.

(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/cm2) pressure.

(6) Connect the two dehydrator fittings with a jumper, 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 burn out 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, R-11, until it begins to pour out of the return line. Continue flushing for at least 15 minutes.

(13) Reverse the pump connections, replace the flter 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 kb/cm2) 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.

i. Compressor installation

CAUTION

The compressor is supplied with a complete charge of oil. Take care that oil is not lost when handling and installing compressor.

NOTE

If any refrigeration piping was disconnected with the compressor being replaced, transfer the piping to the replacement compressor before installing it in the air conditioner.

(1) Lift the compressor and place in unit.

(2) Align four feet of compressor with four mounting cap screws, four resilient mounts and four spacers.

(3) Install four flat washers and lock nuts on four cap screws.

(4) Wrap wet rags or heat sink (Item 28, Appendix B) around compressor and other tube joints removed during disassembly.

(5) Purge the system with nitrogen (See para. 5-4).

(6) Braze all connections (See para. 5-5).

(7) Replace the dehydrator (See para. 5-10).

(8) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(9) Evacuate the system (See para. 5-7).

(10) Charge the system (See para. 5-8).

(11) Re-wrap insulation on suction tube and compressor joint.

Follow-on procedure: Install top cover (See para. 4-14).

5-26. ACCUMULATOR

Preliminary procedure: Remove top cover (See para. 4-14).

a. Inspection

(1) Check clamp for loose or missing hardware. Tighten or replace as needed.

(2) Check for loose or missing mounting hardware. Tighten or replace as needed.

(3) If leak is suspected, leak check per para. 5-6.

b. Removal

WARNING

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

(1) Remove insulation sufficient to debraze tube connections.

(2) Discharge the refrigeration system (See para. 5-3).

(3) Purge the system with nitrogen (See para. 5-4).

(4) Debraze tube connections per para. 5-5.

(5) Remove nut and lockwasher from accumulator stud.

(6) Remove screw, lockwasher and nut from clamp.

(7) Clear stud and remove accumulator from clamp.

c. Installation

(1) Place accumulator in clamp.

(2) Install stud of accumulator in casing.

(3) Purge the system with nitrogen (See para. 5-4).

(4) Braze the tube connections (See para. 5-5).

(5) Replace the dehydrator (See para. 5-10).

(6) Leak check all newly connected joints and those in the repair area (See para. 5-6),

