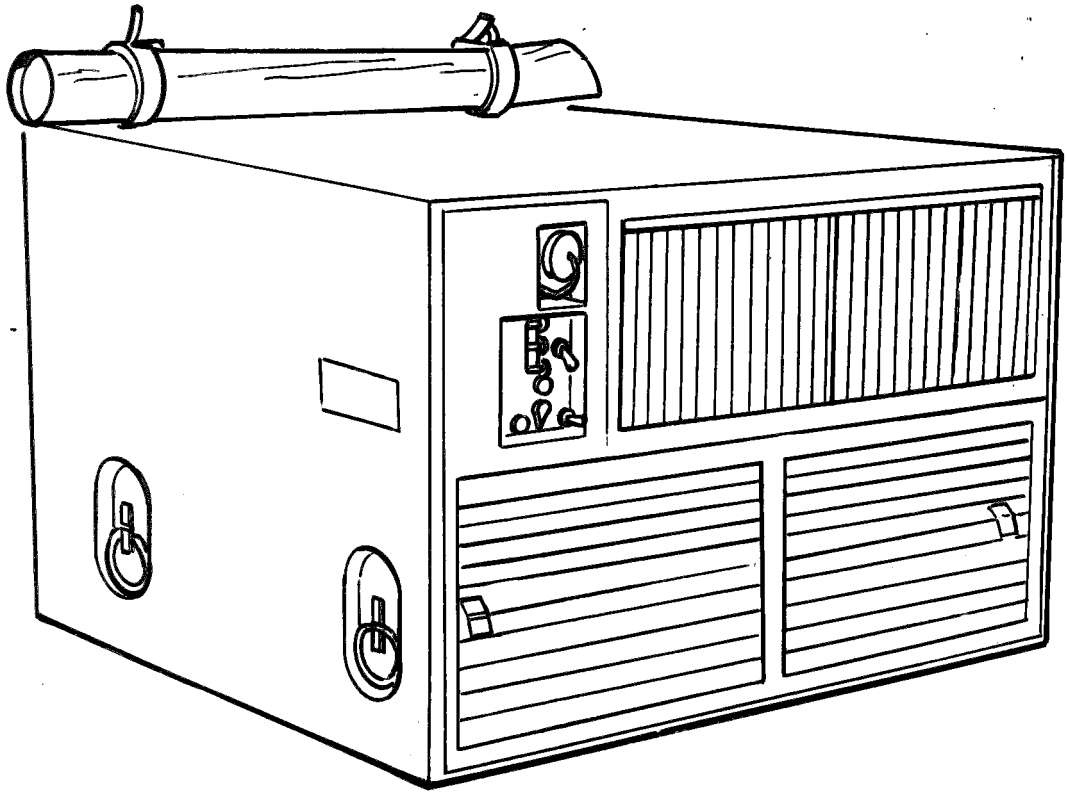
TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT & GENERAL SUPPORT

MAINTENANCE MANUAL

FOR

AIR CONDITIONER, HORIZONTAL, COMPACT, 36000 BTUH



208 VOLT, 3 PHASE 400 HERTZ

NSN 4120-00-063-8182

AMERICAN AIR FILTER CO. MODEL CH436-1

AND

208 VOLT, 3 PHASE, 50/60 HERTZ

NSN 4120-00-063-7575

AMERICAN AIR FILTER CO. MODEL CH636-1

DEPARTMENT OF THE ARMY

30 MAY 1980

CHANGE

No. 4

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Operator, Organizational, Direct Support and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTUH 208 VOLT, 3 PHASE, 400 HERTZ, NSN 4120-01-063-8182 (AMERICAN AIR FILTER CO., MODEL CH436-1) 208 VOLT, 3 PHASE, 50/60 HERTZ, NSN 4120-01-063-7573 (AMERICAN AIR FILTER CO., MODEL CH636-1)

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Operator, Organizational, Direct Support and General Support
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AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTUH
208 VOLT, 3 PHASE, 400 HERTZ, NSN 4120–01–063–8182
(AMERICAN AIR FILTER CO., MODEL CH436–1)
208 VOLT, 3 PHASE, 50/60 HERTZ, NSN 4120–01–063–7573
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Operator, Organizational, Direct Support and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTUH
208 VOLT, 3 PHASE, 400 HERTZ
NSN: 4120-01-063-8182
(AMERICAN AIR FILTER CO., MODEL CH436-1)
208 VOLT, 3 PHASE, 50/60 HERTZ
NSN: 4120-01-063-7573
(AMERICAN AIR FILTER CO., MODEL CH636-1)

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CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
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Operator, Organizational, Direct Support and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTUH
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WARNING
HIGH VOLTAGE
is used in the operation of this equipment.

DEATH ON CONTACT
or severe injury may result if personnel fail
to observe safety precautions.
Always disconnect the air conditioner from
power source before performing maintenance
on this equipment.
If power must remain on for troubleshooting,
exercise extreme care to avoid contact with
any electrical component, fan, fan motor, etc.
Do not operate the air conditioner without
louvers, top covers, and guards in place and
tightly secured.

WARNING
REFRIGERANT UNDER PRESSURE
is used in the operation of this equipment

DEATH
or severe injury may result if personnel fail
to observe safety precautions.
Never use a heating torch on any part
that contains refrigerant-22.
Avoid bodily contact with liquid refrigerant
and avoid inhaling refrigerant gas.

WARNING
The burning of polyurethane foams is dangerous.
Due to the chemical composition of a polyurethane foam,
toxic fumes are released when it is burned or heated.
If it is burned or heated indoors,
such as during a welding operation in its proximity,
precautions should be taken to adequately ventilate the area.
An exhaust system equivalent to that of a
paint spray both should be used.
Air supplied respirators, approved by the
National Institute for Occupational Safety and Health
or the US Burerau of Mines,
should be used for all welding in confined spaces
and when ventilation is inadequate.

Individuals who have chronic or recurrent respiratory
conditions, including allergies and asthma,
should not be employed in this type of environment.

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° -138°F (38° -59°C).

TECHNICAL MANUAL
NO. 5-4120-361-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 May 1980

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENEML SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTUH

208 VOLT, 3 PHASE, 400 HERTZ

NSN 4120-01-063-8182

(AMERICAN AIR FILTER CO., MODEL CH436-1)

208 VOLT, 3 PHASE, 50/60 HERTZ

NSN 4120-01-063-7573

(AMERICAN AIR FILTER CO., MODEL CH636-1)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, U.S. Amy Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, M0 63120-1798. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Scope.

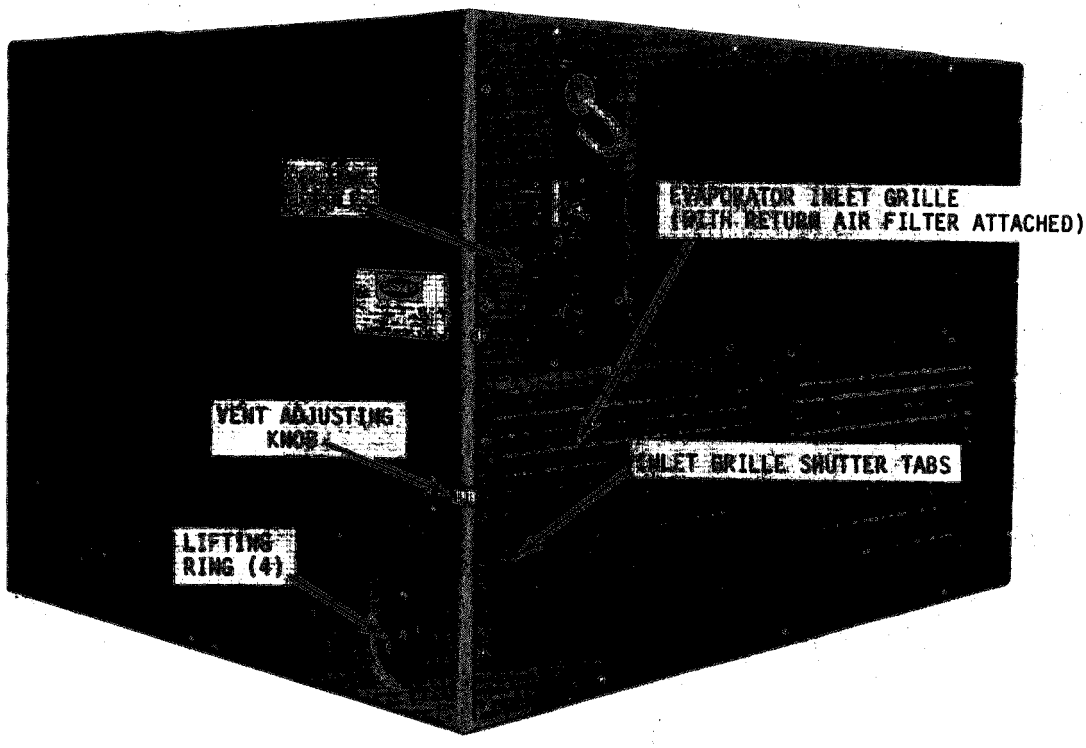
This manual is for your use in operating and maintaining the AAF Models CH436-1 and CH636-1 air conditioners.

1-2. Maintenance Forms and Records.

Maintenance forms and records that you are required to use are explained in TM 38-750.

1-3. Reporting of Equipment Improvements Recommendations.

EIR can and must be submitted by anyone who is aware of any unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply to tell why the design is unfavorable or why a procedure is difficult. EIR may be submitted on



SHIPPING DIMENSIONS	
LENGTH	.... 34.8 IN (88.4 cm)
HEIGHT	.... 27.0 IN (68.6 cm)
WIDTH	.... 38.0 IN (96.5 cm)
WEIGHT	.... 435 LB (198 kg)

Figure 1-1. Air conditioner, right front, three quarter view, with shipping dimensions

SF 368 (Quality Deficiency Report). Instructions for preparing EIR's are provialed in TM 38-750, the Army Maintenance Managements System. Mail directly to Commander Headquarters, U. S. Army Troop Support and Aviation Material Command, ATTN: DRSTS-MEM, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be forwarded directly to you.

1-4. Equipment and Serviceability Criteria.

This equipment is not covered by an ECS.

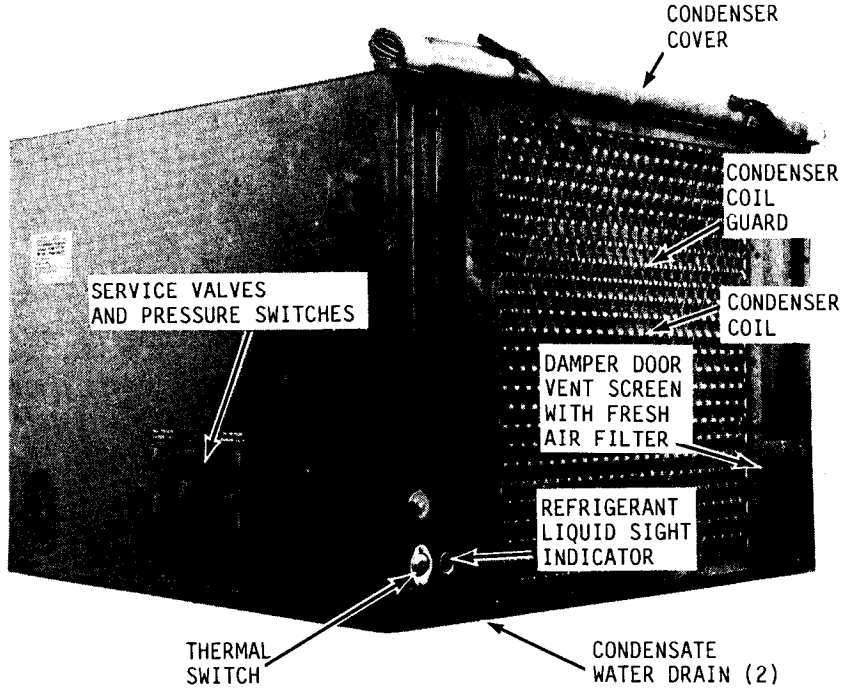


Figure 1-2. Air conditioner left rear, three quarters view

Section II. EQUIPMENT DESCRIPTION

1-5. Equipment Purpose, Capabilities and Features.

Air conditioner Model CH436-1 or CH636-1 (figures 1-1 and 1-2) is a completely self-contained, compact, horizontal unit designed for cooling and heating air to a desired predetermined range, and circulating the conditioned air to provide heating or cooling of equipment or personnel within the air-conditioned area. It is designed for continuous operation, with varying loads. It is used primarily in van type enclosures to provide the filtered cooling and ventilating or heated air required to maintain service conditions necessary for efficient operation of electronic equipment and the comfort of operating personnel. It is equipped with internal ducting so that ventilation air may be drawn into the area being air conditioned. The evaporator and condenser sections of the air conditioner are separated by an insulated metal partition that forms part of the unit housing.

1-6. Location and Description of Major Components.

a. Evaporator Section. The evaporator section (fig. 1-3), located in the front of the air conditioner, contains intake and discharge air louvers, air filter, mist eliminator, evaporator coil, evaporator motor and fans, heater elements, heater thermal protector, primary expansion valve, condensate drain

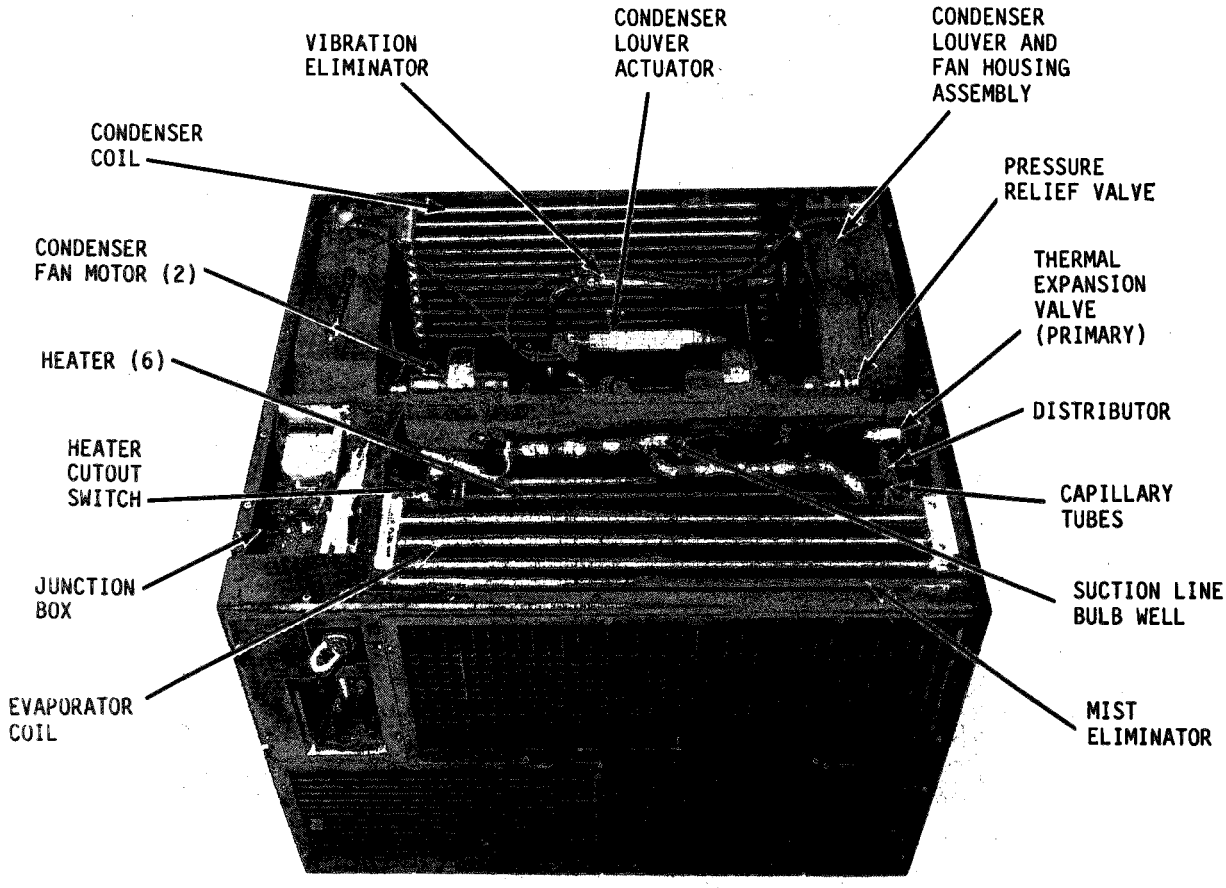


Figure 1-3. Air conditioner top view, top covers removed

hoses, electrical control panel and controls, main input power connector, control mdule, and the ventilation air damper door and control knob. The evaporator fan draws air into the unit, from the space being conditioned, through the inlet louver and air conditioning filter, or when required, from the outside of the unit, through the fresh air filter and ventilation duct; air is then forced over the heater elements through evaporator coil, mist eliminator and outlet louver. The outlet louver has adjustable blades for directing the air flow into a desired pattern within the space being conditioned. The evaporator fan speed is controlled by a toggle switch on the control module.

b. Condenser Section. The condenser section (fig. 1-3) located in the rear part of the air conditioner contains the condenser coil, condenser coil guard, two condenser motors and fans, motor compressor, condenser fan housings and louvers, louver actuator, ventilation air duct, fresh air filter and vent screen, thermal switch, refrigerant liquid sight indicator, solenoid valves, expansion quench valve, discharge bypass regulation valve, pressure relief valve, system access service valves, filter-drier, refrigerant liquid receiver, accumulator, associated electrical wiring and refrigerant tubing and an alternate power input connector. The condenser fan speed is controlled by a thermal switch located on rear of unit. At ambient temperatures of 100°F +5°F (38°C +3°C) or higher, the condenser fan motors will operate at high speed (3750 RPM); and at ambient temperatures below 100°F (38°C), the motor will operate at

low speed (1800 RPM). Due to possible thermal lag, the changeover may be slow to react when the ambient temperature drops below the 100°F (38°C) changeover point.

1-7. Difference Between Models.

This manual covers the following two models.

(1) AAF Model CH436-1 which operates on 208-volt, 3-phase, 400-Hertz ac power

(2) AAF Model CH636-1 which operates on 208-volt, 3-phase, 50-60 Hertz ac power

In this manual, difference in models is identified by reference to the operating frequency, that is, either as the 400-Hertz model or the 60-Hertz model.

1-8. Performance Data.

The following listing contains the performance and dimensional data applicable to the air conditioner.

(1) Air conditioner, models CH436-1 and CH636-1:

Nomenclature	Air conditioner, horizontal, compact
Manufacturer	American Air Filter Co., Inc.
Capacity:	
Cooling	36,000 BTU/hr
Heating:	
High	35,600 BTU/hr.
Low	20,400 BTU/hr.
Ventilation. .	1285 CFM
Phase	3
Hertz	400 (Model CH436-1) 50/60 (Model CH636-1)
AC volts	208
Current input, full load, amperes	
Cooling	28.5
High heat	31
Low heat	15.5
Ventilating. . . .	3.2
Refrigerant. . . .	R22

(2) Dimensions and weights:

Length	34.8 in. (88.4 cm)
Height	27.0 in. (68.6 cm)
Width	38.0 in. (96.5 cm)
Weight	435 lbs (198 kg)

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-9. Refer to paragraphs 1-5 and 1-6 for a description of the functions performed by the air conditioner and identification of the components that perform the various functions. Refer to paragraph 2-2 for a description of the various controls available to the operater. Refer to figure 1-4 for the electical schematic and figure 1-5 for the wiring diagram of the air conditioner electrical system.

Index, Figures 1-4 and 1-5.

ELEC REF DESIG	PART NUMBER	DESCRIPTION
B1	D13216E6309	COMPRESSOR
B2	D13216E6140	MOTOR, CONDENSER FAN
B3	D13216E6451	MOTOR, EVAPORATOR FAN
B4	D13216E6140	MOTOR, CONDENSER FAN

Index, Figures 1-4 and 1-5. (CONT)

ELEC REF DESIG	PART NUMBER	DESCRIPTION
C1	M39014/05-2461	CAPACITOR, FILTER
CB1	D13216E6205	CIRCUIT BREAKER, COMPRESSOR
CB2	C13216E6178	CIRCUIT BREAKER, CONTROL
CB1	D13216E6223	RECTIFIER, SEMICONDUCTOR DEVICE
E1	MS24693-S74	TERMINAL STUD (JUNCTION BOX GRD)
E2	MS24693-S50	TERMINAL STUD (CONTROL MODULE GRD)
E3	MS35206-266	TERMINAL STUD (SYSTEM GRD)
HR1 THRU 6	C13216E6124-5	HEATER ELEMENT
HR7	PART OF D13216E6309	COMPRESSOR, HEATER
J1	MS3100R-24-22P	CONNECTOR, RECEPTACLE, POWER INPUT
J2	D13216E6177	CONNECTOR, RECEPTACLE, JUNCTION BOX
J3	D13216E6193-2	CONNECTOR, RECEPTACLE, EVAPORATOR FAN
J4	D13216E6193-2	CONNECTOR, RECEPTACLE, CONDENSER FAN
J5	D13216E6193-2	CONNECTOR, RECEPTACLE, CONDENSER FAN
J6	PART OF D13216E6309	CONNECTOR, RECEPTACLE, COMPRESSOR
J7	D13216E6193-6	CONNECTOR, RECEPTACLE, COMPRESSOR
J8	D13216E6193-1	CONNECTOR, RECEPTACLE, SOLENOID BY-PASS
	3216E6193-4	CONNECTOR, RECEPTACLE
		THERMOSTATIC SWITCH
J10	D13216E6193-1	CONNECTOR, RECEPTACLE
		SOLENOID VALVE EQUALIZER
J11	D13216E6193-7	CONNECTOR, RECEPTACLE, AUX POWER INPUT
J12	MS3100R-24-22P	CONNECTOR, RECEPTACLE, AUX POWER INPUT
K1	C13216E6182	RELAY, TIME DELAY
K2	MS24192-D1	RELAY, HEATE
K3	MS24193-D1	RELAY, COMPR
K4	C13216E6458	RELAY, CONDENSER
K5	C13216E6458	RELAY, CONDENSER FAN
TB4	D13219E955-2-8	TERMINAL BOARD
K7	MS24192-D1	RELAY, EVAPORATOR FAN
K8	MS24192-D1	RELAY, EVAPORATOR FAN
K9	MS24192-D1	RELAY, HEATER
L1	C13216E6158	VALVE, SOLENOID, BY-PASS
L2	C13216E6158	VALVE, SOLENOID, PRESSURE EQUALIZER
P1	MS3106R-24-22S	CONNECTOR, PLUG, POWER INPUT
P2	D13216E6209-3	CONNECTOR, PLUG, CONTROL MODULE
P3	PART OF D13216E6451	CONNECTOR, PLUG, EVAPORATOR FAN
P4	PART OF D13216E6140	CONNECTOR, PLUG, CONDENSER FAN
P5	PART OF D13216E6140	CONNECTOR, PLUG, CONDENSER FAN
P6	MS3106R-24-11S	CONNECTOR, PLUG, COMPRESSOR
P7	MS3106R-24-11P	CONNECTOR, PLUG, COMPRESSOR
P8	B13216E6173	CONNECTOR, PLUG, SOLENOID VALVE BY-PASS
P9	MS3106R-16-10P	CONNECTOR, PLUG, THERMOSTATIC SWITCH
P10	B13216E6173	CONNECTOR, PLUG, SOLENOID VALVE EQL
P11	MS3106R-24-10S	CONNECTOR, PLUG, AUX POWER INPUT
R1	B13220E6838	RESISTOR
S1	D13216E6201	SWITCH, ROTARY SELECTOR
S2	MS35058-23	SWITCH, TOGGLE
S3	D13216E6203-2	SWITCH, TEMPERATURE CONTROL
S4	C13216E6215-3	SWITCH, HIGH PRESSURE CUTOUT
S5	C13216E6215-1	SWITCH, LOW PRESSURE CUTOUT
S6	C13216E6224	SWITCH, HEATER CUTOUT
S8	C13216E6460	SWITCH, THERMOSTAT
S9	PART OF D13216E6309	COMPRESSOR, THERMAL CUTOUT SWITCH
T1	C13216E62 4	TRANSFORMER
TB1	C13216E6464	TERMINAL BOARD, POWER INPUT
TB2	C13216E6220-3	TERMINAL BOARD
TB3	C13216E6232	TERMINAL BOARD, JUNCTION BOX

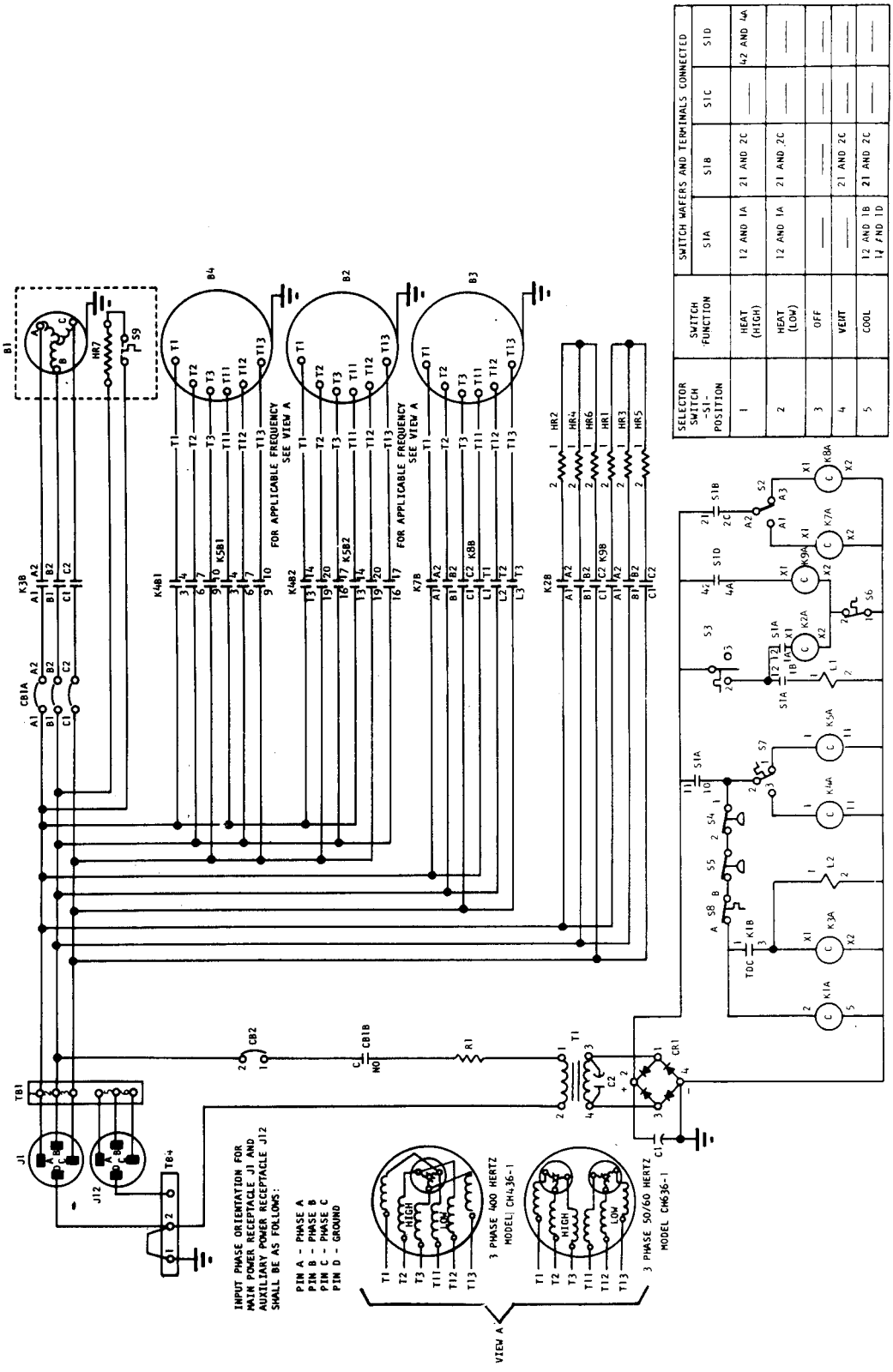


Figure 1-4. Control system schematic diagram

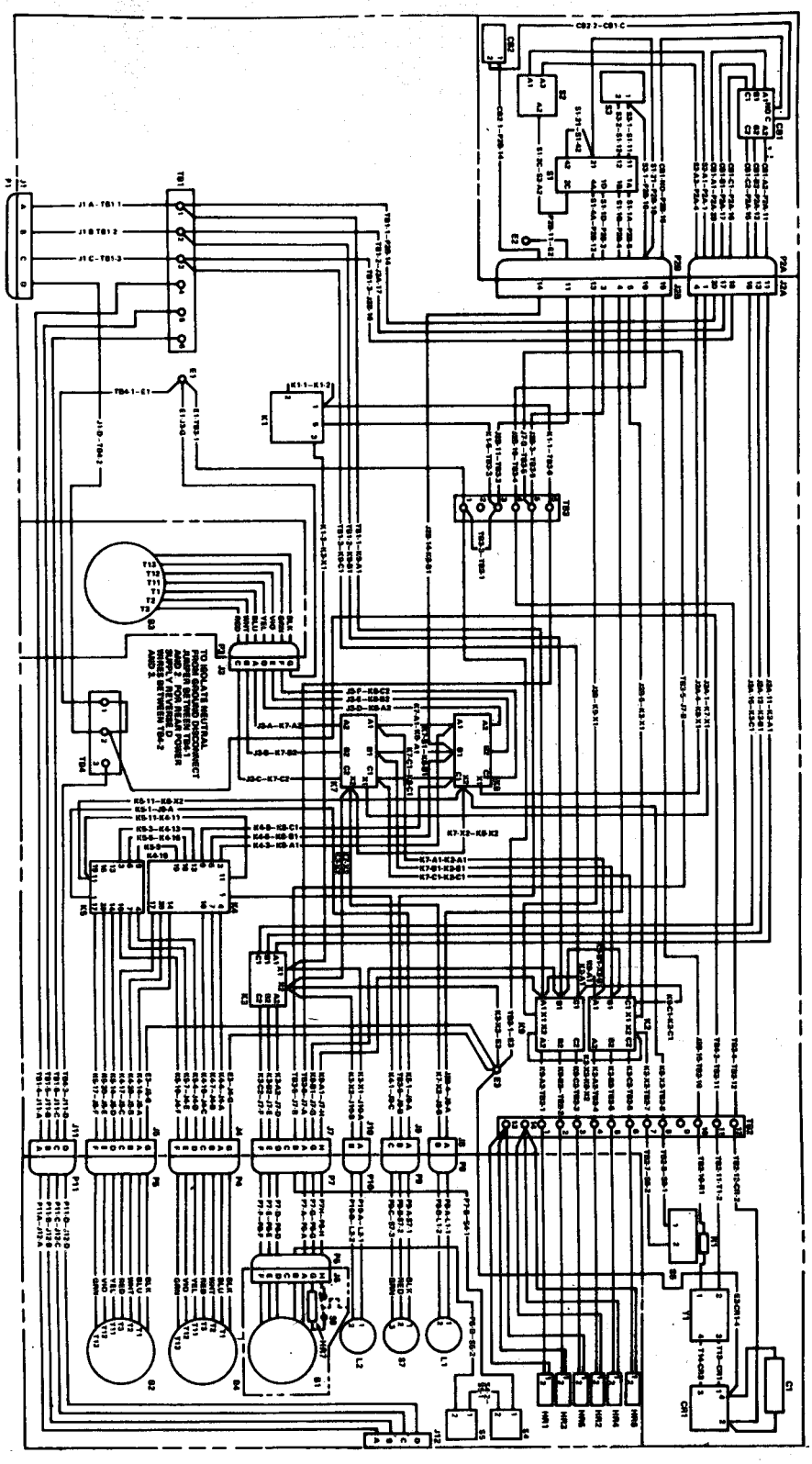


Figure 1-5. Wiring diagram

CHAPTER 2

OPERATING INSTRUCTIONS

CAUTION

If equipment fails to operate refer to troubleshooting procedures in chapter 3.

Section I. CONTROLS AND INSTRUMENTS.

2-1. General.

This section describes, locates and illustrates the various controls and provides the operator/crew sufficient information to insure proper operation of the air conditioner.

2-2. Controls and Instruments.

a. General. The location and the function controls and instruments are illustrated in figure 2-1. The control module contains the control circuit breaker, the manually operated temperature selector switch, mode selector switch, evaporator fan speed switch and compressor circuit breaker. The control module Is designed to permit remote control operation of the air conditioner when connected with a remote control cable. The thermostatic control point of the air temperature is determined by the location of the temperature selector switch sensing bulb. Normally, the air conditioner is operated with the control module remaining on the unit and the sensing bulb of temperature selector switch located in the inlet air stream inside the unit evaporator section.

b. Temperature Selector Switch. The temmrature selector switch is a thermostatic switch which responds to temperature variations from 60°F in the maximum cooler position to 90°F (15.6°C to 32.2°C) in maximum warmer position. The best preliminary adjustment of the temperature selector is midway between the cooler and warmer positions, corresponding to approximately 75°F (24°C). A ten minute period should be allowed between adjustments of the temperature selector for the full effect of the adjustment to be realized. Once the desired temperature of the air conditioner space is obtained, no further adjustment is required for either cooling or heating modes of operation.

c. Mode Selector Switch. The mode selector switch is an electrical switch that can be manually positioned to select the desired operational mode of the air conditioner. The five positions of the mode selector are:

(1) Off. The off mode position is used to stop operation. All major electrical components are isolated from electrical power except the compressor crankcase heater, which is thermostatically controlled as long as input power is connected to the unit.

(2) Vent. In the vent mode position, the evaporator motor operates and the fans circulate filtered air. Ventilation air will be drawn into the unit through the fresh air filter and vent duct if the damper door in the vent duct is open. Some cooling effect will occur if the ventilation air is cold. Ventilation air flow is controlled by opening and closing the damper door with the vent adjusting knob.

(3) Cooler. In the cooler mode position, the refrigerant cycle begins, and the unit will cool under the thermostatic control of the temperature selector switch. The evaporator fan motor, condenser fan motors and compressor are activated and will operate continuously. The speed of the evaporator fan motor is controlled by manually selecting the desired speed position of the evaporator fan speed switch. The speed of condenser fan motors is automatically controlled by an outdoor thermal switch. The motors will operate in low speed when ambient temperature is below 100°F (38°C). The thermal switch automatically switches the motors to high speed if ambient temperature rises above 100°F (38°C). To prevent starting surge current of the compressor coinciding with the starting surge current of the fan motors, the compressor starts about 30

seconds after the fan motors. Although the compressor and fan motors operate continuously in this mode, thermostatic action of the temperature selector switch causes refrigerant to bypass the evaporator coil and stop cooling when the desired temperature setting of the temperature selector switch is satisfied. Ventilation air will be drawn into the unit if the vent damper door is open.

(4) Low Heat. In the low heat mode, the evaporator fan motor operates continuously and three of the six heater elements are activated. The three heater elements cycle on and off under thermostatic control of the temperature selector switch. This mode will produce half of the unit's heating capability. Ventilation air will be drawn into the unit if the vent damper door is open.

