TM 5-4120-285-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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

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

(TRANE MODEL MAC 4V20-4950-03)

400 CYCLE FSN 4120-926-9567,

(TRANE MODEL MAC 6V20-4950-05)

50/60 CYCLE FSN 4120-926-9568

This copy is a reprint which includes current pages from Changes 1 through 5.

HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 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.

Allow at least 5 minutes before restarting a compressor unit.

CHANGE
NO. 7

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C. 1 JULY 1992

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

AIR CONDITIONER, COMPACT, VERTICAL: 208V, 3 PHASE,
18,000 BTUH COOLING, 12,000 BTUH HEATING
(TRANE MODEL MAC 4V20-4950-03) 400 HERTZ, NSN 4120-00-926-9567,
(TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ, NSN 4120-00-926-9568

Approved for public release; distribution is unlimited

TM 5-4120-285-15, 9 April 1969, is changed as follows:

Page 1-1, paragraph 1-1c, is superseded as follows:

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

Page 6-1 is changed as follows:

- Preceding paragraph 6-1c, step (4) insert the following note and text:

NOTE

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

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

- Paragraph 6-1c, step (4) is superseded as follows:

(4) Connect and operate recover/recycle unit in accordance with manufacturer's instructions.

Page 6-3 is changed as follows:

- Preceding paragraph 6-1e, step (1), insert the following note:

NOTE

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

Page C-3 is changed as follows:

- Section Ill. TOOLS AND TEST EQUIPMENT REQUIREMENTS is superseded as shown:

Section Ill. TOOLS AND TEST EQUIPMENT REQUIREMENTS

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

By Order of the Secretaries of the Army and Air Force:

GORDON R. SULLIVAN
Genera/, United States Army
Chief of Staff

Official:

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Administrative Assistant to the Secretary of the Army
01627

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Commander, Air Force Logistics Command

DISTRIBUTION:
To be distributed in accordance with DA Form 12–25E, qty rqr block no. 0121.

* U.S. GOVERNMENT PRINTING OFFICE:1992 654-122/40028

PIN:026140-007

CHANGE NO. 6

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C., 20 NOVEMBER 1990

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

AIR CONDITIONER, COMPACT, VERTICAL: 208V, 3 PHASE,
18,000 BTUH COOLING, 12,000 BTUH HEATING
TRANE MODEL MAC 4V20-4950-03) 400 HERTZ, NSN 4120-00-926-9567,
(TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ, NSN 4120-00-926-9568

Approved for public release; distribution is unlimited

TM 5-4120-285-15, 9 April 1969 is changed as follows:

The U.S. Air Force Number TO 35E9–240-1 is being added to this manual. All future changes or revisions will include the U.S. Air Force.

Page 2–5, 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 2–5, 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

MERRILL A. McPEAK
General USAF
Chief of Staff

Official:

CHARLES C. MCDONALD
General, USAF
Commander, Air Force Logistics Command

DISTRIBUTION:
To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 0121)

* U.S. GOVERNMENT PRINTING OFFICE: 1991 554-123/20192

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 15 December *1971*

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

AIR CONDITIONER, COMPACT VERTICAL; 208V, 3 PHASE; 18,000 BTUH COOLING, 12,000 BTUH HEATING (TRANE MODEL MAC 4V20-4950-03) 400 HERTZ FSN 4120-926-9567, (TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ FSN 4120-926-9568

TM 5-4120-285-15, 9 April 1969 is changed as follows:

Change cycle to HERTZ in title and wherever it appears throughout manual.

Page 2 of Cover. Safety Precautions, after operation, delete the last sentence.

Page *1-5*, paragraph 1-4b; add item "(U)".
(U) Base plan. Refer to figure 1-6 for base plan.

Page *1-6*, figure 1-4. Make the following pen and ink changes.

(1) Delete S-7 and S-8 description.

(2) Under switch position, change "Cook" to "Cool".

(3) Fill in dotted lines going to and from K4 relay.

(4) Delete "omit when K4 is used" and take out the line, the arrow points to, and the arrow.

Add figure 1-6.

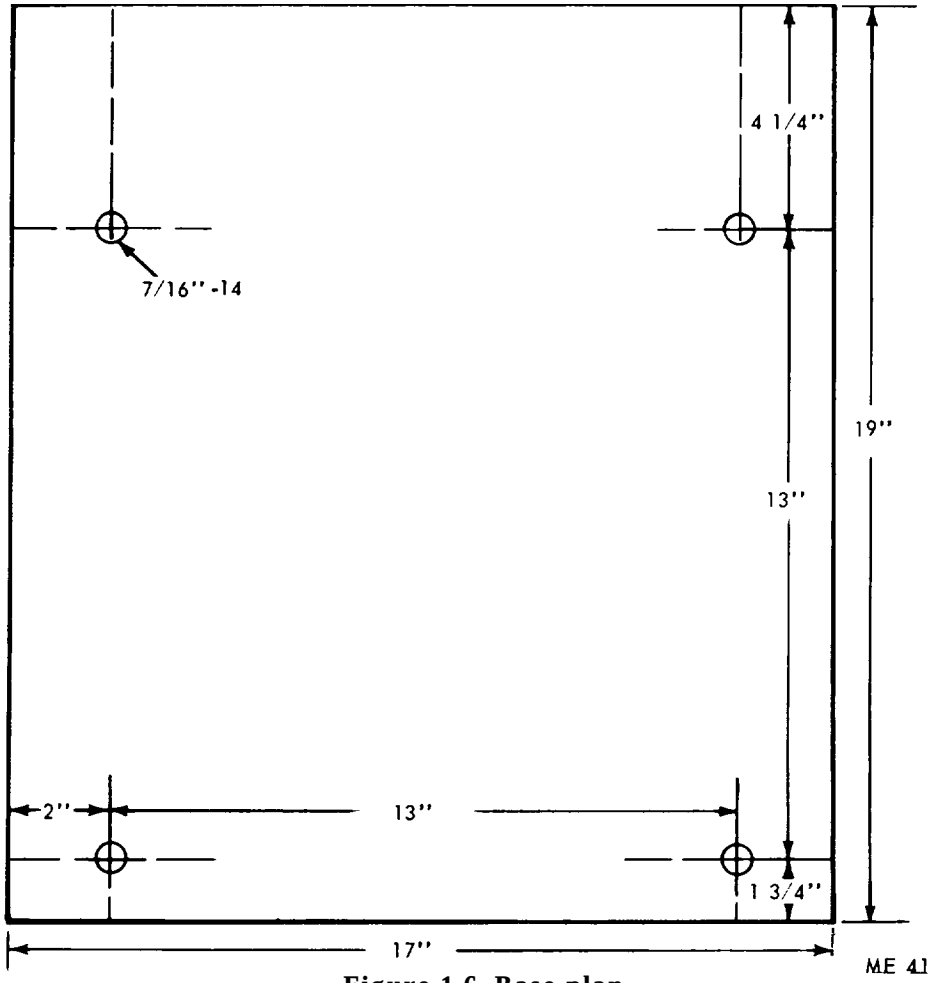

Figure 1-6. Base plan.

Page 1-7, figure 1-5. Make the following pen and ink changes: Move V3 over to a parallel position between the suction and discharge lines from the compressor. Add a sight glass between V2 and W2 on each illustration (A & B).

Page 2-2, paragraph 2-2b; add subparagraph (5).

(5) Power receptacle (fig. 2-2) may also be relocated through blockoff panel.

Page 2-2, paragraph 2-3d, after d add the following note.

NOTE

In mobile applications the unit must be adequately supported at the top. A 5/16 inch-18 thread hole is centered about 2 inches from top rear of unit, and may be utilized if desired.

Page 2-2, paragraph 2-3e, at the end of e add the following: Input phase to unit must be as referenced in figure 1-3 to insure compressor operation.

Page 2-2, paragraph 2-3, add to

CAUTION

Do not change input phase to unit.

Page 2-4. Figure 2-2(2) is superseded as follows:

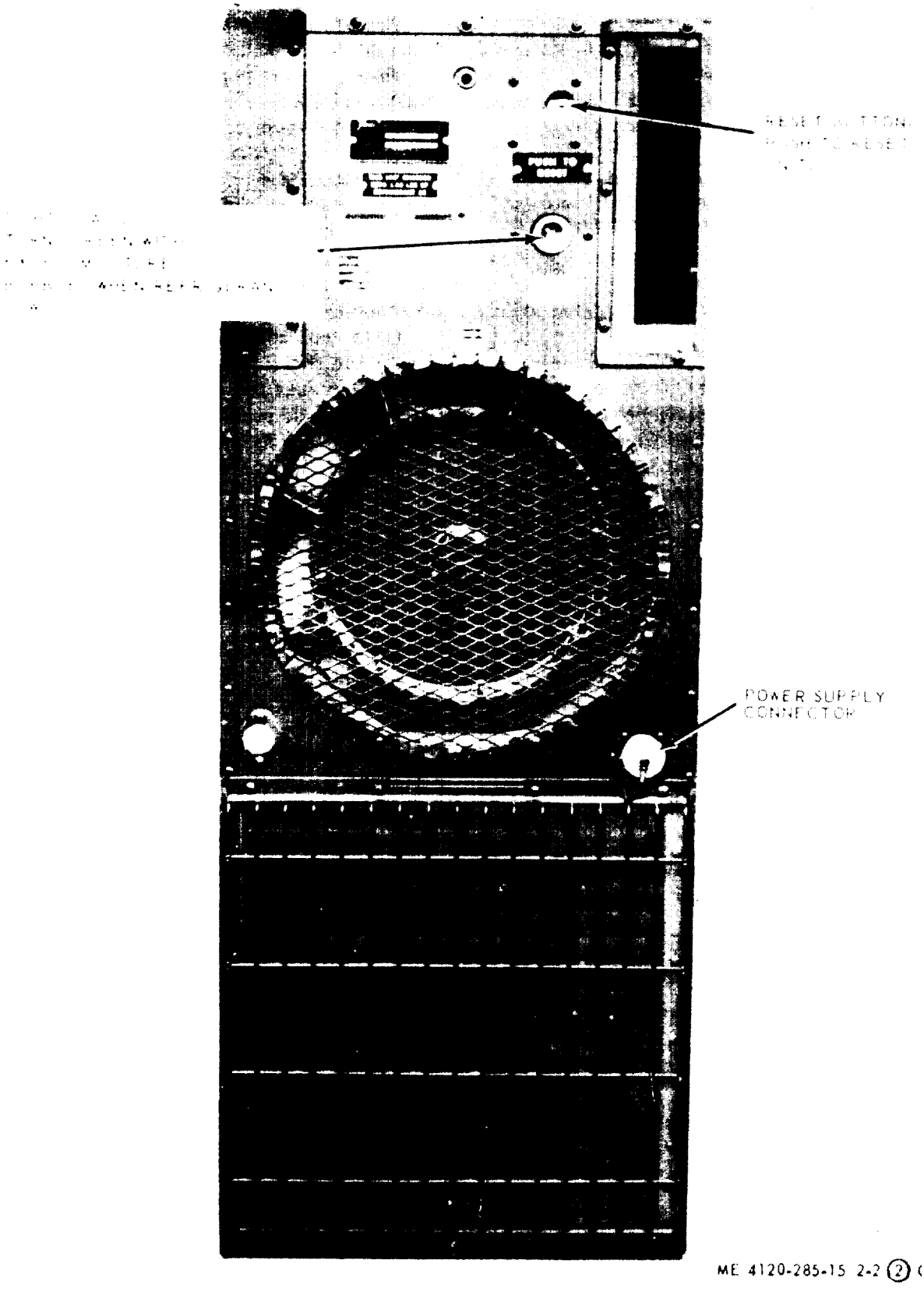

Figure 2-2 Continued ((2) Rear instruments)

Page 2-2, paragraph 2-3e; first sentence delete receptacle and replace with "connector, plug". Second sentence delete plug and replace with connector, receptacle.

Page 3-1, Table 3-1; Add the following to item 3 procedure column: (Cooling Mode only).

Page 3-4, table 3-2; Item h under Probable cause and Corrective Action is superseded as follows:

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

Page 3-13, paragraph 3-23; Change title "Connector Receptacle" to "Power Connection".

Page 3-13, paragraph 3-23 is superseded as follows:

The main power connector is mounted on the case with four screws. When the power 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 power connector be certain that all leads to the connector are handled with care and not pulled loose or damaged. Remove the four mounting screws and case the leads around components in such manner as to assure clearance for future maintenance. Mount the power connector and cover assembly.

Page 3-14, paragraph 3-26a Correct second sentence to read: 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.

Page 3-14, paragraph *3-26b;* add step (4).

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

Page 3-15, paragraph 3-31a Correct second sentence, delete one "and suction" from line 5.

Page 5-1, paragraph 5-6; Correct TM reference, should read: TM 5-4120-285-25P.

Page *5-6,* paragraph 5-13b(2) is superseded as follows:

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

Page 5-7, figure 5-4; Make the following pen and ink changes;

(1) In step 3 add: (Cooling cycle only).

(2) Add 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 bypass cycle (Thermostat turned full increase).

Page 6-1, paragraph 6-1c(3) is superseded as follows:

(3) Discharge refrigerant into a safe area outside.

Page 6-1, paragraph 6-1c; delete paragraphs (4) and (5).

Page B-2, Section H; Delete the following line items:

Binder: Loose leaf
Panel, Block off
Receptacle, Electrical
Attenuator

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States *A rmy.*
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, *Unitcd 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 Equipment: Air Conditioners, 18,000 BTU Compact.

Change No.2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 20 April 1973

Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual AIR CONDITIONER, COMPACT VERTICAL: 208 V, 3 PHASE; 18,000 BTUH COOLING, 12,000 BTUH HEATING (TRANE MODEL MAC 4V20-4950-03) 400 HERTZ, FSN 4120-926-9567, (TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ, FSN 4120-926-9568

TM 5-4120-285-15,9 April 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, Section III.

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

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

c. *Description.* This column indicates the Federal item name and any additional description of the item required.

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

e. *Quantity Authorized (Items Troop Installed or Authorized* Only). This column indicates the quantity of the item authorized to be used with the 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
PC	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) organisational maintenance requirements for Air Conditioners, 18,000 BTU, Compact.

TM 5-4120-285-15
C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 10 March 1975

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

AIR CONDITIONER, COMPACT, VERTICAL: 208 V, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING (TRANE MODEL MAC 4V20-4950-03) 400 HERTZ, NSN 4120-00-926-9567, (TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ, NSN 4120-00-926-9568

TM 5-4120-285-15, 9 April 1969, is changed as follows:

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 equipment: air conditioners, 18,000 BTU.

TM 5-4120-285-15
C 4

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 15 February 1977

Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual
AIR CONDITIONER, COMPACT, VERTICAL: 208V, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING
(TRANE MODEL MAC 4V20-4950-03)
400 HERTZ, NSN 4120-00-926-9567,
(TRANE MODEL MAC 6V20-4950-05)
50/60 HERTZ, NSN 4120-00-926-9568

TM 5-4120-285-15, 9 April 1969, is changed as follows:

Page i. Table of contents. Titles for appendixes B and C are changed to read as follows. Add appendixes D and E.

APPENDIX A. REFERENCES
B. COMPONENTS OF END ITEMS LIST
C. ADDITIONAL AUTHORIZATION LIST (NOT APPLICABLE)
D. MAINTENANCE ALLOCATION CHART
E. EXPENDABLE SUPPLIES AND MATERIALS LIST (NOT APPLICABLE)

page 1-1. Paragraph l-lb is superseded as follows:

b. Appendix A contains the list of publications applicable to this manual. Appendix B list integral components of and basic issue items for the air conditioner. Appendix C is not used. Appendix D contains the maintenance allocation chart. The organizational direct support, general support and depot maintenance repair parts and special tools are listed and illustrated in TM 5-4120-285-25P.

Paragraph 1-1c is superseded as follows:

c. You can help improve this manual by calling attention to errors and by recommending improvements. Your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), and/or DA Form 2028-2 (Recommended Changes to Equipment Technical Manuals), may be used. Copies of DA Form 2028-2 are attached to the back of the manual for your use. Please mail your recommended changes to Commander, US Army Troop Support Command, ATTN: DRSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished direct to you.

Page 3-I. Table 3-1 is superseded as follows:

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

NOTE: Within designated interval, these checks are to be performed in the order list
B — Before A — After M — Monthly
D — During W — Weekly C — Control Operability Checks

Item No.	Interval						Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment will be reported Not Ready (Red) if:
	B	D	A	W	M	C			
1	x					x	Air Filter	Inspect for accumulation of dirt. Refer to figure 3-1 and service the air conditioning filter.	Filter dirty.

Table 3-1. Operator/Crew Preventive Maintenace Checks and Servies-Continued

NOTE: Within designated interval, these checks are to be performed in the order list
B — Before A — After M — Monthly
D — During W — Weekly C — Control Operability Checks

Item No.	Interval						Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment will be reported Not Ready (Red) if:
	B	D	A	W	M	C			
2		x				x	Unit	Check for any unusual noises or vibrations and report an unacceptable condition to direct support maintenance.	Unusual noise or vibration is determine.
3		x				x	Sight Glass	Check for condition of refrigerant charge. Operate unit for 30 minutes and check appearance of refrigerant in sight glass. If or appears milky, report condition to direct support maintenance.	Refrigerant contains bubbles or appears milky.

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

APPENDIX B

COMPONENTS OF END ITEMS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists integral components of and basic issue items for the air conditioner to help you inventory items required for safe and efficient operation.

B-2. General

The Components of End Item List is divided into the following sections:

a. *Section II.* Not applicable.

b. Section III. Basic Issue Items. These are minimum essential items required to place the air conditioner in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the air conditioner during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement BII, based on Table(s) of Organization and Equipment (TOE)/Modification Table of Organization and Equipment (MTOE) authorization of the end item.

B-3. Explanation of Columns

a. Illustrations. This column is divided as follows:

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

(2) *Item number. The* number used to identify item called out in the illustration.

b. National Stock Number (NSN). Indicates the National Stock Number assigned to the item and which will be used for requisitioning.

c. *Part Number (PIN).* Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

d. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. *Usable on Codes.* "USABLE ON" codes are included to help you identify which component items are used on the different models.

NOTE

When the column is blank the item required is applicable to all items.

g. *Quantity Required (Qty Req'd).* This column lists the quantity of each item required for a complete major item.

h. Quatity. This column is left blank for use during inventory. Under the Rec'd column, list the quantity you actually receive on your major item. The Date columns are for use when you inventory the major item at a later date such as for shipment to another site.

Section III. BASIC ISSUES ITEMS

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8) Quantity			
(a) Figure No.	(b) Item No.	National Stock Number	Part No. & FSCM	Description	Location	Usable on Code	Qty Req'd	RCV'd	DATE	DATE	DATE
		TM 5-4120-285-15	Technical Manual								

Page C-1. Appendix C is superseded as follows.

APPENDIX C
ADDITIONAL AUTHORIZATION LIST
(NOT APPLICABLE)

Page D-1. Appendix D is added as follows.

APPENDIX D
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

D-1. General

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

b. 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 IL

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

D-2. Explanation of Columns in Section II

a. *Group Number, Column (1). The* applicable assembly grouping indexes are listed on the MAC (maintenance allocation chart) in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

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

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

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

The maintenance functions are defined as follows:

A— Inspect To 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 teat equipment.

C— Service To clean, to preserve, to charge, to paint, and to add fuel lubricant, 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 test equipment used in precise measurement. Consist of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adust any discrepancy in the accuracy of the instrument being compared with the certified standard

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

H— Replace To replace unserviceable items with serviceable 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 standandards 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 disassembly 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. *Rernaks, Column (5).* This column is provided for referencing by code the remarks (sec. IV) pertinent to the maintenance functions.

D-3. Explanation of Columns in Section III

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T and TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Category. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. *Nomenclature.* This column lists the names or identification of the tool or test equipment.

d. *Tool Number. This* column lists the manufacturer's code and part number, or Federal stock number of tools and test equipment.

D-4. Explanation of Columns in Section IV

a. *Reference Code.* This column consists of two letters separated by a dash, both of which are reference 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

Group No.	(2) Functions group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
01	ACCESSORY ITEMS													
	Tarpaulin	O	...	...	...	...	...	...	O	O				
	Sound Attenuator	O	...	...	...	...	...	..	O					
02	BASE ASSEMBLY, CASING, GRILLS, AND HARDWARE													
	Panels													
	Baffle	O	...	...	...	...	...	...	H					
	Chain and damper control	O	...	...	...	...	...	...	O					
	Cover assemblies	O	...	..	...	...	...	...	O					
	Damper assembly	O	...	...	...	...	...	...	H					
	Grills	O	...	...	...	...	...	...	O					
	Panel assembly, front lower	O	...	...	...	...	...	...	O					
	Panels, back and top	O	...	...	...	...	...	...	O					
	Retainer assembly, filter	O	...	...	...	...	...	...	O					
	Base Assembly	O	...	...	...	...	...	...	H					
	Casting Assembly	O	...	...	...	...	...	...	H					
	Guard, Condenser Fan	O	...	...	..	...	...	...	O					
	Screen, Drain, Base	O	...	...	...	...	...	...	O					
03	ELECTRIC MOTOR, MOTOR SUPPORT, AND FANS													
	Motor Assembly	...	O											
	Mount bushing	...	...	...	...	...	...	...	O					
	Motor assembly, blower	...	...	...	...	...	...	...	O	F				
	Bearing	...	...	...	...	...	...	...	F					
	Rotor Assemblies													
	Rotor, blower motor	O	...	...	...	...	...	...	H					
	Stator Assemblies													
	Stator, blower motor	O	...	...	...	...	...	...	H					
	Frame, Supports, and Housings													
	Cover, stator housing	...	...	...	...	...	...	...	H					
	Endbell, housing	...	...	...	...	...	...	...	H					
	Housing stator	...	...	...	...	...	...	...	H					

(1) Group No.	(2) Functions group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	Starting and Protective Devices													
	Protector, overload	...	F	...	...	...	...	...	F					
	Relay, phase	...	O	...	...	...	...	...	O					
	Fan, Evaporator and Condenser	O	...	...	...	...	...	...	O					
04	CONTROL PANELS, CONTROL BOX, AND COMPONENTS													
	Box, Control	O	...	...	...	...	...	...	O					
	Connector Receptacle	O	...	...	...	...	...	...	O					
	Control Panel Assembly	O	...	...	.	...	...	...	O	F				
	Leads, Electrical	O	...	...	...	...	...	...	O					
	Receptacle	O	...	...	...	...	...	...	O					
	Remote Control Panel	O	...	...	...	...	...	...	O					
	Outdoor Thermostat	...	...	...	...	...	...	...	O					
	Circuit Breakers and Fuses	...	...	...	...	...	...		O					
	Switches	O	...	...	...	...	...	...	O					
	Transformer Rectifier	...	O	...	...	...	...	...	O					
	Terminal Blocks	...	O	...	...	...	...	...	O					
	Thermostatic Switch	...	...	...	...	...	...	...	F					
05	COMPRESSOR ASSEMBLY													
	Compressor Assembly	...	F	F	...	...	...	...	F					
06	CONDENSER, REFRIGERANT UNITS													
	Valve, Regulating	..	F	...	D	...	...	...	F					
	Valve, Expansion	..	...	...	F	...	F	...	F					
	Air Filter	..	...	O	...	...	...	..	O					

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENT

Reference code	Maintenance level	Nomenclature	Tool number
		No special tools required.	

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 (FSN 9150-823-7905).
A — B	Testing includes the use of the Halide Torch Leak Detector, or a soap solution to detect leaks.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
CoA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE 16 DEC 74

PUBLICATION NUMBER	DATE	TITLE
TM5-6115-200-20 AND P	1 APR 72	GENERATOR SET 10 KW NSN 6115-00-231-7286

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE: John Doe

TEAR ALONG DOTTED LINE

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

_____

_____

OFFICIAL BUSINESS

Commander
U.S. Army Troop Support Command
ATTN: DRSTS-MPP
4300 Goodfellow Boulevard
St. Louis, Missouri 63120

TEAR ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

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PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

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DA FORM 1 AUG 74 2028-2 *(TEST)*

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

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DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

Commander
U.S. Army Troop Support Command
ATTN: DRSTS-MPP
4300 Goodfellow Boulevard
St. Louis, Missouri 63120

TEAR ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2 (TEST)

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, *United States Army*
Chief of staff

Official:

PAUL T. SMITH
Major General, *United States Army*
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25C, Organizational Maintenance requirements for Air Conditioner, 18,000 BTU Compact.

TM 5-4120-285-15
C5

CHANGE
NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, ***24 February 1978***

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

AIR CONDITIONER, COMPACT, VERTICAL: 208 V, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING (TRANE MODEL MAC 4V20-4950-03) 400 HERTZ, NSN 4120-00-926-9567, (TRANE MODEL MAC 6V20-4950-05) 50/60 HERTZ, NSN 4120-00-926-9568

TM 5-4120-285-15, 9 April 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	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
01	ACCESSORY ITEMS													
	Tarpaulin	O							O	O				
	Sound Attenuator	O							O					
02	BASE ASSEMBLY, CASING, GRILLS, AND HARDWARE													
	Panels													
	Baffle	O							F					
	Chain and damper control	O							O					
	Cover assemblies	O							O					
	Damper assembly	O							F					
	Grills	O							O					
	Panel assembly, front lower	O							O					
	Panels, back and top	O							O					
	Retainer assembly, filter	O							O					
	Base Assembly	O							F					
	Casting Assembly	O							F					
	Guard, Condenser Fan	O							O					
	Screen, Drain, Base	O							O					
03	ELECTRIC MOTOR, MOTOR SUPPORT, AND FANS													
	Motor Assembly		O											
	Mount bushing								O					
	Motor assembly, blower								O	F				
	Bearing								F					
	Rotor Assemblies													
	Rotor, blower motor	O							F					
	Stator Assemblies													
	Stator, blower motor	O							F					
	Frame, Supports, and Housings													
	Cover, stator housing								F					
	Endbell, housing								F					
	Housing, stator								F					
	Starting and Protective Devices													
	Protector, overload		F						F					
	Relay, phase		O						O					
	Fan, Evaporator and Condenser	O							O					
04	CONTROL PANELS, CONTROL BOX, AND COMPONENTS													
	Box, Control	O							O					
	Connector Receptacle	O							O					
	Control Panel Assembly	O							O	F				
	Leads, Electrical	O							O					
	Receptacle	O							O					
	Remote Control Panel	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
	Outdoor Thermostat	..	..	..	..	..	..	..	O					
	Circuit Breakers and Fuses	..	..	.	..	..	..	..	O					
	Switches	O	..	..	..	..	..	..	O					
	Transformer Rectifier	..	O	..	..	..	..	..	O					
	Terminal Blocks	..	O	..	..	..	..	..	O					
	Thermostatic Switch	..	..	..	.	..	..	..	F					
05	COMPRESSOR ASSEMBLY													
	Compressor Assembly	..	F	F	..	..	..	..	F					
06	CONDENSER, REFRIGERANT UNITS													
	Valve, Regulating		F	..	D	..	..	..	F					
	Valve, Expansion	..	..	..	F	..	F	..	F					
	Air Filter	..	..	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.

TECHNICAL MANUAL

No. 5-4120-285-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 9 *April 1969*

OPERATORS, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL

AIR CONDITIONER, COMPACT VERTICAL: 208V, 3 PHASE, 18,000 BTUH COOLING, 12,000 BTUH HEATING (TRANE MODEL MAC 4V20-4950-03) 400 CYCLE FSN 4120-926-9567, (TRANE MODEL MAC 6V20-4950-05)50/60 CYCLE FSN 4120-926-9568

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual is published for the use of personnel to who the Military Models MAC6V20-4920-05 (hereinafter designated as 6V20) and the MAC4V20-4950-03 (hereinafter designated as 4V20) are 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 instructions for direct support, general support, and depot maintenance. Also included are descriptions of main units and their relationship to other components.

b. Appendix A contains a list of publications applicable to this manual. Appendix B contains a list of basic issue items authorized the operator of this equipment. Appendix C contains the maintenance allocation chart. The organizational, direct support, general support, and depot maintenance repair parts and special tools are listed and illustrated in TM 5–4120–285–25P.

c. Reports 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 DA Publications) and forwarded direct to Commanding General, U.S. Army Mobility Equipment Command, ATTN, AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

1-2. Forms and Records

DA Forms and procedures used for equipment maintenance will be only those prescribed in TM 38–750 (Army Equipment Record Procedures).

Section Il. DESCRIPTION AND DATA

1-3. Description

a. *General.* The air conditioners (fig. 1–1 and 1–2) are used primarily in van type enclosures for providing filtered, conditioned, or heated air as required to maintain the service conditions necessary for the efficient operation of electronic equipment and the comfort of operating personnel housed within the 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 Fan. The condensing section, located in the lower compartments, contains the hermetically sealed compressor, condenser coil, control panel and box, thermostatic switch, blower motor, and service valves.

