TM 5-4120-335-14

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER: WALL OR BASE MOUNTED: AIR COOLED, SELF CONTAINED, ELECTRIC MOTOR DRIVEN, 6,000 BTU/HR, 115V 1 PHASE, 2 WIRE, 50/60 HERTZ (THERM-AIR MODEL CE-6A-60A2) FSN 4120-476-9249

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 JANUARY 1972

WARNING

DANGEROUS CHEMICAL

is used in this equipment

DEATH

or severe damage may result if personnel fail to observe safety precautions.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. When the refrigerant comes in contact with the flame from a halide torch, phosgene gas is formed. This gas is a deadly poison, having the odor of new mown hay. Be sure there is proper ventilation when the torch is used. Exhaust refrigerant from system before beginning any refrigerant line service.

WARNING

HIGH VOLTAGE

is used to operate this equipment

DEATH

or severe injury may result if personnel fail to observe safety precautions.

Never attempt repairs unless unit has been disconnected from power source.

CHANGE

NO. 3

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

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

AIR CONDITIONER, WALL OR BASE MOUNTED, AIR COOLED,
SELF-CONTAINED, ELECTRIC MOTOR DRIVEN, 6,000 BTU/HR,
115 VOLT, 1 PHASE, 2 WIRE, 50/60 HERTZ
THERM AIR MODEL CE-6A-60A2
NSN 4120-00-476-9249

Approved for public release; distribution is unlimited

TM 5-4120-335-14, 31 January 1972, is changed as follows:

Page 1-1, paragraph 1-3. is superseded as follows:

b. You can help improve this manual. If you find any mistake or if you know of a way to improve the procedure, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MMTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

Page 4-2 is changed as follows:

- Add note before paragraph 4-6. Releasing the Refrigerant Charge:

NOTE

In accordance with Environmental Protection Agency regulations, refrigerants cannot be discharged into the atmosphere. A recovery/recycling unit must be used whenever discharging the unit.

- Delete paragraph 4-6.b., and replace paragraph 4-6.b. with the following text:

Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

b. Refer to figure 4-1. Connect and operate recovery/recycle unit in accordance with the manufacturer's instructions.

Page 4-7 is changed as follows:

- Preceding the text to paragraph 4-9, Charging the System, add following note:

NOTE

Whenever available, use recycled refrigerant for charging the refrigeration system.

Page B-2 is changed as follows:

•Following Section II. MAINTENANCE ALLOCATION CHART add Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS as shown:

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
	F-H	Recovery and Recycling Unit, Refrigerant	4130-01-338-2707	17500B (07295)

By Order of the Secretary of the Army:

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

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
01532

DISTRIBUTION:
To be distributed in accordance with DA Form 12–25E, qty rqr block no, 0184.

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PIN # 005797-003

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 20 November 1990

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

AIR CONDITIONER, WALL OR BASE MOUNTED, AIR COOLED,
SELF–CONTAINED, ELECTRIC MOTOR DRIVEN, 6,000 BTU/HR,
115 VOLT, 1 PHASE, 2 WIRE, 50/60 HERTZ
THERM AIR MODEL CE–6A–60A2
NSN 4120–00–476–9249

Approved for public release; distribution is unlimited

TM 5–4120–335–14, 31 January 1972, is changed as follows:

Page 2–4, paragraph 2–11 is superseded as follows:

2–11. 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.

Page 2–4, paragraph 2–12 is superseded as follows:

2–12. Operation in Dusty or Sandy Conditions.

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.

CAUTION

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

b. Protection.

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

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

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

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

c. Cleaning.

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

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

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

By Order of the Secretary of the Army:

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

Official:

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

DISTRIBUTION:
To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 0184)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1991 554-123/20241

PIN: 005797-002

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *7 March 1975*

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

AIR CONDITIONER, WALL OR BASE MOUNTED, AIR COOLED, SELF-CONTAINED, ELECTRIC MOTOR DRIVEN, 6,000 BTU/HR, 115 VOLT, 1 PHASE, 2 WIRE, 50/60 HERTZ, THERM-AIR MODEL CE-6A-60A2 NSN 4120-00-476-9249

TM 5-4120-335-14, 31 January 1972, is changed as follows:
The title is changed as shown above.
Page 2 of Cover. Add the following warning to the list of safety precautions.

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 booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety & Health or the U.S. Bureau 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.

Page 4-9. Paragraph 4-10 *a.*, add the following warning:

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 booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety & Health or the U.S. Bureau 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.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25C, (qty rqr block No. 530). Organizational maintenance requirements for Environment Equipment Air Conditioners, 6,000 BTU.

TECHNICAL MANUAL
No. 5-4120-335-14

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *31 January 1972*

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER: WALL OR BASE MOUNTED: AIR COOLED, SELF CONTAINED, ELECTRIC MOTOR DRIVEN, 6000 BTU / HR, 115V, 1 PHASE, 2 WIRE, 50/60 HERTZ, THERM-AIR MODEL CE-6A-60A2

FSN 4120-476-9249

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. scope

These instructions are published for the use of the operating personnel to whom the air conditioner Therm-air Model CE-6A-60A2 is issued, and provides maintenance instructions for Organizational, Direct and General support maintenance activities.

1-2. Forms and Records

Maintenance forms, records and reports which are to be used by maintenance personnel at all maintenance levels are listed and prescribed by TM 38-750.

1-3. Reporting of Errors

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on 1)A Form 2028 (Recommended Changes to Publications), and forwarded direct to Com - manding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

1-4. Adminstrative Storage

Refer to TM 740-90-1 for administrative storage.

Section II. DESCRIPTION AND DATA

1-5. Description

a. General. The air conditioner (fig. 1-1 and 1-2) is a multi-package, air cooled, electric motor driven unit, designed specifically to provide selected environmental conditioning in air trans - portable shelters and mobile, van-type trucks and trailers for efficient operation of electronic equipment and the comfort of operating personnel. The evaporator and condenser sections of the air conditioner are built separately in aluminum angle frame housings and are interconnected with suitable electrical cable and refrigerant hoses.

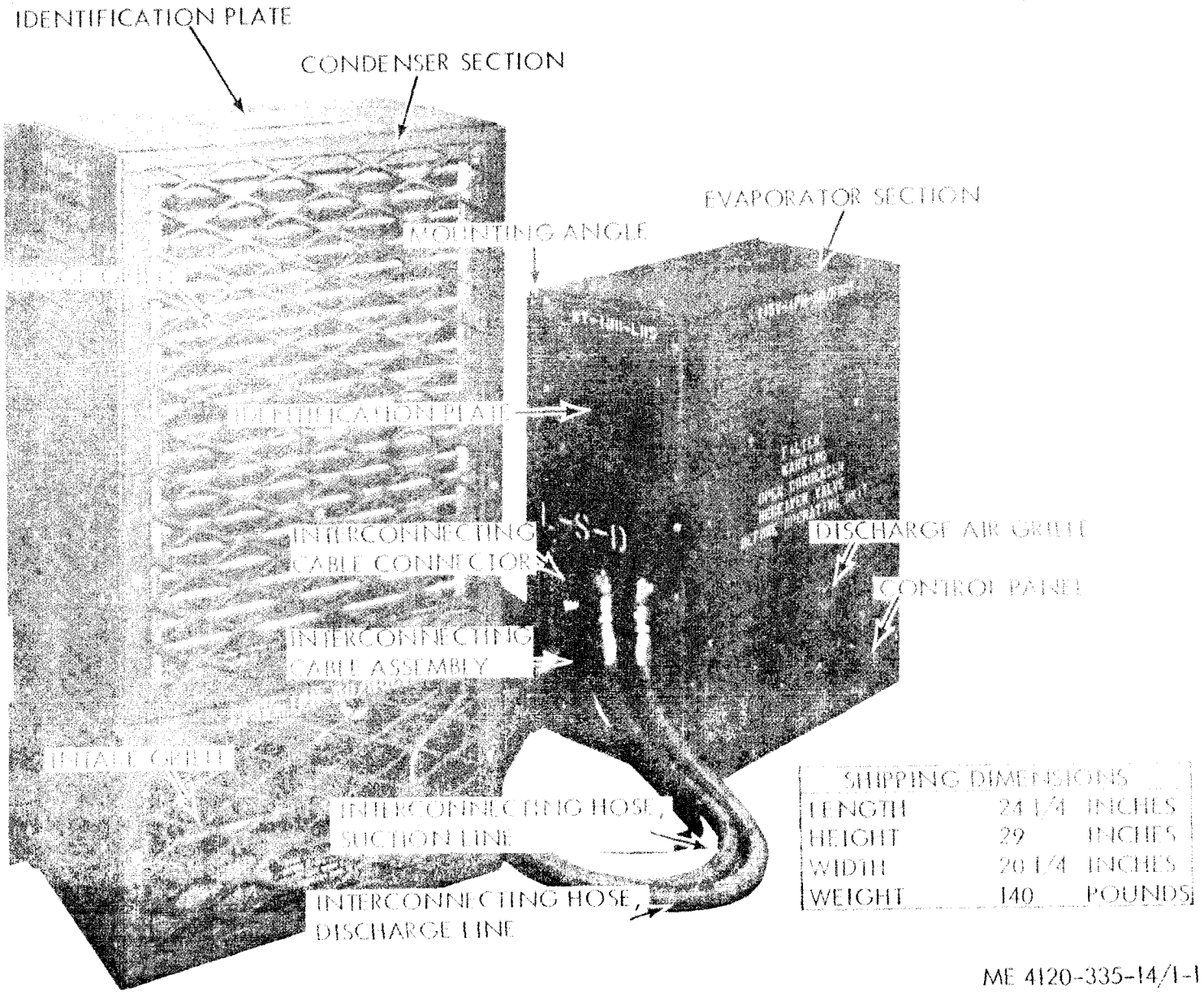


Figure 1-1. Air conditioner, right front three-quarter view with shipping dimensions.

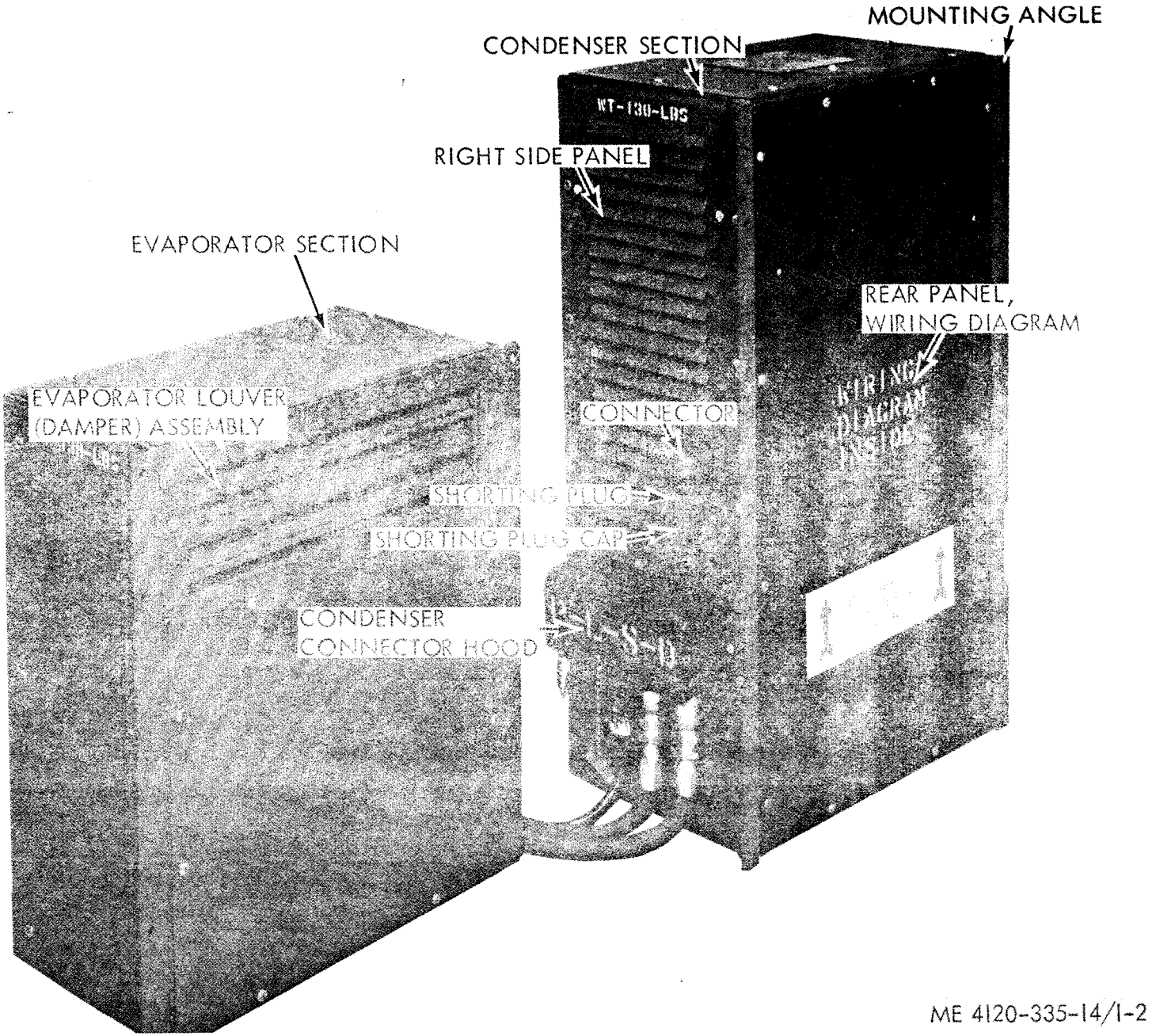


Figure 1-2. Air conditioner, left rear three-quarter view.

b. Evaporator Section. The evaporator section (fig. 1-1 & 1-3) contains intake and discharge grilles, the evaporator coil, fan motor and fan, expansion valve, air filter, air supply and discharge louver control, and electrical controls. The evaporator fan draws air over the evaporator coil. H eat from this air causes the liquid refrigerant to boil in the coil. The flow of liquid refrigerant is controlled by the throttling action of the expansion valve which is activated by thermal (heating) elements. When the refrigerant boils it is in a super-heated state and extracts heat and gives off cool air.

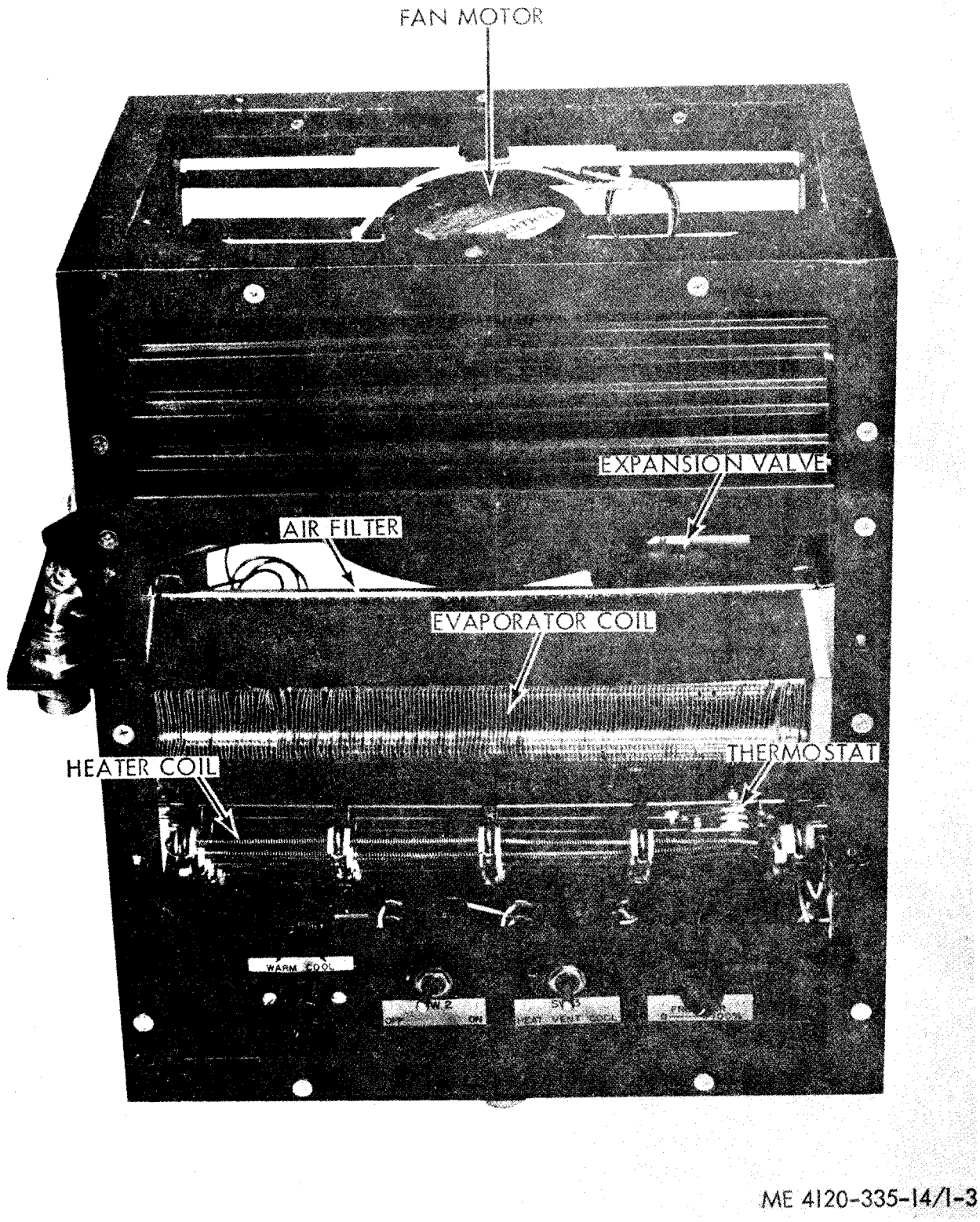


Figure 1-3. Air condition, evaporator section, front view, panels removed.

c. Condenser Section. The condenser section contains the intake and discharge grilles (fig. 1-1). the compressor. the condenser coil, condenser fan. condenser fan motor. fuse, terminal board, com - presser run and start capacitor, receiver, rectifier and compressor relay (fig. 1-4) and filter-drier, sight glass and receiver valve (fig. 1-5). The compressor draws in the super-heated refrigerant

vapor to **pass through the discharge valve port, into the compressor discharge line and enters the condenser. Air forced over the condenser coils by the condenser fan, condenses the refrigerant vapor to a liquid. This liquid, under high pressure, collects in the receiver tank and is admitted into the liquid refrigerant line and also passes through a sight glass. It then travels through a filter-drier to he filtered and flows to the expansion. valve to repeat the cycle.**

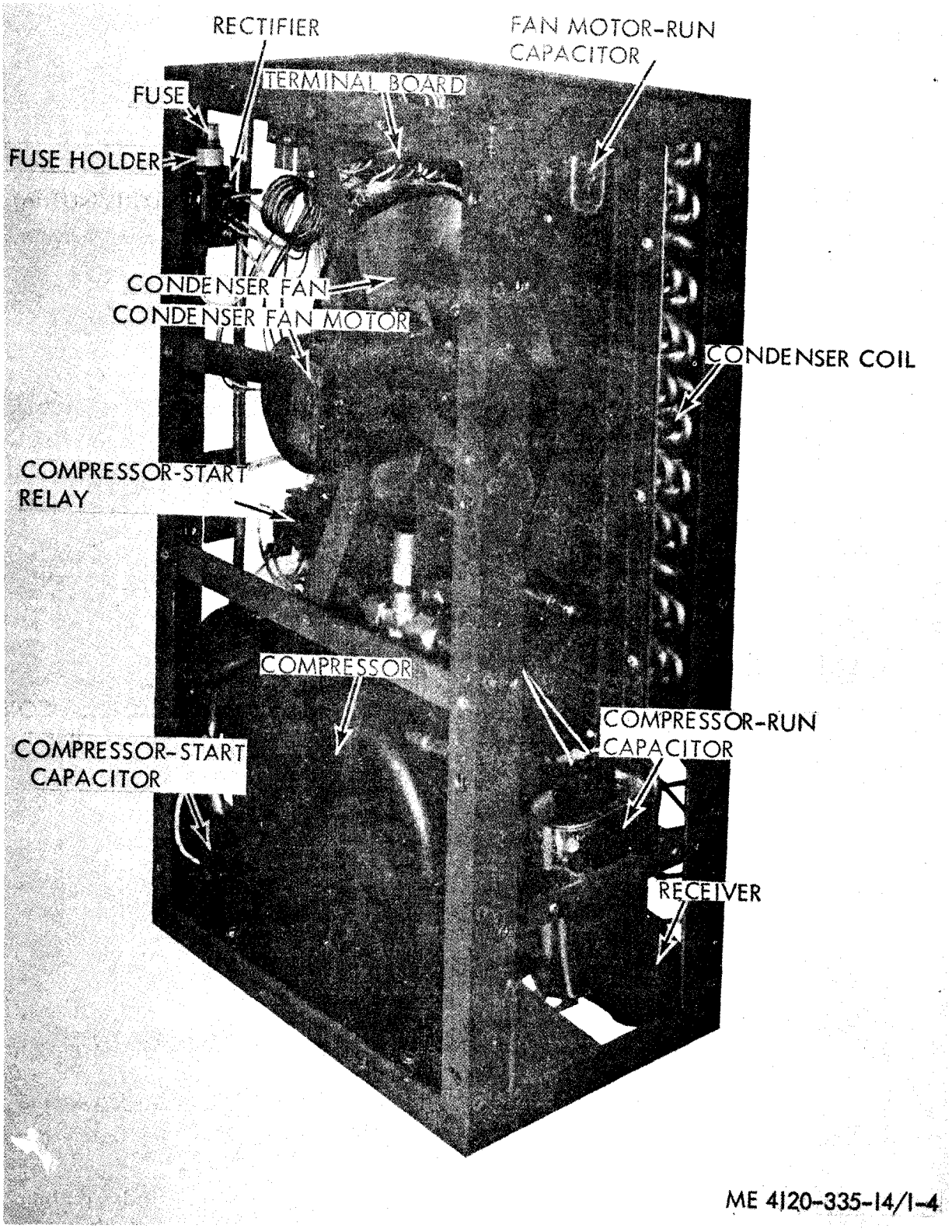


Figure 1-4. Air conditioner, condenser section, rear view, panels removed.

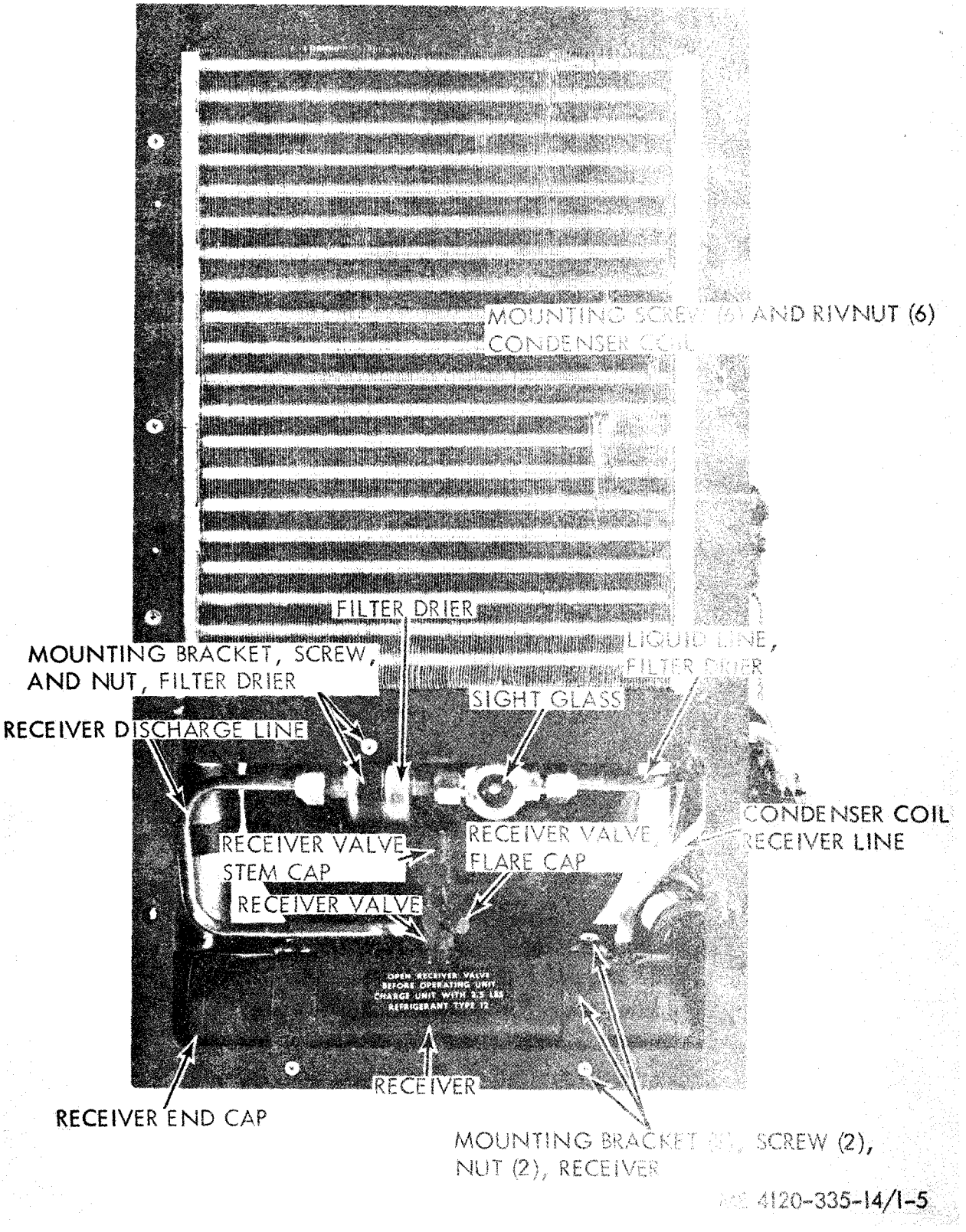


Figure 1-5. Air conditioner, condenser section, front view, panels removed.