(5) High Heat. In the high heat mode, the evaporator fan motor operates continuously and all six of the heater elements are activated, but only three of the heater elements will cycle on and off under thermostatic control of the temperature selector switch. This mode will produce maximum heating capability of the unit. Ventilation air will be drawn into the unit if the vent damper door is open.

d. Evaporator Fan Speed Switch. The evaporator fan speed switch has two positions, "low" and "high." The positions are manually selected to control the evaporator fan speed in all operating modes. Normally the "low" speed should be selected as it is quieter and requires less electrical power; however, the "high" speed position has three advantages over "low" which may dictate its selection:

(1) Maximum cooling capacity can only be achieved in "high."

(2) The increased flow of evaporator air improves air distribution in the conditioned space.

(3) Twice as much ventilation air is drawn into the unit in "high."

e. Vent Adjusting Knob. The vent adjusting knob controls the flow of ventilation air into the unit. The knob is connected by the damper cable to a damper located in the vent duct. The knob controls the flow of ventilation air by adjusting the position of the damper from full closed to full open. Turning the knob to the right closes the damper, turning the knob to the left opens the damper. The force that draws ventilation air into the unit is the small pressure difference between the ambient and the evaporator fan. This is the same small pressure difference that exists between the conditioned space and the evaporator fan; the pressure difference that draws return air through the inlet louver and the return air filter. When ventilation air enters the conditioned space a like flow of air must exhaust from the space to prevent a pressure buildup. Cracks in the space may be sufficient; but if a large flow of ventilation air is desired, some positive means of air exhaust should be provided.

f. Inlet Louver. The inlet louver is finger-adjustable from full open to full closed. Normally the louver shutter tab adjustment is kept at 45° position, which is essentially the same as a full open inlet louver. If the inlet louver is closed, return air will still manage to flow through it; but at a reduced rate with high pressure drop. The increase in pressure drop will cause additional ventilation air to be drawn into the unit. The "vent" mode of operation is normally the only mode where closing the inlet louver (to create increased ventilation airflow) would be considered a real advantage. sufficient ventilation air flow for other modes of operation can be achieved with the inlet louver open and the damper open. The return air filter is attached to the back side of the inlet louver. A dirty filter can easily be observed by looking through the inlet louver blades. Since maximum cooling capability of the unit is obtained with maximum evaporator air flow, a closed inlet louver or a dirty air filter will decrease cooling capacity, and may cause ice to form on the evaporator coil.

g. Outlet Louver. The outlet louver is finger-adjustable in both horizontal and vertical planes. This adjustment on an individual blade basis allows maximum control over the direction of outlet air. The best distribution pattern for outlet air is left to the operator's judgment; but blades should not be adjusted beyond 45°, as evaporator air flow will be impeded.

h. Condenser Louvers. The condenser louvers, located on the rear of the

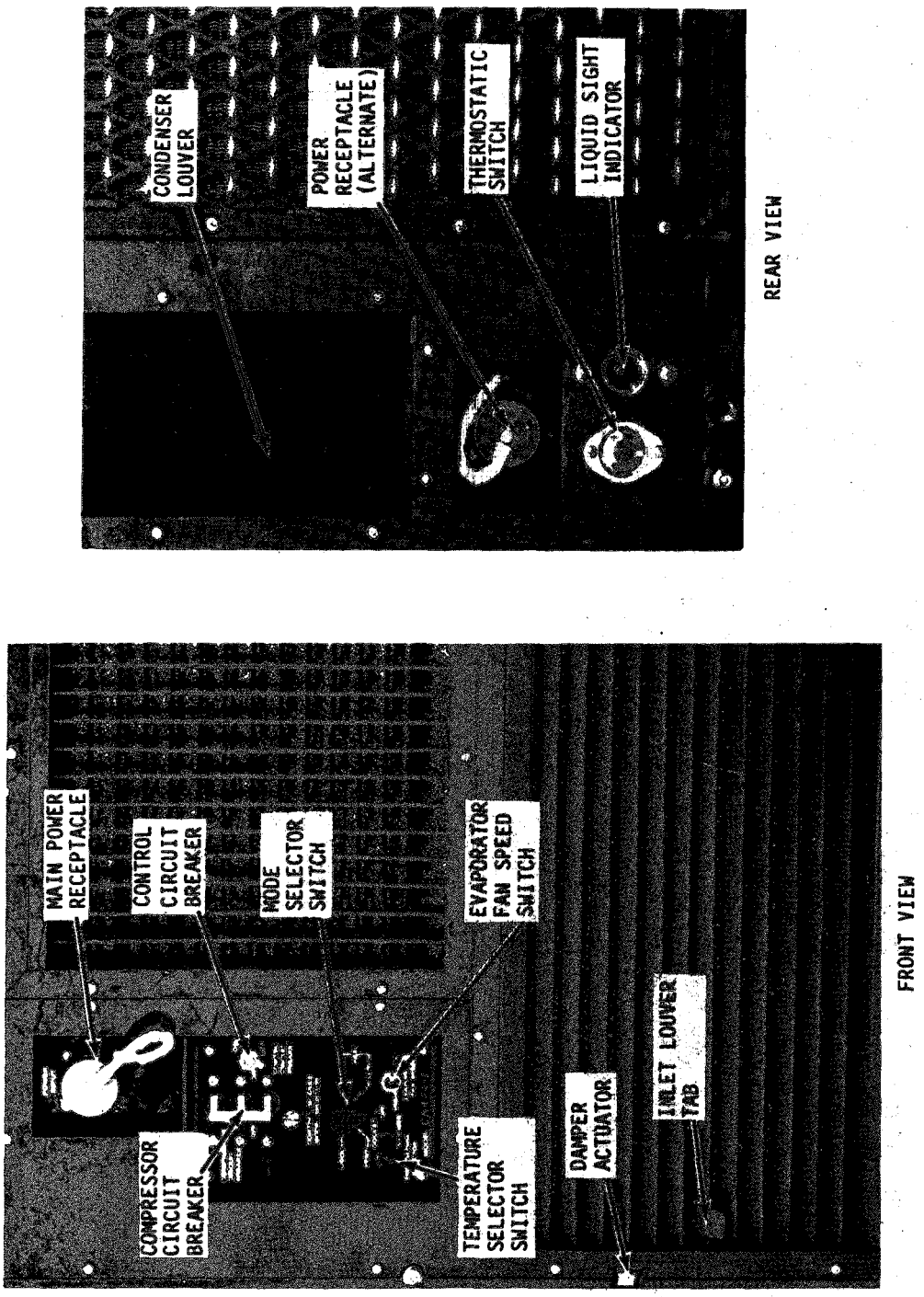


Figure 2-1. Controls and instruments

air conditioner (figure 1-2), are automatically opened and closed by the action of the refrigerant system. The condenser louvers cannot be manually opened and closed.

i. Compressor Circuit Breaker. The compressor circuit breaker is a safety device which provides overcurrent protection for the compressor. The compressor circuit breaker is not a control switch to be used for operating the unit. This breaker should always be kept in the ON position. If the breaker trips to the OFF position, a defective compressor or related defective electrical components, or faulty wiring, is indicated. Inadequate input power voltage will also cause the circuit breaker to trip. The unit control circuit is also connected to auxiliary contacts on the compressor circuit breaker. When this circuit breaker trips to OFF, it disconnects the control circuit allowing the time delay relay to reset and the refrigerant system pressures to equalize. Manually resetting the compressor circuit breaker to ON restores electrical continuity.

j. Control Circuit Breaker. The control circuit breaker is a safety device which provides overcurrent protection for the control circuit of the unit. The control circuit breaker is not a control switch to be used for operating the unit. This breaker should always be maintained in the ON position. If the breaker trips to the OFF position, an electrical defect in the control circuit is indicated and corrective action should be taken. Manually resetting the circuit breaker to ON restores electrical continuity.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-3. General.

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services (PMCS) to be performed are listed and described in paragraph 2-4. The item numbers indicate the sequence of minimum inspection requirements.

a. Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

After you operate. Be sure to perfrm your after (A) PMCS.

d. If your equipment fails to operate Troubleshoot with proper equipment. Report any deficiencies using the proper forms, see TM 38-750.

Defects discovered during operation of the unit will be noted for future correction to be made as soon as operation of the unit has ceased. Stop operation immediately if during operation a deficiency is noted which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 at the earliest possible opportunity

2-4. Daily Preventive Maintenance Servi ces.

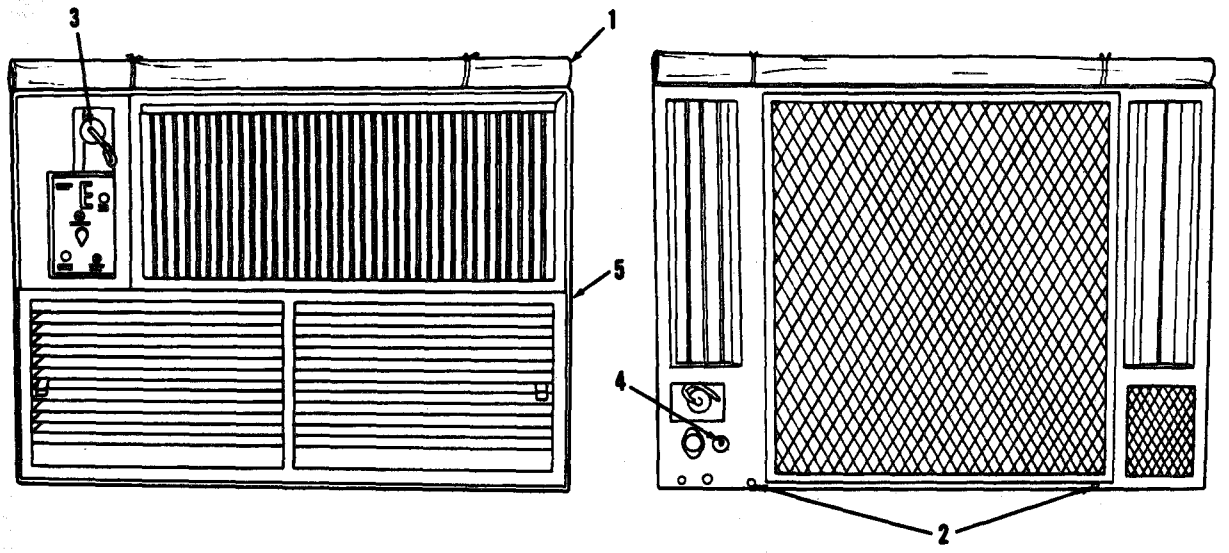
This paragraph contains a tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 2-1 for the daily preventive maintenance services.

NOTE

Use the numbers in the Item No. Column as a source of item numbers for the “TM Number” column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results at PMCS.

Table 2-1. Preventive Maintenance Checks and Services

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



B - Before Operation D - During Operation A - After Operation

ITEM NO.	INTERVAL B	INTERVAL D	INTERVAL A	ITEMS TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	FOR READINESS REPORTING, EQUIPMENT IS NOT READY/AVAILABLE IF
1	•			Condenser Cover	With cover rolled up for air conditioner operation, check securing ties for damage.	▬
2	•	•	•	Condensate Drains	Inspect for obstruction to drainage. Remove obstructions.	Obstructions can not be removed.
3	•			Main Power Receptacle Connector	Check for secure power connection. Tighten if necessary.	Damage to connector prevents satisfactory connection.
4		•		Liquid Sight Indicator	Check for moisture and low refrigerant charge.	Yellow indicates moisture; bubbles or milky appearance indicates low charge.
5		•		Air Conditioner Operation	Check for abnormal operation vibration, unusual noise, failure to respond to controls.	Any condition in procedures column is observed.

Section III. OPERATING UNDER USUAL CONDITIONS

2-5. General.

a. The instructions in this section are published for the information and guidance of the personnel responsible for the operation of the air conditioner.

b. The operator must know how to perform every operation of which the air conditioner is capable. This section gives instructions on starting and stopping the air conditioner, and detailed operating instructions. Since nearly every condition presents a different problem, the operator may have to vary the given procedure to fit the condition.

2-6. Unloading Equipment.

The total weight of the air conditioner is 435 pounds (198 kg.). Use a hand truck or forklift of at least 500 pounds capacity to unload the unit. Keep unit upright during the unloading operation.

2-7. Unpacking Equipment.

Move the unit as near to the site of installation as possible. Remove crating hardware and metal straps being careful not to damage the unit with the tools used for uncrating.

2-8. Inspecting and Servicing Equipment.

a. Inspection. Inspect the entire air conditioner for signs of damage, missing or loose hardware, and any defects that may have been incurred during shipment. Report all damage and defects to organizational maintenance.

b. Servicing. Perform the daily preventive maintenance services listed in paragraph 2-4. Be sure all hardware is securely in place.

2-9. Installation.

a. General. The air conditioner is shipped assembled and ready for operation. It contains a full charge of refrigerant and compressor oil. Install the unit on a firm, level surface to allow proper condensate drainage. Place it so that the control panel and condenser and evaporator louvers are accessible to the operator and to maintenance personnel. Be sure there are no obstructions in front of any air intake or discharge louvers or other openings that may cause insufficient flow of air in to or out of the air conditioner. If the unit is van mounted, report any such obstructions to organizational maintenance.

b. Lifting. Check for broken or deformed lifting ring attachment and hardware before lifting air conditioner. Lift with crane or forklift truck.

CAUTION

Use lifting harness with 4-leg spreader bar. Each leg must be. capable of withstanding a concentrated load of more than 500 pounds. If spreader bar cannot be used, the angle between the harness legs and the top of the air conditioner must be not less than 45-degrees.

c. Mounting. Base mounting hole dimensions are shown on figure 2-2. The resilient mount parts shown in figure 2-3 are shipped with the air conditioner.

CAUTION

For safe operation connect a No. 10 AWG (min.) ground wire between the air conditioner ground connection and an earth ground, as shown in figure 2-4.

d. Connections.

(1) Connect air ducts to the unit as applicable to the site of installation. If the inlet grille is removed, a return air filter should be relocated in the return air duct at a maintainable location. Operation of unit without a return air filter will cause fouling of the evaporator fan and evaporator.

(2) Connect a condensate drain line to carry condensate water away from site of installation only if the drop of condensate is objectionable.

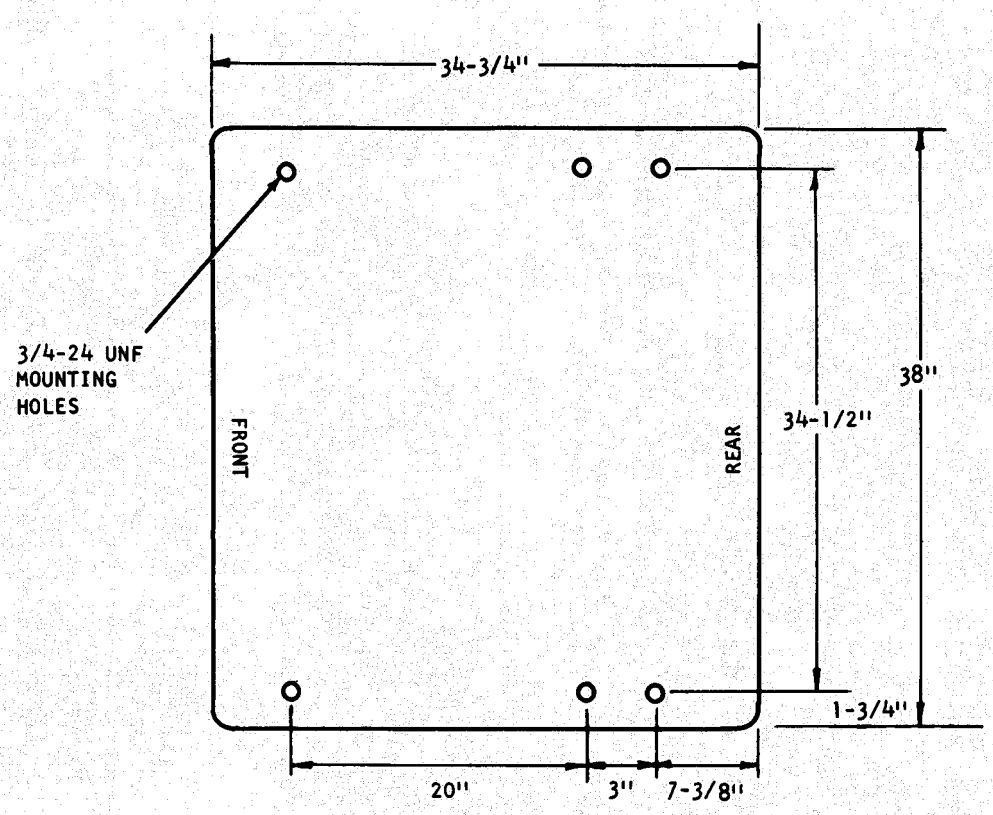


Figure 2-2. Base mounting holes

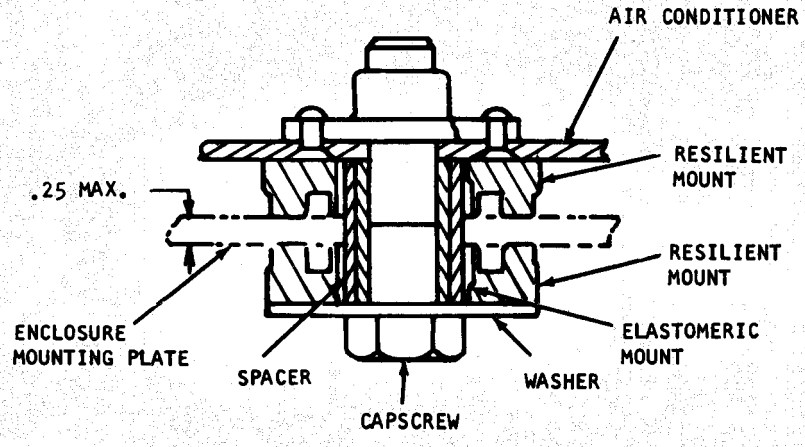


Figure 2-3. Typical installation of air conditioner to enclosure

(3) Connect the MS3106R-24-22S power input connector plug furnished with the air conditioner to a suitable electrical power cable. Connect the cable to the proper electrical power source and install the plug end of cable to either the main power receptacle or the alternate power receptacle. If alternate power receptacle J12 is used, refer to wiring diagram (figure 1-5) and change wire lead connection at TB1.

CAUTION

To avoid damage to the compressor electrical input power must be applied to energize the compressor crankcase heater at least 4 hours before operating unit in the cool mode. For prolonged periods of storage, long shut down periods or lengthly exposure (14 days or more) to sub-zero temperatures, the preheater should be energized for twelve (12 hrs) prior to operation of the air conditioning unit in the cool mode.

2-10. Starting and Operating Instructions.

a. Preparation for Starting.

(1) Perform the daily preventive maintenance service (para 2-4).

(2) Connect the main power cable.

(3) Check drain holes to insure that they were open.

(4) Be sure the unit is firmly secured.

(5) Roll up condenser cover and tie at top of air conditioner to clear condenser opening.

NOTE

When vent damper door is open to admit fresh air, partially close evaporator inlet, louver to balance incoming air. Keep vent or damper door closed during heavy rain.

b. Starting Instructions for Cooling. Start the air conditioner for cooling as shown in figure 2-5.

c. Operating Instructions for Cooling. Operate the air conditioner for cooling as shown by figure 2-6.

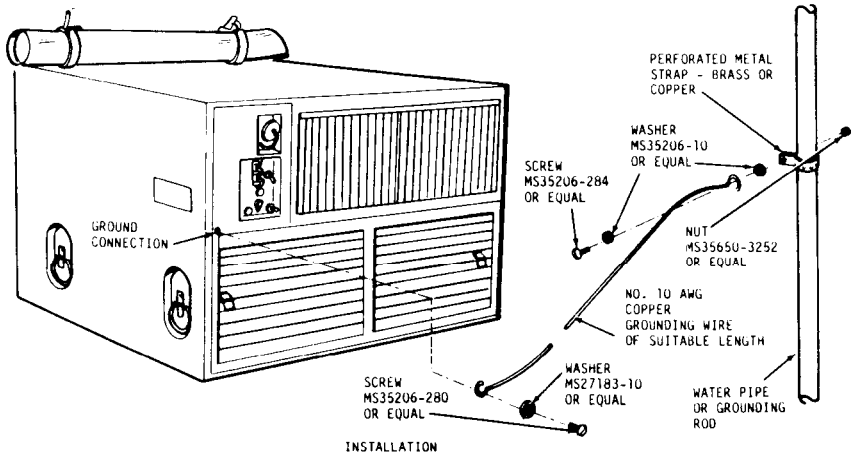
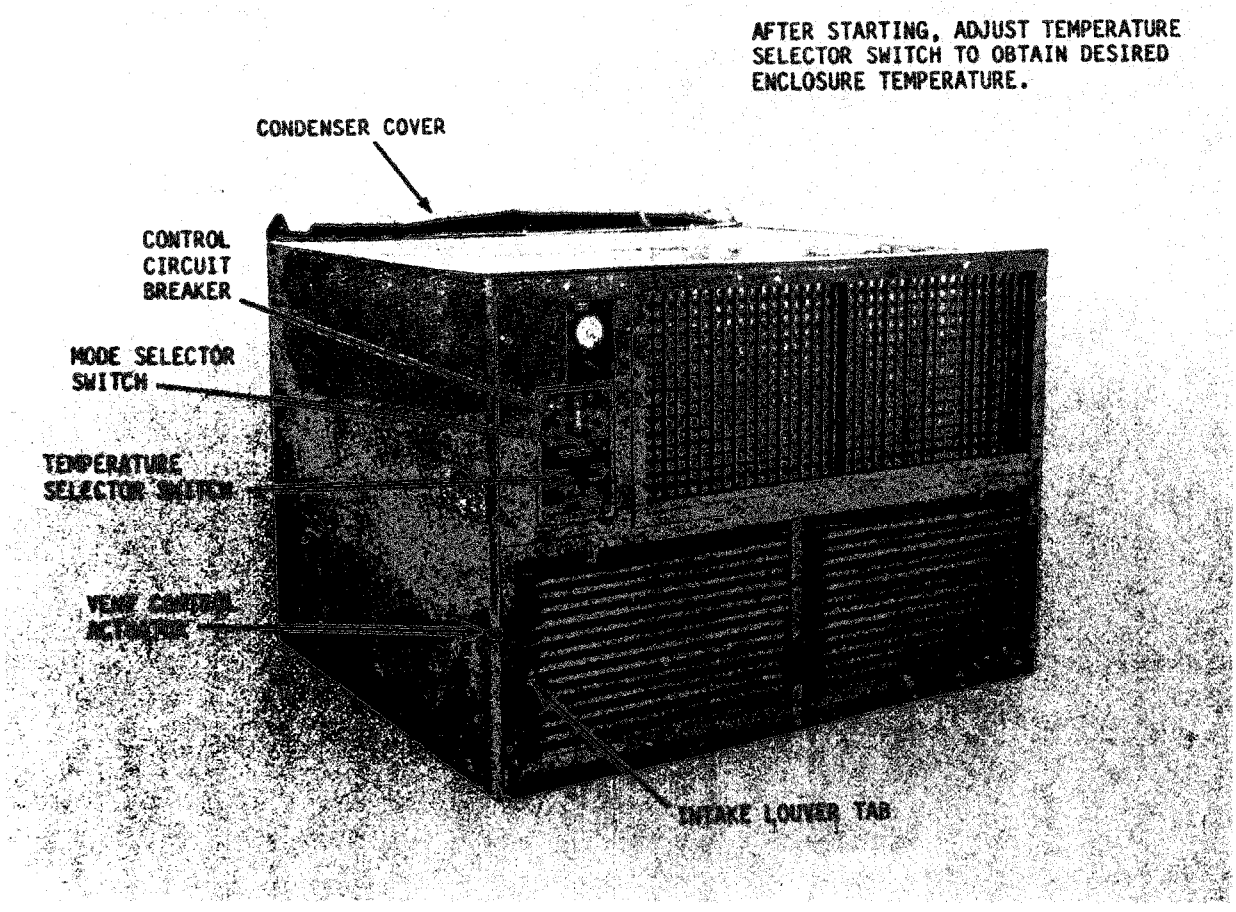


Figure 2-4. Ground wire installation.



CAUTION

To avoid damage to the compressor electrical input power must reapplied to energize the compressor crankcase heater at least 4 hours before operating unit in the cool mode. For prolonged periods of storage, long shut down periods or lengthly exposure (14 days or more) to sub-zero temperatures, the preheater should be energizad for twelve (12 hrs) prior to. operation of the air conditioning unit in the cool mode.

STEP 1. ROLL UP AND TIE CONDENSER COVER.

STEP 2. OPEN INTAKE LOUVERS BY LIFTING TABS.

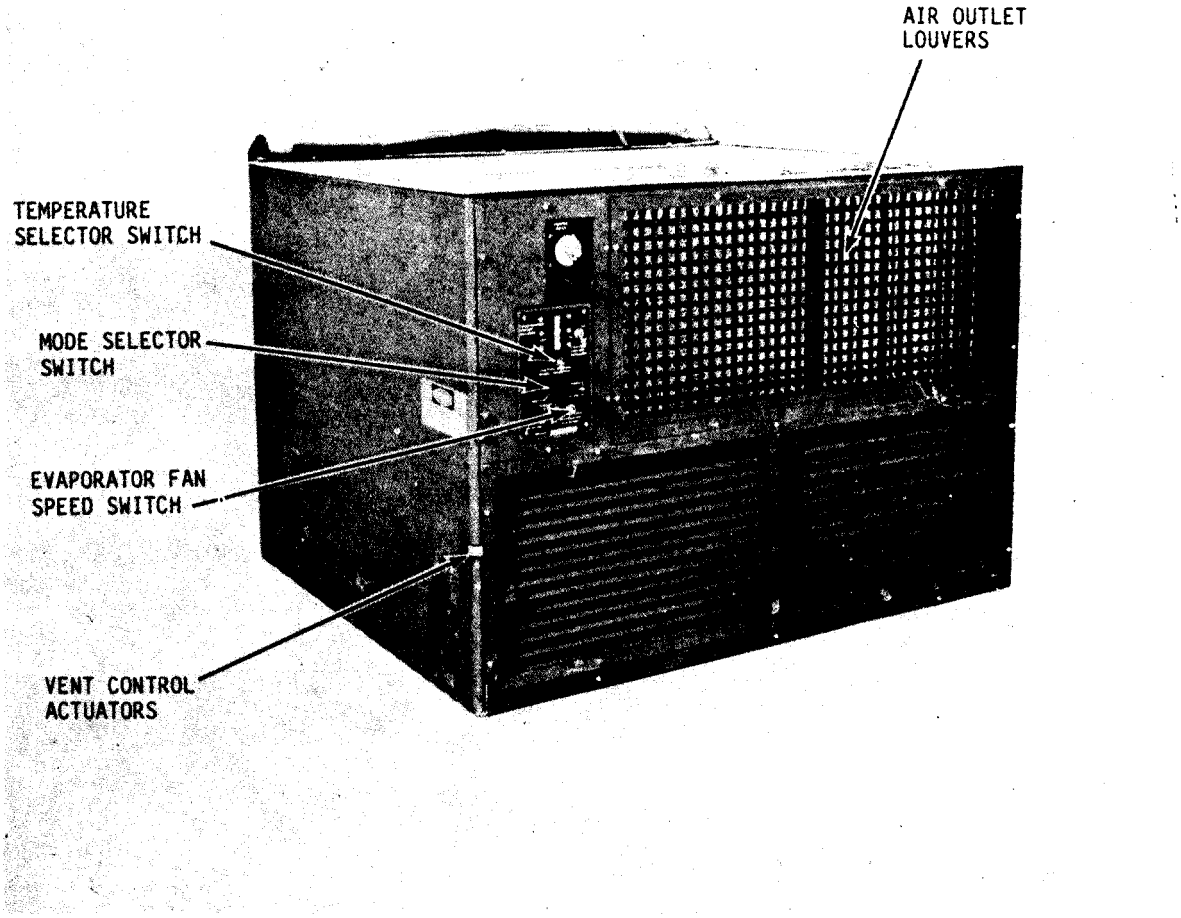
STEP 3. TURN VENT CONTROL ACTUATOR TO CLOSE VENTILATION DAMPER.

STEP 4. TURN TEMPERATURE SELECTOR SWITCH TO MAXIMUM CLOCKWISE POSITION (WARMER).

STEP 5. TURN ON COMPRESSOR AND CONTROL CIRCUIT BREAKERS.

STEP 6. TURN MODE SELECTOR SWITCH TO VENT AND ALLOW FAN TO REACH FULL SPEED, THEN TURN TO COOL.

Figure 2-5. Starting instructions for cooling.



STEP 1. WITH MODE SELECTOR SWITCH ON COOL, ADJUST TEMPERATURE SELECTOR SWITCH TO DEGREE OF COOLING DESIRED.

STEP 2. SET EVAPORATOR FAN SPEED SWITCH TO DESIRED POSITION.

STEP 3. ADJUST AIR OUTLET LOUVERS TO DIRECT AIR FLOW AS DESIRED.

STEP 4. ADJUST VENT CONTROL ACTUATOR TO ADMIT DESIRED AMOUNT OF VENTILATION AIR.

Figure 2-6. Operating instructions for cooling

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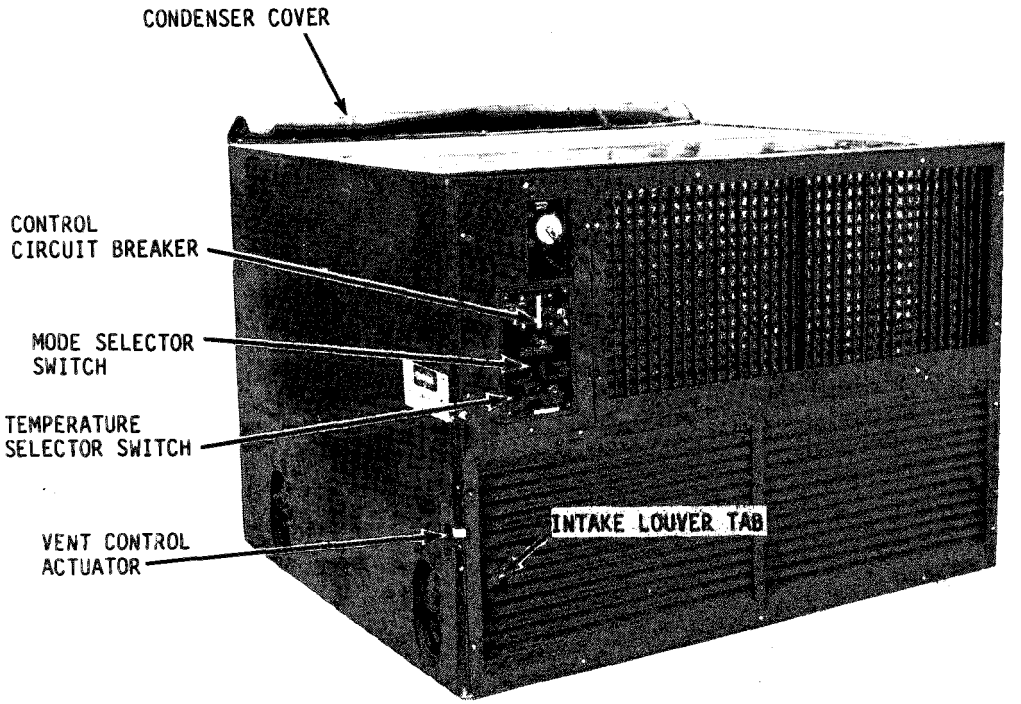


STEP 1. MAKE SURE CONDENSER COVER IS ROLLED UP.

STEP 2. OPEN INTAKE LOUVERS BY LIFTING TABS.

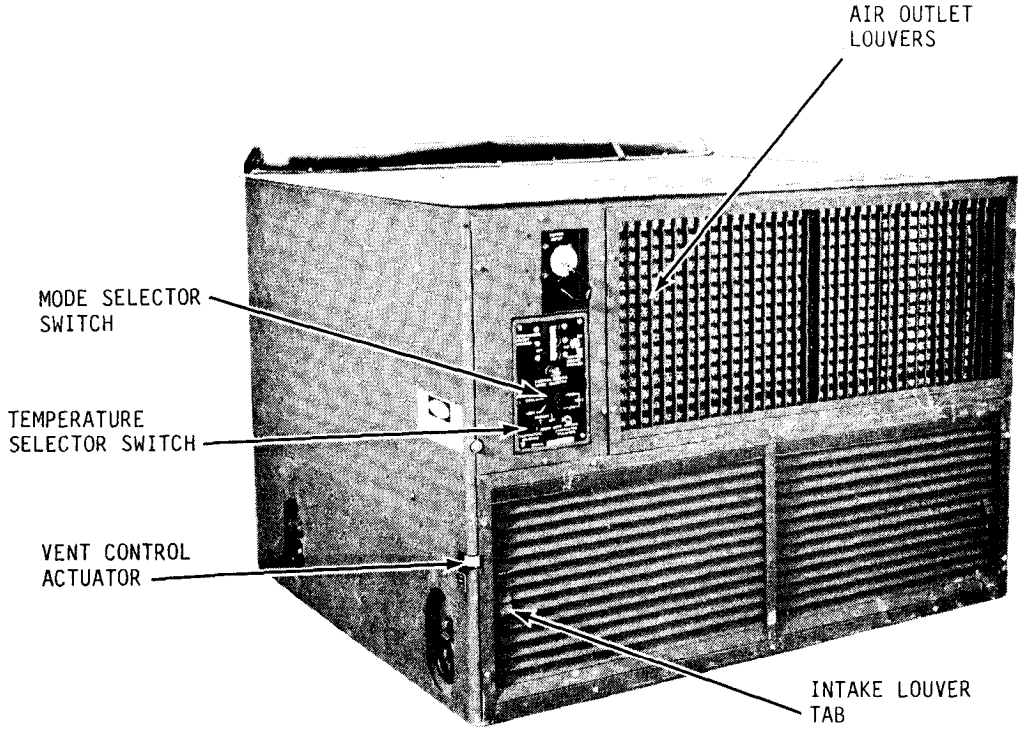
STEP 3. TURN VENT CONTROL ACTUATOR TO CLOSE VENTILATION DAMPER.

STEP 4. TURN TEMPERATURE SELECTOR SWITCH TO MAXIMUM COUNTERCLOCKWISE POSITION (WARMER).

STEP 5. TURN ON CONTROL CIRCUIT BREAKER.

STEP 6. TURN MODE SELECTOR SWITCH TO LOW HEAT. TURN TO HIGH IF MORE HEAT IS DESIRED.

Figure 2-7. Starting instructions for heating



NOTE : AFTER STARTING, ADJUST TEMPERATURE SELECTOR SWITCH TO OBTAIN DESIRED ENCLOSURE TEMPERATURE

STEP 1. TURN VENT CONTROL ACTUATOR TO OPEN DAMPER DOOR.

STEP 2. POSITION TABS TO PARTIALLY CLOSE INTAKE LOUVER BLADES.