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

1-4. Identification and Tabulated Data

a. Identification.

(1) Manufacturers identification *plate.* Located on the upper rear panel. Specifies the model number, serial number, and the manufacturer.

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

(3) *DA identification plate.* Located on the upper rear panel. Specifies the nomenclature, model number, part number, and manufacturer.

(4) Blower *motor identifi.cation plate.* Located on top of the blower motor housing. Speci-

fies the horsepower, type, RPM (revolutions per minute), part numbers, and electrical data.

(5) Wiring diagram. Located on the reverse side of the front access panel. Illustrates the wiring detail.

(6) *Refrigerant* data *plate.* Located on the upper rear panel. Specifies the proper refrigerant for the unit.

(7) *Color indicating plate.* Located on the upper rear panel below the sight glass. Indicates the condition of the unit refrigerant by color as shown in the sight glass.

(8) *Reset plate.* Located on the upper rear panel below the reset button.

(9) *Arrow indicator.* Located on upper rear panel. Indicates proper rotation of condenser fan.

b. Tabulated Data.

(1) *Model 4V20.*

Manufacturer_ _ _ _ _ _ _ _ Trane Co. Lacrosse Wise.
Federal stock number_ _ _ _ 4120-926-9567
Model No._ _ _ _ _ _ _ _ _ _ _MAC 4V20-4950-03
Cycle_ _ _ _ _ _ _ _ _ _ _ _ _400
Voltage _ _ _ _ _ _ _ _ _ _ _ _ 208
Phase_ _ _ _ _ _ _ _ _ _ _ _3
Cooling_ _ _ _ _ _ _ _ _ _ _ _Air
Length_ _ _ _ _ _ _ _ _ _ 20in. (inches)
Height _ _ _ _ _ _ _ _ _ _ _ _ _46in.
Width_ _ _ _ _ _ _ _ _ _ _ _ _17 in.
Weight _ _ _ _ _ _ _ _ _ _ _ _ _210 1b. (pounds)
Capacity
Heating_ _ _ _ _ _ _ _ _ _ _ _12,000 BTUH (British thermal units per hour)
Cooling_ _ _ _ _ _ _ _ _ _ _ _ _18,000 BTUH

(2) *Model 6V20.*

Manufacturer _ _ _ _ _ _ _ _ _ _ _ _ _Trane Co. Lacrosse Wise.
Federal stock no._ _ _ _ _ _ _4120-926-9568
Model No._ _ _ _ _ _ _ _ _ _MAC 6V20–4950-05
Cycle_ _ _ _ _ _ _ _ _ _ _ _ _ _50/60
Voltage_ _ _ _ _ _ _ _ _ _ _ _ _ 208
Phase_ _ _ _ _ _ _ _ _ _ _ _ _ _3
Cooling_ _ _ _ _ _ _ _ _ _ _ _ _ Air
Length_ _ _ _ _ _ _ _ _ _ _ _ _ _20 in.
Width _ _ _ _ _ _ _ _ _ _ _ _ _ _17 in.
Height_ _ _ _ _ _ _ _ _ _ _ _ _ _46 in.
Weight _ _ _ _ _ _ _ _ _ _ _ _ _ _223 lb.
Capacity
Heating_ _ _ _ _ _ _ _ _ _ _12.000 BTUH
Cooling_ _ _ _ _ _ _ _ _ _ _ _ _18,000 BTUH

(3) *Blower motor, (Mode 4V20).*

Manufacturer _ _ _ _ _ _ _ _ _ _ _Welcome Electric Co.
Part No_ _ _ _ _ _ _ _ _ _ _ _ M4720-7A
HP (horsepower)_ _ _ _ _ _ _1.62
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Double extended shaft
Voltage_ _ _ _ _ _ _ _ _ _ _208
Amperes_ _ _ _ _ _ _ _ _ _ _ _ _6.5
Frequency_ _ _ _ _ _ _ _ _406 cycles
Phase_ _ _ _ _ _ _ _ _ _ _ _ _ _3
Duty_ _ _ _ _ _ _ _ _ _ _ _ _ _ Continuous
Drive_ _ _ _ _ _ _ _ _ _ _ _ _ _Direct
RPM's_ _ _ _ _ _ _ _ _ _ _ _ _3700

(4) *Blower motor, (Model 6V20).*

Manufacturer_ _ _ _ _ _ _ _ _ _ _ _Welco Electric Co.
Part No_ _ _ _ _ _ _ _ _ _ _ _ _M4725–8
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _ Double extended shaft
HP_ _ _ _ _ _ _ _ _ _ _ _ _ _ _1.42
Voltage_ _ _ _ _ _ _ _ _ _ _ _ 208
Frequency_ _ _ _ _ _ _ _ _50/60 cyclesles
Phase_ _ _ _ _ _ _ _ _ _ _ _ _3
Duty_ _ _ _ _ _ _ _ _ _ _ _ _ Continuous
Amperes_ _ _ _ _ _ _ _ _ _ _ _ 5.7
Drive_ _ _ _ _ _ _ _ _ _ _ _ _ _ Direct
RPM's_ _ _ _ _ _ _ _ _ _ _ _ _3450

(5) *Compressor (Model 4V20).*

Manufacturer _ _ _ _ _ _ _ _ _Whirlpool Division, RCA Corp.
Model No_ _ _ _ _ _ _ _ _ _ _ _ _WHP422-H18-208-3
Part No._ _ _ _ _ _ _ _ _ _ _ _ _474843
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _ Rotary vane
Weight_ _ _ _ _ _ _ _ _ _ _ _ _46 lbs.
Lubrication_ _ _ _ _ _ _ _ _ _ _Slinger
Phase_ _ _ _ _ _ _ _ _ _ _ _ _3
RPM's_ _ _ _ _ _ _ _ _ _ _ _ _3660
Cycles_ _ _ _ _ _ _ _ _ _ _ _ _400
Voltage_ _ _ _ _ _ _ _ _ _ _ _208
LRA (locked rotor amperage)_ _ _ _ _ _ _ _ _ _ _ _ 64

(6) *Compressor (Model 6V20).*

Manufacturer_ _ _ _ _ _ _ _ _ _ _ _ Whirlpool Division, RCA Corp.
Model No._ _ _ _ _ _ _ _ _ _ _ _ WHP622-H18-208-3
Part No._ _ _ _ _ _ _ _ _ _ _ _ _474837
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _ Rotary vane
Weight_ _ _ _ _ _ _ _ _ _ _ _ _ 52 lbs.
Lubrication_ _ _ _ _ _ _ _ _ _ _ _Forced feed
RPM's_ _ _ _ _ _ _ _ _ _ _ _ _3390
Phase_ _ _ _ _ _ _ _ _ _ _ _ _ _3
Cycles_ _ _ _ _ _ _ _ _ _ _ _ _50/60
Voltage_ _ _ _ _ _ _ _ _ _ _ _ _208
LRA_ _ _ _ _ _ _ _ _ _ _ _ _ _67

(7) *Common components (Models 4V20/ 6V20).*

(a) *Evaporator and condenser fans.*

Manufacturer_ _ _ _ _ _ _ _ _ _ _Trane Co.
Type
Condenser_ _ _ _ _ _ _ _ _ _ _ _ Propeller
Evaporator_ _ _ _ _ _ _ _ _ _ _ Centrifugal
No. per unit_ _ _ _ _ _ _ _ _ _ 1 each
Rotation_ _ _ _ _ _ _ _ _ _ _ _Clockwise

(b) *Evaporator and condenser coils.*

Manufacturer_ _ _ _ _ _ _ _ _ _ _Trane Co.
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _Tube fin
No, per unit_ _ _ _ _ _ _ _ _ _ _1each

(c) *Motor and heater contactors.*

Manufacturer _ _ _ _ _ _ _ _ _ _ _ _ Cutler-Hammer Co.
Part No._ _ _ _ _ _ _ _ _ _ _ _ 9565ED3
Amperes_ _ _ _ _ _ _ _ _ _ _ _25
Type_ _ _ _ _ _ _ _ _ _ _ _ _ _3PST (pole, single throw)
Coil_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Pick up at 170 VDC (volts, direct current)
Operating temperature_ _ _ _ _ _+65° F. (Fahrenheit) to + 125° F.

(d) *Thermostat control.*

Manufacturer _ _ _ _ _ _ _ _ _ _ _ _ _Penn Control Co.
Part No_ _ _ _ _ _ _ _ _ _ _ _ _ _A19AGF-10
Action_ _ _ _ _ _ _ _ _ _ _ _ _ _ SPDT (single pole double throw)
Operating temperature +40° F. to +90° F.
Rating_ _ _ _ _ _ _ _ _ _ _ _ _ _120 volts

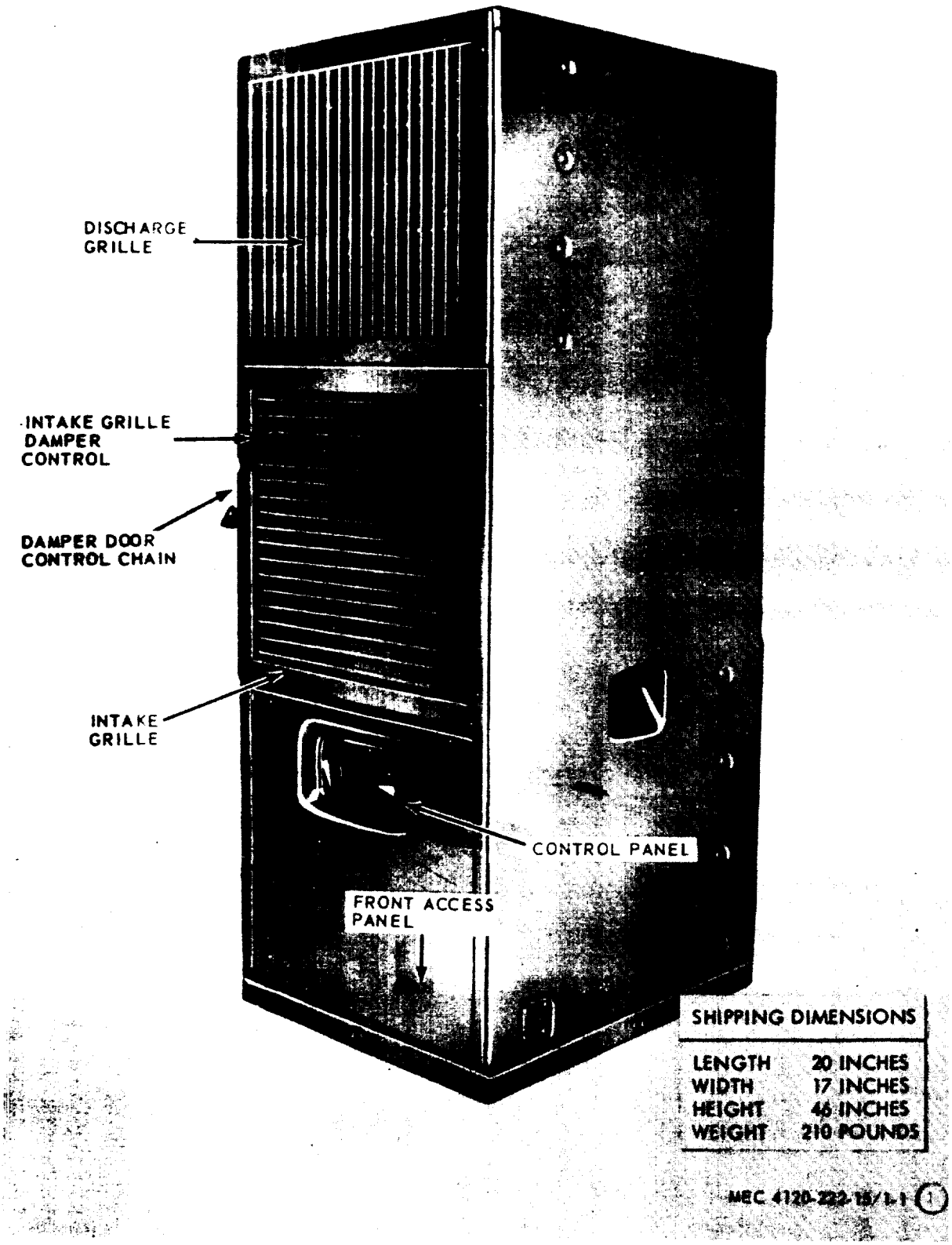


Figure 1-1. Air conditioned, front three quarter view w/shipping dimensions.

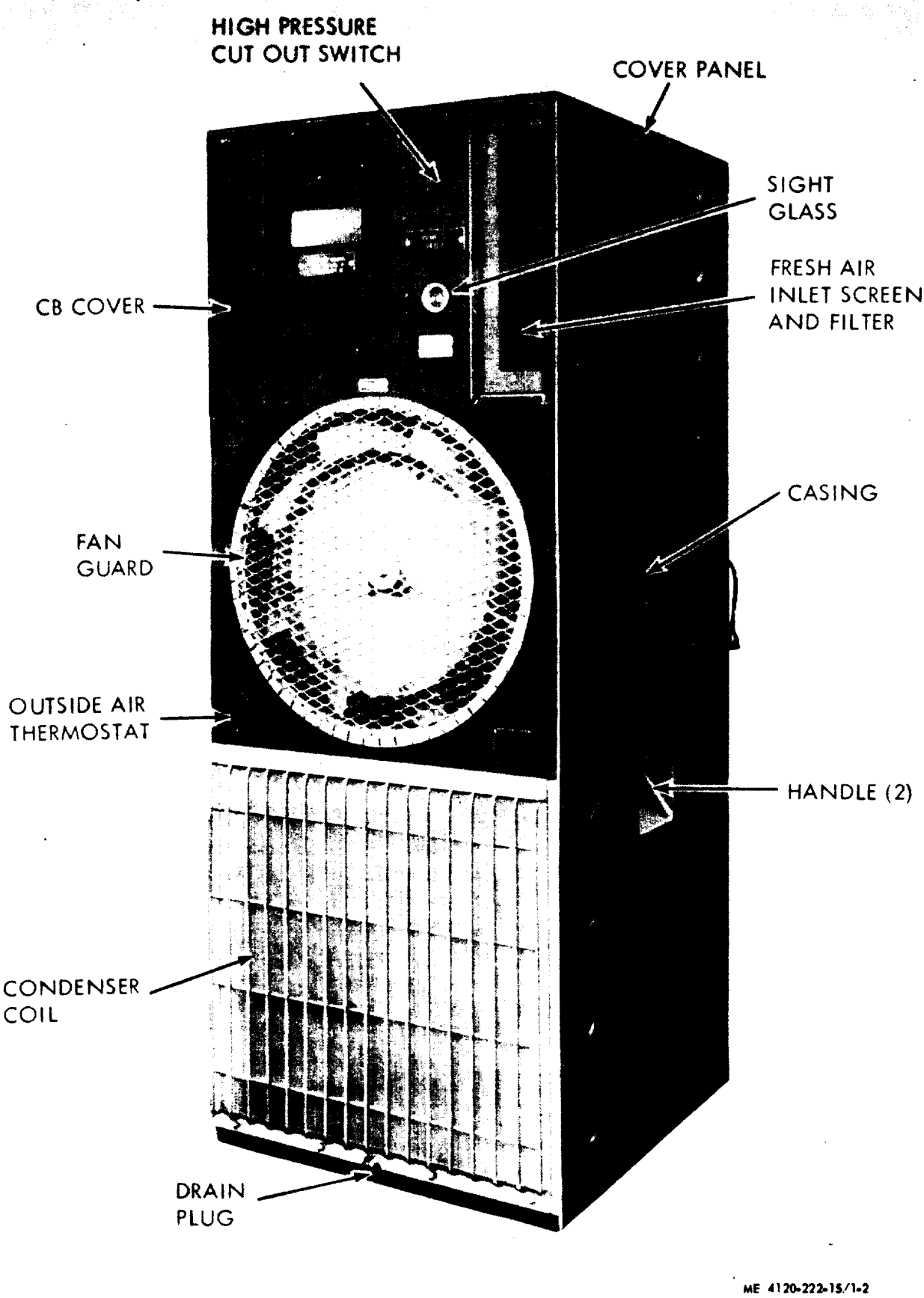


Figure 1-2. Air conditioner, rear view.

(e) Selector switch.

Manufacturer _____ Cutler-Hammer Co.
Type _____ Manual rotary
Part No. _____ 8912K216
Posiions available _____ 5
Rating _____ 15 amperes/250 VAC (volts, alternating current)

(f) Outside air thermostat.

Manufacturer _____ Stevens Mfg. Co. Inc.
Part No. _____ NPT25SPDT
Rating _____ 208 VAC (pilot duty, 20 VAC)
Operation _____ Contractors open at temperature decrease (50° F.)
Differential _____ ±3° F.

(g) Heater *thermostat.*

Manufacturer _____ Metals and Controls Inc.
Part No. _____ MWA 1256
Type _____ Klixon automatic reset
Rating _____ 208 volts
Cycle _____ 60/400
Phase _____ 3
Contacts
Open _____ 90° *C. (centigrade)*
Close _____ 6°C.

(h) Electric heaters.

Manufacturer _____ Trane Co
Type _____ Stainless steel sheath
Voltage _____ 120 VAC
Watts _____ ,600 each
No. per unit _____ 6

(i) *Pressure relief valve.*

Part No _____ 3001 x 4
Setting _____ 540 PSI (pounds per square inch)

(j) Back pressure requlating valve.

Manufacturer _____ Controls Co. of America
Model _____ 237
Part No _____ 70237-142
Setting _____ 58 PSI

(k) Service valves.

Manufacturer _____ Superior Co.
Type _____ Diaphragm, packless

(l) Solenoid valves.

Voltage _____ 187 VDC
Watts _____ 14
No. per unit. _____ 3

Manufacturer _____ Aalco Valve Co.
Model No _____ TLX200HW100
Type _____ Angle
Inlet _____ ¼ in. od (outside diameter)
Outlet _____ 3/8 in. od
Setting _____ 10° F. Superheat
Capacity _____ 2.1 tons

(n) Thermo expansion valve bypass).

Manufacturer _____ Aalco Valve Co.
Model No. _____ TCL200HW100
Type _____ Angle
Inlet _____ 1/4 in. od
outlet _____ 2/8 in. od
Setting _____ 10 F. Superheat
Capacity _____ 1/2 ton

(o) Liquid line sight glass.

Manufacturer _____ Sporlan Co.
Part No. _____ SA-1

(p) High-pressure cutout control,

Manufacturer _____ Penn Control Co.
Model No. _____ 210AP40N
Cutout point _____ 445 ± 10 psi

(q) *Capacities.*

Manual reset _____ 400 psi
Compressor crankcase ____ 20 .5 oz. (ounces)

and 6V20 1-5

conditioners. Differences between models are in the blower motors, compressors, and control circuits. Where differences exist, each model is covered separately in the applicable section of this publication. The Model 4V20 has a 400 cycle motor and compressor while the Model 6V20 has a 50/60 cycle motor and compressor. Both models are equipped with Whirlpool compressors and Welco motors and phase sequence relays.

C083S

1-5. Differences in Models

This manual covers Models 4V20

Located in back of manual

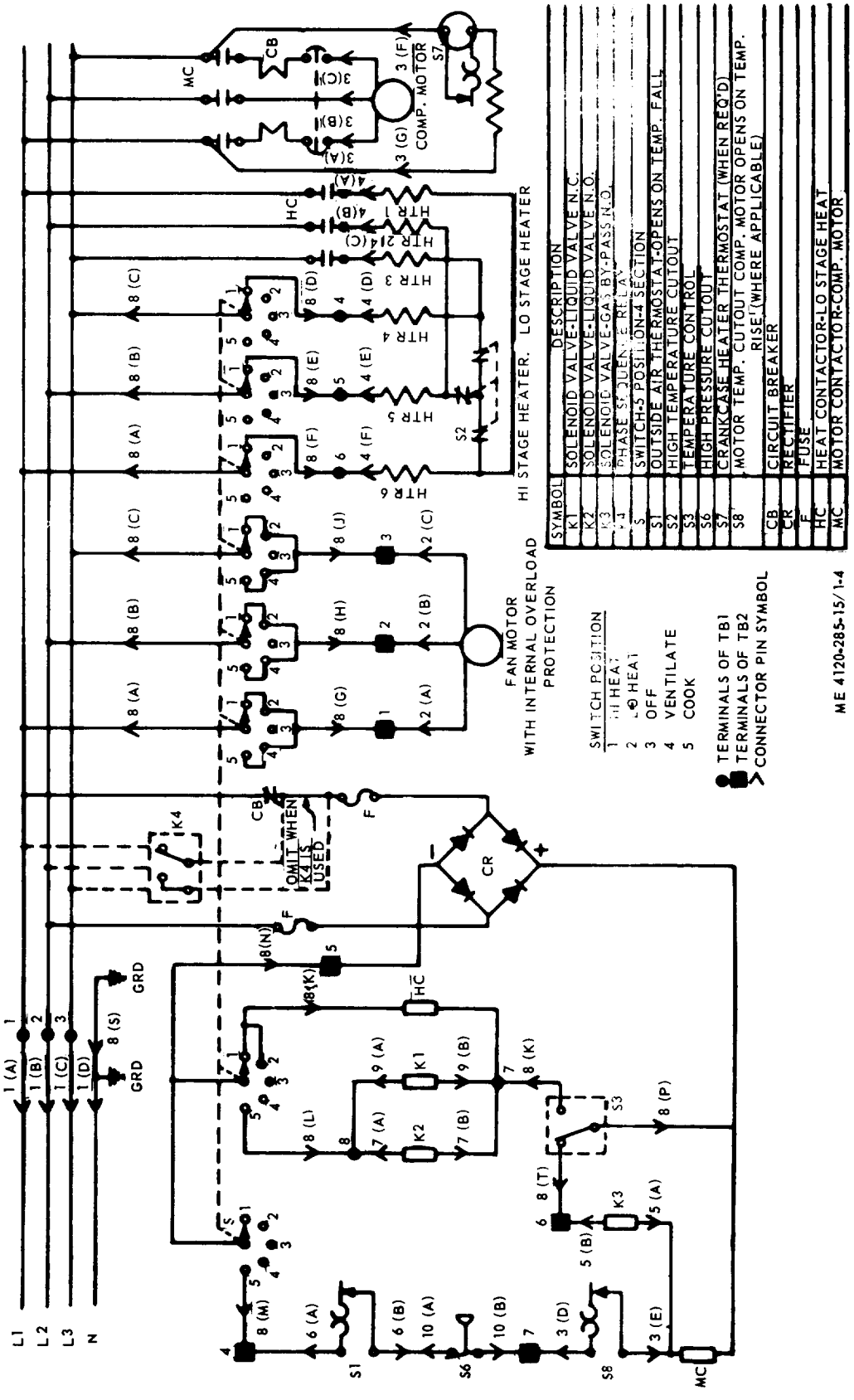
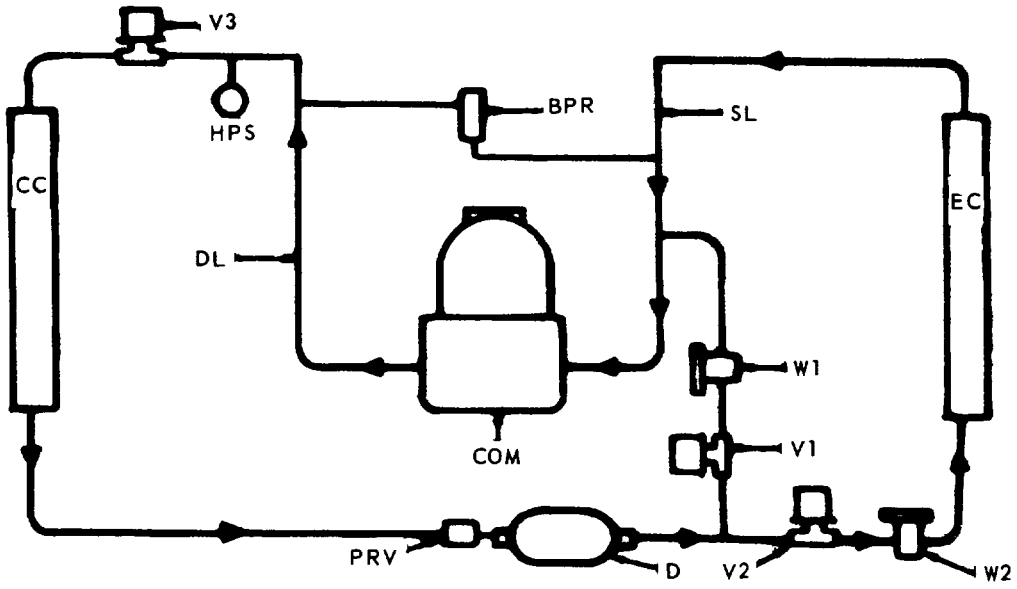
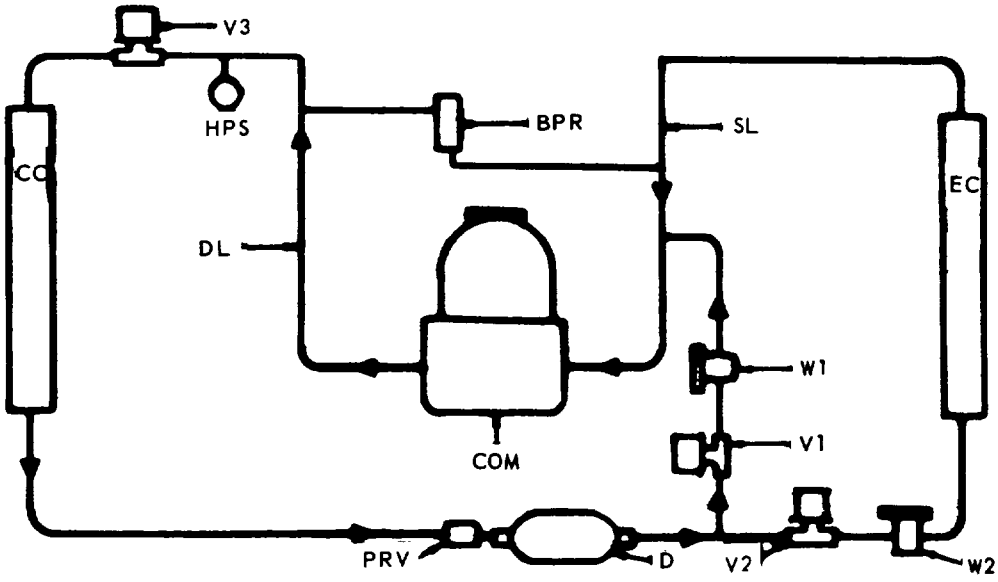


Figure 1–4. Practical wiring diagram (Model 6V20).