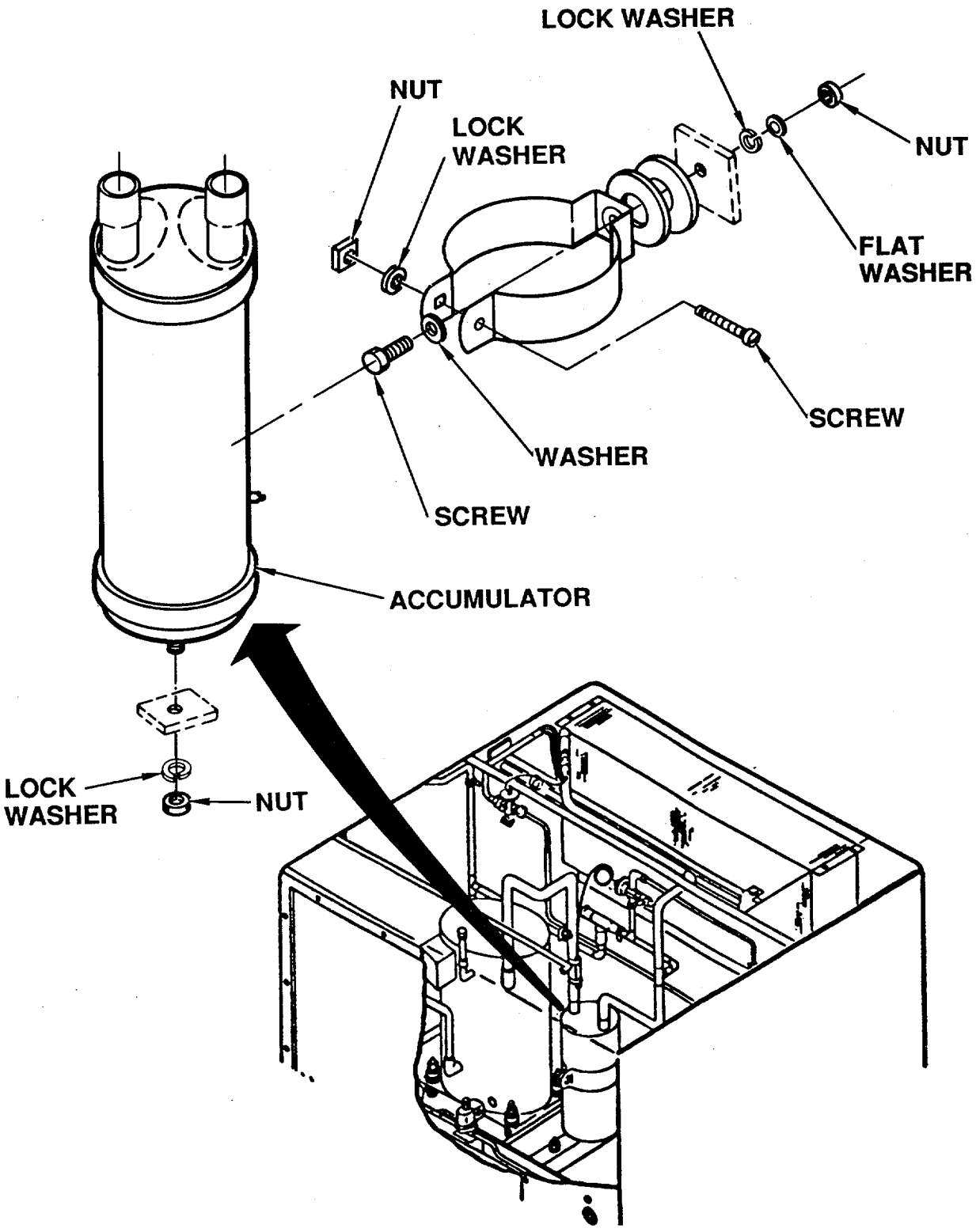


Figure 5-24. Accumulator Removal/Replacement

(7) Evacuate the system (See para. 5-7).

(8) Charge the system (See para. 5-8).

(9) Install screw, lockwasher and nut in clamp.

(10) Install nut and lockwasher in stud of accumulator.

(11) Install insulation or accumulator and tubing.

Follow-on procedure: Install top cover (See para. 4-14).

5-27. CONDENSER COIL REPLACEMENT

Preliminary procedure: Remove top cover (See para. 4-14).

a. Removal

WARNING

All refrigerant must be discharged from system before attempting removal of condenser coil.

(1) Discharge the refrigeration system per para. 5-3.

(2) Remove 16 screws and lockwashers that secure coil to casing.

(3) Purge the system per para. 5-4.

(4) Debraze the tube connections per para. 5-5.

(5) Remove condenser coil from unit.

b. Installation

(1) Place condenser coil in unit and align mounting hardware in condenser coil with clearance holes in casing.

(2) Maneuver condenser guard to align with clearance holes in casing and mounting hardware of coil.

(3) Secure coil to casing with 16 screws and lockwashers.

(4) Purge the system with nitrogen per para. 5-4.

(5) Braze the tube connections per para. 5-5.

(6) Replace dehydrator (See para. 5-10).

(7) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(8) Evacuate the system per para. 5-7.

(9) Charge the system per para. 5-8.

Follow-on procedure: Install top cover (See para. 4-14).

