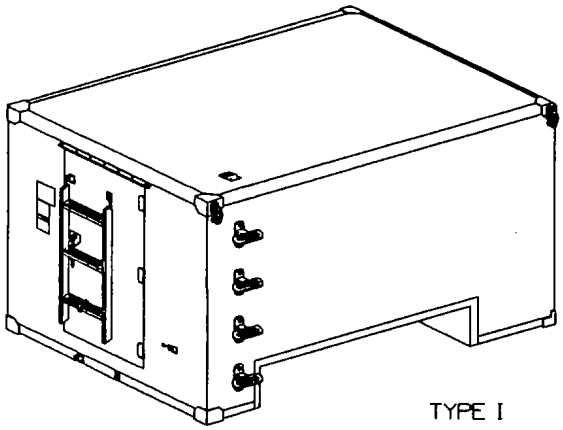
TECHNICAL MANUAL

OPERATOR'S, UNIT, DIRECT SUPPORT & GENERAL SUPPORT MAINTENANCE FOR LIGHTWEIGHT MULTIPURPOSE SHELTERS (LMS) MODEL NO. S-788/G, TYPE I AND TYPE III NSN 5411-01-357-3582 & 5411-01-357-3583



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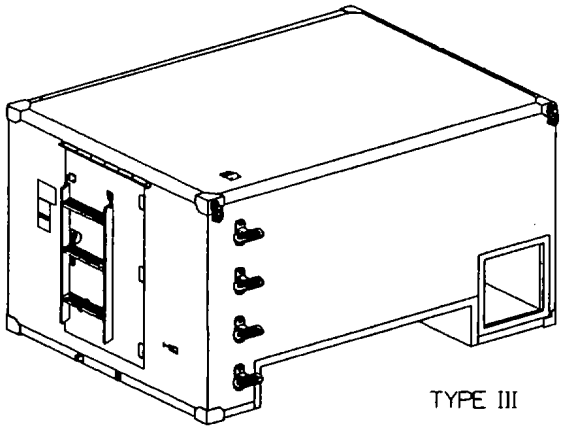

TYPE III

HEADQUARTERS, DEPARTMENT OF THE ARMY
15 DECEMBER 1993

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 10 JUNE 1996

OPERATOR'S, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR

**LIGHTWEIGHT MULTIPURPOSE SHELTERS (LMS)
MODEL NO. S-788/G, TYPE I AND TYPE III
(NSN 5411-01-357-3582 AND 5411-01-357-3583**

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited

TM 10-5411-224-14, 15 December 1993, 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
4-1 Through 4-6	4-1 Through 4-6
4-7 And 4-8	4-7
4-9 And 4-10	4-9
C-1 Through C-3	C-1 Through C-3/(C-4 blank)

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
02327

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25-E, block no. 6188, requirements for TM 10-5411-224-14.

WARNINGS

WEIGHT / HAZARD

The LMS weighs in excess of 600 pounds. Failure to follow safety procedures when the shelter is being lifted and handled can result in severe injury or death.

The door assembly weighs in excess of 50 pounds and requires two personnel to support door during handling or serious injury may result.

DEBRIS / HAZARD

Always wear eye protection when drilling or sanding to prevent serious injury.

TOXIC MATERIALS

Do not use solvents or adhesives in confined spaces. Provide ventilation and avoid prolonged breathing of vapors or repeated contact with skin.

COMBUSTIBLE FLUIDS

Keep solvents away from heat, sparks, and open flame. Keep containers closed when not in use.

Do not smoke when working with flammable materials.

SKIN IRRITANT

Always wear gloves when working with adhesives or sealers.

TECHNICAL MANUAL
NO. 10-5411-224-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 15 December 1993

OPERATOR'S, UNIT, DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL LIGHTWEIGHT MULTIPURPOSE SHELTERS MODEL NO. S-788/G, TYPE I AND TYPE III (NSN 5411-01-357-3582 & 5411-01-357-3583)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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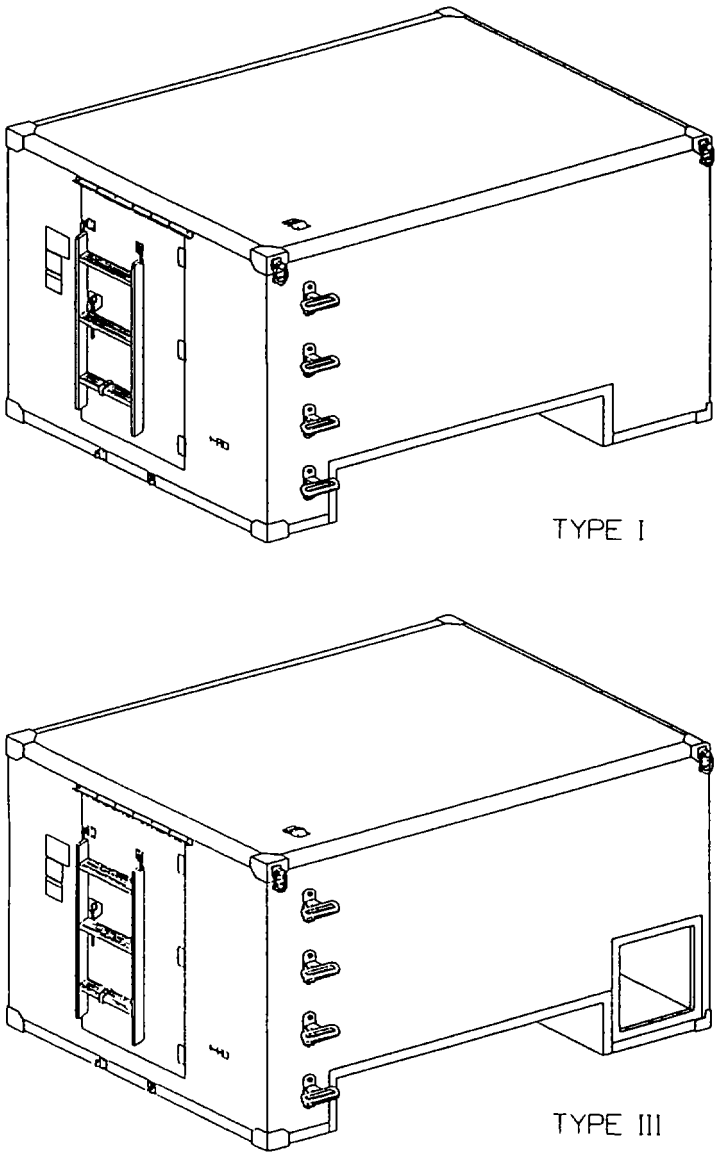

Figure 1-1. S-788/G Lightweight Multipurpose Shelter.

CHAPTER 1
INTRODUCTION

SECTION I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual. This technical manual includes operator, unit, direct and general support maintenance procedures for types I and III of the S-788/G shelter shown in figure 1-1.

b. Equipment Name and Model Number. The equipment name is Lightweight Multipurpose Shelter (LMS). Model number S-788/G type I is provided without tunnel; model number S-788/G type III is provided with tunnel.

c. Purpose of Equipment. The LMS's are lightweight transportable shelters which are normally mounted on a High Mobility Multi-purpose Wheeled Vehicle (HMMWV). Both shelter types can be used for various purposes in the field.

d. HMMWV Mounting Kit. Brackets and all necessary hardware for preparing the bed of a HMMWV for mounting the LMS is provided in a kit as a separately shipped item.

e. Tail Light Extender. A pair of brackets and all hardware required to relocate the HMMWV tail lights from the vehicle frame to the rear bumper is included as separately shipped items.

1-2. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management Systems (TAMMS).

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. Refer to TM 750-244-3 for the instructions for destruction of the LMS to prevent enemy use.

1-4. PREPARATION FOR STORAGE AND SHIPMENT. The preparation for stowage and shipment of the LMS may be found in Chapter 4 of this manual.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS. If your S-788/G needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to:

Commander
U.S. Army Aviation and Troop Command
ATTN: AMSAT-I-MDO
4300 Goodfellow Blvd.
St. Louis, MO 63120-1798

1-6. WARRANTY INFORMATION. The LMS is warranted for two years after acceptance or 12 months after deployment to a field unit, whichever occurs first. A warranty card with instructions will be utilized by the Government at the time the shelter is placed in service at which time the warranty starts. Further details regarding warranty information may be found in Warranty Program for Lightweight Multipurpose Shelters, Model S-788/G (TB 10-5411-224-24).

1-7. SAFETY CARE AND HANDLING. Many adhesive, cleaning, and bonding agents are used during skin repair procedures of the shelter. The prolonged use of these materials without protection can cause skin irritation. Inhalation of the vapors can be toxic if inhaled in quantity. Refer to FM 21-11 for first aid information.

1-8. CORROSION PREVENTION AND CONTROL. Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials , such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of keywords such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in the DA PAM 738-750.

1-9. GLOSSARY. There are no terms used in this manual which require a glossary.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES. The LMS shelter is a lightweight transportable shelter used to house various types of equipment as specified by the user. The shelter is normally mounted on a HMMWV. The LMS uses a two-piece construction method and a honey-comb core. The shelter provides Radio Frequency/ Electromagnetic Interference RFI/EMI shielding to protect user installed electronic equipment . The shield is a continuous metallic surface which maintains continuity around joints, door openings, entry panels and other possible sources of emissions leakage. The LMS shelter is designed for outdoor use in all weather conditions.

1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. Major shelter components are shown in figure 1-2. The ladder assembly is secured to the door during shelter transit and storage and is positioned on brackets below the door when the shelter is to be placed in operation. The drain plug provides an RFI/EMI seal for the floor drain during operation. The plug is loosened for air or rail transport. The step assemblies and handhold provide easy access by personnel to the roof of the shelter. Four lifting rings located at the top corners of the shelter provide attachment points for a sling assembly when the shelter is to be lifted and transported. The access tunnel is provided as a covered location for a power generating unit as specified by the user.

1-12. DIFFERENCES BETWEEN MODELS. The only difference between type I and type III of the LMS model S-788/G is that type III is provided with a tunnel. The shelters are capable of being transported by helicopter.

1-13. EQUIPMENT DATA.

	Type I	Type III
Height:	67 in.	67 in.
Width:	84 in.	84 in.
Length:	102 in.	102 in.
Weight (wiih mounting kit):	615 $\pm$ 15 lb.	650 $\pm$ 15 lb.

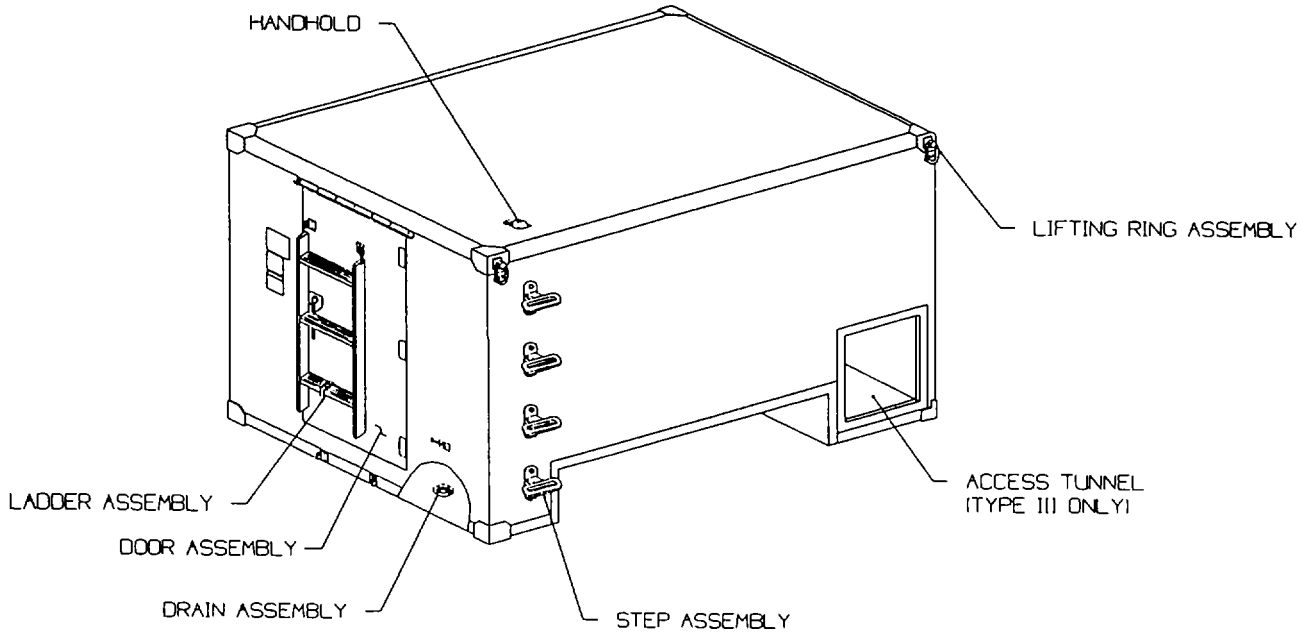

Figure 1-2. Major Shelter Components.

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CHAPTER 2
OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. GENERAL. There are no controls or indicators associated with the LMS.

SECTION II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. GENERAL. Operator Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the LMS operator, your mission is to:

a. Be sure to perform your PMCS each time you operate the LMS. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong.

b. Do your BEFORE (B) PMCS just before the LMS is placed in operation. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

c. Do your DURING (D) PMCS while you operate the LMS. During operation means to monitor the LMS and its related components while it is actually being operated. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

d. Do your AFTER (A) PMCS right after operating the LMS. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

e. Do your WEEKLY (W) PMCS once a week.

f. Do your MONTHLY (M) PMCS once a month.

g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.

2-3. PMCS PROCEDURES.

a. Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your LMS in good operating condition. It is set up so you can make your BEFORE (B) OPERATION checks as you walk around the LMS.

b. The INTERVAL column of Table 2-1 tells you when to do a certain check or service.

c. The PROCEDURE column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

NOTE

Terms "ready/available" and "mission capable" refer to same status: Equipment is on-hand and ready to perform its combat missions. (See DA Pam 738-750)

d. The 'EQUIPMENT IS NOT READY/AVAILABLE IF:" column in Table 2-1 tells you when your LMS is non-mission capable and why the LMS cannot be used.

e. If the LMS does not perform as required, refer to Chapter 3, Section II, Troubleshooting.

f. If anything looks wrong and you can't fix it, write it on your DA Form 2404 . IMMEDIATELY, report it to your supervisor.

Table 2-1. Operator Preventive Maintenance Checks and Services for LMS.

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable if:
1	Before	Door Handles	Make sure door handles operate smoothly without binding or jamming.	Door cannot be opened or closed securely.
2	Before	Door Stay Arm Assembly	Make sure door stay arm engages keeper securely and easily.	
3	Before	Door Assembly	Make sure door opens and closes smoothly without binding. Check hinges for corrosion or loose or missing hardware. Lubricate as necessary.	
			Make sure drip molding is intact	.
			Check door surfaces for punctures.	Punctures are present.
.			Make sure weather gasket is in good condition.	Gasket is damaged.
.			Make sure EMI/RFI gasket is in good condition	Gasket is damaged.
4	Before	Wall, Floor and Ceiling Panels	Inspect for punctures and delamination.	Punctures are present.
5	Before	Drain Plug	Make sure drain plug is in place.	Drain plug is missing or does not seal.
6	Before	Roof Access Steps	Make sure steps operate smoothly and stay in the up or down position.	Steps damaged or missing.
7	Before	Roof Handle	Check for corrosion and loose or missing hardware.	Handle damaged or missing.
8	After	Door Handles	Ensure handles operate smoothly without binding or jamming.	Door cannot be opened or closed securely.

Table 2-1. Operator Preventive Maintenance Checks and Services for LMS.

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable if:
9	After	Door Stay Assembly	Make sure door stay arm engages keeper securely and easily.	
10	After	Door Assembly	Make sure drip molding is intact.	
			Check door surface for punctures.	Punctures are present.
			Ensure weather gasket is in good condition.	Gasket is damaged
			Make sure EMI/RFI gasket is in good condition.	Gasket is damaged.
11	After	Lifting Rings	Inspect for corrosion or excessive wear.	Rings excessively corroded or worn.
12	After	Roof Access Steps	Make sure steps operate smoothly and stay in the up or down position.	
			Check for loose or missing hardware.	
13	After	Roof Handle	Ensure handle is securely mounted to roof.	

SECTION III. OPERATION UNDER USUAL CONDITIONS

2-4. ASSEMBLY AND PREPARATION FOR USE.

a. Unpacking. The LMS shelter does not require any special unpacking instructions.

b. Assembly. The LMS shelter requires some assembly depending on the mode of operation. For operation on the move, there are no assembly instructions. To operate the LMS in a fixed site mode of operation, install the ladder assembly using the following procedure:

(1) Loosen retaining strap securing ladder to the door assembly and lift ladder off of the stowage brackets.

(2) Place ladder hooks in slotted brackets located below the personnel door to provide access into shelter.

c. Installation Instructions. Tighten the drain plug which was loosened for shipment.

2-5. INITIAL ADJUSTMENTS.

a. Routine Checks. Routine checks include the inspection of the door for missing or loose hardware and all interior and exterior surfaces for damage. Check the door for a secure fit. Surface area checks should include inspection for paint damage, corrosion, dents, cracks and punctures.

b. Adjustments. The LMS shelter is ready for use upon receipt and requires no additional adjustments. Refer to the end item technical manual for initial adjustments.

2-6. OPERATING PROCEDURES. There are no operating procedures set aside for the LMS excepting the initial set-up procedures. Refer to the end item technical manual for additional instructions applicable to the shelter configuration.

2-7. DECALS AND INSTRUCTION PLATES. The decals and instruction plates are located on the shelter as shown in figure 2-1.

2-8. PREPARATION FOR MOVEMENT. The LMS is designed for operation at a stationary site. The following instructions detail the procedures for preparing for a movement.

a. Close personnel door.

b. Lift ladder off of the bracket and place hooks in the slotted stowage brackets on the personnel access door. Secure ladder in place using the retaining strap.

Table 2-2. Decals and Instruction Plates

INDEX	ITEM	DESCRIPTION
1	IDENTIFICATION PLATE	Provides pertinent shelter information including nomenclature, type, serial number and other manufacturer data.
2	PAINT INSTRUCTION PLATE	The surfaces of this shelter have been painted with CARC For touch-up Epoxy primer IAW MIL-P-53022. Exterior - Use only lusterless green color no. 34094, polyurethane IAW MIL-C- 46168, type II. Interior - Use only semi-gloss white, color no. 27875 and light green, color no. 24533, epoxy polyamide IAW MIL-C- 22750.
3	AIRCRAFT LOADING DATA PLATE	Provides aircraft loading data.

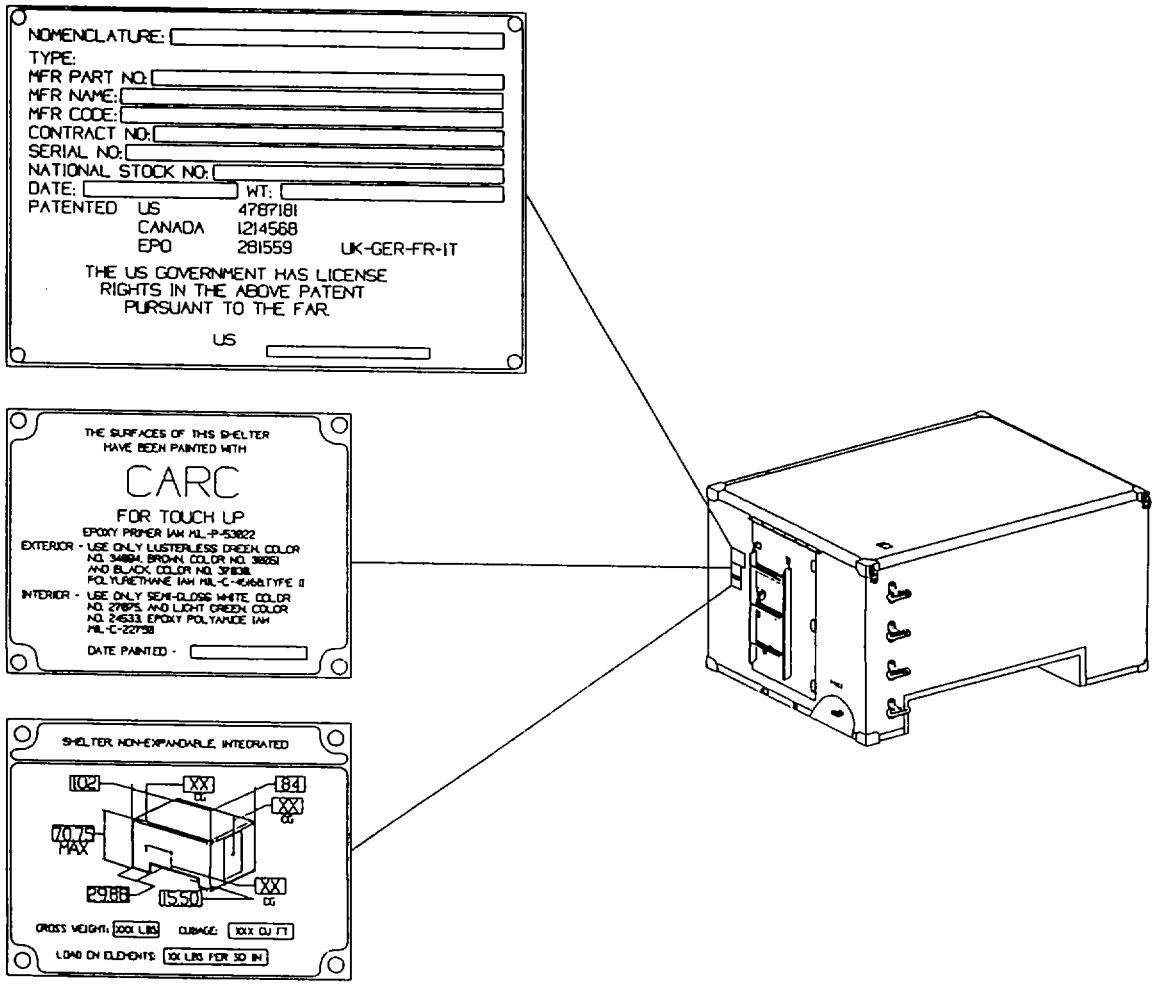

Figure 2-1. Decals and Instruction Plates.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

2-9. UNUSUAL ENVIRONMENT/WEATHER. The LMS shelters are designed for operation in all weather conditions, however, certain environmental conditions dictate special inspection requirements. Shelters located along coastal areas are subject to salt air deterioration. Beaches and desert areas are subject to wind driven sand and/or coral dust. These conditions result in a minimum of a weekly inspection requirement of the LMS to ensure a timely determination of maintenance and repair needs. Additional requirements for operation under unusual conditions may be found in the end item technical manual.

2-10. FORDING AND SWIMMING. The LMS is mounted on the HMMWV and is subject to the same constraints as the vehicle. Fording and swimming data may be found in Operator's Manual for M1037 Utility Truck (HMMWV) TM9-2320-280-10.

2-11. EMERGENCY PROCEDURES. Any damage to the LMS shelter must be patched immediately to prevent water intrusion. In an emergency, any kind of tape or water resistant material may be used to cover a puncture or a large hole. Temporary patches must be replaced with permanent patches as soon as possible. This is especially true for the LMS as RFI/EMI integrity is lost whenever the shelter is punctured.

CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS

SECTION I. LUBRICATION INSTRUCTIONS

3-1. GENERAL. Lubrication instructions are in appendix G, of this TM. All lubrication instructions are mandatory.

SECTION II. OPERATOR TROUBLESHOOTING

3-2. INTRODUCTION. This section contains troubleshooting information for malfunctions which may occur with the shelters. Fault isolation is limited to those components which may be repaired or replaced at the operator level. Table 3-1 lists the common malfunctions you may encounter during operation or maintenance of the shelter.

Each malfunction is followed by a list of tests or inspections and corrective actions. These tests or inspections and corrective actions should be performed in the order listed. This manual cannot list all malfunctions that may occur. If you encounter a malfunction that is not listed or that cannot be corrected by the listed corrective actions, notify your supervisor.

TABLE 3-1. OPERATOR TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR OR MOISTURE IS GETTING INTO SHELTER.

   Step 1. Inspect LMS exterior.

   If any punctures or tears or damage are found that interrupt the integrity of the shelter, notify your supervisor.

2. PERSONNEL DOOR DIFFICULT TO CLOSE.

   Step 1. Inspect personnel door for loose or missing hardware.

   Notify your supervisor if door has loose or missing hardware.

   Step 2. Inspect all parts that rotate or slide for adequate lubrication.

   Lubricate as required (Appendix G).

3. PANEL WALLS, FLOOR, OR CEILING IS DAMAGED.
   Step 1. Inspect LMS interior.

   If any water intrusion is detected, notify your supervisor. Superficial damage may be repainted in accordance with paragraph 3-7, Touch-up Painting.

   Interior damage that interrupts the structural integrity must be reported to your supervisor.

4. PERSONNEL DOOR IS DAMAGED.

   Step 1. Inspect personnel door assembly interior and exterior for damage.

   If dents or punctures are noted, notify your supervisor. Superficial damage may be repainted in accordance with paragraph 3-7, Touch-up Painting.

5. DOOR ASSEMBLY DOES NOT CLOSE TIGHTLY.

   Step 1. Inspect RFI/EMI and environmental gaskets for damage.

   Notify your supervisor if gasket is damaged.