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 Refrigerant flow diagram.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

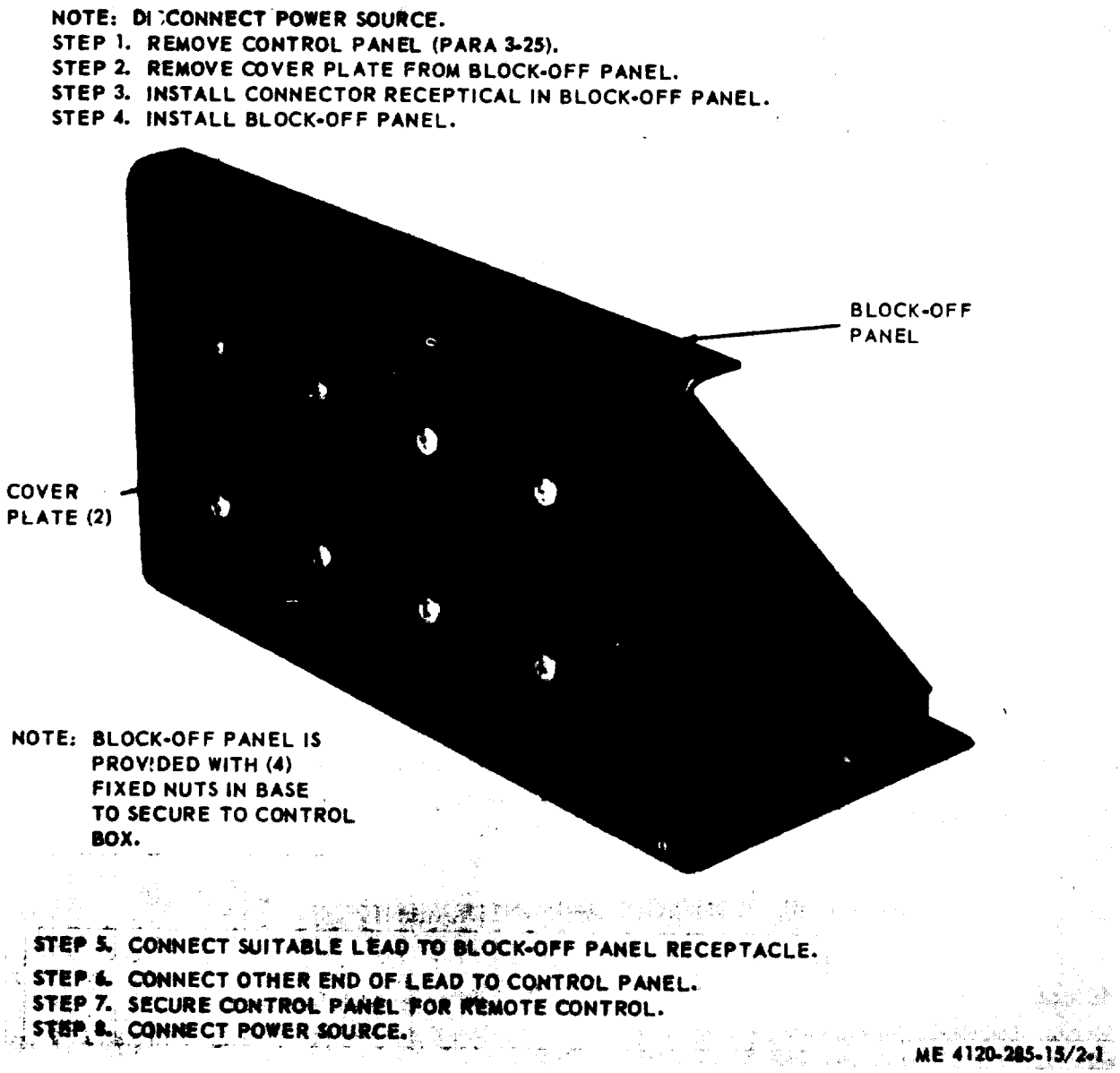


Figure 2-1 Installation of block-off panel.

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 looseness.

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 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. When no external duct work is utilized, a sound attenuator (13211E3798) may be used to reduce noise. A paulin may be used to prevent dirt from entering the condenser (P/N (COV312)).

b. *Remote Control Operation.*

(1) Disconnect power source and remove front access panel (para 3–15).

(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 connect the opposite terminal to the control panel.

2-3. Installation and Setting Up Instructions

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

b. Positioning the Air Conditioner. Position the unit so that the f rent 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 grills from the unit on the ends of the ducts.

c. Chemical-Biological (C/B) 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. Connect drain hose to nipple at rear, or alternate drain, to remove ex. cess condensate. Make certain the excess drain connections are plugged.

e. *Power Source.* The unit is equipped with an MS 3100R–22–22P receptacle located in the rear. Using a cable provided with an MS 3106R–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. Install the cover plate from the alternate location on the rear location.

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

Section II. MOVEMENT TO A NEW WORK SITE

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

2-5. Reinstallation After Movement

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

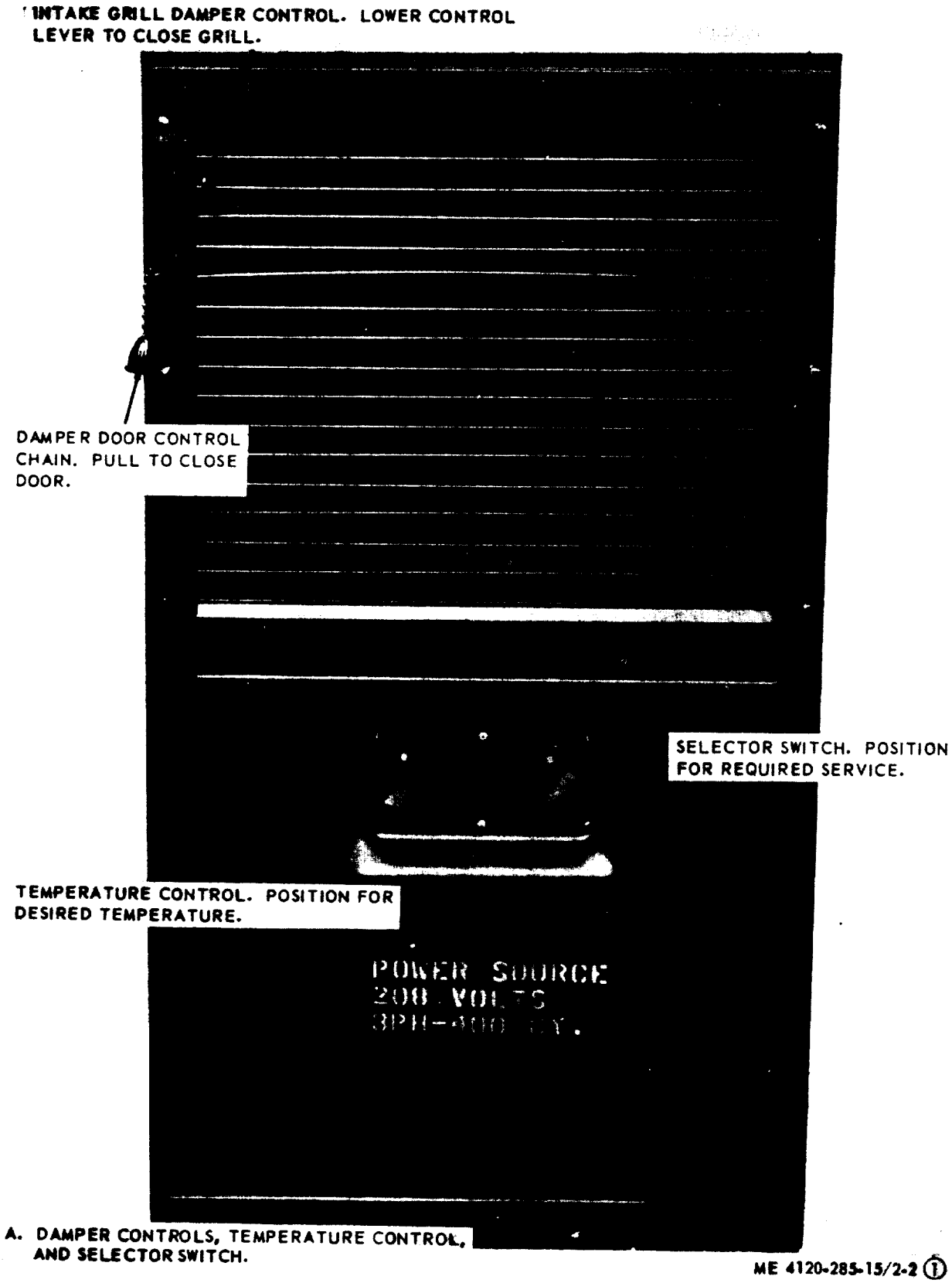
Section III. CONTROLS AND INSTRUMENTS

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,

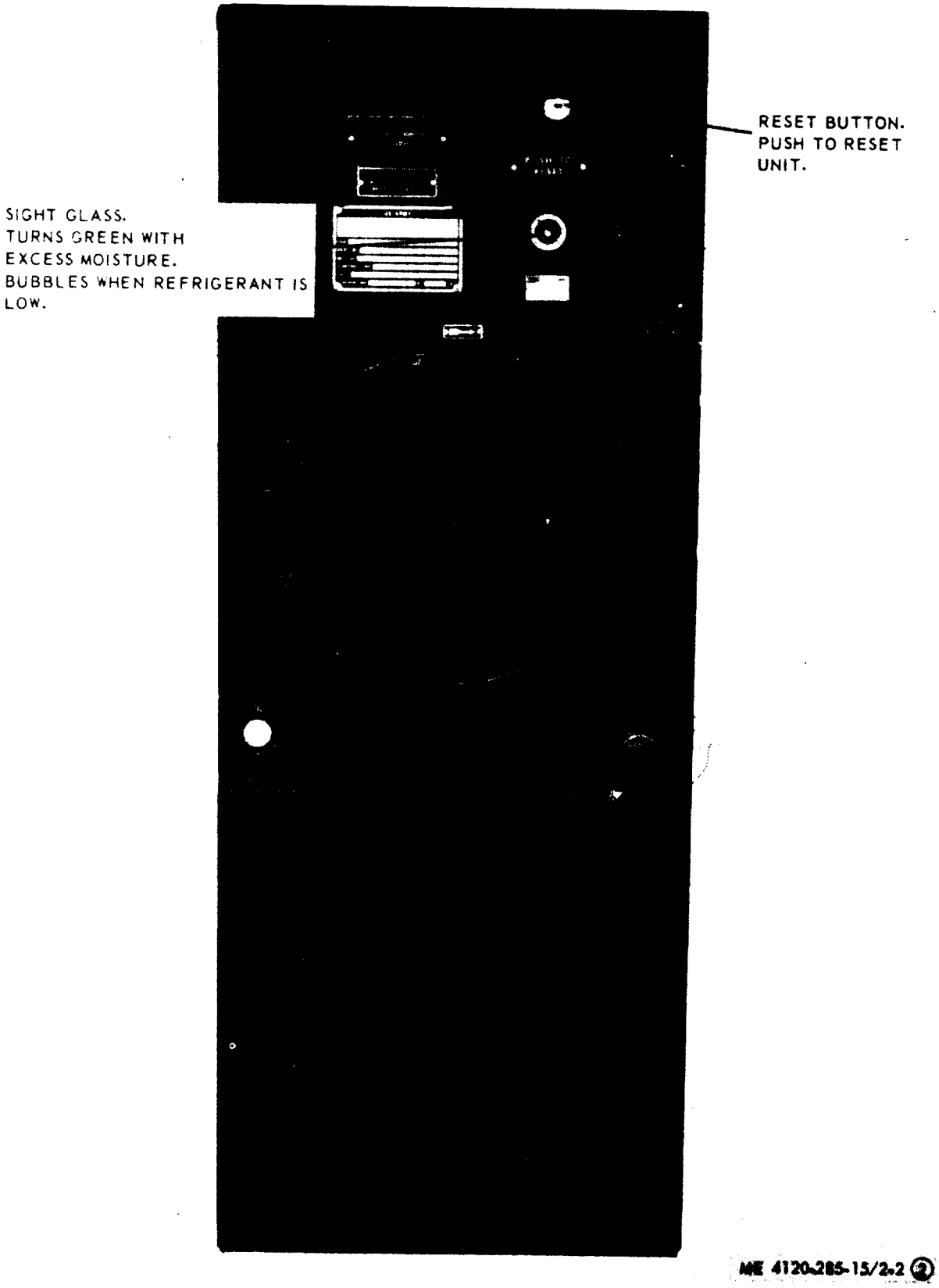
2-7. Controls and Instruments

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



(1) Front controls

Figure 2-2. Controls and instruments.



(2) Rear instruments

Figure 2-2—Continued.

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 every 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.

Section V. OPERATING UNDER UNUSUAL CONDITIONS

2-12. Operation in Extreme Cold

a. *General*. The air conditioner is designed to operate at temperatures as low as –650 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 grills 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 filter, and condenser screen daily.

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.

2-16. Operation in Salt Water Areas

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

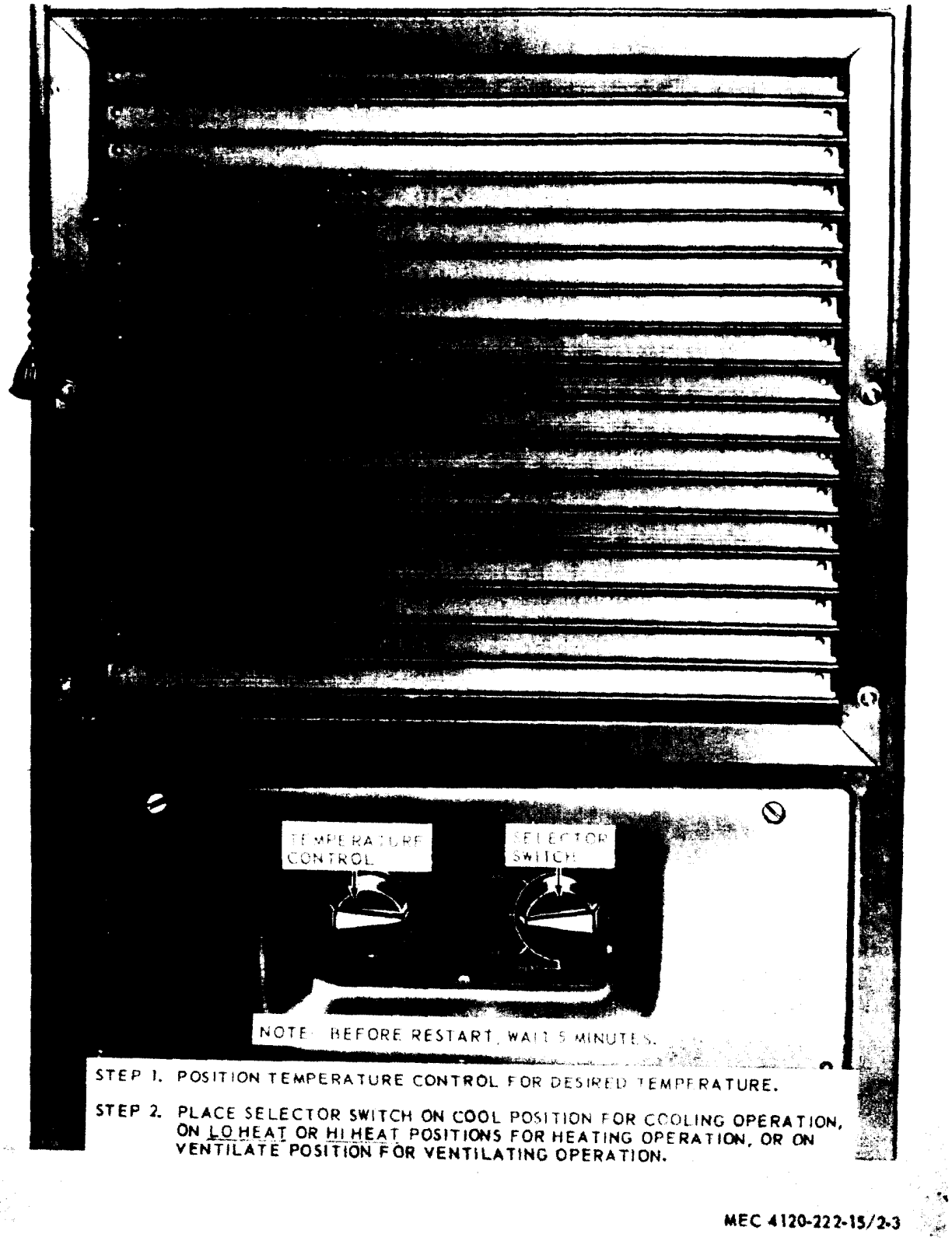


Figure 2-3. Starting instructions.

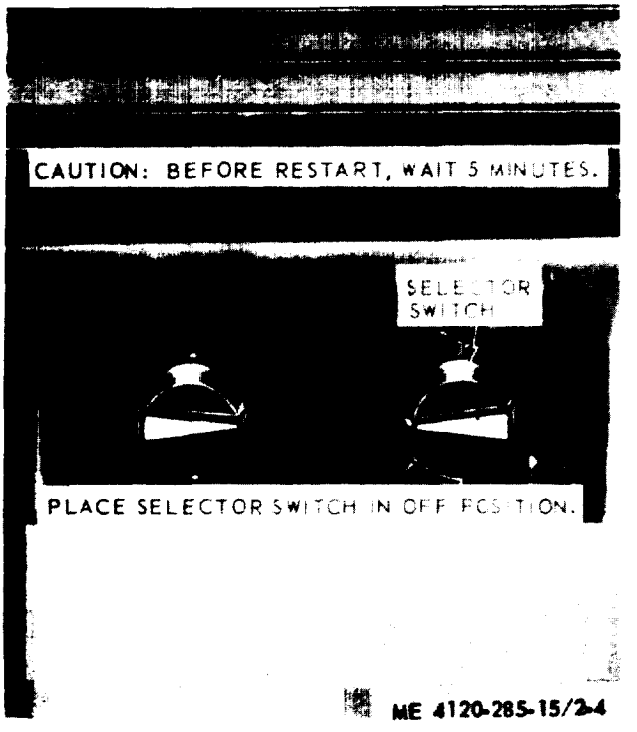
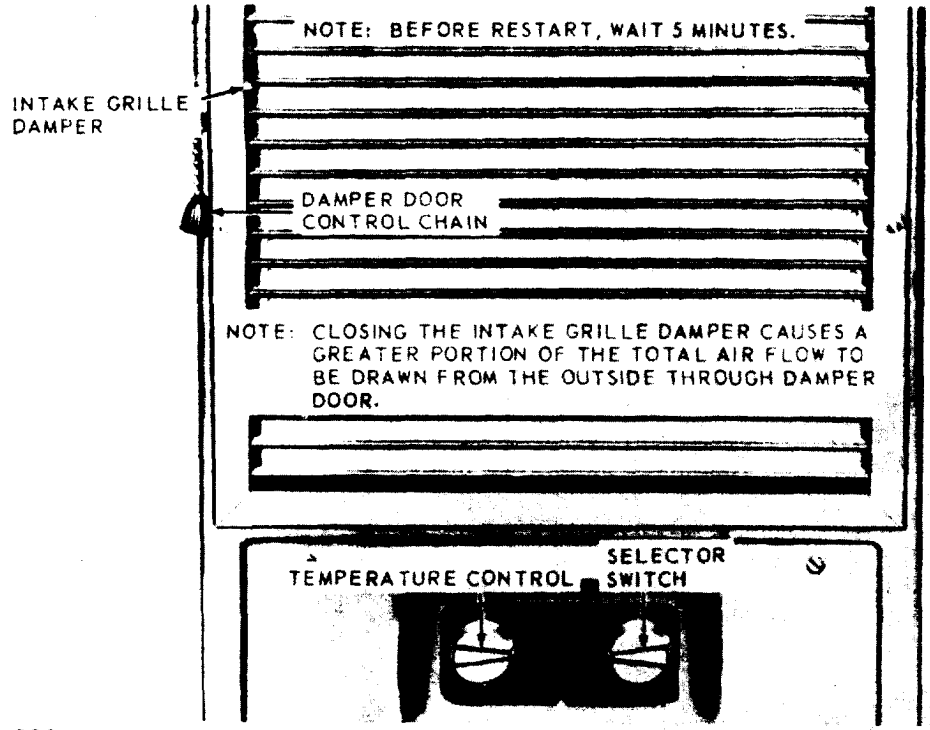


Figure 2–4. Stopping instructions.



A. COOLING OPERATION:
STEP 1. POSITION TEMPERATURE CONTROL FOR DESIRED TEMPERATURE.
STEP 2. PLACE SELECTOR SWITCH ON COOL POSITION.
STEP 3. FOR COOLING WITH 100 PERCENT RECIRCULATED AIR, CLOSE DAMPER DOOR AND OPEN INTAKE GRILLE DAMPER.
STEP 4. FOR COOLING WITH FRESH MAKEUP AIR, OPEN DAMPER DOOR AND PARTIALLY CLOSE INTAKE GRILLE DAMPER.
STEP 5. FOR COOLING WITH FRESH MAKEUP AIR DRAWN THROUGH CHEMICAL, BIOLOGICAL, FILTER UNIT WHEN OUTDOOR AIR IS CONTAMINATED, CLOSE DAMPER DOOR AND PARTIALLY CLOSE INTAKE GRILLE DAMPER.

B. HEATING OPERATION:
STEP 1. POSITION TEMPERATURE CONTROL FOR DESIRED TEMPERATURE.
STEP 2. PLACE SELECTOR SWITCH ON LO HEAT OR HI HEAT POSITION.
STEP 3. FOR HEATING WITH 100 PERCENT RECIRCULATED AIR, CLOSE DAMPER DOOR AND OPEN INTAKE GRILLE DAMPER.
STEP 4. FOR HEATING WITH FRESH MAKEUP AIR, OPEN DAMPER DOOR AND PARTIALLY CLOSE INTAKE GRILLE DAMPER.
STEP 5. FOR HEATING WITH FRESH MAKEUP AIR DRAWN THROUGH CHEMICAL, BIOLOGICAL, FILTER UNIT WHEN OUTDOOR AIR IS CONTAMINATED, CLOSE DAMPER DOOR AND PARTIALLY CLOSE INTAKE GRILLE DAMPER.

C. VENTILATING OPERATION:
STEP 1. PLACE SELECTOR SWITCH IN VENTILATE POSITION.
STEP 2. FOR VENTILATING OPERATION, OPEN DAMPER DOOR AND CLOSE INTAKE GRILLE DAMPER.

MEC 4120-222-15/2-5

Figure 2-5. Operating instructions.

CHAPTER 3

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S 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. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5–4120–285–25P.

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 of failure. The necessary preventive maintenance checks and services to be performed are listed in table 3-1, paragraph 3-4. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately 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 (Equipment Inspection and Maintenance Worksheet) 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.

***Table 3-1. Preventive Maintenance Checks* and Services.**

Item number	Interval						B-Before operation D-During operation	A—After operation W—Weekly	M—Monthly Q-Quarterly
	Operator				Org.				
	Daily								
	B	D	A	W	M	Q	Item to be inspected	Procedure	Reference
1	X		X				Air Filter.	Inspect for accumulation of dirt.	Para 3-6
				X				Check mountings and fittings.	Para 3-6
					X			Clean filter.	Para 3-6
						X		Remove filter and inspect thoroughly. Check for damage.	Para 3-16
2	X						Condenser screen.	Inspect for damage.	
					X	X		Clean thoroughly.	Para 3-17
3	X	X	X	X	X	X	Sight glass.	Inspect for indication of moisture *or* low refrigerant.	Para 5-20
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 3-21

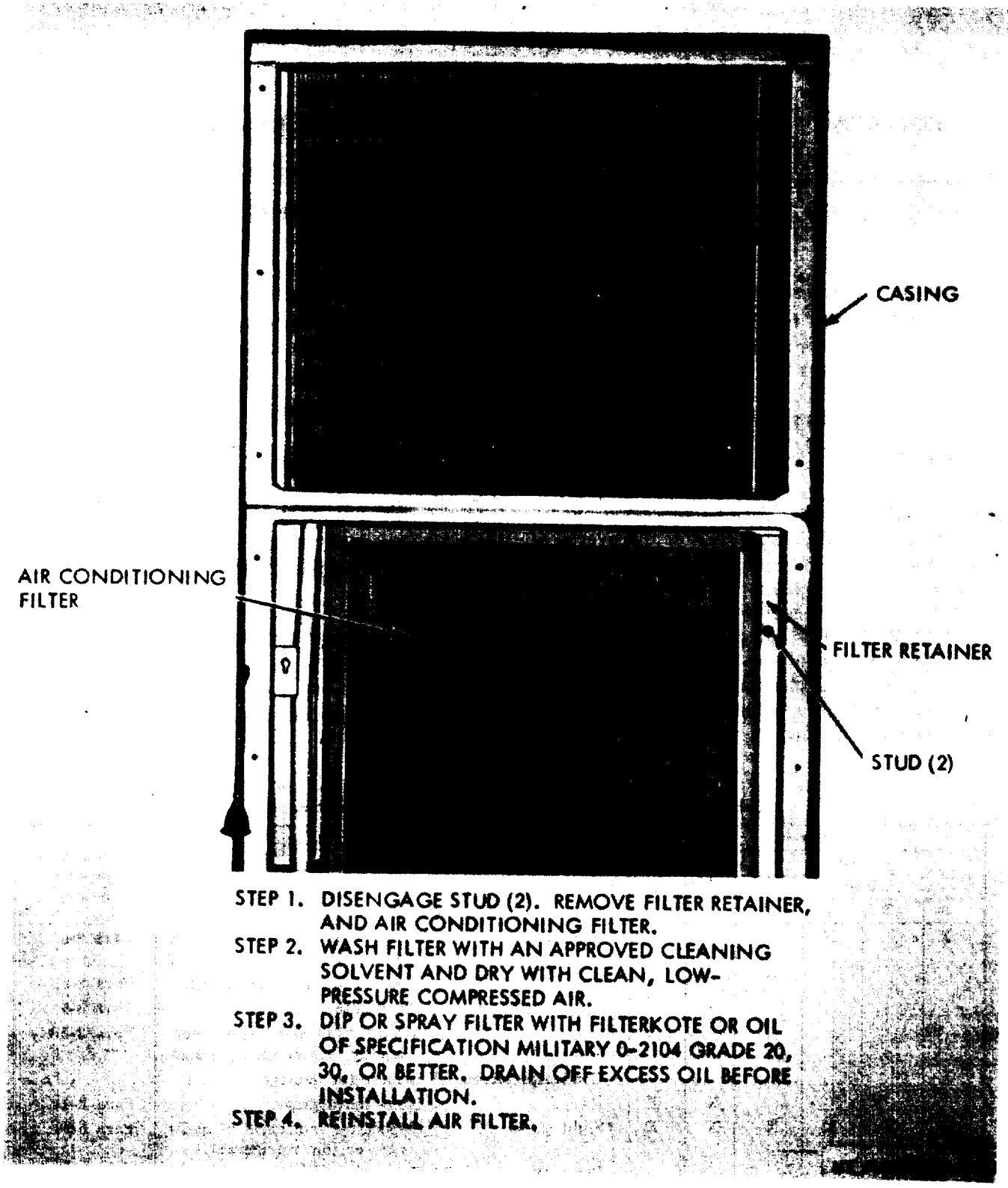


Figure 3-1. Air *conditioning* filter service.

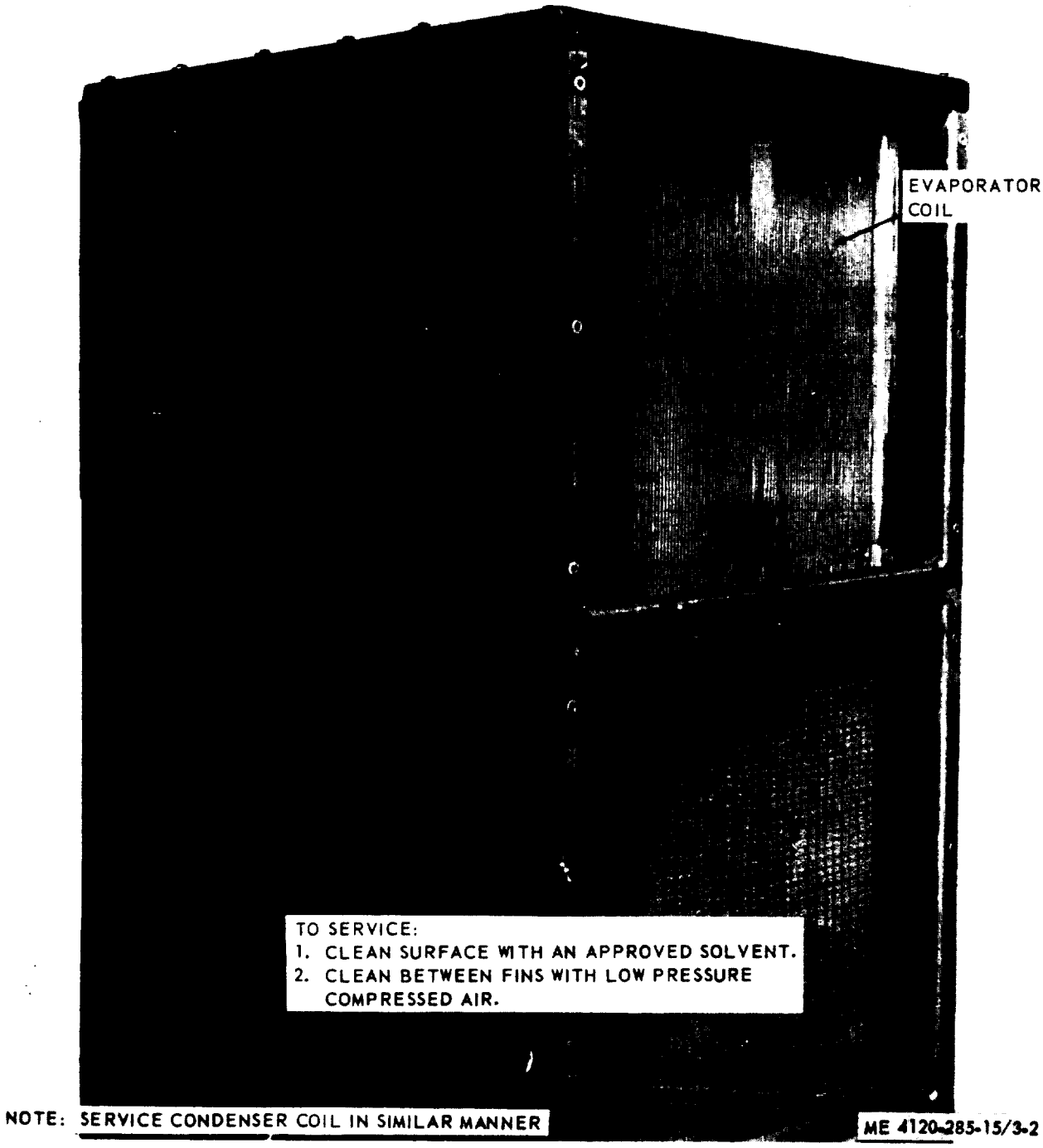


Figure 3-2. Evaporator and condenser coil service.