1-6. Differnece in Models

This manual covers only the Therm-Air Model CE-6A-60A2 air conditioner. No known unit difference exists for the model covered by this manual.

1-7. Identification and Tabulated Data

a. Identification. The air conditioner has four identification plates.

(1) *Manufacturer's identification*

plates. **There are two manufacturer's identification plates. One is located on the top left side of the evaporator unit, the other is located on the top of the condenser unit. These plates specify nomenclature, model number, BTUH (British Thermal Unit Hours), serial number, contract number, date and weight.**

(2) *Blower motor plate.* **The blower motor plate is located on the top of the blower motor in the evaporator unit. This plate specifies horsepower, RPM, phase, hertz, volts, AMP, frame number, rating, rise and serial number.**

(3) *Compressor plate.* **The compressor plate** *is* **located on the side of the compressor in the condenser unit. This plate specifies manufacturer, model number, specification number, volts, phase, hertz, refrigerant, oil charge, oil type and place of manufacturer.**

b. Tabulated Data.

(1) Air conditioner.

cooling capacity . . . .6.754 BTU/HR
Heating capacity . . . . . 4,950 BTU/HR
Operating voltage . . . . . 115 V
Frequency . . . . . 50/60 Hertz
Evaporator air flow . . . . . 220 CFM
Condenser air flow . . . . . 570 CFM
Ventilating capacity . . . . . .213 CFM
Curent input (FL):
Cooling . . . . . l2.8 amps
Ventilating . . . . . l.34 amps
Power input:
Cooling l.4OKW
Ventilating . . . . . l7O KW

(2) *Condenser section.*

(4) Compressor.

Manufacturer . . . . . Welco Industries, Inc.
Model . . . .6 . . . . MIL-U-6-VAC-61 O
Bore . . . . . l½ in.
Stroke . . . . . ¾ in.
Displacement . . . .1.32.5 cu. in.
BTU/ HR 6,000
Refrigerant . . . . . R-12, 2.5 lbs.
Suction line ... . ½ in.
Discharge line . . . . . 3/8% in.
Horsepower 1
Volts . . . . . 11+5
Phase 1
Hertz 60
RPM 3450
Full load current . . . . . 8.1 amps±10%
Locked rotor current . . . . . 45 amps ± 310%
Protector . . . . . overload
Oil charge . . . . . 28 oz.

(b) Condenser coil.

Manufacturer . . . . . Bohn Aluminum & Brass CO.
Part number D13211E4766
Air side resistance @ 580 Ft./Min. face velocity . . . . . 0.8 in. of water
Saturated temperature of condenser . . . . . 155° F
Refrigerant R-12
Capacity @60°F DB to 125°F DB ..... 11,400 BTU/HR
Type, ... Tube and fin
Number of fins per in. 14

(c) Condenser fan,

Manufacturer . . . . . Torin Mfg. Co.
Part number A-23761-1
Pitch . . . . . 20°
operating RPM, ., ... 3450 Maximum
Standard air at .53 in. water static . . . . . 450 CFM Minimum

(d) Condenser fan motor.

Manufacturer . . . . . Welco Industries, Inc.
Part number 371.5-6
Volts . . . . . 115 VAC
Hertz 60
RPM 3450
Duty, , ., ... Continuous
Phase 1
Motor drive ..... Clock wise
Terminal protector .. . . . . Internal
Insulation . . . . . NEMA class H

(e) Filter drier.

Manufacturer . . . . . Tube Manifold Corp.
Part number MD-015-3
Drying capacity—lbs. of refrigerant
at 75° F . . . . . 14 lbs.
at 125° F . . . . . 14 lbs.
Water capacity—drops
at 75° F . . . . . 68 drops
at 125° F . . . . . 68 drops
Refrigerant flow @ 2 psi pressure drop . . . . . 2.0 tons
Filter area . . . . . 11 sq. in.

(f) Receiver.

Manufacturer . . . . . Tube Manifold Corp.
Part number . . . . . 1'.580
Withstanding internal pressure 300" psi
Withstanding hydrostatic pressure 1.500 psi

(g) Sight glass.

Manufacturer . . . . . Sporlan Valve Company
Part number, ... SA13FM
Refrigerant R-l2

(h) Shut-off line valve.

Manufacturer . . . Mueller Brass Company
Partnumber A-136l2
Type . . . . . Seal cap, 3-way. non backseating
Size . . . . . ½ in. 45° male flares

(3) *Evaporator Section.*

(a) Evaporator coil.

Manufacturer . . . . . Halstead & Mitchell Co.
Part number DE3-10-11
Pressure drop over dry coil . . . . . (). 104 in. of water at 220 CFM
Capacity at 60° F DB to to 125° FDB . . . . . 6,000 BTU/HR
Type . . . . . Tube and fin

(b) Evaporator fan.

Manufacturer . . . . . Tin-in Mfg. Co.
Part number A-23759-1
Number of blades 5
Pitch 400

RPM (maximum)	3600
Air flow (minimum)	200 CFM
Rotation	Clockwise

(c) Evaporator fan motor.

Manufacturer	Welco Industries, Inc.
Part number	3715-6
Volts	115 VAC
Hertz	60
RPM	3450
Duty	Continuous
Phase	1
Motor drive	Clockwise
Thermal protector	Internal
Insulation	NEMA class H

(d) Air filter.

Manufacturer	Research Products Corp.
Part number	X-4605
Clean resistance @ 350 FPM	.065
Average efficiency	60%
Dust holding capacity	213G

(e) Heater coil.

Manufacturer	Tuttle Electric Products, Inc.
Part number	H-713
Watts / element at 120 volts	417
Capacity	1251 at 120 volts / element

(f) Expansion valve.

Manufacturer	Sporlan Valve Company
Part number	CFE-½-G-BP / 20
Capacity @ 100 psi differential	6,000 BTU / HR
Refrigerant	R-12

(4) *Electrical controls.*

(a) Thermostat.

Manufacturer	Norwalk Thermostat Co.
Part number	A-22
Type	Non-adjustable
Normally closed contacts open @	110° F
Contact rating	1 amp minimum @ 115 VDC
Differential:	
Maximum (approx.)	15° F
Minimum (approx.)	5° F
Calibrating limits	±5° F
Angle of rotation	300°

(b) Thermostatic control switch (switch # 4).

Manufacturer	Ranco
Part number	C-12-5010
Range	60° to 98° F
Differential	3° ±½
Current capacity	1 amp at 115 VDC minimum

(c) Relay.

Manufacturer	Metals & Controls Corp.
Part number	6400-30-192
Contacts close at	23.9 amps, maximum coil current
Contacts open at	20.4 amps, minimum coil current
Rating	10 amps
Terminal type	Quick disconnect

(d) Power relay.

Manufacturer	Struthers Dunn, Inc.
Part number	219BBX134
Contact rating at 115 VAC	10 amps (minimum)
Maximum operating time	1 sec.
Maximum release time	1 sec.
Minimum life	10,000 switching hertz underload
Continuous operation at room temperature	103 VDC±10% unfiltered full wave rectified 115 VRMS 60 or 400 CPS AC
Coil	1 amp maximum at 103V DC unfiltered full wave rectified 115VRMS 60 or 400 CPS AC

(e) Toggle switch, heat-vent-cool (switch # 3).

Manufacturer	Cutler-Hammer
Part number	8502-K1, MS24525-21
Positions	"HEAT-VENT-COOL"
Current capacity at 28 VDC	
Lamp load circuit	5 amps
Resistive circuit	20 amps
Inductive circuit	12 amps
Current capacity at 60 & 400 Hertz	
Lamp load circuit	4 amps
Resistive circuit	15 amps
Inductive circuit	15 amps

(f) Toggle switch, power (switch # 2).

Manufacturer	Cutler-Hammer
Part number	8502-K9, MS24525-22
Switch positions	"OFF-ON"
Curent capacity @ 28 VDC	
Lamp load circuit	5 amps
Resistive circuit	20 amps
Inductive circuit	12 amps
Current capacity at 115V, 60 & 40 Hertz	
Lamp load circuit	4 amps
Resistive circuit	15 amps
Inductive circuit	15 amps

(g) Pressure switch.

Manufacturer	Penn Controls, Inc.
Part number	210AP-40-AN-5
Voltage	240 VAC, single phase
Full load current	8 amps
Locked rotor current	48 amps
Switch	Single pole, single throw, normally closed contacts, with a trip free manual reset

(h) Motor-run capacitor, compressor.

Manufacturer	General Electric Co.
Part number	49F6474
Terminal type	solder eyelet
Operating life	10,000 hrs. continuous
Working voltage	370 VAC
Capacitance value @ 25° C	25UF±10%
Operating frequency	60 CPS
Temperature	Capacitor must maintain 97% minimum capacitance over entire operating range (—30° to 70° C case temperature)

(i) Motor-run capacitor, condenser fan.

Manufacturer	General Electric Co.
Part number	49F643
Operating life	10,000 hours continuous
Voltage	330 VAC
Capacitance value at 25° C	8UF ±10%
Operating frequency	60 CPS
Temperature	Capacitor must maintain at least 97% capacitance over the entire operating range (—30° to 70° C case temperature)

(j) Capacitor, compressor start.

Manufacturer	Mallory Capacitor Co.
Part number	85508-3
Terminal type	Solder eyelet
Work voltage	280 VAC
Capacitance value	56 UF
Operating frequency	60 CPS
Ambient temperature	180° F through —40° F
Duty	Intermittent

(k) Rectifier.

Manufacturer	Texas Instrument, Inc.
Part number	B391
Input-volts	115 RMS
Output-volts	103 DC

(l) Junction rectifier, silicon.

Manufacturer	General Electric Co.
Part number	1N1695
Maximum allowable PRV	400
Maximum allowable RMS voltage	280
Maximum allowable continuous reverse DC voltage	400
Maximum allowable DC output	
100° C ambient	250 MA
50° C ambient	600 MA
Maximum allowable single hertz surge current	20 amps
Maximum full load forward voltage drop, full hertz average at@ 100° C	.60
Maximum leakage current at@ rated PRV hertz average at 100° C	.5 MA
Peak recurrent forward current	2 amps
Maximum operating temperature	+115° C
Sealed	Hermetically
Leads	Axial

(5) *Floor or vertical mounting.* Refer to figure 1-6 and 1-7 for floor or vertical mounting hole locations and dimensions.

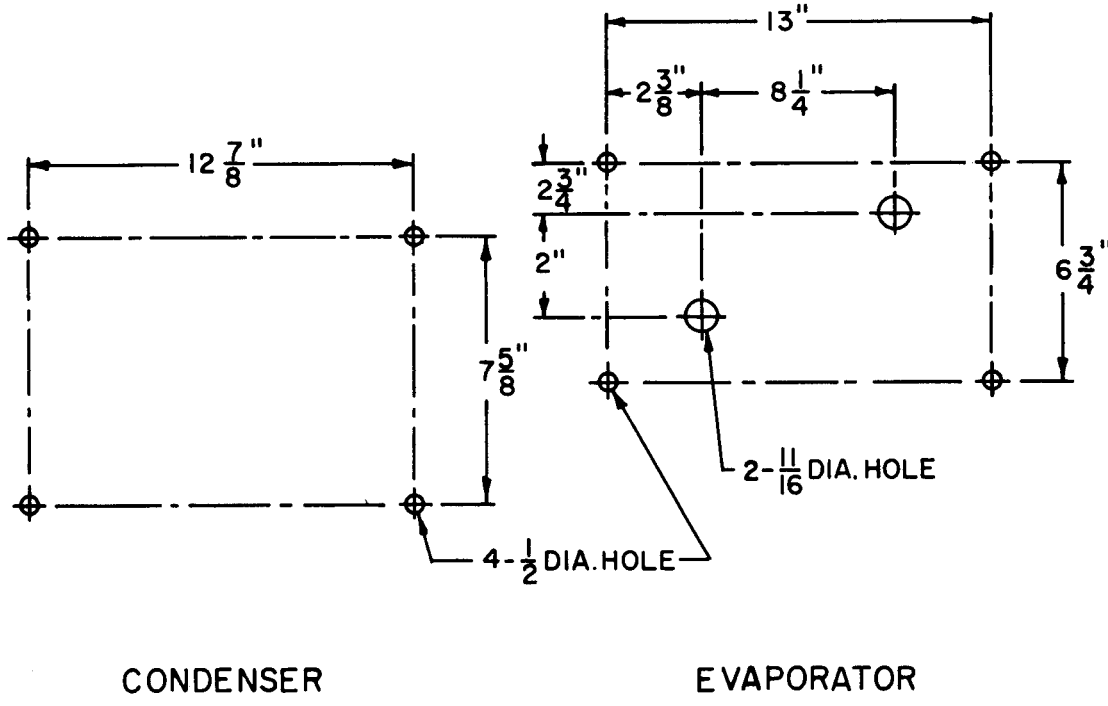
(6) *Overall dimensions and weights.*

(a) Evaporator.

Length	17 7/16 in.
Width	8½ in.
Height	18 in.
Weight	32 lbs.

(b) Condenser.

Length	17 9/16 in.
Width	9¼ in.
Height	26 in.
Weight	80 lbs.
Shipping weight	130 lbs.



ME 4120-335-14/1-6

Figure 1-6. Floor mounting diagram of condenser and evaporator.

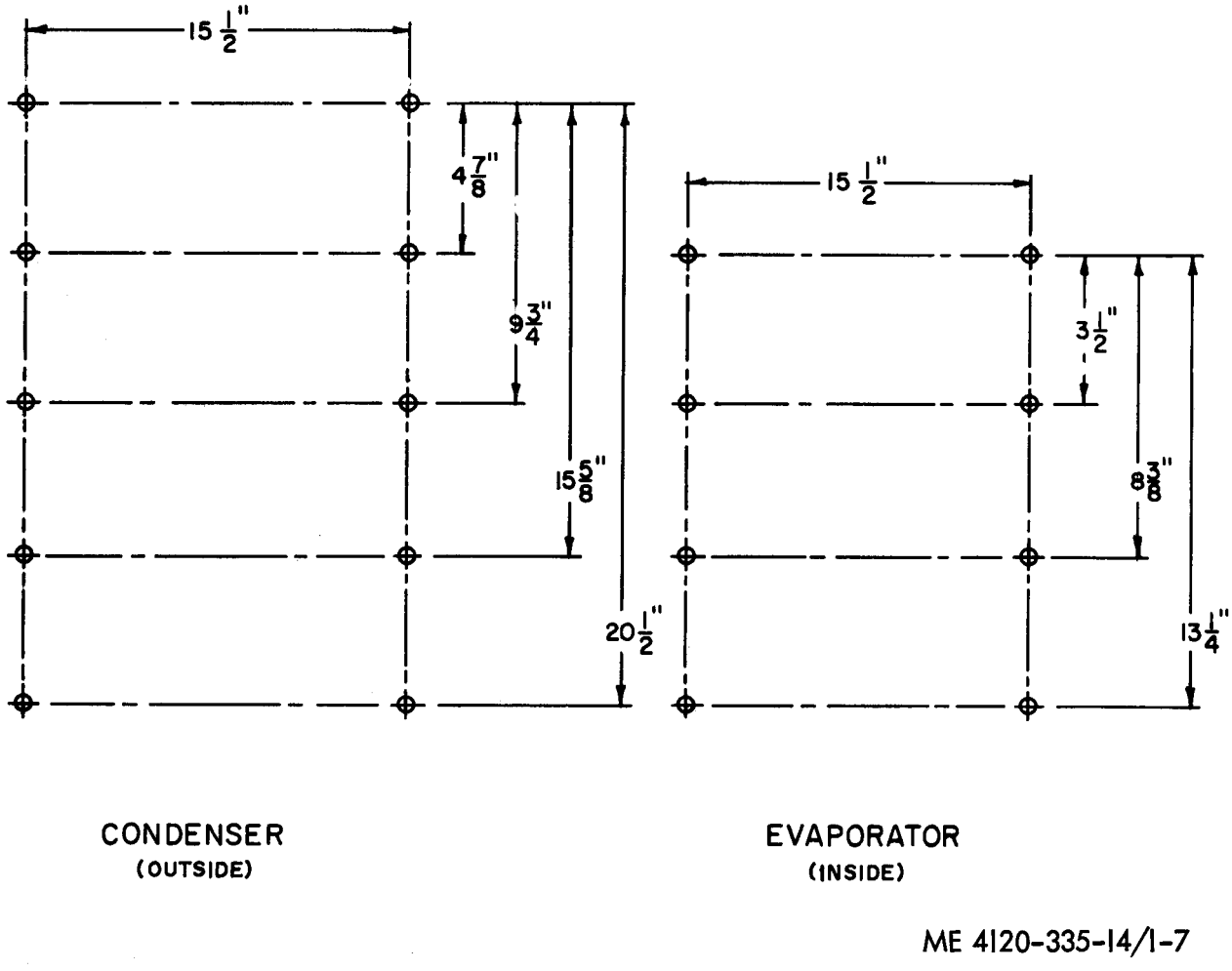


Figure 1-7. Wall mounting diagram of condenser and evaporator.

CHAPTER 2

OPERATING INSTRUCTIONS

Section 1. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Inspecting and Servicing Equipment

a. Inspection. Inspect entire air conditioner for signs of damage, missing or loose hardware and any defects that may have been incurred during shipment. Make a thorough check to see that all wiring, lines, and tubing are secure; and pay particular attention to the evaporator and condenser coils and main power receptacle connector. Be sure that all visible wiring and insulation is not frayed or broken. Check the evaporator and condenser fan motors for free rotation. Report all dam age and defects to organizational maintenance.

b. Servicing. Perform the daily preventive checks and services listed in table 3-1. Be sure all hardware is securely in place.

2-2. **Installation or Setting up Instructions**

a. General. Both the evaporator and condenser are fitted for mounting to a vertical wall or on a base. A layout of the holes required to mount the units on a vertical wall by means of the side brackets is given in figure 1-7. The layout for holes necessary for base mounting is given in figure 1-6. Care and judgement should be exercised in locating the units. The prime consideration for the condenser is that there should be free access for outside air to and from the condenser coil. Keeping in mind that intake air is through the expanded metal screen in front of the condenser section and that discharge is outward through the condenser coil, locate the unit so that there is a minimum of 14 inches of free space in front of the unit. If possible, do not place the unit so that prevailing winds blow toward face of the coil, and do not locate where intake air is likely to be laden with dust, dirt, soot, smoke or other debris. The evaporator section is similarly designed for base mounting or side-angle mounting to a vertical wall. Location of this unit should be determined mainly by the internal layout of the enclosure to be conditioned. As far as possible, locate the unit so that the conditioned air discharges toward the area most critically in need of cooling. (The direction of discharge can be controlled to some extent by adjustment of discharge air louvers. Installation should provide for easy access to the front of the unit in order that filters may be changed and that controls may be manipulated. Fresh air intake is through the back of the unit, which will necessitate a hole cut into the enclosure's wall. Some compromise may have to be made once the locations for each unit have been selected, since these relative locations are restricted by the length of the connecting refrigerant hosing and electrical cabling. The location of each unit must provide for an adequate flow of air to and from the unit. Before mounting either one of the units, check to see that the hoses will reach between the units.

b. Connections.

(1) Connect both ends of the larger refrigerant line to the fittings marked "S" on each of the two section. Use two wrenches, one to hold the fitting on the unit stationary, the other to tighten the coupling to approximately 35 ft. lbs. of torque.

Caution: **Do not allow the fitting on the unit to turn. Avoid kinking or twisting the hose.**

(2) Connect the smaller refrigerant hose to the fittings marked "D".

(3) Open the receiver valve. This valve is located in the condensing section immediately behind the air intake grille. (fig. 1-5). Remove the valve stem cap to expose the stem. Turn this stem counterclockwise as far as it will go and replace and tighten cap. A slight hissing sound may be heard during this process as the refrigerant is released from the tank into the system.

(4) Connect the electrical cable between the receptacles marked "L" with the female end of the cable going to the evaporator section. Since a time delay is not used, thereceptacle on each condensing unit must be shorted out with the plug, which is chained to the receptacle.

(5) Connect the power supply (4-wire cable). One end of this cable contains a female connector which is to be attached to the receptacle marked "P" on the condenser section. The other end of the cable is to be connected to the power supply.

(a) Set switch # 3 to "VENT" position and switch # 2 to "ON".

(b) Turn on power.

(c) Observe rotation of evaporator fan motor, (this should be the only fan operating at this setting). Rotation should be counterclockwise when looking down into the evaporator section. Double check by noting that air is being discharged out of the four discharge air grille louvers, just above the

improper, shut off power and check motor wiring.

(6) Check operations of controls as follows:

(a) Turn on power.

(b) Place switch # 3 in "VENT" position.

(c) Turn switch # 2 "ON. " The evaporator fan and nothing else should run.

(d) **Turn** switch # 1 counterclockwise as far as it will go. Place switch # 3 in "COOL" position. The evaporator fan should still be operating alone.

(e) Turn switch # 1 clockwise. The condenser fan and compressor should start. Check the condenser fan rotation. It should be clockwise when seen through the rear of the condenser section. Observe the sight glass. It should be clear and free of bubbles after a few minutes of operation. If operation is as indicated, unit is ready for service. If any malfunction is noted, consult the troubleshooting section of the manual before performing above steps.

Section II. MOVEMENT TO A NEW WORKSITE

2-3. Dismantling for Movement

If the system is to be moved a short distance, it is necessary only to disconnect the power supply, remove the interconnecting cables and refrigerant hoses, dismantle the mounting, and move to new location.

Caution: Units should be kept vertical at all times.

In the event that the unit is to be moved a considerable distance, it is advisable to pump down the refrigerant charge into the receiver in addition to performing the dismantling operations outlined above. To accomplish this, proceed as follows:

a. Remove cap from refrigerant valve stem located on receiver immediately behind condenser air intake grille.

b. Turn valve stem clockwise as far as it will go.

c. Turn thermostat to coldest setting and set switch # 3 on "COOL".

d. Turn switch # 2 "ON" and observe sight glass. Bubbles will soon appear. Continue compressor operation until bubbling diminishes and almost disappears. A slight bit of colorless liquid refrigerant will be noticed as well as a little oil. Just before bubbling and liquid refrigerant vanishes entirely, shut off unit.

e. Proceed with dismantling as outlined for short distance moving, refer to paragraph 2-3.

f. Crate unit, utilizing base-mounting bolts to secure sections to base of crate or skid.

g. Pack hoses and cables in crates with unit to avoid loss.

h. Fill voids in crate with shredded paper or similar shock absorbing material. Do not use straw or other material that may clog condenser and evaporator coils.

i. Include warning tag with shipment indicating necessity for opening receiver valve.

2-4. Reinstalling After Movement

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

Section II L CONTROLS AND INSTRUMENTS

2-5. General

This section describes, locates, and illustrates the function and purpose of the various controls and instrument of the air conditioner; refer to figure 2-1.

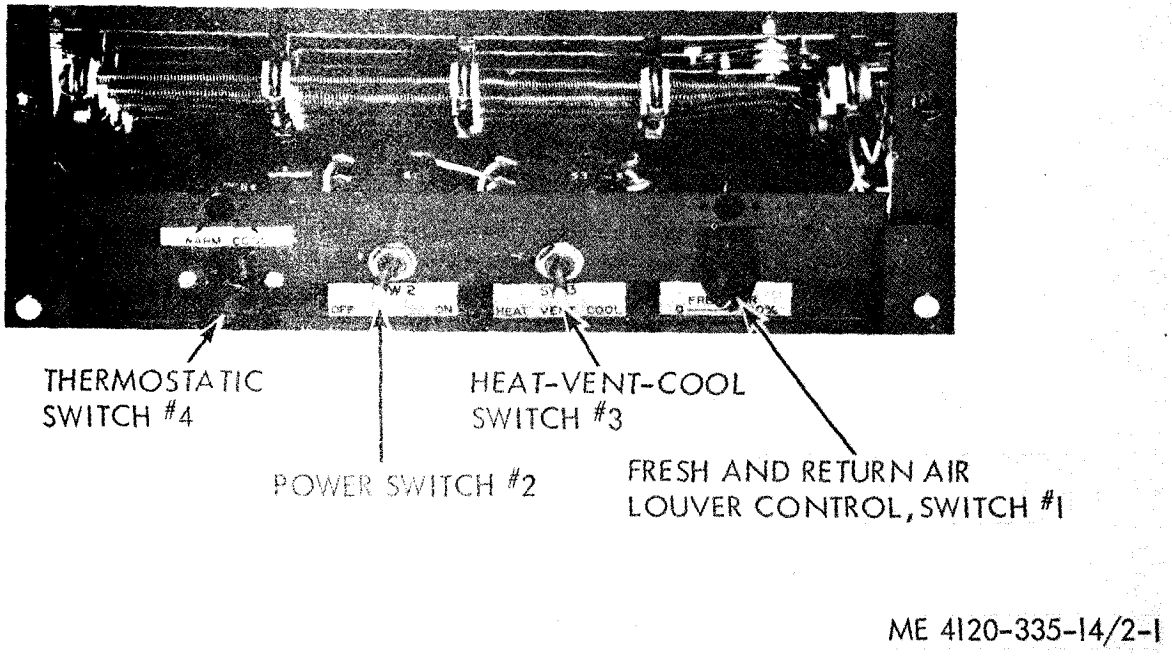


Figure 2-1. Air conditioner, evaporator section, controls and instruments.