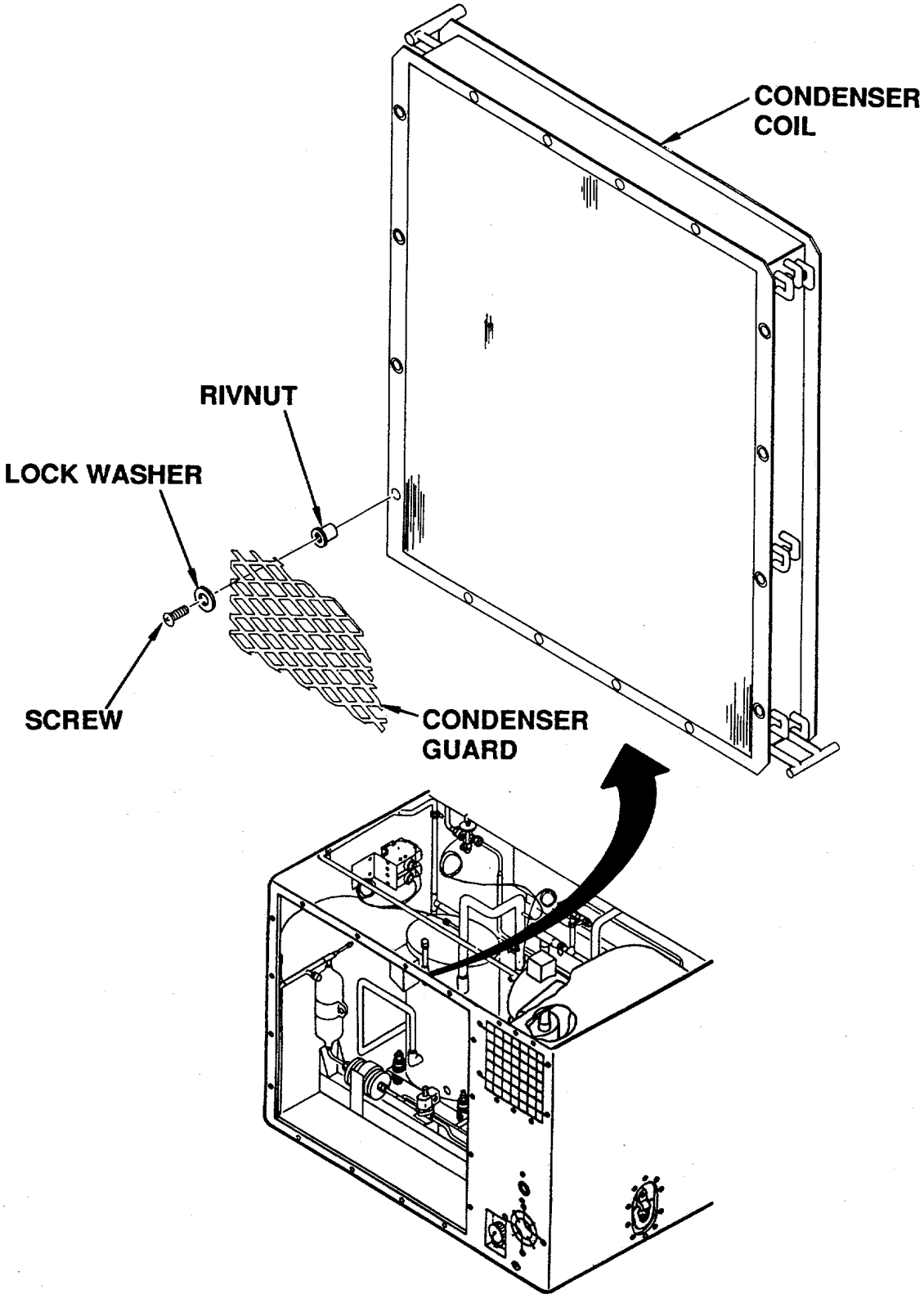


Figure 5-25. Condenser Coil Removal/Replacement

5-28. CONDENSER GUARD

a. Inspection

(1) Check to see that condenser guard is not bent, cracked or otherwise damaged.

(2) Replace condenser guard if severely damaged.

b. Removal

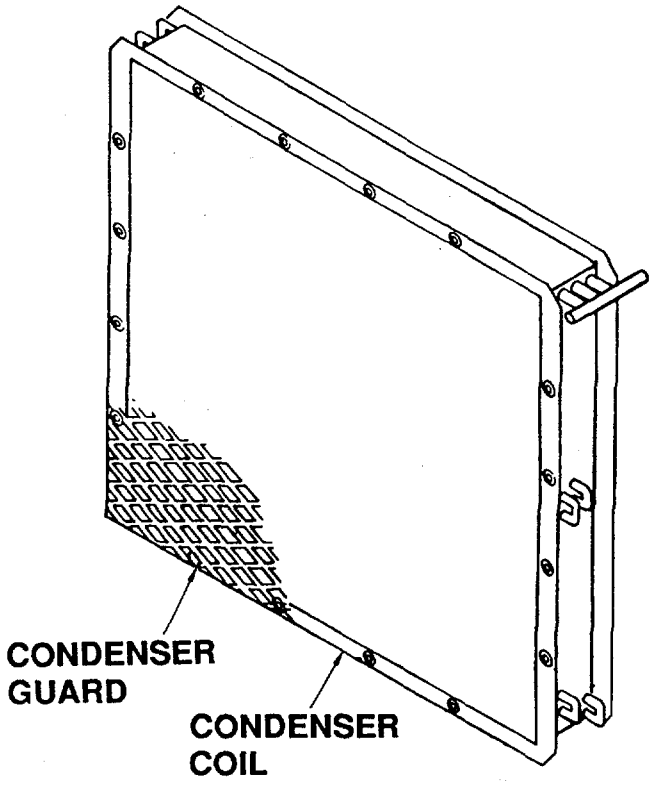


Figure 5-26. Condenser Guard Removal/Replacement

(1) Remove condenser coil (See para. 5-26).

(2) At top, tilt condenser guard forward and out of unit.

c. Installation

(1) Place bottom surface of condenser guard in lower corner of casing.

(2) Tilt condenser guard back to lie flush with casing.

(3) Slide condenser guard up to align with through holes in casing.

(4) Install condenser coil (See para. 5-26).

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

WARNING

All refrigerant -22 must be discharged from system before any tubing or fitting removal.

(1) Discharge the refrigeration system in accordance with para. 5-3.

(2) Purge the system with nitrogen per para. 5-4.

(3) Debraze the tube connections per para. 5-5.

(4) Remove the part.

b. Installation

(1) Replace the replacement part on the tube ends.

(2) Purge the system per para. 5-4.

(3) Braze the tube connections per para. 5-5.

(4) Replace the dehydrator (See para. 5-10).

(5) Leak test all newly connected joints and those in the repair area (See para. 5-6).

(6) Evacuate the refrigerant system (See para. 5-7).

(7) Charge the system per para. 5-8.

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 9-4120-389-24P. No special tools are required for general support maintenance of the air conditioner. Test, Measurement, and Diagnostic Equipment (TMDE), and support equipment, include standard electrical test equipment, and standard pressure and vacuum gages, vacuum servicing manifolds found in any general support maintenance and 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 organization and direct support maintenance for rehabilitation or overhaul of an air conditioner.

6-3. CASING, REPAIR

a. BLIND NUTS AND NUT PLATES

(1) To replace blind nuts (rivnuts) use a drill slightly smaller than the body of the blind nut.

(a) Carefully drill the old blind nut out.

(b) Install replacement part.

(2) To replace nut plates, use a drill slightly smaller than the body of the rivets securing the nut plate.

(a) Carefully drill the rivets loose.

(b) Remove the old nut plate.

(c) Install new nut plate with properly sized rivets.

b. INSULATION, CASING

(1) Inspection

(a) Check for broken welds, badly bent or dented parts, and cracked or broken parts.

(b) Check that plate nuts and blind nuts are in place and secure.

(c) Check that insulation is not loose, missing, burnt, or otherwise damaged. Replace if missing or damaged. Reglue if loose.

(2) Insulation/Removal

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(a) Remove as much old insulation material as possible, by pulling or scraping it away from the metal surface.

WARNING

Methyl-ethyl ketone (MEK) is flammable, and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

(b) Soften and remove old adhesive and insulation residue, using methyl-ethyl ketone (MEK) (Item 19, Appendix E) and a stiff brush.

(3) Installation

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(a) Cut to size

(b) Be sure that the surface to which the insulation is to be applied is clean and free of paint and old adhesive material.