3-5. General

The instructions 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. Air Conditioning Filter Service

a. Remove the air intake grill (para 3-15).

b. Refer to figure 3-1 and service the air conditioning filter.

c. Install the air intake grill.

3-7. Evaporator and Condenser Coil Service

a. Remove the discharge grill and cover panel (para 3-15).

b. Refer to figure 3-2 and service the evaporator and condenser coil.

c. Install the discharge grill and cover panel.

3-8. Fuse Service

a. General. The unit is equipped with two 6 ampere cartridge fueses mounted in the upper right side of the control box.

b. Removal and Installation.

(1) Remove the f rent access panel (para 3-15).

(2) Remove the control box cover (para 3-24).

(3) The fuses are mounted in spring clamps, pry fuse out and replace.

(4) Install cover and panel.

Section IV. TROUBLESHOOTING

3-9. General

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

3-10. Troubleshooting Instructions

Refer to table 3-2 for the list of trouble symptoms and the corrective action procedures.

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 3-27).
	c. Contacts of 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 inoperative, replace switch (para 3-24).
	e. Circuit breaker defective.	e. Replace circuit breaker (para 3-27).
	f. Wiring defective.	f. Replace defective wiring (para 3-21).
	g. Compressor motor contactor defective.	g. Replace contactor (para 3-30).
	h. Evaporator heater contactor defective.	h. Replace evaporator heater contactor (para 3-30).
	i. Phase sequence relay contacts open.	i. Interchange two wires to reverse phase sequence (para 3-26). Replace relay if defective (para 3-26).
2. Suction pressure inadequate.	Filter or evaporator coil air restriction.	Clean filter and coil (para 3-7).
3. High discharge pressure.	Insufficient volumn of air passing through condenser coil.	Service condenser and evaporator coil (para 3-7).
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 over load.	a. High discharge pressure.	a. Clean condenser coil (para 3-7). Remove obstruction from grilles.
	b. Suction pressure low.	b. Service air conditioning filter (para 3-6).
	c. Blower motor defective.	c. Replace blower motor (para 3-22).
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 3-6). Adjust grilles for maximum airflow.

Section V. FIELD EXPEDIENT REPAIRS

3-11. 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 repairs may be used in emergencies, upon decision of the unit commander. Equipment so repaired must be removed from service as soon as possible and properly repaired before being put into service again.

3-12. Compressor Inoperative

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

3–13. 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

3-14. General

The air conditioner is constructed with removable aluminum panels and grills. The front access panel (fig. 1-1) provides access to the control panel, the control box, and service valves. A discharge grill protects the evaporator coil and controls the discharge of conditioned air. The intake grill protects the air conditioning filter and regulates the amount of air intake. The condenser coil grill (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 installation of a chemical/biological filter when required.

3-15. Cover Panel, Grills, and Front Access Panel

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

b. Cleaning, Inspection, and Repair.

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

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

(3) Minor dents may be hammered out by placing a flat board or similar object over dent and hammering on board. Louvers may be straightened with standard pliers. Replace severly damaged components.

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

3-16. Air Conditioning Filter

a. Removal.

(1) Remove the air intake grill (para 3-15).

(2) Refer to figure 3-4 and remove the air conditioning filter.

b. Cleaning and Inspection.

(1) Clean the air conditioning filter thoroughly (para 3-6).

(2) Inspect filter for damage, replace damaged filter.

(3) Dip or spray filter with MIL-L-2104 oil, grade OE-10 or OE–20. Drain excess oil from filter.

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

3-17. CB Cover, Fan Guard, Condenser Coil Grill and Screen

a. Refer to figure 3-5 and remove the C/B cover, fan guard, condenser coil grill and screen.

b. Cleaning, Inspection, and Repair.

(1) Clean C/B cover and grill with an approved solvent.

(2) Clean fan guard and screen with compressed air. Brush as required.

(3) Inspect components for damage, repair minor damage and replace a severly damaged component.

c. Installation. Install the C/B cover, fan guard, condenser coil grill, and screen by reversing the order of removal.

3-18. Evaporator Fan and Inlet Ring

a. General. The evaporator fan is of the air foil design to reduce excess noise and vibration.

b. Removal.

(1) Remove the air intake grill (para 3-15).

(2) Refer to figure 3–6 and remove the evaporator fan and inlet ring.

c. Cleaning and Inspection.

(1) Clean the fan and intake ring with an approved solvent.

NOTE: REPLACE COVER PANEL INSULATION, FRONT ACCESS PANEL GASKET, AND RIVET NUTS (32) IF DAMAGED OR DEFECTIVE.

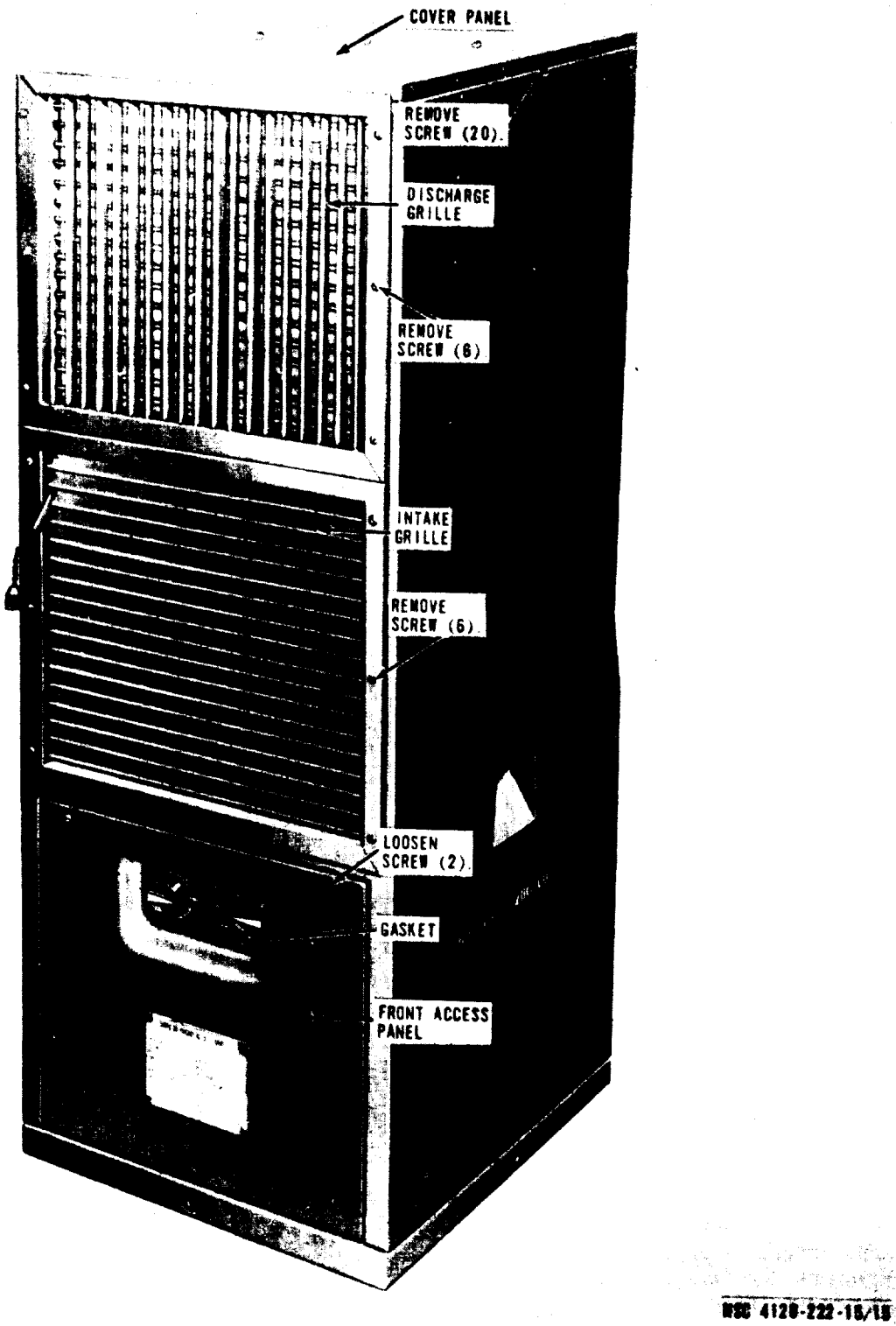


Figure 3-3. Cover panel, grills, and front access panel, removal and installation.

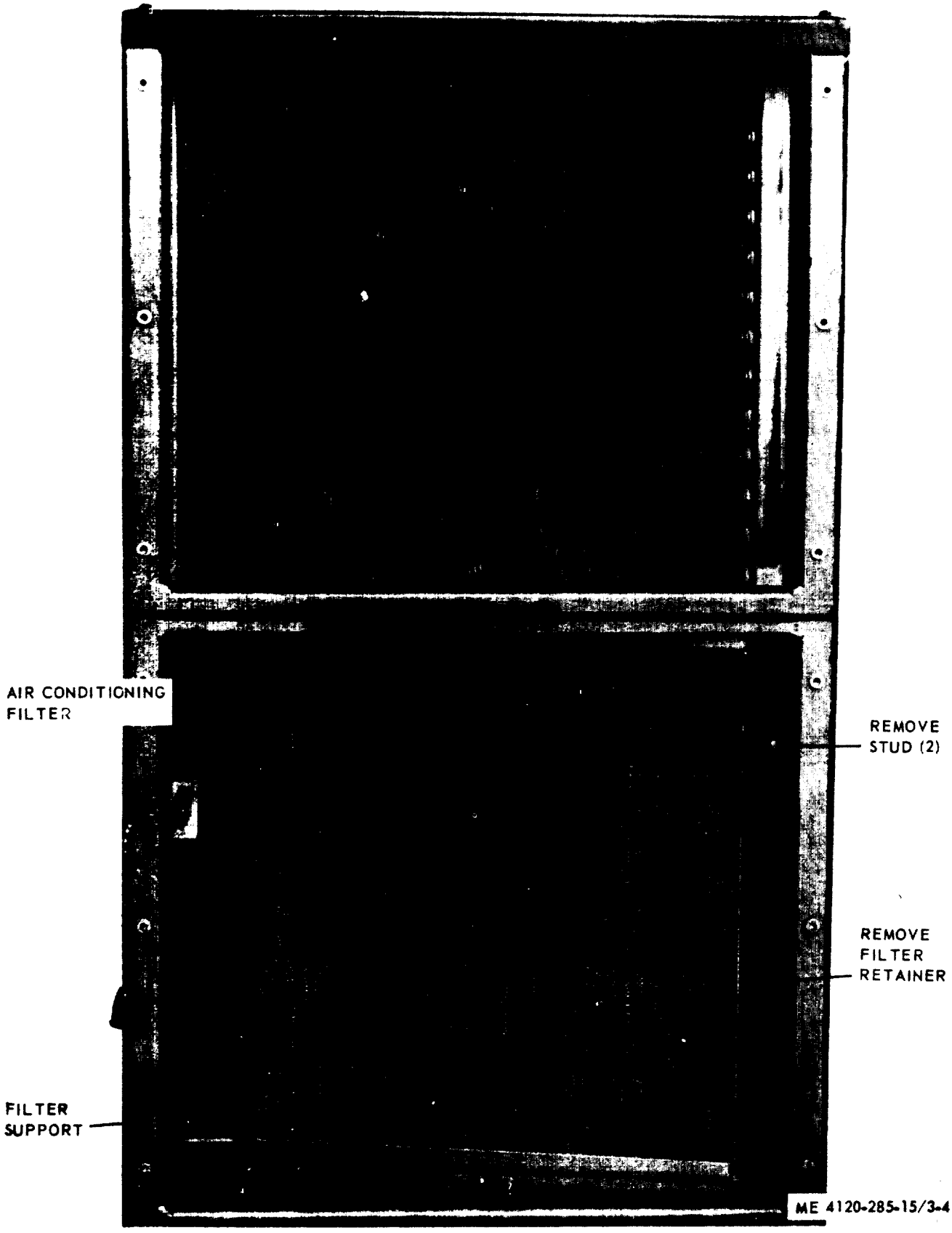


Figure 3-4. Air conditioning filter, removal and installation.

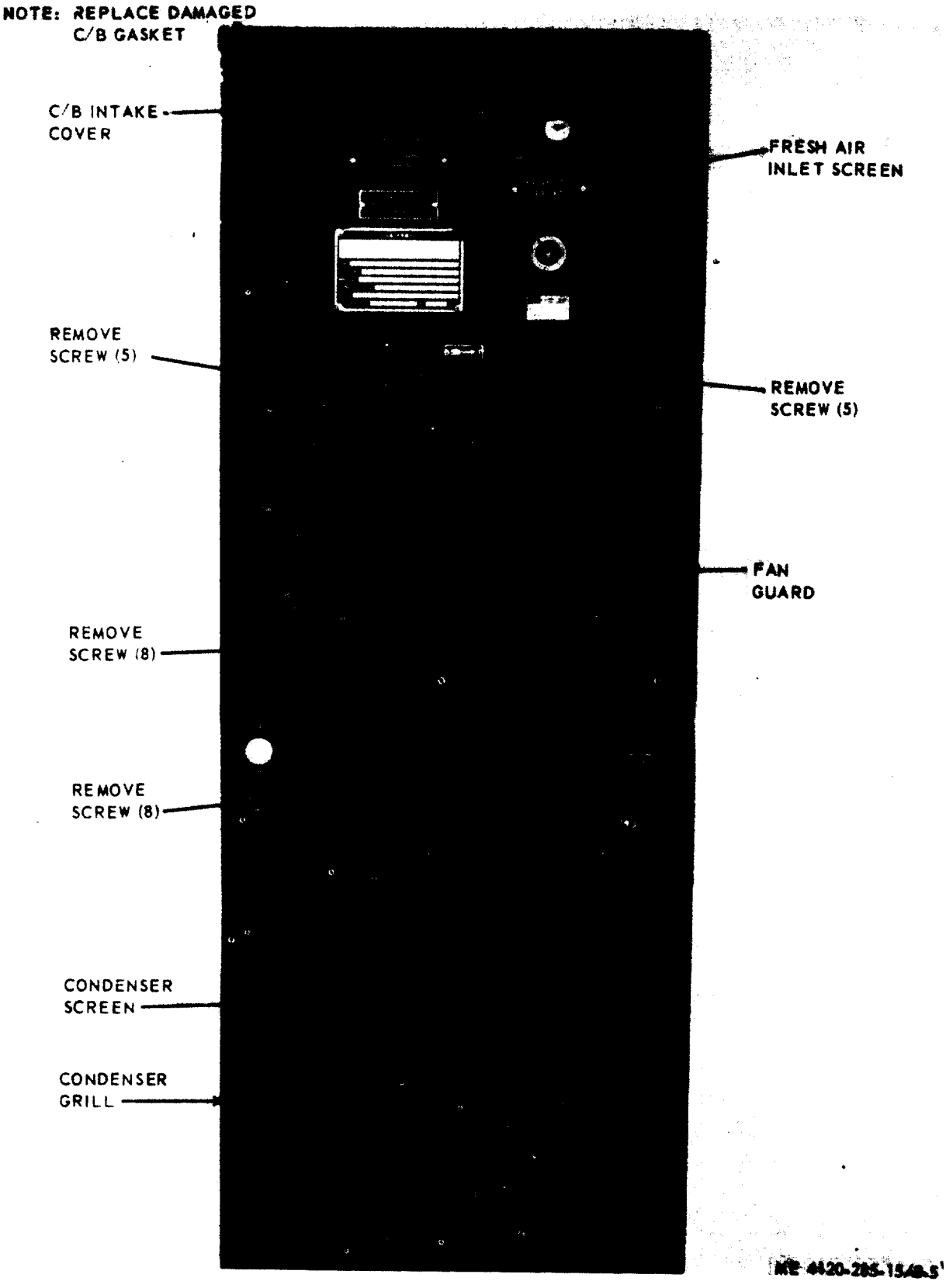


Figure 3-5. C/B cover, fan guard, condenser coil grill, and screen, removal and installation.

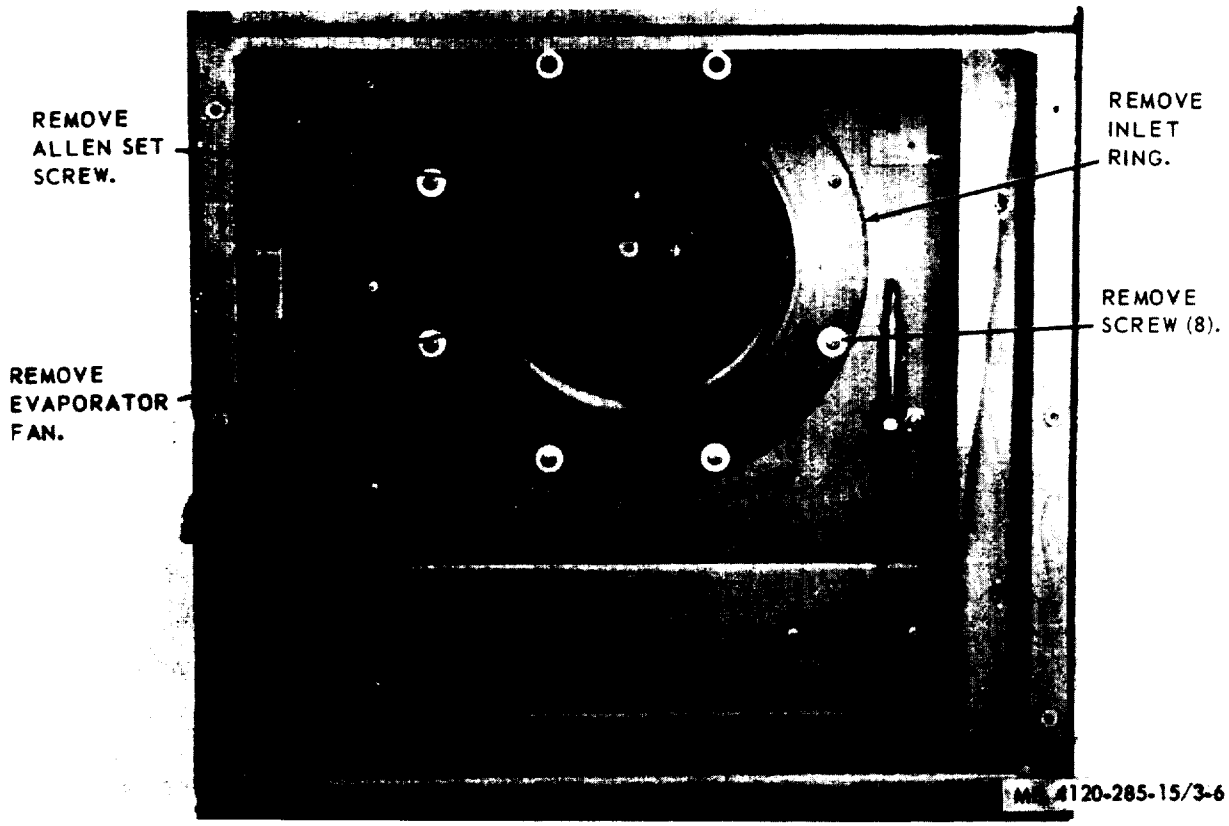


Figure 3-6. Evaporator fan and inlet ring, removal and installation.

(2) Inspect the fan for bent fins or other damage. Inspect the inlet ring for damage.

(3) Replace damaged components.

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

3-19. Condenser Fan

a. General. The condenser fan is of the air foil type to reduce noise and vibration. A baffle is mounted directly behind the fan.

b. Removal.

(1) Remove the air intakegrill (para 3-15).

(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 in place 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 condenser fan with an approved solvent.

(2) Inspect the fan for damage. Check the balance weights for secureness, tighten loose weights. Inspect motor shaft for gouging.

(3) Replace damaged fan.

d. Installation.

(1) Clean the motor shaft and use crocus cloth to remove any small scratches or burrs. Apply a light coat of thin oil to shaft.

(2) Position fan on shaft and push inward, being careful to maintain the fan 90° to shaft. Fan should be mounted with a 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 condenser grill.

3-20. Damper Door Controls

The damper door controls consists of a chain and spring assembly and will require little maintenance when properly handled. Should maintenance become necessary, remove the intake grill (para 3-15) and disconnect the chain from the spring and replace damaged components.

3-21. Electrical Wiring System

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

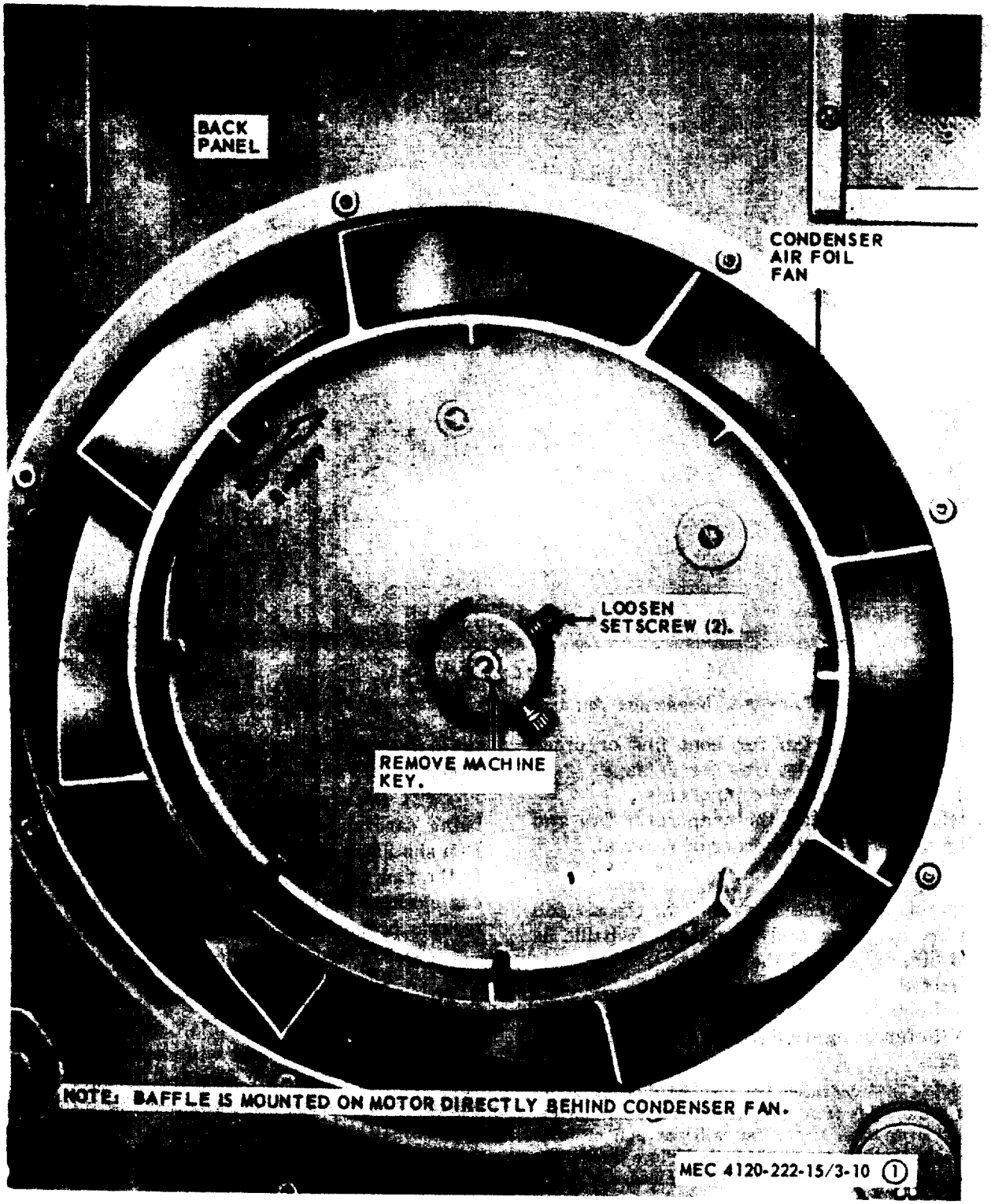


Figure 3-7. Condenser fan, removal and installation.

3-22. Blower Motor Assembly

a. On-Equipment Testing. Before removing the blower motor assembly it is wise to perform 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 cycle motor assembly should carry approximately 2.25 ohms. The 50/60 cycle motor assembly should carry approximately 4.7 ohms.

(2) Connect one multimeter lead to the

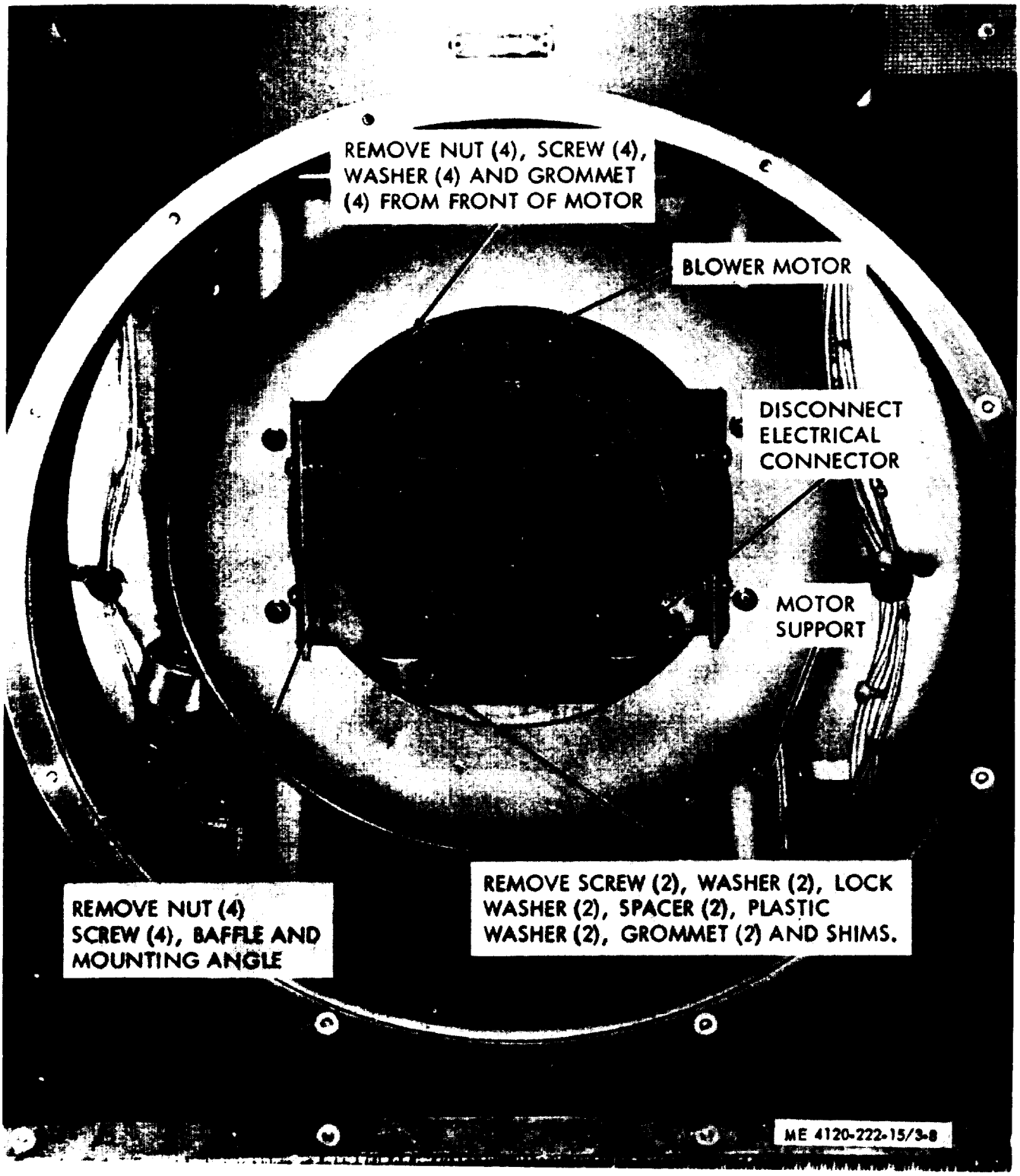


Figure 3-8. Blower motor assembly, removal and installation.