2-6. Controls and Instruments

a. Switch # 1. **Switch # 1 controls the mixture of fresh and return air that is supplied to the evaporator system. It transmits rotary motion of the knob, via a bell crank, into linear motion which acting through a wire cable positions the interlocked fresh and return air louvers.**

b. Switch # 2. **Switch # 2 is the main power control to the unit. It is a double-throw, tow-position switch which makes or breaks the flow of single phase power to the evaporator fan and the common pole of the heat-vent-coo] switch.**

c. *Switch # 3.* **Switch # 3 is a double-throw, three-position switch** *serves* **as the system selector switch. In the center or "VENT"' position the switch makes no contacts and neither heating nor cooling apparatus operates (but evaporator fan may run by virtue of feed from switch # 2.) In the right or "COOL" position, single phase power is fed through the temperature rise side of the thermostat. In the "HEAT" position, the switch feeds single phase power through the temperature drop side of the thermostat.**

d. Switch # 4. **Switch # 4 is a thermostatic control switch which controls both the heating and cooling elements of the system, maintaining within the limits of the unit capacity, the temperature at which it is set. It has a single pole, double-throw action, switching one way on decrease in temperature, oppositely on increase in temperature. The temperature sensing bulb is attached to brackets, located in the return air stream.**

Section IV. OPERATION UNDER USUAL CONDITIONS

2-7. General

Instructions in this section are published for information and guidance of personnel responsible for operation of the air conditioner. It is essential that the operator knows 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.

2-8. Starting and Operating Instructions

a. *Preparation for Starting.*

(1) Check to see that instructions given in paragraph 2-2 have been carried out.

(2) Adjust Switch # 1 for desired outside and return air mixture.

(3) Put Switch # 3 on "VENT".

(4) Put Swtich # 2 "ON". (evaporator fan start)

b. Operating Instructions for Cooling.

(1) For cooling, put Switch # 3 on "COOL".

(2) Adjust Switch # *4* for desired tem. perature. (condenser fan and compressor start)

c. *Operating Instructions for Heating.*

(1) For heating, put Switch #'3 on "HEAT".

(2) Adjust Switch # 4 for desired temperature. (heater coil activates).

d. Operating Instructions for Ventilation.

(1) Refer to paragraph 2-8a. and follow starting instructions.

2-9. Stopping Instructions

To shut down the system it is necessary only to turn the on-off switch # 2 to "OFF".

Section V. OPERATION UNDER UNUSUAL CONDITIONS

2-10. Operation in Extreme Cold (Below 0°F (–18°C))

The air conditioner should not be used below 0°F. However, the system may be operated on the heating cycle in an ambient temperature as low as —65° F. The evaporator fan motor and condenser fan motor should not be operated below —65° F.

2-11. Operation in Extreme Heat

When the unit is required to operate with the condenser in an ambient temperature higher than 125° F, it will, as the temperature increases, suffer a reduction in cooling capacity and a related increase in power requirements until this increased power flow trips the overload devices protecting the compressor. When the outside air temperature is 60° or lower, opening the fresh air louver would make operation of the cooling system unnecessary.

2-12. Operation in Dusty or Sandy Areas

In areas where the air is 'laden with dust, dirt, smoke, soot and other debris, it is essential that the coils, filter, and fans be cleaned periodically so that they can perform efficiently. Since the condenser coil uses outside air, it requires cleaning more frequently than the evaporator coil which is protected from dirt by the filter. Both coils may be cleaned by brush, vacuum cleaner or high velocity air, but care should be taken not to damage the fins. The fan blades should also be inspected periodically and cleaned when the need arises to prevent imbalance and vibration, refer to chapter 3, section 3-17 a. The air conditioner air filter provided in this unit is cleanable and reusable. It may be inspected by removing the front evaporator panel, and sliding the filter from the retainer guide. If dirty, service the filter, refer to paragraph 3-156.

2-13. Operation Under Rainy or Himid Conditions

In areas of high humidity the following precautions should be followed to provide maximum protection to the unit and to assure efficient operation.

a. Keep all inlet and outlet air vent doors shielded from the rain.

b. Keep all electrical components clean and dry.

c. Inspect the condenser and evaporator coils daily for dirt and corrosion. Clean as necessary.

d. Inspect drain tube daily to be sure that it is not restricted. Clean as necessary.

e. Paint all surfaces where the paint is chipped, peeled or worn.

2-14. Operation in Salt Water Areas

For precautions to be followed while operating in salt water areas refer to paragraph 2-13.

2-15. operation in Snow

For precautions to be followed while operating in snow refer to paragraphs 2-10, 2-12 and 2-13.

2-16. operation in Mud

For precautions to be followed while operating in mud refer to paragraphs 2-12 and 2-13.

2-17. operation at High Altitudes

There are no special instructions regarding operation and servicing at high altitudes except that special care be taken to keep air filters clean. Inspect filters daily.

Section VI. OPERATION OF MATERIAL USED IN CONJUNCTION WITH THE EQUIPMENT

2-18. General

This section is not applicable to the air conditioner model CE-6A-60A2.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

3-1. Special Tools and Equipment

No special tools and equipment are required for the air conditioner.

3-2. Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-4120-335-24P.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-3. General

Necessary preventive maintenance checks and services to be performed at the organizational level are listed and described in table 3-1. Item numbers indicate sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, and to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies will be recorded, together with corrective action taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

Table 3-1. Preventive Maintenance Checks and Services

B — Before Operation; D — During Operation; A — After Operation; W — Weekly; M — Monthly; Q — Quarterly

Item number	Interval: Operator: Daily P	Interval: Operator: Daily D	Interval: Operator: Daily A	Interval: Operator: W	Interval: Org.: M	Interval: Org.: Q	Item to be Inspected	Procedure	Reference
1	X						Condenser discharge grille.	Inspect for loose mounting and obstruction	
						X		Remove any obstruction; tighten loose screws.	para 3-9
						X		Replace a damaged or defective grille.	para 3-9
2	X						Louver assemblies	Inspect for loose mountings and obstruction	
						X		Remove obstruction; tighten loose hardware	para 3-8
						X		Replace a damaged or defective louver.	
3	X						Interconnecting cable connectors.	See that cable connectors make firm, secure contact. Tighten or adjust as necessary.	para 3-8.
						X		Replace defective connectors.	para 3-33.
4	X						Refrigerant sight glass.	After running 15 minutes in maximum cooling check for bubbles or milky flow indicating low refrigerant charge; check for yell color which indicates presence of moisture	para 3-36.
5	X	X					Air conditioner drain.	Inspect drain for obstruction ; remove obstruction as necessary.	
6	X					X	Control panel	Check for damage, secure mounting, a proper operation.	
						X		Tighten loose hardware.	para 3-12.
								Check for damage to controls, junction box, control module; check all wiring for worn frayed condition.	
						X		Replace as necessary.	para 3-12.

Table .7-1. Preventive Maintenance Checks and Services—Continued

B — Before Operation A — After Operation M – Monthly
D – During **Operation** **w — Weekly** **Q – Quarterly**

Item number	Interval: Operator Daily B	Operator Daily D	Operator Daily A	Operator W	Org. M	Org. Q	Item to be Inspected	Procedure	Reference
7						X	Air filter	Clean as necessary.	para 3-15.
8	X			X		X	Condenser intake and discharge grilles.	Inspect for insecure mounting and proper operation. Replace as necessary.	para 3-10 and 3-9.
9	X					X	Evaporator and condenser coils.	Check tubing for dirt, leaks, obstructions, and damage. Clean as necessary. Be careful not to damage fins.	para 3-35.
						X		Check tubing connections for leaks and damage.	
10		X					Evaporator and condenser fans.	Check for damage and abnormal vibration.	para 3-30 and “-29.
						X		Check motor for signs of overheating. Clean dirty fan blades.	
11		X				X	Heater coil and wiring,	Check for damage and breaks in wiring and insulation.	para 3-31.
				X				Tighten loose connections.	
12						X	Louver (vent) and louver cable	Inspect for insecure mounting and proper operation. Work control knob manually to insure proper operation.	para 3-8.
								Note. During operation, observe for unusual noise vibration, failure to deliver full capacity of cooling 01 beating, and failure to respond to controls.	

Section III. TROUBLESHOOTING

3-4. General

This section provides information in diagnosing and correcting unsatisfactory operation or failure of the air conditioner at the organizational level. Malfunctions which may occur are listed in table 3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

Table 3-2. Troubleshooting

Malfunction	Probable Cause	Corrective Action
1. Air conditioner fails to operate.	a. Main power cable disconnected.	a. Connect power cable.
	b. Loose electrical connections.	b. Tighten connections.
2. Air conditioner noisy.	a. Compressor oil level incorrect.	a. Report to direct support maintenance.
	b. Compressor defective.	b. Report to direct support maintenance.
	c. Condenser fan bent or broken.	c. Replace bent or broken condenser fan. (para 3-18).
	d. Evaporator fan bent or broken.	d. Replace bent or broken evaporator fan. (para 3-17).
3. Evaporator fan fails to operate.	a. Motors not receiving electrical power.	a. See Item 1 above.
	b. Faulty Switch No. 2.	b. Replace Switch No. 2. (para 3-25).
	c. Loose connections between motor and power supply.	c. Check for and tighten loose connections.
	d. Fan blade binding.	d. Relieve binding.
	e. Fan motor too hot and overloads open.	c. Test fan motor. (para 3-17).
	f. Burned out fan motor.	f. Replace fan motor (para 3-17).
	g. Power relay defective.	g. Replace defective motor relay (para 3-27).
4. Fan rotation wrong.	Wrong motor wiring.	Check wiring diagram (fig. FO-1).
5. Condenser fan fails to operate..	a. Switch No. 3 not on "COOL"	a. Put switch No. 3 on "COOL"
	b. Switch No. 4 not set at low enough temperature	b. Set switch No. 4 on "COOLER".
	c. Loose connection in wiring.	c. Check for and tighten loose connections.
	d. Defective power relay.	d. Replace power relay (para 3-27).
	e. Defective selector switch, switch No. 3.	e. Replace switcb (para 3-25)
	f. Fan blade binding.	f. Relieve binding.
	g. Fan motor too hot and overloads open.	g. Test fan motor (para 3-18).
	h. Burned out fan motor.	h. Replace fan motor (para 3-18).
6. Insufficient cooling.	a. Receiver valve closed.	a. Open receiver valve.
	b. Insufficient air output	b. Correct condition see item 7.
	c. Evaporator fan motor defective.	c. Replace evaporator motor. (para 3-17).
	d. Condenser fan motor defective.	d. Rep lace condenser fan motor (para 3-18).
	e. Compressor defective.	e. Report to direct support maintenance.
	f. Thermostat defective.	f. Report to direct support maintenance.
	g. Low on refrigerant.	g. Report to direct support maintenance.
	h. Filter drier clogged.	h. Report to direct support maintenance.
7. Air output volume insufficient.	a. Dirty filter.	a. Clean filter (para 3-15).
	b. Improper evaporator fan rotation.	b. Check and correct phasing (para 3-17).

Table 3-2. *Troubleshooting (cont.)*

Malfunction	Probable Cause	Corrective Action
	c. Iced or dirty evaporator coil.	*c.* Report to direct support maintenance.
	d. Fan blade off shaft.	*d.* Replace fan blade (para 3-17).
	e. Fan motor not operating.	*e.* Refer to paragraph 3-17.
	f. Air intake blocked.	*f.* Remove obstruction from intake.
8. Heater fails to operate when evaporator fan operates.	a. Switch No. 3 not on "HEAT".	*a.* Put switch No. 3 on "HEAT"'
	b. Switch No. 4 not set high enough.	*b.* Turn switch No. 4 counter wise.
	c. Defective power relay.	*c.* Replace relay (para 3-27).
	d. Loose connections	*d.* Check for and tighten loose connections.
	e. Burned out heating coil element(s).	*e.* Replace heating coil element (para 3-31).
9. Compressor fails to operate.	*a.* Switch No. 3 not on "COOL".	*a.* Put switch No. 3 on "COOL"
	b, Switch No. 4 not set at low enough temperature.	*b.* Set switch No. 4 to "COOLER'".
	c. Loose connection in wiring.	*c.* Check for and tighten loose connections.
	d. Defective power relay.	*d.* Replace power relay (para 3-27).
	e. Defective selector switch, switch No. 3.	*e.* Replace switch (para 3-25).
	f. Compressor defective.	*f.* Report to direct support maintenance.
10. Cooling excessive in cooling position.	*a.* Thermostatic expansion valve defective.	*a.* Report to direct support maintenance.
	b. Power relay defective.	*b.* Replace power relay, (para 3-27).
	c. Heater element defective.	*c.* Replace heater element (para 3--31).
	d. Heater overtemperature protective defective.	*d.* Replace heater over temperature protector (para 3-24).
	e. Thermostat defective.	*e.* Report to direct support maintenance.
11. Louvers fail to operate.	*a.* Bent linkage causing bind.	*a.* Straighten linkage.
	b. Defective control.	*b.* Replace control (para 3-26).
	c. Defective louver.	*c.* Replace louver (para 3-8).
	d. Foreign object in louver blades.	*d.* Remove foreign object from blades.

Section IV. ,MAINTENANCE OF AIR CONDITIONER

3-5. General

The condenser and evaporator sections are separately housed within metal panels on three sides, top and bottom. In the condenser section, the coil and receiver are protected by an open screen which is attached to the front of the unit. The panels are provided with stud fastener receptacles which enable the panels to be removed easily for access to internal components. The evaporator section contains louvers at the top front and rear which permit fresh air to be drawn through the unit or allows the air in the room to be recirculated. Both louvers operate from a single control and are designed so when one is closed the other is open, or both can be partly open.

Section V. ACCESSORY ITEMS

3-6. Dust Caps and Plugs

a. *Removal.* The connector receptacles, located on the side of the condenser and evaporator units, have dust caps which screw on to the receptacles. The refrigerant interconnecting hoses are plugged when not in use. Unscrew caps or plugs to remove.

b. *Inspection.* To inspect dust caps and plugs, wipe with a clean dry cloth and check for thread wear, cracks, breaks, corrosion or other defects. Replace dam aged or defective cap as necessary.

Section VI. PANELS

3-7. Condenser and Evaporator Panels

a. Removal. Refer to figure 3-1 and remove the panels.

b. Cleaning and Inspection.

(1) Clean the panels with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, dents, loose or missing mounting hardware or other defects.

(3) Replace a damaged panel as necessary.

c. Installation. Refer to figure 3-1 and install the panels.

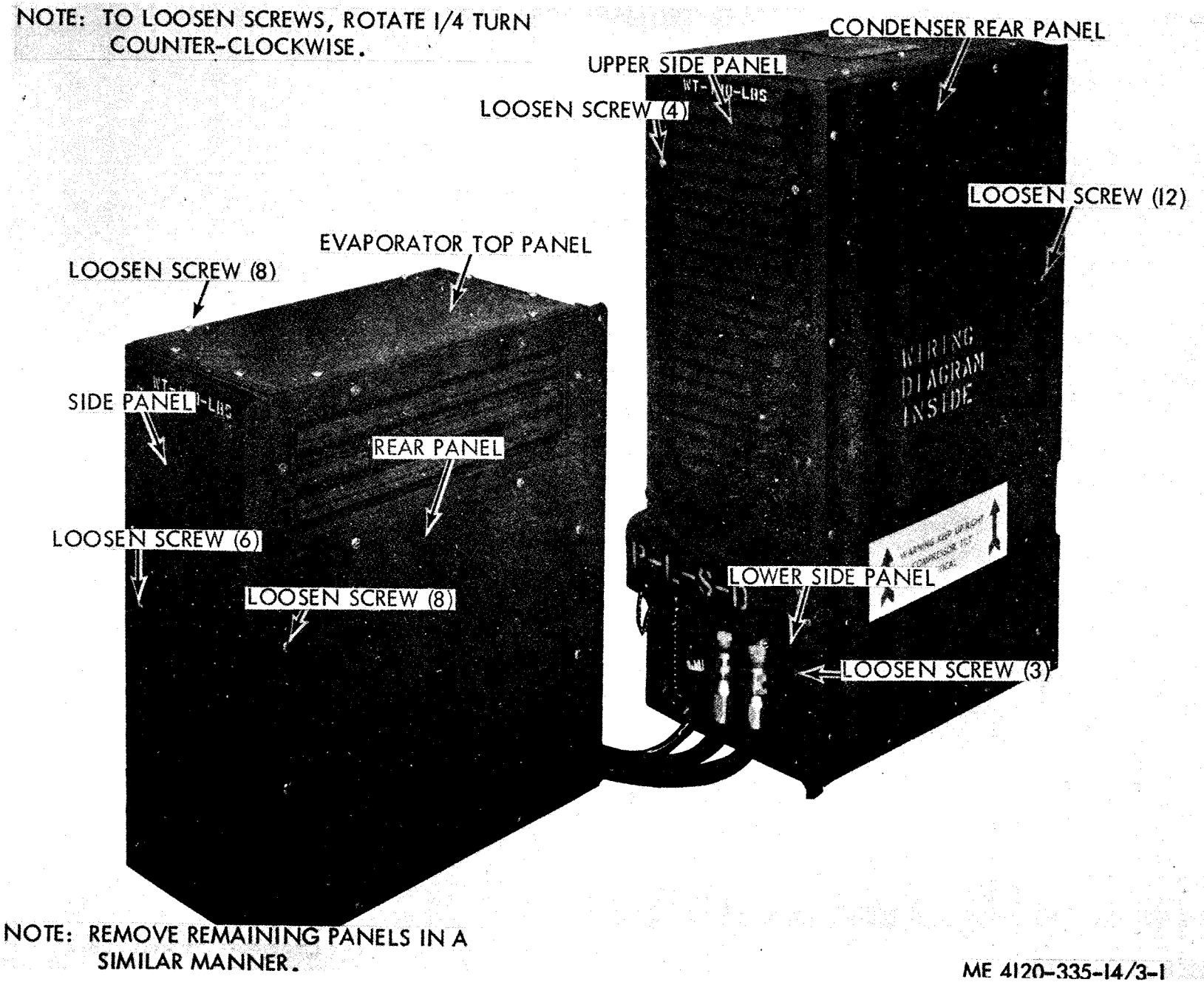


Figure 3-1. Panels, removal and installation.

3-8. Louver Assembly

a. ***Service. The*** **louver assembly Should require no service other than an occasional drop of oil if the hearing surface begins to bind the mechanism. The bearing surface should be cleaned and a drop of oil put on any surface where friction might develop.**

b. Removal.

(1) **Refer to figure 3-1 and remove front, rear, top, and right end evaporator panels.**

(2) Refer to figure 3-3 and remove the rod linkage control and wire control cable from the upper section of the louver assembly.

(3) Refer to figure 3-2 and slide out front and rear louver sections.

(4) Remove cable mounting clamp.

(5) Refer to figure 3-3 and disconnect the louver control mounted on the control panel.

(6) Remove the control and bell crank louver control (cable) from the evaporator assembly, (fig. 3-2 and 3-3).

c. ***Installation.***

(1) **Refer to figure 3-3 and install the louver control in the control panel.**

(2) Install control cable and clamp.

(3) Refer to figure 3-2 and mount front louver section.

(4) Refer to figure 3-2 and mount rear louver section.

(5) Refer to figure 3-3 and install rod linkage control.

(6) Refer to figure 3-1 and replace panels.

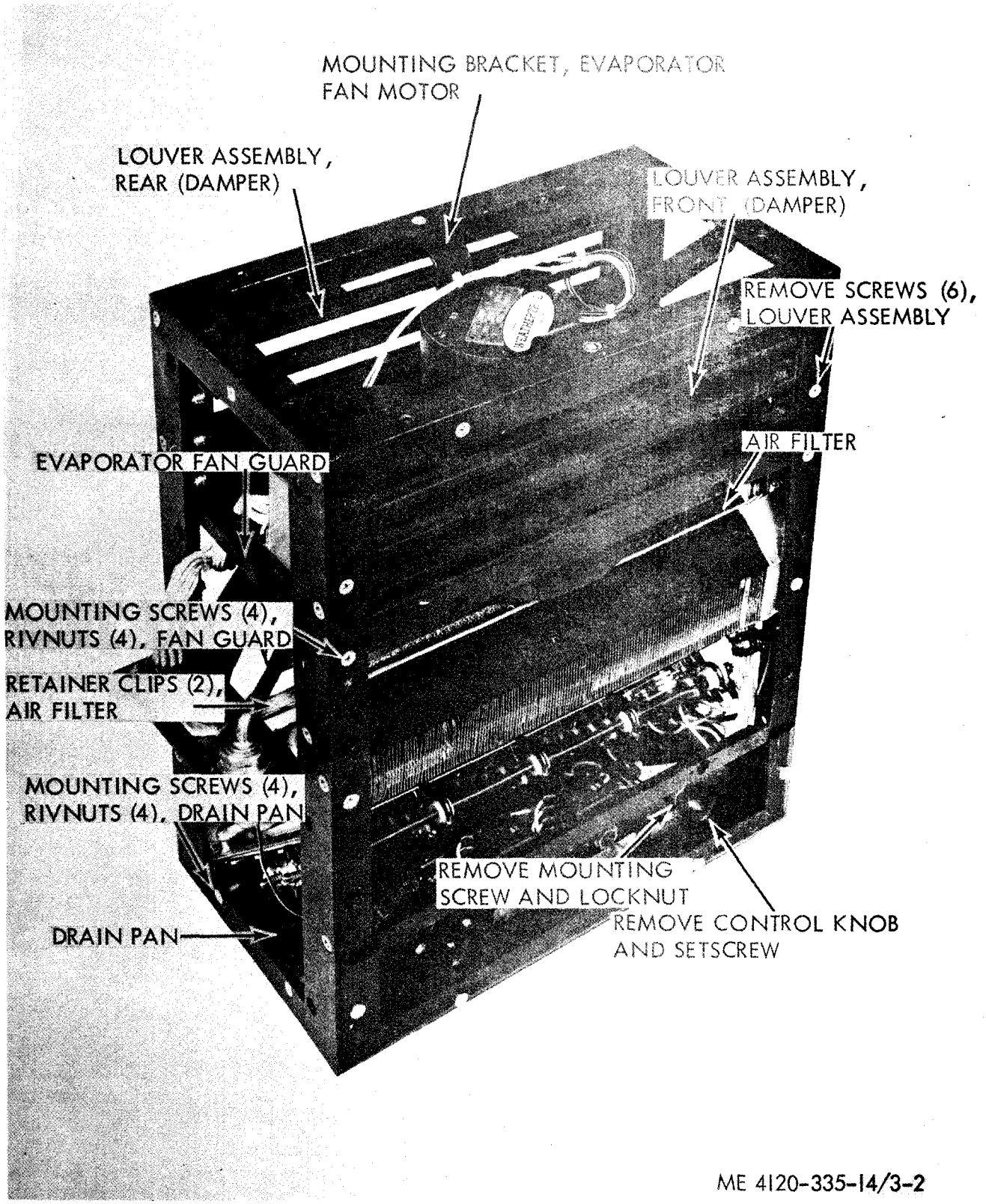


Figure 3-2. Air conditioner, evaporator louver, fan guard, air filter, and drain pan, removal and installation.

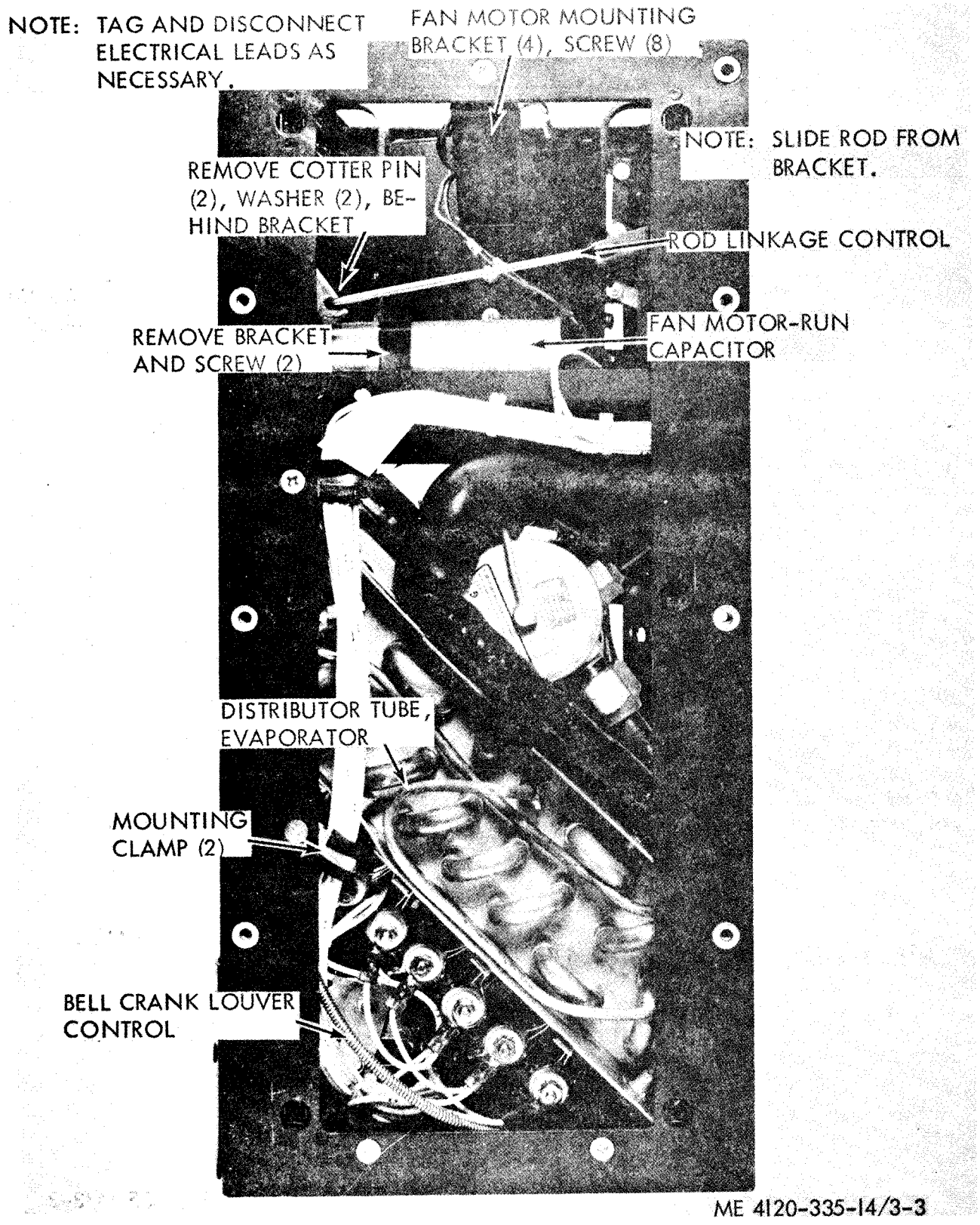


Figure 3-3. Evaporator section, louver and jan motor-run capacitor, removal and installation.

