TECHNICAL MANUAL

GENERAL PACKAGING INSTRUCTIONS FOR FIELD UNITS

HEADQUARTERS, DEPARTMENT OF THE ARMY
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MARKING, PACKING, AND SHIPMENT OF SUPPLIES AND EQUIPMENT

GENERAL PACKAGING INSTRUCTIONS FOR FIELD UNITS

TABLE OF CONTENTS

This technical manual supersedes TM 746-10, 17 October 1977.

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1
INTRODUCTION

1-1. Purpose

This technical manual is for use as a guide for the effective preservation and packing of serviceable and unserviceable economically reparable materiel by personnel of direct support units and general support units. The packaging procedures and instructions provided will prevent damage to items in transit and will protect items from corrosion and deterioration for a maximum of 180 days. The instructions apply to materiel processed as retrograde or recycled and shipped by land, sea, or air.

1-2. Scope

This manual covers the general processes and procedures to be followed for the proper packaging of serviceable retrograde materiel, unserviceable economically reparable retrograde materiel, serviceable and unserviceable materiel to be repaired and recycled, and automatic return items (ARI). The term "packaging" is used here in a general sense to refer to all the operations of preservation, packing, and unitization, as defined below, that protect materiel from damage and deterioration.

1-3. References

Throughout this manual, packing materials, equipment, processes, and methods are often referred to by their common names together with the applicable specification, standard, or other publication symbol. For ease in referral, those publications referenced in this manual are listed at the end of appendix A. Copies of specifications and other documents required by activities of the Defense Logistics Agency, the Departments of the Army, Navy, and Air Force, and the Marine Corps may be obtained by writing to: Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Specific references for packaging terms are-

a. Packaging and preservation references. The packaging and preservation instructions in this manual refer to the designations, identifications, and symbols for cleaning methods, drying procedures, preservatives, and methods of preservation designated in TM 38-230-1. Some examples are cleaning processes C-1 and C-3, drying procedures D-1 and D-4, preservative applications P-9 and P-10, and methods of preservation III and IC. Accomplishment of these methods and use of designations shall be per TM 38-230-1. If the referenced preservatives, barrier materials, cushioning materials, and tapes are not readily available, substitution of packaging materials can be made only if the substitute materials provide equal or better protection than those prescribed by this manual (see app C for authorized substitutes).

b. Packing. Guidance in the packing of materiel may be found in TM 38-230-2. The manual contains detailed guidance on packing operations including proper use of exterior shipping containers, assemblage of items or unit packs into the shipping container, anchoring or blocking and bracing of materiel, cushioning of items or unit packs within the container, and weatherproofing and strapping the exterior shipping container. As prescribed by TM 38-230-2, the selection of exterior containers should be based upon the physical characteristics of the item and the item's shipping destination, with emphasis placed on container weight and dimensional limitations.

c. Repackaging. Packaged materiel will not be unpacked to satisfy the requirements of this manual when a sample inspection reveals that the protection is adequate for issue within a theater or movement out of a theater.

1-4. Packaging Terms

Definitions for preservation and packing terms, which include materials, processes, and methods, may be found in ASTM standard D996 and AR 700-15. Definitions of packaging terms used in this manual are listed alphabetically as follows:

a. Consolidation. This general term, which is closely related to unitization, refers to the actual bringing together (assembly) of like or unlike items for unitization and subsequent shipment.

b. Containerization. Containerization includes the use of a class of large, van-like transport containers to unitize cargo for transportation, supply, and storage. It is a basic method of unitization. Containers include the military-owned demountable container (MILVAN) commercial- or Government-owned (or leased) shipping container (SEAVAN), or the container express (CONEX). The definition of containerization may be expanded when referring to the placement of commodities into paperboard, fiberboard, plywood, or wirebound plywood consolidation containers before loading into transport containers.

c. Exterior pack. A container, bundle, or assembly which is sufficient by design and construction

to protect the unit and intermediate packs and contents during shipment and storage. This can be a unit pack or a container with any combination of unit or intermediate packs.

d. Intermediate pack. An interior pack which contains two or more unit packs and bears adequate identification of its contents.

e. Marking. The application by stamping, printing, or painting on a container, tag, or item the necessary information to identify the item or contents such as stock number, nomenclature, quantity and unit of issue, level of preservation and the date preservation was performed, or any other special information required. When applied to containers of retrograde or recyclable materiel, original identification, precautionary, and special handling markings shall be perpetuated whenever possible.

f Packing. Assembling of items into unit, intermediate, or exterior packs with necessary blocking, bracing, cushioning, weatherproofing, and reinforcement.

g. Palletization. The process of bonding cargo or placing a number of packages on a low portable wooden, metal, or fiberboard platform for the purpose of handling as a complete shipping unit. A palletized load may be shipped independently or loaded into another container. It is also a basic method of unitization.

h. Preservation. The application of adequate protective measures including the use of appropriate cleaning procedures, preservative materials, protective wrappings, barrier materials, cushionings, interior containers, and complete identification markings up to, but not including, the exterior shipping container.

i. Unitization. Assembly of packs (unit, intermediate, or exterior) of one or more line items of supply into a single load so that the load can be handled as a single unit through the distribution system. Unitization (unitized loads/unit loads) encompasses consolidation in a container, placement on a pallet or load base, or binding packs securely together.

j. Unit pack. The first tie, wrap, or container applied to a single item, multiple thereof, or a group of identical items with the same stock number which constitutes a complete and properly identified pack.

1-5. Materiel Terms

a. Serviceable materiel to be recycled. Serviceable materiel that is to be stocked and reused within the theater of operations.

b. Serviceable retrograde materiel. Serviceable materiel that is to be returned to the supply system for modification, repair, redistribution, or disposal.

c. Unserviceable, economically reparable retrograde materiel. Unserviceable, economically reparable materiel that is to be returned to the supply system for repair or disposal.

d. Unserviceable materiel to be recycled. Unserviceable materiel to be moved within a theater of operations for repair or disposal.

1-6. General Packaging Operations

a. Disassembly. Unboxed, serviceable retrograde materiel and unserviceable, economically reparable retrograde materiel should be disassembled, as practical, to achieve maximum reduction in cube prior to movement to a port of embarkation (POE). Parts vulnerable to damage and pilferage and projecting parts whose removal will accomplish reduction in cube should be removed. The removed bolts, nuts, screws, pins, and washers should be placed in one of the mating parts and secured. The removed parts that are vulnerable to pilferage should be placed in the basic issue item pack.

b. Matchmarking. Parts removed from equipment should be matchmarked to facilitate reassembly. Removed parts and the matching parts that remain on the disassembled item should be identically stenciled (matchmarked) by letters or numbers if those parts are large enough to accept stenciling. When parts are too small to accommodate stenciling, information should be placed on cloth shipping tags attached to mated parts.

c. Cleaning and drying. The cleaning of items by any of the approved processes is a prerequisite to the success of subsequent preservation and packaging operations. Cleaning must be thorough and cause no injury to the item. Disassembly must be held to a practicable minimum. After cleaning, items will be thoroughly dried to remove cleaning solutions or residual moisture. Methods of cleaning and drying are described in TM 38-230-1, with the basic requirements listed in MIL-P-116.

d. Lubrication for preservation. Serviceable retrograde materiel and serviceable materiel which is to be recycled will be lubricated in accordance with the applicable lubrication order. All exposed oil can points such as levers, latches, hinges, control rods, and linkage, will be lubricated with preservative oil, P-9. Parts will be manipulated to ensure thorough coverage. Equipment cleaned by processes which remove previously applied lubricants or contaminate previously applied lubricants will be relubricated. Unserviceable, economically reparable, major end items and recoverable repair

parts will be preserved and lubricated as prescribed in paragraphs 3-3 and 3-4.

e. Repainting for preservation. Both interior and exterior surfaces which contain damaged or defective paint film will be cleaned and spot painted unless the damage to the existing paint coating of serviceable equipment is extensive enough to make complete repainting more economical. Variances in the shades of paint used for spot painting from that of the existing paint are not justification for complete repainting.

f. Use of required record forms for major items (retrograde and recyclable materiel). As required by TM 38-750 (C 53 Test), an equipment log book shall be completed for major equipment utilizing, as applicable, either of the following forms:

(1) DA Form 2258 (Depreservation Guide for Vehicles and Equipment).

(2) DD Form 1397 (Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines). The log book shall be packaged per provisions of submethod IC-4 and shall be securely attached in or on the equipment. For each major item that is preserved and processed, the appropriate form will be prepared in duplicate per preparation instructions on each item, with all applicable entries being made. One copy of the completed form will be placed in a waterproof envelope marked "Depreservation Guide" or "Deprocessing Record" and attached to the steering wheel or other operator controls. When packing spare engines, it shall be placed on top of the engines. A second copy will be placed in the package containing the equipment log book, with the package marked to show that the copy is inside.

1-7. Economy in Preservation and Packaging

The military concept of economy in preservation and packaging is to obtain the maximum output of adequately protected items at a minimum cost. Economy measures, consistent with the degree of protection required by an item, should be of prime concern to personnel in charge of or performing preservation and packing operations. Packing operations are described in TM 38-230-2.

1-8. Unitization and Consolidation

Consolidation and unitization (paras 1-4a and 1-4i) are effective ways to achieve economy in packaging because they make better utilization of space, discourage pilferage, decrease damage or item loss, speed handling, increase flexibility, and compensate for shortages of equipment and personnel. When warranted by the quantity of retrograde or recyclable materiel to be packed, unitization shall be effected to the maximum extent possible by employing basic methods of containerization and palletization. Both must be consistent with the mode of shipment and destination requirements.

a. Containerization. Containerization (para 1-4b) shall be accomplished through the use of consolidation containers and consolidation media (transport containers) after considerations are made as to type and quantity of commodities and containers, conditions of the load, item characteristics, and the degree of protection required.

(1) Consolidation containers. Consolidation containers are a series of standard size unit, intermediate, and exterior containers designed to achieve maximum space utilization and to facilitate eventual modular loading into consolidation media. They may be fabricated from paperboard, fiberboard, plywood, or wirebound plywood.

(2) Consolidation media (transport containers). Consolidation media are large, intermodal, van-like containers widely employed for shipping unitized loads. Included are the CONEX, MILVAN, and SEAVAN containers previously defined.

b. Palletization (para 1-4g). Palletized unit loads shall be constructed upon a standard 40by 48inch, 4-way entry, wooden or metal pallet. Loads prepared for shipment in MILVANs shall not exceed 41 inches in height. Loads prepared for shipment in SEAVANs shall not exceed 43 inches in height. Noncontainerized loads shall not exceed 54 inches in height. The maximum weight for domestic, intercoastal, or overseas shipments shall not exceed 3,000 pounds per single pallet load including the pallet, bonding methods, storage aids, and units. Items which are best suited for palletization are identical items with the same stock number, items that cannot be practically packed otherwise, items requiring minimum protection, uniformly sized items, and large quantities of items. The requirements and instructions for palletization are specified in MIL-STD-147.

1-9. Reuse of Containers

a. Accountable containers and dunnage. Depending on the physical condition of the container and its dunnage, reusable shipping and storage containers including fiberboard boxes, fast packs, wood and metal containers, crates, carrying cases, and other reusable packaging materials shall be used to the maximum extent possible for their intended purpose to return serviceable, reparable, and ARIs to the supply system. A storage area

shall be designated to maintain a realistic stockage level of dunnage, materials, and containers.

(1) *End item disposal*. An item that is scheduled for disposal and is packed in a reusable container may be disposed of with or without the container. The alternative providing the highest estimated return shall be selected and implemented.

(2) *Container repair*. Nonexpandable containers will continue to be used until they become unserviceable. They will then be withdrawn from service for repair or overhaul. Repairs will not be accomplished with the intent to return the container to a "like-new" condition. Only minimum repairs are required to make reusable containers suitable for return to service.

(3) *Painting*. Painting will be required on refurbished areas only when the repaired surfaces that require painting exceed 75 percent of the entire container area.

(4) *Marking.* Original identification, precautionary, and special handling markings will be perpetuated on the repaired containers. All other marking requirements will comply with the requirements in paragraph 3-5 and MIL-STD-129.

b. Conditional reusable containers. When reusable containers which are prescribed for specific items are not available and substitute containers are used, newly designed cushioning materials and special cradling or holddown devices must be identical in performance to those retaining devices originally engineered for the item and its reusable container.

c. Reusable metal drums. Metal drums, although not subject to accountability, should be reused until distorted beyond practical repair. Drums having extensively dented or otherwise damaged sealing lips are unfit for further use and should be disposed of.

(1) *Small military drums*. Small standard military drums are identified by a part number and should be reused for small subassemblies that are of complex construction and are highly susceptible to damage or deterioration during shipment or storage. Split-ring closure-type, reusable, metal containers require cushioning and wrapping of the projections of the split-ring and exposed end of the protruding screws for parcel post shipments.

(2) *Metal inserts and dunnage*. When materiel is received packed in reusable metal drums and braced and cushioned with specially designed metal inserts and dunnage, consideration should be given to salvaging the inserts and dunnage and maintaining appropriate stockage levels of each. Such a practice can result in considerable monetary savings.

d. Use of fast-pack containers. Containers specified in PPP-B-1672 are commonly known as fast packs and will be used as often as possible for depot shipments of reparable components to using activities. Items that should be shipped in fast packs include delicate and fragile items that are susceptible to damage in shipment, especially electronic items and circuit cards that are vulnerable to electrostatic discharge (ESD) damage. Any item compatible in size may be shipped in a fast pack. Field activities including overseas activities and continental United States (CONUS) installations will use the containers as often as possible for the return shipment of items to depots or other repair/ rebuild facilities. Although fast packs are identified as reusable containers, they are not accountable items. Each receiving activity should reuse the containers for the return of reparables and should not return empty containers to shippers. See paragraph 5-170 and figure 5-9 for fast-pack packaging instructions for electrostatic discharge sensitive (ESDS) items.

e. Reuse of foam-in-place (FIP) containers. Many serviceable items, including engines and transmissions, are shipped to field units in total encapsulated FIP packs. When packs are properly opened per the accompanying instructions, they can be reused by field activities for returning unserviceable items to repair depots (para 3-6j(5)).

1-10. Care of Packaging Materials and Equipment

a. General. Although the conservation of packaging materials is necessary, the whole program must be well planned from the beginning. Much effort can be expended on the requisitioning of materials, but that effort will be wasted if the supplied are allowed to accumulate without being used. This situation usually results when material is stored in a place or in a manner that makes finding the desired material difficult or impossible. Such a situation should definitely be avoided.

b. Materials. Containers that hold preservatives, cleaning solvents, paint, and adhesives should be tightly sealed and stored in an area where open flames will not occur. Barrier materials, bags, fiberboard and paperboard boxes, tapes, and labels should be stored in an area that protects them from the elements.

c. Equipment. All packaging equipment should be cleaned and placed in its normal storage area when not in use. All power equipment should be lubricated per the applicable lubrication order. Moisture separators installed on compressed air supply lines should be drained frequently. Clean

TRANSMISSION

Find No.	Qty	Nomenclature
1	1	Box, PPP-B-621, class, 2, style 4
2	1	Block
3	2	Block
4	1	Block
5	4	Block
6	2	Brace

NOTE. All lumber sizes nominal except FIND No. 2.

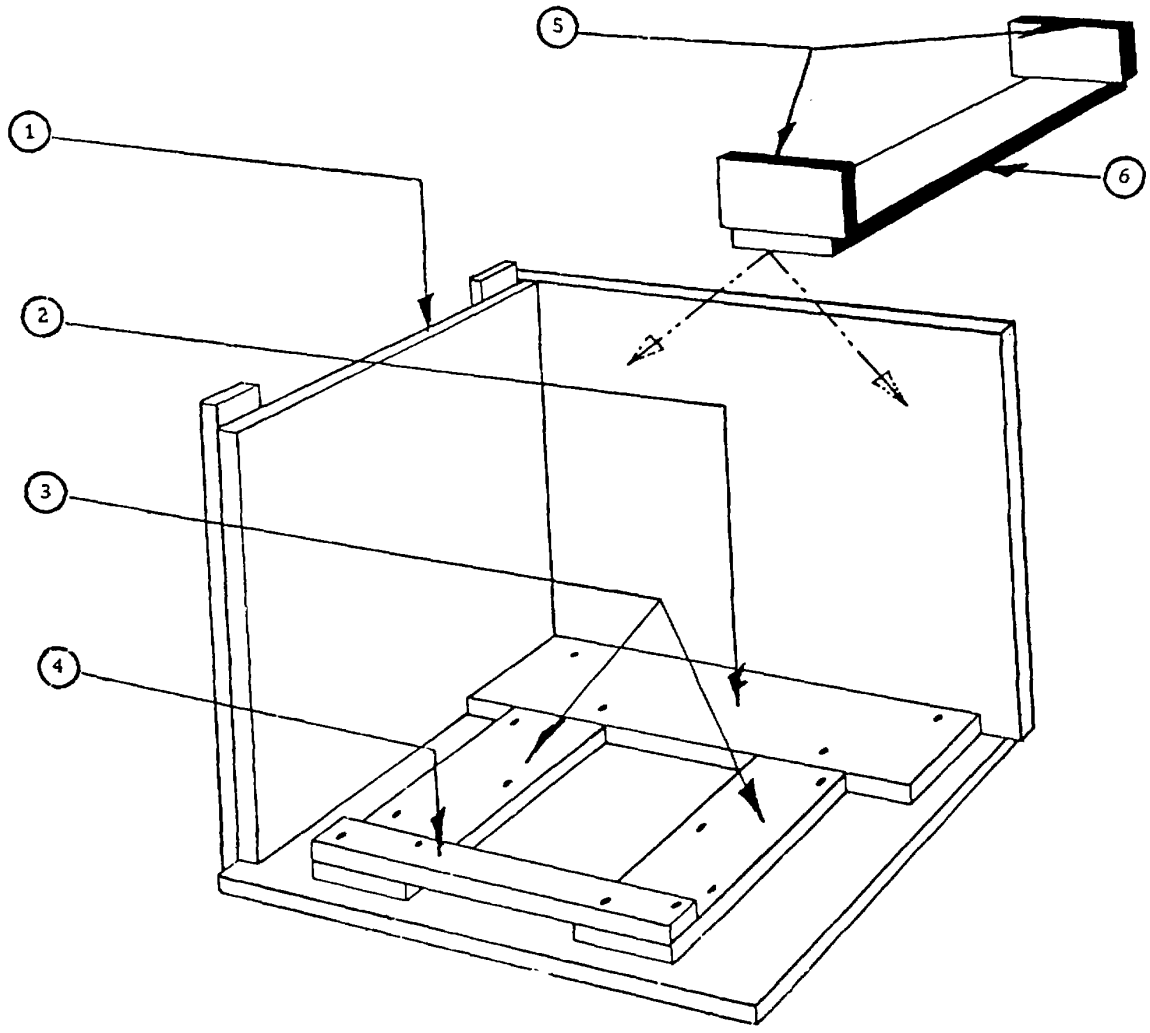


Figure 3-4. Loading, Blocking, Bracing, and Anchoring.

FIND NO.	QTY	NOMENCLATURE
1	1	Box, PPP-B-621, Class 2, Style 4
2	8	Support Cleat
3	2	Saddle Block, Fwd.
4	2	Saddle Block, Aft.
5	2	Cushioning, Non-Corrosive
6	2	Wrap, Greaseproof
7	AR	Contact Preservative

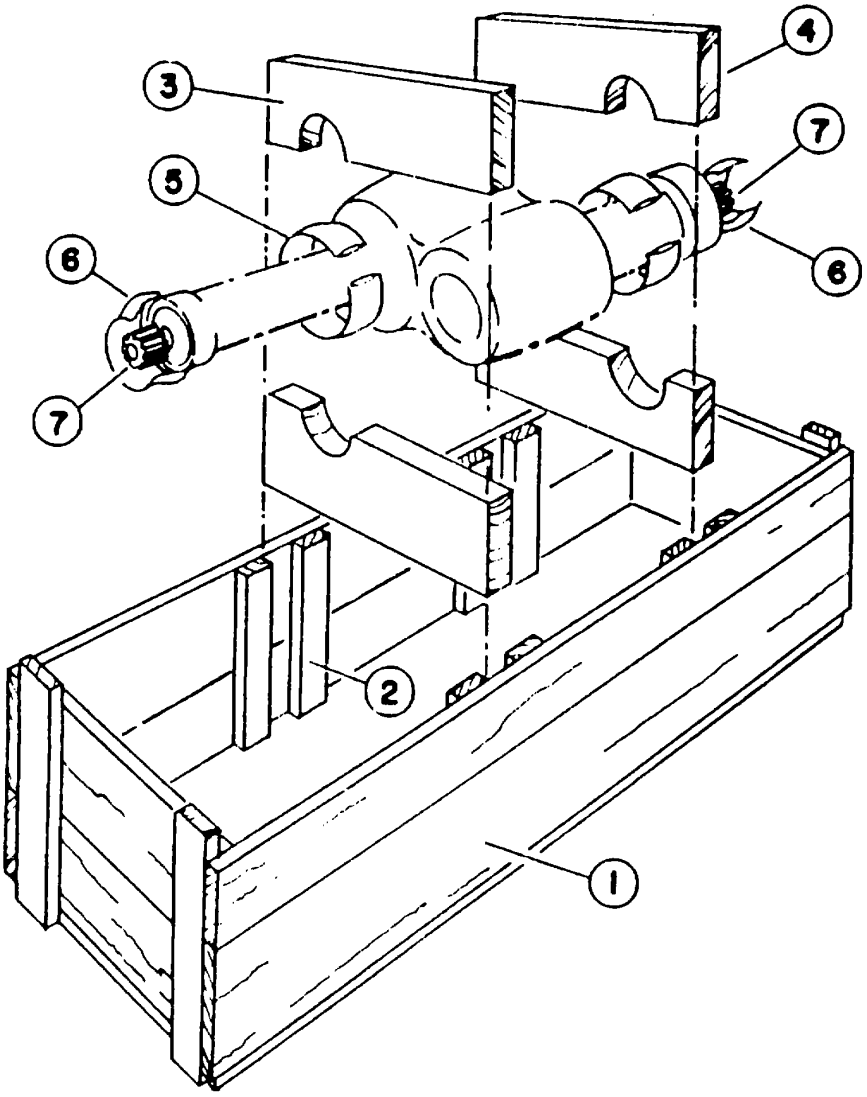


Figure 3-5. Blocking, Bracing, and Anchoring.

Find No.	Qty	Nomenclature
1	1	Skid base, MIL-C-104, with 4" x 4" skids and headers, and 2" flooring
2	1	Blocking
3	1	Blocking
4	2	Angle iron
6	4	Blocking
7	8	Cap screw
8	4	Bolts
9	4	Bolts
10	1	Box, OVM

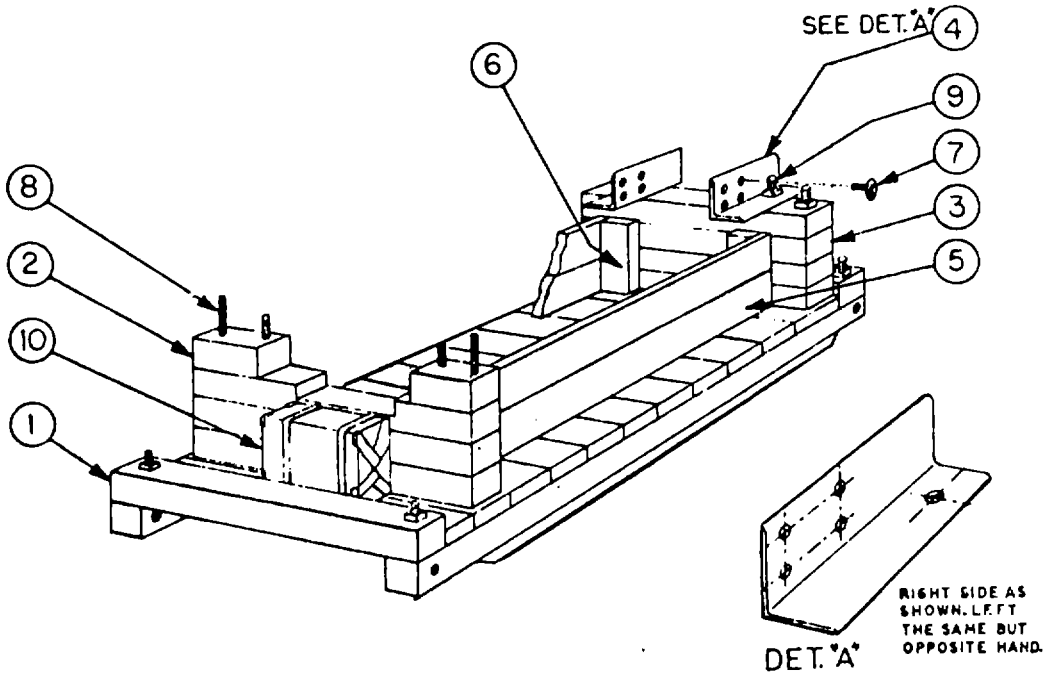


Figure 3-6. Typical Blocking, Bracing, and Anchoring Arrangements, MIL-C-104.

Find No.	Qty	Nomenclature
1	1	Skid base, PPP-B-621, class 2, style 7
2	1	Block, front support
3	2	Bolt, carriage, w/nuts, lockwashers and flat washers
4	2	Angle, steel
5	1	Block, rear support
6	2	Bolt, carriage, w/nuts, lockwasher and flat washers
7	1	Bar, steel
8	1	Block, beveled
9	2	Block, side support
10	2	Block, side
11	4	Block, side
12	2	Bolt, machine, w/lockwashers and flat washers
13	1	Block, rear, filler (not shown)

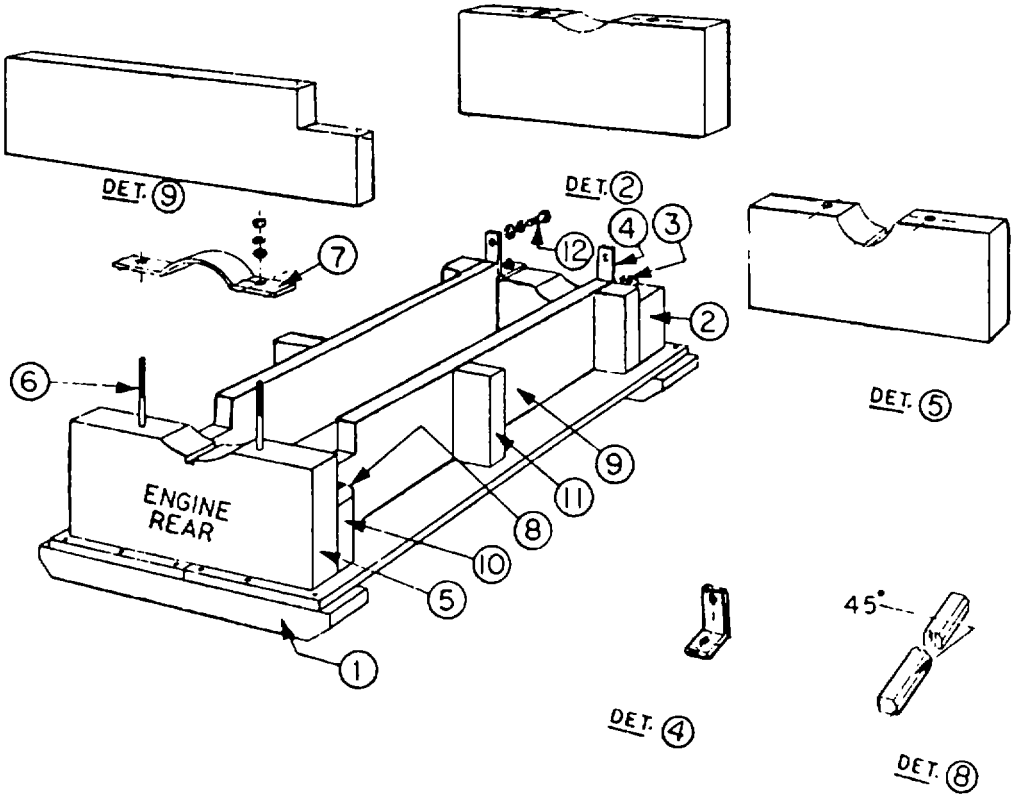


Figure 3-7. Typical Blocking, Bracing, and Anchoring Arrangements, PPP-B-621.

AXLE ASSEMBLY

Find No.	Qty	Nomenclature
1	1	MIL-C-104 Skid base Skids and headers Lumber flooring
2	2	Load bearing member
3	2	Load bearing member
4	2	Holddown block (see detail)
5	4	Bolt w/washers and nuts
6	2	Sleeper

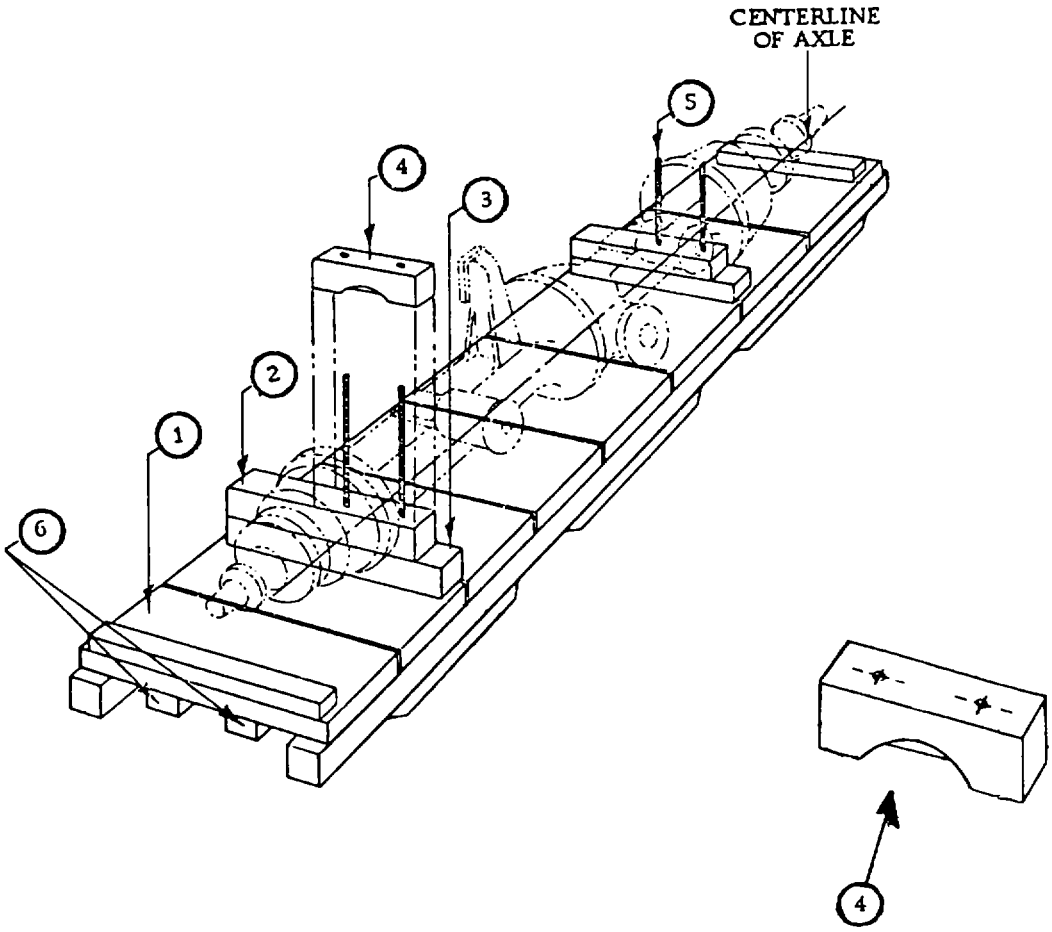


Figure 3-8. Loading, Blocking, Bracing, and Anchoring Typical Axle Assemblies.

ENGINE BLOCK ASSEMBLY

Find No.	Qty	Nomenclature
1	1	Skid base, PPP-B-621, class 2, style 7
2	2	Block
3	2	Block
4	6	Block
5	2	Block
6	1	Block, tie down
7	1	Block, tie down
8	4	Rods, tie down, w/nuts and lockwashers

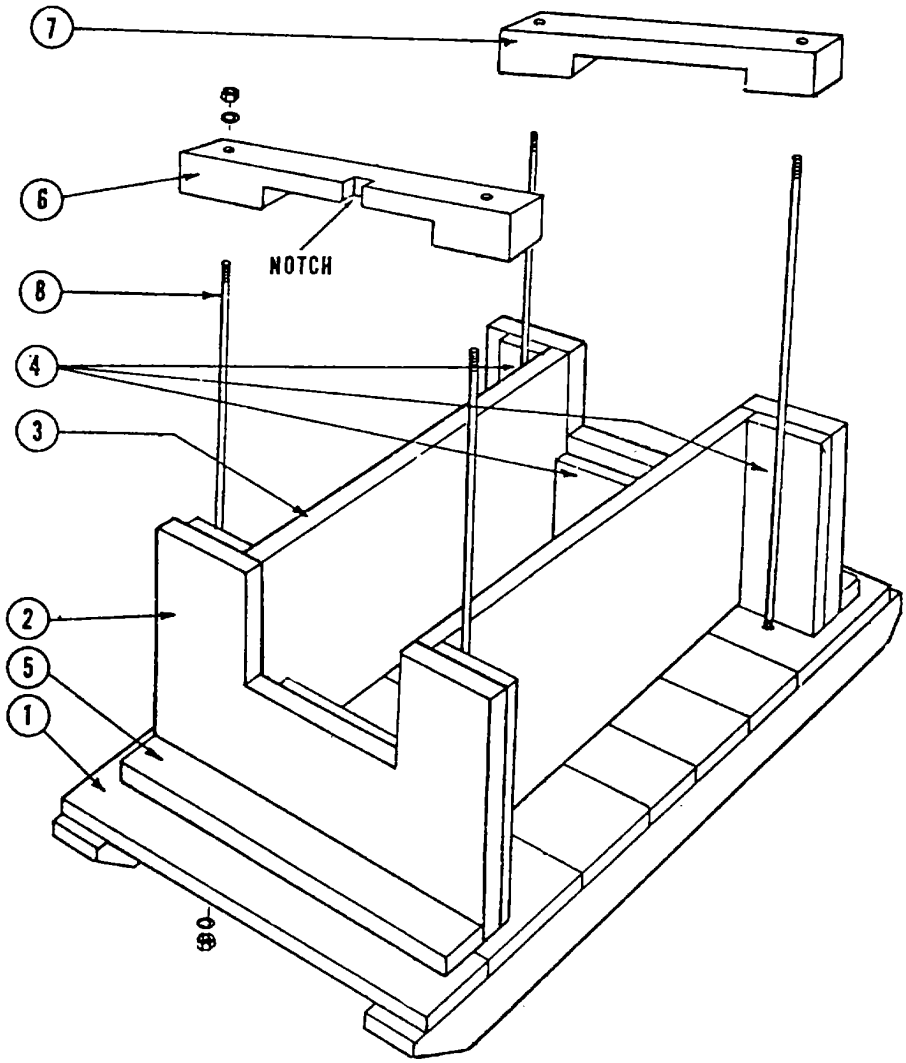


Figure 3-9. Blocking, Bracing, and Anchoring with Tie Down Rods.

LIGHT SET

Find No.	Qty	Nomenclature
1	1	MIL-C-104 Skid base
2	1	Bulkhead
3	1	Bulkhead
4	3	Chest type A
5	2	Chest type B
6		Wire, electrical (fiberboard cushioning required between coils and strapping)
7	1	Box, reflectors
8		All strapping galvanized steel, staple to blocking. Use metal edge protectors on chest and blocking.
9		Blocking to fill voids, cut to fit, 2 blocks required between each chest.

NOTE: ALL LUMBER SIZES NOMINAL.

