TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR CONTAINER, REFRIGERATED MODEL SC209 NSN 8115-01-016-5909

This copy is a reprint which includes current pages from Changes 1 through 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY
10 AUGUST 1979

CHANGE NO.4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 5 February 1990

Operator, Organizational, Direct and
General Support Maintenance Manual
for
CONTAINER, REFRIGERATED
MODEL SC209
NSN 8115-01-016-5909

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TM 55-8115-202-14, 10 August 1979, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
2-3 and 2-4	2-3 and 2-4
4-5 and 4-6	4-5 and 4-6
5-1 and 5-2	5-1 and 5-2
6-1 and 6-2	6-1 and 6-2
B-1 and B-2	B-1 and B-2
C-1 and C-2	C-1 and C-2
D-5 and D-6	D-5 and D-6
E-1 and E-2	E-1 and E-2

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CHANGE
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WASHINGTON, D.C., 27 August 1988

Operator, Organizational, Direct
and General Support
Maintenance Manual

for

CONTAINER, REFRIGERATED
MODEL SC209
NSN 8115-01-016-5909

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4-15 and 4-16	4-15 and 4-16

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TM 55-8115-202-14
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CHANGES }
NO. 2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 24 June 1988

Operator, Organizational, Direct and
General Support Maintenance Manual

for

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Remove pages	Insert pages
2-1 through 2-4	2-1 through 2-4
4-3 and 4-4	4-3 and 4-4
4-9 and 4-10	4-9 and 4-10
4-19 and 4-20	4-19 and 4-20
4-25 and 4-26	4-25 and 4-26
A-1/A-2	A-1/A-2

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CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February 1986

Operator, Organizational, Direct
and General Support
Maintenance Manual for

CONTAINER, REFRIGERATED
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Remove pages	Insert pages
i through iii/iv	i through iii/iv
1-1 and 1-2	1-1 and 1-2
4-15 and 4-16	4-15 and 4-16
---	4-16.1/4-16.2
4-17 and 4-18	4-17 and 4-18
D-3 and D-4	D-3 and D-4
---	E-1 and E-2

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WARNING

DANGEROUS CHEMICALS

are used in this equipment

DEATH

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

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air-supplied respirators, approved by the National Institute for Occupational Safety & Health or the U. S. Bureau of Mines, should be used for all welding in confined spaces when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions including allergies and asthma, should not be employed in this type of environment.

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to contact high-voltage connections when installing or operating this equipment. Before working inside the equipment, turn power off and ground points of high potential before touching them.

WARNING

Be sure the generator set is not operating before attempting to connect or disconnect the power cable; check to see that all switches are in the "off" or "open" position and there is no input on the load.

Never allow personnel to pass under container being lifted or moved. Always use chain and hook to hold door open to prevent injury to personnel. Always be sure no one is inside container before closing container doors. Be sure that generator set is not operating, and that exhaust lines have cooled to the point where they will not burn personnel.

In case of refrigerant leaks, do not allow refrigerant liquid to come into contact with the eyes or skin. If exposed, wash eyes and skin with fresh water.

Do not attempt service or maintenance while refrigerant unit is in operation.

Main power cable must be disconnected before performing any maintenance on the equipment.

Be sure area is well ventilated when testing for leaks with a halide torch. When the torch flame comes into contact with refrigerant, phosgene gas is released. Phosgene gas has the odor of new mown hay and can be deadly.

Use extreme care when testing or adjusting electrical circuit components if electrical power is applied. The coltages can cause serious injury or death.

The nitrogen cylinder has a normal pressure of 2,350 psig; therefore, the cylinder must be equipped with a manually operated pressure reducing and regulating valve before using to prevent a violent rupture of the system, which could result in serious injury.

Never heat any part of the refrigeration system that contains refrigerant; heat could cause expansion and explosion.

Do not release refrigerant gas in confined area; suffocation of personnel could occur.

Do not handle the oil-refrigerant mixture with your bare hands; the mixture may contain hydrochloric and hydrofluoric acids which will burn your skin. The fumes are toxic and should not be inhaled. For acid burns, wash with water immediately and get medical attention.

Before performing maintenance on exhaust system, be sure that generator set is not operating, and that exhaust lines have cooled to the point where they will not burn personnel.

Ensure that the container is properly grounded when used with an external power source.

TECHNICAL MANUAL
TM 55-8115-202-14

HEADQUARTERS
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WASHINGTON, DC., 10 August 1979

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CONTAINER, REFRIDGERATED
MODEL SC209
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope.

This manual contains instructions for the operator, organizational, direct, and general support maintenance personnel maintaining the Refrigerated Container, American Air Filter Model SC209.

1-2. Maintenance Forms and Records

Maintenance forms and records that you are required to use are explained in DA PAM 738-750.

1-3. Hand Receipt.

Hand receipts for Components of End Item (CO-E1), Basic Issue Items (BII), and Additional Authorization List (AAL) items are published in a Hand Receipt Manual, TM 55-8115-202-14HR. This manual is published to aid in property accountability and is available through: Commander, U. S. Army Adjutant General Publication Center, 2800 Eastern Boulevard Baltimore, MD 21220-2896.

1-4. Equipment Serviceability Criteria.

This equipment is not covered by an ESC.

1-5. Destruction of Equipment to Prevent Enemy Use.

Refer to TM 750-244-3.

1-6. Administrative Storage.

Refer to TB 740-97-2 and TM 740-90-1.

Section II. DESCRIPTION AND DATA

1-7. Description.

a. Characteristics. The refrigerated container consists of a framed, insulated box with a self-contained refrigeration unit and generator set as shown in figures 1-1, 1-2, and 1-3. A temperature recorder (Figure 1-1) and an auxiliary fuel tank (Figure. 1-1) are mounted near the right front corner. Fittings at the top and bottom of each corner provide points for lifting, stacking, and locking. One spacer block (fig. 1-1) comes with each container for use when shipping two containers in tandem on a MILVAN semitrailer chassis. The container interior has a switch controlled light (100W), and a ribbed floor and wall spacer strips which provide airflow channels. A vertical ladder and a short folddown ladder section are mounted inside the box frame left front corner, and are used by personnel for access to the equipment and the roof of the container. The right door contains an emergency escape door (small hatch) which can be opened by personnel inside the refrigerated container. The refrigeration unit is a self-contained, packaged unit that attaches to the front wall of the container. This unit will stabilize internal temperatures by refrigerating or heating, and operates from any 208-volt, three phase, four wire, 60 Hz power source. The generator set is a 10-KW, 60-Hz Diesel Engine Generator Set, NSN 6115-00-465-1030. It is a self-contained, skid-mounted set, and provides electrical power to operate the refrigeration unit and th 100W interior light.

b. Capabilities. The refrigerated container can be stacked or connected in tandem for transporting and storage. With the refrigeration unit operating, the refrigerated container can maintain internal set-point temperatures of 0° to 40 ° F in an ambient temperature of 100 O F and 40 O F in ambient to -40 o F, with a full load of pre-cooled supplies. The modes

of transport are limited to road, rail and sea. The methods for handling, securing and storing must be compatible with the design requirements prescribed in MIL-C-52788 and companion standards.

c. Function. The refrigerated container serves a an insulated, temperature controlled shipping and storage container.

d. Purpose. The purpose of the refrigerated container is to store perishable commodities during transport and storage.

1-8. Identification and Tabulated Data.

a. Identification. The identification (data) and instruction plates as follows:

(1) Container Data Plate. Located on the outside of the right hand door. Specifies NSN and serial numbers, tare weight, the manufacturer and technical manual.

(2) Temperature Recorder Identification Plate. Located on the forward side of the recorder's case. Specifies the manufacturer and model number.

(3) Refrigeration Unit Identification Plate. Located on the refrigeration unit frame assembly near the electrical panel. Specifies the manufacturer, model number, electrical requirements, weight, cooling and heating capabilities.

(4) Generator Set Identification Plate. Located on left side of control panel box on generator set. Specifies NSN number and electrical characteristics

b. Tabulated Data.

(1) Container.

Manufacturer	American Air Filter Co., Inc. Defense Products Group
Model	8C209
Tare Weight	7965 lb. (3612 kg)
Max. Gross Wt.	44,800 lb. (20,20 KI)
Shipping Cube (external)	1280 cu. ft (9.26 cu. m)
Nom. Outside Dimensions	8 ft. x 8 ft. x 20 ft. (2.44m x 2.44m x 6.10m)
Auxiliary Fuel Tank Capacity	26 gallon (U. 8.)

(2) Temperature Recorder.

Manufacturer	Partlow
Model	TRLW

***(3) Refrigeration Unit*.**

Manufacturer	American Air Filter Co., Inc. Defense Product Group
Model	CH609-81
Type	Vapor Cycle
Power	Electrical driven, 3-pha, 60-H, 4-wire, 208-vac, 16-ampere
Weight	818 lbs
Btu/Hr	9,000 cooling
Btu/Hr	7,000 beating
Charge	18 lbs
Refrigerant	R-12

NOTE
Refer to TM5 6115-585-12/34 for additional data.

(4) Generator Set.

Model	NSN 6115-00-465-1030
Rating	60-ba, alternating current, plant-continuous artic, 0.8 PF, 10 kw, 12.I kv, 104 amps, 120 volts, 1-pip, 10 kw, 12.5 kva, 52 amps, 240 volts, 1-pae, 10 kw, 12.5 kva, 84.7 amps, 120/206 volts, phase

NOTE
Refer to TM5-6115-585-12/34 for additional data.

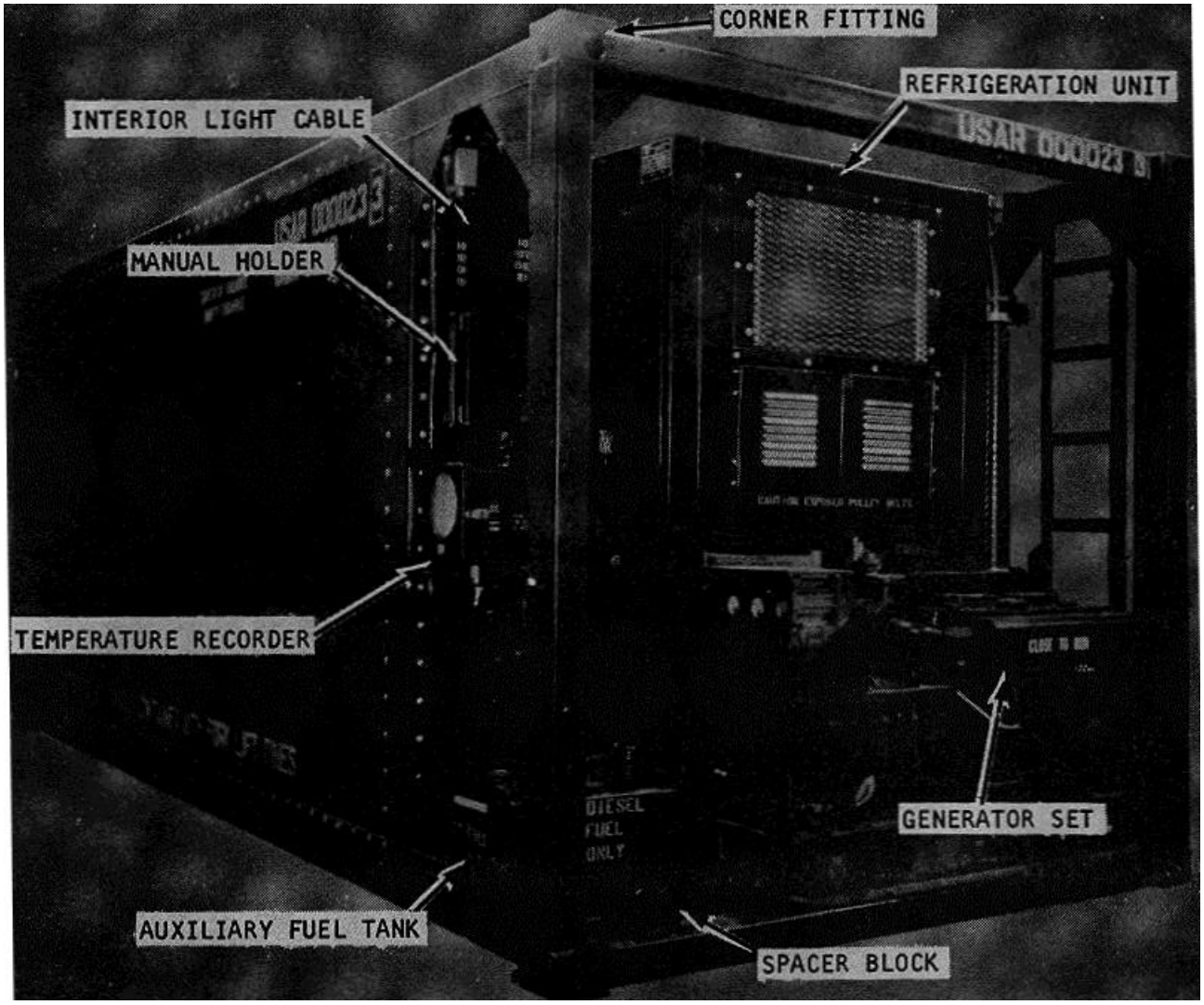


Figure 1-1. Refrigerated Container, Right Front Three-Quarter View.

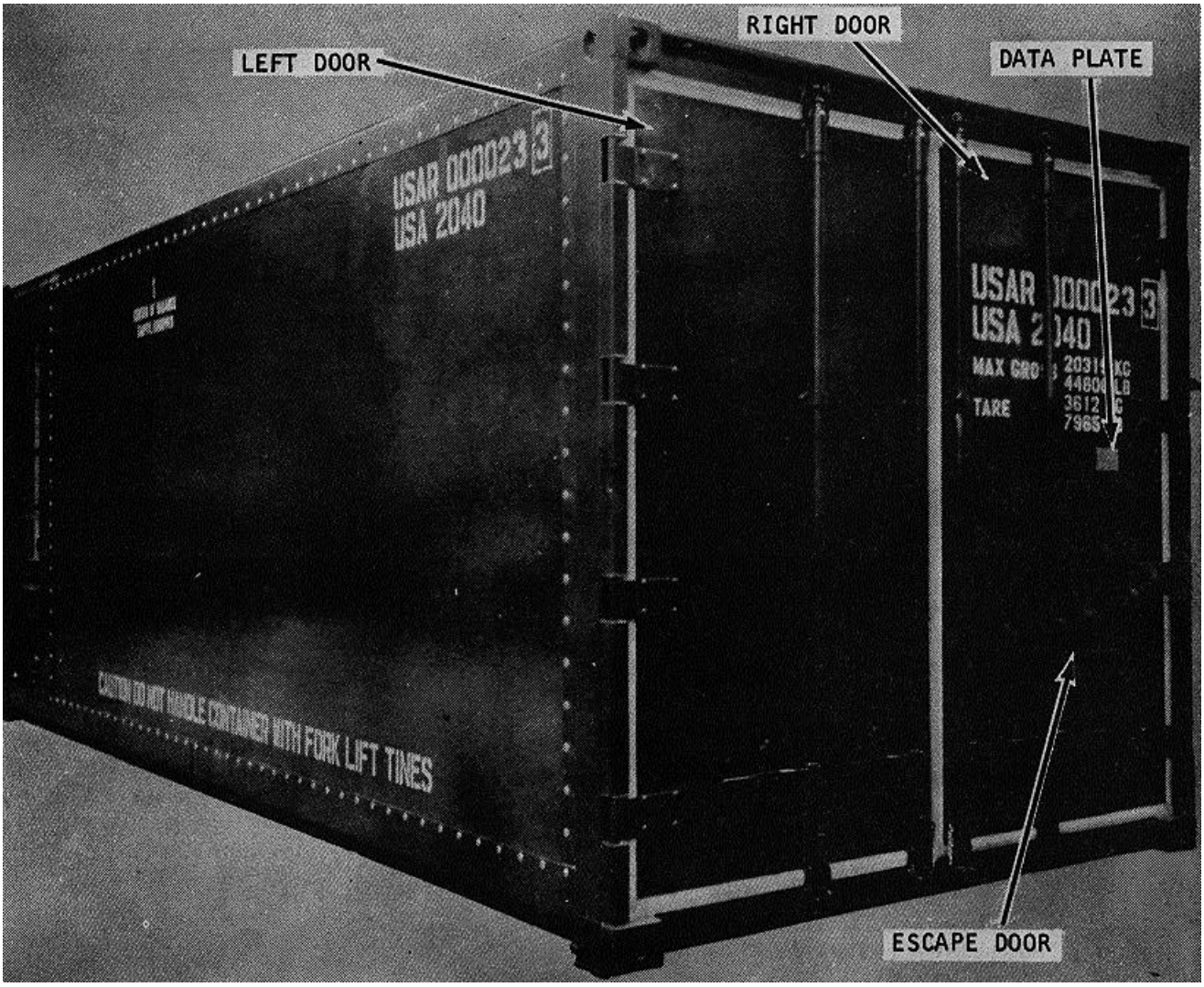


Figure 1-2. Refrigerated Container, Left Rear Three-Quarter View.

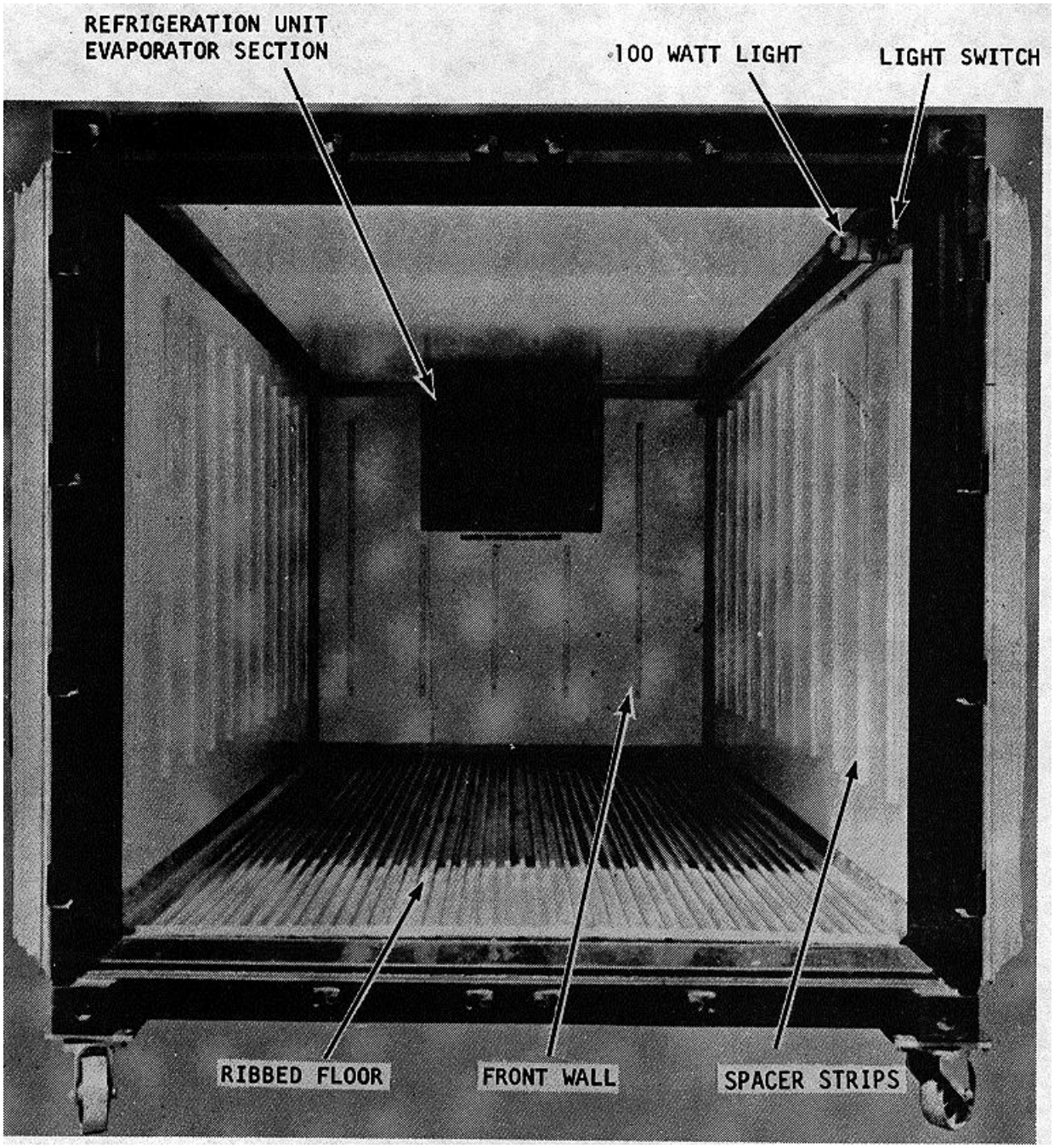


Figure 1-3. Refrigerated Container, Rear Inside View.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

2-1. Inspecting and Servicing the Equipment.

a. Inspection

(1) Container.

(a) Inspect container doors and weather seals for damage.

(b) Inspect roof, sides and front for damage.

(c) Inspect all painted surfaces for deterioration and damage.

(d) Inspect floor drain hoses for damage, kinks, or deterioration.

(e) Inspect the temperature recorder for obvious damage.

(f) Inspect exhaust line extensions for damage and tight connection to generator set.

(g) Inspect auxiliary fuel tank and line for obvious damage and line connection tightness at both ends.

(2) Refrigeration Unit. Refer to TM 5-4110-231-14 for inspecting and servicing requirements.

(3) Generator Set. Refer to TM 5-6115-585-12/34 for inspecting and servicing requirements.

b. ***Servicing.*** Perform daily preventive maintenance checks and services in Table 3-1.

2-2. Equipment Conversion.

a. General. Electrical power required to operate the refrigeration unit is supplied from the generator set or an external source. The power source conversion is accomplished by changing cable connections.

WARNING

Always be sure that the generator set is not operating before attempting to connect or disconnect the power cable. Check to see that all switches are in the "off" or "open" position and that there is no input on the load. (Before connecting to external power source, ensure that the circuit breaker or switch on external power source is in the "off' or "open" position.)

WARNING

Ensure that the container is properly grounded when used with an external power source.

NOTE

Refer to TM 5-6115-585-12/34 for the Generator Set switches, and TM 5-4110-231-14 for the refrigeration unit switches.

b. Generator Power-Connection. Connect receptacle end of 5 ft. generator power cable (Figure 4-15) to connector end of refrigeration unit power cable. Connect generator cable leads (Figure 4-12) to electrical box terminals on generator set (TM 5-6115-585-12/34) to obtain 208-vac, 3-phase power. Plug connector on interior light conduit (Figure 41) into 110-volt receptacle on generator set.

NOTE

Observe color coding applicability noted on wiring diagram (Figure 412).

CAUTION

If compressor motor or fan motor on refrigeration unit runs backwards, immediately stop operation and reverse any two of the three lead connections (A, B, C) to generator set. (See Figure. 4-12).

c. External Power Connection.