(c) Coat the mating surfaces of the metal and the insulation with adhesive (Item 3, Appendix E). Let both surfaces air dry until the adhesive is tacky, but will not stick to the fingers.

(d) Starting with an end, carefully attach the insulation to the metal. Press into firm contact all over.

6-4. CASING, REPLACE

Replacement consist of removing all attaching hardware and reinstalling it on new casing.

APPENDIX A

REFERENCES

A-1. SCOPE

This Appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

Recommended Changes to DA Publications	DA Form 2028-2
Equipment Inspection and Maintenance Work Sheet	DA Form 4042
Report of Discrepancy	SF 367
Quality Deficiency Report	SF 368

A-3. FIELD MANUALS

Electric Motor and Generator Repair	FM20-31
First Aid	FM21-11

A-4. MANUALS

Environmental Control of Small Shelters	MIL-HDBC-116
Hand Portable Fire Extinguishers Approved for Army Users	TB5-4200-200-10
Radio Interference Suppression	TM11-483
The Army Maintenance Management System (TAMMS)	DA PAM738-750
Painting Instructions for Field Use	TM43-0139
Unit, Direct Support, and General Support Maintenance Repair Parts, and Special Tools List	TM9-4120-389-24P
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

A-1/A-2 blank

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists 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 be setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision

measurement. Consists of comparisons of two instruments, one of which is 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 servicesl, including fault location/troubleshooting , removal/installation, and disassembly/assembly3 procedures, and maintenance actions4 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. Depot Maintenance Work Requirements (DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

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[1]Services - Inspect, test, service, adjust, align, calibrate, and/or service.

[2]Fault located/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 operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific 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 ..... Unit Maintenance
F..... Directional 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 REQUIREMENT, SECTION III

a. Column 1, Reference code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN 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

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
01	METAL COVERS AND FRONT LOUVERS							
	Fabric Cover	Inspect	0.1					
		Repair		0.1				
		Replace		0.2				
	Metal Covers	Inspect	0.1					A
		Replace		0.2				
		Repair	0.1					
	Information Plates	Inspect		0.1				
		Replace		0.15				
	Front Louvers	Inspect	0.1					B
		Service		0.1				F
		Adjust	0.1					
		Replace		0.2				
	Filter Air Conditioning	Inspect	0.1					
		Service		0.2				
		Replace		0.2				
	Mist Eliminator & Bracket	Inspect		0.1				
		Service		0.5				
		Replace		0.1				
02	CONDENSER OUTLET AND VENTILATION GUARD, VENTILATION FILTER AND LIFTING RINGS							
	Condenser Outlet Guard	Inspect		0.1				
		Replace		0.1				
	Ventilation Guard	Inspect	0.1					
		Service	0.1					
		Replace		0.1				

APPENDIX B
SECTION II
MAINTENANCE ALLOCATION CHART (con't.)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
02 (cont)	Ventilation Air Filter	Inspect	0.1					
		Service		0.35				
		Replace		0.1				
03	Lifting Ring and Clips	Inspect		0.1				
		Replace		1.5				
	CONDENSER FAN MOTOR, SCROLL ASSEMBLY AND CONDENSER MOTOR SUPPORT							
	Condenser Motor	Inspect		0.1				
		Test		1.0				
		Repair		2.0				
	Condenser Fan	Inspect		0.1				
		Replace		2.0				
	Damper Assembly	Inspect		0.1				
		Replace		2.0				
	Condenser Scroll	Inspect		0.1				
		Repair		2.0				
		Replace		2.0				
		Service		0.2				
	Motor Support & Brace	Inspect		0.1				
		Replace		1.5				
04	CONDENSATE DRAIN							
	Drain Assembly	Inspect		0.1				
		Service		0.5				
		Replace		2.0				
		Repair		1.5				

APPENDIX B
SECTION II
MAINTENANCE ALLOCATION CHART (con't.)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
05	EVAPORATOR FAN ASSEMBLY							
	Evaporator Fan Assembly	Inspect		0.1				
		Repair		2.0				
		Replace		1.0				
	Exaporator Impeller Fans	Inspect		0.1				
		Service		0.2				
		Replace		2.0				
	Evaporator Scrolls	Inspect		0.1				
		Service		1.8				
		Replace		1.5				
	Evaporator Fan Motor and Bracket	Inspect		0.1				
		Test		1.0				
		Replace		1.5				
06	VENTILATION DAMPER AND ACTUATOR	Inspect		0.1				
		Service		0.2				
		Replace		1.0				
		Adjust		0.5				
07	CONTROL MODULE ASSEMBLY AND JUNCTION BOX ASSEMBLY							
	Control Module	Service		0.5				
		Inspect		0.1				
	Components	Test		0.5				
		Replace		1.0				
		Repair		1.8				
	Junction Box	Inspect		0.1				
		Test		0.5				
		Replace		1.0				
		Repair		1.5				

APPENDIX B
SECTION II
MAINTENANCE ALLOCATION CHART (con't.)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
08	WIRE HARNESSES							
	Junction Box Wiring Harness	Inspect Test Repair Replace		0.2 0.5 1.0 1.5				
	Condenser Section Wiring Harness	Inspect Test Repair Replace		0.2 0.5 1.0 1.0				
09	TERMINAL BOARDS, HEATER AND THERMOSTAT SWITCH							
	Terminal Boards	Inspect Replace		0.25 1.0				
	Heating Elements	Inspect Test Replace		0.1 0.25 1.0				
	Heater Cutout Switch	Inspect Test Replace		0.1 0.25 1.0				
10	AUXILIARY POWER CONNECTOR ASSEMBLY	Inspect Repair Replace		0.1 2.0 2.0				
11	REFRIGERATION VALVES, COMPONENTS AND RELATED TUBING							
	Filter Drier Dehydrator	Inspect Replace			1.0 4.0			
	High Pressure Service Valve	Inspect Replace			0.5 4.0			