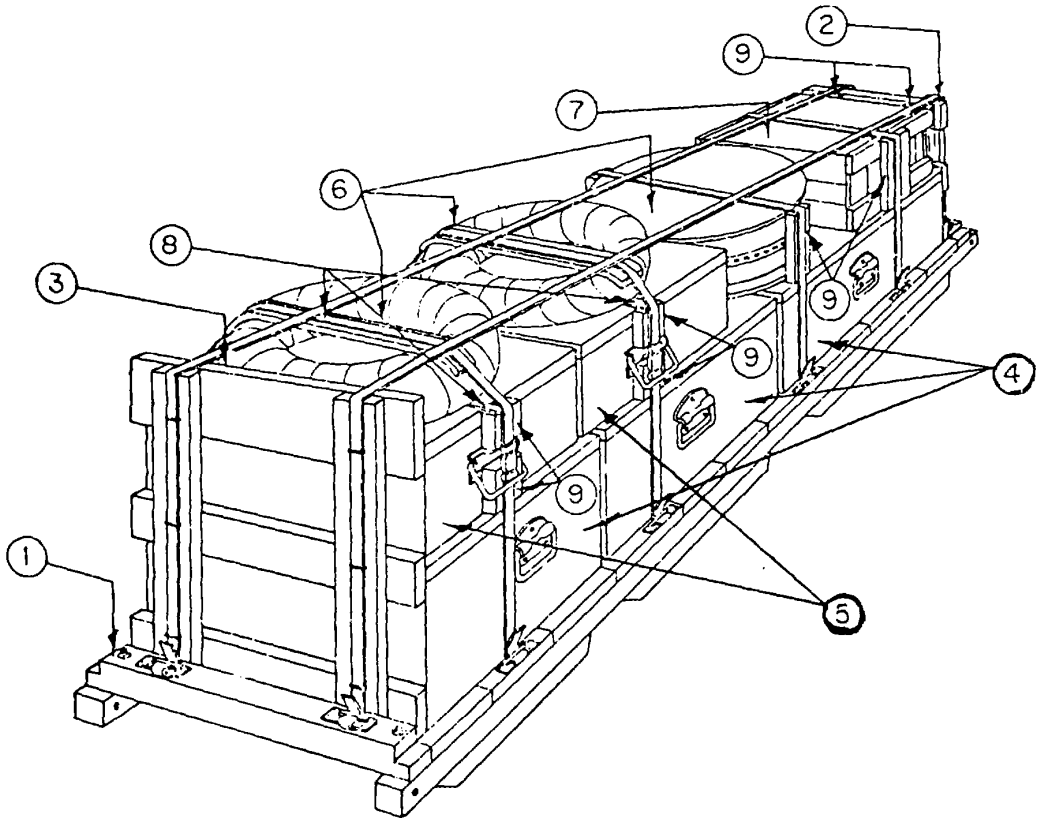


Figure 3-10. Loading, Blocking, Bracing, and Anchoring Complex Assemblies.

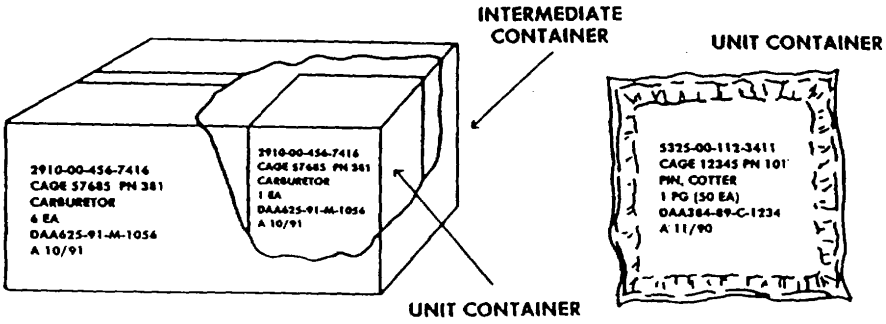
(6) *Pressure sensitive labels*. Labels shall be of a water-resistant grade of paper, film, fabric, or plastic, coated on one side with pressure-sensitive, permanent adhesive that is water-insoluble and will adhere to metal, plastic, or fiberboard surfaces under high or low temperatures.

(7) *Tags*. Shipping tags shall be metal, cloth, plastic, or paper and shall conform to the requirements of UU-T-81 and A-A-900.

(8) *Water-resistant envelopes.* Water-resistant envelopes shall conform to PPP-E-540.

(9) *Packing list protectors.* Packing list protectors shall conform to A-A-1907.

c. Unit, intermediate, and exterior container identification markings (figs 3-11 and 3-12). Containers of retrograde or recyclable materiel shall continue to carry the original identification, precautionary, and special handling markings whenever possible. However, there will be instances when all of these markings cannot be applied to a container prior to shipment. When this occurs, specific identification information must still be placed on each unit, intermediate, and exterior container. Each unit, intermediate, and exterior



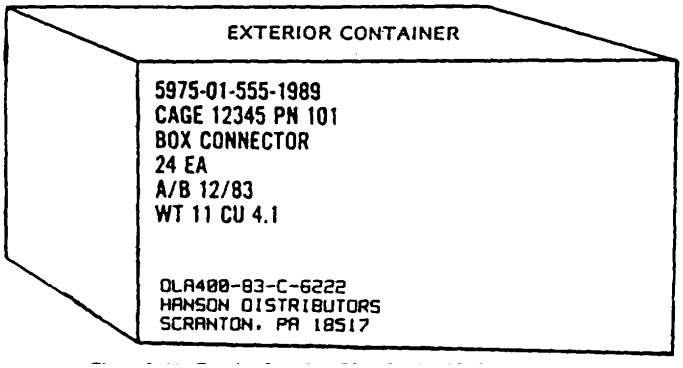


Figure 3-11. Exterior Container Identification Markings.

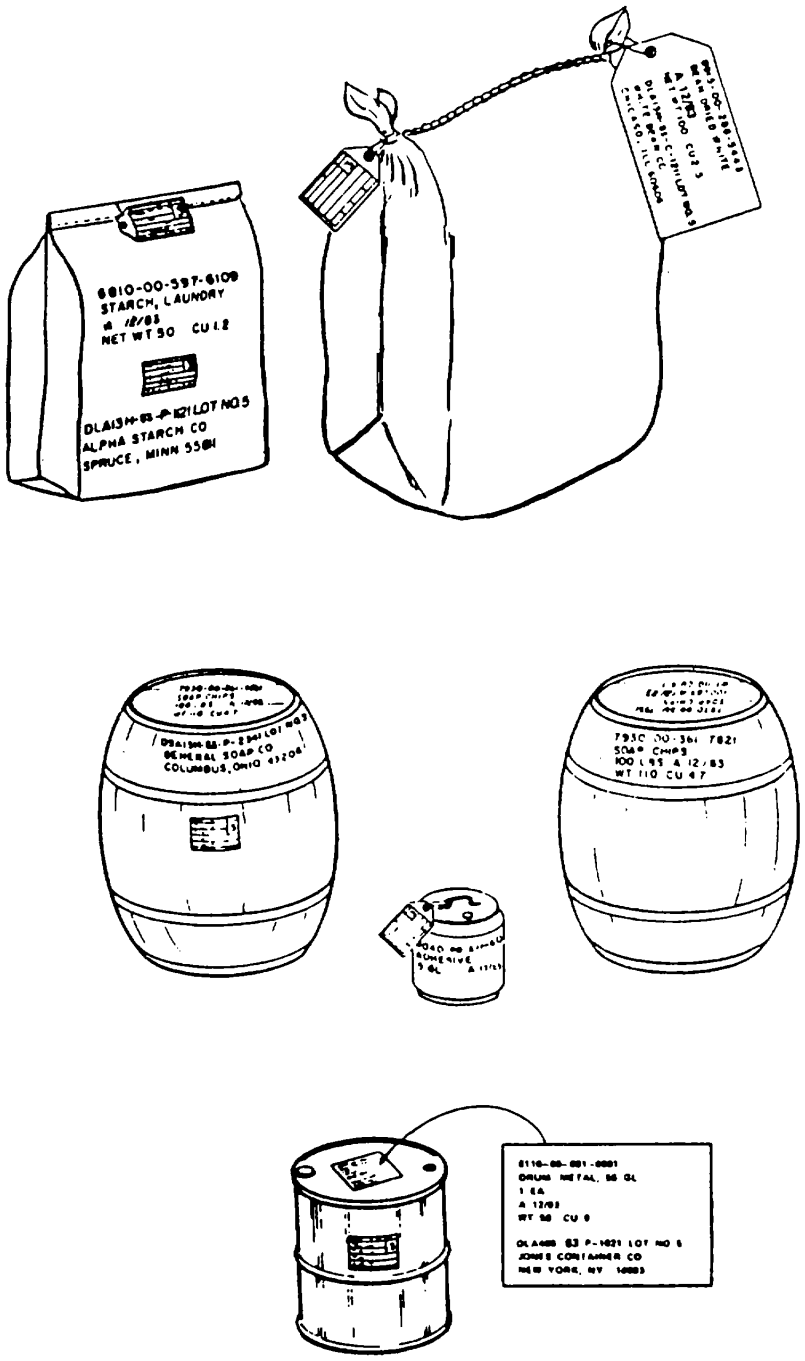


Figure 3-12. Exterior Container Identification and Contract Data Markings for Domestic and Overseas.

container must contain the following minimum identification information:

(1) National stock number (NSN).

(2) Item description.

(3) Quantity and unit of issue.

(4) Preserved on (month-day-year) for a maximum of 180 days or "not preserved," when applicable.

(5) Gross weight and cube (exterior container only).

(6) Condition code F (unserviceable and reparable). It should be noted that condition code F shall be applied only to those items that have been classified as unserviceable and economically reparable. Any other type of packaged materiel designated for return to recycling shall utilize the original identification markings as stated earlier.

d. Multipack identification markings. When containers of unrelated items are consolidated into a shipping container, the word "MULTIPACK" shall be applied to the shipping container along with the level of pack, date of pack, and gross weight and cube instead of the normal exterior container identification markings. Condition code F shall also be applied to rnultipack containers when the multipacks contain line items that have been classified as unserviceable and economically reparable. In addition to the exterior container multipack identification markings, each interior pack within the multipack shall be marked with the following minimum information: applicable NSN, item description, quantity, and unit of issue. An example of the exterior container identification markings on a multipack is-

MULTIPACK
A 12/88
WT 100 CU 4

An example of the minimum identification markings to be placed on an interior container within a multipack is

2910-00-456-7416
CARBURETOR
1 EA

e. Placement of identification markings (fig 3-13). Markings on unit and intermediate packs shall be located to allow the markings to be easily read when the containers are stored on shelves or stacked and to ensure that the markings will not be destroyed when the pack is opened for inspection. On a unit pack, the outermost wrap, bag, or container shall be marked. For exterior containers under 10 cubic feet, markings shall be applied to the upper left two-thirds of the side of the container having the largest marking surface area. Containers over 10 cubic feet are marked in the same location, but one end of the container (the end to the left of the identification side) shall also be marked in addition to the identification side.

f Unpacked major equipment identification markings (fig 3-14). Items that have identification plates shall not require identification markings. When items do not have marking plates, markings shall be stenciled on a marking panel made of wood, plywood, or fiberboard, and the marking panel shall be placed in the most suitable location on the item. If stenciled panels cannot be easily applied, a label shall be applied directly onto the equipment surface with PPP-T-60, type III, class 2, or PPP-T-70 pressure-sensitive tape that is placed over the label and is extended a minimum of half an inch from all edges of the label. For unpacked vehicles, identification markings and address markings shall be applied by stencil or label to a marking panel constructed of wood or wood-based panel (Y4-inch minimum thickness), %inch lumber, or Ys-inch hardboard (masonite or equal). When possible, markings shall be located on the vehicle at a height of not more than 6 feet or less than 4 feet. If the above locations are not practical, select the best alternate location.

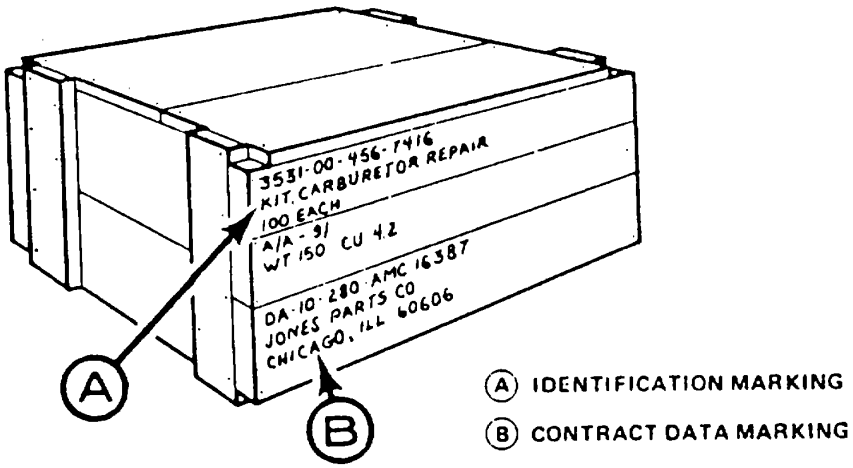
g. Palletized unit load identification marking (fig 3-15). Individual containers that comprise a palletized unit load shall be marked as specified herein. The palletized load shall be placed on the pallet so that the markings on the individual containers do not show on the two adjacent sides of the pallet load. Palletized loads with smooth surfaces may have the identification markings of the pallet load stenciled on the surfaces of two side-by-side, consecutive containers on the load. If the load does not have smooth surfaces, the markings shall be applied on a weather-resistant fiberboard, wood, or wood-based panel (Y-inch minimum thickness). Tags or labels may be used as alternatives. If stretch wrap on a palletized load obscures the identification markings, pressure-sensitive labels may be applied to the outermost layer of stretch wrap. These outside labels shall be in addition to the markings already applied. Labels shall be placed on either side of the load or on a marking board. All markings should be not less than three-fourths of an inch in height.

h. General address markings (fig 3-16 thru 3-18). The DD Form 1387 (Military Shipment Label) shall be used when preparing address markings.

(1) For shipments other than mail, the address label shall be completed as follows:

(a) TCN (transportation control number). Enter the 17-character (alphanumeric) TCN in both forms (bar coded, if possible, and in-the-clear).

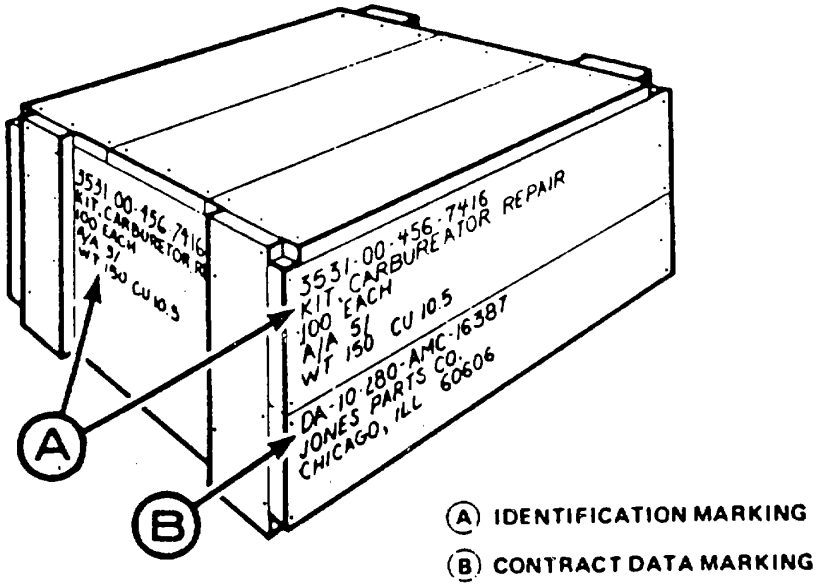
(b) Postage data. Leave blank.



Basic markings for a box under 10 cubic feet.

a. Containers under 10 cubic feet will be stenciled on the upper 2/3 of one side only.

b. Containers 10 cubic feet or larger will be stenciled in the upper 2/3 of one side and the upper 2/3 of one end.



Basic markings for a box 10 cubic feet and over.

Figure 3-13. Examples of Basic Markings for Small and Large Boxes.

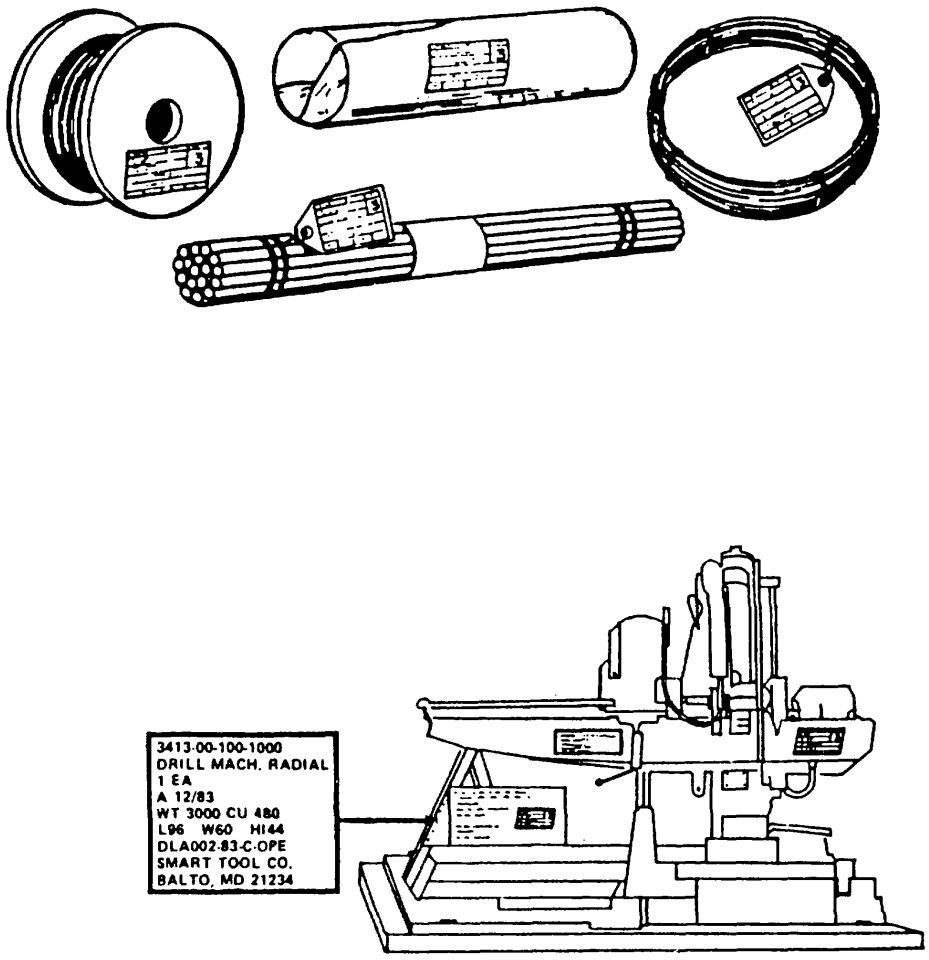


Figure 3-14. Identification and Contract Data Markings and Overseas Address Markings.

(c) *From*. Enter DOD activity address code (DODAAC) and in-the-clear address of the shipping activity.

(d) *Type service*. Enter Air Express, Blue Label, Over-night Delivery, etc., as applicable. If none, leave blank.

(e) *Ship to*/POE. Enter 3-digit Air/Water Port Code along with the in-the-clear port address, if appropriate.

(f) *Transportation priority*. Enter applicable transportation priority 1, 2, or 3.

(g) POD (*Port of Debarkation*). Enter 3-digit POD port designator from Military Standard 3-18 Transportation and Movement Procedures (MILSTAMP), if appropriate.

(h) *Project*. Enter project code, if applicable.

(i) *Ultimate consignee or Mark for*. Enter the DODAAC (bar coded, if possible, and in-the-clear); also, enter the complete address of consignee.

(j) *WT*. (*this piece*). Enter actual weight.

(k) *RDD* (*Required Delivery Date*). Enter RDD, as applicable.

(l) *CUBE (this piece*). Enter cube.

(m) *Charges.* Entry is mandatory for Foreign Military Sales (FMS) shipments. Enter

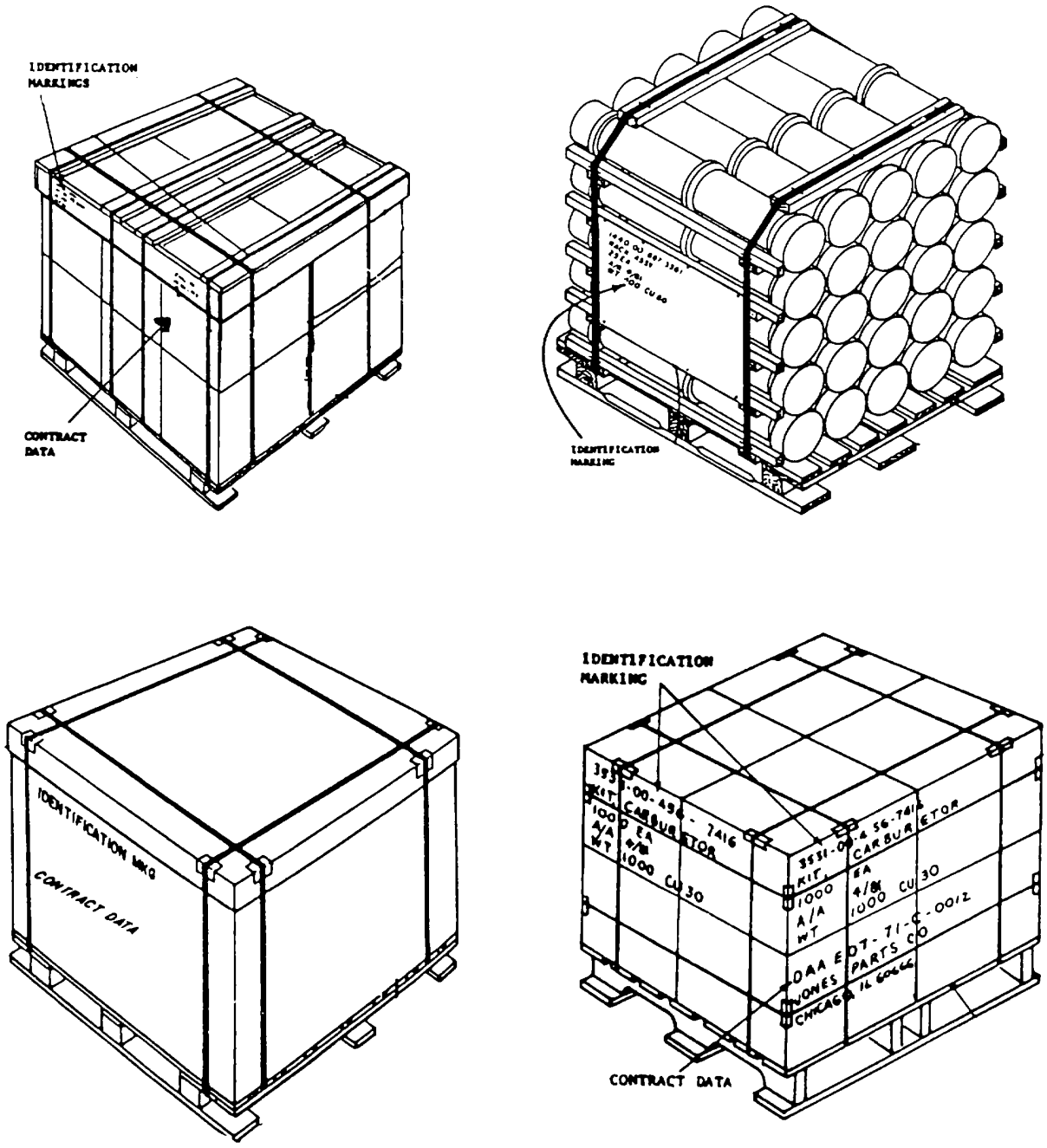


Figure 3-15. Identification and Contract Data Markings and Domestic and Overseas Markings for Palletized Loads.

CONUS inland freight charges on label of number one piece of shipment unit.

(n) Date shipped. Enter four-position julian date (e.g., 8180) or the in-the-clear date (e.g., 29 Jun 88).

(o) FMS case number. Enter as appropriate.

(p) Piece number. Enter bar coded, if possible, and in-the-clear.

(q) Total pieces. Enter total pieces in shipment unit.

(2) For mail shipments, the label shall be completed as follows:

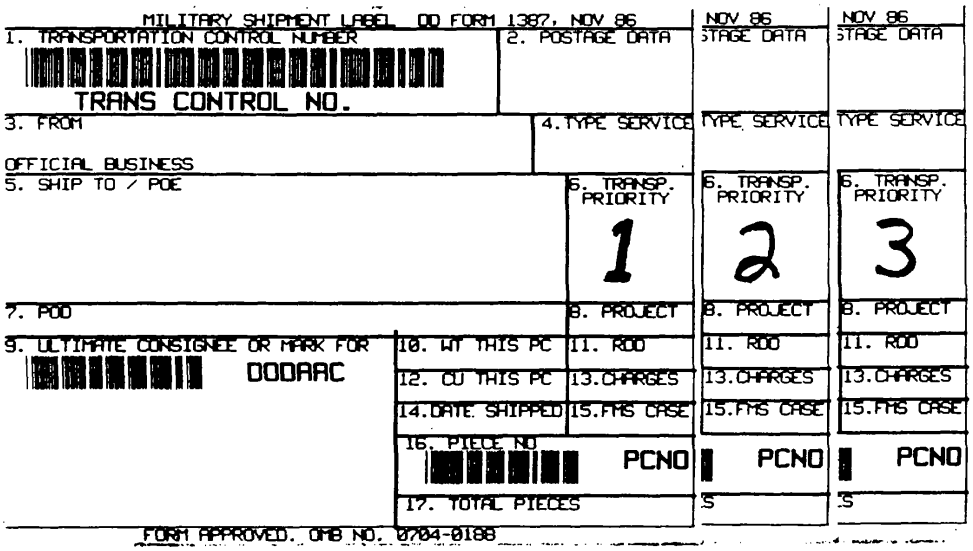


Figure 3-16. DD Form 1387 (Military Shipment Label).

(a) *TCN*. Enter the 17-character (alphanumeric) TCN in both forms (bar coded, if possible, and in-the-clear).

(b) *Postage data*. Use one of the following: 1 For metered mail, leave blank and attach the stick-on metered postage values to or near this block.

2 For permit imprint mail, enter the appropriate service or agency mail authorization.

Example: First Class Mail
Postage and Fees Paid
Defense Logistics Agency
Permit No. G-53

(c) *From.* Enter the in-the-clear address of the shipping activity, including the zip code. The phrase "OFFICIAL BUSINESS, PENALTY FOR PRIVATE USE $300" must be printed on the bottom line of this block.

(d) *Type service.* Enter First-Class Priority Mail, Express Mail, Military Ordinary Mail, etc., as applicable.

(e) *Ship to/POE*. For CONUS mail, enter the complete address of the consignee, including the nine-digit zip code. For mail to overseas locations, enter postal concentration at the Defense Transportation System port or MILSTAMP Air/ Water Port identifier (Army Post Office/Fleet Post Office).

(f) Transportation priority. Enter appropriate transportation priority.

(g) *POD.* Leave blank.

(h) *Project*. Enter project code, if applicable.

(i) *Ultimate consignee or Mark for.* Enter DODAAC of consignee (bar coded, if possible, and in-the-clear). For CONUS, no other data; for overseas shipments, add detailed address.

(j) *WT. (this piece).* Enter actual weight.

(k) RDD. Enter, if applicable.

(l) *CUBE (this piece).* Enter cube.

(m) *Charges*. Leave blank.

(n) *Date shipped*. Enter four-digit julian date (e.g., 8180) or the in-the-clear date (e.g., 29 Jun 88).

(o) *FMS case number.* Enter, if applicable.

(p) *Piece number*. Enter bar coded, if possible, and in-the-clear.

(q) *Total pieces*. Enter number of pieces in the shipment unit.

Whenever possible, the address labels shall be applied directly to the container and to the lower two-thirds of the side with the identification markings. When it is not possible to apply the label directly, the label shall be attached to a paper shipping tag (8135-01-256-1109) conforming to A-1-900 or it shall be applied to the lower two-thirds of a fiberboard or wood or wood-based marking board. Labels or tags shall not be obscured by strapping, cleats, or closure tape. If labels or tags are not available, stenciled address markings may be used.

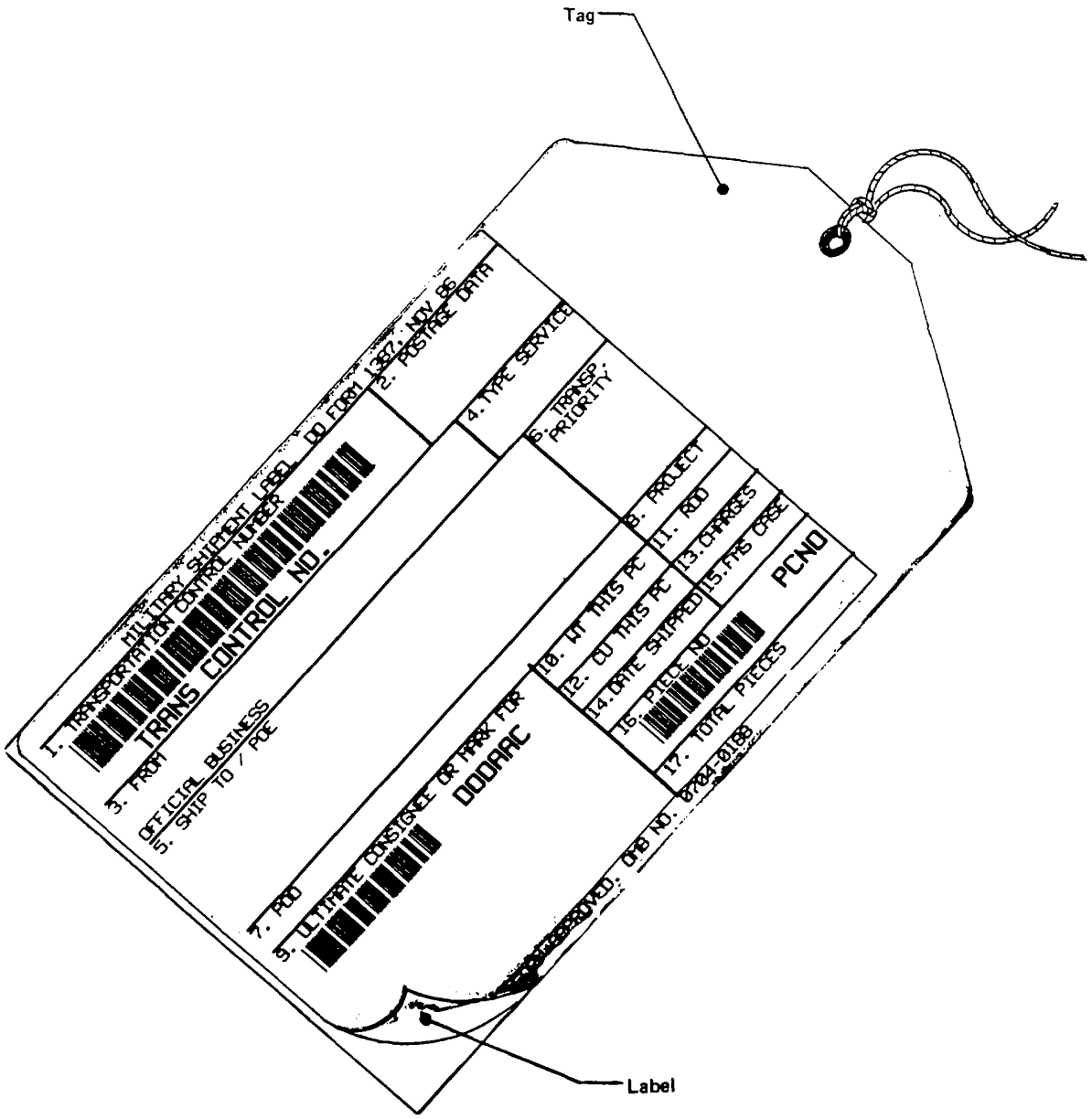


Figure 3-17. DD Form 1387 (Military Shipment Label) on General Purpose Tag.

i. Unpacked major equipment address marking. On major equipment that is not packed, the DD Form 1387 may be applied either on a marking panel or directly onto the equipment surface as detailed in f above. If a suitable location is not available, the label may be placed on a tag, and the tag should then be placed on the equipment in a suitable location. For unpacked vehicles, apply the address label to a marking panel made of wood or wood-based panel (1/4-inch minimum thickness),1/2-inch lumber, or 1/2-inch hardboard (masonite or equal). An alternate method of applying the label is by taping it directly on the vehicle's surface with PPP-T-60 or PPP-T-70 pressure-sensitive tape. The address should be located in the rear or on the right side near the rear of the vehicle.

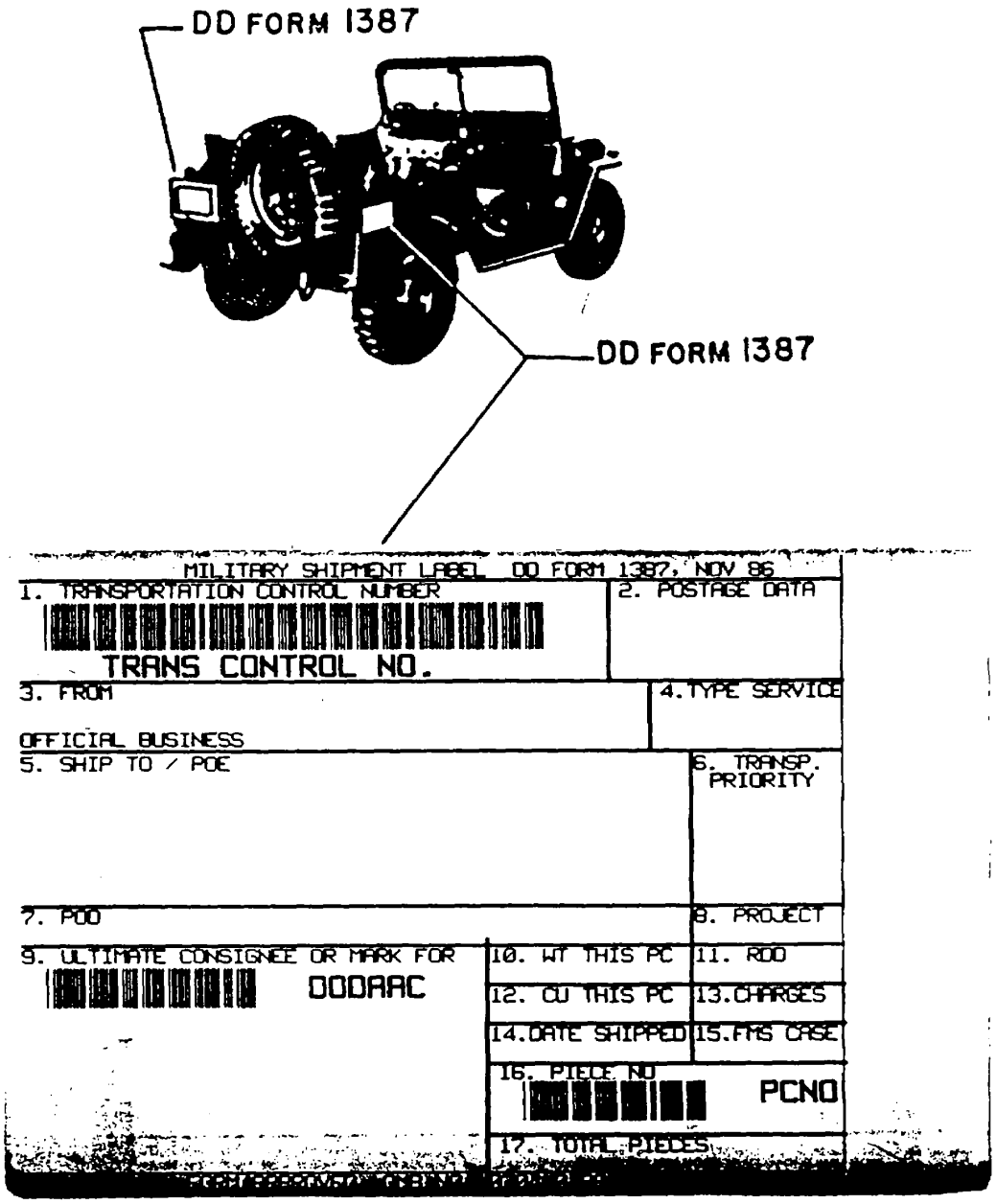


Figure 3-18. Overseas Address Markings for Vehicles.

