TM 5-4120-312-14

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER: COMPACT VERTICAL 208V, 3 PHASE, 18,000 BTUH COOLING; 12,000 BTUH HEATING

(AMERICAN AIR FILTER MODELS)

CH-420-1, 400 HERTZ, FSN 4120-909-0388

CH-620-1, 50/60 HERTZ, FSN 4120-909-0387

This reprint includes all changes in effect at the time of publication: Changes 1 through 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1969

SAFETY PRECAUTIONS

BEFORE OPERATION

Do not attempt to repair a refrigerant leak while the unit is under pressure.

Disconnect the air conditioner from the power source before making any repair or performing any Maintenance operation.

Avoid bodily contact with liquid refrigerant. Avoid inhaling refrigerant gases. In case of leaks, notify direct support maintenance, vent the area immediately.

DURING OPERATION

Do not attempt to make any repairs while the air conditioner is in operation.

Check sight glass frequently.

AFTER OPERATION

Place control switch in the OFF position.

Avoid any contact with liquid refrigerant, especially the eyes. In case of eye contact, seek immediate medical attention.

Do not attempt to make any repair while the unit is under pressure. Drain all refrigerant from system prior to repairing a leak or replacing refrigerant components.

Wear goggles when repairing refrigerant system.
Wear rubber gloves when replacing a motor/compressor unit due to burnout.

Do not discharge refrigerant into area where there is an open flame. Poisonous gases develop when refrigerant is exposed to open flame.

Do not handle any oil-refrigerant mixture with bare hands after a motor/compressor burnout.

When using the Halide leak detector, make certain that adequate ventilation is provided.

Do not lay unit on its side. Always store or ship unit in vertical position only.

CHANGE

No. 6

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

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

AIR CONDITIONER, COMPACT, VERTICAL, 208 VOLT,
3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING
AMERICAN AIR FILTER MODELS CH-420-1, 400 HERTZ,
NSN 4120-0-09-0388, CH-20-1, 50/60 HERTZ, NSN 4120-00-909-0387

Approval for public release; distribution is unlimited

TM 5-4120-312-4, 16 November 1969, is changed as follows:

Page 6-1 is changed as follows:

Ž Add the following note in paragraph 6- 1c, *Purging the System,* before step (1).

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

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

Ž Paragraph 6- 1c(3) is superseded as follows:

(3) Connect and operate recovery/recycle unit in accordance with the manufacturer's instructions.

Page 6-2 is changed as follows:

• Paragraph *e. Charging the Unit is* changed as follows:

■ Add the following note before step (1).

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

Page C-6 is changed as follows:

Ž Add the following table prior to **Section IV. REMARKS:**

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) TOOL OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) 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
01646

DISTRIBUTION
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NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 20 November 199

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

AIR CONDITIONER, COMPACT, VERTICAL, 208 VOLT,
3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING
AMERICAN AIR FILTER MODELS CH–420–1, 400 HERTZ,
NSN 4120–00–909–0388, CH–620–1, 50/60 HERTZ, NSN 4120–00–909–0387

Approved for public release; distribution is unlimited

TM 5–4120–312–14, 16 November 1969, is changed as follows:

Page 2–6, paragraph 2–13 is superseded as follows:

2–13. 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 2–6, paragraph 2–14 is superseded as follows:

2–14. 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:
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C4

CHANGE

NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D, C, *24 February 1978*

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

AIR CONDITIONER, COMPACT, VERTICAL, 208 VOLT, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING AMERICAN AIR FILTER MODELS CH-420-1, 400 HERTZ, NSN 4120-00-909-0388, CH-620-1, 50/60 HERTZ, NSN 4120-00-909-0387

TM 5-4120-312-14, 16 November 1969, is changed as follows:

APPENDIX C, Section II. MAINTENANCE ALLOCATION CHART is superseded as follows:

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	M Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
01	AIR CONDITIONING HOUSING AND PANELS													
	Air Filters													
	Eliminator, mist	C		C					C					
	Fresh air inlet screen	O		O					O					
	Frame Assembly													
	Base Assembly	O							F					
	Casing Assembly	O							F					
	Guard, condenser fan	O							O					
	Panels													
	Chain and damper control	O							O					
	Cover assemblies	C							C					
	Damper assembly	O							F					
	Grilles	C							C					
	Panel assembly front lower	C							C					
	Panels, back and top	O							F					
	Retainer assembly, filter	O							O					
02	BLOWER MOTOR AND BLOWER FANS													
	Blower Assembly													
	Fan, blower	O							O					
	Frame, Support, and Housing													
	Cover, stator housing	F							F					
	Endbell, housing	F							F					
	Housing, stator	F	F						F					
	Motor Assembly													
	Bearing	F							F					
	Motor assembly, blower	O	O						O	F				
	Rotor Assemblies													
	Rotor, blower motor	F							F					
	Starting and Protective Devices													
	Protector overload		F						F					
	Stator Assemblies													
	Stator, blower motor	F	F						F					
03	CONTROL VALVE													
	Control Panels, Housing, Cubicles													
	Box, control		O						O					
	Connector, receptacle		O						O					
	Control panel assembly		O						O					
	Leads, electrical		O						O					
	Receptacle		O						O					

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
	Master or Auxiliary Control Assembly													
	Contactor, electrical		O						O					
	Switches													
	Switch, rotary		O						O					
	Switch, thermostatic		O						O					
04	JUNCTION BOX													
	Circuit Breakers													
	Circuit breakers, compressor		O						O					
	Fuse		O						O					
	Starting and Protective Devices													
	Relay, phase		O						O					
	Terminal Blocks													
	Connector, receptacle		O						O					
	Terminal blocks	O							O					
	Thermostatic Controls													
	Switch, thermostat		O						O					
	Transformer: Rectifier													
	Rectifier		O						O					
05	COMPRESSOR ASSEMBLY													
	Gas Compressor Assembly													
	Compressor Assembly	F	F	F					F					A
	Mount, resilient	O							F					
06	EVAPORATOR, HEATING INDICATORS, AND PIPING													
	Air Filters													
	Filters	C		C					C					B
	Evaporator													
	Evaporator assembly	O	F	O					F					C
	Tube, drain		O						F					
	Valve, expansion		F		F				F					
	Gages													
	Sight glass	C							F					
	Heating Units													
	Heater, electrical		O						O					
	Refrigerant Piping													
	Tubing, copper		F						F					
	Valve, pressure relief		F						F					
	Valve, regulating		F	F					F					
	Valve, service								F					
	Switch													
	Switch, pressure		O						F					
07	CONDENSER, DEHYDRATOR, AND VALVES													
	Condenser													
	Condenser screen	O		O					O					D
	Condenser assembly		F	O					F					
	Hydrating Equipment													
	Dehydrator								F					
	Refrigerant Piping													
	Valve, pressure relief		F						F					
	Valve, solenoid		F						F	F				
08	ACCESSORY ITEMS													
	Panels													
	Blockoff panel							O	O					
	Sound attenuator and paulin	O							O					

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25C, Operator maintenance requirements for Air Conditioners: 18,000 BTU, Compact.

TM 5-4120-312-1
C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARI
WASHINGTON, DC, *10 March 19*

Operator's, Organizational, Direct Support and General Support Maintenance Manual AIR CONDITIONER, COMPACT, VERTICAL, 208 VOLT, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING AMERICAN AIR FILTER MODELS CH-420-1, 400 HERTZ, NSN 4120-00-909-0388, CH-620-1, 50/60 HERTZ, NSN 4120-00-909-0387

TM 5-4120-312-14, 16 November 1969, 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 and Health or the US 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. 542) Organizational maintenance requirements for Environmental Equipments, Air Conditioners, 18,000 BTU, Compact.

TM 5-4120-312-1
C 2

Change No. 2

HEADQUARTERS
DEPARTMENT OF THE ARM
Washington, D. C., *20 April 197*

Operator, Organizational, Direct Support and General Support Maintenance Manual AIR CONDITIONER: COMPACT VERTICAL 208 V, 3 PHASE, 18,000 BTUH COOLING; 12,000 BTUH HEATING (AMERICAN AIR FILTER MODELS) CH-420-1, 400 HERTZ, FSN 4120-909-0388 CH-620-1, 50/60 HERTZ, FSN 4120-909-0387

TM 5-4120-312-14, 16 November 1969, is changed as follows:

Page B-1. Appendix B is superseded as follows:

APPENDIX B
BASIC ISSUE ITEM LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B-1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the air conditioner and are required by the crew/operator for operation, installation, or operator's maintenance.

B-2. General

This basic issue items, items troop installed or authorized list is divided into the following sections:

a. Basic Issue Items List—Section II. Not applicable.

b. Items Troop Installed or Authorized List—Section III. A list in alphabetical sequence of items which at the discretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Secti III.

a. Source, Maintenance, and Recoverability Code(s) (SMR): Not applicable.

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

C. Description. This column indicates the Fede item name and any additional description of t item required.

d. Unit of Measure (U/M). A 2 character alphabe abbreviation indicating the amount or quantity the item upon which the allowances are bas e.g., ft, ea, pr, etc.

e. Quantity Authorized (Items Troop Installed Authorized Only). This column indicates t quantity of the item authorized to be used with t equipment.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR code	(2) Federal stock number	(3) Description Ref. No. & Mfr code / Usable on code	(4) Unit of meas	(5) Qty auth
	7520-559-9618	CASE, MAINTENANCE AND OPERATIONAL MANUAL	EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
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. 542) Organizational maintenance requirements for Air Conditioners: 18.000 BTU Compact.

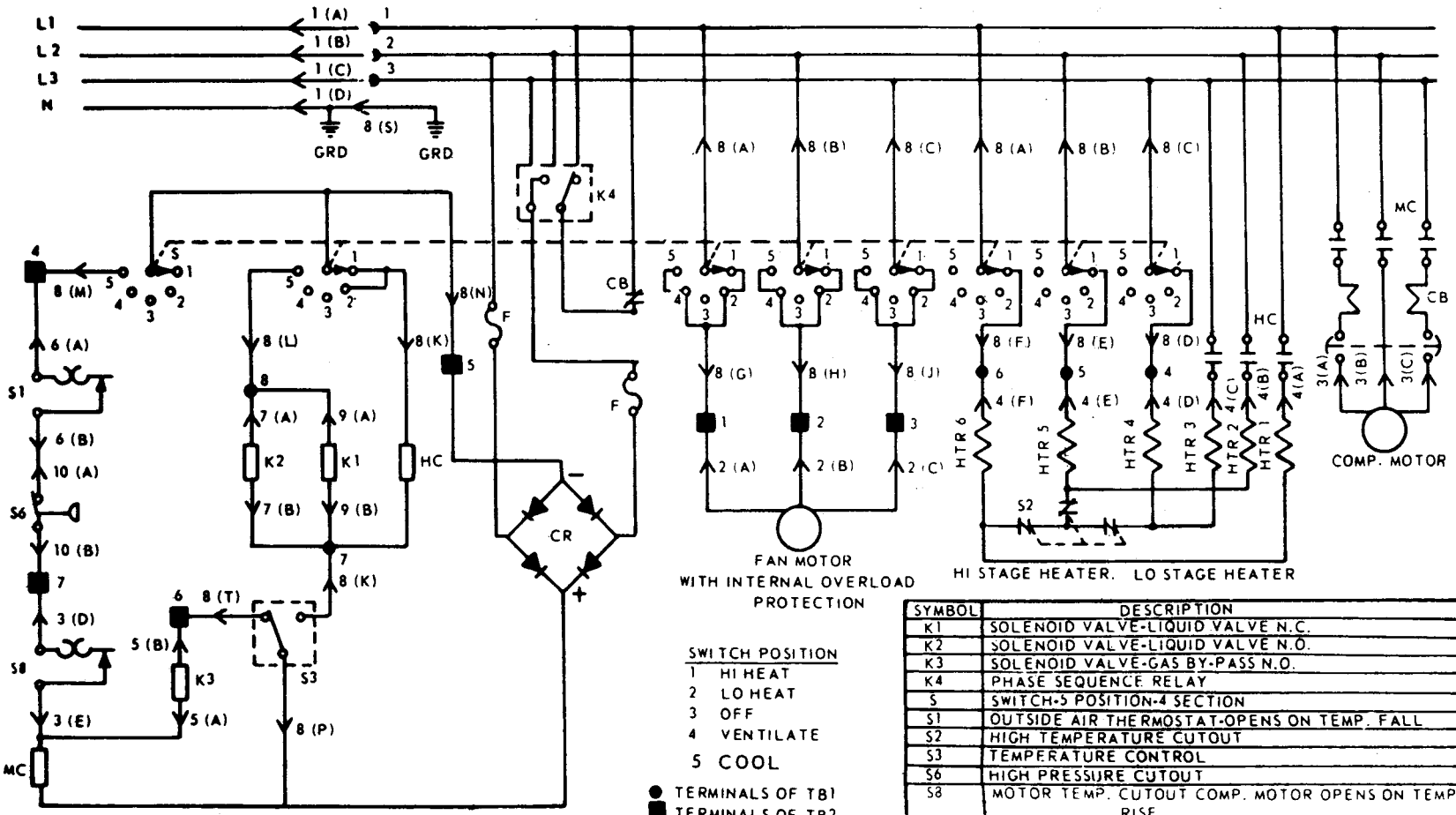
CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., *8 June 1971*

Operator, Organizational, Direct Support And General Support Maintenance Manual AIR CONDITIONER: COMPACT VERTICAL, 208 V, 3 PHASE, 18,000 BTUH COOLING; 12,000 BTUH HEATING (AMERICAN AIR FILTER MODELS) CH-420-1, 400 HERTZ, FSN 4120-909-0388, CH-620-1, 50/60 HERTZ, FSN 4120-909-0387

TM 5-4120-312-14, 16 November 1969 is changed as follows:

Page 1-6. Figure 1-4 is superseded as follows:



SYMBOL	DESCRIPTION
K1	SOLENOID VALVE-LIQUID VALVE N.C.
K2	SOLENOID VALVE-LIQUID VALVE N.O.
K3	SOLENOID VALVE-GAS BY-PASS N.O.
K4	PHASE SEQUENCE RELAY
S	SWITCH-5 POSITION-4 SECTION
S1	OUTSIDE AIR THERMOSTAT-OPENS ON TEMP. FALL
S2	HIGH TEMPERATURE CUTOUT
S3	TEMPERATURE CONTROL
S6	HIGH PRESSURE CUTOUT
S8	MOTOR TEMP. CUTOUT COMP. MOTOR OPENS ON TEMP. RISE
CB	CIRCUIT BREAKER
CR	RECTIFIER
F	FUSE
HC	HEAT CONTACTOR-LO STAGE HEAT
MC	MOTOR CONTACTOR-COMP. MOTOR

ME 4120-312-14/1-4 C1

Figure 1-4. Practical wiring diagram.

Page 2-1. Paragraph 2-2*a* is superseded as follows:

a. General. The air conditioners are basically self-contained units. Under certain conditions it might be desirable to operate from a remote position, using the block-off panel and a suitable cable to allow the operator to control the unit remotely. An external sound attenuator is recommended to reduce the noise level of operation. A paulin may be used to prevent dirt from entering the conditioner.

NOTE

To install the alternator, remove the return and discharge air grilles. Using screws, align slots in the attenuator with damper door chain and fasten attenuator to front of air conditioner.

Page 2-4. In figure 2-2 immediately after "REFRIGERANT IS LOW" add "(COOLING MODE ONLY)."

Page 3-6. Item 1*h* under "Probable cause" is superseded as follows:

Probable Cause	*Correction Action*
h. Input power phase reversal to unit	Refer to figure 1-3, insure correct input phase from power source to air conditioner.

Page 3-15. Paragraph 3-30 *a* (2) is superseded as follows:

(2) Tag and disconnect wiring. Using a multimeter, test the forward and back resistance between the yellow (A/C) terminals 1 and 4 (fig. 1-3). Check the red and black (D/C) terminals 2 and 3 in the same manner. A resistance of infinity in both directions indicates an open rectifier that must be replaced.

Page 5-4. Paragraph 5-12*b* (2) is superseded as follows:

(2) Attach suction pressure gage to read suction. Turn screw clockwise to raise pressure and counterclockwise to reduce pressure. Operate unit in bypass cycle and energize solenoid valve K3.

Page 5-5. In figure 5-2, step 3, after "STABILIZE)." add "Cooling cycle only."

In figure 5-2, step 6 is added immediately after step 5.

Step 6. The thermometer is taped to the suction line near the feeler bulb for the one-half ton thermostatic expansion valve. This valve is adjusted only when the unit is in the bypass cycle (Thermostat turned full increase).

Page B-2. Paragraph B-5 is rescinded.

Section II, last three items (all columns) are rescinded.

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 Army,
The Adjutant General.

Distribution:

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TECHNICAL MANUAL
NO. 5-4120-312-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 16 November 1969

OPERATOR, 0RGANIZATI0NAL DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER: COMPACT VERTICAL, 208V, 3 PHASE, 18,000 BTUH COOLING; 12,000 BTUH HEATING (AMERICAN AIR FILTER MODELS) CH-420-1, 400 HERTZ, FSN 4120-09-0388 CH-620-1, 50/60 HERTZ FSN 4120-909-0387

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual is published for the use of personnel to whom the compact air conditioner is issued. Chapters 1 through 3 provide information on installation, operation, preventive maintenance, and operator's and organizational maintenance of the equipment, accessories, components, and attachments. Chapter 4 provides information on shipment and limited storage, and demolition of the equipment. Chapters 5 and 6 provide instruction for direct support and general support. Also included are descriptions of main units and their relationships to other components.

1-2. Forms and Records

a. DA Forms and procedures used for equipment maintenance will be only those prescribed in TM 88-750 (Army Equipment Record Procedures).

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

Section II. DESCRIPTION AND DATA

1-3. Description

a. General. These air conditions (fig. 1-1 and 1-2) are used primarilyi in van-type enclosures. The units provide filtered, conditioned, or heated air, as required, to maintain the service conditions necessary for the efficient operation of electronic equipment in the vans. The conditioners also provide for the comfort of operating personnel housed within specified vans. The units are completely self-contained, air-cooled, electric motor driven, and designed for continuous operation under varying loads. These units are equipped with internal ducting to the low side of the evaporator fan so that ventilation air from a chemical-biological filter may be supplied by the fan. The units furnish 12,000 BTUH for heating and 18,000 BTUH for cooling.

b. Condenser Section. The condenser section, located in the lower compartments, contains the hermetically sealed compressor, condenser coil, control panel and box, thermostatic switch, blower motor, service valves, and condenser fan.

c. Evaporator Section. The evaporator section, located in the upper compartment contains an evaporator coil drain pan, expansion valves, electrical heaters, sight glass, and evaporator fan.

1-4. Identification and Tabulated Data

a. Identification.

(1) *Air Conditioner (Model CH420-1).*

(a) Corps of Engineers plate A. Located near' top of back panel. Specifies nomenclature, manufacturer, model number, serial number, dimensions, weight and capacity.

(b) Manufacturers identification plate. Located on rear panel just below sight glass. Specifies nomenclature, manufacturer, model" number, serial number of the unit.

(c) Compressor identification plate. Located on front of compressor housing. Specifies compressor model number, part number, serial number, refrigerant, oil type and capacity manufacturer, and complete electrical data.

(2) *Air conditioner (Model CH-620-1).*

(a) Corp of Engineers plate A. Located above fan guard on back panel of unit. Specifies nomenclature, manufacturer, model number, serial number, dimensions, weight, and capacity.

(b) Compressor identification plate. Lo-

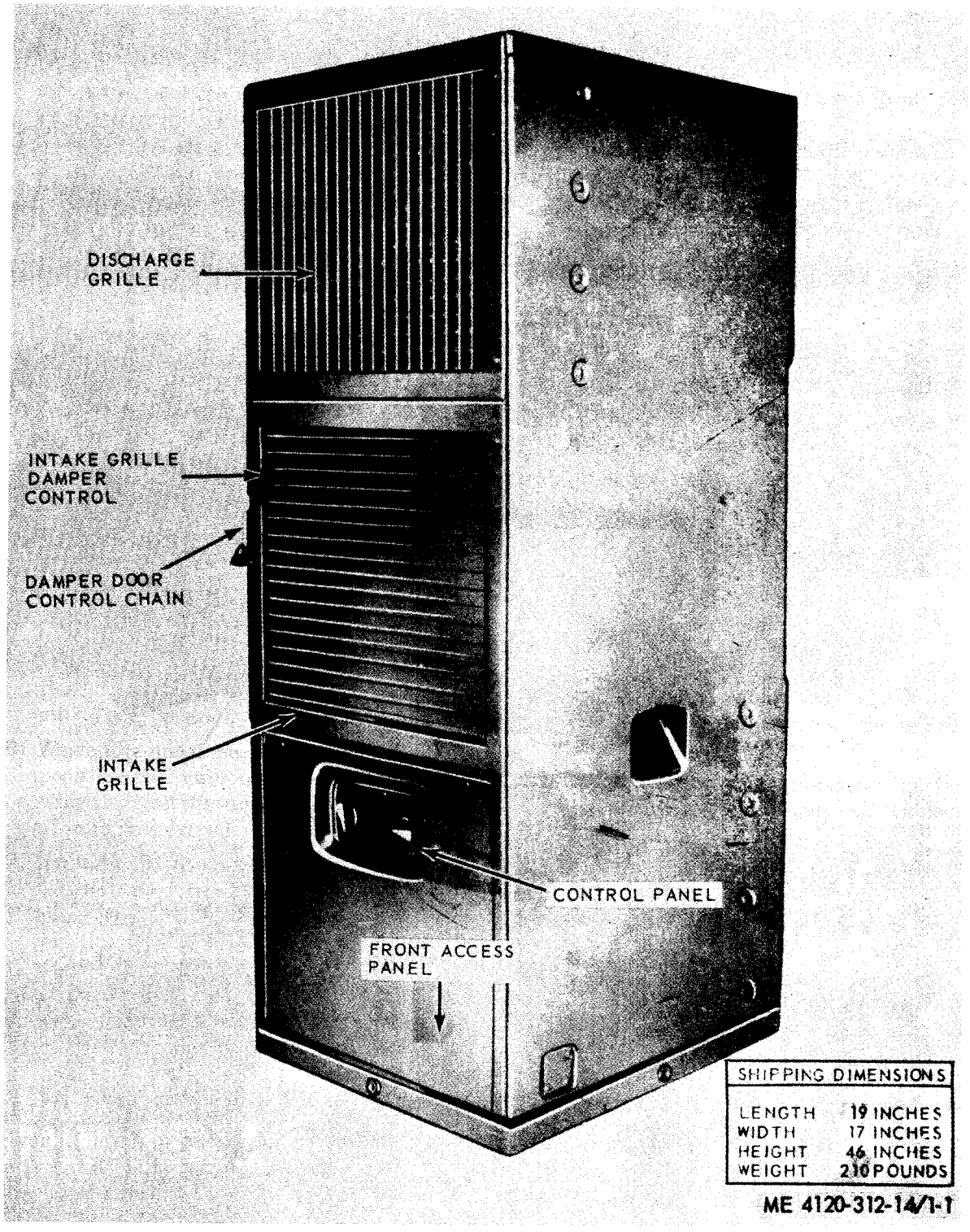


Figure 1-1. Air conditioner, front three-quarters view w/shipping dimensions.

cated on front of compressor housing and compressor crankcase. Specifies compressor model number, part number, serial number, refrigerant, manufacturer, and complete electrical data.

(3) *Identificatication applicable to both models.*

(a) Blower motor identification. Located on top of the blower motor. Specifies motor horsepower, type, serial number, rpm's (revolutions per minute) part number, order number, and electrical characteristics.

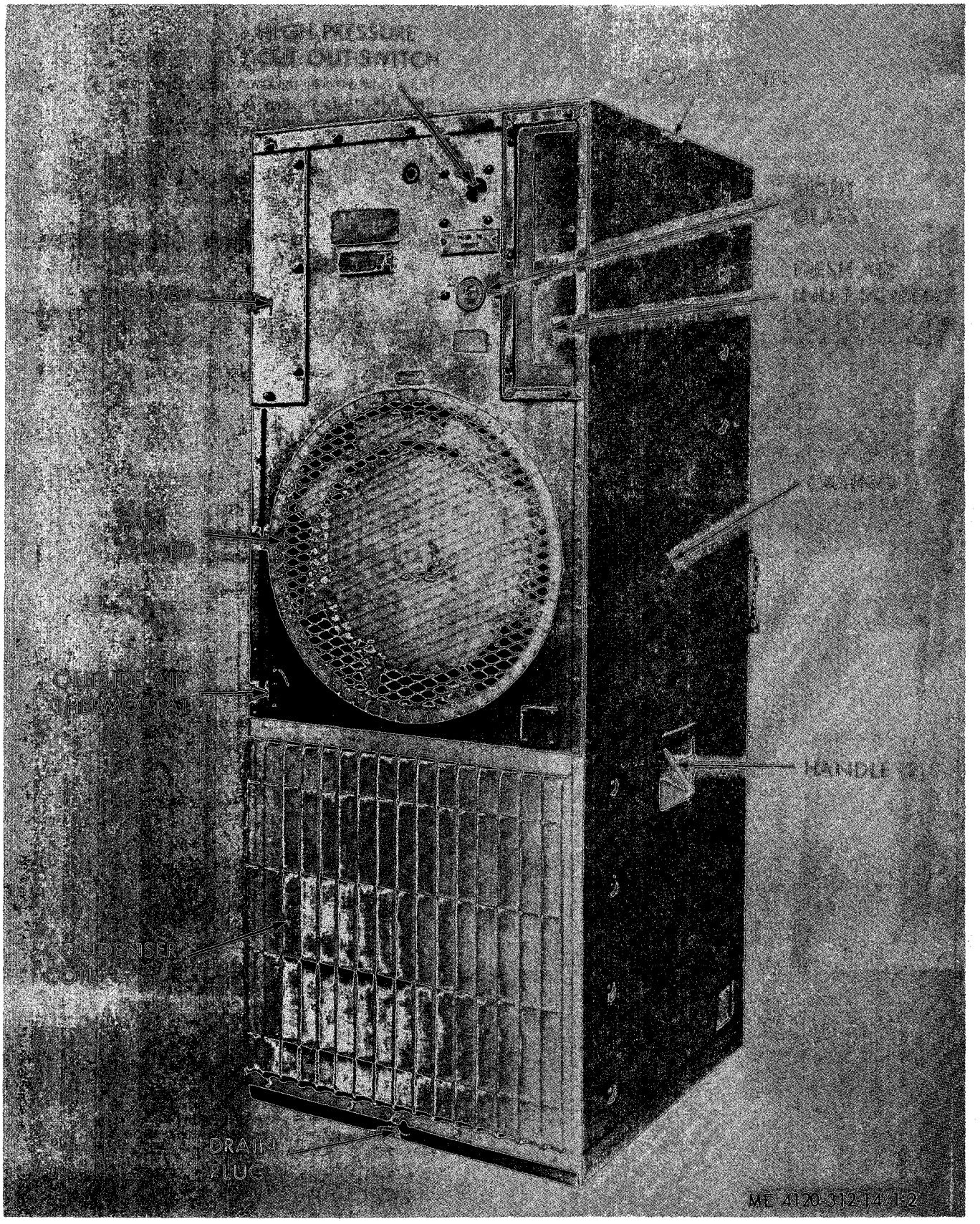


Figure 1-2. ***Air conditioner, rear view.***

(b) Control panel legend plate. Located on front of unit control panel. Indicates unit tern. perature setting for cooling or heating purposes.

(c) *Wiring diagram plate.* Located on inside of front access panel; illustrates complete unit wiring.

(d) Refrigerant-22 plate. Located on rear panel above condenser fan guard. It states that the unit is charged with 3.50 pounds of refrigerant-22.

(e) Color indicating plate. Located on rear panel immediately below the refrigerant sight glass. It has three color bands: green, chartruse, and yellow. The color bands are used in conjunction with the liquid line sight glass to indicate moisture condition of dehydrator.

(f) High pressure cutout control reset plate. Located on rear panel just below high pressure cutout control reset button with nomenclature: PUSH TO RESET.

(g) Indicating arrow plate. located on rear panel just above condenser fan guard; arrow indicates direction of condenser fan rotation.

b. Tabulated Data.

(1) Air Conditioner (Model CH-420-1).

(a) Corps of Engineers plate A. Air Conditioner, Self-Contained, Base Mtg., 208 VAC, 400 Hertz, 3 Phase, Air Cooled.

Stock number	FSN 4120-909-0388
Manufacturer	American Air Filter Co.
Model	CH–420-1
Length	19 in.
Width	17 in.
Height	46 in.
Capacity	18,000 BTU/HR
Shipping weight	210 lbs. (pounds)

(b) Evaporator/Condenser Fan Motor. Procurement on American Air Filter Co. Model.

Manufacturer	Peerless Electric Co.
HP	1.62
Type	Double extended shaft
Volts	208
Amps	9.4
Frame	13211E8275–6
Frequency	400 Hertz
Phase	3
Part number	P–11675
Duty	Continuous
Drive	Pivet

(c) Compressor.

Manufacturer	Whirlpool
Model	WHP422–H18–208–3
Part number	474843
Type	Rotary Vane
Lubrication	Slinger
Phase	3
RPM	3660
Hertz	400
Voltage	208
LRA (locked rotor amperage)	64.0

(d) Performance data.

Cooling Capacity	18,000 BTU/HR nominal, 19,800 BTU actual at 125° F. (Farenheit) DB (Dry Bulb), air to condenser, 90° F. DB, return air to unit at 1.0 SHR (Sensible Heat Ratio) 12,000 BTU/HR (Hi-heat position) 600° BTU/HR (Lo-heat position).

(2) *Air Conditioner (Model CH–620–1).*

(a) Corps of Engineers plate A. Air Conditioner, Self-Contained, Base Mtg., 208 VAC, 50/60 Hertz, 3 Phase, Air Cooled.

Stock number	FSN 4120-909-0387
Manufacturer	American Filter Co.
Model	CH–620-1
Length	19 in.
Width	17 in.
Height	46 in.
Capacity	18,000 BTU/HR
Shipping weight	210 lbs.

(b) Evaporator/Condenser Fan Motor. Procurement for American Air Filter Co. Model.

Manufacturer	Peerless Electric Co.
Type	Double extended shaft
HP	1.42
Volts	208
Amps	5.2
Frame	13211E8275–5
Frequency	50/60 Hertz
Phase	3
Part number	P–11674
Duty	Continuous
Drive	Direct

(c) Compressor.

Manufacturer	Whirlpool
Model	WHP622 H18–208 3
Part number	474837
Type	Rotary Vane
Lubrication	Forced feed
RPM	3390
Phase	3
Hertz	50/60
Volts	208
Lra	67.0

(3) *Data Applicable to Both Models (CH–420–1 and CH–620–1).*

(a) Condenser and Evaporator Coils.

Manufacturer	Modine Company
Type	Extruded aluminum
Number per unit	1 each

(b) Compressor Motor and Heater Contactors.

Manufacturer	Cutler-Hammer
Part number	9565ED3
Amps	25

Type	3 pole, single throw, N.O.
Coil	Pickup at 187 VDC (volts, direct current) continuous operation at 230 VDC maximum.
Operating ambient temperature	+60° to +125° F.