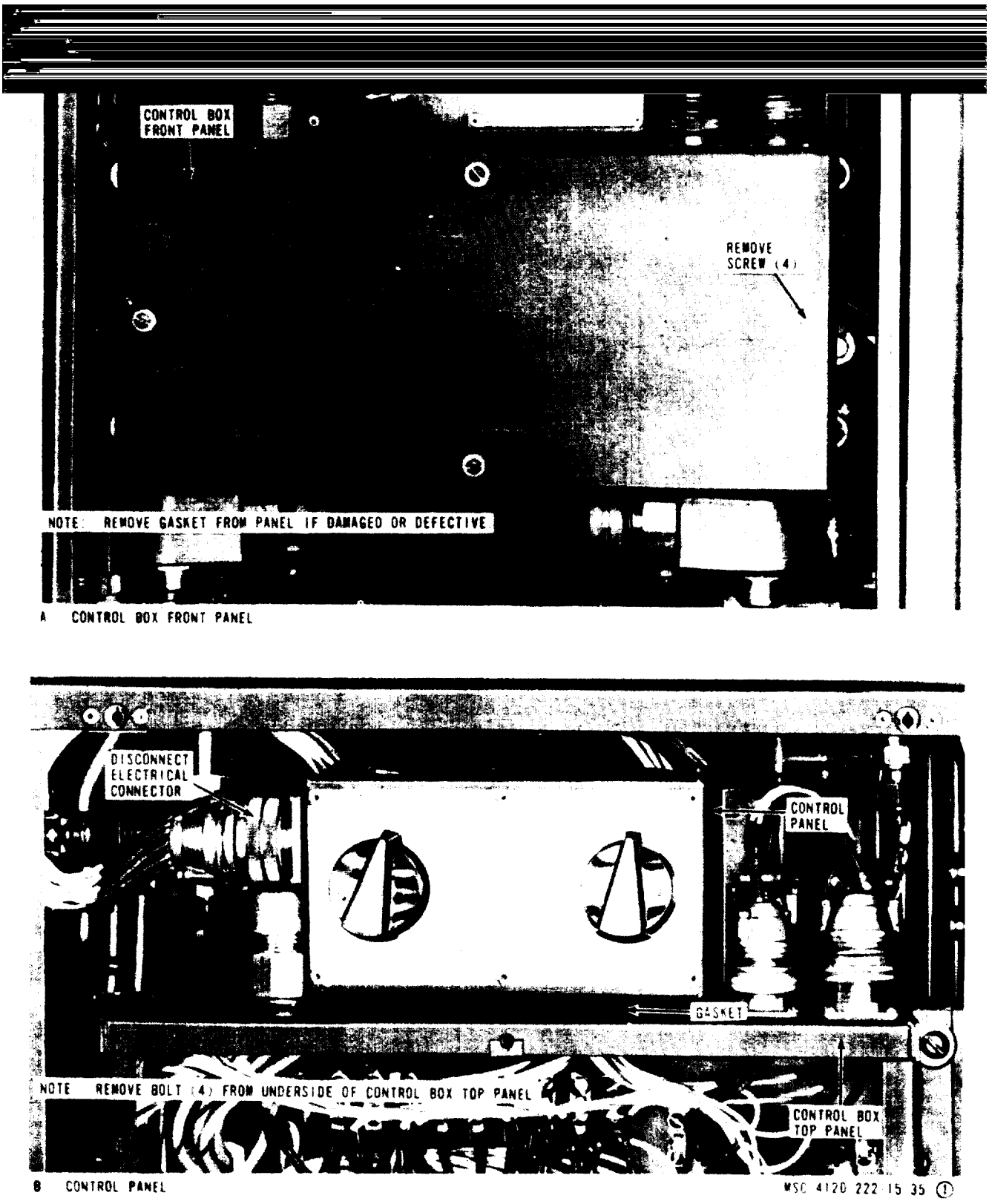


Figure 3-9 ①. Control panel assembly, removal and installation.

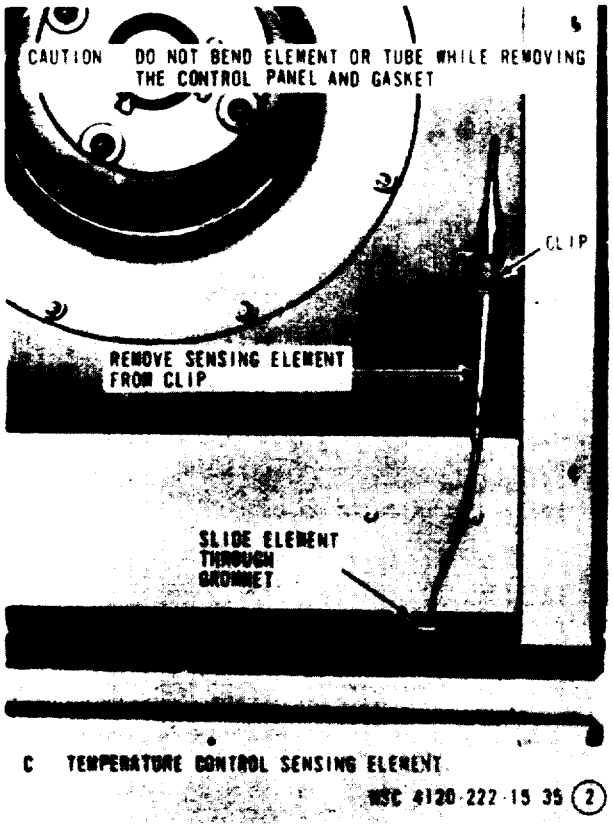


***Figure 3-9* @-Continued.**

motor assembly frame. Connect the other lead to any of the three receptacle pins, no continuity should exist (0 reading).

b. Removal.

(1) Remove the fan guard (para 3-17) and condenser fan (para 3-19).

(2) Remove the evaporator fan and inlet ring (para 3-18).

(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.

3-23. Connector Receptacles

The condenser receptacles are 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 in such manner as to assure clearances for future maintenance. Mount the receptacle connector and cover assembly.

3-24. Control Panel Assembly

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

b. Removal.

(1) Remove front access panel (para 3-15).

(2) Refer to figure 3-9 ① and remove the control box front panel.

(3) Refer to figure 3-9 ① and 3-9 ② and remove the control panel.

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

3-25. Control Box Assembly

a. General. The control box houses the fuses, phase sequence relay, high pressure cutout switch, terminal blocks, circuit breaker, rectifier, evaporator heater contactor, and compressor contactor.

b. Removal.

(1) Remove the front access panel (para 3–15).

(2) Remove the control box front panel and control panel assembly (para 3-24).

(3) Refer to figure 3-10 and remove the control box assembly.

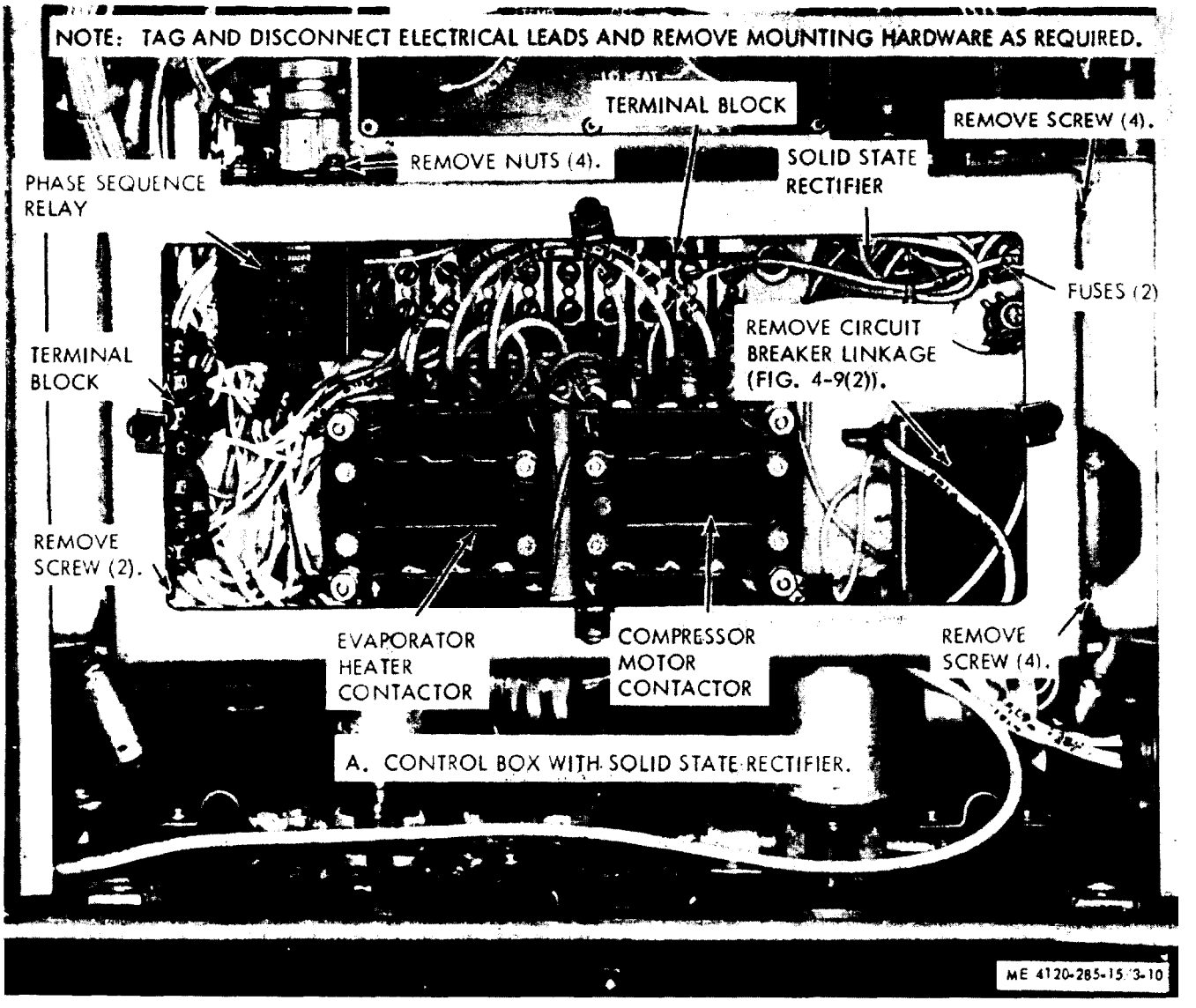


Figure 3-10. Control box assembly and component removal and installation.

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

3-26. 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 of current is 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 3-15) and the control box cover (para 3-24).

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

c. Removal. Refer to figure 3-10 and remove the phase sequence relay.

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

3-27. Circuit Breaker

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

b. Testing.

(1) Remove the front access cover (para 3-15) and control box cover (para 3-24).

(2) Refer to figure 3-10 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 the applicable wiring diagram (fig. 1-3 or 1–4) for contact points.

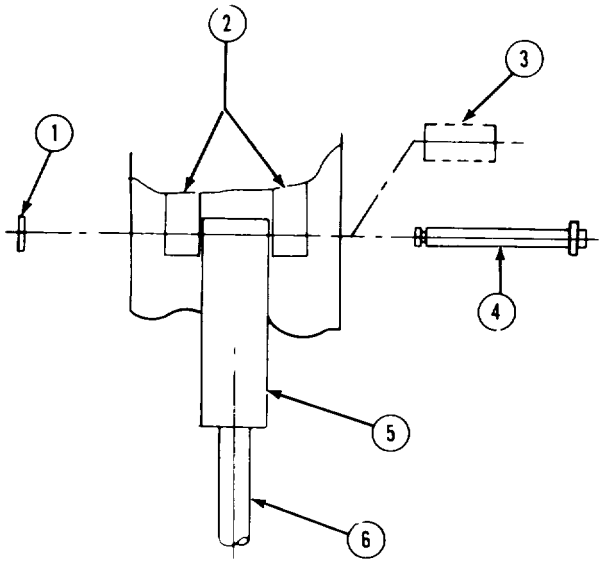
c. *Removal.* Refer to figure 3–10 and remove the circuit breaker. Refer to figure 3-11 and dis- the circuit breaker. Refer to figure 3–11 and disconnect the circuit breaker leads as follows:

(1) Remove snap ring (1, fig. 3-11) 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 cover, and front access cover by reversing the order of removal.



C. CIRCUIT BREAKER LINKAGE

MEC 4120-222-15 4-9 (2)

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

Figure 3-11. Circuit breaker linkage detail.

3-28. Rectifier

a. Testing.

(1) Remove the front access panel (para 3-15) and control box cover (para 3–24).

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

b. Removal. Refer to figure 3–10 and remove the rectifier.

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

3-29. Terminal Blocks

a. Remove the front access panel (para 3–15) and control box cover (para 3–24).

b. Refer to figure 3–10 and remove the terminal blocks.

3-30. Compressor and Heater Contactors

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

b. Removal.

(1) Remove the front access panel (para 3–15) and the control box front cover (para 3-24).

(2) Refer to figure 3-10 and remove the contractors.

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

3-31. 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 50° F. when low condensing and suction and suction pressures will hamper system operation.

b. Removal.

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

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

(3) Remove the two screws mounting thermostat to housing. Remove outdoor thermostat.

c. Testing. Test the thermostat for continuity with a multimeter set on the ohms scale. Refer to the applicable wiring diagram (fig. 1–3/1–4) for points to establish contact.

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

3–32. Fuse Service

a. There are two 5–ampere fuses located in the control box in the upper right hand corner.

b. Removal. Remove front access panel (para 3–15) and control box cover (para 3–24). Remove fuses from fuse holder and replace as required.

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

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 waterproof material. For long distance movement, crate the unit securely.

4-2. Limited Storage

Refer to TM 740-90–1 for administrative (limited) storage procedures.

Section II. DEMOLITION

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 in 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 grills. Fire several rounds of large caliber ammunition at vital parts, ie, 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 components 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, GENERAL SUPPORT, AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

5-1. Scope

The following instructions are provided for direct support, general support, and depot 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 TM 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, general support, or depot maintenance on the air conditioners.

5-6. Direct Support, General Support, and Depot Maintenance Repair Parts

Refer to TM 5-4120-286-25P for the illustrated listing of direct support, general support, and depot maintenance repair parts.

5-7. Specially Designed (fabricated) Tools and Equipment

There are no specially designed tools or equipment required to perform direct support, general support, or depot maintenance 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 probably 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.

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 5-23).
	b. Compressor defective.	b. Replace compressor (para 5-23).
	c. Temperature control defective.	c. Replace temperature control (para 6-3).
2. Compressor starts but fails on overload.	a. Expansion valve defective or incorrectly set superheat.	a. Replace valve if correct adjustment cannot be obtained (para 5-14) 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 5-23).
	d. Defective liquid line bypass or liquid line solenoid valves.	d. Test control coils (para 6-16 or 5-17), check valves for positive opening and closing. Replace coils or valves if defective.
3. Suction pressure too low.	Dehydrator defective.	Replace dehydrator (para 5-18).
4. Discharge pressure inadequate.	Compressor defective.	Replace compressor (para 6-29).
5. Suction pressure high.	a. Liquid line solenoid valve defective.	a. Replace solenoid valve (para 5-17).
	b. Hot gas bypass valve defective.	b. Replace bypass valve (para 5-16).
	c. Compressor defective.	c. Replace compressor (para 5-23).
	d. Pressure regulating valve inoperative.	d. Adjust or replace regulating valve (para 5-19).
	e. Frost on the evaporating coil.	e. Test pressure regulating valve, adjust or replace defective valve (para 5-19).
6. Discharge pressure high.	Overcharge of refrigerant.	Remove smal] 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 5-23).
9. System losing cooling capacity	System pressure inadequate.	Refer to instructions below:

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. 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 below:

Table 5-2. Normal Operating Pressures

90° F Dry bulb return air to unit				
Outdoor ambient temperature	50° F.	75° F.	100° F.	125° F.
Normal gage pressure				
Suction	50-60	56-65	65-75	75-90
Discharge	135–155	185-205	275-295	400-420
80° F Dry bulb return air to unit				
Outdoor ambient temperature	50° F.	75° F.	100° F.	125° F.
Normal gage pressure				
Suction	40-50	45-55	55-65	65-75
Discharge	130–150	180-200	270-290	390-410

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

5-10. 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, general support, and depot 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 convenience 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 grill through motion of the evaporator and condenser fans. If the temperature falls below the set point of the temperature control, the control contacts close energizing the evaporator heater contractor, 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 and condenser fans.

(e) Placing the selector switch in the COOL position energizes the blower motor and the compressor contractor. 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, de-energizing 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 suction pressure from decreasing to a temperature which corresponds to a pressure of less than 32° F.

e. *Heating Operation.* Placing the selector in the LO-HEAT position actuates half of the evaporator 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, open the discharge service valve and relieve the system pressure. Connect a hose line to the suction service valve (para 6-1) and purge the refrigerant to an outside area.

(2) After purging the system allow the tubing to warm to the ambient temperature before 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

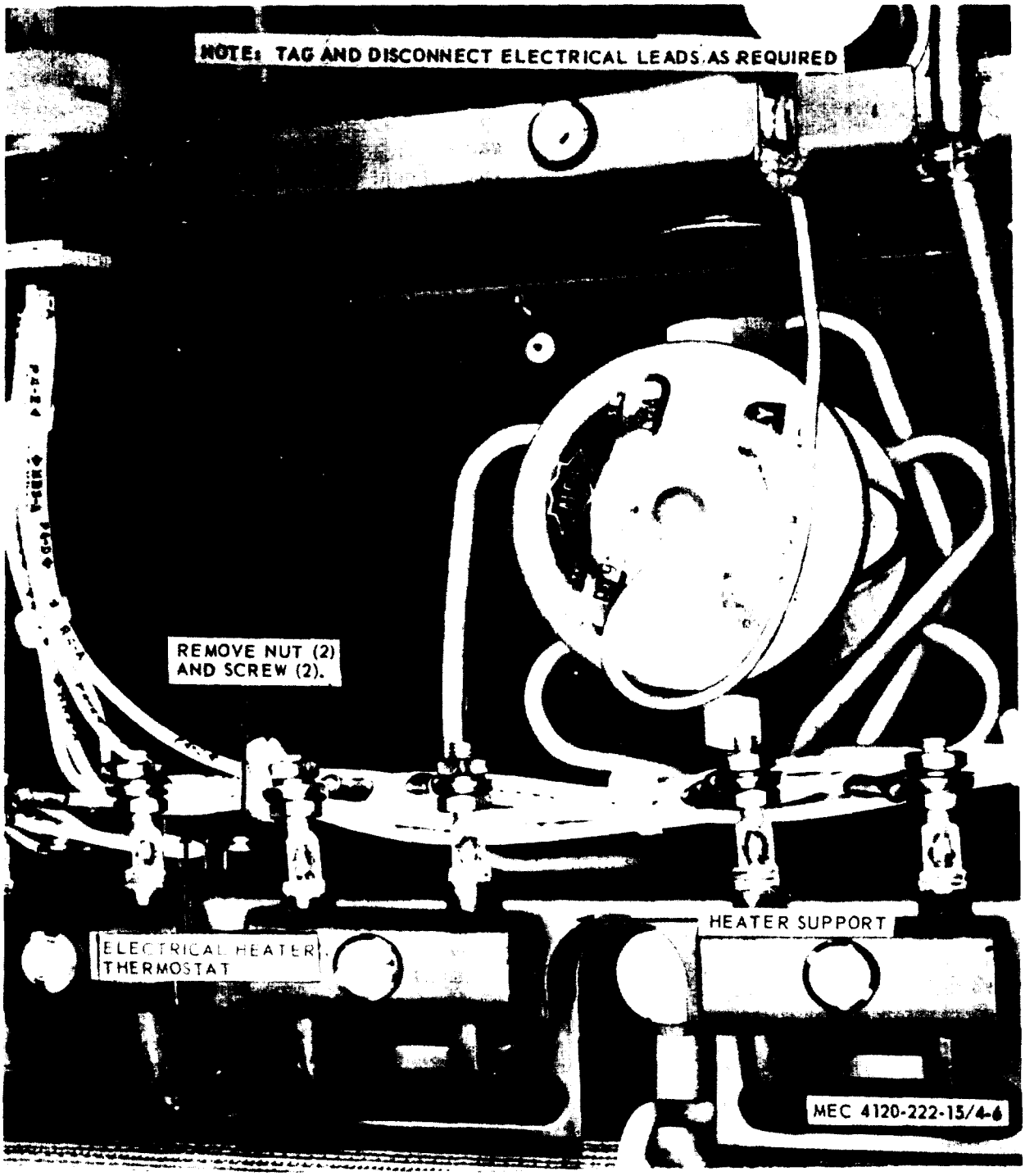


Figure 5-1. Electric heater thermostat, removal and installation.

entry of contaminants and moisture into the system.

(3) Use a silver solder on all soldered connections. Use of a solder of 50 per cent silver capacity and a melting point of approximately 1160° F. is recommended. Continually pass dry nitrogen through the tubing or connection being soldered.

5-11. Electric Heater Thermostat

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

b. Removal. Refer to figure 5-1 and remove the electric heater thermostat.

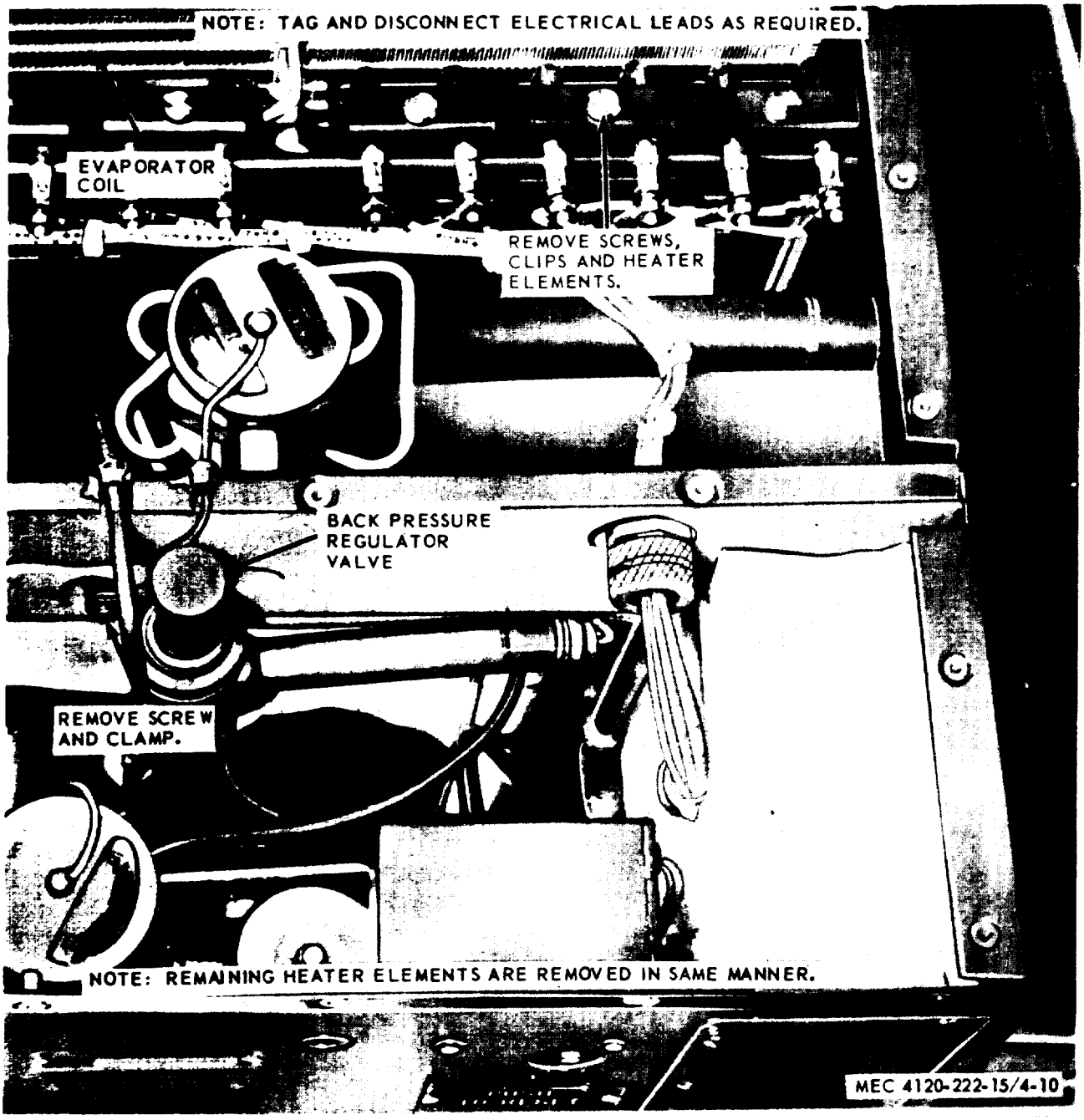


Figure 5-2. Electric heater elements and back pressure regulating valve, removal and installation.

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

5-12. Electric Heater Elements

a. General. The two banks of electrical resistance 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 3-15).

(2) Refer to figure 5-2 and remove the electric heater elements.

c. Installation. Install the electric heater elements be reversing the order of removal.

5-13. Back Pressure Regulating Valve

a. General. The back pressure regulating valve controls the refrigerant pressure in the evapora-

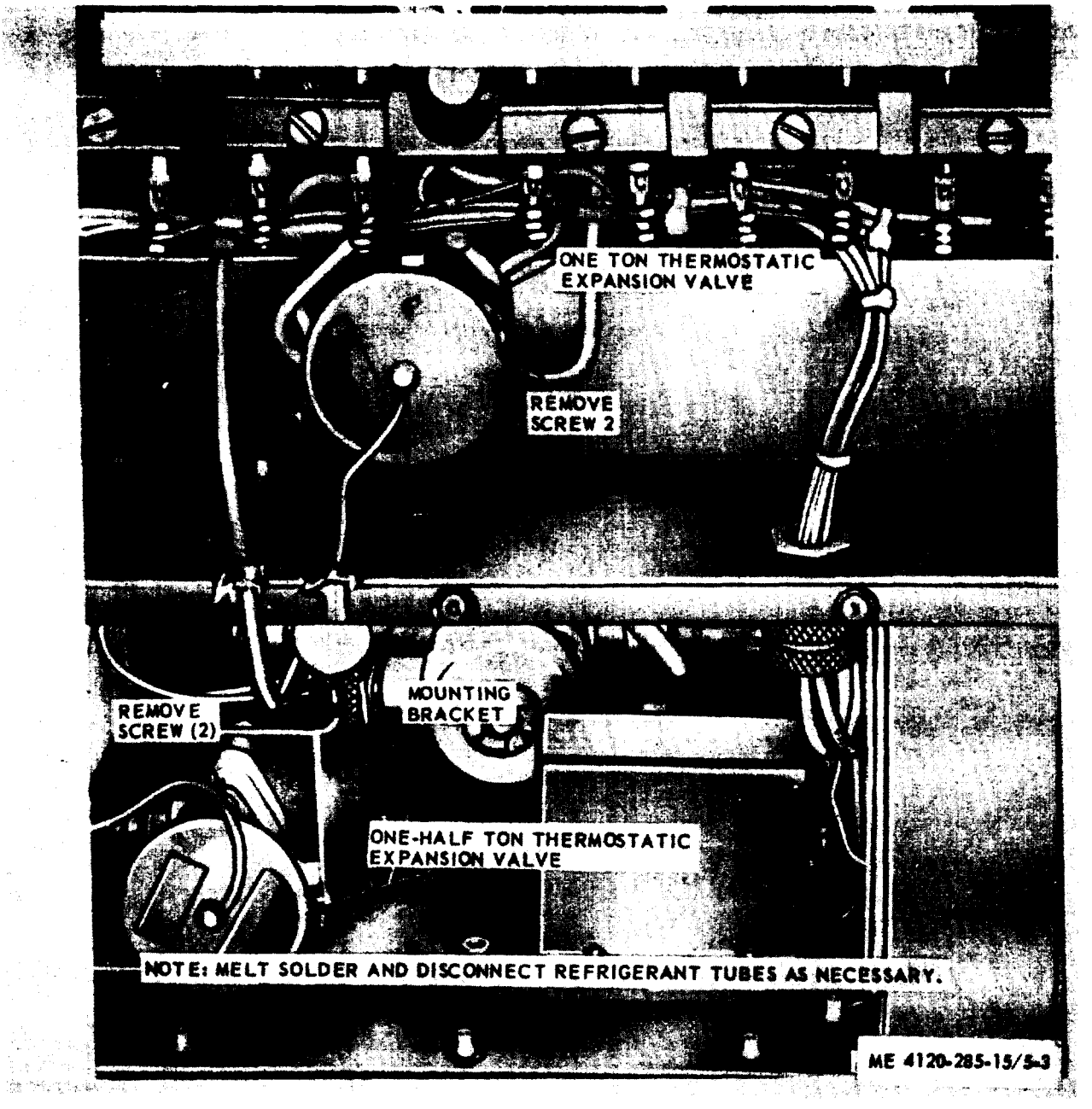


Figure 5-3. Thermostatic expansion valves, removal and installation.

tor 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 preset 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 gage to read suction pressure.Turn screw clockwise to raise pressure and counterclockwise to reduce pressure.

c. Removal.