WARNING

A ground wire installation is required at the container when operating in a stationary position using utility power and a power cable other than the 30-foot power cable supplied.

(1) 208-volt, 3-phase, 4 wire. Disconnect the generator power cable from the refrigeration unit cable. Connect the 30-foot refrigeration unit cable plug to an external 208-volt, 3-phase, 4 wire, a-c power source. An additional receptacle is provided for external power connection. It is stored in the refrigeration unit cable compartment.

(2) 230-volt, 3-phase. Disconnect the generator power cable from the refrigeration unit cable. Connect the 30-foot refrigeration unit cable plug to an external 230-volt, 3-phase, a-c power source. When operating in this configuration, be sure that the applied voltage does not exceed 230-volts at any time. 230-volt is the maximum operating voltage and power sources fluctuating above this voltage due to a variation in load demand, should not be used. Continuous operation of the refrigeration unit above 230-volts will result in a premature failure of the compressor and fan motors.

(3) 380-volt, 50-Hz, 3-phase, with a 2/1 stepdown transformer. Disconnect the generator power cable from the refrigeration unit cable. Connect the 30-foot refrigeration unit cable plug to an external 380-volt, 50-Hz, 3-phase power source with a 2/1 stepdown transformer between the power source and the refrigeration unit. When operating in this configuration be sure that the voltage at the secondary terminals does not exceed 190-volts at any time. The voltage range using 50-Hz power for continuous operation of the refrigeration unit is limited to 173 to 190-volts. Due to a reduced refrigeration capacity when operating with a 50-Hz power supply, the cargo refrigeration requirement for a given environment must be evaluated in order to prevent damage to the cargo arising from failure to maintain a desired interior temperature. To safeguard persons properties and equipment from hazards arising from the use of electricity, all appropriate and pertinent national and local electrical codes shall be complied with.

NOTE

The 5. -foot generator power cable may also be used to connect to an. eternal power source.

Section II. MOVEMENT TO A NEW WORKSITE

2-3. Preparation to Move to a New Worksite.

a. Ensure cargo is secured and meets the requirements of MTMC PAM 55-2, Management and Stuffing of Containers.

b. Be sure that fuel tank for diesel generator is filled and more diesel fuel is available when that runs out. Check fuel gage in auxiliary diesel fuel tank mounted on refrigerated container. (For fuel consumption of generator set, refer to TM 5-6115-585-12/34.

c. Ensure all doors, panels and guards are installed and securely fastened.

d- Be sure that no personnel are inside the container.

2-4. Movement to a New Worksite.

CAUTION

Refrigerated container MILVAN's require an overhead lift. Except when equipped with a top-lift device, conventional forklifts must not be used to handle MILVAN containers in any manner including lifting, tipping, sliding or pushing. Commercially developed container handling equipment (cranes, top-lift devices, front and side loaders and self-loading transporters) is suitable for handling MILVAN's. Always use spreader frame when top lifting container. Containers must be lifted vertically from the four corner fittings. Do not lift container with cable slings at an angle.

WARNING

Never allow personnel to pass under container being lifted or moved.

The container may be moved by military or commercial trailer / chassis, rail, and ship.

Section III. CONTROL AND INSTRUMENTS

2-5. General.

This section describes the various controls and instruments and provides sufficient information to insure proper operation of the refrigerated container. However, actual operating procedures are contained in Sections IV and V of this chapter.

2-6. Container.

a. Rear Doors (Figure 2-1). Always open the right door (as facing rear of container) first. To open, first release the two handle locks on the right door. Then, grip and lift slightly both door release handles to clear bottom half of handle locks, and turn the handles to fully release lock cams from lock keepers, and pull right door open. Open left door the same way. Fasten open doors to side of container using door chains (Figure 2-2). Close doors in reverse order (left door first).

WARNING

Always use chains to hold doors open to prevent injury to personnel.

b. Spacer Block. One spacer block is provided with the container (Figure 2-3) and is used when two containers are mounted front end to rear end on a 40-foot container chassis. The blocks (one from each container) are installed in the top rear corner fittings of the front container. Each block is installed finger-up into the corner fitting hole, and hangs in place. To remove blocks, lift them up slightly and pull outward till finger is free.

NOTE

A short pole of a proper strength may be used to install and remove the blocks. Insert end of pole into bottom cavity of block to do this.

c. Temperature Recorder. The temperature recorder (Figure 2-4) records the temperature inside the container. To replace chart and activate recorder, proceed as follows:

NOTE

Blank charts are stored in manual holder.

(1) Open cover and remove knurled knob (Figure 2-4).

(2) Lift pen and remove chart; then lower pen carefully.

(3) Use key to wind movement (Figure 2-5); then replace key.

(4) Lift pen and install new chart, being sure edges of chart are under the four guides; lower pen carefully.

(5) Aline chart so tip of pen is resting on line for proper day (1-to-31) and morning (M) or night (N).

(6) Install knurled knob (hand tight) while holding chart in alined position (step 5).

(7) Adjust point pressure of pen, if necessary by raising and bending pen lifter (using your hands or needle nose pliers).

(8) Replace pen, if necessary, by lifting blade holder and pulling pen outward (toward edge of recorder). Install new pen, being sure tip end is firmly mated into end slot of blade holder, with pen point facing chart.

NOTE

The pen is of felt-tip design with a built-in ink supply, and will normally write (record) for a period of 3 to 4 months. For replacement, use Partlow No. 64401 703 cartridge pen.

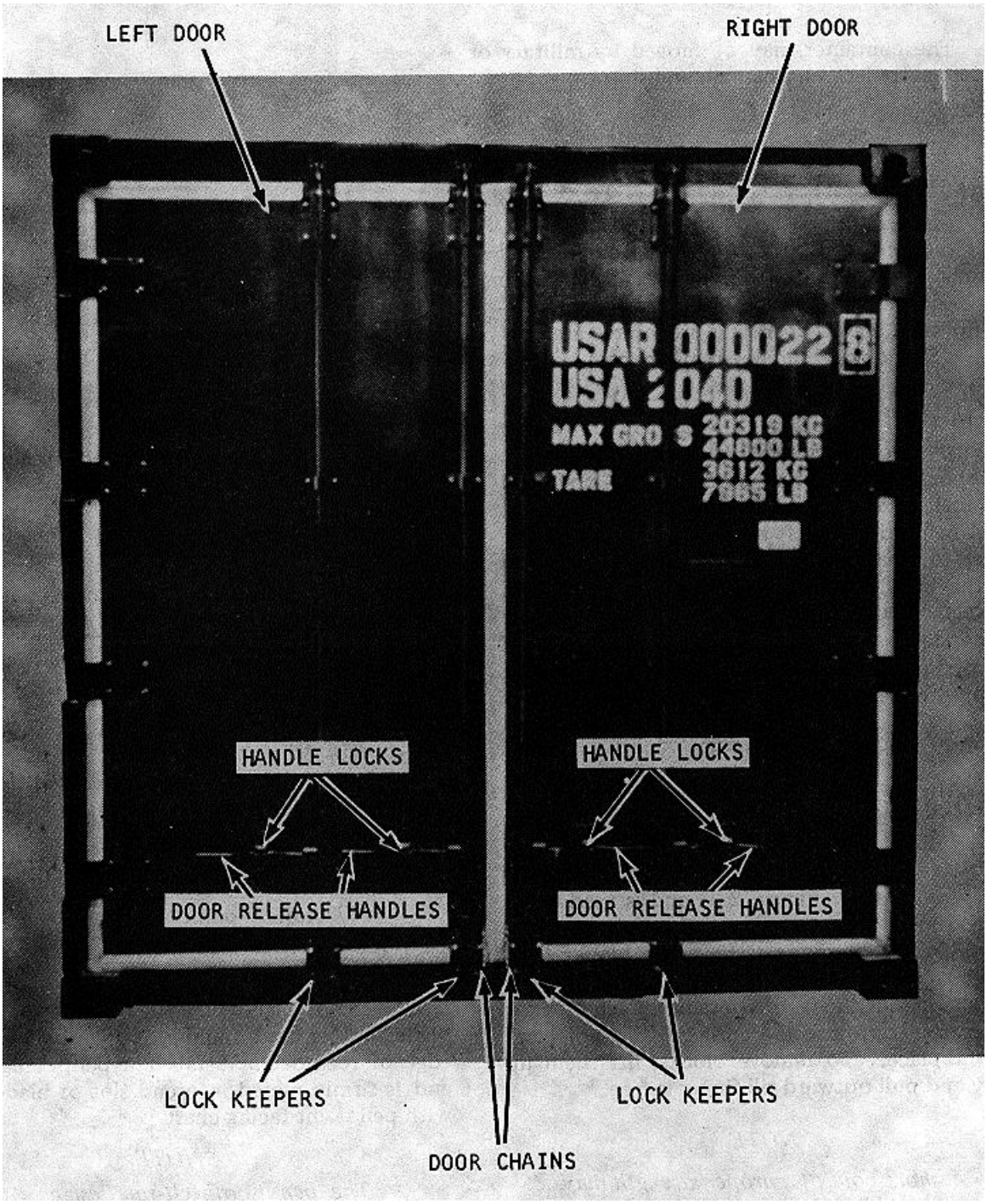


Figure 2-1. Rear Doors.

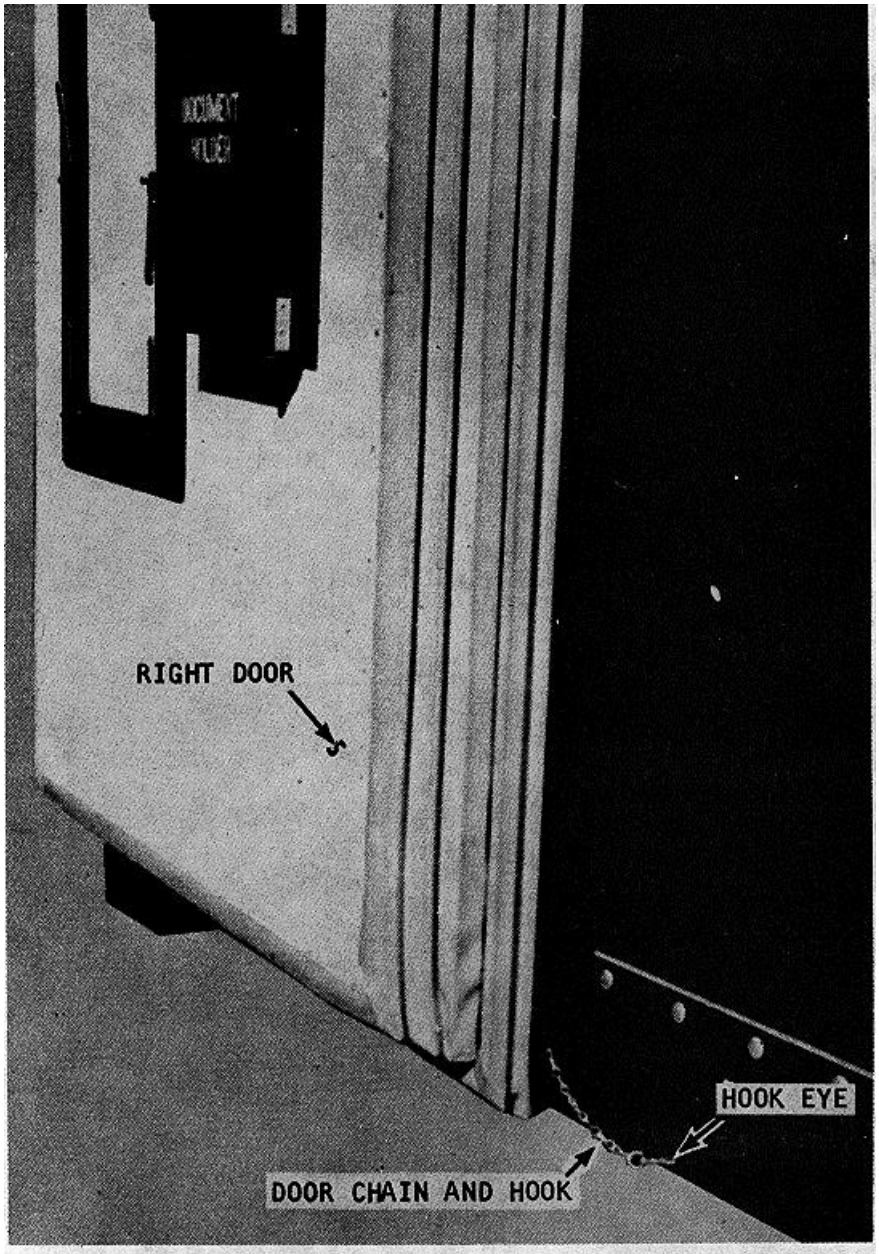
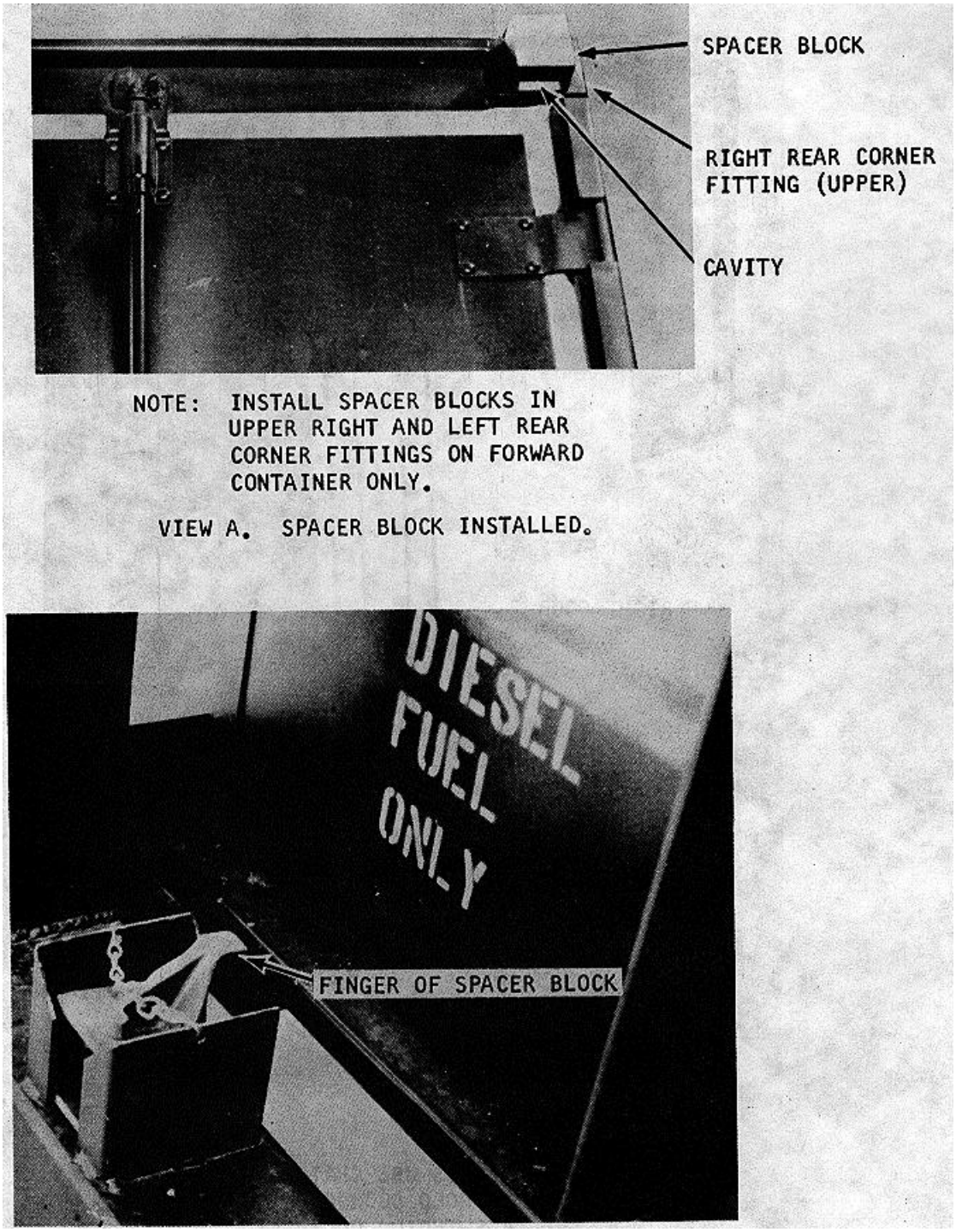


Figure 2-2. Door Chains.



VIEW B. SPACER BLOCK STOWED.

Figure 2-3. Spacer Block, Stowed and Installed.

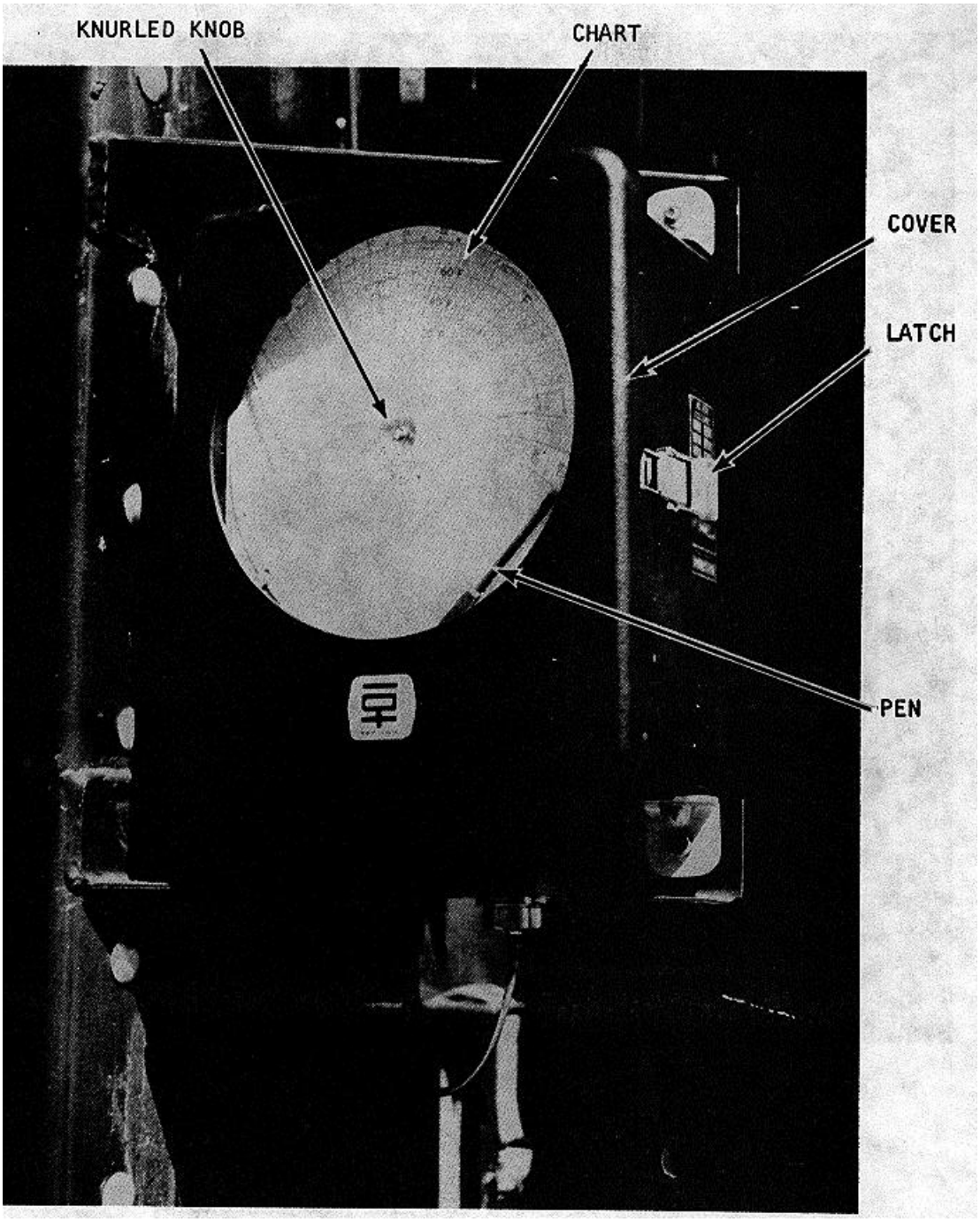
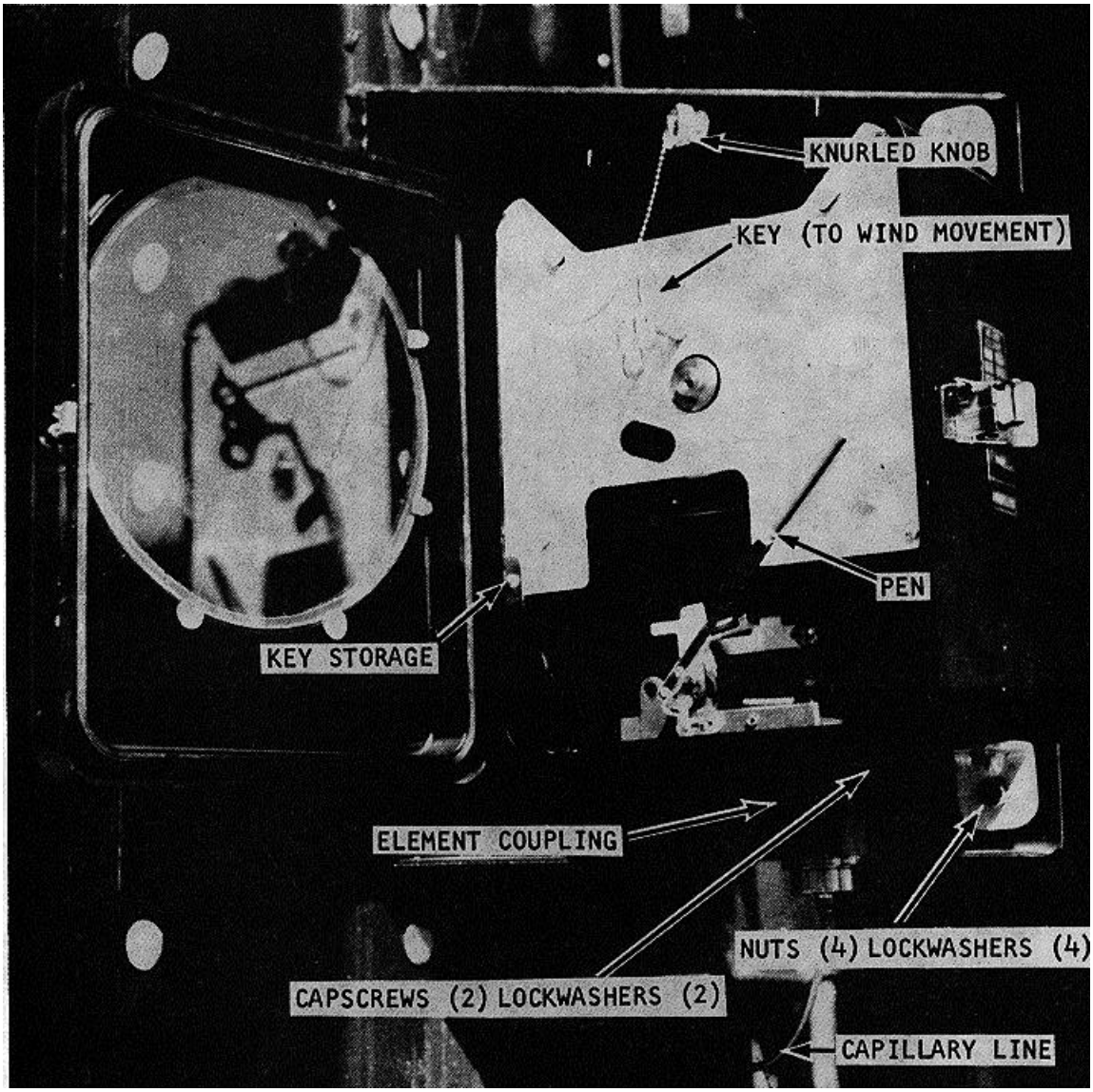


Figure 2-4. Temperature Recorder, Cover Closed.