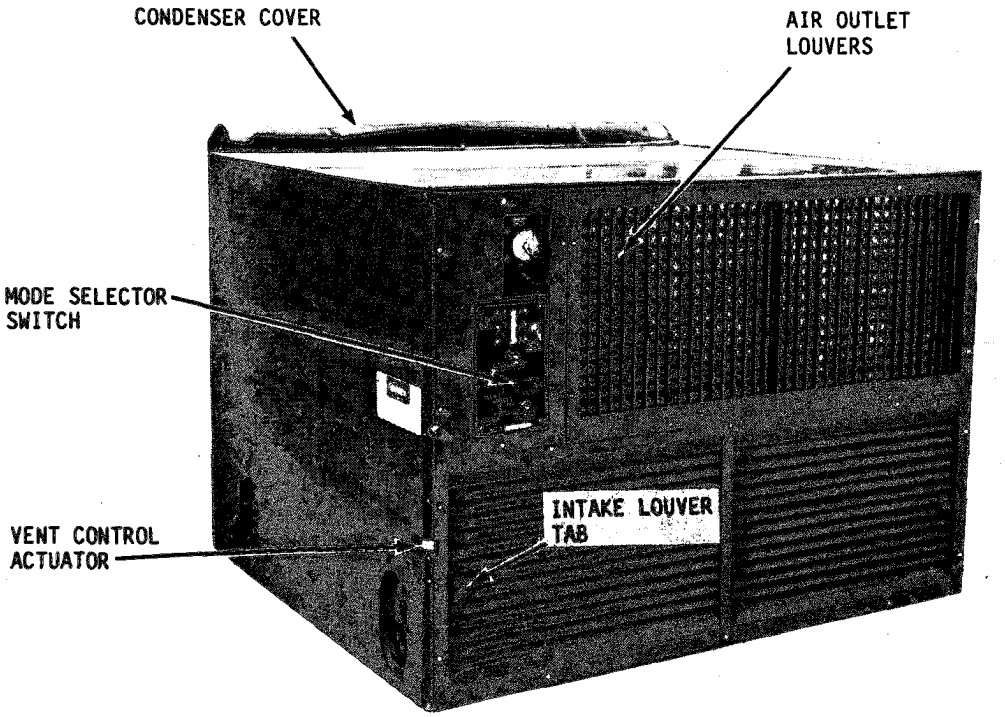
STEP 3. TURN MODE SELECTOR TO HIGH HEAT OR LOW HEAT FOR DESIRED TEMPERATURE RANGE .

STEP 4. ADJUST TEMPERATURE SELECTOR SWITCH TO DESIRED ENCLOSURE TEMPERATURE.

STEP 5. ADJUST AIR OUTLET LOUVERS TO DIRECT AIRFLOW AS DESIRED.

NOTE : AFTER TURNOFF, OPERATE IN VENT MODE (FIGURE 2-9) FOR 2 - 3 MINUTES TO COOL OFF HEATING ELEMENTS.

Figure 2-8. Operating instructions for heating



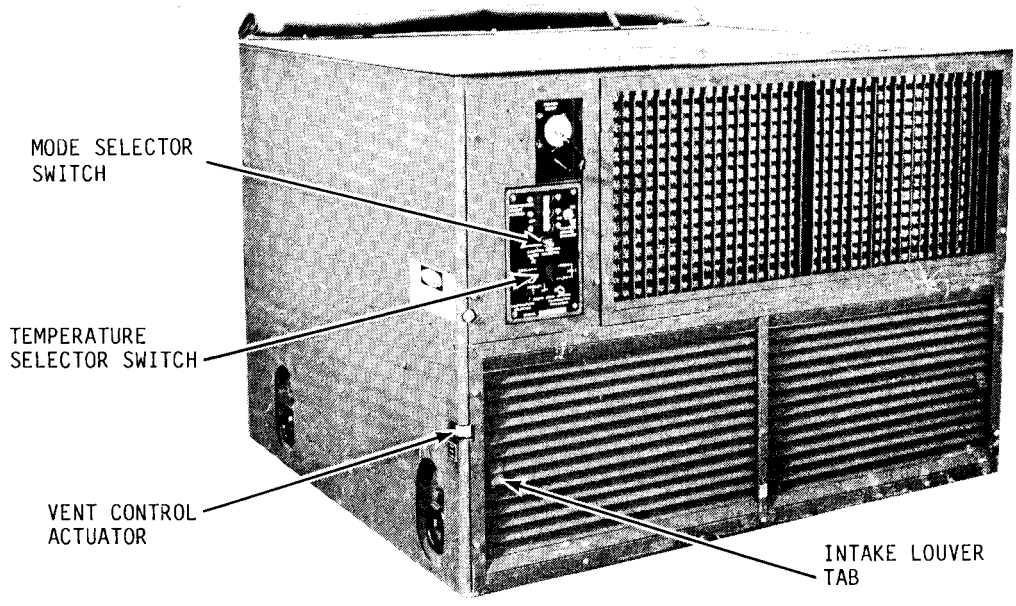
STEP 1. MAKE SURE CONDENSER COVER IS ROLLED UP.

STEP 2. TURN VENT CONTROL ACTUATOR TO OPEN DAMPER DOOR.

STEP 3. POSITION TABS TO PARTIALLY CLOSE INTAKE LOUVER BLADES.

STEP 4. TURN MODE SELECTOR SWITCH TO VENT.

Figure 2-9. Operating instructions for ventilation



STEP 1. TURN MODE SELECTOR SWITCH TO OFF.

STEP 2. POSITION TABS TO CLOSE INTAKE LOUVERS.

STEP 3. TURN ACTUATOR TO CLOSE FRESH AIR VENT DAMPER.

NOTE : IF SHUTDOWN IS FOR AN EXTENDED PERIOD, COVER EVAPORATOR AND CONDENSER GRILLES AND DISCONNECT POWER CABLE.

Figure 2-10. Air conditioner stopping instructions

d. Starting Instructions for Heating. Start the air conditioner for heating as shown in figure 2-7.

e. Operating Instructions for Heating. Operate the air conditioner for heating as shown in figure 2-8.

f. Operating Instructions for Ventilating. Operate the air conditioner for ventilation as shown by figure 2-9.

2-12. Preparation for Movement. To prepare the air conditioner for movement, proceed as follows.

2-13. Dismantling for Movement.

a. Disconnect main power Cable.

b. Disconnect drain line from outlet.

c. Disconnect air ducts and install the-evaporator inlet and outlet grilles.

d. Remove unit from mounting surface.

e. If air conditioner is to be moved over a long distance, recrate it.

2-14. Reinstallation After Movement.

After movement, follow procedures in paragraph 2-9 to reinstall the air conditioner.

2-15. Identification.

a. Identification. Each air conditioner has one major identification plate mounted on the side of the unit. The plate specifies nomenclature, manufacturer, military part number, BTU/hr., phase, hertz, volts, serial number, contract number, and shipping weight. A manufacturer's identification plate mounted just below the military plate contains the manufacturer's name and address and the model and serial numbers.

b. Information Plates. The air conditioner has the following information plates pertinent to operation.

(1) Wiring Diagram Plate. It is located on the top of the unit. This illustrates complete air conditioner wiring.

(2) Fluid Diagram Plate. It is located on the top of the unit. The plate illustrates complete air conditioner refrigerant system.

(3) Ventilation Instruction Plate. It is located on the left front side of the unit. This plate indicates the direction to turn vent adjusting knob to open or close the damper door in the ventilation air duct.

(4) Control Module Instruction Plate. It is located on the front of the unit. This plate indicates the following.

(a) The ON and OFF positions of the control circuit breaker.

(b) The ON and OFF positions of the compressor circuit breaker.

(c) The various heating and cooling positions for the mode selector switch.

(d) Temperature increase and decrease positions for the temperature selector switch.

(e) The HIGH and LOW positions of the evaporator fan speed switch.

(f) The manufacturer's model number of the unit.

(g) The part number of the plate.

(5) Main Power Plate. It is located on the front of the unit above the control module and contains the main power receptacle.

(6) High Pressure and Low Pressure Reset Plates. They are located on the left side of the unit below the service valve access panel. These plates indicate location of the high and low pressure reset buttons.

(7) Service Valves. The high pressure and low pressure service valve plates are located on the left side of the unit above the service valve access panel. These plates indicate the location of the service valves.

(8) Danger Warning Plate. It is located on the right side of the air conditioner near the front. This plate warns of the hazard in operating the air conditioner without a grounding wire.

(9) Nameplate. It is located on the left side of the air conditioner near the front, and contains the manufacturer's name, the air conditioner serial and model numbers and other pertinent nameplate data.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-16. Operation in Extreme Cold.

a. General. The air conditioner is designed to operate on the heating cycle in ambient temperatures as low as minus 50°F (-45°C) and on cooling cycle with 0°F (-18°C) air entering the condenser and 70°F (21°C) air entering the evaporator.

b. Before Operation. Before starting on cooling cycle be sure cover is removed from condenser air intake and discharge. Clear all ice and snow from openings. Be sure all dampers are in operating condition.

c. After Operation. Install cover over condenser air intake and discharge openings.

CAUTION

Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.

2-17. Operation in Extreme Heat.

NOTE

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

a. General. The air conditioner is designed to operate in temperatures up to 120°F (49°C). Extra care should be taken to minimize the cooling load when operating in extreme high temperatures.

b. Protection.

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

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

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

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

NOTE

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

c. Cleaning.

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

2-18. Operation in Dusty or Sandy Areas.

NOTE

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

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

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

b. Protection.

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

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

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

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

c. Cleaning.

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

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

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

2-19. Operation Under Rainy or Humid Conditions.

Take special precautions to keep equipment dry. If installed outdoors, cover the equipment with a waterproof cover when it is not in use. Remove cover during dry o&. Take all necessary precautions to keep the electrical components free from moisture.

WARNING

Make sure power is disconnected from air conditioner before touching any wiring or other electrical parts.

2-20. Operation in Salt Water Areas.

WARNING

Disconnect power source prior to washing the air conditioner.

a. General. Wash the exterior and condenser section of the unit, particularly condenser air discharge louver control mechanism, with clean freshwater at frequent intervals. Be careful not to damage electrical system with water. Special attention must be given to prevent rust and corrosion.

b. Painting. Paint all exposed areas where paint has cracked, peeled, or blistered, or report condition to organizational maintenance. Coat all exposed areas of polished metal with a light coat of grease.

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CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. Fan Motors.

The evaporator and condenser motors are permanently lubricated by the manufacturer and require no additional lubrication.

3-2. Compressor.

The compressor and compressor motor are fully lubricated by the manufacturer and require no additional lubrication.

Section II. TROUBLESHOOTING

3-3. General.

This section contains information that is useful in diagnosing and correcting troubles which cause unsatisfactory operation or failure of the air conditioner.

3-4. Operator's Troubleshooting Chart.

Troubleshooting procedures for operator-crew are listed in table 3-1.

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

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

c. 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.

Section III. MAINTENANCE PROCEDURES.

3-5. General.

This section contains maintenance procedures for the operator of the air conditioner. Operator maintenance is limited to inspection and procedures that can be accomplished without the aid of servicing tools. Any indications of need for servicing resulting from inspection are to be reported to organizational or direct support maintenance.

3-6. Condenser Fabric Cover.

Inspect condenser fabric cover for torn places. Repair minor tears with waterproof tape. Report extensive damage to organizational maintenance.

3-7. Drains.

Inspect condensate water drains, figure 1-2, for obstructions. Remove obstructions. Report total blockage to organizational maintenance.

3-8. Liquid Sight Indicator.

Wipe refrigerant liquid sight indicator glass, figure 1-2, with a soft, clean cloth, set controls, figure 2-1, at COOL-COOLER, operate air conditioner for 15 minutes, then observe liquid sight indicator. Yellow appearance indicates moisture in system. Bubbles or milky flow indicate low refrigerant charge. Report presence of these conditions to direct support maintenance.

Table 3-1. Troubleshooting .

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. AIR CONDITIONER FAILS TO OPERATE
Step 1. Check to see if main power cord is plugged in.
Connect power cable to receptacle (fig. 2-1) supplying 208 VAC, 3 phase power of the proper frequency.
Step 2. Check to see if compressor circuit breaker is in OFF position.
Reset circuit breaker (fig. 2-1).
Step 3. Check to see if mode selector switch is in OFF position.
Turn selector switch to desired operation (fig. 2-1).
Step 4. If air conditioner still is inoperative, report condition to organizational maintenance.
2. INSUFFICIENT COOLING
Step 1. Check to see if mode selector switch is in proper position.
Set switch to COOL (fig. 2-1).
Step 2. Check to see if temperature selector switch is in correct position.
Adjust setting to COOLER (fig. 2-1).
Step 3. Check to see if sufficient air is passing over evaporator coil.
Open evaporator inlet louvers (fig. 2-1). Remove any obstructions from evaporator inlet and outlet louvers.
Step 4. Inspect for clogged air filter.
Report clogged filter condition to organizational maintenance.
Step 5. Check to see if too much outside air is entering unit.
Close or adjust damper door (fig. 2-1).
Step 6. Check to see if the system contains sufficient refrigerant by inspecting liquid sight indicator (para 3-8).
Report low refrigerant condition to direct support maintenance.
Step 7. Check to see if evaporator fan speed switch is set to LOW speed position.
Reset switch to HIGH speed position (fig. 2-1).
Step 8. Check to see if sufficient air is passing through condenser coil.
Remove any obstructions from condenser fan inlet and outlet.

Table 3-1. Troubleshooting. - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. NO HEAT OR LOW CAPACITY HEAT
Step 1. Check to see if mode selector switch is properly set. Set switch to LOW HEAT or HIGH HEAT (fig. 2-1).
Step 2. Check to see if temperature selector switch is set correctly. Adjust to WARNER setting (fig. 2-1).
Step 3. Check for insufficient air movement over heaters. Remove any obstructions from evaporator air intake and discharge louvers. Make sure intake louvers are open (fig. 2-1).

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

4-1. General.

Instructions for unloading, unpacking and installing the air conditioner are covered in Chapter 2, Section III.

4-2. Inspecting and Servicing Equipment.

General inspection of the equipment is covered in Chapter 2, Section II. If possible damage has occurred, requiring removal of covers or other components not authorized for removal by the operator, further inspection of internal components is to be performed by organizational maintenance personnel. If other than new equipment has been received, a thorough inspection is to be performed. Make a thorough check to see that all wiring, lines and tubing are secure. Pay particular attention to the evaporator and condenser coils and main power receptacle connectors. Be sure that all visible wiring and insulation are not broken or frayed. Also check the evaporator and condenser fan motors.

4-3. Return Air Filter.

a. Removal.

(1) Refer to figure 4-1 and remove evaporator air inlet louver.

(2) Refer to figure 4-2 and slide the return air filter from the four filter retaining clips.

b. Service. Service the return air filter as follows:

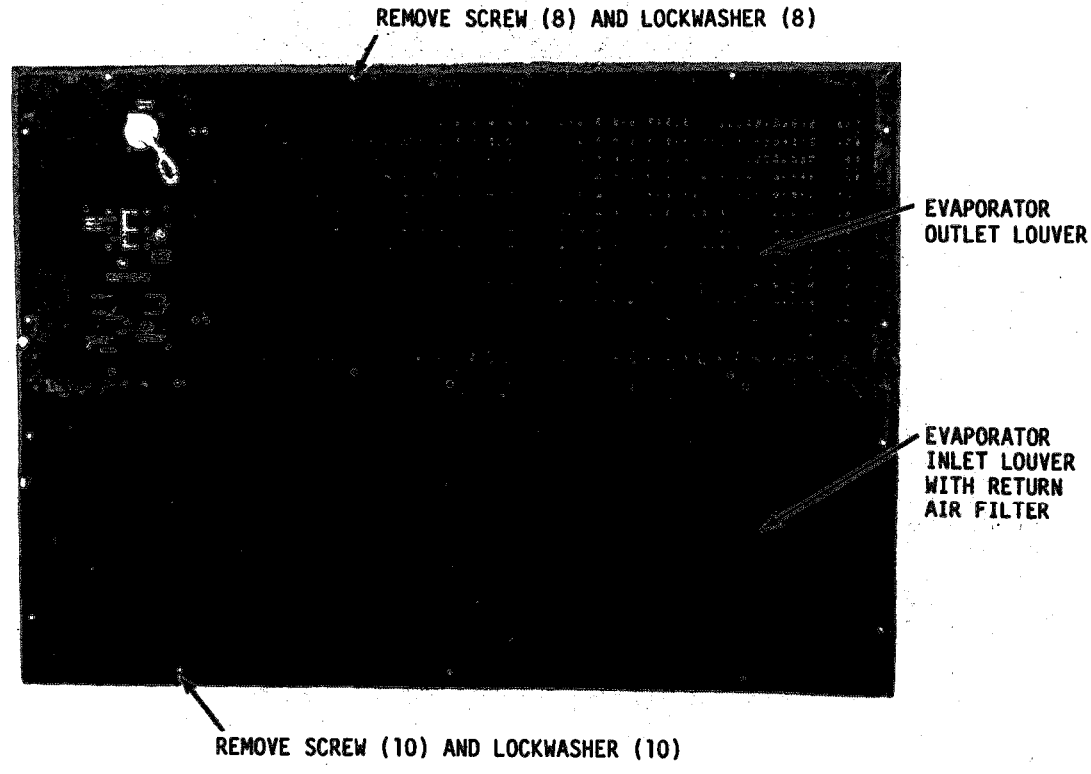


Figure 4-1. Evaporator inlet and outlet louvers, removal and installation

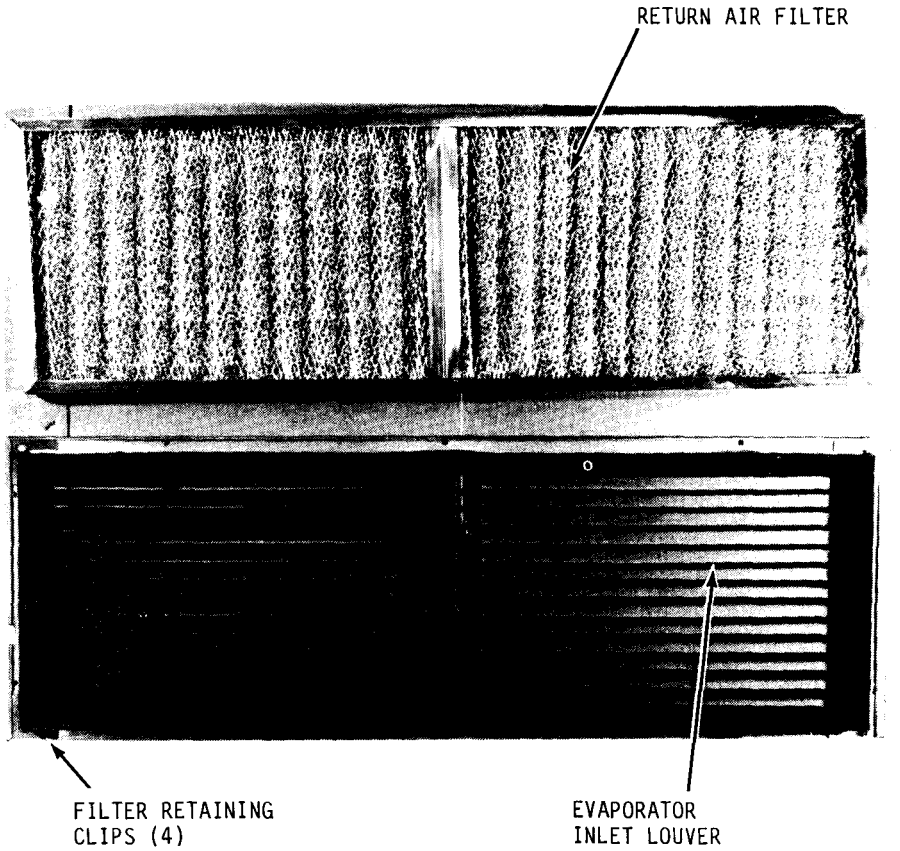


Figure 4-2. Return air filter

WARNING

Cleaning solvent, Federal Specification P-D-680, Type II, used for cleaning electrical parts, is flammable and gives off poisonous vapors. Use only in a well ventilated area. Avoid prolonged breathing of vapors. Keep solvent and vapors away from open flame. Do not use in excessive amounts.

(1) Clean filter with cleaning solvent (Fed. Spec. P-D-680) if lubricating oil is used as the dust collecting adhesive. Clean filter with water if a water soluble filter coater is used as the duct collecting adhesive. Flush the filter with solvent or water in opposite direction of air flow. Be careful not to damage filter during cleaning. Replace filter if the frame is bent or the filtering material is damaged.

(2) Shake excess solvent or water from filter and allow to dry thoroughly. If available, low pressure compressed air (15 psig) can be used to speed drying. When using compressed air for drying filter always direct the air stream in the opposite direction of the filter air flow. Hold the air nozzle a safe distance away from the filter to prevent compressing or separating the filtering material.

(3) Coat the filter with a dust collecting adhesive (see Appendix F) by immersion or spraying. Make sure that the total air filtering surface is thoroughly covered with the adhesive when spraying the filter. Allow excessive adhesive to drain before installing filter.

c. Installation.

(1) Refer to figure 4-2 and slide the air filter into four filter retaining clips.

(2) Refer to figure 4-1 and install evaporator inlet louver.

4-4. Condenser Guard.

Remove any obstructions. Brush off loose dirt and wipe clean.

a. Removal.

(1) Refer to figure 4-3 and remove condenser guard.

(2) With guard removed, wipe condenser coil clean.

b. Installation.

(1) Refer to figure 4-3 and install guard.

4-5. Evaporator Coil and Condensing Coil.

The coils (heat exchangers) should be serviced as often as necessary to insure maximum operating capacity of unit. Dirt and lint loaded coils or bent coil fins not only restrict normal volume of air flow but also insulate the coils, thus reducing their efficiency as heat

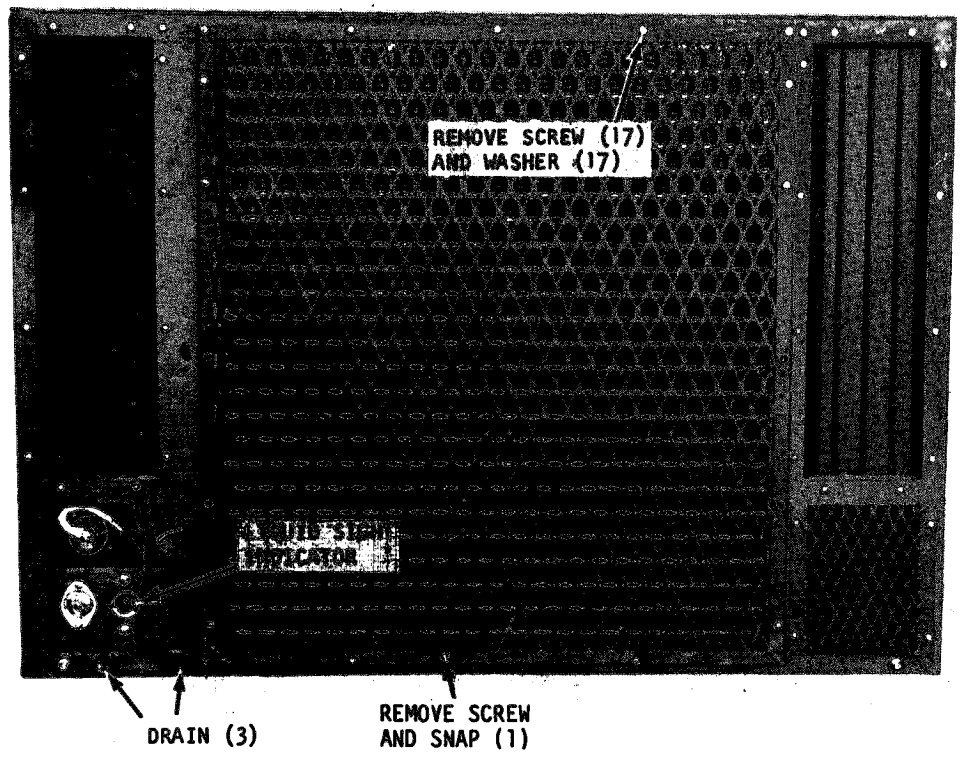


Figure 4-3. Condenser guard removal and installation

exchangers. Frequent cleaning of the external coil surfaces may avoid internal clogging. Clean external surfaces with a softbristled brush or a plastic fin comb. The plastic fin comb can be used to straighten bent coil fins. Clean internally-clogged coils with compressed air. Always direct the compressed air stream straight into coils, to avoid bending fins, and in the opposite direction of normal air flow. Remove covers and louvers (figure 4-1, 4-3 and 4-4) to service coils.

4-6. Top Covers and Condenser Cover.

a. Removal.

(1) Refer to figure 4-4 and remove top front cover. Remove this cover first as it provides access to one screw of the center cover that is not visible from the outside.

(2) Remove condenser cover and top rear cover.

(3) Remove top center cover.

b. Inspection and Repair. Inspect condenser fabric cover for tears. Repair minor tears with waterproof tape. Inspect top covers for dents, breaks, chipped paint and damaged gaskets or insulation. Inspect for minor dents in top covers and make sure that covers are installed flush with mating surfaces of the housing. If top covers cannot be repaired, install replacement covers.

c. Installation. Refer to figure 4-4 and install top covers and condenser cover as follows:

(1) Install top center cover.

(2) Install top rear cover and condenser cover.

(3) Install top front cover.

4-7. Evaporator Inlet and Outlet Louvers.

a. Removal. Refer to figure 4-1 and remove evaporator inlet and outlet louvers.

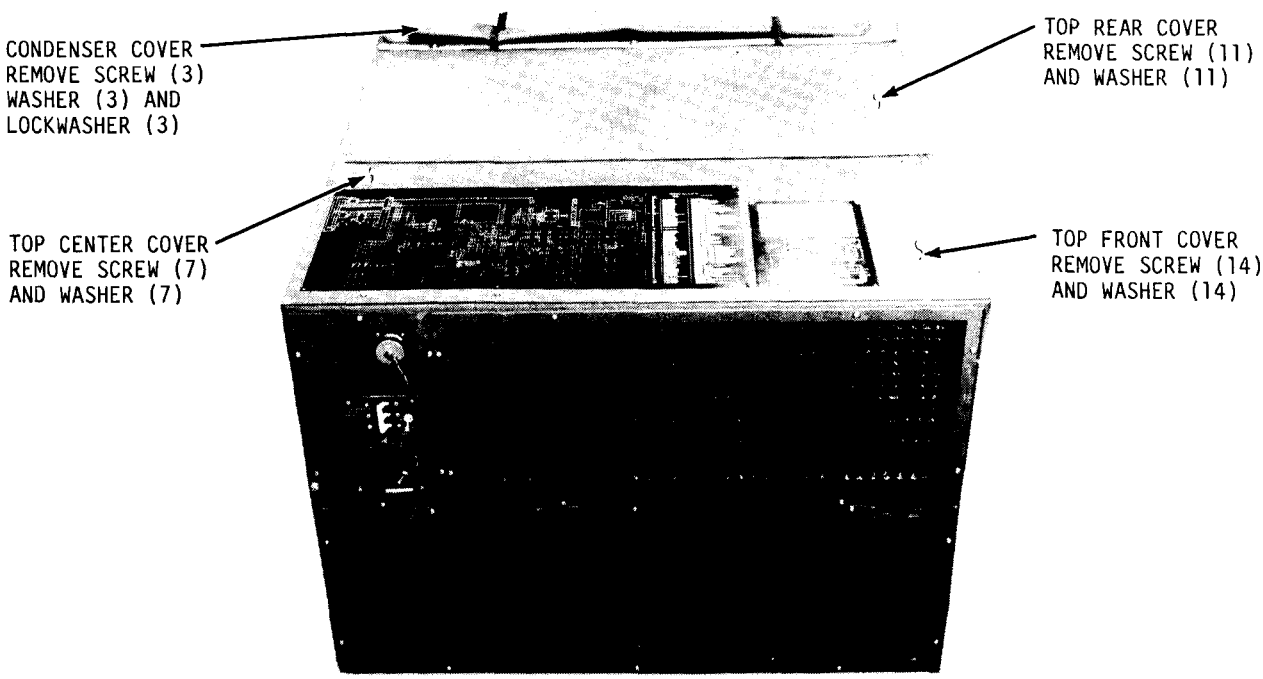


Figure 4-4. Top covers and condenser cover, removal and installation

b. Installation. Refer to figure 4-1 and install evaporator inlet and outlet louvers.

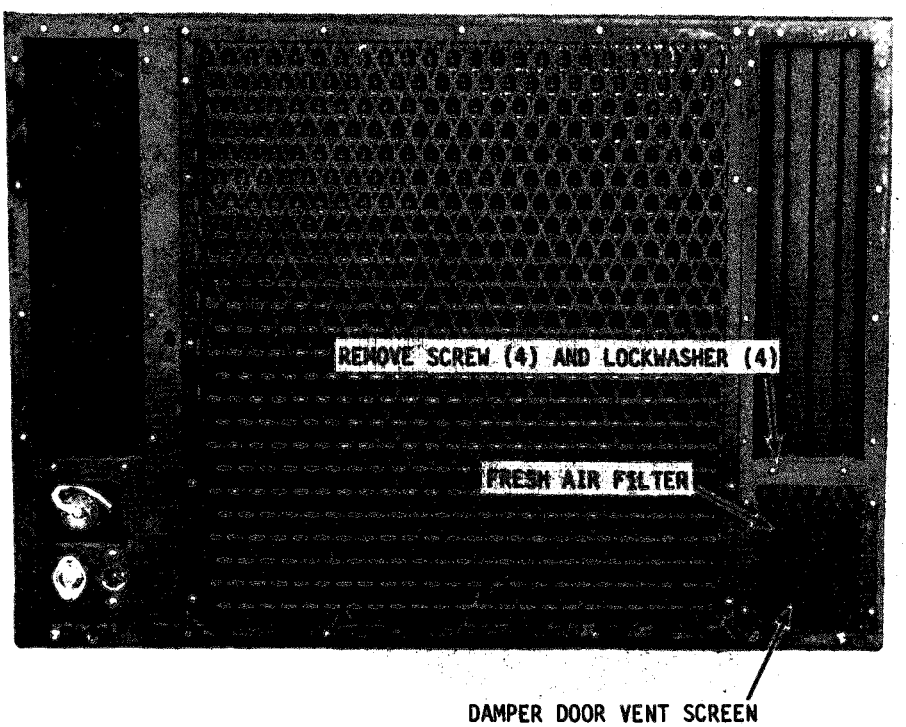
4-8. Damper Door Vent Screen and Fresh Air Filter.

a. Removal. Refer to figure 4-5 and remove damper door vent screen with filter.

b. Service Fresh Air Filter. Flush the-filter (in the damper door vent screen pocket) with clear water and dry.

NOTE

The fresh air filter is a 1/2-inch thick piece of cellulose sponge 4 inches wide and 6 inches long, inserted into the vent door screen.



NOTE : DO NOT REMOVE FRESH AIR FILTER FROM SCREEN POCKET -- FLUSH FILTER WITH CLEAN WATER AND DRY THROUGHLY.

Figure 4-5. Damper door vent screen and fresh air filters, removal and installation

c. Installation. Refer to figure 4-5 and install vent door screen with filter.

4-9. Mist Eliminator.

a. Removal.

(1) Refer to figure 4-4 and remove top front cover.

(2) Refer to figure 4-6 and lift out mist eliminator.

b. Inspection and Service.

(1) Inspect the face area of the mist eliminator for breaks, or any other physical damage, and clogged areas.

(2) Although the mist eliminator should not require any service normally, it may become clogged and dirty. The cleaning procedure is the same as for servicing the fresh air filter (para 4-3).

c. Installation.

(1) Refer to figure 4-6 and install mist eliminator by sliding down into position.

(2) Refer to figure 4-4 and replace top front cover.

4-10. Air Condit oner Installation.

Check air conditioner for proper imstallation. If auxiliary power connection is to be used, change leads as shown on wiring diagram, figure 1-5.

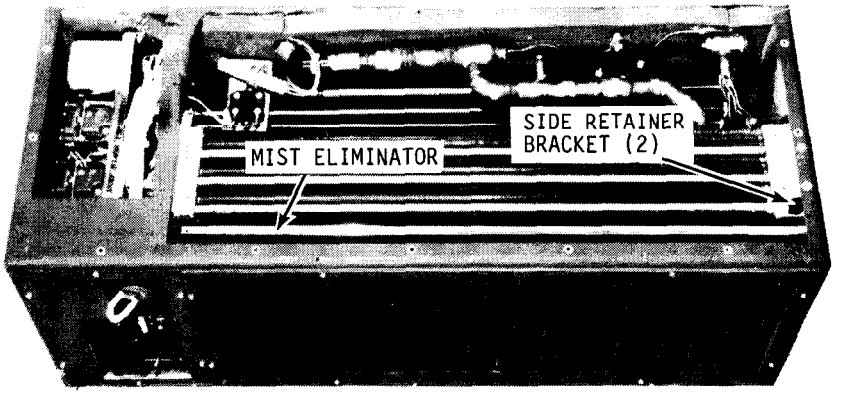


Figure 4-6. Mist eliminator removal and installation

Section II. MOVEMENT TO A NEW WORKSITE

Not applicable.

Section III. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

4-11. Tools and Equipment.

No tools or equipment are issued with the air conditioner.

4-12. Special Tools and Equipment.

No special tools or equipment are required for maintenance of the air conditioner.

4-13. Maintenance Repair Parts.

Repair parts and equipment are listed and illustrated in the repair parts and special tool list covering organizational maintenance for this equipment.

Section IV. LUBRICATION INSTRUCTIONS

4-14. Fan Motors.

The evaporator fan and condenser fan motors are permanently lubricated by the manufacturer and require no additional lubrication.

4-15. Compressor.

The compressor and compressor motor are fully lubricated by the manufacturer and require no additional lubrication.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-16. General.

Periodic maintenance checks are required by organizational maintenance personnel to check the performance of daily preventive maintenance services. Additional periodic maintenance services are required beyond the scope of the operator's maintenance.

4-17. Quarterly Preventive Maintenance Services.

a. This paragraph contains a tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to three calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of inspection and minimum requirements. Refer to table 4-1 for quarterly preventive maintenance services.

c. Some services are required at a shorter interval and are so noted. Service intervals should be shortened under extreme or unusual conditions.

Table 4-1. Organizational Preventive Maintenance Checks and Services

Legend

W-Weekly M-Monthly Q-Quarterly S-Semiannually A-Annually B-Biennially H-Hours MI-Miles

Item No.	Interval								Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready (Red) If:
	W	M	Q	S	A	B	H	MI			
1	●								Air Filter and Mist Eliminator	Inspect and service as necessary (para. 4-3 and 4-9)	Air Filter or Mist Eliminator faulty beyond servicing
2	●								Fresh Air Screen	Inspect and clean or replace as necessary	Fresh air screen faulty beyond servicing
3			●						Evaporator Coil and Condenser Coil	Clean and Inspect (para 4-5)	Coil damaged
4			●						Housing Covers	Repair or replace damaged covers (para. 4-6)	---
5			●						Wiring and Electrical Components	Check for damaged or frayed wiring. Check for defective electrical components. Repair or replace defective wiring. Replace defective electrical components	Repair requires opening refrigeration system.
6			●						Refrigeration System	Check compressor, valves, and piping for damage. Report damage to direct support maintenance	Repair requires opening refrigeration system.