(*c*) *Thermostat Control.*

Manufacturer	Penn
Type	229xc
Action	Single pole double throw
Range	+40° to +90° F.
Electrical rating	120 VAC

(*d*) *Selector Switch.*

Manufacturer	Cutler-Hammer
Type	Rotary (manual)
Part number	8912K216
Number of positions	5 (hi-heat, lo-heat, off, ventilate, coal).
Electrical rating	15 Amps, 250 VAC

(*e*) *Outside Air Thermostat.*

Manufacturer	Stevens Mfg. Co., Inc.
Type	NPT255PDT (Single pole, double throw).
Electrical rating	208 VAC, pilot duty 20 VAC
Operation	Contacts open on temperature decrease.
Range	Contacts open 50° (±3° F.) differential 10°F. maximum

(*f*) *Heater Thermostat.*

Manufacturer	Metals and Controls, Inc.
Type	Kilxon MWA1256 automatic reset
Electrical rating	208V, 60 and 400 Hertz, 3 Phase resistive load.
Contacts open	90° C. (Centigrade)
Contacts close	61° C.

(*g*) *Electric Heaters.*

Manufacturer	The Trane Co.
Type	Stainless Steel Sheath
Voltage	120 VAC
Watts	600 each
Number per unit	6

(*h*) *Pressure Relief Valve.*

Manufacturer	Superior
Part number	300X3
Setting	540 psi

(*i*) *Back Pressure Regulating Valve.*

Manufacturer	Controls Co. of America
Model	104A
Part number	70034-105
Setting	58 psi

(*j*) *Service Valves (Suction and Discharge).*

Rating	600 psi
Number per unit	2

(*k*) *Solenoid Valves.*

Number per unit	3 (1 liquid line, 1 hot gas bypass, 1 quench line)
Watts	10
Voltage	187 (DC)
Refrigerant	R-22

(*l*) *Thermo Expansion Valve (Evaporator).*

Manufacturer	Alco Valve Co.
Model number	DT11544
Type	Angle
Inlet	¼ in. OD (outside diameter)
Outlet	⅜ in. OD
Setting	10° F. Superheat
Capacity	1 ton

(*m*) *Thermo Expansion Valve (Bypass).*

Manufacturer	Alco Valve Co.
Model number	TCL50H
Type	Angle
Inlet	¼ in. OD
Outlet	⅜ in. OD
Setting	10° F. Superheat
Capacity	½ ton

(*n*) *Liquid Line Sight Glass.*

Manufacturer	Sporlan Co.
Part number	SAK13

(*o*) *High Pressure Cutout Control.*

Manufacturer	Penn
Model	210AP40
Connection	
Cutout point	445±10 psi
Manual reset	400 psig

(*p*) *Dehydrator.*

Manufacturer	Sporlan
Type	C0835

(*q*) *Capacities.*

Compressor crankcase	Oil 3½ pints
Refrigerant charge	3.50 lbs. (R-22)

(*r*) *Wiring Data.* Refer to the wiring diagrams, figures 1-3 and 1-4.

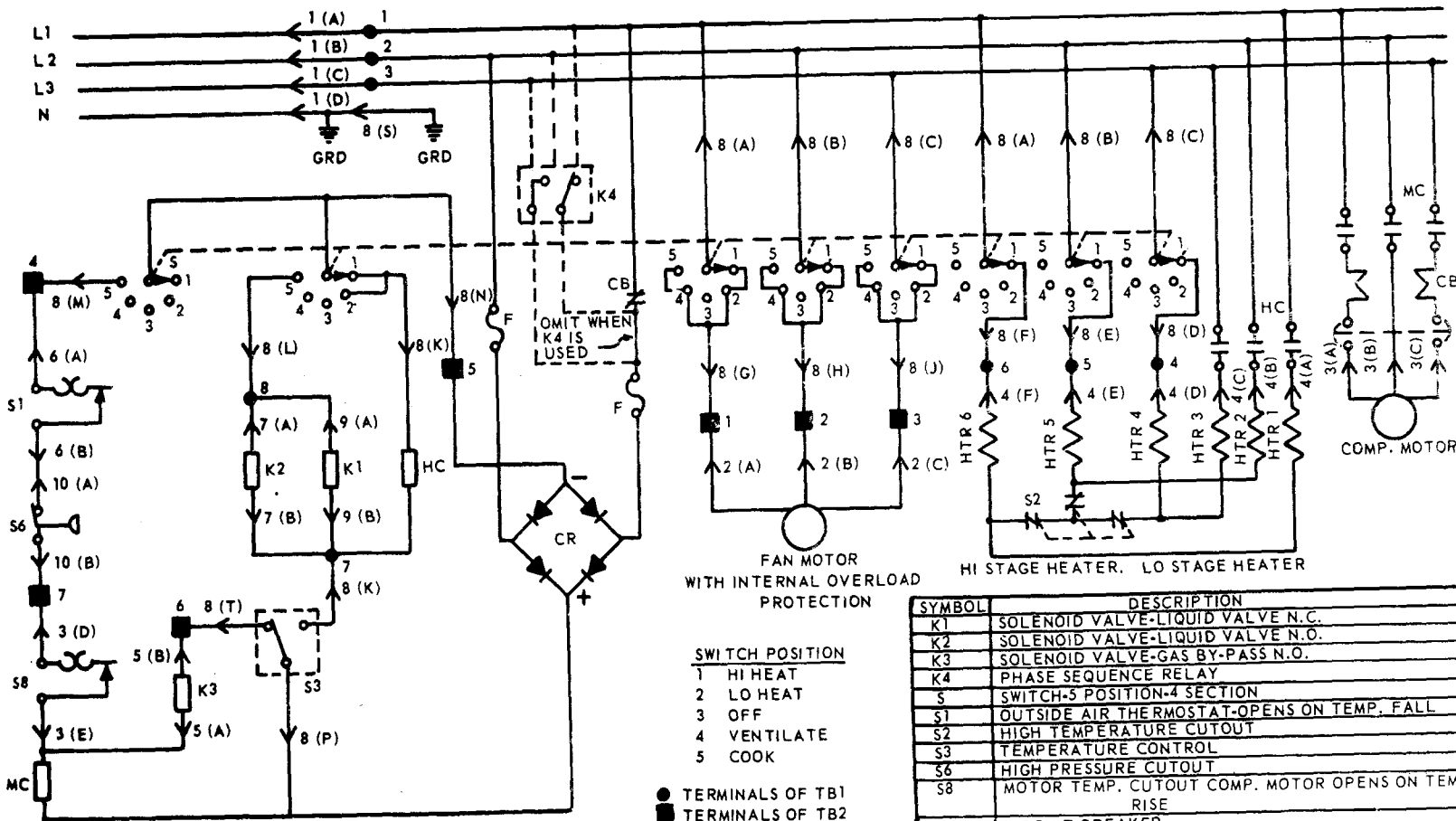
(*s*) *Refrigerant flow.* Refer to figure 1-5 for the refrigerant flow diagram.

1-5. Difference in Models

This manual covers air conditioner models CH-420-1 and CH-620-1. Differences between models are in the blower motors, compressors, and control circuits. Where differences exist, each model is covered separately in the applicable sec-

Figure 1-3. Detailed wiring diagram.

Located in back of manual



SYMBOL	DESCRIPTION
K1	SOLENOID VALVE-LIQUID VALVE N.C.
K2	SOLENOID VALVE-LIQUID VALVE N.O.
K3	SOLENOID VALVE-GAS BY-PASS N.O.
K4	PHASE SEQUENCE RELAY
S	SWITCH-5 POSITION-4 SECTION
S1	OUTSIDE AIR THERMOSTAT-OPENS ON TEMP. FALL
S2	HIGH TEMPERATURE CUTOUT
S3	TEMPERATURE CONTROL
S6	HIGH PRESSURE CUTOUT
S8	MOTOR TEMP. CUTOUT COMP. MOTOR OPENS ON TEMP. RISE
CB	CIRCUIT BREAKER
CR	RECTIFIER
F	FUSE
HC	HEAT CONTACTOR-LO STAGE HEAT
MC	MOTOR CONTACTOR-COMP. MOTOR

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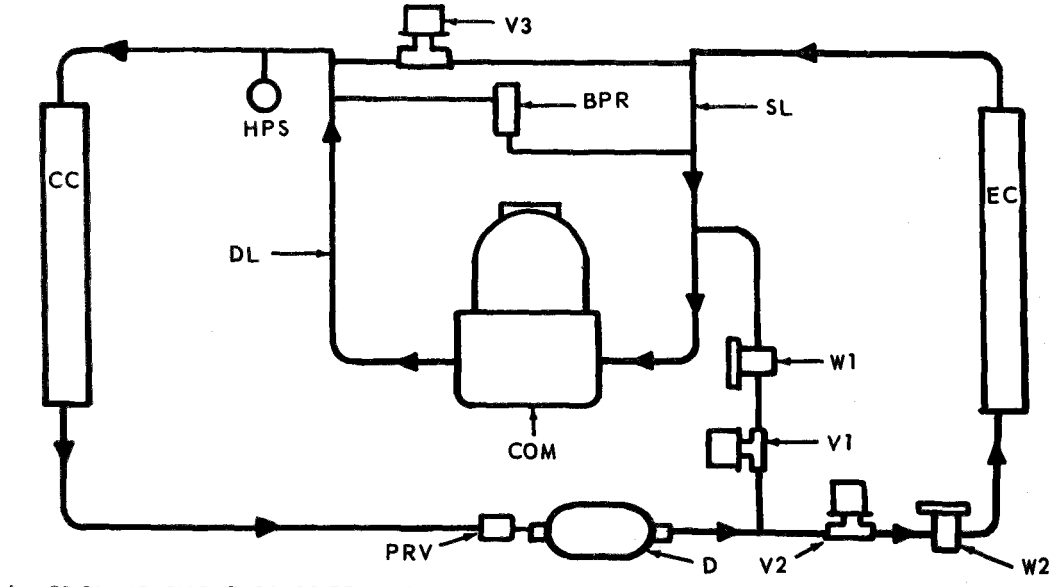
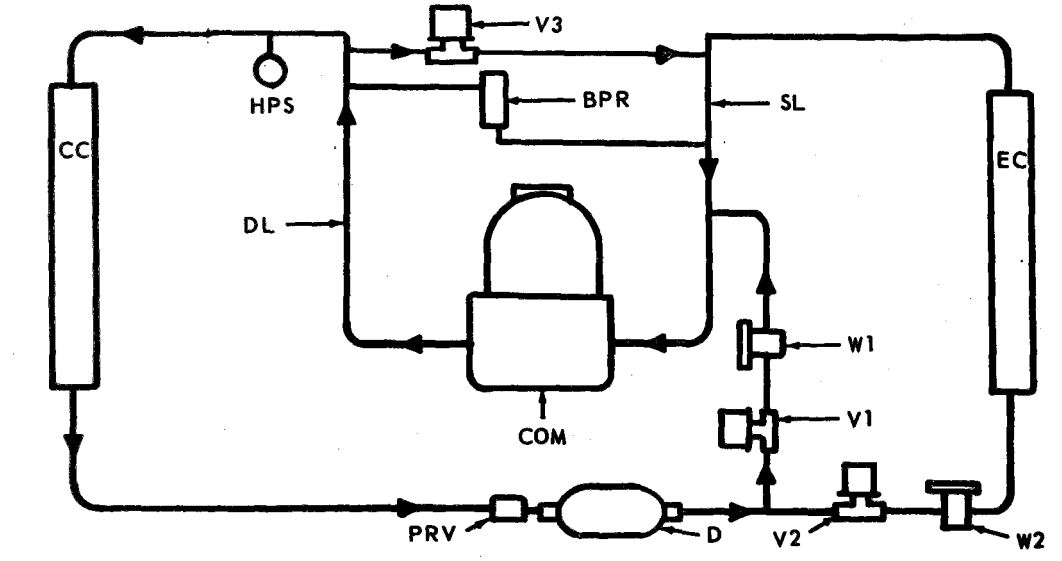
Figure 1–4. Practical wiring diagram.



A. COOLING CYCLE OF OPERATION



B. BYPASS CYCLE OF OPERATION

DEVICE LEGEND:

BPR BACK PRESSURE REGULATOR
CC CONDENSER COIL
COM COMPRESSOR
D DEHYDRATOR
DL DISCHARGE LINE
EC EVAPORATOR COIL
HPS HIGH PRESSURE CUTOUT SWITCH
PRV PRESSURE RELIEF VALVE
SL SUCTION LINE
V1 LIQUID LINE BYPASS SOLENOID VALVE
V2 LIQUID LINE SOLENOID VALVE
V3 HOT GAS BYPASS SOLENOID VALVE
W1 ONE-HALF TON THERMOSTATIC EXPANSION VALVE
W2 ONE-TON THERMOSTATIC EXPANSION VALVE

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Figure 1-5. Repair flow diagram.

tion of this publication. The model CH-420-1 has a 400 Hertz motor and compressor while the model CH-620-1 has a 50/60 Hertz motor and compressor. Both models are equipped with Whirlpool compressors and H.K. Porter motors and phase sequence relays.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Inspecting and Servicing Equipment

a. Inspection.

(1) Inspect casing for signs of rough handling and damage.

(2) Inspect sight glass and control panel for damage.

(3) Remove grilles and inspect evaporator and condenser coils for damage.

(4) Inspect tubing and fittings for damage and losseness.

b. Servicing. The units have been fully charged at the factory and will require no service other than normal preventive maintenance services.

2–2. Installation of Separately Packed Components

a. General. The air conditioner are basically self-contained units. Under certain conditions it might be desirable to operate from a remote position, using the block-off panel and a suitable cable to allow the operator to control the unit remotely. When to external duct is utilized, a sound attenator may be used to reduce noise. A paulin may be used to prevent dirt from entering the condenser.

b. Remote control operation.

(1) Disconnect power source and remove front access panel (para 3-6).

(2) Refer to figure 2-1 and install the block-off panel.

(3) Connect the control receptacle to the block-off panel.

(4) Connect a suitable extension cable to the block-off panel and the opposite terminal to the control panel.

2–3. Installation and Setting Up Instructions

a. General. Install the air conditioner in as near a level position as possible. An alternate drain connection may be used if desirable.

b. Positioning the Air Conditioner. Position the unit so that the front is unobstructed, the sight glass at the rear may be observed, and the reset button may be pushed by hand.

Note. If the unit is to be equipped with ducts, install the grilles from the unit on the ends of the ducts.

c. Chemical-Biological Cover. The C/B cover is provided to allow for installation of a C/B filter when desired.

d. *Installation.* Bolt unit to *the* floor or other suitable base when leveled. Remove applicable drain plug. Alternate drain holes are provided and may be used by removing the drain plugs. A drain hose may be used to direct condensate to an outdoor area. Make certain the alternate drain plugs are installed.

e. *Power Source.* The unit is equipped with a power receptacle (fig. 2-2) located in the rear. Using a cable provided with an MS 3100R-22-22S plug, connect the unit to the applicable power source. The unit is provided with alternate locations for the power receptacle. If it becomes desirable to utilize one of these connections, remove and relocate the receptacle. Remove the cover plate from the alternate receptacle and install it on the rear receptacle.

Caution: **To insure proper electrical power supply connection, move the selector switch momentarily to the VENTILATE position. The airflow should be sucked through the intake grill (fig. 1-1) and expelled through the outlet grill Interchange any two power leads (figs. 1-3 and 1-4) if airflow (fan rotation) is not correct.**

Section II. MOVEMENT TO A NEW WORKSITE

2–4. Dismantling for Movement

The air conditioner need not be dismantled for movement; just disconnect the power source and drain hose. If ducts have been used, remove the

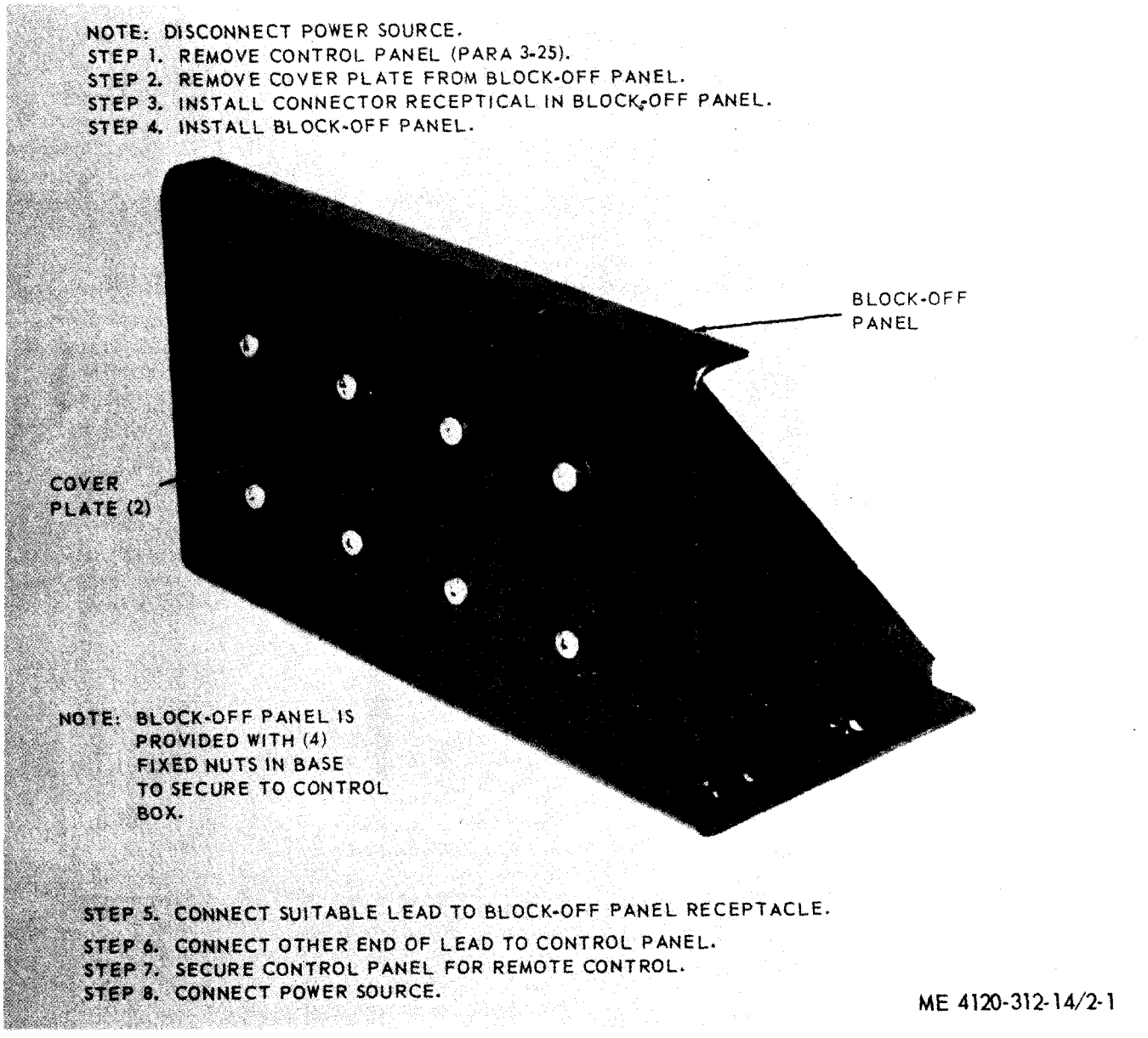


Figure 2-1. Installation of block-off panel.

ducts and reinstall the grilles. It will be desirable to cover the unit during transit. Crate the unit for long distance movement.

Caution: Do not tip unit excessively or lay the **unit on its** side during **movement.**

2-5. Reinstallation after Movement

Refer to paragraph 2-3 and install the air conditioner.

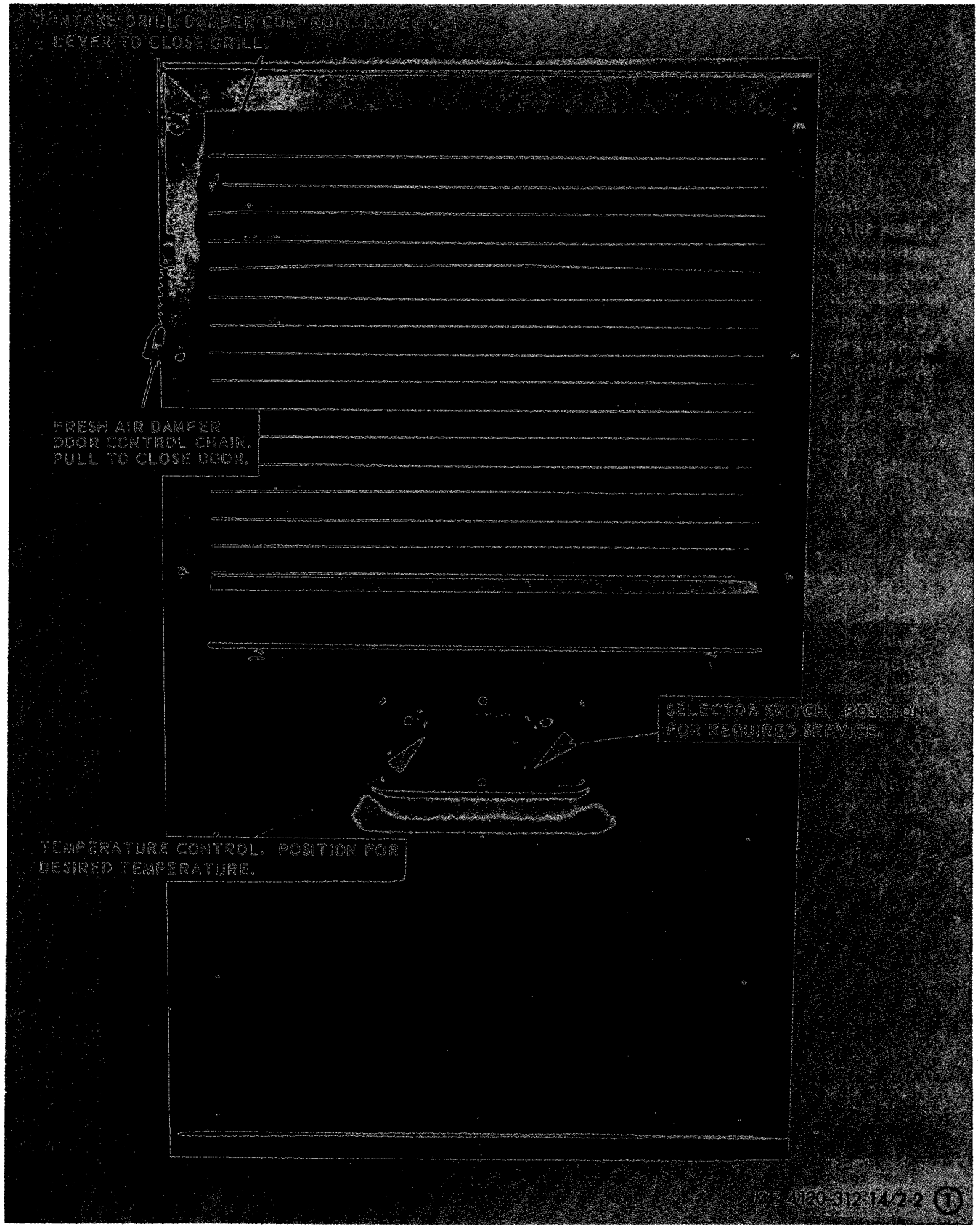
Section III. CONTROLS AND INSTRUMENTS

2-6. General

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

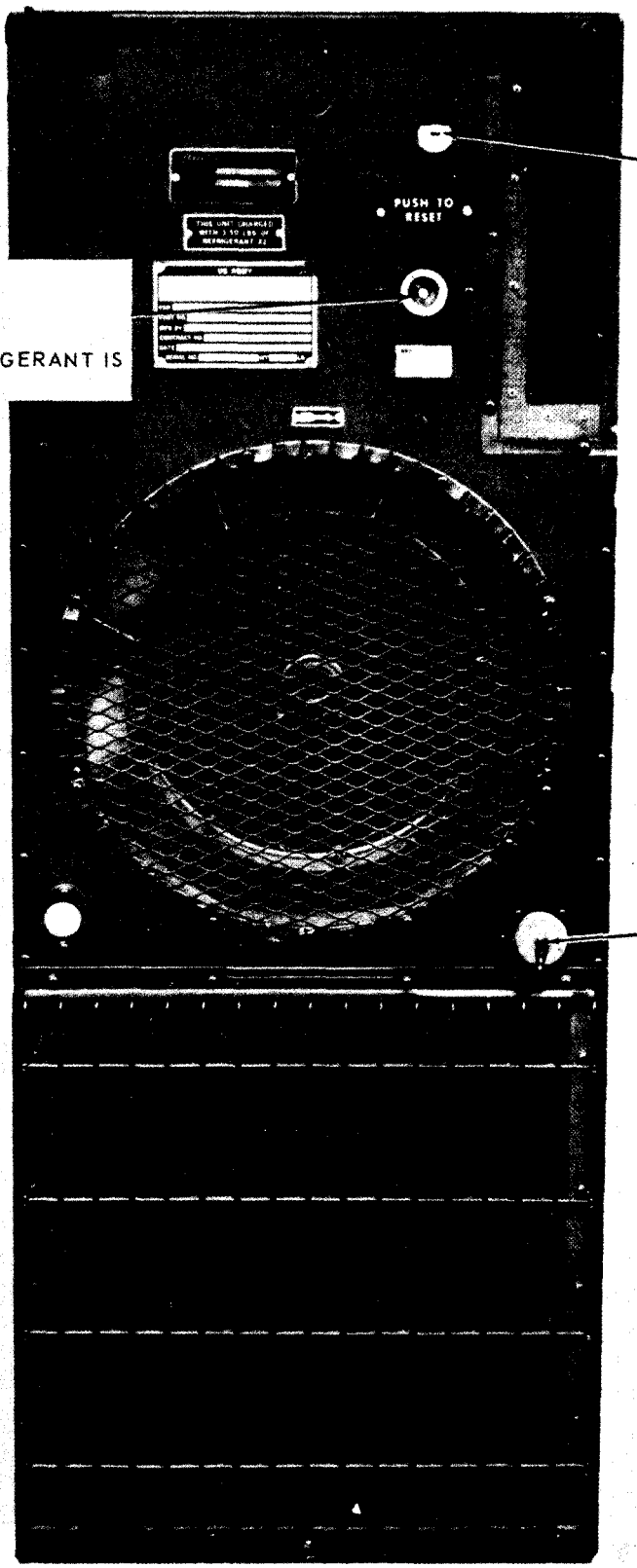
2-7. Controls and Instruments

The location and purpose of the controls and instruments are illustrated in figure 2–2.



Front controls

Figure 2-2①. Control and instruments.



Rear instruments

Figure 2-2 ②- -Continued.

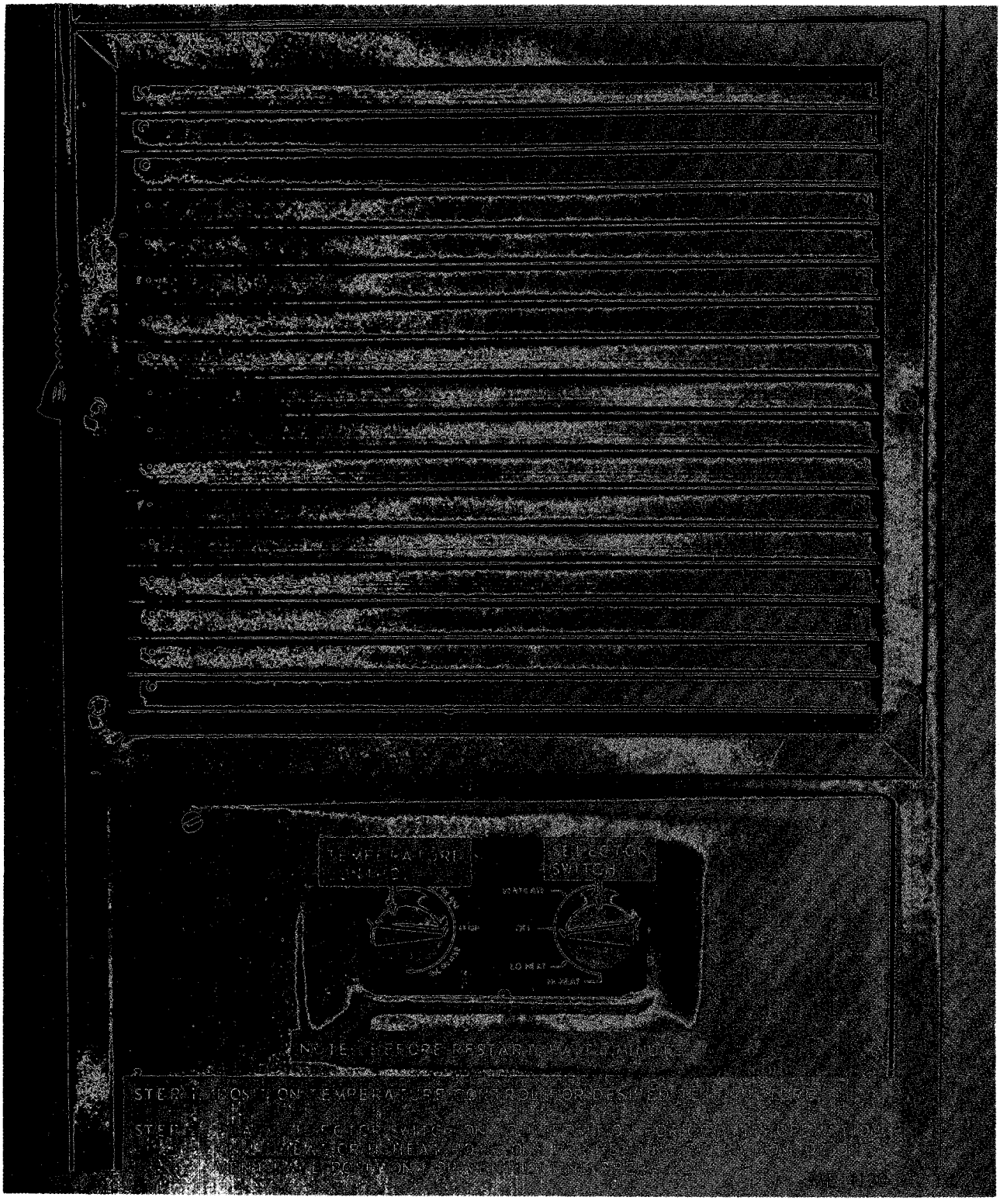


Figure 2-3. Starting instructions.

Section IV. OPERATION UNDER USUAL CONDITIONS

2-8. General

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

b. The operator must know how to perform every operation for which the air conditioner is capable. This section provides instructions for starting, operating, and stopping the air conditioner, and on coordinating the basic motions to perform the specific tasks for which the equipment was designed. Since nearly ever y job presents a different problem, the operator may have to vary given procedures to fit the individual job.

2-9. Starting

a. Perform the before-operation preventive maintenance services (para 3-4).

b. Refer to figure 2-3 and start the air conditioner.

2-10. Stopping

a. Refer to figure 2-4 and stop the air conditioner.

b. Perform the after-operation preventive maintenance services (para 3-4).

2–11. Operation of Equipment

Refer to figure 2–5 and operate the air conditioner.