REMOVAL:

STEP 1. REMOVE CAPSCREWS (2) AND SEPARATE COUPLING FROM RECORDER.

STEP 2. REMOVE NUTS (4) AND RECORDER.

Figure 2-5. Temperature Recorder, Cover Opened.

(9) Adjust point pressure of pen (step 7), if necessary.

NOTE
Temperature recorder zeroing and testing is covered in Chapter 4 (paragraph 4-48).

2-7. Refrigeration Unit.

Refer to TM 5-4110-231-14 for the refrigeration unit controls and instruments.

2-8. Generator Set.

Refer to TM 5-6115-585-12 for controls and instruments on the 10 KW Generator Set.

Section IV. OPERATION UNDER USUAL CONDITIONS

2-9. Starting.

NOTE
A 50-lb capacity carbon dioxide fire extinguisher should be available on a stand-by basis within the operating parameters of this equipment.

a. Close rear doors (paragraph 2-6).

b. Insure power source has been connected (paragraph 2-2). If generator power is to be used, refer to TM 5-6115-585-12 to start generator.

c. Refer to TM 5-4110-231-14 and start refrigeration unit.

2-10. Stopping.

a. Refer to TM 5-4110-231-14 to stop refrigeration unit operation.

b. Refer to TM 5-6115--585-12 to stop generator set operation.

2-11. Normal Operation.

CAUTION
When the temperature inside the container is to be cooled from the surrounding air temperature, do not load container until the inside has been cooled to operating temperature.

a. Start generator set and refrigeration unit (paragraph 2-9).

b. Check temperature readings on temperature recorder and refrigeration unit. The temperature inside refrigeration unit must change to the selected setpoint temperature (set on thermostat).

NOTE
If container doors are to be opened for a long time, be sure to shut down refrigeration unit as instructed in TM 5-4110-231-14. Otherwise, heavy sweating and frosting of the coils and container will occur.

c. Load the container. Refer to MTMS PAM 55-2, Guidelines for Stuffing Containers, and AMCR 5517, Stuffing of MILVAN/SEAVAN Containers.

NOTE
There must be free flow of air into and out of the evaporator (the cold coils). There must be a one-foot space left at top of load, and there must be a free flow of air under and around the load.

WARNING
Be sure no one is inside container before closing container doors.

d. Close the container doors (paragraph 2-6).

e. Refer to TM 5-4110-231-14 for date that indicates refrigeration unit is operating normally.

f. Refer to TM 5-6115-585-12/34 for data that indicates generator set is operating normally.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

2-12. Operation in Extreme Cold (Below 0° F).

CAUTION

In extremely low temperature, if doors have been open for an extended period of time, the door seals become brittle and the doors are difficult to close without damage. It then becomes necessary to operate the refrigeration system in the heating mode (above -20 ° F) with the doors sufficiently closed to warm the seals, or they may be heated with an external source of warm air to facilitate closing. Doors should be kept closed except during loading or unloading to prevent embrittlement damage to door seals.

2-13. Operation in Extreme Heat.

a. Allow sufficient room around the refrigeration unit for proper air circulation.

b. Inspect condenser coils frequently and insure they are clean.

c Inspect evaporator oils frequently and, if frost becomes 1/8 to 1/2 inch thick before automatic defrosting occurs, defrost coil manually (refer to TM 5-4110-231-14).

2-14. Operation in Dusty or Sandy Areas.

a. Keep condenser coil free of sand or foreign matter.

b. Periodically check control panel gasket on refrigeration unit for wear; replace if necessary.

c. Lubricate more often (paragraph 4-11). Keep all lubrication points clean and wipe up any lube spilled on unit.

2-15. Operation Under Rainy or Humid Conditions.

a. Check wiring for cracked or frayed insulation. See that wiring is kept dry and waterproofed.

b. Inspect evaporator coil frequently and, if frost becomes 1/8 to 1/2 inch thick before automatic defrosting occurs, defrost coil manually (refer to TM 5-4110-231-14).

c. Inspect metal doors and frame surfaces for rust. Remove rust and apply paint or oil as applicable.

2-16. Operation in Salt Water Areas

a. Wash unit frequently with clean, fresh water. Keep water out of electrical and refrigerating equipment.

b. Inspect metal doors and frame surfaces for rust. Remove rust and apply paint or oil as applicable.

2-17. Operation in High Altitudes.

a. The refrigeration unit is designed to operate at elevations up to 5,000 feet above sea level without special service or adjustment.

b. Above 5,000 feet the refrigeration unit output will be reduced. The condition cannot be prevented, but maximum performance can be maintained by compliance with all service instructions. Provide ample room for circulation of air through the condenser coil.

Section VI. OPERATION OF MATERIAL USED WITH THE REFRIGERATED CONTAINER

2-18. Operation of 10 KW Generator Set NSN 6115-00-465-1030.

Refer to TM 5-6115-585-12 for instructions on starting and operating the generator set.

2-19. Operation of Other Electric Power Sources.

Refer to the applicable technical manual for instructions on operating the power source.

2-20. Operation of Refrigeration Unit.

Refer to TM 5-4110-231-14 for instructions for starting and operating the refrigeration unit.

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. Container Lubrication.

There are no operator lubrication instructions.

3-2. Refrigeration Unit Lubrication.

Refer to TM 5-4110-231-14 for lubrication instructions for the refrigeration unit.

3-3. Generator Set Lubrication.

Refer to TM 5-6115-585-12/34 for generator set lubrication instructions.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-4. General.

To insure that the refrigerated container is ready for operation at all times, it must be inspected systematically so that the defects may be discovered and corrected before they result in serious damage or failure. Defects discovered during operation of the unit shall be noted for future corrections, to be made as soon as an operation has ceased Stop operation which would damage the equipment if operation were to continue. All deficiencies and shortcomings shall be recorded together with the corrective action taken on DA Form 2404, "Equipment Inspection and Maintenance Worksheet", at the earliest opportunity. When performing your "Before Operation" (B) and "During Operation" (D) PMCS, always keep in mind the CAUTIONS and WARNINGS. After operation, be sure to perform your (A) PMCS. If your equipment fails to operate, troubleshoot with proper equipment. Report any deficiencies using the proper forms, see TM 38-750.

3-5. Preventive Maintenance Checks and Services.

Refer to Table 3-1 for Preventive Maintenance Checks and Services.

a. ***Item Number Column.*** Checks and services are numbered in chronological order regardless of interval. This column will be used as a source of item numbers for the "TM Item Number" column on DA Form 2404 in recording results of PMCS.

b. ***Interval Columns***. The columns headed "B", "D", "A", "W", and "M", will contain a dot (.) opposite the appropriate check indicating it is to be performed Before, During, After, Weekly, or Monthly.

c. ***Item to be Inspected Column***. The items listed in this column are divided into groups and identifies the items to be inspected.

d. ***Procedures Column.*** This column contains a brief description of the procedure by which the check is to be performed.

e. ***For Readiness Reporting, Equipment is Not Ready/Available If: Column.*** This column will contain the criteria which will cause the equipment to be classified as not Ready/Available because of inability to perform its primary mission.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shutdown.

Table 3-1 Preventive Maintenance Checks Services

NOTE: Within designated interval, these checks are to be performed in the order listed.

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

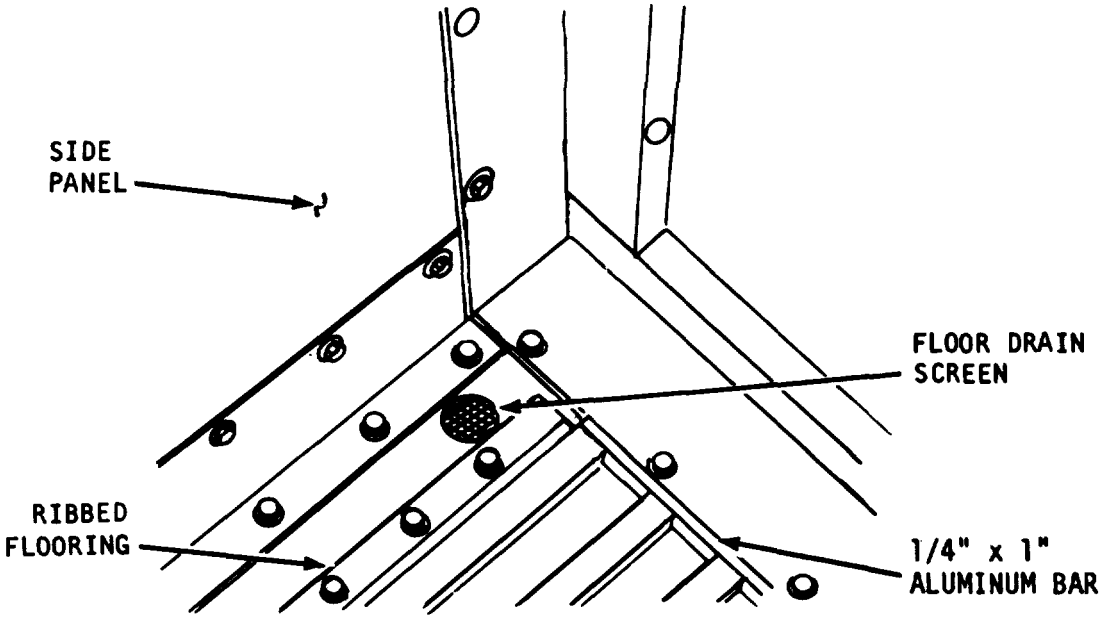
ITEM NO.	INTERVAL B	D	A	W	M	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary.	For Readiness Reporting, Equipment Is Not Ready/Available If:
1	•		•	•		Container	Check for obvious damage and leaks. Check floor drains (Fig.3-1) to see that they are not covered are plugged. Check drain hoses under floor to insure they are not damaged or kinked. Check load to insure that it is properly stacked. **NOTE** **There must be free flow air into and out of evaporator. There must be a one-foot space left on top of load and there must be a free flow of air under and around the load**. Check door seals for damage.	
2		•				Temperature Recorder	Check for obvious damage. Check to insure that the recorder is operating. Wind unit or replace chart paper as required and replace pen if not marking (Para 2-6, C).	
3		•				Refrigeration Unit	Check mounting bolts to container to insure they are tight. Check electrical cable connections to insure they are tight. Check for obvious damage and visible liquid leaks. Check for unusual noises or excessive vibrations. Refer too TM 5-4110-231-14 for specific items to inspect and insure that the refrigeration unit is operating properly.	Refrigeration low; will not cool.
4			•			Generator Set	Check capscrews (Fig.4-15) to container to insure they are tight. Check electrical connections to insure they are tight.	

Table 3-1 Preventive Maintenance Cheeks Service (Con't)

NOTE: Within designated interval, these checks are to be performed in the order listed.

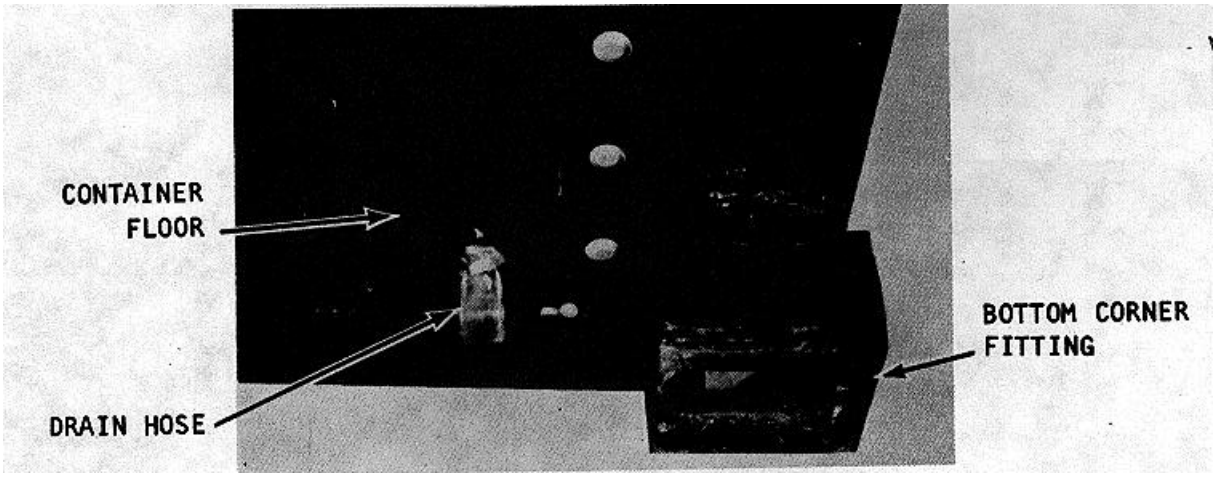
B - Before **D - During** **A - After** **W - Weekly** **M - Monthly**

ITEM NO.	INTERVAL B	D	A	W	M	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary.	For Readiness Reporting, Equipment Is Not Ready/Available If:
							Check exhaust hoses and connections for leaks. Check for obvious damage, liquid leaks, unusual noise and excessive vibrations. Refer to TM 5-6115-585-12/34 for periodic inspection and service dta to insure that the generator set is operating properly.	
5		•				Auxiliary Fuel tank, liner and connections.		



NOTE: THERE ARE FOUR FLOOR DRAINS
(ONE IN EACH CORNER).

VIEW A. FLOOR DRAINS INSIDE CONTAINER



NOTE: DRAIN HOSES ARE SHORT AND
SELF CLOSING, AND AUTOMATICALLY
OPEN TO DRAIN FLUIDS.

Figure 3-1. Floor Drain and Hose.

Section III. TROUBLESHOOTING

3-6. General.

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

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

3-7. Troubleshooting Table.

Table 3-2 lists the common malfunctions which you may find during the operation or maintenance of the refrigeration system or its components. You should perform the test/inspections and corrective actions in the order listed.

Table 3-2. Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. WATER ON FLOOR NOT DRAINING.

Step 1. Check for clogged floor drains.
Clean floor drains (fig. 3-1).

Step 2. Check for kink in drain hose.
Unkink drain hose.

2. TEMPERATURE RECORDER NOT RECORDING OR SENSING PROPERLY.

Step 1. Check to determine if recorder is operating.
Wind recorder as required (para. 2-6, c).

Step 2. Check to see if pen is marking.
Replace pen if not marking (para 2-6, c).

Step 3. Check for proper adjustment of recorder.
Adjust recorder as follows:

a. Make certain the container temperature has stabilized.

b. Open cover of recorder.

c. Loosen setscrew (8ee fig. 4-9, View B).

d. Turn shaft until pen agrees with test thermometer.

e. Retighten setscrew.

f. Close cover of recorder.

3. TEMPERATURE INSIDE CONTAINER ABNORMAL.

Step 1. Check for open or unlatched doors.
Close and latch doors.

Step 2. Check for improperly stacked load.
There must be free flow of air into and out of evaporator. There must be a one-foot space left on top of load and there must be a free flow of air under and around the load. Refer to TM 5-4110-231-14 for proper operation of the refrigeration unit. Refer to TM 5-6115-585-12/34 to check for proper operation of the generator set.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

4-1. Inspecting and Servicing the Refrigerated Container.

a. *Inspection.*

(1) Inspect container doors for loose or damaged hinges, pins, latches, levers, nut and bolts. Inspect gaskets and seals for damage or distortion.

(2) Inspect roof, sides, ends and doors for holes, dents or other obvious damage.

(3) Inspect all surfaces for deterioration and damage.

(4) Inspect the condition of the corner posts, corner fittings and structural rail members. Containers having corner posts or rails torn, bent and kinked, or broken/cracked fittings are unserviceable and should be rejected for use. Corner posts having a small vertical dent are acceptable if the dent does not exceed 1/2" in depth and 12" in length, providing the post/corner fitting joint is not affected. If deformation of the container configuration is evident, dimensions must be checked. The overall dimensions and the variation of diagonal distances between opposite corner fittings should be within tolerances as indicated. The dimensions and tolerances below are adopted from ANSI MH5.

Overall height	8 ft (+0/-3/16 in.)
Overall length	19 ft, 10-1/2 in. (+0/-1/4 in.)
Overall width	8 ft (+0/-3/16 in.)

Variation of diagonal distance between opposite corner fittings:

Ends	(+0/3/8) in.
Top, bottom, side	(+0/-1/2) in.

(5) Inspect floor for scrapes, holes, or damaged condition.

(6) Inspect floor drain hoses for damage, kinks or deterioration.

(7) Inspect supporting frame members for damage or deterioration.

(8) Inspect the temperature recorder for obvious damage.

(9) Inspect the exhaust line extensions for damage and tight connection to generator set.

(10) Inspect the auxiliary diesel fuel tank and line for obvious damage, and be sure that the line connections are secure at both ends.

(11) Inspect internal light fixture and bulb for burnout or damage.

b. *Servicing.* Correct the deficiencies noted during inspection if they are the responsibility of organizational maintenance personnel (See Appendix B, Maintenance Allocation Chart). Otherwise, report the deficiencies to direct and general support maintenance personnel.

4-2. Inspecting and Servicing the Refrigeration Unit.

a. *Inspection*. Inspect tightness of the four mounting nuts (Fig. 4-14) that attach refrigeration unit to refrigerated container wall.

b. *Servicing*. Refer to TM 5-4110-231-14 for detailed inspection and servicing of the refrigeration unit.

4-3. Inspecting and Servicing the Generator Set.

a. *Inspection*.

(1) Inspect all around for damage and missing parts.

(2) Inspect controls and wiring to insure that all parts are dry, all connections are tight, and all controls are in good condition.

(3) Inspect the generator set mounting hardware for tightness.

(4) Insure that the batteries have been installed and connected.

b. *Servicing*. Refer to TM 5-6115-585-12/34 for servicing of the generator set.

4-4. Cleaning, Decontamination, and Painting.

Refer to Chapter 5 for general maintenance procedures covering sealing, cleaning, decontamination, and painting of the refrigerated container. These procedures should be performed as required to keep the refrigerated container clean and protected.

4-5. Equipment Conversion.

Electrical power for operation of the refrigeration unit is obtained from the generator set or an external source. Refer to paragraph 2-2 for operating power conversion procedures.

Section II. MOVEMENT TO A NEW WORKSITE

4-6. Preparation to Move and Movement to a New Worksite.

Refer to Chapter 2, Section II for preparation to move and movement instructions.

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-7. Tools and Equipment.

Tools and equipment are not issued with the refrigerated container.

4-8. Special Tools and Equipment.

The following special tools are required to remove and install the Camtainer fasteners used in the refrigerated container:

a. TORX Bit T55 (for internal drive Camtainers).

b. TORX Socket E16 (for external drive Camtainers).

Each tool has a fluted end which engages the Camtainer nut to transmit torque. The T55 tool utilizes a 1/4 inch drive and the E16 a 1/2 inch drive on standard size ratchets and power wrenches.

4-9. Maintenance Repair Parts.

Repair parts are listed and illustrated in TM 55-8115-202-24P.

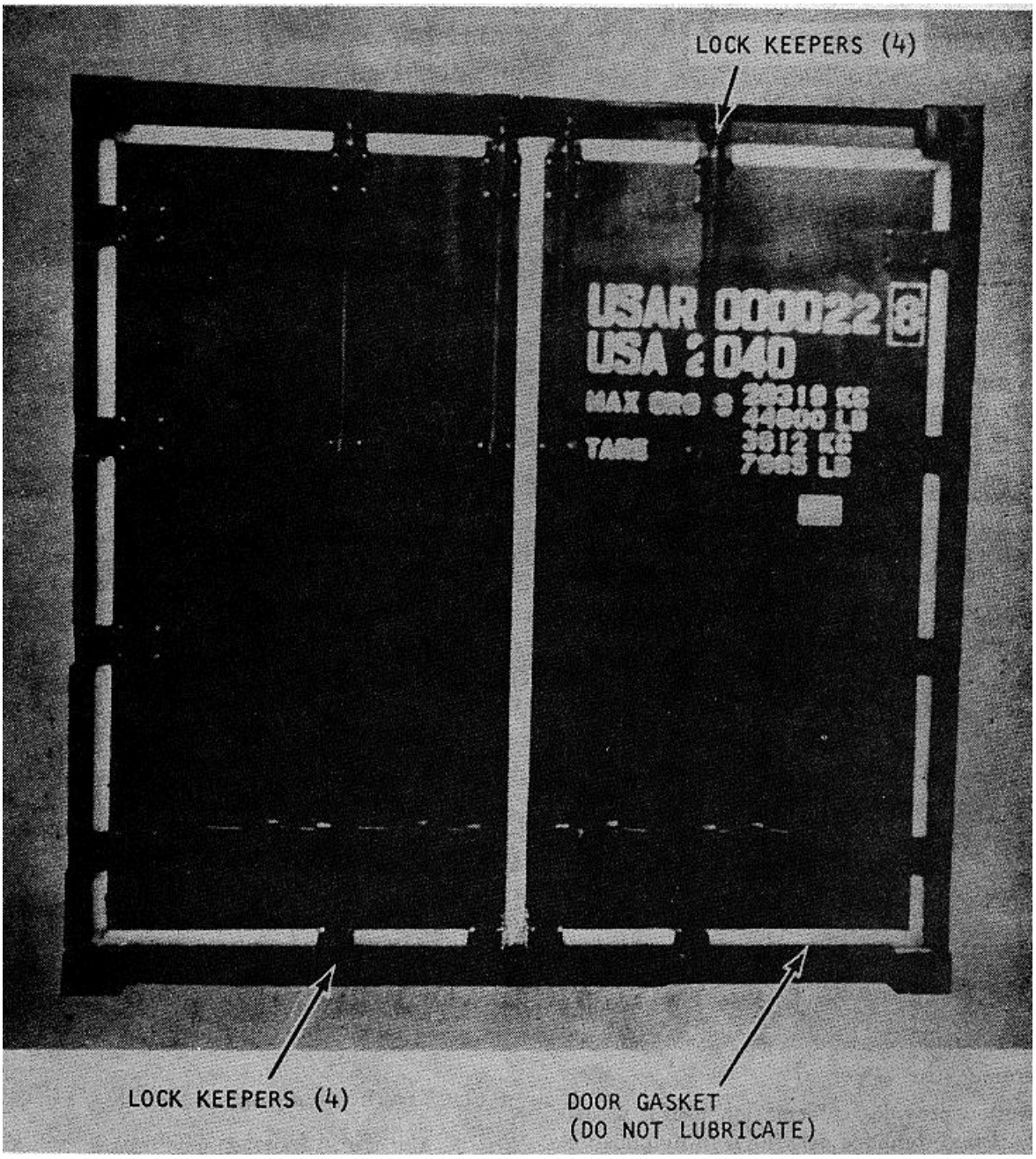
Section IV. LUBRICATION INSTRUCTIONS

4-10. General.