SECTION III. OPERATOR MAINTENANCE PROCEDURES

3-3. GENERAL. The LMS is delivered with no internally installed equipment or provisions. Operator level maintenance and repair addresses shelter exteriors or easily accessible interior areas. Do not operate electrical equipment when floors, ceilings, or walls show evidence of water intrusion. Notify your supervisor if any of the following conditions exist:

a. Structural. Panel damage spans a structural member.

b. Wall, Ceiling. and Floor Panels. Replacement of an entire wall, ceiling, or floor is required.

c. Unauthorized Removal of Equipment. Extensive removal of equipment is necessary that is beyond the capability of the maintenance support activity.

d. Welding. Welding is required.

e. Distortion of Panels. Damage to a structural member is severe enough to cause distortion of a wall, especially an edge or corner area.

f. Non-visible Damage Assessment. Lift eye or corner castings are damaged severely enough to indicate possible damage to the underlying structural member.

3-4. GENERAL REPAIR PROCEDURES. General repair procedures at the operator level are limited to inspection, cleaning and touch-up painting. The following procedures identify the operator repair procedures for the items listed in the troubleshooting table.

3-5. INSPECTION PROCEDURES. Periodic inspections must be made by operators and maintenance personnel to insure that any defects or hazardous conditions are detected and corrected. Those items that require frequent inspection and maintenance to insure the operational integrity of the shelter are listed in table 2-1 and the Maintenance Allocation Chart in Appendix B.

3-6. CLEANING PROCEDURES. Use a vacuum cleaner to remove dust and dirt from places that are difficult to access otherwise. Use a mild detergent solution with water to clean interior and exterior surfaces. The exterior of the LMS shelter can be rinsed with water to remove accumulation of dirt.

3-7. TOUCH-UP PAINTING. When required to prevent rust and corrosion, touch up small areas of damaged or chipped paint in accordance with TM 43-0139. If large areas need repainting, notify your supervisor.

CHAPTER 4
UNIT MAINTENANCE INSTRUCTIONS

SECTION I. REPAIR PARTS; TOOLS; SPECIAL TOOLS; TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS. A complete list of common tools and tool kits may be found in Section III of Appendix B, Maintenance Allocation Chart.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. There are no special tools or test equipment needed to maintain the LMS.

4-3. REPAIR PARTS. Repair parts for unit maintenance are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 10-5411-224-24P.

SECTION II. SERVICE UPON RECEIPT

4-4. SERVICE UPON RECEIPT OF SHELTER. Inspect shelter for damage incurred during shipment. If the shelter has been damaged, report the damage in accordance with the instructions in the Warranty Technical Bulletin, TB 10-5411-224-14. If the shelter is crated or pallet mounted, refer to the end item technical manual for unpacking instructions. If the shelter is to be loaded onto a new HMMWV, perform the following:

NOTE

- For shelters to be replaced or moved from one vehicle to another and for any component of the installation mounting kit which requires maintenance, perform only the steps which are applicable.

- Prior to performing the following procedures, remove Shelter-To-Vehicle Mounting Kit and inventory per Table C-1.

a. Vehicle Preparations. (Refer to Figure 4-1)

(1) Remove wheel well side panels located on each side of vehicle per TM 9-2320-280-20.

(2) Carefully feed antenna cable back through wheel well grommet, place protective cap over connectors, and secure cables behind cross member support in wheel well.

(3) From inside the curbside rear wheel well, remove the wiring harness clamp mounting bracket.

(4) Remove cable clamps from wiring.

(5) Remove tail lights from HMMWV lower frame per TM 9-2320-280-20. Retain hardware.

(6) Secure tail lights (1) to tail light mounting brackets (2) using bolts and washers removed in step (5).

(7) Make a single cut through grommet and place it around the tail light wiring.

(8) Remove camlock fasteners from the vehicle mounting beam located in the front of the vehicle's bed, both sides. Refer to TM 9-2320-280-20.

(9) Remove strap tie down ring from the front of the bed floor, passenger side. Refer to TM 9-2320-280-20.

b. Rear Shelter Preparations (Refer to Figure 4-1)

WARNING

Be sure shelter is properly positioned on support stands capable of supporting 2000 Lbs. Failure to observe safety procedures when working under the shelter could result in severe injury or death.

CAUTION

Do not use excessive force when tightening nuts. Damage to the equipment can occur.

NOTE

During procedure, threaded holes may be fouled with paint/primer/sealer preventing full insertion of bolts. Should this occur use a bottom tap to clean foreign matter from holes.

(1) Secure clamping bracket and shim (3) to rear mounting bracket (4) using screw (5), flat washer (6), lockwasher (7), and nut (8). Do not tighten.

(2) Remove nuts (9), bolts (10), lockwashers (11), flat washers (12) securing curbside rear bumper to vehicle frame. Retain nuts (9), lockwashers (11) and flat washers (12).

(3) Position and secure rear mounting bracket (4) to rear bumper using (new) longer bolts (10) -and fiat washers (12), lockwashers (11), and nuts (9). Do not tighten bolts.

(4) Locate tail light mounting bracket (2) with tail light (1) to rear mounting bracket (4) and secure with screw (13), flat washer (14), lockwasher (15), and nut (16).

(5) Insert tail light wiring connectors through hole in rear mounting bracket (4), across top of rear bumper and reconnect to vehicle wiring harness. Install grommet (29) in hole in rear mounting bracket (4).

(6) On the bottom of the shelter, remove all paint and sealer from any rivet head that may come in contact with the rear mounting adapter (28).

(7) Insert an isolator mounting screw (17), flat washer (18), and isolator mount washers (19) down through each round opening in the rear mounting adapter (28).

(8) Position and secure rear mounting adapter (28) to shelter using screws (20, 21, 22, and 23), flat washers (24 and 25), and lockwashers (26 and 27). Do not tighten.

(9) Repeat steps 1 through 8 for other side of shelter.

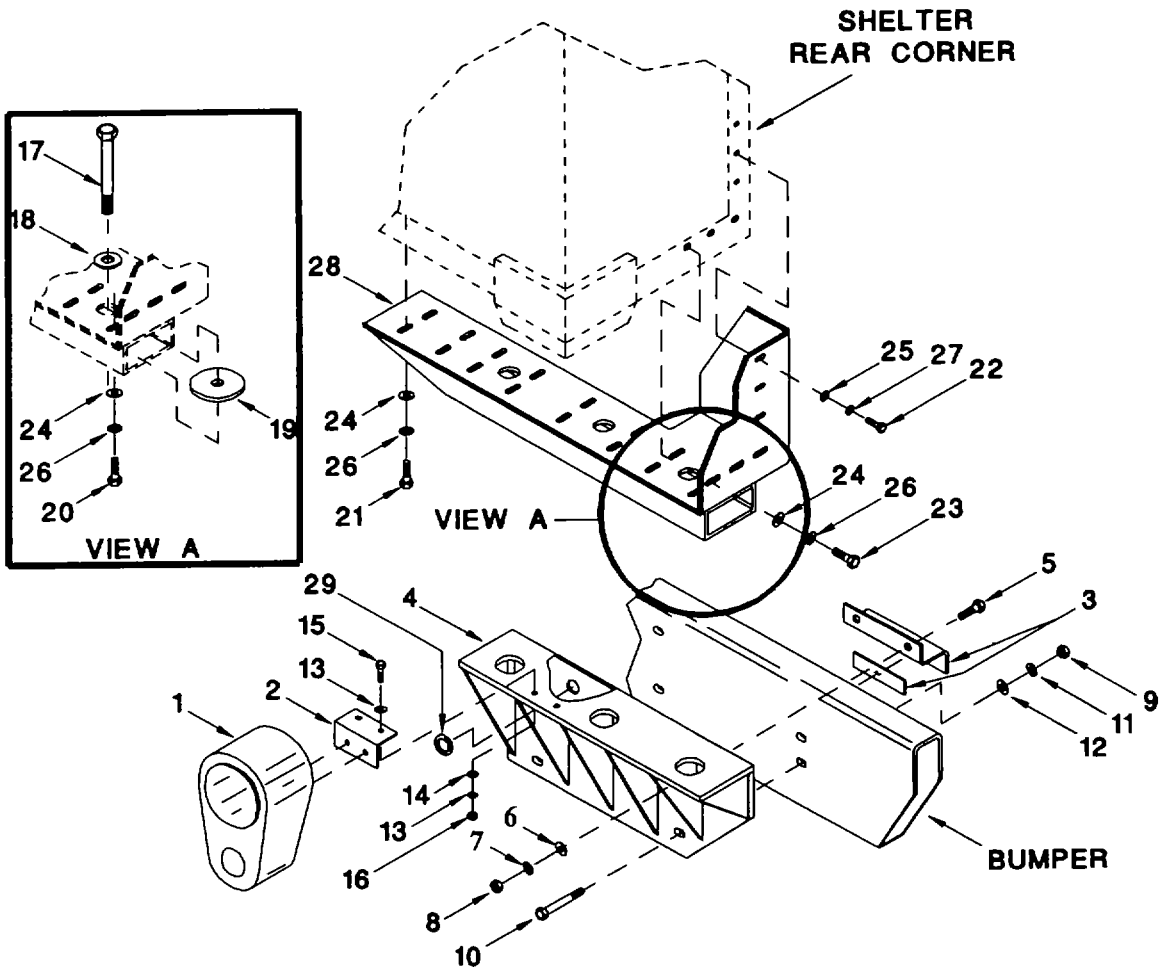

Figure 4-1. Rear Bracket Mounting Assembly

c. Front Shelter Preparations. (Refer to Figure 4-2)

(1) Remove bolts/plugs from the front and bottom front surfaces of the shelter.

CAUTION

Do not use excessive force when tightening bolts. Damage to equipment may occur.

(2) Set mounting angle assembly (1) to shelter and secure front section with screws (2), lockwashers (3), flat washers (4) and bottom section with bolts (5) and flat washers (6). Tighten screws/bolts to 8-10 ft-lbs.

(3) Insert screw (7), flat washer (8), isolator mount washer (9), and isolator (10) into each slot of mounting angle assembly (1).

(4) Repeat steps 1 through 3 for other side of shelter.

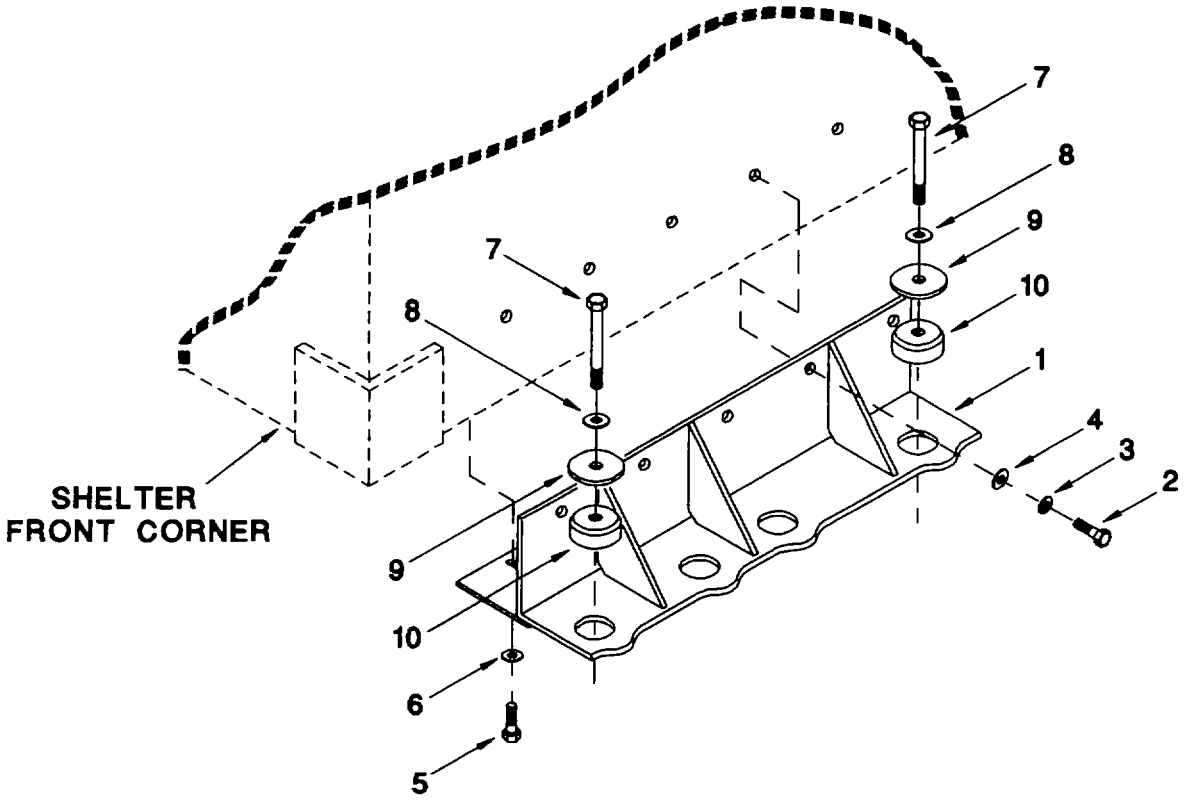

Figure 4-2. Front Bracket Mounting Assembly

d. Mounting Shelter on Vehicle (Refer to Figure 4-3)

WARNING

To prevent injury or death to personnel, ensure hooks of lifting device are inspected and securely attached before lifting shelter.

Slings and hoists must be properly certified. Use of an uncertified sling, or a sling which is not currently certified, may result in equipment damage or severe injury or death to personnel.

Do not use handling and lifting equipment of less capacity than the gross shelter weight. Failure to observe warning may result in equipment damage or severe injury or death to personnel.

LMS shelter weighs in excess of 600 pounds. Failure to follow safety procedures when the shelter is being lifted and handled can result in severe injury or death.

CAUTION

Do not jerk, bounce, or jar shelter when lifting. Avoid swinging shelter from side to side. Do not attempt to butt or push shelter into place with a forklift. If shelter is crated or palleted, follow the stenciled instructions for forklift operations.

If shelter panel is punctured during loading or securing, repair puncture as soon as possible to prevent moisture from seeping into panels and to restore RFI/EMI shielding.

Carefully watch rear portion of shelter and vehicle to prevent interference and possible damage.

NOTE

Both the HMMWV and shelter should be laterally and longitudinally level to aid in proper alignment as shelter is lowered.

(1) Attach certified sling assembly (1) to all four lifting rings (2) on shelter using the four sling hooks (3) at opposite ends of cables from sling assembly lifting ring (4).

(2) Insert lifting hook (5) of the lifting device into sling assembly lifting ring (4).

(3) Slowly lift shelter with lifting device so the isolator mounting screws (6 and 20) are located over their respective mounting holes on the vehicle.

(4) Slowly lower the shelter so that the front isolator mounting screws (6) are located slightly above the vehicle beam (7).

NOTE

Two people may be required to hold hardware on the mounting screws when lowering shelter to prevent hardware from falling off.

(5) Slide isolator spacer (8), isolators (9), sleeve spacers (10), and isolator washers (11) onto mounting screws (6) and slowly lower into front vehicle mounting holes.

(6) Position bar assembly (12) under the vehicle mounting beam (7) and thread the mounting screws of the three outside isolator assemblies into the bar assembly (12). Do not tighten.

(7) Place flat washer (13) and self locking nut (14) on the inside isolator mounting screw (6). Do not tighten. (There is no isolator washer in this mounting hole).

(8) Repeat for other side of shelter.

(9) Raise rear of the shelter just far enough to allow access between the rear mounting brackets (16) and rear mounting adapters (15). Loosen front mounting screws more if more clearance is required.

(10) Due to potential variations in the HMMWV or shelter length and width, carefully align each mounting screw (20) with holes on rear mounting bracket (16). Using the slotted holes in the respective pieces, adjust the mounting bracket (16) for any lateral movement required and the mounting adapter (15) for any longitudinal movement required.

(11) Tighten all bolts and screws securing the rear mounting bracket (16) to the rear bumper and rear mounting adapter(15) to shelter floor and sides.

(12) Slide isolator (17), isolator spacer (18), and sleeve spacers (19) onto each mounting screw (20) between rear mounting brackets (16) and rear mounting adapter (15) (13) Slowly lower the shelter, maintaining alignment, and slide isolators (17) isolator washers (21 and flat washers (22) onto each mounting screw (20) secure with self locking nut (23). Do not tighten.

(14) Repeat for other side.

CAUTION

Do not use excessive force when tightening bolts. Damage to equipment may occur.

(15) Recheck and tighten all screws/nuts to 8-10 ft-lbs.

(16) Lower the shelter all the way and remove the lifting sling from the lift rings.

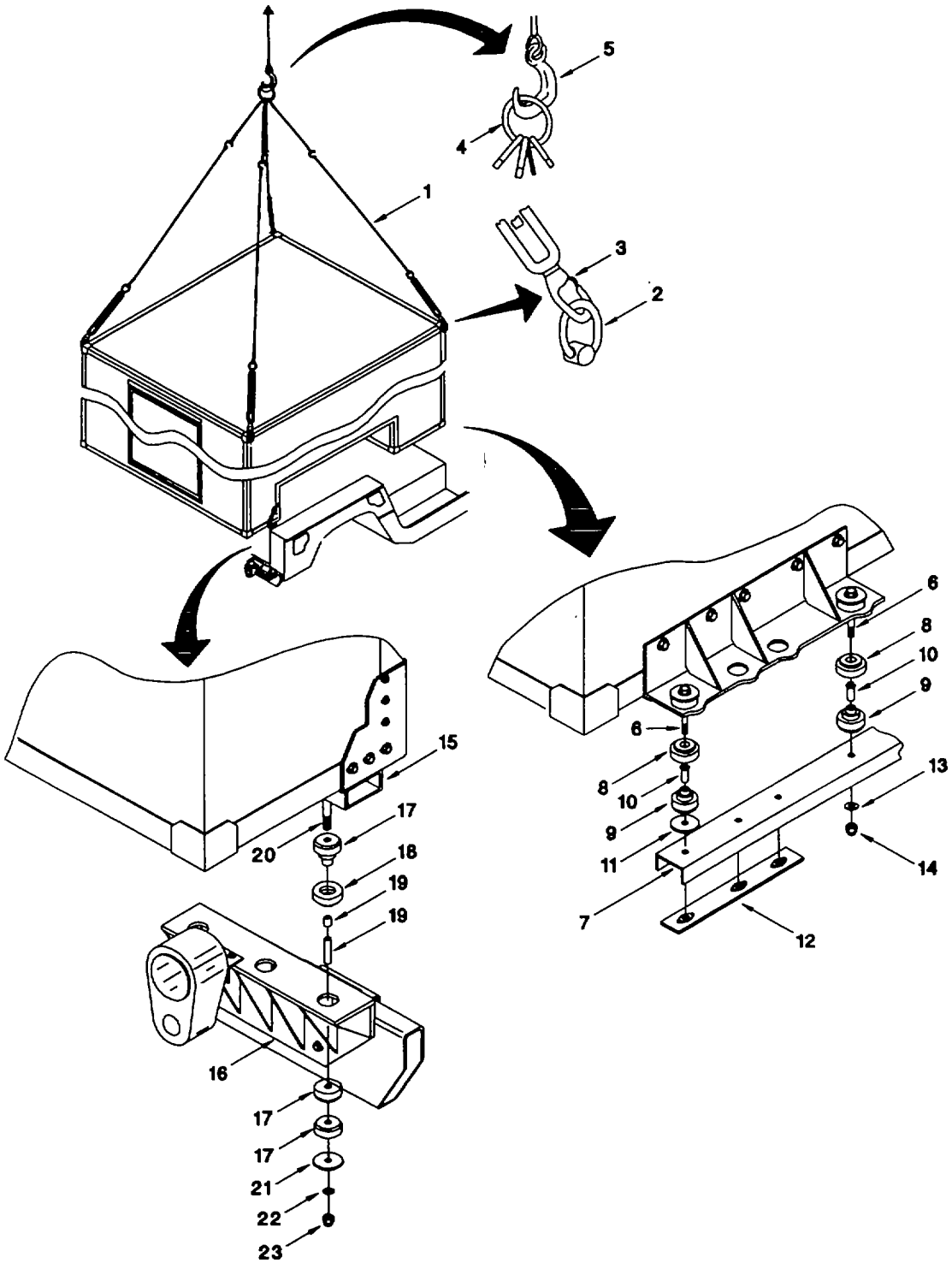

Figure 4-3. Shelter Mounting

Pages 4-8 and 4-9, including Figures 4-4 and 4-5, deleted.

4-5. SITE REQUIREMENTS. Site requirements for the LMS are in accordance with the end item technical manual.

SECTION III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-6. GENERAL. Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the LMS unit maintenance technician, your mission is to:

a. Be sure to perform your PMCS on schedule. Always do your PMCS in the same order, so it gets to be a habit.

b. Do your SEMIANNUAL (S) PMCS every six months. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

c. Do your ANNUAL (A) PMCS once each year. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

d. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover during inspection unless you can fix them. You DO NOT need to record faults that you fix.

4-7. PMCS PROCEDURES.

a. Your Preventive Maintenance Checks and Services, Table 4-1, lists' inspections and care required keep your LMS in good operating condition. It is set up so you can make your checks as you walk around the LMS.

b. The INTERVAL column of Table 4-1 tells you when to do a certain check or service.

c. The PROCEDURE column of Table 4-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

NOTE

Terms "ready/available" and 'mission capable' refer to same status: Equipment is on hand and ready to perform its combat missions. (See DA Pam 738-750)

d. The 'EQUIPMENT IS NOT READY/AVAILABLE IF:" column in Table 4-1 tells you when your LMS is non-mission capable and why the LMS cannot be used.

e. If the LMS does not perform as required, refer to Section IV, Troubleshooting.

f. If anything looks wrong and you can't fix it, write it on your DA Form 2404 . IMMEDIATELY, report it to your supervisor.

Table 4-1. Unit Preventive Maintenance Checks and Services for LMS.

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable if:
1	Monthly	Lifting rings	Inspect for excessive wear.	Excessively worn.
2	Semi-annually	Walls, floors and ceiling panels	Inspect for punctures and delamination.	Punctures are present.
3	Semi-annually	EMI/RFI gasket	Make sure EMI/RFI gasket is in good condition.	Gasket is damaged.
4	Semi-annually	Weather gasket	Make sure gasket is in good condition.	Gasket is damaged.
5	Semi-annually	Lifting ring bumpers	Inspect for major damage or loss.	
6	Semi-annually	Shelter pads	Inspect for major damage.	
7	Semi-annually	Shelter steps	Inspect for corrosion and loose or missing hardware.	Steps excessively corroded or hardware loose or missing.
8	Semi-annually	Roof handle	Ensure handle is securely mounted and operates smoothly.	Handle damaged or missing

SECTION IV. UNIT TROUBLESHOOTING

4-8. GENERAL. This section contains troubleshooting information for malfunctions which may develop in the shelters. Fault isolation is limited to those components which may be repaired or replaced at the unit level. Table 4-1 lists the common malfunctions you may encounter during operation or maintenance of the shelter. Each malfunction is followed by a list of tests or inspections and corrective actions. These tests or inspections and corrective actions should be performed in the order listed. This manual cannot list all malfunctions that may occur. If you encounter a malfunction that is not listed or that cannot be corrected by the listed corrective actions, notify your supervisor.

TABLE 4-1. UNIT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR OR MOISTURE IS GETTING INTO SHELTER.

Step 1. Inspect LMS exterior for damage.

Notify your supervisor if any punctures or tears or damage are found that interrupt the integrity of the shelter .

Scratches or superficial damage may be cleaned and painted in accordance with Chapter 3 paragraph 3-7, Touch-up Painting.

Step 2. Inspect personnel door interior and exterior for damage.

Replace door if damage is severe (paragraph 4-18).

If dents or punctures are noted, notify your supervisor. Superficial damage may be repainted in accordance with Chapter 3 paragraph 3-7, Touch-up Painting.

Step 3. Inspect personnel door environmental gasket for dirt accumulation or damage.

Clean gasket and contacting surface of door opening. If gasket is damaged, notify your supervisor.

2. DOOR ASSEMBLY DOES NOT SEAL TIGHTLY.

Step 1. Test door for adequate closure pressure in accordance with paragraph 4-17.

Adjust seal pressure in accordance with paragraph 4-17.

3. SHELTER STEPS DO NOT FUNCTION PROPERLY.

Step 1. Inspect shelter step assemblies for adequate lubrication.

Lubricate as required (appendix G).

Step 2. Inspect step assembly for damage or loose or missing hardware.

Repair or replace components as required (paragraph 4-11).

TABLE 4-1. UNIT TROUBLESHOOTING - continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. SHELTER ROOF HANDHOLD DOES NOT FUNCTION PROPERLY.

Step 1. Inspect shelter roof handhold for adequate lubrication.

Lubricate as required (appendix G).

Step 2. Inspect handhold for damage or loose or missing hardware.

If handhold is damaged, notify your supervisor.

5. LADDER ASSEMBLY DOES NOT MOUNT PROPERLY.

Step 1. Inspect ladder for damage.

Replace ladder as required (paragraph 4-15).

Step 2. Inspect stowage brackets and strap for damage or loose hardware.

Tighten hardware and replace components as required (paragraph 4-16).

Step 3. Inspect deployed brackets for damage or loose hardware.

Tighten hardware or replace brackets as required (paragraph 4-12)

6. SHELTER PADS DAMAGED.

Step 1. Inspect pads for major damage.

Replace pads as required (paragraph 4-13).

7. SHELTER LIFTING RING BUMPERS DAMAGED.

Step 1. Inspect lifting ring bumpers for major damage.

Notify your supervisor if bumpers need to be replaced.

8. DOOR HOLDER DOES NOT PROPERLY ENGAGE.

Step 1. Inspect door holder for damage or loose or missing hardware.

Repair or replace as required (paragraph 4-14).

TABLE 4-1. UNIT TROUBLESHOOTING - continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

9. PERSONNEL DOOR DRIP MOLDING DAMAGED.

Step 1. Inspect personnel door drip molding.

Notify your supervisor if drip molding is damaged.