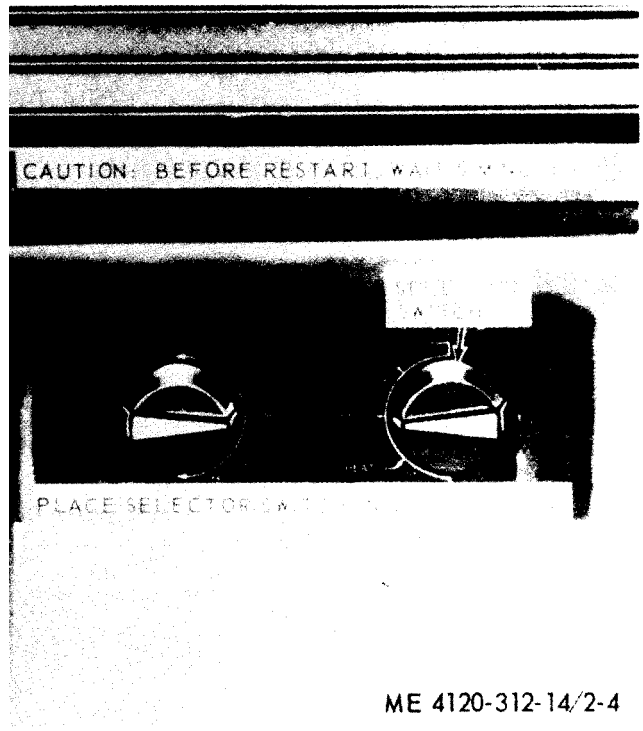


Figure 2–4. Stopping instructions.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

2-12. Operation in Extreme Cold

a. General. The air conditioner is designed to operate at temperatures as low as 65° F. The unit will provide cooling to plus 500 F. Be sure that all thermostatic controls and dampers are in operable condition.

b. Electrical System. Make sure that all wiring and plugs are free of ice and moisture.

2-13. Operation in Extreme Heat

a. General. The air conditioner is designed to operate satisfactorily at temperatures up to + 125° F.

b. Ventilation. Allow sufficient room around the unit for adequate air circulation. Make certain that the intake and discharge grilles are not obstructed in any manner.

2-14. Operation in Dusty or Sandy Areas

Inspect and clean the evaporator and condenser coils frequently. Service the air conditioning filter, fresh air inlet screen, and condenser screen daily. Shelter the unit from dust, sand and direct sunshine in high temperature areas, Keep electrical components clean.

2-15. Operation Under Rainy or Humid Conditions

If the unit has been installed outside, a shelter should be erected to protect it from the rain. Cover the unit when not operating. In humid areas keep the unit in operation as much as possible to counteract the effects of high humidity. Remove cover during operation. Inspect electrical equipment thoroughly prior to operating during wet weather. Keep electrical components dry and clean.

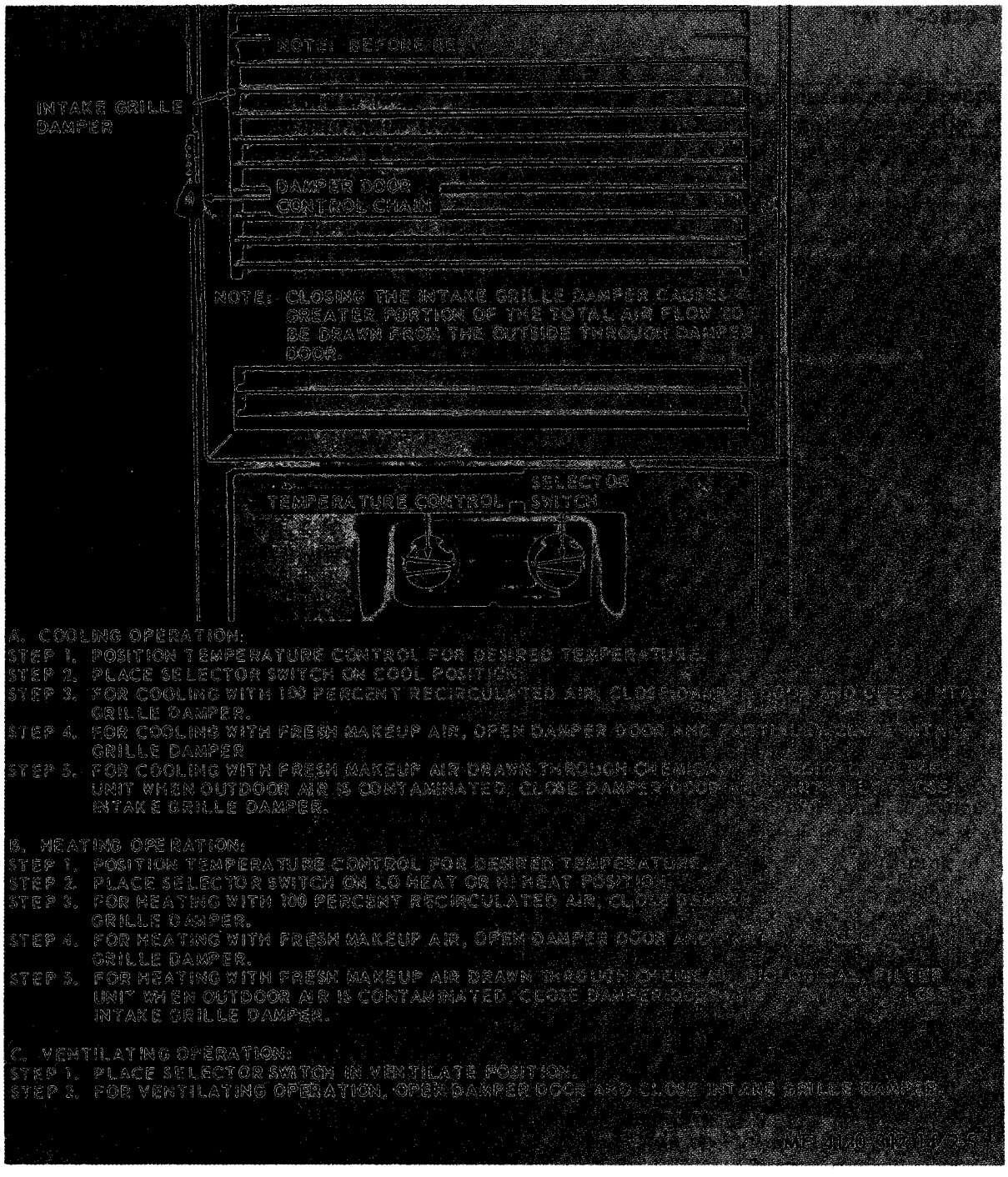


Figure 2-5. Operating instructions.

2-16. Operation in Salt Water Areas

Wash exterior of the unit at frequent intervals. Coat exposed metal with rust-proof substance. unit painted and free of corrosion. Service evaporator coil, condenser coil, and filters frequently. Keep electrical components dry and clean.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS AND EQUIPMENT

3-1. Tools and Equipment

Basic issue tools and repair parts issued with or authorized for the air conditioner are listed in Appendix B of this manual.

3-2. Organizaticmal Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-4120-312-24P, (when published).

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-3. General

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically so that all defects may be discovered and corrected before they result in serious damage or failure. Defects discovered during operation of the unit will be noted for futured correction, to be made as soon as operation has ceased. Stop operation immedately if a deficiency is noted during operation that would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken on DA Form 2404 at the earliest possible opportunity,

3-4. Preventive Maintenance Checks and Services

Refer to table 3-1 for a list of preventive maintenance checks and services.

Section III. OPERATOR'S MAINTENANCE

3-5. General

The intructions in this section are published for the information of the operator to maintain the air conditioner.

Warning: Disconnect the power source before performing any maintenance function.

3-6. Cover Panel, Discharge and Intake Grilles, and Front Access Panel

a. Removal. Refer to figure 3-1 and remove the cover panel, grilles, or front access panel as required.

b. Cleaning, Inspection and Repair.

(1) Clean panels and grilles, and dry thoroughly.

(2) Inspect panels and grilles for damage. Inspect gaskets for wear or damage.

(3) Smooth out minor dents by placing a flat board or similar object over dent and hammering on board. Straighten out louvers with standard pliers. Replace severely damaged components.

c. *Installation.* Install the panels and grilles by reversing the order of removal.

3-7. Air Conditioning Filter

a. Removal.

(1) Remove the air intake grill (para 3-6).

(2) Refer to figure 3-2 and remove the air conditioning filter.

b. Servicing, Inspection, and Replacement.

(1) Refer to figure 3-2 and service the filter.

(2) Inspect filter for damage; replace a damaged filter.

c. Installation. Install the filter by reversing the order of removal.

Table 3-1. Preventive Maintenance Checks and Services

Item number	Interval: Operator: Daily: B	D	A	W	Org.: M	Q	Item to be inspected	Procedure	Reference
	B—Before operation D—During operation		A—After operation W—Weekly		M—Monthly Q—Quarterly				
1	X		X				Air filter.	Inspect for accumulation of dirt.	Para 3-7
				X				Check mountings and fittings.	Para 3-7
				X				Clean filter.	Para 3-7
				X				Remove filter and inspect thoroughly. Check for damage.	Para 3-7
2	X						Condenser screen.	Inspect for damage.	
					X	X		Clean thoroughly.	Para 3-19
3	X	X	X	X	X	X	Sight glass.	Inspect for broken or cracked glass and for dirt.	Para 3-12
4	X						Controls.	Check for freedom of operation and effectiveness.	Para 2-7
	X						General.	Observe for any unusual noises or vibration.	
5	X		X	X	X	X	Electrical wiring.	Inspect for damage and wear.	Para 3-23

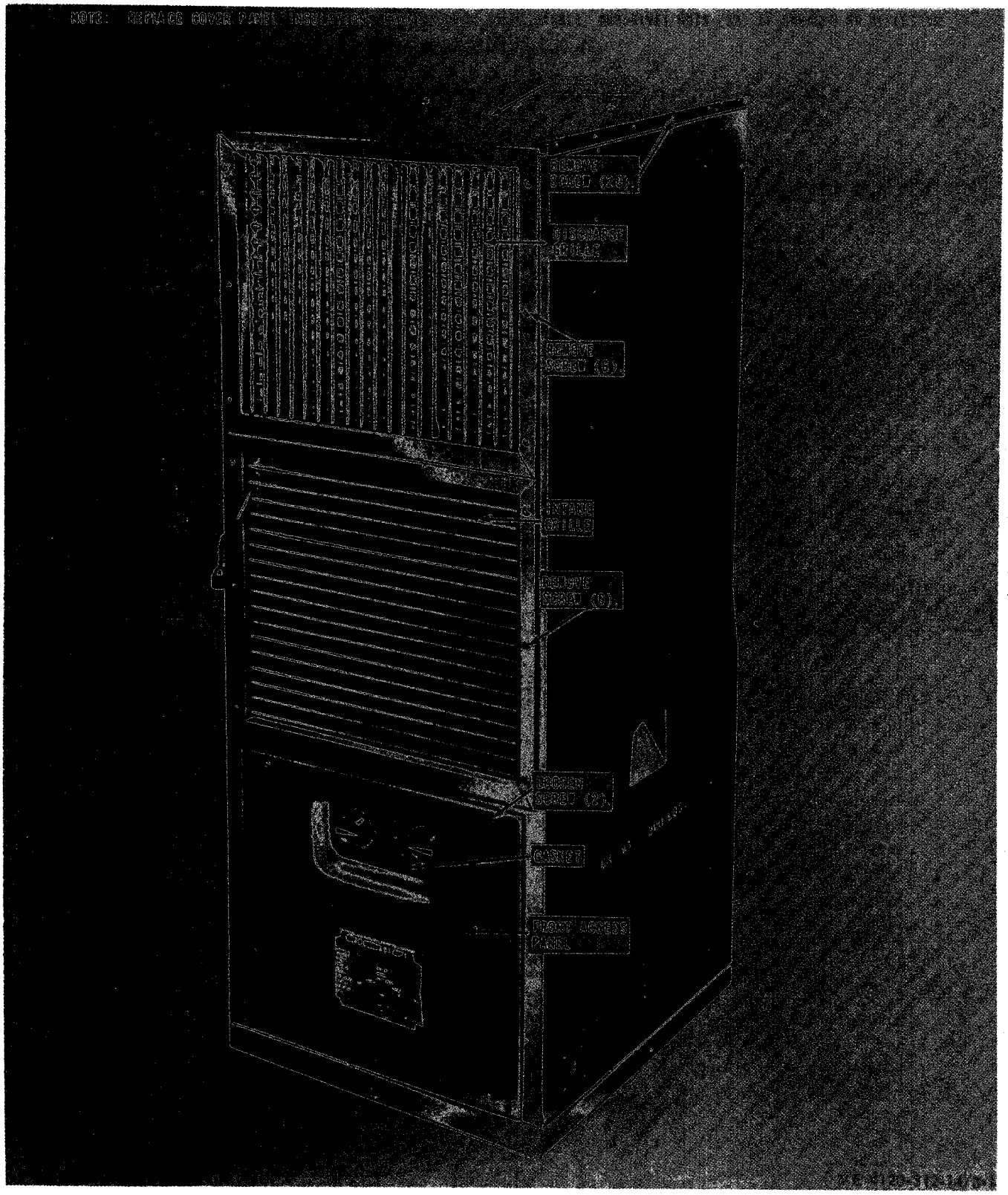


Figure 3-1. Cover panel, discharge and intake grilles, and front access panel, removal and installation.

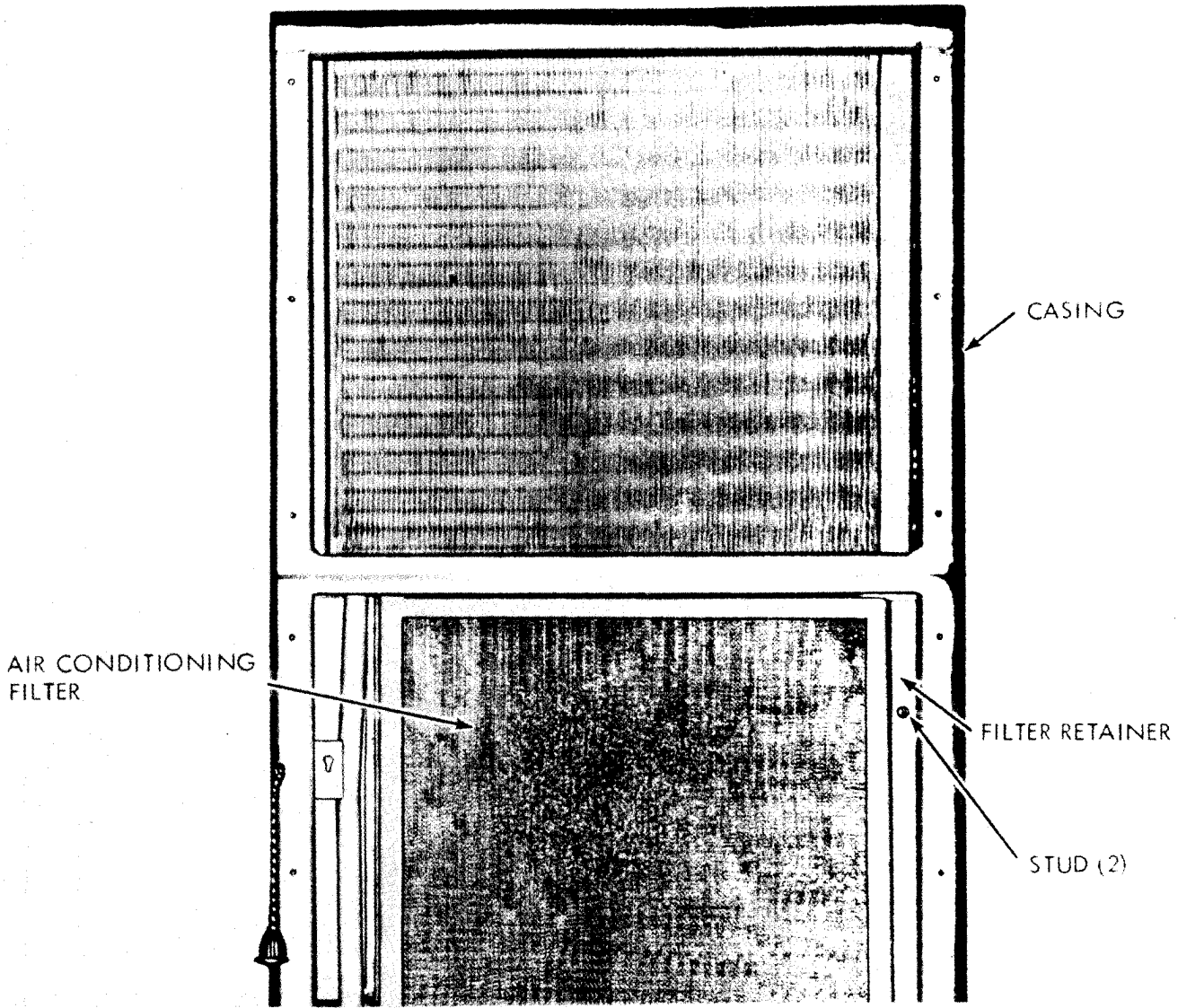


Figure 3-2. Air conditioning filter service.

3-8. Mist Eliminator

a. Removal.

(1) Remove the cover panel (para 3-6).

(2) Lift mist eliminator (fig. 3-3) from casing behind discharge grille, and remove eliminator from unit.

b. Servicing, Inspection and Replacement.

(1) Refer to figure 3-3 and service the eliminator.

(2) Inspect the eliminator for damage; replace a damage eliminator.

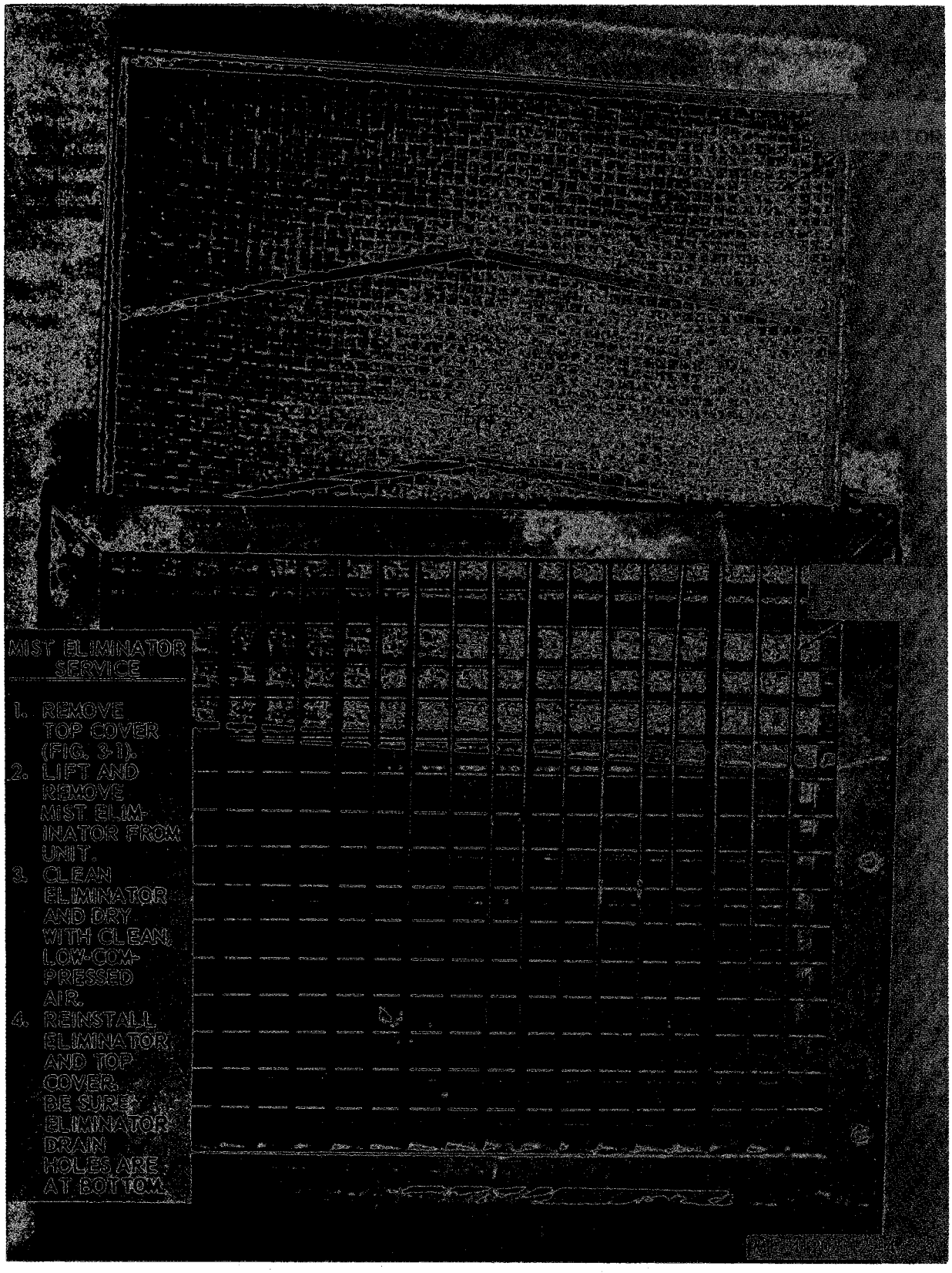


Figure 3-3. Mist eliminator service.

Table 3-2. *Troubleshooting*

Malfunction	Probable cause	Corrective action
1. Compressor fails to start.	*a.* Control circuit open and/or fuse blown.	*a.* Repair control circuit and replace fuse.
	b. Circuit breaker contacts open.	*b.* Reset circuit breaker (para 3-29).
	c. Contact sof high pressure cutout switch open.	*c.* Press reset button.
	d. Outdoor thermostat defective or open.	*d.* Wait until the ambient temperature exceeds 50" F. If switch is imperative replace switch (para 3-26).
	e. Circuit breaker defective.	*e.* Replace circuit breaker (para 3-23)
	f. Wiring defective.	*f.* 3-23).
	g. Compressor motor contactor defective.	*g.* Replace contactor (para 3-32).
	h. Electrical heater contactor defective.	*h.* Replce electrical heater contactor (para 3-32).
	i. Phase sequence relay contacts open.	*i.* Interchange two wires to reverse phase sequence (para 3-28). Replace relay if defective (para 3-28).
2. Suction pressure inadequate.	Filter or evaporator coil air restriction.	Clean filter and coil (para 3-9).
3. High discharge pressure.	Insufficient volume of air passing through condenser coil.	Service condenser coil and evaporator coil (para 3-9).
4. Suction and discharge pressure low.	Lack of refrigerant.	Check sight glass for appearance of bubbles. Report low refrigerant to direct support maintenance.
5. Compressor starts but fails on overload.	*a.* High discharge pressure.	*a.* Clean condenser coil (para 3-11). Remove obstruction from grilles.
	b. Suction pressure low.	*b.* Service air conditioning filter (para 3-7).
	c. Blower motor defective.	c. Replace blower motor (para 3-24).
6. Little *or* no heating capacity.	*a.* Defective heater, contactor, or circuits.	*a.* Test and replace defective heater and contractors. Check the wiring circuits repair or replace as necessary.
	b. Air movement over the evaporator insufficient.	*b.* Service the air conditioning filter (para 3-7). Adjust grilles for maximum air flow.

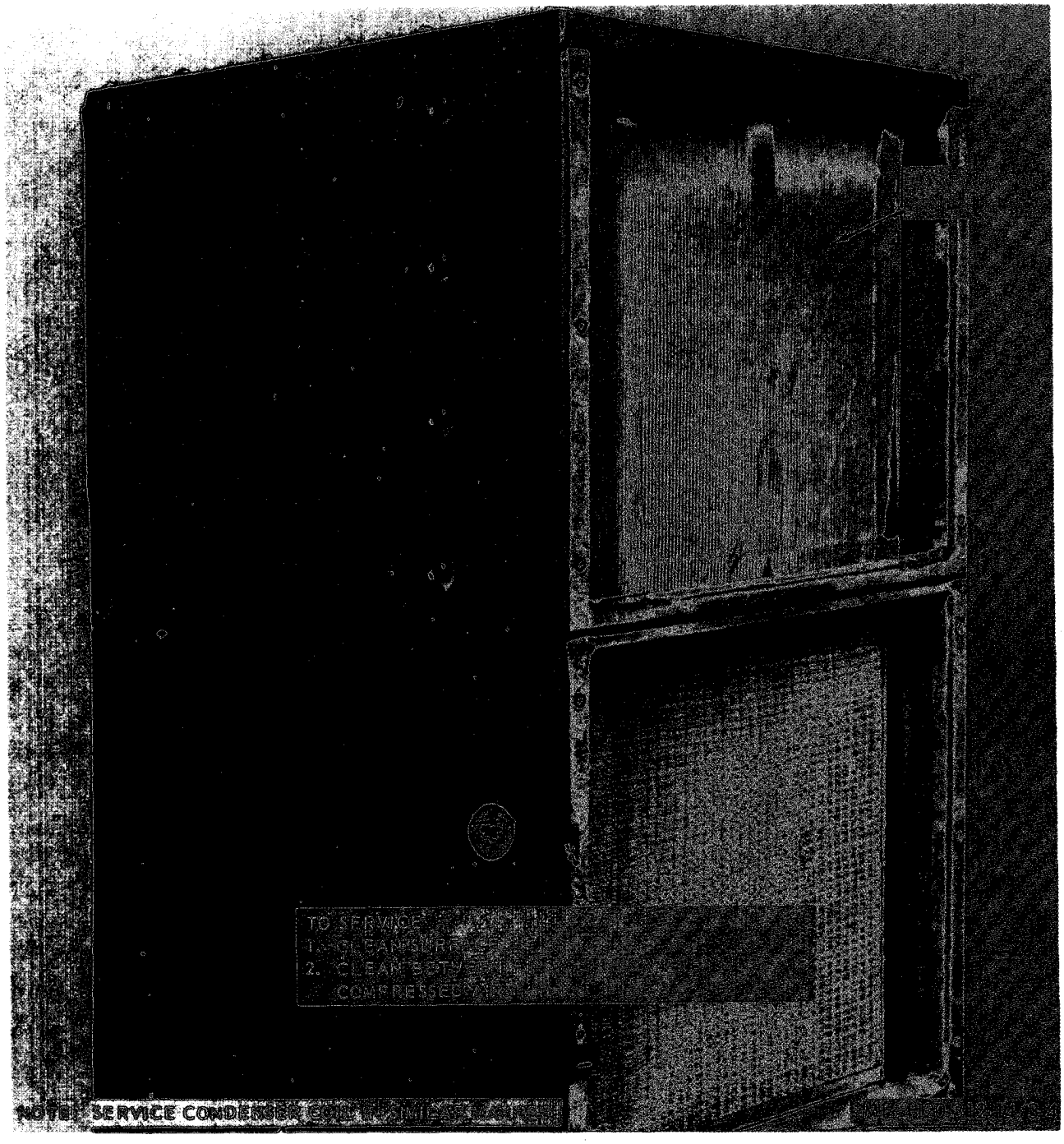


Figure 3–4. Evaporator coil and condenser coil service.

c. Installation. Install the eliminator by reversing the order of removal.

3–9. Evaporator Coil

a. Removal.

(1) Remove the cover panel and discharge grille (para 3–6).

(2) Remove the mist eliminator (para 3–8).

b. Servicing. Refer to figure 3–4 and service the evaporator coil.

c. Installation. Install the mist eliminator and cover panel and discharge grille by reversing the order of removal.

3–10. C/B Cover and Condenser Grille

a. Removal. Refer to figure 3–5 and remove the cover and grille.

b. Inspection and Replacement.

(1) Inspect the cover and grille for bends, dents, breaks or other damage.

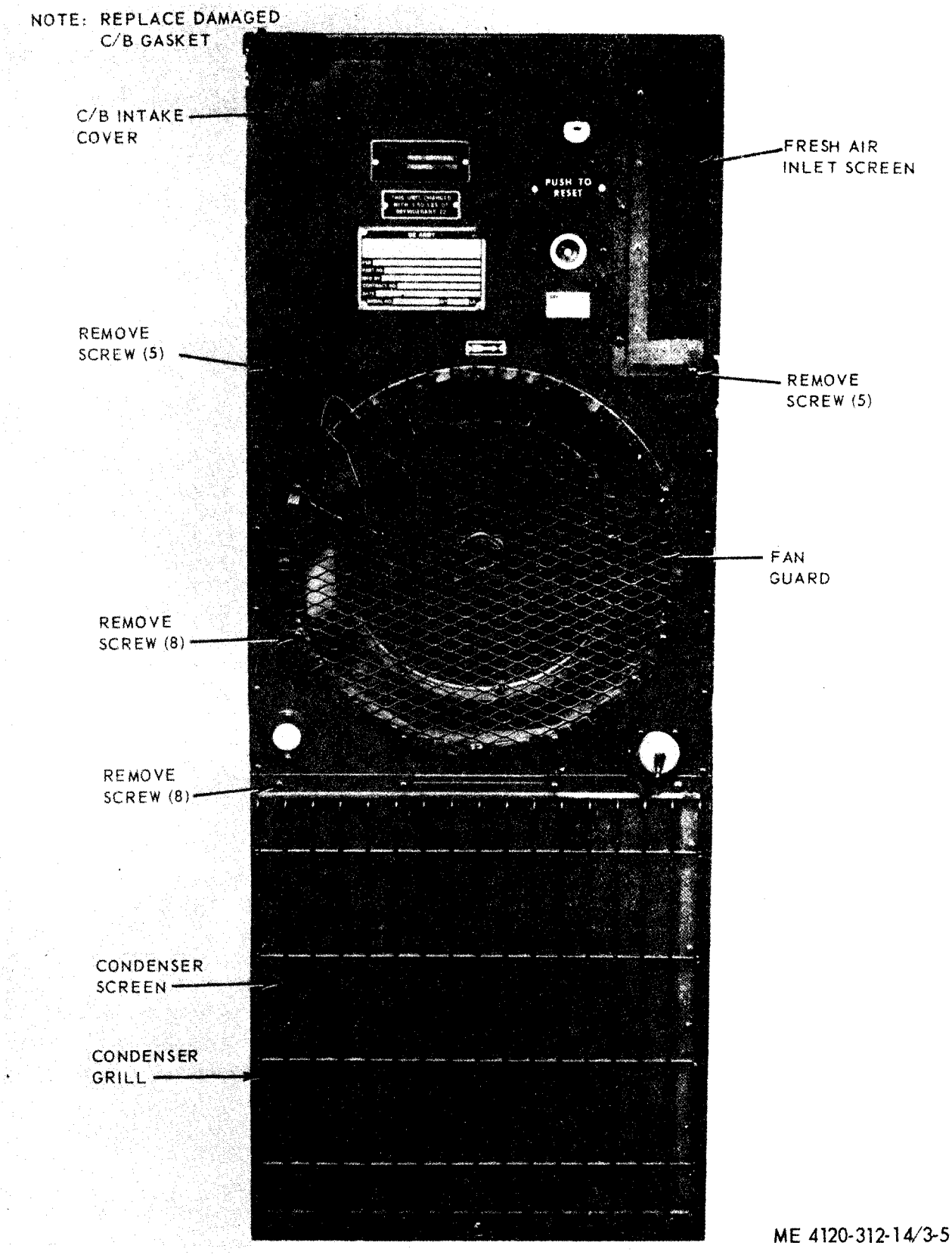


Figure 3-5. C/B cover, fan guard, condenser grille, condeser screen, and fresh air inlet screen.

(2) Replace a damaged cover or grille.

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

3-11. Condenser coil

a. Removal. Refer to figure 3-5 and remove the condenser gille and screen.

b. Servicing. Refer to figure 3-4 and service the condenser coil.

c. installation. Refer to figure 3-5 and install the grille and screen.

3-12. Sight Glass

Inspect the sight glass (fig. 1-2) for cracks, broken glass, and dirt,

Section IV. TROUBLESHOOTING

3-13. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or its components.

3-.14. Troubleshooting Instructions

Refer to table 3-2 for the list of malfunctions and the corrective action procedures. Each malfunction is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

Section V. FIELD EXPEDIENT REPAIRS

3-15. General

Organizational maintenance troubles may occur while the air conditioner is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient repair may be used in emergencies, upon decision of the unit commander. Equipment so repaired must be removal from service as soon as possible and properly repaired before being put into service again.