It should also be noted that unpacked materiel shall be marked to indicate that preservation has been performed.

j. Palletized unit load address marking. Provided that a smooth surface is available, apply the address label to the lower one-third of the identification marked surface of the load. If the load does not provide a smooth surface, place the label on a weather-resistant fiberboard or wood or wood3-22 based panel or on a tag placed in any suitable location on the identification marked surface.

k. SEA VAN/MILVAN address marking. The address for SEAVAN and MILVAN shall be marked on a DD Form 1387 which, in turn, is attached to the rear of the SEAVAN/MILVAN. Shipping containers, palletized unit loads, and unpacked items consolidated into a full SEAVAN/MILVAN load by the original shipper for delivery as a unit to the

ultimate consignee do not require address markings. Consolidation activities receiving shipments for consolidation into SEAVAN/MILVAN are not required to obliterate address labels applied by the original shipper.

l. Special markings (figs 3-19 and 3-20). Some shipments of retrograde/recyclable materiel require special markings. Some of these markings are-

(1) *Classified shipment markings*.

(a) Shipments of classified material shall not have packing lists attached to the outside of the container.

(b) Markings indicating the classified nature of the material, its manufacture, and its security classification shall not appear on the exterior of the container.

(c) Appropriate instructions shall be issued by the cognizant activity concerned or by departmental regulations.

(2) *Transportation protective service markings.*

(a) Shipments identified as classified or sensitive cargo or items requiring special handling during transit shall be provided "Signature Security Service, Protective Security Service, Armed Surveillance, or Armed Guard Service."

(b) When required by the applicable carriers tariff, each exterior container shall be labeled or tagged to indicate the service requested in the lower right hand corner of the identification marked side.

(c) When shipments are sent by military aircraft, the shipper shall prepare a DD Form 1387-2 (Special Handling Data/Certification) per the requirements of TM 38-250 and DOD 4500.32-R.

(3) *Set or assembly markings.*

(a) When a set or assembly is placed in two or more containers, all containers with component parts are shipped together.

(b) Each container will have its own number within the set, the total number of containers making up the set, and the number of the set within each shipment.

(c) A 2-inch, black disc will be placed above these numbers on each container. For surfaces on which black is not legible, a yellow or white disc must be applied.

(d) All component parts of disassembled items will have the serial number of the item on each shipping container of the set. An example is-

•
SET 1
PK 1 OF 5
SER NO. 18063

(e) If the item has no serial number, a date (month, day, year) followed by a capital letter to identify a set or assembly shall be shown on the shipping container instead of the serial number. Each set shall bear a different letter. Examples are-

•	•	•
SET 1	SET 2	SET 3
PK 1 of 3	PK 1 of 3	PK 1 of 3
4-1-76A	4-1-76B	4-1-76C

(f) Set or assembly markings will be placed on the surface containing the identification markings and shall be located in the lower right-hand corner.

(4) *Single stock-numbered sets.*

(a) This marking is used when the components of a single stock-numbered item are packed in two or more shipping containers or stored together as a set.

(b) The stock number shown on each shipping container will be that of the complete set and will be prefixed with "P/O" (part of).

(5) *Method II marking*. Method II packs which serve as shipping containers must bear a Method II precautionary label, OF 73 (7540-00-139-4738) or OF 74 (7540-00-139-4752), on the identification marked side.

(a) Method II markings may be applied by using this label or by printing or stenciling a copy of the label on the container using waterproof red ink.

(b) When there is insufficient space for applying the label, the words "METHOD II PACKAGE-DO NOT OPEN UNTIL READY FOR USE" in letters as large as space permits must be printed or stenciled on the container adjacent to the identification markings.

(6) *Serial number markings*. An item assigned a serial number shall have the number applied to the unit pack and the intermediate and exterior containers preceded by the abbreviation "SER NO." The serial number shall be located directly below the identification markings. (Example: SER NO. 26481.)

(7) *ARI markings.* In addition to the requirements given in paragraph 1-12, project code disc labels for ARI markings shall be used. Lettering shall be black on a white background. Labels shall be stenciled or printed in the center of the disc (or circle) with the code letters "ARI" proportionate to the size of the circle. Two sizes of labels are available for use. DA Label 143 (Project Code DISC) (3X3) has a 2-inch diameter disc in its center, while DA Label 143-2 (Project Code DISC) (9X9) has a 6-inch diameter disc in its center. In general, containers with sides 24 inches or more in length or tubular-shaped containers with a circumference

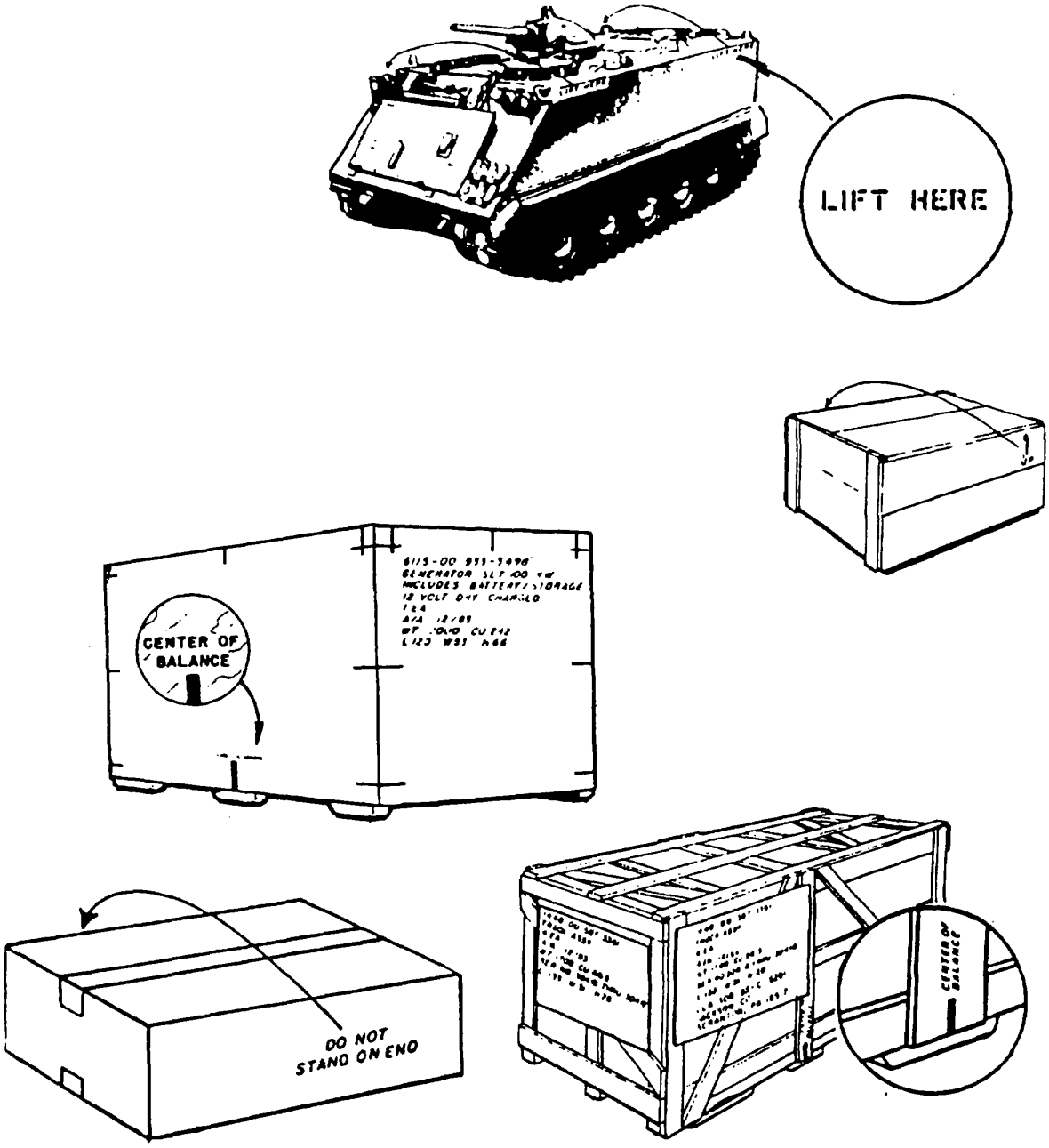


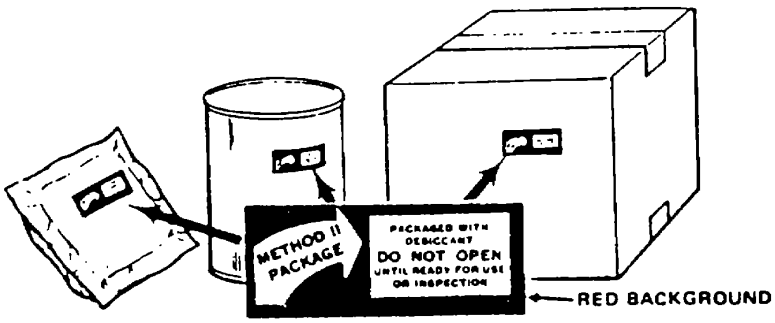
Figure 3-19. Examples of Special Markings.

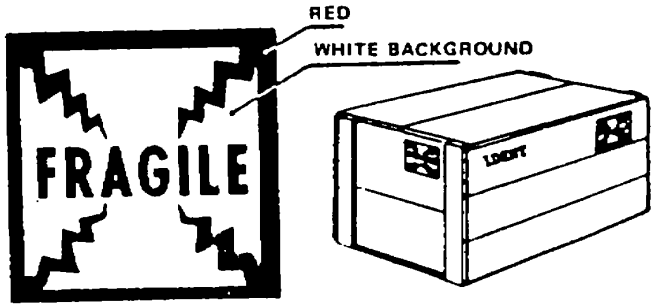
of 24 inches or more should employ the 9by 9-inch (6-inch disc) label, while containers with sides under 24 inches in length should use the 3by 3-inch (2-inch circle) label.

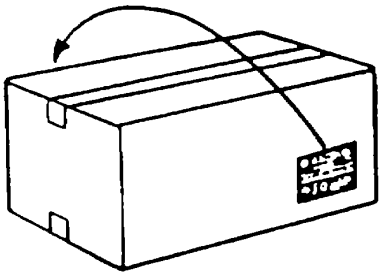
(a) ARI labels shall be applied with MMM-A-179 adhesive placed both on the container and over the label (1 inch on all sides) and with sufficient drying time allowed (approximately 5 minutes). Labels shall be applied as follows:

1. *Rectangular containers, consolidation containers, and palletized loads*. Two labels, one on each side.

2. *CONEX containers*. One disc on each marking board. The 9- by 9-inch label is preferred. However, if the board surface size is not sufficient to accommodate the larger label, then the smaller label shall be used.







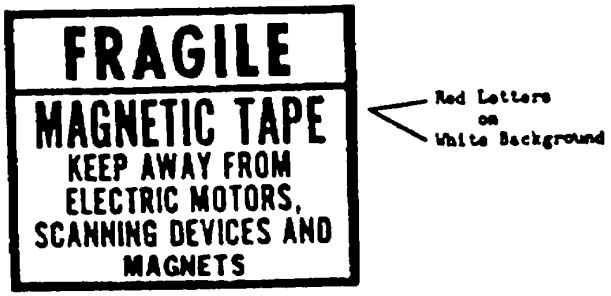


Figure 3-20. Examples of Special Marking Labels.

CAUTION
Do not cover other markings with the project code label.

3 Cylindrical containers. Two discs equally spaced and on opposite surfaces of the circumference.

4 -Irregular-shaped containers and loose or unpacked items. Stenciled or printed on the identification marked side of a tag.

5 Vehicles or other major, unpacked items. One disc on each marking board. As an alternate method, discs may be applied directly on the vehicle or equipment, secured with PPP-T-60, type III, class 2, or PPP-T-70, pressure-sensitive tape. The tape shall be placed on all four edges of the label and shall extend a minimum of one-half inch from the edges.

6. *Parcel post.* One disc adjacent to the address marking.

7. *MILVANs/SEAVANs.* No label required. However, the containers or items comprising the van load shall be labeled as specified herein.

(b) Label adhesive MMM-A-179 shall be used on all wooden boxes, crates, fiberboard boxes, plastic or fiberglass containers, and marking boards. For vehicles or equipment with painted surfaces, use the label adhesive listed in the applicable paragraph herein for the coating of address labels.

m. DD Form 1750.

(1) *DD Form 1750 defined*. A DD Form 1750 (Packing List) provides a description of the contents of a multipack container or unitized load and shall be used for shipments generated by DOD activities.

(a) Each set, kit, or assembly having unlike stock-numbered items but identified by a single stock number shall have a packing list attached to the end or side of the container.

(b) Each set, kit, or assembly comprising a palletized-unitized load or consolidation container shall also have a packing list attached to the exterior surface of each container.

(c) Sets that consist of unlike stock-numbered items that are contained in two or more exterior shipping containers (single stock-numbered assembled sets) require a packing list for each container.

1. The packing list shall be attached to the exterior of each container.

2. A master packing list shall be prepared for the set and a copy attached to the number one container.

(2) *Application of packing lists*. Two copies shall be prepared for each multipack container. One copy is placed in a bag and placed inside the container. The other shall be sealed with tape or put in a water-resistant envelope (PPP-E-540, class 4) that shall be firmly sealed to the exterior of the container.

(a) The water-resistant envelope shall be secured to the exterior of the palletized load or container in the most protected location with pressure-sensitive tape, tacks, or staples, or it can be secured in a pressure-sensitive envelope.

(b) For overseas shipments, except parcel post, the waterproof envelope shall be further protected with a packing list protector securely attached to the palletized-unitized load or container.

(c) When tacks or staples are used, they shall not be driven into the envelope in such a manner as to fasten or bind the packing list, nor shall they be of such length to penetrate the container.

(3) *Alternate application of packing lists.* An alternate method of applying a packing list to fiberboard, metal, or plastic containers is the placing of a glassine sheet of paper over the folded packing list, then applying transparent tape over the glassine sheet.

(a) The tape should extend half an inch from all edges of the packing list.

(b) The glassine paper shall have the words "PACKING LIST ENCLOSED" printed on the face.

n. DOD Form 1348-1.

(1) *Shipment units of single line items*. One copy of DD Form 1348-1 (DOD Single Line Item Release/Receipt Document) must be attached to the materiel in shipping container No. 1. In addition, at least one copy will be enclosed in a water-resistant envelope and attached to the outside of the number 1 shipping container.

(a) When the storage container is used as the shipping container, the copy normally placed on the inside of the container shall be enclosed with the copy attached to container No. 1. For overseas shipments, the water-resistant envelope shall be further protected with an envelope protector with the words "Materiel Release/Receipt Documents" marked on the outside of the protector.

(b) If containerization of the shipment unit is accomplished by the shipper, an additional copy must be securely fastened to the inside door or access wall of the container.

(c) If containerization takes place later during the movement process (e.g., transshipment points), a copy of DD Form 1348-1 will be removed from the water-resistant envelope and will be

fastened to the inside door or access wall of the container.

(2) *Shipment units of multiple line items*. One copy of DD Form 1348-1 must be placed in a PPP-E-540, class 4, water-resistant envelope in such a manner that the NSN is visible.

(a) The bag must be attached to the package applicable to each requisition by either transparent tape or masking tape.

(b) When a polyethylene bag is used to group a single item for packing, DD Form 1348-1 will be placed in that bag.

(c) At least one copy applicable to each requisition shall be placed in a water-resistant envelope and shall be attached to each multipack container.

(d) For overseas shipments, the water-resistant envelope must be further protected with an envelope protector marked on the outside with the words "Materiel Release/Receipt Documents." (e) When this procedure is used, DD Form 1348-1 serves as the packing list.

(3) Alternate method of attaching papers which accompany a shipment onto fiberboard boxes. DD Form 1348-1 may be attached to fiberboard boxes in the following manner:

(a) Prior to sealing the box, the papers are placed in a water-resistant envelope.

(b) The envelope is placed under the flaps of the box so that the open end flap of the envelope extends down the end of the box under the closure tape.

(c) The words "PAPERS HERE" in letters half an inch high must be placed on the tape directly over the envelope containing the papers. This method of attachment is required for registered parcel post shipments.

o. Materiel condition code markings and authorized forms. Materiel condition tags or labels shall be used whenever the possibility exists that materiel may become mixed in shipment or storage or when evidence is necessary for materiel control and the prevention of duplicate inspections. Condition codes are defined in DOD 4000.25-2-M and are implemented by specific departmental directives. The tags and labels described below are authorized for use in identifying the materiel or indicating the condition(s) of the materiel to which they are attached. They should not be used indiscriminately on serviceable materiel that does not present a shipping or storage problem. One tag or label should be applied to the item, and one should be applied to the shipping container. If several items or unit packs are placed in a single shipping container, then each item or unit pack must be labeled or tagged.

(1) *DD Form 1574 and DD Form 1574-1.* Materiel that is serviceable (issuable without qualification, issuable with qualification, or priority issue) shall be conspicuously marked with either DD Form 1574 (Serviceable Tag-Materiel) or DD Form 1574-1 (Serviceable Label-Materiel). The tag and the label should have yellow margins and letters. While it is preferable to have the lettering be the same color as the border, there may be cases when printing is not legible, especially in poorly lighted warehouses. In these instances, black lettering may be used. To assist in identification, a 1by 5-inch yellow stripe may be printed on the back of each tag.

(2) *DD Form 1577-2 and DD Form 1577-3*. Materiel that is unserviceable (limited restoration, reclamation, or incomplete) shall be conspicuously marked with either DD Form 1577-2 (Unserviceable (Repairable) Tag-Materiel) or DD Form 1577-3 (Unserviceable (Repairable) Label-Materiel). Both the tag and label should have green margins and letters. To assist in identification, a 1by 5-inch green stripe may be printed on the back of each tag.

(3) *DD Form 1577 and DD Form 1577-1*. Materiel that is unserviceable (condemned or scrap) shall be conspicuously marked with either DD Form 1577 (Unserviceable (Condemned) Tag Materiel) or DD Form 1577-1 (Unserviceable (Condemned) Label-Materiel). Both the tag and label should have red margins and letters. To assist in identification, a 1by 5-inch red stripe may be printed on the back of each tag.

(4) *DD Form 1575 and DD Form 1575-1*. Materiel that is suspended (stocks awaiting classification, returns awaiting classification, or stocks held pending negotiation or litigation) shall be conspicuously marked with either DD Form 1575 (Suspended Tag-Materiel) or DD Form 1575-1 (Suspended Label-Materiel). Both the tag and label should have brown margins and letters. To assist in identification, a 1by 5-inch brown stripe may be printed on the back of each tag.

(5) *DD Form 1576 and DD Form 1576-1*. Serviceable materiel that requires testing, alteration, modification, conversion, or disassembly prior to issue shall be conspicuously marked with either DD Form 1576 (Test/Modification Tag Materiel) or DD Form 1576-1 (Test/Modification Label-Materiel). The tag or label should have blue margins or letters. To assist in identification, a 1by 5-inch blue stripe may be printed on the back of each tag.

p. Other required record forms for major items (retrograde and recycled materiel). As discussed in paragraph 1-6f and as required by TM 38-750, an

equipment log book shall be completed for major equipment utilizing, as applicable, either of the following:

(1) DA Form 2258.

(2) DD Form 1397. The log book shall be packaged per the provisions of submethod IC-4 and shall be securely attached in or on the equipment. For each major item that is preserved and processed, the appropriate form, as described above, will be prepared in duplicate according to the preparation instructions for each, and all applicable entries will be made. One copy of the completed form will be placed in a waterproof envelope marked "Depreservation Guide" or "Deprocessing Record" and will be attached to the steering wheel or other operator control on the equipment. When packing spare engines, it shall be placed on top of the engines. The second copy will be placed in the package containing the equipment log book and will be marked to show that the copy is inside.

q. Other marking requirements. General and specific marking requirements provided herein have been given to assist support units in performing the most often used, routine marking procedures when shipping and handling retrograde and recyclable materiel. However, these requirements do not cover every marking instance. When further direction is needed to correctly mark containers, refer to MIL-STD-129.

3-6. Form-in-Place (FIP) Packaging

a. General. FIP may be used to package economically reparable materiel when it has been determined that FIP can afford adequate protection during shipment and for 180 days maximum storage after considering the item(s) size, weight, and degree of fragility. All three classes of foams (flexible, rigid, and semirigid) that are used for FIP are excellent materials for cushioning or blocking and bracing. They should be considered when-

(1) The original container is damaged or missing.

(2) The original blocking, bracing, cushioning, or any other dunnage is damaged or missing.

(3) The use of FIP would be more cost effective than the use of other cushioning materials. It shall never be used for items that are susceptible to damage from Electrostatic Discharge (ESD) because urethane foams are a generator of ESD. Additionally, items that are susceptible to damage or deterioration from exotherm temperatures of 150°F or above shall never be packaged using FIP techniques.

b. Polyurethane foam. Polyurethane dispensing foam is a two-part (designated A and B) chemical. When mixed and dispensed together, the resulting material expands and forms around the item inside the container to provide cushioning or blocking and bracing.

c. Recycled foam. Recycled or scrap foam may be used if the foam is of the same approximate density as that of freshly dispensed foam. Scrap foam may be used for blocking or filler but should not exceed 50 percent of the total foam volume. Its use should be minimal, and it should never be used as a filler for technique VII packs of MIL-STD-1191. It is most appropriately used for positioning an item.

d. Unit protection. Unit protection such as preservatives, wraps, and barriers shall be that which is required for the individual items as specified in packaging instructions for reparables (para 3-3f) and per MIL-P-116.

e. Dispensing equipment. Any equipment may be used to mix and dispense the foam chemicals provided the quality of the finished foam meets MIL-F-83671 requirements and the dispensing equipment conforms to MIL-F-87075.

f Foaming conditions. All of a component's surfaces and wraps and the void areas to be foamed shall be conditioned and maintained at a constant temperature range of 60 to 100°F. Chemical ingredients shall not be exposed to temperatures other than those recommended by the equipment supplier. Foamed surfaces shall be free of grease, oil, loose particles, moisture, and all other foreign matter.

g. Platens. Platens or load-bearing supports shall be used as cushioning for sharp-ended items in order to prevent these type items from penetrating the foam and to prevent the items from shifting (fig 3-21).

h. Techniques. MIL-STD-1191 lists the following eight FIP techniques:

(1) Split pack, standard.
(2) Split pack, alternate.
(3) Split pack, inverted.
(4) Foam in bag.
(5) Special technique, modified.
(6) Preformed molding.
(7) Foamed container.
(8) Encapsulated pack.

The most common techniques for field level application are the split pack alternate, the split pack standard or inverted, and the encapsulated pack. The split pack standard technique is the same as the split pack inverted technique except that the blocking is not removed and the item is not inverted in the standard technique (fig 3-22).

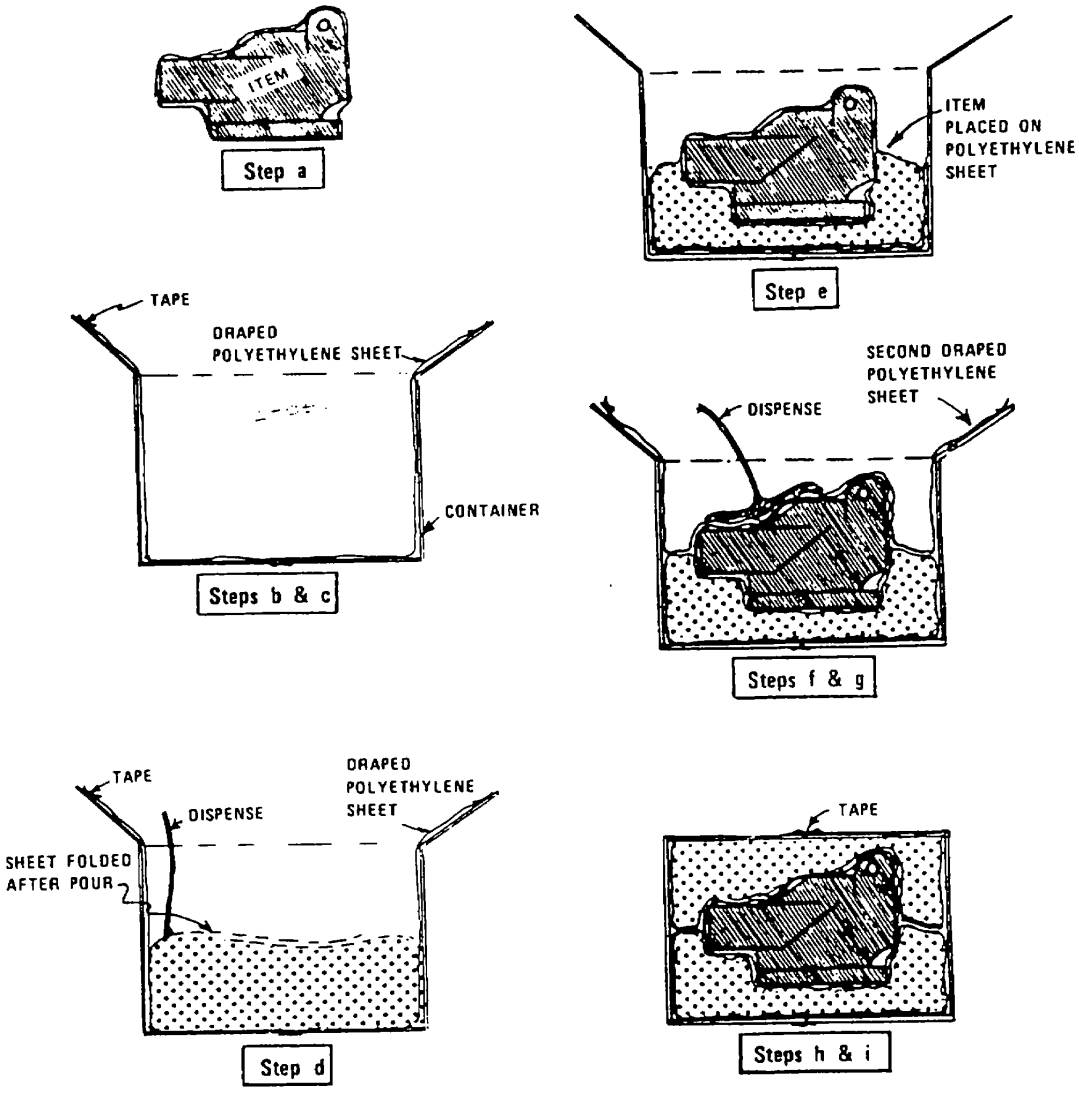


Figure 3-21. FIP Split Pak, Alternate Technique.

Instructions contained herein are for these four techniques. Field packaging facilities may use, but are not limited to, these four techniques. If other techniques are to be used, refer to MIL-STD-1191.

i. Safety. As required, the following safety procedures shall be followed by all personnel during the dispensing of foam and the fabrication of containers:

(1) When preparing or dispensing foam, all personnel involved in the operation shall wear protective equipment and clothing including goggles or face shield, rubberized gloves, and a protective apron or coveralls. Personnel engaged in box fabrication shall wear safety glasses, safety shoes, and gloves.

CAUTION
Do not wear gloves while operating power tools such as power saws and drills.

(2) If chemical component A or B is splashed onto the skin, wipe the chemical off with a clean cloth and immediately apply tincture of green soap or rubbing alcohol to the splashed areas. Wait 5 minutes and wash or shower with clean water.

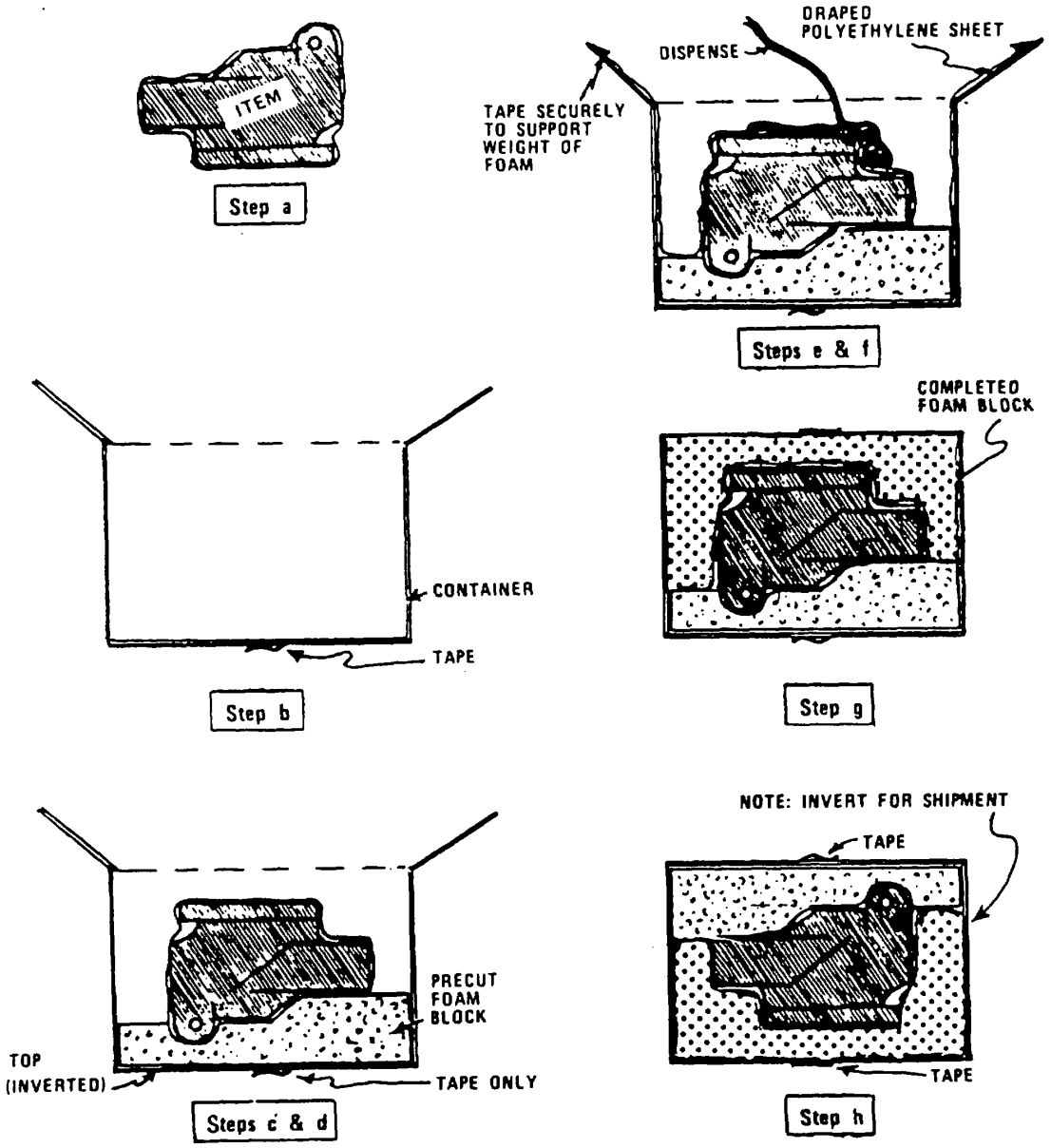


Figure 3-22. FIP Split Pack, Inverted Technique.

the chemicals are splashed into the eye, flush immediately with clean water for approximately 5 minutes while holding eyelids apart. After flushing, obtain medical assistance immediately. Similarly, if someone is overexposed to vapors from the chemical components, he or she should be transported to a physician at once. If any of the chemicals are accidentally swallowed, vomiting should be induced, and the victim should be transported immediately to a physician.

CAUTION

If the subject starts convulsing or becomes unconscious, do not induce vomiting, but immediately transport to a physician. When transporting injured personnel to a physician for treatment, obtain as much information as possible about the chemicals to facilitate diagnosis and subsequent treatment.

ing tanks should be drained of cleaning solvent when the solvent becomes contaminated and proper disposal of solvent should be made. Tanks should be thoroughly cleaned prior to filling them with cleaning solvent. Covers on cleaning and preservative tanks should be closed when not in use.

1-11. Reclamation of Packaging Materials

A significant savings in packaging supplies may be realized from the careful reclamation and reuse of salvageable packaging and packing materials. Effective management will prevent an accumulation of materials in excess of reasonable requirements. A reclamation goal of 50 percent of requirements should be established initially and adjusted from user experience.

a. Storage of reclaimed materials. If materials are to be reused, a storage area is necessary. Such an area must be arranged per the same considerations made when planning a warehouse for spare parts storage.

b. Wood containers. Boxes and crates must be sorted by size and stacked so that they can be located as needed. Covered storage is required. However, any type protection that denies visibility and discourages the reuse of containers such as covering boxes with tarpaulins is not recommended.

(1) *Container disassembly*. When boxes or crates are disassembled for reuse, component frame members and boards should be sorted by sizes and stocked per TM 743-200-1.

(2) *Nailing reclaimed lumber and material examination*. When renailing lumber, the original size nails shall be used. Driving new nails into existing prenailed holes shall be avoided to assure maximum grip of the wood. Lumber is not the only material that should be considered in a conservation program. Fiberboard boxes, wrapping paper, greaseproof paper, bags, and cushioning materials should be inspected upon removal from a container to determine reuse possibilities.

1-12. Packaging of Automatic Return Items (ARI)

a. Benefits. The return of economically reparable materiel back to the depots or repair facilities for cycling back into the supply system is a viable and important program. The benefits derived from the Materiel Returns Program are measured not only in monetary savings but also in logistical support efficiency. The lack of proper packaging or TM 746-10 marking of ARIs can be costly and can have an adverse effect on our mission capabilities.

b. Packaging. Packaging of ARIS is generally accomplished by packing the item to be shipped in the same container in which the replacement item was received. However, if this is not possible, the applicable packaging section of this manual should be referred to for the packing of the individual item.

c. Marking. In addition to marking and labeling requirements specified for the individual item for shipment and storage, project code discs for ARIs shall be affixed to the exterior container per paragraph 3-51(7) and MIL-STD-129.

1-13. Health and Safety

a. Policy.

(1) No instructions contained in this manual authorize any compromise with safety requirements in the preservation, packing, or handling of general supplies and equipment.

(2) Safe operating procedures should be observed at all times.

(3) Shippers will affix a materiel inspection tag to each vehicle, weapon (except small arms), or other piece of major equipment indicating that all explosives have been removed prior to shipment from overseas commands. The tag will be affixed in a readily visible location and in a manner that will protect it from deterioration and mutilation and preserve its legibility.

b. General. TM 38-230-1 identifies potential hazards which are associated with certain cleaning processes and describes precautionary measures to be taken when using volatile corrosion inhibitors (VCI). Relevant safety procedures governing the use of protective equipment, as listed in TM 38-230-1, should be posted in all applicable work areas and should be brought to the attention of all individuals working in or visiting the packaging area.

c. Polyurethane FIP blocking. Potential hazards associated with the use of FIP procedures should be minimized through the use of proper preventive measures and controls. Specific guidance may be found in Upjohn Technical Bulletin 107 and from local industrial hygiene, medical, and safety personnel. MIL-STD-1191, MIL-F-83671, and MIL-F-87075, should be consulted for additional safety and health considerations including first aid procedures. Other considerations are

(1) *Personnel*. Operators of polyurethane foam equipment should be specialists who have been thoroughly schooled in first aid, equipment functioning, and maintenance.

(2) Ventilation. Work areas should be well ventilated, preferably by using a downdraft-type exhaust booth, when using machine-dispensing equipment or when making large foam pours.

(3) Protection from particle inhalation. Organic vapor masks or respirators are required for foam dispensing operations. Prolonged breathing of the fumes from the product should be avoided. Personnel having bronchial difficulties or possessing allergic reactions should not work with polyurethane foam materials.