3-9. Condenser Discharge Grille

a. Removal. Refer to figure 3-4 and remove the condenser discharge grille.

b. Cleaning and Inspection.

(1) Clean the grille with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, dents, loose or missing mounting hardware or other defects.

(3) Replace a damaged condenser discharge grille as necessary.

c. *Installation.* Refer to figure 3-4 and install condenser discharge grille.

3-10. Condenser Intake Grille

a. Removal. Refer to figure 3-4 and remove the condenser intake grille.

b. Cleaning and Inspection.

(1) Refer to paragraph 3-9 *b (1)* and use same procedure to clean intake grille.

(2) Refer to paragraph 3-9 *b* (2) and use same procedure to inspect intake grille.

(3) Replace a damaged condenser intake grille as necessary.

c. *Installation.* Refer to figure 3-4 and install condenser intake grille.

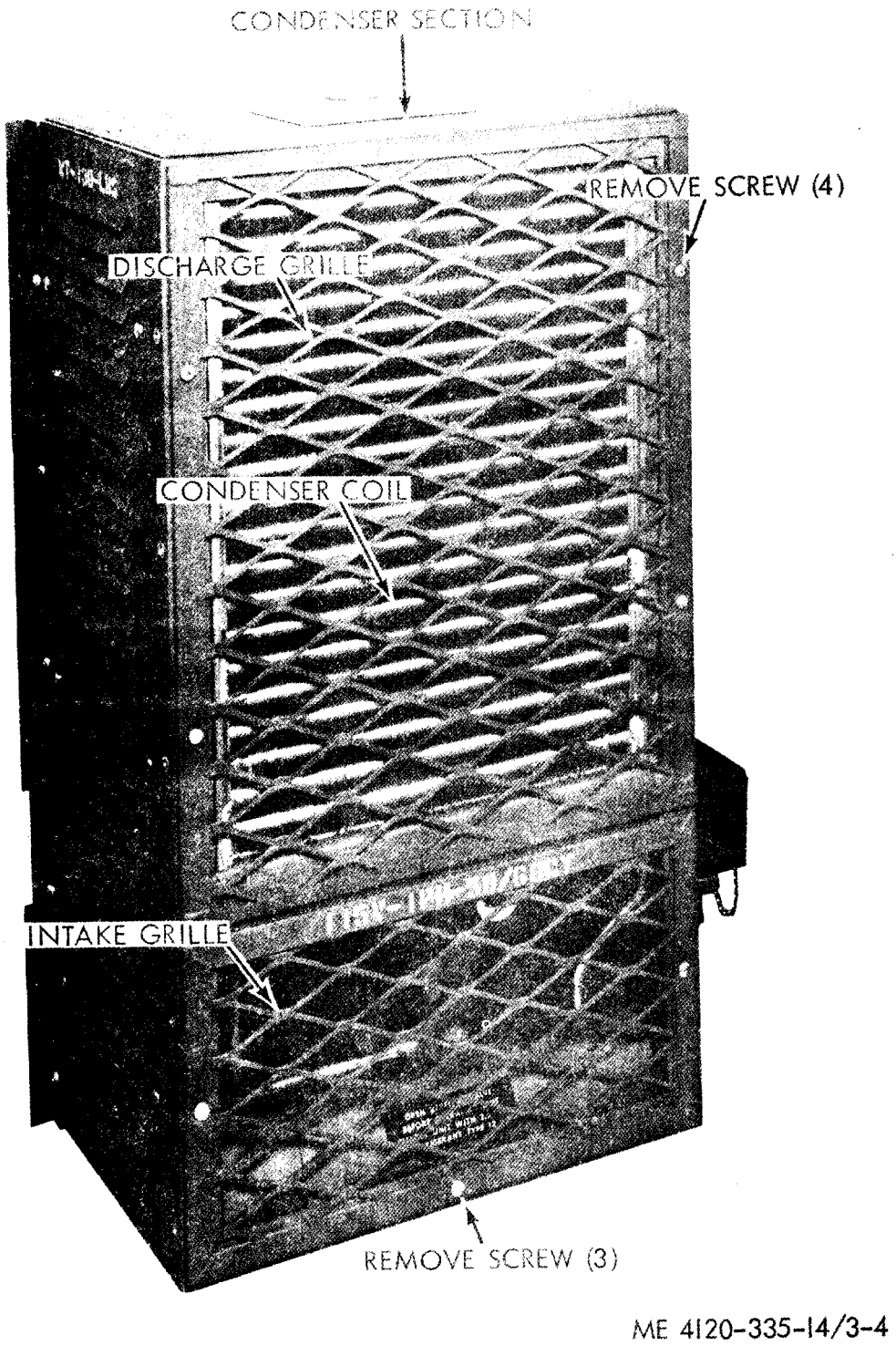


Figure 3-1. Condenser grilles, removal and installation.

3-11. Evaporator and Condenser Hoods

a. Removal. Refer to figure 3-5 and remove the evaporator or condenser hood.

b. Cleaning and Inspection.

(1) Wipe the hood with a clean cloth dampened slightly with an approved cleaning solvent.

(2) Inspect for breaks, cracks, dents, loose or missing mounting hardware or other defects.

(3) Replace a damaged hood as necessary.

c. Installation. Refer to figure 3-5 and install the hood.

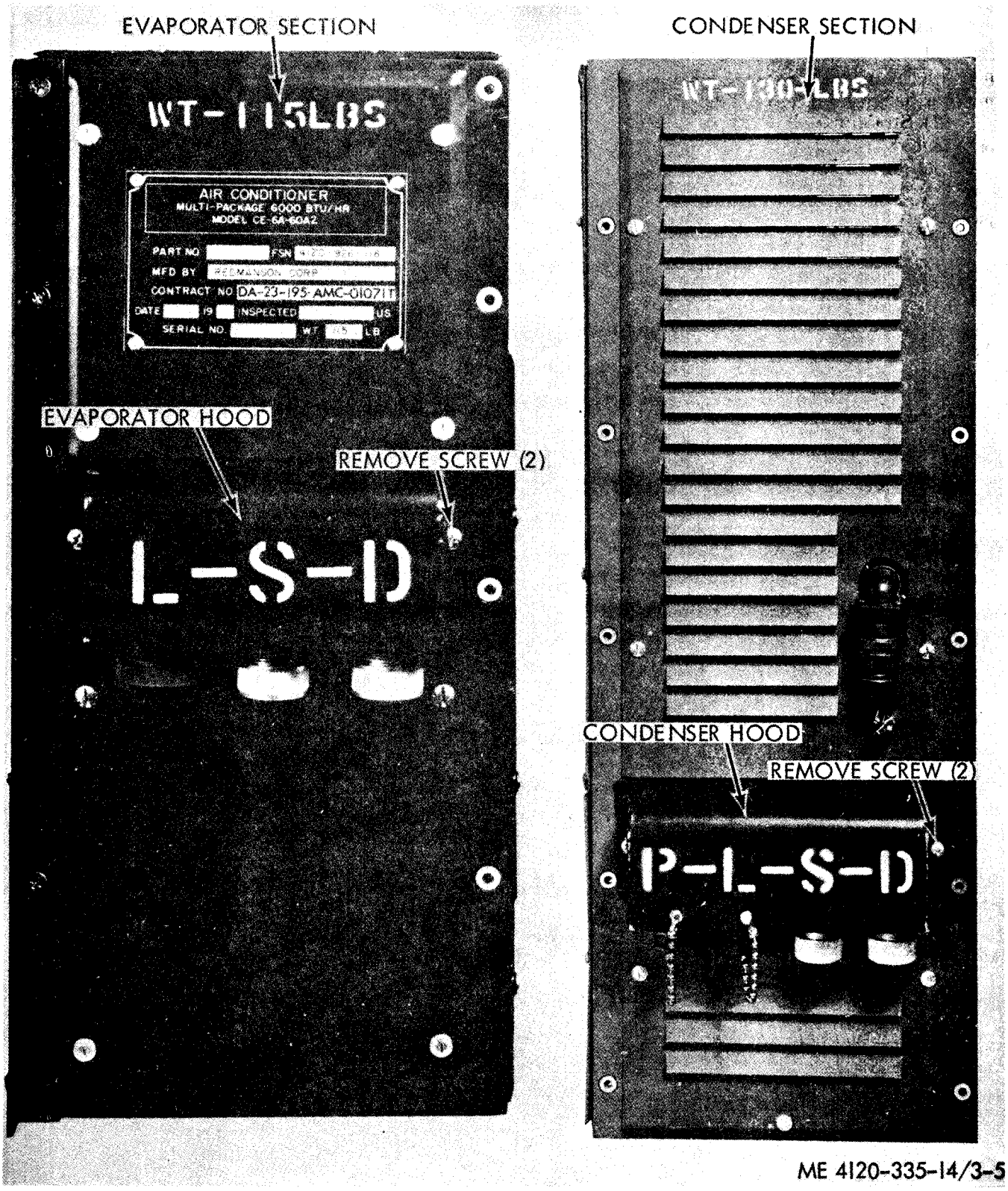


Figure 3-5. Evaporator and condenser hood, removal and installation.

3-12. Control Panel

a. ***Inspection.***

(1) Refer to figure 3-6 and inspect control panel for dents, breaks, cracks and damaged or **missing hardware.**

(2) Straighten all dents and replace damaged or defective control panel or hardware as necessary.

b. ***Removal.***

(1) Refer to figure 3-6 and remove front panel.

(2) Refer to paragraph 3-8 and disconnect ***bell*** crank louver control (cable) from switch #1.

c. Installation

(1) Refer to figure 3-6 and replace control **panel.**

(2) Refer to paragraph 3-8 **and connect** control cable to switch # 1.

(3) Refer to figure 3-6 and **replace front** panel.

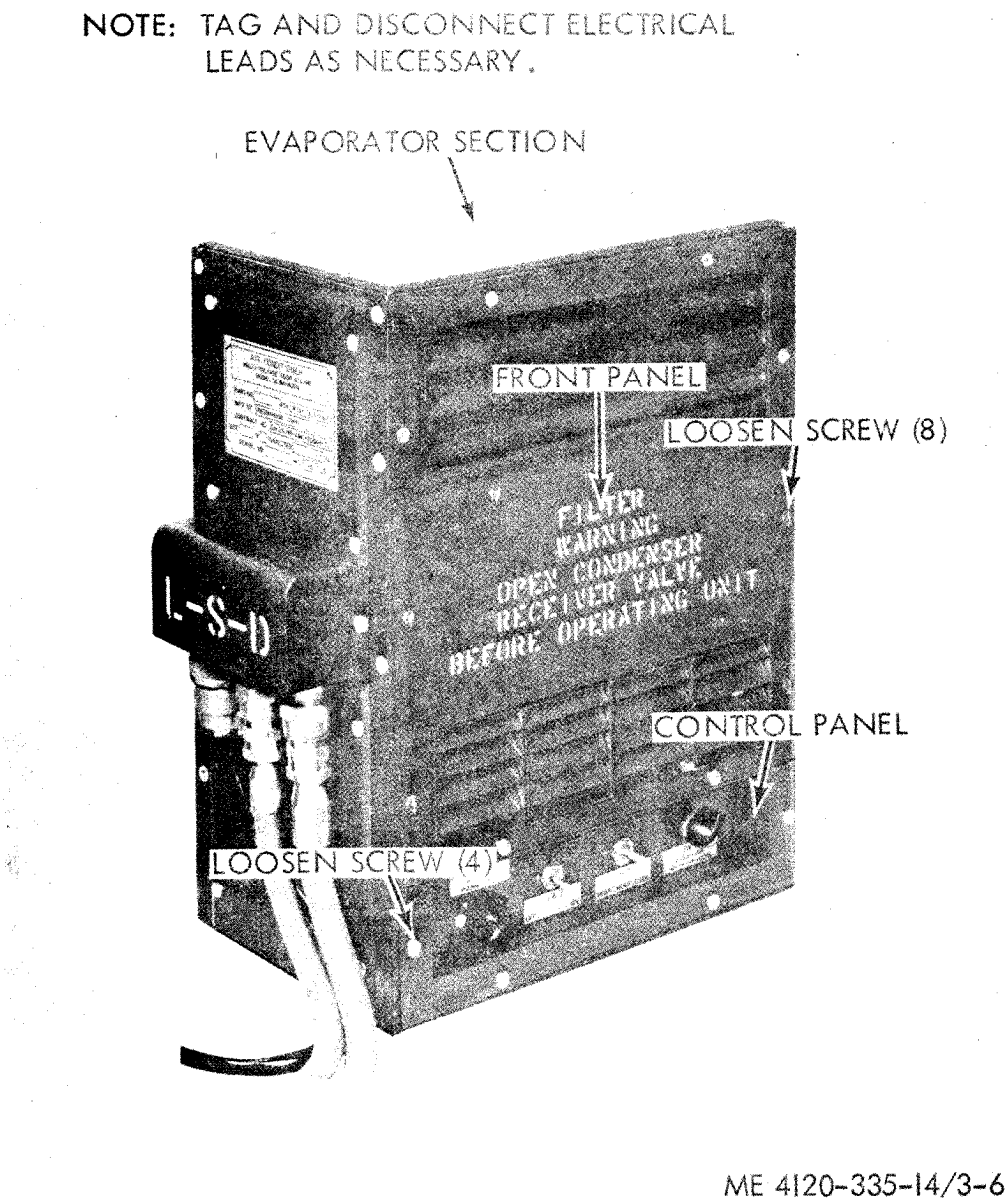


Figure 3-6. Evaporator front panel and control panel. removal and installation.

3-13. Stud Fastcner Receptacles

a. Removal

(1) Remove required panel.

(2) Drill out rivets holding receptacle to the condenser or evaporator angle frame. Remove receptacle.

b. Installation

(1) Place fastener on frame and while holding it in place. insert the two rivets which will secure it to the frame.

(2) Replace panel and check for tightness.

Section VII. IDENTIFICATION AND DATA PLATES

3-14. Identification and Data Plates

a. *Inspection.* Inspect identification or data plate for chipped paint, cracks, breaks, and dents. Replace as necessary.

b. *Removal.*

(1) Refer to figures 1-1 and 3-1 and remove panel upon which the identification or data plate is secured.

(2) Remove damaged plate by drilling out retaining rivets.

c. *Installation.*

(1) Replace new plate on panel and insert rivets.

(2) Replace panel.

Section VIII. AIR FILTER

3-15. Air Filter

a. Removal.

(1) Refer to figure 3-1 and remove evaporator front panel.

(2) Refer to figure 3-2, slide filter up and out of retainer clips.

b. *Cleaning and Inspection.*

(1) Examine filter for dirty or clogged condition.

(2) Clean filter by flushing with water in opposite direction of air flow. Allow filter to dry completely before lubricating.

Note. Be careful not to damage the filter during cleaning.

c. Lubricating.

(1) Treat filter with oil, lubricating grade 30, by spraying a light coat of oil on the air inlet side of the filter. Keep oil can spray nozzle 12 to 14 inches from filter while spraying.

(2) Allow filter to drain thoroughly before replacing it.

d. Installation.

(1) Refer to figure 3-2 and replace filter into (2) side retainer clips. Slide filter downward into position.

(2) Refer to figure 3-1 and install the evaporator front panel.

Section IX. ELECTRICAL SYSTEM

3-16. General

The electrical system can be divided into two circuits. A power circuit and a control circuit. The power circuit requires 115 volt, 60 hertz, 1 phase supply. A rectifier transforms the AC current into 115 volt DC current for the control circuit. Refer to the wiring schematic, FO-2 (located in back of manual) for component nomenclature and as a guide for troubleshooting. The wiring diagram, FO-1 (located in back of manual) should be used to check the exact connections of wiring.

Warning: Always disconnect power supply before performing maintenance on the electrical system.

3-17. E vaporator Fan Motor

a. Testing and Inspection.

(1) Refer to figure 3-1 and remove evaporator top panel.

(2) Remove red, yellow and brown motor leads.

(3) Using a multimeter, check for continuity between motor leads. If check fails, this indicates an open winding or protector. Replace the motor, refer to *b.* and c. below.

(4) Check for continuity between the red lead and the motor frame. If 'there is continuity, one of the windings is shorted to the ground. Replace the motor, refer to *b.* and c. below.

(5) If the motor cycles on and off without being switched check the amperage flowing in the leads. If any reading greatly exceeds 2.47 amps and the motor and blade are free from external factors that could cause binding, replace the motor. Either a partial short circuit through the windings or internal physical binding are indicated.

b. *Removal.*

(1) Refer to figure 3-1 and remove evaporator top. top left, and right side panels.

(2) Tag and disconnect the motor leads.

(3) Refer to figure 3-2 and remove motor from fan motor mounting bracket.

(4) Loosen setscrews (2) and remove the fan blade from the motor shaft.

c. *Installation.*

(1) Slip evaporator fan blade on shaft of motor and tighten setscrews.

(2) Refer to figure 3-2 and install motor into mounting bracket.

(3) Connect motor leads.

(4) Refer to figure 3-1 and replace evaporator top, top left, and right side panels.

3-18. **Condenser Fan Motor**

a. Testing and Inspection.

(1) Refer to figure 3-1 and remove rear condenser panel.

(2) Refer to figure 3-7 and disconnect red, yellow, and brown motor leads from condenser terminal board.

(3) Check for continuity between motor leads. If check fails to show continuity, this indicates an open winding or protector. Replace motor, refer to paragraph b. and c. below.

(4) Check for continuity between the red lead and the motor frame. If there is continuity one of the windings is shorted to the ground. Replace motor. refer to paragraph *b.* and c. below.

(5) If the motor cycles on and off without having been switched check the amperage flowing in each of the leads. If any reading greatly exceeds 2.47 amps and the motor and blade are free from external factors that could cause binding, replace the motor. Either a partial short circuit through the windings, or internal physical binding are indicated.

b. Removal.

(1) Refer to figure 3-1 and remove rear condenser panel.

(2) Refer to figure 3-7 and tag and disconnect the red, yellow, and brown motor leads from the terminal board.

(3) Refer to figure 3-7 and remove fan motor.

(4) To remove fan blade, loosen setscrews securing blade to the motor shaft and slip from the shaft.

c. *Installation.*

(1) Slip the condenser fan blade with the flange and setscrew section of the blade closer to the motor, and tighten setscrews.

(2) R er to figure 3-7 and install fan motor.

(3) R er to figure FO-1 (located in back of manual) a d connect the motor leads.

(4) R er to figure 3-1 and replace condenser rear panel

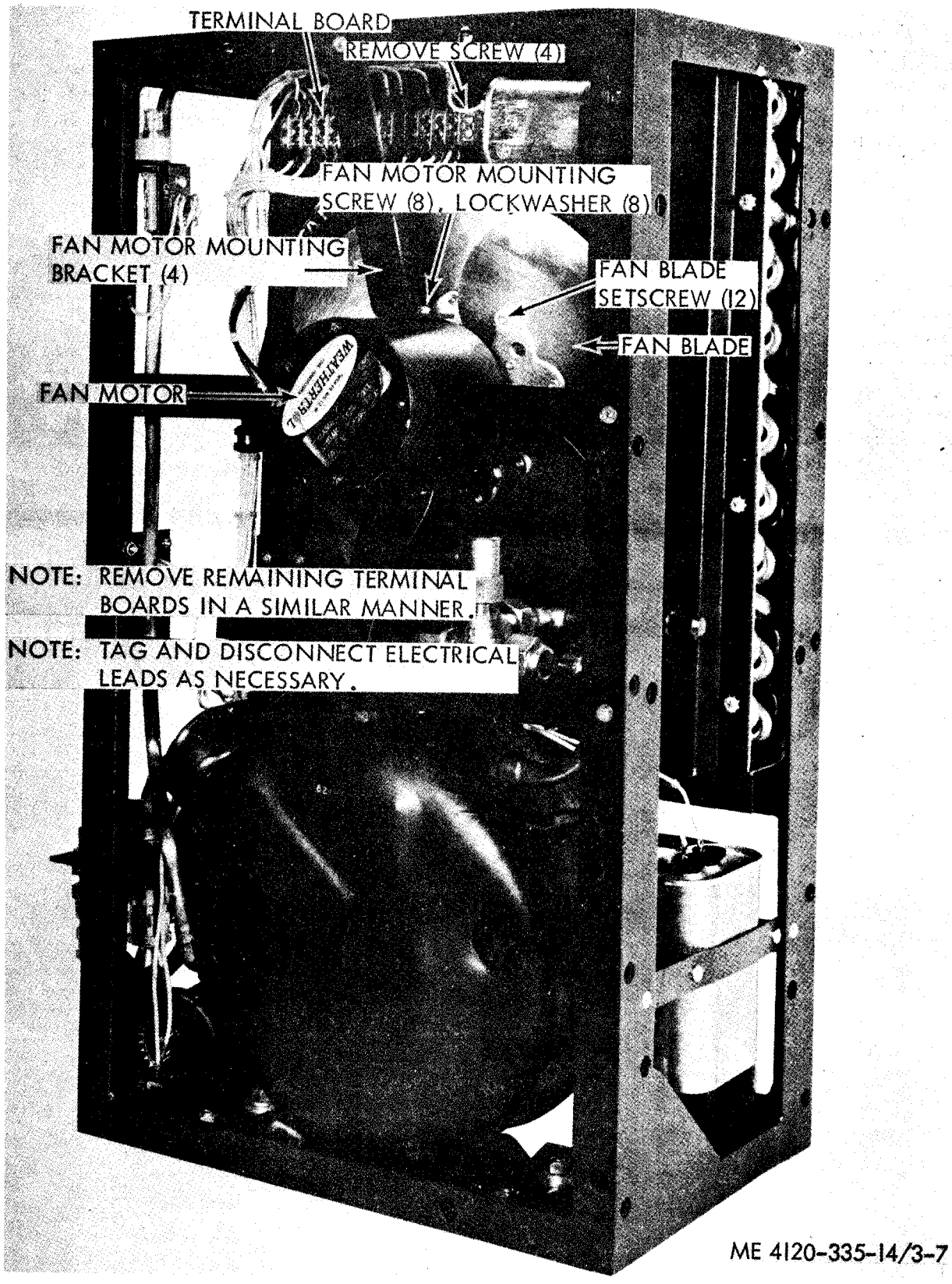


Figure 3-7. Condenser Jan motor and terminal board, removal and installation.

3-19. Fuse

a. *Removal.*

(1) Refer to figure 3-1 and remove condenser section rear cover panel.

(2) Refer to figure 3-8 and remove the fuse.

Note. If fuse is burned out the cap on the fuse holder is a neon glow lamp and will light until the defective fuse is replaced.

c. *Installation.*

(1) Refer to figure 3-8 and install the fuse.

(2) Refer to figure 3-1 and install the condenser section rear cover panel.