10. PERSONNEL DOOR DOES NOT OPEN OR CLOSE SMOOTHLY.

Step 1. Inspect hinges, handles and roller latch mechanism for adequate lubrication.

Lubricate as required (appendix G).

Step 2. Inspect door handle and roller latch mechanism for loose or missing hardware.

Repair or replace components as required (paragraph 4-19).

Step 3. Inspect door brace for damage or improper operation.

Repair or replace door brace (paragraph 4-20).

11. PANEL WALLS, FLOOR, OR CEILING IS DAMAGED.

Step 1. Inspect LMS interior

If any water intrusion or damage that interrupts the structural integrity is detected, notify your supervisor. Superficial damage may be repainted in accordance with Chapter 3 paragraph 3-7, Touch-up Painting.

12. FLOOR DRAIN ASSEMBLY DOES NOT SEAL PROPERLY.

Step 1. Inspect floor drain plug and lanyard for damage.

If drain plug is damaged or missing, notify your supervisor.

If the drain tube is damaged and does not provide a good seal for the drain plug, notify your supervisor.

SECTION V. UNIT MAINTENANCE PROCEDURES

4-9. GENERAL. Unit level maintenance and repair will primarily involve shelter exteriors or easily accessible interior areas. Do not operate electronic equipment when floors, ceilings, or walls show evidence of water intrusion. Notify your supervisor if any of the following conditions exist:

a. Structural. Panel damage spans a structural member.

b. Wall, Ceiling, and Floor Panels, Replacement of an entire wall, ceiling, or floor is required.

c. Unauthorized Removal of Equipment. Extensive removal of equipment is necessary that is beyond the capability of the using unit.

d. Welding. Welding is required.

e. Distortion of Panels. Damage to a structural member is severe enough to cause distortion of a wall, especially an edge or corner area.

f. Non-visible Damage Assessment. Lift fittings or corner castings are damaged severely enough to indicate possible damage to the underlying structural member.

4-10. GENERAL REPAIR PROCEDURES. General repair procedures at the unit level are limited to the replacement of small items and securing of loose hardware. The following procedures identify the unit repair procedures for the items listed in the troubleshooting table.

4-11. SHELTER STEP ASSEMBLY.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit
(Item 1, Appendix B)

Materials/Parts:
Step Assembly
Lockwasher (Item 24, Appendix E)

REMOVAL

1. Remove two bolts (1) and lock washers (2) securing step (3) to shelter.

2. Remove step (3).

INSTALLATION

1. Locate step (3) to shelter and secure in place using two bolts (1) and lockwashers (2).

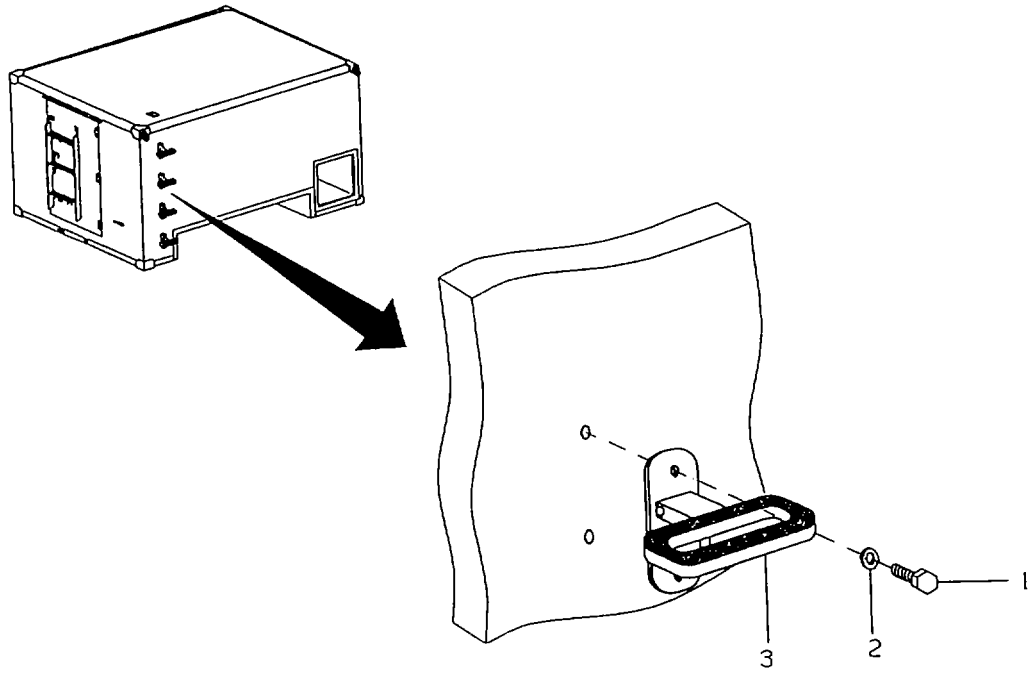

Figure 4-6. Shelter Step Assembly.

4-12. DEPLOYED LADDER BRACKET ASSEMBLIES.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Ladder Bracket - Deployed (roadside)
Ladder Bracket -Deployed (curbside)

REMOVAL

1. Remove two screws (1) and washers (2) securing roadside bracket (3) to shelter.

2. Remove two screws (1) and washers (2) securing curbside bracket (4) to shelter.

INSTALLATION

1. Locate curbside deployed bracket (4) to shelter and secure using two screws (1) and washers (2).

2. Locate roadside deployed bracket (3) to shelter and secure using two screws (1) and washers (2).

4-12. DEPLOYED LADDER BRACKET ASSEMBLIES - continued

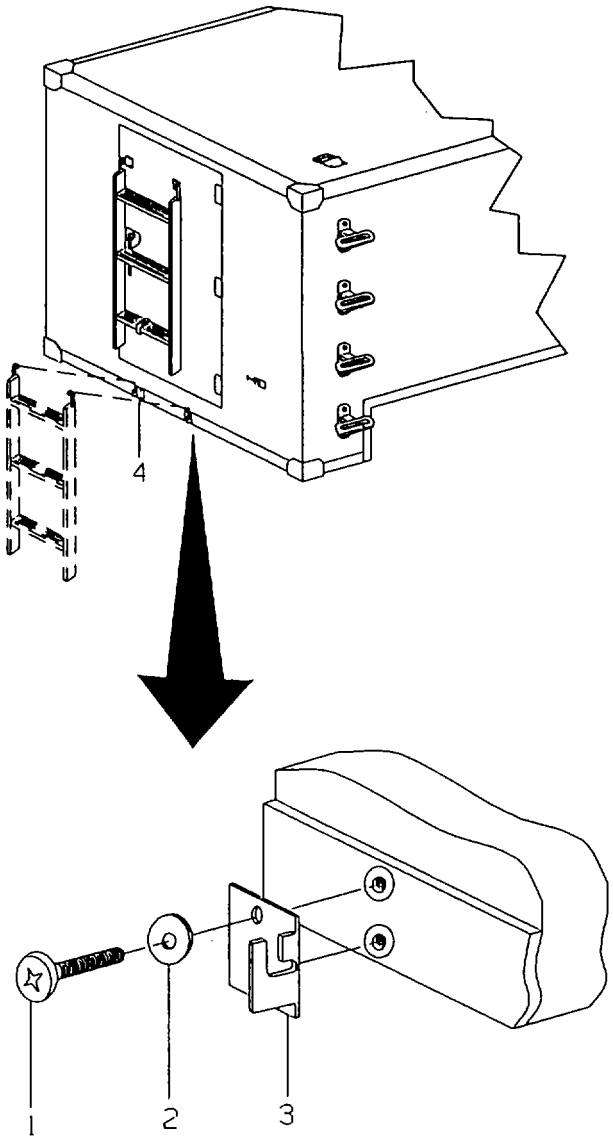

Figure 4-7. Deployed Ladder Bracket Assemblies.

4-13. SHELTER PAD ASSEMBLIES.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit
(Item 1, Appendix B)

Materials/Parts:
Pad Assembly
Cloth, Cotton (Item 3, Appendix E)

REMOVAL

1. Remove four bolts (1) and washers (2) securing pad (3) and shim (4) to corner of shelter and remove pad (3) with shim (4).

2. Wipe pad mounting area clean with cloth.

INSTALLATION

1. Locate pad (3) with shim (4) to corner of shelter and secure with four bolts (1) and washers (2).

4-13. SHELTER PAD ASSEMBLIES - continued.

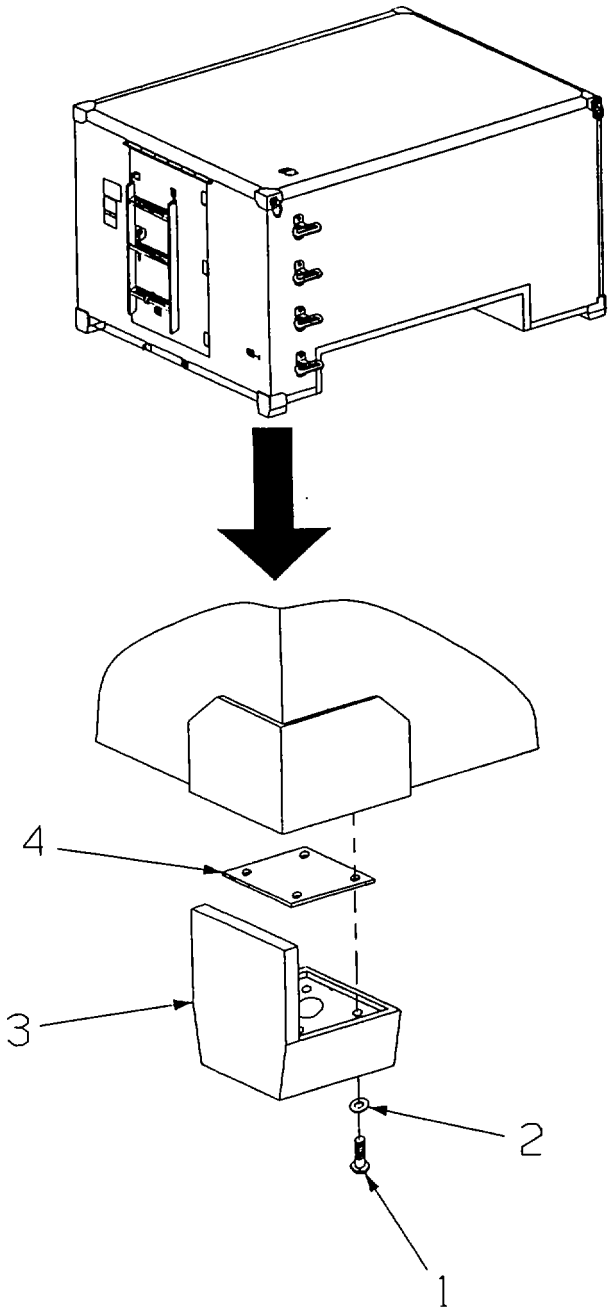

Figure 4-8. Shelter Pads Assemblies.

4-14. POSITIVE DOOR HOLDER.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B}

Materials/Parts:
Positive Door Holder
Lockwasher (Item 21, Appendix E)

REMOVAL

1. Remove four screws (4), lockwashers (3) and flat washers (2) securing arm section of door holder (1) to shelter and remove.

2. Remove four screws (5), lockwashers (6) and flat washers (7) securing retainer section of door holder (1) to door and remove.

INSTALLATION

1. Locate retainer section of door holder (1) to door and secure with four screws (5), lockwashers (6) and flat washers (7).

2. Locate arm section of door holder (1) to shelter and secure with four screws (4), lockwashers (3) and flat washers (2).

4-14. POSITIVE DOOR HOLDER - continued.

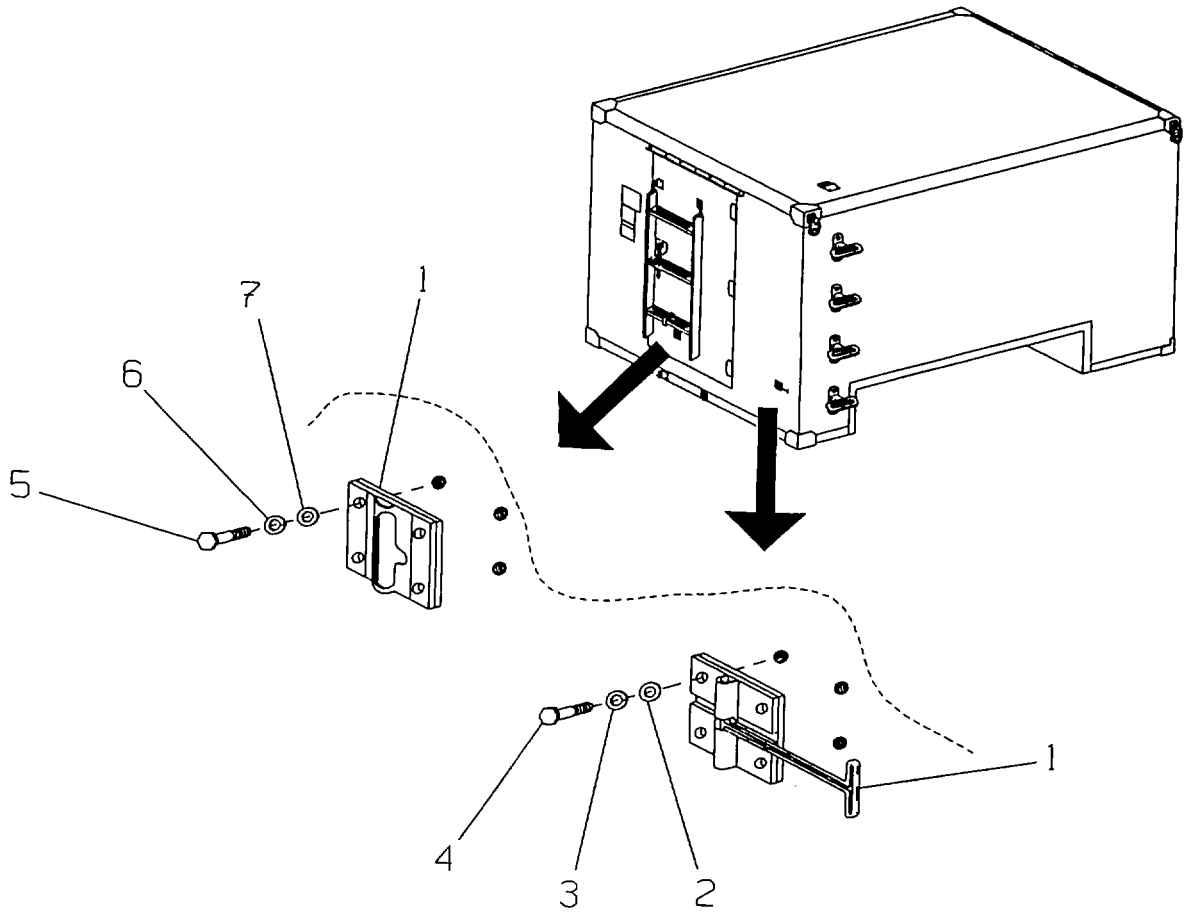

Figure 4-9. Positive Door Holder.

4-15. LADDER ASSEMBLY.

This task covers:

a. Replacement

INITIAL SETUP

Tools:
None

Materials/Parts:
Ladder

REPLACEMENT

1. Loosen retaining strap (1) securing the ladder (2) to the door (3) and lift ladder (2) off of storage brackets (4).

2. Place new ladder (2) on stowage brackets (4) and secure with retaining strap (1).

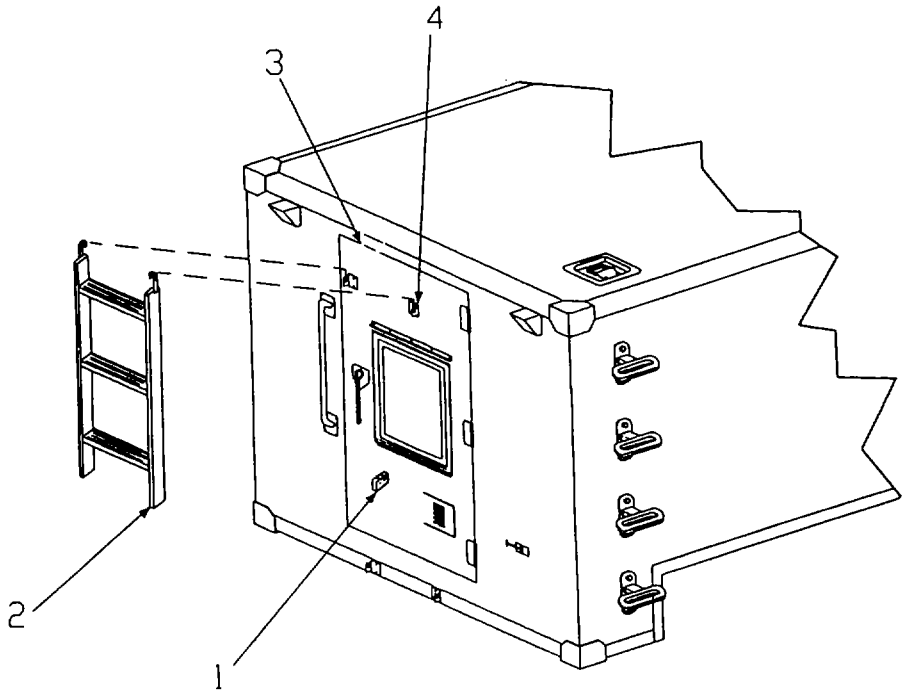

Figure 4-10. Ladder Assembly.

4-16. STOWED LADDER BRACKETS AND STRAP ASSEMBLY.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Strap Assembly
Ladder Bracket, Stowed (roadside)
Ladder Bracket, Stowed (curbside)

REMOVAL

STRAP

1. At the shelter door (1), loosen strap (2) and remove ladder (3).
2. Remove screw (4) and washer (5) securing strap (2) to door (1).

STOWED LADDER BRACKETS

3. Remove two screws (6) and washers (7) securing curbside stowed bracket (8) to door (1).
4. Remove two screws (6) and washers (7) securing roadside stowed bracket (9) to door (1).

INSTALLATION

STOWED LADDER BRACKETS

1. Locate roadside stowed bracket (9) to door (1) and secure using screws (6) and washers (7).
2. Locate curbside stowed bracket (8) to door (1) and secure using screws (6) and washers (7).

STRAP ASSEMBLY

3. Locate strap (2) to door (1) and secure using screw (4) and washer (5).
4. Secure ladder (3) to door (1) with strap (2).

4-16. STOWED LADDER BRACKETS AND STRAP ASSEMBLY - continued.

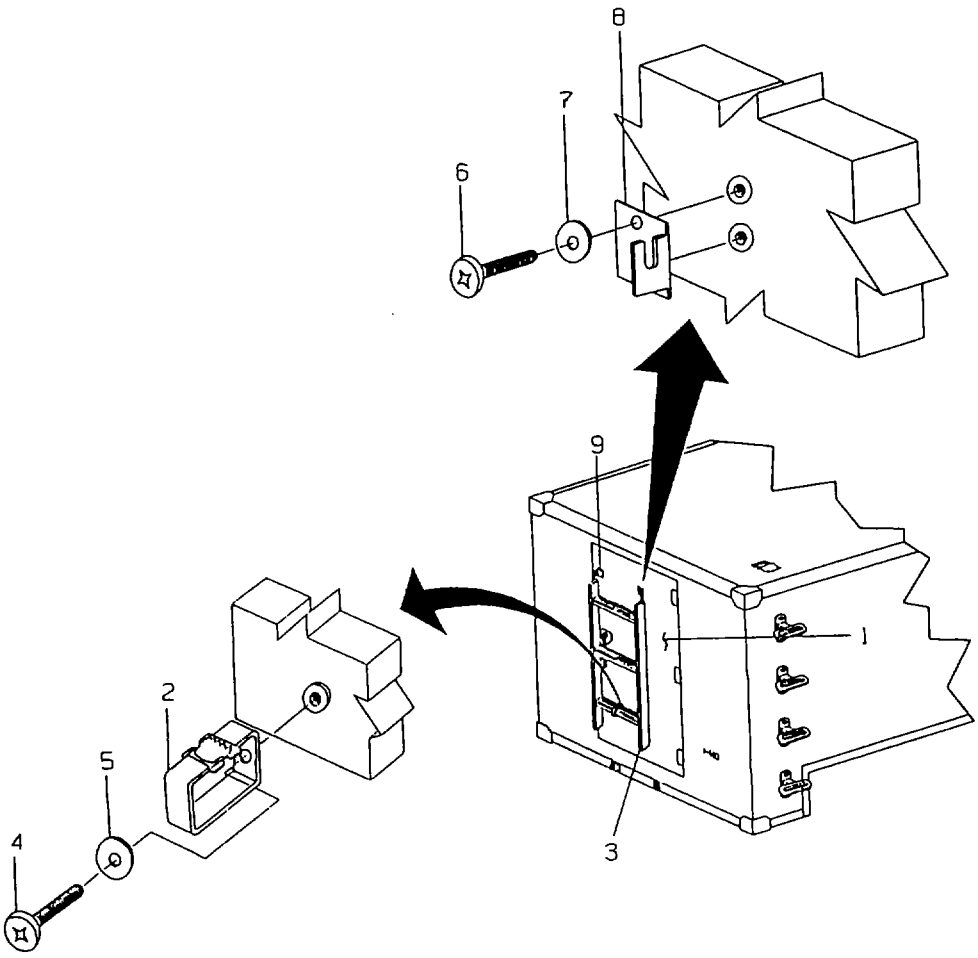

Figure 4-11. Stowed Ladder Brackets and Strap Assembly.

4-17. SHELTER DOOR ADJUSTMENT.

This task covers:

a. Test **b. Adjustment**

INITIAL SETUP

Tools:
General Mechanics Tool Kit
(Item 1, Appendix B)

Materials/Parts:
Shim (Item 23, Appendix E)

TEST

1. Place a single piece of paper 0.005 inches thick by 2 1/2 inches wide (e.g., a dollar bill) between the door silicone weather gasket and its bearing surface.

2. Close and latch the door and withdraw the paper. Do this at the top, middle, and bottom sections of the door. If there is resistance to the withdrawal at each of the test points, sufficient seal pressure exists and no adjustments are necessary. If there is no resistance at the hinged side, notify your supervisor. If there is no resistance at the roller latch side, increase the gasket compression by adding shims as follows:

ADJUSTMENT

1. Open door and remove roller latch assembly (para 4-18).

2. Remove two bolts (1) and lockwashers (2) securing striker plate (3) at the location requiring adjustment.

2. Insert approximately 0.032" aluminum alloy shim(s) (4) between striker plate (3) and door panel, to a maximum thickness of 0.096".

3. Locate striker plate (3) with added shim(s) (4) to door and secure with two bolts (1) and lockwashers (2).

4. Retest the door assembly for proper closure pressure and repeat adjustment procedure as necessary.

4-17. SHELTER DOOR ADJUSTMENT.

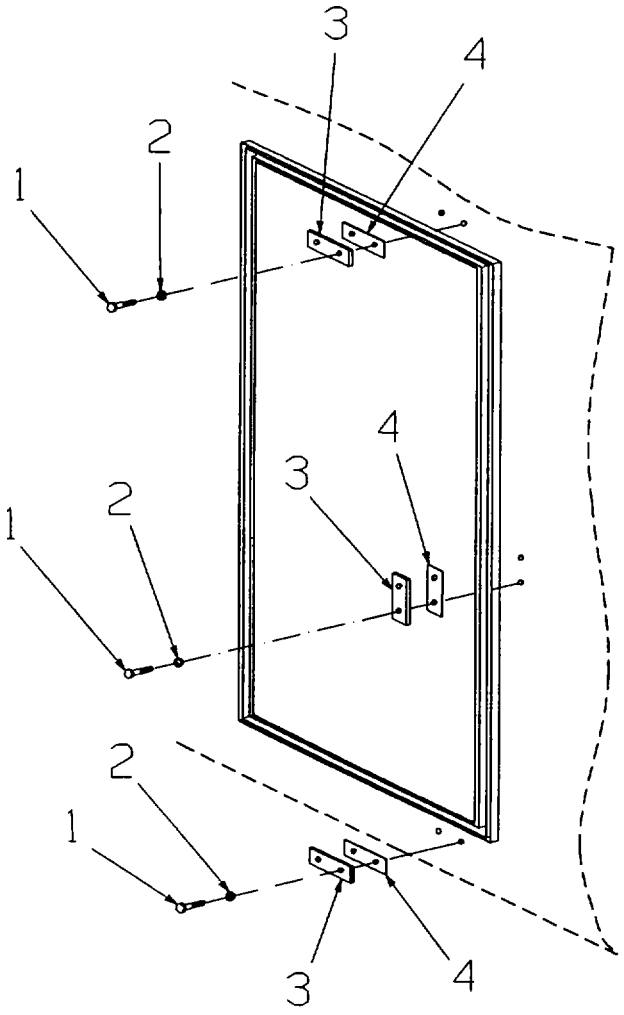

Figure 4-12. Shelter Door Adjustment

4-14. POSITIVE DOOR HOLDER.

This task covers:

a. Removal
b. Installation
c. Test
d. Adjustment

INITIAL SETUP

Tools:
General Mechanics Tool Kit
(Item 1, Appendix B)

Personnel Required: (2)

Materials/Parts:
Door Assembly
Lockwasher (Item 20, Appendix E)
Lockwasher (Item 21, Appendix E)
Cotter Pin (Item 22, Appendix E)
Shim (Item 23, Appendix E)

Equipment Condition:
Roller Latch Assembly removed (Para. 4-18)

REMOVAL

1. At the shelter door (1), loosen strap (2) and remove ladder (3).

2. Remove two screws (8), lockwashers (9), and flatwashers (10) securing ground jumpers (11) to door (1).

3. Open shelter door (1).

4. Remove cotter pin (4) from chain and pin assembly (5) and remove pin from door stop bracket (6) and door brace (7).

WARNING

Door assembly weighs in excess of 50 pounds use two personnel to support door during removal or serious injury may result.