(4) Protective clothing. Plastic aprons or coveralls and neoprene gloves are required. Additionally, glasses or goggles shall be worn during the actual foaming operations.

1-14. Changes and User Review

a. Changes. Changes and revisions to this manual shall be made as required.

b. User review. Users are encouraged to submit comments and recommended changes for improving the manual. Comments and recommendations should be keyed to a specific page, paragraph, and line of text. Reasons should be provided to ensure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and should be forwarded to: Director, U.S. Army Material Command Packaging, Storage, and Containerization Center, ATTN: SDSTO-T, Tobyhanna, PA 18466-5097.

CHAPTER 2

QUARANTINE INSPECTION

2-1. Preparation for Quarantine Inspection

a. When materiel is to be returned to CONUS, preparation for quarantine inspection shall be accomplished as follows:

(1) Completely clear soil from all equipment and containers when loading on ships or aircraft.

(2) Clear all containers including CONEX transporters, SEAVANs, and MILVANs of all spilled grain, foodstuff, or soil before loading with retrograde cargo or returning empty to CONUS.

(3) Inspect wood containers and packing material for termites, wood borers, or other insect infestation before packing in larger containers or loading on ships or aircraft. Under no circumstances will infected wood or packing material be used.

(4) Inspect all containers and packaging material prior to packing to ensure the absence of any insects or animals.

(5) Use only authorized packaging material. Do not use native grasses or fibers. Stow all packaging material to prevent infestation by insects or rodents.

b. Treat all box and crate-type containers as follows:

(1) Apply diazinon dust, 2 percent, 684000-753-5038 (unit of issue 25-lb pail), to the interior of each container at the rate of 4 pounds per 1,000 square feet. Do not exceed this amount. Evenly apply insecticide to the floor and surface of the containers. The application shall be spread toward the walls and upper corners to help reduce the transporting of quarantinable pests or insects. Dust can be applied with either a manually operated, rotary fan duster, 3740-00-132-5935, or a manually operated, tubular pump, 3740-00-132-5936. The latter is preferred for use with smaller boxes.

(2) Rodenticide should be used in 8-ounce bait blocks of diphacinona-paraffin, 6840-00-089-4664 (unit of issue 20-lb box), in containers of more than 10 cubic feet. Place one block near the center of each container. Extend the red tape attached to the block to the outside of the container so that the tape is clearly visible when the container is closed.

c. Treat CONEX containers, SEAVANs, MILVANs, or closed trailers as follows:

(1) Attach 2-inch strips of dichlorvos insecticide, 6840-00-142-9438 (unit of issue 144 per case), to the interior of each closed container at the rate of 5 linear inches of strips per container. Attach the strips to the ceiling of containers and into areas with the greatest amount of open space. The 2-inch strips should be used at the rate of 3 per CONEX and a minimum of 12 per SEAVAN, MILVAN, and closed trailer.

(2) One 8-ounce rodenticide bait block of diphacinona-paraffin should be used for each 5 linear feet evenly spaced throughout the length of the container. Extend the red tape from the block nearest the opening to the outside so that the tape is clearly visible.

Note

In the event vans or trailers are loaded with containers that have already been treated, use 3 bait blocks evenly spaced throughout the length of the vans or the closed trailers. Extend the red tape from the block nearest the door to the outside so that the tape is clearly visible.

d. Prepare the retrograde aircraft for quarantine inspection as follows:

(1) Use 2-inch dichlorvos strips for insect control in aircraft that have been sealed while being processed for return to CONUS. Dichlorvos strips of varying lengths may be available, and the number of strips should be varied accordingly. For example, one 5-inch strip can be used instead of three 2-inch strips, or one 10-inch strip can be used instead of six 2-inch strips. The insecticide strips will be used as follows:

Aircraft	*Dosage*	
	5-inch strip	*2-inch strip*
0-1, U-1, U-6, OV-1	1	3
U-8, U-21	3	9

When multiple numbers of strips are used, suspend them in different sites rather than in a single location.

(2) One 8-ounce rodenticide bait block of diphacinona-paraffin should be placed near the door of the aircraft. Extend the red tape that is attached to the block to the outside of the aircraft so that the tape is clearly visible when the door is sealed.

e. Treat tanks, trucks, shelters, and all other large items of equipment per c above.

f. In the event the instructions given above are at variance with the command regulations regard-

ing shipment of retrograde cargo, consult the Command Surgeon's Office. Obtain technical assistance and advice regarding these instructions from the Command Surgeon's Office.

2-2. Safety Instructions

Ensure that personnel involved in applying the dust, strips, and bait blocks wear gloves, protective clothing, and respirators as recommended by the Command Surgeon or Command Engineer.

2-3. Decontamination of Retrograde Materiel

Insecticide and rodenticide materials must be collected and disposed of during the unpacking operations. These materials must be removed from all containers before individual items are unpacked or equipment is processed. This includes all containers that have been treated with diazinon dust or dichlorvos strip insecticides and all containers that have red tape extending through a container opening or have red tape extending from a block or blocks of diphacinona-paraffin rodenticide. These pest treatment materials shall be removed before unpacking of the contents and shall be collected and disposed of as follows:

a. For removal and disposal of dust and bait blocks -:

(1) When opening a container treated with diazinon dust and rodenticide, vacuum clean to collect the diazinon dust as the individual items or packs are removed from the containers. Remove dust from each pack.

(2) After contents have been removed and cleaned, vacuum the inner surfaces of the container to remove remaining dust.

(3) Remove rodenticide bait blocks during unpacking.

(4) Place all dust and bait blocks in separate closed metal containers for collection and proper disposal by the Command Engineer.

(5) Ensure that personnel involved in removing the dust and bait blocks adhere to the safety instructions specified in paragraph 2-2.

(6) Immediately notify the Command Engineer or Command Surgeon of any living or dead insects, rodents, or other animals that are found during unpacking operations.

b. For removal and disposal of dichlorvos strips and bait blocks

(1) Remove dichlorvos strips and bait blocks during the unpacking operation.

(2) Place all strips and bait blocks in separate closed metal containers for collection and proper disposal by the Command Engineer.

(3) Ensure that personnel involved in removal of the strips and bait blocks adhere to safety instructions specified in paragraph 2-2.

(4) Immediately notify the Command Engineer or Command Surgeon of living or dead insects, rodents, or other animals that are found during unpacking operations.

CHAPTER 3

GENERAL INSTRUCTIONS FOR PRESERVATION, PACKING, AND MARKING OF RETROGRADE MATERIEL

3-1. General

This chapter provides general instructions for preservation, packing, and marking of retrograde Army materiel to ensure adequate protection against corrosion, deterioration, and damage. Subsequent chapters prescribe the detailed preservation and packing requirements for end items and their recoverable repair parts. Certain packaging precautions and methods of cleaning, drying, unit protection, types of preservatives, and their methods of application are described in TM 38-230-1.

3-2. Disassembly

Unboxed, serviceable retrograde materiel and unserviceable, economically reparable retrograde materiel should be disassembled, as practical, to achieve maximum reduction in cube prior to movement to a POE Parts which are vulnerable to damage and pilferage and projecting parts whose removal will accomplish reduction in cube should be removed. The removed bolts, nuts, screws, pins, and washers should be placed in one of the mating parts and secured. The removed parts that are vulnerable to pilferage should be placed in the basic issue item pack. Parts removed from equipment should be matchmarked to facilitate reassembly. Removed parts and the matching parts that remain on the disassembled items should be identically stenciled (matchmarked) by letters or numbers if those parts are large enough to accept stenciling. When parts are too small to accommodate stenciling, information should be placed on cloth shipping tags attached to mated parts.

3-3. Preservation

Preservatives and their application and the methods and materials used in packaging are described in TM 38-230-1 and are set forth in this and succeeding chapters for specific Army materiel.

a. General. Cleaning and drying methods and processes are described in TM 38-230-1, and their basic requirements are given in MIL-P-116. Cleaning must be thorough and may be accomplished by any method which is not detrimental to the condition of the item. Disassembly must be held to a practical minimum. Immediately after cleaning, thoroughly dry items to remove cleaning solution or residual moisture. When possible, clean entire item without interruption. When interruptions are necessary, provide temporary protection to the areas that have been cleaned.

b. Optical elements and assemblies. Clean exposed surfaces of optical elements or assemblies in the following manner:

(1) Wipe surface to be cleaned with cotton lens paper, NNN-P-40, or clean cheesecloth which is saturated with alcohol.

CAUTION

Only lens tissue paper, NNN-P-40, or batiste cloth will be used to clean plastic elements. The surfaces will be dried by wiping with clean cotton, lens paper, or clean cheesecloth.

(2) Immediately after cleaning, wrap or cover the optics with lens paper. Secure wrap with tape or cover with fungus-resistant plastic caps.

c. Mobile equipment. Free exterior and interior surfaces including chassis, hulls, turrets, cabs, and bodies of all dirt, grease, and other contaminants. Accomplish removal by any method which will not damage equipment and components. Wash off mud and dirt and remove stones and debris from suspension, wheels, and tracks. Do not direct stream of water or steam under pressure against mounted air cleaners, generators, starters, distributors, magnetos, or against openings between hull and turret (turret ring), grills, exhaust deflectors, fire control, or armament. Complete the cleaning of surfaces which are to be preserved or sealed by using the appropriate cleaning solvent.

d. Ferrous materials. As prescribed in TM 38-230-1, preserve ferrous steel and iron parts and tools by thoroughly cleaning the items and then coating them with the applicable preservative. If an oil-base preservative is used, thoroughly drain the excess from the coated surface. Approved alternate methods of preserving ferrous parts or tools are by brushing VCI liquid directly on the item or by wrapping the part with VCI-treated material. Table A-1 contains procurement information and lists the applicable specifications. Wrap the preserved item in a waterproof shroud, bag, polyethylene film, or greaseproof barrier material, as applicable, to provide protection against entry of water, to restrict free movement of air, and to contain VCI vapors.

CAUTION

Do not use preservative oil or VCI to protect electrical items. Do not use VCI to protect items that contain metals or a combination of alloys other than ferrous materials unless otherwise specified in MIL-P-3420 or MIL-L-46002.

e. Composite materials. Preserve parts and tools which are constructed of composite materials that may combine such materials as steel, brass, and aluminum by applying P-9 preservative and overwrapping or bagging with greaseproof barrier material. Use tape to hold protective barriers in place.

f. Unserviceable, economically reparable materiel and ARIs. Ensure that unserviceable, economically reparable materiel is afforded sufficient preservation and packing to prevent further deterioration or damage. The item must be maintained in an "as is" condition pending reconditioning action. Preserve and pack materiel as specified to the maximum extent possible. Remove fuel injectors, spark plugs, covers, manifolds, flanges, or plugs, as necessary, to accomplish the required preservation when an inoperable engine is being packed. Openings which result from missing or damaged components that allow entry of water to interior surfaces must be sealed with tape.

3-4. Packing

Packing is the assembling of items into unit, intermediate, or exterior packs with the necessary blocking, bracing, cushioning, weatherproofing, and reinforcement. Guidance on container selection and packing and the techniques used to accomplish blocking, bracing, anchoring, and cushioning are contained in TM 38-230-2. Container selection will be based on load level, characteristics of the item (weight, size, configuration, adequacy of mounting provision, criticality), and the degree of protection required for the specific item.

a. For movement out of a theater of operations.

(1) *End items*. Items that are wheel or truck mounted, weigh over 1,000 pounds, and can be moved by towing do not require crating and shall normally be shipped in a mobile configuration. Items that are skid or frame-mounted, unmounted or wheel-mounted, and weigh 1,000 pounds or less shall be boxed or crated for movement out of a theater of operations.

(a) Mobile (unboxed) items. Secure handtools, manuals, publications, and component items in the equipment tool box. Pack components or components that require additional container protection in wood or plywood boxes, or in single-, 3-2 double-, or triple-wall fiberboard boxes.

Secure removed components, packaged and unpackaged, and intermediate containers in the cab or operator's compartment, if so equipped. If not, they shall be secured in any available space on the basic unit in a manner that will not increase cubage or interfere with towing or lifting of the unit with slings. Accomplish securing by metallic strapping. When the components cannot be positioned on the unit, consolidate components into wood or plywood boxes, triple-wall fiberboard boxes, or crates. Shroud items consolidated into open crates with waterproof barrier material or polyethylene film and secure in place with tape. Before shipping, immobilize any movable equipment parts such as drum conveyors, revolving drums, shakers, articulating frames, pivot axles, crane houses, or turrets by installing stabilizing devices that were furnished with the equipment.

1 Mounted attachments. Secure attachments such as grader blades, bulldozer blades, and scarifiers approximately 8 inches above ground level so they will not interfere with the mobility of the unit. Securing may be accomplished by locking, cabling, or any other suitable means that will prevent their dropping during storage or shipment. Cranes may be shipped with the booms attached provided they do not interfere with towing or lifting and do not affect the counter-weight position. Normally, when shipping a truck-mounted crane, the point section of the boom is removed and secured to the side of the engine compartment. When shipping a rough-terrain crane, the point section of the boom is removed and banded to the base section of the boom. Blocking will be used to prevent damage to the cab and engine compartment. Attachments such as hook blocks may be banded to the base section of the boom. However, for shipment out of the theater of operations, it is necessary to consider removing the boom to reduce cube, particularly with crawler-mounted cranes because water transportation charges are based on measurement ton (40 cubic feet) regardless of weight.

2 Removed attachments. Bundle attachments such as booms, buckets, blades, catwalks, pile driver leads, shovel fronts, backhoes, and scarifiers. Nest and arrange component parts to form a compact bundle. Accomplish bundling by use of metallic strapping and wood blocking.

(b) *Boxed or crated items.*

1 Items weighing 1,000 pounds or less. Pack in wood or plywood boxes or single-, double-, or triple-wall fiberboard boxes. Use close-fitting boxes and strap per requirements in TM 38-230-2 for the applicable container. Utilize the chests

included in sets of equipment as exterior shipping containers. Pack items that cannot be accommodated within the chest in wood or plywood boxes or triple-wall fiberboard boxes.

2 Items weighing more than 1,000 pounds. Pack in open or closed crates. Items packed in this way may be anchored by using lumber holddowns and tiedown rods used in combination, iron straps and angles, bolts, or steel strapping. Items packed in open crates must be shrouded in waterproof barrier material or polyethylene film and must be secured in place with tape.

(2) Recoverable repair parts. Use the container selection criteria cited herein and in TM 38-230-2 to pack recoverable repair parts. As outlined below, cushion, block, brace, and anchor items within the container to prevent movement that might cause damage to the part:

(a) Use cellulosic cushioning or fiberboard for cushioning or immobilizing lightweight items.

(b) Use lumber, fiberboard, plywood, or a combination of lumber and plywood for the blocking and bracing of irregular-shaped, medium weight, rugged items. The selection and application of wood braces or holddowns will be per TM 38-230-2. Refer to TM 38-230-2 for typical methods of blocking and bracing, which are illustrated in figures 3-1 through 3-5 herein.

(c) Use bolts, tiedown rods, lumber holddowns and tiedown rods used in combination, iron straps and angles, or metallic strapping for anchoring items to the bases of shipping containers. Refer to figures 3-1 through 3-10 and TM 38-230-2 for typical methods of anchoring.

Note

Lumber, plywood, or other hygroscopic materials should never be placed in direct contact with critical or unpainted metal surfaces because such material will absorb and retain moisture which, in turn, causes corrosion. Always provide a waterproof barrier between critical metal surfaces and hygroscopic packing materials.

b. For movement within a theater of operations. Materiel being moved within a theater of operations will not normally be subjected to the same environmental conditions and shock that it would receive if it were moved out of a theater of operations (returned to CONUS for redistribution). Therefore disassembling and packing of materiel must only be sufficient to safeguard vulnerable items and parts from pilferage, damage, or loss. When necessary, other components will be disassembled to reduce dimensions in order to meet transportation requirements for the end item being moved. Other than that, items will normally be packed in exterior shipping containers which will facilitate the use of materials handling equipment during storage stacking operations. Select a shipping container per TM 38-230-2.

3-5. Marking

a. General. Containers that hold retrograde or recyclable materiel shall continue to carry the original identification, precautionary, and special handling markings whenever possible. If additional marking is necessary, it shall be accomplished as specified in MIL-STD-129 and as supplemented herein. Surfaces to be marked must be dry and free of dirt and grease. Unacceptable or unnecessary markings shall be removed by covering the markings with obliterating paint or lacquer or stencil ink. New markings shall be stenciled directly onto each unit, intermediate, and exterior container, or the markings shall be typed on a label or tag which is then attached to each pack. All markings must be clear, legible, durable, and nonfading. They should be black unless applied to a surface on which black is not legible and should be capital letters of equal height proportionate to the space available. Labels may be used when the container type or size does not permit stenciling. Labels are preferred over tags except when the use of labels is impractical. Either tags or labels must be placed in a conspicuous location on the side of the container.

b. Marking materials. The materials that shall be used when marking containers are as follows:

(1) *Waterproofing* varnish or coating compound. Spar varnish conforming to TT-V-121 (8010-00-160-5852) or clear acrylic coating compound conforming to MIL-C-17504 (8010-00290-6159) shall be used for protecting and waterproofing markings.

(2) *Stenciling materials*. Stencil ink shall conform to A-A-208 (7510-00-161-0811). Removable paint for direct marking on unboxed and uncrated equipment shall conform to MIL-P-52905.

(3) *Obliterating lacquer*, *enamel, or paint*. Obliterating paint in aerosol containers shall conform to A-A-1801 (8010-00-582-4743). Water emulsion paint for obliterating shall conform to MIL-P-52108 (8010-00-226-3906).

(4) *Paper labels*. Paper labels shall be made of sized white paper stock having a smooth finish and a minimum base weight of 20 pounds.

(5) *Paper label adhesive*. Paper label adhesive or cement shall conform to A-A-529 (8040-00-656-0814) or to MMM-A-179 (8040-00-053-8452).

FIND	QTY	NOMENCLATURE
1	1	Base, ½ " Plywood
2	1	Wood Block
3	1	Sleeve
4	1	Pad
5	4	Bolt, 3/8", Square Neck with Nut
6	4	Washer, Flat, 3/8"
7	4	Washer, Flat, ½ "

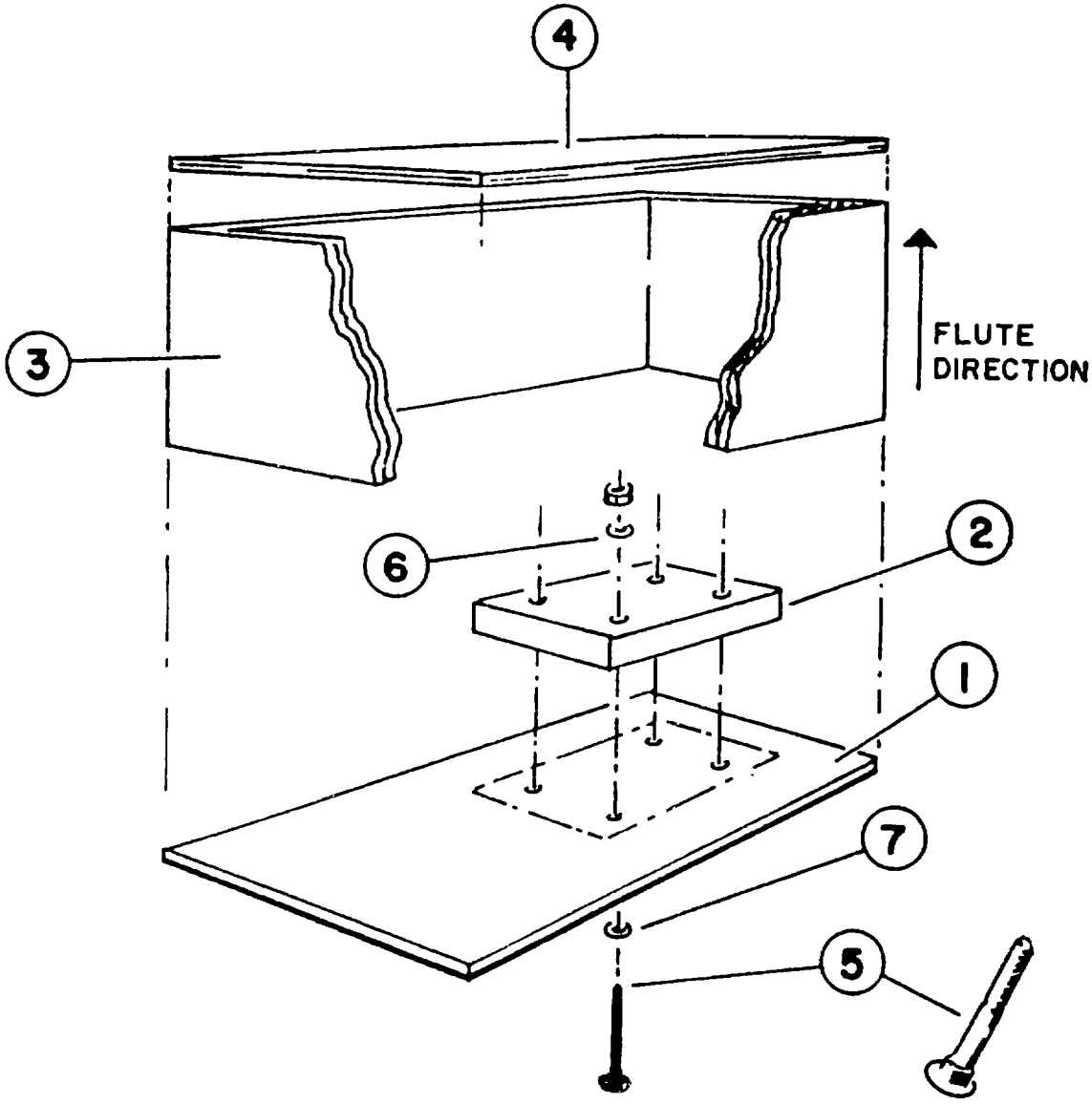


Figure 3-1. Anchoring and Cushioning.

Find No.	Qty	Nomenclature
1	1	½" Plywood base
2	1	Wood blocking
3	1	Wood blocking
4	1	Wood blocking
5	1	Sleeve
6	1	Pad

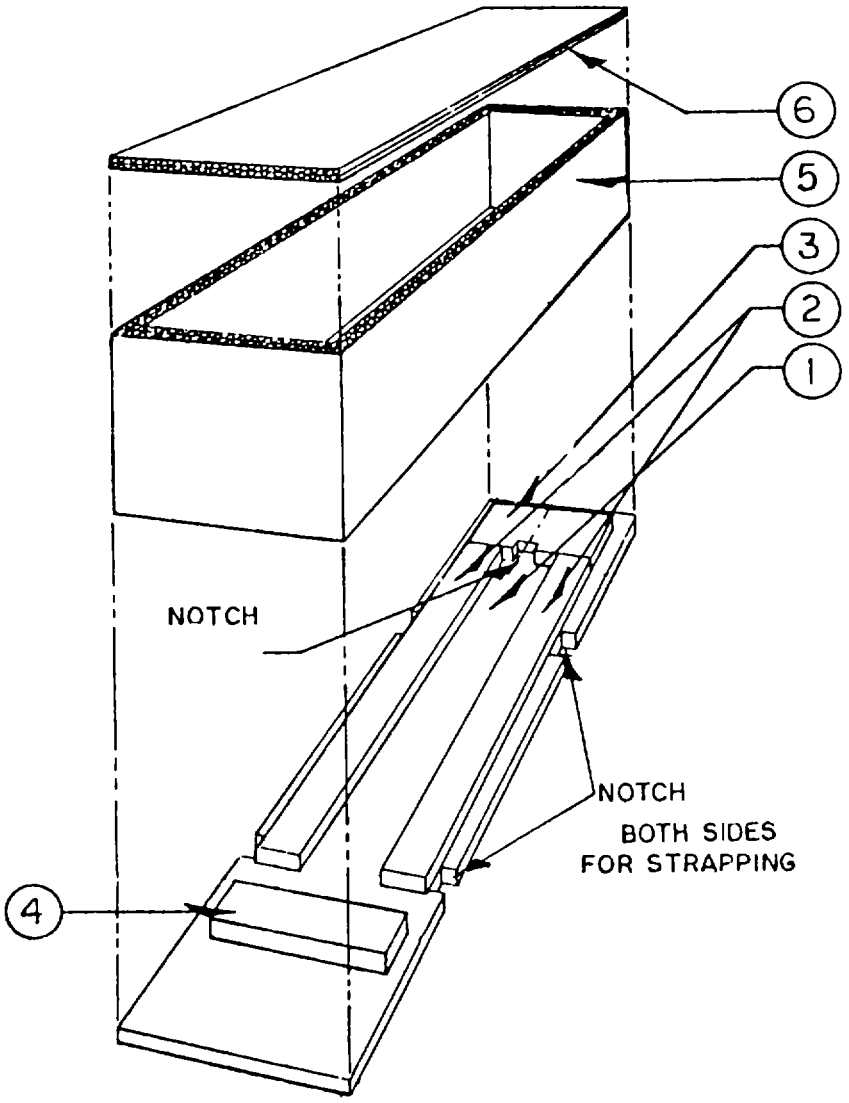


Figure 3-2. Blocking and Cushioning.

DIFFERENTIAL

Find No.	Qty	Nomenclature
1	1	Nailed Wood Box W/ 3" X 4" Skids
2	1	Wood Block
3	2	Wood Block
4	2	Wood Block
5	2	Wood Block
6	2	Wood Block

NOTE: All blocking secured by nailing, lumber sizes nominal

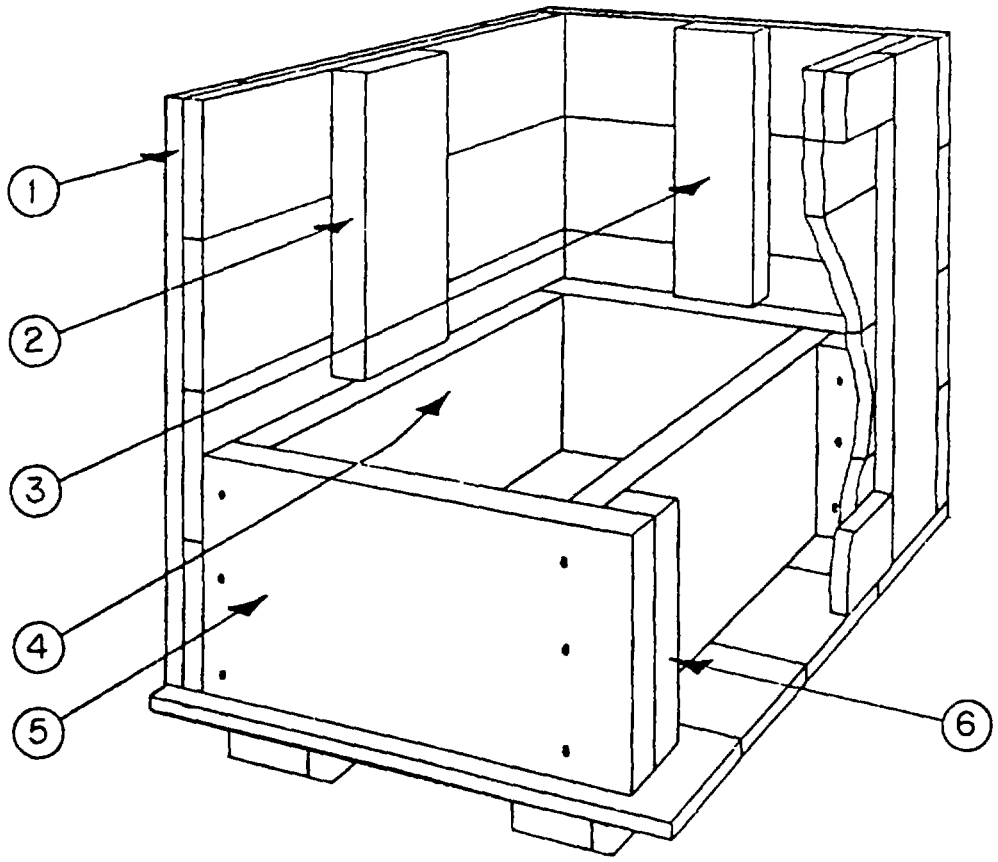


Figure 3-3. Loading, Blocking, Bracing, and Anchoring, Skidded Base.

j. Procedures. Instructions for FIP packaging are shown in figures 3-21 through 3-26, tables 3-1 and 3-2, and as follows:

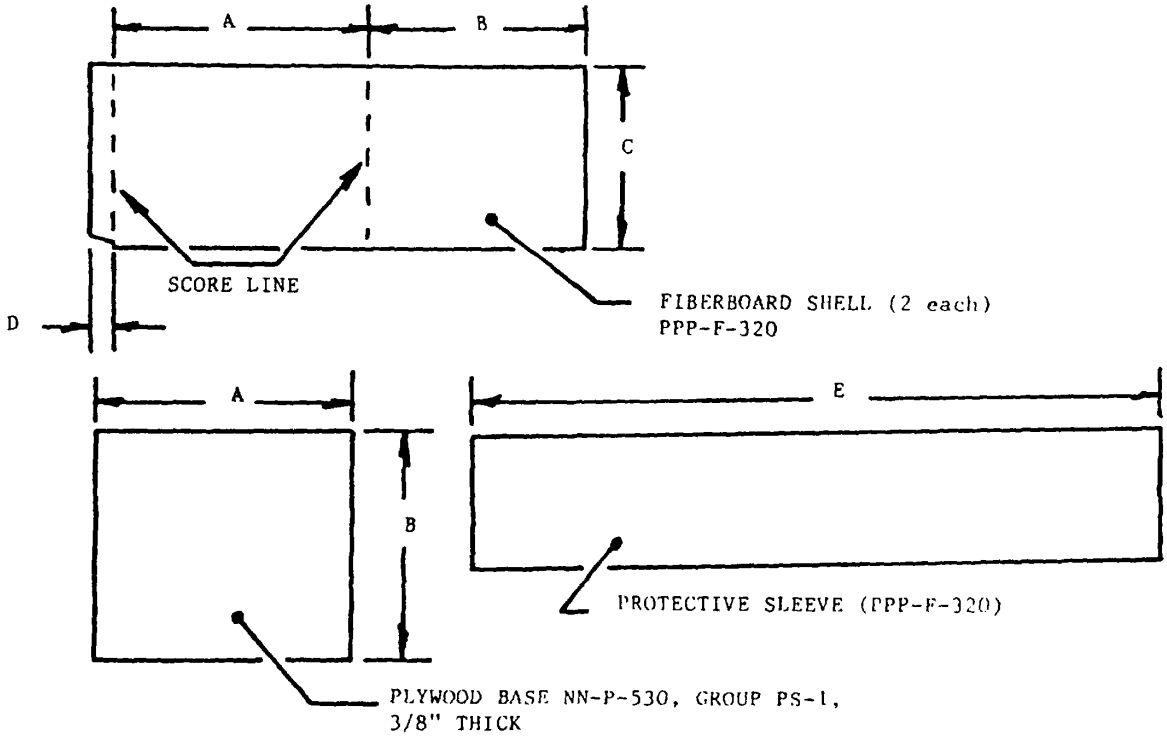
(1) Split pack alternate (fig 3-24). This technique is used for small items that may be easily handled.

(a) Clean and preserve the item per the appropriate packaging instructions for the individual item.

Wrap the sharp corners and projections of the item with a suitable cushioning material and secure with tape. Wrap the complete item with polyethylene film and secure with tape.

(b) Measure and weigh the item and select the appropriate size box, as specified in figure 3-26.

(c) Line the bottom, sides, and ends of the inner box with a single sheet of polyethylene wrap. The wrap shall be large enough to allow a sufficient overlap of the expanded foam at the center of the horizontal axis of the box.



LEGEND
DIMENSION A = CUSHION THICKNESS X 2 + ITEM LENGTH.
DIMENSION B = CUSHION THICKNESS X 2 + ITEM WIDTH.
DIMENSION C = CUSHION THICKNESS X 2 + ITEM DEPTH.
DIMENSION D = 1½ INCH MINIMUM
DIMENSION E = LENGTH OF ITEM X 2 + WIDTH OF ITEM X 2 + 4".

NOTES: 1. ALL WOOD USED SHALL CONFORM TO MIL-STD-731, GROUP II OR III, CLASS 2.

2. LUMBER FOR ALL NAILING STRIPS SHALL BE 2" X 2" NOMINAL.

3. LUMBER FOR SKIDS SHALL BE 3 X 4 NOMINAL MINIMUM.

Figure 3-23. FIP Encapsulated Technique (3 figures).

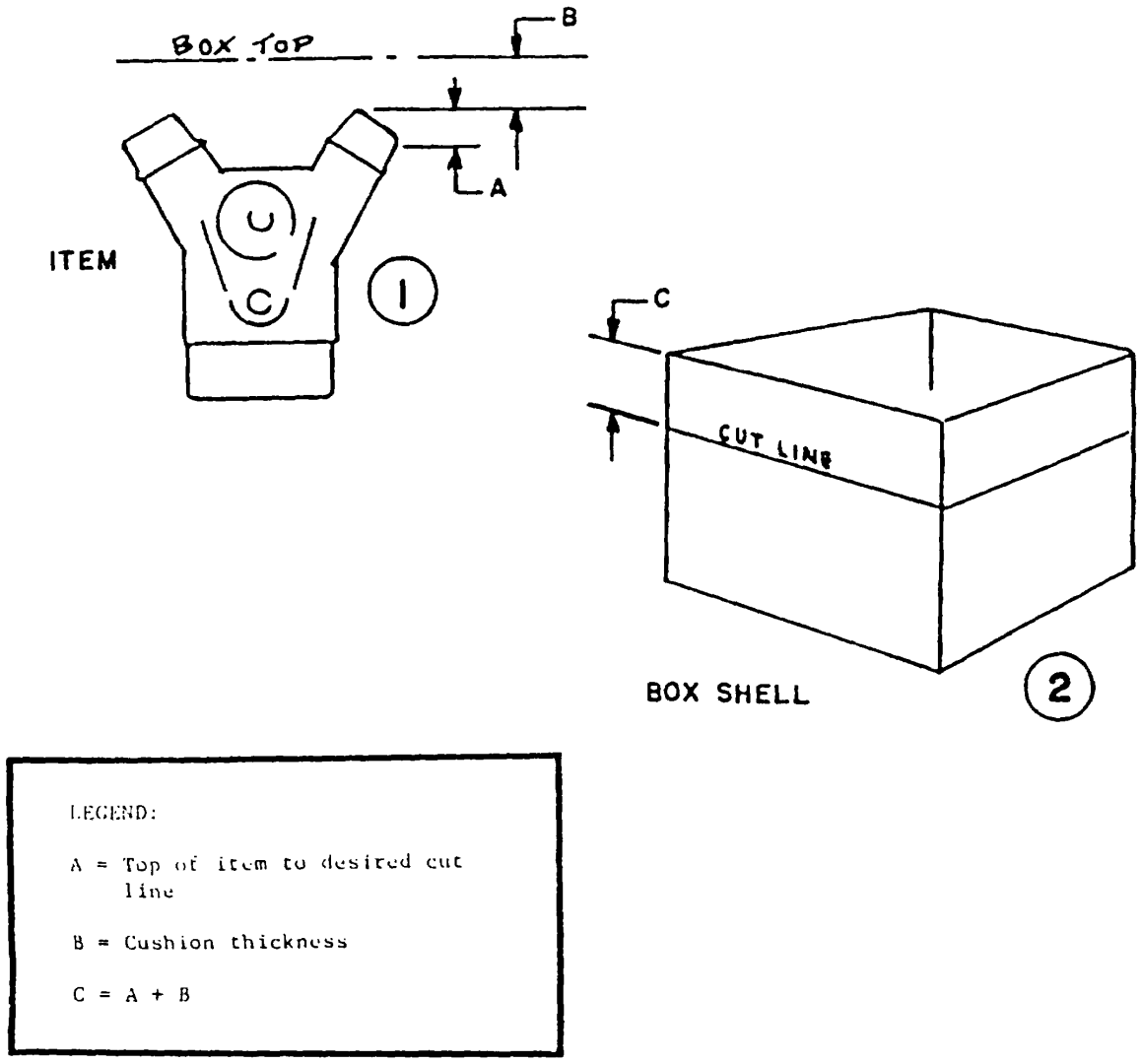


Figure 3-23. FIP Encapsulated Technique-Continued.