3-16. Compressor Inoperative

Trouble	*Expedient remedy*
Compressor overload protector malfunctioning.	**Bypass the protector by installing 'two insulated jumper wires between the connection terminals on the compressor.**

3-17. Control Circuit Inoperative

Trouble	*Expedient remedy*
Fuse blown.	**Remove the front access panel, control box cover, and fuse. Install jumper wire and bypass fuse.**

Section VI. ORGANIZATIONAL MAINTENANCE PROCEDURES

3-18. General

The air conditioner is constructed with removable aluminum panels and grilles. The front access panel (fig. 1-1) provides access to the control panel, the control box, and service valves. A discharge grille protects the evaporator coil and controls the discharge of conditioned air. The intake grille protects the air conditioning filter and regulates the amount of air intake. The condenser coil grille (fig. 1-2) protects the condenser coil. A fan guard (fig. 3-5) is mounted on the rear to protect operating personnel from the condenser fan. The fresh air inlet screen permits the entry of outside air, which is controlled by a damper door control (fig. 1-1). The C/B cover is provided for ease of instillation of a chemical/biological filter when required.

3-19. Fan Guard, Condenser Screen and Fresh Air Inlet Screen

a. Removal. Refer to figure 3-5 and remove the fan guard, condenser grille and screen, and fresh air inlet screen.

b. (Waning. Clean the screens with compressed air.

c. Inspection, Inspect the guard and screens for bends, dents breaks or other damage.

d. Replacement. Replace a badly damaged guard or screen with a serviceable one.

e. Installation. Refer to figure 5 and install the guard, condenser screen and grille, and fresh air inlet screen.

3-20. Evaporator Fan and Inlet Ring

a. Removal.

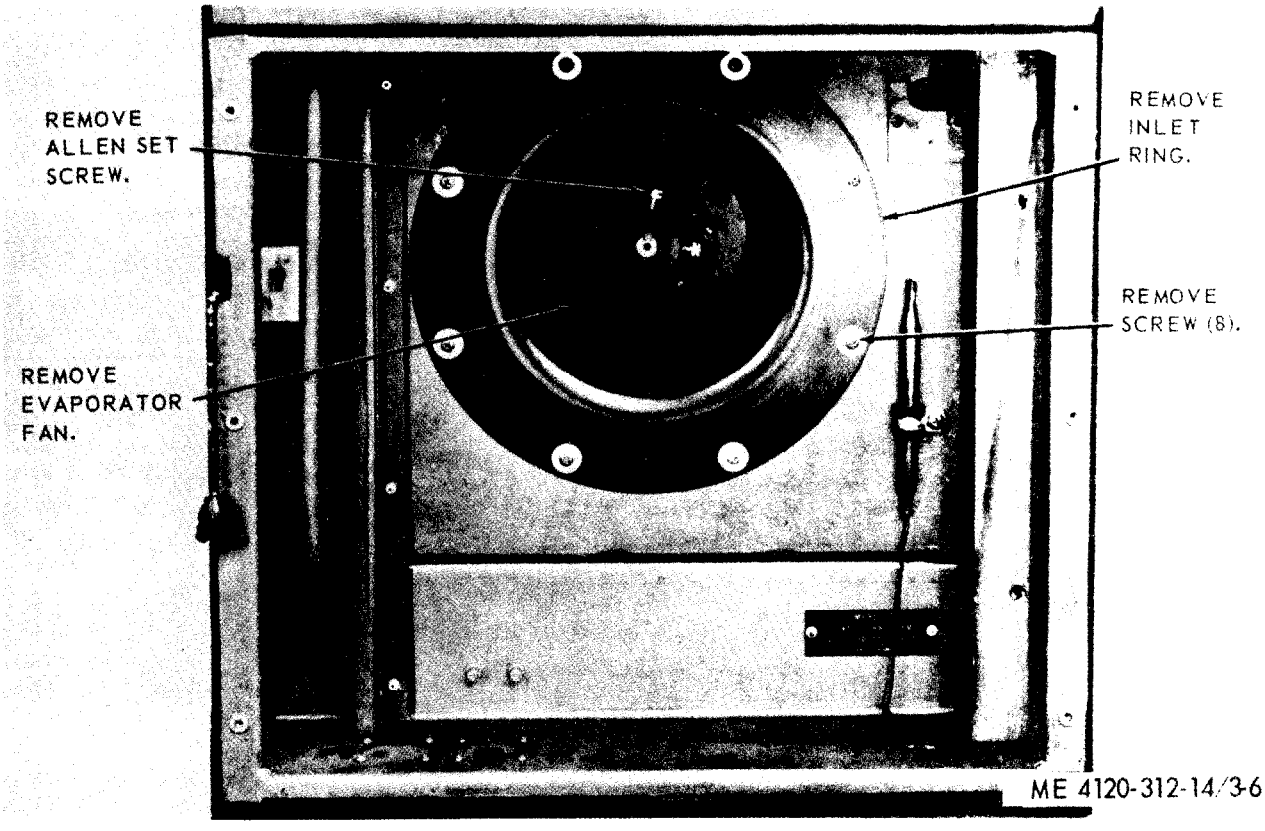


Figure 3-6. *Evaporator fan and inlet ring, removal and installation.*

(1) Remove the air intake grille (para 3-6).
(2) Refer to figure 3-6 and remove the inlet ring and evaporator fan.

b. Cleaning and Inspection.
(1) Clean the fan and inlet ring and dry thoroughly.
(2) Inspect the fan for bent fins or other damage. Inspect the inlet ring for damage.
(3) Replace damaged components.

c. *Installation.* Install the evaporator fan and inlet ring by reversing the order of removal.

3-21. Condenser Fan

a. General. The condenser fan is of the airfoil type to reduce noise and vibration.

b. Removal.
(1) Remove the fan guard (para 3-19).
(2) Refer to figure 3-7 and remove the condenser fan.

Note. The condenser fan may be difficult to remove from the shaft if it has been inplace for an extended period of time. If the fan will not pull off with minimum effort, utilize a suitable puller. Place the pulling ends carefully so as not to damage the fan blades.

c. Cleaning and Inspection.
(1) Clean the fan and dry thoroughly.
(2) Inspect the fan for damage. Check the balance weights for looseness; tighten loose weights. Inspect motor shaft for gouging.
(3) Replace damaged fan.

d. Installation.
(1) Clean the motor shaft and remove small scratches or burrs with a crocus cloth.
(2) Position fan on shaft and push inward} be careful to maintain the fan 90° to shaft. Fan should be mounted with minimum of effort. If the fan resists the pushing motion, apply crocus cloth to the motor shaft again until the fan mounts properly.
(3) Replace the fan guard.

3-22. Damper Door Control

The damper door control consists of a chain and spring assembly and will require little maintenance when properly handled, Should maintenance be necessary, remove the intake grille (para 3-6) disconnect the chain from the spring, and replace damaged component.

3-23. Electrical Wiring System

The electrical wiring system (figs. 1-3 and 1-4) should be inspected frequently to avoid damage or failure during operation. Any wiring showing

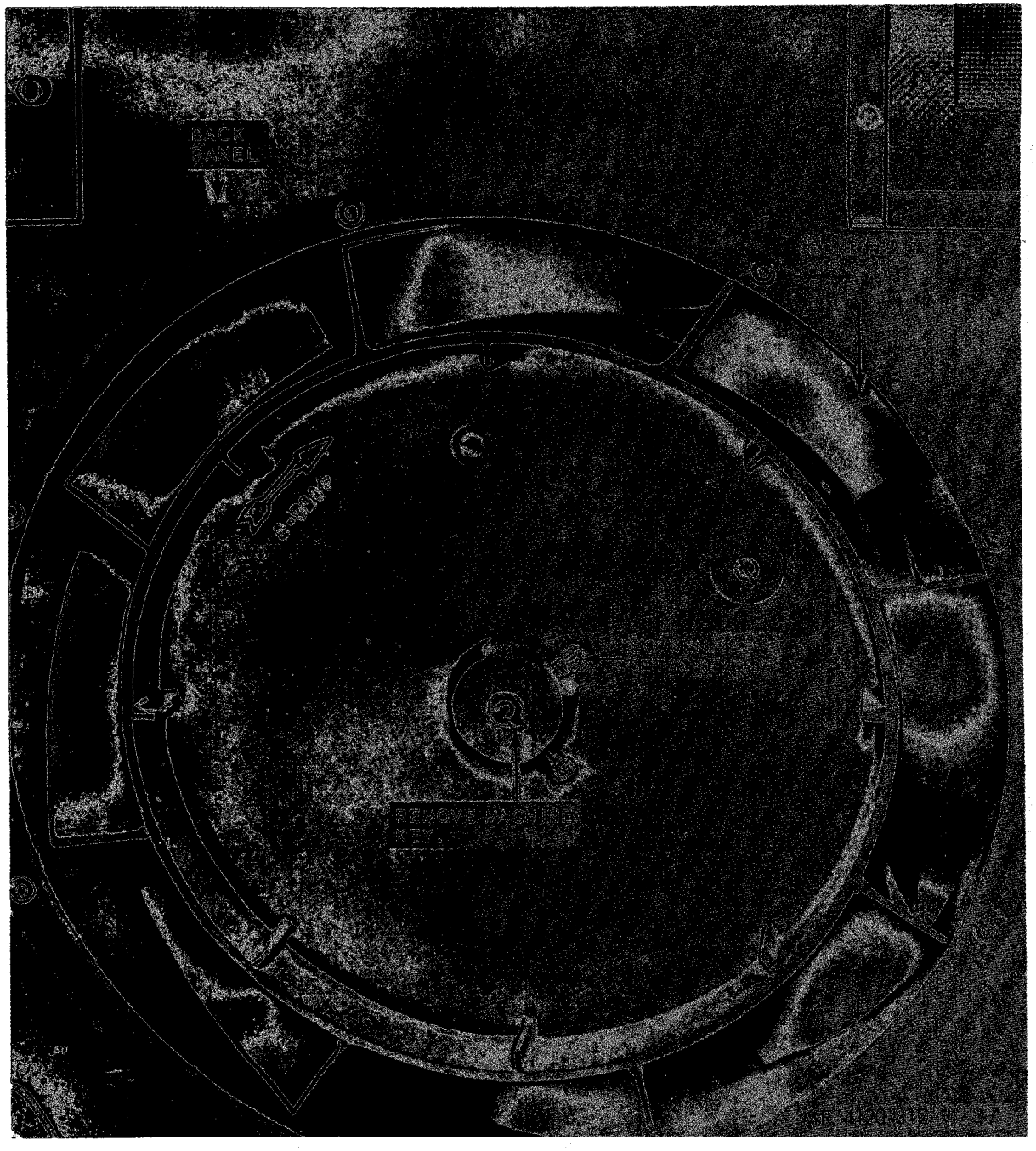


Figure 3-7. Condenser fan, removal and installation.

signs of damage or wear should be replaced immediately. When replacing wiring, be sure that the identical type wire is used. Consult wiring diagram frequently during any electrical maintenance. Solder all terminal conditions.

Warning: **The use of tests with power on may be required. Insure that normal safety precautions are taken when operating tests are required.**

3–24. Blower Motor Assembly

a. On-Equipment Testing. Before removing the blower motor assembly, peform an on-equipment test to determine if removal is necessary. Test the motor for resistance with a multimeter set on the ohm scale as follows:

(1) Touch the multimeter leads to the pins in the receptacle connector. The 400 Hertz motor assembly should indicate about 2.25 ohms. The 50/60 Hertz motor assembly should indicate about 4.7 ohms.

(2) Connect one multimeter lead to the motor assembly frame. Connect the other lead to any of the three receptacle pins; no continuity should exist (O reading).

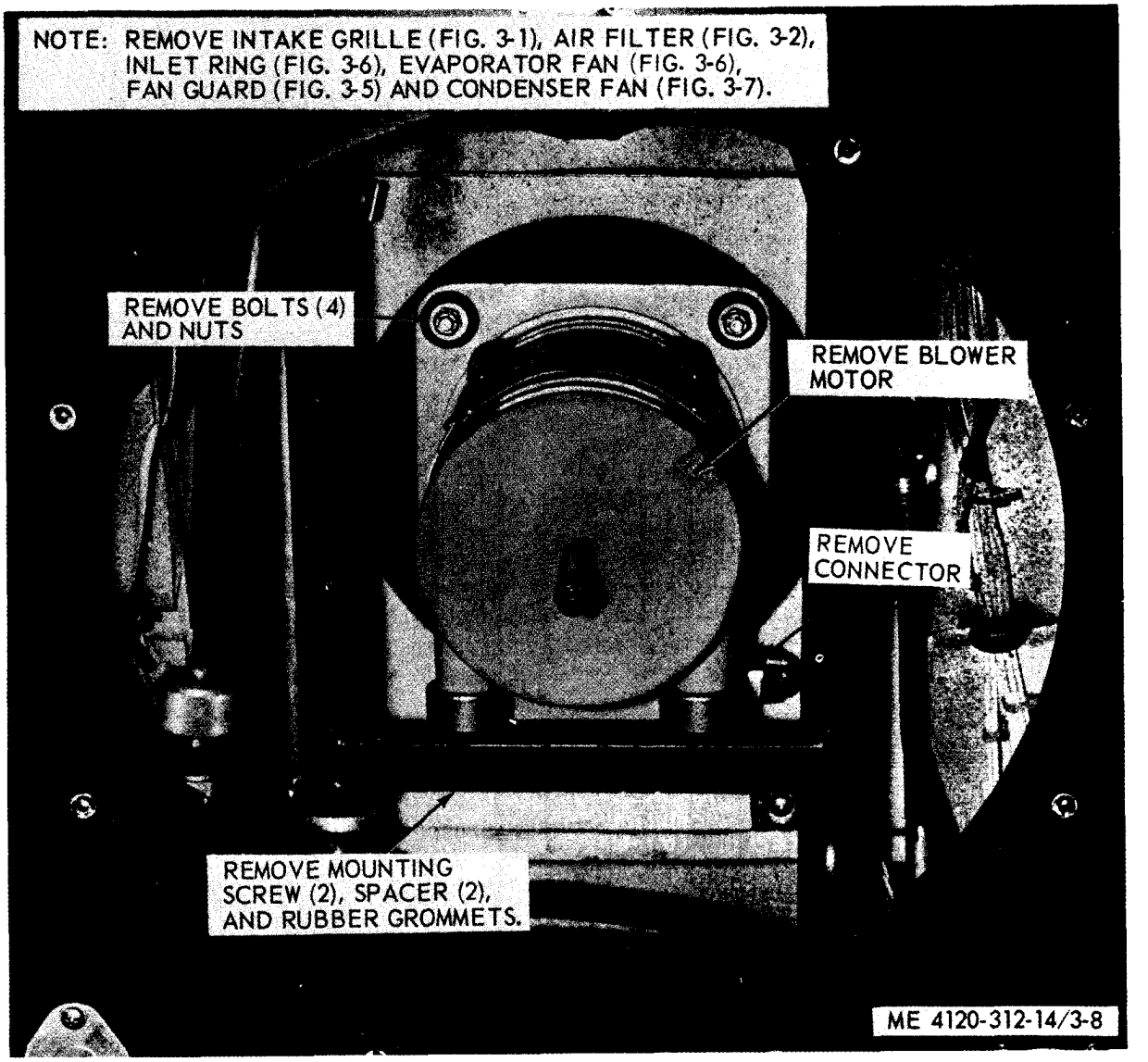


Figure 3-8. Blower motor assembly, removal and installation.

b. Removal.

(1) Remove the fan guard (para 3-19) and condenser fan (para 3-21).

(2) Remove the evaporator fan and inlet ring (para 3-19).

(3) Refer to figure 3-8 and remove the blower motor assembly.

c. *Installation.* Install the blower motor assembly, fans, and guards by reversing the order of removal.

3-25. Power Connector Receptacle

The power receptacle (fig. 2-2) is mounted on the case with four screws. When any receptacle connector is moved to an alternate position, replace the connector with the cover that was removed from the alternate position. When changing the location of the receptacle connector, be certain that all leads to the receptacle are handled with care and not pulled loose or damaged. Remove the four mounting screws and ease the leads around components so as to assure clearances for future maintenance. Mount the receptacle connector and cover assembly.

3-26. Control Panel

a. General. The control panel, housing the selector switch and temperature control switch, is mounted on the control box.

Note. Some applications may require remote locations for this panel.

b. Removal.

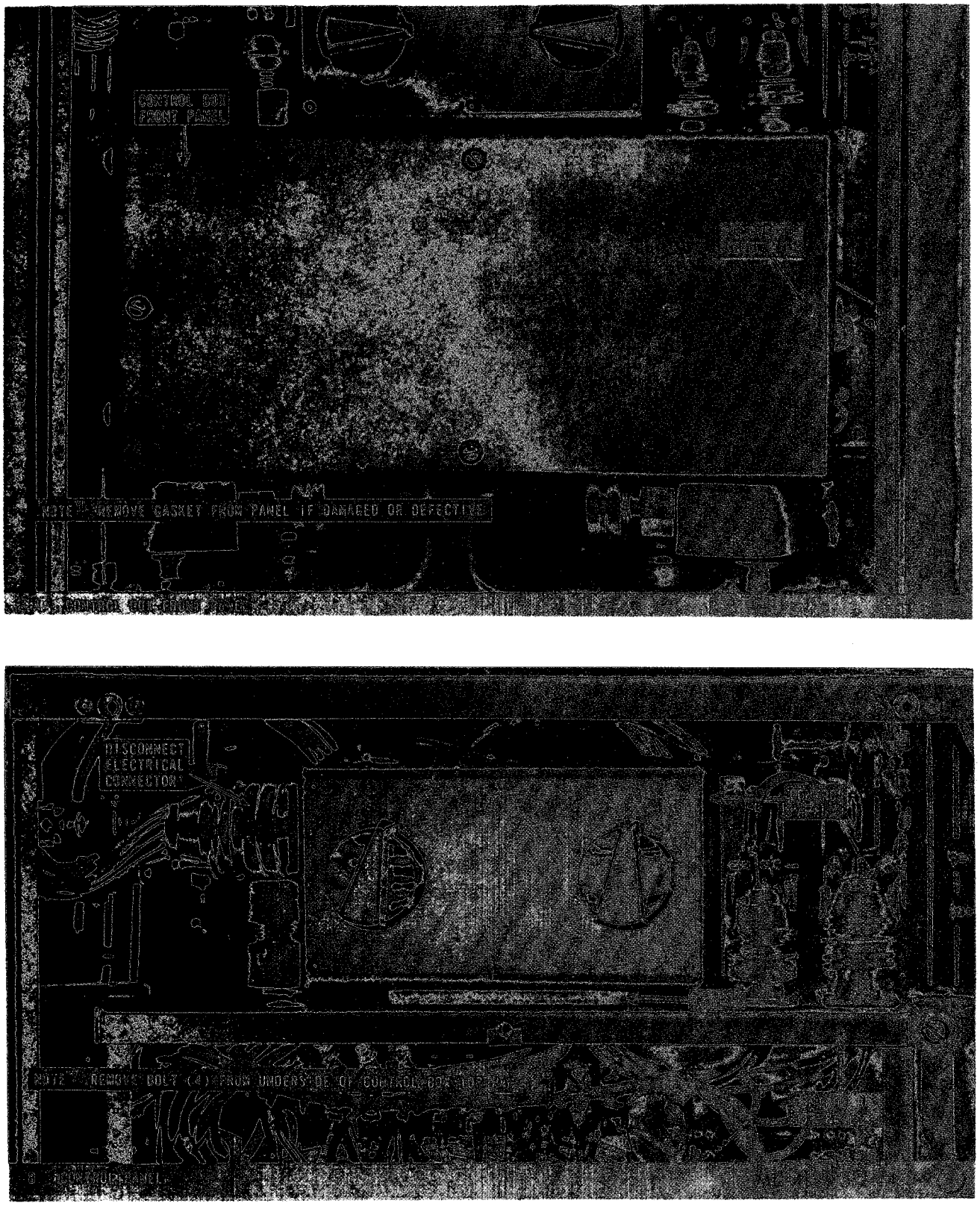


Figure 3–9①. Control panel assembly, removal and installation.

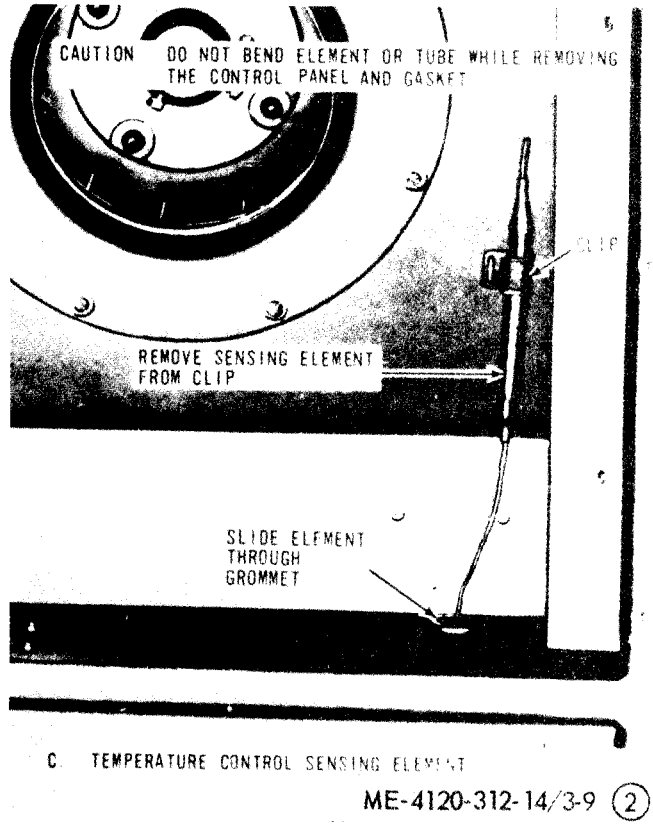


Figure 3–9⑧—Continued.

(1) Remove the front access panel (para 3-6).

(2) Refer to figure 3-9 and remove the control box front panel.

(3) Refer to figure 3-9 and remove the control panel.

c. Testing. Test the temperature control and the rotary switch by referring to the electrical wiring diagram (fig. 1-3) for test points.

d. Disassembly. Refer to figure 3-10 and disassemble the control panel.

e. Repair. Replace all unserviceable parts with serviceable like items.

f. Reassembly. Refer to figure 3-10 and reassemble the control panel.

g. *Installtion.* Refer to figure 3-9 and install the control panel and control box f rent panel.

3-27. Control Box

a. General. The control box houses the fuses, phase sequence relay, terminal blocks, circuit breaker, rectifier, electrical heater contactor, and compressor contactor.

(1) Remove the front access panel (para 3-6) .

(2) Remove the control box front panel and control panel assembly (para 3-26).

(3) Refer to figure 3-11 and remove the control box assembly.

Caution: Remove circuit breaker control linkage and /or knob before removing the control box assembly.

c. Installation. Install the control box assembly, control panel, and panels by reversing the order of removal.

3–28. Phase Sequence Relay

a. General. The phase sequence relay prevents operation of the motor/compressor unit unless the phase sequence is correct. With the control circuit operating properly, 208 volts are fed through the circuit breaker auxiliary contacts, relay pins 2 and 3, and the fuses into the rectifier.

b. Testing.

(1) Disconnect the power source.

(2) Remove the front access panel (para 3-6) and the control box front panel (para 3-25).

(3) Refer to the applicable wiring diagram (fig. 1-3 or 1-4) and check for continuity between pins A, B, and C.

Note. With power on, 208 volts at relay, and phase sequence correct, continuity should exist between pins 2 and 3 of the relay; if not, replace relay.

c. Removal. Refer to figure 3-11 and remove the phase sequence relay.

d. Installation. Install the phase sequence relay, control box front panel, and front access panel by reversing the order of removal.

3-29. Circuit Breaker

a. General. The circuit breaker protects the compressor from continuous overload and short circuits.

b. Testing.

(1) Remove the front access panel (para 3-6) and control box f rent panel (para 3-6).

(2) Refer to figure 3-11 and disconnect the circuit breaker leads (tag leads for facilitating installation). Test the circuit breaker for continuity with a multimeter set on the ohm scale. Refer to applicable wiring diagram (fig. 1-3 or 1-4) for test points. Auxiliary contacts (pins 3 and 5) are also located on the circuit breaker. When the circuit is on, continuity should exist between pins 3 and 5 of the circuit breaker; if not, replace circuit breaker.

c. Removal. Refer to figure 3-11 and remove the circuit breaker. Refer to figure 3-12 and disconnect the circuit breaker linkage as follows:

(1) Remove the snap ring (1, fig. 3-12) **from pin (4).**

(2) Pull pin (4) and spacer (3) from switch **arm (2).**

(3) Remove linkage rod (6) and connector **(5).**

d. Installation. Install the circuit breaker, control box front panel, and front access panel by reversing the order of removal.

3-30. Rectifier

a. Testing.

(1) Remove the front access panel (para 3-6) and control box front panel (para 3-26).

(2) Using a multimeter, test the front and back resistance of the rectifier. A resistance of infinity in both directions indicates an open rectifier that must be replaced.

b. Removal. Refer to figure 3-11 and remove the rectifier.

c. Installation. Install the rectifier, control box front panel, and front access panel by reversing the order of removal.

3-31. Terminal Blocks

a. Removal and Installation.

(1) Remove the front access panel (para 3-6) and the control box front panel (para 3-26).

(2) Refer to figure 3-11 and remove the terminal blocks.

(3) Refer to figure 3-11 and install the terminal blocks.

b. Inspection. Inspect the terminal blocks for loose terminals and for cracks or breaks. Check threaded parts for damage or worn threads.

c. Replacement. Replace damaged or defective parts.

3-32. Compressor and Heater Contractors

a. General. Both contractors are located within the control box. The compressor contactor starts the compressor and the heater contractor "energizes the heaters.

b. Testing.

(1) Remove the front access panel (para 3-6) and the control box front panel (para 3-26).

(2) With power off, coil of contactor for continutiy "with multimeter set on ohms. Replace contactor if coil is open or *shorted.*

(3) When contactor is energized, continuity should exist across the line and load terminals of the contactor.

c. Removal. Refer to figure 3-11 and remove the contractors.

d. Installation. Install the contractors, control box front panel, and front access panel by reversing the order of removal.

3-33. Outdoor Thermostat

a. General. The outdoor thermostat is mounted to the rear housing (fig. 1-2) of the air conditioner. It prevents the compressor from being started when the outside air temperature is below plus 50° F. when low condensing and suction pressures will hamper system operation.

b. Removal.

(1) Remove the condenser fan guard and fan (para 3-21).

(2) Tag and disconnect electrical leads connecting the outdoor thermostat to the unit.

(3) Remove the two screws securing the thermostat to the housing.

c. Testing. Test the thermostat for continuity with a multimeter set on the ohm scale. Refer to the applicable wiring diagram (fig. 1-3 and 1-4)

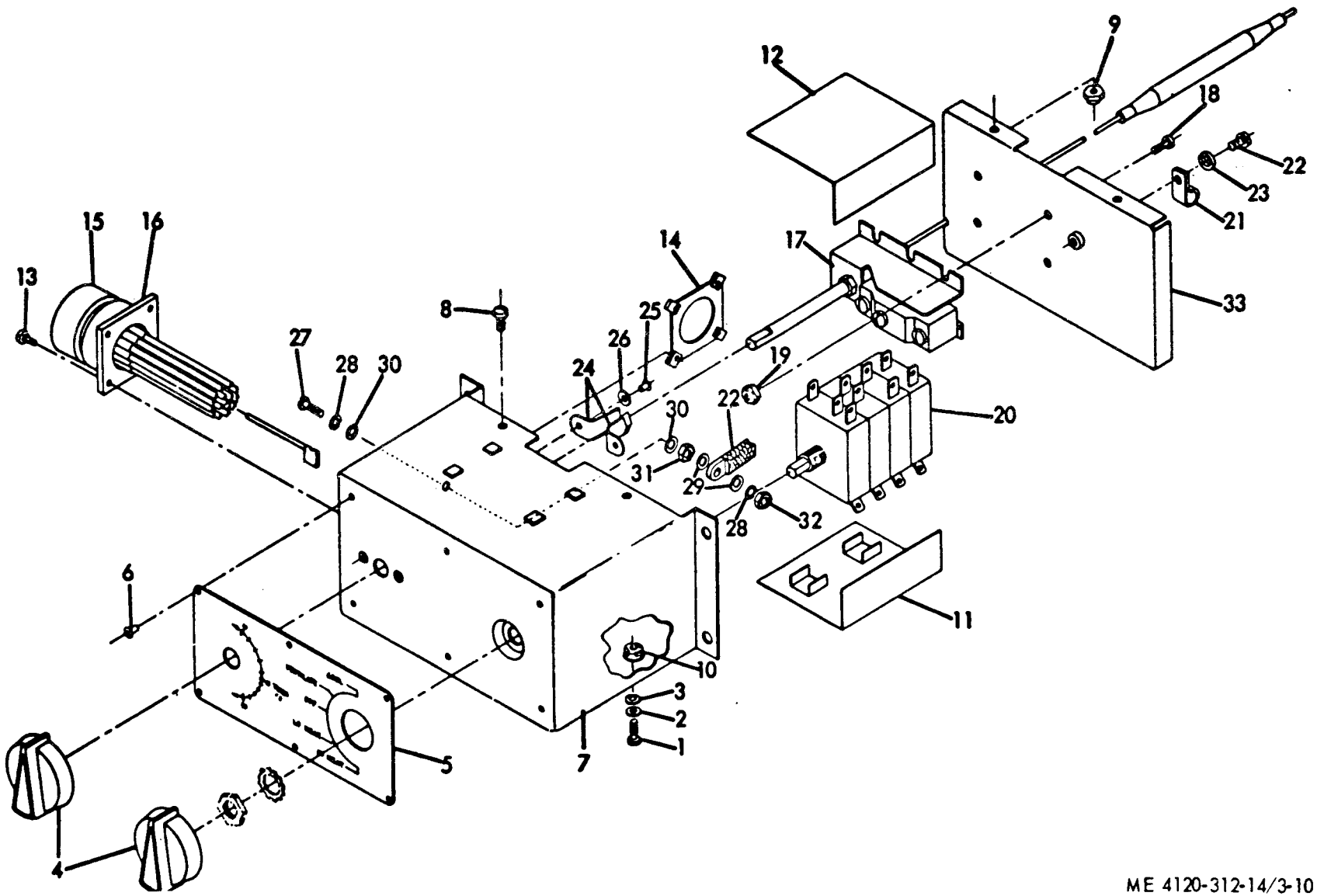


Figure 3–10. Control panel, disassembly and reassembly.