This section contains specific lubrication instructions for the refrigerated container. This lubrication is accomplished quarterly (every three months). Lubrication instructions for the refrigeration unit and the generator set are referenced.

4-11. Container Lubrication.

a. Lubricate lock keepers as shown in Figure 4-1.



NOTE: 1. **USE GRAPHITE GREASE CONFORMING TO SPECIFICATION VV-G-671, GRADE 1 (NSN 9150-00-235-5568).**

2. **DOOR SEALS (INSIDE) ARE LUBRICATED WITH SILICONE GREASE OR SPRAY.**

Figure 4-1. Rear Doors, Lubrication Points.

b. Lubricate door seals (Figure. 4-4) with silicone spray.

4-12. Refrigeration Unit Lubrication.

See TM 5-4110-231-14 for lubrication instructions for the refrigeration unit.

4-13. Generator Set Lubrication.

See TM 5-6115-585-12/34 for lubrication instructions for the generator set.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-14. General.

Inspect and service the Refrigerated Container periodically to find and correct defects before they result in serious damage or failure. Stop operation immediately if a deficiency is noticed which would damage equipment if operations were continued. Record all deficiencies together with the corrective action taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

4-15. Preventive Maintenance Checks and Services

a. ***Refrigerated Container.***

(1) See Table 3-1 for the daily preventive maintenance checks and services.

(2) Quarterly preventive maintenance checks and services consist of lubrication only (paragraph 4-11).

b. ***Refrigeration Unit.*** See Table 3-1 for the daily preventive maintenance checks and services, and TM 5-4110-231-14 for specific checks and services.

c. ***Generator Set***. See Table 3-1 for the daily preventive maintenance checks and services, and TM 5-6115-585-12/34 for specific checks and services.

Section VI. TROUBLESHOOTING

4-16. Scope.

This section provides information useful to organizational maintenance personnel in diagnosing and correcting unsatisfactory operation or failure of the refrigerated container.

4-17. Troubleshooting.

See Tables 3-2 and 4-1 for malfunction, test or inspection, and correction action.

Table 4-1. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR ESCAPING FROM EDGES OF REAR DOOR.

Step 1. Check for leaky door seals.
Repair door seal (para 4-26).
Step 2. Check for damaged seals.
Replace door seal (para 4-26).

2. TEMPERATURE RECORDER NOT RECORDING OR SENSING PROPERLY.

Step 1. Check recorder sensing element.
Replace recorder sensing element (para 4-49 and 4-50).
Step 2. Check to see if pen is marking.
Replace pen if not marking chart (para 2-6, c).
Step 3. Inspect recorder for damage.
Replace bad recorder (para 4-45 and 4-46).

3. TEMPERATURE INSIDE CONTAINER ABNORMAL (HIGH OR LOW).

Refer to TM 5-4110-231-14 for refrigeration unit troubleshooting data.

4. GENERATOR SET NOT OPERATING PROPERLY.

Refer to TM 5-6115-585-12/34 for generator set troubleshooting data.

5. AIR LEAKS FROM CONTAINER.

Check to determine extent of leakage.
Seal minor leaks (para 4-39, c).
Repair area that leaks (para 6-3).

Section VII. MAINTENANCE OF DOOR ASSEMBLY

4-18. General.

The rear door assemblies (figure 1-2) are constructed of metal-clad plywood with a gasket type weather seal around the edges. The inner door sides (fig. 4-4) are foam insulated and have a seal which mates with the container opening to provide an airtight closure. The document holder is mounted inside on the right door. The right door also contains an escape hatch door which opens from the inside.

4-19. Inspection.

a. Wash doors with a detergent solution, rinse, and allow to air dry.

b. Inspect door lining sheet for damage (rips, holes, gashes, cuts, loss of foam insulation).

c. Inspect door gasket (outer weather seal) for tears, cuts, and other damage.

NOTE

The door seals are covered in Section VIII. The door hardware is covered in Section IX. The document holder and escape door are covered in Section X.

4-20. Removal of Door.

a. Burn weld off end of hinge pins.

b. Remove hinge pins and door.

4-21. Repair.

a. Minor Repair of Door Lining Sheet.

(1) Remove loose chips or particles from edges of holes.

(2) Roughen entire surface around damaged area in order to allow parching material to stick better.

(3) Use repair kit Glass Reinforced Plastic Laminate MILR19907 (NSN 2090-00-372-6064). Apply epoxy furnished in kit according to instructions furnished.

(4) Apply fiberglass tape over entire patch.

b. Major Repair of Door Lining Sheet (Up to 144 sq. in.).

(1) Remove loose chips or particles from edges of holes.

(2) Remove damaged foam insulation and install replacement foam (paragraph 4-21, c).

(3) Roughen entire surface around damaged area to improve adherence properties of patching material.

(4) Use repair kit Glass Reinforced Plastic Laminate MILR19907 (NSN 2090-00-372-6054). Apply the low viscosity epoxy to cloth (furnished in kit) cut to a size at least 2 to 3 inches greater in each direction of the hole to be covered.

(5) Affix cloth patch over damaged area.

(6) Tape cloth patch in the vertical and horizontal direction so that it will not slip while curing.

c. *Foam Insulation Repair*. If the area to be repaired is small (.75 cu. ft. or less), FROTH-PAK Kit 9.5 manufactured by INSTA-FOAM Products, Inc., Joliet, Illinois can be used or remove damaged foam with a sharp tool and form the area to be patched in such a manner that a sheet of urethane insulation foam can be easily cut and placed in the area.

Snugly fit the replacement foam next to the adjacent foam. The replacement foam must be the same thickness as the adjacent foam, and meet the requirements of Federal Spec. HH-I-530A, Type 2, Grade 2, Class 1.

d. *Replacement of Door Lining Sheet*. See Figure 4-2 for removal and installation instructions. Install replacement foam insulation as required (paragraph 4-21, c).

e. *Door Gasket Repair and Replacement*.

NOTE

To repair or replace a damaged edge, you will need the following tools: Knife, screw driver, mallet, scraper blade, brush, saw, hand caulking gun staple gun, and a repair kit (,Sea-Lok Door Kit SLRI-8S70, Metal-Wood (Co.).

(1) Carefully remove corner of mitered corner tabs with sharp knife then peel off with assistance of knife blade. (See View A, Figure 4-3).

(2) At the mitered corner, insert screw driver tip into the joint, prying under the web of the plastic channel. When end is loosened, pull off edging with peel back technique, prying with screw driver as required to break loose. (See View B).

(3) Prepare the panel edge for replacement by scraping off old adhesive sealant; then brush off all loose particles.

(4) Replace corner filler tabs, using staple or other small fastener, carefully locating tab on center of edge; then caulk as shown (See View C).

(5) Cut replacement edge extrusion to size by first mitering one end with saw at approximately a 45° angle; then, from the opposite end fit to door edge so that you allow approximately 1/8" clearance at each end. (See View D, Ref. 1/8" gap).

(6) When door edge is ready for application of edging, apply 3/16" diameter beads of SEA-LOK Adhesive Sealant 58-S-1 at the mid points of the inside walls of the rigid channel. (See illustration on Cartridge label).

NOTES:

1. **USE REMOVED LINING SHEET FOR HOLE LAYOUT AND SIZE PATTERN (USE BULK MATERIAL FOR NEW SHEET)**

2. **INSULATION AND LINING SHEET ARE CEMENTED WITH CONTACT ADHESIVE**

REMOVAL:

STEP 1. REMOVE DOOR (PARA 4-20).

STEP 2. REMOVE SPACER STRIPS (PARA 4-42).

STEP 3. RIGHT DOOR ONLY: REMOVE ESCAPE DOOR AND DOCUMENT HOLDER (PARA 4-35).

STEP 4. DRILL OUT RIVETS AROUND ALL EDGES OF LINING SHEET.

STEP 5. PEEL LINING SHEET OFF DOOR, BEING CAREFUL NOT TO DAMAGE FOAM INSULATION.

STEP 6. REPLACE DAMAGED FOAM INSULATION (PARA 4-21, c).

INSTALLATION:

STEP 1. APPLY ARMSTRONG 520 CONTACT ADHESIVE TO SURFACE OF FOAM INSULATION AND LINING SHEET.

STEP 2. PLACE NEW LINING SHEET (SEE NOTES) OVER FOAM INSULATION, BEING CAREFUL TO LINE UP RIVET HOLES.

STEP 3. TUCK IN DOOR SEAL EDGES AND INSTALL POP RIVETS THROUGH LINING SHEET TO DOOR BOX CHANNELS.

STEP 4. INSTALL SPACER STRIPS (PARA 4-42).

STEP 5. RIGHT DOOR ONLY: INSTALL ESCAPE DOOR AND DOCUMENT HOLDER (PARA 4-36).

STEP 6. INSTALL DOOR (PARA 4-22).

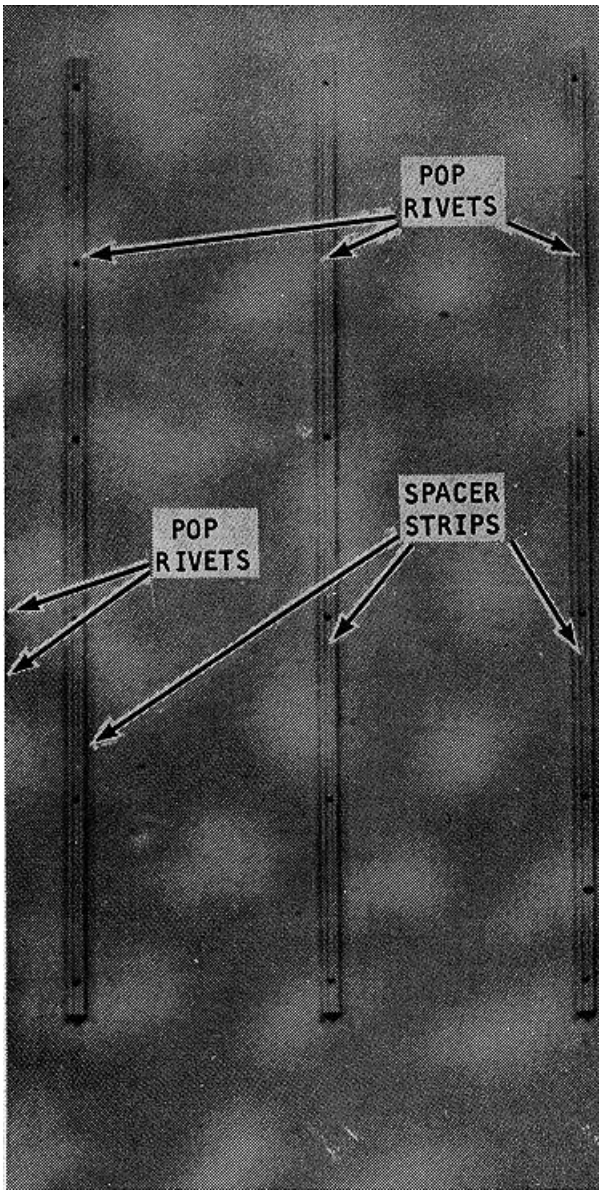
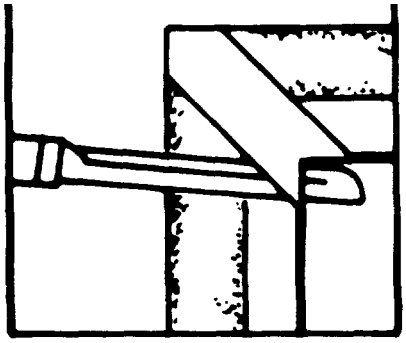
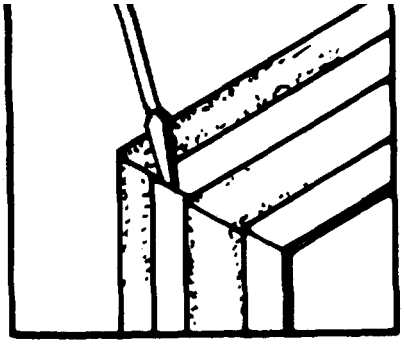


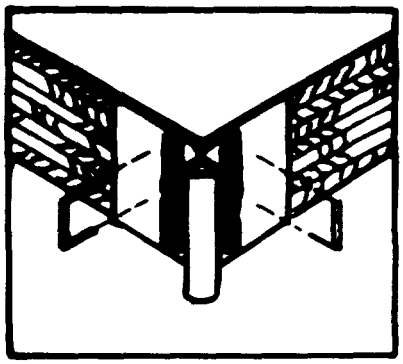
Figure 4-2. Door Lining Sheet, Removal and Installation.



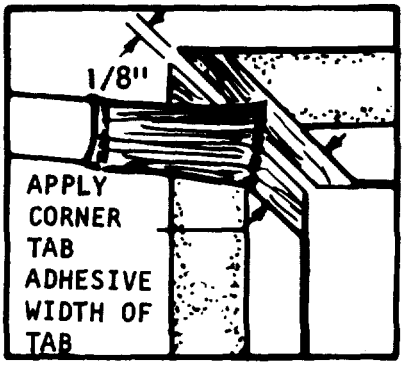
VIEW A. TO REMOVE CORNER TAB



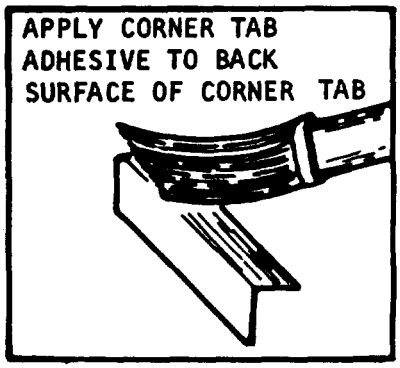
VIEW B. TO REMOVE EDGING



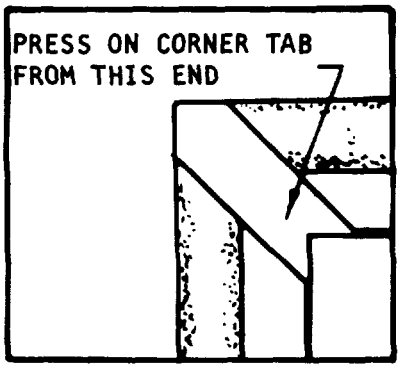
VIEW C. REPLACING CORNER TAB FILLER



VIEW D. APPLYING ADHESIVE



VIEW E. APPLYING ADHESIVE TO TAB



VIEW F. APPLYING TAB

TS 8115-202-14/4-3

Figure 4-3. Door Gasket, Repair and Replacement.

(7) Immediately mount the replacement edging on the panel by first spreading rigid legs on one end. Then tap edging into place progressively with wood block (fitted between flexible legs) and mallet, making sure that the edging is in place within approximately 3-minutes after applying the SEALOK Adhesive Sealant 58-S-1.

(8) To finish corners, apply the SEA-LOK Corner Tab Adhesive 58-A-1 to the edge moulding as shown in View D and to the concave surface (back) of corner tabs, 58-T-1 (View E). Let corner tab dry until tacky, then firmly press the tab over the mitered corner joint to effect bond. This step is repeated with the Short Corner Tabs 58-T-2 on the inside joints over the shorter flexible legs. (See View D, E and F).

4-22. Installation.

a. Install door and hinge pins.

b. Weld hinge pins on shank end only.

Section VIII. MAINTENANCE OF DOORS SEALS

4-23. General.

The door seals (Figure 4-4) are accordion type, and made of polyvinyl and filled with polyurethane foam. The door seals provide an airtight closure when both doors are fully closed and latched.

4-24. Inspection.

Inspect door seals for tears, cuts, and other obvious damage.

4-25. Removal of Door Assembly.

Refer to paragraph 4-20 for removal.

4-26. Repair and Replacement.

a. Repair of cuts and tears.

NOTE

Repair of seal is limited to taping of tears or cuts which do not exceed three inches in length, and not more than one tear in any vertical or horizontal length. Replace seal if any one tear exceeds three inches, or if more than four tears occur in one door seal.

(1) Clean surface of seal at least two inches around perimeter of seal.

NOTE

Repair of seal should be accomplished at an ambient temperature of 70° F or above.

(2) Apply 3 in. wide or wider adhesive backed polyvinyl. chloride (PVC) tape to damaged area assuring that tape exceeds at least 1-1/2 in. beyond edge of tear.

NOTE

Tape is R. Mileti Co., Type RM1200.

b. Replacement of Seal.

(1) Remove door (Paragraph 4-20).

(2) Remove pop rivets securing door seal to door lining sheet (Figure 4-4).

(3) Remove pop rivets securing door seal to retaining strips (Figure 4-4).

(4) Remove entire door seal from door assembly.

(5) Install new door seal on door assembly, securing corners in place first.

(6) Secure door seal first to retaining strips, then to door lining sheet, using pop rivets.

(7) Install door on container (Paragraph 422).

4-27. Installation of Door Assembly.

a. Install door and hinge pins.

b. Weld hinge pin to hinge butt.

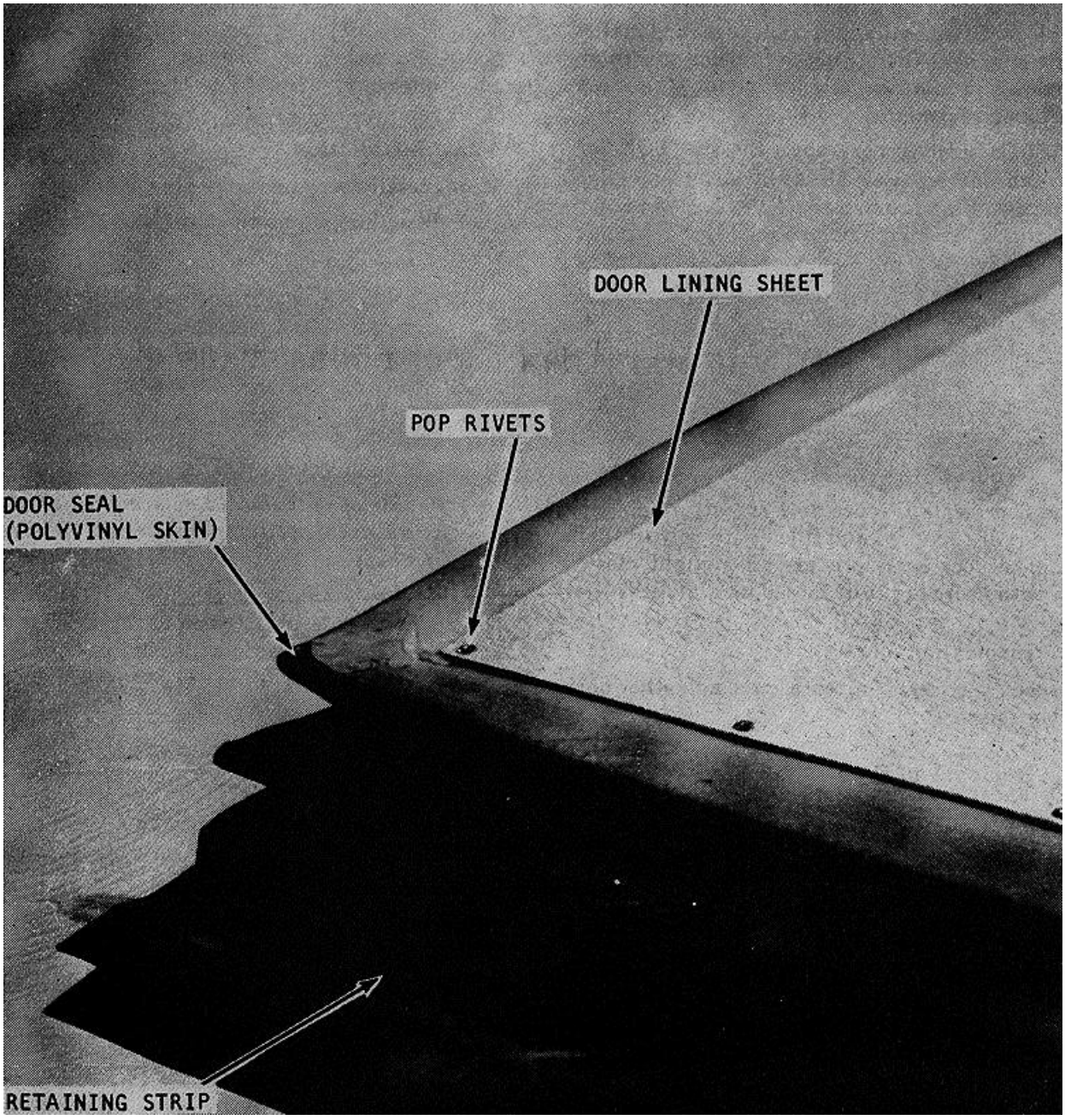


Figure 4-4. Floor Seal, Removal and Installation.

Section IX. MAINTENANCE OF DOOR HARDWARE

4-28. General.

The door hardware consists of the hinges which attach the doors to the container, the frame, and the latching mechanisms (handles, rods, guides, locks) which are operated to lock and unlock the doors.

4-29. Inspection.

a. Inspect hinges for cracks, loose bolts, and other obvious damage.

b. Inspect rod guides, rods, handles and locks for cracks, loose bolts, and other obvious damage.

c. Inspect paint on door surfaces and door hardware for excessive wear, chipping, peeling, and general condition.

4-30. Service.

a. Lubricate door hardware (Paragraph 4-11).

b. Paint door surfaces and door hardware (Paragraph 5-9).

c. Replace damaged or defective door hardware (Paragraph 4-31 and 4-32).

4-31. Removal.

a. ***Door Assembly.*** Refer to paragraph 4-20 for removal.

b. ***Door Lining Sheet.*** Refer to Figure 4-2 for removal.

c. ***Foam Insulation.*** Use a sharp tool to cut and remove foam over bolts attaching door hardware to be replaced (Figure 4-5).

d. ***Door Hardware***. See Figure 4-5 to identify and remove damaged or defective door hardware.

4-32. Installation.

a. ***Door Hardware.*** See Figure 4-5 and install new door hardware.

b. ***Foam Insulation.*** Use a sharp tool to cut and snugly fit replacement foam insulation where removed for access to bolts. The replacement foam must be the same thickness as the adjacent foam and meet the requirements of Federal Specification HH-I-503A, Type 2, Grade 2, Class 1.

c. ***Door Lining Sheet***. See Figure 4-2 for installation.

d. ***Door Assembly.***

(1) Install door and hinge pins.