APPENDIX B
SECTION II
MAINTENANCE ALLOCATION CHART (con't.)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
11 (cont)	Fusible Plug	Inspect						
		Replace			4.0			
	Receiver	Inspect			1.0			
		Replace			4.0			
	Solenoid Valve	Inspect		0.2				
		Repair			4.0			D
		Replace			4.0			
	Sight Glass	Inspect			0.1			
		Replace			4.0			
	Quench Valve	Inspect			0.15			
		Test			1.0			
		Replace			4.0			
	Pressure Regulating Valve	Inspect			0.15			
		Test			1.0			
		Replace			4.0			
	Damper Actuator	Inspect			0.15			
		Replace			4.0			
	Tubing and Fittings	Replace			4.0			
12	PRESSURE SWITCHES	Inspect		0.1				
		Test		0.5				
		Replace			4.0			
13	EVAPORATOR COIL THERMO EXPANSION VALVE AND RELATED TUBING							
	Evaporator Coil	Inspect		0.25	1.0			
		Service		1.0				
		Replace			4.0			

APPENDIX B
SECTION II
MAINTENANCE ALLOCATION CHART (con't.)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE C	O	F	H	(5) TOOLS AND EQUIP.	(6) REMARKS
13 (cont)	Expansion Valve	Inspect			0.15			
		Test			1.0			
		Replace			4.0			
	Tubing and Fittings	Replace			4.0			
14	COMPRESSOR, ACCUMULATOR AND RELATED TUBING							
	Compressor	Inspect		0.1				
		Test			0.5			
		Repair			1.0			
		Replace			4.0			
	Low Pressure Service Valve	Inspect			0.5			
		Replace			4.0			
	Accumulator	Inspect			0.5			
		Replace			4.0			
	Tubing and Fittings	Replace			4.0			
15	CONDENSER COIL, GUARD AND RELATED TUBING							
	Condenser Coil	Inspect		0.25				
		Service		1.0				
		Replace			4.0			
	Condenser Guard	Inspect		0.1				
		Replace			4.0			
	Tubing and Fittings	Replace		4.0-				
16	CASING ASSEMBLY HOUSING	Repair			2.0	E		
		Replace			24.0			

APPENDIX B
SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
MAINTENANCE ALLOCATION CHART

(1) Tool or Test Equip Ref Code	(2) Maintenance Level	(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, Refrigeration 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) 14008
4	F-H	Recovery and Recycling Unit, Refrigerant	4130-01-338-2707	(07295) 17500B
		SPECIAL TOOLS		
5	O	Heat Gun	4940-01-042-4855	(16327)
6	F	Regulator Assy. (Nitrogen)	6680-00-503-1327	
7	O	Riveter, Blind, Hand	5120-00-017-2849	
8	O	Straightener, Fin	5120-00-157-2180	
9	O	Screwdriver, Offset, Crosstip	5120-00-256-9014	

APPENDIX B

SECTION IV REMARKS

MAINTENANCE ALLOCATION

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.
F	Front louver must be removed in order to adjust louver up or down.

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 operations.

C-2 GENERAL.

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Action 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, B11 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 B11, 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.

c. Column (3)-Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4)-Unit of Measure (U/M). Indicates the measure used in performing the actual operation/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5)-Quantity required (Qty rqt). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEMS LIST

ILLUS NO.	NATIONAL STOCK NUMBER	DESCRIPTION FSCM & PART NUMBER	U/M	QTY REG
1.	5935-00-853-3133	Connector, Power Input (96906) MS3100R-24-22P	EA	1
2.		Discharge, Louver, Metal (97403) 13216E6318	EA	1
3.		Inlet, Louver with Filter Clips (97403) 13229E6218	EA	1
4.		Guard, Ventilation (97403) 13229E6172	EA	1
5.		Filter, Ventilation (97403) 1322E6173	EA	1
6.		Guard, Condenser Outlet (97403) 13229E6192	EA	1
7.		Control, Module Assembly (97403) 13229E6228	EA	1
8.		Mist, Eliminator (97403) 13229E6227	EA	1
9.		Filter, Air Conditioner (97403) 13329E6221	EA	1
10.		Cover, Fabric (97403) 13329E6153	EA	1