Section VI. TROUBLESHOOTING

4-18. General.

This section contains troubleshooting instructions for the isolation of causes and common troubles that may occur during operation, and also gives the possible remedies to correct the trouble.

4-19. Organizational Troubleshooting Chart.

a. General. Troubleshooting procedures for organizational maintenance personnel are listed in table 4-2. As shown in the table, troubleshooting begins by identifying the malfunction. Next, suitable tests or inspections are made in step-by-step order. Finally, a corrective action is given. Remedies beyond the scope of organizational maintenance must be reported to direct support maintenance personnel. Additional procedures are given in paragraphs(b) and (c) which follow:

b. Control Circuit. The cause for the failure of the system to operate can be narrowed to a specific portion of the system if the control component associated with the failure can be isolated. It is the purpose of safety devices to open the circuit under certain overload or fault conditions. If a safety device is open, additional checking is required to determine if the open is due to a faulty safety device or if the safety device is performing its intended function, and the fault is located elsewhere in the system. To check the control circuit, proceed as follows:

(1) Disconnect air conditioner from source of power.

(2) Using a series test lamp or ohmmeter, check the continuity through each control in the affected circuit with the control in the closed position while being checked. Use the system schematic and wiring diagram for point-to-point circuit tracing.

(3) Replace each defective part with a serviceable like item.

c. Safety Devices. When testing the control circuit and associated components, take into account the normal state of the safety device. Determine (1) whether it is normal for the device to be open under the existing conditions or (2) if the open condition indicates trouble elsewhere in the air conditioner.

Table 4-2. Troubleshooting

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

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
1. AIR CONDITIONER FAILS TO OPERATE	
Step 1. Check to see if main power cable is connected.	Connect cable to power source.
Step 2. Check to see if main power receptacle is defective.	Replace defective connector.
Step 3. Check for loose electrical connections.	Tighten loose connections.
Step 4. Check to see if mode selector rotary switch is improperly positioned or is defective.	Turn selector to COOL or VENT. Replace switch if defective (para 4-26).
Step 5. Check to see if control circuit breaker or compressor circuit breaker is in OFF position or is defective.	Reset circuit breaker(s) or replace defective circuit breaker (para 4-26).
Step 6. Remove service valve access panel (figure 1-2) and check to see if high pressure or low pressure switch has cutout.	Reset high pressure or low pressure cutout . Note that time delay relay starts compressor 30 seconds after reset.
Step 7. Test control circuit transformer and rectifier for faulty operation.	Replace defective transformer and/or rectifier (para 4-28 and 4-29).
2. INSUFFICIENT COOLING	
Step 1. Check to see if the mode selector switch is improperly positioned.	Set switch to COOL.
Step 2. Check to see if temperature selector control is improperly positioned or is defective.	Adjust setting or replace switch (para 4-26).

Table 4-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
2. INSUFFICIENT COOLING - Continued	
Step 3.	Check to see if fresh air damper control is incorrectly set or improperly adjusted. Verify setting and, if necessary, correct adjustment of damper control (para 4-39).
Step 4.	Check to see if evaporator outlet louver is bent or stuck in closed position. Repair or replace louver. (para 4-7)
Step 5.	Inspect condenser coil for dirt accumulation. Clean coil (para 4-5).
Step 6.	Inspect evaporator return air filter for dirt accumulation Clean filter (para 4-3).
Step 7.	Check to see if evaporator fan is loose or defective. Tighten if loose or replace if defective (para 4-21).
Step 8.	Check evaporator fan motor for a defective thermal protective device. Replace thermal protector (para 4-22).
Step 9.	Check to see if evaporator fan motor is worn or defective. Report deficiency to direct support maintenance or replace motor (para 4-21).
Step 10.	Check refrigerant system for insufficient charge by inspecting liquid sight indicator. Presence of bubbles indicates a low refrigerant charge. Report low-charge condition to direct support maintenance.
Step 11.	Check for intermittent compressor operation. Report condition to direct support maintenance.
3. EVAPORATOR OR CONDENSER FAN FAILS TO OPERATE	
Step 1.	Check to see if main power cable is connected. Connect cable to power source.
Step 2.	Check to see if main power receptacle or plug connectors are defective. Replace connectors or receptacle.

Table 4-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. EVAPORATOR OR CONDENSER FAN FAILS TO OPERATE - Continued
Step 3. Check to see if mode selector rotary switch is improperly adjusted or is defective. Replace switch if defective (para 4-26).
Step 4. Check to see if evaporator fan speed control switch is defective. Replace defective switch (para 4-26).
Step 5. Check to see if condenser fan motor thermal protector is defective. Replace defective thermal protector (para 4-24).
Step 6. Check to see if evaporator fan motor thermal protector is defective. Replace defective thermal protector (para 4-22).
Step 7. Check to see if evaporator fan or condenser fans are binding. Relieve binding or replace fan (para 4-21).
Step 8. Check to see if condenser fan high-low thermostat switch is defective. Replace defective thermostat switch (para 4-31).
Step 9. Test condenser fan relay for defective operation. Replace defective relay (para 4-27).
Step 10. Test evaporator fan motor and condenser fan motor for defective operation. Replace defective fan motor (para 4-21 and 4-23).
4. COMPRESSOR WILL NOT START
Step 1. Set circuit breakers to ON position. Turn mode selector switch to COOL position and temperature selector switch to COOLER position. Reset controls properly.
Step 2. Check for defective or tripped compressor internal temperature overload switch. Set circuit breaker and mode selector switch to off. Disconnect main power cable for 45 minutes; then, reconnect cable and reset controls. If condition continues, report deficiency to direct support maintenance.
Step 3. Check for loose electrical connections or faulty wiring. Tighten loose connections. Repair faulty wiring.

Table 4-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
4. COMPRESSOR WILL NOT START - Continued
Step 4. Test for open control circuit by means of continuity check (para 4-32). Report open-circuit condition to direct support maintenance.
Step 5. Check to see if contacts on high or low pressure cutout switch are open. Reset pressure switches. If condition continues, report deficiency to direct support maintenance.
Step 6. Test control circuit breaker and compressor circuit breaker for faulty operation. Replace defective circuit breaker (para 4-27).
Step 7. Test control transformer and rectifier for defective operation. Replace defective transformer (para 4-28) and defective rectifier (para 4-29).
Step 8. Test for defective time delay relay. Replace defective relay (para 4-27).
Step 9. Test for defective compressor relay. Replace defective relay (para 4-27).
Step 10. Check to see if compressor motor is defective. Test for open or grounded winding (para 4-35). Report motor-fault condition to direct support maintenance.
5. COMPRESSOR STARTS BUT CUTS OUT ON OVERLOAD
Step 1. Check for high pressure due to improper condenser coil airflow. Clean condenser coil and louvers. Verify proper operation of condenser fans and louvers.
Step 2. Test condenser fan for motor failure. Replace defective motor (para 4-23).
6. EVAPORATOR AIR OUTPUT VOLUME LOW
Step 1. Check to see if evaporator fan speed switch is set at low speed. Reset switch to HIGH speed.
Step 2. Check for dirty or damaged filter or mist eliminator. Clean or replace filter (para 4-3). Clean or replace mist eliminator (para 4-9).

Table 4-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
6. EVAPORATOR AIR OUTPUT VOLUME LOW - Continued
Step 3. Check for iced or dirty evaporator coil. De-ice and clean coil (para 4-5).
Step 4. Inspect evaporator fan for defect. Replace defective fan.
Step 5. Test fan motor for faulty operation. Replace motor (para 4-21).
7. CONDENSER AIR OUTLET VOLUME LOW
Step 1. Check for dirty condenser coil or guard. Clean coil and guard (para 4-4).
Step 2. Check to see if air outlet louvers are stuck in closed position. Free louvers and control cable. Adjust control, or notify direct support maintenance if actuating cylinder is not functioning properly.
Step 3. Check for defective HIGH-LOW condenser fan thermostatic switch. Replace switch (para 4-26).
Step 4. Inspect for defective condenser fan. Replace fan.
Step 5. Test for defective fan motor. Replace motor (para 4-23).
8. AIR CONDITIONER FAILS TO HEAT
Step 1. Check to see if mode selector switch is improperly adjusted. Reset selector LOW heat or HIGH heat.
Step 2. Check to see if temperature selector control is set correctly. Adjust control to WARMER.
Step 3. Inspect evaporator return air filter for dirty condition. Clean filter (para 4-3).
Step 4. Inspect for defective temperature selector switch or mode selector switch. Replace defective switch (para 4-26).

Table 4-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
8. AIR CONDITIONER FAILS TO HEAT - Continued
Step 5. Inspect for defective heater high temperature cutout thermostatic switch. Replace defective thermostatic switch (para 4-31).
Step 6. Test for defective heater relay. Relay defective relay (para 4-27).
Step 7. Inspect and test for defective heaters and associated wiring. Tighten connections and repair damaged wiring. Replace defective heaters (para 4-30).
Step 8. Test for defective evaporator fan motor. Replace motor (para 4-21).
9. EXCESSIVE NOISE
Step 1. Check evaporator fan or condenser fan for loose blade or loose mounting. Tighten fan blade on motor shaft. Tighten all mounting hardware.
Step 2. Test for defective or worn evaporator or condenser fan motor. Replace worn or defective motor (para 4-21 and 4-23).
Step 3. Check to see if compressor knocks or chatters. Stop air conditioner and report condition to direct support maintenance.

Section VII. MAINTENANCE OF AIR CONDITIONER

4-20. Electrical System.

This section describes the testing, removal, and installation of the electrical system compnents which are the responsibility of organizational maintenance. Refer to the schematic (figure 1-4) for cmponent nomenclature and as a guide for troubleshooting. use the wiring diagram (figure 1-5) to check the exact connections of wiring.

4-21. Evaporator Fan and Motor Assembly.

a. General. The evaprator fan motor is a multispeed motor. The 400 Hz motor operates at 3750 RPM in high speed and 1800 RPM in low speed. The 60 Hz motor operates at 3450 RPM in high speed and 1725 RPM in low speed. The motor contains separate windings for high or low speed operation and each winding is thermally protected. Motor speed is manually controlled by the evaporator fan speed switch.

b. Controls. Before removing the evaporator fan and motor assembly, test the mode selector switch, evaporator fan speed switch, and control circuit breaker (para 4-26) and evaporator fan motor low/high speed switch (para 4-27) which control operation of the motor. If electrical control components or wiring that supply power to the motor are not defective and the motor does not operate, proceed as follows:

c. Removal.

(1) Refer to figure 4-1 and remove the evaporator air inlet louver.

(2) Refer to figure 4-7 and remove the evaporator fan and motor assembly.

(3) Refer to figure 4-8 and disassemble the fan and motor assembly.

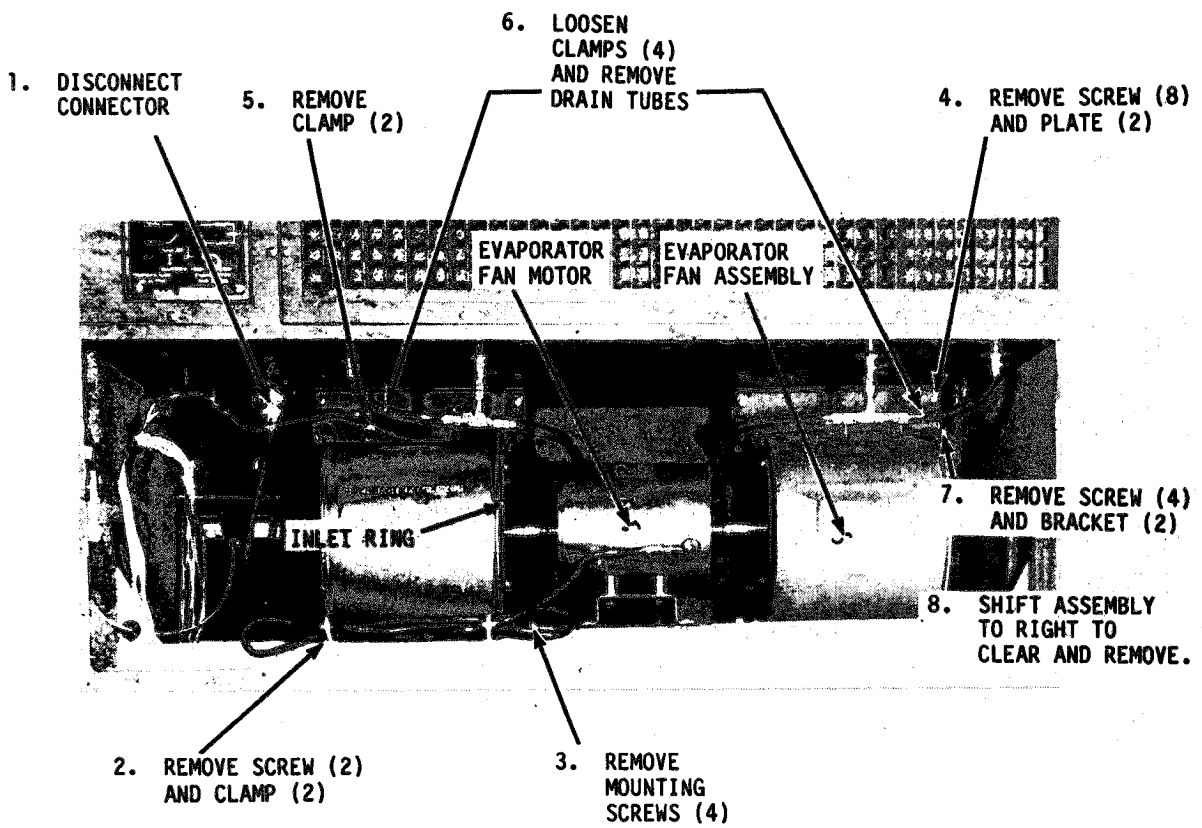


Figure 4-7. Evaporator fan and motor assembly, removal and installation

NOTE : REMOVE AND INSTALL CONDENSER MOTOR THERMAL PROTECTOR IN SAME MANNER

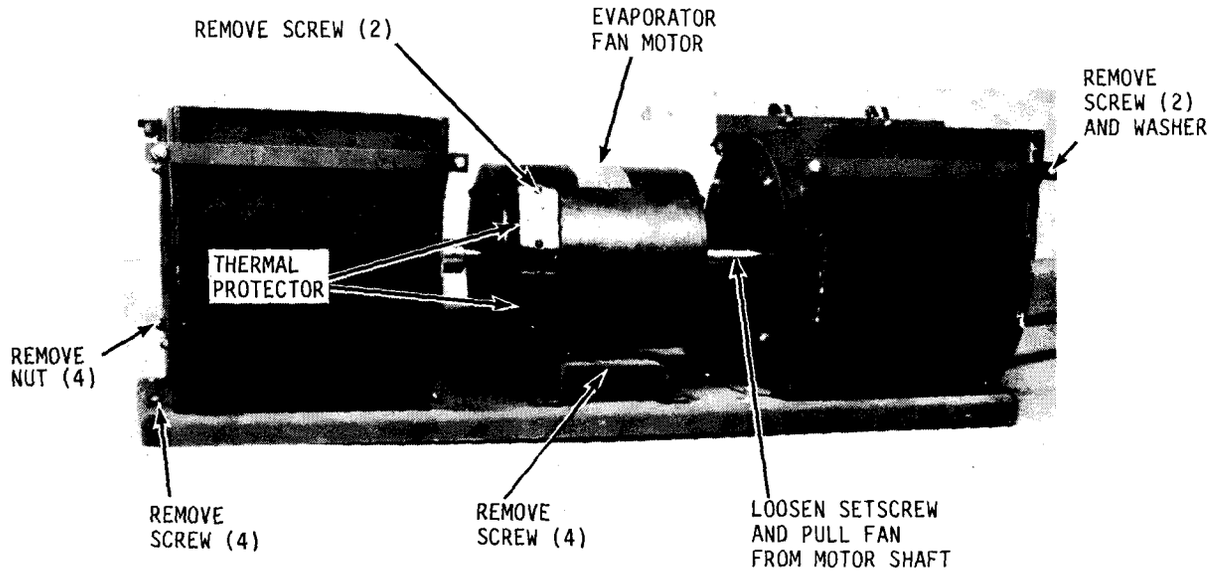


Figure 4-8. Evaporator, fan, motor, and thermal protector, removal and installation

d. Test.

(1) Refer to figure 4-8 and remove housing from the high and low speed motor winding thermal protectors. Refer to para 4-22c and test thermal protectors.

(2) Test the motor for open-circuited or grounded windings as follows.

(a) Using a multimeter, test at P3 for continuity across a combination of two leads until each of the three high speed winding leads is tested. Do the same for the three low speed winding leads. If continuity is not indicated, the winding is open and the motor should be replaced.

(b) Using a multimeter, test for continuity by placing one test probe against the motor housing (on bare metal only) and the other probe against each of the motor winding leads. If continuity is indicated, the winding is grounded, and the motor should be replaced.

(c) Reinstall housing on thermal protector.

e. Installation.

(1) Refer to figure 4-8 and assemble the fan and motor assembly.

(2) Refer to figure 4-7 and install evaporator fan and motor assembly.

(3) Refer to figure 4-1 and install the evaporator air inlet louver.

4-22. Evaporator Fan Motor Thermal Protector.

a. General. There are two automatic reset thermal protectors on the evaporator fan motor. Both thermal protectors are similar in appearance. One of the protectors provides overload protection for the low speed motor winding while the other provides protection for the high speed motor winding.

b. Removal.

(1) Refer to paragraph 4-21c and remove evaporator fan and motor assembly .

(2) Refer to figure 4-8 and unsolder thermal protectors.

c. Test. Using a multimeter, test for continuity across each pair of terminal connections. If continuity is not indicated, the thermal protector is defective and must be replaced.

d. Installation.

(1) Refer to figure 4-8, install thermal protectors.

(2) Refer to paragraph 4-21e and install evaporator fan and motor assembly.

4-23. Condenser Fan and Motor Assembly.

a. General. The condenser fan motors are multispeed motors. The 400 Hz motors operate at 3750 RPM in high speed and 1800 RPM in low speed. The 60 Hz motors operate at 3450 RPM in high speed and 1725 RPM in low speed. The motors contain separate windings for high or low speed operation and each winding is thermally protected. Motor speed is automatically controlled by an outdoor thermal switch (figure 1-2). The motors will operate at low speed until the outdoor ambient temperature rises above 100°F ±5°F (37.8°C ±3°C).

b. Test. Before removing a condenser fan motor, test mode selector switch and control circuit breaker (para 4-26) and the fan motor high/low speed switch (para 4-27) that control operation of the condenser fan motor. If electrical control components or wiring that supply power to the motor are not defective and the motor does not operate, remove the condenser fan and motor assembly (c. below) and make the following tests:

(1) Test the high and low motor winding thermal protectors, as in para **4-24c.** Replace a defective protector (para **4-24c).**

(2) With the high and low speed motor winding leads disconnected from the thermal protectors, test for open or grounded windings as follows:

(a) Using a multimeter, test for continuity across a combination of two leads until each of the three high speed winding leads is tested. DO the same for the three low speed winding leads. If continuity is not indicated, the winding is open and the motor should be replaced.

(b) Using a multimeter, test for continuity by placing one test probe against the motor housing (on bare metal only) and the other probe against each of the motor winding leads. If continuity is indicated, the winding is grounded and the motor should be replaced.

c. Removal.

(1) Refer to figure 4-4 and remove the condenser cover and top rear cover.

(2) Refer to figure 4-9 and remove the condenser fan and motor assembly.

d. Installation.

(1) Refer to figure 4-9 and install the condenser fan and motor assembly. Refer to figures 1-4 and 1-5 for electrical connections.

(2) Refer to figure 4-4 and install the condenser cover and top rear cover.

4-24. Condenser Fan Motor Thermal Protector.

a. General. There are two automatic reset thermal protectors on each of the condenser fan motors. Both thermal protectors are similar in appearance. One of the protectors provides overload protection for the high speed motor windings and the other provides overload protection for the low speed motor windings.

b. Removal.

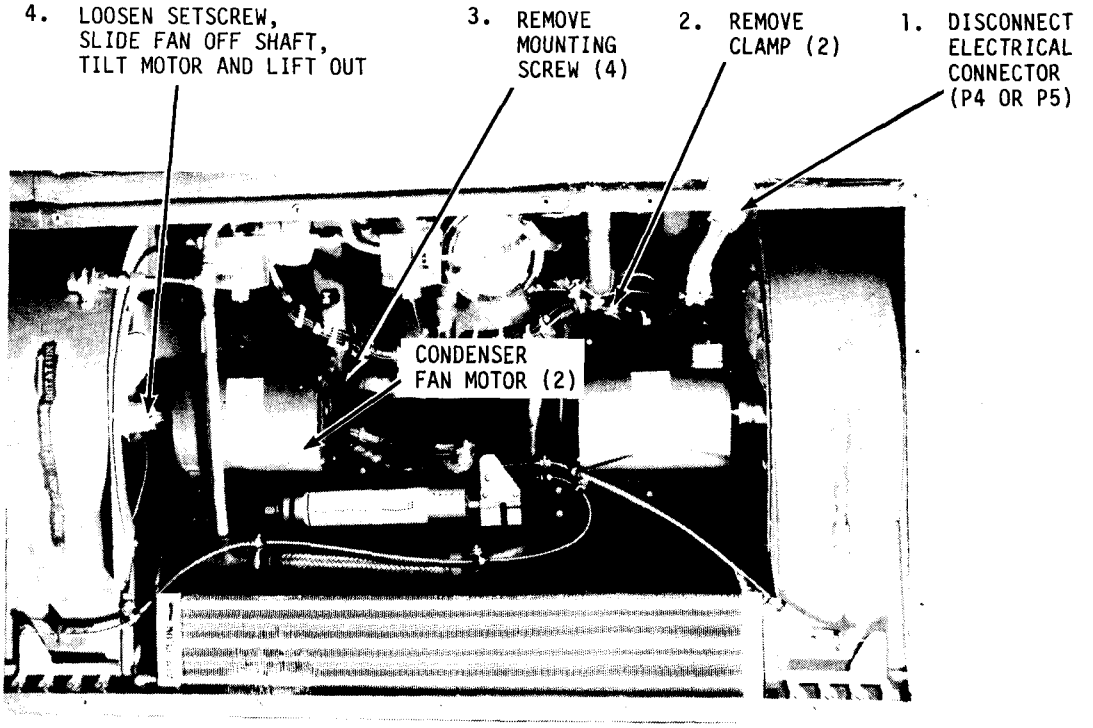
(1) Refer to paragraph 4-23 and remove the condenser fan and motor assembly.

(2) Refer to figure 4-8 and remove the thermal protector.

c. Test. Using a multimeter, test for continuity across each terminal connection. If continuity is not indicated, the thermal protector is defective and must be replaced.

d. Installation.

(1) Refer to figure 4-8 and install the thermal protector.



NOTE : REMOVE OTHER MOTOR IN SIMILAR MANNER

Figure 4-9. Condenser fan and motor assembly, removal and installation

(2) Refer to paragraph 4-23 and install the condenser fan and motor assembly. Ensure correct direction of rotation.

4-25. Control Module and Junction Box.

a. General. The control panel is located in the upper left front corner of evaporator section. The control module is mounted on the junction box by a long bolt with a slotted steel knob. The junction box and control module contain all of the electrical controls on the unit.

CAUTION

Do not turn control module mounting bolt unless unit has been disconnected from power source.

b. Removal.

(1) Refer to figure 4-4 and remove the top front cover.

(2) Refer to figure 4-1 and remove the evaporator inlet louver.

(3) Refer to figure 4-10 and remove control module and junction box.

c. Installation.

(1) Refer to figure 4-10 and install control module and junction box.

(2) Refer to figure 4-4 and install top front cover.

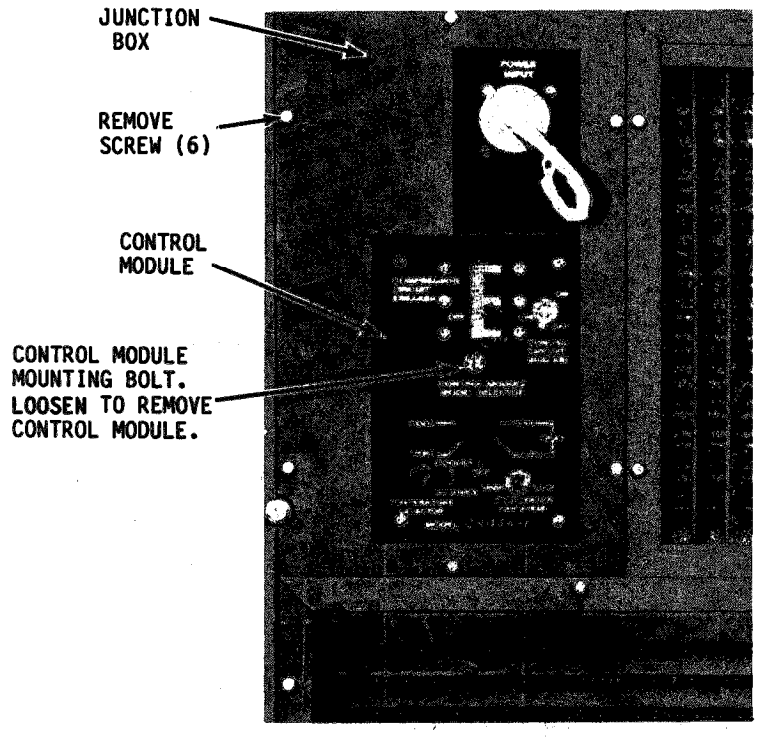
4-26. Control Module Components.

a. General. The control module components consist of the compressor circuit breaker, control circuit breaker, mode selector switch (rotary), temperature control switch, and the evaporator fan speed relay switch. All components have the same inspection and test requirements. The compressor circuit breaker is a safety device which provides overcurrent protection for the compressor. The control circuit breaker provides protection for the DC control system.

b. Inspection and Test. Before removing any of the control module components-check for loose connections, pitted contacts, and cracked or broken casings. Refer to wiring diagram (figure 1-5) and check for continuity with a multimeter. If no continuity exists with the circuit breaker in the ON position, or if a casing is broken or cracked, replace the circuit breaker.

CAUTION: BEFORE ATTEMPTING TO FULLY REMOVE CONTROL MODULE OR JUNCTION BOX, DISCONNECT THERMOSTAT SENSING BULB FROM HOUSING AND CAREFULLY THREAD BULB THROUGH OPENING INJUNCTION BOX.

CAUTION: DO NOT TURN CONTROL MODULE MOUNTING BOLT UNLESS UNIT HAS BEEN DISCONNECTED FROM POWER SOURCE.



NOTE : INSTALL JUNCTION BOX IN UNIT. INSTALL CONTROL MODULE IN JUNCTION BOX. OBSERVING CAUTION ABOVE ADD ATTACHING HARDWARE.

Figure 4-10. Junction box and control module, removal and installation

CAUTION: BE CAREFUL NOT TO DAMAGE SENSING BULB

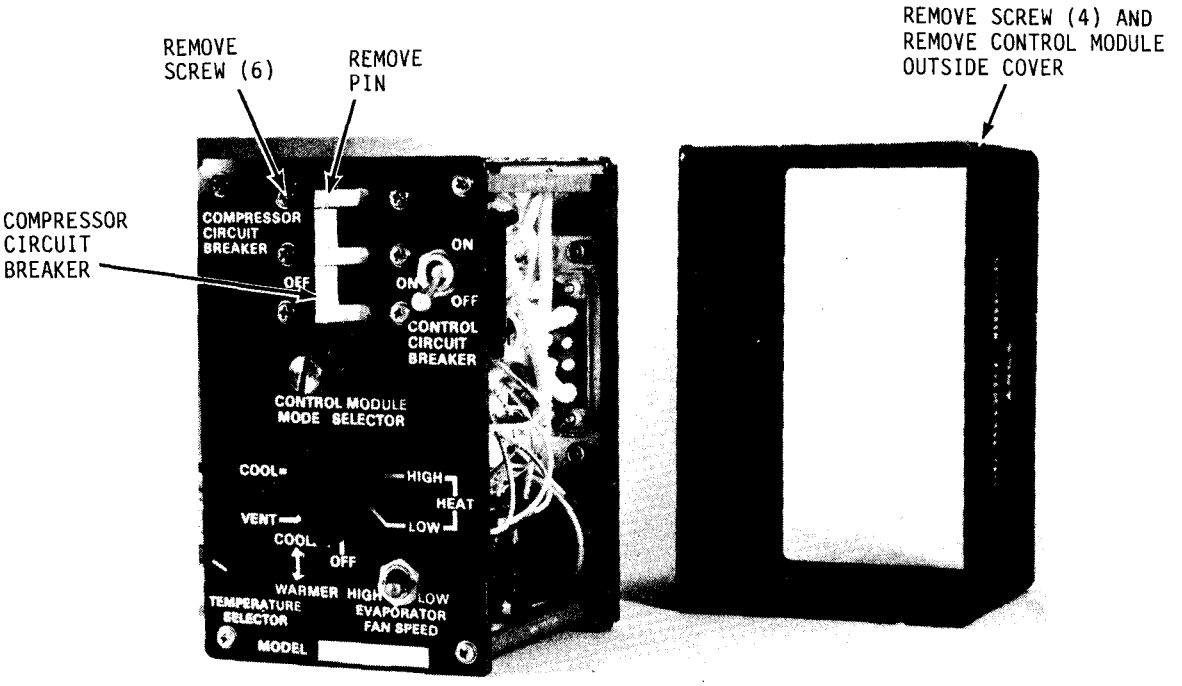


Figure 4-11. Compressor circuit breaker, removal and installation

CAUTION: BE CAREFUL NOT TO DAMAGE SENSING BULB

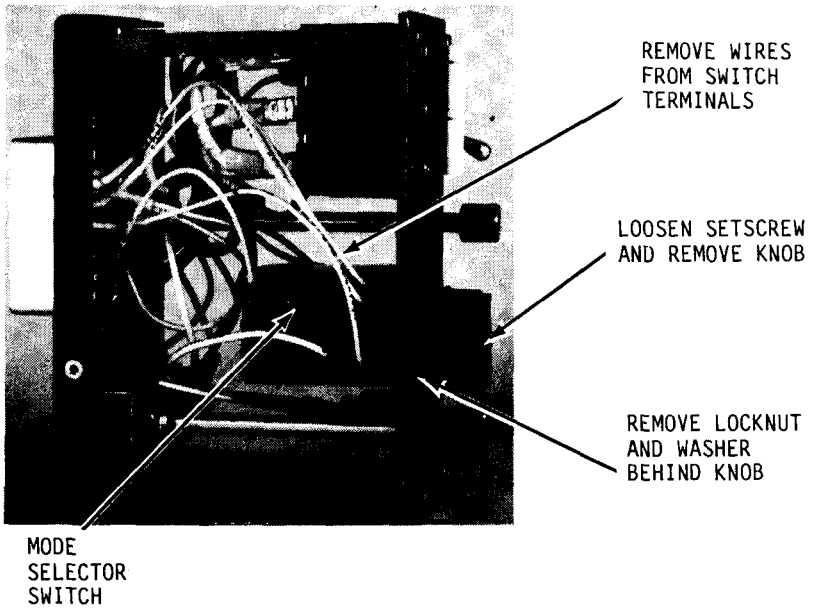


Figure 4-12. Mode selector switch removal and installation

(1) Compressor circuit breaker.

(a) Removal.

(i) Refer to figure 4-10 and remove the control module.

(ii) Refer to figure 4-11 and remove the compressor circuit breaker. The pin assembly must be removed first before removing circuit breaker.

(b) Installation.

(i) Refer to figure 4-11 and install the compressor circuit breaker.

(ii) Refer to figure 4-10 and install the control module.

(2) Mode Selector Switch (Rotary) is an electrical switch that can be manually positioned to select the desired operational mode of air conditioner. Refer to para **2-2c.**

(a) Testing. Check for loose connections, loose control knob and cracked or broken casing. Check for continuity with a multimeter.

If no continuity exists with switch in either one of the four "ON" positions, or if the casing is broken or cracked, replace the mode selector switch. If knob is loose, tighten set screw. If knob is defective, replace.

(b) Removal.

(i) Refer to figure 4-10 and remove the control module.

(ii) Refer to figure 4-12 and remove the mode selector switch.

(c) Installation.

(i) Refer to figure 4-12 and install the selector switch.

(ii) Refer to figure 4-10 and install the control module.

(3) Temperature Control Switch.

(a) Testing. Check for loose connections, loose control knob, cracked or broken casing, and kinked or broken capillary tube. Refer to wiring diagram (figure 1-5) and make a continuity check. If no continuity exists when in the cooling mode and the thermostat temperature is above its set point or if the capillary tube is damaged, replace the temperature control switch. if knob is loose, tighten set screw. If knob is defective, replace.

(b) Removal.

(i) Refer to figure 4-10 and remove the control module.

(ii) Refer to figure 4-13 and remove the temperature control switch.

(c) Installation.

(i) Refer to figure 4-13 and install the temperature control switch.

(ii) Refer to figure 4-10 and install the control module.

(4) Evaporator Fan Speed Switch.

(a) Testing. Check for loose connections, mountings, and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is broken or cracked, replace switch.

(b) Removal.

(i) Refer to figure 4-10 and remove the control module.

(ii) Refer to figure 4-14 and remove the evaporator fan speed switch.

(c) Installation.

(i) Refer to figure 4-14 and install the evaporator fan speed switch.

(ii) Refer to figure 4-10 and install the control module.

(5) Control Circuit Breaker.

(a) Testing. Check for loose connections, mountings, and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is broken or cracked, replace the circuit breaker.

(b) Removal.

(i) Refer to figure 4-10 and remove the control module.

(ii) Refer to figure 4-14 and remove the control circuit breaker.