1	Screw	12	Insulation	23	Washer
2	Washer	13	Screw	24	Contact
3	Washer	14	Nut	25	Rivet
4	Knob	15	Connector	26	Washer
5	Instruction plate	16	Connector base	27	Screw
6	Rivet	17	Temperature control	28	Washer
7	Case	18	Screw	29	Washer
8	Screw	19	Nut	30	Washer
9	Nut	20	Rotary switch	31	Nut
10	Retainer	21	Clamp	32	Nut
11	Insulation	22	Screw	33	Mounting plate

Figure 3-10-Continued

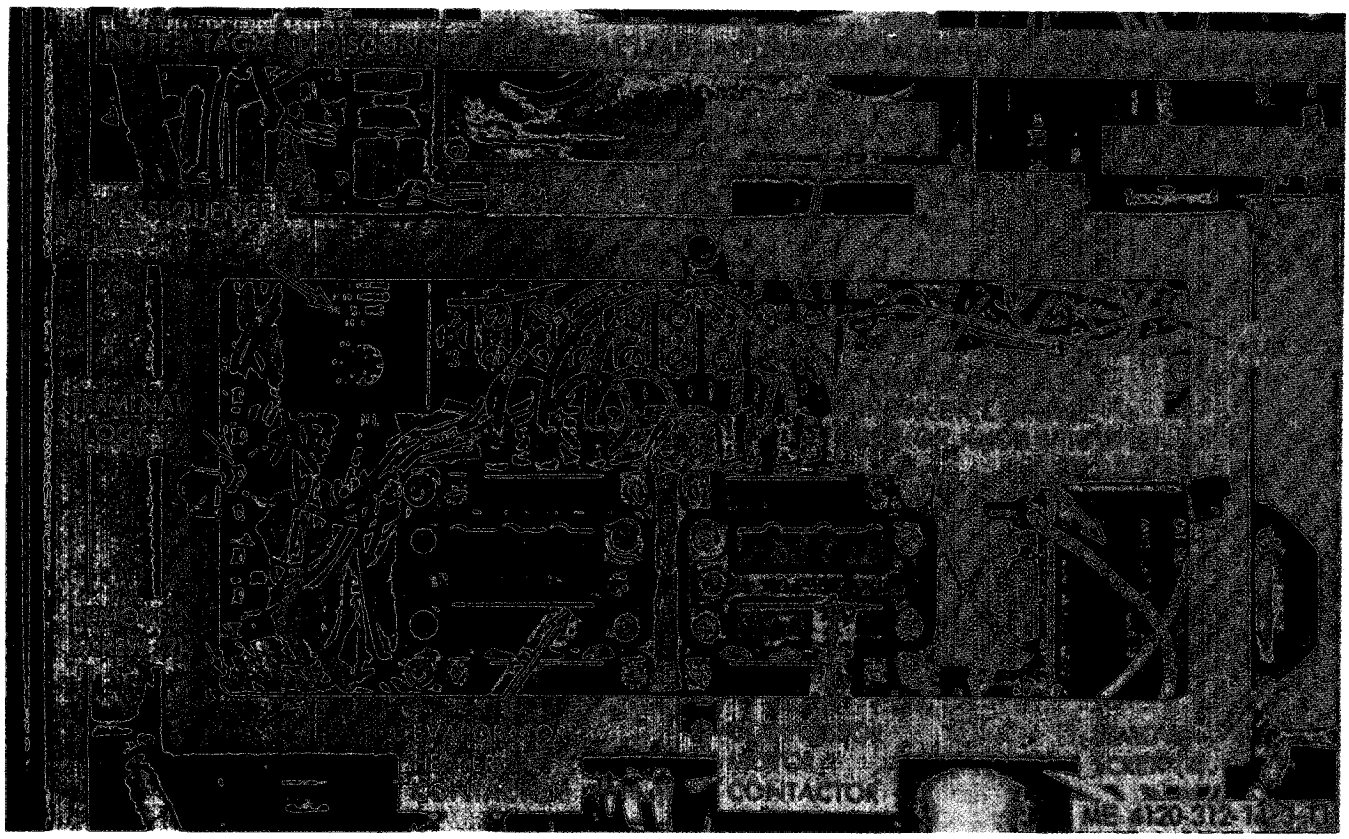


Figure 3-11. Control box assembly and components, removal and installation.

for points to establish contact. Continuity should exist across to terminals of the switch when the temperature is above plus 50°F.

d. Installation. Install the outdoor thermostat, fan, and fan guard by reversing the order of removal.

3-34. Fuse Service

a. General. There are two 5-ampere fuses in the upper right hand corner of the control box.

b. Removal. Remove the front access panel (para 3-6) and control box front panel (para 3-26) .

3-35. Electric Heater Thermostat

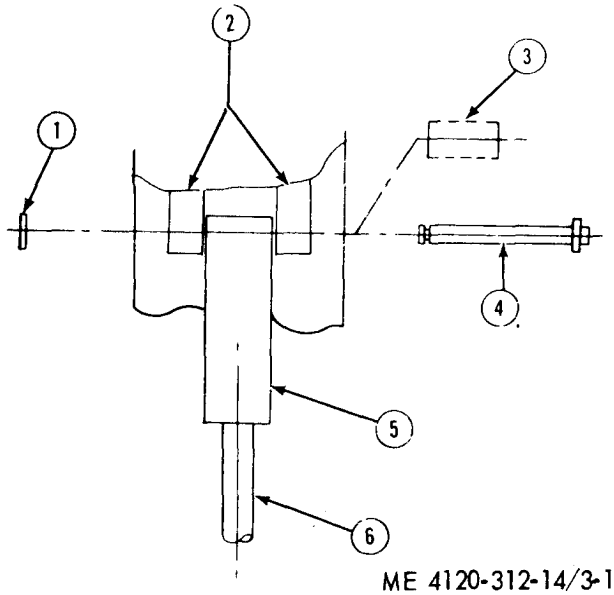
a. Testing. Tag and disconnect the leads and test for continuity with a multimeter set on the ohm scale. Refer to the applicable wiring diagram (fig. 1-3 or 1-4) for the contact points.

b. Removal. Refer to figure 3-13 and remove the electric heater thermostat.

c. Installation. Install the thermostat by reversing the order of removal.

3-36. Electric Heater Elements

a. General. The two banks of electrical resist-



1	Snap ring	3	Phenolic spacer	5	Linkage connector
2	Switch arm	4	Pin	6	Linkage rod

Figure 3–12. Circuit breaker linkage detail.

ante heaters are mounted directly behind the evaporator coil. These heaters provide the heat called for by the temperature control to maintain the desired heat. The two banks of heaters provide two ranges of heating and are manually controlled by the selector switch.

b. Removal.

(1) Remove the top cover of unit (para 3-6).

(2) Refer to figure 3-14 and remove the electric heater elements.

c. Installation. Install the electric heater elements by reversing the order of removal. When installing, be sure the heater element is inserted into the bottom retaining clip.

3-37. High Pressure Cutout Switch Testing Procedure

Test the switch for continuity with a multimeter set on the ohm scale. Refer to the wiring diagram (fig. 1-3) for contact points. If no continuity is indicated, push the reset button.

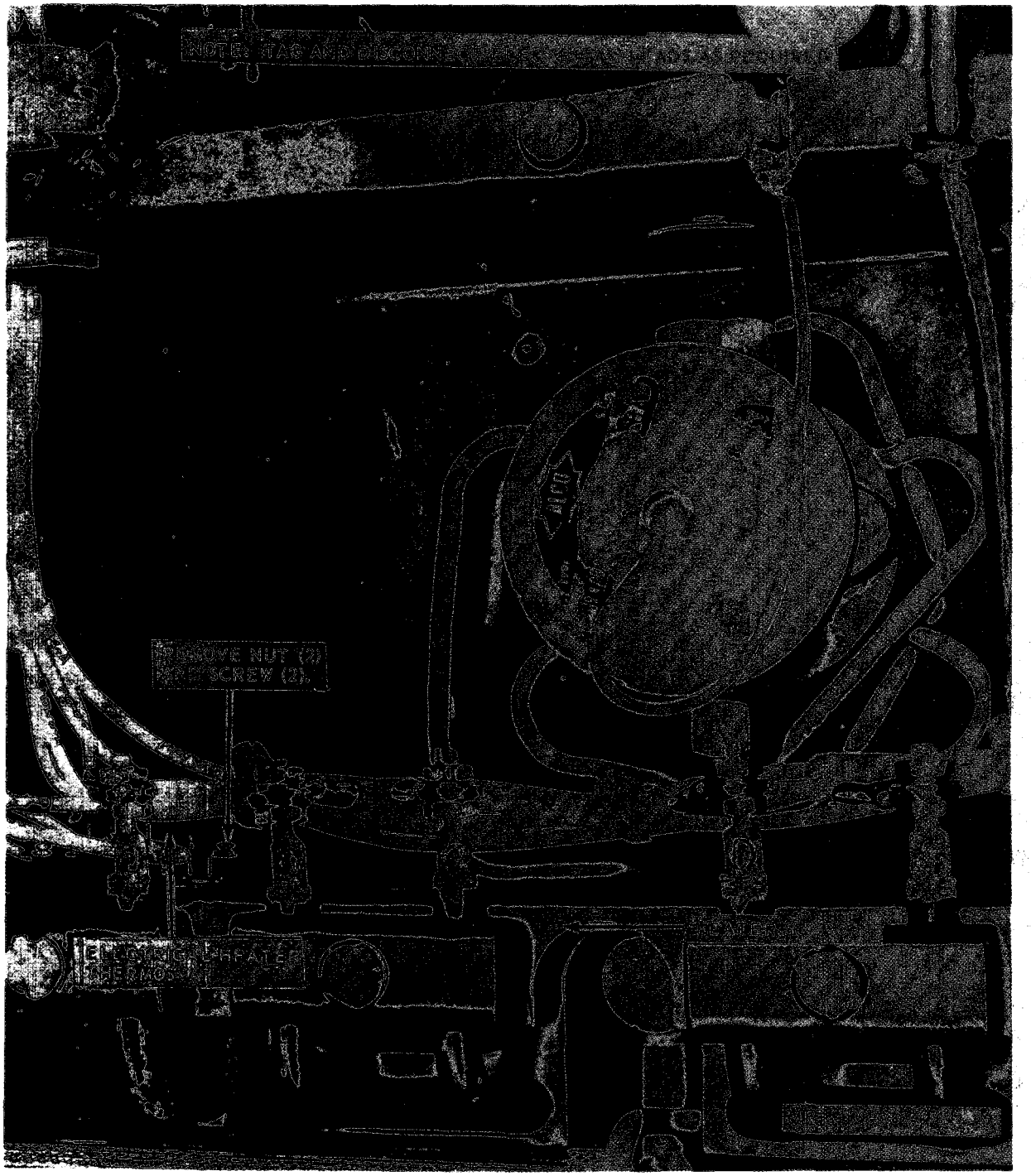


Figure 3-13. Electric heater thermostat, removal and installation.

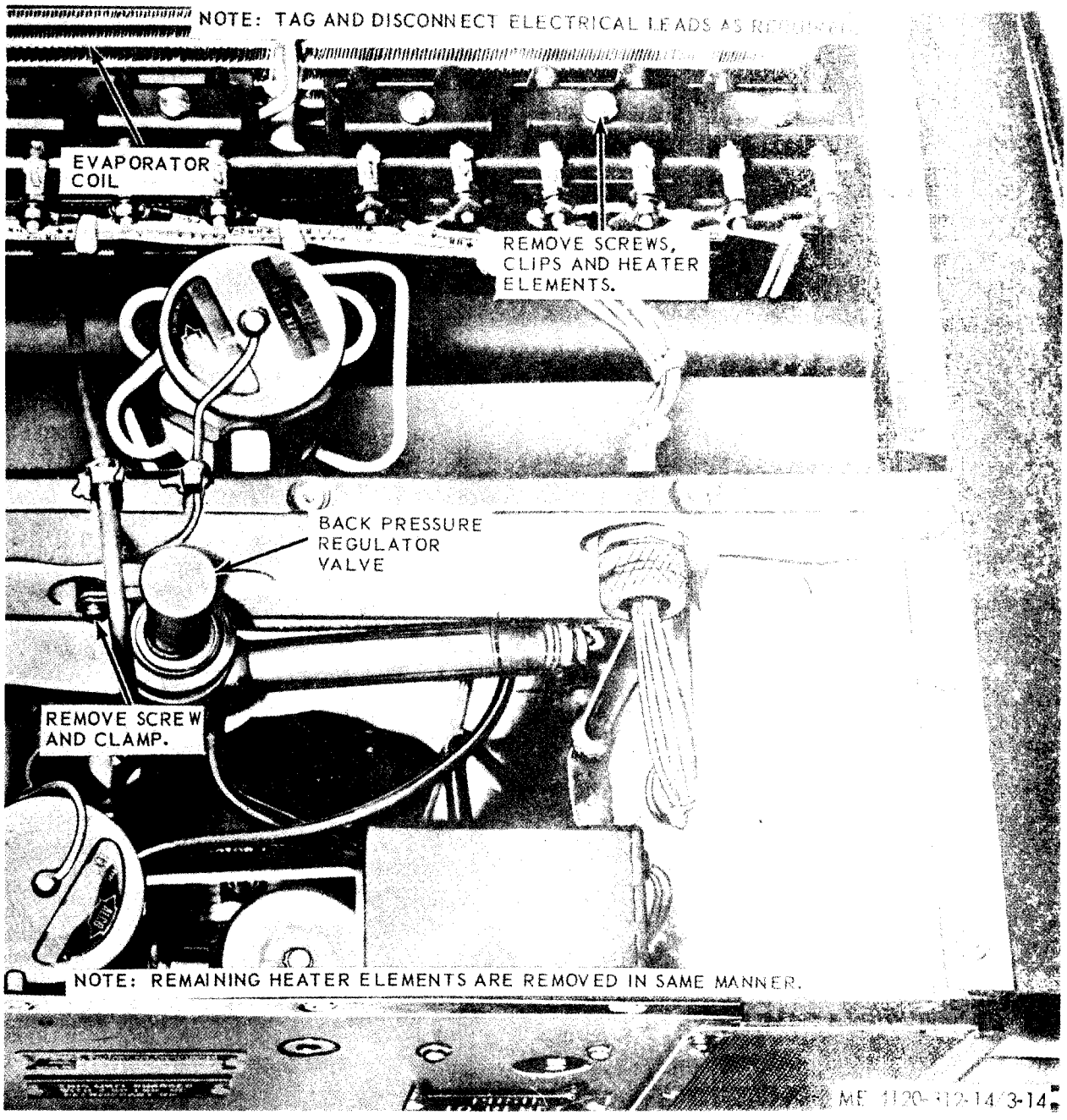


Figure 3-14. Electric heater elements and back pressure valve, removal and installation.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

4–1. Shipment

The air conditioner may be moved short distances with minimum protection. Cover the unit with a water prcof material. For long distance movement, crate the unit securely. Keep the unit in a vertical position during shipment and/or limited storage.

4–2. Limited Storage

Refer to TM 740–90–1 for administrative (limited) storage procedures. Keep the unit in a vertical position during shipment and/or limited storage.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

4–3. General

When capture or abandonment of the air conditioner to an enemy is imminent, the responsible unit commander must make the decision to destroy the unit or render it inoperative. Based on this decision, orders are issued which cover the desired extent of demolition. Whatever method of destruction is used, it is essential to destroy the same vital parts in all units as well as the corresponding spare parts.

4–4. Demolition By Mechanical Means

Use a sledge hammer of sufficient weight to batter all vital parts to complete destruction. Place the unit such a position that a bulldozer or tank can run over it if such equipment is available.

4–5. Demolition By Explosives or Weapons Fire

a. Demolition by Explosives. Place one charge inside the lower compartment and one charge inside the center compartment. Make sure the charges are of sufficient strength to completely destroy the compressor and evaporator sections.

b. Demolition by Weapon Fire. Remove all access panels and grilles. Fire several rounds of large caliber ammunition at vital parts, i.e., the compressor, evaporator, blower motor and service valves. For most effective destruction use high explosive shoulder weapons (recoiless rifle, rocket launcher, etc). Incendiary weapons are also recommended.

4-6. Other Demolition Methods

a. If components cannot be destroyed or smashed, drain the oil from the compressor. and discharge the refrigerant. Operate the unit at full speed.

Warning: **Do not** inhale **refrigerant fumes or make bodily contact with the refrigerant.** Discharge refrigerant into the atmosphere.

b. Components may be removed and scattered and concealed by burial in remote areas. Remove any evidence of burial by brushing ground with, branches.

c. If a lake, river, or other large enough body of water is' available, the unit and component may be destroyed by submersion. Be certain that the unit and any components are completely submerged and not visable from the surface.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

5–1. Scope

The following instructions are provided for direct support and general support maintenance personnel. They contain information on equipment maintenance that is beyond the scope of the tools, equipment, personnel, or supplies that are normally available to using organizations.

5-2. Forms and Records

DA Forms and procedures used for maintenance of the equipment will be only those prescribed in M 38-750.

Section II. DESCRIPTION AND DATA

5–3. Description

A complete description and illustration of the air conditioners is available in paragraph 1–3 of this publication.

5–4. Tabulated data

Paragraph 1–4 of this publication reflects complete tabulated data for the units covered in this chapter.

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

5–5. Special Tools and Equipment

No special tools and equipment are required to perform direct support or general support maintenance on the air conditioners.

5–6. Direct Support and General Support Maintenance Repair Parts

Refer to TM 5–4120–312–24P (when published) for the illustrated listing of direct support and general support maintenance repair parts.

5–7. Specially Designed (Fabricated) Tools and Equipment

There are no specially designed tools or equipment required to perform direct support or general support functions on the air conditioners.

Section IV. TROUBLESHOOTING

5–8. General

This section provides information useful in diagnosing and correcting unsatisfactory operation of the air conditioner or any of its components. Malfunctions which may occur are listed in table 5–1. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

5–9. Troubleshooting Instructions

Refer to table 5–1 for troubleshooting instructions.

5–10. Suction and Discharge Pressures

If the system is losing its cooling capacity, or is in some manner not functioning properly, a check of the system operating pressure will frequently lead to the cause of the malfunction.

Table 5-1. Troubleshooting

Malfunction	Probable cause	Corrective action
1. Compressor fails to start.	*a.* Compressor thermostatic switch (internal) open or defective.	*a.* Test the switch after compressor is cool; if switch is open, replace the compressor (para 5-22).
	b. Compressor defective.	*b.* Replace compressor (para 5-22).
2. Compressor starts but fails on overload.	*a.* Expansion valve defective or in. correctly set superheat.	*a.* Replace valve if correct adjustment cannot be obtained (para 5-13) or if valve fails to modulate refrigerant flow correctly.
	b. Discharge pressure too high,	*b.* Remove small amount of refrigerant (para 6-1).
	c. Compressor defective.	*c.* Replace compressor (para 5-22).
	d. Defective liquid line bypass or liquid line solenoid valves.	*d.* Test control coils (para 6-5), check valves for positive opening and closing. Replace coils or valves if defective.
3. Suction pressure too low.	Dehydrator defective.	Replace dehydrator (para 5-17).
4. Discharge pressure inadequate.	Compressor defective.	Replace compressor (para 5-22).
5. Suction pressure high.	*a.* Liquid line solenoid valve de feetive.	*a.* Replace solenoid valve (para 5-16).
	b. Hot gas bypass valve defective.	*b.* Replace bypass valve (para 5-15).
	c. Compressor defective.	*c.* Replace compressor (para 5-22).
	d. Pressure relief valve inoperative,	*d.* Adjust or erplace relief valve (para 5-18).
	e. Frost on the evaporating coil.	e. Test pressuer relief valve, adjust or replace defective valve (para 5-18).
6. Discharge pressure high.	Overcharge of refrigerant.	Remove small amount of refrigerant (para 6-1).
7. Suction and discharge pressure low.	Lack of refrigerant	Check sight glass for appearance of bubbles, add R-22 refrigerant as required. Check for leaks (para 6-1).
8. High suction pressure with low discharge pressure.	Compressor defective	Replace compressor (para 5-22).
9. System losing cooling capacity.	System pressure inadequate	Refer to instructions in para 5-10.

Table 5-2. Normal Operating Pressure

Outdoor ambient temperature	90° F Dry Bulb Return Air to Unit			
	50° F.	75° F.	100° F.	125° F.
Normal gage pressure (p.s.i.g.)				
Suction	58–65	58-70	65-75	75-90
Discharge	135-155	185–205	275-295	400-420
Outdoor ambient temperature	**80° F Dry Bulb Return Air to Unit**			
	50° F.	75° F.	100° F.	125° F.
Normal gage pressure				
Suction	58-65	58–70	60-75	65-75
Discharge	130-150	180-200	270–290	390-410

Install pressure gages on the service valves and turn the valves two turns to open, exposing gages to the system pressures. Compare gage readings to the normal operating pressure indicated in table 5-2 below:

Section V. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

Note. Whenever a component is removed from the refrigerant system, the entire system is exposed to the atomosphere. After such exposure, the dehydrator must be replaced and the system evacuated and recharged.

5–11. Refrigerant System

a. General. The following paragraphs provide information relating to the removal and installation of major components of the air conditioner as well as an analysis of the operation to assist direct support and general support maintenance personnel in the performance of their functions.

b. Analysis of Operation.

(1) The air conditioner, once started, is automatic in operation. The relationship of the automatic components, controls, and instruments explained is for the converience of maintenance of the unit. A refrigerant flow diagram (fig. 1–5) is included for reference purposes.

Warning: **Disconnect the power source before performing any maintenance on the air conditioner or its components.**

(2) The type and degree of air conditioning provided by the unit is controlled by the selector switch (para 2–7) and a temperature control thermostat.

(*a*) When the selector switch is in the OFF position the entire power circuit is dead.

(*b*) Placing the selector switch in the high heat position energizes the blower motor which forces air out of the discharge grille through motion of the evaporator fan. If the temperature falls below the set point of the temperature control, the control contacts close, energizing the heater contactor, supplying power to the heaters.

(*c*) Moving the selector switch to the LO-HEAT position presents the same sequence of control outlines in (*b*) above but reduces the heating capacity of the unit in that only one bank of heaters are energized.

(*d*) Placing the selector switch in the VENTILATE position energizes the blower motor which forces air through the motion of the evaporator fans.

(*e*) Placing the selector switch in the COOL position energizes the blower motor and the compressor contactor. The energized compressor contactor supplies power to the compressor through the normally closed contacts of the circuit breaker and overload protector. With the motor and compressor operating, the flow within the refrigerant circuit is controlled by the temperature control setting. When the temperature rises above the selected setting, the temperature control contacts open, deenergizing the solenoid valves. This positions the valves for cooling service. Should the temperature fall below the selected temperature, the contacts will close, positioning the valves for bypass operation.

c. Cooling Cycle of Operation. The blower motor and compressor run continuously, whether the temperature control is calling for cooling or. not, when the unit is adjusted to operate on the cooling cycle. This feature provides a constant electrical load, preventing voltage fluctuations within the system.

d. Bypass Cycle of Operation. When the conditioned air falls below the temperature control setting, the circuit controlling the solenoid valves is energized resulting in:

(1) The liquid line solenoid valve (V2, fig. 1-5) closing, stopping the flow of refrigerant to the evaporator coil and completely stopping the cooling function of the unit.

(2) The hot gas bypass line solenoid valve, (V3) opens, bypassing a major part of the compressed refrigerant vapor directly back to the suction side of the compressor.

(3) The liquid line bypass solenoid valve (V1) opens, bypassing a small amount of liquid refrigerant through a thermostatic valve (W1) into the suction tubing.

(4) The back pressure regulating valve (BPR) prevents frost from forming on the evaporator coil by preventing auction pressure from decreasing to a pressure which corresponds to a temperature of less than 32° F.

e. Heating Operation. Placing the selector in the LO-HEAT position actuates half of the electrical heaters mounted, in the conditioned air stream, directly behind the evaporator coil. When the selector switch is placed on the HI-HEAT position, the remaining heaters are energized, providing maximum heating capacity (12,000 BTUH).

f. Repair Procedures.

(1) If the system must be opened for repair, the refrigerant is first completely discharged to an outdoor area (para 6-1). Remove condenser fan, attach hose to discharge valve, open valve and discharge all of the refrigerant.

(2) After discharging the system, allow the tubing to warm to the ambient -temperature be-

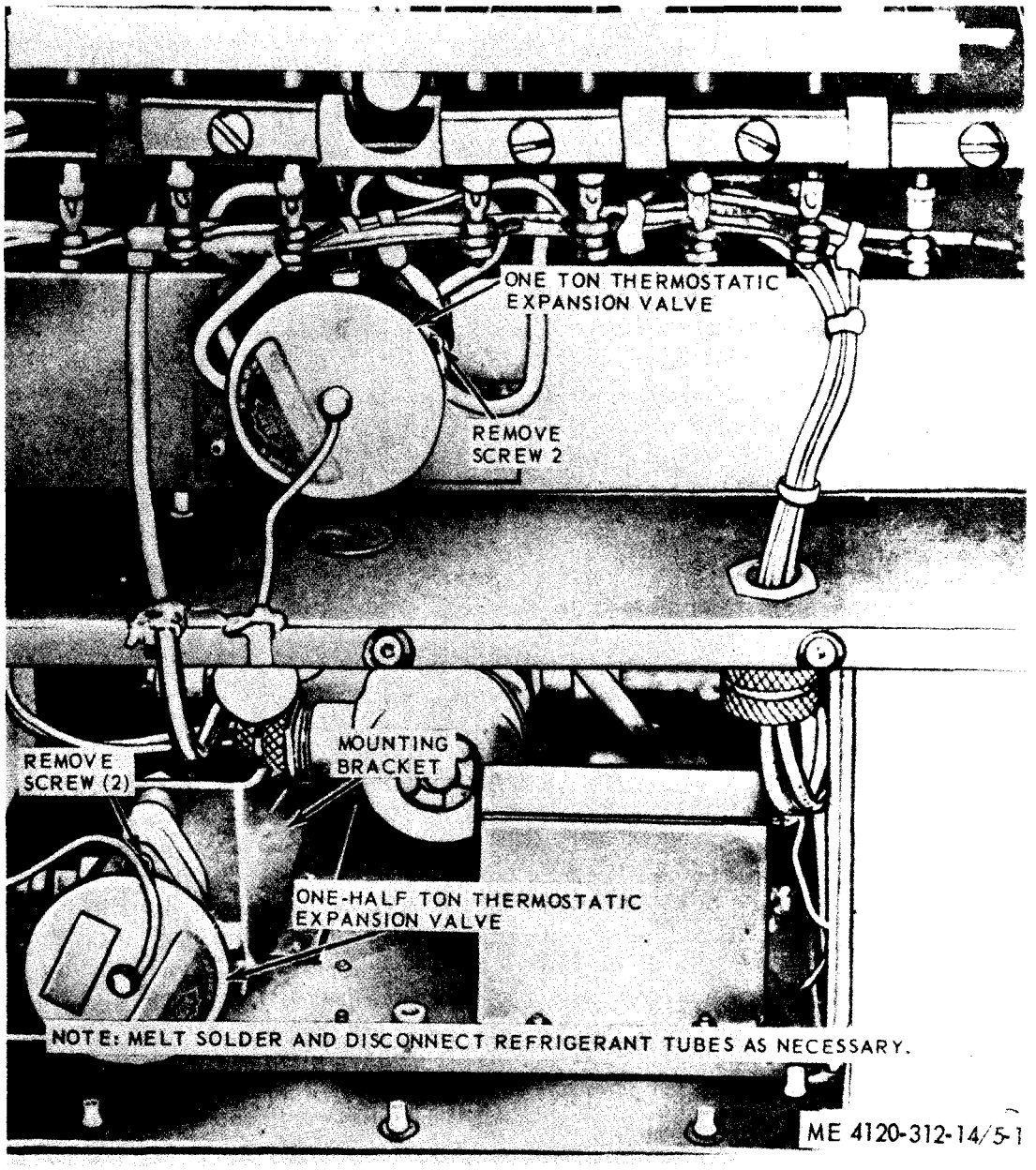


Figure 5-1. Thermostatic expansion valves, removal and installation.

fore opening the system; this delay will help to prevent the formation of condensation on the inside walls of the tubing. Plug or cap all openings as a part is removed from the system to minimize the entry of contaminants and moisture into the system.

(3) Use a silver solder on all soldered connections. Continually pass dry nitrogen through the tubing or connection being soldered.

5-12. Back Pressure Regulating Valve

a. General. The back pressure regulating valve controls the refrigerant pressure in the evaporator to prevent evaporator freeze up. It also bypasses refrigerant gas from the discharge line to the suction line during bypass operation when the switch is on COOL. The valve is pre-set to establish a minimum pressure of 57.8 PSIG in the evaporator.

b. Adjustment.

(1) Remove the button plug from the cap at top of valve.

(2) Attach a service adjusting screw to read suction pressure. Turn screw clockwise to raise pressure and counterclockwise to reduce pressure.

Caution: **Adjustment of valve only required if all other system/components are operating satisfactorily.**

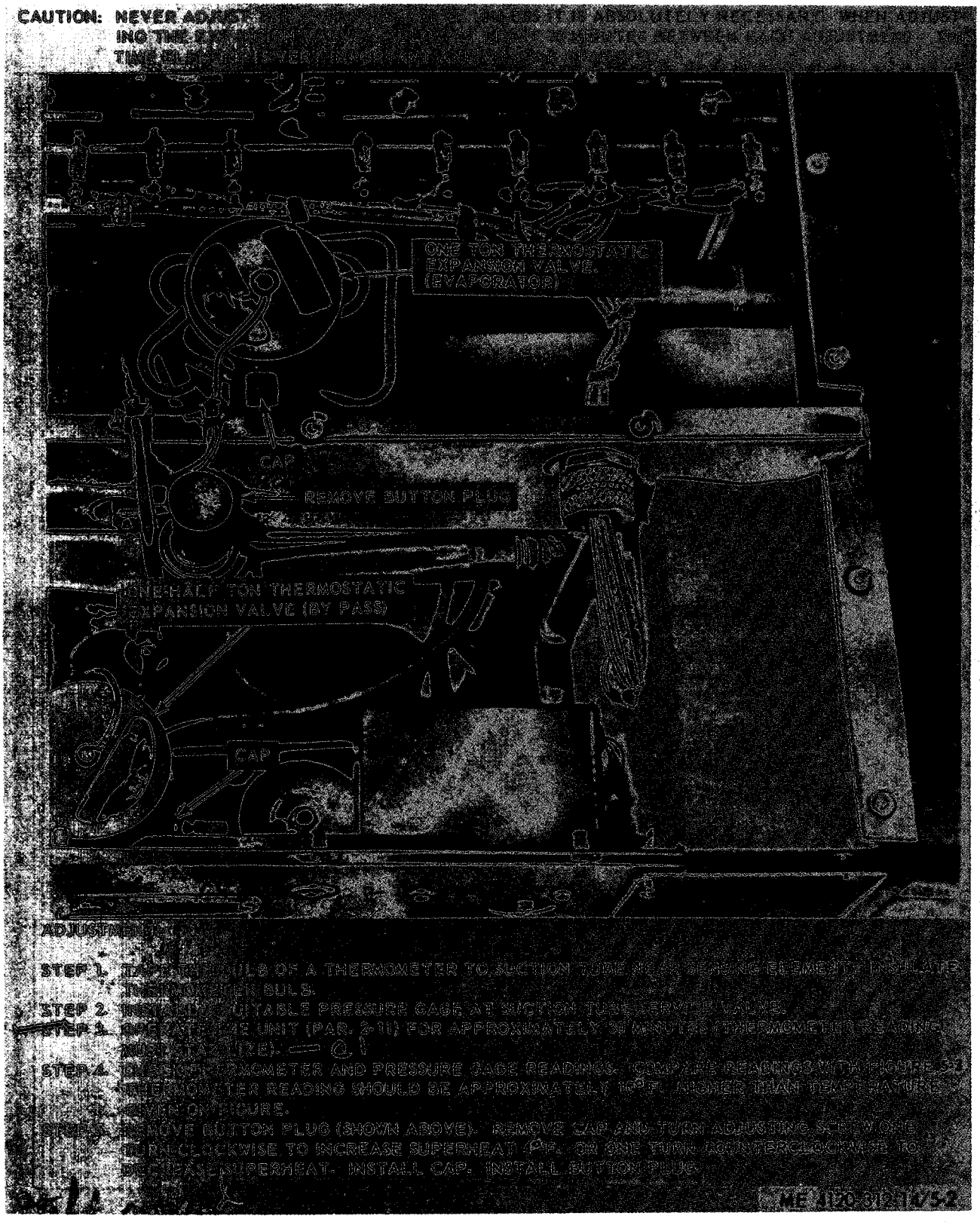


Figure 5-2. Thermostat expansion valve adjustment procedure.