(2) Full weld hinge pins on shank end only.

Section X. MAINTENANCE OF DOCUMENT & MANUAL HOLDERS

4-33. General.

The document holder (Figure 4-6) and the manual holder (Figure 4-7) are metal containers used to hold shipping papers and technical data applicable to the container and its contents.

4-34. Inspection.

Inspect both holders for obvious damage and defective hardware.

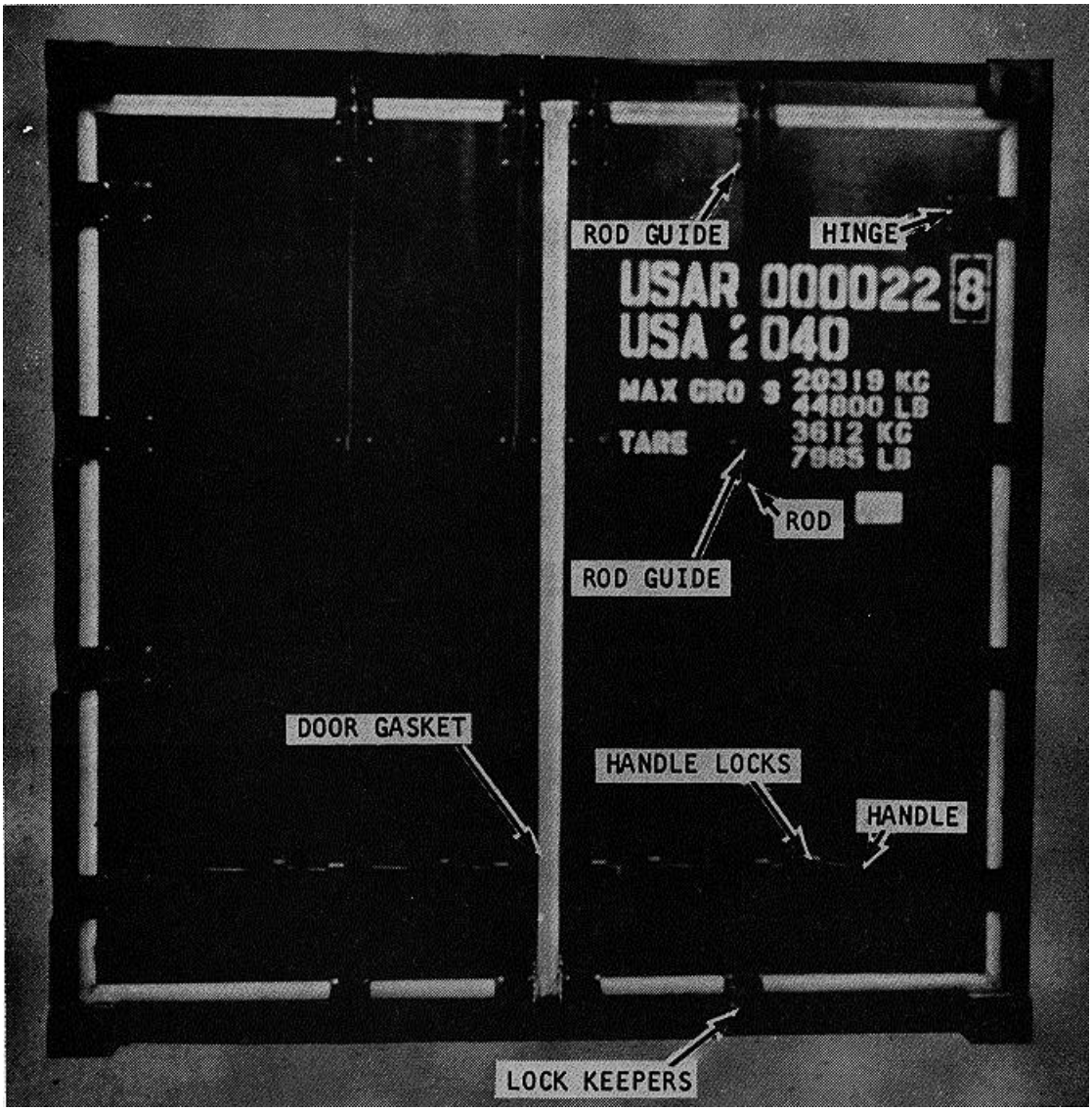
4-35. Removal.

a. ***Document Holder***. See Figure 4-6 for removal.

b. ***Manual Holder***. See Figure 4-7 for removal.

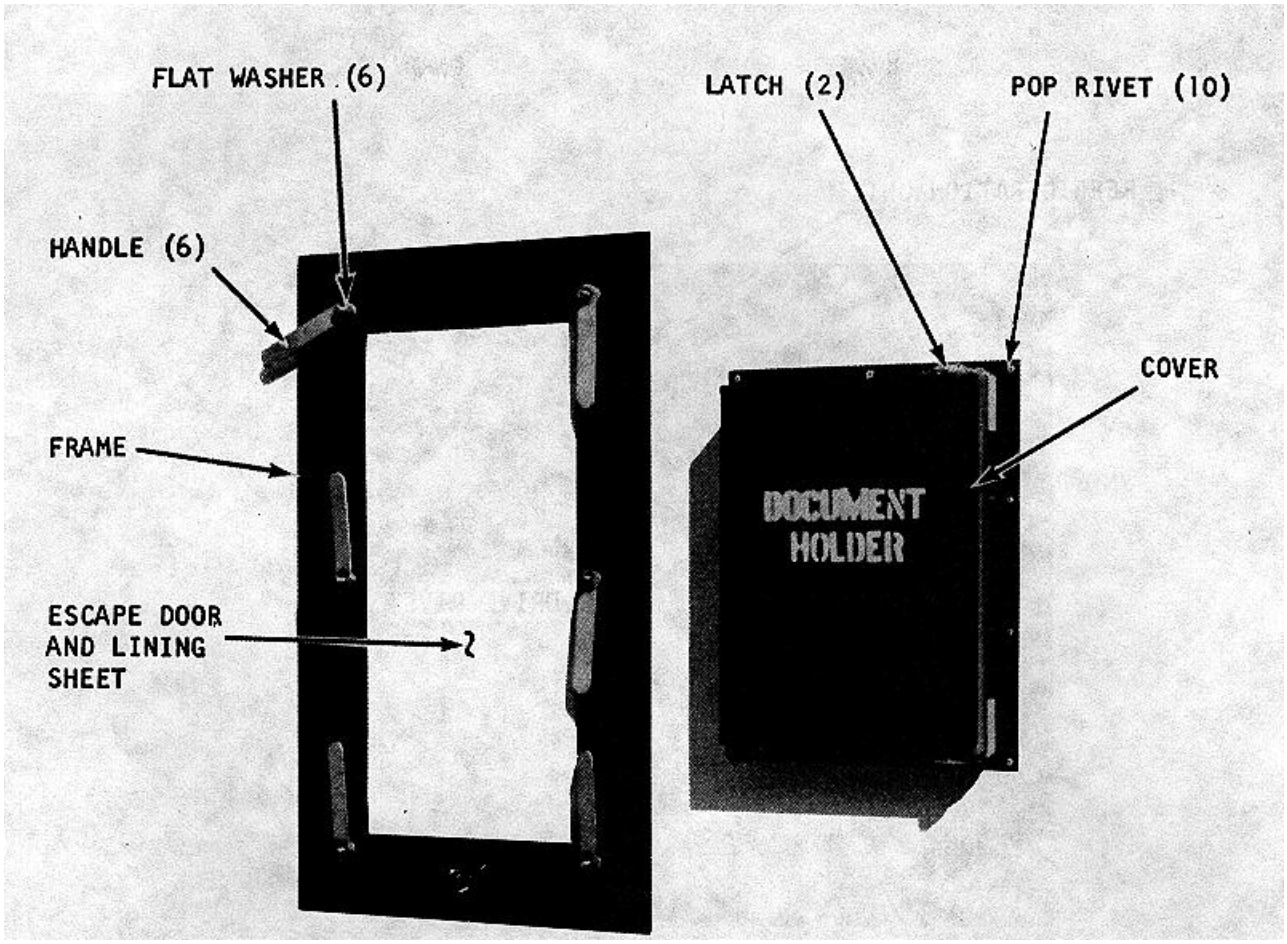
4-36. Installation.

See applicable Figure (4-6 or 4-7) and install holder.



NOTE: **EACH HANDLE LOCK IS ATTACHED WITH ONE CAPSCREW AND ONE CAMTAINER FASTENER. ALL OTHER DOOR HARDWARE IS ATTACHED WITH CAMTAINER FASTENERS WHICH REQUIRE THE USE OF A SPECIAL TOOL (TORX BIT T55 OR TORX SOCKET E16). THE LOCK KEEPERS ARE WELDED TO THE CONTAINER FRAME.**

Figure 4-5. Door Hardware, Identification.



ESCAPE DOOR

REMOVAL:

STEP 1. UNSCREW 6 HANDLES, REMOVE 6 FLAT WASHERS, AND REMOVE FRAME IF LOOSE.

NOTE: ESCAPE DOOR MAY BE OPENED WITH FRAME IN PLACE. FRAME IS HELD BY 6 STUDS.

STEP 2. PUSH OUT ESCAPE DOOR AND LINING SHEET.

INSTALLATION:

STEP 1. INSTALL ESCAPE DOOR FROM OUTSIDE.

STEP 2. INSTALL ESCAPE DOOR LINING SHEET AND FRAME, AND INSTALL FLAT WASHERS AND HANDLES.

DOCUMENT HOLDER

REMOVAL:

STEP 1. OPEN LATCHES, AND REMOVE COVER AND DOCUMENTS.

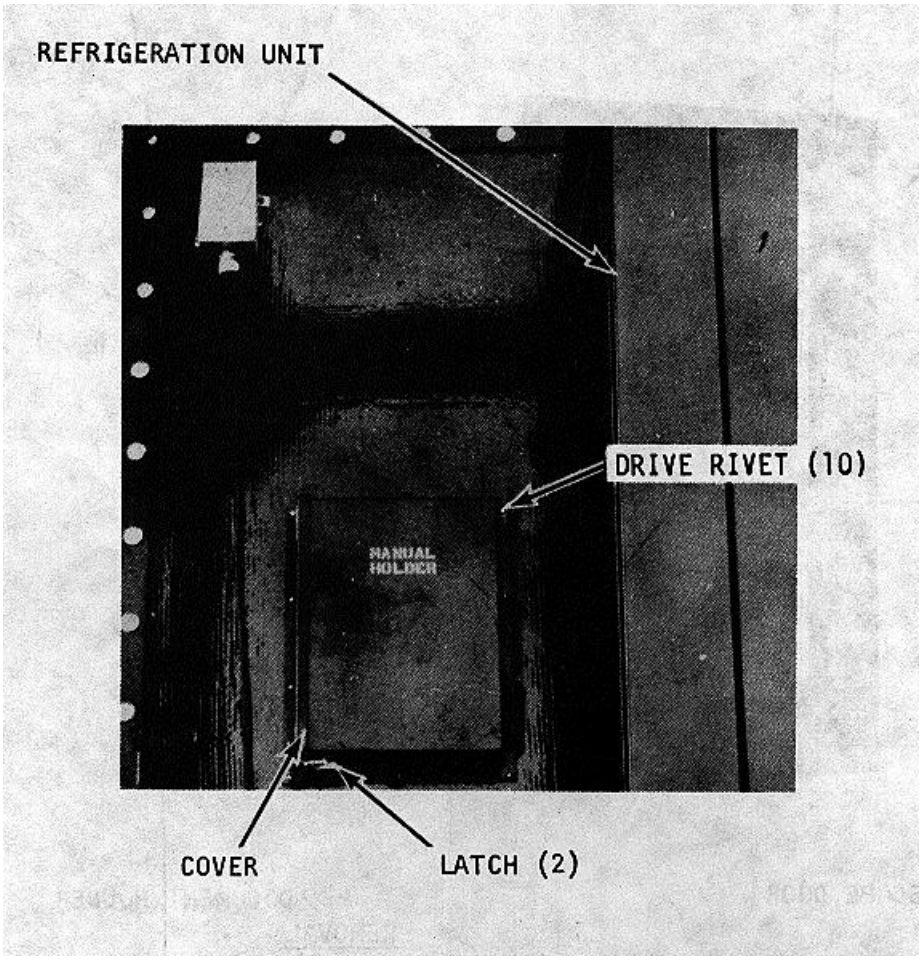
STEP 2. DRILL OUT ALL POP RIVETS, AND REMOVE DOCUMENT HOLDER.

INSTALLATION:

STEP 1. INSTALL DOCUMENT HOLDER USING POP RIVETS.

STEP 2. INSERT DOCUMENTS, AND INSTALL COVER, USING LATCHES.

Figure 4-6. Escape Door and Document Holder, Removal and Installation.



REMOVAL:

STEP 1. OPEN LATCHES, AND REMOVE COVER AND MANUALS.

STEP 2. DRILL OUT ALL DRIVE RIVETS, AND REMOVE MANUAL HOLDER.

INSTALLATION:

STEP 1. INSTALL MANUAL HOLDER USING DRIVE RIVETS.

STEP 2. INSERT MANUALS, AND INSTALL COVER, USING LATCHES.

Figure 4-7. Manual Holder, Removal and Installation.

Section XI. MAINTENANCE OF FLOOR, FRONT, ROOF, AND SIDES

4-37. General.

The floor, front, roof, and sides of the container are one-piece, composite panel constructions (Figure 6-1) made of fiberglass reinforced plywood and polyurethane foam. The outer plywood is overlaid with fiberglass-reinforced polyester, and has a fused-on gel coat (olive drab color) on the exterior side only. The inner plywood is overlaid with fiberglass-reinforced polyester, and has a fuse-on gel coat (white colored) on the interior side only. A polyurethane foam core and rib stiffeners are bonded in between the inner and outer plywood pieces, forming an insulated composite panel. Each panel is installed in the container box assembly frame with Camtainer fasteners through holes on all edges of the outer plywood piece. The floor panel is also supported by spaced, I-beam cross members in the box assembly frame bottom. Ribbed, extruded aluminum floor board sections are placed over the floor panel to provide passages for airflow under the cargo. Surfaces of the front and side panels and doors have vertical spacer strips which provide passages for airflow down the sides of the cargo.

4-38. Inspection.

a. Wash panels with a mild detergent and water; thoroughly rinse and allow to air dry.

b. Inspect panels for abrasions, scrapes, punctures, and other damage.

4-39. Repair.

a. ***Minor abrasions*** (glass fibers not damaged).

(1) Remove all loose particles and clean the area (paragraph 5-8).

(2) Trowel polyester body putting (filler) over the scrape and allow the putty to setup.

NOTE
Body putty is Cortec Fiberglass Evercoat Putty.

(3) Level off surface with a rasp or sander.

(4) Apply polyurethane paint (white inside, olive drab outside).

NOTE
Recommended paint is MIL-C-52261A, TT-E-485, COLOR 24087.

b. ***Scrapes*** (glass fibers damaged).

(1) Grind and dishout the damaged area.

(2) Remove all loose particles and clean the area (Paragraph 5-8).

(3) Apply polyurethane paint (white inside, olive drab outside).

NOTE
Recommended paint is MIL-C-52661A, TT-E-485, COLOR 24087.

c. ***Punctures*** (small holes less than six inches in diameter).

(1) Clean damaged area of fractured glass, wood, and etc.

(2) Fill the puncture hole with polyester body putty (filler), overfilling the hole by 1/8 inch for shrinkage allowance. Cover the putty filled hole using any rigid material (hardboard, plywood, etc.) and masking tape, and leave it in place to support the putty while it sets-up.

NOTE
Body putty is Cortec Fiberglass Evercoat Putty.

(3) Level off surface with a rasp or grinder and allow another setup period of 15 to 30 minutes.

(4) Lightly sand area around the filled puncture hole for bonding.

(5) Patch area using two layers of glass cloth and polyester resin from repair kit NSN 2090-00-372-6064. Apply cloth and resin according to instructions furnished in kit.

(6) Sand smooth and apply polyurethane paint (white inside, olive drab outside).

NOTE
Recommended paint is MIL-C-52661A, TT.E-485, COLOR 24087.

Section XII. MAINTENANCE OF SPACER STRIPS AND CARGO RESTRAINTS

4-40. General.

The spacer strips (Figure 4-8) are installed on the doors, sides, and front of the container to provide an airflow passage. Spacer strips are made of soft, flexible ethylene vinyl acetate, and are 0.625 inch thick.

The cargo restraints (Figure 4-8) consists of 3 tiers of slotted tracks installed on the sides of the container, on which metal beams are inserted.

4.41. Inspection.

a. Inspect slotted tracks (Figure 4-8) for obvious damage, defects, and attachment to container wall.

b. Inspect beams for obvious damage and defects.

c. Inspect the spacer strips for cuts, attachment to container wall, and other damage.

4-42. Replacement.

See figure 4-8 for removal and installation.

4-42.1. Removal

a. Remove beams (Figure 4-8) from track.

b. Remove sheet metal screws (Figure 4-8) from damaged slotted track and remove track.

4.42.2. Installation.

a. Measure and cut replacement track section to fit.

b. Cut track section on center between slots.

c. Make sure track section is aligned with corresponding section of the opposite wall of the container.

d. Attach track at each end with sheet metal screws (Figure 4-8).

e. Fill each screw hole with silicone caulk, Appendix E, Item 1.

f. Insert remaining screws.

g. Remove screws inserted in step d, fill screw holes with silicone caulk and re-insert screws.

h. Install beams into track.

Section XIII. MAINTENANCE OF THERMOMETER ASSEMBLY

4-43. General

The thermometer assembly (Figure 4-9) consists of a mechanical recorder and its remote sensing element. This assembly provides a record of temperatures inside the refrigerated container during operation. The chart recorder is spring operated (key wind-up), and uses replaceable charts.

4-44. Inspection.

Inspect thermometer recorder assembly (Figure 2-4, 2-5) for obvious damage, chart installation, and pen operation.

NOTE

Thermometer element is tested and recorder is adjusted in Section XIV.

4-45. Removal.

a. Disconnect thermometer element coupling from recorder (Figure 4-9).

b. See Figure 4-9 and remove attaching parts and thermometer recorder assembly.

4-46. Installation.

a. Install thermometer recorder assembly and attaching parts (Figure 4-9).

b. Connect thermometer element coupling to recorder.

Section XIV. MAINBTENANCE OF THERMOMETER ELEMENT

4-47. General.

The thermometer element (Figure 4-10) is located inside the refrigerated container, above the evaporator plenum chamber. The element senses the ambient internal temperature, and through a capillary tube and coupling, transmits it to the recorder assembly.

4-48. Testing.

a. Recorder adjustment.

(1) Make certain the container temperature has stabilized.

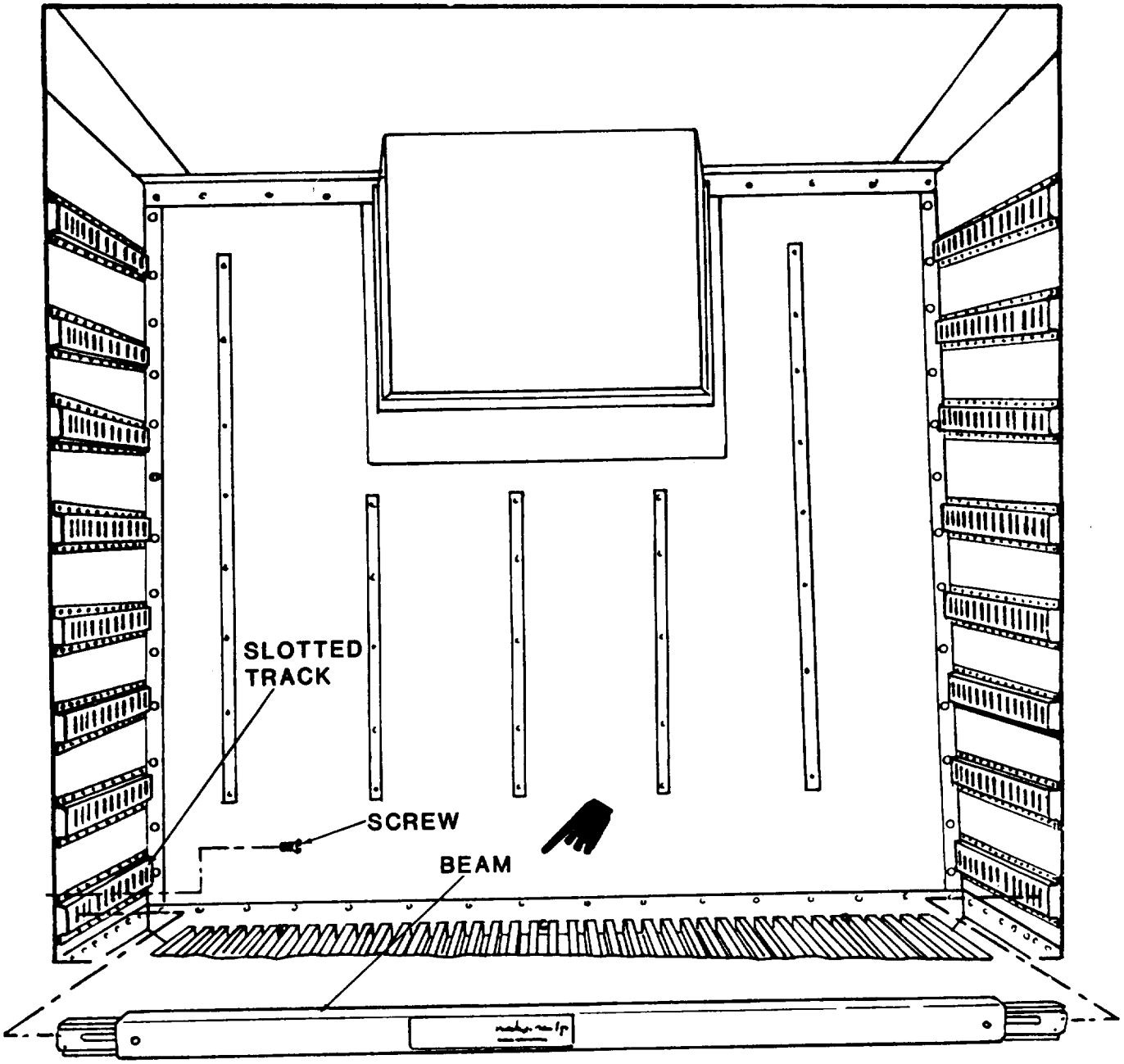
(2) Open cover of recorder.

(3) Loosen set screw (Figure 49).

(4) Turn shaft until pen agrees with test thermometer.