(d) Dispense foam evenly into the bottom of the wrap. The amount of dispensed foam will vary according to the size of the container and the manufacturer's formulation but should be enough to center the item.

(e) As foam starts to expand, fold and overlap the polyethylene film over the foam. As the foam is completing the expansion, place the item on top of the film allowing the foam to expand around the bottom half of the item.

(f) When the foam has cured for approximately 15 minutes, place one sheet of polyethylene film over the top of the item covering the inside top half of the box (see (c) above).

(g) Dispense enough foam to surround the item and fill the container. Then fold polyethylene film over the top. After the foam has cured, trim excess foam to allow for closure of the box.

(h) Close box and seal all openings (fig 3-27).

(i) Mark and label for shipment per paragraph 3-5.

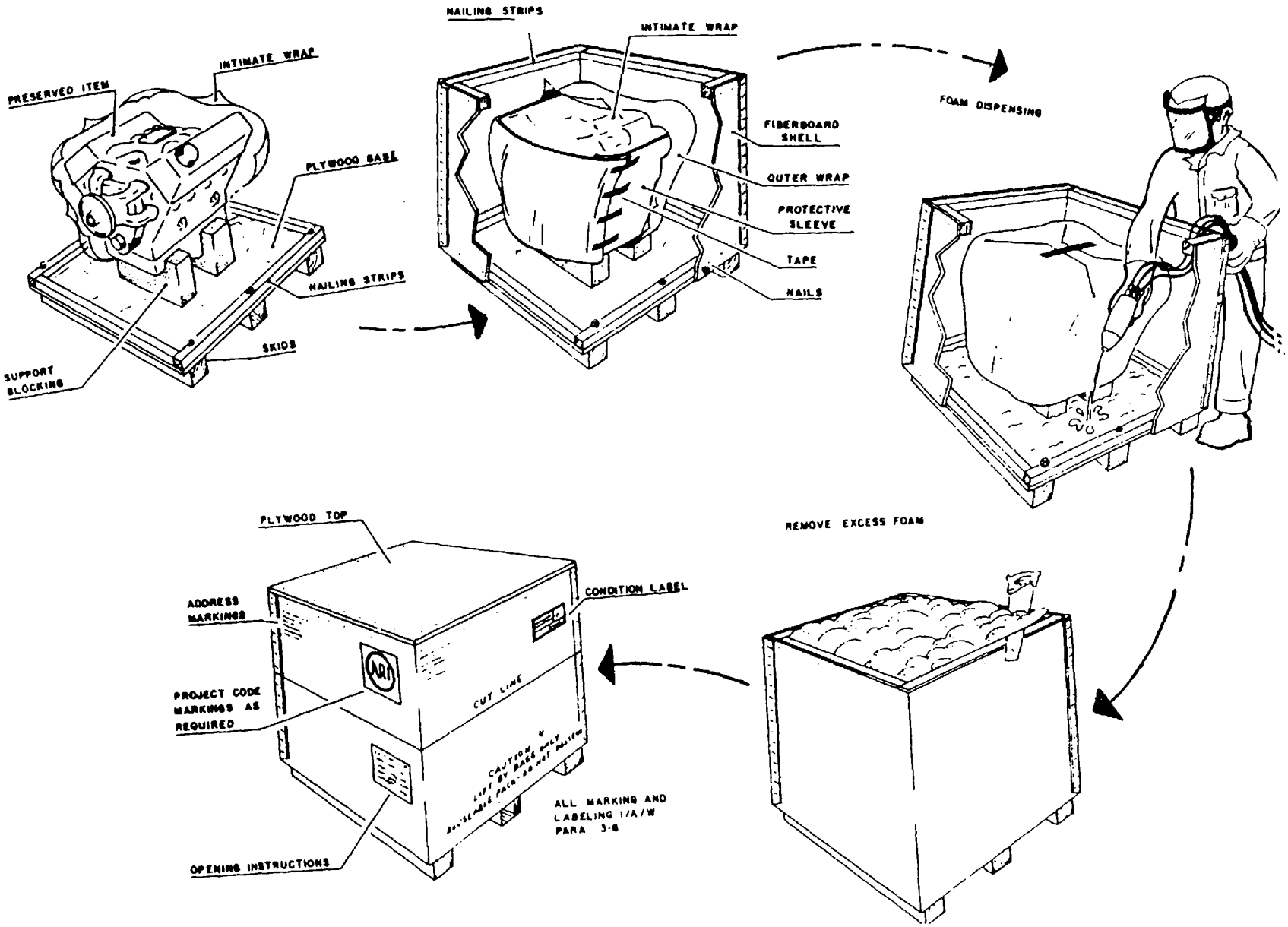


Figure 3-23. FIP Encapsulated Technique-Continued.

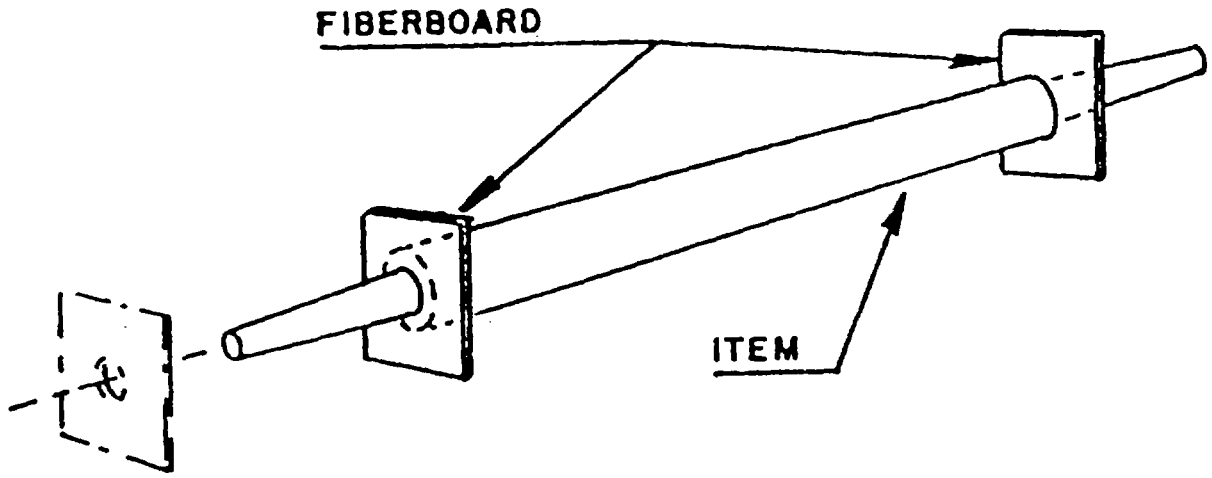


Figure 3-24. Preparing Sharp Items for FIP.

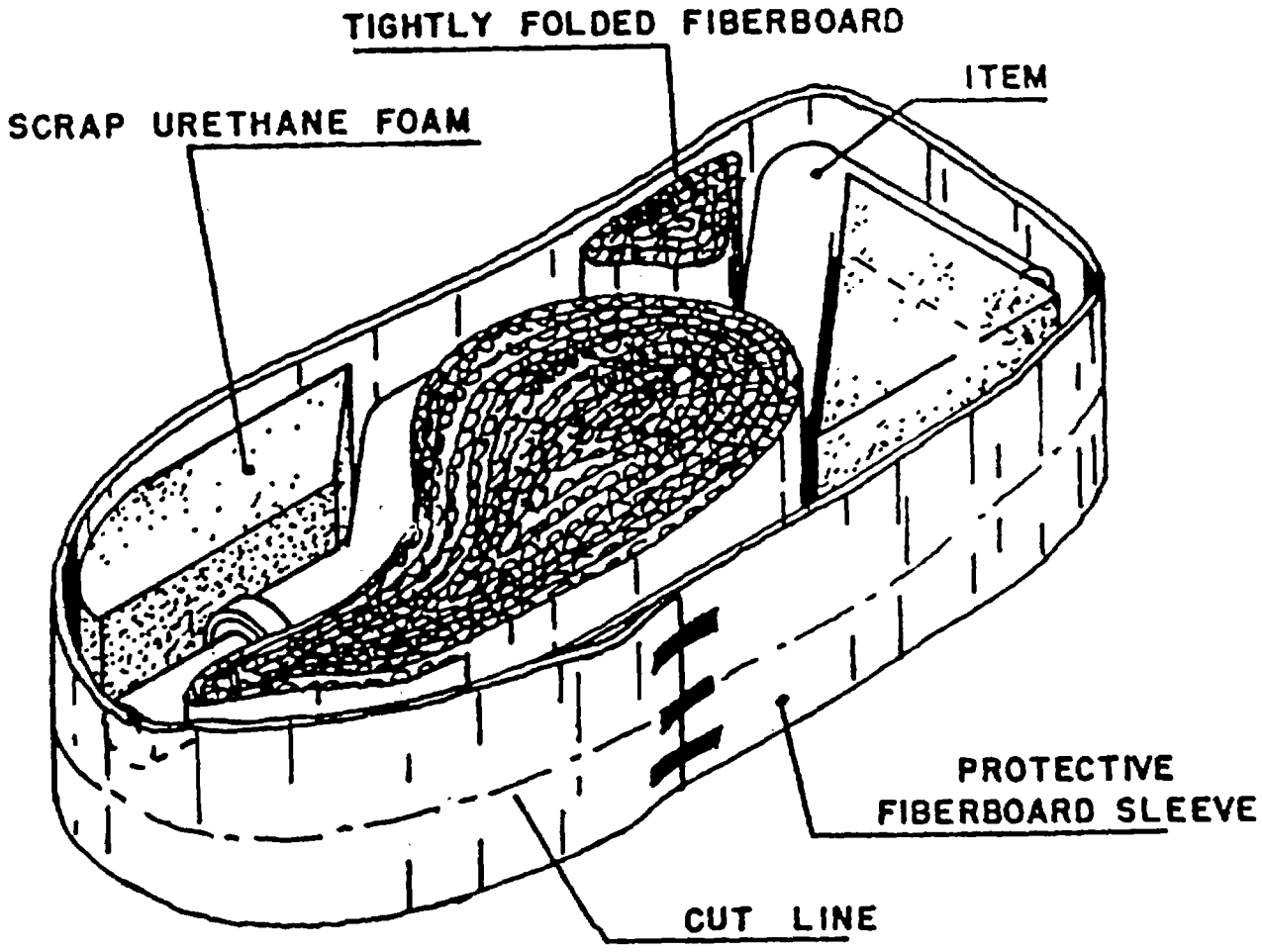
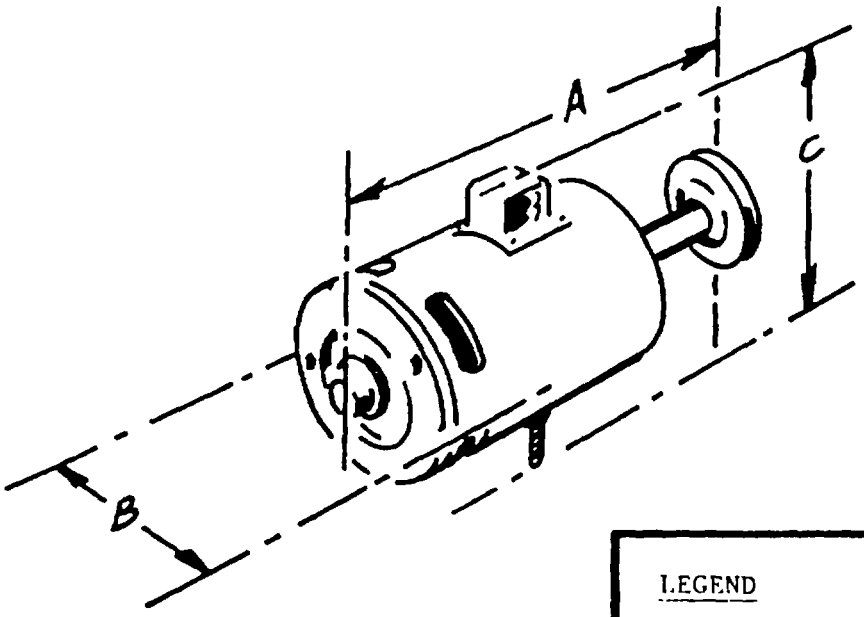


Figure 3-25. Preparing Odd-Shaped Items for Encapsulated FIP.



LEGEND

A = Total Length

B = Total Width

C = Total Depth

To determine the box size:

1. Measure and weigh the preserved item.
2. Select foam thickness from Table 3-2.
3. Box length = foam thickness x 2 + item length.
4. Box width = foam thickness x 2 + item width.
5. Box depth = foam thickness x 2 + item depth.

Figure 3-26. Box Size Selection.

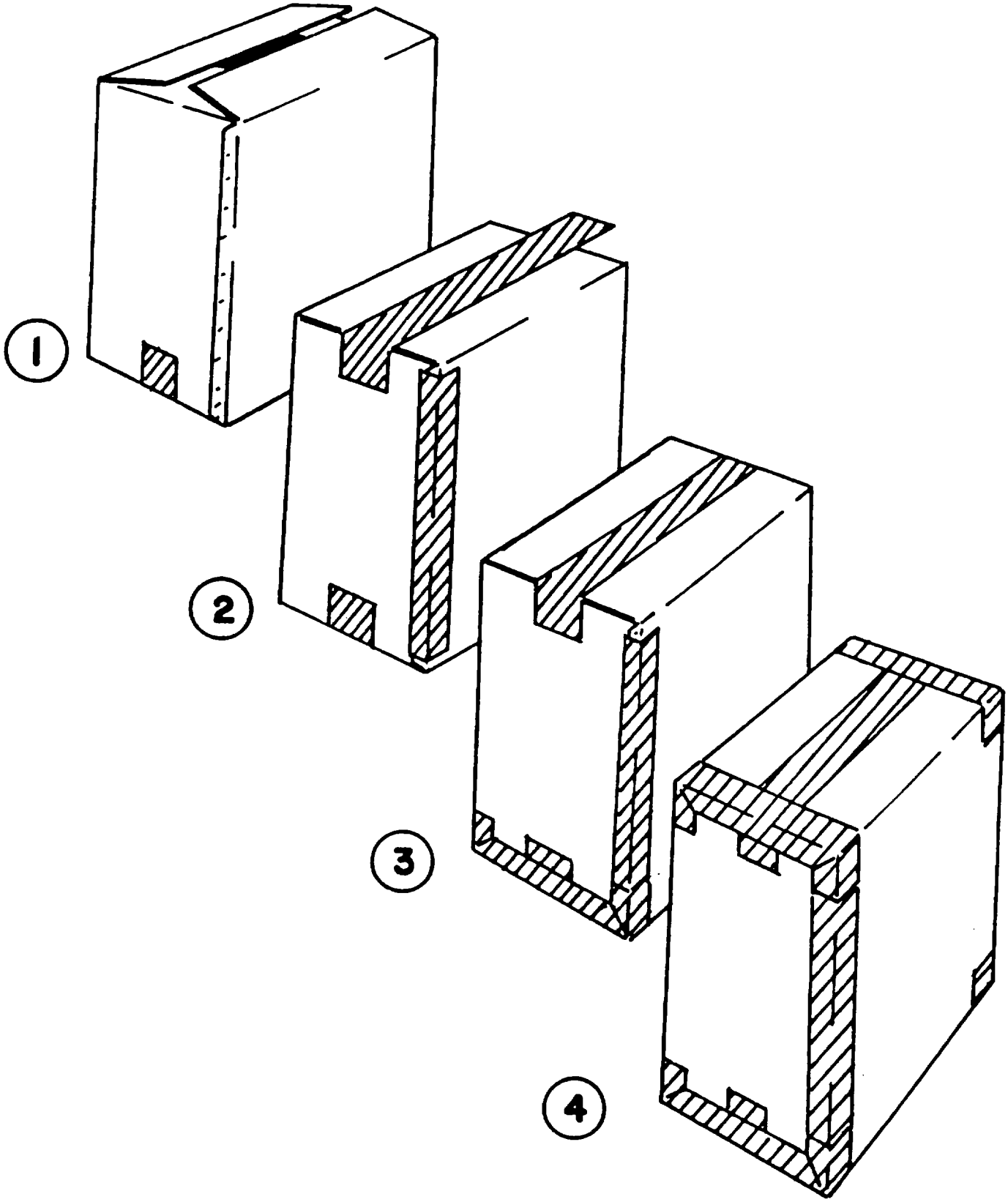


Figure 3-27. Fiberboard Box Tape Closure.

Note

Tables 3-1 and 3-2 are on the following pages.

Table 3-1. Foam-in-Place Application (General)

Item weight (lbs)	Technique (Listed in order of preference)	Recommended foam class
To 50	Split pack, alternate	* Flexible / semirigid
	Split pack, standard	" "
	Split pack, inverted	" "
	Preformed molding	" "
	Foamed container	" "
51-150	Split pack, inverted	Semirigid / rigid
	Split pack, standard	" "
	Foamed container	" "
	Foam in bag	" "
	Preformed molding	" "
151-	Split pack, standard	*Semirigid / rigid
	Encapsulated	" "
	Foamed container	" "
	Foam in bag	" "
	Preformed molding	" "

* Items weighing over 200 pounds shall be packed with rigid class foam. Items weighing over 50 pounds shall not be packed in flexible class foam.

Note

Recommended techniques and foam classes are listed for normal field packaging operations. Technique preference may vary according to types of foaming equipment and availability of packaging materials.

Table 3-2. Foam-in-Place Cushion Thickness Application

Item weight (lbs)	Cushion Thickness (inches) For		
	Flexible	Semirigid	Rigid
1-25	3	2	--
26-50	4	3	2
51-75	--	4	3
76-100	--	5	4
101-200	--	6	5
201-	--	--	6

Note

Cushion thicknesses listed are recommended for normal field packaging operations for items with fragility factors from medium to high. Items with known low-fragility factors shall be packed per the Army Packaging Data Microform File.

Note

Cushion thicknesses listed are recommended as minimum thicknesses. Foam selection may be determined by availability of classes of foam. The most rigid foam should be selected, when feasible, to reduce cube.

(2) Split pack, inverted (fig 3-22). This technique is used for items weighing between 50 and 150 pounds that can be inverted without difficulty and are not susceptible to damage in the inverted position. Split pack standard instructions are not furnished in this section because of their similarity to split pack inverted instructions. The split pack standard procedures are the same except that the item or the box is inverted and the support blocks are not removed. Instead, they become a part of the cushioning, blocking, and bracing.

(a) Clean and preserve the item per the appropriate packaging instructions for the individual item. Wrap the sharp corners and projections of the item with a suitable cushioning material and secure with tape. Wrap the complete item with polyethylene film and secure with tape.

(b) Measure and weigh the item and select the appropriate size box, as specified in figure 3-26.

(c) Close and tape the top flaps of the box, invert the box, and open the bottom flaps.

(d) Select two pieces of blocking from rigid foam, wood, or any other suitable material that will temporarily support the item. Cut the blocking to dimensions which will allow the item to rest inside the center of the box.

(e) Place the inverted item on the blocks.

CAUTION

Items that must stay in an upright position to prevent internal damage should not be packed using this inverted technique.

(f) Drape a piece of polyethylene film over the top half of the item covering the item, sides, and ends of the box. Secure the top of the sheet to the box flaps with tape. The sheet should be secured so the film will not sag below the horizontal center of the item while the foam is expanding.

(g) Dispense foam. The amount of foam to dispense is normally predetermined by the equipment supplier, but the foam should surround the item and fill the container.

(h) After the foam has completely expanded, allow appropriately 15 minutes curing time. Trim excess foam (if necessary), fold the polyethylene sheet over the foam, close the bottom flaps, and secure with tape.

(i) Turn the box upright, remove the temporary blocking, and repeat (X)(f), (g), and (h) above.

(j) Close top flaps and seal all openings with tape (fig 3-27).

(k) Mark and label the box per the instructions in paragraph 3-5.

(3) *Encapsulated pack (fig 3-23 and 3-25*). See figures 3-23 through 3-25 for weighing over 150 pounds.

(a) Measure the length, width, and depth of the item.

Note

When measuring the item, measure to and from the farthest points. Determine the desired thickness of the foam (see table 3-2) and fabricate the plywood base, fiberboard sheet, and protective sleeve, as specified in figure 3-23.

(b) Preserve and wrap the item, as specified in chapter 5 and MIL-P-116.

(c) Fabricate the box base and nailing strips. The nailing strips shall be fabricated from 2by 2-inch nominal lumber. Form two frames from the nailing strips with the outside dimensions the same as the inside dimensions of the box in length and width. The base shall be made of %-inch minimum plywood. Cut the skids from 3by 4-inch nominal lumber. The number of skids shall be determined by the width of the box. Skids shall be no more than 24 inches apart.

(d) Bolt the base, bottom nailing strips, and skids together with %-inch bolts at the skid ends and nail the base to the skids. Fabricate the box top from %-inch minimum plywood.

(e) Fabricate support blocking from high density, scrap foam. If the foam will not support the weight of the item, reinforce with plywood. The blocks shall be cut to dimensions that will allow the item to rest in the center of the box.

(f) Determine cut line. To determine the cut line, refer to figure 3-23.

(g) Wrap the horizontal plane of the item with the protective sleeve, completely covering the cutting plane and allowing 3 to 4 inches on both sides. Secure with tape.

(h) Wrap the entire item and protective sleeve with kraft paper with the smooth surface facing the item. Secure with tape in such a manner that there is sufficient overlap to prevent the rising foam from seeping in against the item.

(i) Lower the wrapped item onto the support blocks.

(j) Assemble the fiberboard shell and upper nailing strips onto the base as shown in figure 3-23.

(k) Dispense foam. The quantity of foam that is dispensed is normally specified by the equipment supplier but should surround the item and fill the container.

CAUTION

When dispensing foam, protective goggles or face shield, rubber gloves, and safety clothing shall be worn by the operator.

(1) After the foam has fully expanded, allow for sufficient curing time (approximately 15 minutes). Trim excess foam from the top, if necessary, and secure the box top with nails or metal staples.

(m) Mark and label the box as specified in paragraph 3-5 and figure 3-23.

(4) *Encapsulated pack opening*. To open an encapsulated pack, a handsaw, a rip type saw with a medium blade, and a pry bar with a wide flat tip will be needed.

(a) With the handsaw, cut along the marked cut line of the box shell. After cutting through the shell on all four surfaces, continue cutting completely through the foam until the blade contacts the protective sleeve all around.

(b) Insert the end of the pry bar into the cut and pry up on all four sides of the box. If the foam does not separate evenly all around, reinsert the handsaw and cut all around the protective sleeve ensuring that the perimeter of the foam is cut through.

(c) After cutting, lift the top half of the box and place in an area that is free from dirt, oil, grease, or any other foreign matter.

(d) After removing the item, place the top half of the pack onto the lower half, secure with tape, and store in a clean, moisture-free area. Obliterate all address markings.

(5) *Reusability*. Most FIP packs can be reused. In order to maintain the pack in a reusable condition, follow these procedures:

(a) Exercise care when opening and removing the item to prevent damage to the foam or the box.

CAUTION

Do not remove tape from the fiberboard boxes. This procedure often tears the outer layer of fiberboard and shortens the life of the box. To open taped boxes, cut the tape down through the box opening.

(b) After item removal, assemble the complete pack and secure with tape.

(c) Mark or stencil "REUSABLE PACK, DO NOT DESTROY" on one side of the box in letters a minimum of half an inch high. Obliterate obsolete

markings but keep the nomenclature and stock number to identify the item for which the box applies.

(d) Store the pack in a clean, moisture-free area with the identifying markings facing outward.

(e) To reuse the pack, place the preserved item in the preformed foam and close the top flaps of the container. Seal all openings with tape (fig 3-27).

(f) To reclose an encapsulated pack, place the item in the preformed foam, place the top half of the pack onto the lower half, and seal the box opening (cut area) with tape.

Place strapping conforming to either ASTM D3950 or ASTM D3953 around the sides, top, and bottom of the box.

(g) Cover obsolete markings with obliterating lusterless enamel conforming to TT-E-515 (8010-00-291-0889) and sand color 30277 of FED-STD-595 or its equal. Mark for shipment as specified in paragraph 3-5.

CHAPTER 4

PRESERVATION AND PACKING OF MAJOR ITEMS

Section I. UTILITY AND SUPPORT EQUIPMENT

4-1. General

Preservation and packing of utility and support equipment not specifically identified in this section should be processed by using instructions for similar-type items possessing the same physical and mechanical characteristics.

4-2. Maintenance and Repair Shop Equipment

a. Machine tools installed in vans. Thoroughly clean items such as lathes, drill presses, saws, and grinders of dirt and exterior grease, and lubricate them with prescribed lubricants. Coat unpainted, exposed machine surfaces with P-10. Wrap or cover the coated surfaces with greaseproof barrier material and secure in place with tape.

b. Portable electric tools. Coat unprotected metal surfaces with P-10 and cover coated surfaces with greaseproof barrier material. Place in carrying cases, if provided, or package in fiberboard boxes.

c. Handtools, reamer sets, tap and die sets, etc.

(1) Individually wrap items with VCI in sets contained in cases and secure with tape. Place items in their designated location in the case and seal with tape. As an alternate, a single sheet of VCI may be placed on top of the tools and the case sealed, as specified herein.

(2) If no case is provided, preserve tools, as specified above, and preserve unit pack submethod IC-1. Place tools in drawers, cabinets, or other storage space within the van.

d. Tachometers, multimeters, voltmeters, electrical test sets, frequency meters, etc. Cushion and place items in carrying cases provided or cushion and pack in fiberboard boxes.

e. Common handtools. Preserve common handtools such as hammers, screwdrivers, chisels, picks, and shovels by applying P-1 to unprotected, ferrous metal surfaces.

f. Pneumatic tools. Coat interior surfaces of air motors by injecting P-10, grade 30, into the air stream while operating the air motor until the preservative appears at the exhaust port. Cover the air inlets and outlets with tape or a combination of tape and greaseproof barrier material. Coat unpainted or unprotected, ferrous metal surfaces with P-1.

4-3. Air Compressors

Perform preservation of compressor prior to, or simultaneously with, the preservation of the power unit. Process the power unit per paragraph 4-5.

a. Reciprocating compressors.

(1) *Rated 200 pounds per square inch (psi) and below*. Fill compressor crankcase to operating level with P-10, grade 30. Remove the air cleaners and pour or spray 4 to 5 ounces of P-10, grade 30, into each air cleaner connection. Start the compressor and, while operating, fog or spray an adequate amount of the same preservative oil into the first stage compressor section until the preservative is observed in the final stage discharge. Drain the excess preservative oil from the condensate separators while the compressor is operating. Stop the compressor and reinstall the air cleaners.

(2) *Rated above 200 psi*. Fill compressor crankcase with P-10, grade 30. Start the compressor and operate, without load, at normal operating speed for 30 minutes. At the end of the operating period and before the compressor is stopped, open the drain valve. Stop the compressor and, when the pressure has been completely released, close the drain valve. Purge the compressor stages for 1 hour with dry compressed air or nitrogen with a dew point of minus 40°F or more. Close the valve on the downstream side of the receiver. Place new cartridges in the cartridge holders and close the rain caps or covers.

b. Rotary compressors. Fill compressor crankcase to operating level with P-10, grade 10. Start the compressor and operate at normal speed until it reaches its normal temperature. Reduce the speed and operate at a slow idle for approximately 3 minutes and then stop the compressor.

c. Air receivers. Fog with P-10, grade 30, the interior surfaces of air receivers on reciprocating compressors and rotary compressors when the air receiver is located downstream on the dry side from the air oil separators. Drain cocks will be left open.

d. Pressure regulation system. Coat interior, ferrous metal surfaces with P-10, grade 10.

e. Openings. Seal all openings into the compressor such as crankcase breathers, oil filter tubes, and oil dipstick tubes with tape.

4-4. Drain Pumps

Coat interior surfaces of the casing and all parts within the casing by spraying or fogging with P-9. Continue spraying or fogging long enough to ensure complete coverage. Coat drain plug with the same preservative oil and replace the plug.

CAUTION

When it is known that the pump will be used for pumping POTABLE WATER, P-14 (MIL-C-10382), corrosion-preventive compound for food handling machinery and equipment, will be used in lieu of P-9.

4-5. Generator Sets

a. Engine. Preserve engine per paragraph 3-3. Handcrank engines without automatic starting facilities to accomplish engine rotation during processing of combustion chambers.

b. Generator. Seal all openings into the windings with tape. Attach a warning tag containing the following information: "REMOVE PACKAGING TAPE PRIOR TO OPERATING THE GENERATOR SET." Tape openings through which cooling air flows over or through the frame structure, but do not tape the electric windings within the machine.

4-6. Heaters, Duct Type, Portable

a. Preserve engine or electric motor per paragraph 3-3.

b. Coat all exposed, ferrous metal surfaces of the unit with P-10. Cover or wrap the preserved surfaces that contact other surfaces with greaseproof barrier material and secure in place with tape.

c. Seal all openings into the unit, duct storage tubes, and control boxes with tape or a combination of tape and greaseproof barrier material.

d. Unit pack ducts and duct adapters method II using fiberboard boxes.

e. Attach a warning tag containing the following information in a conspicuous location: "REMOVE ALL TAPE AND PRESERVATIVE OIL FROM COATED SURFACES PRIOR TO STARTING AND OPERATING HEATER."

4-7. Heaters, Immersion Type

a. Drain fuel from heater body and fuel tank. Fog interior surfaces of heater body and fuel tank with P-10 and drain excess.

b. Coat unpainted exterior surfaces with P-14.

c. Coat stovepipe with P-10. Nest the preserved stovepipe one within the other, wrap with greaseproof barrier material, and secure by taping or tying. Place pipe on combustion chamber and secure to the flue with tape or by tying. Wrap complete heater with greaseproof barrier material and secure in place with tape.

d. Unit pack heater in a fiberboard box.

4-8. Heater, Space, Coal-fired

a. Coat unpainted metal surfaces of components with P-1.

b. Remove, cushion, and unit pack the thermostat submethod IC-1.

c. Preserve the stovepipe, as specified in paragraph 4-7. Secure grates and ash pan against movement and block and brace the refractory linings to provide protection against loosening. Place all loose component parts of the heater such as thermostat, stovepipe, and shaker inside the heater and cushion with cellulosic cushioning to prevent movement.

d. Pack each complete heater in a wood box. Shroud the heater with polyethylene film prior to closure of the box.

4-9. Heaters, Portable, Electric, Multifuel, and Van Type

a. Completely drain fuel system of multifuel heaters. Shroud heaters with polyethylene film and secure with tape.

b. Pack individual heater units in fiberboard boxes. Use cellulosic cushioning material to prevent movement and seal with tape.

4-10. Heater, Hot Oil, Trailer-mounted

a. Process the heater, component items, and trailer chassis per applicable paragraphs of this chapter.

b. Package the flame safeguard relay as follows: remove the program controller from the control box and package in a watervaporproof bag; provide adequate cellulosic cushioning within the bag to prevent puncture of the barrier material; heat seal the bag and secure it in the control box; and attach a warning tag containing the following information: "FLAME SAFEGUARD RELAY IS DISCONNECTED AND IS SECURED WITHINCONNECT RELAY BEFORE OPERATING HEATER."

4-11. Bath Units

a. Drain the entire water and fuel system including the water heater, pumps, lines, all connections, line strainers, filters, shower stands, and hoses. The fuel system will be reassembled. Valves and pet cocks will be left in the open position. Dry water and fuel systems with dry compressed air.

b. Fog the combustion chamber, exhaust tubes, exhaust pipe, burner nozzles, and shutter assembly with P-10, grade 30. Seal the blower assembly and exhaust port with greaseproof barrier material and secure with tape.

c. Preserve generator set per paragraph 4-5.

d. Preserve water pump per paragraph 4-4.

e. Seal openings in the shower stands and shower heads with tape.

f: Coil and secure firehoses, suction hoses, and electric cords with tape or twine.

g. Secure all component parts in their respective places with the hold-downs provided on the crate base. Assemble crate per TM 38-230-2.

4-12. Laundry Units

a. Drain the entire water and fuel system including the water heater, pumps, hoses, tumbler, washer-extractor, fuel lines, water and tumbler heater, fuel pump, fuel filters, solenoid fuel valves, and fuel connections. Dry water and fuel systems with dry compressed air.

b. Coat all bare, ferrous metal surfaces that do not contact other surfaces in operation with P-1. Coat bare, ferrous metal surfaces that contact each other in operation with P-II.

c. Process generator set, pump, air compressor, heaters, air receivers, and trailer chassis per applicable paragraphs of this chapter.

d. Unit pack hoses in fiberboard boxes method III.

e. Seal all openings into and around electric motors, outlets, switches, access doors, air vents, timers, shell doors, control panels, etc., with tape or a combination of tape and greaseproof barrier material.

4-13. Field Ranges

a. Coat all bare, ferrous metal surfaces of accessory items with P-14.

b. Place all small items inside the large pan and place pans and pots in a polyethylene bag and seal with tape. Locate bag in proper storage racks in range.

c. Preserve range with P-9.

d. Completely wrap range with VCI-treated material and secure with tape.

e. Shroud range with greaseproof barrier material or polyethylene film, or place range in a heat-sealed bag fabricated from either of the aforementioned materials.

f. Fabricate fiberboard caps for the top and bottom of the package to prevent damage of the shroud or bag. Secure caps in place with metallic or nonmetallic strapping around each cap.

4-14. Bakery Equipment

a. Drain the entire water and fuel system including tanks, pumps, lines, and burners. Leave shutoff valve open.

b. Clean and sanitize the interior surfaces of the mixer, divider, and molder including the dough troughs with one of the following sanitizing rinse solutions: 1 pouch of food service disinfectant (MIL-D-11309) or 2 ampules of water purification powder (O-C-289) dissolved in 1 gallon of water. Rinse with clear water and dry with dry compressed air.

c. Coat interior surfaces of mixer including interior surfaces of dough troughs, dough divider, and molder surfaces which come in contact with dough with P-14.

d. Preserve the heating system including burners and combustion chamber per paragraph 4-11.

e. Process components not identified above and the trailer chassis per applicable paragraphs of this chapter.

4-15. Water Purification Sets

Drain all chemical solutions and water from tanks and water systems. Clean van and components with forced hot air.

a. *Filter sleeves*. Remove the filter sleeves from the filter elements. Insert a flat separator pad of fiberboard or similar material not less than ½ inch thick by 4 %-inches wide by 22-inches long in each sleeve. Place each sleeve in a waterproof bag and close the bag by heat sealing. Pack the sleeves, in quantities of six, in a fiberboard box placed on end and secured to the filter unit. Securely attach to the filter unit a warning tag containing the following information: "SLEEVES REMOVED FROM FILTER ELEMENTS-REINSTALL BEFORE OPERATING"

b. *Float assembly*. Secure low-water-level float assembly with a wood block and plastic tape so that the assembly does not rest on the sensitive switch.

c. *Hoses, cables, and light extensions*. Coil and secure by taping or tying.

d. Pipe fittings, valves, and nozzles. Coat ferrous

metal surfaces with P-1. Pack these and other small items in fiberboard boxes.

e. *Pumps*. Preserve pumps per paragraph 4-4.

f. Chemical containers. Check to ensure that containers are free of corrosion and leaks and are tightly sealed. Chemicals unit packed in fiberboard or other nonmetallic containers will have a watervaporproof bag or polyethylene film bag placed around the container, and the bag will be closed by heat sealing.

g. *System vehicle*. Clean, dry, and preserve power train, brakes, steering, and all other components of the mobility aspects of the vehicle per paragraph 3-3. Place and secure component items inside the van body or trailer.