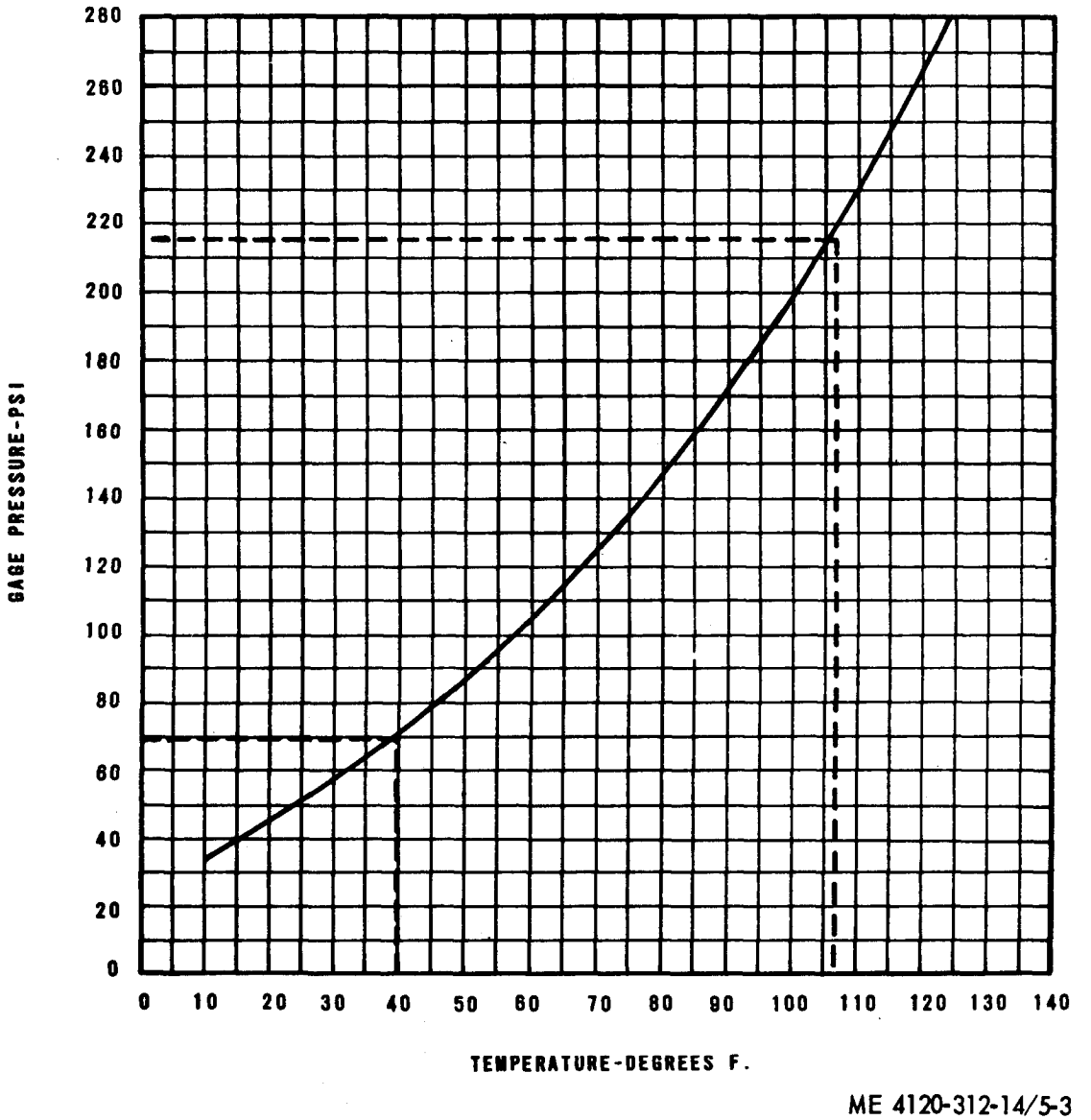


Figure 5–3. Pressure-temperature curve.

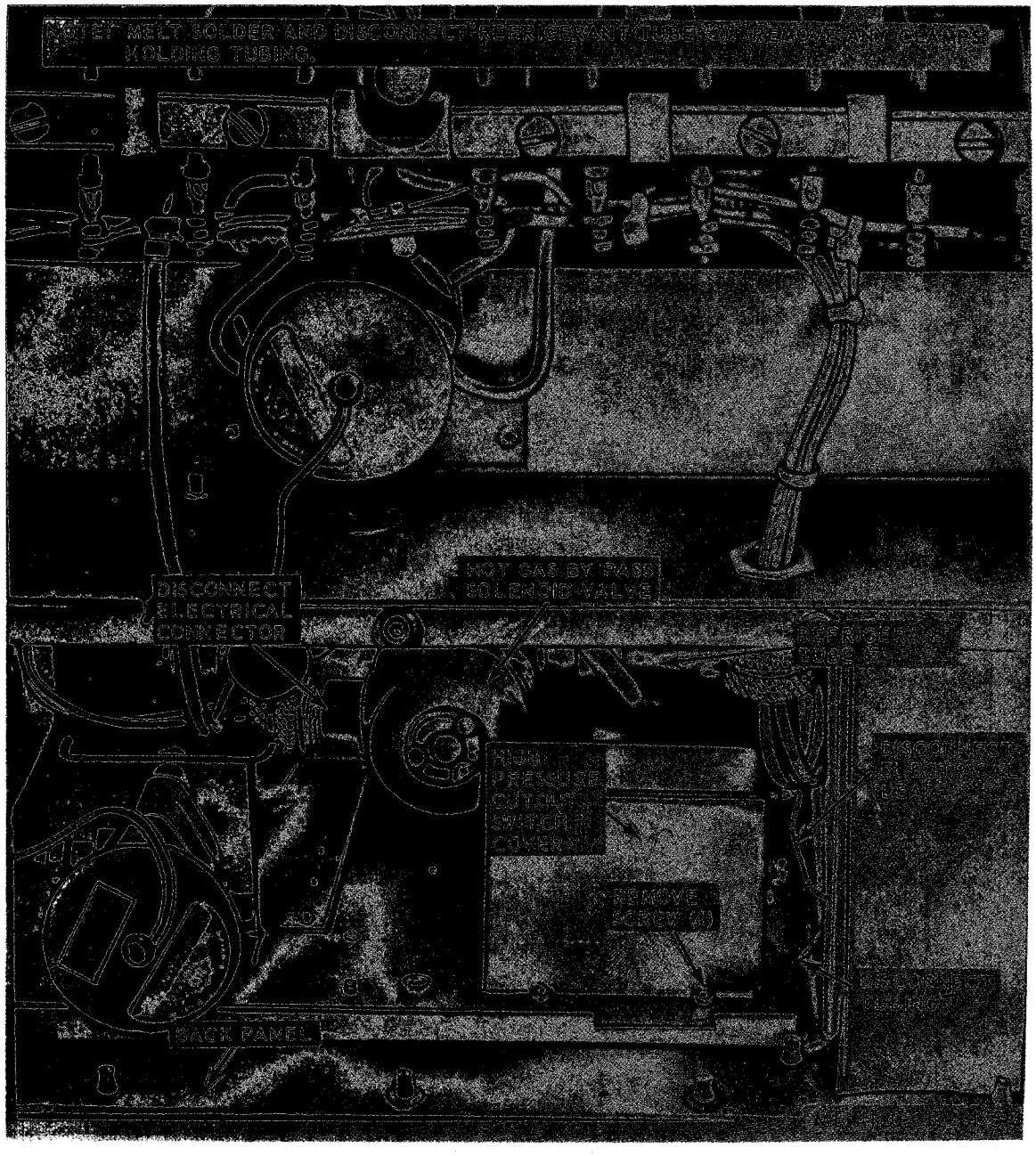


Figure 5-4. High pressure cutout switch and hot gas bypass solenoid valve, removal and installation.

c. Removal.

(1) Remove top cover from unit (para 3-6).

(2) Discharge refrigerant (para 6-1).

(3) Refer to figure 3-14 and remove the back pressure regulating valve.

d. Installation.

(1) Install the back pressure regulating valve and top cover by reversing the order of removal.

(2) Replace the dehydrator (para 5-17).

(3) Evacuate and recharge the refrigerant system (para 6-1).

(4) Recheck system suction pressure after proper charging.

5-13. Thermostatic Expansion Valves

a. General. A l-ton thermostatic. expansion valve controls the flow of liquid refrigerant into the evaporator coil during the cooling cycle. The ½-ton thermostatic expansion valve functions when the unit is in the bypass cycle. Each expansion valve is provided with a superheat setting to insure the operating efficiency of the refrigerant system.

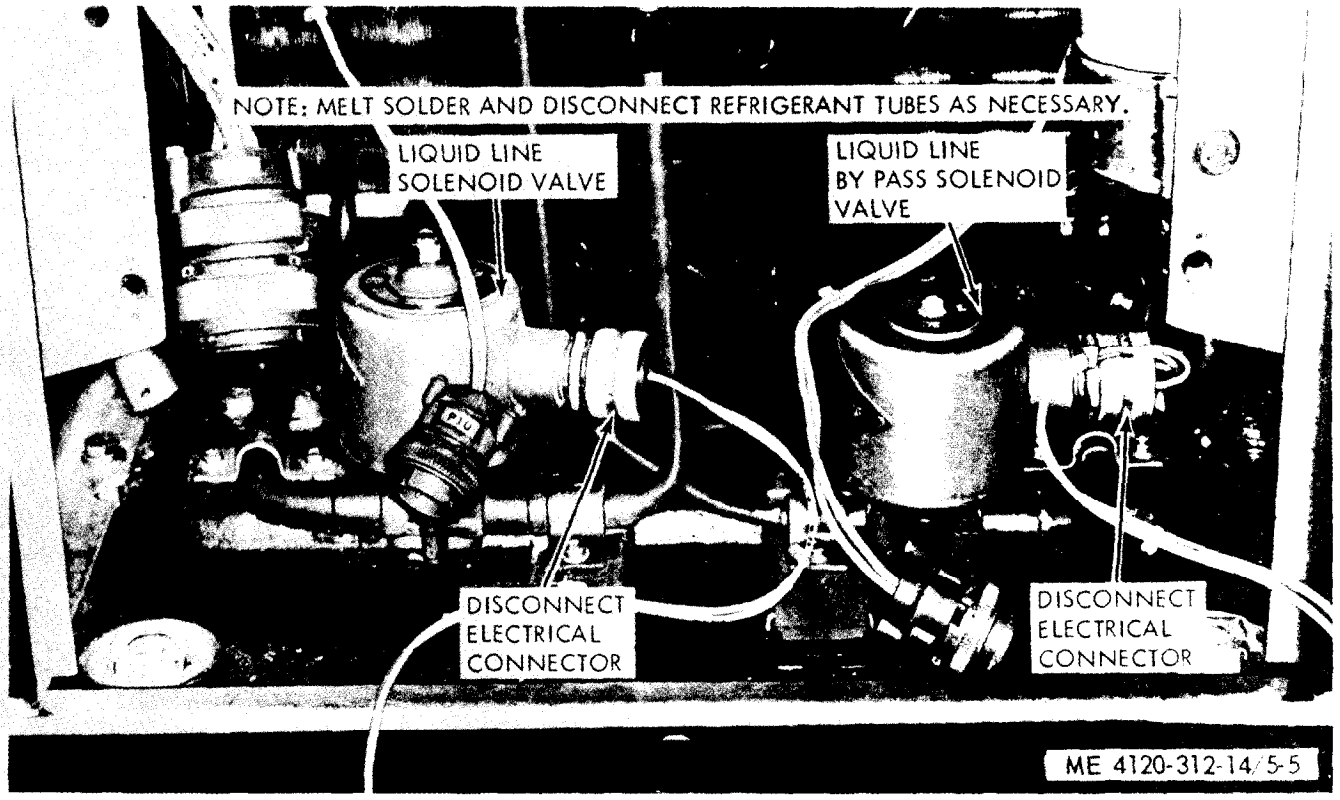


Figure 5-5. Liquid line solenoid valve and liquid line bypass solenoid valve, removal and installation.

b. Removal.

(1) Remove the top cover (para 3-6).

(2) Discharge the system (para 6-1).

(3) Refer to figure 5-1 and remove the thermostatic expansion valves.

c. *Adjustment,* Refer to figure 5-2 and adjust the thermostatic expansion valves.

Caution: Never adjust the expansion valves unless it is absolutely necessary.

Note. Both expansion valves adjust in the same manner.

d. installation.

(1) Install the thermostatic expansion valves by reversing the order of removal.

(2) Replace the dehydrator (para 5-17).

5-14. High Pressure Cutout Switch

a. General. The high pressure cutout switch prevents operation of the compressor when the system pressure exceeds 445 PSIG.

b. Removal.

(1) Relieve the system pressure by discharging refrigerant (para 6-1).

(2) Remove the top cover (para 3-6),

(3) Refer to figure 5-4 and remove the high pressure cutout switch.

c. Installation.

(1) Install the high pressure cutout switch and top cover by reversing the order of removal.

(2) Evacuate and recharge the refrigerant system (para 6-1).

5-15. Hot Gas Bypass Solenoid Valve

a. General. The hot gas bypass valve is automatically operated by the temperature control thermostat. The valve controls the flow of refrigerant through the system when it is in the bypass cycle. It is closed during the cooling cycle of operation.

b. Removal.

(1) Remove the top cover (para 3-6).

(2) Discharge the refrigerant (para 6-1).

(3) Refer to figure 5-4 and remove the hot gas bypass valve.

c. Installation.

(1) Install the hot gas bypass valve by reversing the order of removal.

(2) Replace the top cover (para 3-6).

(3) Replace the dehydrator (para 5-17).

(4) Evacuate and recharge the refrigerant system (para 6-1),

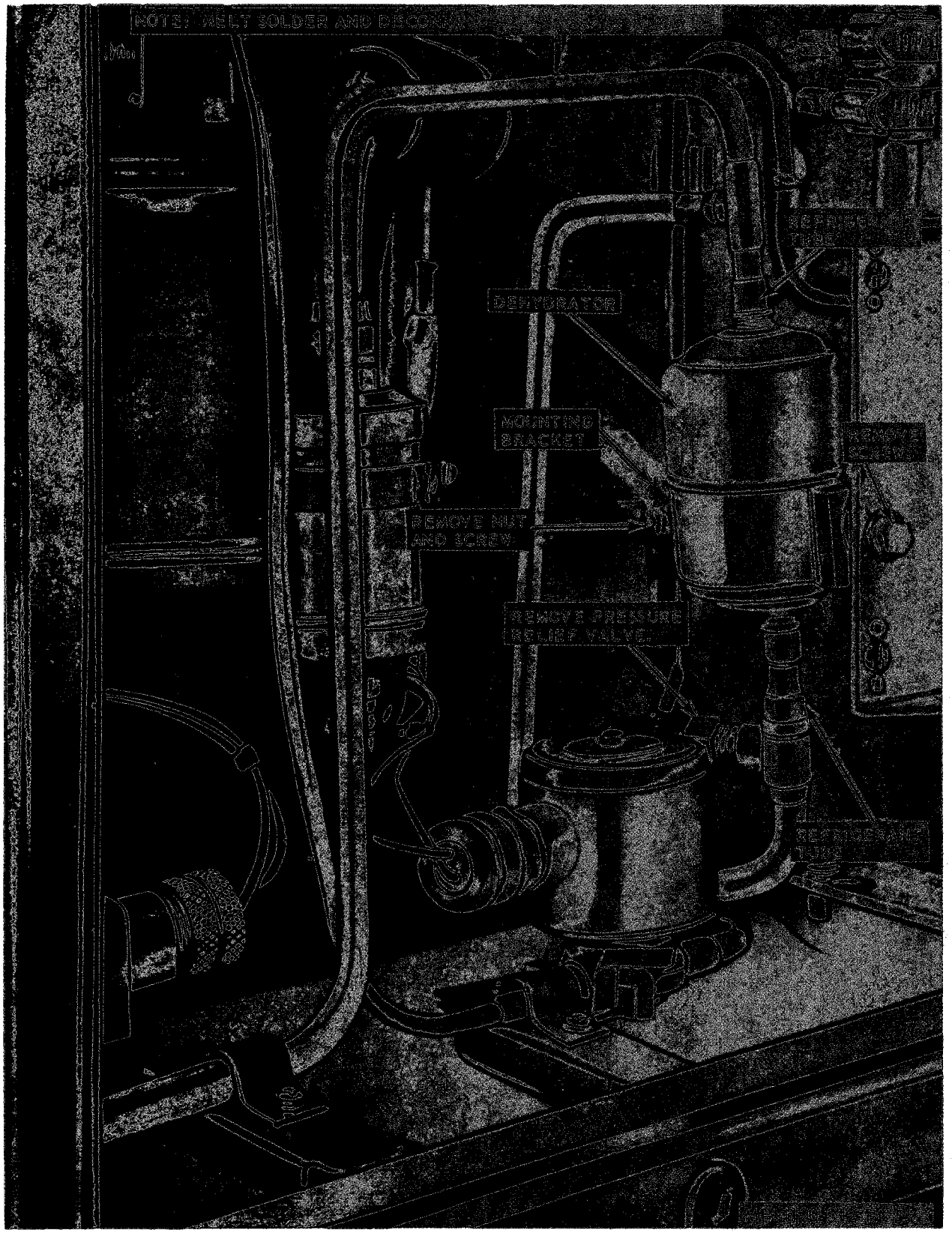


Figure 5–6. Dehydrator and pressure relief valve, removal and installation.

Figure 5-7. Sight glass, removal and installation.

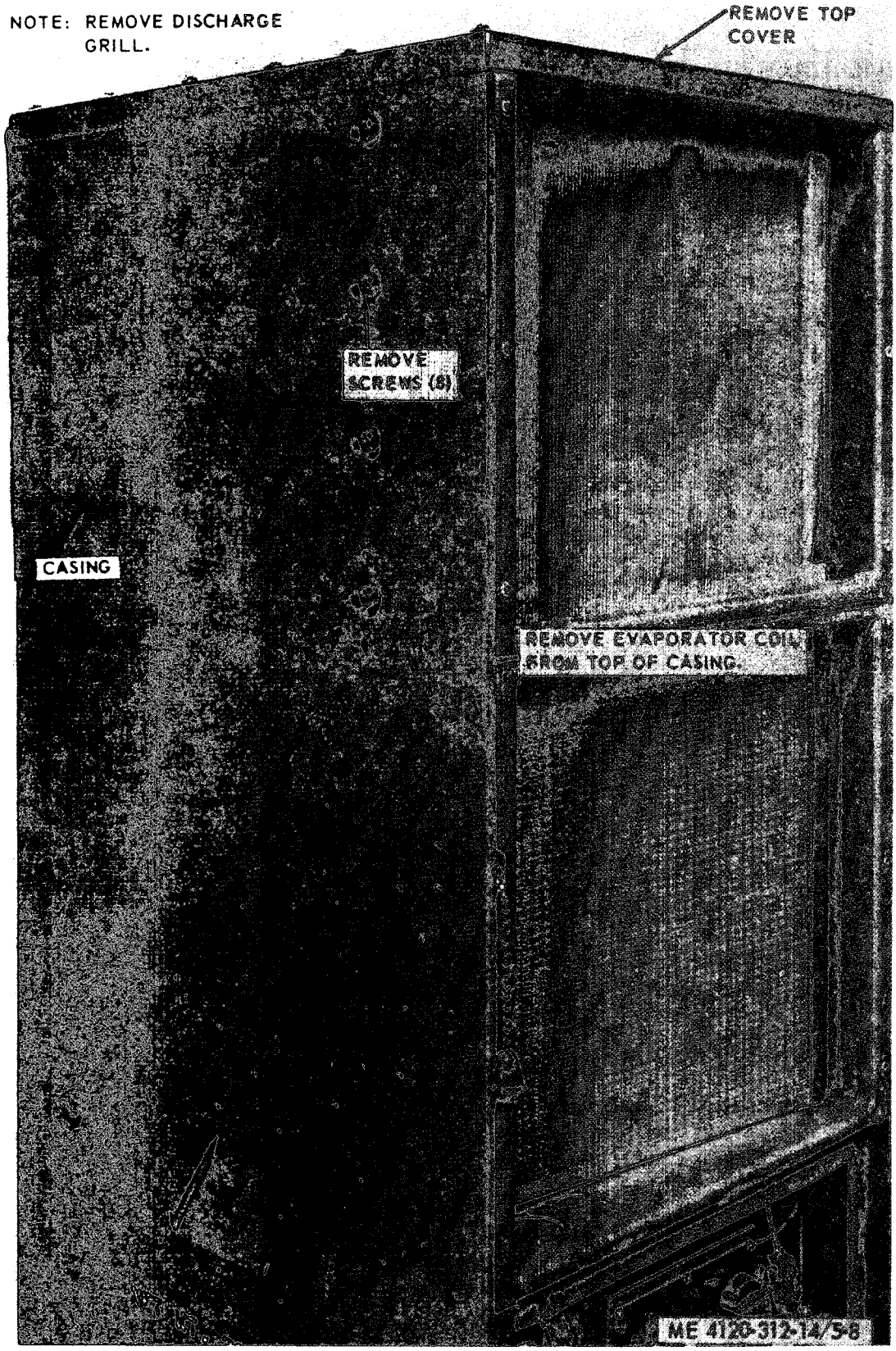


Figure 5–8. Evaporator coil, removal and installation.

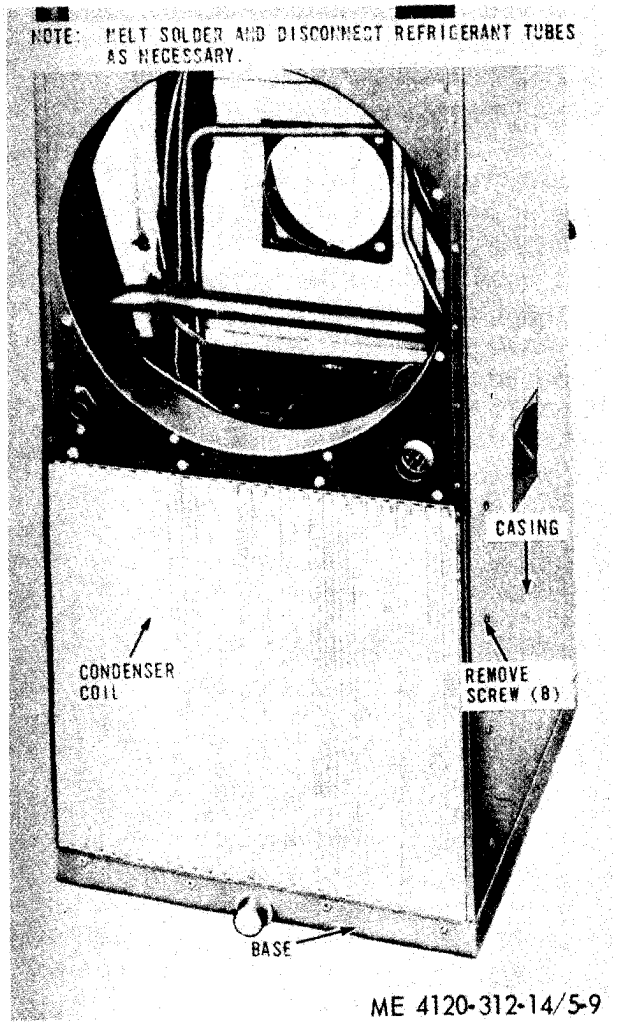


Figure 5-9. Condenser coil, removal and installation.

5-16. Liquid line Bypass Solenoid Valve and liquid line Solenoid Valve

a. Removal.

(1) Discharge the refrigerant system (para 6-1).

(2) Remove the front access panel (para 3-3).

(3) Refer to figure 5-5 and remove the solenoid valves.

b. Installation.

(1) Install the solenoid valves by reversing the order of removal.

(2) Replace the dehydrator (para 5-17).

(3) Replace the front access panel (para 3-6).

(4) Evacuate and recharge the refrigerant system (para 6-1).

5-17. Dehydrator

a. General. The dehydrator prevents the accumulation of moisture and contaminants within the refrigerant system. The dehydrator must be replaced each time the refrigerant system is exposed to the atmosphere during the replacement of a system component or whenever the sight glass indicates moisture is present in the system.

b. Removal.

(1) Remove the front access panel (para 3-6).

(2) Discharge the refrigerant system (para 6-1).

(3) Refer to figure 5-6 and remove the dehydrator.

c. Installation.

(1) Install the dehydrator and access panel by reversing the order of removal. insure proper flow direction when installing the dehydrator. The outlet toward the down stream side of the refrigerant flow.

(2) Evacuate and recharge the refrigerant system (para 6-1).

5-18. Pressure Relief Valve

a. General. The pressure relief valve, located immediately beneath the dehydrator, prevents excessive pressure in the refrigerant system.

b. Removal.

(1) Remove the f rent access panel (para 3-6).

(2) Discharge the refrigerant system (para 6-1).

(3) Refer to figure 5-6 and remove the pressure relief valve.

c. ***Installation.***

(1) Install the pressure relief valve by reversing the order of removal.

(2) Replace the dehydrator (para 5-17).

(3) Replace the f rent access panel (para 3-6) .

(4) Evacuate and recharge the refrigerant system (para 6-1).

5-19. Sight Glass

a. ***General.*** The sight glass indicates when more refrigerant may be required and if moisture is present in the refrigerant circuit.

b. Removal.

(1) Discharge the refrigerant (para 6-1).

(2) Remove top cover (para 3-6).

(3) Sweat the sight glass connections loose. Protect the surrounding area from heat or flame.

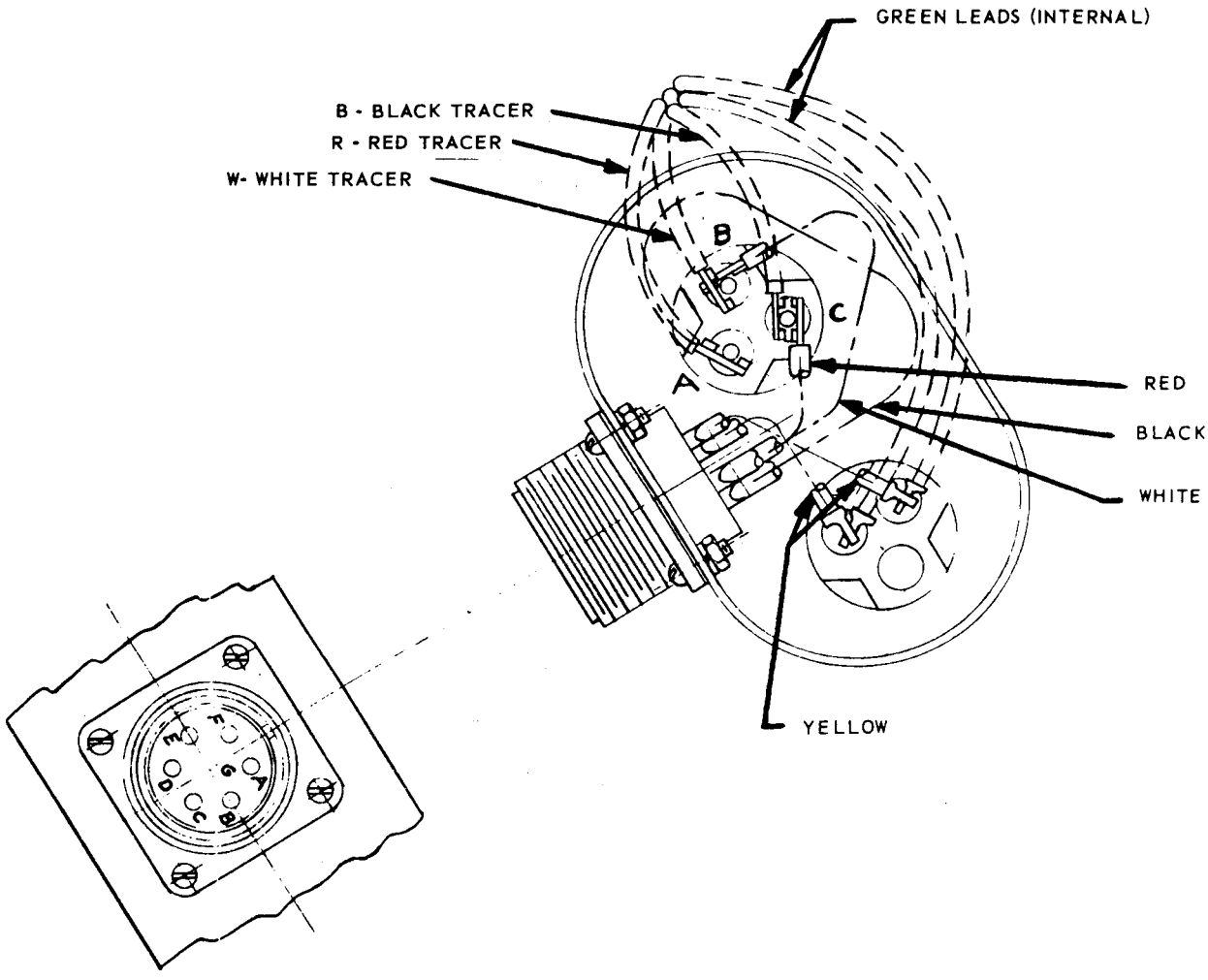
(4) Refer to figure 5-7 and remove the sight glass.

c. ***Installation.***

(1) Install the sight glass by reversing the order of removal.

(2) Solder sight glass connections. Protect the surrounding area from heat.

Figure 5–10①. Compressor/motor assembly, removal and installation.



ATTACH CONNECTOR LEADS
TO THE FOLLOWING:

TERMINAL	LEAD	COLOR
A	PHASE A	BLACK
B	PHASE B	WHITE
C	PHASE C	RED
D	THERMOSTAT	YELLOW
E	THERMOSTAT	YELLOW
F	OPEN NC	
G	OPEN NC	

WHIRLPOOL COMPRESSOR

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Figure 5–10②—Continued.

(3) Replace dehydrator (para 5–17).
(4) Evacuate and recharge the refrigerant system (para 6–1).
(5) Replace top cover (para 3–6).

5–20. Evaporator Coil

a. General. The evaporator coil is mounted on the casing directly behind the discharge grille.
b. Removal.
(1) Remove the discharge grille and top cover (para 3–6).
(2) Discharge refrigerant system (para 6–1).
(3) Refer to figure 5–8 and remove the evaporator coil.
c. Installation.
(1) Install coil by reversing the order of removal. Replace top cover (para 3–6).
(2) Replace dehydrator (para 5–17).
(3) Evacuate and recharge refrigerant system (para 6–1).
(4) Service coil and install discharge grille (para 3–6).

5–21. Condenser Coil

a. General. The condenser coil is located at the rear of the lower compartment.
b. Removal.
(1) Remove the condenser grille and screen (para 3–19).
(2) Discharge the refrigerant system (para 6–1).
(3) Carefully sweat the coil connections loose.
(4) Refer to figure 5–9 and remove the condenser coil.
c. Installation.
(1) Install condenser coil by reversing the order of removal.
(2) Replace dehydrator (para 5–19).
(3) Evacuate and recharge refrigerant system (para 6–1).
(4) Service coil (fig. 3–4) and replace the condenser screen and grille (para 3–19).