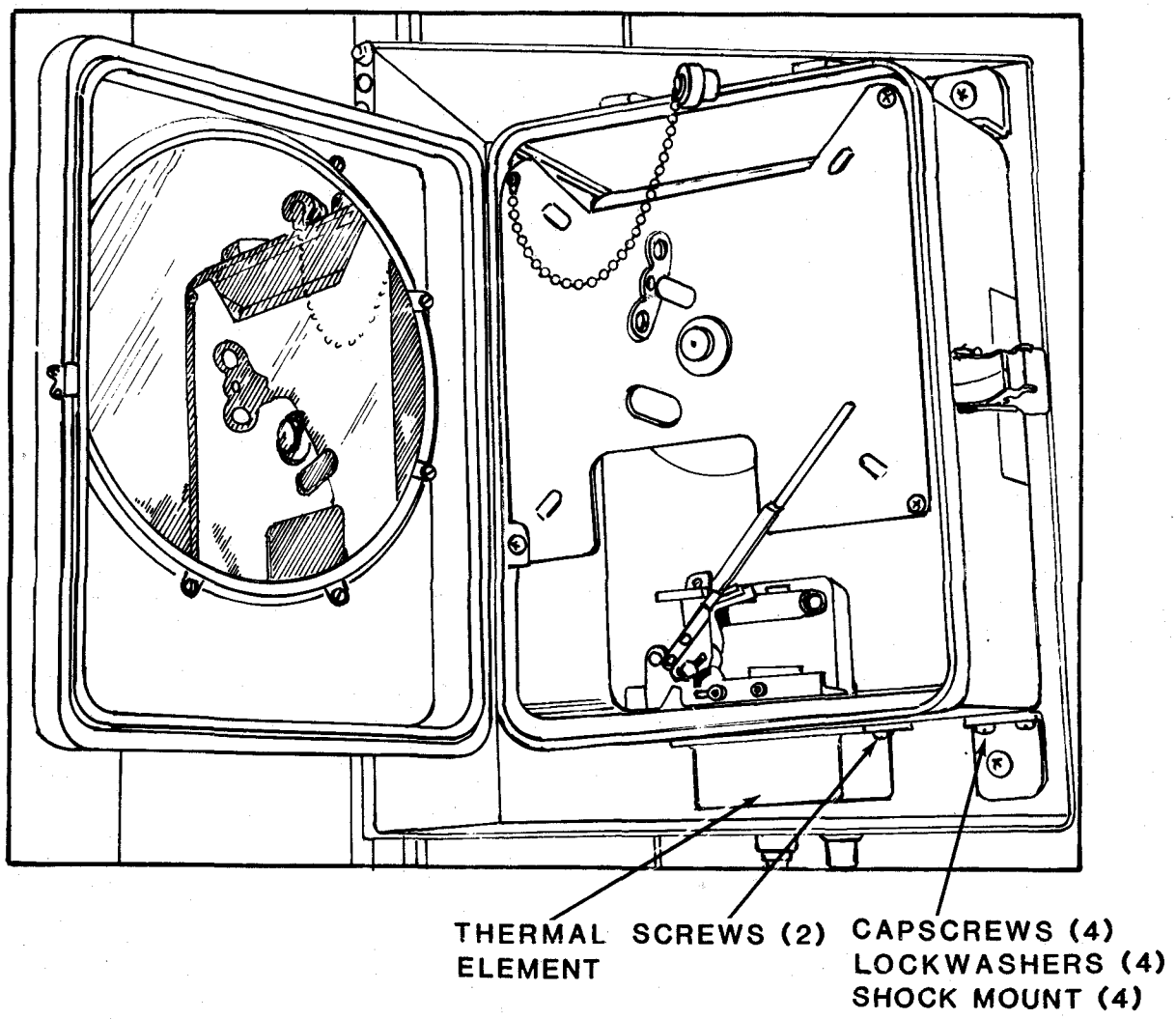
(5) Retighten setscrew.

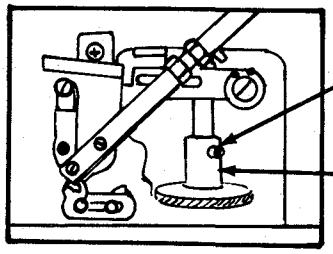
(6) Close cover of recorder.



NOTE: SPACER STRIPS ON DOORS ARE FASTENED TO THE DOOR LINING SHEET WITH POP RIVETS. TO REMOVE, DRILL OUT THE POP RIVETS.

FIGURE 4-8. SPACER STRIPS, CARGO RESTRAINT, REMOVAL AND INSTALLATION





NOTE: CHART MUST BE INSTALLED ON RECORDER WHEN ADJUSTING SHAFT TO CHECK PEN INDICATION OF TEMPERATURE.

VIEW B. ADJUSTMENT POINTS

FIGURE 4-9. TEMPERATURE RECORDER, ADJUSTMENT POINTS AND REMOVAL AND INSTALLATION.

b. Testing of thermal element with sensing element.

(1) Perform recorder adjustment (see preceding).

(2) Reset refrigeration unit thermostat (MK410) to a setting of 5-degrees warmer or cooler.

(3) Allow container temperature to stabilize, as indicated by test thermometer, to the selected temperature.

(4) Recorder should indicate container temperature within +2 degrees of test thermometer indication; if not, replace thermal element (paragraph 4-49, 4-50).

(5) Reset refrigeration unit thermostat (TM 5-4110-231-14).

4-49. Removal of Thermal Element With Sensing Element.

a. Remove capillary line clamps and free sensing element from clips (Figure 4-10).

b. Disconnect thermal element to recorder (Figure 4-9).

c. Remove grommets and pull capillary line and element through container wall hole.

4-50. Element Installation.

a. Pass sensing element through container wall (Figure 4-10).

b. Connect thermal element to recorder (Figure 4-9).

c. Install sensing element in clips, install clamps and grommets (Figure 4-10), and seal with room temperature curing silicon rubber, Dow-Corning RTV 732.

d. Perform recorder adjustment (paragraph 448).

Section XV. MAINTENANCE OF FUEL SYSTEM

4-51. General.

The fuel line connects the auxiliary diesel fuel tank (Figure 4-11) to the generator set engine to allow extended running. The fuel tank has a vented fuel cap and a fuel gage. The fill tube extending to the level marking has a pin hole for venting purposes in case the fuel level reaches above the level marking.

4-52. Inspection.

a. ***Fuel cap***. Inspect for obvious damage and defects, and verify vent passage is open including the pin hole in the fill tube.

b. ***Fuel gage***. Inspect for broken glass, deteriorated gaskets, loose screws, and operation (fuel level indication versus approximate known fuel level in tank).

c. ***Fuel line***. Inspect for obvious damage and defective fittings.

d. ***Fuel tank***. Inspect for obvious damage, leaks, punctures, rust, and security.

4-53. Replacement.

a. ***Fuel cap.*** Replacement is obvious.

b. ***Fuel line***. See Figure 4-11 for removal and installation.

c. ***Fuel tank*** (1) See Figure 4-11 for removal and installation.

(2) Repair fuel tank using epoxy patch kit NSN 8040-00-777-0631 as follows:

NOTE
Only small pinholes and cracks may be repaired with epoxy patch.

(a) Drain fuel tank to a level below holes or cracks, via drain plug in bottom of fuel tank.

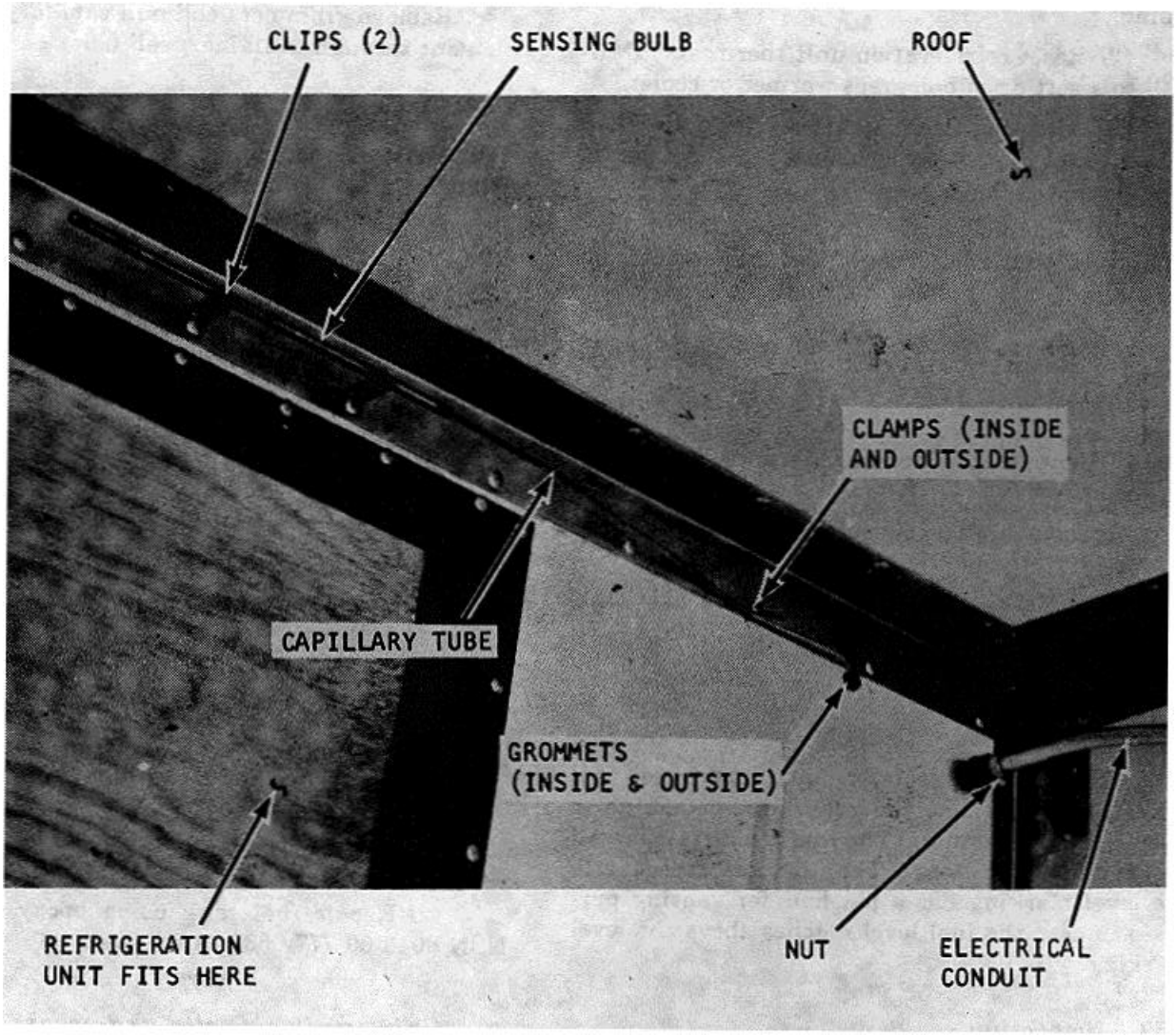
(b) Remove paint and clean area to be repaired using crocus cloth or sandpaper.

(c) Mix and apply epoxy patch in accordance with instructions supplied in the kit.

(d) Allow epoxy to cure for 30 minutes or as specified in the instructions supplied.

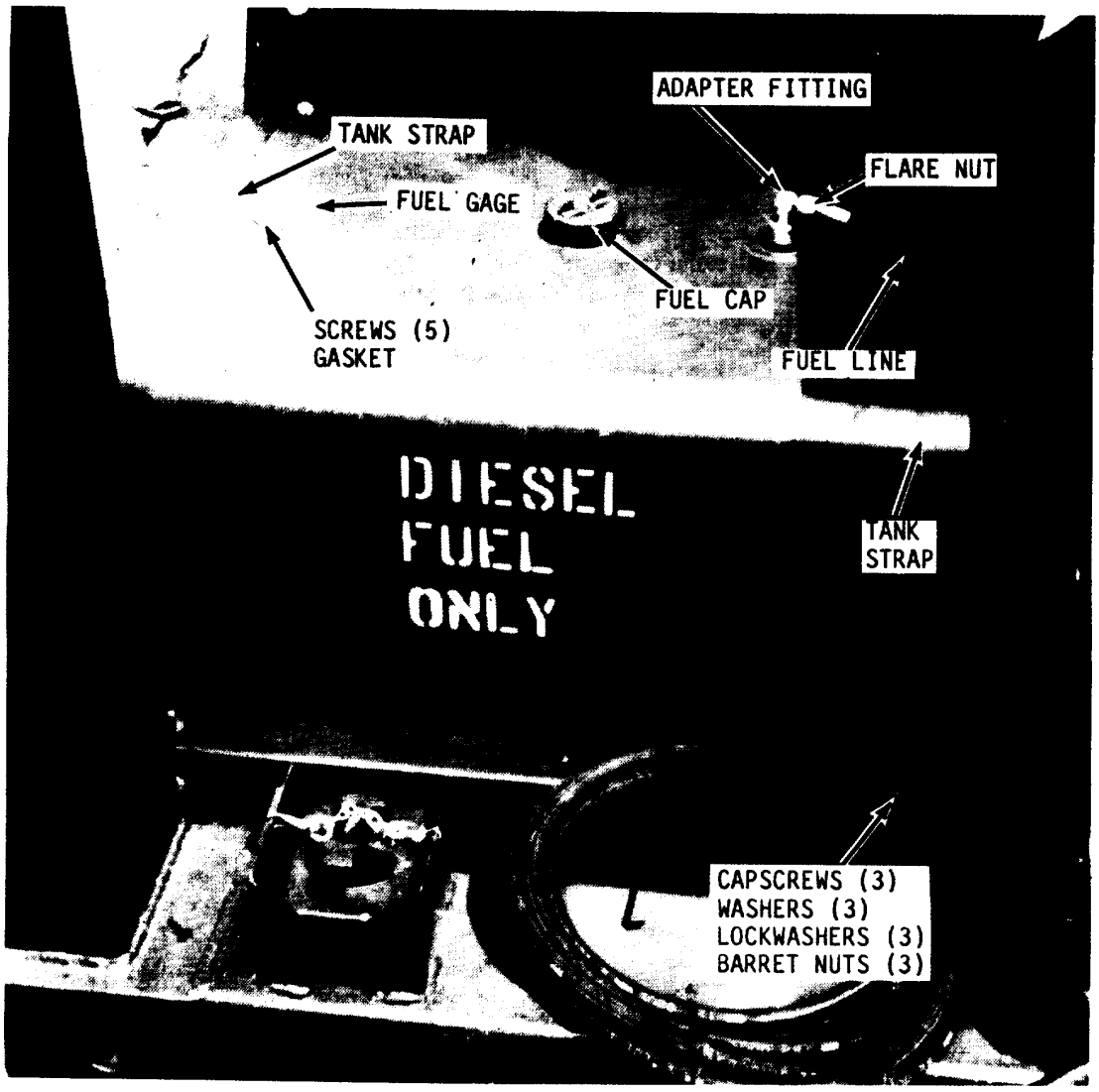
(e) Fill fuel tank and inspect for leaks around the repaired areas.

(f) Paint repaired surface using color 24087, MIL-STD-595.



NOTE: DISCONNECT WIRES IN JUNCTION BOX ON OUTSIDE OF FRONT WALL, AND LOOSEN NUT TO SEPARATE CONDUIT ONLY WHEN REMOVING RIGHT SIDE OR FRONT.

Figure 4-10. Thermometer Element, Removal and Installation.



NOTE: SEE TM 5-6115-585-12/34 FOR FUEL LINE CONNECTION TO 10O-KW GENERATOR SET.

Figure 4-11. Fuel System Components, Removal and Installation.

d. Fuel gage. See Figure 4-11 for removal and installation.

Section XVI. MAINTENANCE OF POWER CABLE

4-54. General.

The power cable (Figure 4-12) is a heavy duty, insulated wire assembly carrying 3-phase electric power from the generator set to the refrigeration unit power cable. It has a cable connector on one end for connection to the refrigeration unit cable connector, and pigtail leads on the other end for connection to terminals in the generator set terminal box.

4-55. Inspection.

Inspect generator electric cable and connector for obvious damage and defects.

4-56. Removal.

WARNING

Always be sure that the generator set is not operating before attempting to connect or disconnect the power cable. Check to see that all switches are in the "off" or "open" position and that there is no input on the load.

NOTE

Refer to TM 5-6115-585-12/34 for the Generator Set switches, and TM 5-4110-231-14 for the refrigeration unit switches.

a. Disconnect generator electric cable connector from refrigeration unit cable connector.

b. Disconnect electric cable leads from generator set terminals and remove cable (TM 5-6115-585-12/34).

4-57. Installation.

WARNING

Always be sure that the generator set is not operating before attempting to connect or disconnect the power cable. Check to see that all switches are in the "off" or "open" position and that there is no input on the load.

NOTE

Refer to TM 5-6115-585-12/34 for the generator set switches, and TM 5-4110-231-14 for the refrigeration unit switches.

a. Connect electric cable leads (Figure 4-12) to generator set terminals (TM 5-6115-585-12/34) for 208 V, 3-phase AC power.

NOTE

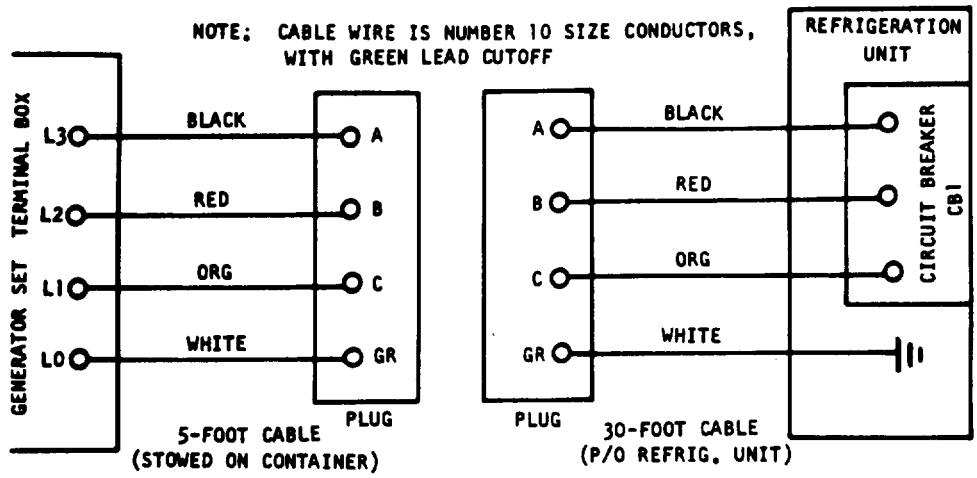
Observe serial number applicability noted on wiring diagram (Figure 4-12).

b. Connect generator electric cable connector to refrigeration unit cable connector.

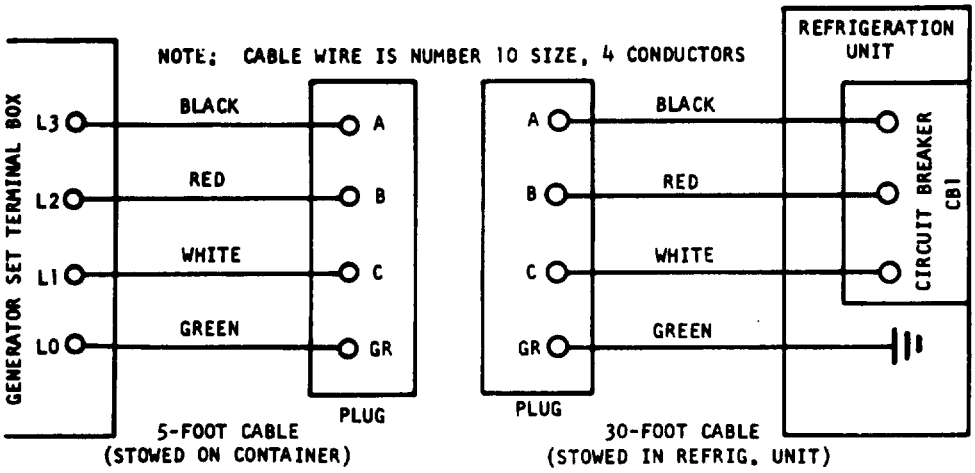
Section XVII. MAINTENANCE OF EXHAUST SYSTEM

4-58. General.

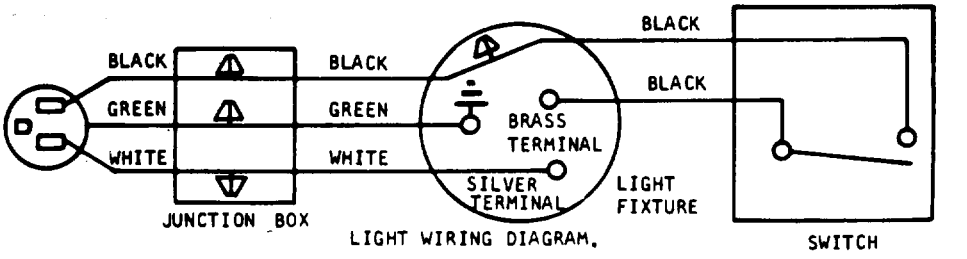
The exhaust system (Figure 4-13) consist of flexible and rigid steel piping designed to carry exhaust gases away from the generator set diesel engine. The input ends are connected with couplings to the engine muffler, and the output ends have a hinged bonnet for all weather protection.



POWER CABLE WIRING DIAGRAM, SERIAL NUMBERS 001 THRU 011.



POWER CABLE WIRING DIAGRAM, SERIAL NUMBERS 012 THRU 240.



TS 8115-202-14/4-12

Figure 4-12. Power Cable and Light Wiring Diagram.