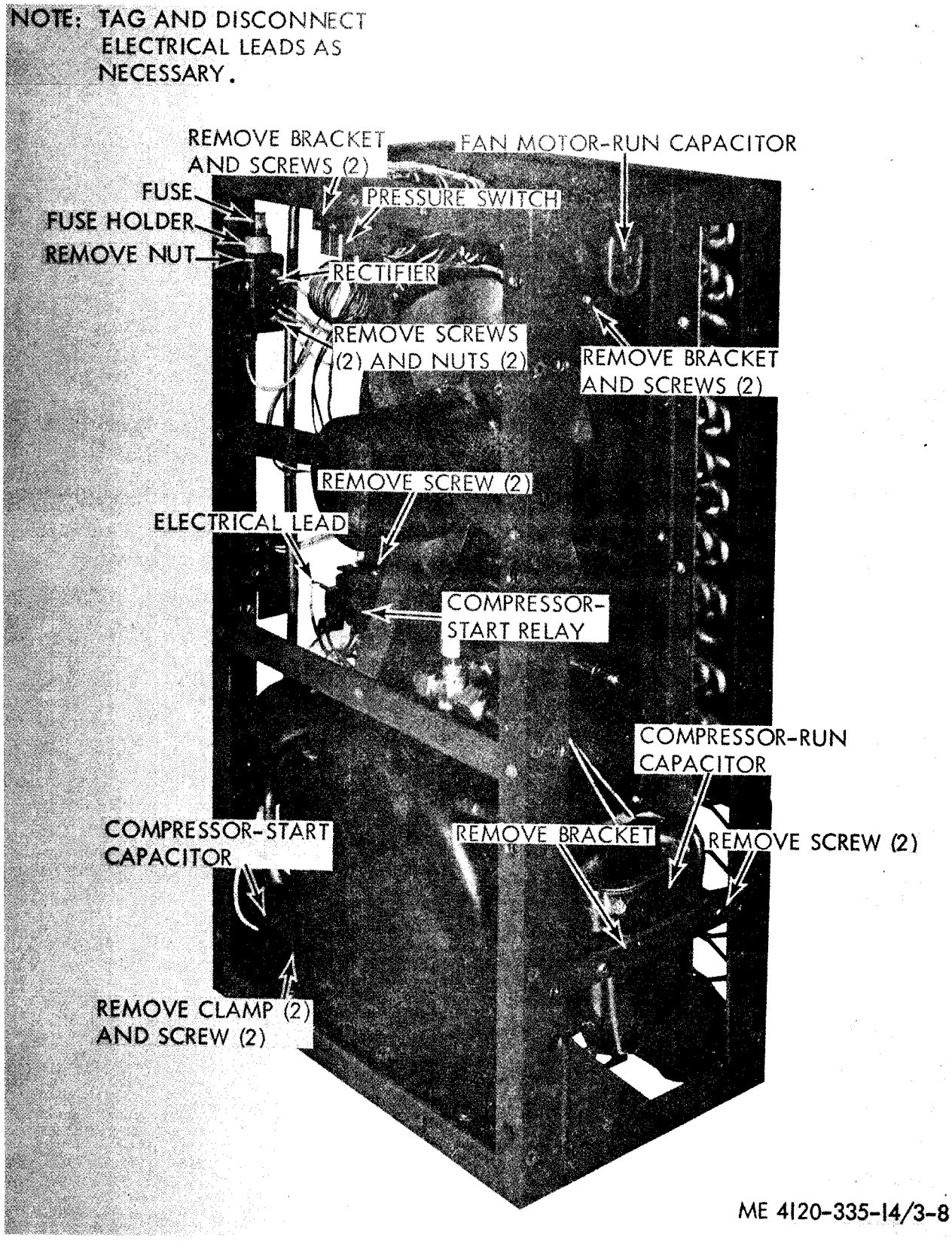


Figure 3-8. Condenser section. fuse, capacitors, pressure switch, and relay, removal and installation.

3-20. Compressor Start Capacitor

a. Removal.

(1) Refer to figure 3-1 and remove the condenser rear and lower right panels.

(2) Refer to figure 3-8 and remove compressor start capacitor.

b. Cleaning, Inspection, and Testing.

(1) Wipe capacitor with a clean dry cloth.

(2) Inspect for breaks, cracks, corrosion or other defects.

(3) Test a suspected defective capacitor with a capacitance checker.

(4) Replace a damaged or defective capacitor as necessary, refer to paragraph c. on following page.

c. *Installation.*

(1) Refer to figure *3-8* and install the compressor start capacitor.

(2) Refer to figure 3-1 and install the condenser rear and lower right panels.

3-21. Compressor Start Relay

a. Removal.

(1) Refer to figure 3-1 and remove the condenser rear panel.

(2) Refer to figure 3-8 and remove the compressor start relay.

b. Cleaning, Inspection and Testing.

(1) Wipe the relay with a clean dry cloth.

(2) Inspect for breaks, cracks, corrosion, rust, loose electrical connections, or other defects.

(3) Place probes of a continuity checker on terminal board 5 and 13 and test for continuity, refer to figures 3-7 and FO-1. If continuity exists, apply power to unit and check voltage at terminal board 4 and 13. If no voltage exists, replace relay.

c. *Installation.*

(1) Refer to figure 3-8 and install relay.

(2) Refer to figure 3-1 and replace rear panel.

3-22. Evaporator Fan Motor Capacitor

a. Removal.

(1) Refer to figure 3-1 and remove evaporator right end panels.

(2) Refer to figure 3-3 and remove the evaporator fan motor-run capacitor.

b. Inspect and Test. Refer to paragraph 3-20 *b* and follow same inspection and testing procedures.

c. *Installation.*

(1) Refer to figure 3-3 and install evaporator fan motor-run capacitor.

(2) Refer to figure 3-1 and install evaporator end panels.

3-23. Compressor-Run Capacitor

a. *Removal.*

(1) Refer to figure 3-1 and remove the condenser left end panel.

(2) Refer to figure 3-8 and remove the capacitor from the condenser section.

b. *lnspect and Test.* Refer to paragraph 3-20 *b*. and follow same inspection and testing procedures.

c. *lnstallation.*

(1) Refer to figure 3-8 and install the compressor-run capacitor.

(2) Refer to figure 3-1 and install the condenser left end panel.

3-24. Heater Over temperature Protector, Thermostat

a. Removal.

(1) Refer to figure 3-6 and remove the front panel from the evaporator section.

(2) Refer to figure 3-9 and install the heater overtemperature protector, thermostat.

b. *Inspect and Test.*

(1) Wipe the heater overtemperature protector, thermostat with a clean, dry cloth.

(2) Inspect for pitted contacts, breaks, cracks, corrosion, loose or missing mounting hardware, or other defects.

(3) Test as follows:

(a) Using a voltmeter test voltage to heater overtemperature protector thermostat, 115 V nominal, refer to figures 3-9 and FO-1.

(b) Check voltage to heater over-temperature protector thermostat with voltmeter, 115 V nominal, refer to figure 3-9.

(c) Remove power. Using a continuity checker, touch probes to each end of the heater overtemperature protector thermostat and check for continuity. refer to figure 3-9.

(4) Replace a damaged or defective heater overtemperature protector, thermostat as necessary, refer to paragraph c below.

c. Installation.

(1) Refer to figure 3-9 and install the heater overtemperature protector, thermostat to the heater.

(2) Refer to figure FO-1 and replace the wires to the protector.

(3) Refer to figure 3-6 and replace the front panel.

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS AS NECESSARY.

NOTE: REMOVE SWITCHES FROM REAR OF PANEL.

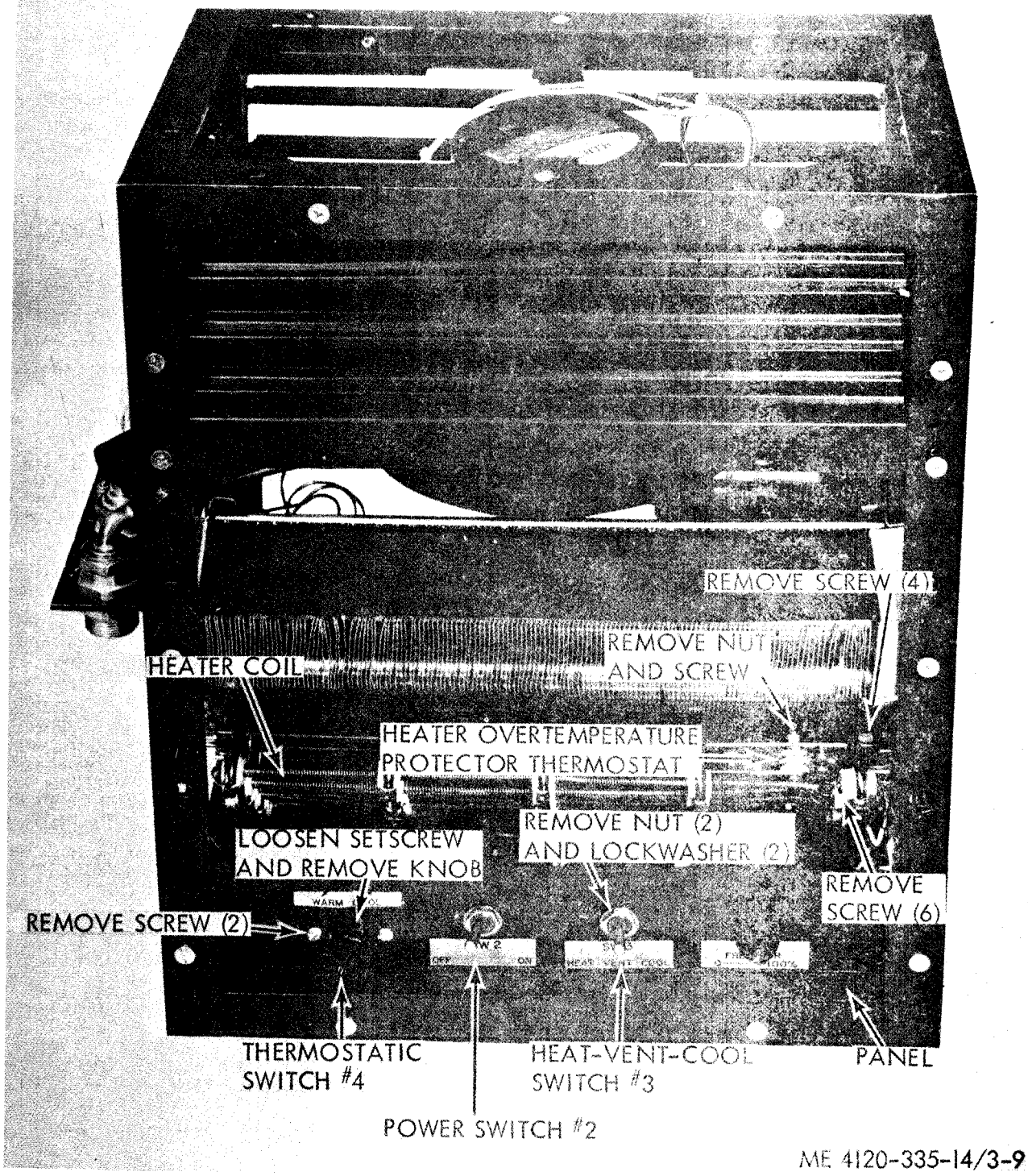


Figure 3-9. Heater overtemperature protector thermostat, thermostatic switch No. 4, power switch No. 2, and heat-vent-cool switch No. 3, removal and installation.

3.25. Power (Switch #2,) and Heat-Vent-Cool Switch (Switch #3).

a. Removal.

(1) Disconnect power to unit.

(2) Refer to figure 3-2 and disconnect control knob.

(3) Refer to figure 3-6 and remove the evaporator front panel.

(4) Refer to figure 3-6 and remove the control panel.

(5) Refer to figure 3-9 and disconnect switches from the control panel.

b. Test.

(1) *Power Switch (Switch # 2).*

(a) Place switch in the ON position,

(b) Touch the probes of a multimeter to terminals 2 and 3, 5 and 6, 8 and 9, and 11 and 12. Each pair of terminals should indicate continuity, if the terminals do not indicate continuity, the switch is defective and should be replaced.

(2) *Heat-Vent-Cool Switch (Switch # 3).*

(a) Place switch in the COOL position.

(b) Touch probes of a multimeter to terminals 2 and 3, 5 and 6, 8 and 9, and 11 and 12. Each pair of terminals should indicate continuity.

(c) Place switch in HEAT position.

(d) Touch the probes of a multimeter to terminals 1 and 2, 4 and 5, 7 and 8, and 10 and 11. Each pair of terminals should indicate continuity. If the terminals do not indicate continuity as outlined above, the switch is defective and should be replaced.

c. *Installation.*

(1) Refer to figure FO-1 and secure wires to terminals of switch.

(2) Refer to figure *3-9* and install the power switch and heat-vent-cool switch.

(3) Refer to figure 3-6 and install control panel and evaporator front panel.

(4) Refer to figure *3-2* and install control knob.

3-26. **Air Supply and Discharge Louver Control Switch [Switch #1)**

a. Removal.

(1) Refer to paragraph 3-8 and disconnect the bell crank louver control cable from the louver.

(2) Refer to figure 3-2 and remove the louver control knob.

b. *Cleaning and Inspection.*

(1) Clean the louver control assembly with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, bends, loose or missing mounting hardware, damaged cable, or other defects.

(3) Replace a damaged or defective louver control as necessary.

c. *Installation.*

(1) Refer to figure *3-2* and replace the louver control knob.

(2) Refer to paragraph *3-8* and connect the bell crank louver control cable to the louver.

3-27. **Power Relay**

a. Removal.

(1) Refer to figure 3-1 and remove evaporator top panel and top left side panel.

(2) Refer to figure 3-10 and remove power relay.

b. Cleaning, Inspection and Testing.

(1) Wipe the relay with a clean, dry cloth.

(2) Inspect for breaks, cracks, corrosion, rust, loose electrical connections, or other defects. Check mounting screw on relay for tightness to socket base.

(3) If relay is tight in socket and does not function, remove relay from socket and test pin numbers 6 and 7 for continuity, see paragraph 3-32 *b.*

(4) Replace a damaged or defective relay as necessary.

c. *Installation.*

(1) Refer to figure 3-10 and align the pins of the relay to be installed with the sockets in the mounting base and insert pins, pressing element firmly into the base.

(2) Refer to figure 3-1 and replace evaporator top panel and top left side panel.

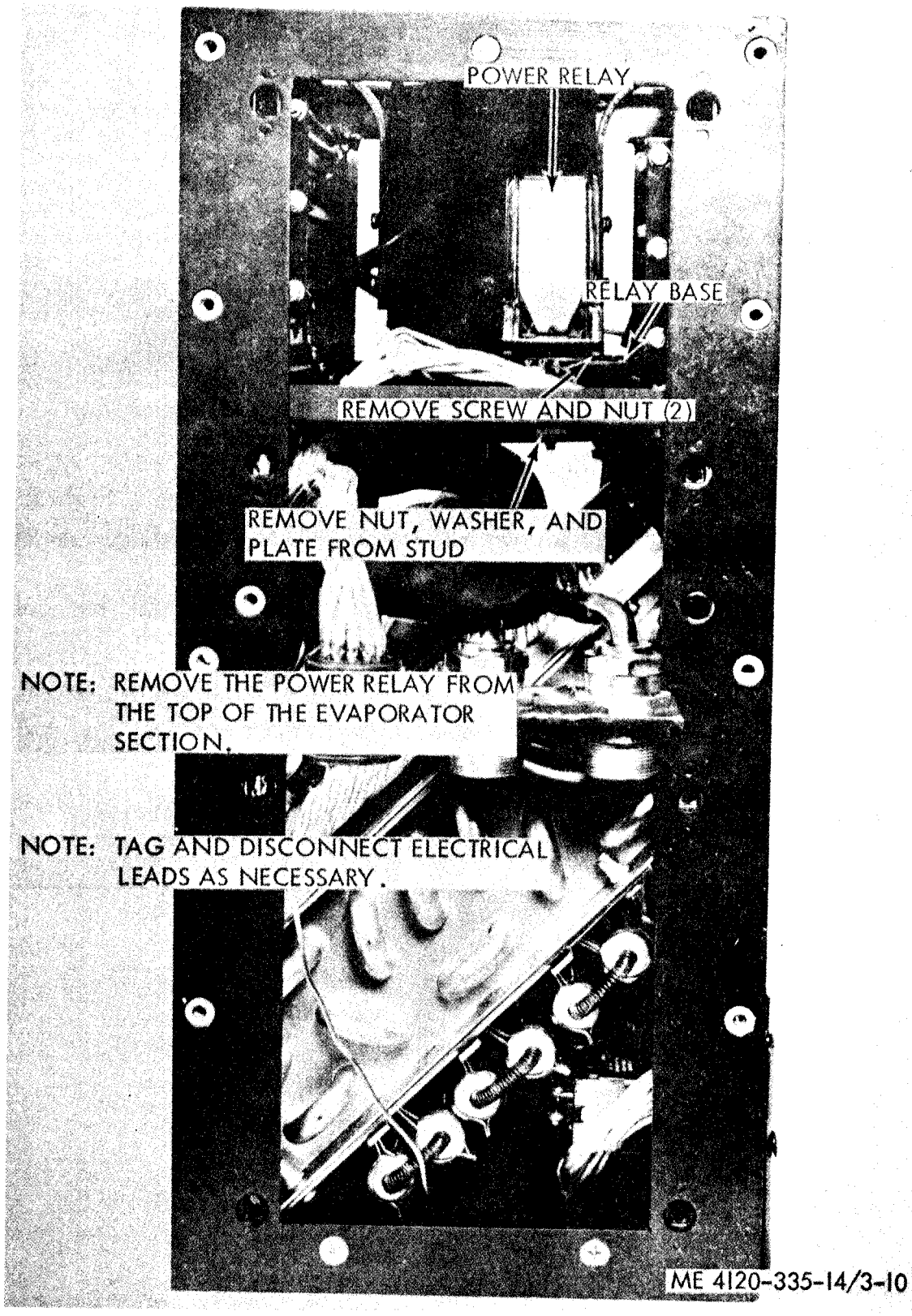


Figure 3-10. Evaporator section, power relay, removal and installation.

3-28. Terminal Board

a. ***Removal.***

(1) Refer to figure 3-1 and remove condenser rear and top panel.

(2) Refer to figure 3-7 and remove terminal board.

b. Cleaning and Inspection.

(1) Wipe the terminal board with a clean, dry cloth.

(2) Inspect for breaks, cracks, corrosion, loose terminals, or other defects.

(3) Replace a damaged or defective terminal board as necessary.

c. ***Installation.***

(1) Refer to figure 3-7 and mount terminal board.

(2) Refer to figure FO-1 and replace wires on terminal board.

(3) Refer to figure 3-1 and replace condenser rear and top panel.

3-29. Condenser Fan Assembly

a. Removal.

(1) Refer to figure 3-1 and remove the condenser rear panel.

(2) Refer to paragraph 3-18 and remove the condenser fan.

b. Cleaning and Inspection.

(1) Wipe the fan with a clean cloth dampened slightly with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, dents, bends, loose or missing mounting hardware or other damage.

(3) Replace a damaged condenser fan as necessary.

c. ***Installation.***

(1) Refer to paragraph 3-18 and install the condenser fan.

(2) Refer to figure 3-1 and install the condenser rear panel.

3-30. Evaporator Fan Assembly

a. Removal.

(1) Refer to figure 3-1 and remove the evaporator top panel.

(2) Refer to paragraph 3-17 and remove the evaporator fan.

b. Cleaning and Inspection.

(1) Wipe the evaporator fan with a clean cloth dampened slightly with an approved cleaning solvent.

(2) Inspect for breaks, cracks, dents, bends, loose or missing mounting hardware or other defects.

(3) Replace a damaged evaporator fan as necessary.

c. ***Installation.***

(1) Refer to paragraph 3-17 and install the evaporator fan.

(2) Refer to figure 3-1 and install the evaporator top panel.

3-31. Heating Unit

a. Removal.

(1) Refer to figure 3-1 and remove evaporator front, left lower, and right side panels.

(2) Refer to figure 3-9 and remove the heater coil.

b. Cleaning, Inspection, and Testing.

(1) Wipe the heating element unit with a clean, dry cloth.

(2) Check for loose or missing mounting hardware. Inspect heater coils for breaks, cracks, and corrosion. Inspect heater overtemperature protector thermostat for clean contacts, refer to figure 3-9.

(3) With switch # 3 in HEAT position, check voltage to heater coil terminals and heater overtemperature protector thermostat, with voltmeter, 115 V nominal, refer to figure 3-9.

(4) Remove power and test heater coils for continuity with a continuity checker, see paragraph 3-32 b.

(5) Replace a damaged or defective heating element unit as necessary.

c. ***Installation.***

(1) Refer to figure 3-9 and install the heater coil.

(2) Rewire per wiring diagram, figure FO-1.

(3) Refer to figure 3-1 and replace evaporator front, left lower, and right side panels.

3-32. Condenser and Evaporator Wiring Harness

a. ***General.*** The evaporator and condenser sections each have their individual wiring harness which terminates at connectors where the units are coupled with a cable assembly. The routing of the various wires can be determined by referring to figures FO-1 and FO-2.

b. Testing. To test a wire for continuity, disconnect the wire from the components to which it is attached at both ends. Touch the probes of a continuity checker to each end of the wire; if the wire does not show continuity it is defective and must be repaired or replaced.

c. ***inspection.*** Inspect insulation for cracks, or frayed condition. Inspect for corrosion, loose terminal lugs, or broken wires. If a wire is found to be damaged, it must be repaired or replaced.

d. Replacement.

(1) To replace a wire that is not part of a wiring harness, disconnect it at each end and install a new wire of the same size. Be sure to identify the new wire with the same identification as the one removed.

(2) If the defective wire is part of a wiring harness and cannot be removed, disconnect the

wire at **both ends and tape the ends so that no bare wire shows. Tape a new wire to the outside of the wiring harness and attach both ends to the components from which the defective wire was removed.**

(3) If the wiring shows wear, but not enough to expose the bare wires, tape the worn part of the wire with an approved electrical tape.

3-33. Power and Cable Receptacles and Suction and Discharge Connectors

a. Removal.

(1) Refer to figure *3-5* and remove connector cover.

(2) Refer to figure 3-11 and remove the power and cable receptacles and suction and discharge connectors.

b. C[eaning, Inspection, and Testing.

(1) Wipe parts with clean dry cloth.

(2) Disconnect power cable and inspect wires soldered to connectors for loose wires.

(3) Test each wire and connector pin for continuity, refer to paragraph 3-32 *b.*

(4) Replace a damaged or defective power and cable receptacle or suction and discharge connector as necessary.

c. *Installation.* Refer to figure 3-11 and install the power and cable receptacle, suction and discharge connector.

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS AS NECESSARY.

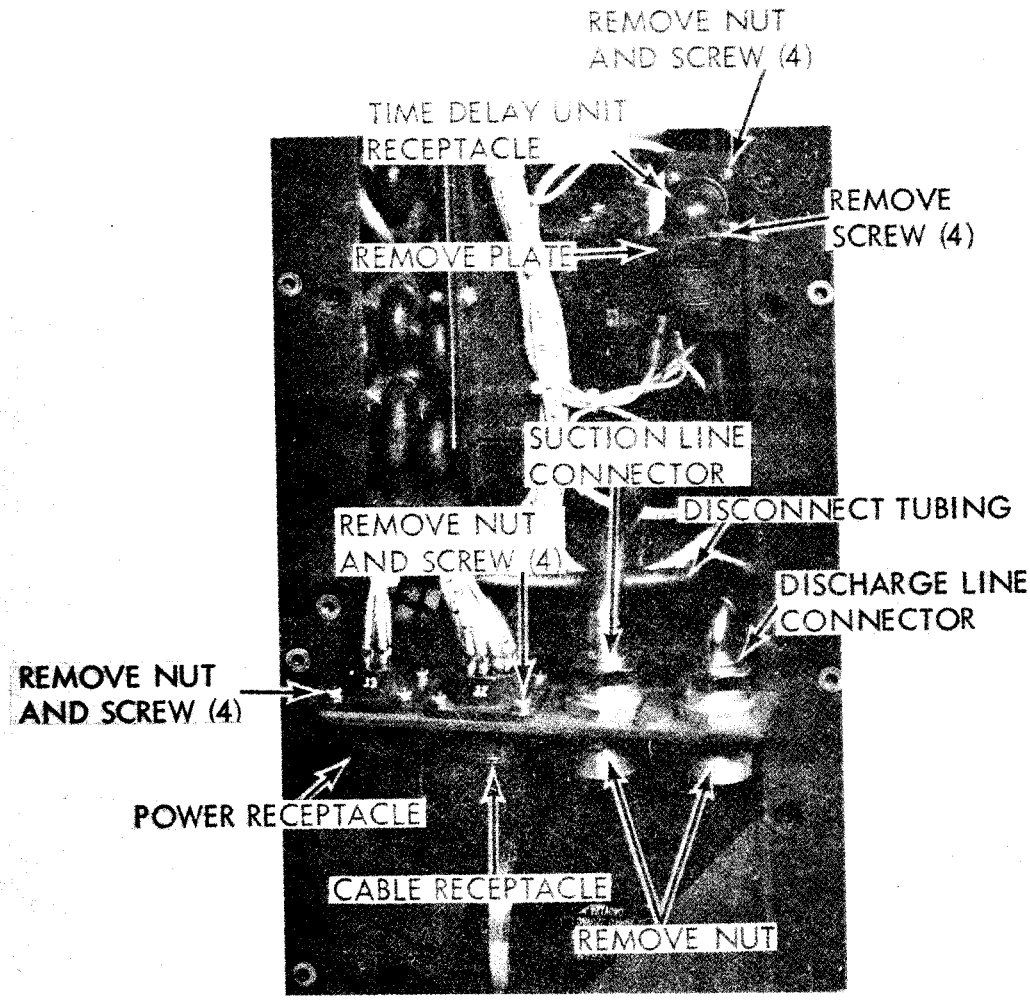


Figure 3-11. Power and cable receptacles, and suction and discharge connectors, removal and installation.

3-34. Refrigerant Piping Inspection

Inspect refrigerant hoses, tubing and fittings for signs of leakage, abrasion, kinking, or if the hoses show signs of wear or fittings become loose, replace the hoses.

Note. If a hose has been worn or damaged to the extent that it loses its refrigerant, the system must be recharged after the hose is replaced.