5–22. Compressor/Motor

a. General. The purpose of the compressor is to raise the pressure of refrigerant gas from evaporator pressure to condensing pressure. Its function is to deliver refrigerant to the condenser at a pressure and temperature at which the condensing process can be readily accomplished.
b. Removal.
(1) Remove the front access panel (para 3–6).
(2) Clean the area surrounding the replacement compressor motor assembly and dry thoroughly.

Caution: Use rubber gloves when handling or cleaning the unit or surrounding area.

(3) Discharge the refrigerant (para 6-1).
(4) Refer to figure 5-10 and remove the compressor/motor unit. Use extreme care when sweating the connections loose,

c. Installation.
(1) Install the compressor/motor unit by reversing the order of removal.
(2) Replace the dehydrator (para 5-17).
(3) Evacuate and recharge the refrigerant system (para 6-1).
(4) Replace the front access panel (para 3-6).

5-23. Casing Assembly

a. General. The casing assembly protects, and provides air control around the components. Removal and installation instructions for the access panels, covers, grilles, and screens have been included in the applicable component maintenance instructions. Figure 5-11 is provided as a guide should it become necessary to remove panels or insulation not previously covered.

b. Removal. Refer to figure 5-11 and remove the casing components as required.

Note. **The majority of the panels have been installed with rivet nuts which must be removed carefully so** as to **avoid damage to the equipment.**

c. Installation. Install the casing components by reversing the order of removal.

5-24. Suction and Discharge Service Valves

a. General. The suction and discharge service valves provide access to the refrigerant system.
b. *Removal.*
(1) Remove the condenser fan (para 3-21).
(2) Discharge the refrigerant system (para 6-1).
(3) Refer to figure 5-12 and remove the service valves as follows: Both valves must be sweated from the lines. Apply heat carefully to avoid damage to adjacent components.

c. Installation.
(1) Install the service valves by reversing the order of removal.
(2) Replace the dehydrator (para 5-17).
(3) Evacuate and recharge the refrigerant system (para 6-1).

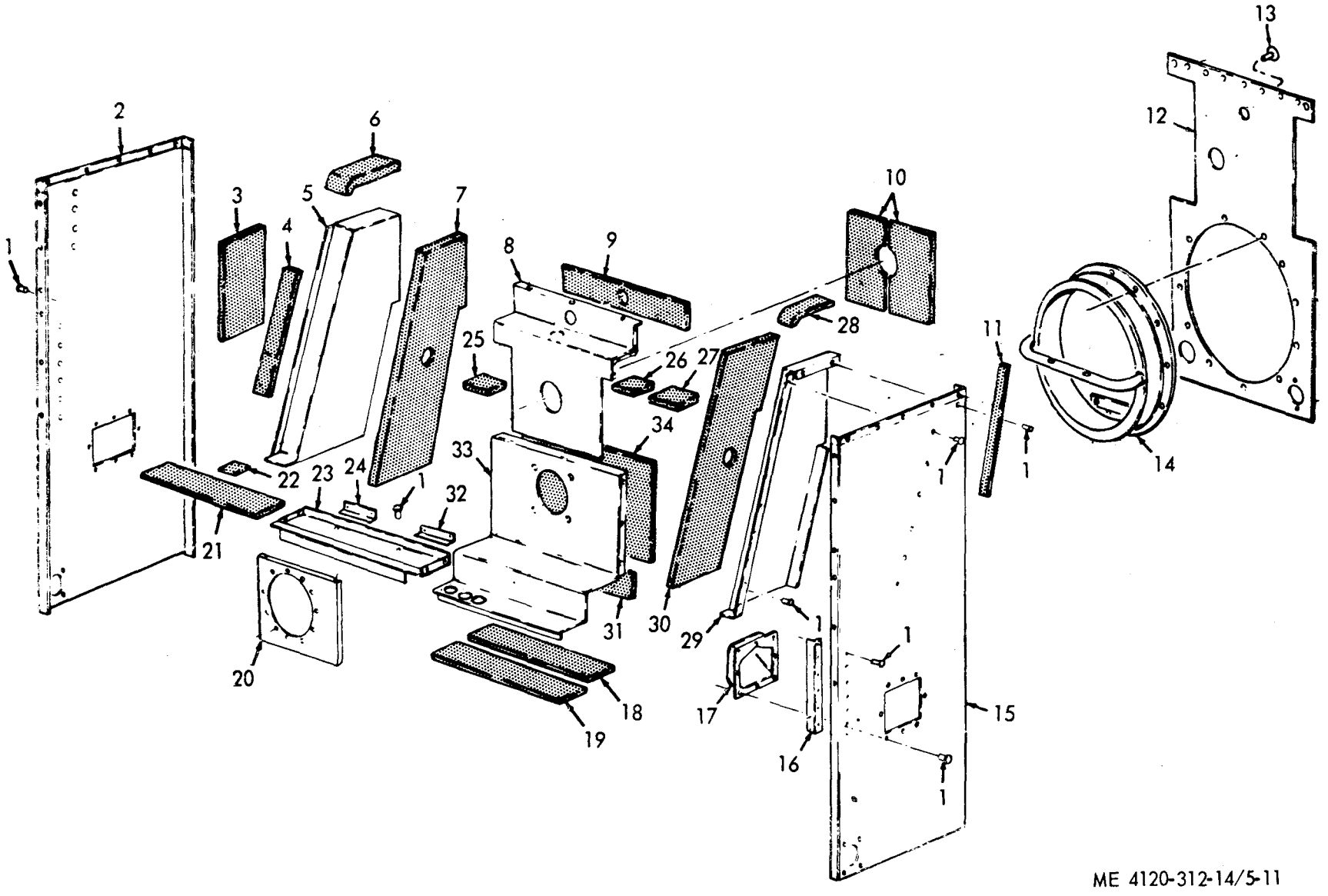

Figure 5-11. Casing assembly, removal and installation.

1 Rivet nut
2 Right side panel
3 Rubber insulation
4 Rubber insulation
5 Right hand duct
6 Rubber insulation
7 Rubber insulation
8 Top partition panel
9 Rubber insulation
10 Rubber insulation
11 Rubber insulation
12 Back panel
13 Rivet nut, 5-16-18
14 Motor support and cone assembly
15 Left side panel
16 Filter support
17 Handle (2 rqr)
18 Rubber insulation
19 Rubber insulation
20 Intake panel
21 Rubber insulation
22 Rubber insulation
23 Drain pan
24 Drain pan right hand angle
25 Rubber insulation
26 Rubber insulation
27 Rubber insulation
28 Rubber insulation
29 Left hand duct
30 Rubber insulation
31 Rubber insulation
32 Drain pan left hand angle
33 Partition panel
34 Rubber insulation

Figure 5-11—Continued

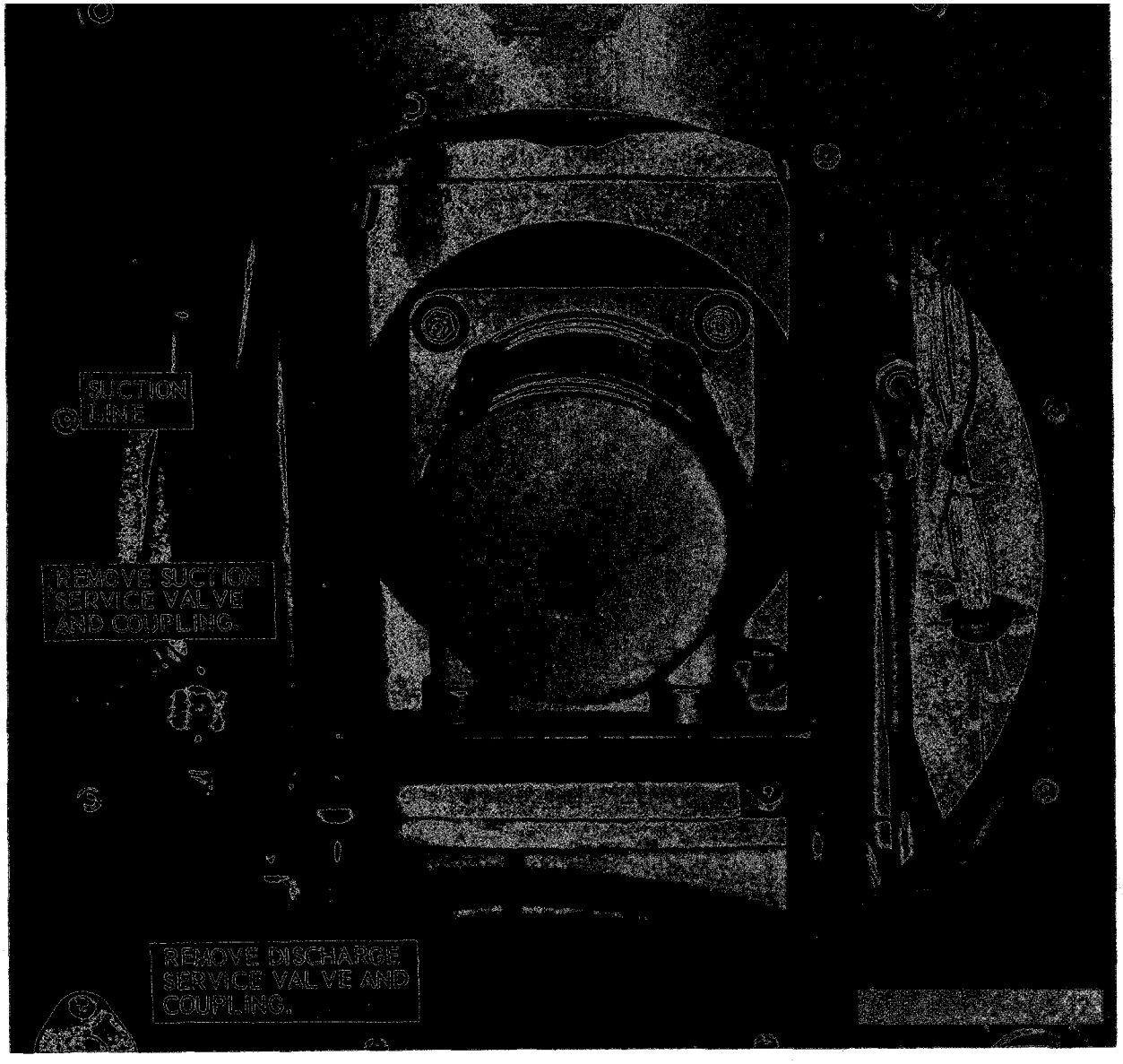

Figure 5-12. Suction and discharge service valves, removal and installation.

CHAPTER 6

REPAIR INSTRUCTIONS

Section I. REFRIGERATION SYSTEM

6-1. Servicing the Refrigerant System

a. General. When a leak is suspected within the system it is necessary to make a thorough check to locate the leak. To gain access to the refrigerant components it is necessary to remove the panels, grilles, and covers, as well as the condenser fan. Refer to the applicable maintenance paragraph for instructions covering the removal and installation of the protecting access components.

b. Testing Procedures.

(1) *Halide torch method.* The Halide torch system is recognized as an efficient method to test the refrigerant system for leaks. The Halide detector suction tube is passed over all sweated connections, fittings, and valve connections. The original blue flame will turn green when a leak is detected. A large leak will turn the flame dense blue with a reddish tip, or, put the flame out altogether. Mark any leaks and refer to the applicable maintenance paragraph for repair instructions.

(2) *Soap solution method.* Brush all possible areas of leakage with a liberal soap solution. A leak will cause the solution to bubble. When using this method, follow a definite pattern to insure that all components are checked.

c. Purging the System.

(1) Remove the condenser fan (para 3–21).

(2) Remove the outdoor thermostat (para 3–33) or the alternate cover at the right of the fan area and install a service hose on the discharge service valve.

(3) Slowly discharge the refrigerant into a safe area outside.

Warning: **Avoid bodily contact with the refrigerant or inhaling any refrigerant gases. In case of a leak, ventilate the area immediately. In case of bodily contact, seek medical aid immediately.**

(4) When system is completely discharged, remove the hose from the discharge service valve. Reinstall condenser fan and fan guard.

d. Pressure Testing and Evaluating the System.

(1) Remove the condenser fan (para 3-21).

(2) Connect the suction line of a suitable pressure manifold loosely to the suction service valve. Connect the center manifold to the refrigerant drum and the discharge pressure gage line to the discharge service valve. Make sure all valves and the drum and gages are closed (fig. 6-1).

(3) Open the refrigerant drum shutoff slightly to purge hose line. Tighten connection at suction service valve. Open suction service valve and drum shutoff valve.

Note. Drum must be in upright position to allow only gaseous refrigerant to enter system.

(4) Close the drum shutoff valve when the discharge pressure reaches 10 psig. Close suction service valve and disconnect hose from refrigerant drum.

(5) Loosen suction service valve connection and connect the center manifold line to nitrogen drum shutoff valve (fig. 6-2).

(6) Tighten suction service valve connection, open service valve and nitrogen shutoff valve. Build up system until pressure reaches 150 psig. Close suction service valve and shutoff valve.

(7) Test for leaks and purge system (subpara *b* and *c* above).

(8) Remove the cap from discharge service valve. Attach a suitable vacuum pump to suction service valve and a manometer to the discharge service valve. Open both service valves and operate the vacuum pump until the manometer indicates 2.6 mm hg. abs. (millimeters mercury absolute).

(9) Close suction valve and stop the pump. Attach hose from refrigerant drum, purge air from line with refrigerant and slowly break the vacuum by opening the suction service valve until 760 mm hg. abs. Close suction service valve.

(10) Remove refrigerant drum and attach vacuum pump to the suction service valve. Purge air from hose, start pump and open suction ser-

vice valve, Operate pump until manometer again indicates 2.5 mm hg. abs.

(11) Close suction service valve and allow unit to stand under vacuum for approximately 12 hours. If no noticeable rise in pressure occurs, the system is ready for charging. Close service valves, remove vacuum pump, manometer and install valve caps.

Note. Rise in pressure will be influenced by ambient temperature. Make sure that vacuum in system is completely relieved before charging.

(12) Inspect service valve area before installing condenser fan (para. 3-21) and fan guard.

e. Charging *the* Unit,

(1) Remove the condenser fan (para 3-21) and the alternate receptacle cover located on the right side immediately beneath the condenser fan.

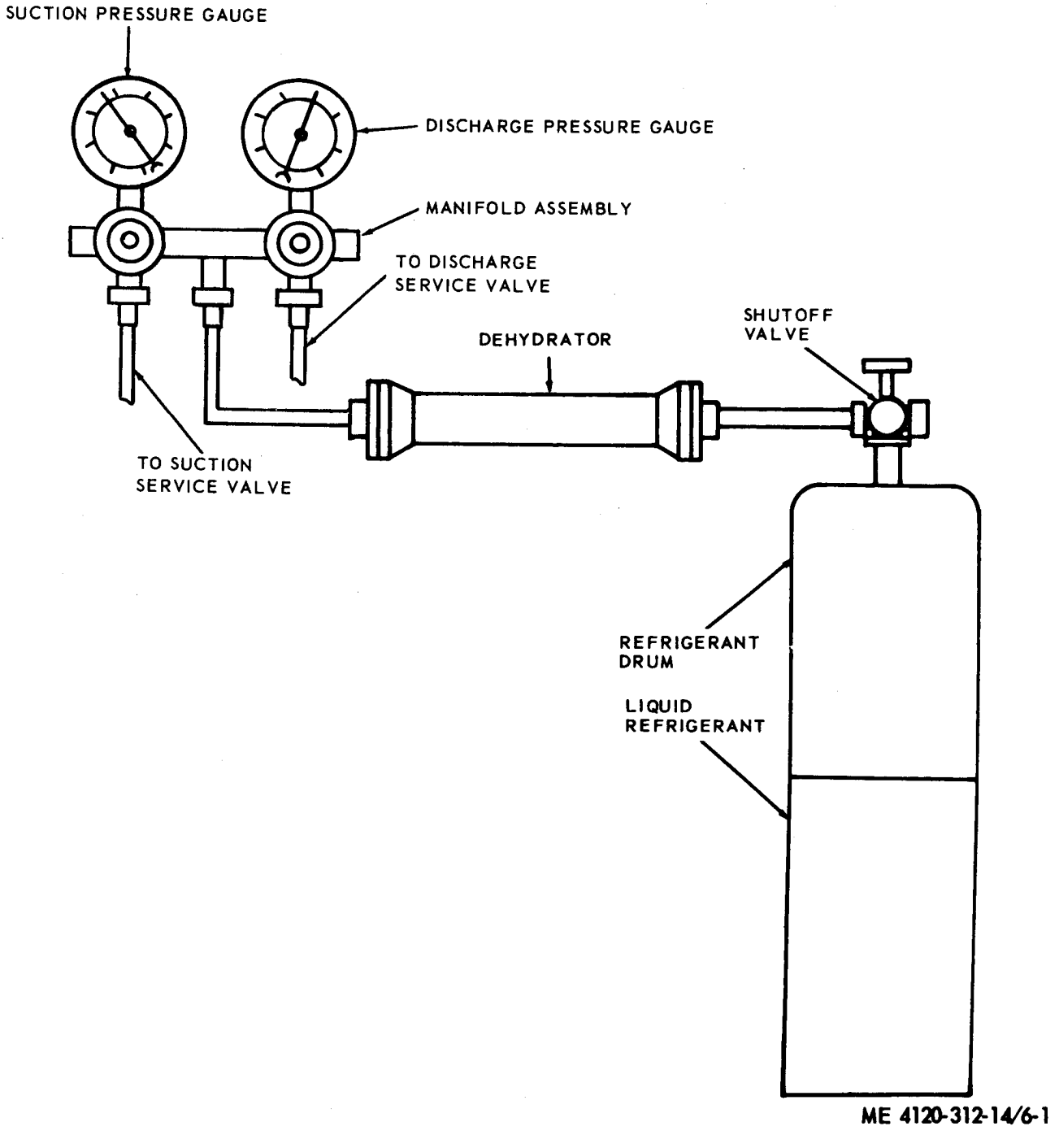

Figure 6-1. Pressure testing (refrigerant R-22).

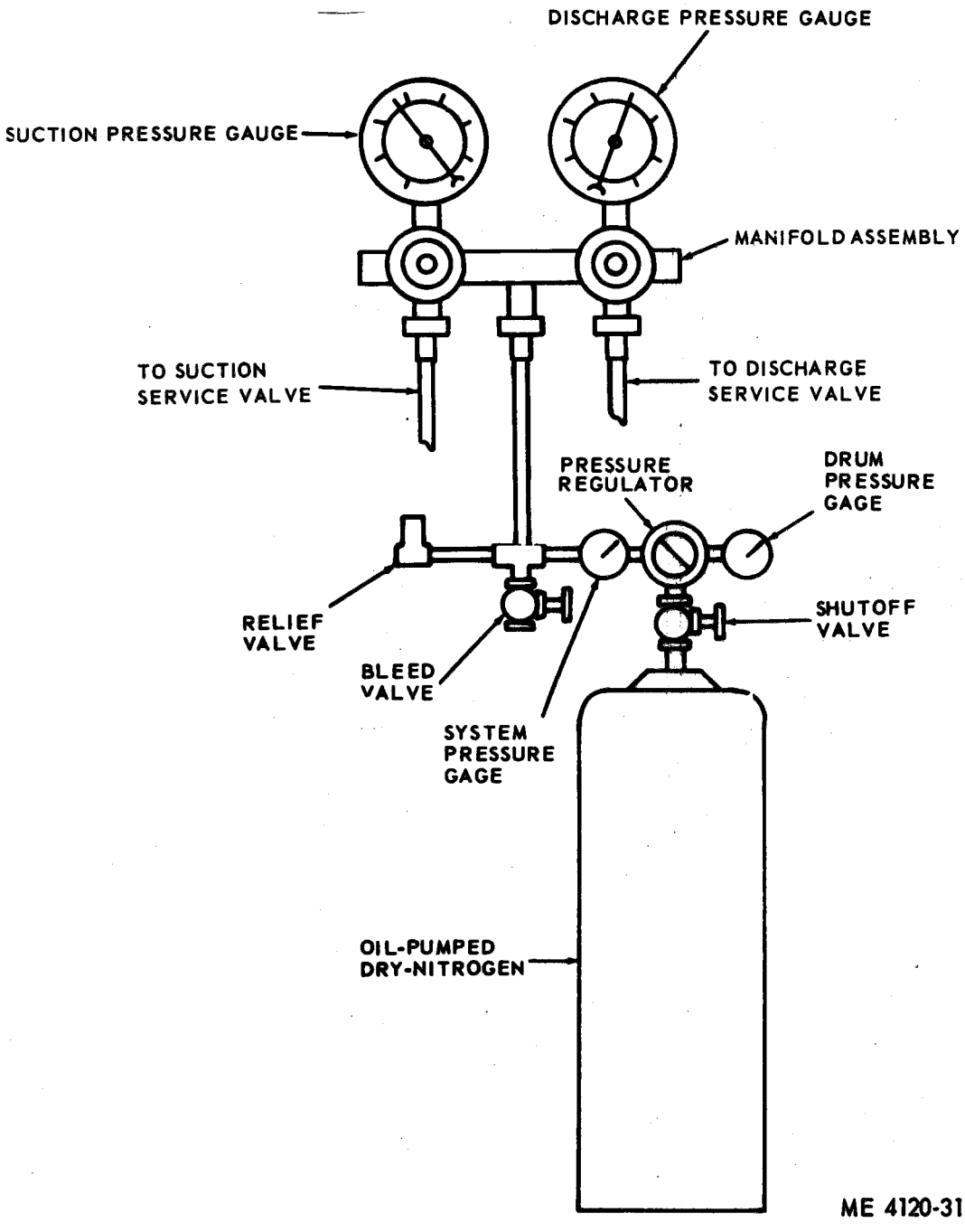

Figure 6-2 Pressure testing (dry nitrogen).

(2) Remove the caps from the service valves.

(3) Insert the discharge service valve and suction service valve lines from a suitable pressure manifold (fig. 6-1) through the receptacle opening and attach loosely to the service valves. Attach center manifold line to a refrigerant drum shutoff valve (fig. 6-1). Open shutoff valve and purge lines.. Tighten connections at both service valves.

Note. **Set refrigerant drum in an upright position so that only gaseous refrigerant will enter system. To facilitate speed of charging, set refrigerant drum in warm water. Never use a heating torch for this purpose.**

(4) Set temperature control above ambient temperature.

(5) Close discharge service valve.

(6) Install the condenser fan and fan guard (para 3-21).

(7) Open refrigerant drum shutoff valve.

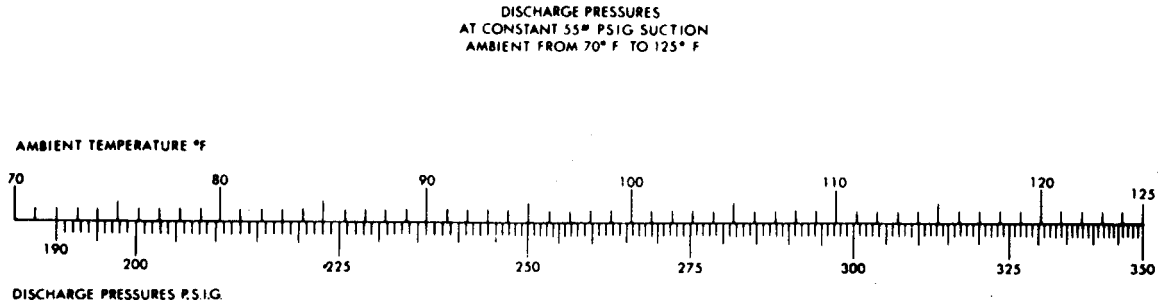

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Figure 6-3. *Pressure-temperture chart.*

Start unit and weigh in 3.5 pounds of refrigerant R–22. Continue adding refrigerant until sight glass indicates full.

Note. Operate unit at COOL position during charging operation. Partially block discharge grill with cardboard baffle. Adjust baffle until suction pressure gage reads 55 psig pressure. Continue adding refrigerant slowly, while maintaining 55 PSIG suction pressure by adjusting the baffle, until the discharge pressure gage reading corresponding to the ambient temperature is obtained. Refer to figure 6-3.

(8) Remove condenser fan and close service valves; close refrigerant drum shutoff valve and stop the unit.

(9) Disconnect the pressure manifold from the service valves. Replace valve caps.

(10) Inspect the compartment thoroughly and install the condenser fan and fan guard (para 3-21).

6-2. Refrigerant Tubing

The refrigerant tubing used in the air conditioner consists of copper tubing and the necessary fittings. The joints of the refrigerant tubes are soldered with silver solder (para 5-11 *f* (3)). Inspect the tubing and fittings for leaks, cracks, breaks, or signs of excessive wear. Replace any defective tubing or fittings with material of the same size, type, and shape. When applying heat to the tubing close to a solenoid valve, direct the heat away from the valve body. Keep flame away from distributor of expansion valves. Test all tubing repair for leaks.

Note. If the refrigerant system has been exposed to the atmosphere by the removal of any tubing or a fitting, replace the dehydrator and pressure test and evacuate the system before recharging. When removing or replacing tubing, pass dry nitrogen through the lines to prevent copper oxides.

Section II. BLOWER MOTOR ASSEMBLY AND SOLENOID VALVES

6-3. Blower Motor Assembly

a. On-Equipment Testing. Prior to removing the blower motor assembly, test for open windings or shorts as follows:

(1) Disconnect the receptacle connector from the control box. Test for continuity across each combination of two motor terminals. Lack of continuity indicates an open winding.

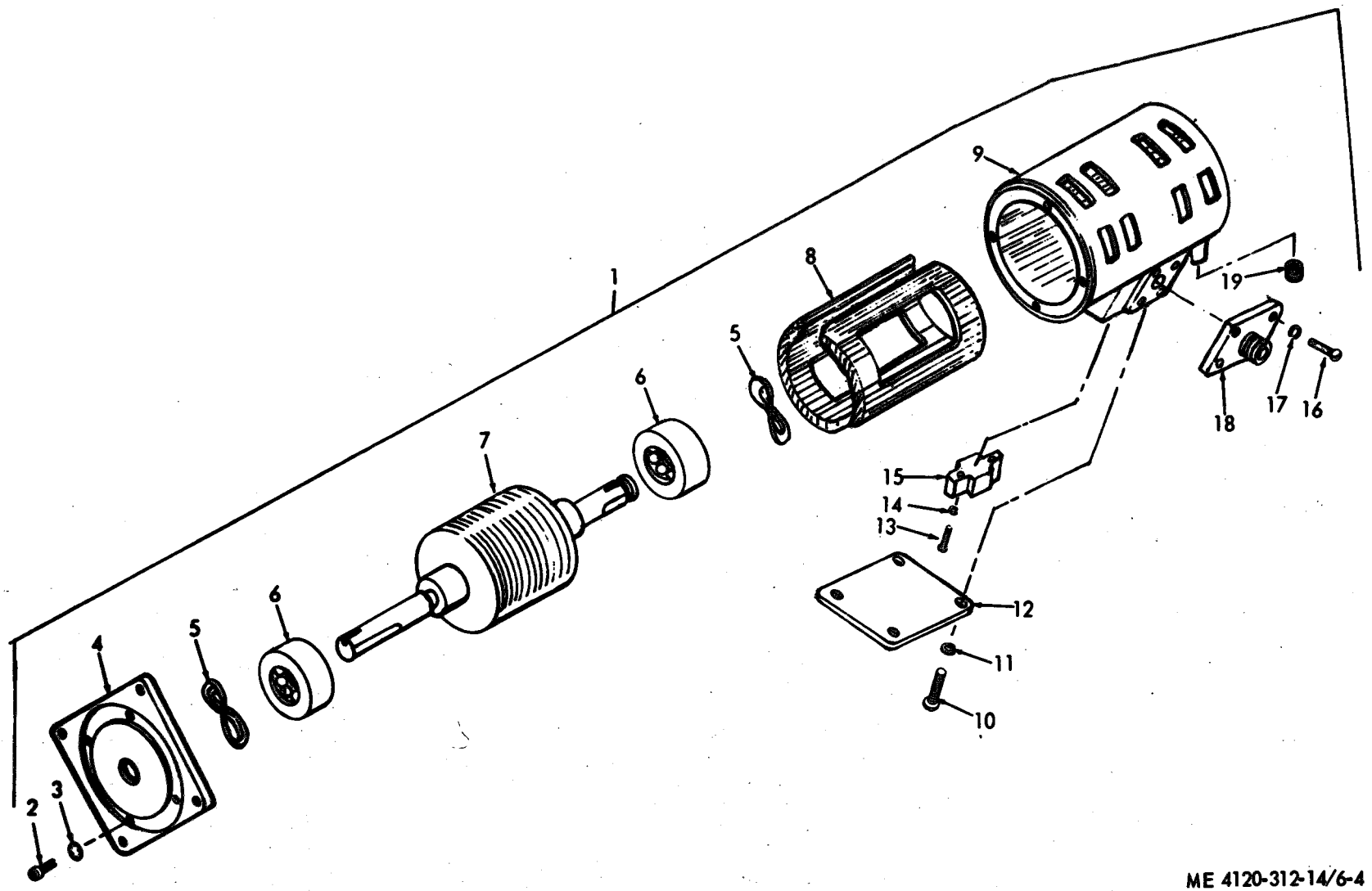
(2) Place one contact of tester against motor housing and the other on one of the terminals, continuity will indicate a grounded motor.

(3) Test the motor stator for insulation resistance as instructed in TM 5-764. The insulation resistance should measure not less than 0.5 megohms.

Note. The resistance measurement should be used only as a guide, taking into consideration the accuracy of the instrument used, test lead resistance, and ambient temperature at time of test. If more precise measurement is required, an instrument such as a Kevin or Wheatstone bridge should be used, or comparative measurements between the suspected component and a like item known to be in good condition.

In all cases where a megometer is used for testing, make certain that the unit is thoroughly dry. Wet condemnation tolerances should be considered.

(4) Connect the motor leads to a proper source of power. Use a hook type ammeter and read the amperage flowing in each of the motor leads. On model CH-420-1 the ammeter should



1	Motor assembly	4	Flange	7	Rotor	10	Screw	13	Screw	16	Screw
2	Capscrew	5	Boad spring	8	Stator	11	Lockwasher	14	Lockwasher	17	Lockwasher
3	Lockwasher	6	Ball bearing	9	Shell	12	Cover terminal box	15	Motor protector	18	Connector
										19	Helicoil

Figure 6–4. Blower motor assembly, disassembly and reassembly.

read between 1.45 and 2.2 amperes at no load. On model CH-620-1 the ammeter should read between 1.75 and 2.5 amperes at no load. Start the unit and check the ammeter reading. If the readings are not equal, the motor bearings are worn or the stator winding is defective. Follow the instructions in c following and disassemble the motor for further testing.

b. Removal. Refer to paragraph 3-24 and remove the blower motor assembly.

c. Disassembly. Refer to figure 6-4 and disassemble the blower motor assembly as required.

d. Testing Procedure.

(1) *Overload Protector. Disconnect the* electrical leads from the overload protector. Test the protector with a multimeter set on the ohm scale. If continuity does not exist, replace the overload protector.

(2) *Motor Bench Test.* Perform the growler tests on the stator as instructed in TM 5-764. Replace defective stator.

e. Cleaning, Inspection and Repair.

(1) Clean all parts with a damp cloth and dry thoroughly.

(2) Inspect the stator housing for cracks, breaks, or defects.

(3) Inspect bearings for pits, scoring, wear, or out-of-round condition.