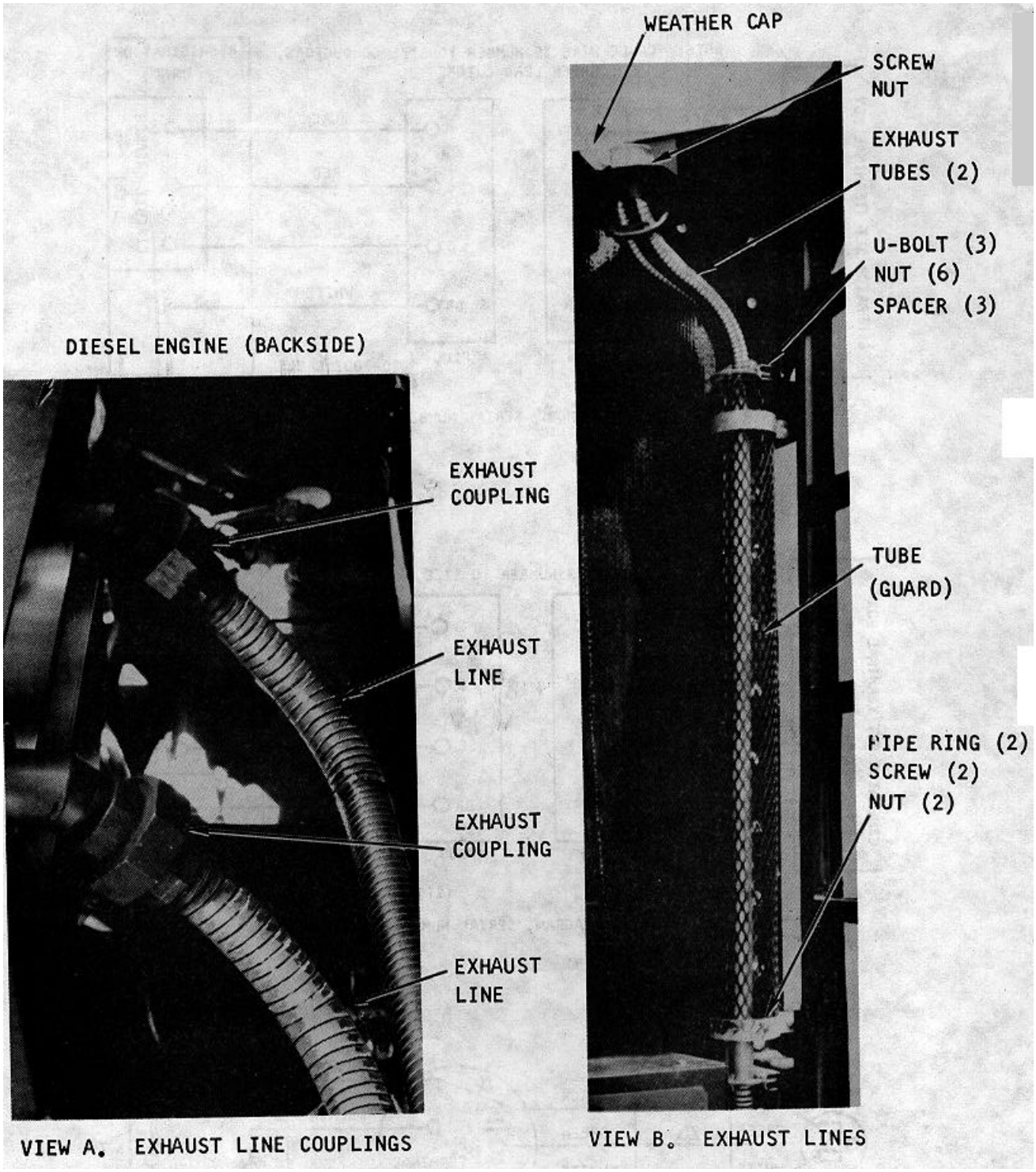


Figure 4-13. Exhaust System Components, Removal and Installation.

4-59. Inspection.

Inspect exhaust line and branches for obvious damage, leaks, cracks, ruptures, and deterioration.

4-60. Removal.

WARNING

Before performing maintenance on exhaust system be sure that generator is not operating, and that exhaust lines have cooled to the point where they will not burn personnel.

a. Disconnect exhaust couplings from diesel engine (Figure 4-13).

b. Remove exhaust lines and guard.

4-61. Installation.

a. Install new exhaust lines and guard (Figure 413).

b. Connect exhaust lines to diesel engine.

CAUTION

During removal and installation of exhaust lines, be careful not to damage flexible tubing. Turn the sharp edges on the tube guard (expanded metal) towards the wall to avoid accidental contact.

Section XVIII. MAINTENANCE OF REFRIGERATION UNIT

4-62. General.

The refrigeration unit (Figure 1-1) operates as a self-contained, externally powered system which cools or heats and circulates the air within the refrigerated container. See MKP-410 for further descriptive and operating data.

4-63. Inspection, Test, Servicing.

See TM 5-4110-231-14 for complete inspection, testing, and servicing data for the refrigeration unit.

4-44. Removal.

a. Stop operation of refrigeration unit (TM 5-4110-231-14).

b. Stop operation of generator set (TM 5-6115-585-12/34).

WARNING

Always be sure that the generator set is not operating before attempting to connect or disconnect the power cable. Check to see that all switches are in the "off' or "open" position and that there is no input on the load.

c. Disconnect refrigeration unit power cable and position it on cable reel located inside the refrigeration unit (Figure 4-14).

d. Position fork lift truck forks beneath refrigeration unit.

e. See Figure 4-14 and remove the four attaching nuts. Note that there are two nuts on each side of the refrigeration unit.

f. Remove the refrigeration unit, using extreme care not to damage the evaporator section or the frame of the opening in the container wall as the unit passes through.

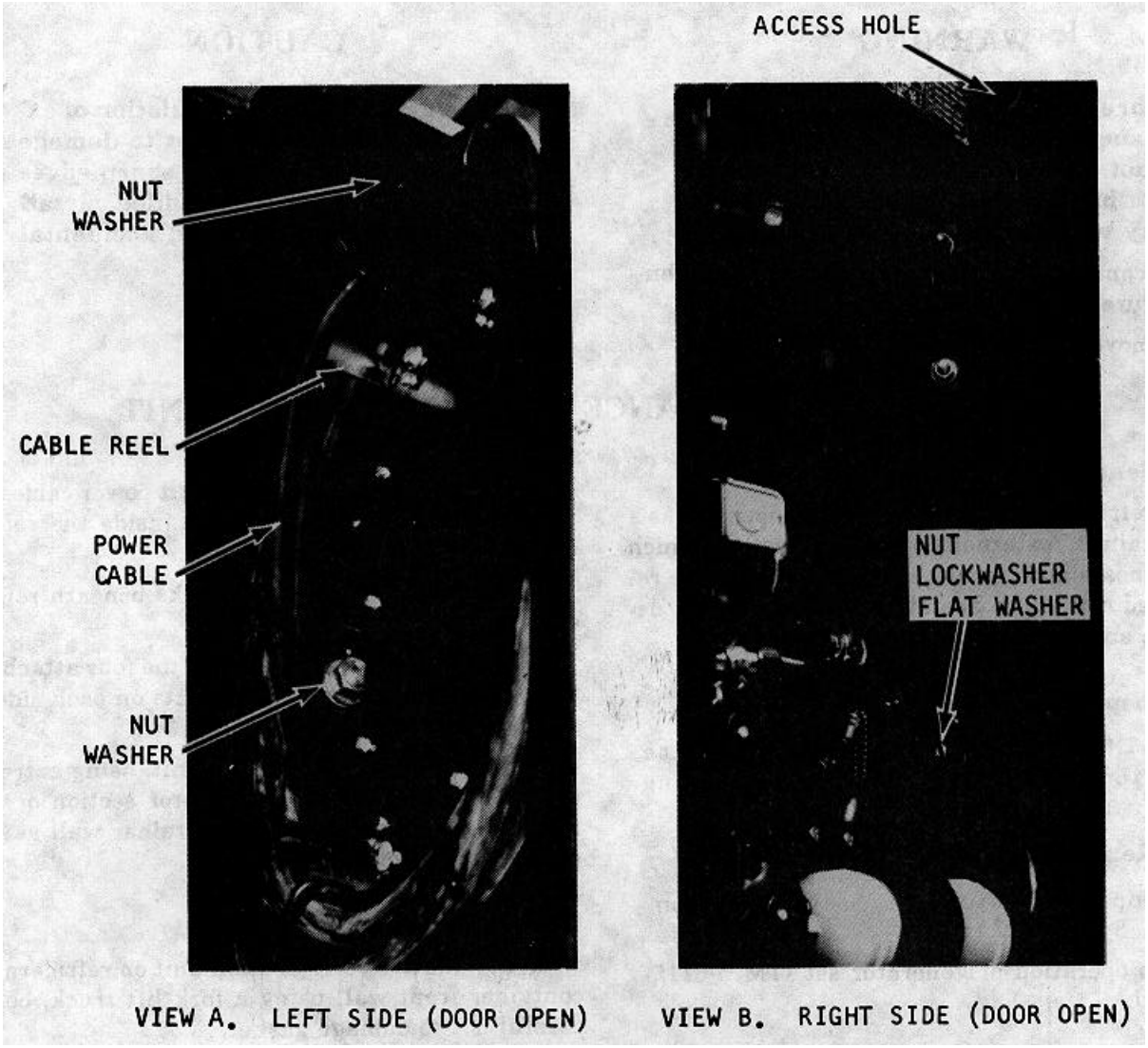
4-65. Installation.

a. Installation refrigeration unit on refrigerated container front wall using a fork lift truck, being careful not to damage gasket.

b. Install four nuts, four lockwashers, and one flat washer (Figure 4-14) to fasten refrigeration unit to container front wall.

c. Disengage fork lift truck forks.

d. Connect refrigeration unit power cable to electrical power source (paragraph 2-2).



NOTE: UPPER NUT IS VISIBLE THROUGH ACCESS HOLE.

Figure 4-14. Refrigeration Unit, Removal and Installation:

Section XIX. MAINTENANCE OF GENERATOR SET

4-66. General.

The diesel engine powered generator set (Figure 1-1) operates as a self-contained unit, and supplies 3-phase, ac power to operate the refrigeration unit and 110-volt receptacle. See TM 5-6115-585-12/34 for descriptive and operating data.

467. Inspection, Test, Service.

See TM 5-6115-585-12/34 for complete inspection, testing, and servicing data for the diesel generator set.

4-68. Removal.

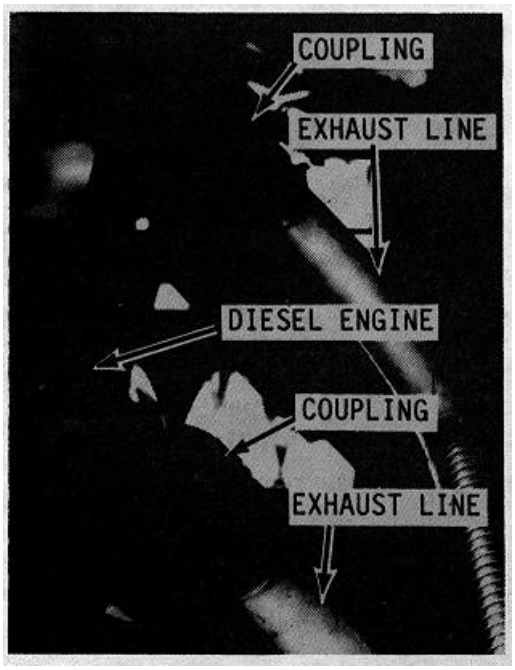
WARNING

Always be sure that the generator set is not operating before attempting to connect or disconnect the power cable. Check to see that all switches are in the "off' or "open" position and that there is no input on the load.

See Figure 4-15 to remove generator set.

449. Installation.

See Figure 4-15 to install generator set, reversing the procedural steps.



VIEW A. EXHAUST LINE COUPLINGS, BACK OF DIESEL ENGINE.

REMOVAL:

STEP 1. DISCONNECT CABLE CONNECTORS, AND STOW 30-FT. CABLE INSIDE REFRIGERATION UNIT (SEE VIEW C).

STEP 2. DISCONNECT FUEL LINE (NOT SHOWN) BETWEEN AUXILIARY TANK AND ENGINE FUEL LINE CONNECTIONS, AND STOW FUEL LINE IN STORAGE BOX BEHIND AUXILIARY FUEL TANK (VIEW B)

STEP 3. DISCONNECT EXHAUST LINE COUPLINGS

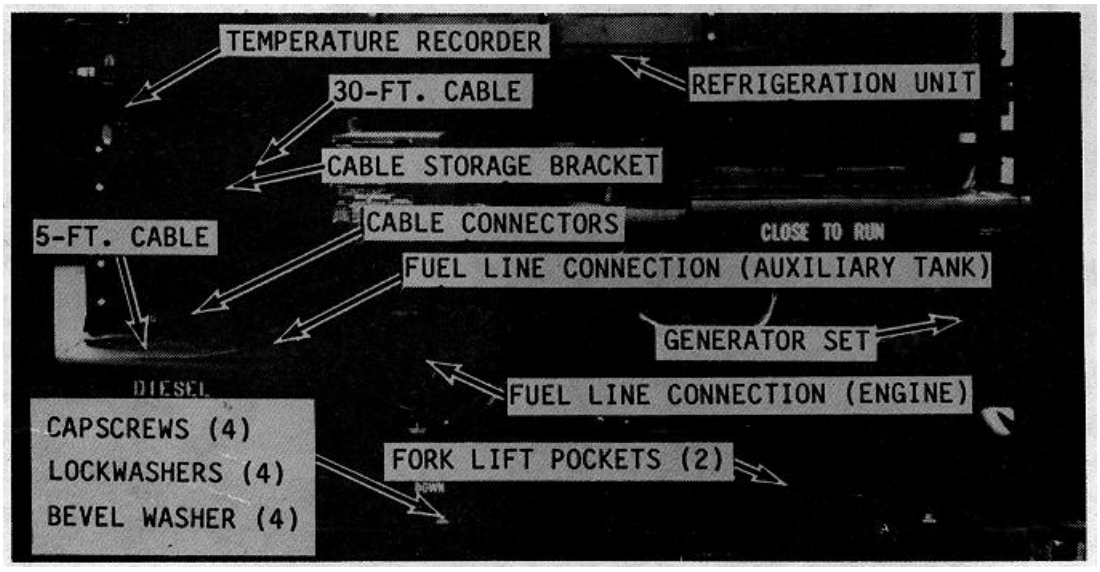
STEP 4. REMOVE CAPSCREWS AND WASHERS.

STEP 5. REMOVE GENERATOR SET USING FORKLIFT TRUCK ENGAGED IN FORK LIFT POCKETS IN SKID BASE.

STEP 6. DISCONNECT 5-FT.CABLE FROM GENERATOR SET (TM 5-6115-585-12/34), AND STOW CABLE ON STORAGE BRACKET (SEE VIEW D)

INSTALLATION:

FOLLOW REMOVAL PROCEDURES IN REVERSE ORDER, AND REFER TO FIGURE 4-12 FOR CORRECT 5-FT. CABLE WIRE CONNECTIONS TO GENERATOR SET TERMINALS (STEP 6).



VIEW B. ATTACHMENT, CONNECTIONS, AND LIFT POINTS.

Figure 4-15. Generator Set, Removal and Installation (Sheet I of 2).

NOTE: RETAIN GENERATOR POWER CONNECTION TO CABLE AT ALL TIMES.

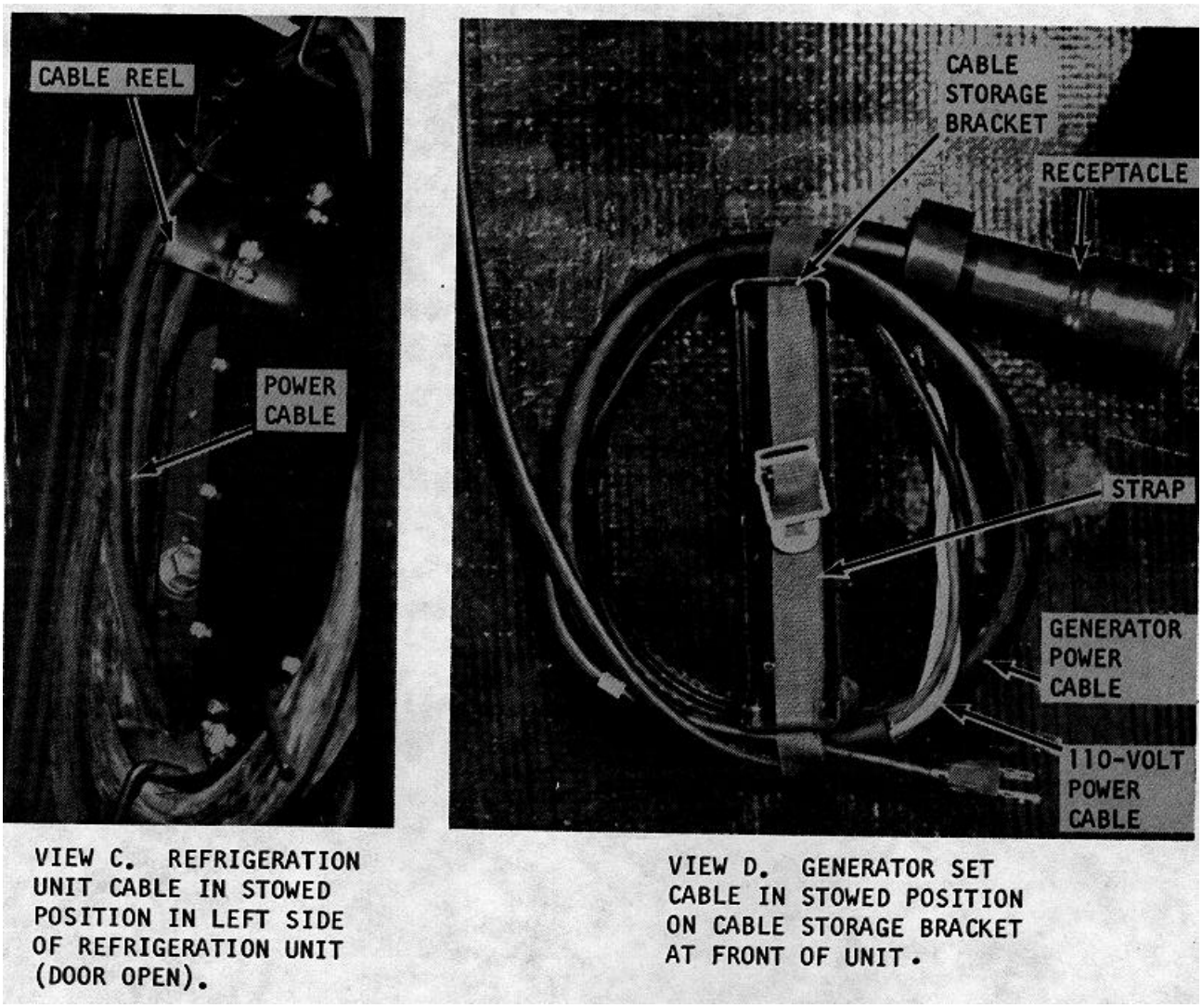


Figure 4-15. Generator Set, Removal and Installation (Sheet 2 of 2).

CHAPTER 5
DIRECT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

5-1. Tools and Equipment.

Tools and equipment are not issued with the refrigerated container.

5-2. Special Tools and Equipment.

Special tools are required for direct and general support functions. Refer to paragraph 4-8 for a description of the tools and their use.

5-3. Maintenance and Repair Parts.

Repair parts and equipment are listed and illustrated in TM 55-8115-202-24P.

Section II. TROUBLESHOOTING

5-4. Scope.

This section references information useful in diagnosing and correcting unsatisfactory operation or failure of components of the refrigerated container.

5-5. Troubleshooting.

See Tables 3-2 and 4-1 for malfunction, test or inspection, and corrective action.

Section III. GENERAL MAINTENANCE

5-6. Scope.

This section contains general repair instructions which may be the responsibility of direct and general support maintenance. The instructions cover common maintenance such as surface sealing, undercoat sealing, cleaning and decontamination, and painting of steel and aluminum parts.

5-7. Surface and Undercoat Sealing.

a. Surface Sealing. Seal surfaces of roof, sides, floor and doors of container with polyurethane paint using white color on interior surfaces, and olive drab color (24087 per FED-STD-595) on the exterior surfaces. Apply paint to seal surfaces only where the original fused-on gel coat has been damaged or destroyed.

NOTE

Recommended paint is Dupont Imron or equivalent, olive drab color is 24087 per FED-STD-595.

b. Undercoat Sealing. Apply undercoat sealant, as needed, conforming to federal specification TT-C-520. Undercoating is to be applied over the painted bottom surfaces (floor panel underside and I-beam supports), and should be 1/16-inch thick.

5-8. Cleaning and Decontamination.

a. Container Exterior. Wash with any suitable detergent. Thoroughly rinse with fresh water and allow to air dry.

b. Container Interior. The inside of the container may be cleaned with a light detergent solution and pressure hose, or it may be steam cleaned.

c. Decontamination. Procedures required b, TM 743-200 shall apply.

5-9. Painting.

a. General. Apply paint only for the protection of base metal. Clean and treat surfaces which require paint in accordance with MIL-T-704.

b. Steel Parts. Apply two coats of olive drab, rust-inhibiting, semi-gloss lacquer per MIL-L- 52043, Color 24087 per FED-STD-595.

c. Aluminum Paris. Apply one coat of olive drab semi-gloss paint conforming to FED-STD-595, Color Chip 24037.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

5-10. General

The refrigerated container has two container has two auxiliary components and six major components which require special removal and installation procedures.

5-11. Auxiliary 7component3.

a. Generator Set. See paragraphs 4-68 and 4-69 for removal and installation procedures.

b. Refrigeration Unit. See paragraphs 4-64 and 4-65 for removal and installation procedures.

5-12. Major Components.

The major components consists of the roof, sides, front, ribbed flooring, and floor. Except for the ribbed flooring, all these components are one-piece, composite panel constructions (Figure 6-1). The edges of each panel are fastened to the contained box assembly frame with Camtainer fasteners. The ribbed flooring fits over the floor panel.

a. Roof.

(1) Removal.

(a) Remove upper front and side corner angles, the roof zee, and foam insulation (Figure 5-1).

(b) Remove sealant and foam rope gasket around roof panel outer edges.

(c) Remove sealant and foam rope gasket around roof panel outer edges.

(d) Use slings and hoist to remove roof

(e) Remove butyl rubber gasketing stuck to container box frame.

CAUTION

Be careful in removing roof angles and zee. They are adhered to foam insulation.

(2) Installation. Installation is essentially the r-everse of removal except as follows:

(a) Use new butyl rubber gasketing between roof panel edges and container box frame.

NOTE

Gasketing is 3M Co. sealant tape, 1202T.

(b) Use new foam rope gasket around roof panel outer edges and seal in-place with a sealant.

NOTE

Recommended sealant is Dow-Corning 732 RTV; rope gasket is Dow-Chemical polyethylene ethafoam, 1/2 inch dia.

b. Sides.