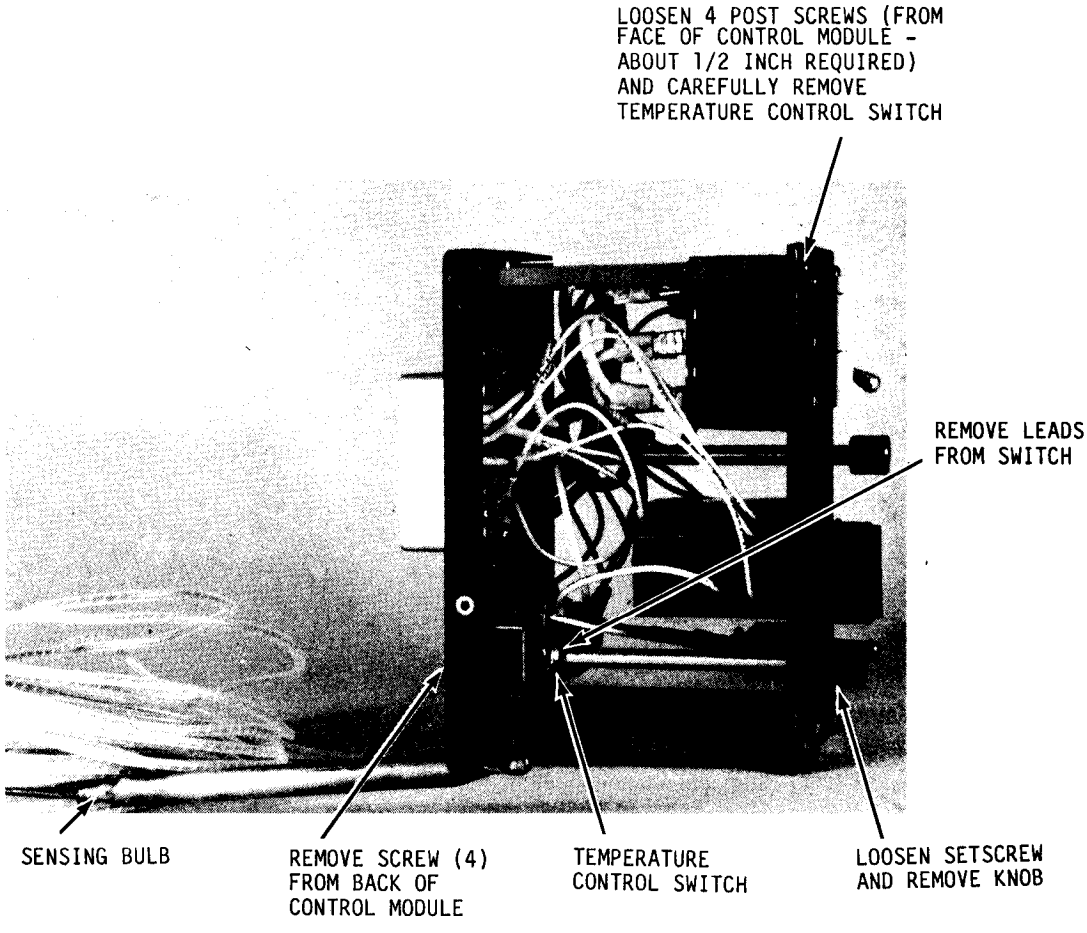


Figure 4-13. Temperature control switch, removal and installation

(c) Installation.

(i) Refer to figure 4-14 and install the control circuit breaker.

(ii) Refer to figure 4-10 and install the control module.

4-27. Junction Box Components.

a. General. The junction box components consist of the following: time delay relay, evaporator fan motor low speed relay, fixed heater relay, cycling heater relay, evaporator fan motor high speed relay, condenser fan motor high speed relay, condenser fan motor low speed relay, compressor relay, and terminal boards.

b. Inspection and Test. Before removing any of the junction box components check for loose connections, pitted contacts, and cracked or broken casings. Refer to wiring diagram (figure 1-5) and check for continuity with a multimeter. If no continuity exists, or a casing is broken or cracked, replace the component.

(1) Time Delay Relay.

(a) Testing. Turn mode selector switch to cool and note time lapse between starting of fan motors and starting of compressor. If time lapse is less than 27 seconds or more than 33 seconds, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-15 and remove the time delay relay.

(c) Installation.

(i) Refer to figure 4-15 and install the time delay relay.

(ii) Refer to figure 4-10 and install the junction box.

(2) Evaporator Fan Motor Low Speed Relay.

(a) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-15 and remove the evaporator fan low speed relay.

(b) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if

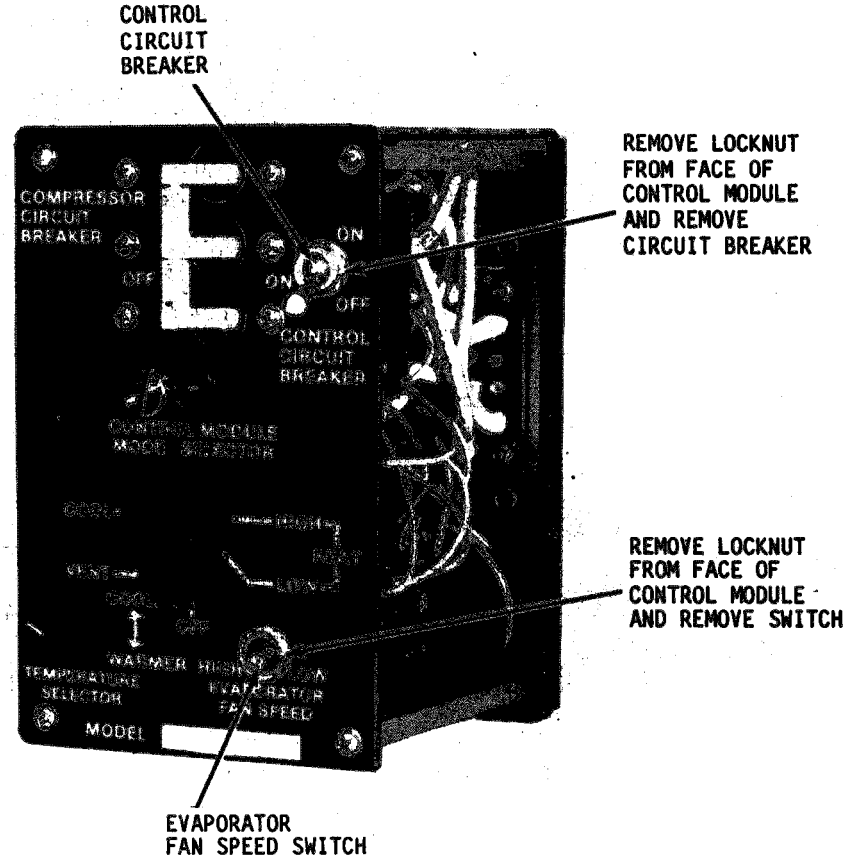


Figure 4-14. Evaporator fan motor speed switch and control circuit breaker, removal and installation

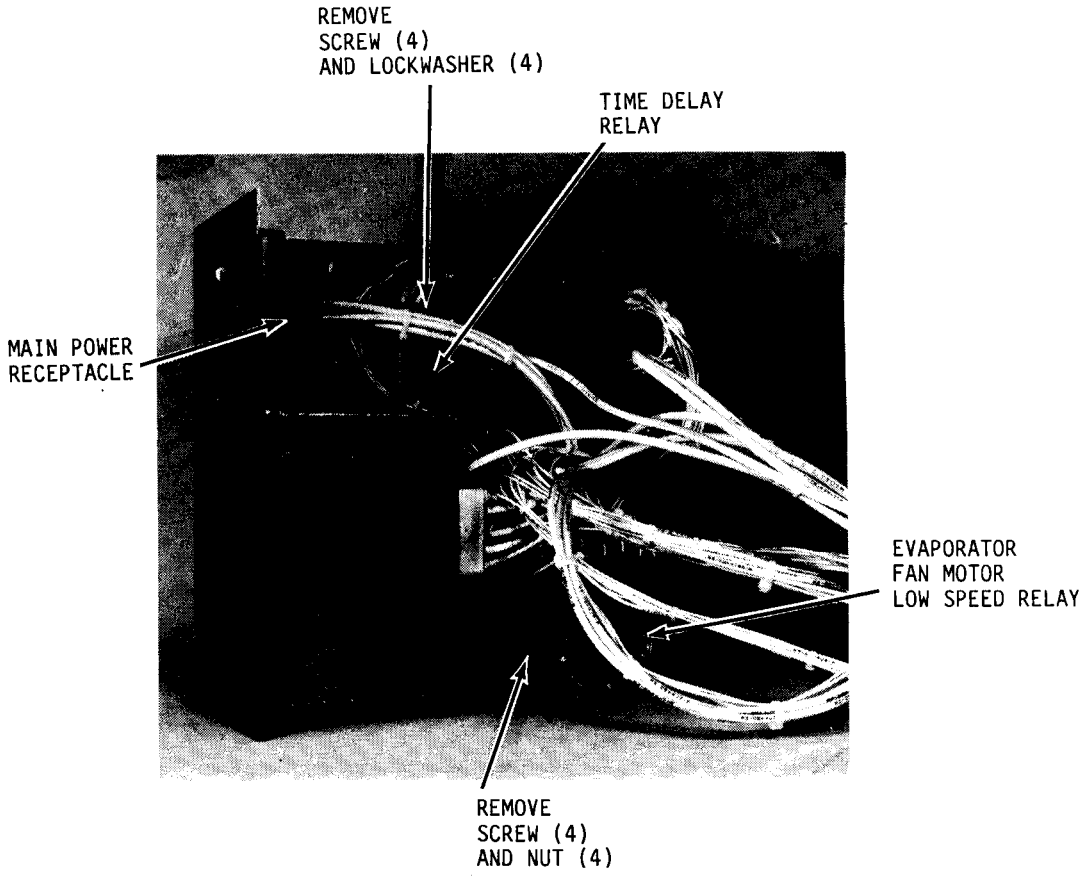


Figure 4-15. Time delay relay and evaporator fan motor low speed relay, removal and installation

the casing is cracked or broken, replace the relay.

(c) Installation.

(i) Refer to figure 4-15 and install the evaporator fan low speed relay.

(ii) Refer to figure 4-10 and install the junction box.

(3) Fixed Heater Relay.

(a) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the fixed heater relay.

(b) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is cracked or broken, replace the relay.

(c) Installation.

(i) Refer to figure 4-16 and install the fixed heater relay.

(ii) Refer to figure 4-10 and install the junction box.

(4) Cycling Heater Relay.

(a) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is cracked or broken, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 for removal of the cycling heater relay.

(c) Inshallation.

(i) Refer to figure 4-16 and install the cycling heater relay.

(ii) Refer to figure 4-10 and install the junction box.

(5) Evaporator Fan Motor High Speed Relay.

(a) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is cracked or broken, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the evaporator fan motor high speed relay.

(c) Installation.

(i) Refer to figure 4-16 and install the evaporator fan motor high speed relay.

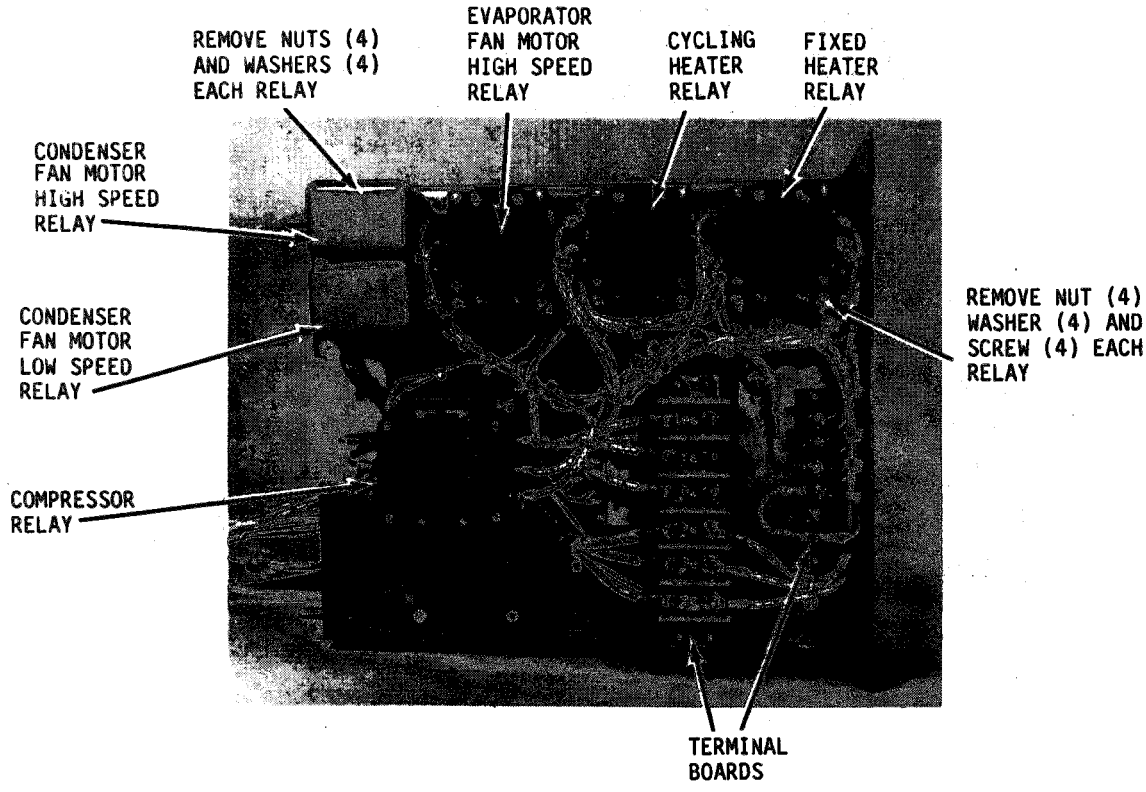


Figure 4-16. Heater relays, evaporator fan motor high speed relay, condenser fan motor relays, compressor relay and terminal boards, removal and installation.

(ii) Refer to figure 4-10 and install the junction box.

(6) Condenser Fan Motor High Speed Relay.

(a) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists or if the casing is cracked or broken, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the condenser high speed relay.

(c) Installation.

(i) Refer to figure 4-16 and install the condenser high speed relay.

(ii) Refer to figure 4-10 and install the junction box.

(7) Condenser Fan Motor Low Speed Relay.

(a) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists, or if the casing is cracked or broken, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the condenser low speed relay.

(c) Installation.

(i) Refer to figure 4-16 and install the condenser low speed relay.

(ii) Refer to figure 4-10 and install the junction box.

(8) Compressor Relay.

(a) Testing. Check for loose connections and cracked or broken casing. Check for continuity with a multimeter. If no continuity exists or if the casing is cracked or broken, replace the relay.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the compressor relay.

(c) Installation.

(i) Refer to figure 4-16 and install the compressor relay.

(ii) Refer to figure 4-10 and install the junction box.

(9) Terminal Boards.

(a) Testing. Check for loose connections, loose mounting or cracked or broken casing; replace if defective.

(b) Removal.

(i) Refer to figure 4-10 and remove the junction box.

(ii) Refer to figure 4-16 and remove the terminal boards.

(c) Installation.

(i) Refer to figure 4-16 and install the terminal boards.

(ii) Refer to figure 4-10 and install the junction box.

4-28. Transformer and Resistor.

a. Removal.

(1) Refer to figure 4-10 and remove the junction box.

(2) Refer to figure 4-17 and remove the transformer and resistor. Remove resistor from transformer if either is faulty when tested as follows:

b. Testing.

(1) Refer to wiring diagram (figure 1-5) and use a multimeter to test the transformer for continuity through both the primary winding and the secondary winding. If no continuity exists through either winding, replace the transformer.

(2) use the multimeter to verify the resistor ohms. If measurement shows other than 10 ±1 ohm, replace the resistor.

c. Installation.

(1) Refer to figure 4-17 and install the transformer and resistor.

(2) Refer to figure 4-10 and install the junction box.

4-29. Rectifier and Capacitors

a. General. The rectifier and capacitors are located on the bottom of the junction box compartment. The rectifier is a 4-diode unit providing full-wave rectification which converts the ac to dc for the 24-volt control circuit. The capacitors reduce EMI radiation to specified levels.

b. Removal.

(1) Refer to figure 4-10 and remove the junction box.

(2) Refer to figure 4-17 and detach the cable from the rectifier.

(3) Remove the capacitors from the rectifier cable terminals.

(4) Remove the rectifier by removing the two mounting screws and washers.

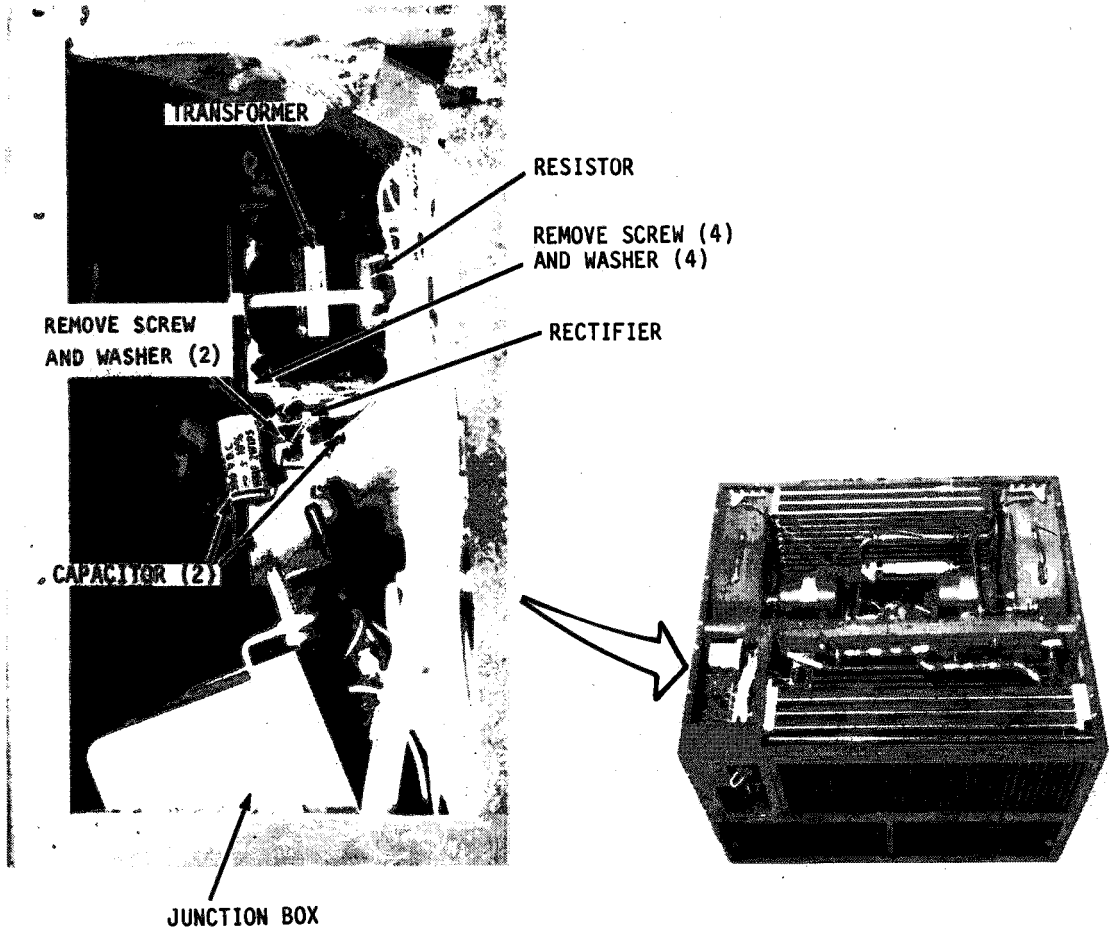


Figure 4-17. Transformer, resistor, rectifier and capacitors, removal and installation

c. Inspection and Test.

(1) Inspect rectifier and both capacitors for cracked or broken case and signs of overheating. Replace if scorched or blistered, or if case is damaged.

(2) Using the ohms function of a multimeter, measure the resistance between the + and - terminals of the rectifier:

(a) With the + lead of the meter on the - terminal of the rectifier and the - lead of the meter on the + terminal of the rectifier, conductivity should be indicated.

(b) Reverse the meter leads to the rectifier; meter should indicate an open circuit (infinity).

(c) Replace rectifier if measurements differ from those given in (a) and (b).

(3) Using multimeter, test capacitor for continuity. Replace capacitor if continuity exists.

d. Installation.

(1) Refer to figure 4-17 and install rectifier.

(2) Refer to figure 1-5 and install capacitors by crimping leads into cable terminals.

(3) Refer to figure 1-5 and attach cable to rectifier.

(4) Refer to figure 4-10 and install the junction box.

4-30. Heating Elements and Heater Cutout Switch.

a. General. A bank of six elements provides heat for the heating mode; three elements are energized in the LOW and all six in the HIGH heat position. Temperature is controlled by thermostatic cycling. Dangerously high temperatures are prevented by the heater cutout switch.

b. Removal.

(1) Refer to figure 4-4 and remove top front cover.

(2) Refer to figure 4-10 and remove the control module and junction box .

(3) Refer to figure 4-18 and remove the heating elements or the heater cutout switch.

c. Testing. Refer to wiring diagram (figure 1-5) and test across the heatinq element leads for continuity, using a multimeter. If no continuity exists, replace the heating element. Using a multimeter, test the heater cutout switch for continuity between terminals 1 and 2 (also between terminals 3 and 4). If no continuity exists, replace the heater cutout switch.

d. Installation.

(1) Refer to figure 4-18 and install the heating element or heater cutout switch.

(2) Refer to figure 4-10 and install the junction box and control module.

(3) Refer to figure 4-4 and install the top front cover.

4-31. Thermostatic Switch.

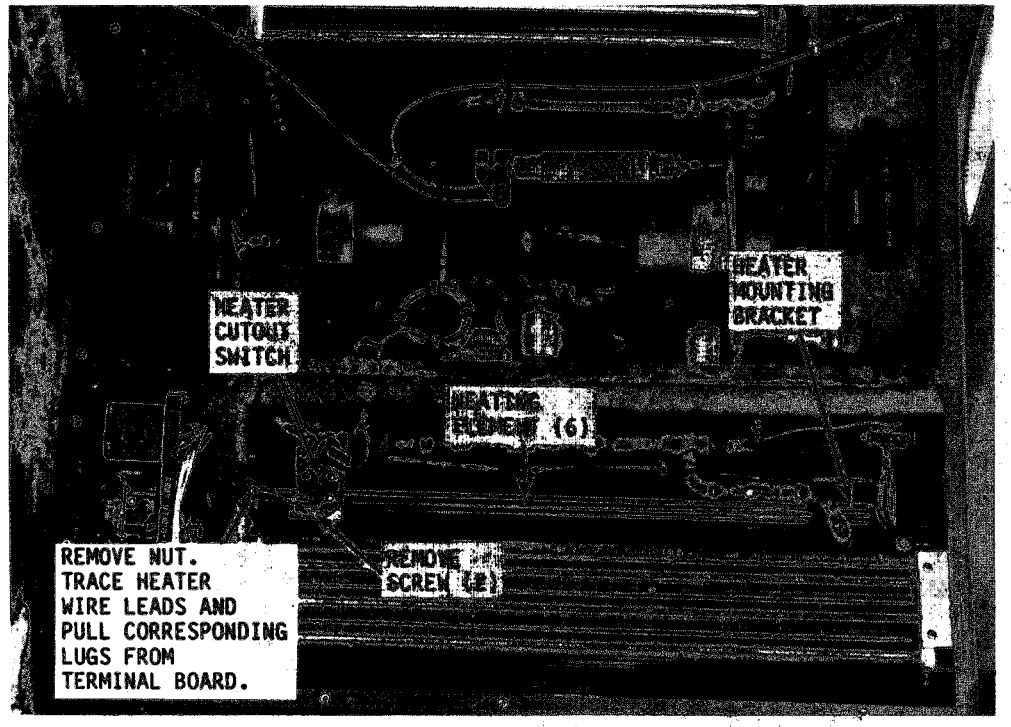
a. General. The thermostatic switch automatically changes the condenser fan speed by sensing ambient temperature. With the ambient temperature at 95°F (35°C) or below, the condenser fan will run at low speed. If the ambient temperature rises to approximately 105°F (40.6°C), the condenser fan will run at high speed. Conversely, if the fan is running at high speed and the ambient drops to approximately 95°F (35°C), the fan will run at low speed.

b. Testing. If no speed change is noted (change in noise level) during operation, when the ambient temperatures change as described in paragraph a. above, the switch is defective and must be replaced.

c. Removal.

(1) Refer to figure 4-4 and remove top front cover.

(2) Refer to figure 4-19 and remove thermostatic switch.



TO REMOVE HEATING ELEMENT:

GRIP HEATING ELEMENT FITTING FLANGE WITH WRENCH PLIERS, AND WITH END WRENCH, REMOVE LOCKNUT AND WASHERS. SLIDE ELEMENT FREE OF HOUSING PANEL, THEN OUT OF MOUNTING BRACKET. START WITH TOP ELEMENT AND WORK DOWN.

Figure 4-18. Heating element and heater cutout switch, removal and installation

d. Installation

(1) Refer to figure 4-19 and install the thermostatic switch.

(2) Refer to figure 4-4 and install the top front cover.

4-32. Wiring.

a. Inspection. Inspect insulation for cracks and signs of deterioration. Pay particular attention to wires passing through holes in the frame and over rough metal edges. If inspection reveals a broken or cut wire, and the wire is exposed, it must be repaired. If the break in the wire is in the wiring harness or in an inaccessible area, replace wire (**c.** below).

b. Testing. Test a wire for continuity by disconnecting each end from the component(s) to which it is connected. Touch the test probes of a multimeter to the ends of the wire under test. If continuity is not indicated, the wire is defective and must be repaired or replaced.

c. Replacement. To replace a defective wire lead, disconnect both ends at the components and install new wire with an exact duplicate of wire being replaced. If the defective wire is difficult to remove from wiring harness, cut

the wire back from the components about two inches and cover ends to outside of harness with electrical tape or plastic clamps.

4-33. High Pressure Cutout Switch and Low Pressure Cutout Switch.

a. General. The high pressure cutout (HPCO) switch prevents the compressor from operating if the discharge pressure exceeds 445 ±10 psig. The low pressure cutout (LPCO) switch prevents the compressor from operating if the suction pressure drops below 15 ±5 psig. Each is reset manually. Inspect and test the HPCO and LPCO switches if the compressor fails to operate after the switch is reset.

b. Inspection.

(1) Refer to figure 4-20 and remove the access cover.

(2) Inspect for broken or damaged wire leads and kinked or broken capillary tubes.

c. Testing. (See WARNING inside front cover.

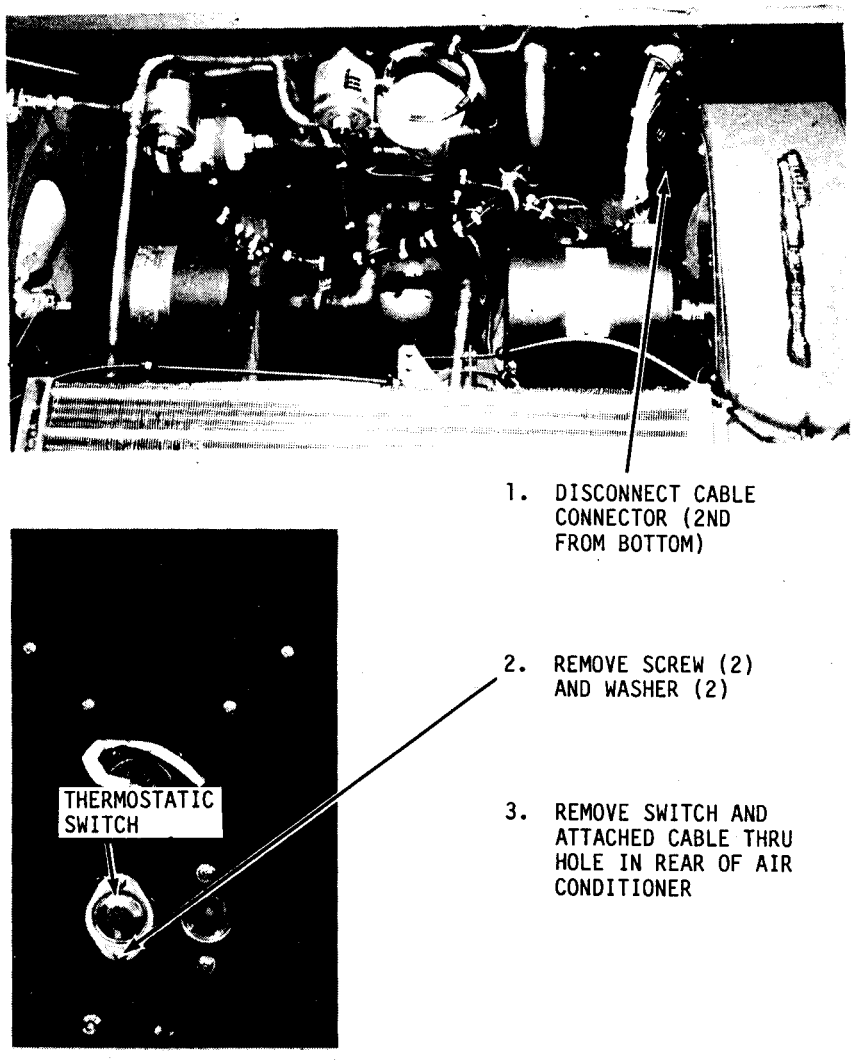


Figure 4-19. Thermostatic switch removal and installation

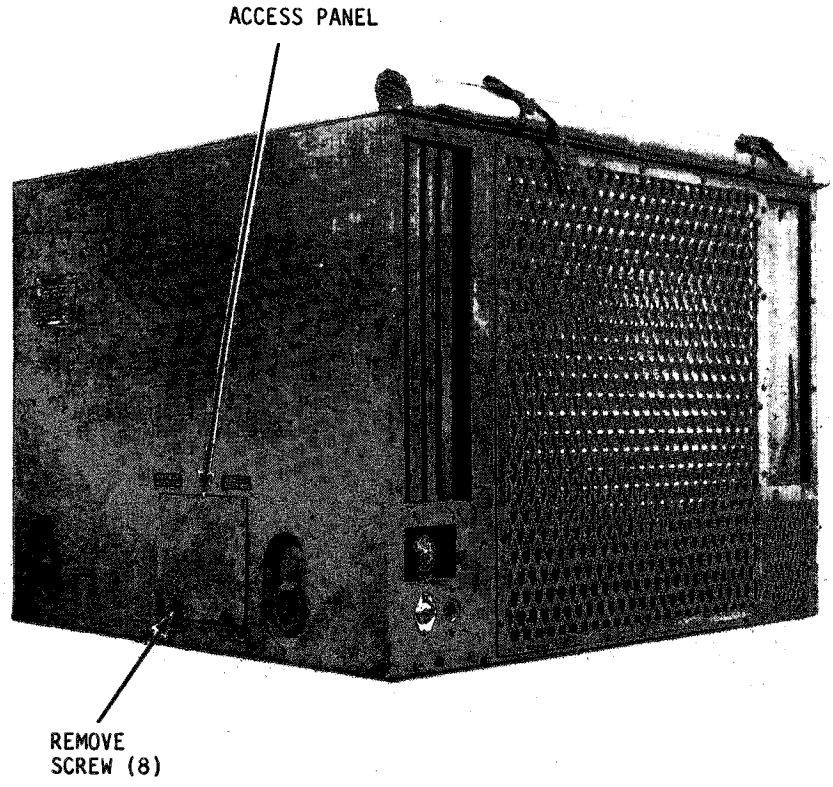


Figure 4-20. Access to pressure cutout switches

(1) Using a multimeter, test for continuity between terminals 1 and 2 of each pressure cutout switch.

(2) If continuity is not indicated, the pressure cutout switch is defective and must be replaced. Report to direct supprt maintenance for replacement of defective switch.

4-34. Compressor (See WARNING inside front cover.)

a. General. The compressor is a hermetically sealed unit and is not reparable. An inoperative compressor is usually due to a mechanical failure causing the copressor to freeze, a control failure, or motor burnout. Compressor replacement is required in all cases of mechanical or motor burnout. If the motor is defective report to direct or general support maintenance.

b. Test.

(1) Refer to figure 4-4 and remove the condenser cover and top rear cover.

(2) Refer to figure 4-9 and remove condenser fan motor and the compressor electrical junction box.

(3) Disconnect receptacle connector from compressor junction box and remove junction box cover.

(4) Refer to wiring diagram (figure 1-5) and test for continuity using a multimeter. Lack of continuity indicates an open winding.

(5) Place one contact of the meter against the compressor housing and the other against the motor terminals, one at a time. If a circuit is indicated, the motor is grounded.

4-35. Condensate Water Drain Tubes.

a. General. Refer to paragraph 2-4c(2).

b. Removal.

(1) Refer to figure 4-1 and remove the evaporator inlet louver.

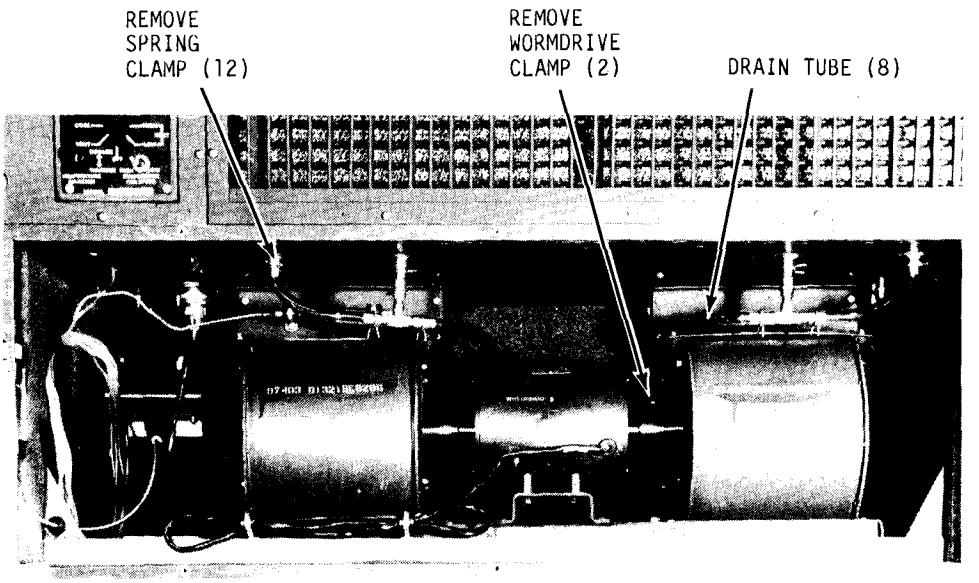


Figure 4-21. Drain tubes, removal and installation

(2) Refer to figure 4-21 and remove clamps which hold plastic drain tubes to fittings.

c. Inspection and Servicing.

(1) Inspect tubes for cracks, obstructions and loose connections.

(2) Clean tubes with low pressure compressed air or flush with water.

d. Installation.

(1) Refer to figure 4-21 and replace tubes and clamp securely.

(2) Refer to figure 4-1 and replace the evaporator inlet louver.

4-36. Liquid Line Solenoid Valve, L1

a. General. The normally-open liquid line solenoid valve is electrically closed when the mode selector switch is turned to COOL. When the temperature control thermostat is satisfied, the liquid line solenoid valve opens placing the refrigerant system in the bypass condition.

b. Inspection (See WARNING inside front cover)

(1) Refer to figure 4-4 and remove rear top cover.

(2) Refer to figure 6-3 and remove nut from valve.

(3) Remove valve cover and inspect coil for cracks, breaks, loose connections, frayed wires or other defects.

(4) Report any defects to direct support maintenance.

c. Test. Using a multimeter, test across the valve coil leads for continuity. If no continuity is indicated, the coil may be defective. Report to direct support maintenance.

4-37. Pressure Equalizing Solenoid Valve, L2

a. General. The normally-open equalizing solenoid valve is electrically closed when the mode selector is turned to COOL. When power is switched from the solenoid coil the valve opens, equalizing the high side to low side pressure.

b. Inspect.

(1) Refer to figure 4-4 and remove top front cover.

(2) Remove the valve cover and inspect coil for cracks, breaks, loose connections, frayed wires or other defects.

(3) During the cooling cycle, inspect the compressor suction line. If it feels hot, the pressure equalizing solenoid valve (figure 5-7) is defective.