CAUTION

Door assembly weighs in excess of 50 pounds use two personnel to support door during removal to prevent damage to the door or shelter.

4-18. DOOR ASSEMBLY - continued.

5. Remove 12 screws (12) securing hinges (13) to shelter and remove door (1).

6. Remove two screws (14) and washers (15) securing strike plates (16) and shims (17) to door (1).

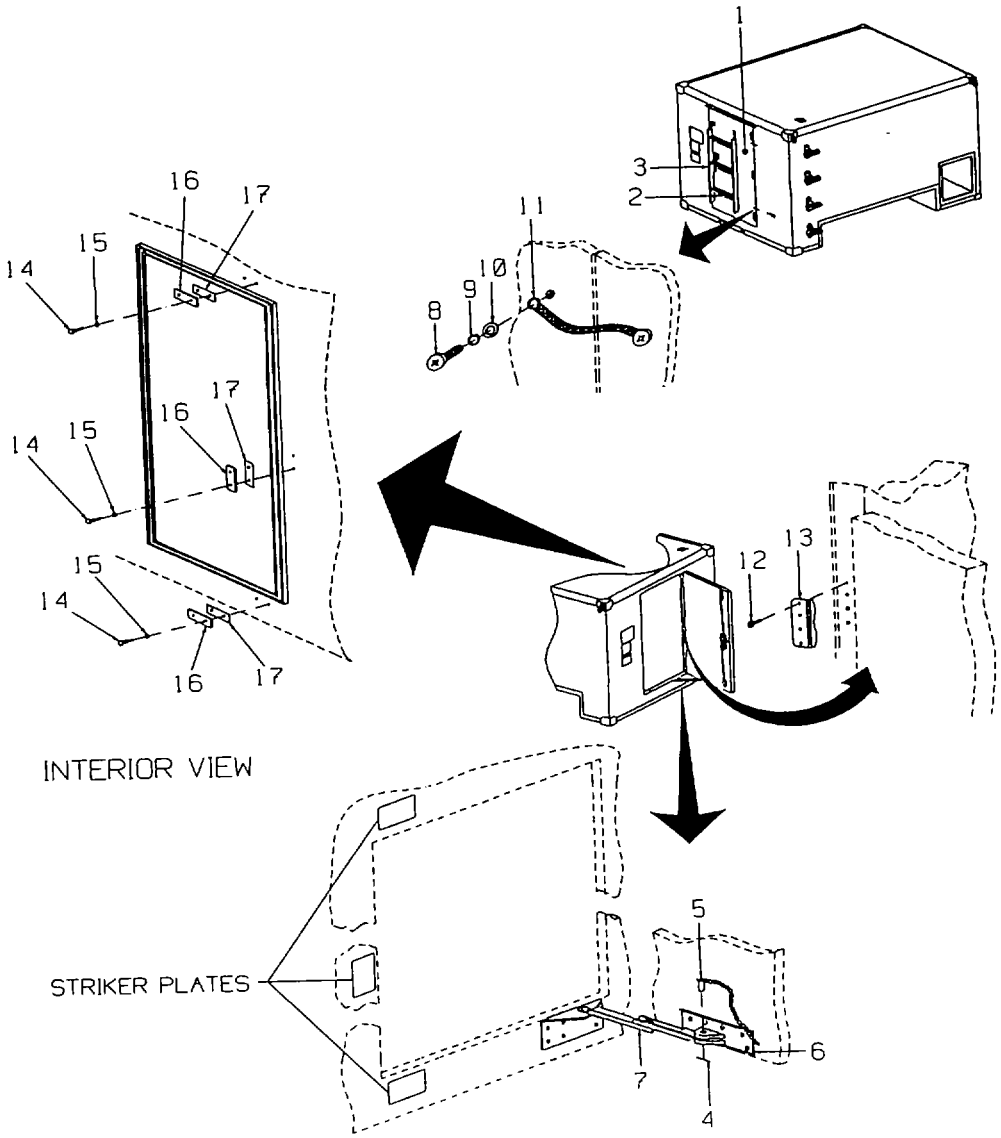

Figure 4-13. Door Assembly.

4-18. DOOR ASSEMBLY - continued.

INSTALLATION

1. Locate shims (17) and strike plates (16) to door (1) and secure using two screws (14) and washers (15).

WARNING

Door assembly weighs in excess of 50 pounds use two personnel to support door when installing or serious injury may result.

CAUTION

Door assembly weighs in excess of 50 pounds use two personnel to support door when installing to prevent damage to the door or shelter.

1. Locate door (1) to shelter positioning hinges (13) over the holes.

2. Secure the three door hinges (13) to shelter using twelve screws (12).

3. Align holes at ends of two ground jumpers (11) with holes in door (1) and secure each in place using screw (8), lock washer (9) and flatwasher (10).

4. Secure ladder (3) to door (1) using strap (2).

5. Locate end of door brace (7) to door stop bracket (6) and install pin of chain and pin assembly (5).

6. Secure chain and pin assembly (5) in place using cotter pin (4).

7. Install Roller Latch Assembly (para. 4-18).

TEST

NOTE

The procedure listed below should be performed at the top center and bottom center of the door and three places along each side of the door.

1. Place a single piece of paper 0.005 inches thick by 2 1/2 inches wide (e.g., a dollar bill) between the silicone weather gasket and its bearing surface.

4-18. DOOR ASSEMBLY - continued.

TEST (cont.)

2. Close and latch the door and withdraw the paper. If there is resistance to the withdrawal at each of the test points, sufficient seal pressure exists, and no adjustments are necessary. If there is no resistance at the hinged side, notify your supervisor. If there is no resistance at the roller latch side, increase the gasket compression by adding shims as follows:

ADJUSTMENT

1. Open the door and remove two bolts (14) and lockwashers (15) securing striker plate (16) requiring adjustment to shelter panel.

2. Insert approximately 0.032" aluminum alloy shim(s) (17) between striker plate (16) and shelter panel, to a maximum thickness of 0.096".

3. Locate striker plate (16) with added shim(s) (17) to shelter and secure with two bolts (14) and lockwashers (15).

4. Retest the door assembly for proper closure pressure and repeat adjustment procedure as necessary.

4-19. ROLLER LATCH ASSEMBLY.

This task covers:

a. Removal **b. Installation**

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Roller Latch Assembly
Lockwasher (Item 25, Appendix E)

REMOVAL

1. Remove four bolts (1), lockwashers (2), roller latch door shim (3) and two roller latch door spacers (4).

2. Remove four bolts (6), lockwashers (7), flat washers (8), roller latch door shim (9) and two roller latch spacers (10).

3. Remove four bolts (12), lockwashers (13), flat washers (14), roller latch door shim (15) and two roller latch spacers (16).

4. Remove roller latch assembly (18) from door.

INSTALLATION

1. Locate roller latch assembly (18) to door.

NOTE
Do not tighten bolts until all shims are installed.

2. Secure upper three point roller latch (17) to door using four bolts (12), lockwashers (13), flat washers (14), shim (15) and two spacers (16),

3. Secure handle three point roller latch (5) to door using four bolts (1), lockwashers (2), shim (3) and two spacers (4).

4. Secure lower three point roller latch assembly (11) to door using four bolts (6), lockwashers (7), flat washers (8), shim (9) and two spacers (10).

5. Tighten bolts and check door closure pressure in accordance with paragraph 4-17.

4-19. ROLLER LATCH ASSEMBLY - continued.

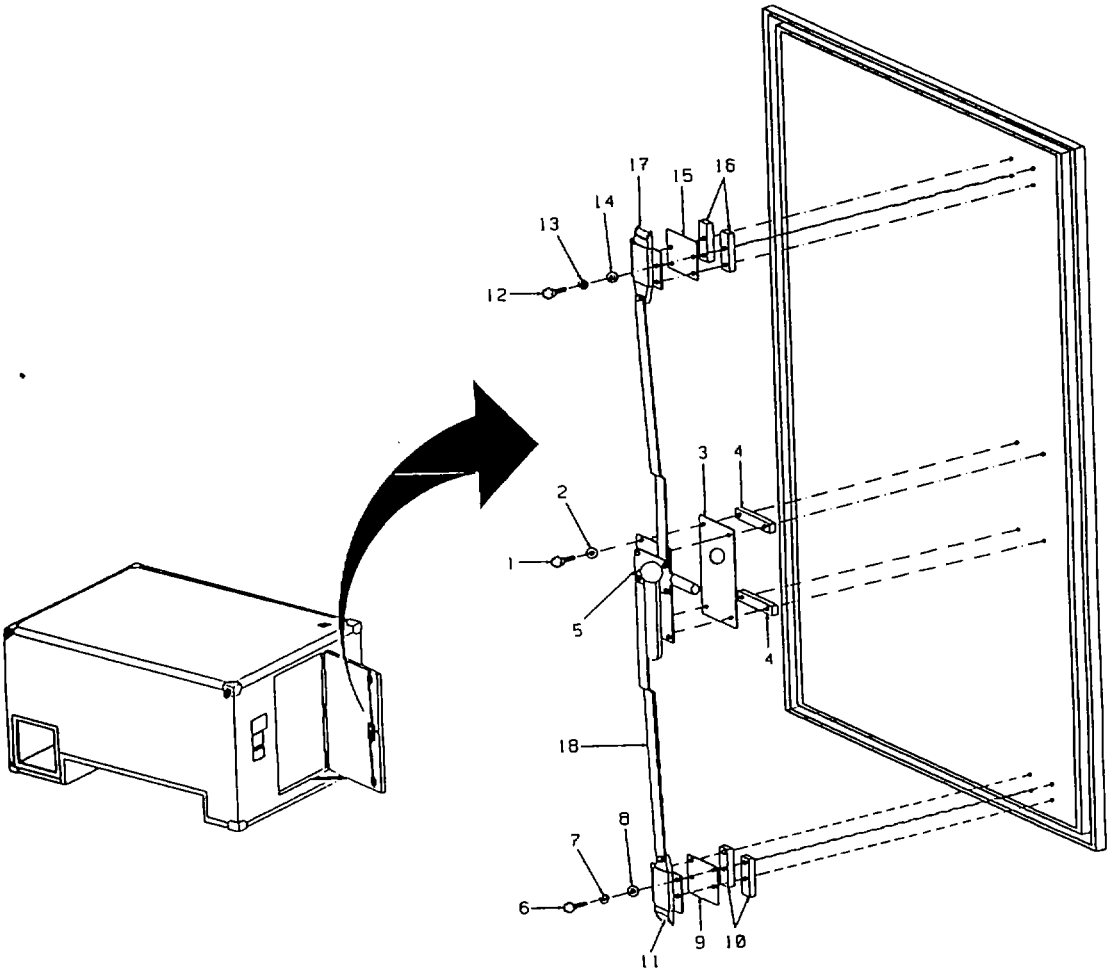

Figure 4-14. Roller Latch Assembly.

4-20. DOOR BRACE ASSEMBLY.

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit
(Item 1, Appendix B)

Materials/Parts:
Door Brace Assembly
Cotter pin (Item 22, Appendix E)
Lockwashers (Item 20, Appendix E)
Lockwashers (Item 26, Appendix E)

REMOVAL

1. Remove screw (1) and lockwasher (2) securing end of chain and pin assembly (3) to door (4).

2. Remove six screws (5), lockwashers (6), and flat washers (7) securing door stop bracket (8) on door (4).

3. Remove six hex head screws (9) securing door stop angle (10) to shelter.

4. Remove door brace assembly (11) with door stop bracket (8) and door stop angle (10) attached.

DISASSEMBLY

1. Straighten cotter pin leads and remove cotter pin (12) from pin and chain assembly pin (13).

2. Remove pin and chain assembly pin (13) from door stop bracket (8).

3. Remove nut (14), washer (15), and shoulder bolt (16) from door stop angle (10) and remove door brace assembly (11).

ASSEMBLY

1. Locate door brace assembly (11) on door stop angle (10) and secure in place using shoulder bolt (16), washer (15) and nut (14).

2. Locate door brace assembly (11) on door stop bracket (8) and secure using pin and chain assembly pin (13).

4-20. DOOR BRACE ASSEMBLY - continued.

3. Insert cotter pin (.12) in pin and chain assembly pin (13).

4. Bend leads of cotter pin (12) to secure in place.

INSTALLATION

1. Locate door stop angle (10) on the shelter and secure using six hex head screws (9).

2. Locate door stop bracket (8) on door (4) and secure using six screws (5), lockwashers (6) and washers (7).

3. Secure end of pin and chain assembly (3) to shelter using screw (1) and lockwasher (2).

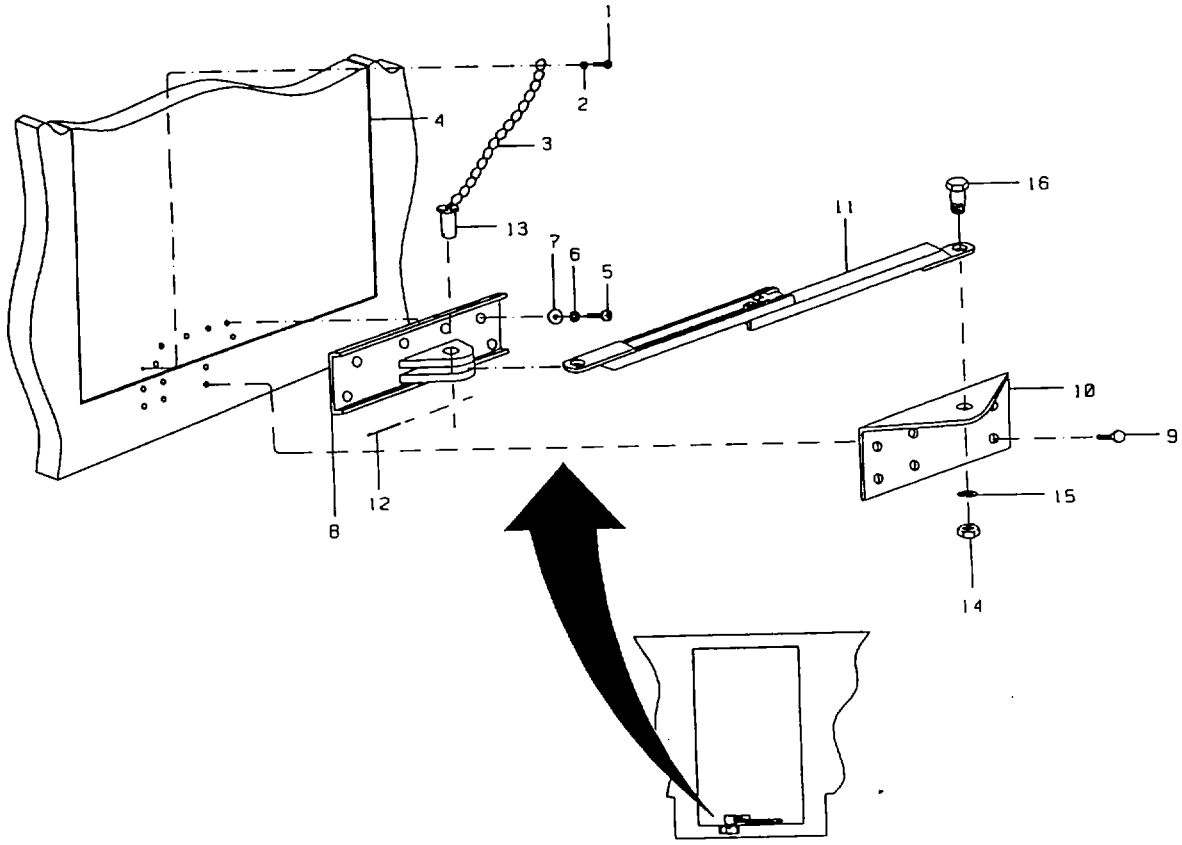

Figure 4-15. Door Brace Assembly

SECTION VI. PREPARATION FOR SHIPMENT AND STORAGE

4-21. GENERAL. No special preparation is required for shipment of the shelter other than making sure the correct sling assembly is available and in good condition and the drain plug is loosened for air or rail transport.

4-22. LOADING. Shelters may be shipped in Type 1AA ANSI/ISO containers only when crated or pallet mounted. Block crates or pallets securely in the container to prevent movement and damage during transit. Install the shelter in accordance with TB 11-5400-200-14.

4-23. UNLOADING. Shelters may be unloaded in accordance with the instructions contained in paragraph 44, Service Upon Receipt and TB 11-5400-200-14.

4-24. STORAGE. Accumulation of moisture within the shelter resulting from temperature and humidity fluctuations can damage user installed equipment. Minimize moisture accumulation by keeping the shelter door and drain hole open during indoor storage. During outdoor storage, keep doors and drain hole closed.

4-25. SPECIAL INSTRUCTIONS FOR ADMINISTRATIVE STORAGE. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factor requirement specified by the directing authority. During the storage period, appropriate maintenance records will be kept.

Before placing equipment in administrative storage, current maintenance services and Equipment Serviceable Criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWOs) should be applied.

Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

CHAPTER 5
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I. REPAIR PARTS; TOOLS; SPECIAL TOOLS; TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

5-1. COMMON TOOLS. A complete list of common tools and tool kits may be found in Section III of Appendix B, Maintenance Allocation Chart.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. There are no special tools or test equipment needed to maintain the LMS.

5-3. REPAIR PARTS. Repair parts for direct support maintenance are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 10-5411-224-24P.

SECTION II. DIRECT SUPPORT TROUBLESHOOTING

5-4. GENERAL. This section contains troubleshooting information for malfunctions which may develop in the shelters. Fault isolation is limited to those components which may be repaired or replaced at the direct support level. Table 5-1 lists the common malfunctions you may encounter during operation or maintenance of the shelter. Each malfunction identifies a test or inspection followed by a corrective action. These tests or inspections and corrective actions should be performed in the order listed. This manual cannot list all malfunctions that may occur. If you encounter a malfunction that is not listed or that cannot be corrected by the listed corrective actions, notify your supervisor.

TABLE 5-1. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. SHELTER DAMAGED

Step 1. Inspect shelter and door interior and exterior for dents or punctures.

NOTE

Punctures can cause a loss of EMI/RFI integrity. Repairs should be performed as soon as possible.

Repair dents in accordance with paragraph 5-6.

Repair punctures in accordance with paragraph 5-7 or 5-8 as appropriate.

Step 2. Inspect panel surfaces for delamination in accordance with paragraph 5-9.

Repair delaminations in accordance with paragraph 5-9.

Step 3. Inspect drip molding above top of door exterior for damage.

Replace drip molding in accordance with paragraph 5-10.

2. DRAIN PLUG NOT SEALING PROPERLY.

Step 1. Inspect for presence of drain plug and secure fit in drain tube.

If missing or fails to fit tight in drain tube, replace in accordance with paragraph 5-11.

3. DIFFICULTY ACCESSING SHELTER ROOF FROM STEPS.

Step 1. Inspect handhold assembly for damage or improper operation.

If difficult to move to upright position, lubricate in accordance with Lubrication Order, Appendix G.

If damaged, repair in accordance with paragraph 5-12.

4. LIFTING RINGS CONTACT SHELTER WALL.

Step 1. Inspect lifting ring bumpers for damage or missing areas.

Repair in accordance with paragraph 5-13.

TABLE 5-1. DIRECT SUPPORT TROUBLESHOOTING - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

5. GROUND JUMPERS NOT SECURED TO DOOR OR SHELTER.

Step 1. Check to see if attaching hardware is loose or missing.

Tighten hardware or replace ground jumpers as required (paragraph 5-14).

6. DOOR ASSEMBLY DOES NOT OPERATE PROPERLY.

Step 1. Test door operation (open and close door several times).

If door does not operate smoothly, lubricate in accordance with Lubrication Order, Appendix G.

Step 2. Inspect door for loose or missing hardware or damaged hinge.

Tighten hardware as required.

If a hinge is damaged, notify your supervisor.

7. DOOR ASSEMBLY DOES NOT SEAL SECURELY.

Step 1. Check RFI/EMI gasket for damage.

Replace RFI/EMI gasket (paragraph 5-15).

Step 2. Check environmental gasket for damage.

Replace environmental gasket (paragraph 5-16).

If door still does not close tightly, adjust in accordance with Chapter 4, paragraph 4-17.

SECTION III. DIRECT SUPPORT MAINTENANCE PROCEDURES

5-5. GENERAL. These procedures are general procedures that may be needed during repair or replacement of shelter components. Wherever these general procedures apply, they are referenced at the appropriate point in the specific maintenance procedure paragraph.

a. Blind Rivet Installation and Removal. Blind rivets are used in locations where only one side of the area to be worked on is accessible. Blind pop rivets must be used in the shelter honey comb panels since the hammering required to install conventional rivets would damage the material. The types of rivets used in the shelter are described in table 5-2 and shown in figure 5-1. When installing floor patches, countersunk head rivets (styles K and T) are preferred, but, dome head rivets (styles R and S) are an acceptable alternate. When installing interior wall patches, countersunk head rivets shall be used in any instance where dome head rivets will interfere with the installation of equipment. Closed end rivets (styles K and R) must be used for exterior repairs and floor repairs to prevent moisture and dirt from entering panels.

Table 5-2 Blind Rivets

*Part No.	Style	Dim A	Dim H	Dim D	Dim L
AD42H	R	0.236	0.051	1/8	0.361
AD43H	R	0.236	0.051	1/8	0.377
AD45H	R	0.236	0.051	1/8	0.502
AD62H	R	0.375	0.081	3/16	0.345
AD64H	R	0.375	0.081	3/16	0.470
AD68H	R	0.375	0.081	3/16	0.720
AD42S	R	0.236	0.051	1/8	0.361
MS20470AD6-8	R	0.375	0.080	3/16	0.375
NAS1398D4-3	R	0.250	0.067	0.156	0.326
NAS1398D4-4	R	0.250	0.067	0.156	0.388
NAS1398D6-3	R	0.375	0.080	0.187	0.350
NAS1398D6-5	R	0.375	0.080	0.187	0.475
NAS1398D6-8	R	0.375	0.080	0.187	0.662
NAS1399D4-4	R	0.225	0.042	0.125	0.385
NAS1399D6-6	R	0.353	0.070	0.187	0.537
NAS1739E4-3	R	0.286	0.047	0.173	0.375

* Part No. Code Explanation

A D 4 4 A H

Rivet Body Material
A = Aluminum
Head Style
D = Dome head
K = Countersunk
Rivet Diameter in 32nds of an inch
Example: 4 = 4/32 or 1/8 body diameter
Max. Grip in 16ths of an inch
Example 4 = 4/16 or 1/4 inch maximum grip range
Mandrel Material
A = Aluminum
No letter = Carbon steel
Core Design
H = Hollow core
S = Solid core

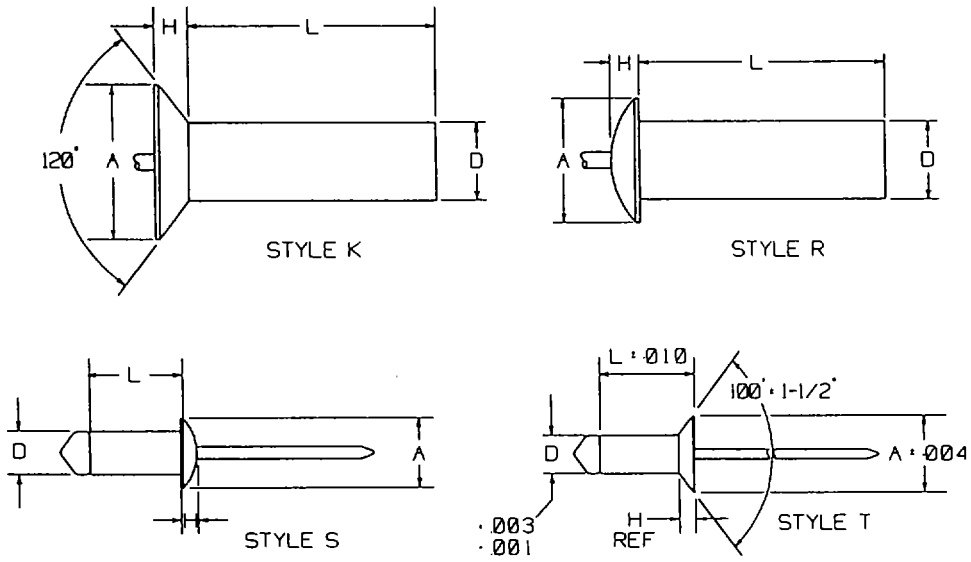

Figure 5-1. Blind Rivet Types

NOTE

Open end rivets may be used only where moisture and dirt intrusion will not effect the shelter.

(1) Installation. (Figure 5-2).

NOTE

When installing new rivets in the same location as a rivet that has been removed, if diameter of hole in structure has been enlarged during removal of rivet, use next larger diameter rivet for replacement. Clean rivets with solvent before installing.

(a) Determine type, size, and grip range of rivet to be used. Grip length equals the combined thickness of the materials being riveted together. Grip range of the rivet must encompass the grip length.

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure drill bit has a stop attached which will prohibit the drill from exceeding a depth of one inch.

NOTE

Drill hole size must match the size of the rivet being used. Quantities of sheets may be drilled at the same time when held together with sheet fasteners.

(b) Drill hole in structure.

(c) Remove all metal chips and burrs from drilled holes.

(d) If flush head rivet is being installed, countersink hole using a 100-degree or 120-degree machine countersink.

(e) Coat all rivet bodies with fiber filled polyester resin (Item 10, Appendix E) before installing.

(f) Insert rivet in hole. Make sure sheets are held tightly together before upsetting or pulling rivet.

(g) Select proper pulling head for rivet being installed and install pulling head on rivet gun.