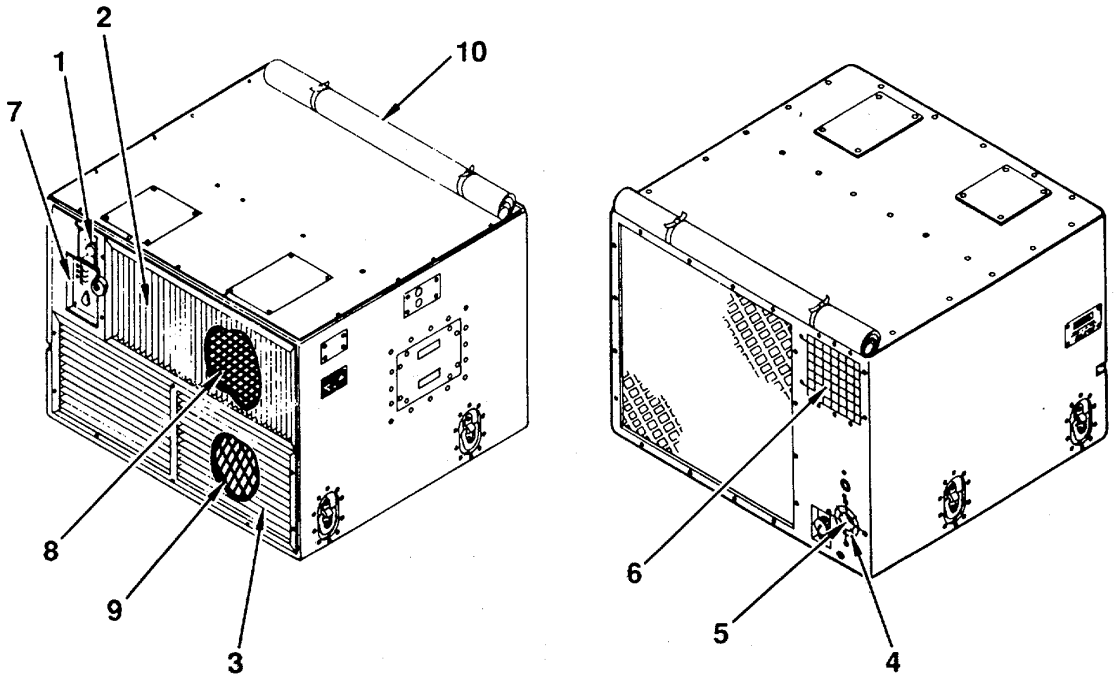

Figure C-1. Component End Item

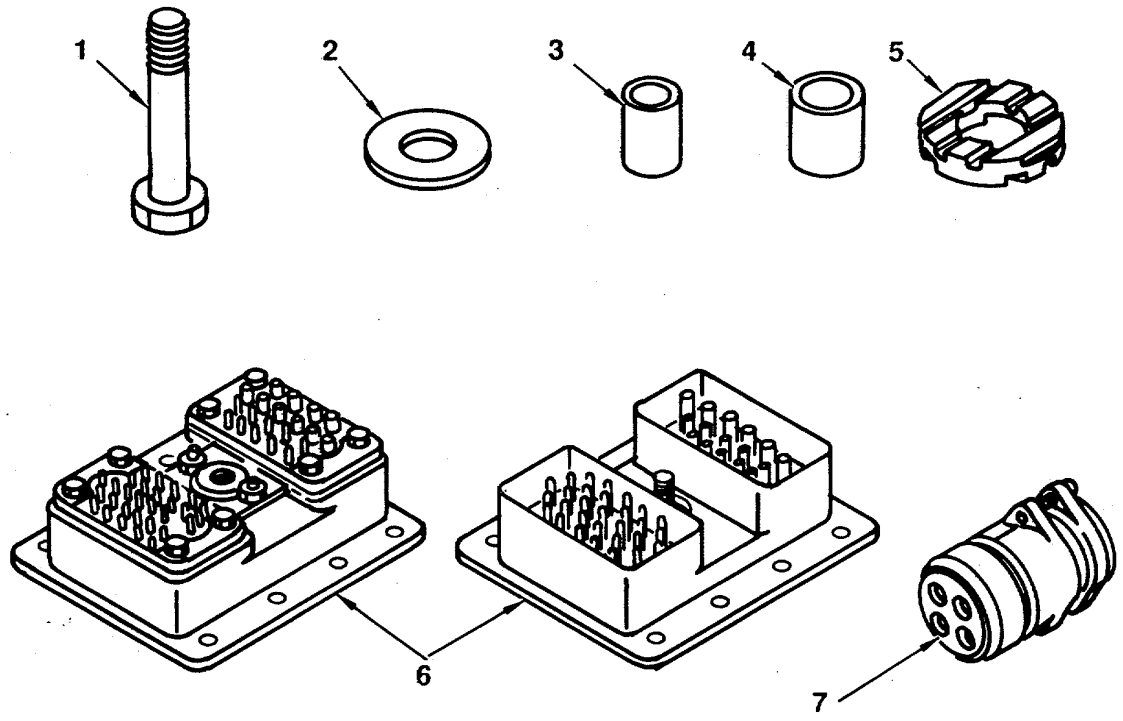

Figure C-2. Basic Issue Item

SECTION II. COMPONENTS OF END ITEMS LIST

ILLUS NO.	NATIONAL STOCK NUMBER	DESCRIPTION FSCM AND PART NUMBER	U/M	QTY REG
1.	5935-00-369-208	Screw, Cap Hex Head (96906) MS90726-65	EA	6
2.	5310-00-566-9504	Washer (97403) 13216E138-2	EA	6
3.	530-00-566-9504	Spacer (97403) 13216E6152	EA	6
4.	4730-01-036-2334	Tube, Elastomeric (97403) 13216E6153	EA	6
5.	5340-01-042-5742	Mount, Resilient (97403) 13216E6137	EA	12
6.	5935-00-462-2390	Connector, Receptacle (97403) 13216E6177	EA	1
7.	5935-00-482-2380	Connector, Plug, Electrical (96906) MS3106R24-22p	EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIAL 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	F-Direct Support Maintenance
O-Unit 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 Commercial and Government Entity (CAGE).