(4) Report all defects to direct supprt maintenance.

c. Test. Test the pressure equalizing solenoid valve for continuity across electrical leads with a multimeter. If no continuity is indicated, the valve is defective and should be replaced. Report all defects to direct support maintenance.

4-38. Expansion Valve (Primary) Inspection and Test.

a. General. If the air conditioning units is not cooling properly, inspect and test the expansion valve for defects.

b. Inspection.

(1) Refer to figure 4-4 and remove top front cover.

(2) Refer to figure 4-22 and para 5-29c(4) and check that the required length of the expansion valve's sensing bulb is fully in the suction line bulb well.

(3) Refer to figure 4-22 and examine the flow restrictor capillary tubes carefully. They should be very cold and evenly frosted. Unfrosted tubes are blocked and should be re-placed.

(4) If none of the capillary tubes is cold and frosted, the valve is

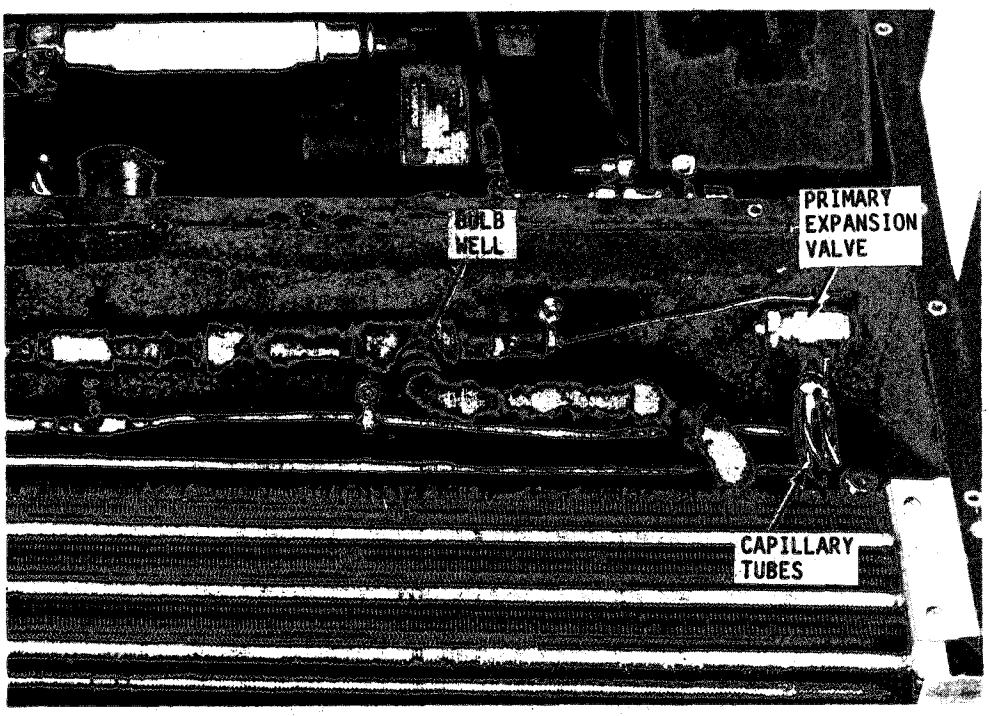


Figure 4-22. Expansion valve, primary

blocked or the valve's power assembly is ruptured. The test for the power assembly is listed in the following paragraph (c).

c. Test. Test the power assembly by removing the valve's sensing bulb from the suction bulb well (figure 4-22). Hold the sensing bulb firmly in both hands for two or three minutes. The warmth from holding the bulb should put enough pressure on the bellows to start the refrigerant flowing into the system. If cooling does not commence, the expansion valve is defective and should be replaced. Report all defects to direct support maintenance.

4-39. Vent Damper Actuator.

a. Removal.

(1) Refer to figure 4-1 and remove the evaporator inlet louver.

(2) Refer to figure 4-23 and disassemble the vent damper actuator and control assembly as follows:

(a) Loosen the setscrew in the actuator.

(b) Remove the actuator top bracket by removing one nut, three screws and three washers.

(c) Raise the actuator nut and the actuator from the lower bracket.

(d) Remove the screw and nut from the bracket on the vent door.

(e) Remove inner cable from control assembly.

(f) Remove outer nuts and grommet on control assembly.

(9) Remove control assembly outer cable.

b. Installation.

(1) Refer to figure 4-23 and install the vent actuator as follows:

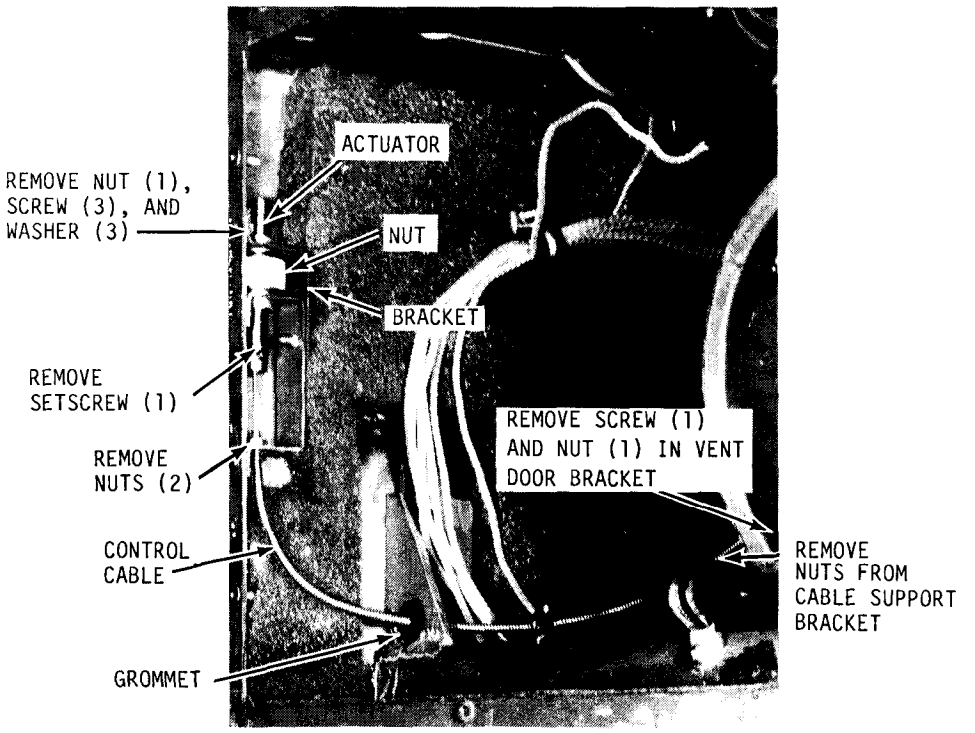


Figure 4-23. Vent damper actuator removal and installation

(a) With inner nuts in place, install the outer cable in the support bracket.

(b) Install the grommet in the intermediate cable support.

(c) Fasten the cable ends in the support brackets by installing the outer nuts.

(d) Thread the inner cable through the outer cable. Attach the looped end of the inner cable to the vent door.

(e) Lubricate the threads on the actuator, install actuator and actuator nut in the fixed actuator bracket, then install the removable bracket. Ensure that bushings are in both brackets with the bushing flange adjacent to the actuator nut. Rotate actuator nut to the left (counterclockwise) to place the actuator in the uppermost position.

(2) Adjust the damper actuator as follows:

a. Ensure that the damper door is closed.

b. Insert cable end in actuator, adjusting, if necessary, the cable nuts to properly seat the cable end in the actuator.

c. Tighten the actuator setscrew onto the cable.

(3) Refer to figure 4-1 and install the evaporator inlet louver.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

5-1. Tools and Equipment.

No tools or equipment are issued with the air conditioner.

5-2. Special Tools and Equipment.

No special tools or equipment are required for maintenance of the air conditioner.

5-3. Maintenance Repair Parts.

Repair parts and equipment are listed and illustrated in the repair parts and special tool list covering direct and general support maintenance for this equipment.

Section II. TROUBLESHOOTING

5-4. General.

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or any of its components. Electrical schematic and wiring diagrams shown in figures 1-4 and 1-5 will be helfpul for checking electrical circuits. A refrigerant flow diagram is shown in figure 5-1. System pressure test instructions are in paragraph 6-2. Troubleshooting procedures for-direct and general support maintenance are listed in table 5-1. Each trouble symptom or malfunction stated is followed by a step-by-step procedure for inspecting and testing the system to determine the specific cause of fault or failure. The corrective action recommended follows the determination of probable cause.

FIND NO.	PART NO.	QTY	NOMENCLATURE
1	D13216E6306	1	COMPRESSOR
2	C13216E6167	1	HOSE ASSEMBLY, METAL
3A	D13216E6284	1	COIL, CONDENSER
3B	PT OF FIND NO. 3A	1	SUBCOOLER
4	D13216E6330	1	CYLINDER ASSY, ACTUATING, LINEAR
5	D13216E6355	1	RECEIVER, LIQUID REFRIGERANT
6	C13214E3969	1	INDICATOR, SIGHT, LIQUID
7	C13216E5918-2	1	DEHYDRATOR, DESICCANT, REFRIGERANT
8	C13216E6172-3	1	SOLENOID VALVE, WITH LEADS (L1)
9	C13216E6160-3	1	VALVE, EXPANSION (PRIMARY)
10	C13216E6345	1	RESTRICTOR, FLUID FLOW
11	D13216E6283	1	COIL, EVAPORATOR
12	C13216E6344	2	BULB WELL
13	C13216E6174-3	1	VALVE, EXPANSION (QUENCH)
14	C13216E6172-4	1	SOLENOID VALVE, WITH LEADS (L2)
15	C13216E6362-1	1	REGULATOR, FLUID PRESSURE
16	B13211E8369	1	VALVE, PRESSURE RELIEF
17	C13219E9499-1	2	VALVE CHARGING
18	C13216E6215-3	1	SWITCH, PRESSURE (HIGH)
19	C13216E7546	1	ACCUMULATOR
20	C13216E6215-1	1	SWITCH PRESSURE (LOW)

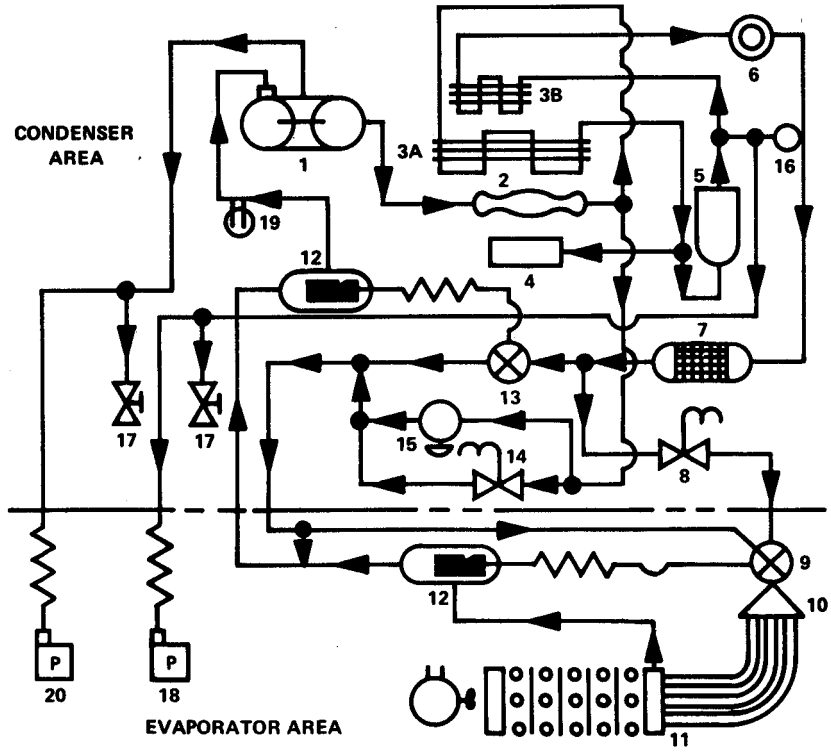


Figure 5-1. Refrigerant flow diagram

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. COMPRESSOR WILL NOT START
Step 1. Test for an open-circuit condition in the control circuit by means of a continuity check.
Replace component or wire causing open circuit (para 4-32).
Step 2. Test circuit breaker for defective operation.
Replace defective circuit breaker (para 4-26).
Step 3. Check to see if high or low pressure cutout switch is defective.
Replace defective switch (para 5-22).
Step 4. Check to see if compressor motor or thermal protectors are defective.
Replace compressor (para 5-16).
2. COMPRESSOR STARTS BUT IMMEDIATELY STOPS
Step 1. Check to see if thermal protector or circuit breaker is tripped.
Reset circuit breaker, or allow thermal protector to cool and reset. If condition repeats, replace compressor (para 5-16).
3. LITTLE OR NO HEATING CAPACITY.
Step 1. Check for loose electrical connections or faulty wiring.
Repair or replace wiring as necessary (para 4-32).
Step 2. Test mode selector switch and temperature selector for faulty closure in heat control circuit.
Replace defective switch (para 4-23).
Step 3. Test heater relay for faulty contact closure.
Replace defective relay (para 4-27).
Step 4. Test for defective operation of heater high temperature cutout,
Replace defective thermostat switch (para 4-30).
Step 5. Test heater for open-circuited element.
Replace defective heaters (para 4-30).
4. INSUFFICIENT COOLING
Step 1. Test for low refrigerant charge.
Add refrigerant (figure 6-3).

Table 5-1. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
4. INSUFFICIENT COOLING - Continued
Step 2. Check for indications of a clogged dehydrator. Replace clogged dehydrator (para 5-24).
Step 3. Check for indications of a defective pressure regulator valve. Replace defective valve (para 5-30).
Step 4. Check for indications of air in system. Purge and charge system (fig. 6-1 and 6-2).
Step 5. Check for indications of a defective thermal expansion valve. Replace defective valve (para 5-28).
Step 6. Check for indications of defective solenoid valve. Replace defective solenoid valve (para 5-25).
Step 7. Check for indications of defective quench valve. Replace defective valve (para 5-29).
5. LOW SUCTION PRESSURE (See Table 6-1)
Step 1. Check for indications of a clogged dehydrator. Replace clogged dehydrator (para 5-24).
Step 2. Check for indications of a defective thermal expansion valve. Replace defective valve (para 5-28).
Step 3. Check for indications of a defective quench valve. Replace defective valve (para 5-29).
6. LOW DISCHARGE PRESSURE (See Table 6-1)
Step 1. Check to see if compressor is not pumping due to defect.
Step 2. Check to see if HIGH/LOW condenser fan thermostatic switch is defective. Replace defective switch (para 4-26).
7. LOW SUCTION AND DISCHARGE PRESSURE (See Table 6-1)
Step 1. Check for low refrigerant charge by inspecting sight glass for bubbles or milky appearances. Also check system for leaks. Repair leaks and add refrigerant as necessary.

Table 5-1. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
7. LOW SUCTION AND DISCHARGE PRESSURE - Continued
Step 2. Check for indications of defective thermal expansion valve. Replace valve (para 5-28).
Step 3. Check for indications of defective quench valve. Replace valve (para 5-29).
8. HIGH SUCTION PRESSURE (See Table 6-1)
Step 1. Check for indications of defective thermal expansion valve. Replace valve (para 5-28).
Step 2. Check for indications of defective quench valve. Replace valve (para 5-29).
9. HIGH HEAD PRESSURE (See Table 6-1)
Step 1. Check to see if condenser coil is dirty. Clean coil.
Step 2. Check condenser coil temperature gradient for indications of refrigerant overcharge. Discharge refrigerant (fig. 6-1) while observing head pressure and sight glass.
Step 3. Inspect or test condenser fan motor for defective operation. Repair motor (para 6-8).
Step 4. Inspect condenser louvers and actuating mechanism for correct adjustment and proper operation. Adjust and clean as necessary. Replace in operative components (para 5-20).
Step 5. Check for indications of defective quench valve. Replace defective valve (para 5-29).
Step 6. Check to see if the compressor is defective. Replace defective compressor (para 5-16).

Section III. GENERAL MAINTENANCE INSTRUCTIONS

5-5. General.

This section contains general servicing instructions that otherwise would have to be repeated several times in this manual.

5-6. Testing for Leaks.

The air conditioner can be tested for refrigerant leaks by the use of an electronic leak detector, by the halide test or by the soap bubble method. The preferred method is use of the electronic leak detector. If sufficient pressure is not present in the system to accomplish an adequate leak test, add dry nitrogen at the receiver charging valve to increase the system pressure to 300 psig, then conduct the leak test. If the system is totally discharged, to conserve leak test refrigerant, pressurize the system with R-12 to 72 psig, isolate the compressor by front-seating the service valves (1 and 2, figure 3-2). At the receiver charging valve pressurize the system with dry nitrogen to 300 psig, then conduct the leak test.

(1) By Electronic Leak Detector. Using a G.E. Type H-2 Leak Detector, or equivalent, proceed as follows:

(a) Turn on and calibrate the leak detector as described in the instructions supplied with the instrument.

(b) Slowly pass the detector probe tip over the sweat fittings, mechanical couplings and valves in the refrigerant circuit. If refrigerant is leaking, detector will provide a visible or audible signal.

(c) Use the soap-bubble method to localize the leak to a defective component or connection.

(2) By Halide Leak Test. Using a propane flame halide leak detector, proceed as follows.

(a) Slowly pass the exploring tube on the torch over the sweat fittings, mechanical couplings and valves. If refrigerant is leaking, the flame will be affected as follows:

Small leak -- flame changes from blue to green

Large leak -- flame changes from blue to dense blue with reddish tip

Massive leak- may extinguish flame

(b) Use the soap-bubble method to localize the leak to a defective component or connection.

(3) By Soap Solution Method. Using either a prepared bubble-type leak detector compound or a solution of hand soap in water, proceed as follows.

(a) Apply the solution to all points of possible leakage, and watch for bubble formation indicating a refrigerant leak.

NOTE

Allow solution to remain on joints long enough for small leaks to form noticeabe bubbles.

(b) Wipe solution from joints and mark spots where leakage is observed.

5-7. Refrigeration System.

a. Opening System. When the refrigeration system must undergo maintenance that requires the system to be opened for removal of parts, the system must first be discharged (para 6-3). After the repair has been made and all soldering completed, the system must be tested for leaks and charged (para 6-3).

b. Removal of Parts. When the refrigeration system must undergo maintenance that requires the refrigerant system to be opened for removal of parts, the system must first be discharged and purged (figure 6-1). After the repair has been made and all soldering completed, the system must be tested for leaks and charged (para 6-3). Except for flare nut connection, all the tubing attachments in the refrigeration system are “sweat-joints” which are opened by heating with a brazing torch. During unseating, shield the wiring, insulation, painted metal, and valves from the heat of the torch. Use wet

cloths to protect the gas charge in expansion valve bulbs and capillary tubing.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

c. Brazing. Braze copper-to-copper joints with silver solder type 3, 4 or 6A specification QQ-S-561 and copper-to-brass or copper-to-steel with type 4 or 6A specification QQ-S-561 per MIL-B-7883. Solder melting point is 1160°F (625°C). All brazed or soldered joints shall be made with an atmosphere of inert gas to prevent internal oxidation.

5-8. Insulation and Gaskets.

Replace dmaged insulation and gaskets. Cement loose insulation.

5-9. Hardware.

Replace any damaged screws, washers, lockwashers or nuts. use screws of correct length to hold parts securely. In some applications screws that are too long may hit bottom before the head is tight against part it is to hold or may cause damage to the threads or other parts.

5-10. Shims.

Be sure to remove all shims where used. Keep shims together and identify them as to location.

5-11. Repairing Damaged Threads.

Damaged threads should be repaired by use of a thread restorer or by chasing in a lathe. Internal threads should be repaired with a tap of the correct size. If threads cannot be satisfactorily repaired, replace the part. Drill out and replace blind rivet nuts having defective threads.

5-12. Repair of Damaged Machined and Polished Surfaces.

Smooth rough spots, scores, burrs, galling, and gouges from damaged machined and polished surfaces so that part will efficiently perform its normal function. The finish of the repaired part is to approximate that of the original finish. In perfoming any of these operations, critical dimensions must not be altered.

5-13. Removal of Rust or Corrosion.

Remove corrosion from all parts of material. To remove rust or corrosion, use wire brush, abrasive cloth, sand blast, vapor blast equipment, or rust remover except on highly polished surfaces. On these surfaces, buffing or the use of crocus cloth is recommended.

5-14. Tubes and Fittings.

Check tubes and fittings for cracked or split condition. Check tubing for kinks. Replace defective fittings. Replace damaged tubing with tubing of same size. Take care in making bends in tubing to prevent kinking of tubing. All tubing and fittings must be completely clean on inside prior to installation.

5-15. Valves.

Valves and other parts should be handled carefully to prevent damage. Capillary tubes must be handled very carefully to prevent kinking of the tubes.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND ASSEMBLIES.

5-16. General. (See WARNING inside front cover.)

This section covers removal of all major assemblies of the air conditioner which are the responsibility of the direct support and general support maintenance. The refrigerant piping and valves cannot be removed as a unit, and only those parts that require replacement should be removed. Removal and installation instructions for individual

valves and other components of the refrigeration system are contained in this section. Refer to paragraph 5-6 before performing maintenance on the refrigeration system.

5-17. Compressor.

a. General. The compressor is a self-contained hermetically sealed unit and cannot be repaired.

b. Removal. Refer to figure 5-2 and remove compressor as follows:

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation rhythm abnormalities or the induction of arrhythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove top covers.

(3) Refer to figure 5-2 and disconnect condenser louver actuator with bracket attached. Move aside without altering actuator adjustments.

(4) Refer to figure 4-9 and remove condenser fan motors and motor support.

(5) Disconnect electrical connector P1 from compressor, also

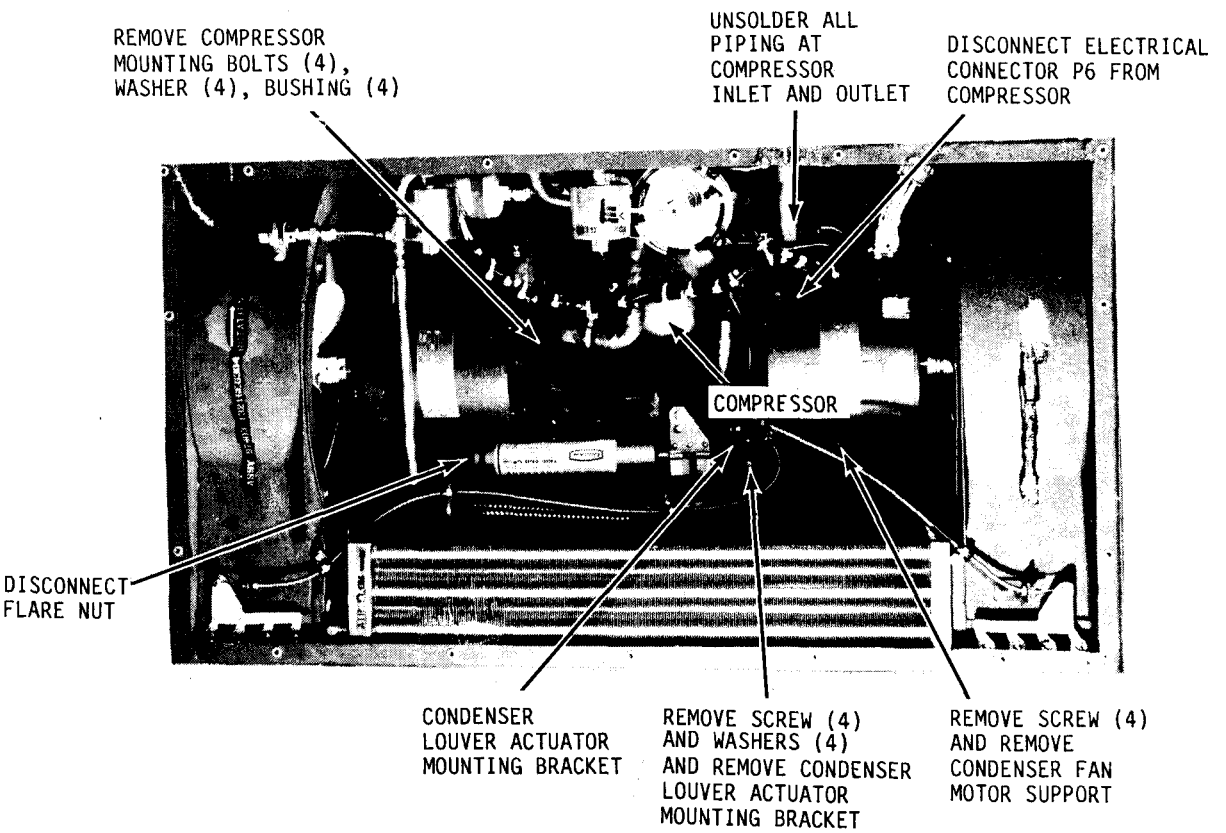


Figure 5-2. Compressor and accumulator, removal and installation

refrigerant tubing as required to permit removal of compressor.

(6) Remove four screws, washers, lock washers and compressor mount bushings.

(7) Lift compressor from air conditioner.

CAUTION

If compressor is being replaced because of a motor burnout, decontaminate system as instructed in paragraph 6-5. Failure of the replacement compressor will result if all the contaminants are not removed.

c. Installation. Install compressor as follows:

(1) Refer to figure 5-2, place compressor on mounts and install four compressor mount bushings. Secure compressor with four screws, washers and lock washers.

(2) Connect compressor tubing. Refer to figure 5-7 and install dehydrator.

(3) Refer to paragraph 5-6a and leak-test connections.

(4) Connect electrical connector P6.

(5) Refer to figure 4-9 and install condenser motor and motor supports.

(6) Refer to figure 5-2 and install condenser louver actuator and mounting bracket.

(7) Refer to figure 6-1 and purge the refrigerant system.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(8) Refer to figure 6-2 and recharge the refrigerant system.

(9) Refer to figure 4-4 and install top covers.

5-18. Evaporator Coil and Mist Eliminator Holder.

a. General. A portion of the evaporator coil mounting hardware is used to attach the mist eliminator holder. Therefore coil and mist eliminator holder are removed under the same procedure.

b. Removal. Remove the evaporator coil and mist eliminator holder as follows:

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove housing top covers.

(3) Refer to figure 4-1 and remove evaporator air outlet louvers and mist eliminator.

(4) Refer to para 4-30 and remove heating elements.

(5) Refer to figure 5-3 and remove support plate that holds coil to housing.

(6) Refer to figure 5-3 and disconnect tubing from evaporator coil.

(7) Remove six screws, washers, and lockwashers that hold evaporator coil and mist eliminator holders to air conditioner. Remove holders and coil.

c. Installation. Install evaporator coil and mist eliminator holder as follows:

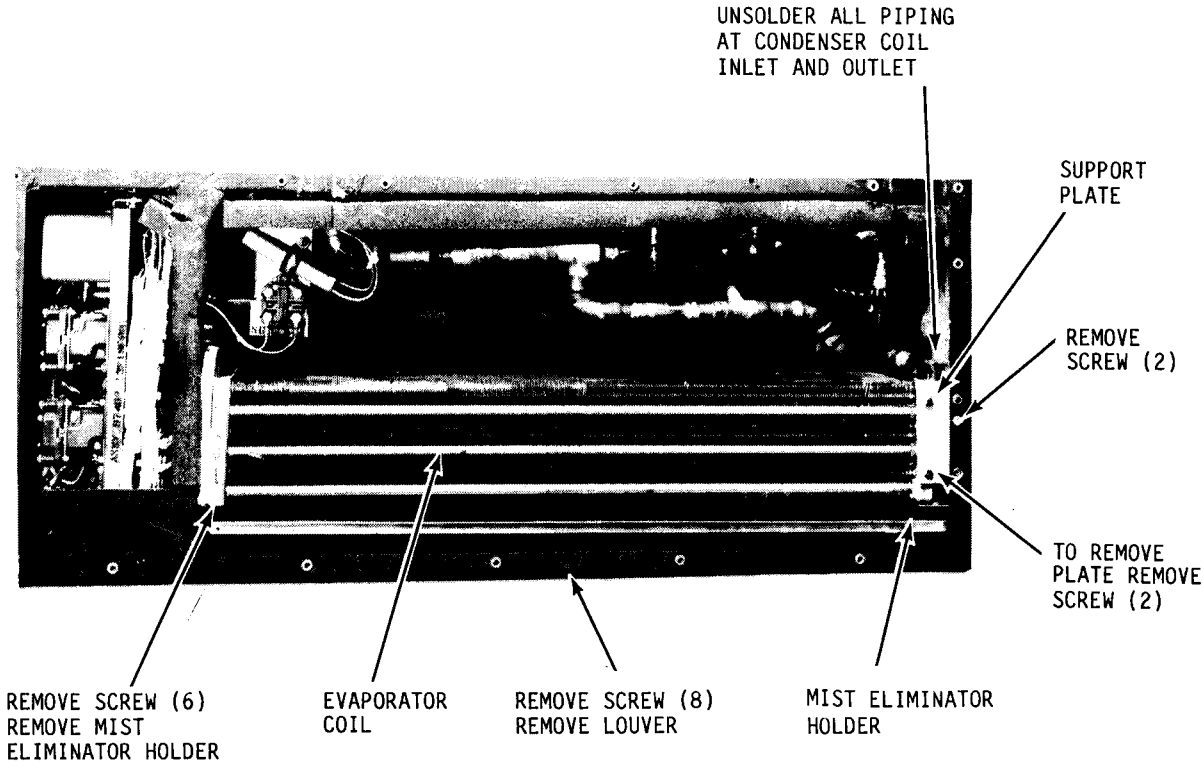


Figure 5-3. Evaporator coil and mist eliminator holder, removal and installation

(1) Install coil and mist eliminator holder in air conditioner and secure to brackets with six screws, washers, and lock washers. The upper four screws, washers and lockwashers attach both the coil and mist eliminator holder; the lower two hold the coil only.

(2) Refer to figure 5-3 and install coil support plate.

(3) Connect tubing to coil. Leak test as described in 5-6.

(4) Refer to figure 4-1 and install evaporator air outlet louver.

(5) Refer to figure 4-18 and install heating elements.

(6) Refer to figure 4-4 and install housing top covers.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-1 and purge the refrigerant system.

(8) Refer to figure 6-2 and charge the refrigerant system.

5-19. Condenser Coil.

a. Removal. Remove condenser coil as follows:

WARNING

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(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove housing top covers.

(3) Refer to figure 4-3 and remove condenser guard.

(4) Refer to figure 4-9 and remove power actuator, bracket and left condenser fan motor and supports.

(5) Disconnect tubing from condenser coil and remove other tubing and fittings as required.

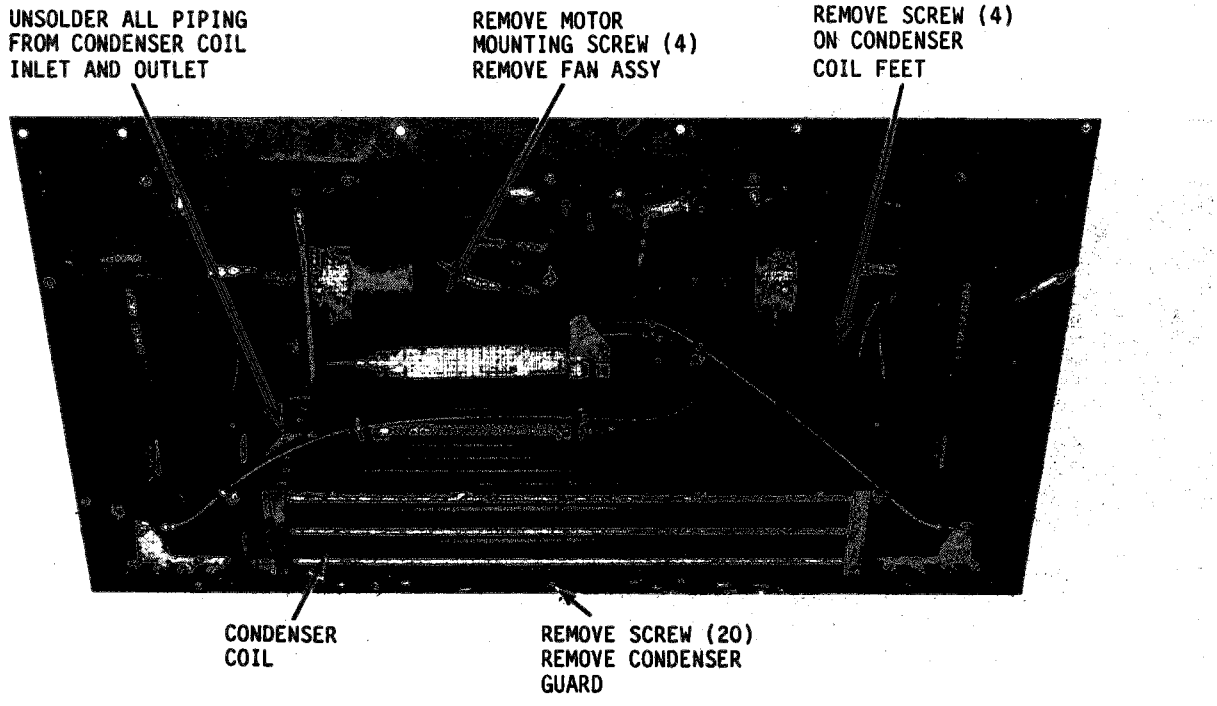

Figure 5-4. Condenser coil removal and installation

(6) Remove screws that secure coil to base of housing.

(7) Remove coil from air conditioner. Use care when removing coil to prevent damage to coils and fins.

b. Installation. Install condenser coil as follows:

(1) Be sure sheet spring nuts are in place on bottom of coil. Position coil in air conditioner and install four countersunk-head screws from underside of housing.

(2) Connect tubing to condenser and attach actuator flare nut.

(3) Leak test as described in para 5-6.

(4) Refer to figure 4-3 and install condenser guard.

(5) Refer to figure 4-9 and install condenser fan motors and supports and actuator.

(6) Refer to figure 4-4 and install housing top covers.

(7) Refer to figure 6-1 and purge the refrigerant system.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(8) Refer to figure 6-2 and charge the refrigerant system.

5-20. Condenser Louver Actuator and Control.

a. Removal. Remove actuator and push-pull control as follows:

WARNING

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(1) Refer to 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-3 and remove housing covers.

(3) Refer to figure 5-5 and loosen mechanical post screws at each end to loosen control wire.

(4) Remove screw, lockwasher and loop clamp.

(5) Remove push-pull control assembly clips at each end and remove push-pull control.

(6) Disconnect flare nut from end of actuator cylinder.