(1) Remove top cover from unit.

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

(3) Refer to figure 5-2 and remove the back pressure regulating valve.

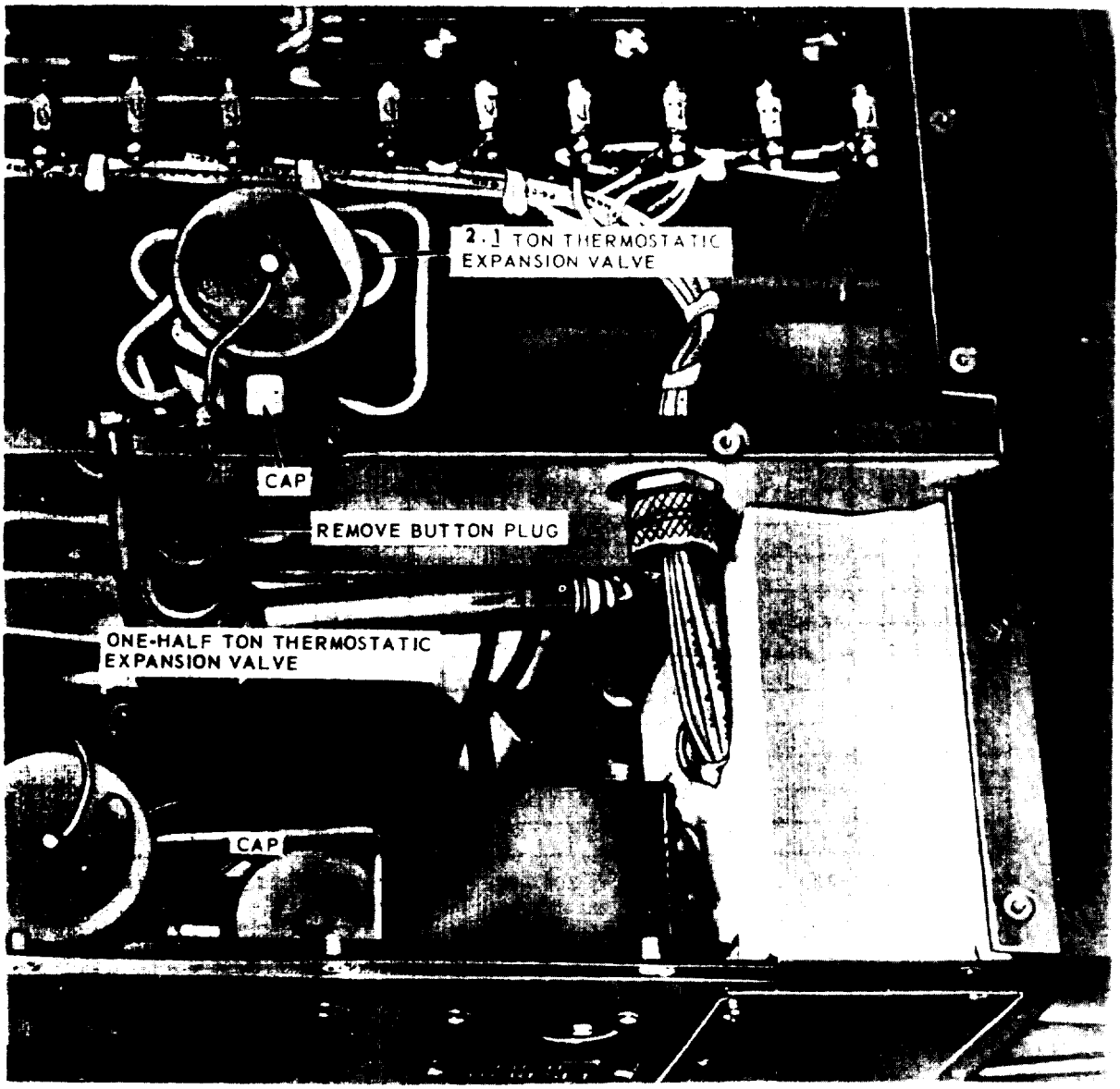
d. Installation.

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

(2) Replace the dehydrator (para 5-18).

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

CAUTION: NEVER ADJUST THE EXPANSION VALVE UNLESS IT IS ABSOLUTELY NECESSARY. WHEN ADJUSTING THE EXPANSION VALVE, ALLOW AT LEAST 20 MINUTES BETWEEN EACH ADJUSTMENT. THIS TIME ELEMENT IS VERY IMPORTANT AND MUST BE OBSERVED.



ADJUSTMENT:

STEP 1. TAPE THE BULB OF A THERMOMETER TO SUCTION TUBE NEAR SENSING ELEMENT. INSULATE THERMOMETER BULB.

STEP 2. INSTALL A SUITABLE PRESSURE GAGE AT SUCTION TUBE SERVICE VALVE.

STEP 3. OPERATE THE UNIT (PAR. 2-11) FOR APPROXIMATELY 30 MINUTES. THERMOMETER READING MUST STABILIZE). (Cooling cycle only).

STEP 4. CHECK THERMOMETER AND PRESSURE GAGE READINGS. COMPARE READINGS WITH FIGURE 5-5. THERMOMETER READING SHOULD BE APPROXIMATELY 10° F HIGHER THAN TEMPERATURE GIVEN ON FIGURE.

STEP 5. REMOVE BUTTON PLUG (SHOWN ABOVE). REMOVE CAP AND TURN ADJUSTING SCREW ONE TURN CLOCKWISE TO INCREASE SUPERHEAT 4°F. OR ONE TURN COUNTERCLOCKWISE TO DECREASE SUPERHEAT. INSTALL CAP. INSTALL BUTTON PLUG.

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Figure 5-4. Thermostatic expansion valve adjustment procedure.

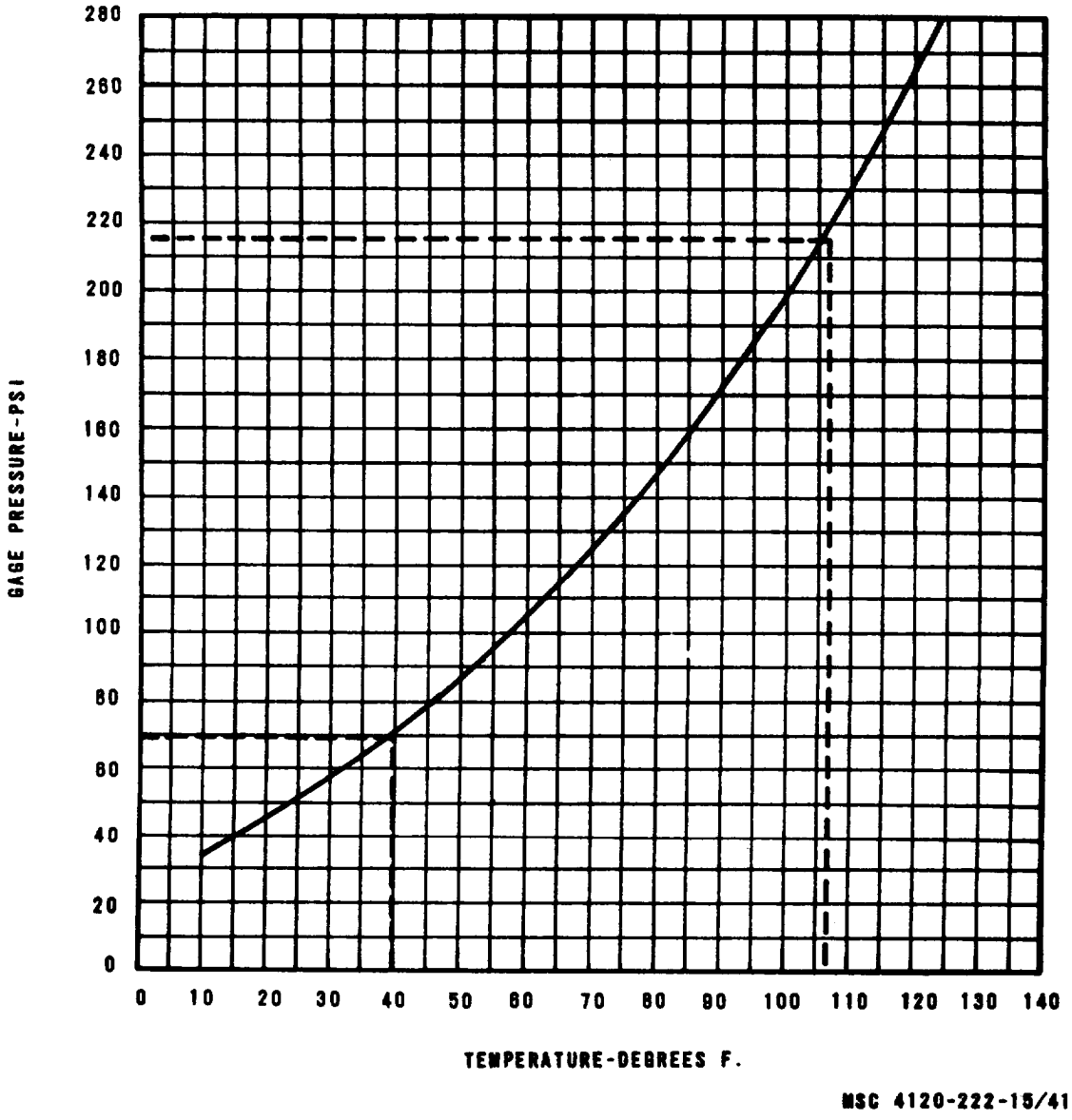


Figure 5-5. Pressure-temperature curve.

5-14. Thermostatic Expansion Valves

a. *General.* A 2.1 ton thermostatic expansion valve controls the flow of liquid refrigerant into the evaporator coil during the cooling cycle. The one-half 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.

b. Removal.

(1) Remove top cover (para 3-15).

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

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

c. Adjustment.

Caution: **Never adjust the expansion valve unless it is absolutely necessary. Refer to figure 5-4 and adjust the thermostatic expansion valves.**

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 5-18).

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

5-15. High Pressure Cutout Switch

a. General. The high pressure cutout switch

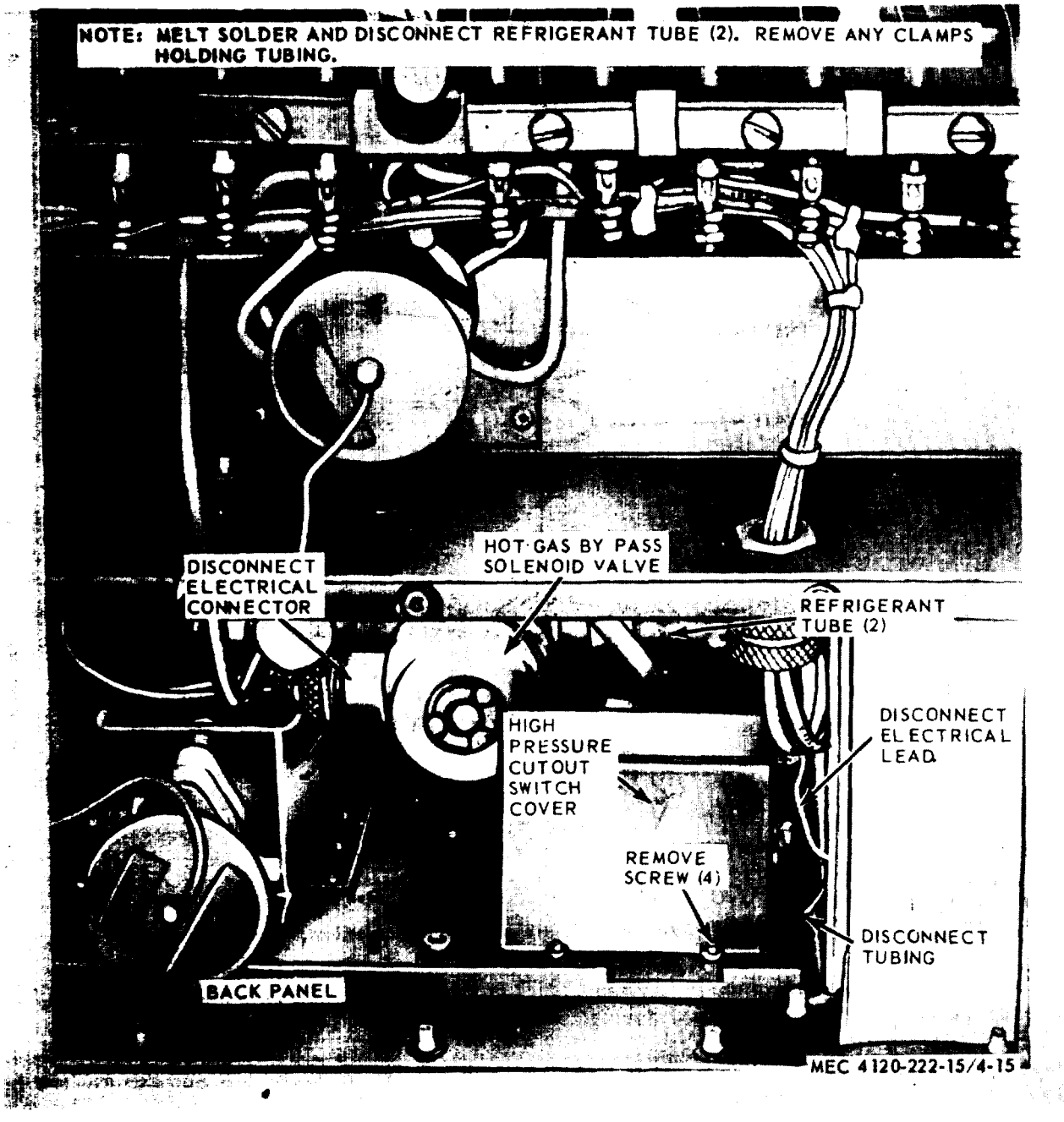


Figure 5-6. High pressure cutout switch and hot gas bypass solenoid valve, removal and installation.

prevents operation of the compressor when the system pressure exceeds 445 PSIG.

b. Removal.

(1) Relieve the system pressure and discharge refrigerant (para 6-1).

(2) Remove top cover (para 3-15).

(3) Refer to figure 5-6 and remove the high pressure cutout switch.

c. Testing Procedure. Test for continuity with a multimeter set on the ohm scale. Refer to the wiring diagram for points to establish contact. If no continuity is indicated, push the reset button. Replace a defective switch.

d. 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).

5-16. Hot Gas Bypass Solenoid Valve

a. General. The hot gas bypass valve is automatically operated by the solenoid unit and con-

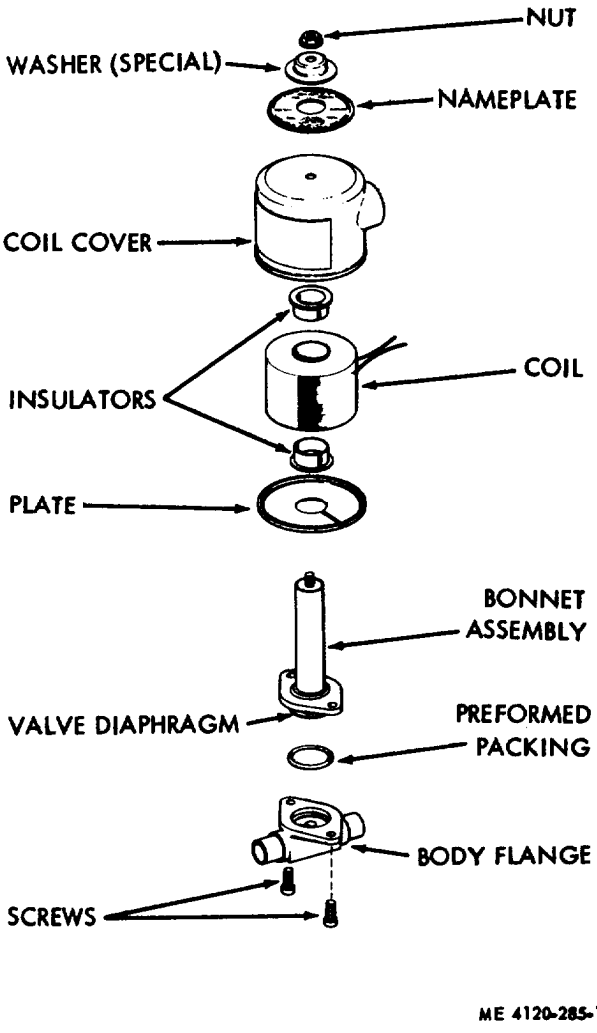


Figure 5-7. Solenoid valve, disasseembly and reassembly.

trols the flow of refrigerant through the system when it is in the bypass circle. It is closed during the cooling cycle of operation.

b. On-Equipment Testing.

(1) Remove the top cover (para 3-15).

(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 5–13) 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 5–6 and remove the electrical leads. Test the valve termi. nals for continuity with a multimeter set on the ohm scale. Continuity should exist between contacts. Connect one coil lead to the air conditioner casing and the other end to either coil lead, continuity should not exist.

c. Removal and Disassembly.

(1) Remove top cover (para 3-15).

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

(3) Refer to figure 5-6 and remove the hot gas bypass valve.

(4) Refer to figure 5-7 and disassemble the hot gas bypass valve.

(5) Remove the tubing from valve body.

d. Reassembly.

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

(1) Solder the tubing to the valve body.

(2) Complete reassembly of the hot gas bypass valve by reversing the order of disassembly.

e. Installation.

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

(2) Replace the top cover (para 3-15).

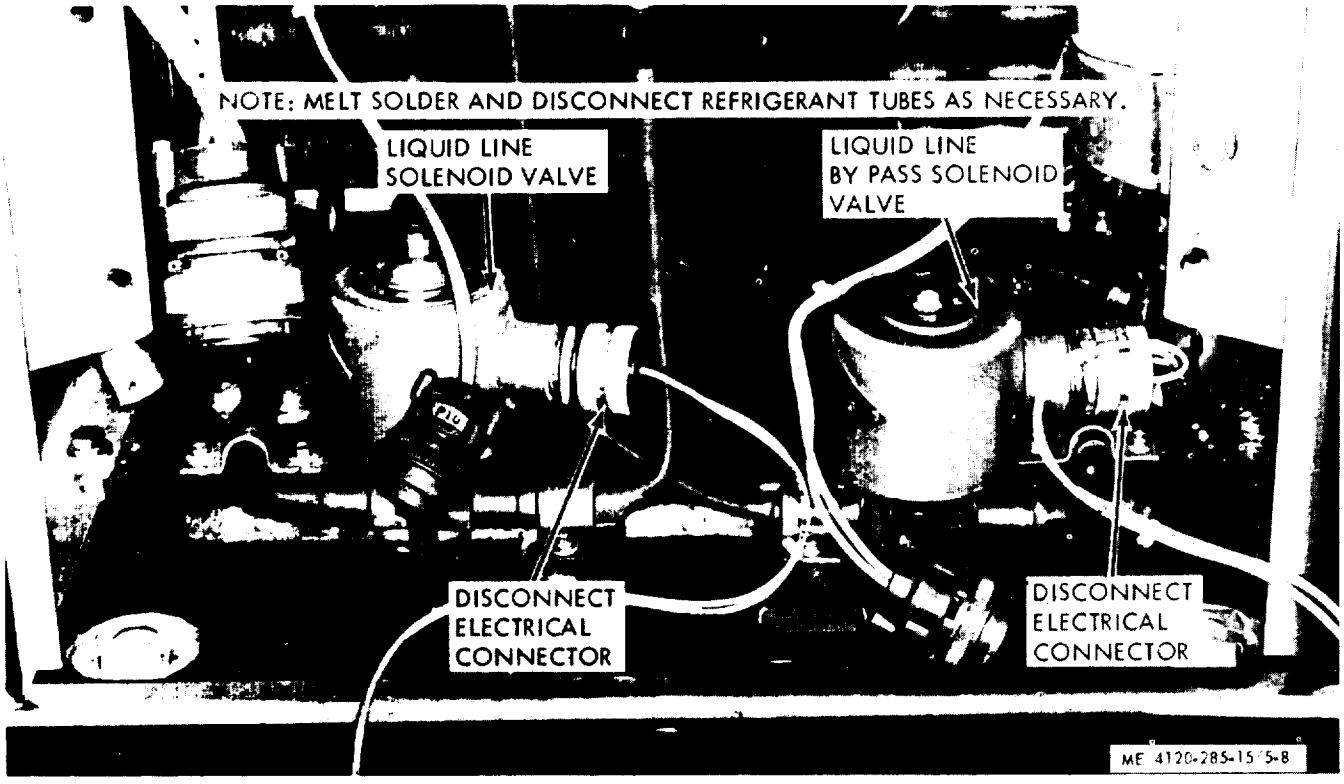


Figure 5-8. Liquid line solenoid valve and liquid line bypass solenoid valve, removal and installation.

(3) Replace the dehydrator (para 5-18).

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

5-17. 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 valve (para 5-16).

b. Removal and Disassembly.

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

(2) Remove the front access panel (para 3-15).

(3) Refer to figure 5-8 and remove the liquid line solenoid valves.

(4) Refer to figure 5-9 and disassemble the liquid line solenoid valves. Do not apply heat to assembled valve.

(5) Disconnect tubing from body.

c. Reassembly.

(1) Solder tubing to body.

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

d. Installation.

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

(2) Replace the dehydrator (para 5-18).

(3) Replace the front access panel (para 3-15).

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

5-18. 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.

b. Removal.

(1) Remove the front access panel.

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

(3) Refer to figure 5-10 and remove the dehydrator.

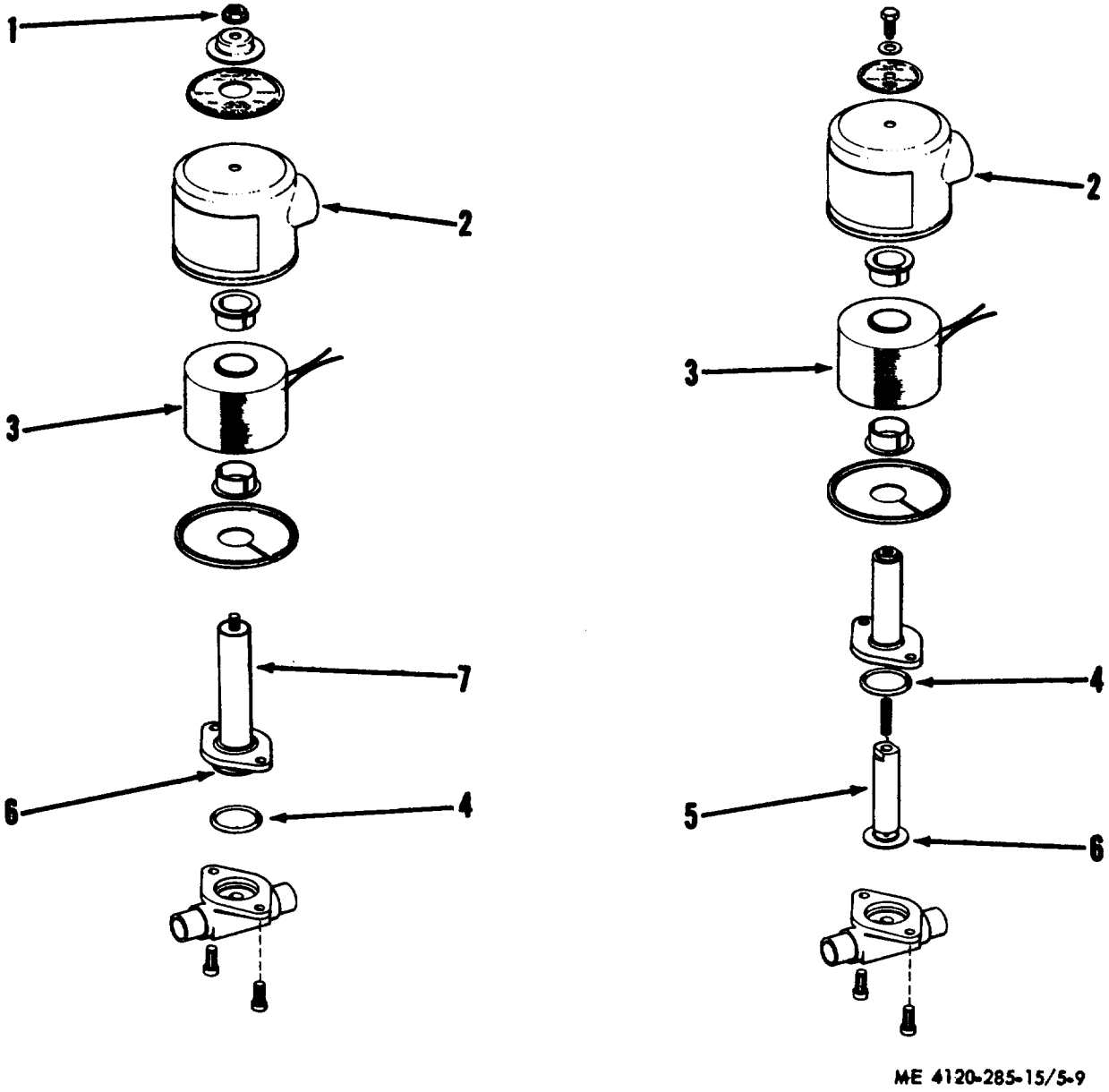
c. Installation.

(1) Install the dehydrator and access panel by reversing the order of removal.

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

5-19. Pressure Relief Valve

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



1 Cover retaining nut
2 Coil cover
3 Solenoid coil
4 Preformed packing
5 Solenoid plunger
6 Flat diaphragm valve
7 Bonnet assembly

Figure 5-9. Liquid line solenoid valve and liquid line bypass valve, disassembly and reassembly.

b. Removal.

(1) Remove the front access panel (para 3-15).

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

(3) Refer to figure 5-10 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 5-18).

(3) Replace the front panel (para 3-15).

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

5-20. Sight Glass

a. Removal.

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

(2) Remove top cover (para 3-15).

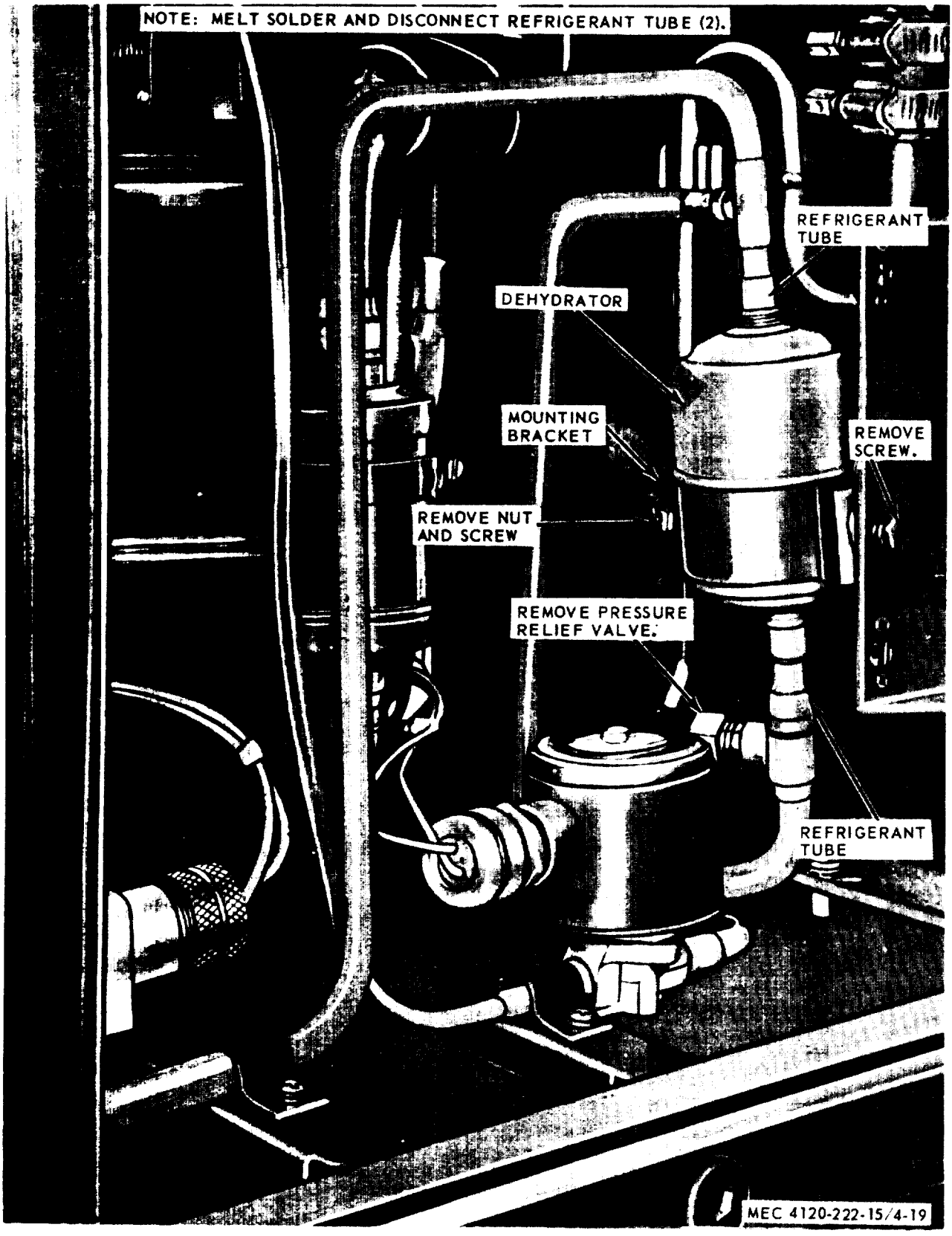


Figure 5–10. Dehydrator and pressure relief valve, removal and installation.