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 / DURABLE SUPPLIES AND MATERIAL LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	8040-00-142-9823	Silicone Adhesive Sealant RTV General Purpose MIL-A-46106, Type 1	
2	O	3422-00-269-6110	Solder, Lead-Tin, QQ-S-571 Type SN60WRP2	
3	O	8040-00-290-4301	Adhesive, Scotch-Grip-1357	qt
4	F	6830-00-292-0732	Nitrogen	cy
5	F	3439-00-528-3882	Brazing alloy, silver QQ-B-654	
6	F	3439-00-188-6982	Brazing alloy, copper QQ-B-654, BCUP-S Class IV or V	
7	F	3439-00-640-3713	Flux, brazing O-F-499, type B	cn
8	F	5350-00-192-5047	Abrasive cloth	pg
9	F	7920-00-205-1711	Rags	pg
10	F	6850-00-837-9927	Monochlorodifluoromethane, Technical; w/cylinder 22 lb. (Refrigerant-22) BB-F-1421 Type 22 (81348)	cy
11	F	5640-00-103-2254	Tape, duct	roll
12	F	6830-00-872-5120	Trichloromonofluoromethane, Technical; w/cylinder 50 lb. (Refrigerant-11) BB-F-1421 Type 11 (81348)	cy

SECTION II. EXPENDABLE / DURABLE SUPPLIES AND MATERIAL LIST (cont)

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
13	F	8030-00-889-3534	Tape, Antiseize, Polytetraflucroethylene MIL-T-27730, Size 1	roll
14	F	9160-00-036-3734	Air Filter, Lubricant	cn
15	F	9150-00-058-2301	Oil, Vacuum Pump, DuoSeal	qt
16	0	3439-01-045-7940	Flux, Soldering, Liquid Rosin Base, MIL-F-14256	qt
17	0	5610-01-042-2456	Thermal Mastic	qt
18	F	8034-04-481-3825	Sealing Compound Grade H MIL-S-22473	qt
19	F		Solvent, Cleaner (MEK)	cn
20	F	7520-00-223-0000	Brush, Bristle; Soft	ea
21	F	7240-00-137-1609	Bucket	ea
22	F	8415-00-266-8677	Gloves, Rubber	pr
23	F	4240-00-052-3776	Goggle, Industrial	pr
24	F	9150-00-664-4448	Lubricant, Gen. Purpose	cn
25	F	9150-00-754-0064	Lubricant, Silicone; Solid	cn
26	0		Detergent, Mild	oz
27	0	535-00-192-5047	Cloth, Abrasive	sht
28	F		Heat Sink	roll
29	F	5970-00-419-4291	Tape, Insulation	roll

INDEX

INDEX (cont)

INDEX (cont.)

INDEX (cont.)

INDEX (cont.)