(1) Removal

NOTE

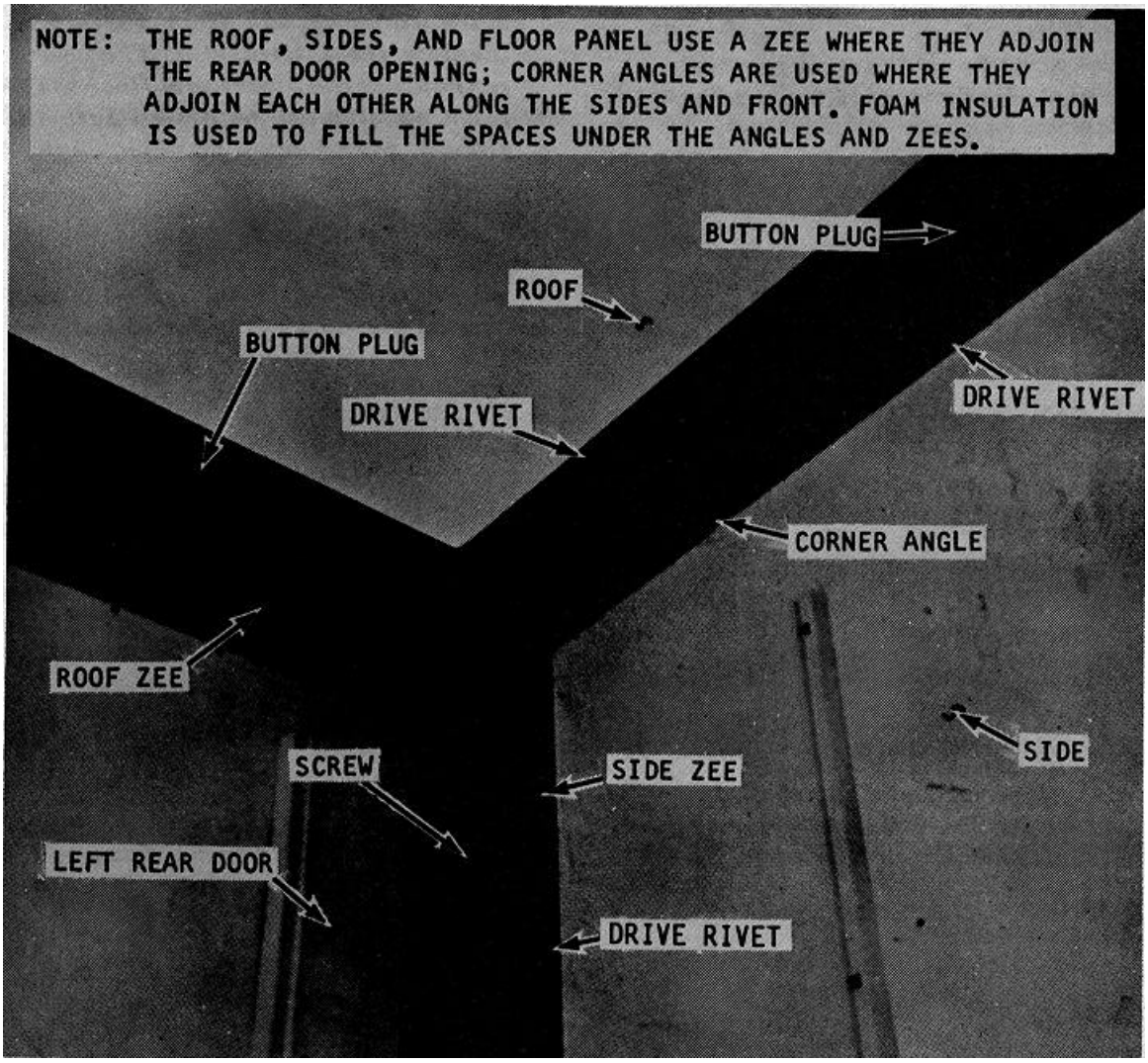
Step (a) applies to removal of right side panel only.

(a) Remove interior light and switch, and conduit.

(b) Remove ribbed flooring (paragraph 5-12), d)

(c) Remove side corner angles, the wall zee, and foam insulation (Figure 5-1).

(d) Support side and remove Camtainer fasteners around edges.



REMOVAL:

STEP 1. REMOVE OUTER OVERLAPPING CORNER ANGLES FIRST, DRILLING OUT DRIVE RIVETS AND REMOVING SCREWS. CAREFULLY PRY CORNER ANGLE LOOSE.

STEP 2. REMOVE OTHER CORNER ANGLES AND ZEES SIMILARLY, AS REQUIRED.

STEP 3. USE A SHARP TOOL TO CUT AND REMOVE FOAM INSULATION.

INSTALLATION:

STEP 1. INSTALL INNER UNDERLAPPING ZEES AND CORNER ANGLES FIRST, USING DRIVE RIVETS AND SCREWS.

STEP 2. INSTALL OUTER CORNER ANGLES SIMILARLY.

STEP 3. REMOVE BUTTON PLUGS ON ALL CORNER ANGLES AND ZEES REPLACED.

STEP 4. APPLY FOAM INSULATION THROUGH BUTTON PLUG HOLES TO FILL SPACES.

STEP 5. INSTALL BUTTON PLUGS.

Figure 5-1. Corner Angle and Zee, foam Insulation, Removal and Installation.

(e) Use slings and hoist to remove side.

(f) Remove sealant stuck to container box frame.

(2) Installation. Installation is essentially the reverse of removal Be sure to apply new sealant between side panel edges and container box frame.

NOTE
Sealant is Dow-Corning 732RTV.

c. Front.

NOTE
The refrigeration unit, roof and sides must be removed before the front can be removed (I) Removal (a) Disconnect interior light conduit and wire at front panel (Figure 4-10).

(b) Remove interior corner angles and foam insulation (Figure 5-1).

(c) Support front and remove Camtainer fasteners around edges.

(d) Use slings and hoist to remove front.

(e) Remove sealant from container box frame.

(2) Installation. Installation is essentially the reverse of removal. Be sure to install new sealant between front panel edges and container box frame.

NOTE
Sealant is Dow-Corning 732RTV.

d. Ribbed Flooring.

(1) Removal

(a) Remove 1/4 x 1 inch aluminum bar located on door end of floor (Figure 3-1).

(b) Remove screws holding interlocking floor boards to floor panel.

(c) Beginning from the right side, remove the ribbed floor boards one by one until the center board is reached; then, remove boards on left side.

NOTE
If a new floor panel is used, prior to securing the ribbed aluminum flooring, mark lines on the floor surface to identify the lateral rib. The screws for holding the aluminum floor to the floor panel must be driven into the rib.

NOTE
If the floor panel is not being replaced, the existing holes are to be used if possible. Or the screws should be aligned with the existing holes on the floor panel (2) Installation.

(a) Beginning with center ribbed floor board, secure to floor panel using screws.

(b) Secure remaining floor boards to floor panel as they were removed.

(c) Apply RTV sealant around entire floor area edges and seams along the front and rear edges between aluminum flooring.

(d) Weld 1/4 x 1 inch aluminum bar to front edge of floor.

e. Floor.

NOTE
The roof, aides and front, must be removed to gain access to the floor.

(1) Removal

(a) Remove the floor zee (Figure 5-1).

(b) Remove Camtainer fasteners around edges.

(c) Use slings and hoist to remove floor.

(d) Remove butyl rubber gasketing stuck to container box frame.

(2) Installation. Installation is essentially the reverse of removal except as follows:

(a) Install new butyl rubber gasketing between floor panel and container box frame.

NOTE
Gasketing is 3M Co. sealant tape, 1202T.

(b) Apply full undercoat to floor underside (paragraph 5-7).

CHAPTER 6
REPAIR INSTRUCTIONS

6-1. General.

This chapter contains instructions for repair of rupture damage to the roof, sides, front, and floor panels. Minor repair instructions for abrasions, scrapes, and punctures are contained in Section XI of Chapter 4.

6-2. Maintenance Evaluation.

It must be determined if repair shall be made with the panel installed in the container, or if removal is necessary. Removal of panels should be avoided if at all possible. Minor damage near or on the end of a panel can usually be repaired; however, extensive damage along fasteners will usually require replacement of the panel. Any rupture damage must be evaluated as to how it affected the overall panel structure; if most of the ribs and bonded joints have been broken, the whole panel should be replaced. Generally, where rupture damage is localized, the panel can be easily repaired. Also, ruptures involving up to half the surface area of a panel can be satisfactorily repaired with the panel installed.

6-3. Rupture Repair.

NOTE
These procedures apply to ruptures into and completely through a panel.

a. Remove panel if necessary (paragraph or weakened plywood around the ruptured area using a bevel cut (Figure 6-1).

NOTE
A hand, keyhole type saw is recommended to cut plywood around ruptures area.

c. Trim damaged insulation and install replacement installation of the same type and thickness, or use FROTH-PAK Kit 9.5, manufactured by INSTA-FOAM Products, Inc., Joliet, Illinois.

d. Replace damage rib sections with same size and type material using a bevel cut, and bond rib in place.

e. Cut replacement piece from repair panel, and bevel cut edges to fit rupture snugly.

NOTE
Repair panels are fiberglass reinforced and come in two thicknesses, 1/2 and 5/8 inch.

f Install replacement pieve using polyester resin on the mating surfaces, and nail in-place.

g. Grind and taper the fiberglass surface (skin only) approximately two inches back on both sides of the rupture perimeter.

h. Cut three layers of 10-oz. glass cloth strips, long enough to cover the 4-inch wide rupture perimeter all around.

NOTE
Use fiberglass repair kit NSN 2090-00-392-6064, and follow application instructions in kit.

i. Use polyester resin to bond the three layers of glass cloth over the rupture area, overlapping the rupture perimeter.

j. Apply polyurethane paint (white inside, olive drab outside) over repair area.

NOTE
Recommended paint is Dupont Imnron or equivalent, olive drab color is 2408 7 per FLD-STD-595.

k. Install panel if removed (paragraph 5-12).

6-4. Edge Repair.

NOTE
Only minor damage on or near the edge, not affecting panel structurally, should be repaired.

a. Remove panel is necessary (paragraph 5-12).

b. Repair abrasions, scrapes, and punctures (paragraph 4-39).

c. Repair ruptures (paragraph 6-3).

d. Install panel if removed (paragraph 5-12).

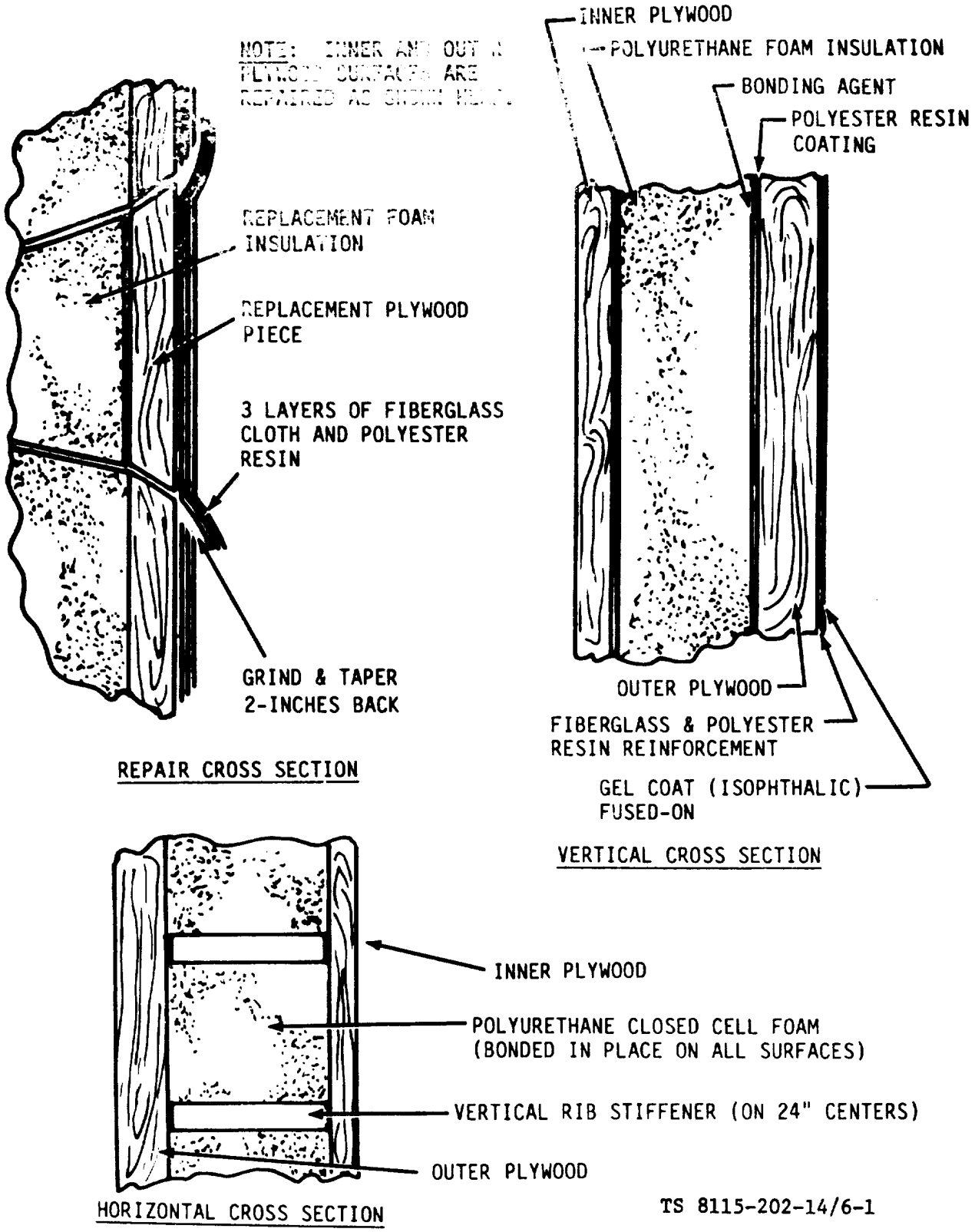


Figure 6-1. Rupture Repair of Panel.

CHAPTER 7
MAINTENANCE OF MATERIEL USED IN CONJUNCTION WITH THE REFRIGERATED CONTAINER

Section I. REFRIGERATION UNIT

7-1. Refer to TM 5-4110-231-14 for maintenance instructions for the refrigeration unit, model CH609-31.

Section II. GENERATOR SET

7-2. Refer to TM 5-6115-585-12/34 for maintenance of the GFE generator set (Diesel engine driven, 10 kw.; 60 Hz).

APPENDIX A
REFRENCES

A-1. Operation.

MTMC PAM 55-2	**Management and Stuffing of Containers**

A-2. Fire Protection.

TB 5-4200-200-10	**Hand Portable Fire Extinguishers Approved for Army Users**

A-3. Lubrication.

C9100-IL	**Fuels, Lubricants, Oils and Waxes**

A-4. Painting.

TM 43-0139	**Painting Instructions for Field Use**

A-5. Maintenance.

TM 5-4110-231-14	Operator, Organizational, Direct Support and General Support Maintenance Manual for Refrigeration Unit, Electric Motor Driven, 9,000 BTU, Model CH609-31
TM 5-4110-231-24P	Refrigeration Unit, Repair Parts and Special Tools List, Model CH609-31
TM 55-8115-202-24P	**Refrigerated Container, Repair Parts and Special Tools List, Model SC209**
TM 5-6115-585-12/34	**10 KW, 60 Hz, Diesel Engine Generator Set, NSN 6115-00-465-1030**

A-6. Shipment and Storage.

TB 740-97-2	**Preservation of USAMEC Mechanical Equipment for Shipment and Storage.**
TM 740-90-1	**Administrative Storage of Equipment**

A-7. Destruction of Army Equipment.

TM 750-244-3	**Procedures for Destruction of Equipment to Prevent Enemy Use**

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 Refrigerated Container 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. Internal Components of the End Item. These items, when assembled, comprise the Refrigerated Container and must accompany it whenever it is transferred or turned in. These illustrations will help you identify these items.

b. Section III. Basic Issue Items. These are minimum essential items required to place the Container in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the Container during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is our authority to requisition replacement BII, ased 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. Illustration. 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 Code. "USABLE ON" codes are included to help you identify which component items are used on different models. Identification of the codes used in these lists are:

CODE	USED ON

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

h. Quantity. This column is left blank for use during inventory; Under the Rcv'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 II. INTEGRAL COMPONENTS OF END ITEM

(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 Reqd	Rev'd Date	Date	Date
1-1		6685-01-072-0480	30416 (90598)	Thermometer	Right Front Frame		1			
1-1			30400-100 (90598)	Ladder Side Rear	Right		1			
1-2		5340-01-074-3529	30355-100 (90598)	Door, Escape	Right Rear Door		1			
1-2			30356-100 (90598)	Frame, Door	Right Rear Door		1			
1-1			30414-100 (90598)	Block, Spacer	Right Front Bottom Rail		1			
4-4			30442-100 (90598)	Cable AY	Right Side Front Panel		1			
1-1		2910-01-073-6023	30305-100 (90598)	Tank, Fuel	Right Front Bottom Frame		1			

Section III. BASIC ISSUE 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 Reqd	Rev'd	Date	Date	Date
			N/A								

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. Scope.

This appendix lists additional items you are authorized for the support of the Refrigerated Container.

C-2. General.

This list identifies items that do not have to accompany the Container and that do not have to be turned in with it. These items are authorized to you by CTA, MTOE, TDA or JTA.

C-3. Explanation of Listing.

National Stock Number, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. "USABLE ON" codes are identified as follows:

CODE	USED ON

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	PART NUMBER & FSCM	(2) DESCRIPTION	USABLE ON CODE	(3) U/M	(4) QTY AUTH
5130-01-091-3750	480-TX55 93907	Bit, Torx T55 (93907)		ea	1
5120-01-088-8833	TX-5416 93907	Socket, Torx E16 (93907)		ea	1

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 and the work measurement time required to perform the functions by the designated maintenance level. 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 tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions or explanatory notes for a particular maintenance function.

D-2. Explanation of Columns in Section II.

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

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

c. Maintenance Functions, Column (3). This column lists the functions to be performed on the items listed in Column 2. The lowest maintenance level authorized to perform these functions is indicated by a symbol in the appropriate column. The symbol designators for the various maintenance levels 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:

(1) Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards through examination.

(2) Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

(3) Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

(4) Adjust. To maintain within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

(5) Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

(6) Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

(7) Install. The act of emplacing, setting, or fixing into position an item, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

(8) Replace. The act substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

(9) Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

(10) Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to a like-new condition.

(11) Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

d. Maintenance Level, Column (4). This column is made up of subcolumns for each category of maintenance. Work time figures are listed in these subcolumns for the lowest level of maintenance authorized to perform the function listed in Column 3.These figures (shown directly below the symbol) indicate the average active time required to perform the maintenance function at the indicated category of maintenance under typical field operating conditions.

e. Tools and Equipment, Column (5). This column is provided for referencing by code, the special tools and test equipment (Sec. III) required to perform the maintenance functions (Sec. II).

f. Remarks, Column (6). This column shall contain a letter code in alphabetic order which shall be keyed to the remarks contained in Section IV.

D-3. Explanation of Columns in Section III.

a. Reference Code. This column consists of an arabic number listed in sequence from column (5) of Section II. The number references the special tools and test equipment requirements.

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

c. Nomenclature. This column lists the name or identification of the tools or test equipment.

d. National/NATO Stock Number. This column is provided for the NSN of special tools and test equipment listed in the nomenclature column.

e. Tool Number. This column lists the manufacturer's code and part number of tools and test equipment.

D-4. Explanation of Columns in Section IV.

a. Reference Code. This column consists of a letter code in alphabetic order which is keyed to column 6 of Section II.

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

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS
Container, Refrigerated

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
01	Document Holder and Plates								
0101	Holder, Document	Inspect		0.1					
		Replace		0.5					
0102	Plate, Name	Inspect		0.1					
		Replace		0.5					
02	Door and Hardware								
0201	Door Assembly	Inspect		0.1					
		Replace			4.0			1	E
		Repair		4.0					
0202	Seal, Door	Inspect		0.1					
		Replace		4.0					
		Repair		1.0					
0203	Hardware, Door	Inspect		0.1					
		Replace		0.5				1	E
		Repair		8.0					
03	Sides, End and Roof								
0301	Roof Panel	Inspect		0.1					F
		Replace			6.0			1,2	D
		Repair		2.0					A, C
0302	Side and End Panel	Inspect		0.1					
		Replace				8.0		1,2	D
		Repair		2.0					A, C
0303	Cargo Restraint	Inspect		0.1					
		Replace		2.0					
04	Floor								
0401	Floor Rib Assy	Inspect	0.1						
		Replace			2.0			1,2	D
		Repair			3.0				
0402	Floor Panel	Inspect	0.1						
		Replace			8.0			1,2	D
		Repair			2.0				A, C

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
05	Frame Members, Secondary								
0501	Frame Assy	Inspect	0.1						
		Repair			8.0				B
06	Thermometer Assy								
0601	Thermometer	Inspect	0.1						
		Replace		4.0					
0602	Element	Test		4.0					
		Replace		4.0					
07	Fuel Tank Assy								
0701	Tank, Fuel	Inspect	0.1						
		Replace		0.5					
		Repair		1.0					B, F
0702	Cap, Fuel	Inspect	0.1						
		Replace		0.1					
0703	Fuel Lines and Connections	Inspect	0.1						
		Replace		0.5					
08	Exhaust Line Extension								
0801	Line, Exhaust	Inspect	0.1						
		Replace		1.0					
09	Electrical Equip-ment								
0901	Cable, Electric Power	Inspect	0.1						
		Replace		1.0					
0902	Light Assy	Inspect	0.1						
		Replace		1.5					
		Repair		0.5					
10	Refrigeration Unit	Inspect	0.5						
		Test		2.0					
		Replace		2.0					G
11	Generator Set, Diesel	Inspect	0.5						
		Test		2.0					
		Service		2.0					
		Replace		4.0					H

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	D, E	TORX BIT	5130-01-091-3750	T55
2	D	TORX SOCKET	5120-01-088-8833	E16

Section IV. REMARKS MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
A	Repair accomplished by sealing leaks with sealing compound or patching.
B	Repair accomplished by straightening.
C	Repair accomplished by patching.
D	Replacement of panel requires special tool for removal of camtainer fasteners.
E	Replacement of door and door hardware requires special tool for removal of camtainer fasteners.
F	Repair accomplished by welding.
G	See maintenance allocation chart for end item refrigeration unit, 9000 BTU, Model CH609-31, NSN 4110-01-014-4646, TM 5-4110-231-14.
H	See maintenance allocation chart for end item, generator set, diesel engine driven, 10KW, 60 HZ C(Type I, Clam 2) Mode III, Model MEP03A, NSN 6115-00-465-7030, TM 5-6115-585-12.

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the container, refrigerated. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 1, App. E").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

(enter as applicable)

C - Operator/Crew
0 - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	0	8040-00-225-4548	SILICONE CAULK RTV 102	OZ
2	0	9150-00-235-5568	GREASE, GRAPHITE, VV-G-671 (81348)	LB
3	O, F, H	2090-00-372-6064	REPAIR KIT, REINFORCE, MILR19907 (81349	- EA
4	O, F, H	5640-01-122-5010	KIT, URETHANE FOAM, FROTH-PAK KIT 9.5 (54577)	EA
5	0	8040-00-841-9773	ADHESIVE, 520 (03938)	- PT
6	O, F, H	8010-00-297-2124	ENAMEL, COLOR 24087, TT-E-485 (81348)	GL
7	0	8030-01-282-1332	SEALING COMPOUND, RTV 732 (71984)	- PT
8	0	8040-00-777-0631	ADHESIVE, 1C (04347)	- PT
9	F, H	8030-00-221-1834	CORROSION PREVENTIVE COMPOUND, TT-C-520 (81348)	- GL
10	F, H	8010-00-842-5235	LACQUER, COLOR 24087, MIL-L-52043 (81349)	- GL
11	F, H	9320-00-855-3399	TAPE, ADHESIVE, RUBBER 1202T (76381)	FT
12	F, H	8040-00-078-9774	ADHESIVE, 732RTV (71984)	- PT

ALPHABETICAL INDEX

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T

E. C. MEYER
General, United States Army
Chief of Staff

Official:

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

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

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PREVIOUS EDITIONS ARE OBSOLETE.

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

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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