3-35. Condenser and Evaporator Coil Inspection

The coils, figures 1-3 and 1-4 should be inspected as often as necessary to insure maximum operating capacity of the unit. Dirt and lint loaded coils or bent fin coils got only restrict normal volume of air flow but also insulate the coils. Report a defective coil to direct support maintenance.

3-36. Sight Glass Inspection

Wipe the refrigerant sight glass, figure 1-5, with a soft clean cloth and observe the color of the indicator for dryness of the refrigerant system. If the indicator is yellow (indicating presence of moisture in the system) or if bubbles are observed after 15 minutes of operation in the cool mode, report condition to direct support maintenance.

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

4-1. Tools and Equipment.

Tools and equipment issued with or authorized for the air conditioner are listed in the basic items list, appendix C.

4-2. Special Tools and Equipment.

There are no special tools or equipment required by direct or general support maintenance personnel to maintain the air conditioner.

4-3. Maintenance Repair Parts.

Direct and general support maintenance repair parts are listed in TM 5-4120-335-24P.

Section II. TROUBLESHOOTING

4-4. General.

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or any of its components. Malfunctions which may occur are listed in table 4-1, Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause. The troubleshooting operations shown in table 4-1 are only those which cannot be performed at organizational maintenance levels (see table 3-2 for organizational maintenance troubleshooting). Refer to FO-3 (Located in the back of manual) for refrigeration schematic.

Table 4-1. Troubleshooting

Malfunction	Probable Cause	Corrective Action
1. Compressor will not start.	*a.* Corn presser defective.	*a.* Replace compressor, (para 4-14).
	b. Power switch, switch No, 2 defective,	*b.* Replace switch, (para 3-25).
	c. Selector switch, switch No. 2 defective.	c. Replace switch, (para 3-25).
	d. Thermostatic switch defective.	*d.* Replace switch, (para 4-18).
	e. Power relay defective.	*e.* Replace relay, (para 3-27).
	f. Starting capacitor defective.	*f.* Replace capacitor, (para 3-20).
2. Cooling insufficient in cooling position.	*a.* Evaporator fan motor defective.	a. Replace motor, (para 3-17).
	b. Condenser fan motor defective.	*b.* Replace motor, (para 3-18).
	c. Compressor defective.	*c.* Replace compressor, (para 4-14).
	d. Thermostatic switch defective.	*d.* Replace switch, (para 4-18).
	e. Filter drier clogged.	*e.* Replace filter drier, (para 4-12).
3. Cooling excessive in cooling position.	*a.* Thermostatic expansion valve defective.	*a.* Replace valve, (para 4-17).
	b. Power relay defective.	*b.* Replace relay, (para 3-27).
	c. Thermostatic switch defective.	c. Replace switch, (para 4-18).
4. Heater does not heat properly.	*a.* Heater overtemperature protector, thermostat defective.	*a.* Replace heater over-temperature protector, thermostat, (para 3-24).
	b. Selectro switch, switch No. 3 defective.	*b.* Replace switch No. 3, para 3-25).
	c. Thermostatic switch defective.	c. Replace switch, (para 4-18).

Section III. GENERAL MAINTENANCE

4-5. General

This section describes and illustrates procedures which are necessary to recharge the system, leak test the system, evacuate the system charge, release the charge from the system, and make repairs to the system components by brazing.

4-6. Releasing the Refrigerant Charge

a. Remove the condenser intake grille, refer to figure 3-4.

b. Refer to figure 4-1 and release the refrigerant charge.

Warning: **Avoid contact with R-12 refrigerant. Wear goggles to prevent the refrigerant from getting in the eyes. If refrigerant is inhaled immediately inhale fresh air.**

c. Install the condenser intake grille, refer to figure 3-4.

NOTE: REMOVE VALVE CAP FROM VALVE STEM.

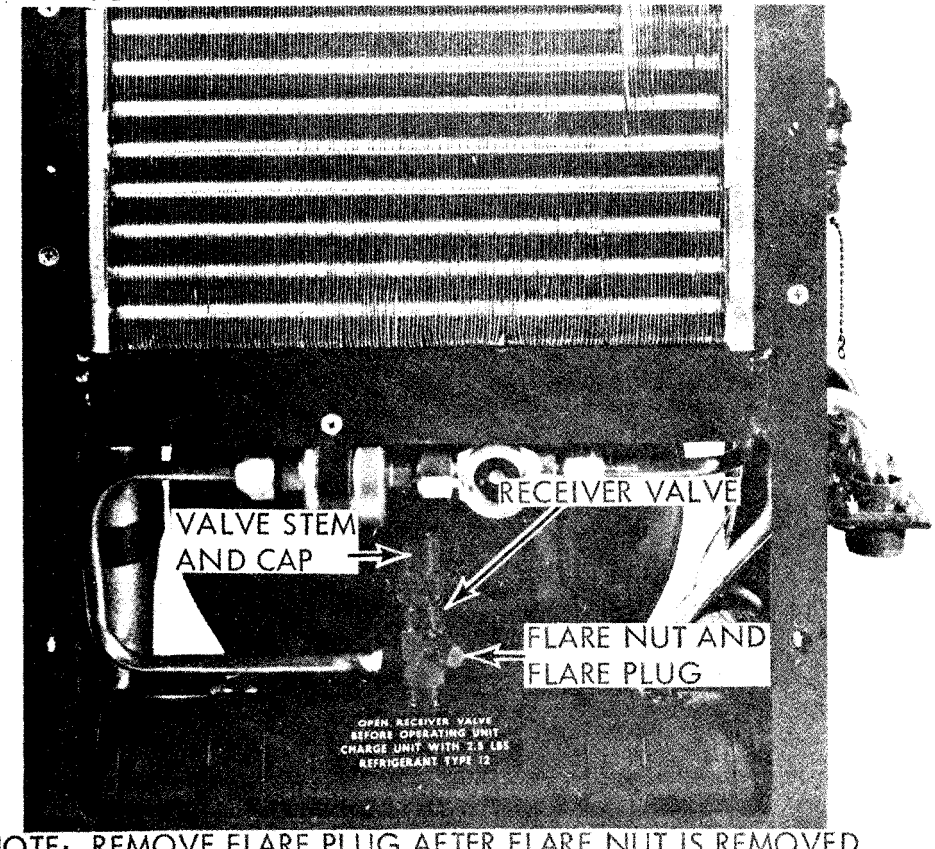
STEP 1. BACK SEAT THE RECEIVER VALVE BY TURNING THE VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS.

STEP 2. REMOVE THE FLARE NUT AND FLARE PLUG FROM THE RECEIVER VALVE.

STEP 3. ROTATE VALVE STEM CLOCKWISE SLOWLY UNTIL GAS STARTS TO ESCAPE.

NOTE: DO NOT PERMIT THE OIL TO ESCAPE FROM THE UNIT, IF OIL IS ESCAPING CLOSE THE VALVE SLIGHTLY.

NOTE: DO NOT PERMIT THE REFRIGERANT TO ESCAPE FAST ENOUGH TO FORM ICE OR FROST ON LINES OR THE VALVE.



NOTE: REMOVE FLARE PLUG AFTER FLARE NUT IS REMOVED.

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Figure 4-1. Releasing the refrigerant charge.

4-7. Leak Testing the Refrigerant System

a. Remove the condenser section intake grille. (fig. 3-4.)

6. Refer to figure 4-2 and leak test the system.

Warning: When R-12 gas comes in contact with a flame from a halide torch, phosgene gas is formed. This gas is deadly poison and has the odor of new mown hay. Make sure that the space where the torch is being used is well ventilated.

c. Install the condenser intake grille. (fig. 3-4.)

NOTE: REMOVE VALVE STEM CAP TO EXPOSE VALVE STEM.

STEP 1. TURN VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS.

STEP 2. REMOVE FLARE NUT AND FLARE PLUG FROM THE RECEIVER VALVE.

STEP 3. CONNECT REFRIGERANT R-12 SOURCE TO GAGE VALVE PORT. TURN VALVE CLOCKWISE ONE TURN. ALLOW REFRIGERANT TO BUILD UP PRESSURE TO 15 PSIG.

STEP 4. TURN VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS. DISCONNECT REFRIGERANT LINE AND CONNECT LINE FROM A REGULATED DRY NITROGEN SOURCE. TURN VALVE STEM ONE TURN CLOCKWISE AND ALLOW NITROGEN TO BUILD UP 300 PSIG. TURN VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS.

STEP 5. TEST FOR LEAKS WITH AN ELECTRONIC LEAK TESTER OR A HALIDE TORCH BY STARTING AT A GIVEN POINT AND TRACING THE ENTIRE SYSTEM UNTIL RETURNING TO THE STARTING POINT. IF NO LEAKS EXIST, EXHAUST THE CHARGE TO ATMOSPHERE AND EVACUATE THE SYSTEM, REF. PARA. 4-8.

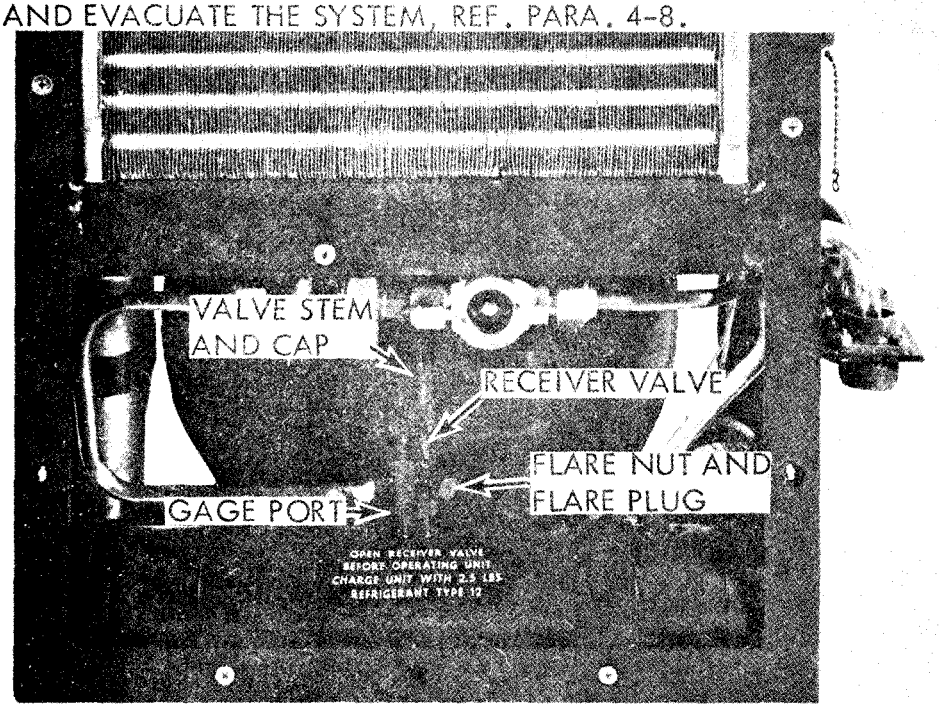

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Figure 4-2. Leak testing the refrigerant system.

NOTE: REMOVE RECEIVER VALVE STEM CAP.

STEP 1: TURN VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS.

STEP 2: REMOVE GAGE PORT CAP FROM RECEIVER VALVE.

STEP 3: CONNECT REFRIGERANT COMPOUND GAGE TO GAGE PORT OF VALVE WITH CHARGING HOSE.

STEP 4: CONNECT SECOND HOSE OF REFRIGERANT GAGE MANIFOLD TO SUCTION SIDE OF VACUUM PUMP.

STEP 5: OPEN CHARGING VALVE ON RECEIVER THEN START VACUUM PUMP. OPEN VALVE ON GAGE MANIFOLD.

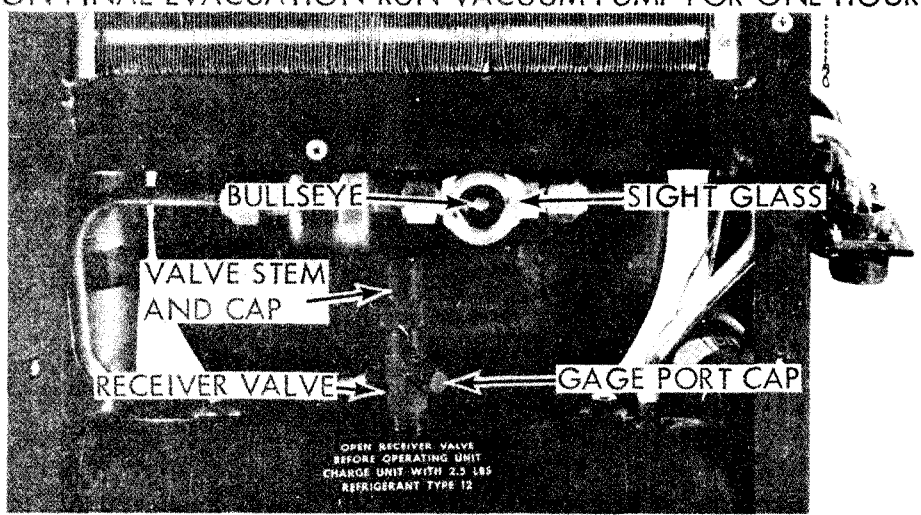
STEP 6: EVACUATE SYSTEM FOR 30 MINUTES. GAGE INDICATION SHOULD BE AT LEAST 28 INCHES OF MERCURY.

STEP 7: CLOSE VALVE ON COMPOUND GAGE MANIFOLD, STOP VACUUM PUMP AND REMOVE HOSE.

STEP 8: CONNECT HOSE TO R-12 DRUM AND OPEN DRUM VALVE. LOOSE HOSE FITTING ON GAGE MANIFOLD AND ALLOW FREON VAPOR TO SWEEP THRU HOSE.

STEP 9: TIGHTEN HOSE FITTING ON MANIFOLD, OPEN MANIFOLD VALVE. OPEN RECEIVER VALVE AND ADMIT R-12 VAPOR INTO SYSTEM UNTIL GAGE READS 15 LBS. POSITIVE PRESSURE.

STEP 10: CLOSE DRUM VALVE AND MANIFOLD VALVE AND RECONNECT HOSE TO VACUUM PUMP. START PUMP, OPEN MANIFOLD VALVE AND EVACUATE FOR 30 MINUTES. REPEAT STEPS 6 THRU 10 THREE TIMES. ON FINAL EVACUATION RUN VACUUM PUMP FOR ONE HOUR.



NOTE: CHECK BULLSEYE IN SIGHT GLASS AFTER FINAL EVACUATION. COLOR SHOULD BE PURE GREEN. IF THERE IS A TINT OF YELLOW, REPEAT STEPS 6 THRU 10 UNTIL COLOR IS PURE GREEN.

NOTE: ALLOW UNIT TO REMAIN ON VACUUM FOR 15 MINUTES. IF VACUUM HOLDS, SYSTEM IS READY FOR CHARGING. IF VACUUM DOES NOT HOLD, CHECK FOR LEAKS IN SYSTEM.

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Figure 4-3. Evacuating the system.

4-9. Charging the System

a. Evacuate the system, refer to paragraph 4-8.

b. Bleed the charging equipment as follows:

(1) Connect metered refrigerant charging bottle to drum of R-12.

(2) Connect outlet of charging bottle to gauge manifold by means of the charging hose.

(3) Open refrigerant drum valve.

(4) Open fitting on inlet to metered bottle and allow vapor to Sweep through line.

(5) Tighten fitting on inlet to metered bottle and open inlet valve slightly.

(6) open vent valve on charging bottle and allow R-12 vapor to sweep through bottle.

(7) Close vent, close inlet valve. Open outlet valve and loosen hose fitting on gauge manifold.

(8) Open inlet valve to metered bottle and allow R-12 vapor to sweep through inlet hose, bottle and outlet hose to gauge manifold.

(9) Tighten hose connections to manifold valve, shut outlet valve from metered bottle.

(10) Invert R-12 drum and feed 2.5 lbs. of liquid refrigerant into metered bottle (opening the vent valve very slightly will facilitate this process.)

(11) Close inlet valve to metered bottle and valve vent.

Vote. Make sure that the bottle contains 2.5 lbs. of refrigerant If necessary place slightly more than 2.5 lbs. in bottle and bleed off excess through vent.

c. Refer to figure 4-4 and charge the system.

d. Backseat the receiver valve. Close all valves in charging system and remove hose fitting from receiver valve. Replace stem cap and gauge port cap. System is now ready for operation.

STEP 1: TURN VALVE STEM COUNTERCLOCKWISE UNTIL IT STOPS AND CONNECT HOSE FROM REFRIGERANT SOURCE TO ADAPTER.

STEP 2: OPEN OUTLET VALVE, OPEN GAGE MANIFOLD VALVE AND ALLOW REFRIGERANT TO ENTER SYSTEM. 1.5 LBS. WILL ENTER READILY.

STEP 3: TO CHARGE REMAINDER OF REFRIGERANT INTO SYSTEM, SHUT OFF RECEIVER VALVE AND GAGE MANIFOLD VALVE. OPERATE COMPRESSOR UNTIL GAGE INDICATES 5 PSIG. OPEN GAGE MANIFOLD VALVE. REMAINDER OF REFRIGERANT SHOULD FLOW INTO SYSTEM. IF NOT, SHUT OFF MANIFOLD VALVE, OPERATE COMPRESSOR UNTIL GAGE INDICATES 5 PSIG. STOP COMPRESSOR AND OPEN MANIFOLD VALVE. REPEAT AS OFTEN AS NECESSARY TO CHARGE ENTIRE 2.5 LBS. INTO SYSTEM.

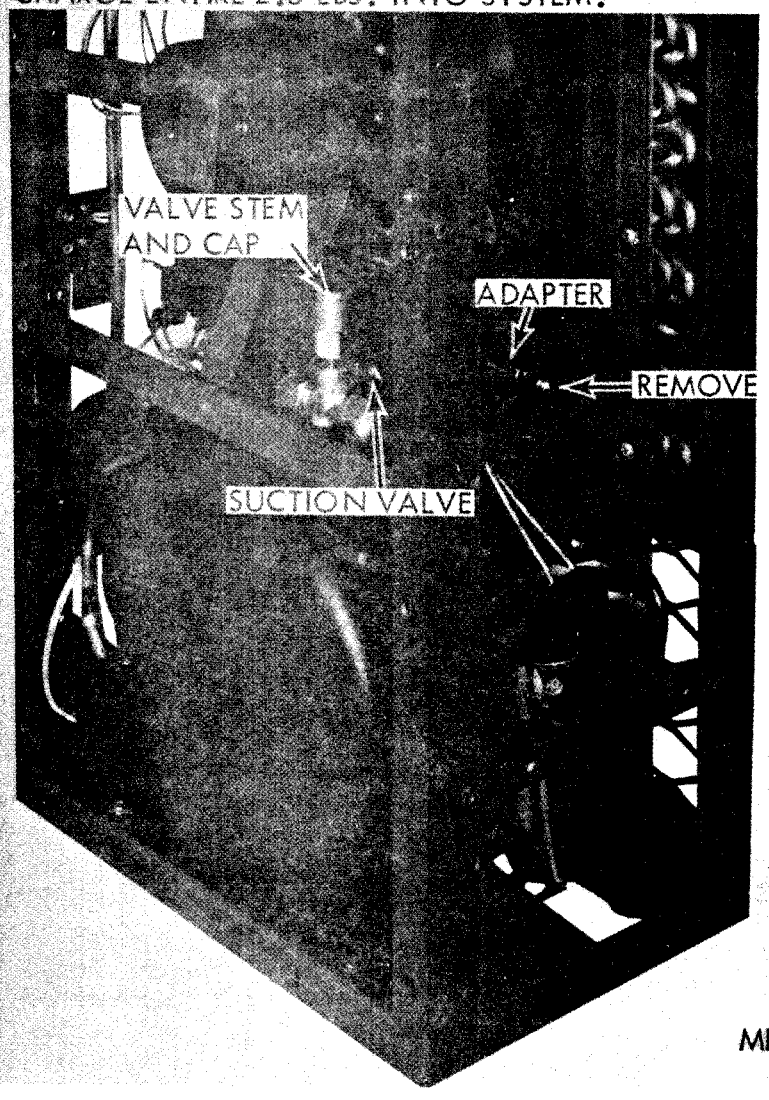

Figure 4-4. Charging the system.

4-10. Brazing

a. Phos-copper. The entire joint area must be as clean as possible. If tubing must be cut to make a repair, the cut end must be reamed both inside and out.

Caution: **Use** extreme care to prevent contamination of refrigerant system with dirt, moisture, metal chips, flux, or other foreign particles.

Parts to be joined should be close fitted, approximately .003 inch clearance. Copper to copper joints will require no flux, but all other metals will require the use of an approved flux. The joint being brazed should be heated evenly to 1300 degrees Fahrenheit. The rod starts to flow at 1300 degrees Fahrenheit. The flame should be kept moving, covering as much of the joint as possible. When the flux turns clear or a dull red color of the metal is reached, the flame should be drawn back two to three inches and the rod applied. Move the flame completely around the joint to cause the rod to flow evenly into the joint. Avoid overheating and remelting. To remove surplus flux, wipe with a cloth saturated with hot water.

When making joints in areas close to the sight glass or hose fittings a heat sink must be provided to prevent the transfer of heat into areas which may be dam aged by extremely high temperatures.

If care is used to prevent moisture from entering the system, such a sink may be made from asbestos cloth soaked in water and wrapped around the temperature sensitive part.

b. Silver Brazing Alloys. Although phos-copper joints are acceptable in most instances, a more dependable joint can be made with silver brazing alloy with a high silver content. It is especially recommended to join dissimilar metals and for use in joints subject to vibration. Clean all joints thoroughly of all oxides, dirt and grease. Maintain .009 inch maximum clearance between tube and fitting. Cover the joint surfaces with an approved flux before brazing.

Caution; Be careful not to allow the flux to contaminate the system.

Heat the joint uniformly with neutral flame and broad heat until the flux is liquid. Apply the rod to the joint and keep flame moving. Excess flux may be removed by wiping with a cloth saturated in hot water.

4-11. Flushing the System.

A compressor motor burn will seriously contaminate the refrigerant system with acids and gum my residue from the insulation. Release some refrigerant, refer to paragraph 4-6 and if there is a burn out, the refrigerant will have a burned smell, then proceed as follows:

a. Release the remainder of the refrigerant, refer to paragraph 4-6.

b. Remove the filter-drier and expansion valve. (para. 4-12 and 4-17), Bypass these items with flexible hose.

c. Remove the compressor (para. 4-14).

d. Connect the discharge line of the refrigerant system to the discharge side of a small diaphragm-type pump, e.g. Ace model 77NRS, or equal.

e. Using a small drum, (approximately five pounds), connect a suction line from the side, close to the bottom. The line should extend to a filter-drier (5 ton size) on the suction side of the pump. Install a shut-off valve in this line close to the drum.

f. Extend the system suction line to discharge liquid into top of drum. Do not tighten fitting into drum. Allow venting to avoid pressure build-up inside drum.

g. Fill drum 4 / 5 full of refrigerant 11. Start the porn p and circulate the refrigerant 11 for a minimum of three hours. It will be necessary to replenish this refrigerant to replace that which will vaporize. The boiling point of refrigerant 11 is approximately 74.8°F.

Warning: **Be sure there is adequate ventilation during this procedure.**

h. Shut off pump. Close valve in line leading from R-11 drum. Remove the circulative pump. Connect discharge line of the refrigerant system to drum of Refrigerant 12 and use the vapor to "blow out" the Refrigerant 11 from the system.

i. Replace expansion valve and filter-drier. (para 4-17 and 4-12).

j. Install the compressor. (para 4-14).

k. Check for refrigerant leaks. (para 4-7).

l. Evacuate the refrigerant system. (para 4-8).

m. Charge the refrigerant system. (para 4-9).

Section IV. REMOVAL, INSTALLATION AND REPAIR OF MAJOR COMPONENTS AND AUXILIARIES

4-12. Filter-Drier

a. General. The filter-drier is a throw away type of unit used to remove moisture, sludge, and dirt from the refrigerant. It should be replaced each time the refrigerant system is opened for maintenance and service.

b. Removal.

(1) Remove the condenser intake grille (fig. 3-4).

(2) Release the refrigerant charge. (para 4-6).

(3) Refer to figure 4-5 and remove the filter-drier.

c. Installation.

(1) Refer to figure 4-5 and install the filter-drier.

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Install the condenser intake grille. (fig. 3-4).