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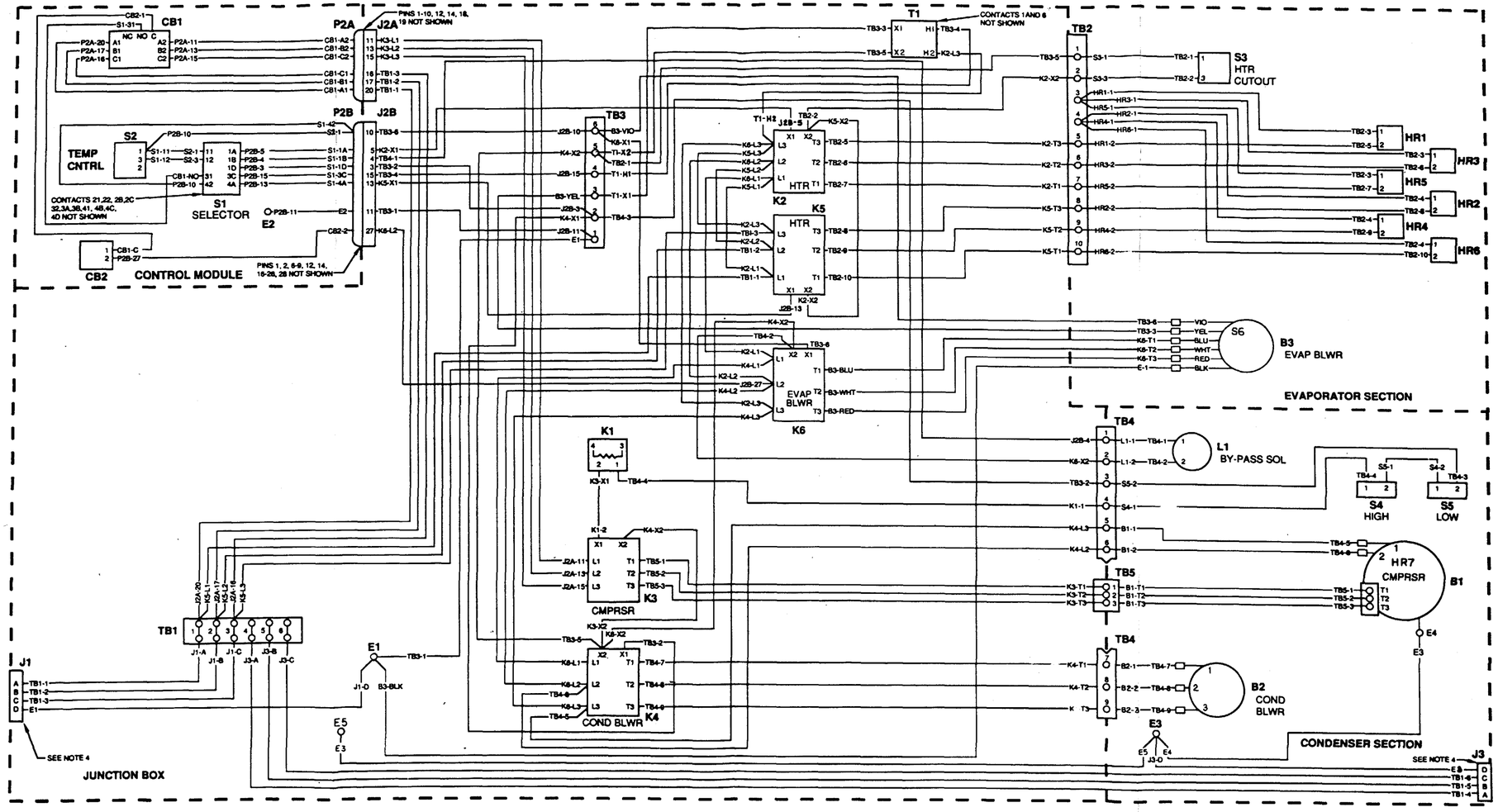
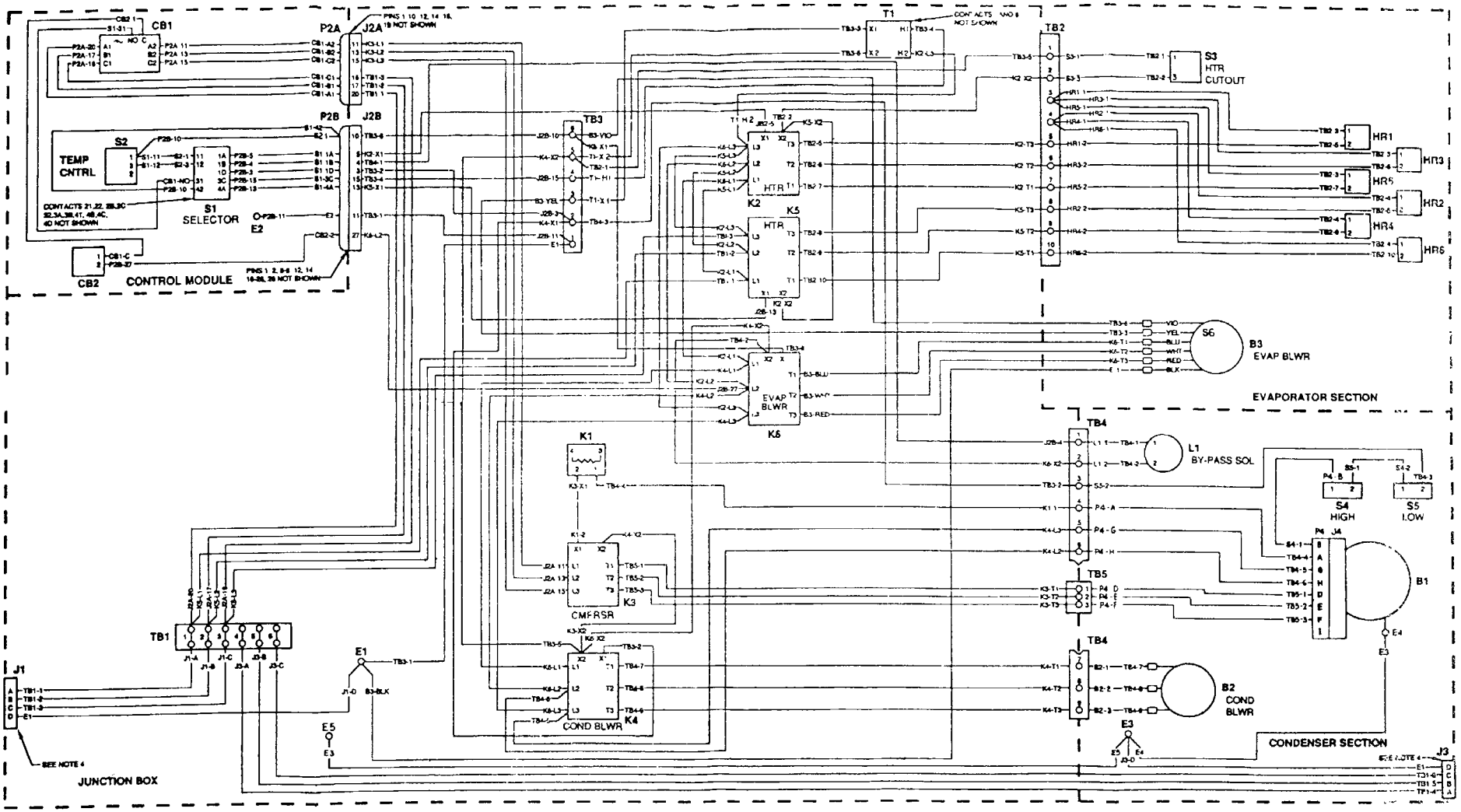
INDEX (cont.)



FO-1. Wiring Diagram.



FO-1 Wiring Diagram
(Serial Numbers 990 thru 1335)

By Order of the Secretary of the Army:

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

official:

PATRICIA P. HICKERSON
Brigadier General, United States Army
The Adjutant General

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .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 milliters = .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: 068616-003