(h) Insert stem of rivet into pulling head.

(i) With pulling head parallel to axis of rivet, upset rivet. Exert firm pressure but do not bend or buckle metal sheets. Stem will break off below rivet head surface. No trimming should be required.

(j) Make sure riveted parts are not loose, rivet does not rotate, and rivet head is seated tightly against riveted surface. If rivet is loose or improperly installed, remove the rivet and repeat steps (a) through (i).

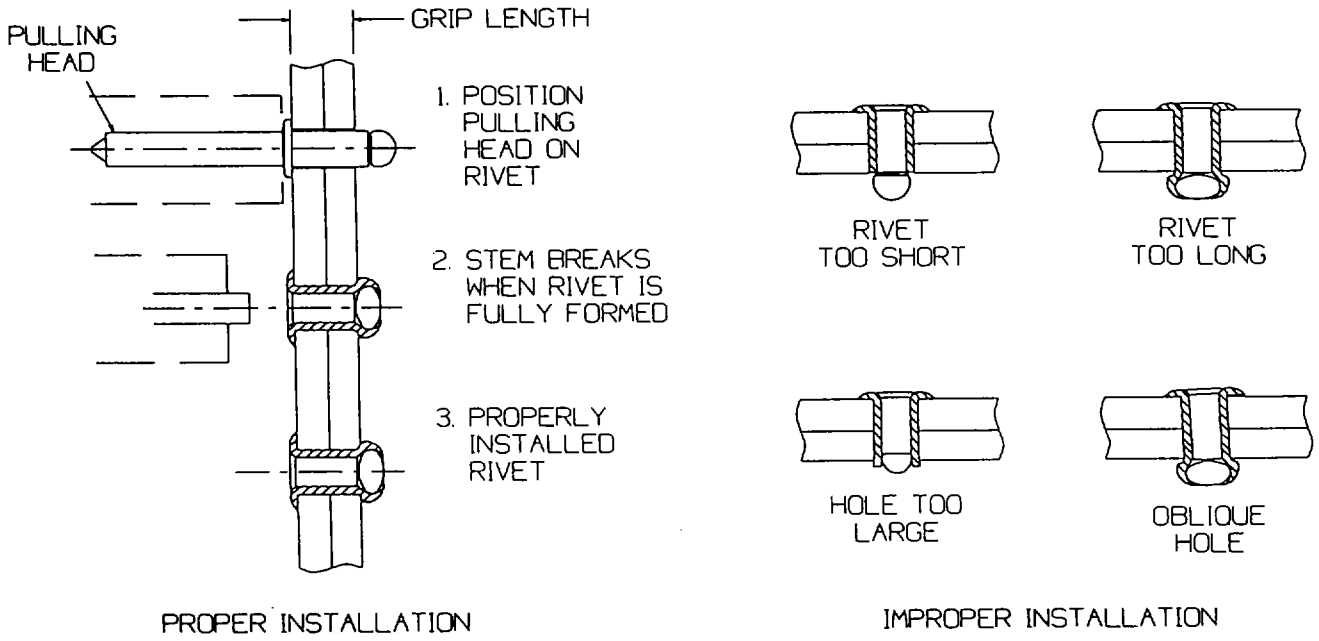

Figure 5-2. Rivet Installation

(2) Removal. (Figure 5-3)

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure drill bit has a stop attached which will prohibit the drill from exceeding a depth of one inch.

NOTE

When drilling through rivet head, be careful to avoid enlarging hole in structure. Keep drill perpendicular to material being drilled and do not exert excessive pressure on drill, or replacement rivets will be too loose.

(a) Drill through head of rivet only, using hole in rivet as a guide. Use the proper drill size as follows:

Rivet Size (in.)	Drill Size
1/8	No. 30
5/32	No. 20
3/16	No. 11
1/4	1/4 inch

(b) Using a pin punch, pry off rivet head.

CAUTION

Do not punch rivet shanks out as you may damage the other side of the panel.

(c) Using a pin punch, push out rivet shank.

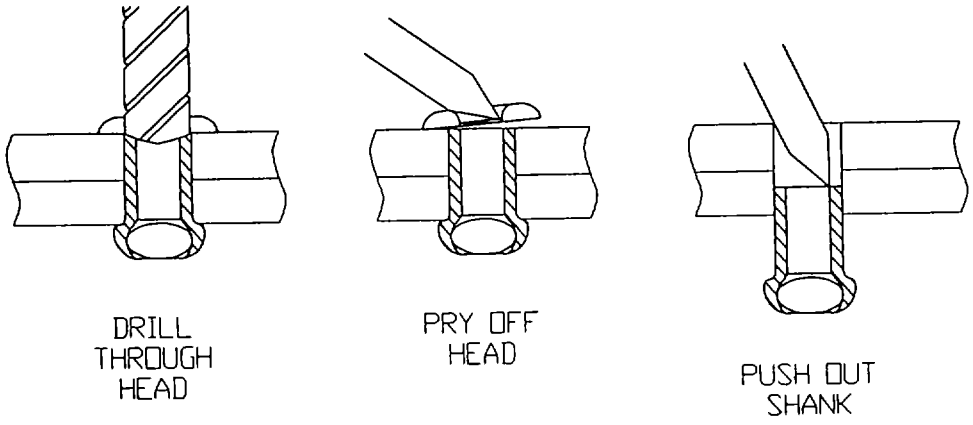

Figure 5-3. Rivet Removal

b. Rivnut Installation and Removal. Rivnuts (threaded inserts) are tubular rivets with internal threads and are used throughout the shelter wherever blind threads are required. The types of rivnuts used in the shelter are shown in figure 5-4 and described in Table 5-3.

NOTE

Flat head rivnuts (style D and E) may be used wherever head thickness will not interfere with the installation of equipment. Countersunk head rivnuts (style C), are used for flush installation. Keyed rivnuts are used in locations which are subject to vibration and torque. Closed end rivnuts (styles C and E) must be used for exterior repairs and floor repairs to .keep moisture and dirt from entering panels. Open end rivnuts (style D) may be used in areas where sealing is not required.

(1) Installation (Figure 5-5).

NOTE

When installing new rivnuts in the same location as a rivnut that has been removed , use the next larger diameter rivnut for replacement if diameter of the hole in the structure was enlarged during removal.

(a) Determine thread size, grip range, style, and material of rivnut to be used. Grip length equals combined thickness of materials being fastened together. Grip range of rivnuts must encompass grip length.

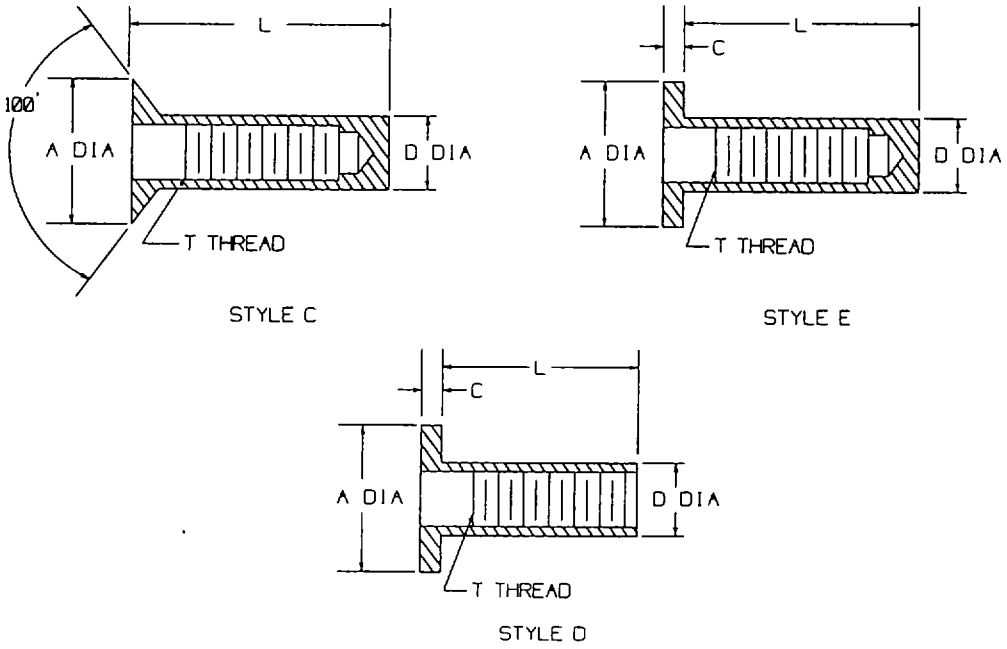

Figure 5-4. Types of Rivnuts

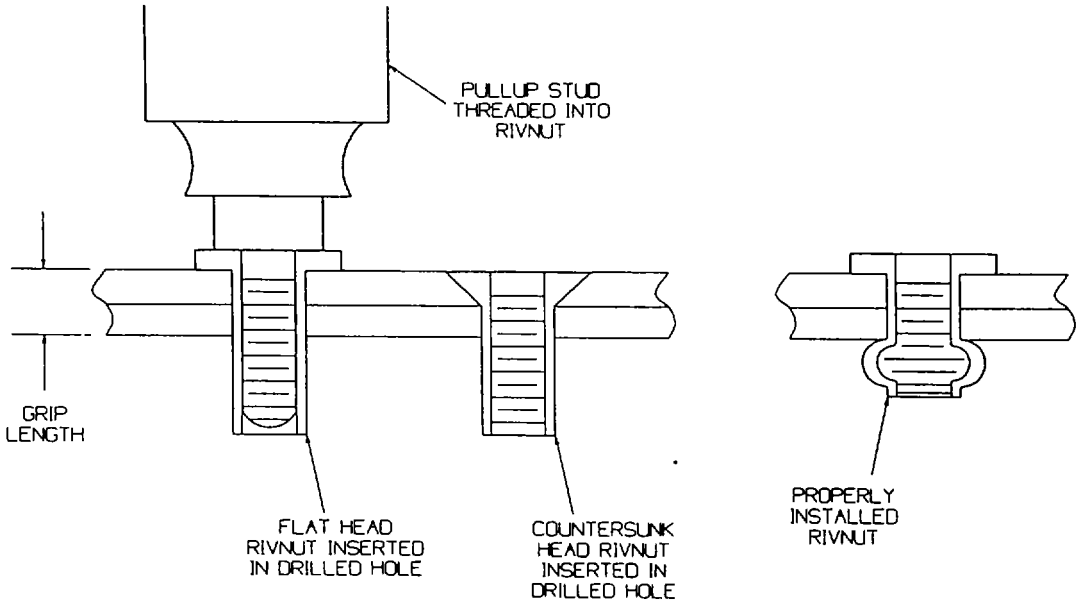

Figure 5-5. Rivnut Installation

Table 5-3. Rivnuts

Dash No.	Part No.	Style	Dim A	Dim D	Dim L	T	Dim C	Grip Range
SM-C-563711-1	S25B151	C	0.529	0.332	1.000	1/4-20 UNC-3B	.	.089 - .151
SM-C-563711-2	S25B211	C	0.529	0.332	1.062	1/4-20 UNC-3B		.151 - .211
SM-C-563711-3	S25B451	C	0.529	0.332	1.312	1/4-20 UNC-3B		.391 - .451
SM-C-563711-4	S10B366	C	0.391	0.250	1.094	10-32 UNC-3B		.316 - .366
SM-C-563711-5	S25B140	E	0.475	0.332	1.000	1/4-20 UNC-3B	0.058	.080 - .140
SM-C-563711-6	S8B106	C	0.355	0.221	0.687	8-32 UNC-3B		.065 - .106
SM-C-563711-7	S31B350	D	0.665	0.413	1.032	5/16-18 UNC-3B	0.062	.275 - .350
SM-C-563711-8	S318125	E	0.665	0.413	1.187	5/16-18 UNC-3B	0.062	.030 - .125
SM-C-563711-9	S31B481	C	0.656	0.413	1.562	5/16-18 UNC-3B		.406 - .481.
SM-C-563711-10	S8B201	C	0.355	0.221	0.687	8--32 UNC-3B		.161 - .201
SM-C-563711-11	S8B161	C	0.355	0.221	.0687	8-32 UNC-3B		.106 - .161
SM-C-563711-12	S25B320	E	0.475	0.332	1.187	1/4-20 UNC-3B	0.058	.260 - .320
SM-C-563711-13	S318425	E	0.665	0.413	1.531	5/16-UNC-3B	0.062	.350- .425
SM-C-563711-14	S31B350	E	0.665	0.413	1.437	5/16-18 UNC-3B	0.062	.275-.350

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure drill bit has a stop attached which will prohibit the drill from exceeding a depth of one inch.

NOTE

Drill hole size must match size of rivnut being installed. Quantities of sheets may be drilled at the same time when held together with sheet fasteners.

(b) Drill hole in structure.

(c) Remove all metal chips and remove burrs from drilled holes.

(d) If a countersunk rivnut is being installed, countersink hole using a 100- degree machine countersink.

(e) Thread stem of appropriate pull-up stud into rivnut. Stud should protrude through open end rivnuts or be 1-1/2 threads from bottoming in closed end rivnuts.

(f) Coat rivnut body with fiber filled polyester resin before installing.

(g) Insert rivnut in hole. Make sure sheets are held tightly together before pulling.

(h) With pull-up stud parallel to axis of rivnut, pull up on rivnut. Exert firm pressure but do not bend or buckle metal sheets.

(i) Make sure fastened parts are not loose, rivnut does not rotate, and rivnut head is seated tightly against surface. Make sure rivnut threads are in good condition. If threads are damaged or rivnut is improperly installed, remove it and install a new one.

(2) Removal (Figure 5-6).

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

(a) Drill through head of rivnut, using same size drill used to make original hole. Counterbore in rivnut will act as a drill guide.

(b) Remove head of rivnut.

CAUTION

Do not puncture opposite face sheet of panel when punching out rivnut shank.

(c) Punch out shank of rivnut using a pin punch slightly smaller than hole in structure. Punch only enough to disengage. Move rivnut aside to install new rivnut.

(3) Repair (Figure 5-7). When excessive torque is applied on screws attached on rivnuts, it may cause a rivnut to spin (turn). Table 5-4 provides the maximum torque requirement for hardware to prevent rivnut turning. To correct a spinning rivnut, proceed as follows:

(a) Drill a .062 (+ .003, - .001) diameter hole by 1.00 inch long on the stem of the spinning rivnut as shown in figure 5-7.

(b) Install a headless straight pin.

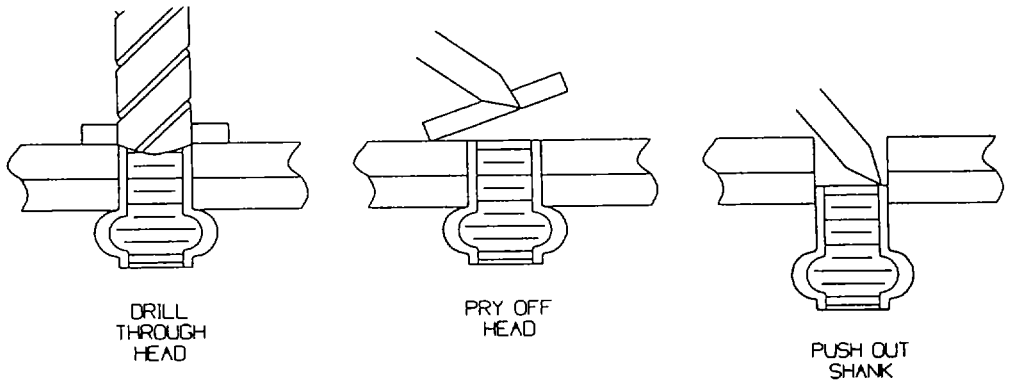

Figure 5-6. Rivnut Removal

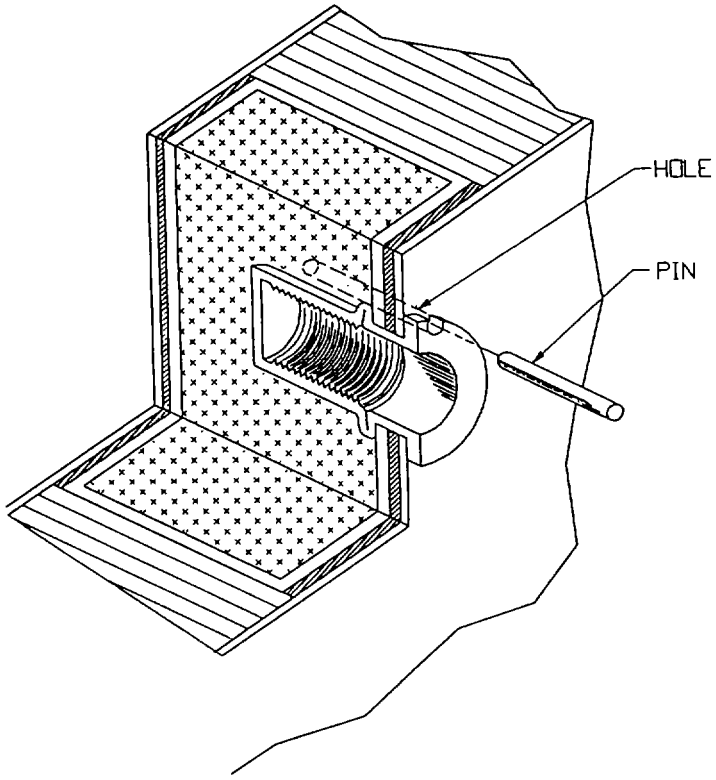

Figure 5-7. Spinning Rivnut Repair

Table 5-4. Maximum Torque Requirements for Rivnut Screws.

Screw Size	Torque (lbs/in.)
4 - 40	8 lb/inch
6- 32	12 lb/inch
8 - 32	20 lb/inch
10 - 32	20 lb/inch
1/4 - 20	50 lb/inch
5/16 - 18	65 lb/inch
3/8 - 16	120 lb/inch

5-6. REPAIR OF SHELTER PANEL DENT.

This task covers:

a. Repair

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Oscillating Sander (Item 2, Appendix B)
Putty Knife (P/O Item 1, Appendix B)
Safety Glasses (Item 8, Appendix B)

Materials/Parts:
Alcohol, Isopropyl (Item 7, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Polysulfide sealer (Item 2, Appendix E)
Gloves, rubber (Item 11, Appendix E)
Sandpaper (Item 12, Appendix E)
Commercial Body Filler (Item 8, Appendix E)

REPAIR

WARNING

- To avoid injury to personnel, safety glasses must be worn during drilling and sanding operations.
- Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

1. Using an oscillating sander, roughen the area to be repaired.

NOTE

This repair procedure is for damaged areas not exceeding 100 square inches in area and located between structural members. To determine whether a large or deep dent is between structural members, tap area with finger. A structural member has a tight drum-like sound while the area between has a soft sound between members. Extensive damage such as denting or buckling of the exterior shelter skin (which displaces the opposite shelter skin), generally constitutes an unrepairable type of damage.

5-6. REPAIR OF SHELTER PANEL DENT - continued.

NOTE

Make sure that the area is completely clean. Do not touch the area with hands or any item that may leave an oily residue.

2. Wear rubber gloves and use a clean cotton cloth with alcohol and clean the entire surface.

3. Fill the dent with body filler using a putty knife or other flat-edge implement and smooth the surface evenly to a feathered edge.

4. Allow the resin to set thoroughly (approximately 1 hour depending on ambient air temperature) in accordance with manufacturers recommendations.

5. Sand the repaired area to a flat, smooth finish.

6. Prime and paint the repaired surface in accordance with paragraph 3-7.

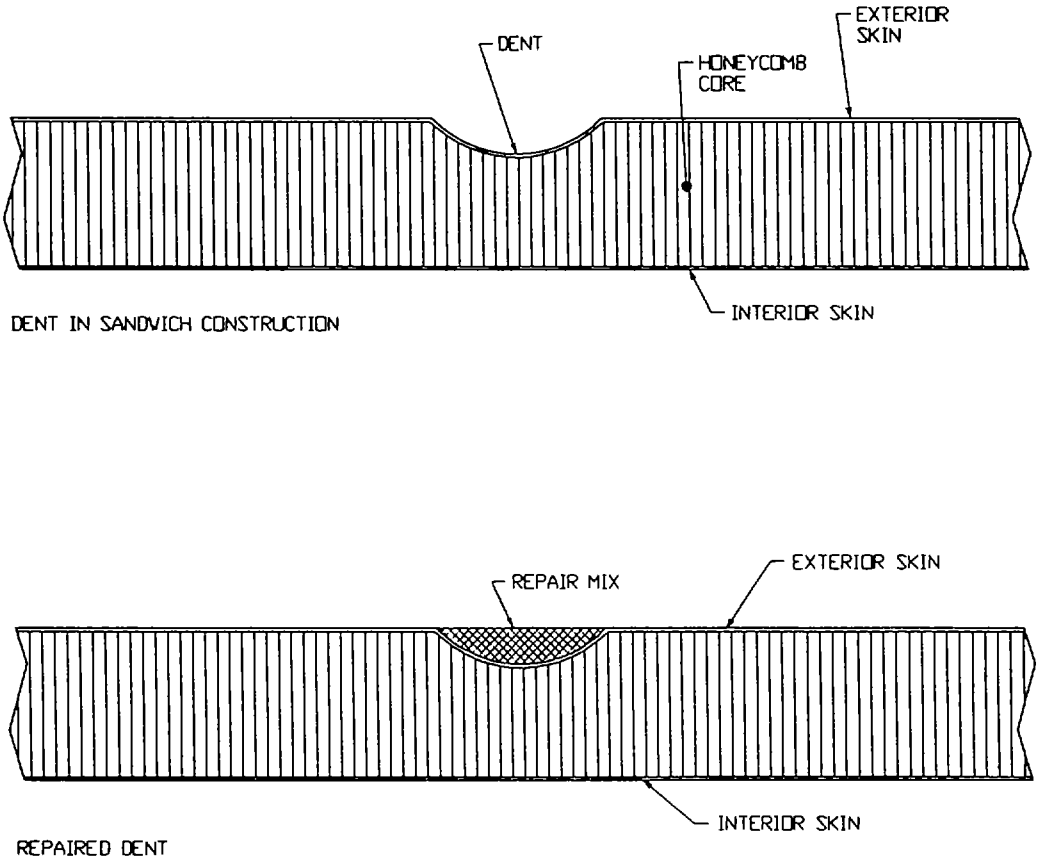

Figure 5-8. Repair of Shelter Panel Dent

5-7. REPAIR OF SHELTER PANEL PUNCTURE - NO CORE DAMAGE.

This task covers:

a. Repair

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Riveting Tool (Item 3, Appendix B)
Oscillating Sander (Item 2, Appendix B)
Putty Knife (P/O Item 1, Appendix B)
Drill (Item 4, Appendix B)
Drill bit - #11 (P/O Item 4, Appendix B)

Materials/Parts:
Alcohol, Isopropyl (Item 7, Appendix E)
Aluminum (Item 13, Appendix E)
Polysulfide sealer (Item 2, Appendix E)
Commercial Body Filler (Item 8, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Dome Head Pop-Rivets (Item 18, Appendix E)
Sandpaper (Item 12, Appendix E)
Gloves, rubber (Item 11, Appendix E)

REPAIR

1. Select an aluminum patch that overlaps the puncture or cut by one inch in all directions.

2. Roughen the skin surface with 80 grit abrasive paper.

WARNING

Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

NOTE

Make sure that the area is completely clean. Do not touch the area with hands or any item that may leave an oily residue.

3. Wear rubber gloves and use a clean cotton cloth with isopropyl alcohol to remove all dust and residue.

5-7. REPAIR OF SHELTER PANEL PUNCTURE - NO CORE DAMAGE - continued.

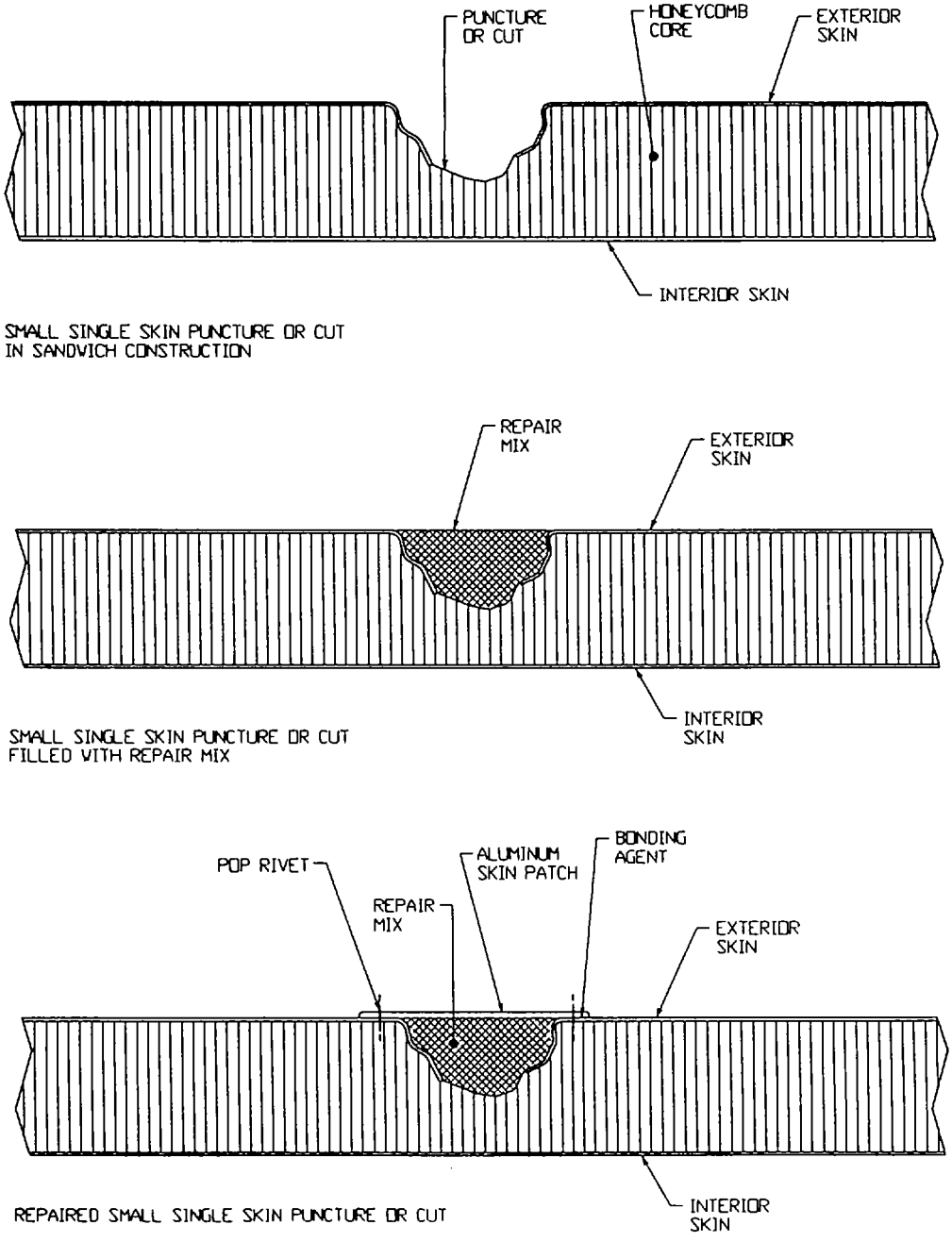

Figure 5-9. Repair of Shelter Panel Puncture - No Core Damage

5-7. REPAIR OF SHELTER PANEL PUNCTURE - NO CORE DAMAGE - continued.