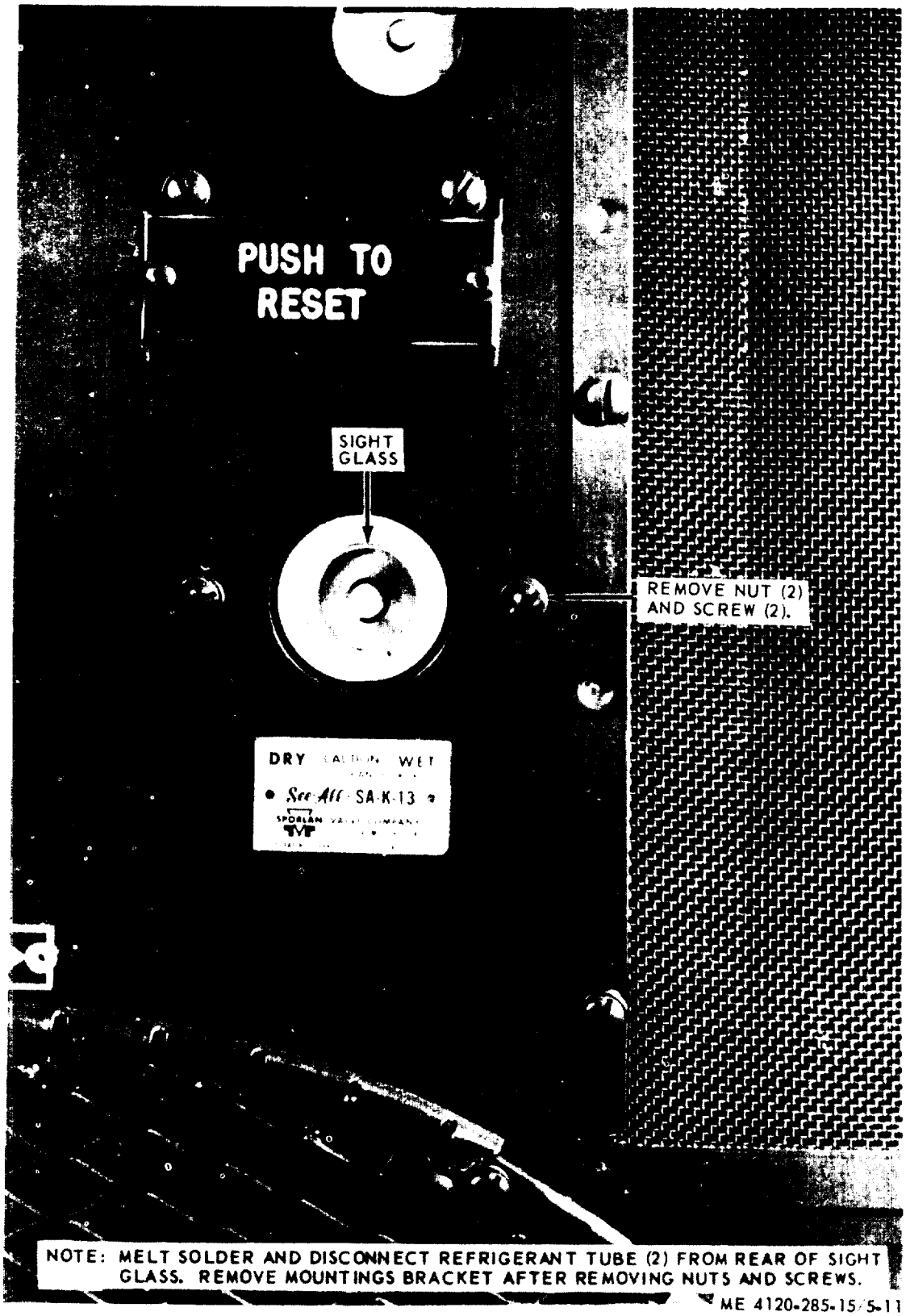


Figure 5-11. Sight glass, removal and installation.

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

(4) Refer to figure 5-11 and remove the sight glass.

b. Installation.

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

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

(3) Replace dehydrator (para 5-18).

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

(5) Replace top cover (para 3-15).

5-21. Evaporator Coil

a. General. The evaporator coil is mounted on the casing directly behind the discharge grill.

b. Removal.

(1) Remove the discharge grill and top cover.

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

(3) Refer to figure 5-12 and remove the evaporator coil.

c. Cleaning, Inspection, and Repair.

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

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

(3) Use needle nosed pliers to straighten fins, replace coil with damaged coil runs or internal leak.

d. Installation.

(1) Install evaporator coil by reversing the order of removal. Replace top cover (para 3-15).

(2) Replace dehydrator (para 5-18).

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

(4) Service coil (para 3-7) and replace grill.

5-22. Condenser Coil

a. General. The condenser coil is located at the rear of the lower compartment.

b. Removal.

(1) Remove condenser grill and screen (para 3-17).

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

(3) Carefully sweat the coil connections loose.

(4) Refer to figure 5–13 and remove the condenser coil.

c. Cleaning, Inspection, and Repair. Clean, inspect and repair the condenser coil in same manner as outlined in paragraph 5-21.

d. Installation.

(1) Install condenser coil by reversing the order of removal.

(2) Replace dehydrator (para 5-18).

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

(4) Service coil (para 3-7) and replace the screen and grill (para 3-17).

5-23. Compressor/Motor Assembly

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. The compressor motor is hermetically sealed and is 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 has been a burnout and 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 5-24 for burnout clean up 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 subparagraph *b* below.

b. Resistance Measurements.

(1) Model *6V20.*

(a) Remove the front access panel (para 3-15).

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

(2) *Model 4VZ0.*

(a) Remove the front access panel (para 3-15).

(b) Check the terminal to terminal resistance as indicated in (1) (b) above. Reading should be 0.387 ohms at 25° C. with a tolerance of 7 per cent.

c. Removal.

(1) Remove the front access panel (para 3-15).

(2) Clean the area surrounding the replacement compressor motor assembly with an approved solvent and dry thoroughly.

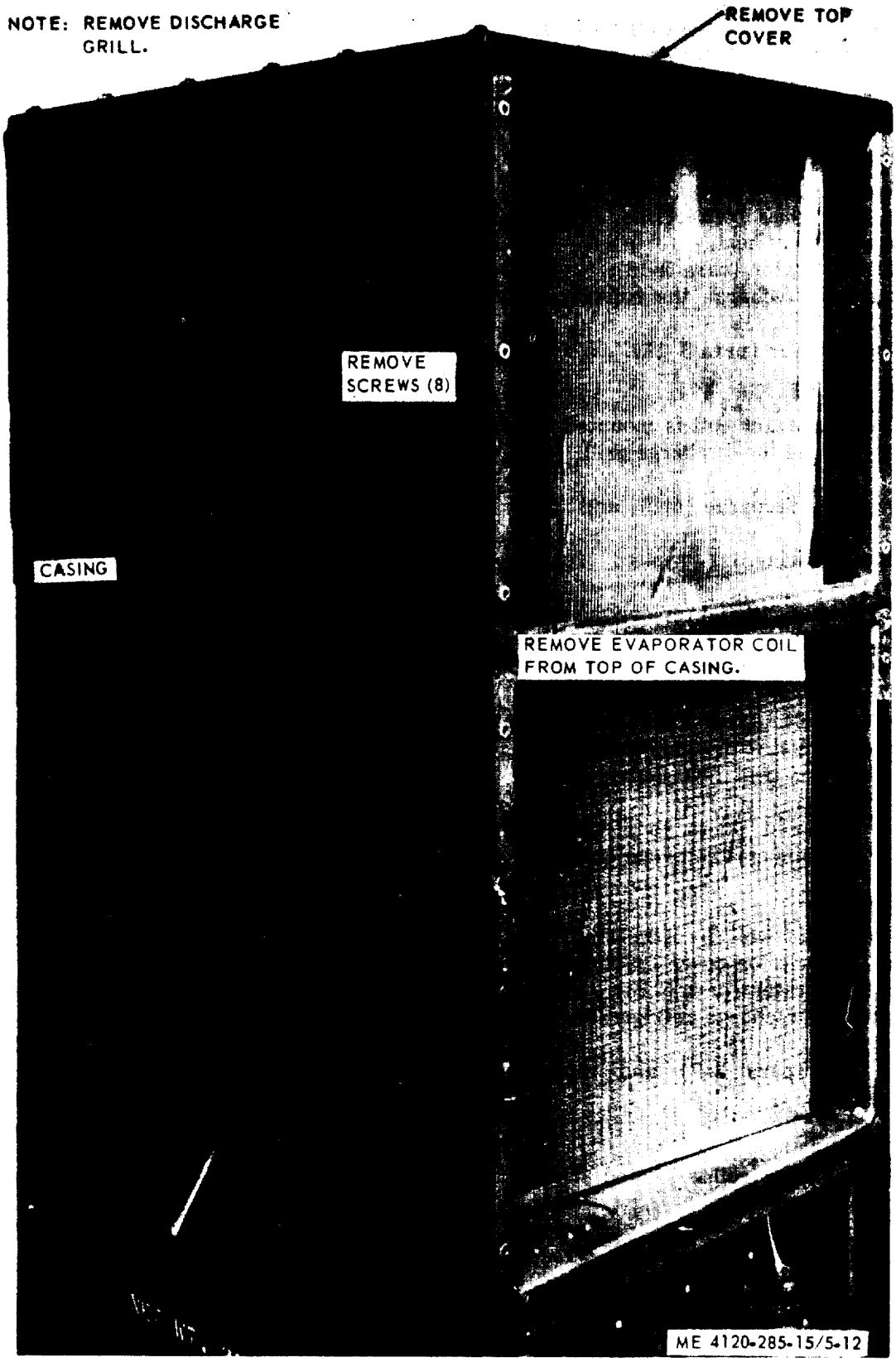


Figure 5–12. Evaporator coil, removal and installation.

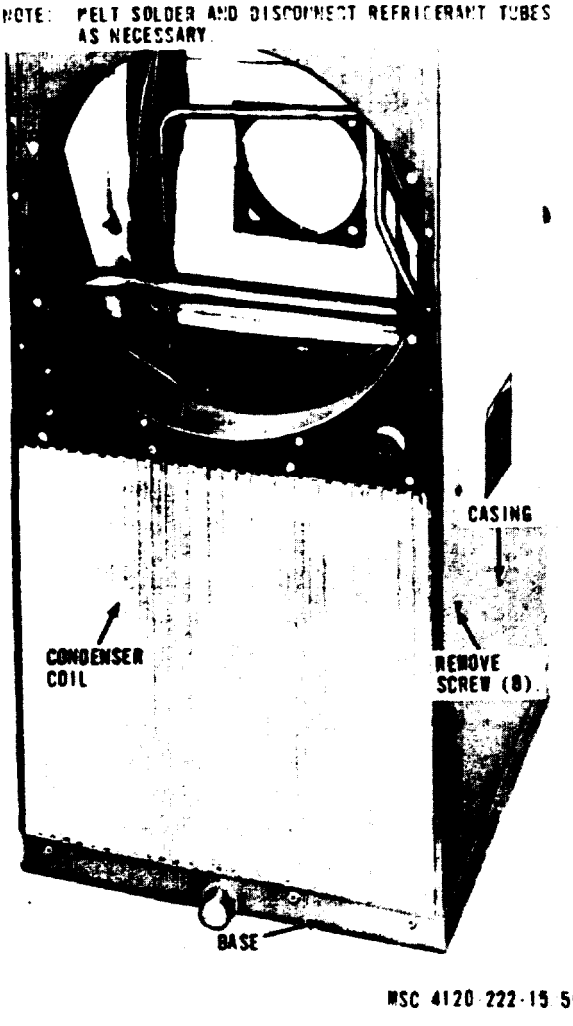


Figure 5–13. Condenser coil, removal and installation.

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

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

(4) Refer to figure 5-14 and remove the compressor/motor unit. Use extreme care when sweating the connections loose.

d. Installation.

(1) Install the compressor/motor unit by reversing the order of removal.

(2) Replace the dehydrator (para 5-18).

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

(4) Replace the front access panel (para 3-15).

5-24. Compressor/Motor Burnout Clean Up 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. Clean Up Procedure. Make certain that a burnout has occurred. A motor that fails to start may be due to improper voltage *or* a malfunction of the motor starter, or a compressor mechanical fault.

(1) To check for proper voltage, turn off the main disconnect switch so that all power is off.

(2) Remove the front access panel (para 3-15).

(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. Otherwise a false indication may be obtained due to *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 ohmeter 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 ohmeter 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 ohmeter 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 necessary to come in contact with oil or sludge from a burned out compressor, ap-

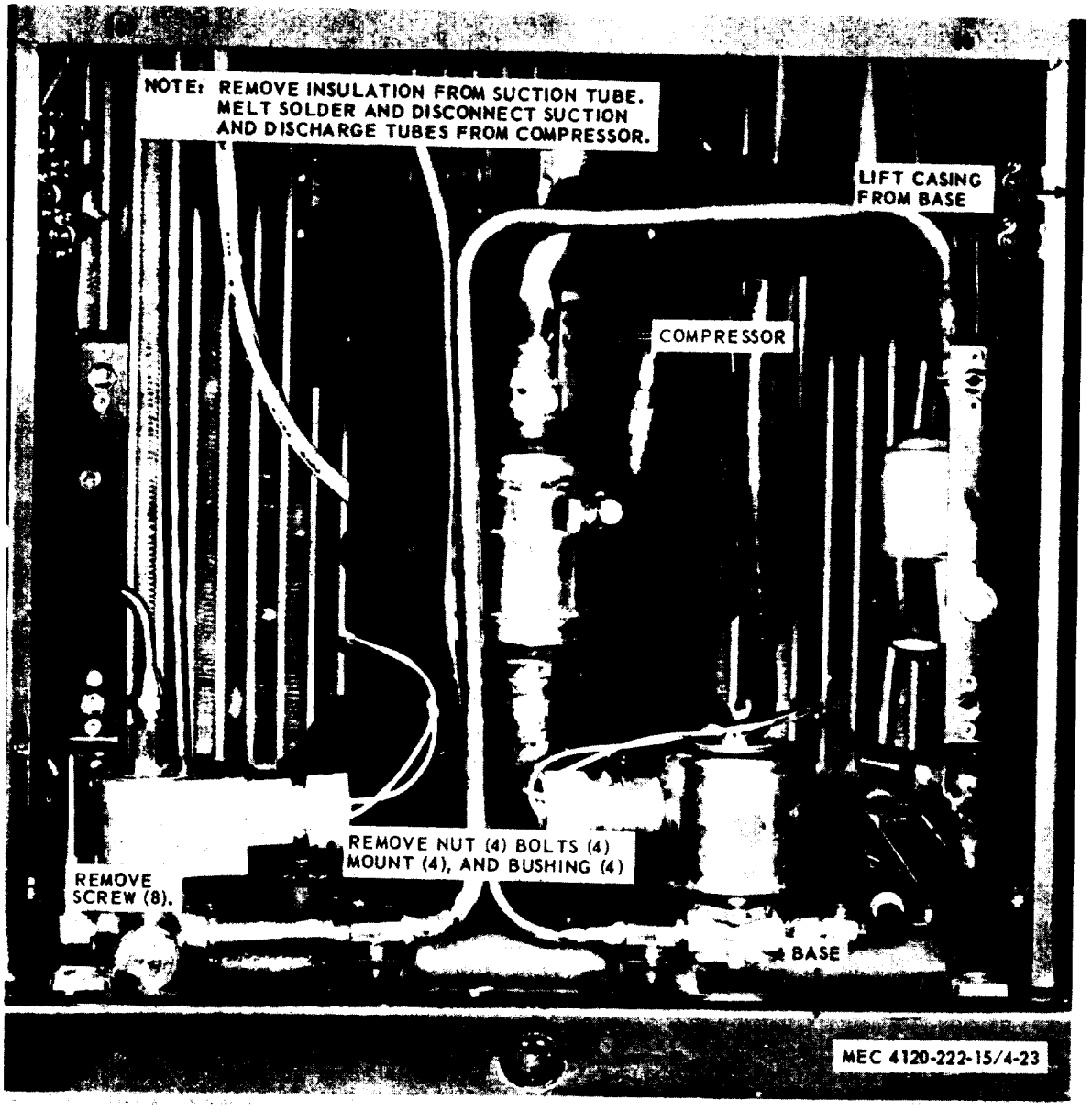


Figure 5–14 ①. Compressor/motor assembly, removal and installation.

proved rubber gloves should be worn 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:

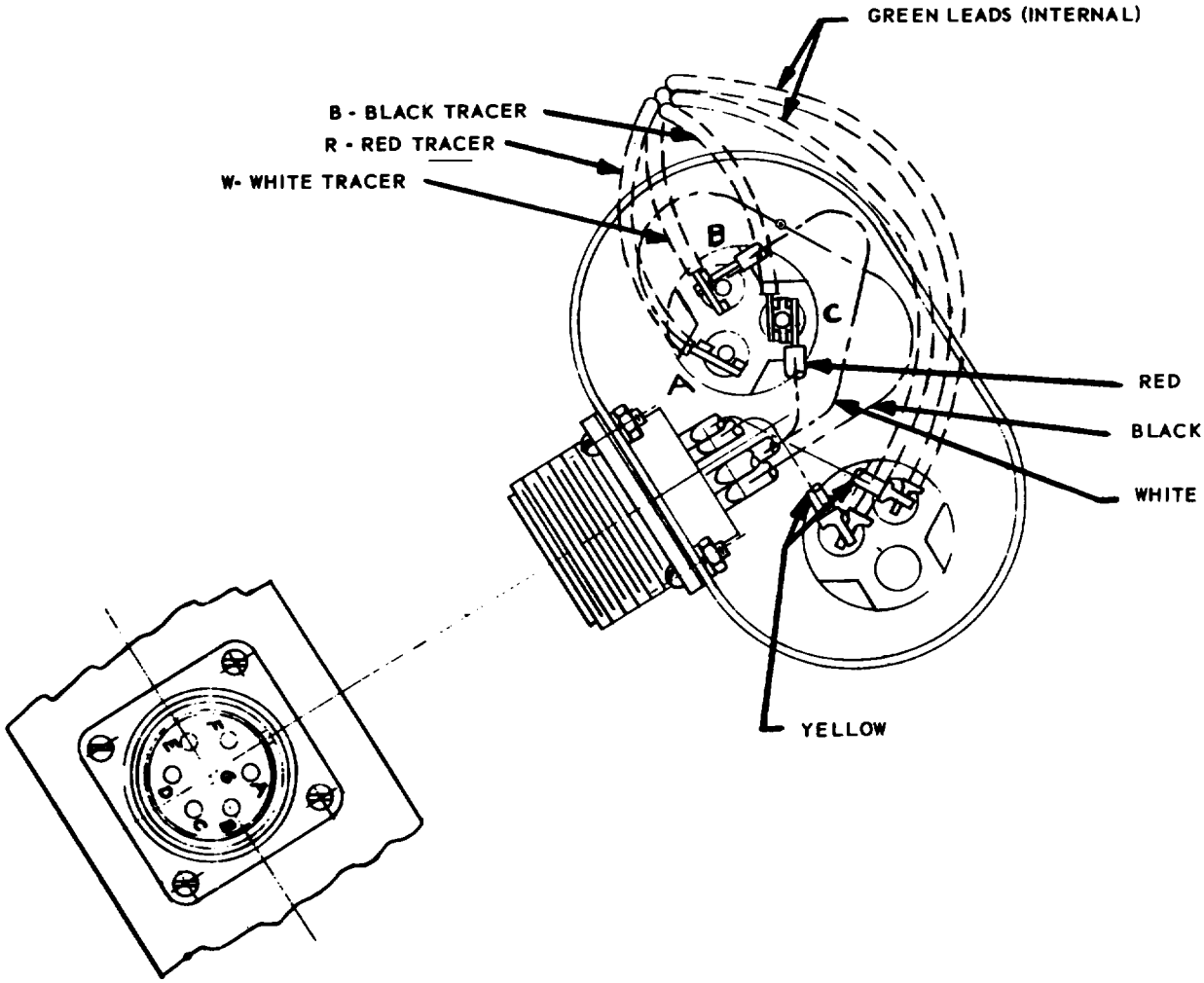
(1) If possible, obtain a small sample of oil from the burned out compressor and analyze it, using an acid test kit. Excessive acidity (over .05 acid number) in the oil indicates a severe burnout. This is the best method of determining the severity of burnout. Discoloration of the oil may also indicate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

e. Clean-up After a Mild Burnout. When the burnout is mild, the contaminants can be removed by changing the liquid line filter-dryer, or installing one if the system did not have one originally. The procedure to follow is:



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	

B. WHIRLPOOL COMPRESSOR

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Figure 5-14 (2)—Continued. -Continued.

(1) Discharge the refrigerant.

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

(3) Remove the dryer and install an oversize 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) Discharge the refrigerant.

(2) Install a filter-dryer 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

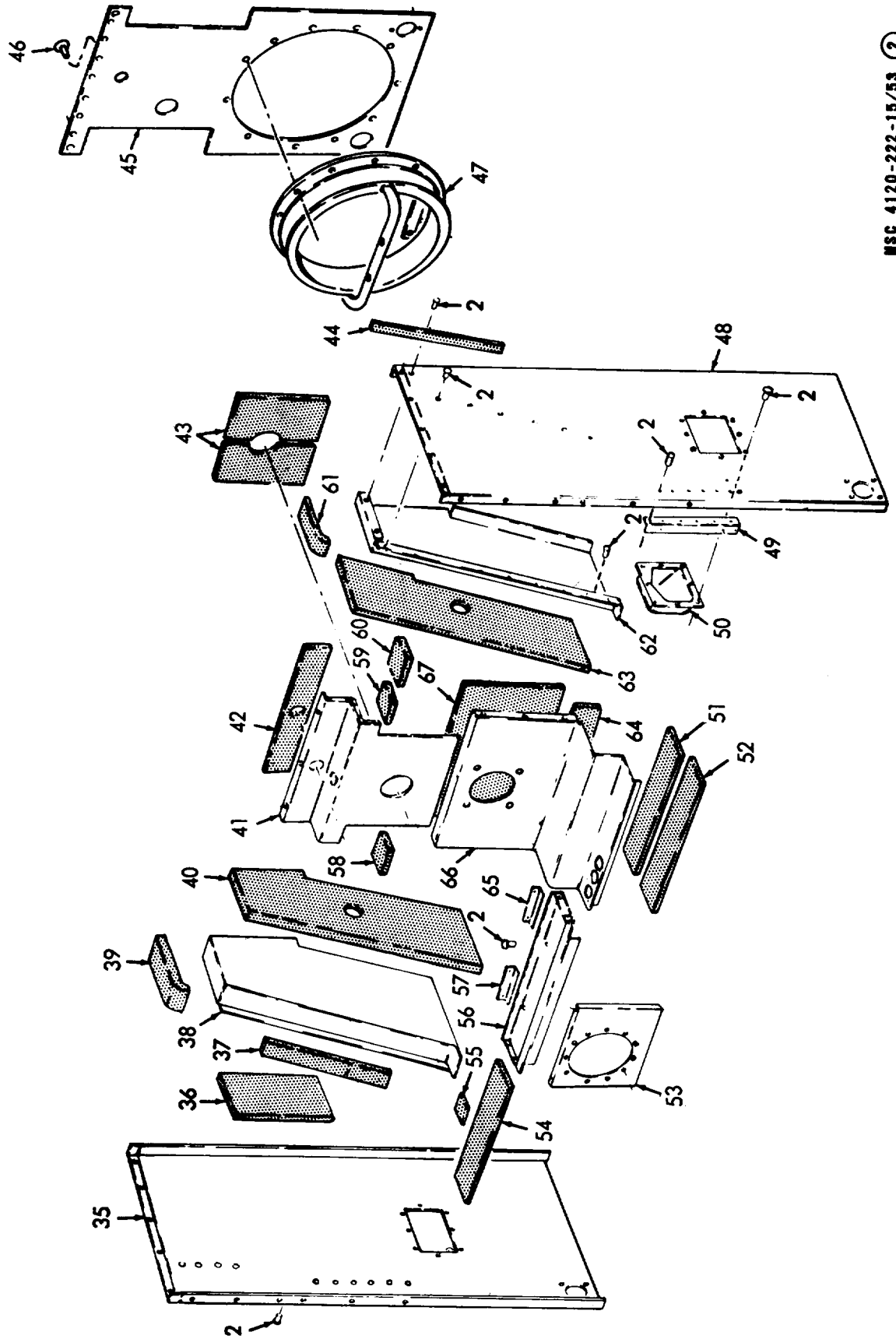

Figure 5-15. Casing assembly, removal and installation.

1 and 3 thru 34 not used
2 Rivet nut
35 Right side panel
36 Rubber insulation
37 Rubber insulation
38 Right hand duct
39 Rubber insulation
40 Rubber insulation
41 Top partition panel
42 Rubber insulation
43 Rubber insulation
44 Rubber insulation
45 Back panel
46 Rivet nut, 5–16–18
47 Motor support and cone assembly
48 Left side panel
49 Filter support
50 Handle (2)
51 Rubber insulation
52 Rubber insulation
53 Intake panel
54 Rubber insulation
55 Rubber insulation
56 Drain pan
57 Drain pan right hand angle
58 Rubber insulation
59 Rubber insulation
60 Rubber insulation
61 Rubber insulation
62 Left hand duct
63 Rubber insulation
64 Rubber insulation
65 Drain pan left hand angle
67 Rubber insulation

Figure 5–15—Continued.

the system. Leaving a permanent type filter-dryer in the suction line allows the serviceman to complete the clean-up 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.

5-25. Casing Assembly

a. General. The casing assembly protects and provides air control around the components. Removal and installation instructions for the access panels, covers, grills, and screens have been included in the applicable component maintenance instructions. Figure 5–15 is provided as a guide should it become necessary to remove panels or insulation not previously covered.

b. Removal. Refer to figure 5–15 and remove casing components as required.

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

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

5-26. 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 3-19).

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

(3) Refer to figure 5-16 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 5-18).

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

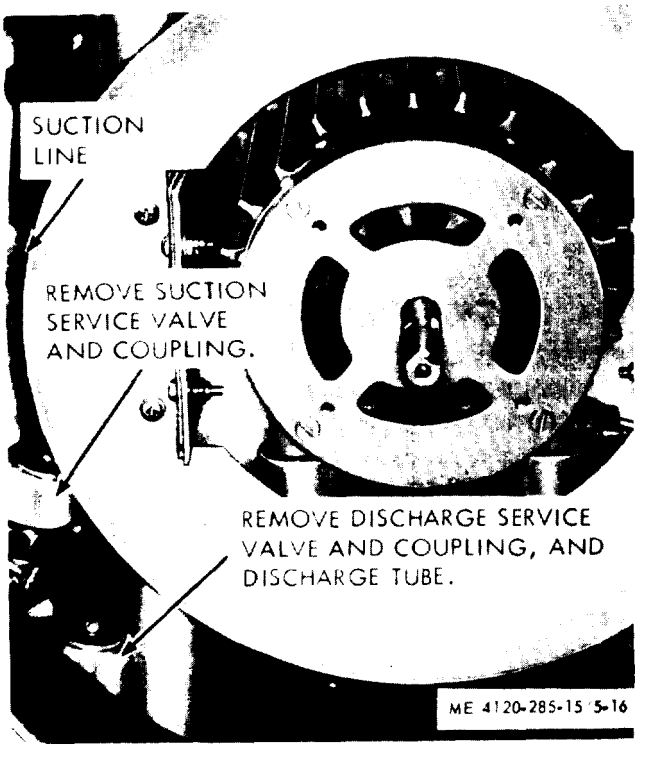

Figure 5–1 6. Discharge and auction service valves, removal and installation.