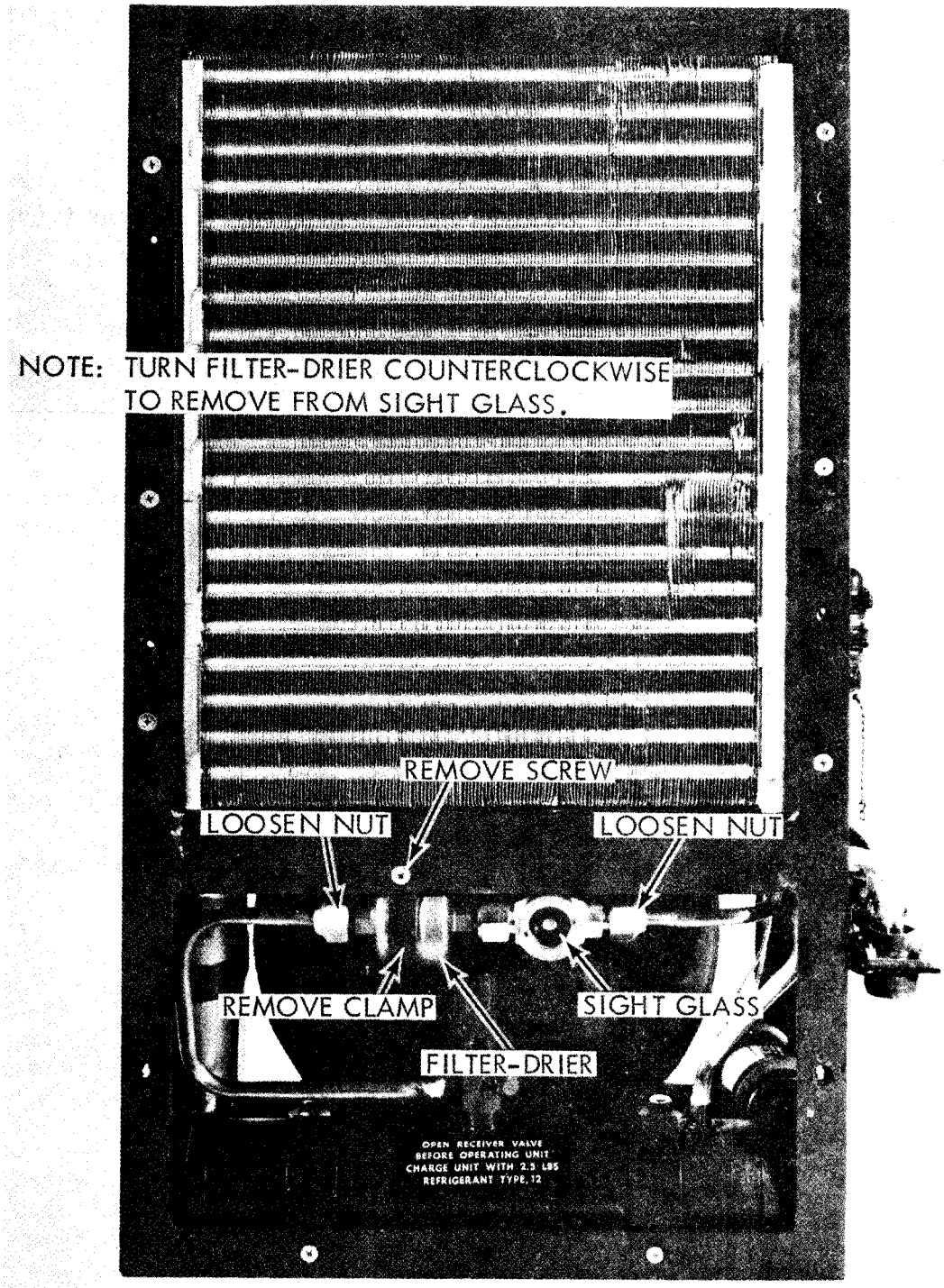

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Figure 4-5. Filter-drier and sight glass. removal and installation.

4-13. Sight Glass

a. Removal.

(1) Remove condenser intake grille. (fig. 3-4).

(2) Release refrigerant charge. (para 4-6).

(3) Refer to figure 4-5 and remove the sight glass.

b. Installation.

(1) Refer to figure 4-5 and install the sight glass.

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Install the condenser intake grille. (fig. 3-4).

4-14. Compressor

a. Removal

(1) Remove the condenser intake grille, rear and side panels. (fig. 3-1, 3-4).

(2) Release the refrigerant charge. (para 4-6).

(3) Refer to figure 4-6 and remove the compressor.

b. Cleaning, Inspection and Testing.

Note. Disconnect power before performing the following cleaning, inspection and testing procedures.

(1) Wipe the exterior surface of the compressor with a clean cloth dampened slightly with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, leaks, loose or missing mounting harware or other defects.

(3) Check compressor overload protector for an open circuit between terminals 1 and 3 with continuity checker.

(4) Reset pressure switch by depressing reset button, on top panel of condenser section as necessary.

(5) Test terminals S, R and C for continuity with a continuity checker Replace the compressor if there is an open circuit.

c. *Installation.*

(1) Install the compressor. (fig. 4-6).

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Install the condenser rear and side panels. (fig. 3-1, 3-4).

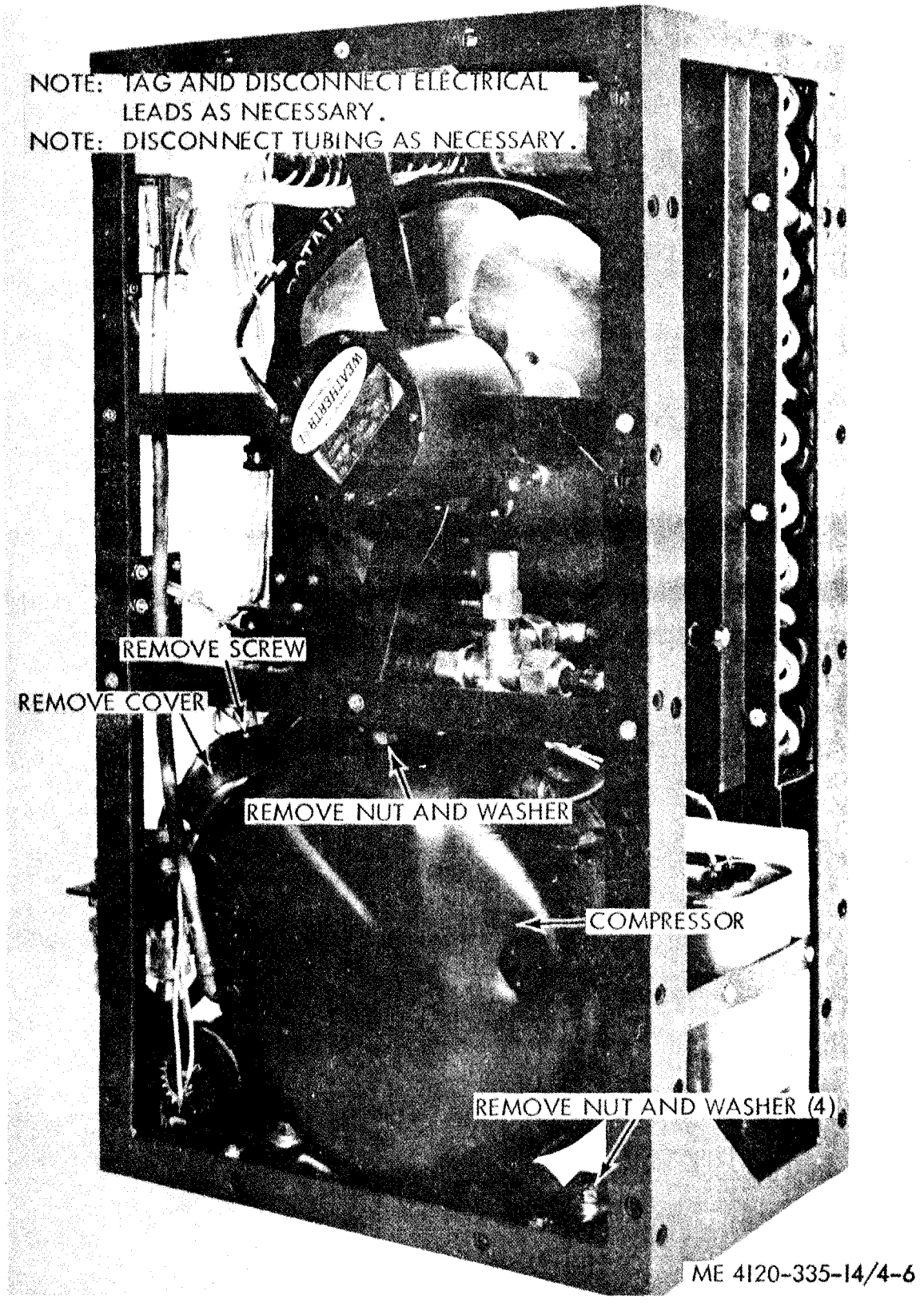


Figure 4-6. Compressor removal and installation.

4-15. Evaporator Coil

a. Removal,

(1) Remove the front, rear and side panels of the evaporator section. (fig. 3-1).

(2) Remove the condenser intake grille. (fig. 3-4).

(3) Release the refrigerant charge. (para 4-6).

(4) Remove the air-filter. (fig. 3-2).

(5) Remove evaporator coil. (fig. 4-7).

b. ***Service.*** The only service required is keeping the coil clean and the fins straight. One method of cleaning is to wipe the exterior surfaces with a clean cloth dampened with an approved cleaning solvent and dry thoroughly. The other is clean with a soft bristled brush, vacuum cleaner, high velocity air, or a plastic fin comb. When using high velocity air always direct the air stream straight into the coils to avoid bending the fins and in a direction opposite to the normal air flow. The plastic fin comb can be used also to straighten the fins.

c. ***Testing.*** Refer to paragraph 4-7 and figure 4-2 and use test procedure listed.

d. Repair. To make repairs on the evaporator coil, refer to paragraph 4-10 and follow given procedures.

e. ***Installation.***

(1) Install the evaporator coil. (fig. 4-7).

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Replace the condenser intake grille. (fig. 3-4).

(6) Replace the front, rear and side panels of the evaporator section. (fig. 3-1).

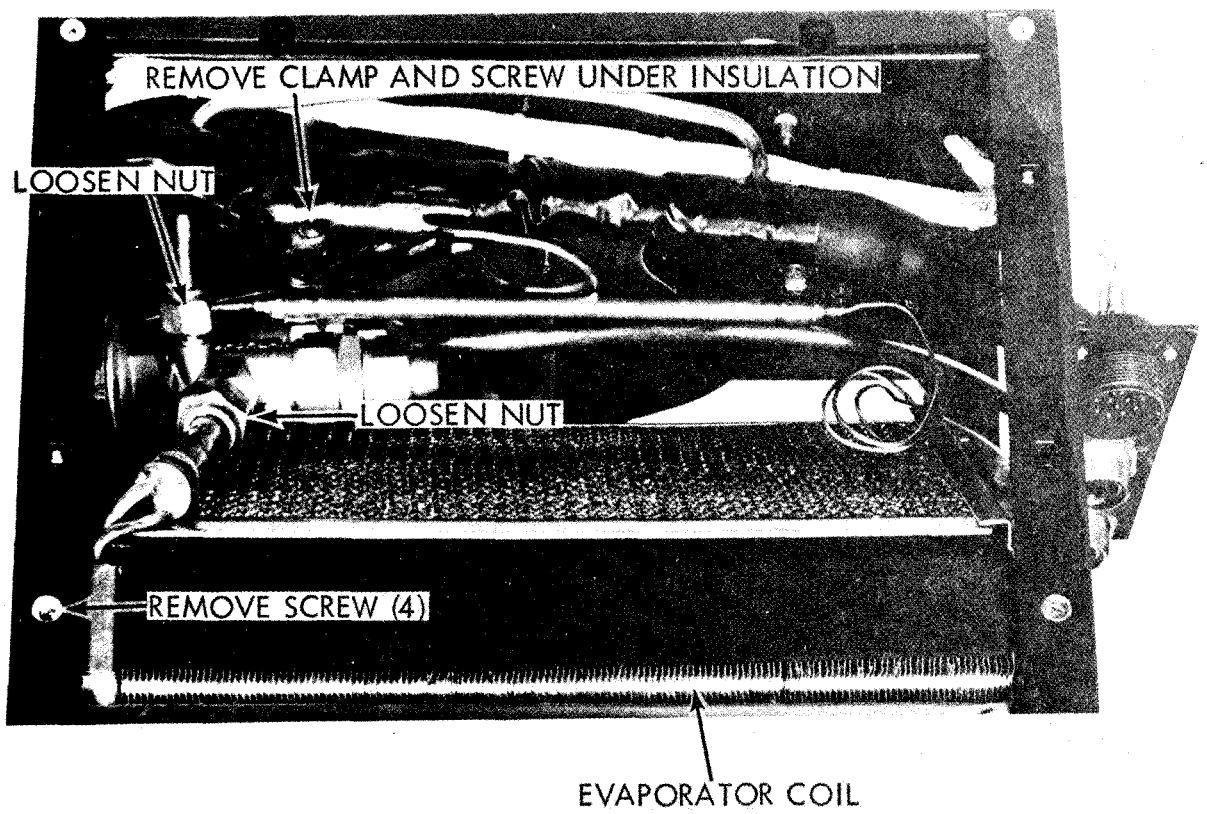


Figure 4-7. Evaporator coil removal and installation.

4-16. Condenser Coil

a. Removal.

(1) Remove condenser front, rear, and side panels. (fig. 3-1).

(2) Release the refrigerant charge. (para 4-6).

(3) Remove the condenser fan and fan motor. (para 3-18).

(4) Remove the condenser discharge grille. (fig. 3-4).

(.5) Remove the condenser coil. (fig. 4-8).

b. Service. **The requirements are the same as for the evaporator coil. (para 4-15** *b).*

c. Testing. **The testing procedure is the same as the evaporator coil. (para 4-7 and fig. 4-2).**

d. Repair. **The repair requirements are the same as the evaporator coil. (para 4-15** *d).*

e. Installation.

(1) Install the condenser coil. (fig. 4-8).

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Install the condenser discharge grille. (fig. 3-4).

(6) Install the condenser fan and fan motor. (para 3-18).

(7) Replace condenser front, rear and side panels. (fig. 3-1).

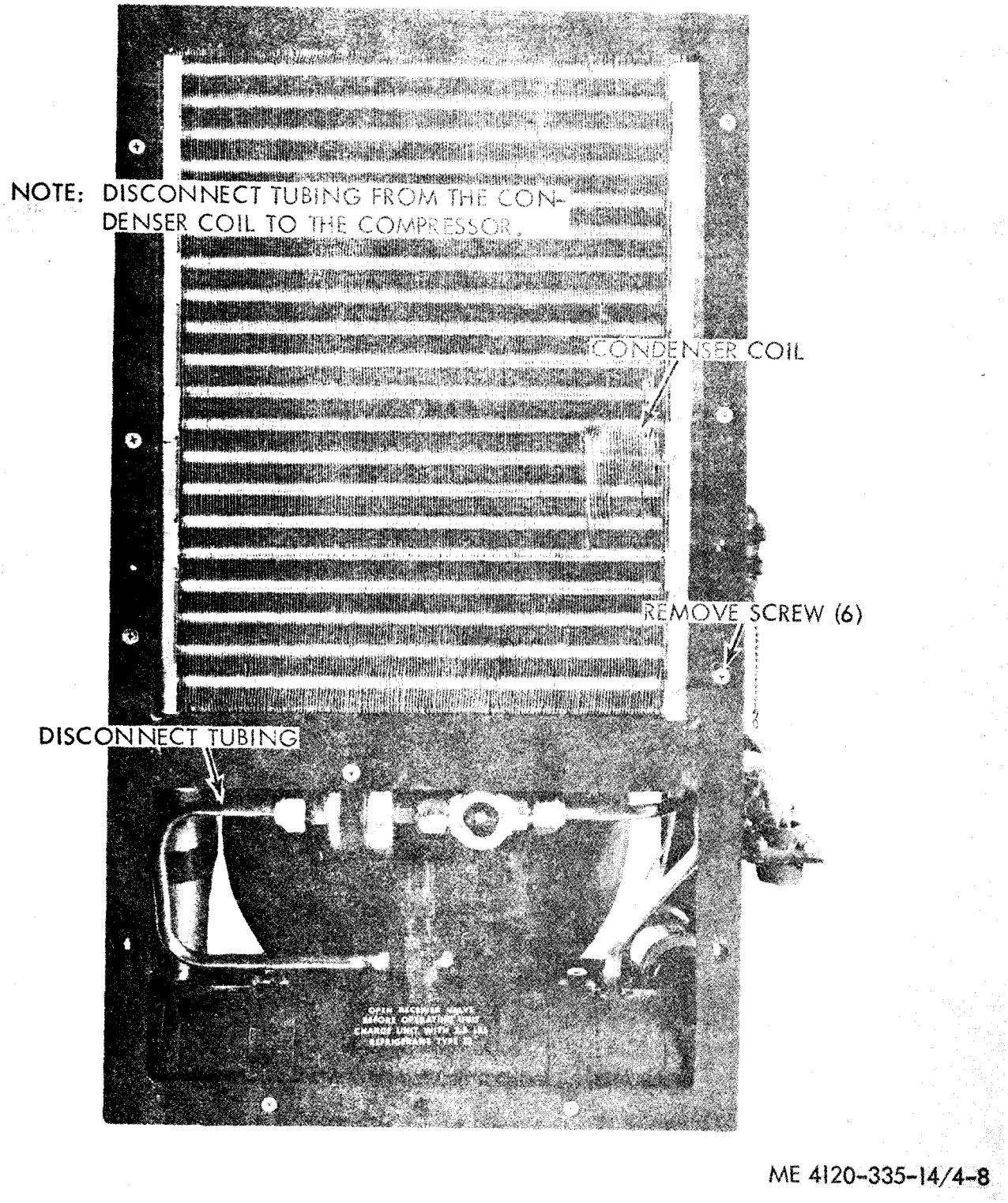


Figure 4-8. Condenser coil removal and installation.

4-17. Expansion Valve

a. Removal.

(1) Remove the evaporator rear and right side panels. (fig. 3-1).

(2) Remove the condenser intake grille. (fig. 3-4).

(3) Release the refrigerant charge. (para 4-6).

(4) Refer to figure 4-9 and remove the expansion valve and thermal bulb.

b. Cleaning and Inspection.

(1) Wipe the exterior surface with a clean cloth slightly dampened with an approved cleaning solvent and dry thoroughly.

(2) Inspect for breaks, cracks, damaged threaded area, corrosion, evidence of leaks or other defects.

(3) Replace a damaged expansion valve (thermal bulb.

c. *Installation.*

(1) Install the expansion valve and thermal bulb. (fig. 4-9).

(2) Check for refrigerant leaks. (para 4-7).

(3) Evacuate the refrigerant system. (para 4-8).

(4) Charge the refrigerant system. (para 4-9).

(5) Install the condenser intake grille. (fig. 3-4).

(6) Install the evaporator rear and right side panels, (fig. 3-1).

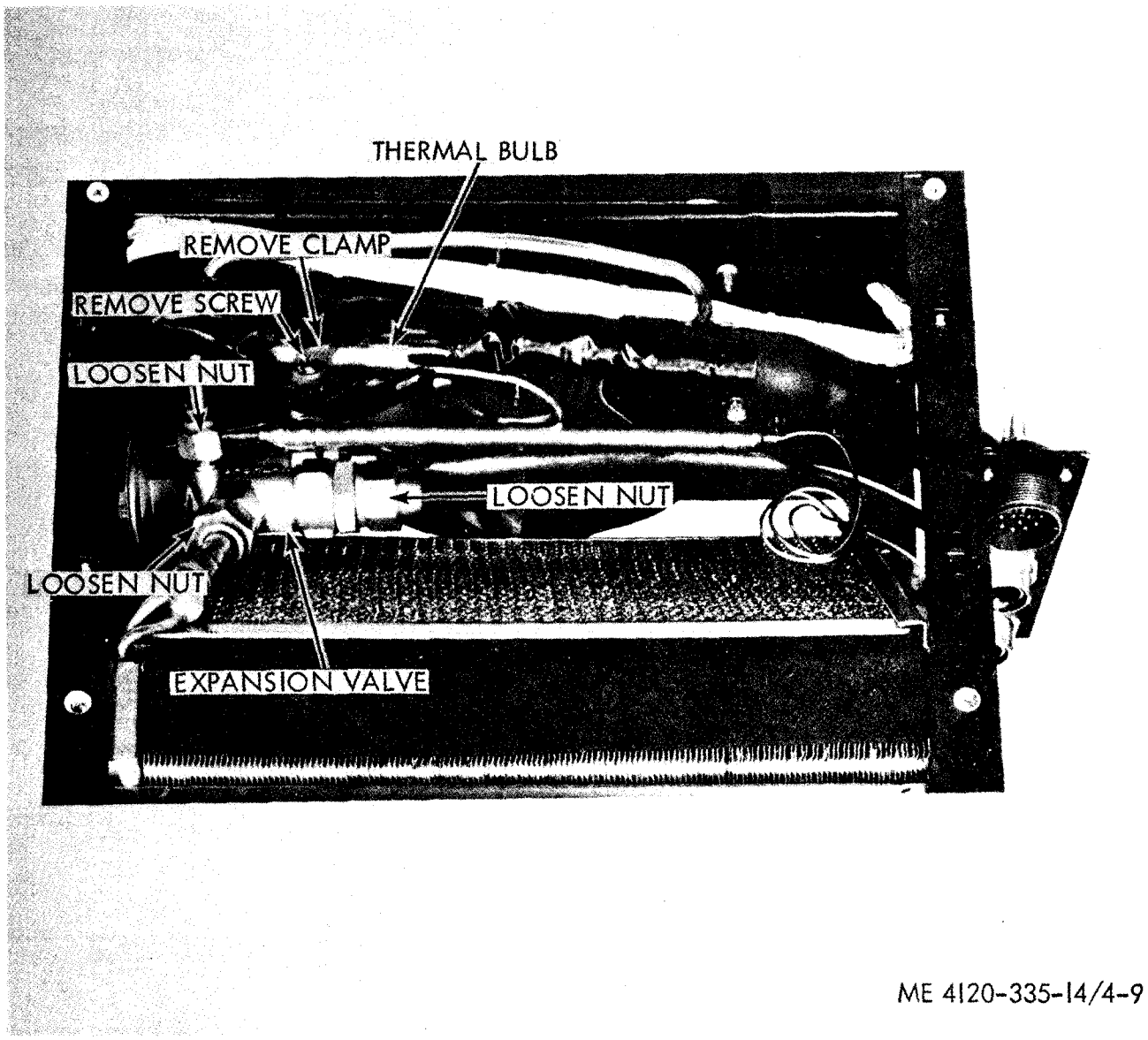


Figure 4-9. ***Expansion valve and*** **thermal** ***bulb removal and installation.***

4-18. Thermostatic Switch

a. Removal.

(1) Disconnect power to the unit.

(2) Remove the control panel. (fig. 3-2 and 3-

(3) Remove the evaporator rear panel. (fig. 3-1).

(4) Refer to figure 4-10 and remove the thermostatic switch.

b. Cleaning and Inspection.

(1) Wipe switch with a clean dry lint free cloth.

(2) Tighten all loose terminals or replace missing hardware.

c. *Test.*

(1) Place switch No. 3 in COOL position.

(21 Touch probes of multimeter to terminals 1 and 2 of thermostat and continuity should be indicated.

(3) Rotate the thermostatic switch towards the warm position until a click is heard in the switch.

(4) Touch the probes of the multimeter to terminals 2 and 3 and continuity should be indicated. If continuity is not indicated the switch is defective and should be replaced.

d. Installation.

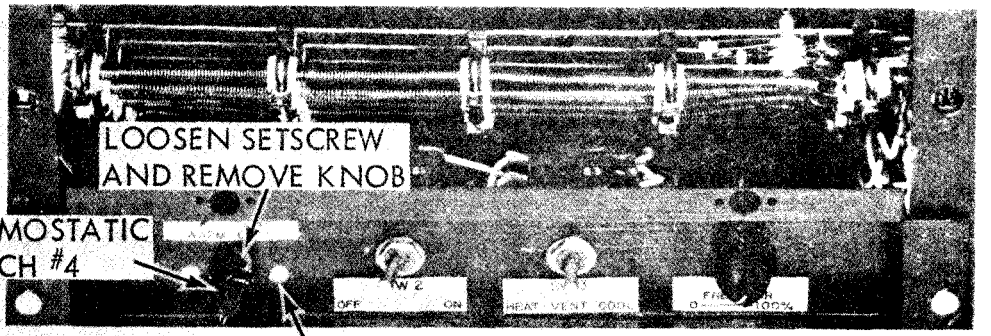
(1) Refer to figure 4-10 and install thermostatic switch.

(2) Install control panel. (fig. 3-2 and 3-6).

(3) Install the evaporator rear panel. (fig. 3-1).

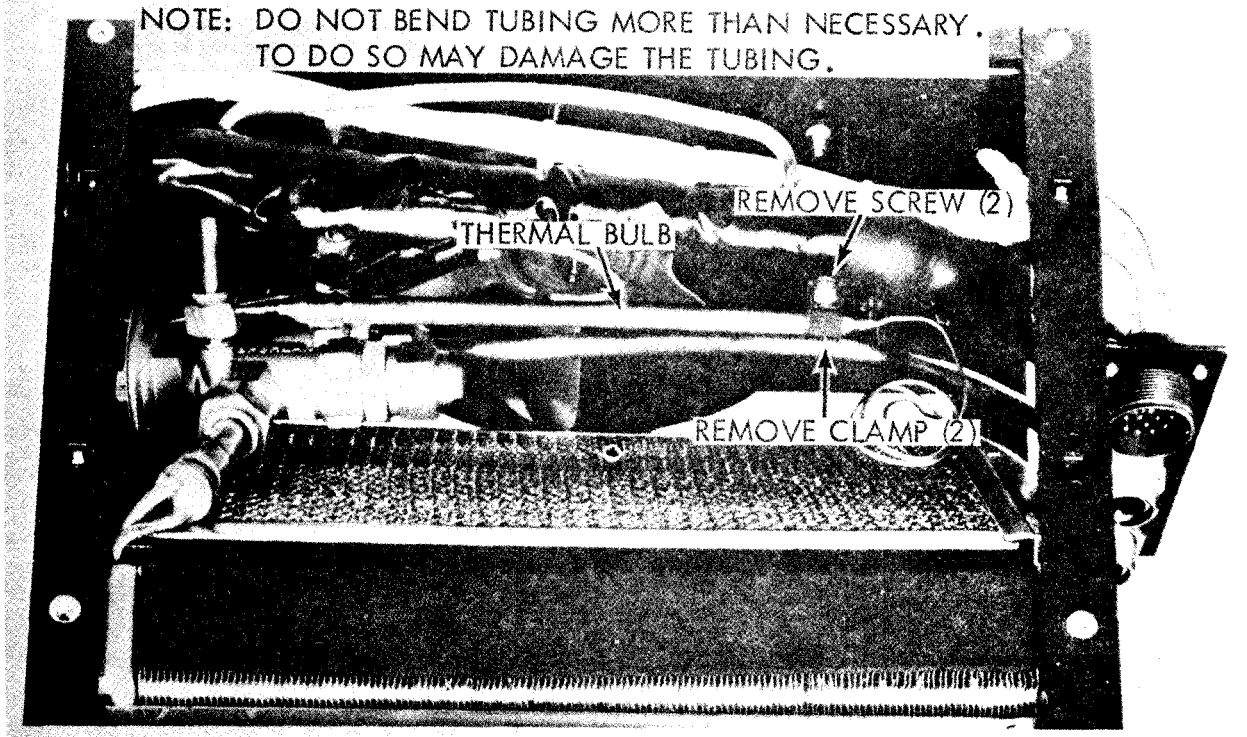
(4) Connect power to unit.