REPAIR (cont'd)

WARNING

To avoid injury to personnel, safety glasses must be worn during drilling and sanding operations.

4. Fill the puncture and surrounding dented area with body filler using a putty knife.

5. Allow the resin to cure thoroughly (approximately one hour depending on ambient air temperature) in accordance with manufacturers recommendations.

6. Use an oscillating sander and sand the repaired area to a flat, smooth finish, flush with the contour of the skin surface.

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure drill bit has a stop attached which will prohibit the drill from exceeding a depth of 5/8 inch.

7. Locate the aluminum patch to the shelter and drill holes for 3/16in. pop rivets (#11 drill) through the patch and the skin of the shelter (approximately one inch spacing between centers and 1/2 in. from the edge).

WARNING

To avoid injury to personnel, gloves must be worn when working with polysulfide sealer.

8. Dip pop rivets in polysulfide sealer, and use a pop rivet gun to secure aluminum patch to shelter skin.

9. Remove the excess polysulfide sealer squeezed out during the riveting process.

10. Apply polysulfide sealer around perimeter of patch.

11. Prime and paint the repaired surface in accordance with paragraph 3-7.

5-8. REPAIR OF SHELTER PANEL PUNCTURE - DAMAGE TO CORE.

This task covers:

a. Repair

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Circular Saw (Item 6, Appendix B)
Putty Knife (P/O Item 1, Appendix B)
Drill (Item 4, Appendix B)
#11 Drill Bit (P/O Item 4, Appendix B)
Oscillating Sander (Item 2, Appendix B)
Riveting Tool (Item 3, Appendix B)
Paint Brush (Item 5, Appendix B)
Safety Glasses (Item 8, Appendix B)

Materials/Parts:
Alcohol, Isopropyl (Item 7, Appendix E)
Aluminum (Item 13, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Dome Head Pop Rivets (Item 18, Appendix E)
Sandpaper (Item 12, Appendix E)
Polysulfide Sealer (Item 2, Appendix E)
Adhesive (Item 4, Appendix E)
Commercial Body Filler (Item 8, Appendix E)
Core, honeycomb (Item 9, Appendix EF
Gloves, rubber (Item 11, Appendix E)

REPAIR

NOTE

The following repair procedures are for damaged skin between structural members. If the puncture or cut did not seriously damage the honey-comb core, follow the procedures in paragraph 5-10. If the puncture or cut damaged the honeycomb core, perform the following procedures.

1. Use a circular saw and make a cut out by removing approximately one inch of skin around the outside of the puncture.

2. Select an aluminum patch that overlaps the cut out by one inch in all directions.

5-8. REPAIR OF SHELTER PANEL PUNCTURE - DAMAGE TO CORE - continued.

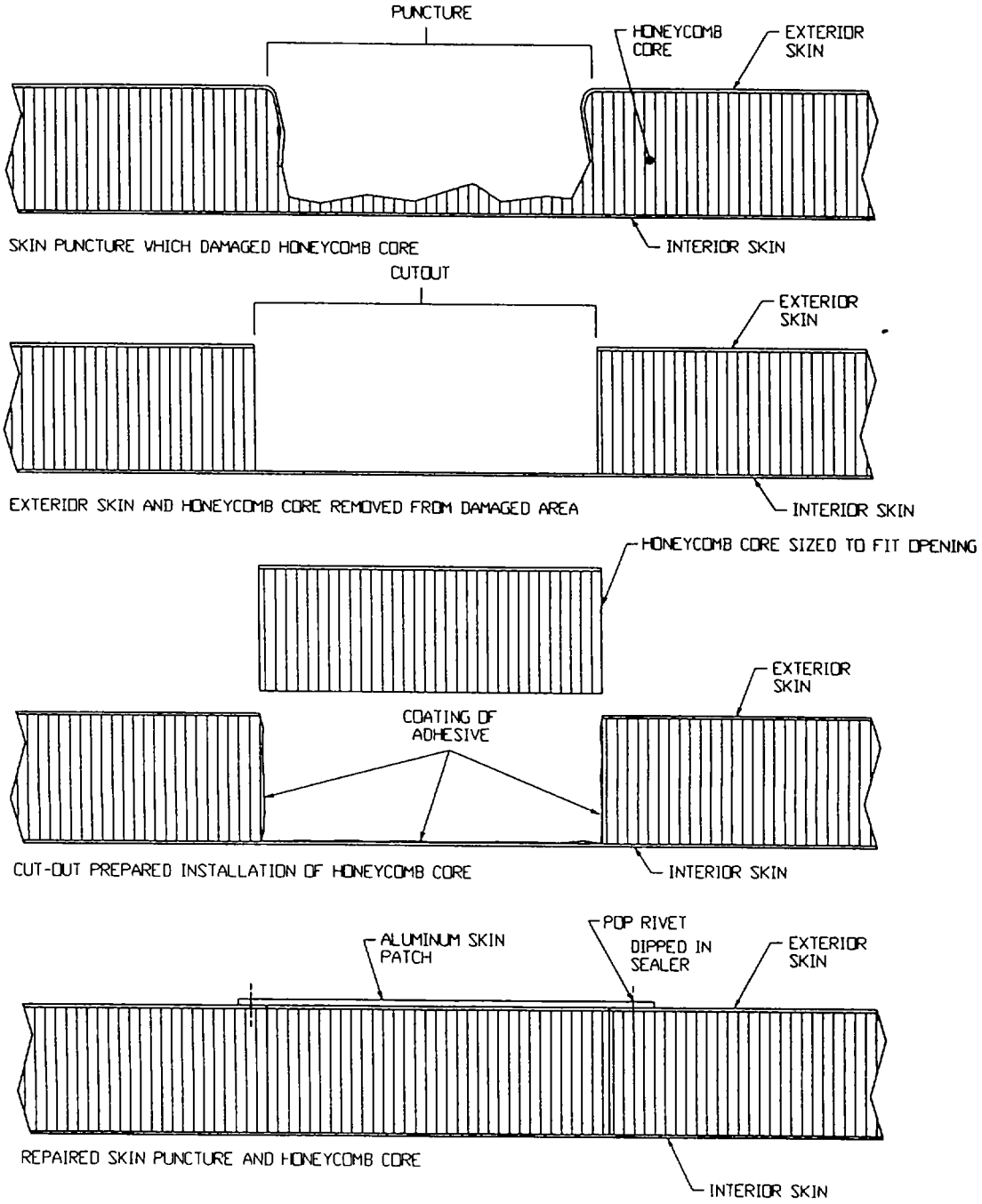

Figure 5-10. Repair of Shelter Panel Puncture - Damage to Core

5-8. REPAIR OF SHELTER PANEL PUNCTURE - DAMAGE TO CORE - continued.

CAUTION
When cutting honeycomb core, use care to ensure the interior skin is not cut.

3. Using a putty knife, cut through the damaged honeycomb core using the edge of the cut out as a guide.

4. Remove the damaged honeycomb material.

5. Size a block of honeycomb core for the cut out. Ensure the honeycomb is the same thickness, length and width of the cut out, even with the skin that provides a snug fit.

WARNING
To avoid injury to personnel, safety glasses must be worn during drilling and sanding operations.

CAUTION
Make sure drill bit has a stop attached which will prohibit the drill from exceeding a depth of 5/8 inch.

6. Locate the aluminum patch to the shelter and pre-drill holes for 3/16-inch pop rivets (#11 drill) through the patch and skin of the shelter (approximately one inch spacing between centers and 1/2 inch from the edge of the patch).

7. Set patch aside for later use.

WARNING
To avoid injury or death to personnel, no smoking is allowed when working with flammable materials.

WARNING
To avoid injury to personnel, gloves must be worn when working with adhesive.

8. Coat the interior opening of the cut out and the entire surface of the replacement honeycomb block with adhesive.

9. Insert the replacement honeycomb block into cut out.

10. Locate the skin patch to the shelter.

5-8. REPAIR OF SHELTER PANEL PUNCTURE - DAMAGE TO CORE - continued.

WARNING

To avoid injury or death to personnel, no smoking is allowed when working with flammable materials.

WARNING

To avoid injury to personnel, gloves must be worn when working with adhesive.

11. Dip the pop rivets in polysulfide sealer and use a pop rivet gun to secure skin patch to the shelter.

12. Remove the excess polysulfide sealer and adhesive squeezed out during the riveting process.

13 Apply polysulfide sealer around perimeter of patch.

14. Prime and paint the repaired surface in accordance with paragraph 3-7.

5-9. REPAIR OF SHELTER PANEL DELAMINATION.

This task covers:

a. Inspect **b. Repair**

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Tapping Hammer (P/O Item 1, Appendix B)
Riveting Tool (Item 3, Appendix B)
Drill (Item 4, Appendix B)
#11 Drill Bit (P/O Item 4, Appendix B)
Caulking Gun (Item 7, Appendix B)

Materials/Parts:
Alcohol, Isopropyl (Item 7, Appendix E)
Caulking Cartridge (Item 14, Appendix E)
Polyethylene Wrap (Item 6, Appendix E)
Cloth, cotton (Item 3, Appendix El
Chalk (Item 5, Appendix E)
Adhesive (Item 4, Appendix E)
Epoxy base and accelerator (Epic and Versamid) (Items 16 & 17, Appendix E)
Polysulfide Sealer (Item 2, Appendix E)
Gloves, rubber (Item 11, Appendix E)
Dome Head Pop Rivets (Item 18, Appendix E)
Container, Unwaxed (Item 15, Appendix E)

INSPECT

1. The area between the inner and outer aluminum panels is filled with a honeycomb core bonded to the panels with an epoxy adhesive. Separation of this core from the aluminum panel will cause a structural weakness in the affected area. Large delaminations should be repaired as soon as possible.

2. Delaminated areas produce a light hollow sound similar to the sound the bottom of an oil can makes when pressed. A bonded area produces a dull solid sound. The sound may change somewhat when crossing structural members.

3. Using a tapping hammer, inspect the roof, floor, endwalls, and sidewalls of the inner and outer aluminum panels attached to structural members for a hollow sound.

REPAIR

1. Mark off the limits of the delamination using chalk.

5-9. REPAIR OF SHELTER PANEL DELAMINATION - continued.

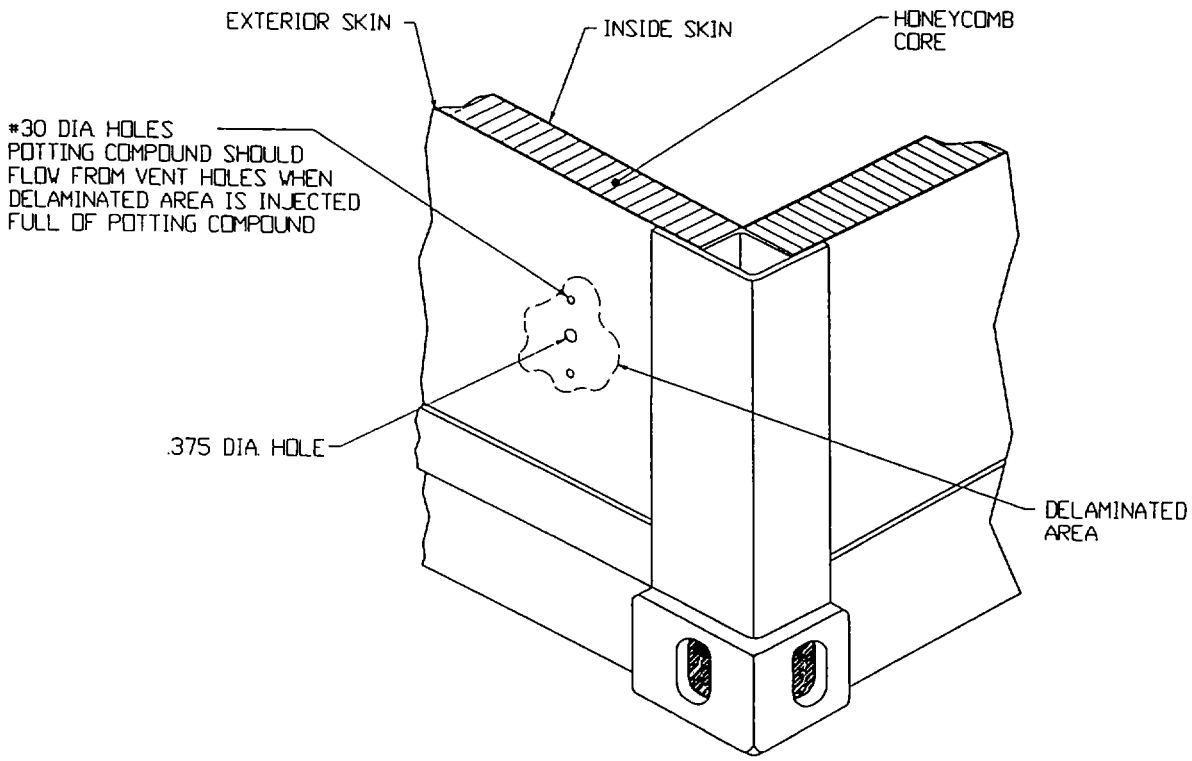

Figure 5-11. Repair of Shelter Panel Delamination

5-9. REPAIR OF SHELTER PANEL DELAMINATION - continued.

WARNING

To avoid injury to personnel, safety glasses must be worn during drilling and sanding operations.

CAUTION

Make sure the drill bit has a drill stop attached to prevent the drill bit from exceeding a depth of 5/8 inch.

2. Using a drill with a #11 drill bit, drill clearance holes (number of holes is dependent on the size of the 0delamination) for 3/16 inch pop rivets spaced (not greater than 5 inches on center) within the chalk line.

3. Using the outline of the marked delaminated area, mask the surrounding area approximately two feet wide with polyethylene.

WARNING

To avoid injury to personnel, gloves must be worn when working with adhesive.

4. In a clean unwaxed container, mix Epic R1002 adhesive with Versamid 140 material as follows:

- By Weight: 15 oz. Epic to 5 oz. Versamid
- By Volume: 2 parts Epic to 1 part Versamid

NOTE

The mixed adhesive must be used within the time specified below, considering the ambient temperature.

60° F - 2 hours
70° F- 1 hour
80° F - 40 minutes
90° F - 20 minutes

5-9. REPAIR OF SHELTER PANEL DELAMINATION - continued.

CAUTION

Inject adhesive slowly. Too much force could increase the size of the delamination and cause additional damage.

5. Using a caulking gun, inject adhesive into the bottom hole until adhesive begins to seep out of the holes in line with the injection hole.

6. Using a pop rivet gun, (dip rivet in polysulfide sealer for exterior delaminations), install one 3/16 inch rivet in the hole.

7. When the holes on each side of the injection hole are riveted, install a rivet in the injection hole and use the next series of pre-drilled holes to continue injecting adhesive.

8. Repeat steps 5 through 7 until all holes are filled with adhesive and pop rivets.

9. Clean the excess adhesive with nonresidual cleaning solvent (Isopropyl alcohol).

10. Apply a fixed, even surface pressure to the area for a minimum of 12 hours to ensure that the skin of the shelter is held in contact with the honeycomb core, and allow the adhesive to cure.

11. Prime and paint repaired panel surface in accordance with Chapter 3, paragraph 3-7.

5-10. REPAIR OF SHELTER DOOR DRIP MOLDING.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
Drill (Item 4, Appendix B)
#11 Drill Bit (P/O Item 4, Appendix B)
Safety Glasses (Item 8, Appendix B)
Riveting Tool (Item 3, Appendix B)

Materials/Parts:
Dome Head Pop Rivets (Item 18, Appendix E)
Drip Molding

REMOVAL

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure the drill bit has a drill stop attached to prevent the drill bit from exceeding a depth of one inch.

1. Using a drill with a #11 drill bit, carefully drill out seven rivets (2) securing drip molding (1) to shelter.

2. Remove drip molding (1).

INSTALLATION

1. Locate drip molding (1) to shelter and insert seven rivets (2) through holes in drip molding (1) and into holes in shelter.

2. Using a pop rivet tool, secure drip molding (1) to shelter.

3. Prime and paint repaired panel surface in accordance with Chapter 3, paragraph 3-7.

5-10. REPAIR OF SHELTER DOOR DRIP MOLDING - continued.

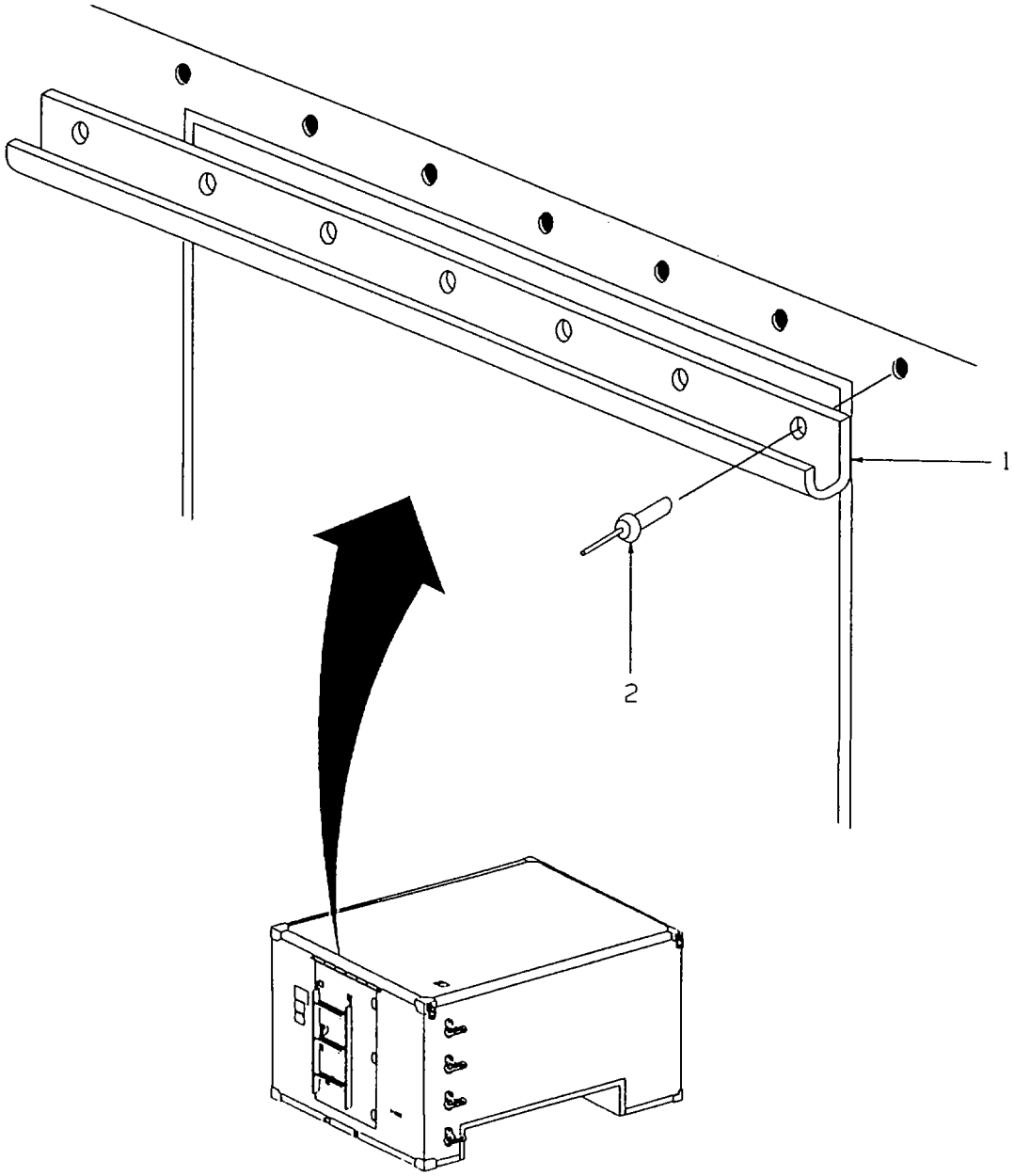

Figure 5-12. Repair of Shelter Door Drip Molding

5-11. REPAIR OF FLOOR DRAIN PLUG.

This task covers:

a. Removal b. Installation

INITIAL SETUP
Tools:
Drill (Item 4, Appendix B)
#11 Drill Bit (P/O Item 4, Appendix B)
Safety Glasses (Item 8, Appendix B)
Riveting Tool (Item 3, Appendix B)

Materials/Parts:
Dome Head Pop Rivet (Item 18, Appendix E)
Drain Plug

REMOVAL

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure the drill bit has a drill stop attached to prevent the drill bit from exceeding a depth of one inch.

1. Using a drill with a #11 drill bit, carefully drill out rivet (2) securing lanyard of drain plug (1) to drain pan.
2. Turn drain plug (1) counterclockwise and remove.

INSTALLATION

1. Install drain plug (1) in drain pan and secure by turning clockwise until flush with floor.
2. Using a pop rivet tool, secure lanyard end of drain plug (1) to drain pan with rivet (2).

5-11. REPAIR OF FLOOR DRAIN PLUG - continued.

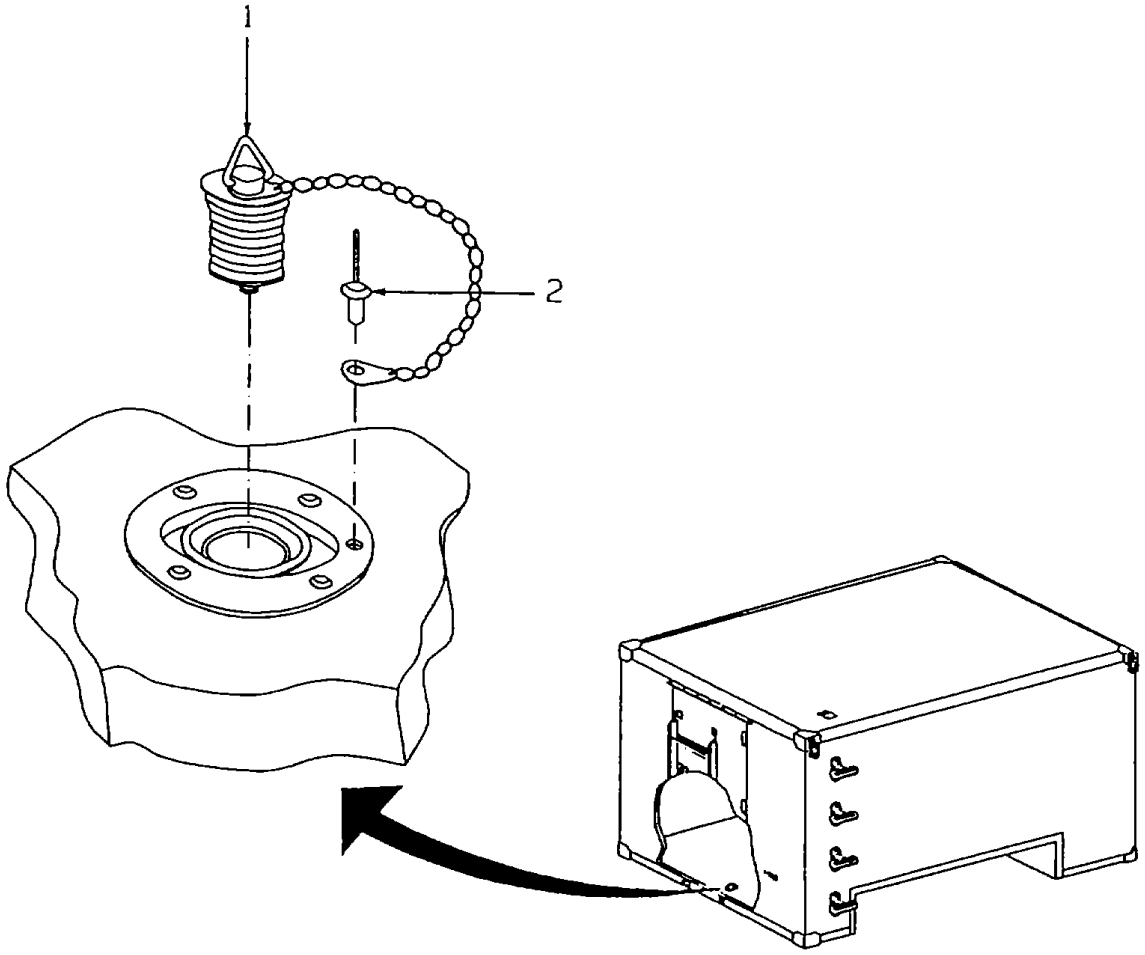

Figure 5-13. Repair of Floor Drain Plug

5-12. HANDHOLD ASSEMBLY.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Handhold Assembly
Sealer (Item 19, Appendix E)
Alcohol, Isopropyl (Item 7, Appendix El
Cloth, cotton (Item 3, Appendix El
Gloves, rubber (Item 11, Appendix E)
Lockwashers (Item 20, Appendix E)

REMOVAL

1. Remove four screws (1), lockwashers (2), and flat washers (3) securing handhold (4) to shelter roof.

2. Remove handhold from shelter.

INSTALLATION

WARNING

Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

1. Clean the roof mounting area for handhold (4) using nonresidual cleaning solvent (Isopropyl alcohol) and cotton cloth.