4-16. Heater, Water, Oil-fired

a. Preserve heater per paragraph 4-11.

b. Remove the photoelectric cell assembly. Provide adequate cellulosic cushioning and place in a watervaporproof bag. Close bag by heat sealing. Secure to the unit with tape. Attach a warning tag to the control panel containing the following information: "PHOTOELECTRIC CELL ASSEMBLY HAS BEEN REMOVED-REINSTALL BEFORE OPERATING HEATER."

c. Seal all openings into the unit that will permit entry of water and openings into and around electric motors, switches, or control panels with tape or a combination of tape and greaseproof barrier material.

4-17. Dispenser, Riot Control Agent, Helicopter, or Vehicle Mounting

a. Decontaminate, clean, and dry the dispenser per detailed specifications available from U.S. Army Chemical, Research and Development Center, Aberdeen Proving Ground, MD-DSN 584-3259. Check to ensure that all pressure has been released and leave all valves open except the ball valve.

b. Preserve and pack per requirements of applicable paragraphs of this chapter.

c. Remove hoses and gun group and place inside the tank.

d. Shroud with polyethylene film or waterproof barrier material and secure with plastic tape.

4-18. Decontamination Apparatus, M3A3, and Similar Equipment

a. Clean and dry per detailed specifications available from U.S. Army Chemical, Research and Development Center, Aberdeen Proving Ground, MD-DSN 584-3259.

b. Preserve pump per paragraph 4-4.

c. Coat all bare, ferrous metal machined surfaces with P-1l.

d. Coil and secure hoses by tying or taping.

e. Spray interior of tank with VCI lubricating oil (MIL-P-46002, grade 1). If not available, the following procedure will be applied: spray interior of slurry tank with P-9 and then blow 40 to 50 grams of VCI crystals (MIL-I-22110) into the interior of the tank. Replace tank cover and secure latch.

f. Process miscellaneous items, as specified, except that P-19 may be used instead of P-2 and P-9 may be used instead of P-7.

g. Clean, dry, and preserve power train, brakes, suspension, steering, and all other portions of the mobility aspects of the vehicle per paragraph 3-3.

4-19. Decontamination Apparatus, Portable, 1 1/2 Quarts

Empty apparatus and install nitrogen cylinder and lead seal per TMs 3-4230-204-12 and 3-4230-204-12P. Cover 74-7 nozzle with a small piece of tape to prevent foreign matter from entering it. Package individually in fiberboard boxes.

4-20. Outboard Motors and Gasoline, Engine-driven Chain Saws

a. Engine. With the engine running smoothly at 34 open-throttle speed, spray P-10, grade 30, into the carburetor throat until the engine chokes to a stop. Securely attach a warning tag containing the following information: "ENGINE PRESERVED DO NOT CRANK." Completely drain watercooled, cooling systems.

b. Component parts. Preserve component parts per paragraph 3-3 and place with the item in carrying case provided. Seal carrying case with tape.

4-21. Liquid Fuel-dispensing Systems

a. Completely drain the unit including pumps, hoses, and filter/separator.

b. Fog interior surfaces of the separator tank with P-10, grade 10, and drain the excess preservative.

c. Coil hoses on their respective reels and secure the reels to prevent uncoiling. Coil unattached hoses, secure with tape or twine, and pack in fiberboard boxes.

d. Process engine, pump, and other components per this section and paragraph 3-3.

e. Shroud the complete unit, except tanks, with polyethylene film and secure in place with tape.

4-22. Refrigeration Units, Gas Engine and Electric Motor-driven

a. Refrigerant compressor. Operate the compressor simultaneously with the preservation of the engine (or run electric motor for sufficient length of time) to ensure coverage of all internal surfaces with oil. Attach a tag to the compressor containing the information: "COMPRESSOR CRANKCASE FILLED WITH OPERATING OIL."

b. Refrigerant system, condenser, and receivers. Pump down the refrigerant system and close the valves. Do not apply preservative oil to the internal surfaces of the refrigerant condensers and receivers. Attach a tag to the compressor or operating controls containing the following information: "OPEN VALVES BEFORE OPERATING THE COMPRESSOR."

c. Gasoline engine and electric motor. Preserve engines and electric motors per paragraph 3-3.

4-23. Air Conditioners

a. Refrigerant system. When pump down means are provided, pump down the refrigerant system leaving the low-pressure side of the system with a positive, pressure-holding charge. Attach a tag to the electrical power connection or the starting system containing the following information: "OPEN VALVE BEFORE EQUIPMENT IS OPERATED." Do not apply preservatives to the refrigerant system, piping, or valves.

b. Power supply cable. Coil and secure power supply cable by tying or taping.

c. Air ducts. Wrap air ducts individually with greaseproof barrier material and secure with tape. Place air ducts in compartments provided or secure to trailer. Place the canvas cover over the air conditioner.

d. Gasoline engine, electric motor, and trailer chassis. Preserve engines, motors, and chassis per paragraph 3-3.

4-24. Welding Equipment

a. Preserve the engine or electric motor per paragraph 3-3.

b. Seal all openings that will permit entry of water with tape.

c. Coat unpainted, unprotected, ferrous metal surfaces of set components with P-10 and cover or wrap with greaseproof barrier material. Pack component items not requiring a contact preservative method III in fiberboard boxes.

4-25. Clothing, Textile, and Shoe Repair Shops

a. Preserve generator, electric motors, trailer chassis, and handtools per applicable paragraphs of this chapter.

b. Coat all unprotected metal surfaces and moving parts of machine heads with P-10. Shroud each head with greaseproof barrier material and secure with tape. Remove lights and thread stands and individually pack in fiberboard boxes. Secure packs to the appropriate machine stand from which removed.

c. Secure removable pulley belts to the appropriate machinery with tape.

4-26. Cargo Sets

a. Handtools will be preserved and packed per paragraph 4-2.

b. Coat unpainted or unprotected surfaces of hooks slings, shackles, clamps, vises, spreaders, wire rope, etc., with P-1.

c. Place component items of cargo sets and secure within the chest provided. The chest will not require overpacking.

4-27. Insecticide Sprayers

a. Thoroughly flush lines, pumps, hoses, and insecticide containers with fresh water and dry with dry compressed air.

b. Preserve engines, pumps, and tanks per paragraph 3-3.

c. Coil hoses and secure with tape. Secure hoses on reels to prevent the hose from unwinding.

d. Coat unpainted, unprotected, ferrous metal surfaces with P-1.

4-28. Gas Generating and Charging Plants:

Acetylene, Carbon-dioxide, Oxygen-nitrogen, Semitrailer-mounted. Cleaning and drying will be per paragraphs 3-3 and 3-4 and as specified in MIL-C-52211.

a. Vent openings. Seal vent openings on trailer roof with waterproof barrier material and secure with plastic tape.

b. Compressors. Operate acetylene and air compressors for sufficient length of time to ensure that all interior surfaces are coated with lubricant.

c. Personnel heaters. Remove igniter plugs and fog combustion chamber with P-10.

d. Charging lines. Pack in fiberboard boxes.

e. Refrigeration system. Pump down the refrigerant system, leaving the low-pressure side of the system with a positive, pressure-holding charge.

Do not apply preservatives to the refrigerant system, piping, or valves. Attach a tag to the electrical power connection or the starting system bearing the information: "OPEN VALVE BEFORE THE EQUIPMENT IS OPERATED."

f. Water system. Completely drain the water system, including the pump, and dry with dry compressed air. Preserve pump per paragraph 4-4. Leave drains open.

g. Testing apparatus. Unit pack each item in a fiberboard box.

*h. Valves (*oxygen-nitrogen generating and charging plant). Close valves throughout the plant. EXCEPTION Open the four condensate-trap drain valves on the air compressor.

i. Compressor air intake and liquid oxygen outlet connection (oxygen-nitrogen generating and charging plant). Cushion components within their cabinets with cellulosic cushioning.

j. Power cables and hoses. Place and secure in storage area provided.

k. Scales. Lock, block, and cushion to prevent damage and then place and secure in the storage compartment using the securing device provided.

l. Semitrailer. Preserve per applicable paragraphs of this chapter.

CAUTION

No preservative will be applied to surfaces that will come in contact with liquid or gaseous form of oxygen or nitrogen. No preservative will be applied to surfaces that are subject to extremely, low temperature. No preservative will be applied to high-pressure systems, lines, hoses, pipes, etc., including relief valves.

4-29. Conversion Unit, Carbon-dioxide, Semitrailer-mounted

Clean and dry per paragraphs 3-3 and 3-4 and as specified in MIL-C-52211.

a. Vent openings. Seal vent openings on trailer roof with waterproof barrier and secure with tape.

b. Heater. Drain heater fuel tank and fog interior with P-10. Reinstall the drain plug.

c. Carbon-dioxide and refrigeration system. Drain the refrigerant and carbon-dioxide system. Dry interior surfaces of the system with dry compressed air. Close valves and seal openings into the system with tape.

d. Carbon-dioxide compressor. Do not apply preservatives to interior surfaces. Seal openings with tape.

e. Dry ice press. Actuate the dry ice press to ensure coating of all interior surfaces of pumps, piping, and valves. Coat pressure platens with P-10 and cover with greaseproof barrier material. Secure with tape. Secure control levers to prevent movement.

f. Scales. Lock, block, and cushion to prevent damage by vibration. Coat machined surfaces with P-10 and cover with greaseproof barrier material. Cushion the scales with cellulosic cushioning.

g. Hoses and power cables. Secure in storage area provided.

h. Bandsaw. Coat machined surfaces with P-10.

i. Semitrailer. Preserve per applicable paragraphs of this chapter.

4-30. Firefighting Equipment

a. Electric motor sirens, battery chargers, and monitor-type nozzles. Seal openings with tape.

b. Water and foam tanks. Drain the tanks and all connecting piping. Leave drain valves open.

c. Fire extinguisher charges. Pack in fiberboard boxes and waterproof seal with tape.

d. Floodlights, lanterns, and flashlights. Pack in fiberboard boxes. Cushion items within the box with cellulosic cushioning.

e. Water and carbon-dioxide fire extinguishers. Pack in fiberboard boxes.

f. Gaskets, expansion rings, and fittings. Unit pack submethod IC-1.

g. Hoses and rope. Coil and secure with twine. Cover ends of hoses with greaseproof barrier material and secure with tape.

h. System vehicle. Clean, dry, and preserve power train, brakes, steering, and all other components of the mobility aspects of the vehicle per applicable paragraphs of this chapter. Place components in truck compartments or tool boxes, if space permits, or pack in plywood, wood, or triple wall fiberboard boxes. Secure boxes and ladders inside of truck with metallic strapping. Pack in a closed crate those component items that cannot be accommodated within the truck.

4-31. Diving Equipment Sets

a. Gaskets, gloves, glove inserts, *filter elements*, *cloth, cotton cord, cuffs, filters, socks, strap, rubber tubing, diver's knife, drawers, and undershirts.* Individually unit pack each item submethod IC-1.

b. Adapters, bags, clamps, harness, helmet cushion, machine screws, reducers, wing nuts, nipples, packing material, safety latch, and beeswax. Unit pack submethod IC-1.

c. Springs, taps, dies, and tools. Preserve per paragraph 4-2.

d. Valves. Cushion valves with cellulosic cushioning and unit pack submethod IC-1.

e. Diving shoes, trousers, amplifier system, diver's belt, extension light, diver's dress, face plate, front window, door, *and mask*. Cushion with cellulosic cushioning and individually unit pack in fiberboard boxes.

f Lens and stop watch. Cushion each lens and stop watch with cellulosic cushioning and individually unit pack submethod IC-3.

g. Ropes, rope assembly, and life line. Coil and secure with equally spaced ties of twine or tape.

h. Unit packed and unpacked components. Place unit packed and unpacked components in spare parts box and chests provided to the maximum extent possible. Pack remaining components in plywood, wood, or triple-wall fiberboard boxes.

4-32. Lubricating and Service Units

a. Lubricant tanks. Coat interior surfaces with P-10. Coat unprotected exterior surfaces with P-1.

b. Alcohol dispenser. Coat interior surfaces with P-10.

c. Pumps. Preserve pumps per paragraph 4-4.

d. Portable lubricator and lubricating guns. Coat interior surfaces with P-10. Coat unprotected, exterior surfaces with P-1.

e. Control valves. Coat control valves with P-10 and wrap individually with greaseproof barrier material.

f. Hoses. Wind on reels and secure to prevent unwinding and lock reels. Coil hoses not attached to reels and secure by tying or taping. Seal open ends of hoses with tape.

g. Engine, compressor, pumps, air motors, and trailer chassis. Preserve per applicable paragraphs of this chapter. Place all components in tool box, drawers, or miscellaneous equipment boxes. Close and secure drawers and equipment boxes.

4-33. Cleaning Machine, Fuel Can and Drum

a. Tank assemblies. Coat unprotected, ferrous metal surfaces with P-1. Seal openings with tape.

b. Cradles. Wrap cradles individually with cellulosic cushioning and secure with tape. Place five wrapped cradles in the compartment of each tank assembly. Cushion float assembly and strainer with fiberboard to prevent damage and movement of cradles.

c. Drum washer assemblies. Coil hose and secure, together with the pipe attachment, in the racks and clamps provided.

d. Y-suction hose attachment. Wrap with cellulosic cushioning and secure with tape. Place with the coil of suction hose in left-hand tank assembly. Fittings on ends of suction hose will be wrapped with cellulosic cushioning and secured with tape.

e. Hoses and nozzles. Seal with dust caps and plugs and place in compartments provided.

f. Engine and pump. Preserve engine and pump per applicable paragraphs of this chapter.

4-34. Detecting Sets, Mine, Portable

a. Requires no preservative. Place components within the carrying case and secure with the latches provided.

Note

Batteries will not be packed with the instrument and may be discarded.

CAUTION

Turn the carrying case relief valves two turns counterclockwise before latching the top case to the bottom case. After securing the case, close the relief valve by turning it clockwise until snug. This procedure minimizes the difference between interior and exterior air pressures.

b. Pack each detecting set in a fiberboard box and cushion with cellulosic cushioning. Waterproof seal the box with tape.

4-35. Detecting Sets, Mine, Truck-mounted

Disassemble carriage box assembly and boom arms from the truck.

a. Modules, headsets, repair kits, and cable assemblies. Unit pack individually by submethod IC-3.

b. Electronic-box assembly and indicator panel assembly. Shroud with polyethylene film and secure in place with tape.

c. Lamps and fuses. Cushion with cellulosic cushioning material.

d. Hydraulic control system. Preserve per applicable paragraphs of this chapter.

e. Systems vehicle. Clean, dry, and preserve power train, brakes, steering, and all other components of the mobility aspects of the vehicle per applicable paragraphs of this chapter. Install and secure carriage box assembly and boom arms in the carrying racks provided. Place preserved and packed components in the spare parts box and tool box, if space permits, or in a fiberboard box.

Waterproof seal the box with tape and secure to truck.

4-36. Light Sets

a. Reels, stakes, wire rope assemblies, and carriages. Coat unpainted, ferrous metal surfaces with P-1.

b. Telescopic masts. Coat inner, telescopic sections of the mast with P-10.

c. Lights, adapters, covers, lamps, dimmers, reflectors, transformers, shields, circuit breakers, etc. Place items in chest and cushion with cellulosic cushioning.

d. Reeling machines. Coat unprotected, unpainted metal surfaces with P-1. Collapse reeling machines and cushion sharp points with cellulosic cushioning. Secure with tape.

e. Handtools. Preserve handtools per paragraph 4-2.

f. Climbers sets, safety belts, cotton duck bags, switches, and insulators. Place items in chest and cushion with cellulosic cushioning.

g. Glide angle lights, aircraft traffic lights, current regulators, and control panels. Place in chest and cushion with cellulosic cushioning.

h. Packed and unpacked items. Place all items within their respective chest per the chest-loading plan. Seal chest with tape. Pack items that cannot be accommodated within chests in fiberboard boxes and seal with tape. When all component items are intermediate packed inside the chests, the chests will not require overpacking. Pack components that cannot be accommodated inside chests in plywood, wood, or triple-wall fiberboard boxes.

4-37. Forklift Trucks

a. Forks. Coat all unpainted surfaces of forks with P-1.

b. System vehicle. Clean, dry, and preserve brakes, power train, steering, and all other components of the mobility aspect of the forklift truck per applicable paragraphs of this chapter. When shipping out of a theater of operations, detach forks that are not collapsible or cannot be folded back into the truck body. Secure forks in a suitable location on the truck in a manner that will not cause damage or unnecessarily increase cubage. Secure forks to the truck with metallic strapping. Wood dunnage may be used in conjunction with the strapping.

4-38. Machinery, Metal and Woodworking

a. Preservation and packing.

(1) Boring machines.
(2) Degreasers.
(3) Drilling machines, radial and floor up-right.
(4) Dynamometers.
(5) Filing machines.
(6) Lathe, engine.
(7) Metallizing outfits
(8) Press, hydraulic
(9) Press, arbor
(10) Spray outfits.
(11) Saw, power, floor type
(12) Vulcanizing equipment.
(13) Welding machine

b. Disassembly and cleaning. Remove accessories and attachments such as chucks, face plates, steady rests, tool holders, and wheel dressers prior to cleaning. Clean internal and external surfaces by process C-1. Operate equipment at lowest speed for internal cleaning and no longer than necessary to ensure thorough cleaning.

(1) *Lubricating system*. Connect machine to a power source during cleaning. Drain all lubricants from machine. If additional cleaning is necessary, use only clean lubricating oils. Accomplish cleaning by refilling the system, circulating the oil, and draining.

(2) *Hydraulic system*. Drain hydraulic oils and flush system with a solution consisting of 10 parts oil (P-10, grade 30) and 90 parts solvent.

(3) *Coolant system*. Flush thoroughly with a solution consisting of 10 parts lubricating oil (P-10, grade 30) and 90 parts solvent until clean. Drain system completely and blow out lines with dry compressed air.

(4) *Water-cooling chamber, water jacket, steam line, air line,* etc. Drain all water accumulations and dry systems with dry compressed air.

(5) *Cutting tools and other machine surface tools*. Clean critical and close tolerance surfaces by process C-5.

(6) *Maintenance tools*. Clean by any applicable process.

(7) *Blasting cabinets, conveyor systems, frames, spray booths, tanks, etc*. These are generally of a noncritical nature and may be cleaned by wire brushing, buffing, or with solvent to remove rust, scale, or other contaminants.

c. Preservative application. Except as specified herein, preserve interior surfaces with P-9 and exterior, unpainted surfaces with P-1.

(1) *Lubricating systems and gear cases.* Drain lubricating oils and flush system and gear cases with P-10, grade 30. Drain lubricants and close all vents and drain valves.

(2) *Coolant systems*. Flush P-21 through the system leaving a residual film of preservative in

the lines and tank. Close all openings.

(3) *Nonlubricated, interior surfaces*. Spray, flush, or fog with P-21 interior surfaces which do not run in lubricants.

(4) *Bearings, journals, and journal boxes*. Grease lubricated bearings with P-ll. Preserve journals and journal boxes with P-2.

(5) *Hydraulic system.* Fill system (while connected to power source) with operating fluid. After filling, operate system to circulate preservative. Clearly mark with tags the hydraulic system which has preservative left in the reservoir.

(6) *Air Cylinders*. Fog internal surfaces with P-10, grade 30.

(7) *Sliding or friction surfaces and recessed metal surfaces*. Preserve surfaces of ways, gibs, adjusting screws, driving gears, and sliding and friction surfaces with P-2 or P-11. Coat unexposed gears, recesses, blind holes, and cavities which cannot be easily preserved with P-ll.

(8) *Cutting maintenance tools.* Apply P-2 preservative.

(9) *Dies, fixtures, and jigs*. Apply P-9 preservative.

d. Preservation.

(1) Wrap all preserved surfaces covered with other than P-1 with greaseproof barrier material and secure to adjacent painted surfaces with tape. Cover large openings with waterproof barrier material and seal edges with tape.

(2) Cover electric wiring system ends, plug openings, sockets, terminals, etc., with tape.

(3) Wrap machine and cutting tools in greaseproof barrier material or package submethod IC-1, depending upon the size of tools.

(4) Release drive belts from tension but do not remove.

(5) Package grinding wheels and abrasives in a fiberboard box, cushion with cellulosic cushioning, and seal with tape.

(6) Process electric motors, devices, and component parts per the electronic requirements herein.

(7) Consolidate preserved and packaged component parts and accessories in fiberboard boxes and seal with tape.

e. Packing. Place each complete machine, parts, and accessories which comprise a single unit in an open wood crate up to 16,000-pound item weight or in a sheathed wood crate over 16,000-pound item weight (fig 4-1). Block and brace contents to immobilize. Shroud machine with waterproof barrier material and secure in place with tape.

4-39. Machinery, Bench-mounted

The following requirements cover preservation and packing for

a. Grinding machine.

b. Drilling machine.

c. Saw, power. Clean, dry, preserve, and package basic unit, tools, and accessories per paragraph 4-38. Place one machine in a wood or plywood box (fig 4-2). Block and brace item and nail blocking securely.

Section II. CONSTRUCTION EQUIPMENT

4-40. General

When preserving and packing construction equipment which is not specifically identified in this section, use instructions for similar-type items possessing the same physical and mechanical characteristics.

4-41. Tractors and Loaders

a. Start tractor or loaders and operate through all gear ranges to ensure distribution of lubricants and preservatives over all internal surfaces. Operate all hydraulic systems and retract hydraulic pistons as far as linkage will permit.

b. Coat unprotected metal surfaces of attachments with P-1. Secure unremoved blades, buckets, or other attachments in a raised position off the ground level with wire rope and cable clamps. When provided, use means for securement of attachments on the tractor or loader in lieu of those specified above.

c. Clean, dry, and preserve power trains, brakes, steering, suspensions, and all other portions of the mobility aspect of the tractors and loaders per applicable paragraphs of this chapter.

4-42. Ditching Machines

a. Start and operate ditching machine through all gear ranges to ensure distribution of lubricants and preservatives over all internal surfaces. Operate hydraulic systems and retract hydraulic pistons as far as linkage will permit.

b. Coat unprotected metal surfaces of the digging boom assembly with P-1, wrap with greaseproof paper, and secure with tape.

c. Clean, dry, and preserve hydraulic systems, power trains, brakes, suspension, steering, and all other portions of the mobility aspect of the ditching machines per applicable paragraphs of this chapter.

Legend

Find No.	Qty	Nomenclature
1	2	Skid
2	As req'd	Bolts or lag bolts
3	As req'd	Rubbing strips

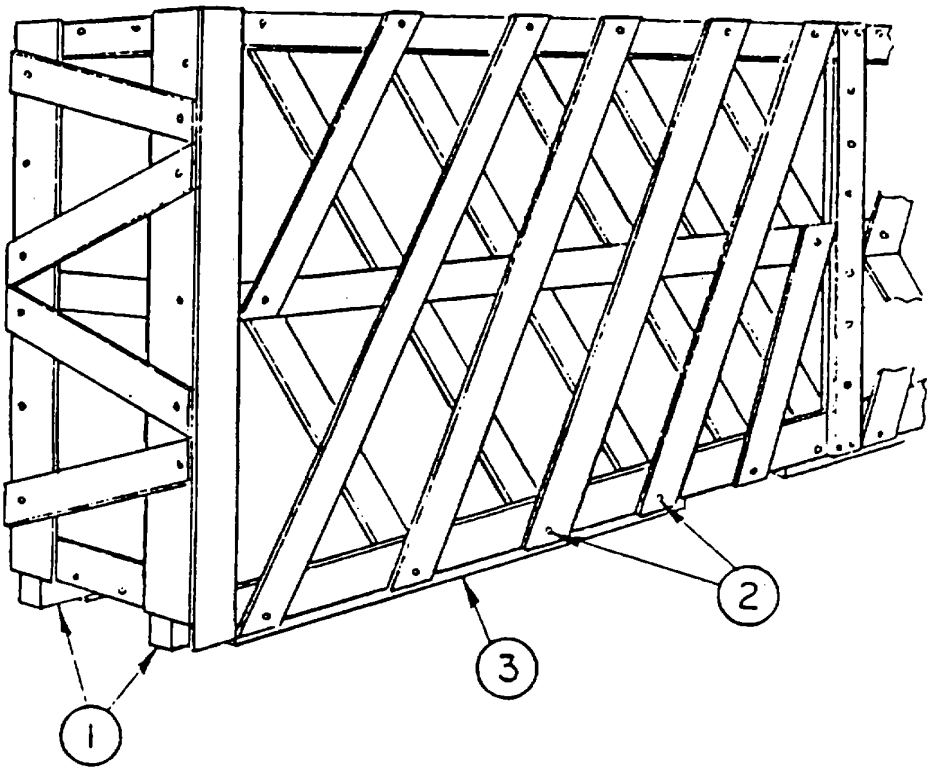


Figure 4-1. Open Crate, Nailed or Bolted.

4-43. Graders

a. Start grader and operate through all gear ranges to ensure distribution of lubricant or preservative over all internal surfaces. Operate all hydraulic controls. Center the circle under the main grader frame and turn the moldboard so that the ends do not protrude outside of the tires and wheels. Raise moldboard and circle to maximum height and lock in position. Secure hydraulically controlled moldboard to prevent movement by tying the circle to the grader frame with wire rope and cable clamps. Raise scarifier to its maximum height and lock in position. Secure hydraulically controlled scarifiers with wire rope specified above. Position leaning wheels in a vertical position and lock in place.

b. Coat unpainted metal surfaces with P-1, wrap with greaseproof paper, and secure with tape.

c. Clean, dry, and preserve hydraulic system, power trains, brakes, suspension, steering, and all other portions of the mobility aspect of the graders per applicable paragraphs of this chapter.

4-44. Cranes

a. Coat all bare surfaces on traversing gear and rollers with P-1.

b. Preserve front and rear outriggers with P-1.

LEGEND

FIND NO.	QTY	NOMENCLATURE
1	1	Box, PPP-B-621, Class 2, Style 4
2	8	Support Cleat
3	2	Saddle Block, Fwd
4	2	Saddle Block, Aft
5	2	Cushioning, Non-Corrosive
6	2	Wrap, Greaseproof
7	AR	Contact Preservative

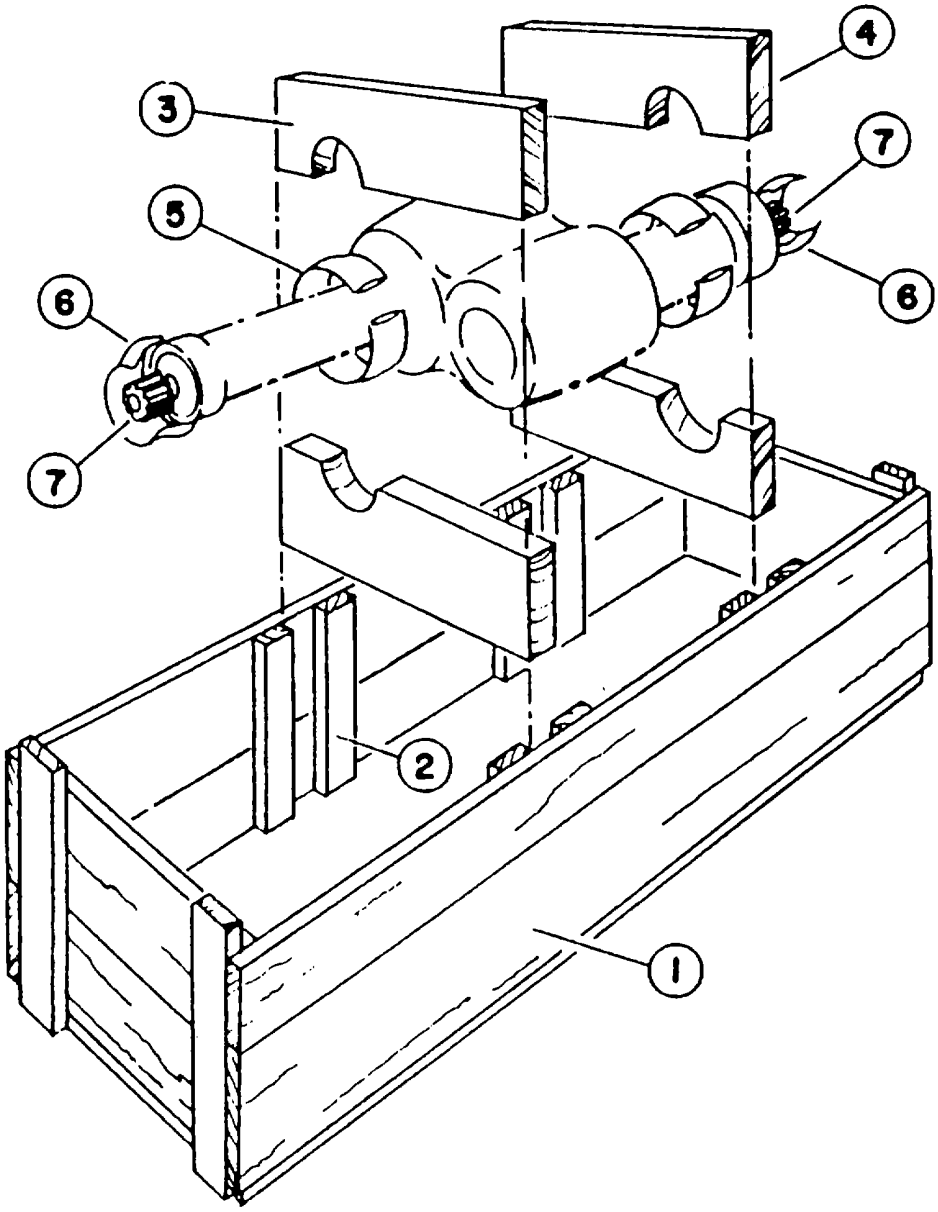


Figure 4-2. Blocking and Bracing.

Use same preservation on outrigger height adjustment screws. Float plates may be painted or preserved same as outriggers and screws.

c. Cushion floodlights with cellulosic cushioning and pack in fiberboard boxes. Secure boxes in crane cab.

d. Process crane, components, and attachments per applicable paragraphs of this chapter. Cover all openings into the crane cab that will permit entry of water with waterproof barrier material and secure in place with tape.

e. Clean, dry, and preserve power trains, brakes, steering, suspensions, and all other portions of the mobility aspects of the crane and carrier per applicable paragraphs of this chapter.

4-45. Crane Attachments

a. Coat unpainted, unprotected metal surfaces of attachments including wire rope, bolts, nuts, and cable sheaves with P-1.

b. Nest and arrange each shovel front, backhoe, piledriver lead, etc., to form a compact bundle (exclude dippers and buckets). Place wood blocks between sections and secure the bundle together with 1 ¼-inch metallic strapping. Pack component parts including publications in wood, plywood, or fiberboard boxes. Seal all openings of fiberboard boxes with tape (see figure 4-3). Do not exceed weight limitation of boxes. Secure box to the attachment or within bucket with metallic strapping specified herein.

4-46. Rollers, Motorized

a. Drain rolls, water supply tanks, and sprinkler systems and dry with dry compressed air. Spray interior surfaces of rolls and water supply tank with P-10. Flush sprinkler system and coat filler and drain plugs with the same preservative and secure plugs in place.

b. Coat unprotected metal surfaces with P-1.

c. Clean, dry, and preserve power trains, brakes, steering, suspension, and all other portions of the mobility aspect of the rollers per applicable paragraphs of this chapter.

4-47. Rollers, Towed

a. Remove drain plug from hoppers of pneumatic tired rollers and drain plugs or ballast hole cover plate. Drain and dry with dry compressed air. Spray interior surfaces of roller drums with P-10. Reinstall drain plug and cover plate.

b. Coat drain plugs removed from hoppers of pneumatic tired rollers with P-1 and place in tool box.

c. Coat unprotected metal surfaces with P-1.

4-48. Distributors (Water and Bituminous), Truck-mounted

Completely drain and dry all tanks, pumps, spraybars, and piping including the heating system.

a. Water tanks. Coat interior surfaces of tanks (except those that are corrosion resistant), tank gauge mechanisms, screens, and strainers as follows: use P-9 for NONPOTABLE water tanks and use P-14 for POTABLE water tanks, and leave the drain valves open.

b. Bitumen tanks. Coat interior surfaces of tanks (except those that are corrosion resistant), tank gauge mechanisms, screens, and strainers with P-10. Leave the drain valves open.

c. Pumps. Coat interior surfaces of the pump casing and all parts within the casing. Spraying or fogging will continue long enough to ensure complete coverage. Seal openings into the pump interior with tape. Use the following preservatives: VV-L-800 (P-9) for NONPOTABLE water pumps; MIL-C-10382 (P-14) for POTABLE water pumps; and MIL-L-21260 (P-10), grade 30, for bitumen pumps.

d. Spraybars, piping, valves, and fitting. Coat interior surfaces with the applicable preservatives cited in c above.

e. Heating systems. Coat interior surfaces of burner fuel tanks, fuel pumps, steep piping, and valves with P-10. Seal openings with tape.

f. Bitumeters and Fifth-wheel tachometers. Secure in the carrying position on the distributor.

g. Distributor charts. Unit pack distributor charts submethod IC-3.

h. Unprotected, ferrous metal surfaces. Coat with P-1.

i. Systems vehicle. Clean, dry, and preserve pump engine and power train, brakes, suspension, steering, and all other portions of the mobility aspects of the distributors per applicable paragraphs of this chapter.

4-49. Distributor, Water, Collapsible Tank

a. Remove spraybar assemblies and braces and coat exterior surfaces with P-1.

b. Pack emergency repair items together in a fiberboard box.

c. Coil hose and secure with twine.

d. Lay tank flat with the fittings up and caps installed. Place preserved and packed components on top of the tank around the fittings and fold tank in manner to form a compact bundle and pack in a wood-cleated plywood box.

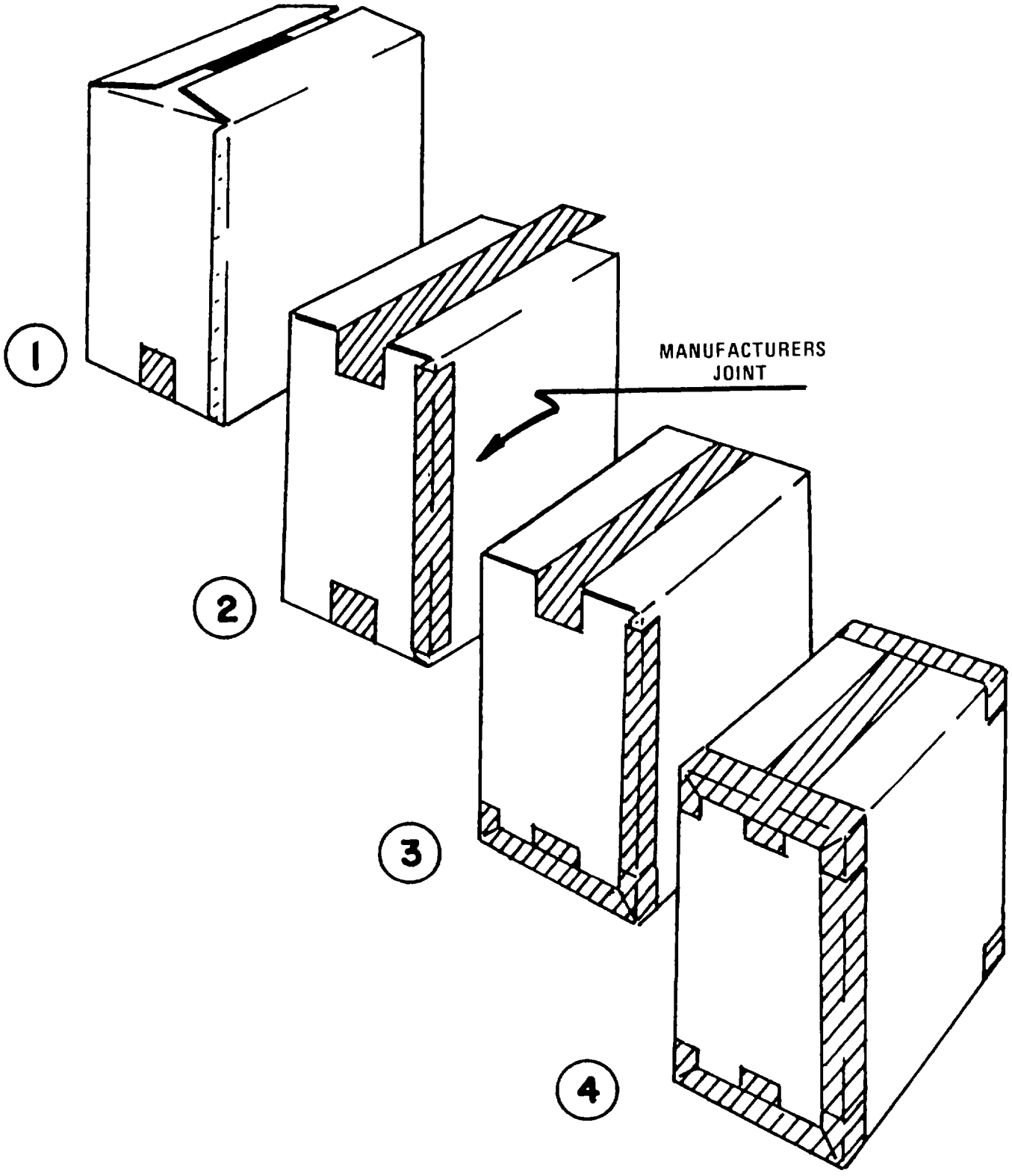


Figure 4-3. Fiberboard Box Tape Closure.