(4) Inspect the rotor shaft for cracks, wear, misalignment, gouges, pits, or other damage.

(5) Inspect the rotor for cracks, breaks, and damaged laminations.

(6) Inspect all threaded parts for damage,

(7) Replace unserviceable parts with serviceable like parts.

f. Reassembly. Reassemble the motor assembly by reversing the order of disassembly,

g. Installation, Refer to paragraph 3-24 and install the motor assembly.

6-4. Hot Gas Bypass Solenoid Valve

a. On-Equipment Testing.

(1) Remove the top cover (para 3-6).

(2) Start the air conditioner. In the bypass mode of operation the tubing from the discharge side of the valve should become warm immediately, If not, stop the unit and check the electrical connection (para 5-12) and the solenoid coil. If the valve fails to click upon the start of the bypass cycle, stop the unit and check the electrical connection and coil. Refer to figure 5-4 and remove the electrical leads, Test the coil terminals for continuity with a multimeter set on the ohm scale, Continuity should exist between coil leads.

b. Removal. Remove the hot gas bypass solenoid valve (para 5-15).

c. Disassembly.

(1) Refer to figure 6-5 and disassemble the hot gas bypass solenoid valve.

(2) Remove the tubing from the valve body.

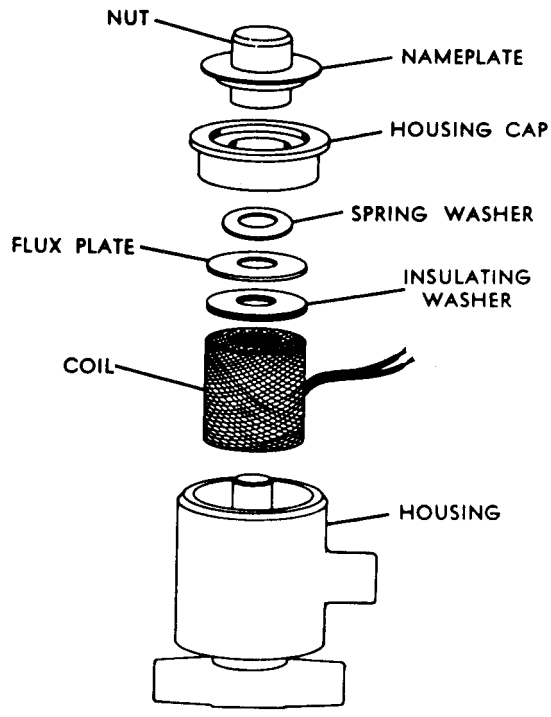


Figure 6-5. Hot gas bypass solenoid valve, disassembly and reassembly.

d. Repair. Replace unserviceable parts with serviceable like parts.

e. Reassemble.

Caution: **Heat must not be applied to assembled valve.**

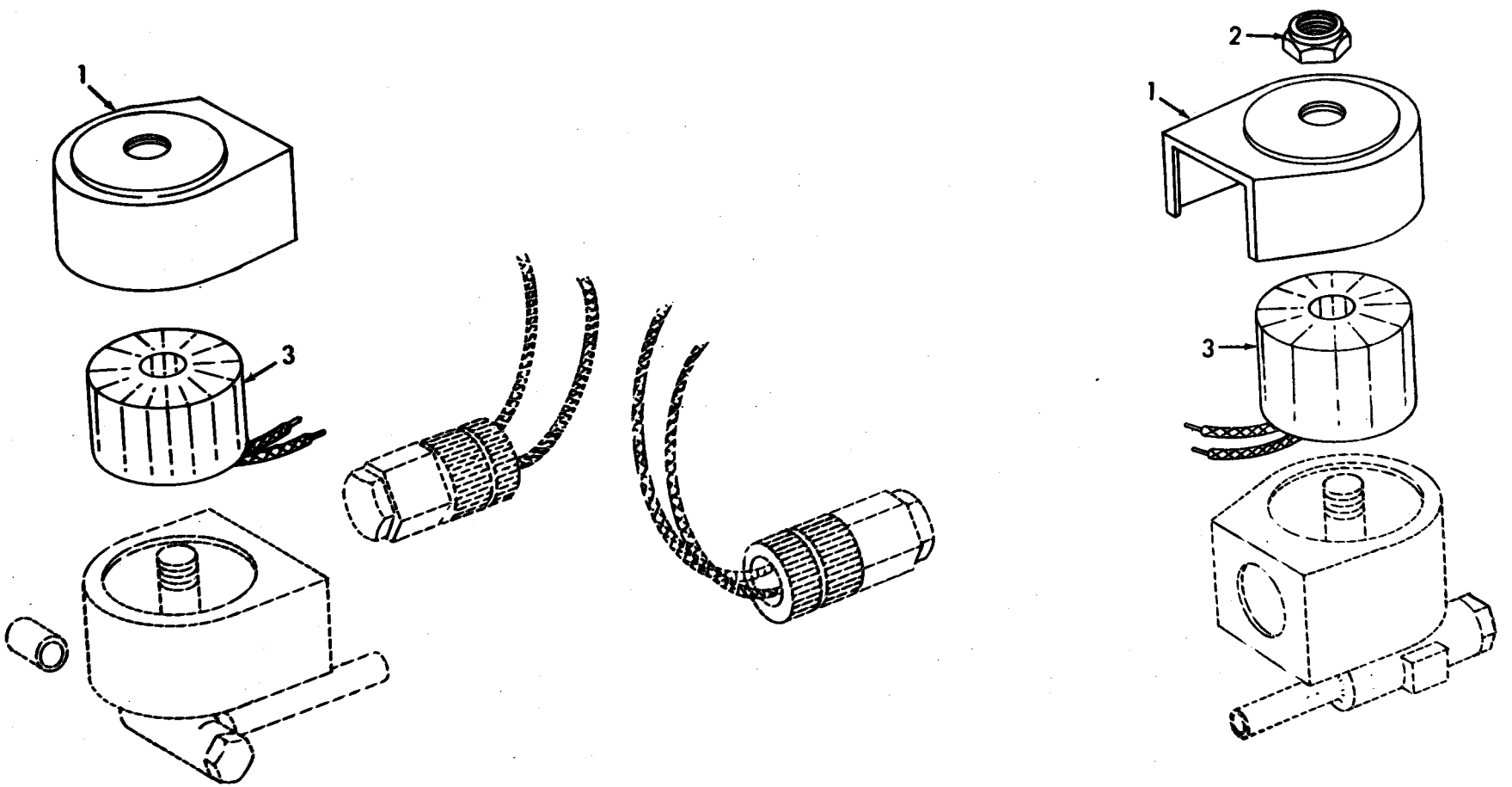
(1) Solder the tubing to the valve body,

(2) Reassemble the hot gas bypass valve by reversing the order of disassembly,

f. Installation. Install the hot gas bypass valve (para 5-15).

6-5. Liquid line Bypass and Liquid Line Solenoid Valves

a. On-Equipment Testing. Start the unit, If the solenoid valve fails to click upon start of operation, stop the unit and check the valve coil and connections in the same manner as used for the hot gas bypass solenoid valve (para 6-4). The liquid line solenoid valve is closed during the bypass cycle of operation, and is open during the cooling cycle of operation. The liquid line bypass



1 Coil cover 2 Cover retaining nut 2 Solenoid valve coil

Figure 6–6. Liquid line solenoid valve and liquid line bypass solenoid valve, disassembly and reassembly.

solenoid valve is open during the bypass cycle of operation and closed during the cooling cycle of operation. When testing these valves for proper operation, determine which cycle of operation (bypass or cooling) the unit is in, and test operation of valves accordingly.

b. Removal. Remove the valves (para 5-16).

c. Disassembly.

(1) Refer to figure *6-6* and disassemble the valves.

(2) Disconnect tubing from body.

d. Repair. Replace unserviceable parts with serviceable like parts.

e. Reassembly.

(1) Solder tubing to body.

(2) Reassemble the valves by reversing the order of disassembly.

f. Installation. Install the valves (para 5-16).

Section III. EVAPORATOR AND CONDENSER COILS

6-6. Evaporator Coil

a. Removal. Remove the evaporator coil (para 5-20) .

b. Cleaning, Inspection, and Repair,

(1) Clean the coil area with a wire brush. Avoid damage to the fins during brushing. Blow coil with compressed air.

(2) Inspect the coil for bent fins, damaged coil runs, and internal leaks.

(3) Straighten the fins with needle nosed pliers. Replace a coil with damaged coil runs or internal leaks.

c. Installation. Install the evaporator coil (para 5-20).

6-7. Condenser Coil

a. Removal. Remove the condenser coil (para 5-21).

b. Cleaning, Inspection, and Repair. Clean, inspect, and repair the condenser coil in the same manner as outlined in paragraph 6-6.

c. *Installation.* Install the condenser coil (para 5-21).

Section IV. COMPRESSOR/MOTOR ASSEMBLY AND BURNOUT CLEANUP PROCEDURES

6–8. Compressor/Motor

a. General. The compressor motor is hermetically sealed and not repairable. An inoperative compressor is usually due to a mechanical failure causing the compressor to freeze, a control failure, or a motor burnout. If the compressor has been mechanically frozen there may be a burnout. If so, the compressor unit must be replaced. When the motor of a hermetically sealed unit fails, high temperatures may develop within the compressor causing a breakdown of the oil or refrigerant, resulting in formation of moisture, acid, and sludge, all extremely harmful to the air conditioner. Repeated burnouts may occur if contaminants are not completely removed. Refer to paragraph 6-9 for burnout cleanup procedures. The compressor has a suction line filter strainer to prevent damage to the compressor from contamination. If 'a compressor/motor unit fails to operate check the compressor motor for resistance as outlined in *b.* below.

b. Resistance Measurements.

(1) *Model CH-620-1.*

(a) Remove the front access panel (para 3-6)

(b) Check the terminal' to terminal resistance (A to B, B to C, and C to A) with a multimeter set on the ohm scale. Proper resistance is 1.37 ohms at 25° C. Tolerance is ± 7 percent.

(c) Replace the front access panel (para 3-6).

(2) *Model CH-420-1.*

(a) Remove the front access panel (para 3-6).

(b) Check the terminal to terminal resistance as indicated in (1) *(b)* above. Reading should be 0.387 ohms at 250 C. with a tolerance of ± 7 percent.

(c) Replace the front access panel (para 3-6) .

6-9. Compressor/Motor Burnout Cleanup Procedure

a. General.

(1) The scope of this procedure pertains to hermetic compressors.

(2) Experience has demonstrated that after a hermetic motor burnout the system must be cleaned thoroughly to remove all contaminants; otherwise a repeat burnout will occur. Failure to follow these instructions as quickly as possible will result in an excessive risk of a repeat burnout, and damage to other system components.

b. Cleanup Procedure, Make certain a burnout

has occured. Failure of a motor to start may result from improper voltage, a malfunction of the motor starter, or a compressor mechanical fault.

(1) Turn off the main disconnect switch so that all power is off.

(2) Remove the front access panel (para 3–6).

(3) Remove the compressor leads at the compressor side of the starter.

(4) Close the disconnect switch to energize the control circuit.

(5) Check for voltage on all lines at both the line and load side of the starter.

Note. Before checking the compressor motor, make sure the compressor is cool to the touch. If the compressor is not cool, a false indication may be obtained as a result of the internal motor protectors being open.

(6) Check the compressor motor to see if it is electrically grounded or open. A 500-volt megger or an ohmmeter can be used for making the test. Typical megger readings are 5 megohms for R22. If no fault is found and if the normal values for winding resistance are known, check and record stator currents for balance by the watt meter or ohmmeter method. Use rated meters.

Note. A slight unbalance in stator currents may occur. An appreciable unbalanced phase indicates a shorted winding. Resistance should be checked with a precision ohmmeter to determine if turn-to-turn shorts exist.

(7) Purge a small quantity of refrigerant gas from the compressor and smell it cautiously. A motor burnout is usually indicated by the customary burned odor.

c. Safety Measures. In addition to the electrical hazards, the serviceman should be aware of acid burns.

(1) When testing for odor, release a small amount of gas and smell it cautiously to avoid inhalation of toxic decomposition products.

(2) When discharging gas or liquid refrigerant from a burnout, avoid eye or skin contact with the product. If the entire charge is to be removed, it should be discharged outside any enclosure. Do not discharge in the vicinity of open flame.

(3) When coming in contact with oil or sludge from a burned out compressor, personnel should wear approved rubber gloves to avoid acid burns.

d. Determine Severity of Burnout. It is helpful to classify burnouts as "mild" or "severe" and to use the severity as a guide for the clean-up procedure to be followed. The severity can be determined by the following means:

(1) If possible, obtain a small sample of oil from the burned out compressor and analyze it, using an acid test kit. Excessive acidity (over .05 acid number) in the oil indicates a severe burnout. This is the best method of determining the severity of burnout. Discoloration of the oil may also indicate a severe burnout.

(2) Discharge a small amount of refrigerant and smell it. A characteristic burned odor indicates a severe burnout.

(3) Inspect the suction line at the compressor and the liquid line dryer. Any carbon deposits indicate a severe burnout.

(4) If none of the above indications of severe contamination are found, the burnout can be classified as mild.

e. Cleanup After a Mild Burnout. When the burnout is mild, the contaminants can be removed by changing the liquid line filter-dryer. The procedure to follow is:

(1) Discharge the refrigerant.

(2) Remove the burned out compressor and install the replacement.

(3) Remove the dryer and install an over. size replacement dryer.

(4) Evacuate the system.

(5) Recharge the system and put in operation.

f. (Clean-up After a Severe Burnout. Complete cleaning of the system is required.

(1) Dicharge the refrigerant.

(2) Install a filter-dryed in the suction line, change strainer, as well as changing or installing an oversize liquid line filter-dryer. In this way the suction filter-dryer protects the new compressor from any contaminants that may remain in the system. Leaving a permanent type filter-dryer in the suction line allows the serviceman to complete the cleanup at one time. A pressure tap should be installed upstream of the suction filter-dryer so that the pressure drop from the tap to the service valve can be checked after several hours of operation. A pressure drop in excess of 3 psi is generally considered excessive.

(3) Check the expansion device and clean or replace it. Replace sight glass.

(4) Remove the burned out compressor and install the replacement.

(5) Evacuate the system.

(6) Recharge the system and put in operation.

(7) Check pressure drop across suction filter-dryer after one hour operation. Change if necessary and evacuate system.

(8) After 8-24 hours operation, change suction filter-dryer, check odor and color of oil or test with test kit. Evacuate system.

(9) After 14 days of operation, check color and acidity of oil. If required, change filter-

dryers. Before clean-up is complete, it is essential that oil is clean and no acid is present.

Note. The new compressor should not be used for pulling a vacuum. Pull a high vacuum (less than 500 microns) for several hours. Allow the system to stand several hours to be sure the vacuum is maintained.

APPENDIX A

REFERENCES

A-1. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers For Army Users

A-2. Painting

TM 9-213	Painting Instructions for Field Use

A-3. Maintenance

TM 5-4120-312-24P (when published)	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List
TM 5-764	Electric Motor and Generator Repair
TM 38-750	Army Equipment Record Procedures

A-4. Shipment and Storage

TB 740-93-2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage
TM 740-90-1	Administrative Storage of Equipment

APPENDIX B

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B-1. Scope

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

B-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 rquired by the operator/crew for installation, operation, or maintenance.

B. Maintenance and Operating Supplies-Section III.

B-3. Explanation of Columns

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

a. Source, Maintenance, And Recoverability Codes (SMR) Column (1).

(1) Source code indicates the selection status and source for the listed item. Source codes are:

Code	Explanation
P	Applies to repair parts which are stocked in or supplied from GSA/DSA or **Army** supply system, and authorized for use at indicated maintenance categories.
P2	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	Applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance levels.
A	Applied **to** assemblies which are not procured or stocked as such, but are made up of two or more units, each of which carry individual stock numbers and description and are procured and stocked separately and can be assembled by units at indicated maintenance categories.
X	Applied to parts and assemblies which are not procured or stocked, the mortality of which is normally below that of the applicable end item or component, and the failure of which should result in retirement of the end item from the supply system.
X1	Applied to repair parts which are not procured or stocked the, requirement for which will be filled by use of the next higher assembly or component,
X2	Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.
G	Applied to major assemblies that are procured with PEMA (Procurement Equipment Missiles Army) funds for initial issue only to be used as exchange assemblies at DSU and GSU level, These assemblies will not be stocked above DS or 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	---------- Operator/crew

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

Code	Explanation
R	Applied to repair parts (assemblies and components) which are considered economically repairable 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. When 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 710-60. When so listed, they will be replaced by supply on an exchange basis.
S	Applied to repair parts and assemblies which are economically repairable 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 repairable, they will be evacuated to a depot for evaluation and analysis before final disposition.
T	Applied to high dollar value recoverable repair

Code	Explanation
	parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Applied to 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, Column (2). This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description, Column (9). 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 preceded 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), Column (4). 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, Column* (5). This column indicates the quantity of the item used in the functional group or 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, Column (6). This column indicates the quantity of an item furnished with the equipment.

g. *Illustration, Column (7).* This column is divided as follows:

(1) *Figure Number, Column* (7) *(a),* Indicates the figure number of the illustration in which the item is shown.

the callout number used to reference the item in the illustration.

B-4. Abbreviations

ea	each

B-5. Federal Supply Code for Manufacturers

Code	Manufacturer
97403	Engineering Research and Development Laboratories, Fort Belvoir, Va.

Section II. BASIC ISSUE ITEMS

(1) SMR Code	(2) Federal stock number	(3) Description Ref No. & mfr code / usable on code	(4) Unit of meas	(5) Qty Inc in unit	(6) Qty furn with equip	(7) Illustration (A) Fig No.	(7) Illustration (B) Item No.
		BASIC ISSUE ITEMS, MANUFACTURER OR DEPOT INSTALLED					
PC	7520-559-9618	CASE: operation and Maintenance publications, cotton, duck, water repellent, mildew resistant, MIL-B-11743B	ea	1	1		
		OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL TM 5-4120-312-14	ea		1		
PC		PANEL, BLOCK OFF: electrical receptacle (97403) 13211E83 92					
PC		RECEPTACLE ELECTRICAL: (97403) MS3106R22-22-S	ea	1	1		
PC		ATTENUATOR: sound (97403) 13211	ea	1	1		

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section II. INTRODUCTION

C-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.

C-2. Explanation of Columns in Section II

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 dissassembly sequence beginning with the first assembly removal in a top down disassembly sequence.

b. Functional 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) and indicates the lowest maintenance category authorized to perform these functions. The symbol designation 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 determine 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, to paint, and to add fuel, lubricants, cooling agents, and air.

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

E—Aline: 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 teat equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

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

H—Replace: To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I—Repair: To *restore* an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

J—Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K—Rebuild: To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete diassembly of the item, inspection of all parts or components, repair or replacement of worn *or* unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

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. *Remark, Column (6).* This column is provided for referencing by code the remarks (See IV) pertinent to the maintenance functions.

C-3. Explanation of Columns in Section IV

a. Reference Code. This column consists of two

letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(2) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
01	AIR CONDITIONING HOUSING AND PANELS													
	Air Filters													
	Eliminator, mist	C	--	C	--	--	--	--	C					
	Fresh air inlet screen	O	--	O	--	--	--	--	O					
	Frame Assembly													
	Base Assembly	O	--	--	--	--	--	--	H					
	Casing Assembly	O	--	--	--	--	--	--	H					
	Guard, condenser fan	O	--	--	--	--	--	--	O					
	Panels													
	Chain and damper control	O	--	--	--	--	--	--	O					
	Cover assemblies	C	--	--	--	--	--	--	C					
	Damper assembly	O	--	--	--	--	--	--	H					
	Grilles	C	--	--	--	--	--	--	C					
	Panel assembly front lower	C	--	--	--	--	--	--	C					
	Panels, back and top	O	--	--	--	--	--	--	H					
	Retainer assembly, filter	O	--	--	--	--	--	--	O					
02	BLOWER MOTOR AND BLOWER FANS													
	Blower Assembly													
	Fan, blower	O	--	--	--	--	--	--	O					
	Frame, Support, and Housing													
	Cover, stator housing	F	--	--	--	--	--	--	F					
	Endbell, housing	F	--	--	--	--	--	--	F					
	Housing, stator	F	F	--	--	--	--	--	F					
	Motor Assembly													
	Bearing	F	--	--	--	--	--	--	F					
	Motor assembly, blower	O	O	--	--	--	--	--	O	F				
	Rotor Assemblies													
	Rotor, blower motor	F	--	--	--	--	--	--	F					
	Starting and Protective Devices													
	Protector overload	--	F	--	--	--	--	--	F					
	Stator Assemblies													
	Stator, blower motor	F	F	--	--	--	--	--	F					
03	CONTROL VALVE													
	Control Panels, Housing, Cubicles													
	Box, control	--	O	--	--	--	--	--	O					
	Connector, receptacle	--	O	--	--	--	--	--	O					
	Control panel assembly	--	O	--	--	--	--	--	O					
	Leads, electrical	--	O	--	--	--	--	--	O					
	Receptacle	--	O	--	--	--	--	--	O					

(1) Group No.	(2) Functional group	(2) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
	Master or Auxiliary Control Assembly													
	Contactor, electrical	--	O	--	--	--	--	--	O					
	Switches													
	Switch, rotary	--	O	--	--	--	--	--	O					
	Switch, thermostatic	--	O	--	--	--	--	--	O					
04	**JUNCTION BOX**													
	Circuit Breakers													
	Circuit breakers, compressor	--	O	--	--	--	--	--	O					
	Fuse	--	O	--	--	--	--	--	O					
	Starting and Protective Devices													
	Relay, phase	--	O	--	--	--	--	--	O					
	Terminal Blocks													
	Connector, receptacle	--	O	--	--	--	--	--	O					
	Terminal blocks	O	--	--	--	--	--	--	O					
	Thermostatic Controls													
	Switch, thermostat	--	O	--	--	--	--	--	O					
	Transformer: Rectifier													
	Rectifier	--	O	--	--	--	--	--	O					
05	**COMPRESSOR ASSEMBLY**													
	Gas Compressor Assembly													
	Compressor Assembly	F	F	F	--	--	--	--	H	--	--	--	-------	A
	Mount, resilient	O	--	--	--	--	--	--	H					
06	**EVAPORATOR, HEATING INDICATORS, AND PIPING**													
	Air Filters													
	Filters	C	--	C	--	--	--	--	C	--	--	--	-------	B
	Evaporator													
	Evaporator assembly	O	F	O	--	--	--	--	F	--	--	--	-------	C
	Tube, drain	--	O	--	--	--	--	--	F					
	Valve, expansion	--	F	--	F	--	--	--	F					
	Gages													
	Sight glass	C	--	--	--	--	--	--	F					
	Heating Units													
	Heater, electrical	--	O	--	--	--	--	--	O					
	Refrigerant Piping													
	Tubing, copper	--	F	--	--	--	--	--	F					
	Valve, pressure relief	--	F	--	--	--	--	--	F					
	Valve, regulating	--	F	F	--	--	--	--	F					
	Valve, service	--	--	--	--	--	--	--	F					
	Switch													
	Switch, pressure	--	O	--	--	--	--	--	F					

07	CONDENSER, DEHYDRATOR, AND VALVES														
	Condenser														
	Condenser screen	O	--	O	--	--	--	--	O	--	--	--	-------	D	
	Condenser assembly	--	F	O	--	--	--	--	H						
	Hydrating Equipment														
	Dehydrator	--	--	--	--	--	--	--	F						
	Refrigerant Piping														
	Valve, pressure relief	--	F	--	--	--	--	--	F						
	Valve, solenoid	--	F	--	--	--	--	--	F	F					
08	ACCESSORY ITEMS														
	Panels														
	Blockoff panel	--	--	--	--	--	--	O	O						
	Sound attenuator and paulin	O	--	--	--	--	--	--	O						

Section IV. REMARKS

Reference Code	Remarks
A–C	Service includes check of oil level and add oil using clean, fresh and dry oil of specification and adding refrigerant.
A–B	Testing includes the use of the Halide Torch Leak Detector, or a soap solution to detect leaks and proper operating pressure tests.
B–C	Clean and dry thoroughly, apply filter.
C–C	Clean and dry thoroughly.
D–C	Clean and dry thoroughly.

By Order of the Secretary of the Army:

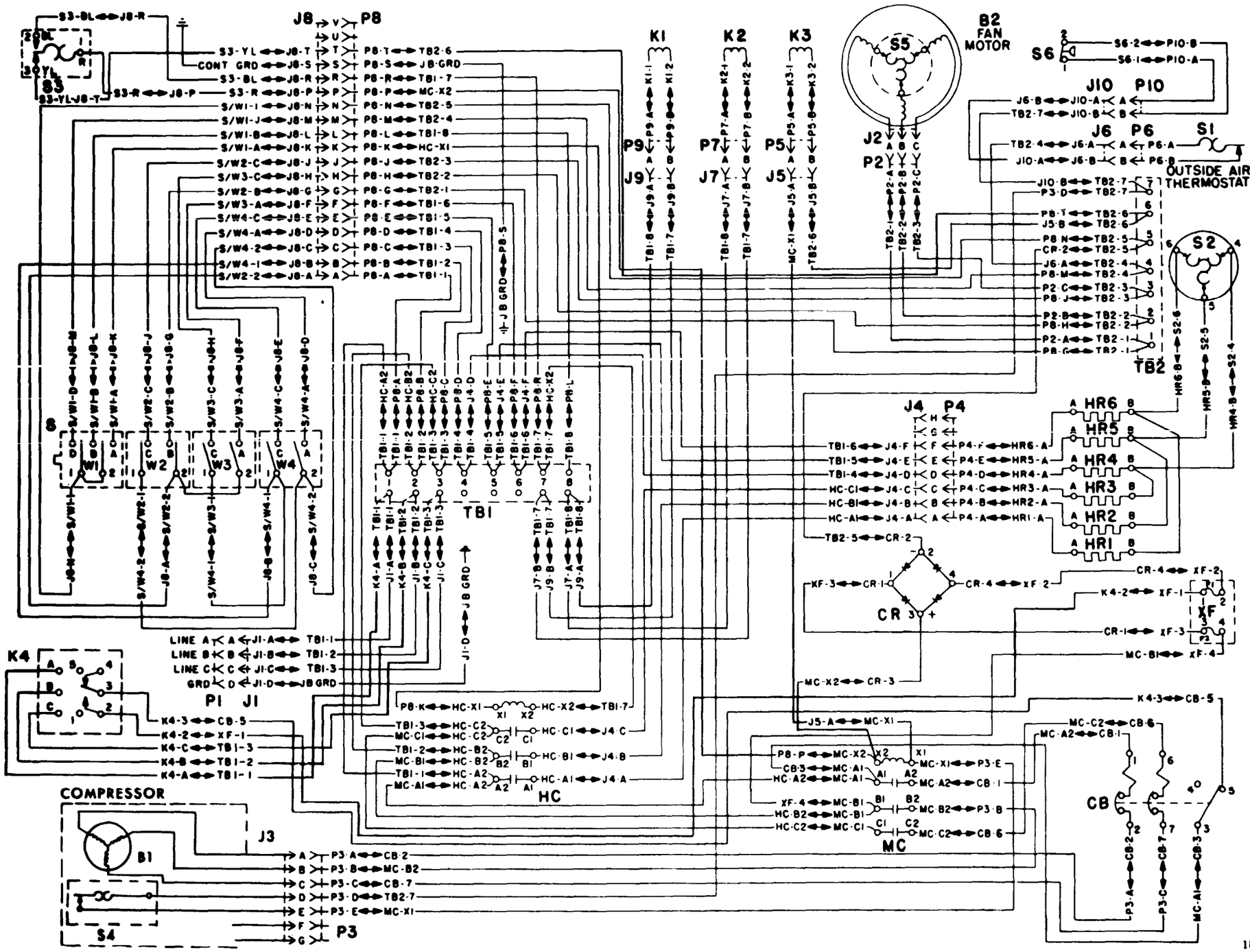
W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official :

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution :

To be distributed in accordance with DA Form 12-26, Sec III (qty rqr Block #542), Organizational maintenance requirement for Air Conditioners, 18,000 BTU, Compact.



SWITCH POSITION

WAFER NO.	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & C					
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
2	2 & A					
	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
	1 & C	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
	1 & D					
3	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	2 & B					
	1 & C	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
	1 & D					
4	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	2 & B					
	1 & C	CLOSED	OPEN	OPEN	OPEN	OPEN
	1 & D					

LEGEND

SYMBOL	PART NO.	DESCRIPTION
J1	MS3100R-22-22P	CONNECTOR-RECEPTACLE
J2	MS3102R-14S-7P	CONNECTOR-RECEPTACLE
P2	MS3106R-14S-7S	CONNECTOR-PLUG
J3	MS3102R-20-15P	CONNECTOR-RECEPTACLE
P3	MS3106R-20-15S	CONNECTOR-PLUG
P4	MS3106R-22-23P	CONNECTOR-RECEPTACLE
J4	MS3102R-22-23S	CONNECTOR-PLUG
P5	MS3106R-16S-4P	CONNECTOR-RECEPTACLE
J5	MS3102R-16S-4S	CONNECTOR-PLUG
P6	MS3102R-16S-4P	CONNECTOR-RECEPTACLE
J6	MS3102R-16S-4S	CONNECTOR-PLUG
P7	MS3106R-16S-4P	CONNECTOR-RECEPTACLE
J7	MS3102R-16S-4S	CONNECTOR-PLUG
J8	C13211E8399	CONNECTOR-RECEPTACLE
P8	MS3100R-22-14S	CONNECTOR-PLUG
P9	MS3106R-16S-4P	CONNECTOR-RECEPTACLE
J9	MS3102R-16S-4S	CONNECTOR PLUG
CB	C13211E8330	CIRCUIT-BREAKER-COMPRESSOR
HC	D13211E8312	CONTACTOR-ELECTRIC HEATERS
S2	C13211E8307	HIGH TEMPERATURE CUTOUT
S3	C13211E8301	TEMPERATURE CONTROL
TB1	MIL-T-55164/3, TYPE 39T88	TERMINAL BOARD NO. 1
TB2	C13211E8267	TERMINAL BOARD NO.2
B1	D13211E3793	MOTOR-COMPRESSOR
CR	S13211E3791	RECTIFIER
S	C13211E8293	SELECTOR SWITCH, ROTARY
K1	C13211E8219	SOLENOID VALVE-NORMALLY CLOSED
K2	C13211E8311	SOLENOID VALVE-NORMALLY OPEN
K3	C13211E8220	SOLENOID VALVE-GAS BYPASS-NO
S1	C13211E8180	THERMOSTAT OUTSIDE-AIR
B2	D13211E8275	FAN-MOTOR
MC	D13211E8312	CONTACTOR-COMPRESSOR MOTOR
HR	C13211E8353	120 V HEATER ELEMENT 600 WATT
S4	FURNISHED WITH COMPRESSOR	THERMAL CUTOUT
F1 & F2	B13211E3785	FUSE
S5	FURNISHED WITH FAN MOTOR	THERMAL CUTOUT
S6	C13211E8404	HIGH PRESSURE CUTOUT
J10	MS3102R-16S-4S	CONNECTOR-PLUG
P10	MS3106R-16S-4P	CONNECTOR-RECEPTACLE
P1	MS3106R-22-22S	CONNECTOR-RECEPTACLE
K4	C13211E3792	RELAY, PHASE SEQUENCE
XF	B13211E3784	FUSEHOLDER

18,000 BTU AIR CONDITIONER 208 V, 60 OR 400 CPS 3 PHASE

ME 4120-312-14/1-3

Figure 1-8. Detailed wiring diagram.

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