WARNING

To avoid injury to personnel, gloves must be worn when working with polysulfide sealer.

5-12. HANDHOLD ASSEMBLY - continued.

3. Apply sealer to underside of handhold (4).

4. Locate handhold (4) to shelter roof.

5. Secure handhold (4) in place using four screws (1), lockwashers (2), and flat washers (3).

6. Using a cotton cloth and nonresidual cleaning solvent (Isopropyl alcohol), remove excess sealer from handhold (4).

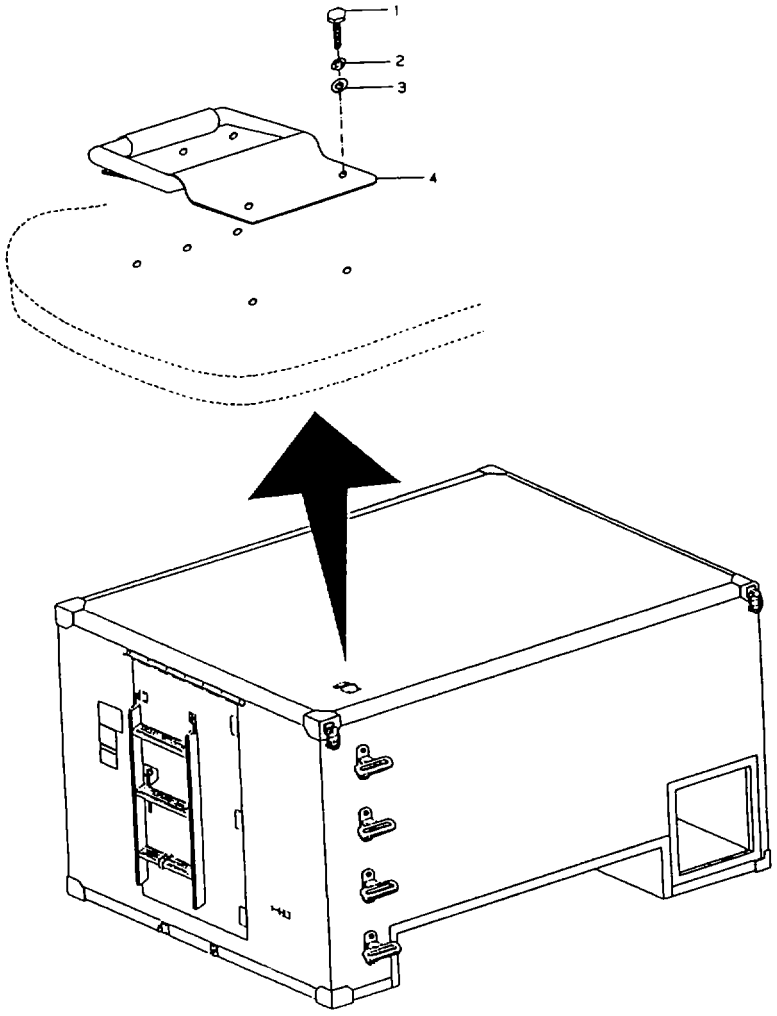

Figure 5-14. Handhold Assembly

5-13. LIFTING RING BUMPERS.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Bumper
Rivet, Dome Head (Item 27, Appendix E)
Rivet, Dome Head (Item 28, Appendix E)

REMOVAL

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure the drill bit has a drill stop attached to prevent the drill bit from exceeding a depth of one inch.

NOTE

A shim is located under the front bumpers and a longer rivet is installed in the most forward hole of each.

1. Using a drill with a #11 drill bit, carefully drill out two rivets securing bumper (3) to shelter and remove bumper. Remove and retain shim (4) if removing a front bumper.

INSTALLATION

1. Position bumper (3) to shelter (with shim (4) if installing a front bumper).

2. Align holes and secure rear bumper (3) in position with two rivets (1). Secure front bumper using one rivet (1) and one rivet (2), installing the longer rivet (2) in the most forward hole of front bumpers.

5-13. LIFTING RING BUMPERS - continued.

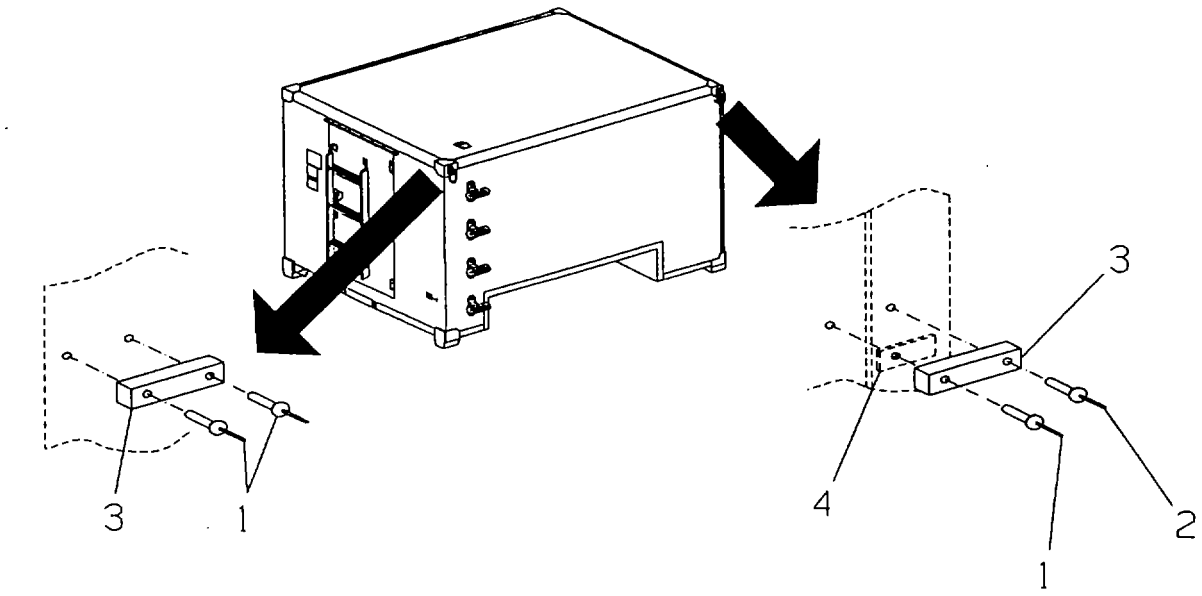

Figure 5-15. Lifting Ring Bumpers

5-14. PERSONNEL DOOR GROUND JUMPERS.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Ground Jumper (Appendix F, Figure F-3)
Lockwasher (Item 20, Appendix E)
Isopropyl Alcohol (Item 7, Appendix E)
Cotton cloth (Item 3, Appendix E)

REMOVAL

1. Remove four screws (1), lockwashers (2), and flat washers (3) securing ground jumpers (4) to door (5) and shelter.

2. Remove ground jumpers (4).

3. Clean area around the mounting holes using Isopropyl alcohol and cotton cloth.

INSTALLATION

1. Locate ground jumpers (4) on shelter and door (5) and secure with four screws (1), lockwashers (2), and flat washers (3).

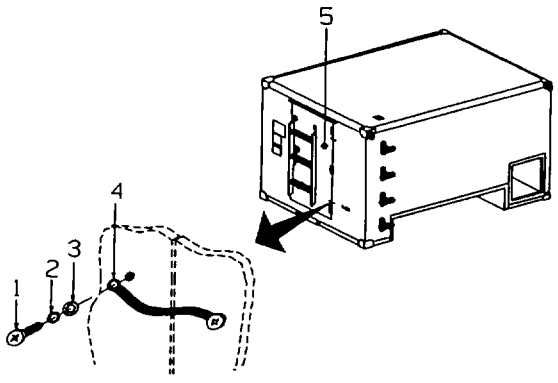

Figure 5-16. Personnel Door Ground Jumpers

5-15. DOOR ASSEMBLY RFI/EMI GASKET.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Riveting Tool (Item 3, Appendix B)
Safety Glasses (Item 8, Appendix B)

Materials/Parts:
Alcohol, Isopropyl (Item 7, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Gloves, rubber (Item 11, Appendix E)
RFI/EMI Gasket (Appendix F, Figure F-2)
Rivets (Item 31, Appendix E)
Strap
Strap

REMOVAL

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

1. Drill out 58 rivets (1) securing metal straps (2), (3), (4) and (5) and EMI/RFI gasket (6) in track around door perimeter.

2. Remove metal straps (2), (3), (4) and (5) and RFI/EMI gasket (6) from door.

WARNING

Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

3. Using a clean cloth and alcohol, clean dirt and residue out of track.

5-15. DOOR ASSEMBLY RFI/EMI GASKET - continued.

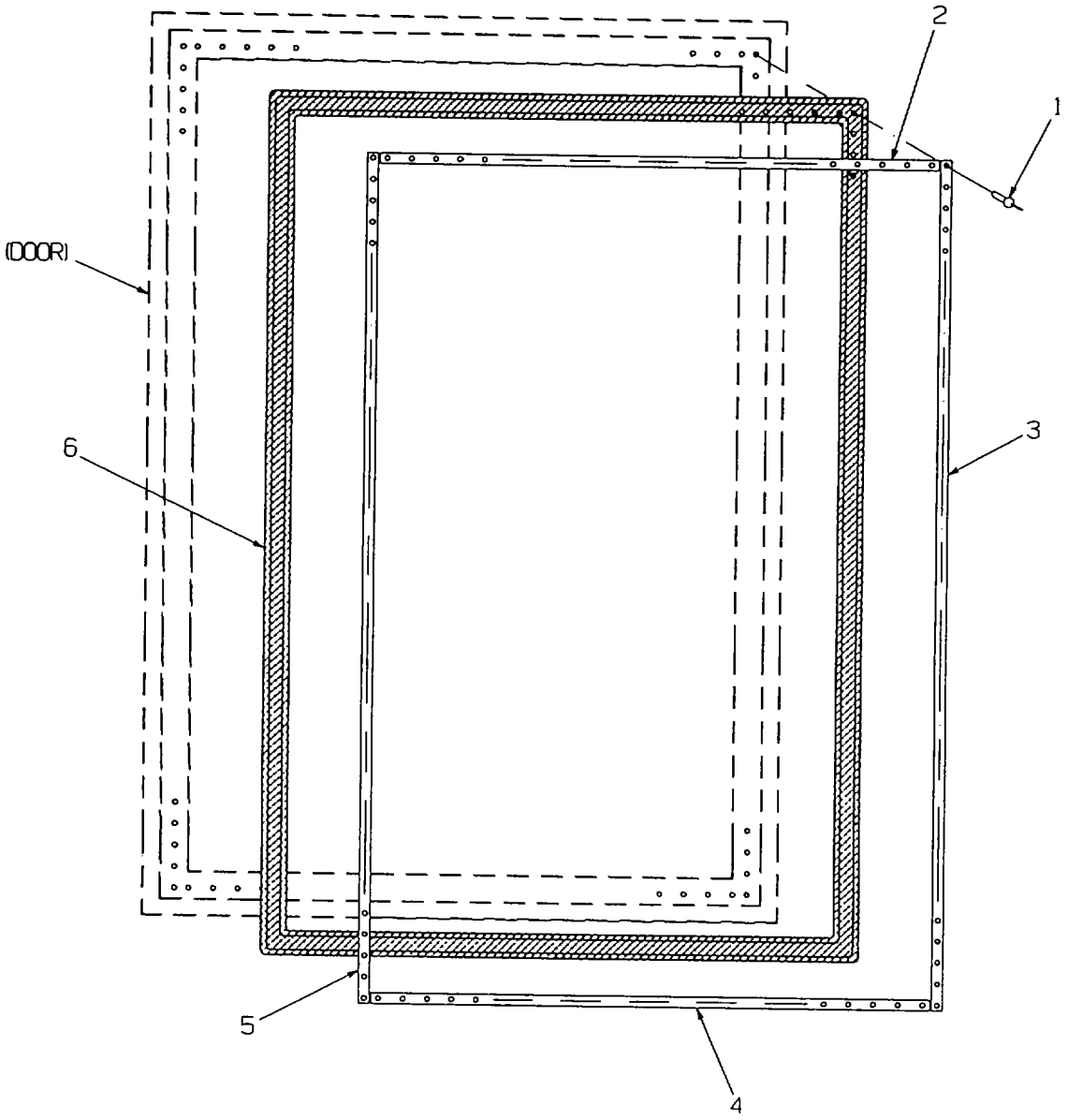

Figure 5-17. Door Assembly RFI/EMI Gasket

5-15. DOOR ASSEMBLY RFI/EMI GASKET - continued.

INSTALLATION

1. Press RFI/EMI gasket (6) in track around perimeter of door, starting midway on hinged side. Ensure there is an overlap at the ends.

2. Position metal strap (2) in channel of gasket (6) at the top of the door and align holes by pushing two or three rivets (1) through strap and gasket (6) material and into holes in track.

3. Secure strap (2) and gasket (6) in track at top of door with 11 rivets (1).

4. Firmly press gasket (6) around top corner and down the handle side of door.

5. Position metal strap (3) in channel of gasket (6) on the handle side of door and align strap holes by pushing several rivets (1) through strap (3) and gasket material and into holes in track.

6. Secure strap (3) and gasket (6) in track along handle side of door with 18 rivets (1).

7. Firmly press gasket (6) around bottom corner and continue around corner at hinged side of door.

8. Position metal strap (4) in channel of gasket (6) at the bottom of the door and align strap holes by pushing two or three rivets (1) through strap (4) and gasket material and into holes in track.

9. Secure strap (4) and gasket (6) in track along bottom of door with 11 rivets (1).

10. Firmly press gasket in track and, at overlap of gasket material on the hinged side of door, trim all but a one inch excess.

11. Roll back approximately one inch of the braided shield at the ends of the gasket (6) and cut 1/2 inch off the core material of each end.

12. Butt the two ends of the gasket (6) and roll the braid of one end over the braid of the other and firmly press gasket (6) in the track.

13. Position metal strap (5) in channel of gasket (6) on the hinged side of door and align strap holes by pushing several rivets (1) through strap (5) and gasket material and into holes in track.

14. Secure strap (5) along hinged side of door with 18 rivets (1).

5-16. DOOR ASSEMBLY ENVIRONMENTAL GASKET.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)

Materials/Parts:
Environmental Gasket (Appendix F, Figure F-1)
Alcohol, Isopropyl (Item 7, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Gloves, rubber (Item 11, Appendix E)
Adhesive (Item 34, Appendix E)

REMOVAL

1. Remove environmental gasket (1) from track around door perimeter.

WARNING

Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

2. Clean remaining adhesive and dirt from track using cotton cloth and alcohol.

INSTALLATION

NOTE

Gasket is installed in four sections, with each section cut to fit with a 90° miter at each corner.

1. Cut lengths of gasket (1) to fit top, bottom and side door tracks, angling corners to make a 90° miter with adjacent gasket pieces.

2. Apply a bead of adhesive in track and press gasket sections in place in track.

3. Fill each side of gasket at corners with adhesive for one inch.

5-16. DOOR ASSEMBLY ENVIRONMENTAL GASKET - continued.

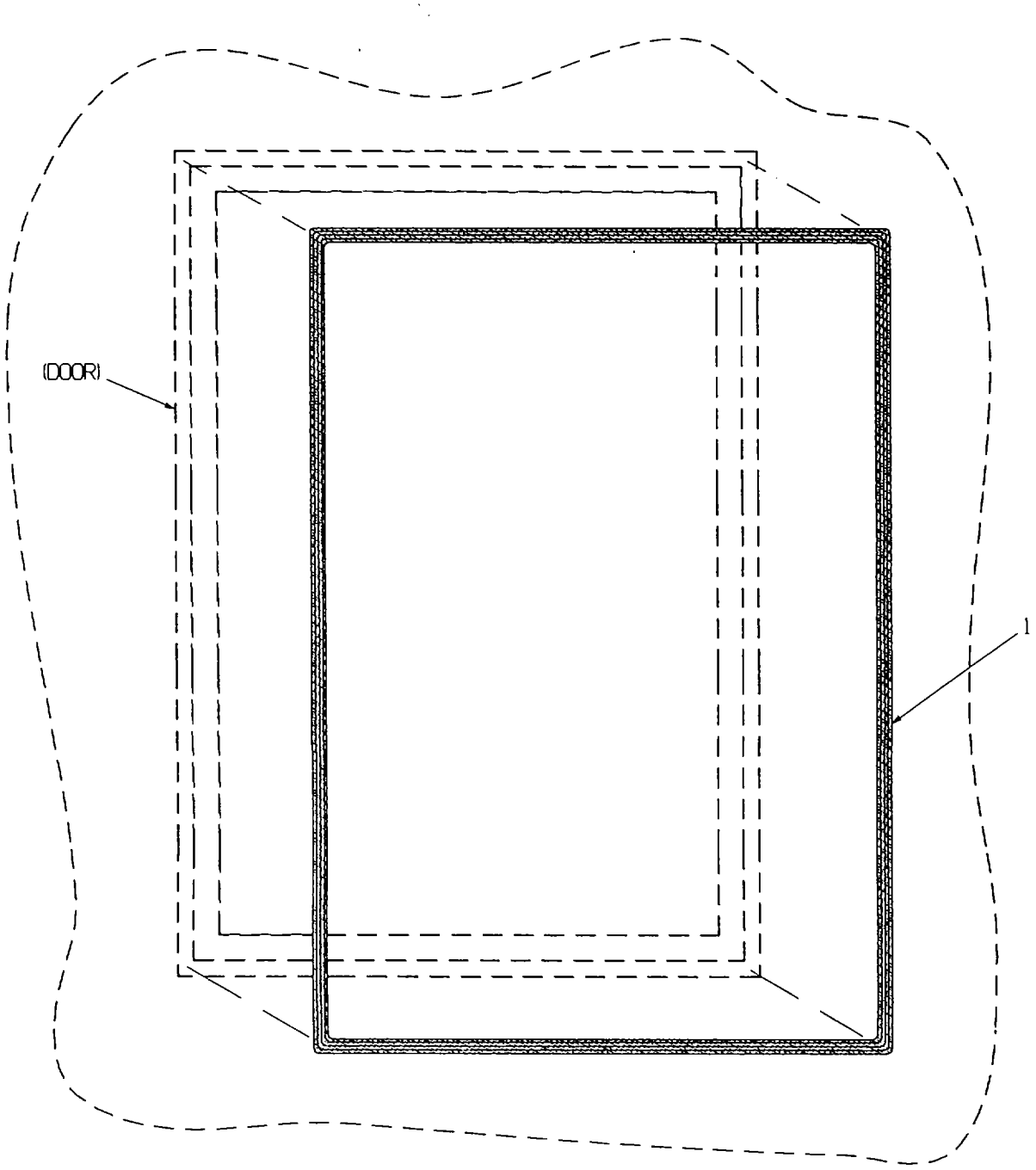

Figure 5-18. Door Assembly Environmental Gasket

CHAPTER 6
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I. REPAIR PARTS; TOOLS; SPECIAL TOOLS; TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

6-1. COMMON TOOLS. A complete list of common tools and tool kits may be found in Section III of Appendix B, Maintenance Allocation Chart.

6-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. There are no special tools or test equipment needed to maintain the LMS.

6-3. REPAIR PARTS. Repair parts for general support maintenance are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 10-5411-224-24P.

SECTION II. GENERAL SUPPORT MAINTENANCE PROCEDURES

6-4. GENERAL. The following paragraph provides the procedure for the replacement of a personnel door hinge at the general support level.

6-5. PERSONNEL DOOR HINGE.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Tools:
General Mechanics Tool Kit (Item 1, Appendix B)
Riveting Tool (Item 3, Appendix B)
Safety Glasses (Item 8, Appendix B)

Materials/Parts:
Hinge (Appendix F, Figure F-4)
Cotter Pin (Item 22, Appendix E)
Blind Fastener (Item 29, Appendix E)
Alcohol, Isopropyl (Item 7, Appendix E)
Cloth, cotton (Item 3, Appendix E)
Gloves, rubber (Item 11, Appendix E)
Sealer (Item 19, Appendix E)
Conductive Sealer (Item 30, Appendix E)

REMOVAL

1. Open shelter door.

2. Remove cotter pin (1) from chain and pin assembly (2) and remove pin from door stop bracket (3) and door brace (4).

3. Remove four screws (5) securing hinge (6) to shelter.

WARNING

Drilling creates metal chips which may enter eyes and cause serious injury. Eye protection is required.

CAUTION

Make sure the drill bit has a drill stop attached to prevent the drill bit from exceeding a depth of one inch.

4. Drill out four rivets (7) securing hinge (6) to door and remove hinge (6) and shim (8).

6-5. PERSONNEL DOOR HINGE - continued.

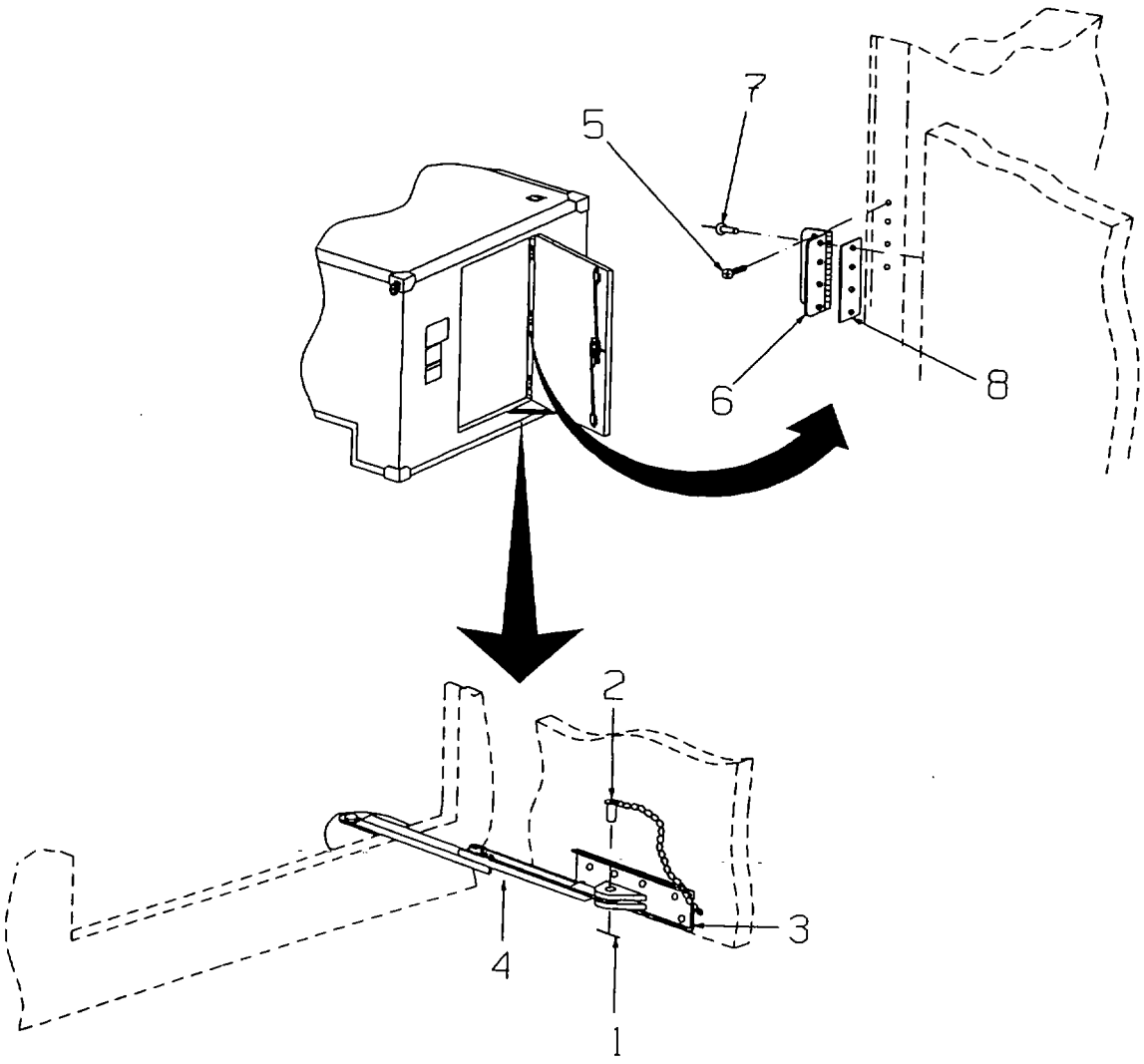

Figure 6-1. Personnel Door Hinge

6-5. PERSONNEL DOOR HINGE - continued.

WARNING

Alcohol solvents are flammable. Keep away from heat, sparks, and open flame. Keep containers closed when not in use. Use only in well ventilated areas. Avoid prolonged breathing of vapors or repeated contact with skin.