4-50. Hammer, Piledriver, Self-powered

a. Unpainted, ferrous metal surfaces. Coat all unpainted, unprotected, ferrous metal surfaces with P-1.

b. Cylinder and ram. Coat interior surfaces of cylinder and ram with P-10, grade 30.

c. Combustion chambers. Fog combustion chambers through the air inlet port with P-10, grade 30.

d. Fuel and lubricating oil tanks. Drain to the maximum extent possible and fog interior surfaces with P-10.

e. *Cylinder openings. Seal with plastic tape.*

f. Hydraulic transmitter. Coat interior and exterior surfaces of transmitter with P-10. Wrap or cover with greaseproof barrier material and unit pack in fiberboard boxes. Seal all openings of boxes with tape (fig 4-3).

g. Hoses. Coat fittings with P-1 and coil.

h. Other component items. Pack other component items in wood or plywood boxes.

4-51. Pneumatic Tool and Compressor Outfits

a. Bits, chisels, drill rods, ripping tools, moil points, tamping pads, picks, rods, and spades. Coat with P-1.

b. Pneumatic tools. Preserve per paragraph 4-2f.

c. Hoses. Coil and secure with tape or twine.

d. Goggles and inflator gauge. Cushion with cellulosic cushioning and unit pack submethod IC-1.

e. Compressor and trailer chassis. Preserve per applicable paragraphs of this chapter. Place packed and unpacked component items within the compartments provided on the compressor. Consolidate components that cannot be accommodated within the compartments in wood or plywood boxes and secure the boxes to the rear of the trailer with steel strapping.

4-52. Rock-drilling Equipment Sets

a. Drill rods, pickets, and tool steel. Coat with P-1. Bundle items of like size and description with metallic strapping.

b. Couplings, bushings, menders, extractors, and bits. Coat with P-l, wrap with greaseproof barrier material, secure with tape, and pack in fiberboard boxes.

c. Oilers, manifolds, nipples, unions, and elbows. Coat interior surfaces of oilers and manifolds with P-10 and seal openings with plastic tape. Pack items in fiberboard boxes.

d. Air motors and pneumatic drills. Preserve per paragraph 4-2f.

e. Hoses. Seal ends with plastic wrap (L-P-378 or equal) and tape. Coil hoses to a safe minimum diameter and secure with the tape specified herein.

f *Belts, harness, gloves, power cable, wire rope, valves, and wire reels*. Pack in fiberboard boxes.

g. Galvanometer, goggles, abrasive wheels, blasting machine, and grinder. Pack in fiberboard boxes and cushion items within the box with cellulosic cushioning.

h. Igniters and cap boxes. Place igniters in cap boxes and cushion with cellulosic cushioning. Pack in fiberboard boxes.

i. Handtools. Package per paragraph 4-2a.

j. Drifter drill. Preserve and pack drifter drill per above requirements. Consolidate component items except those that are bundled in wood, plywood, or triple-wall fiberboard boxes and secure to the drifter drill. Position sinker drill on drifter drill and secure with steel strapping. Secure boom and drill on unit in a compact position to reduce cube and prevent damage.

4-53. Well-drilling Machines

Preserve and pack per paragraphs 4-51 and 4-52 for similar components of this chapter and as follows:

a. Folding mast and crown block assembly. Coat unpainted surfaces including sheaves, anchor, guard, and traveling block with P-1.

b. Hoisting assembly. Coat main hoist, sand reel drums, and planetary reduction gears with P-1.

c. Mud pump. Drain fluid cylinders and valve chambers. Coat interior surfaces of the cylinder liners, cylinder heads, valve seats, and valve cover plates with P-10. Replace cylinder heads and cover plates. Cover exposed openings through the piston rod lubricating glands with greaseproof barrier material and secure in place with tape.

d. Component items. Intermediate pack component items requiring the protection of a container in wood, plywood, or triple-wall fiberboard boxes.

4-54. Concrete Mixers, Trailer-mounted

a. Water-measuring tank and pump. Coat interior surfaces including working parts of water pump, tank, valves, and lines with P-10. Allow excess preservative to drain and seal 6penings with tape. Coat exterior unprotected surfaces with P-1.

b. Mixing drum. Remove mixing drum drain plug and position the drum with the drain at the

lowest point so that all water will drain from the drum. Coat the drain plug threads and the opening threads with P-1. Place plug with parts in the tool box.

c. Engine, gears, chains, trailer, and other components. Preserve per applicable paragraphs herein.

4-55. Extractor, Pile, Pneumatic, or Steam

Preserve and pack per applicable paragraphs of this chapter and as follows:

a. Cylinder. Fog extractor cylinder through air or steam-intake opening with P-10. Seal openings into the interior of the cylinder with tape.

b. Pipefittings. Coat threads with P-l, wrap with greaseproof barrier material, and secure with tape.

4-56. Paving Machine, Bituminous Material.

a. Unprotected surfaces. Coat unprotected surfaces such as levers, rollers, spreader screws, screed plates, screed extensions, tamper bars, and cutoff shoes with P-1.

b. Burner. Completely drain burner, and coat interior surfaces of the pump, piping, valves, and burner with P-10.

c. Systems vehicle. Clean, dry, and preserve power trains, brakes, suspensions, steering, and all other portions of the mobility aspect of the pavers per applicable paragraphs of this chapter.

4-57. Mixer, Rotary Tiller

a. Additive pump. Coat interior surfaces of pump with P-10 through the inlet opening while the pump is actuated. Allow excess preservative to drain, close shutoff valve, and install dust cap.

b. Rotor and tines. Coat unpainted surfaces of rotor and rotor tines with P-1. Place extra set of tines in the tool box.

c. Hose. Install dust cap on hose and secure on the mixer with metallic strapping.

d. Speed indicator. Lock speed indicator ground wheel in raised position.

e. Spraybar. Coat unpainted, exterior surfaces with P-1 and leave shutoff valves open.

f. Systems vehicle. Clean, dry, and preserve the power trains, brakes, suspensions, steering, and all other portions of the mobility aspect, and the pump engine of the mixer per applicable paragraphs of this chapter.

4-58. Jetting Set, Portable

a. Pipe fittings and nozzles. Coat unprotected surfaces with P-1, wrap with greaseproof barrier material, and secure with tape. Pack in fiberboard boxes.

b. Hoses. Coat exposed ends of hose couplings with P-1, wrap with greaseproof barrier material, and secure with tape. Coil cotton hoses and pack together in a fiberboard box.

c. Steel pipe. Coat unprotected surfaces with P-1, wrap with greaseproof barrier material, and secure with tape.

d. Packing. Bundle uncoiled hoses and steel pipe in secured lifts with metallic strapping. Overpack all other packed items in a plywood, wood, or triple-wall fiberboard box.

4-59. Drier Mixers, Bituminous-concrete

Preserve and pack per applicable paragraphs of this chapter and as follows:

a. Heater, fuel tank, pump, lines, and burner. Drain fuel tank and fill with P-10. Actuate the pump to ensure complete coverage of all interior surfaces of the pumps, lines, and burner jets. Drain preservative and close drain openings.

b. Exhaust stack. Cover with waterproof barrier material and secure in place with tape.

c. Hose cable and drum. Unreel cable; and coat cable and drum with P-1. Rewind cable on drum and secure to prevent unwinding.

d. Trailer chassis. Preserve per applicable paragraphs of this chapter.

4-60. Melter, Asphalt, Skid-mounted

a. Piping and fittings. Coat interior surfaces with P-10. Coat exterior, unprotected surfaces with P-1.

b. Hose assembly. Coat unprotected metal surfaces of couplings with P-1. Seal ends with tape.

c. Dedrumming tunnel. Coat unprotected metal surfaces with P-1. Place dedrumming tunnel inside tank and secure with devices provided.

4-61. Concrete Curing and Finishing Machines and Spreaders

Preserve and pack per applicable paragraphs of this chapter and as follows:

a. Unpainted, exterior surfaces. Coat with P-1.

b. Pumps and spray heads. Coat interior surfaces of pumps, ferrous metal surfaces of spray head, and nozzle with P-10 in a manner to ensure thorough coating of all interior parts and surfaces. Seal openings into pumps with tape.

c. Removed components. Secure components removed for reduction of cube to the unit. No overpacking of the curing machine, finishing machine, or spreader is required.

4-62. Pile-driving Rig

Coat unprotected surfaces of the basic pile-driving rig including structural members, booms, leads, and components with P-1. Structural members and fabricated section may be packed as loose pieces or bundled in secure lifts with metallic strapping to facilitate handling. Bundle planks and timbers in secured lifts with the strapping specified herein. Overpack miscellaneous small parts in plywood, wood, or triple-wall fiberboard boxes.

4-63. Batching Plant, Cement

Completely disassemble the batching plant per paragraph 3-2.

a. Unpainted, unprotected metal surfaces. Coat components of the batching plant, drive chains, sprockets, exposed gears, clevises, shafts, couplings, gates, brackets, framing, linkage, or any other surface exposed by disassembly with P-1.

b. Exposed, exterior machined surfaces. Coat with P-10. Wrap or cover coated surfaces with greaseproof barrier material and secure in place with tape.

c. Scale. Coat unpainted, unprotected metal surfaces with P-1. Cushion components with cellulosic cushioning material and pack in wood box.

d. Engine. Preserve engine per applicable paragraphs of this chapter.

e. Disassembled components. Bundle items of like description, (i.e., structure, operator's platform, ladder, storage bin, and elevator) in quantities most convenient for handling with 1 ¼-inch metallic strapping. Pack all other component parts in wood or plywood boxes.

4-64. Test Sets, Asphalt, Concrete, Soil

a. Unprotected machined surfaces. Coat surfaces with P-10 and cover with greaseproof barrier material.

b. Stopwatches, indicators, tape measures, and thermometers. Cushion each item individually with cellulosic cushioning and unit pack submethod IC-3.

c. Drafting scales, porcelain dishes, glass cylinders, level and plumb, porcelain mortars and pestles, jars, or other fragile items. Protect each item individually with cellulosic cushioning and secure with tape.

d. Scale, beam indicating. Coat unprotected surfaces with P-9 and wrap with greaseproof barrier material. Cushion with cellulosic cushioning and pack individually in fiberboard boxes.

e. Cloth, graph paper, filter paper, test paper, color chart, filter ring, and gloves. Unit pack submethod IC-3.

f. Shaking machine and hot plate. Pack in fiberboard boxes and cushion with cellulosic cushioning to prevent movement or damage.

g. Other components. Pack larger components for which no space is provided within the chests in fiberboard boxes.

h. Intermediate packs. To the maximum extent possible, place components of each set in the chests provided and cushion with cellulosic cushioning to prevent movement or damage. Pack set components that cannot be accommodated within the chests in intermediate fiberboard boxes. Waterproof seal chests and boxes with tape.

i. Packing. Pack set components packed in fiberboard boxes in plywood, wood, or triple-wall fiberboard boxes. The chests will not require overpacking.

4-65. Rock Crushing, Screening, and Washing Equipment

a. Engines, electric motors, and pumps. Preserve per applicable paragraphs of this chapter.

b. Unpainted, unprotected metal surfaces. Coat components such as drive chains, sprockets, tie rods, clevises, couplings, coil springs, shafts, hopper, chutes, feeders, jaws, screens, brackets, framing, linkage, ratchets, pauls, pins, washers, nuts, bolts, or any other surface exposed by disassembly with P-1.

c. Exposed, exterior machined surfaces. Coat with P-10 or P-11 and wrap or cover coated surfaces with greaseproof barrier material. Secure in place with tape.

d. Drive belts and conveyor belts. Release tension from all belts.

e. Wire rope cables. Coat with P-1.

f. Electric power cables. Wind and secure on reels.

g. Electrical components. Seal openings into the control panels, junction boxes, switches, instrument panels, and the exposed ends of electric wiring with tape.

h. Instruments. Cover glass of instruments not protected by a housing or cover with cushioning and a fitted piece of ¼-inch plywood. Secure in place with tape.

i. Piping equipment. Coat all threads with P-1.

After preservative has dried, wrap all exterior threads with greaseproof barrier material, and secure with tape. Bundle piping in secured lifts in quantities most suitable for handling with 1/4-inch metallic strapping. Pack pipe fittings in wood, plywood, or triple-wall fiberboard boxes.

Section III. PRINTING, DUPLICATING, AND BOOKBINDING EQUIPMENT

4-66. General

Use instructions for similar-type items possessing the same physical and/or mechanical characteristics to preserve and pack printing, duplicating, and bookbinding equipment not specifically identified in this section.

4-67. Camera, Copying, Lithographic

a. *Machined and precision metal surfaces*. Coat unprotected surfaces of components with P-11. Wrap or cover coated surfaces with grease-proof barrier material and secure with tape.

b. *Other unprotected metal surfaces*. Coat unpainted, unprotected metal surfaces such as coil springs, structural members, bolts, nuts, and similar components with P-1.

c. *Negative holders with adjustment mechanism; positive holders with clamps and screen holders*. Coat all exterior, unpainted metal surfaces and all interior metal surfaces with P-9. Wrap or cover coated, exterior surfaces with grease-proof barrier material and secure with tape.

d. *Lensboard, copyboard and bellows carriages, and lensboard and copyboard-frame assemblies*. Coat reduction gears, counter mechanisms, and ball-bearing rollers of the carriages with P-9. Coat unpainted metal surfaces of the bellows carriages and copyboard-frame assemblies with P-1. Unit pack the carriages and assemblies individually by sub-method IC-1.

CAUTION

Do not allow preservative to contact electric motors, resistors, electric wiring, or control cables of the carriages or felt backing around the lens-plate bearings.

e. *Glass.* Cushion all glass components with cellulosic cushioning and package in fiberboard boxes.

f *Pumps.* Coat interior surfaces including rotors, shafts, vanes, pistons, cooling systems, and air reservoirs with P-10.

g. *Electric wiring systems*. Seal exposed ends of terminals, wires, plugs, opening of wiring harnesses, and junction boxes with tape.

h. Lamp assemblies, hoss and hose fittings, lenses, and gauges. Cover lenses with lens paper and cushion with cellulosic cushioning and pack individually in fiberboard boxes.

i. *Lens plate*. Dip in P-9, drain, and individually wrap the grease-proof barrier material. Pack in fiberboard boxes.

j. *Curtains.* Coat unpainted metal frames with P-1. Coat roller ends with P-9 and wrap in greaseproof barrier material. Pack sets of curtains in fiberboard boxes.

k. *Electrical components*. Seal all openings into electric motors, rheostats, and transformers with tape.

I. *Packing*. Pack each camera, with components packaged as specified in paragraph 4-67, in a MIL-C-104, type I, class 2, style A crate.

4-68. Photocopying and Processing Machine

a. *Machined and precision metal surfaces*. Coat surfaces such as gears, chains, sprockets, and rails with P-9.

b. *Non-precision metal surfaces*. Coat unpainted metal surfaces with P-1.

c. *Lens and prism assembly.* Remove lens and prism assembly with the lens cap in place and cushion with cellulosic or foam cushioning wrap, minimum 1-inch thickness, to prevent breakage.

Pack in a fiberboard box and waterproof seal with tape (fig 4-3.).

d. *Lamp assemblies*. Remove, cushion with cellulosic or foam cushioning, and individually pack in fiberboard boxes (fig 4-4).

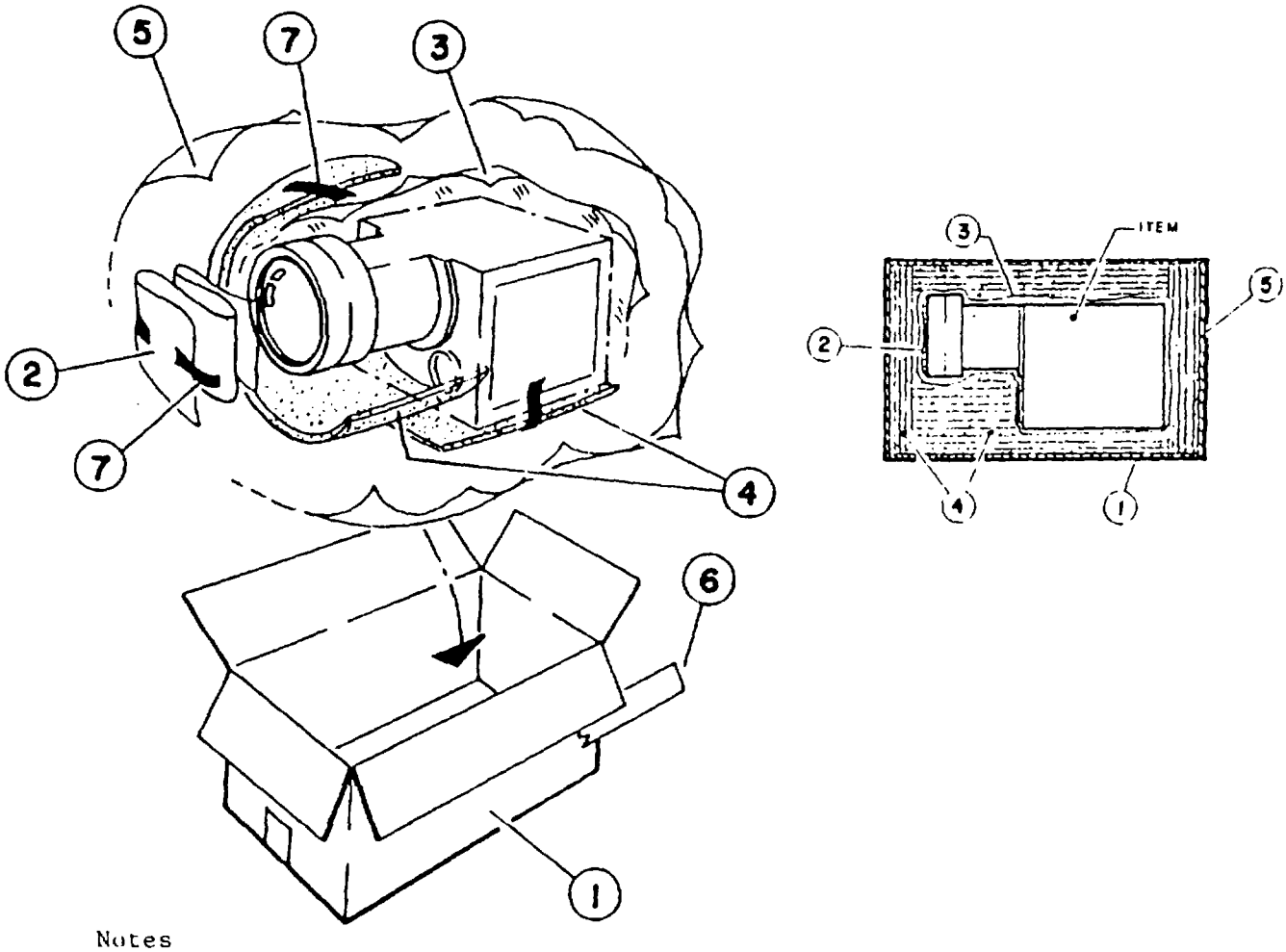
e. *Glass*. Individually wrap ground glasses, with or without frames, with grease-proof barrier material. Provide a minimum of 3-inch thick cellulosic cushioning on all surfaces of the glass. Pack individually in wood or plywood boxes.

f. *Intermediate pack*. Place packed and unpacked components (except basic units and glass) in a wood box. Cushion and block components to prevent movement within the box.

g. *Packing.* Pack each photocopying and processing machine and intermediate packed components in a MIL-C-104, type I, class 2, style A crate. Internal blocking and anchoring will include necessary cribbing to support the focusing rack.

LEGEND

FIND NO.	QTY	NOMENCLATURE
1	1	Box, PPP-B-636
2	1	Lens Paper
3	1	Wrap, L-P-378
4	AR	Cushioning, PPP-C-1797
5	1	Barrier, Heat Sealable
6	AR	Tape, PPP-T-60
7	AR	Tape, Masking



Notes

1. Typical packaging configuration for lensed and/or fragile items.

2. Method of pack shown is JA-8, the PDMF should be referred to for packaging methods for individual items, dependent on their condition code.

Figure 4-4. Fragile Items Cushioned in Fiberboard Boxes.

4-69. Plate Coating Machine, Photolithographic

a. Exposed, machined metal surfaces. Coat surfaces such as shafts, worm gears, levers, and working parts with P-9.

b. Drive belts. Release belt tension.

c. Electric motors, controls, and wires. Seal exposed ends of wires; electrical cables; plug openings; and openings into motors, switches, junction boxes, and couplings with tape.

d. Air Filter, Remove, clean, coat with P-10, and then reinstall.

e. Heating elements and blower pipe. Cover all openings into the heating elements and blower with greaseproof barrier material and secure with tape.

f Gears. Coat with P-ll.

g. Packing. Pack each plate-coating machine in a plywood or wood box.

4-70. Table, Line up and Register

a. Exposed, machined metal surfaces. Coat surfaces such as clamps, gear tracks, straightedge, carriages, retainers, and scales with P-ll. Wrap or cover coated surfaces with grease-proof barrier material and secure with tape.

b. Ruling mechanism, ruling device holders and accessories. Coat metal surfaces with P-ll, applied by brushing to prevent the preservative from contacting the ink pad and roll. Wrap with grease-proof barrier material, cushion with cellulosic or foam cushioning, and place in table drawer.

c. Lamp housing. Seal the fluorescent lamp, switches, and starter sockets with tape. Coat door hinges and catches with P-9. Coil extension cable and secure with tape specified herein, cushion with cellulosic or foam cushioning, and place in lamp housing.

d. Fluorescent lamps. Cushion with cellulosic or foam cushioning and pack in fiberboard box. Place in lamp housing and cushion to prevent movement.

e. Fluorescent lamp starters. Package sub-method IC-3. Place in table drawer and cushion to prevent movement.

f. Extra glass plates. Wrap each glass plate with cellulosic or foam cushioning and secure with tape specified herein. Place each wrapped plate between fitted pieces of class weather-resistant fiberboard of sufficient size to protect all surfaces and edges and secure with tape. Place cushioned glass plates on table top and secure with tape.

g. Locks and keys. Cover keyhole with tape. Coat keys with P-ll, wrap with grease-proof barrier material, and place in table drawer.

h. Packing. Pack each lineup table in a wood or plywood box.

4-71. Paper Cutter, Guillotine

a. Unpainted, ferrous metal surfaces. Coat with P-1.

b. Electric motors. Seal openings with tape.

c. Knives. Coat with P-1.

d. Handtools. Package per paragraph 4-2.

e. Intermediate pack. Place knives in case provided. Cushion spare knives with cellulosic cushioning. Intermediate pack tools and knives in a fiberboard box.

f. Packing. Pack each complete cutter in a wood or plywood box.

4-72. Duplicating Machine, Offset Process

Clean and dry per paragraphs 3-3 and 3-4 and as follows: Accomplish cleaning by brushing or wiping the unit with a soft bristle brush or solvent-saturated cloth. Do not allow solvent to contact rubber, rubberized components, or fabric materials. Following the initial cleaning process, clean critical surfaces such as steel rollers, drums, and cylinders with fingerprint remover (MIL-C15074), after which, clean the surfaces a second time with solvent to remove any traces of fingerprint remover material.

a. Exposed, machined metal surfaces. Coat surfaces such as shafts, worm gears, levers, and working parts with P-9. Wrap or cover coated surfaces with greaseproof barrier material, and secure in place with tape.

b. Enclosed gears and chains. Fill housings to operating level with operating lubricants and operate to ensure coating all internal surfaces.

c. Exposed chains. Coat with P-3.

d. Clutches. Secure springloaded-type clutches in a partially disengaged position to eliminate contact between disk facing and pressure plates. Completely disengage snap-over-center and togglein type clutches.

e. Drive belts. Release tension.

f. Gauges and indicators. Cushion with cellulosic cushioning material and secure with tape.

g. Rubber suckers. Remove and unit pack submethod IC-1.

h. Intermediate pack. Intermediate pack components and accessories in fiberboard boxes.

i. Packing. Pack each duplicating machine in a sheathed crate.

4-73. Duplicating Machine, Spirit Process and Stencil Process

a. Exposed, machined metal surfaces. Coat surfaces such as shafts, worm gears, levers, and working parts with P-9. Wrap or cover coated surfaces with greaseproof barrier material and secure in place with tape.

b. Gauges and indicators. Cushion with cellulosic cushioning and secure with tape specified herein.

c. Packing. Pack each complete duplicator in wood, plywood, or triple-wall fiberboard boxes.

4-74. Printing Press, Offset

Clean and dry per paragraphs 3-3, 3-4, and 4-72.

a. Exposed machined surfaces; enclosed gears and chains; exposed chains, clutches, drive belts, gauges, and indicators; and rubber suckers. Preserve and pack per paragraph 4-72.

b. Press cylinders and steel rollers. Coat the surfaces of the cylinders and rollers with P-9. Wrap or cover coated surfaces with greaseproof barrier material and secure in place with tape. Adjust press cylinders so that the bearing surfaces will not be in contact when on impression. Secure the rollers to prevent movement.

c. Intermediate pack. Package components and accessories in fiberboard boxes.

d. Packing. Pack each printing press in a MIL-C-104, type I, class 2, style A crate.

4-75. Printing Plant, Special Warfare, Semitrailer and Shelter-mounted

Clean and dry per paragraphs 3-3, 3-4, and 4-72.

a. Water system. Drain and blow dry with dry compressed air.

b. External, electrical power cable and drain hoses. Remove coil and secure with tape and place inside shelter.

c. Air conditioners. Preserve per paragraph 4-32.

d. Component items. Preserve component items per applicable paragraphs of this section.

e. Securing components. Secure components with locking devices provided. Secure or cushion component parts that are free to move or rotate, but are not provided with locking devices, to prevent damage during transit. Place supplies in appropriate drawers or cabinets and cushion with cellulosic cushioning. Take special care to ensure that supplies in glass bottles are adequately cushioned.

f. Semitrailer. Preserve semitrailer per applicable paragraphs of this chapter.

4-76. Topographic Reproduction Sets, Truck-mounted

Clean and dry per paragraphs 3-3, 3-4, and 4-72.

a. Plate coating machine. Preserve per paragraph 4-69.

b. *Table, lithographic* layout, and straightedge assembly. Coat exposed machined surfaces with P-ll. Wrap or cover coated surfaces with greaseproof barrier material and secure in place with tape.

c. Glass working surface. Cushion working surface of table top with cellulosic cushioning. Place a piece of class weather-resistant fiberboard of sufficient size to completely cover working surface and secure in place with tape specified herein.

d. Extra glass plates. Package per paragraph 4-70f

e. Drafting, engraving, and plate process instruments and equipment. Place each item and its accessories in the carrying case or container provided and cushion with cellulosic cushioning. Cushion and pack each item without carrying case or container in fiberboard boxes and seal all openings with tape (fig 4-3).

f. *Ferrous metal surfaces*. Preserve ferrous metal surfaces of components per paragraph 4-67.

g. *Air conditioner*. Preserve per paragraph 4-23.

h. Table, line up and register. Preserve per paragraph 4-70.

i. Camera. Preserve and pack per paragraph 4-67.

j. Curtains, lamp assemblies, hoses, pumps, elec trical systems, lenses, gauges, etc. Preserve per applicable paragraphs of this section.

k. Truck. Clean, dry, and preserve power train, brakes, steering, and all other components of the mobility aspect of the vehicle per applicable paragraphs of this chapter.

l. Intermediate pack (unmounted components). Place components in the storage cabinets or chests and cushion with cellulosic cushioning. Pack components that cannot be placed in cabinets or chests in triple-wall fiberboard boxes and cushion with cushioning material specified herein.

m. Packing. Secure the mounted components within the van with the locking devices provided. Secure or cushion component parts that are free to rotate or move, but are not provided with locking devices, to prevent damage during transit. Secure drawers, doors, and storage cabinets with the closing devices provided and with metallic strapping. Protect cabinet edges by placing fiberboard pads under the strapping. Block, brace, and cushion intermediate packed components within the van to prevent damage.

4-77. Reproduction Set, Silk-screen Process

a. Brushes and squeegee. Individually unit pack submethod IC-3.

b. Frame. Protect with cellulosic cushioning material.

c. Handtools. Preserve per paragraph 4-2a

d. Shears, pan, staple tacker. Coat unprotected TM 746-10 metal surfaces with P-10 and wrap with greaseproof material.

e. Silktone process screen, signboard, stencil sets, ruler, tracing paper, and cloth. Unit pack submethod IC-3.

f. Intermediate pack. Intermediate pack the set components within the chests provided. Cushion and block to protect the items from damage.

Section IV. DRAFTING, SURVEYING, AND TOPOGRAPHIC EQUIPMENT

4-78. General

Use instructions for similar-type items possessing the same physical and/or mechanical characteristics to preserve and pack drafting, surveying, and topographic equipment not specifically identified in this section.

4-79. Stereo-plotter, Projection

a. Handtools. Preserve and pack per paragraph 4-2a

b. Machined and precision metal surfaces. Coat with a thin film of P-9. Wrap or cover the coated surfaces with grease-proof material and secure in place with tape.

c. Unprotected metal surfaces. Coat unpainted, unprotected, exterior metal surfaces with P-1.

d. Packing. Place and secure the stereo-plotter components, accessories, and tools in their appropriate carrying chests provided and cushion with cellulosic cushioning. The chests will serve as shipping containers.

4-80. Transits, Theodolites, Chronometers, Surveying Levels, and Altimeters

a. Machine and precision metal surfaces. Coat with a light film of P-10. Wrap or cover coated surfaces with grease-proof barrier material and secure in place with tape.

b. Tripods. Reduce to the minimum dimensions and secure the legs together with straps provided. Place each tripod in a fiberboard box. Fit end of box next to the points with a wood block.

c. Handtools. Preserve per paragraph 4-2a

d. Instrument with accessories and components. Secure the instrument with accessories and components within its appropriate carrying case.

e. Packing. Pack each instrument with accessories, components, and tripod together in a wood or triple-wall fiberboard box. Cushion the items within the box with a minimum of 2 inches of cellulosic or foam cushioning on all surfaces to prevent movement and damage.

4-81. Projector, Stereo-plotter, Multiplex

a. Machined and precision metal surfaces. Coat with a thin film of P-10. Wrap or cover the coated surfaces with grease-proof barrier material and secure in place with tape.

b. Unprotected metal surfaces. Coat unpainted, unprotected metal surfaces with P-1.

c. Handtools. Preserve per paragraph 4-2a d. Packing. Place and secure a set of three projectors with accessories in the case provided and cushion with cellulosic cushioning. Close and secure the case lid with the closing devices provided. The case will serve as the shipping container.

4-82. Drafting Equipment Sets

a. Drawing boards and trestles, folding tables, and office tables and chairs. Individually wrap drawing board and trestles, folding tables and chairs, and office tables with legs removed with cellulosic cushioning. Pack in fiberboard, wood, or plywood boxes.

b. Drawing and tracing tables with illuminated glass surfaces. Package per paragraph 4-76c

c. Extra glass plates. Package per paragraph 4-70f.

d. Filing cabinets. Secure drawers with locking devices provided and pack in fiberboard boxes.

e. Tracing cloth, paper pads, drawing paper, graph paper, tracing paper, kraft paper, and tape. Unit pack sub-method IC-3.

f Altimeter, barometer, magnetic compass, counter, map measurer, drafting scales, shears, and stereoscope (pocket type). Cushion each item individually with cellulosic cushioning and unit pack sub-method IC-3.

g. Electric eraser, fluorescent lamps, desk lights, magnifier, microscope, pencil sharpener, and stereo

scope. Cushion each item individually with cellulosic cushioning and pack in fiberboard boxes.

h. Drafting instruments with cases. Cushion instruments within cases with cushioning and unit pack submethod IC-3.

i. Intermediate pack. Intermediate pack the set components within the chests provided, cushioning the items with cellulosic cushioning to prevent damage or breakage. When no chests are included in the set, intermediate pack small items in fiberboard boxes.

j. Packing. When the entire set is packed within the chests provided, the chests will serve as shipping containers. Pack components of sets without chests in fiberboard, wood, or plywood boxes, or in sheathed crates, as applicable.

4-83. Repair Kit, Stereoplotter, Projection

a. Machined and precision surfaces. Coat with a think film of P-10. Wrap or cover the coated surfaces with greaseproof barrier material and secure in place with tape.

b. *Supplementary multiplex equipment*. Place each item and its accessories in the chest or case provided and cushion with cellulosic cushioning. Secure chests and cases with locking devices provided. Pack small cases in fiberboard boxes.

c. *Power cable*. Coil electrical cable and secure coils by tying or taping.

d. *Electrical connectors and fixed resistors*. Unit pack submethod IC-3. Package in quantities required for the set.

e. *Spectacles, stereoscope, weight gauge, variable resistors, receptacles, nadirscope, and pressure plates.* Cushion with cellulosic cushioning and pack in fiberboard boxes.

f. *Repair parts and other components*. Pack in fiberboard boxes. Cushion item within the boxes with cellulosic cushioning.

g. Packing. Pack packaged and unpackaged items in plywood, wood, or triple-wall fiberboard boxes.

4-84. Repair Kit, Surveying Equipment

a. Handtools. Preserve and pack handtools per paragraph 4-2.

b. Brushes, chamois, cloth, and lens paper. Unit pack submethod IC-3.

c. Intermediate packs. Intermediate pack set components in fiberboard boxes. Cushion items within boxes with cellulosic cushioning.

d. Packing. Pack intermediate packed items, as specified in paragraph 4-84c, in wood, plywood, or triple-wall fiberboard boxes.

4-85. Surveying Sets

a. Handtools. Preserve and pack handtools per paragraph 4-2.

b. Surveying instruments and accessories. Preserve and pack per paragraph 4-80.

c. Printed forms, lens paper, writing pads, charts, cloth tags, tracing paper, and cloth. Unit pack submethod IC-3.

d. Binoculars, hand levels, battery power supply, thermometers, and lamps. Cushion with cellulosic cushioning and pack in fiberboard boxes.

e. Taping stools. Coat threads of locking device with P-1. Cushion points of legs and pack in fiberboard box.

f. Intermediate pack. Intermediate pack set components within the chests provided. Cushion items with cellulosic cushioning to prevent damage and breakage. When no chests are included in the set, intermediate pack small items in fiberboard boxes and cushion with cushioning material specified herein.

g. Packing. When the entire set is packaged within the chests provided, the chests will serve as shipping containers. Pack components of sets without chests in wood, plywood, or triple-wall fiberboard boxes, or in sheathed crates, as applicable.