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, grills, 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 the most 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 3-19).

(2) Remove the outdoor thermostat (para 3-31) or the alternate cover at the right of the fan area and insert a suitable hose to the discharge service valve.

(3) Reinstall the condenser fan and grill (para 3-19).

(4) Start the unit and 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.

(5) When system is completely discharged, remove the condenser fan and remove the hose from the discharge service valve. Reinstall consenser fan and grill (para 3–19).

d. Pressure Testing and Evacuating the System.

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

(2) Connect the suction line of a suitable pressure manifold loosely to the suction service valve. Connect the center manifold line 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 element 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. Disconnect hose from service valve and remove pressure manifold.

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

(8) Remove cap from discharge service valve. Attach a suitable vaccum 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 2.5 mm hg. abs. (millimeters mercury absolute).

(9) Close suction valve and stop the pump.

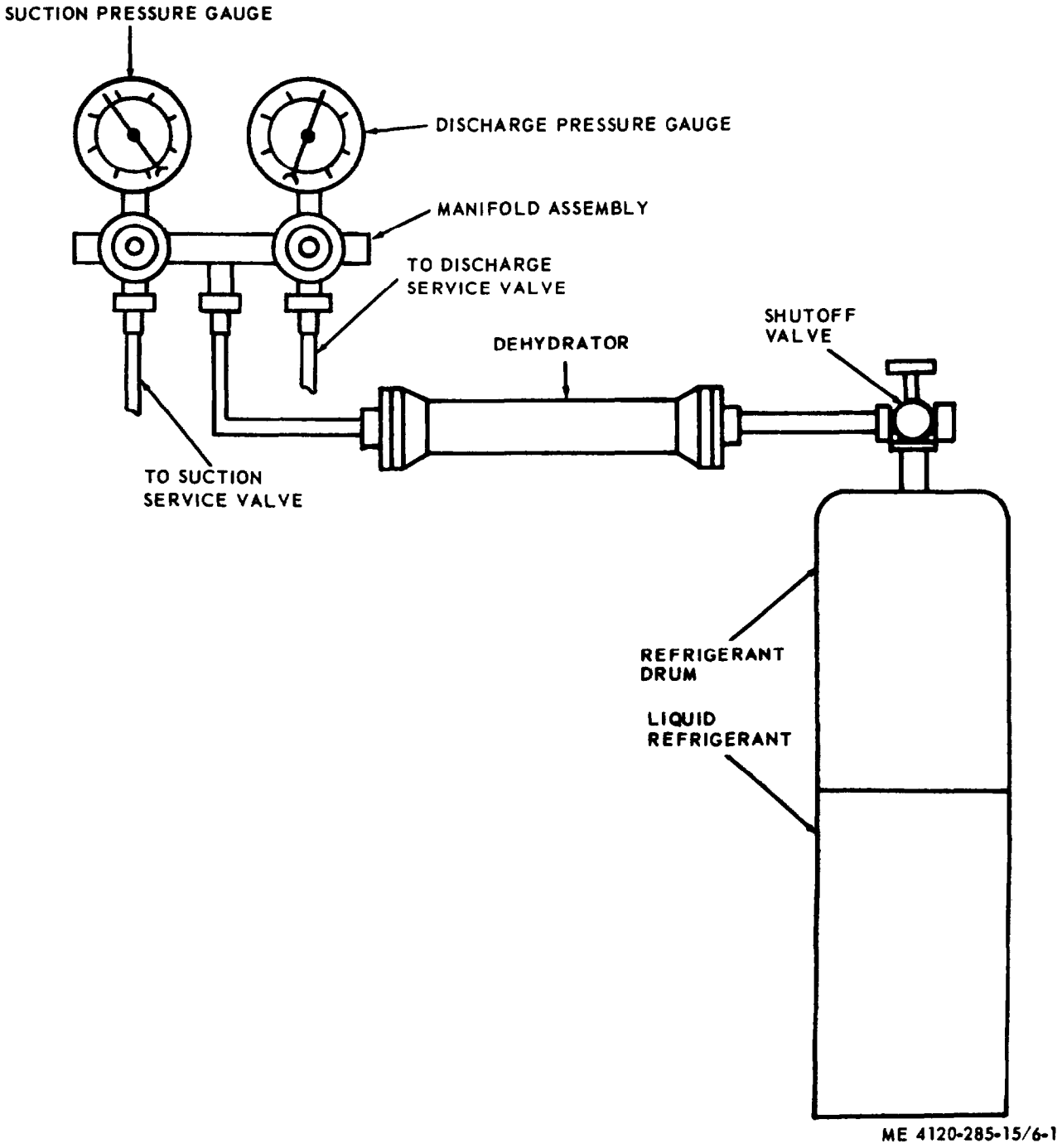

Figure 6-1. Pressure testing and evacuating the refrigerant system.

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 service 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 changing. 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.

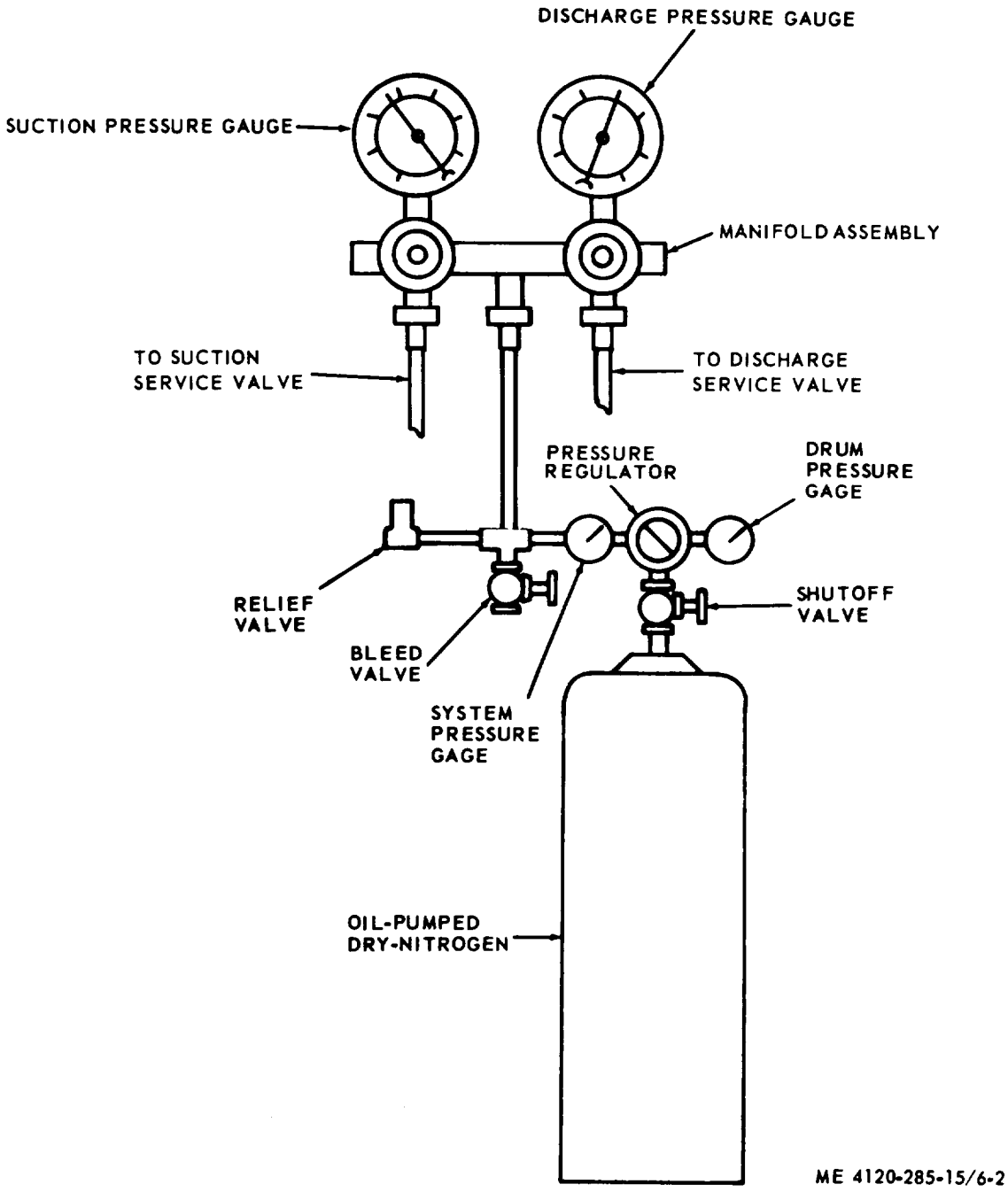

Figure 6-2. Charging the refrigerant system.

(12) Inspect service valve area before in. stalling condenser fan (para 3-19).

e. Charging the Unit.

(1) Remove the condenser fan (para 3-19) and the alternate receptacle cover located on the right side immediately beneath the condenser fan.

(2) Remove caps from the service valves.

(3) Insert the discharge service valve and discharge service valve line 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 element 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,

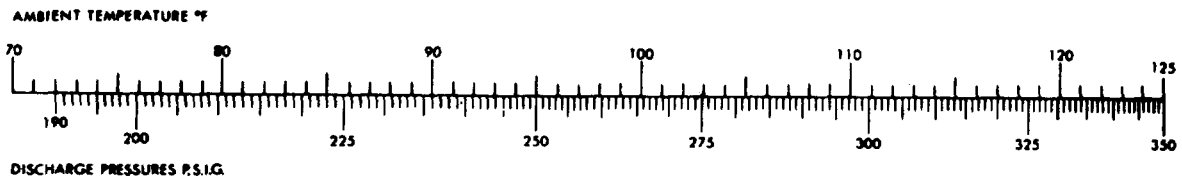

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Figure 6-3. Pressure temperature chart.

(6) Install condenser fan and grill (para 3-lo).

(7) Open refrigerant drum shutoff valve. 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 adjusting bathe until the discharge pressure corresponding to the ambient temperature is obtained.

(8) 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 grill (para 3-19).

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 5-10f(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 repairs 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. CONTROL PANEL AND BLOWER MOTOR

6-3. Control Panel

a. Removal. Refer to paragraph 3-24 and remove the control panel.

b. Disassembly and Reassembly. Refer to figure 6-4 and disassemble the control panel.

c. Installation. Refer to paragraph 3-24 and install the control panel.

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 6-4—Continued.

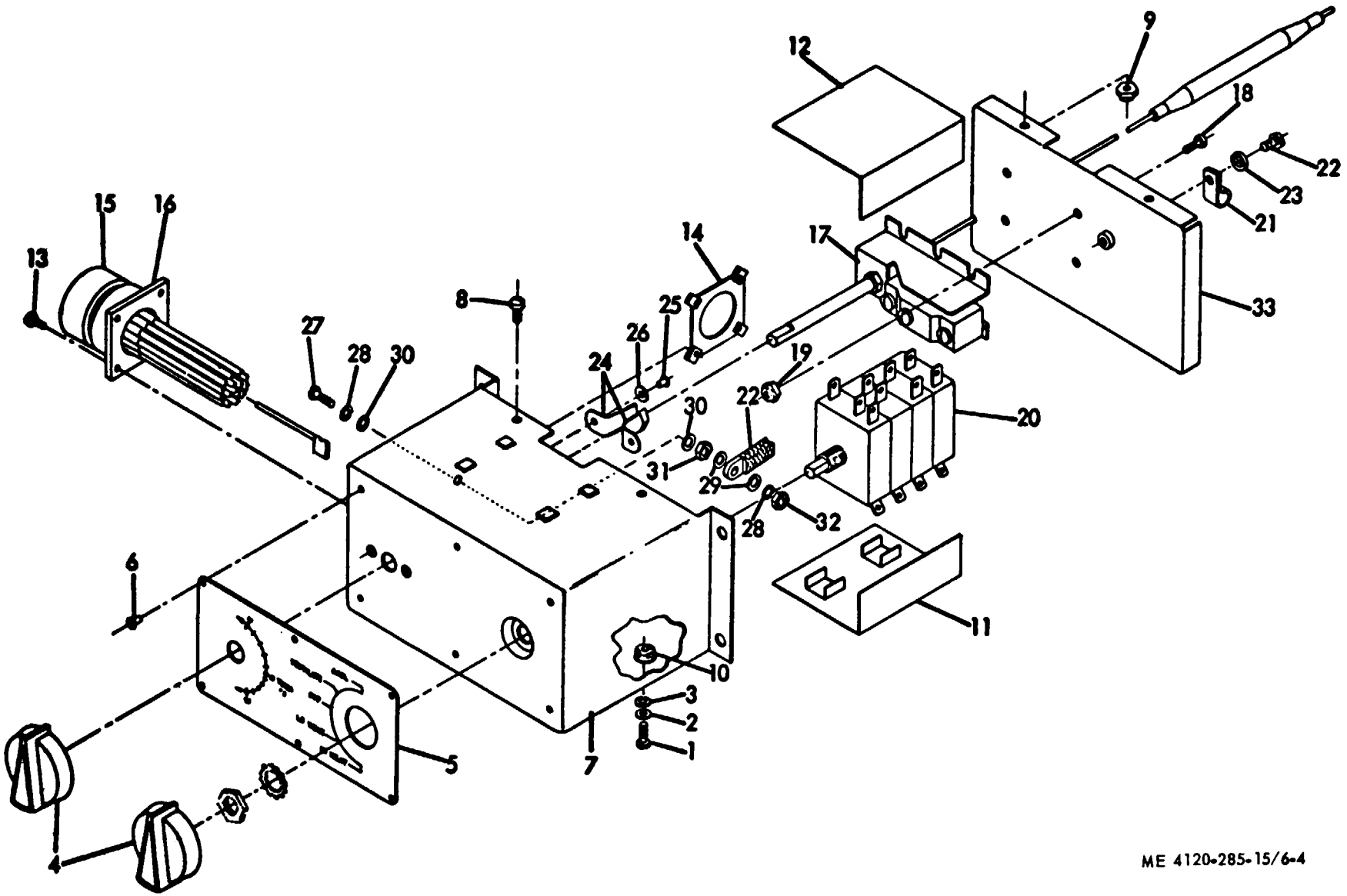
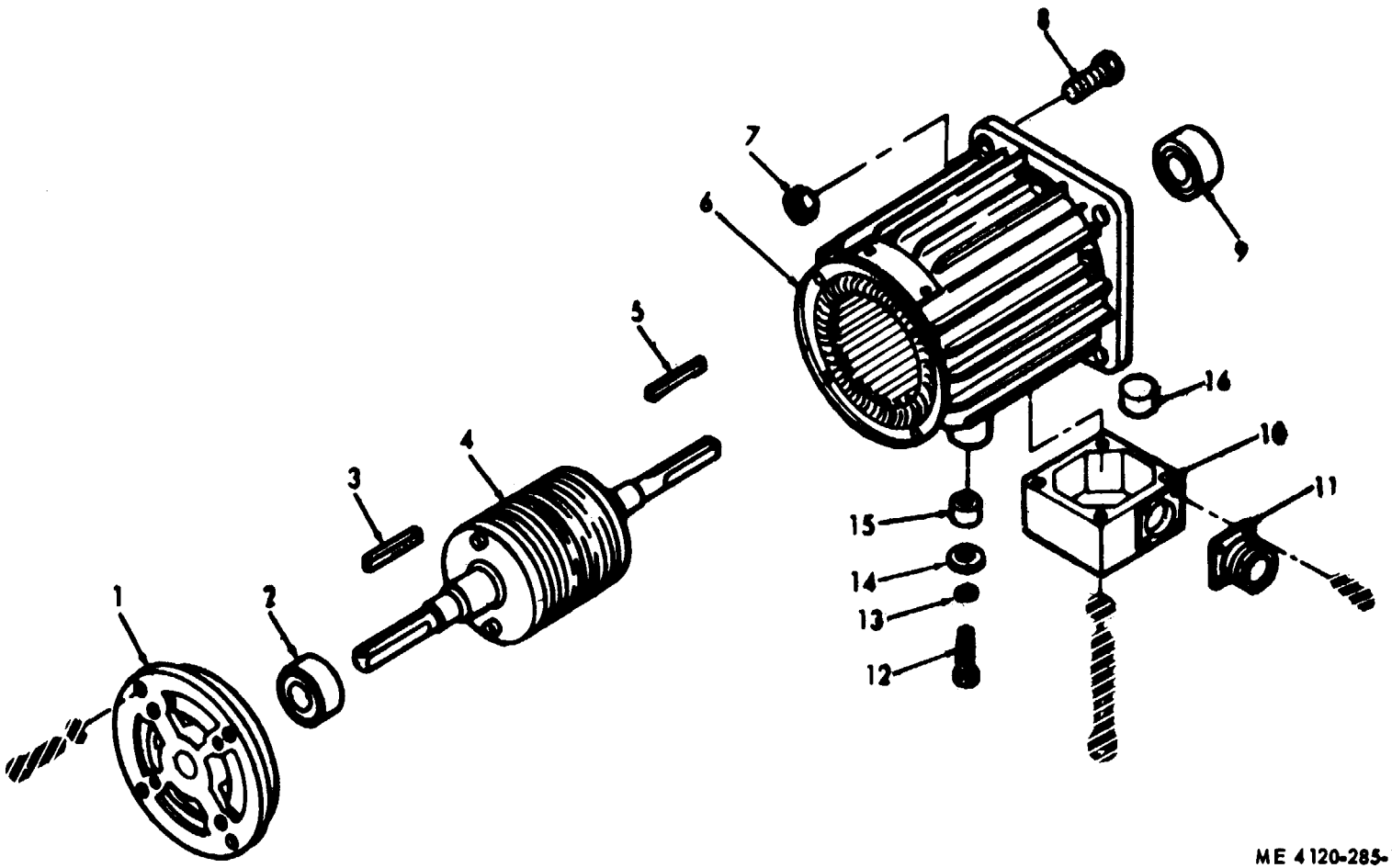


Figure 6–4. Control panel, disassembly and reassembly.



1	Front end bell	11	Connector	6	Frame and stator
2	Ball bearing	12	Screw	7	Nut
3	Key	13	Washer	8	Screw
4	Rotor and shaft	14	Washer	9	Ball bearing
5	Key	15	Spacer	10	Overload protector cover
		16	Overload protector		

Figure 6–5. Blower motor assembly, disassembly and reassembly.

6-4. 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 4V20 the ammeter should read between 1.45 and 2.2 amperes at no load. On model 6V20 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 3–22 and remove the blower motor assembly.

c. Disassembly. Refer to figure 6–5 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 cloth dampened in an approved solvent,

(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, misalinement, gouges, pits, or other damage.

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

(6) Inspect all threaded parts for damage.

(7) Replace any damaged or worn part.

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

g. Installation. Refer to paragraph 3–22 and install the motor assembly.

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 Users

A-3. Maintenance

TM 5-4120-285-25P	Organizational, Direct Support, General Support and Depot Maintenance Repair Parts and Special Tools List
TM 5-764	Electric Motor and Generator Repair
TM 38-750	Army Equipment Record Procedures
TM 740-90-1	Administrative Storage

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, operation, 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 required by the operator/crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies—Section III. Not applicable.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular 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 code is:

Code	Explanation
P	Applied to repair parts which are stocked in or supplied from GSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.

(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

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

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. The physical security calssification of the item is indicated by the parenthetical entry. 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 2 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.

(2) *Item Number, Column (7) (b).* Indicates the callout number used to reference the item in the illustration.

B-4. Abbreviations

Not applicable.

B-5. Federal Supply Code for Manufacturers

Code	*Manufacturer*
96903	Military Standard
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) figure No.	(7) illustration (B) Item No.
		GROUP 31—BASIC ISSUE ITEMS MANUFACTURER INSTALLED					
		3100—BASIC ISSUE ITEMS, MANUFACTURER OR DEPOT INSTALLED					
PC	7510–889–3494	BINDER: Loose leaf, U.S. Army Equipment Log Book ..	EA	1	1		
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, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL, TM 6–4120–285–15					
		ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST, TM 5–4120–285–25P					
PC		PANEL, BLOCK OFF: Electrical receptacle (97403) 13211E83 92.	EA	1	1		
PC		RECEPTACLE, ELECTRICAL: (97403) MS3106R22–22–S.	EA	1	1		
PC		ATTENUATOR: Sound (97403) 13211E3798	EA	1	1		

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. 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.

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 applicable assembly grouping indexes are listed on the MAC (maintenance allocation chart) in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

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

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 designations for the various maintenance categories are as follows:

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

The maintenance functions are defined as follows:

A—Inspect: To 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 test 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—Install: To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—Replace: To replace unserviceable items with serviceable 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 disassembly 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. HI) required to perform the maintenance functions (sec. II).

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

C-3. Explanation of Columns in Section III

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T and TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be

used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Category. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. Nomenclature. This column lists the names or identification of the tool or test equipment.

d. Tool *Number.* This column lists the manufacturer's code and part number, or Federal stock number of tools and test equipment.

C-4. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are reference 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	(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
01	ACCESSORY ITEMS													
	Tarpaulin	O	--	--	--	--	--	--	O	O				
	Sound Attenuator	O	--	--	--	--	--	--	O					
02	BASE ASSEMBLY, CASING, GRILLS, AND HARDWARE													
	Panels													
	Baffle	O	--	--	--	--	--	--	H					
	Chain and damper control	O	--	--	--	--	--	--	O					
	Cover assemblies	O	--	--	--	--	--	--	O					
	Damper assembly	O	--	--	--	--	--	--	H					
	Grills	O	--	--	--	--	--	--	O					
	Panel assembly, front lower	O	--	--	--	--	--	--	O					
	Panels, back and top	O	--	--	--	--	--	--	O					
	Retainer assembly, filter	O	--	--	--	--	--	--	O					
	Base Assembly	O	--	--	--	--	--	--	H					
	Casting Assembly	O	--	--	--	--	--	--	H					
	Guard, Condenser Fan	O	--	--	--	--	--	--	O					
	Screen, Drain, Base	O	--	--	--	--	--	--	O					
03	ELECTRIC MOTOR, MOTOR SUPPORT, AND FANS													
	Motor Assembly	--	O											
	Mount bushing	--	--	--	--	--	--	--	O					
	Motor assembly, blower	--	--	--	--	--	--	--	O	F				
	Bearing	--	--	--	--	--	--	--	F					
	Rotor Assemblies													
	Rotor, blower motor	O	--	--	--	--	--	--	H					
	Stator Assemblies													
	Stator, blower motor	O	--	--	--	--	--	--	H					
	Frame, Supports, and Housings													
	Cover, stator housing	--	--	--	--	--	--	--	H					
	Endbell, housing	--	--	--	--	--	--	--	H					
	Housing, stator	--	--	--	--	--	--	--	H					
	Starting and Protective Devices													
	Protector, overload	--	F	--	--	--	--	--	F					
	Relay, phase	--	O	--	--	--	--	--	O					
	Fan, Evaporator and Condenser	O	--	--	--	--	--	--	O					
04	CONTROL PANELS, CONTROL BOX, AND COMPONENTS													
	Box, Control	O	--	--	--	--	--	--	O					
	Connector Receptacle	O	--	--	--	--	--	--	O					
	Control Panel Assembly	O	--	--	--	--	--	--	O	F				
	Leads, Electrical	O	--	--	--	--	--	--	O					
	Receptacle	O	--	--	--	--	--	--	O					
	Remote Control Panel	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
	Outdoor Thermostat								O					
	Circuit Breakers and Fuses								O					
	Switches	O							O					
	Transformer Rectifier		O						O					
	Terminal Blocks		O						O					
	Thermostatic Switch								F					
05	COMPRESSOR ASSEMBLY													
	Compressor Assembly		F	F					H					
06	CONDENSER, REFRIGERANT UNITS													
	Valve, Regulating		F		D				F					
	Valve, Expansion				F		F		F					
	Air Filter			O					O					

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENT

Reference code	Maintenance level	Nomenclature	Tool number
		No special tools required.	

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 (FSN 9150–823–7905).
A—B	Testing includes the use of the Halide Torch Leak Detector, or a soap solution to detect leaks.

INDEX

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 12-25, Section III, (qty rqr block no. 542) organizational maintenance requirements for Air Conditioners: 18,000 BTU Compact.

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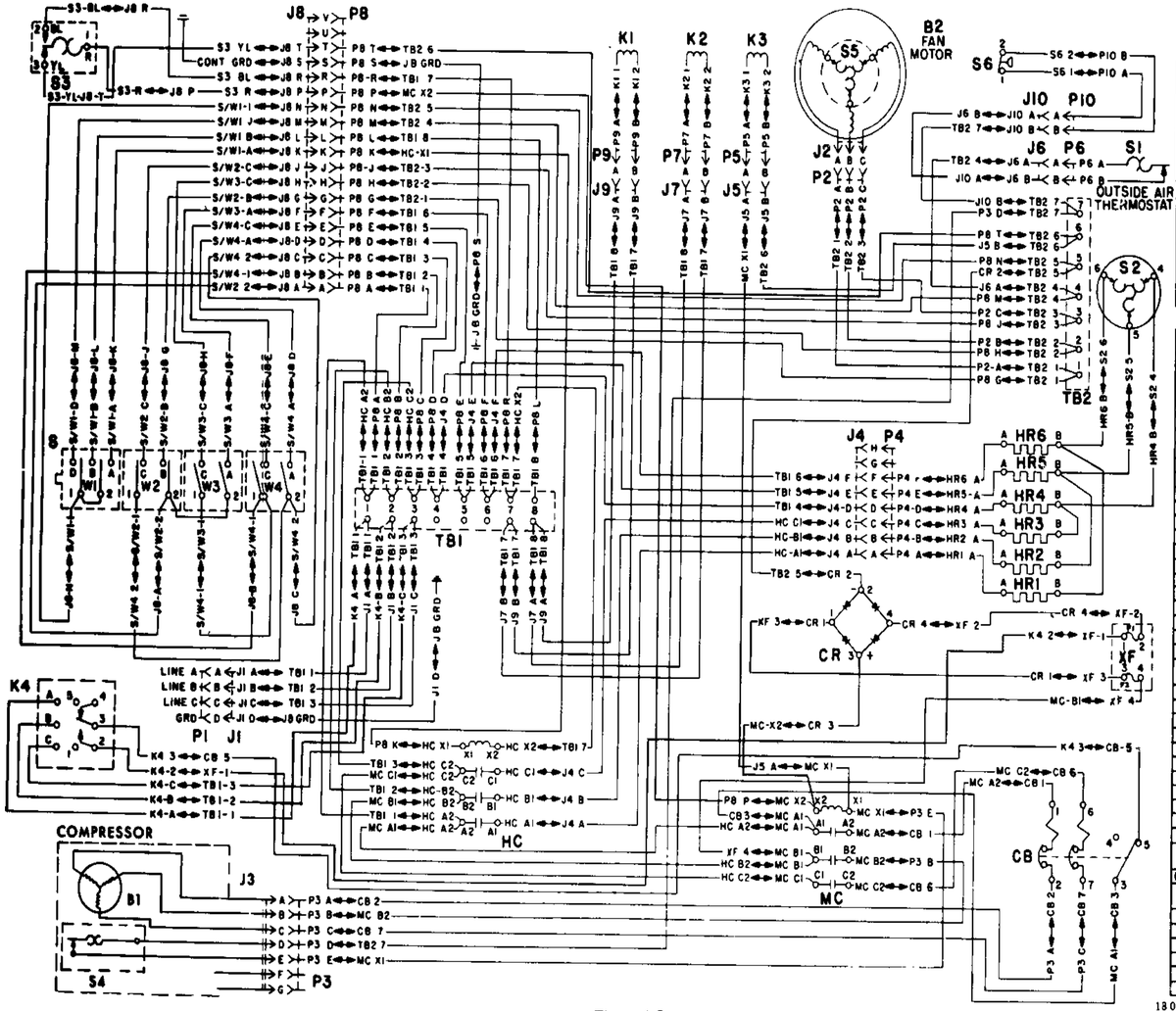

WAFER NO	CONTACT NO	SWITCH POSITION 1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & C					
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
2	2 & A					
	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
	1 & C	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
	1 & D					
3	2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

SYMBOL	LEGEND 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 39188	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

Figure 1-3. *Practical wiring diagram (Model 4V20)*

PIN : 026140-000