(7) Remove two nuts and lockwashers from bracket and remove actuator cylinder. If cylinder is to be replaced, remove rivets and retain push-pull control assembly brackets.

b. Installation. Install actuator cylinder and control as follows:

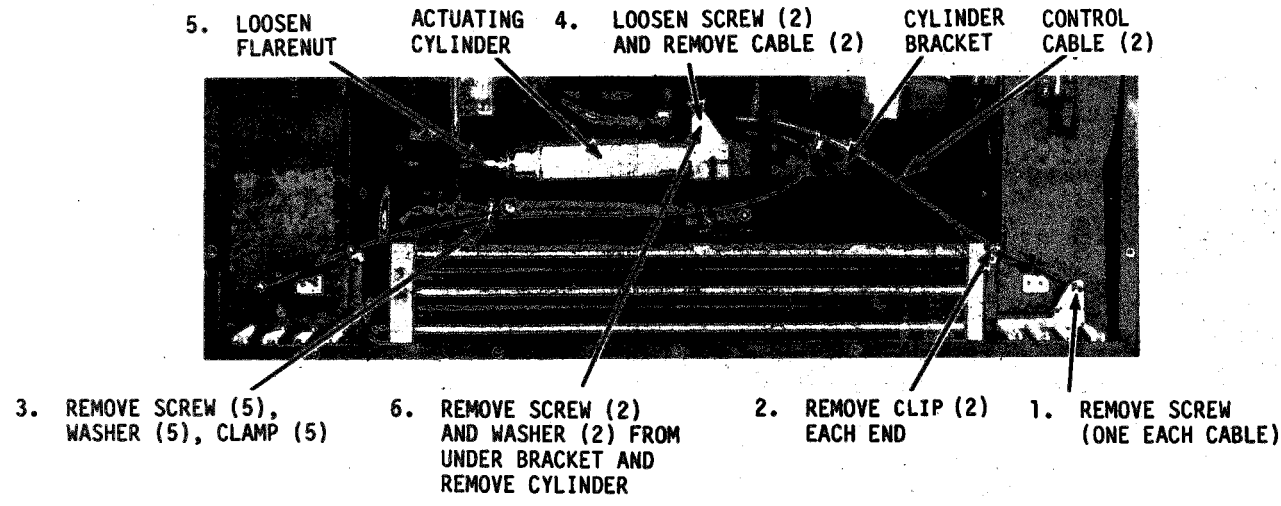

Figure 5-5. Condenser louver control, removal and installation

(1) Reinstall push-pull control assembly brackets on replacement cylinder.

(2) Install actuator cylinder (figure 5-5) with studs through openings in bracket. Install lockwashers and nuts on studs.

(3) Connect flare nut.

(4) Install push-pull control. Place outer control casing clips over wire and insert wire ends into openings in mechanical posts on louver lever and actuator cylinders.

(5) Install push-pull control clips to hold control in position. Install loop clamp, screw, and lockwashers.

(6) Adjust control as described in c. below.

c. Adjustment. Before system is charged, adjust louver push-pull control as follows:

(1) Close louver blades and tighten screw in mechanical post to lock wire on that end.

(2) Extend actuator rod until there is a 1/4 inch space between inner edge of mechanical post bracket and the face of the cylinder. Tighten the mechanical post screw.

(3) Refer to figure 4-4 and install housing top covers.

WARNING

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2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arryth-mias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(4) Refer to figure 6-2 and charge the refrigerant system.

5-21. Service Valves.

a. Removal.

(1) Refer to figure 4-20 and remove charging valve box access cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(2) Refer to figure 6-1 and discharge the refrigeration system.

(3) Refer to figure 5-6 and disconnect the service valve flare nuts.

(4) Remove four screws and pull charging valve box outward as allowed by the cutout switch wiring and capillary tubes. Take care not to damage the capillary tubes.

(5) Remove service valve by removing mounting screws on side of charging valve box.

NOTE

If new cap is installed on valve, remove keeper and chain to avoid chain contact with cutout switch terminals.

b. Installation.

(1) Refer to figure 5-6 and mount service valve in charging valve box.

(2) Place charging valve box in position and attach to housing.

(3) Attach refrigerant line flare nut to service valve.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(4) Refer to para 5-6 and leak test the system.

(5) Refer to figure 6-1 and purge the refrigeration system.

(6) Refer to figure 6-2 and charge the refrigeration system.

(7) Refer to figure 4-20 and install charging valve box access cover.

5-22. High Pressure Cutout (HPCO) and Low Pressure Cutout (LPCO) Switches.

a. Removal.

(1) Refer to figure 4-20 and remove the charging valve box access cover.

WARNING

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2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(2) Refer to figure 6-1 and discharge the refrigerant system.

(3) Refer to paragraph 5-21 and disconnect the service valve flare nuts.

(4) Remove four screws and pull charging valve box outward as allowed by wiring and capillary tubes. Take care not to damage the capillary tubes.

(5) Refer to figure 5-6 and disconnect the pressure cutout switch electrical leads.

(6) Remove pressure cutout switch mounting screws on side of charging valve box.

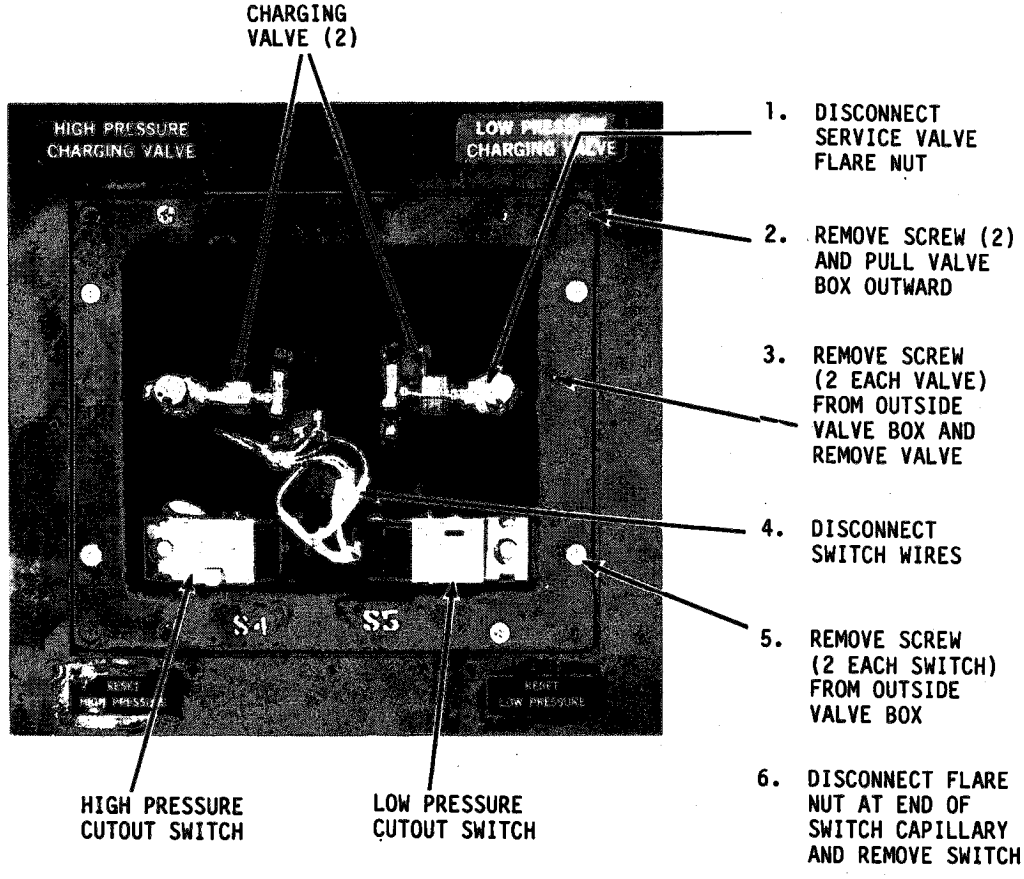


Figure 5-6. Service valves, high and low pressure cutout switches, removal and installation

(7) Disconnect the pressure cutout switch flare nut from the refrigerant line tee.

(8) Remove the capillary tube grommet in the back wall of the charging valve box and extract the capillary tube and flare nut through the opening.

b. Testing. Test the pressure cutout switch as described in paragraph 4-33.

c. Installation.

(1) Refer to figure 5-6 and install capillary tube and grommet in charging valve box.

(2) Mount pressure cutout switch to charging valve box.

(3) Attach pressure cutout switch and charging valve flare nuts to refrigeration lines.

(4) Refer to para 5-6 and leak test the refrigeration system.

(5) Place charging valve box in position and attach to housing.

(6) Refer to wiring diagram (figure 1-5 or figure 1-6) and attach electrical leads to pressure cutout switch. Attach service valve flare nuts.

(7) Refer to figure 6-1 and purge tile refrigeration system.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(8) Refer to figure 6-2 and charge the refrigeration system.

(9) Refer to figure 4-20 and install charging valve box access cover.

5-23. Pressure Relief Valve.

a. General. In the event the refrigerant system pressure should exceed 455 ± 10 psig, the pressure relief valve "pops off" to restore normal pressure in the system. It may happen, that having once opened, the pressure relief valve does not totally seal closed when normal pressure is restored. In order not to constitute a continuous system leak, the valve must be replaced.

b. Removal.

(1) Refer to figure 4-4 and remove front top cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(2) Refer to figure 6-1 and discharge the refrigeration system.

(3) Refer to figure 5-7 and remove the clamp around the pressure relief valve by removing the screw and washer that hold the clamp to the condenser fan housing.

(4) Unscrew the flare nut and remove the pressure relief valve.

b. Installation.

(1) Refer to figure 5-7 and install the pressure relief valve by fastening the refrigerant circuit flare nut to the pressure relief valve.

(2) Using the screw and washer removed in 5-23a(3), install the clamp that fastens the pressure relief valve to the condenser fan housing.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(3) Refer to para 5-6 and leak test the refrigeration system.

(4) Refer to figure 6-1 and purge the refrigeration system.

(5) Refer to figure 6-2 and charge the refrigeration system.

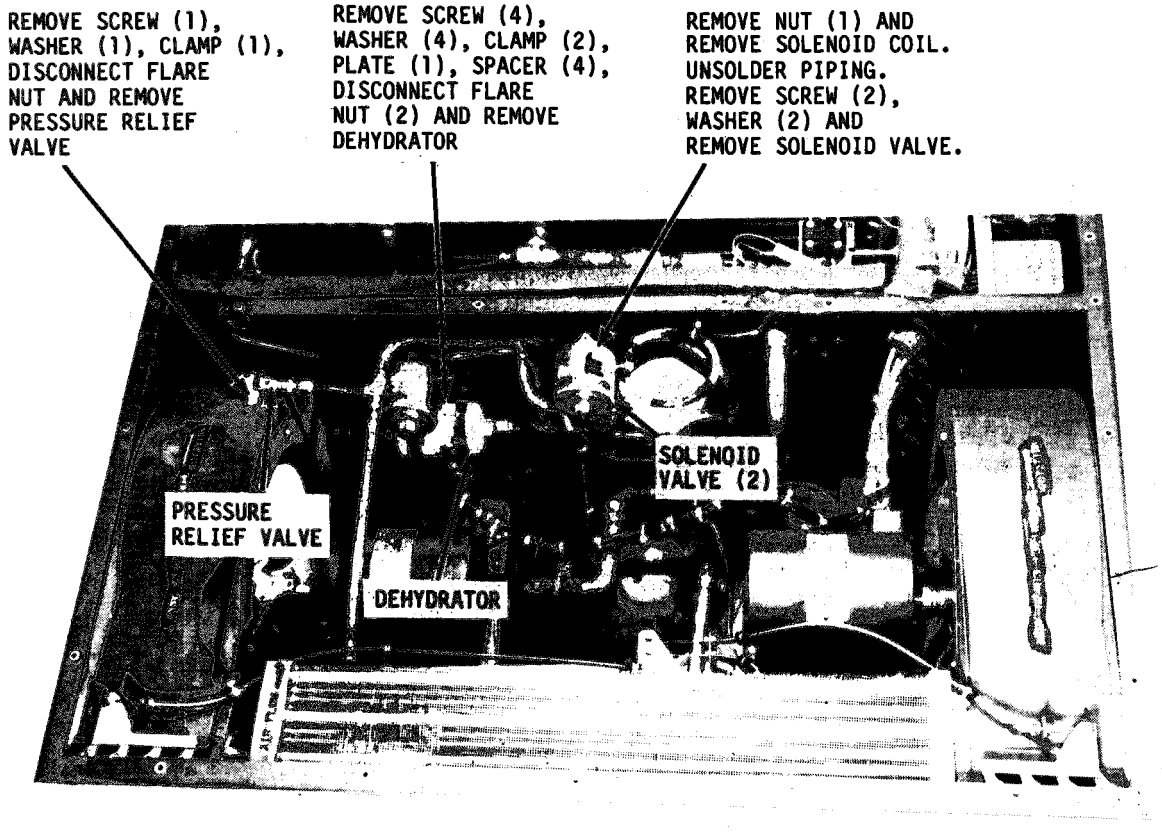


Figure 5-7. Pressure relief valve, dehydrator and solenoid valves, removal and installation

(6) Refer to figure 4-4 and install top front cover.

5-24. Dehydrator.

a. General. The dehydrator (filter-drier is to be replaced whenever the refrigeration system is opened for maintenance.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

b. Removal.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove housing rear top cover.

(3) Refer to figure 5-7 and remove screws, washers and dehydrator clamps.

(4) Unscrew flare nuts and remove dehydrator.

c. Installation.

(1) Refer to figure 5-7 and connect dehydrator to refrigerant system tubing by tightening flare nuts. Use sealing compound on screw threads.

(2) Attach clamps to dehydrator.

(3) Refer to para 5-6 and leak test the refrigeration system.

(4) Refer to figure 6-1 and purge the refrigeration system.

(5) Refer to figure 4-4 and install housing rear top cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(6) Refer to figure 6-2 and charge the refrigerant system.

5-25. Liquid Line and Pressure Equalizing Solenoid Valves L1 and L2

a. General. L1 and L2 are electrically-operated valves, which close when electrical power is applied to the solenoid coils. Both are alike, only the usage is different. L2 which opens when the air conditioner is switched off the cooling mode, allows low side and high side pressures to equalize. When the air in the conditioned space has lowered to the thermostat (S8) setting, L1 opens allowing refrigerant to bypass the expansion valve thereby discontinuing cooling without shutting down the compressor.

b. Removal.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove top covers.

(3) Refer to figure 5-7 and remove solenoid cover and coil as described in paragraph 4-34.

(4) Remove two solenoid valve mounting screws.

(5) Unsolder solenoid valve from tubing.

c. Installation.

(1) Refer to figure 5-7 and mount solenoid on compartment wall.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Refer to paragraph 5-6 and solder solenoid valve to refrigerant system tubing.

(3) Install coil and cover on solenoid valve.

(4) Refer to para 5-6 and leak test the refrigeration system.

(5) Refer to figure 6-1 and purge the refrigeration system.

(6) Refer to figure 4-4 and install top covers.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-2 and charge refrigerant system.

5-26. Receiver.

a. General. The receiver is located below the left side (counterclockwise rotating) condenser fan motor. To obtain access to the receiver, the motor and its mounting bracket must be removed.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove rear top cover.

(3) Refer to figure 4-9 and remove counterclockwise rotation condenser fan assembly and mounting bracket.

(4) Refer to figure 5-8 and remove receiver mounting bracket.

(5) Unsolder receiver from refrigeration system tubing.

c. Installation.

(1) Refer to figure 5-8 and mount receiver on compartment wall.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Refer to paragraph 5-6 and solder receiver to refrigerant system tubing.

NOTE

Curved end of tube installed in top at receiver enters in length sufficient for tip of tube to face inner wall of receiver.

(3) Refer to paragraph 5-6 and leak test the refrigeration system.

(4) Refer to figure 4-9 and install condenser fan assembly.

(5) Refer to figure 4-4 and install rear top cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(6) Refer to figure 6-1 and purge the refrigeration system.

(7) Refer to figure 6-2 and charge refrigeration system.

5-27. Accumulator

a. General. Refer to 5.26a.

b. Removal

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rythm abnormalities should be made aware of the potential for aggravation of existing cardiac rythm abnormalities or the induction of arrhythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove rear top cover.

NOTE: CONDENSER FAN AND MOTOR REMOVED TO SHOW RECEIVER AND ACCUMULATOR

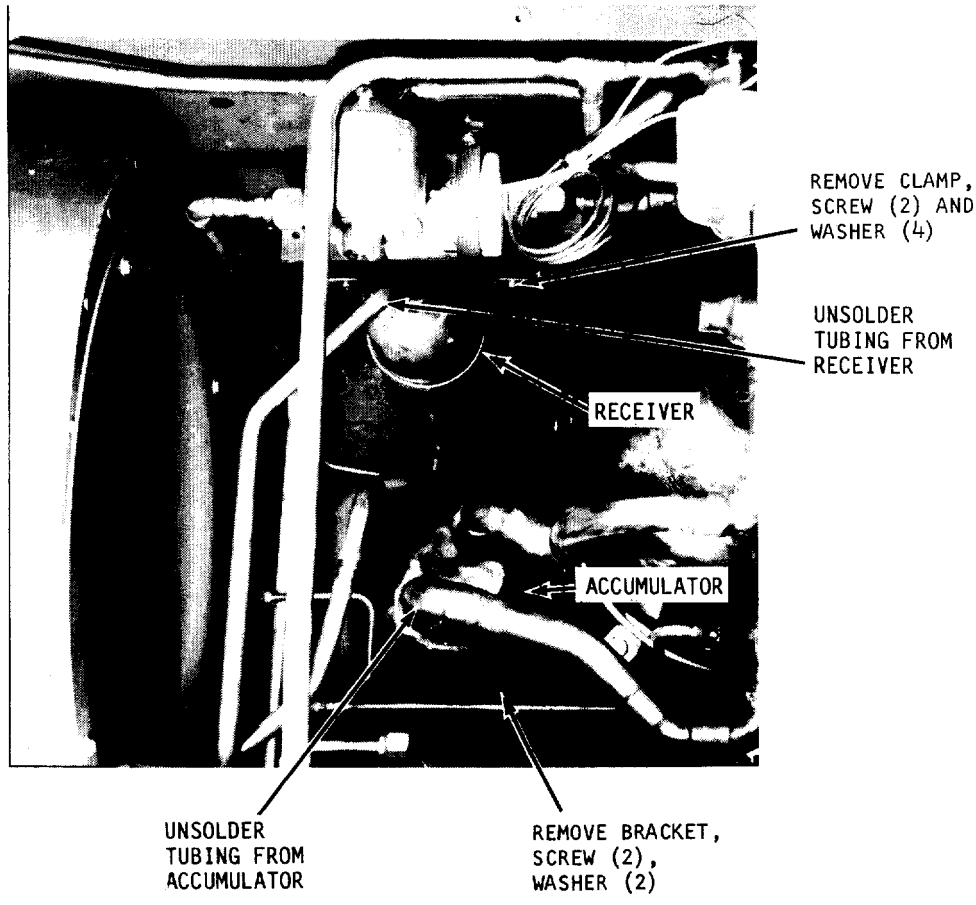


Figure 5-8. Receiver and accumulator, removal and installation

(3) Refer to figure 4-9 and remove counterclockwise rotation condenser fan assembly and mounting bracket.

(4) Refer to figure 5-8 and unsolder system tubing from accumulator.

(5) Remove two screws and washers holding accumulator bracket. Remove accumulator.

(6) Remove nut to separate accumulator from bracket.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

c. Installation

(1) Mount bracket on accumulator.

(2) Refer to figure 4-9 and install accumulator using bracket attaching hardware.

(3) Refer to paragraph 5-7 and solder system tubing to accumulator.

(4) Refer to paragraph 5-6 and leak test the refrigeration system.

(5) Refer to figure 4-9 and install condenser fan assembly and mounting bracket.

(6) Refer to figure 4-4 and install rear top cover.

(7) Refer to figure 6-1 and purge the refrigerant system.

(8) Refer to figure 6-2 and charge refrigerant system.

5-28. Liquid Sight Indicator

a. General. The liquid sight indicator provides a heavy glass porthole to give visible indication of refrigerant flow. Figure 1-2 shows the location and figure 5-9 is a closeup view.

b. Removal.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove rear top cover.

(3) Refer to figure 4-9 and remove the counterclockwise rotation condenser fan assembly and mounting bracket.

(4) Refer to figure 5-9 and remove the liquid sight indicator mounting plate.

(5) Unsolder the liquid sight indicator from the refrigerant system tubing.

c. Installation.

(1) Refer to figure 5-9 and install the liquid sight indicator and its mounting bracket.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Refer to paragraph 5-6 and solder the liquid sight indicator to the refrigerant system tubing.

(3) Refer to para 5-6 and leak test the refrigeration system.

(4) Refer to figure 6-1 and purge the refrigeration system.

(5) Refer to figure 4-9 and install the counterclockwise rotation condenser fan assembly and fan mounting bracket.

(6) Refer to figure 4-4 and install the rear top cover.

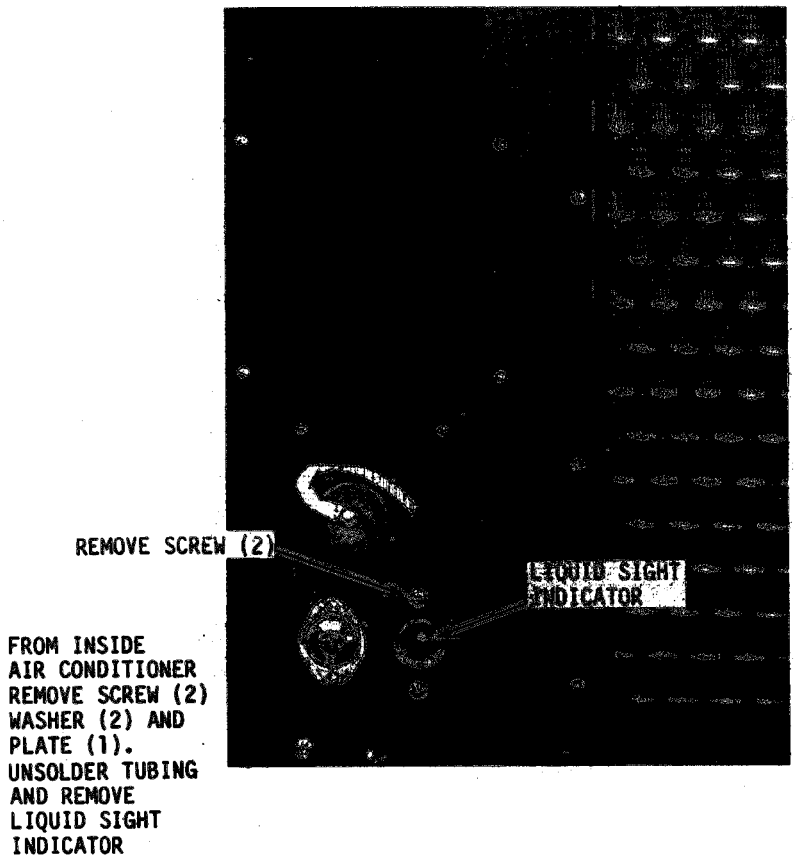


Figure 5-9. Liquid sight indicator removal and installation

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-2 and charge the refrigerant system.

5-29. Primary Thermal Expansion Valve.

a. General. The primary thermal expansion valve is hermetically sealed and cannot be repaired.

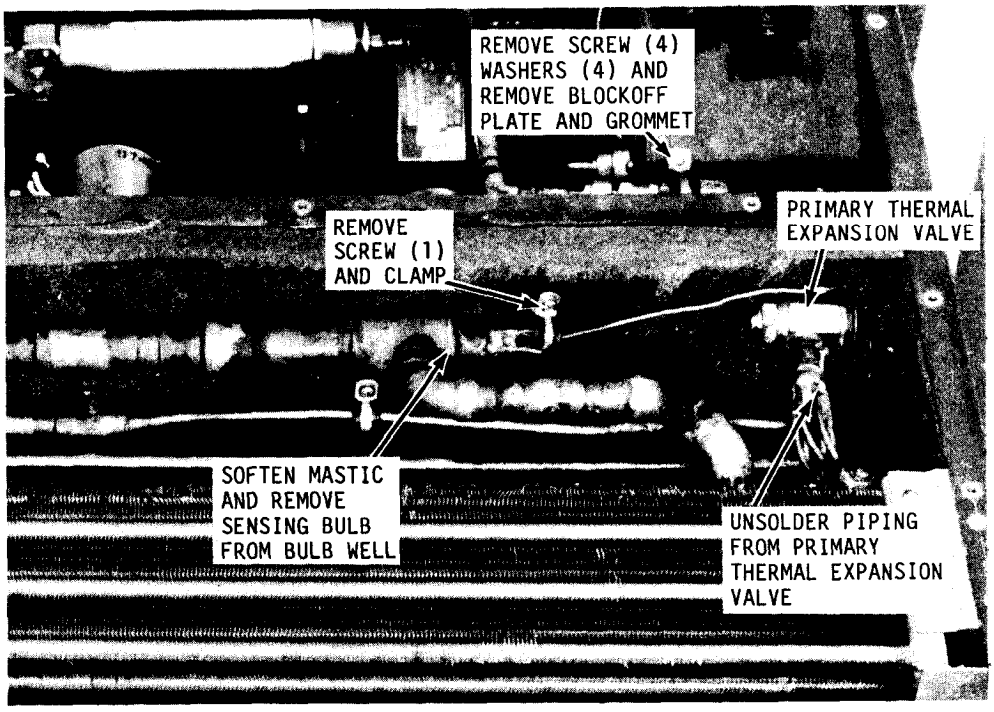


Figure 5-10. Primary thermal expansion valve, removal and installation

b. Removal.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove the top front cover.

(3) Refer to figure 5-10. Soften the mastic in the bulb well and remove the expansion valve bulb. Take care to avoid damaging the capillary tube.

(4) Remove the expansion valve clamp.

(5) Unsolder the expansion valve from the refrigerant system tubing.

c. Installation.

(1) Refer to figure 5-10 and mount the expansion valve against the compartment wall using the mounting clamp.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Solder the expansion valve to the refrigerant system tubing.

(3) Refer to para 5-6 and leak test the refrigeration system.

(4) Insert approximately one ounce of thermal mastic in bulb well. Insert sensing bulb of expansion valve and move bulb back and forth to distribute mastic. Position bulb approximately one inch beyond open end of bulb well.

(5) Refer to figure 6-1 and purge the refrigerant system.

(6) Refer to figure 4-4 and install top front cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-2 and charge refrigerant system.

5-30. Quench Thermal Expansion Valve.

a. General. The quench thermal expansion. valve is hermetically sealed and cannot be repaired.

b. Removal.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

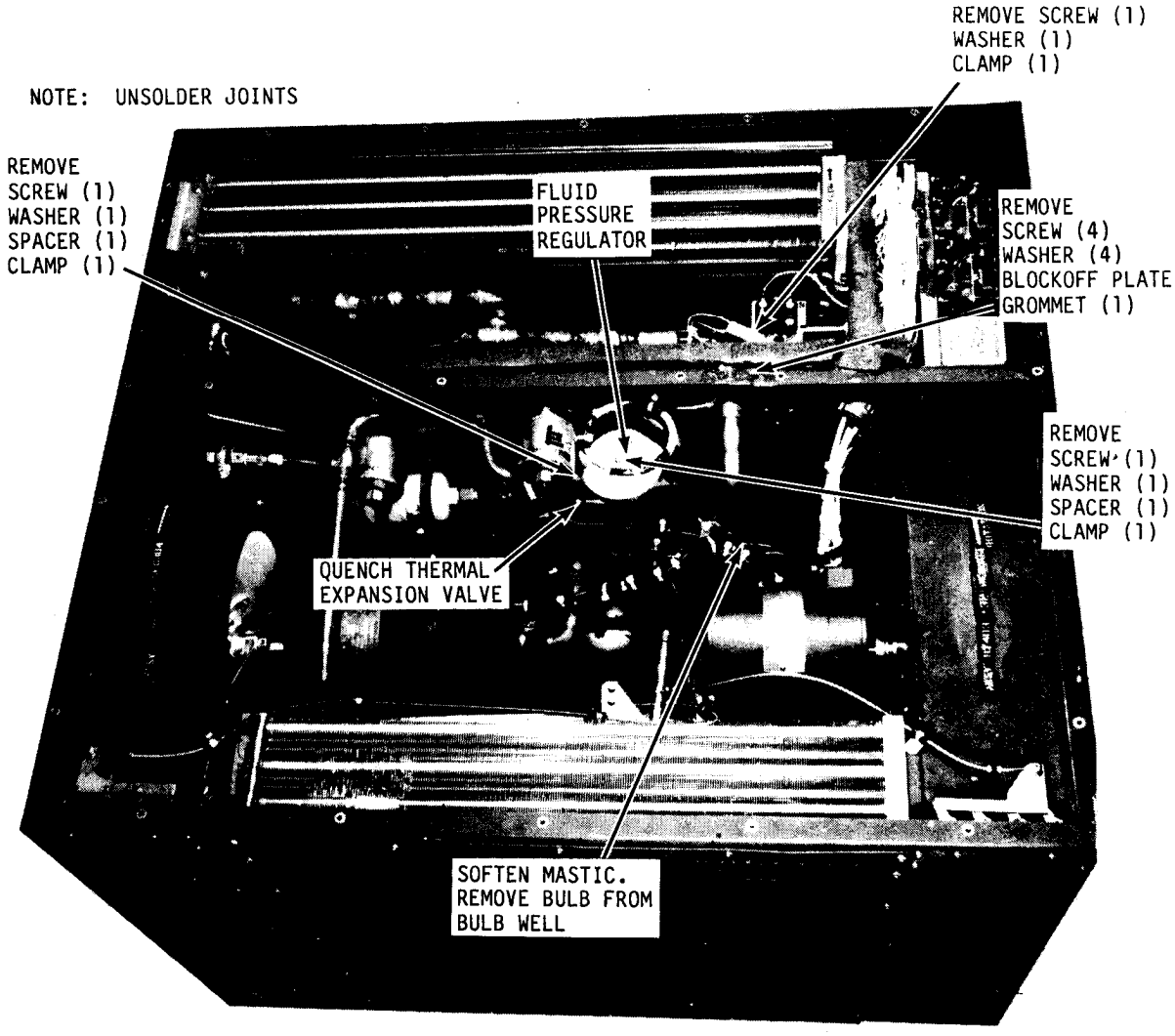


Figure 5-11. Quench thermal expansion valve and fluid pressure regulator, removal and installation

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove the top rear cover.

(3) Refer to figure 5-11. Soften the mastic in the bulb well and remove the expansion valve bulb. Take care to avoid damaging the capillary tube.

(4) Remove the expansion valve clamp.

(5) Unsolder the expansion valve from the refrigerant system tubing.

c. Installation.

(1) Refer to figure 5-11 and mount the expansion valve against the compartment wall using the mounting clamp.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Solder the expansion valve to the refrigerant system tubing.

(3) Refer to para 5-6 and leak test the refrigerant system.

(4) Insert approximately one ounce of thermal mastic in bulb well. Insert sensing bulb of expansion valve and move bulb back and forth to distribute mastic. Position bulb approximately one inch beyond open end of bulb well.

(5) Refer to figure 6-1 and purge the refrigeration system.

(6) Refer to figure 4-4 and install top rear cover.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-2 and charge refrigerant system.

5-31. Fluid Pressure Regulator Valve.

a. General. The fluid pressure regulator valve is hermetically sealed and cannot be repaired.

b. Removal.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(1) Refer to figure 6-1 and discharge the refrigerant system.

(2) Refer to figure 4-4 and remove the air conditioner top covers.

(3) Refer to figure 5-11 and unclamp the regulator valve sensing bulb.

(4) Remove the regulator valve mounting clamp.

(5) Unsolder the regulator valve from the refrigerant system tubing. Remove by drawing the bulb through the compartment wall.

c. Installation.

(1) Refer to figure 5-11 and mount the fluid pressure regulator against the compartment wall using the mounting clamp.

WARNING

1. Brazing operations should be carried out using approved eye protection equipment and rods not containing cadmium.

2. Certain brazing operations may require mechanical ventilation.

3. Local preventive medicine personnel should be queried if doubt exists as to rod composition or ventilation requirements.

(2) Solder the pressure regulator to the refrigerant system tubing.

(3) Feed the sensing bulb through the compartment wall and clamp in place.

(4) Refer to para 5-6 and leak test the refrigeration system.

(5) Refer to figure 6-1 and purge the refrigeration system.

(6) Refer to figure 4-4 and install the top covers.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

(7) Refer to figure 6-2 and charge the refrigerant system.

CHAPTER 6

REPAIR INSTRUCTIONS

Section I. REFRIGERATION SYSTEM

6-1. General.

The refrigerant system, illustrated by the refrigerant flow diagram (figure 5-1), is a mechanical, vapor cycle type circuit consisting of the evaporator, thermal expansion valve, motor-compressor, condenser, and the necessary valves and cutout devices for automatic control during operation. The thermal expansion valve releases high-pressure liquid refrigerant into the evaporator at reduced pressure. The liquid refrigerant begins to vaporize by absorbing heat from the air passing over the external surface of the evaporator coil. The heated vapor is sucked out of the evaporator section by the motor-compressor and forced into the condenser section under high pressure where it is cooled and condensed back into a liquid. The heat released during condensation is carried off by the condensing air stream. The liquid refrigerant flows from the condenser to a receiver, to a subcooler, and then to the thermal expansion valve. If the temperature control switch (evaporator return air thermostat) becomes satisfied, or the evaporator return air temperature is lower than the control switch set point, the refrigerant system will switch to a bypass condition. The temperature control switch will activate the normally-open liquid bypass solenoid valve, closing the valve, and therefore shutting off the evaporator section of the unit. The motor-compressor will continue to pump as usual and the suction pressure will begin to drop. When it reaches approximately 58 psig (400 kPa), the pressure regulating valve will start to open in an effort to maintain the suction pressure above 55 psig (380 kPa) (approximately). As the suction temperature increases, due to the pressure regulating valve opening, the quench expansion valve will start to meter liquid refrigerant into the suction line in an effort to maintain the suction temperature below 75°F (24°C) (approximately), or 30°F (-1°C) superheat (approximately). This action (the pressure regulator and quench valve actions) is totally automatic and also may occur at extreme conditions in an attempt to maintain the suction pressures (even during the cooling mode) at a condition above 55 psig (380 kPa) and the suction temperatures (measured at the quench bulb well) below 75°F (24°C). The condenser louvers are operated by a refrigerant powered piston located in the high pressure part of the system. This piston should be fully extended (louvers open at 80°F (27°C) - proximately) at 250 psig (1140 kPa) head pressure and fully closed at 165 psig (1140 kPa). Failure to perform this function could result in icing of the evaporator coil and/or cutout on the low pressure cutout.

6-2. Pressure Testing the Refrigerant System.

a. General. A pressure test Will indicate whether the air conditioner is operating at normal or at abnormal pressures. When the air conditioner is not operating at normal pressures, the cause should be ascertained and corrected. Refer to table 5-1 for troubleshooting chart.

b. System Pressure Test. Remove caps from high and low pressure service valves (fig. 5-6), connect suction and discharge pressure gages to their respective service valves. Compare the gage reading with the normal range of system pressure shown in table 6-1.

Table 6-1. Normal Operating Pressures.