5. Clean the area where the hinge (6) was secured using cotton cloth and isopropyl alcohol.

INSTALLATION

1. Apply a thin uniform film of conductive sealer to shim (8) and hinge (6).

2. Orient hinge (6) such that the wider section is aligned with the door and the narrow section is positioned for attachment in the door jamb.

3. Locate hinge (6) with shim (8) to door and secure using four rivets (7).

4. Clean excess conductive sealer from hinge (6) using a cotton cloth and isopropyl alcohol.

5. Apply a bead of sealer around perimeter of riveted section of hinge (6).

6. Secure other member of hinge (6) to shelter with four screws (5).

7. Locate end of door brace (4) to door stop bracket (3) and install pin of chain and pin assembly (2).

8. Secure chain and pin assembly (2) in place using cotter pin (1).

APPENDIX A
REFERENCES

A-1. SCOPE. This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual.

A-2. FORMS.

Recommend Changes to Publications and Blank Forms DA-2028
Product Quality Deficiency Report..... SF-368
Packaging Improvement Report ..... DD Form-6
Equipment Inspection & Maintenance Worksheet DA-2404

A-3. FIELD MANUALS.

First Aid FM 21-11

A-4. TECHNICAL MANUALS.

The Army Maintenance Management Systems . ..... DA Pamphlet 738-750
Painting Instructions for Field Use ..... TM 43-0139
Operator's Manual for M1037 Utility Truck (HMMWV) ..... TM 9-2320-280-10
Container ..... TM 10-5400-200-10
Warranty Program for Lightweight Multipurpose Shelters Model S-788/G..... TB 10-5411-224-24
Destruction of Army Equipment to Prevent Enemy Use..... TM 750-244-3
Repair Parts and Special Tools List for Lightweight Multipurpose Shelters
Model S-788/G ..... TM 10-5411-224-24P

APPENDIX B
MAINTENANCE ALLOCATION CHART

SECTION I. INTRODUCTION

B-1. THE ARMY MAINTENANCE SYSTEM MAC.

a. This introduction (section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit - includes two subcolumns, C (operator/crew) and 0 (unit) maintenance.

Direct Support - includes an F subcolumn.

General Support - includes an H subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

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

B-2. MAINTENANCE FUNCTIONS. Maintenance functions are limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g. by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

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

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

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services[1], including fault location/ troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and 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.

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

k. Rebuild. Consists of those services/action 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 (e.g., hours/miles) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 list the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance category. Column 4 specifies each level of maintenance authorized to perform each function listed in column 3, by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures are shown for each level.

---

[1]Services - Inspect, test, service, adjust, align, calibrate, and/or replace.

[2]Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3]Disassembly/assembly - The step-by-step breakdown (taking apart of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

[4]Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

d. Column 4, Maintenance Category (cont.). The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

C ..... Operator or crew maintenance
0 ..... Unit maintenance
F ..... Direct support maintenance
H ..... General support maintenance

e. Column 5, Tools and Test Equipment Reference Code. Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools , special TMDE, and special support equipment required to perform the designated function. Codes are keyed to tools and test equipment in section II.

f. Column 6, Remarks, When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section III.

B-4. EXPLANATION OF COLUMN IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National Stock Number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number, model number, or type number.

SECTION II. MAINTENANCE ALLOCATION CHART (MAC)
FOR
THE LMS

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support		
			C	O	F	H		
00	SHELTER	INSPECT	0.3					
		TEST		0.2				
		REPLACE			1.0		1	
		REPAIR		1.0			1	
		REPAIR			8.0		1-8	
01	PANEL WALLS, FLOORS, CEILING	INSPECT	0.1					
		REPAIR			4.0		1-8	
02	DOOR ASSEMBLY	TEST		0.3				
		ADJUST		1.0			1	
		REPLACE			6.0		1	
		REPAIR			3.0	2.0	1,3,4,8-11	
0201	ROLLER LOCK ASSEMBLY	REPLACE			1.0			
		REPAIR			2.0			
03	LADDER	INSPECT	0.1					
		REPLACE		0.3				
		REPAIR			1.0		1	
04	FLOOR DRAIN	REPLACE		1.0			1,3,4,8	
					1.0			

SECTION III. TOOLS AND TEST EQUIPMENT FOR THE LMS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL O,F,H	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	Tool Kit, General Mechanics	5180-00-177-7033	
2	O	Oscillating Sander	5130-00-409-8653	
3	O	Riveter, Blind, Hand	5120-00-017-2849	
4	O	Drill, Electric, Portable, 1/4 inch Cap., with Drill Bits	5130-00-561-1389	
5	O	Paint Brush	8020-00-256-6480	
6	O	Circular Saw	5130-00-089-3354	
7	O	Caulking Gun		
8	O	Safety Glasses/Goggles	6520-01-140-5364	
9	H	Welding Equipment		MS25411
10	H	Crimping Tool		MS23002
11	H	Crimping Die		

APPENDIX C
COMPONENTS OF END ITEM (COEI) LIST
AND BASIC ISSUE ITEMS (BII)

SECTION I. INTRODUCTION

C-1. SCOPE. This appendix lists components of the end item and basic issue items for the LMS to help you inventory the items for safe and efficient operation of the equipment.

C-2. GENERAL. The Components Of End Item (COEI) and Basic Issue Items (BII) Lists are divided into the following sections:

a. Section II, Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the LMS. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the LMS in operation, operate it, and do emergency repairs. Although shipped separately packaged, Bll must be with the LMS during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

C-3. EXPLANATION OF COLUMNS.

a. Column (1), Illus Number, gives you the number of the item illustrated.

b. Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.

c. Column (3), Description and Usable On Code, identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) (in parentheses) and the part number.

d. Column (4), U/I (unit of issue), indicates how the item is issued for the National Stock Number shown in column two.

e. Column (5), Qty Rqd, indicates the quantity required.

SECTION II. COMPONENTS OF END ITEM

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/I	(5) Oty Rqd
		LADDER ASSEMB LY (stored on door, deployed below door) (29381) 17-1-3619-1	EA	1
		MOUNTING KIT, HMMWV (shipped separately with shelter) (29381) 17-1-3507-1	EA	1
		TAIL LIGHT EXTENDER, HMMWV (shipped separately with shelter) (29381) 17-1-3508-1	EA	1

Tail Light Extender Assembly Parts List (29831), 17-1-3508-1

Part Number	Nomenclature	Quantity
17-1-3613-1	Bracket, Tail Light	1
17-1-3613-2	Bracket, Tail Light	1
B1821 BH050C325N	Screw	4

TABLE C-1. HMMWV Mounting Kit Parts List (29381) 17-1-8584-1

Part Number	Nomenclature	Quantity
17-1-8563-1	MOUNTING ASSEMBLY, REAR	1
17-1-8220-1	BRACKET, REAR MOUNTING	1
17-1-8220-2	BRACKET, REAR MOUNTING	1
17-1-8221-1	ADAPTER, MOUNTING	1
17-1-8221-2	ADAPTER, MOUNTING	1
17-1-3607-1	ISOLATOR	12
17-1-3605-2	WASHER, ISOLATOR MOUNT	6
17-1-3606-1	WASHER, ISOLATOR MOUNT	12
AN960C816	WASHER, FLAT	16
MS21045C8	NUT, SELF LOCKING	6
NAS43HT8-156	SPACER, SLEEVE	6
MS35308-426	SCREW, CAP	6
B1821BH050C325N	SCREW, CAP	8
MS35307-307	SCREW, CAP	6
MS15795-810	WASHER, FLAT	6
MS35338-139	WASHER, LOCK	6
MS35307-360	SCREW, CAP	6
MS35338-141	WASHER, LOCK	42
MS15795-814	WASHER, FLAT	46
MS35307-363	SCREW, HEX	8
MS35307-361	SCREW, HEX	28
B1 B21BH050C150N	SCREW, HEX	4
MS35338-48	WASHER, LOCK	4
MS51967-14	NUT, HEX	4
17-1-8245-1	BRACKET, CLAMP	2
17-1-8244-1	SHIM, BRACKET	2
17-1-8243-1	SPACER	6
MS51971-3	NUT, HEX	4
17-1-8246-1	BRACKET, TAIL LIGHT	2
17-1-6854-1	GROMMET	2
17-1-3597-1	BAR ASSEMBLY, MOUNTING KIT	2
17-1-3599-1	ANGLE ASSEMBLY, MOUNTING	1
17-1-3599-2	ANGLE ASSEMBLY, MOUNTING	1
NAS43HT81 56	SPACER, SLEEVE	8
17-1-3605-1	WASHER, ISOLATOR MOUNT	8
MS35307-410	SCREW, HEX	10
17-1-3606-1	WASHER, ISOLATOR MOUNT	16
17-1-3607-1	ISOLATOR, MOUNTING INSTALLATION	8
AN8C7A	BOLT, MACHINE	8
MS21045C8	NUT, SELF LOCKING	2
MS35308-426	SCREW, HEX	8
AN960C816	WASHER, FLRAT	28
MS35338-143	WASHER, LOCK	10

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APPENDIX D
ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

D-1. SCOPE. This appendix lists additional items you are authorized for the support of the LMS.

D-2. GENERAL. This list identifies items that do not have to accompany the LMS and do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF COLUMNS. National stock numbers, descriptions, and quantities are provided to help you identify and request additional items you require to support this equipment. The items are listed in alphabetical sequence by item name. If the item you require differs between serial numbers of the same model, effective serial numbers are shown in the last line of the description. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are not required for this model.

SECTION II. ADDITIONAL AUTHORIZED ITEMS LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER	USABLE ON CODE	(3) U/I	(4) QTY RECM

APPENDIX E
EXPENDABLE AND DURABLE ITEMS LIST

SECTION I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable and durable items that you will need to operate and maintain the LMS. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable 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 item (e.g. "Use cleaning compound, item 5, Appendix E".)

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

c. Column 3. National stock number. This is the national stock number assigned to the item which you can use to requisition it.

d. Column 4. Item name description, Commercial and Government Entity Code (CAGEC), and part number. This provides the other information you need to identify the item.

e. Column 5. Unit of measure. This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

SECTION II. EXPENDABLE AND DURABLE ITEMS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION CAGEC, PART NUMBER	(5) U/M
1	C	9158-00-759-0014	Lubricant, Solid Film MIL-L-23398	A/R
2	F		Polysulfide Sealer	GL
3	C	6850-00-948-5853	Cloth, Cotton	AR
4	F	8040-00-078-9774	Adhesive	GL
5	F	7830-00-884-4014	Chalk	GR
6	F		Polyethelyone Wrap	SH
7	F	6810-00-286-5435	Alcohol, Isopropyl	GL
8	F		Commercial Body Filler	GL
9	F		Core, Honeycomb	AR
10	F		Fiber Filled Polyester Resin	GL
11	F	8415-00-009-1900	Gloves, Rubber	PR
12	F	5350-00-161-9043	Sandpaper	SH
13	F		Aluminum, QQ-A-250, 6061-T6, .042”	AR
14	F		Caulking Cartridge	EA
15	F		Container, Unwaxed	EA
16	F	8040-00-222-9059	Epoxy Resin (Versimid 140)	GL
17	F	8040-01-197-0228	Epoxy Resin (EPIC R1003)	GL
18	F	5320-00-956-7355	Rivet, Domed Head, Pop, 07707, AD64H	EA
19	F	8030-01-136-8953	Sealer, 80063, SM-B-563756	AR
20	O	5310-00-933-8120	Lockwasher, 96906, MS35338-138	EA
21	O	5310-00-592-5965	Lockwasher, 96906, MS35338-44	EA
22	O	5315-01-359-1451	Cotter Pin, 96906, MS24665-285	EA
23	O		Shim, 29381, 17-1-3566-3	EA
24	O	5310-01-338-7338	Lockwasher, 96906, MS35338-45	EA
25	O	5310-01-249-9376	Lockwasher, 96906, MS35338-139	EA
26	O	5310-00-929-6395	Lockwasher, 96906, MS35338-136	EA
27	F	5320-00-882-3375	Rivet, Domed Head, Pop, 07707, AD66H	EA
28	F	5320-01-032-6534	Rivet, Domed Head, Pop, 07707, AD68H	EA
29	F	5320-01-210-7955	Fastener, Blind, 96906, MS90354U0603	EA
30	F		Sealer Conductive, 29381, 17-1-5706-1	AR
31	F	5320-01-295-9924	Rivet, Domed Head Pop, 07707,AD42H	EA
32	F		Adhesive, 96906, M4610611DWI	AR

APPENDIX F
ILLUSTRATED LIST OF MANUFACTURED ITEMS

F-1. INTRODUCTION. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at general support maintenance level.

A Part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

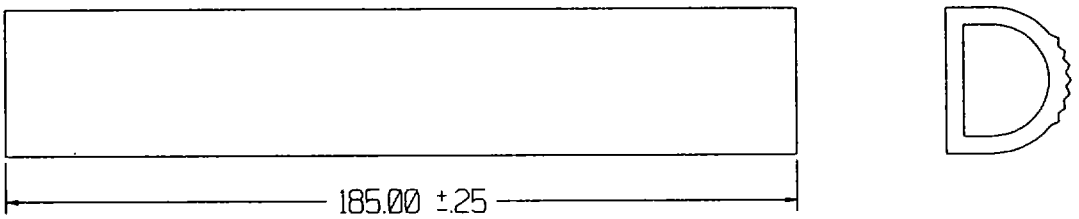
All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

F-2. MANUFACTURED ITEMS PART NUMBER INDEX. Table F-1 provides a list of those items that are manufactured at general support maintenance level.

Table F-1. General Support Manufactured Items

Part No.	Figure
17-1-3704-1	F-1
17-1-3705-1	F-2
17-1-8507-1	F-3
17-1-8552-1	F-4

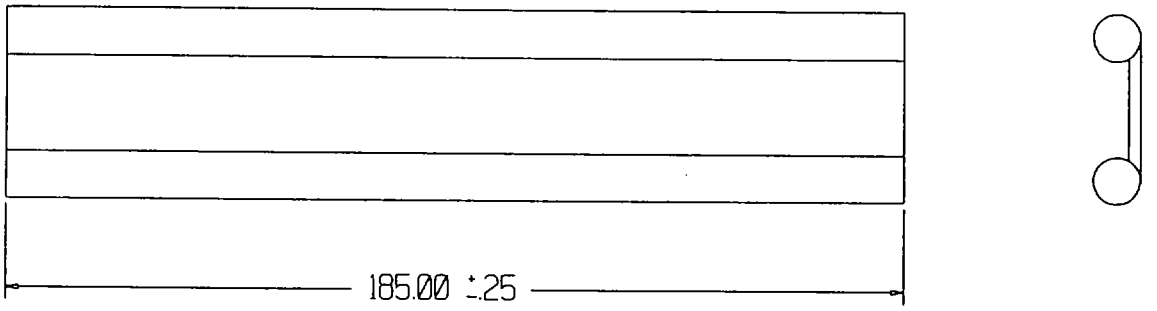
I



MATERIALS	
DESCRIPTION	NSN
RUBBER, NEOPRENE, DUROMETER 40, D-SHAPE, EXTRUDED, 0VZL4, P/N BI-12009-40.	

NOTES:
1. DIMENSIONS SHOWN ARE IN INCHES.
2. WORKMANSHIP IAW MIL-STD-454, REQT 9.

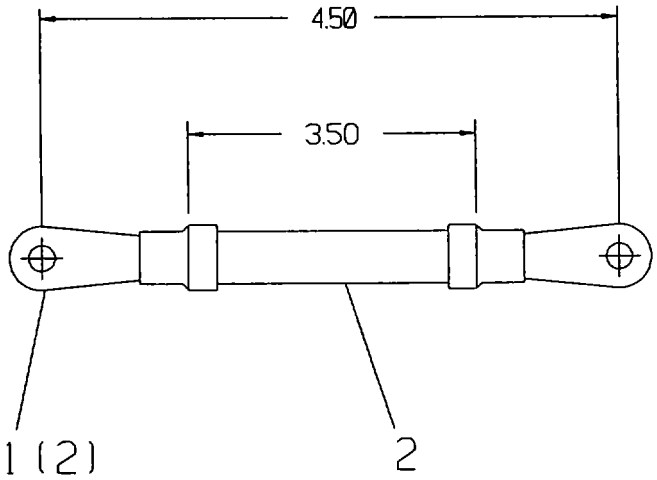
Figure F-1. Personnel Door Environmental Gasket



MATERIALS	
DESCRIPTION	NSN
.025 O.D. X .045 SILICONE TUBING PER ZZ-R-765, CLASS II, GRADE 40 WITH 3 COVERS,.0045 DIA FERREX WIRE MESH PER ASTM B-520,18565, P/N 01-0504-6424.	

NOTES:
1. DIMENSIONS SHOWN ARE IN INCHES.
2. WORKMANSHIP IAW MIL-STD-454, REQT 9.

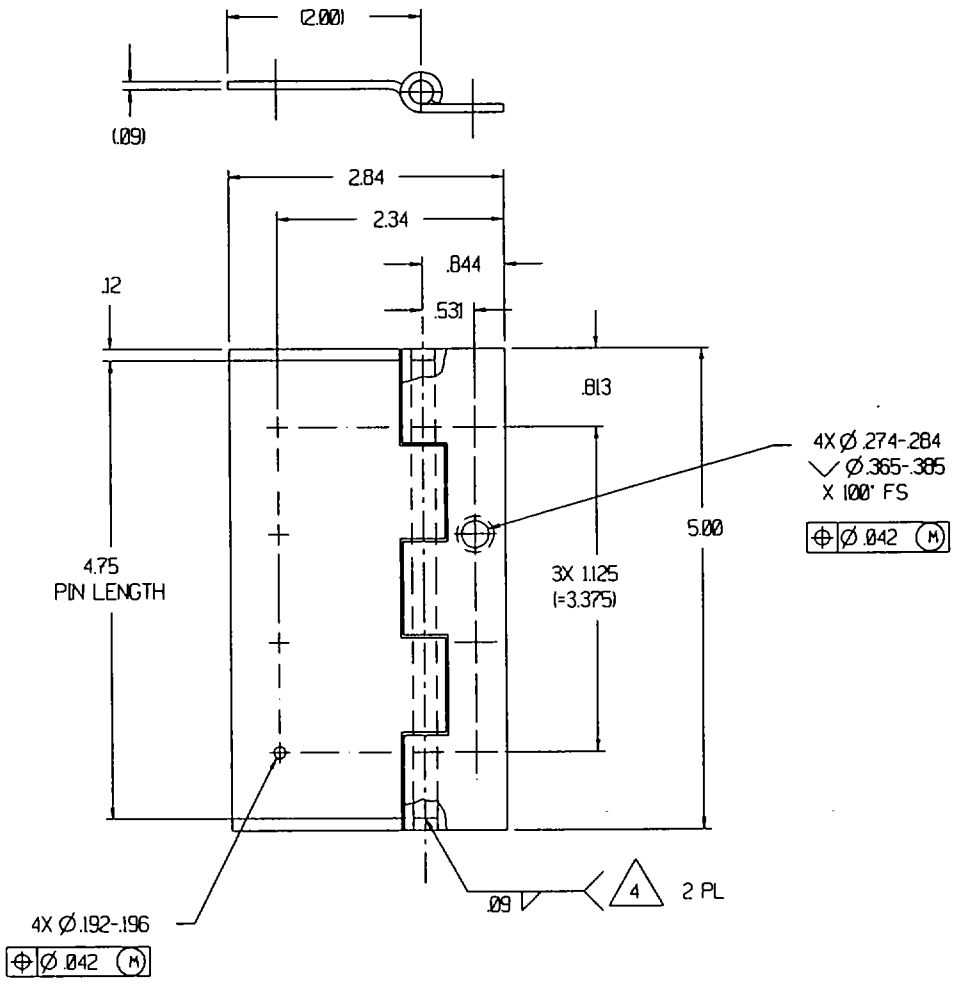
Figure F-2. RFI/EMI Gasket



MATERIALS	
DESCRIPTION	NSN
1. TERMINAL, LUG, 96906, P/N MS25036-119. 2. WOVEN TINNED COPPER BRAID ROLLED FLAT GROUND STRAP, 92194, P/N 1234.	5940-00-114-1310

NOTES:
1. DIMENSIONS SHOWN ARE IN INCHES $\pm$ 0.6 IN.
2. WORKMANSHIP IAW MIL-STD-454, REQT 9.
3. CUT ITEM 2 TO 3.5 $\pm$ .25 AND CRIMP ITEM 1 ON BOTH ENDS USING CRIMPING TOOL MS25441 AND DIE MS23002.

Figure F-3. Ground Jumper



MATERIALS	
DESCRIPTION	NSN
STAINLESS STEEL HINGE AND PIN, TYPE 304, QQ-S-763, 6 FOOT LENGTH, 03007, P/N SS09080711.	

NOTES:
1. DIMENSIONS SHOWN ARE IN INCHES.
2. REMOVE ALL BURRS AND SHARP EDGES R.005 - R.015.
3. UNTOLERANCED DIMENSIONS LOCATING TRUE POSITION ARE BASIC.
4. WELD END (2 PLACES) TO RETAIN PIN PER MIL - STD - 2219, CL C.

Figure F-4. Personnel Door Hinge

APPENDIX G
LUBRICATION INSTRUCTIONS

G-1. INTRODUCTION. This appendix provides lubrication instructions for the Light Weight Multipurpose Shelters (LMS), MODELS S-788/G TYPE I AND TYPE III.

G-2. MAINTENANCE LEVELS. Lubrication instructions are applicable to crew (C) and unit (O) level maintainers.

G-3 LUBRICATION INTERVALS. Lube intervals (on-condition or hard time) are based on normal operation. During extreme weather or environmental conditions, the frequency of lubrication should be increased.

G-4. LUBRICANT. All items noted on figure G-1 should be lubricated using MIL-L-23398.

G-5. LUBRICATING POINTS. Figure G-1 identifies the lubrication points for the LMS. All lubrication points require the same lubricant at the same interval.

CAUTION

Do not use alternate types/grades of lubricant, component damage may result.

G-6. LUBRICATING PROCEDURES.

a. Clean part with cotton cloth prior to lubricating.

b. Lubricate part, being careful not to over lubricate.

c. Wipe any excess lubricant from part.

Table G-1. Lubricant Table for LMS

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Air cure test:	(S-749)	A/R	O/C	1
25° ± 2° C 77 ± 3° F 50 % Rel. Hum.	MIL-L-23398			

Lube Pt.	Description
A	Handhold
B	Step Assys.
C	Lift Rings
D	Door Holder
E	Door Hinges
F	Roller Latch Assy.
G	Door Brace

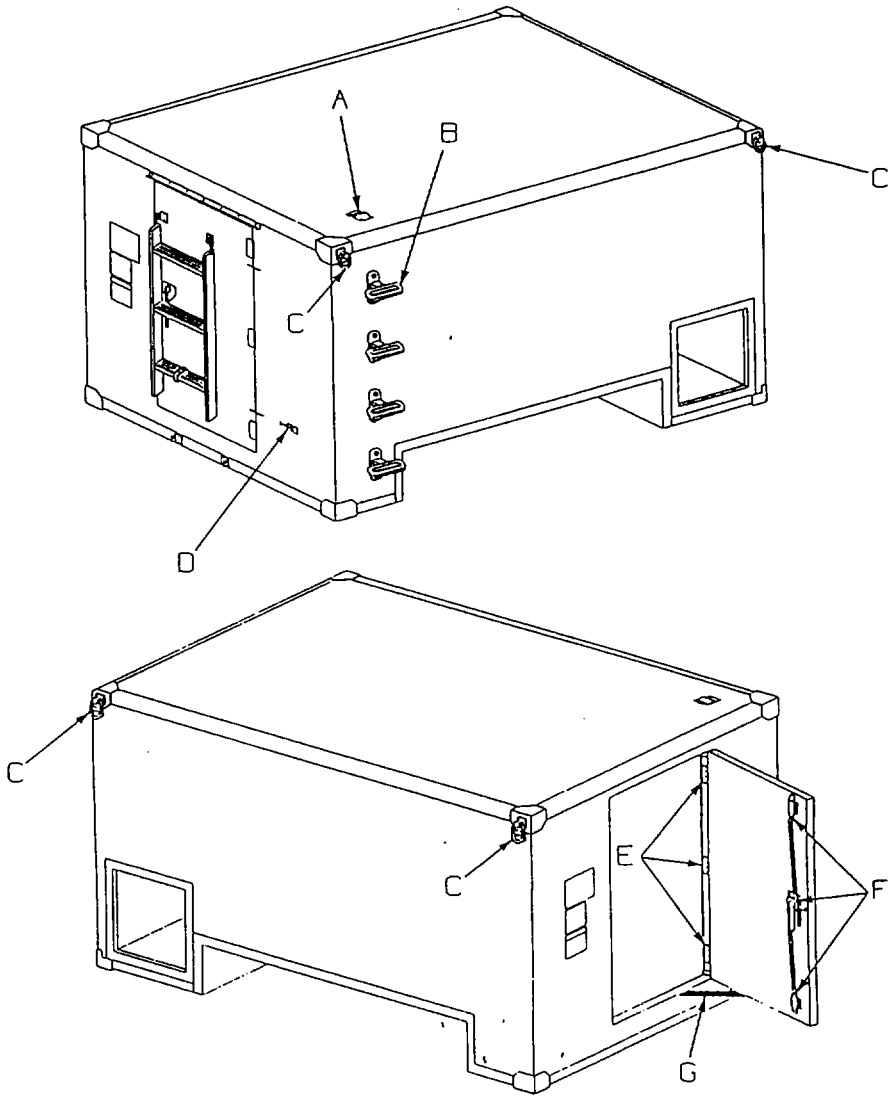


Figure G-1. LMS Lubrication Points

ALPHABETICAL INDEX

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

Official:

MILTON H. HAMILTON
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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

PIN: 072076-001