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS AS NECESSARY.
NOTE: REMOVE SWITCHES FROM REAR OF PANEL.



A. THERMOSTATIC SWITCH

NOTE: DO NOT BEND TUBING MORE THAN NECESSARY.
TO DO SO MAY DAMAGE THE TUBING.



B. THERMAL BULB

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Figure 4-10. Thermostatic switch removal and installation.

4-19. Pressure Switch

a. Removal.

(1) Refer to figure 1-2 and remove top and ear panels.

(2) Refer to figure 3-8 and remove pressure switch.

b. Cleaning and Inspection.

(1) Wipe the switch with a clean dry lint free cloth.

(2) Check for loose terminals, missing mounting hardware, cracks, breaks or other dam age.-

c. Test. Test the pressure switch for continuity with a continuity checker. Replace pressure switch as necessary.

d. Installation.

(1) Refer to figure 3-8 and install pressure switch.

(2) Refer to figure 1-2 and install top and rear panels.

APPENDIX A

REFERENCES

A-1. Fire Protection

TB 5-4200-200-10 — Supply of DA Approved Fire Extinquishers to Army Troop Users.

A-2. Painting

TM 9-213 — Painting Instructions for Field Use.

A-3. Shipment and Limited Storage

TM 38-230 — Preservation, Packaging and Packing of Military Supplies and Equipment.

A-4. Maintenance

TM 38-750 — Army Equipment Record System and Procedures.

TM 5-4120-335-24P — Operator, Organizational, Direct and General Support Maintenance Manual.

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. 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—(Not applicable).

d. **Section IV contains supplemental instructions, explanatory notes and / or illustrations required for a particular maintenance function—(Not applicable).**

B-2. Explanation of Columns in Section 11

a. Group Number, Column (1). **The assembly group is a numerical group assigned to each assembly in a top down breakdown sequence. The applicable assembly groups are listed on the MAC in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.**

b. Assembly Group, Column (2). **This column contains a brief description of the components of each assembly group.**

c. *Maintenance Functions, Column* **(3). This column lists the various maintenance functions (A through K). The lowest maintenance category authorized to perform these functions are indicated by a symbol in the appropriate column. The symbol designations for the various maintenance categories are as follows:**

C—Operator or crew
O-Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D-Depot maintenance

The maintenance functions are defined as follows:

A—INSPECT: To verily serviceability of an item by comparing its physical. mechanical, and electrical characteristics with established standards.

B—TEST: To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—SERVICE: To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

D—ADJUST: To rectify to the extent necessary to bring into proper operating range.

E—ALIGN: To adjust specified variable elements of an item to bring to optimum performance.

F—CALIBRATE: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison 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 with the certified standard.

G—INSTALL: To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—REPLACE: To replace unserviceable items with serviceable like items.

1— REPAIR: Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each category of maintenance.

J—OVERHAUL: Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

K—REBUILD : The highest degree of material maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

d. Tools and Equipment, Column (4). **This column is provided for referencing by code the special tools and test equipment, (sec. III) required to perform the maintenance functions (sec. II).**

e. *Remarks, Column (5).* **This column is provided for referencing by code the remarks (sec. IV) pertinent to the maintenance functions.**

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
01	Panels													
	Condenser section	O	..	O	..	..	..	..	O	O				
	Evaporator section	O	..	O	..	..	..	..	O	O				
02	Air Filters													
	Filter	O	..	O	..	..	..	..	O					
03	Electrical System													
	Motor assembly	O	O	O	..	..	..	..	O					
	Starting & protective devices	..	O	..	..	..	..	..	O					
	Switches	..	O	..	..	..	..	..	O					
	Relays	..	O	..	..	..	..	..	O					
	Rectifier	..	O	..	..	..	..	..	O					
	Blower assembly	O	..	O	..	..	..	..	O	O				
	Heating units	O	O	..	..	..	..	..	O	O				
	Wiring harness	O	O	O	..	..	..	..	O	O				
	Electrical interconnecting cable	O	O	O	..	..	..	..	O	O				
04	Air Conditioning Components:													
	Compressor	..	F	..	..	..	..	..	F					
	Refrigerant Piping	O	F	..	..	..	..	..	F	F				
	Condenser	O	F	F	..	..	..	..	F	F				
	Evaporator	O	F	F	..	..	..	..	F	F				
	Thermostatic controls	..	F	F	..	..	..	..	F					
	Sight glass	O	..	O	..	..	..	..	F					

APPENDIX C

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. scope

This appendix lists items which accompany the air conditioner or are required for installation, operation or operator's maintenance.

C-2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items—Section II. A list of items which accompany the air conditioner and are required by the operator / crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies—Section III. A listing of maintenance and operating supplies required for initial operation—(not applicable)

C-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, section II.

a. Source code, indicates the source for the listed item. Source codes are:

Code	*Explanation*
P	**Repair parts which are stocked in or supplied from the GSA / DSA, or Army supply system and authorized for use at indicated maintenance categories.**
	Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.
M	**Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.**
A	**Assemblies which are not procured or stocked as such. but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.**
X	**Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.**
xl	**Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.**
Code	***Explanation***
X2	**Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization. W here such repair parts are not obtainable through cannibalization, requirements will be requisitioned. with accompanying justification. through normal supply channels.**
G	**Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DS and GS level or returned to depot supply level.**

(2) Maintenance code, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code	*Explanation*
C	**Crew / operator**

(3) Recoverability code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code	*Explanation*
R	**Repair parts (assemblies and components) which are considered economically reparable at direct and general support maintenance levels. When the maintenance capability to repair these items does not exist, they are normally disposed of at the GS level. W hen supply considerations dictate, some of these repair parts may be listed for automatic return to supply for depot level repair as set forth in AR 710-,50. When so listed, they will be replaced by supply on an exchange basis.**
S	**Repair parts and assemblies which are economically reparable at DSU and GSU activities and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically reparable, they will be evacuated to a depot for evaluation and analysis before final disposition.**
T	**High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.**
U	**Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value reusable casings or castings.**

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. *Description.* This **column indicates the Federal item name and any additional description of the item required. The abbreviation "w / e", when used as a part of the nomenclature, indicates the Federal stock number, includes all armament, equipment, accessories, and repair parts issued with the item. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parenthesis. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.**

d. Unit of Measure (U/M). **A two-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.**

e. Quantity Incorporated in Unit. **This column indicates the quantity of the item used in the assembly group.** A "V" **appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g. shims, spacers, etc.).**

f. Quantity Furnished With Equipment. **This column indicates the quantity of an item furnished with the equipment.**

g. *Illustration.* **This column is divided as follows :**

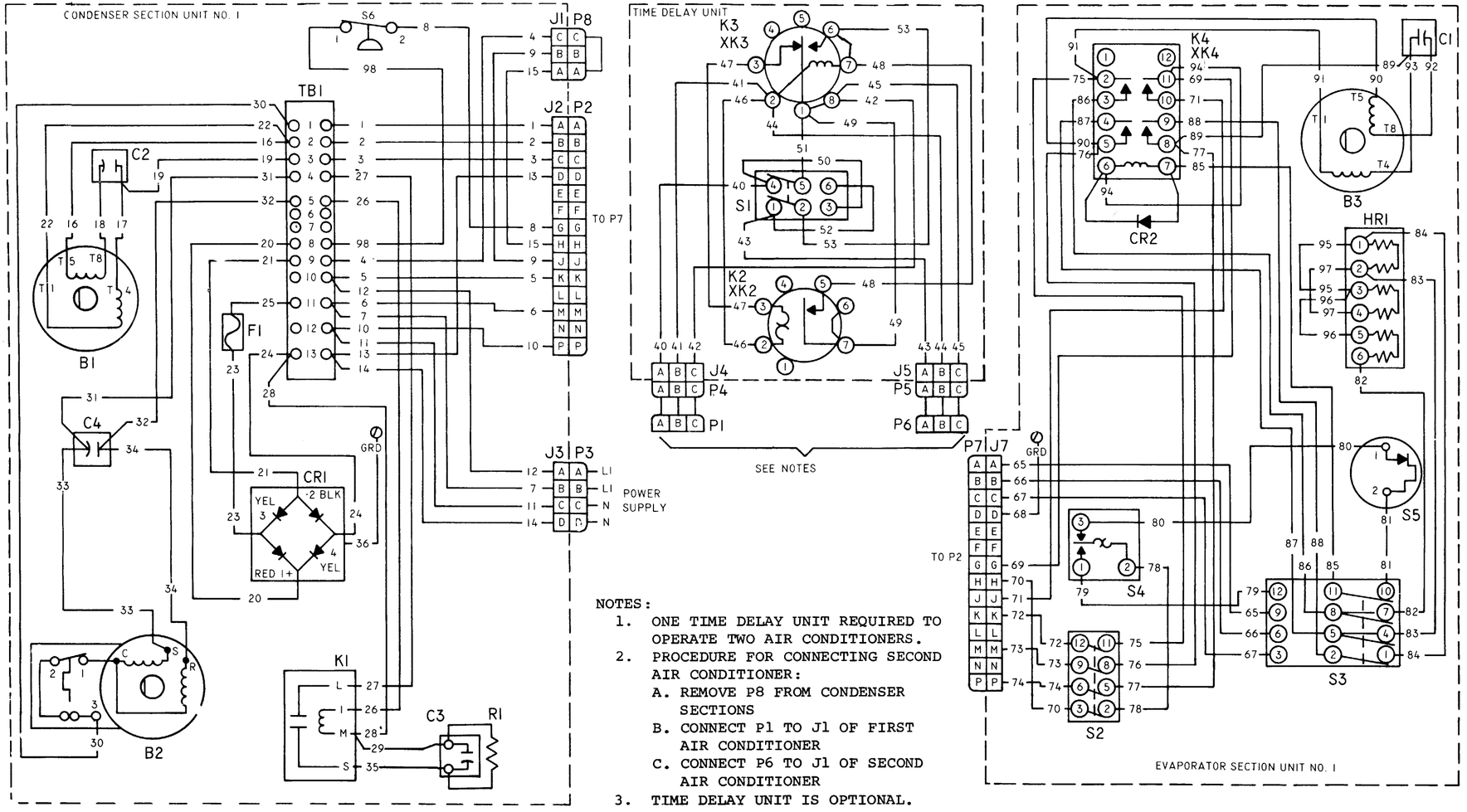
(1) *Figure number. Indicates* **the figure number of the illustration in which the item is shown.**

(2) *Item number.* **Indicates the callout number used to reference the item in the illustration.**

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description Ref no. & mfg code	Usable on code	(4) Unit of meas	(5) Qty inc in unit	(6) Qty f with equip	(7) Illustration (A) Fig No.	(B) Item No.
PC	7520-559-9618	CASE: Manual		ea		1		
PC		ARMY TECHNICAL MANUAL TM 5-4120-335-14		ea		1		

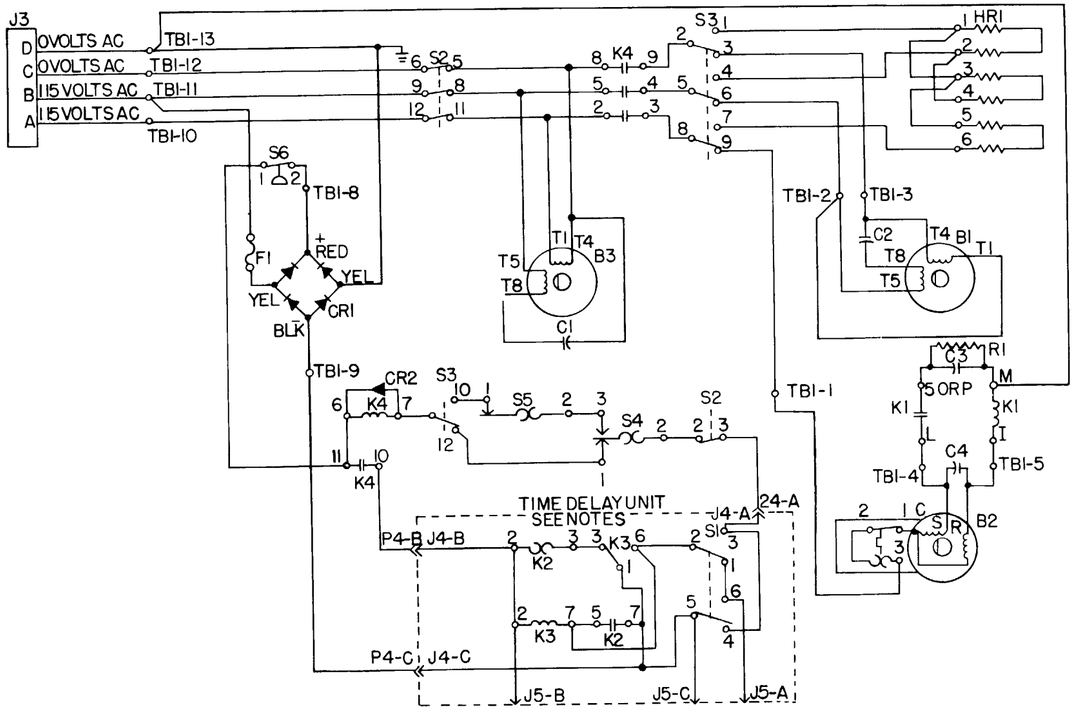
INDEX



LEGEND		
SYM	PART NO.	DESCRIPTION
B1	C13211E4735	MOTOR
B2	C13211E4690	COMPRESSOR
B3	C13211E4735	MOTOR
C1	B13211E4734	CAPACITOR, MOTOR RUN
C2	B13211E4734	CAPACITOR, MOTOR RUN
C3	B13211E4741	CAPACITOR
C4	B13211E4736	CAPACITOR
CR1	B13211E4696	RECTIFIER
F1	MIL-F-15160/02	FUSE
HR1	D13211E4613	COIL, HEATER
J1	B13211E4742	CONNECTOR, 90°
J2	MS3102R-22-19S	CONNECTOR
J3	MS3102R-18-4P	CONNECTOR
J4	C13216E5863	CONNECTOR
J5	C13216E5863	CONNECTOR
J7	MS3102R-22-19P	CONNECTOR
K1	B13211E4740	RELAY
K2	C13211E4705	RELAY, THERMAL TIME DELAY
K3	B13211E4698	RELAY
K4	B13211E4636	RELAY
P1	MS3106R-14S-7P	CONNECTOR
P2	MS3106R-22-19P	CONNECTOR
P3	MS3106R-18-4S	CONNECTOR
P4	C13216E5864	CONNECTOR
P5	C13216E5864	CONNECTOR
P6	MS3106R-14S-7P	CONNECTOR
P7	MS3106R-22-19S	CONNECTOR
P8	MS3106A-14S-7P	SHORTING PLUG
S1	MS35059-23	SWITCH, TOGGLE
S2	MS24525-22	SWITCH, TOGGLE
S3	MS24525-21	SWITCH, TOGGLE
S4	C13211E4621	CONTROL, THERMOSTAT
S5	C13211E4620	THERMOSTAT
TB1	MIL-T-55164/1 CL 37TB13	TERMINAL BOARD
XK2	MIL-S-12883/8 TS102P02	SOCKET
XK3	MIL-S-12883/1 TS101P01	SOCKET
XK4	B13211E4657	SOCKET
R1	RC42GF153J Per MIL-R11-7	RESISTOR
S6	C13216E6215-5	SWITCH, PRESSURE
CR2	C13214E3287	RECTIFIER, JUNCTION SILICON

ME 4120-335-14/FO-1

FO-1. Wiring diagram.



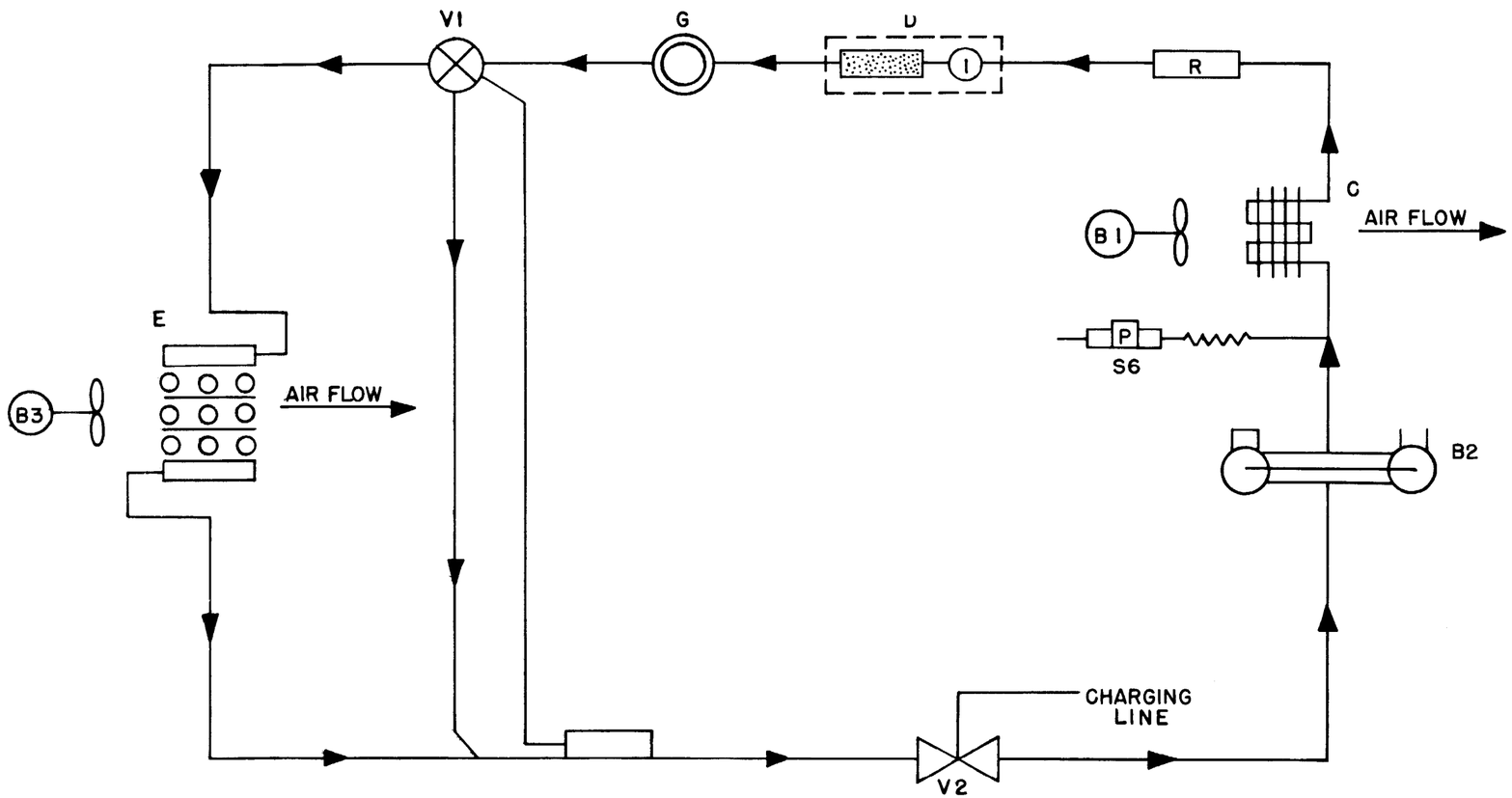
NOTES:

1. P4-A AND P4-C SHALL BE SHORTED WHEN TIME DELAY UNIT IS NOT REQUIRED.
2. ALL VOLTAGE REFERRED TO GROUND.
3. TIME DELAY RELAY OPTIONAL.
4. ONE TIME DELAY UNIT REQUIRED TO OPERATE TWO AIR CONDITIONERS.
5. PROCEDURE FOR CONNECTING SECOND AIR CONDITIONER:
   A. REMOVE P8 FROM CONDENSER SECTIONS
   B. CONNECT P1 TO J1 OF FIRST AIR CONDITIONER
   C. CONNECT P6 TO J1 OF SECOND AIR CONDITIONER

LEGEND		
SYM	PART NO.	DESCRIPTION
B1	C13211E4735	MOTOR
B2	C13211E4690	COMPRESSOR
B3	C13211E4735	MOTOR
C1	B13211E4734	CAPACITOR, MOTOR RUN
C2	B13211E4734	CAPACITOR, MOTOR RUN
C3	B13211E4741	CAPACITOR
C4	B13211E4736	CAPACITOR
CR1	B13211E4696	RECTIFIER
F1	MIL-F-15160/02	FUSE
HR1	D13211E4613	COIL, HEATER
J1	B13211E4742	CONNECTOR, 90°
J2	MS3102R-22-19S	CONNECTOR
J3	MS3102R-18-4P	CONNECTOR
J4	C13216E5863	CONNECTOR
J5	C13216E5863	CONNECTOR
J7	MS3102R-22-19P	CONNECTOR
K1	B13211E4740	RELAY
K2	C13211E4705	RELAY, THERMAL TIME DELAY
K3	B13211E4698	RELAY
K4	B13211E4636	RELAY
P1	MS3106R-14S-7P	CONNECTOR
P2	MS3106R-22-19P	CONNECTOR
P3	MS3106R-18-4S	CONNECTOR
P4	C13216E5864	CONNECTOR
P5	C13216E5864	CONNECTOR
P6	MS3106R-14S-7P	CONNECTOR
P7	MS3106R-22-19S	CONNECTOR
P8	MS3106A-14S-7P	SHORTING PLUG
S1	MS35059-23	SWITCH, TOGGLE
S2	MS24525-22	SWITCH, TOGGLE
S3	MS24525-21	SWITCH, TOGGLE
S4	C13211E4621	CONTROL, THERMOSTAT
S5	C13211E4620	THERMOSTAT
TB1	MIL-T-55164/1 CL 37TB13	TERMINAL BOARD
XK2	MIL-S-12883/8 TS102P02	SOCKET
XK3	MIL-S-12883/1 TS101P01	SOCKET
XK4	B13211E4657	SOCKET
R1	RC42GF153J Per MIL-R11-7	RESISTOR
S6	C13216E6215-5	SWITCH, PRESSURE
CR2	C13214E3287	RECTIFIER, JUNCTION SILICON

ME 4120-335-14/FO-2

FO-2. Wiring schematic.



NOTES:

1. REFRIGERANT TYPE 12 PER BB-C-310.

LEGEND		
REF DESIGNATION	DESCRIPTION	PART NO.
B1	FAN MOTOR, CONDENSER	C13211E4735
B2	COMPRESSOR	C13411E4690
B3	FAN MOTOR, EVAPORATOR	C13211E4735
R	RECEIVER	D13211E4666
D	FILTER-DRIER	C13211E4675
G	SIGHT GLASS	C13211E4687
V1	VALVE, EXPANSION	B13211E4766
C	COIL, CONDENSER	D13211E4766
E	EVAPORATOR	D13211E4612
V2	VALVE, LINE SHUT-OFF	B13211E4697
S6	SWITCH, PRESSURE	C13216E6215-4

ME 4120-335-14/FO-3

FO-3. Refrigeration schematic.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, United States Arm y,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-25C, (qty rqr block no. 530) Organizational maintenance requirements for Environmental Equipment Air Conditioners 6,000 BTU.

* U. S. GOVERNMENT PRINTING OFFICE: 1993 - 342 - 421/61768

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

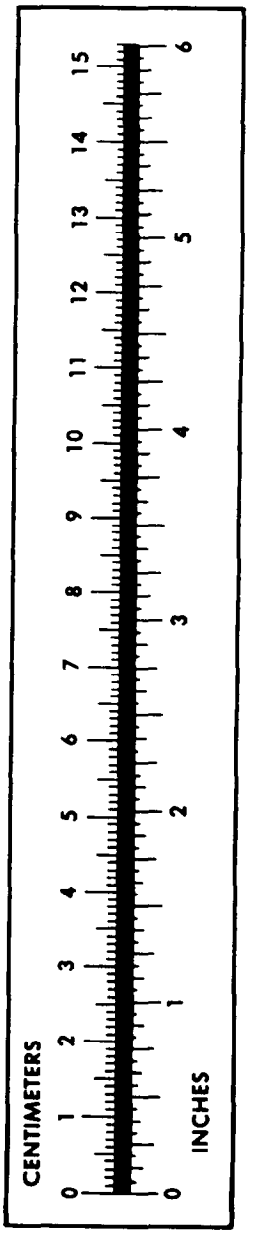
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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