	Outdoor Ambient Temperature			
	50°F (10°C)	75 °C (24°C)	100°F (38°C)	120 °F (49°C)
	At 90° F (32°C) DB return air to unit			
Suction Pressure	58-65 psi (400-450 kPa)	58-70 psi (400-485 kPa)	60-75 psi (255-295 kPa)	75-90 psi (515-620 kPa)
Discharge Pressure	125-160 psi (860-1100kPa)	175-210 psi (1200-1450kPa)	255-295 psi (1750-2025kPa)	370-410 psi (2550-2825kPa)
	At 80 °F (27°C) DB return air to unit			
Suction Pressure	58-65 psi (400-450 kPa)	58-70 psi (400-485 kPa)	60-75 psi (415-515 kPa)	65-75 psi (450-515 kPa)
Discharge Pressure	120-155 psi (825-1070kPa)	170-205 psi (1170-1415kPa)	(250-290 psi (1725-2000kPa)	370-410 psi (2550-2825kPa)

6-3. Servicing Refrigerant System.

WARNING

1. Caution should be exercised with fluorocarbon refrigerant gas (freons) as they can displace oxygen and thereby cause suffocation.

2. Personnel with a history or other evidence of cardiac rhythm abnormalities should be made aware of the potential for aggravation of existing cardiac rhythm abnormalities or the induction of arrythmias, as a result of exposure to fluorocarbon refrigerant gases (freons). Such individuals should be evaluated by local medical authorities before working in environments where potential freon exposure may occur.

a. General. When the air conditioner must undergo maintenance that requires opening the system, the system must be discharged with a recovery/recycling unit prior to maintenance, then leak tested and purged, a new dehydrator installed, and the system charged after maintenance. Basic procedures involved in servicing the refrigerant system are as follows:

b. Discharging System. Refer to figure 6-1 for instructions on discharging the refrigerant system.

c. Testing System for Leaks. Refer to paragraph 5-6 and leak test the refrigeration system.

d. Purging the Refrigerant System. Refer to figure 6-1 and purge the refrigerant system.

e. Charging the System. Refer to figure 6-2 for instructions on charging the system with refrigerant.

6-4. Repairing Refrigerant Leaks.

a. Locate leak (para 5-6).

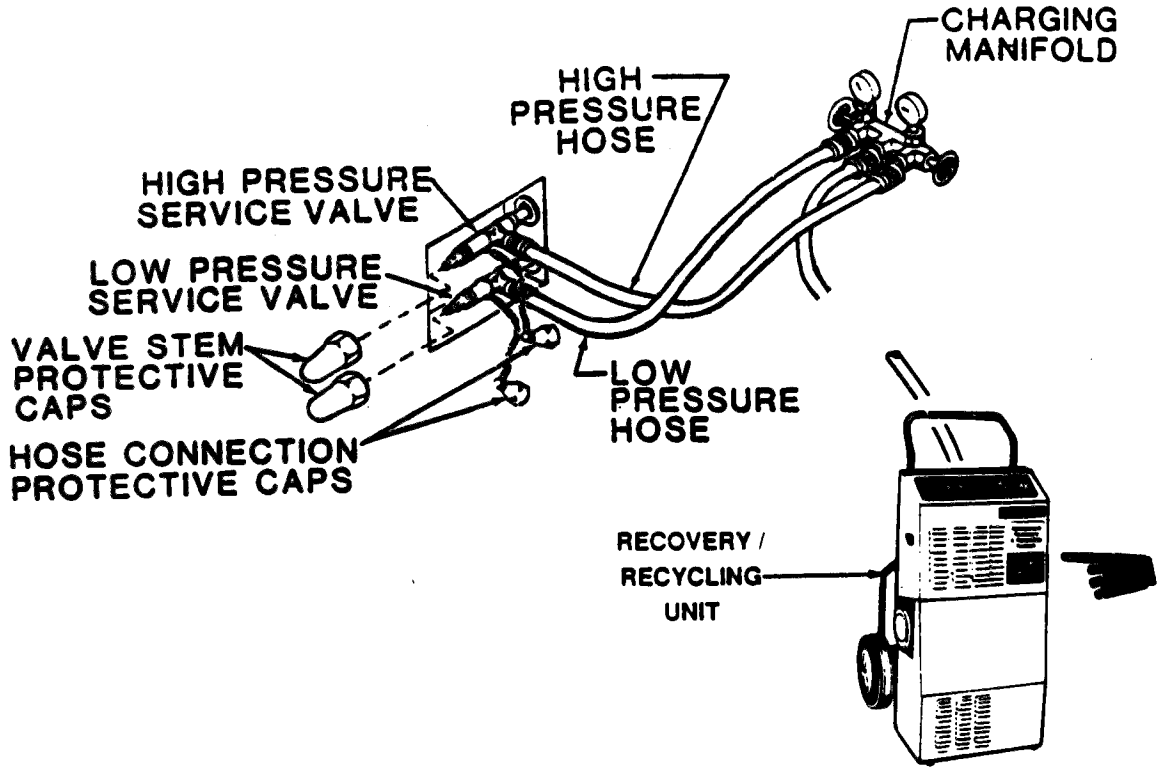
b. Discharge system (figure 6-1). repair leak. and recharge system (figure 6-2).

NOTE

If soldering is necessary on any part of the system. a constant purge of dry nitrogen must be fed through the system being soldered to prevent scale formation within the system.

6-5. Decontamination.

a. General. The compressor is a hermetically sealed unit and cannot be



NOTE
IN ACCORDANCE WITH ENVIRONMENTAL PROTECTION AGENCY REGULATIONS REFRIGERANTS CANNOT BE DISCHARGED INTO THE ATMOSPHERE. A REFRIGERANT RECOVERY & RECYCLING UNIT MUST BE USED WHENEVER DISCHARGING THE REFRIGERANT SYSTEM.

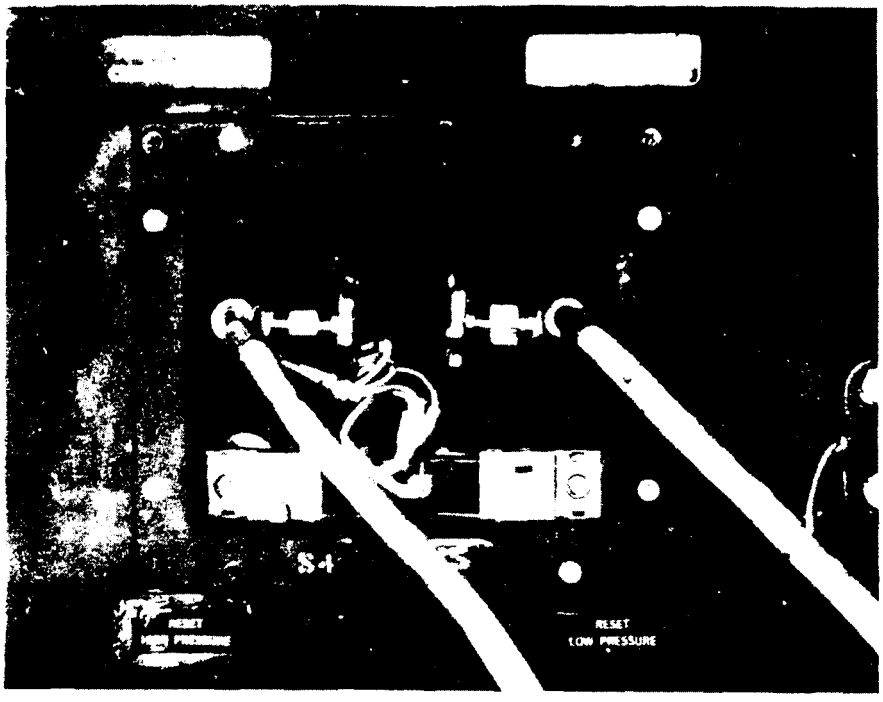
OPERATION OF THE RECOVERY/RECYCLING UNIT MUST BE BY AUTHORIZED PERSONNEL ONLY

TO DISCHARGE SYSTEM:
REMOVE ACCESS COVER. REMOVE LOW PRESSURE CHARGING VALVE CAP. ATTACH A SUITABLE HOSE TO CHARGING VALVE. CONNECT AND OPERATE A RECOVER/RECYCLING UNIT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

TO PURGE SYSTEM:
REMOVE HIGH PRESSURE CHARGING VALVE CAP. CONNECT VALVE TO A CYLINDER OF DRY NITROGEN. ATTACH A SUITABLE DISCHARGE HOSE TO LOW PRESSURE CHARGING VALVE. OPEN NITROGEN VALVE AND ALLOW NITROGEN TO FLOW THROUGH SYSTEM UNTIL ALL MOISTURE IS FORCED OUT. CLOSE NITROGEN CYLINDER VALVE.

TO EVACUATE SYSTEM:
CONNECT A VACUUM PUMP TO HIGH AND LOW PRESSURE CHARGING VALVES. START VACUUM PUMP AND RECORD TIME FOR MAXIMUM VACUUM READING ON GAGE. CONTINUE EVACUATING FOR EQUAL PERIOD OF TIME. STOP PUMP AND OBSERVE GAGE. IF VACUUM HOLDS FOR A TIME EQUAL TO PUMP DOWN TIME, EVACUATION IS SATISFACTORY. SEE FIGURE 6-2 FOR CHARGING SYSTEM.

Figure 6-1. Discharging and purging refrigerant system



NOTE: STEPS 1,2,3 AND 4 APPLY ONLY TO A COMPLETELY EVACUATED SYSTEM, A FULLY CHARGED SYSTEM CONTAINS 11.5 ± .5 POUNDS (5.23 ± .23 KG) OF REFRIGERANT 22. TO ADD REFRIGERANT TO AN INCOMPLETELY CHARGED SYSTEM, REFER TO STEP 5.

NOTE: WHENEVER AVAILABLE, USE RECYCLED REFRIGERANT FOR CHARGING THE REFRIGERATION SYSTEM.

STEP 1. REMOVE SERVICE VALVE ACCESS COVER. REMOVE VALVE CAPS AND LOOSELY CONNECT CHARGING MANIFOLD SERVICE LINES TO AIR CONDITIONER CHARGING VALVES. ATTACH LINE FROM REFRIGERANT DRUM TO MANIFOLD.

STEP 2. OPEN REFRIGERANT DRUM VALVE AND MANIFOLD VALVES AND PURGE AIR BOTH FROM MANIFOLD AND SERVICE LINES. TIGHTEN SERVICE LINE CONNECTIONS AT CHARGING VALVES AND CLOSE LOW SIDE VALVE ON CHARGING MANIFOLD.

STEP 3. POSITION REFRIGERANT DRUM UPSIDE DOWN ON A SCALE. OPEN AIR CONDITIONER HIGH PRESSURE CHARGING VALVE AND CHARGE SYSTEM UNTIL SCALE INDICATES A FULL CHARGE, THEN CLOSE BOTH HIGH PRESSURE CHARGING VALVE AND DRUM VALVE. DISCONNECT CHARGING LINES UNLESS. DUE TO PRESSURE EQUALIZATION IN DRUM AND AIR CONDITIONER SYSTEM, A FULL CHARGE IS NOT MEASURED. THEN PROCEED TO STEP 4.

Figure 6-2. Charging refrigerant system (Sheet 1 of 2)

repaired. An inoperative compressor is usually due to a mechanical failure or motor burnout. If the compressor is mechanically frozen or sustains a motor burnout, it must be replaced. A compressor failure generates high temperature causing a breakdown of oil, refrigerant and motor insulation, with the resulting formation of acid, moisture, and sludge. These products are extremely corrosive and must be flushed from the system or repeated burnouts will occur.

b. Procedure.

(1) Discharge system and purge with nitrogen (figure 6-1).

(2) Remove defective motor-compressor (figure 5-2).

(3) Remove dehydrator (figure 5-7).

(4) With compressor out of system, purge all lines with dry nitrogen.

(5) Install a new compressor (figure 5-2) containing a full and proper oil charge.

(6) Install new dehydrator (figure 5-7). In step (10) this dehydrator will again be replaced.

(7) Triple evacuate system and charge with refrigerant R22.

(8) Start air conditioner (figure 2-5) and operate unit for 24 hours.

(9) Discharge system and purge with nitrogen (figure 6-1).

(10) Install new dehydrator (figure 5-7).

NOTE

Whenever available, use recycled refrigerant for charging the refrigeration system.

(11) Evacuate system and recharge with refrigerant (figure 6-2).

(12) Operate air conditioner.

6-6. Evaporator and Condenser Coils.

a. Inspection. Inspect coils for damaged tubing and bent fins. Inspect threaded holes for damaged or stripped threads.

STEP 4. POSITION REFRIGERANT DRUM UPRIGHT ON SCALE WITH LINES CONNECTED FOR GAS CHARGING. IF THE WEIGHT OF REFRIGERANT TO FULLY CHARGE THE SYSTEM IS KNOWN, OPERATE AIR CONDITIONER WITH CONTROLS SET FOR MAXIMUM COOLING. OPEN REFRIGERANT DRUM VALVE, LOW PRESSURE CHARGING VALVE, AND LOW SIDE MANIFOLD VALVE. CONTINUE OPERATION UNTIL THE SYSTEM IS FULLY CHARGED, THEN CLOSE VALVES. STOP AIR CONDITIONER OPERATION AND DISCONNECT CHARGING LINES.

STEP 5. TO ADD REFRIGERANT TO SYSTEM WITH LOW CHARGE AS INDICATED BY BUBBLES IN LIQUID SIGHT INDICATOR:
WITH REFRIGERANT DRUM UPRIGHT, CONNECT LINES FOR GAS CHARGING THROUGH LOW SIDE MANIFOLD VALVE. PURGE CHARGING LINES BY LOOSELY CONNECTING LINE AT DRUM VALVE AND SLIGHTLY OPENING AIR CONDITIONER CHARGING VALVES. TIGHTEN LINE AT DRUM VALVE. OPERATE AIR CONDITIONER WITH CONTROLS SET FOR MAXIMUM COOLING. OPEN REFRIGERANT DRUM VALVE, LOW SIDE MANIFOLD VALVE, AND LOW PRESSURE CHARGING VALVE ON AIR CONDITIONER. CONTINUE OPERATION UNTIL BUBBLES NO LONGER APPEAR IN SIGHT INDICATOR. THEN CLOSE LOW PRESSURE CHARGING VALVE ON AIR CONDITIONER. REPEAT CHARGING IF BUBBLES REAPPEAR IN SIGHT INDICATOR. WHEN BUBBLES DO NOT REAPPEAR AFTER 15 MINUTES OF OPERATION, THE SYSTEM IS FULLY CHARGED. CLOSE CHARGING VALVES AND DISCONNECT LINES.

Figure 6-2. Charging refrigerant system (Sheet 2 of 2)

b. Repair. Repair any leaks. Straighten bent fins. Repair or replace damaged tubing if possible. Replace coil if repair is not practical.

6-7. Solenoid Valve.

a. General. Replaceable parts are the coil bonnet assembly, diaphragm and the preformed packing. See figure 6-3.

b. Coil Replacement. Replace coil as follows:

(1) Remove electrical connector from solenoid valve leads.

(2) Remove nut on top of valve housing. Lifting housing and coil assembly from bonnet assembly.

(3) Remove coil from housing.

(4) Install coil bottom plate with edge upward.

(5) Install lower coil sleeve with flange at bottom. Install coil with lead exits at bottom.

(6) Install coil spring with flat edges upward and upper coil sleeve with

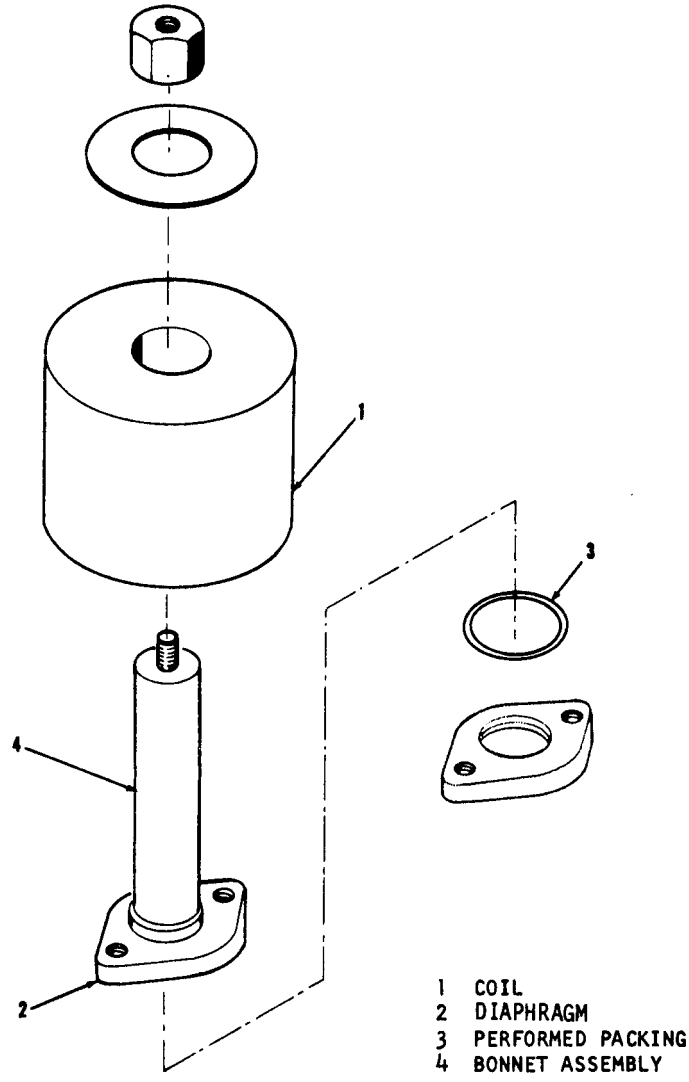


Figure 6-3. Solenoid valve, exploded view

flange at top. Sleeve passes through the coil spring.

(7) Install coil housing, data plate, and nut.

6-8. Fan Motors.

a. General. Except for the shaft on the rotor, the condenser fan motors and the evaporator fan motor are identical, therefore, the following instructions apply equally to either motor.

b. Disassembly. Refer to figure 6-4 and disassemble motor as follows:

(1) Remove four screws (1). Remove end bell (2).

(2) Remove end bell bearing (3).

(3) Remove rotor (4).

(4) Remove four screws (5). Remove end bell (6) from stator (7).

(5) Remove screw (8) and loop clamp (9). Remove screws (10) and remove cable (11) from motor.

(6) Remove bearing (12) and spacer (13) from end bell (6).

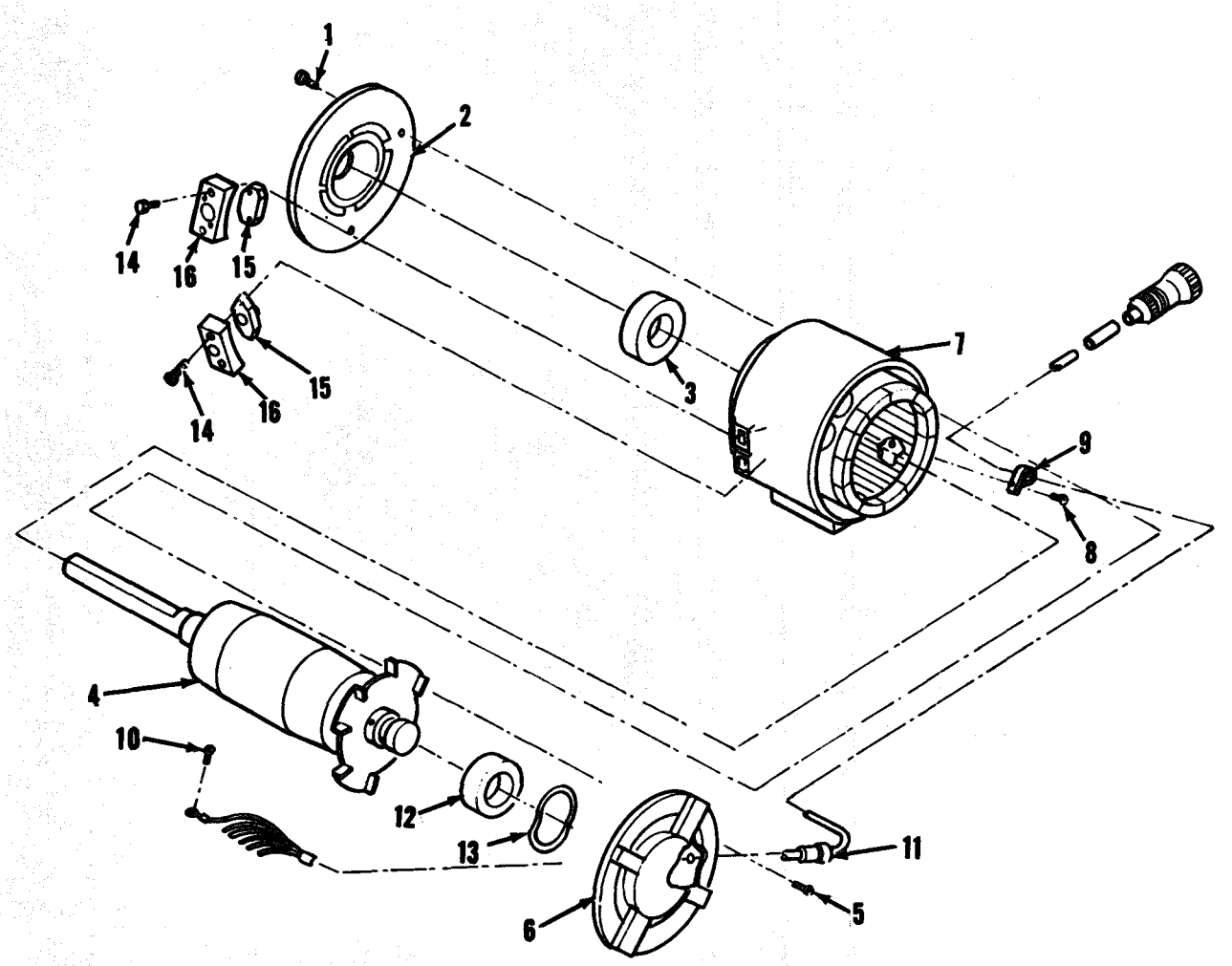


Figure 6-4. Fan motor exploded view

(7) Refer to paragraph 4-20 and 4-22 and remove screws (14), thermal protectors (15) and housing (16).

c. Cleaning, Inspection and Repair. Clean, inspect and repair parts as follows :

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° - 138°F (38° - 59°C).

(1) Clean metal parts with cleaning solvent (Fed. Spec. P-D-680). Wipe off electrical parts with a clean cloth.

(2) Inspect wiring for damaged insulation and broken wiring. Repair damaged insulation.

(3) Inspect connector for damage.

(4) Inspect bearing for wear, galling or flat spots. Replace defective bearings.

(5) Inspect shaft for gouges or worn bearing surface. Repair minor defects.

(6) Inspect stator for damaged, broken or shorted wiring.

d. Assembly. Refer to figure 6-4 and assemble motor as follows:

(1) Install thermal protectors (15), housing (16), and screws (14), as described in paragraph 4-20 and 4-22.

(2) Install spacer (13) and bearing (12) in end bell (6).

(3) Install cable ends using screws (10).

(4) Attach end bell (6) to stator (7) with screws (5).

(5) Attach cable (11) to stator (7) with clamp (9) and screws" (8).

(6) Install rotor (4) in motor.

(7) Install bearing (3) in end bell (2).

(8) Attach end bell (2) with screws (1).

APPENDIX A

REFERENCES

A-1 . Fire Protection.

TB 5-4200-200-10	Hand Portable Fire Extinguisher for Army Users

A-2 . Lubrication.

C91OOIL	Fuels, Lubricants, Oils and Waxes

A-3 . Painting.

TM 9-213	Painting Instructions for Field Use

A-4 . Maintenance.

TM 5-4120-361-24P	Organizational, Direct and General Support Maintenance Repair Parts and Special Tool List for Air Conditioner, Horizontal, Compact, 36,000 BTUH
TM 38-750	Army Maintenance Management System
TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use
Fed. Spec. P-D-680	Dry Cleaning Solvent

A-5. Shipment and Storage.

TM 740-90-1	Administration Storage of Equipment

APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

1. Scope.

This appendix lists integral components of and basic issue items for the air conditioner to help you inventory items required for safe and efficient operation.

2. General.

This Component of End Item List is divided into the following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the air conditioner and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these 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 packed, they must accompany the air conditioner during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement B11, based on TOE/MTOE authorization of the end item.

3. Explanation of Columns.

a. Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

c. Part Number. Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

d. Description. Indicates the Federal item name and, if required, a minumum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code. "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes in these lists are:

Code	Used On
DBK	Model CH436-1
DBJ	Model CH636-1

g. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

h. Quantity. This column is left blank for use during an inventory. Under the Recv'd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date; such as for shipment to another site.

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)		(8) Quantity		
(a) Figure No.	(b) Item No.	National Stock No.	Part No.	Description	Location	Usable On	Qty Reqd	Rec'd	Date	Date	Date

Section II.
INTEGRAL COMPONENTS OF END ITEM

NONE

Section III.
BASIC ISSUE ITEMS

	Connector	DBJ/DBK	1
TM5-4120-361-14	Technical Manual	DBJ/DBK	1
TM5-4120-361-24P	Technical Manual	DBJ/DBK	1
	Installation parts consisting of:	DBJ/DBK	
13216E6137	Mount, Resilient		2
13216E6153	Tube, Elastomeric		1
13216E6152	Spacer		1
13216E6138-2	Washer		1
MS90726-65	Screw		1

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

1. Scope.

This appendix lists additional items you are authorized for the support of the air conditioner.

2. General.

This list identifies items that do not have to accompany the air conditioner and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

3. Explanation of Listing.

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are identified as:

Code	Used On
DBK	Model CH436-1
DBJ	Model CH636-1

(1)	(2)	(3)	(4)
NATIONAL STOCK NUMBER	DESCRIPTION PART NUMBER & FSCM	USABLE ON CODE	U/M QTY AUTH
	NONE		

APPENDIX D

MAINTENANCE ALLOCATION CHART

Section I. Introduction

D-1. General.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions on explanatory notes for a particular maintenance function.

D-2 . Maintenance Functions.

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item, or system.

j. Overhaul. That maintenance effort (services actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. 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 materiel

maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

D-3 . Column Entires Used in the MAC.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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 Level. column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The number of man-hours specified by 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. The symbol designations for the various maintenance levels are as follows:

C . . . . . Operator or crew

O . . . . . Organization maintenance

F . . . . . Direct support maintenance

H. . . . . General support maintenance

D . . . . . Depot maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall contain a letter code in alphabetical order which shall be keyed to the remarks contained in Section IV.

D-4 . Column Entries Used in Tool and Test Equipment Requirements.

a. Column 1, Tool or Test Equipment Reference Code. The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.

b. Column 2, Maintenance Level. The lowest level 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/NATO Stock Number. The National or NATO stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer’s part number.

D-5. Explanation of Columns in Section IV.

a. Reference Code. The code scheme recorded in column 6, Section II.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

36,000 BTU/HR Air Conditioner, Compact, Horizontal											
(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
	Air Conditioner	Inspect	.10						
		Service	.20						
		Install		.75					
01	TOP Covers and Front Louvers								
	Metal Covers	Inspect	.10						
		Service	.10						
		Repair		.25					
		Replace		.20					
	Cover Gaskets	Inspect	.10						
		Replace		.25					
	Cover Insulation	Inspect		.10					
		Replace		.25					
	Information Plates	Inspect		.10					
		Service		.10					
		Replace		.25					
	Front Louvers	Inspect	.10						
		Service	.10						
		Adjust	.10						
		Replace		.20					
	Air Conditioning Filter	Inspect	.10						
		Service		.40					
		Replace		.20					
02	Condenser Guard, Covers, Ventilation Air Filter, & Lifting Ring								
	Condenser Guard	Inspect	.10						
		Service	.10						
		Replace		.20					

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal					
(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C O F H D	(5) Tools & Equipment	(6) Remark
	Fabric Cover	Inspect	.10		
		Service	.10		
		Repair	.10		
		Replace	.20		
	Ventilation Air Filter	Inspect	.10		
		Service	.35		
		Replace	.30		
	Lifting Ring & Clip	Inspect	.10		
		Replace	1.0		
03	Condenser Fans & Motor Support Assembly				
	Axial Fans	Inspect	.10		
		Service	.15		
		Align	.25		
		Replace	2.0		
	Motor Supports	Inspect	2.0		
		Replace	3.0		
04	Condenser Fan Motor	Inspect	.10		
		Service	.15		
		Test	1.0		
		Repair	4.0		
		Replace	2.0		
05	Evaporator Impeller, Housing and Related Parts				
	Impeller	Inspect	.10		
		Service	.15		
		Align	.25		
		Replace	2.0		

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal						
(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C	O	F	H	D	(5) Tools & Equipment	(6) Remarks
	Housing & Mounting Base Assemblies	Inspect	.10						
		Replace	2.0						
06	Evaporator Motor	Inspect	.10						
		Service	.15						
		Test	1.0						
		Repair			4.0				
		Replace	1.5						
07	Ventilation Damper and Actuator	Inspect	.10						
		Service	.20						
		Adjust	.50						
		Replace	1.0						
08	Condenser Louver Actuator & Control Assembly								
	Louver Control Cables	Inspect			.15				
		Service			.25				
		Adjust			.35				
		Replace			.50				
	Cable Actuator	Inspect			.15				
		Replace			8.0				
09	Refrigerant Valves and Related Tubing								
	Expansion Valves	Inspect			.15				
		Test			.50				
		Replace			4.0				
	Solenoid Valves	Inspect			.15				
		Test			.25				
		Replace			4.0				
	Pressure Regulating Valve	Inspect			.15				
		Test			.50				
		Replace			4.0				

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
.. INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal														
(1) Group Number	(2) Component/Assembly	(3) maintenance Functions	(4) Maintenance Level C			O			F			H		D	(5) Tools & Equipment	(6) Remark
	Tubing & Fittings	Inspect							.10							
		Replace							4.0							
10	Dehydrator & Related Tubing															
	Dehydrator	Inspect							.10							
		Replace							4.0							
	Tubing & Fittings	Inspect							.10							
		Replace							4.0							
11	Pressure Switches, Liquid Receiver, Sight Indicator, Charging Valves & Related Tubing															
	Receiver	Inspect							.50							
		Replace							12.0							
	Sight Indicator	Inspect			.05											
		Service			.05											
		Replace							12.0							
	Charging Valves	Inspect							.10							
		Replace							4.0							
	Tubing & Fittings	Inspect							.10							
		Replace							4.0							
	Pressure Switches	Inspect				.10										
		Test				.25										
		Replace							4.0							
12	Compressor, Accumulator, & Related Parts															
	Compressor	Inspect				.10										
		Test				.15										
		Replace							12.0							

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal						
(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C	O	F	H	D	(5) Tools & Equipment	(6) Remark
	Accumulator	Inspect	.10						
		Service	.10						
		Replace			12.0				
13	Evaporator & Condenser Coils & Related Compartment Parts								
	Mist Eliminator	Inspect	.10						
		Service	.50						
		Replace	.10						
	Coils	Inspect	.10						
		Service	.15						
		Replace			8.0				
	Tubing & Fittings	Inspect			.10				
		Replace			4.0				
	Compartment Insulation	Inspect			.10				
		Service			.15				
		Replace				2.0			
14	Junction Box & Control Module Assy	Inspect	.10						
		Service	.25						
		Replace	.10						
	Control Module Electrical Components	Inspect	.10						
		Service	.25						
		Test	.50						
	Replace		1.0						
	Junction Box Electrical Components	Inspect	.10						
		Service	.25						
		Test	.30						
		Replace	1.0						
15	Wiring Harness	Inspect	.25						
		Test	.40						
		Repair	1.0						
		Replace	8.0						

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal					
(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C O F H D	(5) Tools & Equipment	(6) Remark
16	Ambient Thermostat, Auxiliary Power Inlet, and Condensate Drain Assembly				
	Ambient Thermostat Switch Assembly	Inspect Test Replace	.10 .50 8.0		
	Inlet Pwr Connector Assy	Inspect Repair Replace	.10 8.0 8.0		
17	Heater, Transformer, Rectifier and Related Parts				
	Heater Element	Inspect Test Replace	.10 .25 1.0		
	Thermostatic Switch	Inspect Test Replace	.10 .25 .50		
	Rectifier	Inspect Test Replace	.10 .25 .50		
	Transformer	Inspect Test Replace	.10 .50 1.0		
	Capacitor	Inspect Test Replace	.10 .25 .25		

. SUBCOLOUMNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section II. MAINTENANCE ALLOCATION CHART (CONT)

36,000 BTU/HR Air Conditioner, Compact, Horizontal

(1) Group Number	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Level C	O	F	H	D	(5) Tools & Equipment	(6) Remark
18	Louver & Condenser Fan Housing Assy								
	Louver Assy	Inspect	.15						
		Service	.25						
		Adjust			.50				
		Repair	.50						
		Replace	1.0						
	Fan Housing	Inspect	.10						
		Service	.25						
		Replace	2.0						
19	Housing Assembly								
	Housing	Repair				1.0			
		Replace				24.0			

. SUBCOLOUNNS ARE AS FOLLOWS: C - OPERATOR/CREW O - ORGANIZATIONAL
F - DIRECT SUPPORT H - GENERAL SUPPORT D - DEPOT
. . INDICATES WT/MH REQUIRED.

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
	F	Recovery and Recycling Unit, Refrigerant	4130-01-338-2707	(07295) 17500B
		Tool Kit, Service, Refrigeration Unit (SC 5	5180-00-597-1474	
		Soldering Gun Kit	3439-00-930-1638	

Section IV. MAINTENANCE ALLOCATION CHART

REFERENCE CODE	REMARKS
	No supplemental instructions or explanatory remarks for a particular maintenance function listed in Section II are required. All functions are sufficiently defined in Section I. Due to various methods of installing the air conditioner, all active time listed for maintenance tasks are with the air conditioner in the off-equipment position at organizational user level or in a repair shop facility.

APPENDIX E

REPAIR PARTS AND SPECIAL TOOLS LIST

See TM 5-4120-361-24P

APPENDIX F

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

1. Scope.

This appendix lists expendable supplies and materials you will need to operate and maintain the air conditioner. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

2. Explanation of Columns.

a. Column 1- Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. D").

b. Column 2- Level. This column identifies the lowest level of maintenance that requires the listed item.

O- Organizational Maintenance
F- Direct Support Maintenance

c. Column 3 - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5- Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.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.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	4130-00-860-0042	Dust Collecting Adhesive	pt
			NOTE	
			Whenever available, use recycled refrigerant for charging the refrigeration system.	
2	F	6830-00-106-1659	R-22 (monochlorodifluoromethane, CHC	

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ALPHABETICAL INDEX

ALPHABETICAL INDEX (Continued)

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By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Mqjor General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25C Operator maintenance requirements for Air Conditioners, 36,000 BTU

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980-665134/2135

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 5-4120-361-14	30 MAY 80	Air Conditioner, Horizontal, Compact, 36,000 BTUH

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN.

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE:
John Doe

DA FORM 1 AUG 74 2028-2

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

DRSTS-M Overprint 1, 1 Nov 78

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REVERSE OF DA FORM 2028-2

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = . 39 inch
1 decimenter = 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 decigrams = . 035 ounce
1 dekagram = 10 grams = . 35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = . 34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 38.82 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. decimenter = 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	1.365	metric tons	short tons	1.102
pound-inches	newton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C