4-86. Topographic Mapping Sets, Truck-mounted

a. Rectifier. Coat exposed machined and precision metal surfaces such as shafts, gears, levers, and working parts with P-9. Wrap or cover the coated surfaces with greaseproof barrier material and secure in place with tape. Secure locking devices in lock position. Attach a tag containing the following information to the removable locking device for the lamp house and tiltlock assembly: "REMOVE BEFORE OPERATING-REUSABLEDO NOT DESTROY."

b. Lens surfaces, plotting tables, and projection easel. Cover or wrap with greaseproof barrier material and secure in place with tape.

c. Contact printer. Deflate the air bags. Elevate the lids and block in place to prevent contact with the rubber seals.

d. Stereoscopes. Place in carrying cases provided and cushion with cellulosic cushioning.

e. Multiplex tables. Place and secure each complete multiplex table in the chest provided.

f. Tracing tables. Place and secure each complete tracing table with accessories in the carrying

case and cushion with cellulosic cushioning.

g. Double and single-multiplex frames with tables. Coat unpainted, exterior metal surfaces of components such as nuts, bolts, adjusting screws, base bar, and double-frame adapter with P-9. Wrap or cover the coated surfaces with greaseproof barrier material and secure in place with tape.

h. Air conditioners, pumps, electrical cables, and outlets. Preserve per paragraphs 4-4 and 4-23.

i. Truck. Clean, dry, and preserve power train, brakes, steering, and all other components of the mobility aspect of the vehicle per applicable paragraphs of this chapter.

j. Instruments and equipment. Place each item and its accessories in the carrying case, container, or chest provided and cushion with cellulosic cushioning. Cushion and pack items without carrying cases or chests (needing the protection of a box) in fiberboard boxes.

k. Intermediate pack. Place components in the storage cabinets, drawers, or chests and cushion with cellulosic cushioning. Pack components that cannot be placed in cabinets, drawers, or chests in fiberboard boxes and cushion with cushioning material.

l. Packing. Secure the mounted components within the van with the locking devices provided. Component parts that are free to move or rotate and are not provided with locking devices must be secured or cushioned to prevent damage during transit. Secure drawers, doors, storage cabinets, and chests with the closing devices provided and with metallic strapping. Protect cabinet edges by placing fiberboard pads under the strapping. Block, brace, and cushion intermediate packed components within the van to prevent damage.

4-87. Tower Erection Set, Topographic

a. Handtools. Preserve handtools per paragraph 4-2.

b. Aprons, bags, safety belts, climber's sets, safety straps, and textile tape. Pack in fiberboard boxes.

c. Tackle blocks, wire rope clamps, cable grips, and turnbuckles. Coat unpainted or unprotected surfaces with P-1.

d. Instrument plate. Cover the finished surface of the *instrument plate attac*hed to the adjustable top of the inner tower with cellulosic cushioning and overwrap with polyethylene film. Secure the cover with tape.

e. Bolts, screws, and nuts. Coat with P-1.

*f. Tower structural comp*onents. Nest structural *angles of like description such as diag*onals, horizontals, verticals, and other members belonging only to the same section of the tower to form a compact bundle of a size most convenient for handling. Secure the bundles with a 1l/4-inch metallic strapping. Place the two end straps onesixth the distance from each end of the bundle. Use an additional strap when the distance between straps exceeds 30 inches. Place wood battens under the strapping.

g. Intermediate pack. Intermediate pack components of set in the chests provided. Pack swivel legs, anchor posts, and other small items in wood boxes.

h. Packing. Pack tower components in open crates.

Section V. BRIDGING, FIXED AND FLOATING

4-88. General

Use instructions for similar-type items possessing the same physical and/or mechanical characteristics to preserve and pack bridging equipment not specifically identified in this section. Bridge sets that are packed will not be opened, and bundles will not be broken for preservation.

4-89. Bridge, Fixed: Highway, Steel, Bailey Type

a. Unpainted, unprotected metal surfaces. Coat unpainted, unprotected metal surfaces of component items with P-1.

b. Nuts and cap screws. Pack preserved nuts and cap screws in fiberboard boxes.

c. Luminous tape. Unit pack submethod IC-3.

d. Packing.

(1) Steel pickets. Pack in triple-wall fiberboard or wood boxes. Fit end of the box next to the points with a wood block to prevent damage to either type box.

(2) Bracing bolts, connector bolts, riband bolts, transom clamps, connector pins, sway brace pins, tie plates, bridge pin retainers, and footwalk posts. Pack in triple-wall fiberboard or wood boxes. Do not exceed weight limitation of the boxes.

(3) Chess. Place chesses face to face in bundles of 14 each. Secure each bundle with three 1¼/4-inch metallic straps. Place 3 subbundles edge to edge and consolidate into bundles of 42 chesses. Secure the bundle with four 1¼/4-inch metallic straps. Use metallic edge protectors under all metallic straps to protect the chess.

(4) Bearing shoes. Pack bearing shoes, in quantities of eight, in wood boxes.

(5) Nuts, cap screws, and tape. Pack in triplewall fiberboard boxes.

(6) Footwalk bearers, ramp pedestals, sway braces, footwalk assemblies, bracing frames, rakers, and end posts. Bundle in quantities most convenient for handling with 1 Y4-inch metallic strapping.

(7) Plain and button ramps and plain and button stringers. Bundle in quantities of four each. Secure bundles with four 1¼4-inch metallic straps.

(8) Base plates, guardrail ribands, and truss panels. Require no packing.

(9) Manila rope. Pack in triple-wall fiberboard or wood box.

4-90. Bridge Conversion Set, Fixed Bridge; Bailey Type

a. Unpainted, unprotected metal surfaces. Coat unpainted, unprotected metal surfaces of component items with P-1.

b. Cotton duck bag. Unit pack submethod IC-3.

c. Juntion link bearings, bracing bolts, connector bolts, chord clamps, transom clamps, junction links, launching nose links, connector and sway brace pins, tie plates, and bridge pin retainers. Pack in triple-wall fiberboard or wood boxes. More than one NSN item may be packed in boxes; however, weight limitation of the boxes will not be exceeded.

d. Bearing cribs, crib capsills, junction chesses, and bracing frames. Bundle in quantities of four each with l14-inch metallic strapping.

e. Sway braces, junction posts, and rakers. Bundle in quantities most convenient for handling with 1¼4-inch metallic strapping.

4-91. Bridge Erection Set, Fixed Bridge; Bailey Type

a. Unpainted, unprotected metal surfaces. Coat unpainted, unprotected metal surfaces of components parts with P-1.

b. Handtools. Preserve and pack per paragraph 4-2.

c. Cotton duck bags. Unit pack submethod IC-3.

d. Packing.

(1) Holdfast assembly. Pack per paragraph 4-89d(1).

(2) Rocking roller templates. Bundle in quantities of four and secure with 1¼4-inch metallic strapping.

(3) Plain templates. Bundle in quantities of 12 and secure with 1 ¼4-inch metallic strapping.

(4) Lumber and carrying bars. Bundle in quantities most convenient for handling with 1Y4inch metallic strapping.

(5) Rack bar jacks. Bundle jacks and jack handles in quantities of two, with metallic strapping specified herein.

(6) Rocking rollers. Do not pack rocking rollers.

(7) Other components. Pack bridge erection set components other than specified in paragraph 4-91 in triple-wall fiberboard or wood boxes. More than one NSN item may be packed in boxes; however, weight limitation of the boxes will not be exceeded.

4-92. Bridge, Floating, Highway, 135 Feet

a. Unpainted, unprotected metal surfaces. Coat unpainted, unprotected metal surfaces of component items with P-1.

b. Handtools. Preserve and pack per paragraph 4-2.

c. Cotton duck bags. Unit pack submethod IC-3.

d. Sockets, shackles, hold-down bolts, adapters and pontoon assembly pins, wire rope clips, pins, repair kits, thimbles, bridge connectors, and retainers. Pack in fiberboard boxes. Gross weight of each box will not exceed 90 pounds. Reinforce boxes with metallic strapping.

e. Air gauges and luminous tape. Unit pack individually submethod IC-3.

f. Pin and spring holder assembly. Secure pin and spring holder assemblies, which are part of ramps, stiffeners, etc., in place with bridge pin retainers to prevent loss. If subject to damage, remove and pack in fiberboard boxes.

g. Packing.

(1) Holdfast assemblies and steel pickets. Pack per paragraph 4-89d(1).

(2) Handrail posts, retainer assemblies, rope, chain hoist, cable grip, and wire rope assemblies. Place in chests if space permits or pack in triplewall fiberboard or wood boxes.

(3) Curbs, anchors, outboard motor brackets, raft brackets, deck units, deck panels and ramps, panel assemblies, plate covers, and saddles. Nest and bundle in quantities most convenient for handling with 1¼4-inch metallic strapping. The number of bundles and pieces to a bundle should be kept to a minimum to facilitate association to the respective end item. If bundling is impracticable, items will require no overpacking.

(4) Chain hoists. Pack in chests provided.

(5) Pontoon floats. Deflate and place repair parts in the pockets provided. Fold pontoons and

place in carrying case with the attached ropes. Pontoons require no overpacking.

(6) Saddles, trestle assemblies, and towers. Pack or bundle disassembled subitems in quantities most convenient for handling. Pack in triple-wall fiberboard or wood boxes.

(7) Other components. Pack components not specified above in triple wall fiberboard or wood boxes.

4-93. Bridge, Floating, Aluminum, Foot

a. Unprotected, ferrous metal surfaces. Coat all unprotected, unpainted, ferrous metal surfaces of hinge clamps, wire rope clips, approach posts, hook assemblies for pontoon boats, and snap hooks with P-1. Pack in fiberboard boxes. Gross weight of the boxes will not exceed 90 pounds.

b. Reflective tape. Unit pack submethod IC-3.

c. Packing.

(1) Packaged items. Pack packaged items (see a and b above) in fiberboard or wood boxes.

(2) Holdfast assemblies. Pack per paragraph 4-89d(1).

(3) Superstructure treadways. Bundle in quantities of four each with 1¼/4-inch metallic strapping.

(4) Boat hooks. Bundle in quantities of two each with metallic strapping.

*(5) Pontoon boats and reels of wire rop*e. No packing required.

4-94. Ferry Conversion Set, Raft

a. Tackle blocks, wire rope clips, cable grips, hammers, holdfast assemblies, tricycle traveler, wire ropes, and open end wrenches. Coat unpainted, unprotected, ferrous metal surfaces with P-1.

b. Chain hoists and adjustable wrenches. Coat with P-10. Wrap individually with greaseproof barrier material and secure in place with tape.

c. Packing. Place all component items in the chest provided. No overpacking is required.

4-95. Bridge Erection Set, Floating Bridge, Aluminum

a. Unpainted, unprotected, ferrous metal surfaces. Coat unpainted, unprotected, ferrous metal surfaces of all components with P-1.

b. Cotton duck bags and measuring tape. Unit pack submethod IC-3.

c. Chain hoist. Coat with P-10, wrap individually with greaseproof barrier material, and secure with tape.

d. Ranging poles. Pack in fiberboard boxes.

e. Intermediate pack. Intermediate pack set components in fiberboard boxes. Gross weight of boxes will not exceed 90 pounds.

f. Packing.

(1) Chain hoist. Pack in chests provided.

(2) Rubberized pneumatic rollers and life preservers. Pack in triple-wall fiberboard boxes.

(3) Multiple-carrying bars. Bundle in quantities of four each with metallic strapping.

(4) Other components. Pack components other than chain hoists, rubberized pneumatic rollers, life preservers, and multiple carrying bars in triple-wall fiberboard or wood boxes.

4-96. Bridge, Floating, Raft Sections

a. Unpainted, unprotected, ferrous metal surfaces. Coat unpainted, unprotected, ferrous metal surfaces of all components with P-1.

b. Load binders, chain assemblies, pin assemblies, pumps, bridge pin retainers, manila rope, and cap screws. Pack in fiberboard boxes. Gross weight of the boxes will not exceed 90 pounds. Reinforce boxes with metallic strapping.

c. Pin assemblies. Secure pin assemblies which are a part of panels, curbs, and pontoon boats in place with bridge pin retainers to prevent loss. Secure tie-down assemblies to pontoon boat cradles with metallic strapping.

d. Packing.

(1) Packaged components. Pack in triple-wall fiberboard or wood boxes.

(2) Holdfast assemblies. Pack per paragraph 4-89d(1).

(3) Boat paddles. Place in carrying bag provided. No additional packing is required.

(4) Pontoon boats and cradles. No packing is required.

(5) Deck panels, articulator filler panels, and filler panels. Position top to top and bundle in quantities of two each with 1¼4-inch metallic strapping.

(6) Articulator and ramp assembly cubs and deck assembly curbs. Bundle in quantities of four each with 1¼4-inch metallic strapping.

(7) Ramp panels. Bundle in quantities of two each, top to top, with top panel reversed to form a compact bundle with 1¼-inch metallic strapping.

(8) Outboard motor brackets. Fold brackets and bundle in quantities of two each with 1¼/4-inch metallic strapping.

(9) Marine anchors. Bundle in quantities of four each with 1¼4-inch metallic strapping.

4-97. Bridge, Armored Vehicle Launched

a. Unpainted, unprotected surfaces. Coat unpainted surfaces of bolts, nuts, pins, washers, hold-down chains, turnbuckles, exterior surfaces of hydraulic pipe, and cables with P-1.

b. Packing. Fold each bridge. No overpacking is required.

4-98. Launcher-M48 and M60 Tank Chassis, Transporting

Preserve launcher, including the hydraulic system, per applicable paragraphs of this chapter.The launcher will be prepared for mobile shipment.

Section VI. RAIL AND MARINE EQUIPMENT

4-99. Rail Equipment

Preserve rail equipment per the preservation procedures (but without the dehumidification procedures) outlined in TB 740-97-5, Preservation of Railroad Equipment for Storage, but with the following exceptions:

a. Do not coat pulley grooves and clutch or brake components.

b. Do not preserve internal parts of governors, magnetos, or distributors.

c. Preserve wheel and axle assemblies and spare truck assemblies in accordance with TB 740-97-5, but do not cover with strippable coating compound. Seal openings into journal boxes with tape.

d. Seal openings into traction motors with tape. Cover large openings with a double thickness of greaseproof barrier material and secure in place with the tape specified herein.

4-100. Marine Equipment

Preserve marine equipment per preservatives specified (but without the dehumidification procedures) in TB 740-97-4, Preservation of Vessels for Storage, with the following exceptions:

a. Do not coat pulley grooves and clutch or brake components with primer.

b. Do not remove pump packing from pumps.

c. Preserve machine tools per paragraph 4-2.

Section VII. WEAPONS AND FIRE CONTROL EQUIPMENT

4-101. General

The materials, methods, processes, and procedures specified herein are based on the general requirements of TM 38-230-1 and TM 38-230-2 and specific instructions contained in this section.

a. This section provides instructions for preserving and packing weapons and associated fire control equipment. This includes requirements for cleaning, drying, preservative application, wrapping, cushioning, and blocking and bracing.

b. The following requirements are referenced throughout this section:

(1) Disassembly. Items may be disassembled, as necessary, to accomplish cleaning, drying, preservative application, etc., and to obtain minimum cube for packaging purposes. Refer to paragraph 1-6a. Parts or components removed during the packaging operation will either be reinstalled or packaged separately, as specified herein. Wheels and axles will not be removed from items prepared in towaway condition.

(2) Cleaning and drying-standard processes. Reference paragraph 3-3a. If necessary, more than one process may be used to accomplish thorough cleaning.

(3) Cleaning-special processes.

(a) Burned powder residue and hard carbon deposits. Surfaces subjected to burned powder, residue, and hard carbon will be cleaned, as specified herein, prior to standard cleaning. Surfaces will be scrubbed with bristle brushes and swabs saturated with rifle bore cleaner. The brushes and swabs will be passed over and through the surfaces as many times as necessary to remove contaminants. The scrubbed surfaces will be flushed with solvent.

(b) Optical surfaces. Reference paragraph 3-3b.

(*c) Bearings*, antifriction, open and closed. Bearings which are sealed (closed) and prelubricated or preserved will be cleaned by wiping with a cloth moistened with solvent. The quantity of solvent applied to the cloth will be limited to avoid dissolving lubricants or preservatives. Repeat the above operation using fingerprint remover in lieu of solvent.

1. Open bearings (unsealed) will be cleaned by process C-5.

2. Immediately after cleaning, the bearings will be dried and preserved or lubricated as prescribed by the lubrication order.

c. Surfaces subject to burned powder residue

will be dried using procedure D-1 except that barrel bores, chamber, and similar surfaces will be dried by procedure D-4 using clean, dry, lint-free swabs or rags. Drying of optical surfaces is done during the cleaning process. Immediately after cleaning, all open and closed antifriction bearings will be dried by procedure D-1, D-2, or D-3 per TM 38-230-1. When D-1 is used, bearings must not spin or rotate rapidly. Slow rotation or oscillation during drying is permitted to allow exposure of all surfaces to the air used for drying.

d. Immediately after drying, apply preservative. Selection of the preservative material shall be as follows: first choice, VCI; second choice, P-2; and third choice, P-1. If VCI is used, it should be in the form of a bore strip and outer wrap. If a bore strip is not available, cut a strip from the wrap the length and diameter of the bore, insert the strip into the tube, and completely wrap the item with VCI wrap. If P-2 is used, apply by dipping or brushing and allow excess to drain. After P-2 or P-1 is applied, wrap complete item with greaseproof barrier material and secure with tape.

e. Greaseproof wraps will be applied by enclosing the item to cover preserved surfaces. The wrap will conform snugly to the item without causing puncture or rupture of the wrap.

f. Various cushioning materials are referenced primarily throughout this section and are generally applied as follows:

(1) Cellulosic or foam material is used to cushion projecting surfaces to prevent rupture of wraps and barrier bags and as an overwrap to protect fragile and delicate components, and it is used to minimize or control item movement within barrier bags and containers. It may also be used as dunnage to fill container voids with irregularshaped items.

(2) Bound fiber offers more resistance to vibration and shock from impact and is generally applied to large or heavy items. This material may be used both in unit and shipping containers to distribute shock forces over a large area by isolating the item from container surfaces. Heavier items (20 pounds and up) require a minimum 2-inch thickness to prevent "bottoming out" of the material when subjected to severe shock forces.

(3) In some instances, it may be necessary to employ both materials to prevent physical or mechanical damage to the item.

(4) Fiberboard sheet stock may also be used to cushion or separate items in containers.

(5) When the type of cushioning material used within reusable metal or plastic containers is known to the packaging activity, the same type of cushioning material should be used for those items TM 746-10 when applying cushioning for nonreusable (wood or fiberboard) containers.

(6) When it can be expected that the item may be subject to damage during shipment, it is advisable that additional cushioning protection be utilized. This is especially true with high cost or highly sensitive items.

g. When the term "snug fitting" is referenced, a fiberboard container will be selected to adequately enclose the contents without forcing the contents in place or allowing excessive void areas. When standardor stock-size containers are selected, some void areas may be present; however, adequate cushioning will be provided to prevent free movement of the item or items. When containers are fabricated, the item or items will be carefully measured to provide the minimum practical container size. When multiple quantities are involved, the items will be arranged to provide a square container, if possible, or at least one with two dimensions being the same. Fast packs (PPPB-1672) shall be considered when weight, size, and fragility factors are compatible.

h. The following guidance is offered in determining the total quantity of like items allowed per container where specific quantities are not stated. The quantity may be determined by any of the following ways or as local conditions dictate:

(1) The weight or size limits of the container.

(2) The weight and size of a container that may reasonably be lifted and handled by one man (70 pounds).

(3) The size and shape of a container that will permit palletizing.

i. When required, blocking and bracing will be employed during the packing operation to provide physical and mechanical protection to the item(s). Free movement of the item(s) will be prevented, and concentrated loads will be transformed to large areas or faces of the container. General guidance is available in TM 38-230-2, and sample blocking format is referenced in chapter 3 of this manual (see fig 3-1 thru 3-10).

j. Basic issue items (*BII)* are ancillary items needed for operation that are not assembled to the end item for use but are used by the crew for operation of the end item. Common or special tools qualify if needed for operation but repair parts are not included. End items may or may not have BII. When BII is applicable to the end items, the BII components will be processed as follows, except that cleaning will be by C-1 and drying by D-1 unless otherwise specified:

(1) Nonmetallic items (canvas, wood, plastic, etc.). Items will be cleaned with a clean, dry brush or cloth. DO NOT APPLY preservatives. Where

practicable, small canvas items will be folded and placed in a waterproof barrier bag, and the bag will be closed by staple or tape. Canvas too large to bag will be compactly folded and wrapped in a waterproof barrier and secured with tape.

(2) Handtool and assemblies. Items that are plated (cadmium, zinc, chrome) need no preservative and will be wrapped or bagged, as stated in (1) above. Items that are phosphate coated or bare steel will be cleaned with solvent, dried, and preserved with P-9. Small items will be placed in greaseproof barrier bags with sharp projections covered with greaseproof barrier material. Close bags by heat seal. Larger items will be wrapped in greaseproof barriers and overwrapped in waterproof barriers, with the wraps then secured with tape.

(3) Pioneer tools (axes, picks, shovels, etc.). Unpainted metal surfaces will be preserved with P-1 and allowed to air dry.

(4) Fire control equipment. Items will be processed per applicable paragraphs of this manual.

(*5) Special items of equipment*. Items will be processed per applicable paragraphs of this manual.

(6) Publications. Publications and technical manuals including equipment log books and record forms will be placed in a waterproof barrier bag, with the bag then closed by heat seal.

(7) Intermediate pack. A number of small bagged, boxed, or wrapped items should be intermediate packed in fiberboard boxes, cushioned with cellulosic cushioning, and closed with tape. Large items, pioneer tools, or items requiring no additional protection need not be intermediate packaged. Preserved BII going directly into unit containers with the major item requires no intermediate pack.

(8) Packing. When BII quantities are small, every effort should be made to pack the BII in the same container as the major items (e.g., rifles, machine guns, recoilless rifles, and mortars). When it is impractical to pack the BII in the major item box, intermediate pack items and loose items will be packed in wood or plywood boxes. Block and brace contents within the box to prevent movement.

(9) BII stowage. When practicable and where space is available, BII boxes will be secured in exposed locations on weapons, vehicles, or systems. BII boxes will be secured to the major item/system with metallic strapping. BII will be marked as BII for its particular system.

k. To prevent corrosion to metal surfaces, a barrier material will be used between all metal surfaces of equipment, wood surfaces of blocking 4-28 and bracing, and the surfaces of the wood container. Barriers used for this application are greaseproof barrier material or wrapping paper. When applied to cylindrical surfaces such as saddle cutouts, the barrier may be stapled to adjacent wood surfaces to hold into place, but no staples will be permitted on the bearing surface of the blocking. Chock padding is used to line wood surfaces where a greater degree of protection is required for critical machined surfaces such as recoil rods and machined cylinders. A minimum of Y4-inch thickness is required for items up to 100 pounds and a minimum %-inch thickness for items 100 pounds and above.

4-102. Weapons Only

a. Aiming circles. Clean and dry optical portions as indicated in paragraph 3-3b.

(1) Aiming circle head. Turn level vial covers to closed position. Fold lens paper into a pad and cover all optics, securing in place with tape. Wrap entire head with neutral barrier and secure with tape. Unit pack submethod IA-8.

(2) Cover and tripod. Wrap each item in neutral barrier material and secure with tape.

(3) Accessories (lamp holders, plumb bob, etc.).

Wrap items in cellulosic cushioning and unit pack submethod IC-1.

(4) Component packaging Place all components that comprise the complete aiming circle into a fiberboard box. Cushion with cellulosic cushioning material.

CAUTION

Ensure that tripod feet are cushioned to protect container end. Close box with plastic tape. A quantity of aiming circles may be placed in a wood or plywood box.

b. Armament pods. Disassemble components, as necessary, to accomplish thorough cleaning.

CAUTION

Do not submerge electric motors, sealed bearings, cable assemblies, or recoil adapters in solvent.

(1) Preserve gun barrels and all other unpainted surfaces per paragraph 4-101d.

(2) Place one armament pod in its reusable, metal, shipping container, if available.

(3) Use wood or plywood box as alternate container.

(4) Cushion pod in box with bound fiber and securely block and brace within the wood box.

c. Armament subsystems. This instruction covers requirements for all armament subsystems. Refer to the topical index of this manual for packaging instructions of components which are common to more than one subsystem or end item. Disassemble components, as necessary, to accomplish thorough cleaning.

CAUTION

Do not submerge electric motors, sealed bearings, cable assemblies, or other electrical components in solvent.

(1) Machine guns. Package per paragraph 4-102k.

(2) Grenade launchers. Package per q(l) below).

(3) Rocket launchers. Package per q(2) below.

(4) Fire control and sighting equipment. Package per the general provisions of paragraph 4-101 and as otherwise listed in the topical index.

(5) Turret assembly component. Preserve unpainted, ferrous metal surfaces with P-9. Secure the turret assembly to a plywood base with bolts, washers, and nuts. Place the item and base in a wood or plywood box. Shroud the assembly with greaseproof barrier material and secure in place with tape. Locate four wood key blocks in the box corners to secure the assembly in place. Nail all blocking securely.

(6) Ammunition chuting. Wrap chuting in greaseproof barrier material and secure with tape.

(7) Ammunition boxes. Process per the general provisions of paragraph 4-101.

(8) Junction boxes, intervolometers, and electrical components. Do not apply preservatives. Wrap each item in greaseproof barrier and secure with tape. Overwrap item with cellulosic cushioning or bound fiber securing cushioning with tape. Unit pack submethod IA-8. Place bagged item in a fiberboard box and seal with tape.

(9) Cable assemblies. Package per paragraph 4-114.

(10) Recoil adapters, crossovers, feeders, and drive units. Package per this paragraph and as otherwise indicated in the general provisions of paragraph 4-101.

(11) Mount assemblies (pylons). Preserve unpainted, ferrous metal surfaces with P-9. Wrap preserved surfaces with greaseproof barrier material and secure in place with tape. Secure one pylon to a wood base with bolts, washers, and nuts. Place the base and pylon in a wood or plywood box. Locate four wood key blocks in the box corners to immobilize. Securely nail all blocking (fig 4-2 and 4-5.).

(12) Rack and support assemblies. Preserve and wrap per (11) above. Secure one rack and support assembly to a plywood side support with three bolts, washers, and nuts. (Locate and support in a vertical position-not flat.) Secure second rack and support assembly in the same manner. Place framework and the two racks and supports into a fiberboard box and close with tape.

(13) Control panels. No preservative required.

Wrap each control panel in greaseproof barrier material and secure with tape. (Sandwich panels which have no outer metal protectors between two pieces of fiberboard and secure fiberboard together with tape.) Overwrap, as applicable, with cellulosic cushioning and unit pack submethod IA-8. Place one control panel in a fiberboard box. Seal box with tape.

(14) Loose attaching hardware. Preserve all metal, loose attaching, hardware items such as bolts, screws, nuts, washers, clamps, and brackets with P-9. Unit pack hardware in a bag, submethod IC-1, clearly identified as to contents and parent item; component; or assembly for which it is to be used for reassembly, and secure with tape or place adjacent to the mated item, component, or assembly.

(15) System packing. Place all processed components into a plywood box. Fill all container void with bound fiber or wood blocking, as applicable. Nail all wood blocking securely.

d. Armored reconnaissance vehicle, M551.

(1) Gun launcher. CLean and dry the barrel bore and associated parts per paragraph 4-101b(3). Retain gun launcher in battery with travel lock secured in locked position. Roll a strip of VCI into a tube, treated side out. Insert rolled strip into gun launcher bore extending entire length of bore and chamber. Fabricate wood muzzle plug for the muzzle end. Wrap muzzle plug with greaseproof barrier and insert plug into barrel bore. Secure in place with tape. Completely seal the point around muzzle plug and gun launcher with tape. Place a polyethylene film bag over muzzle end of the gun launcher and secure in place with tape. Run tape lengthwise onto bag and 6 inches onto painted surfaces of the gun launcher. Seal bag to cannon with tape. Apply tape around the gun launcher onto both bag and painted surfaces. Apply two 1-inch strips at equal intervals between muzzle end and the area where bag is sealed to gun launcher.

(2) Breech mechanism and coupling. Coat all unpainted surfaces including phosphated surfaces on the breech coupling, breech chamber, and breech operating and firing mechanisms with P-11.

FIND	QT"Y	NOMENCLATURE
1	1	Base, 1/2" Plywood
2	1	Wood Block
3	1	Sleeve
4	1	Pad
5	4	Bolt, 3/8", Square Neck with Nut
6	4	Washer, Flat, 3/8"
7	4	Washer, Flat, !I"

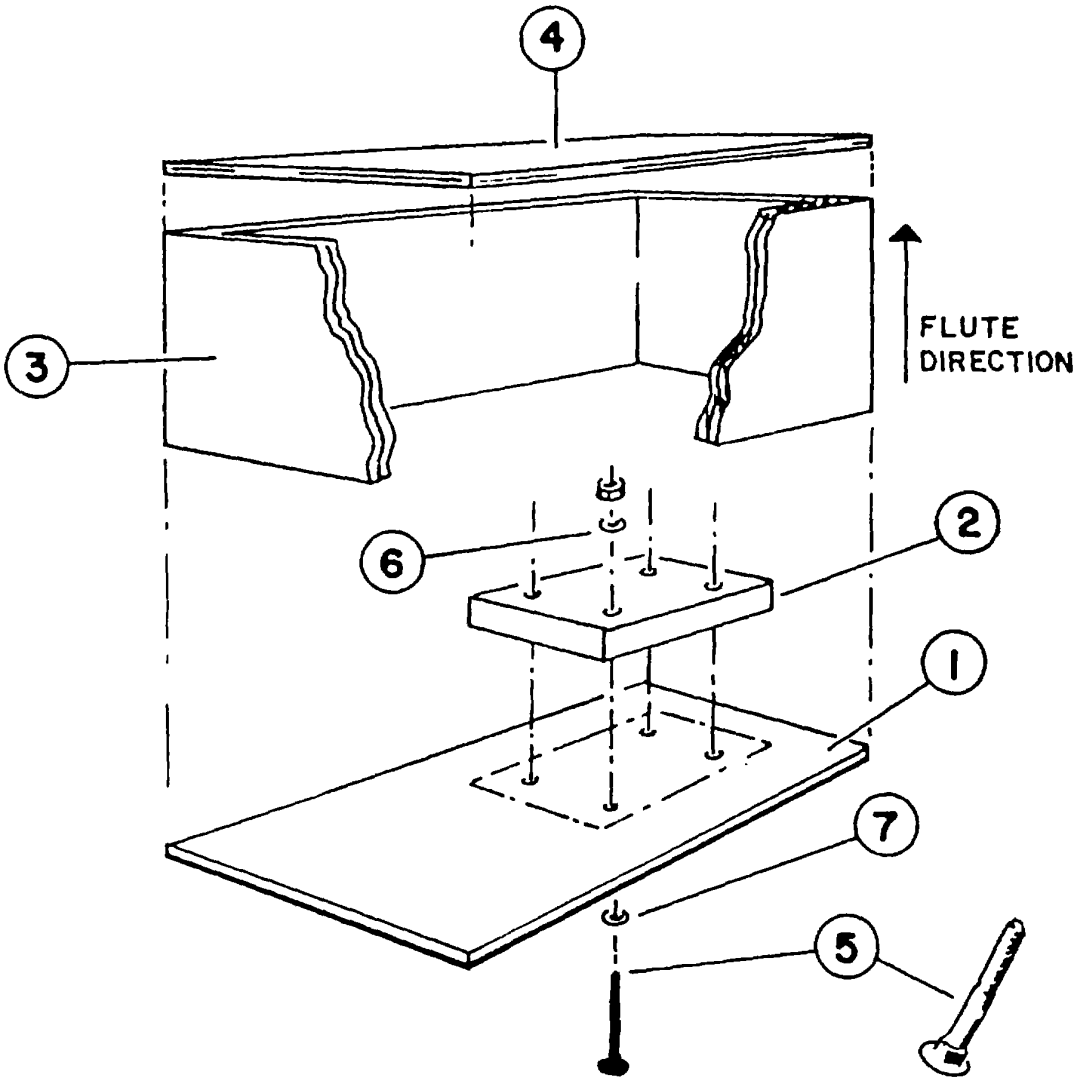


Figure 4-5. Anchoring and Cushioning.

(3) Recoil mechanism. Remove dust shield and coat accessible surface of chrome plated recoil sleeve with P-ll. Coat surface of recoil mechanism immediately forward of breech coupling with the same type grease. Apply grease while gun launcher is out of battery.

(4) Counter recoil buffer. Without disassembly, coat exposed, unpainted, machined surfaces of the counter recoil buffer with P-ll1.

(5) Processing replenisher. Elevate gun launcher to 15° (265 mils). Check reservoir oil level and, if required, fill to the l-quart mark with the oil specified on the applicable lubrication order.

(6) Elevating and traversing mechanism. Coat exposed, unpainted surfaces of elevating mechanism, trunnions, turret traversing ring gear, and elevating hand crankshaft with P-ll. Secure handle lock pin and turret traverse lock in locked position.

(7) Turret ring bearing. Remove plugs from grease fitting openings in turret ring bearing and install grease fittings. Pump P-ll through grease fittings until grease is visible between the two sections around the circumference of the ring. Rotate turret five times in both directions and again lubricate until all surfaces on the circumference of the ring are lubricated. Remove grease fittings and reinstall plugs. Remove excess grease from the outside surface of the rail.

(8) Backrests and seats. Cover backrests and cushioned components of seats with waterproof barrier and secure in place with tape.

(9) Miscellaneous preservative application. Except as otherwise specified herein, coat all exposed, unpainted, machined metal surfaces on the interior and exterior of the system with P-1.

(*10) Processing and system vehicle*. Clean the power trains, brakes, suspension, steering, and all other portions of the mobility aspects of the vehicle. Then dry and preserve per instructions contained in paragraph 3-3.

e. Artillery, towed. Prepare towed artillery in a towaway condition. Lower cannon to zero degrees elevation for cleaning and preservative application. After cannon is cleaned and preserved, place weapon in locked travel position. Inflate tires to 10 pounds above normal operating pressure. Apply P-1 to all unpainted metal surfaces not specifically covered herein.

(1) Breech mechanism. Remove obturator pad, rings, and disc. Preserve interior and exterior surfaces with P-ll. Insert

a wood spacer wrapped in greaseproof barrier material in place of the removed obturator pad. Ensure that spacer is 1¼/4-inches thick and the diameter fits the space of the breech mechanism. Close the breech and wrap the mechanism with greaseproof barrier material, securing with tape.

(2) Obturator pad, rings, and disc. Preserve the rings and disc per paragraph 4-101d. Unit pack wrapped rings and disc submethod IA-8. Place bag and obturator pad in a fiberboard box and close with plastic tape. Secure box to the weapon with filament tape and identify "obturator pad."

(3) Cannon tube. Process installed cannon per the appropriate instructions in paragraph 4-101.

(4) Elevating and traversing gears. Coat gears with P-1. Activate through the complete cycle to evenly distribute the grease and reapply P-1 to the disturbed surfaces.

(5) Recoil mechanism. Preserve unpainted surfaces with P-ll. Wrap preserved surfaces with greaseproof barrier and secure with tape.

(6) Handwheels, handles, chains, etc. Secure in place with wire.

(7) Fire control and sighting equipment. Package per the general provisions of paragraph 4-101 and as otherwise indicated for individual components referenced in the topical index.

f. Combat vehicle, gun, self propelled (Vulcan).

(1) General requirements. Lubricate chassis and gun mount per their lubrication order. Place radar antenna unit in a towed position and secure. Ship the gun with barrels assembled and mounted in place in a horizontal position pointing directly forward and secure it in the traveling lock provided. Retain generator set mounted in place. Mount batteries with cables disconnected and secure in place with battery clamps provided.

(a) Cleaning. Clean gun barrels per paragraph 4-101b(3).

(*b) Preservative application*. Apply P-9 to all interior and exterior unpainted, ferrous metal surfaces except the azimuth, elevating gear drives, turret ring, which will be preserved with P-1l, and gun and barrels. Activate gears through a complete cycle to evenly distribute the preservative and reapply P-ll to the disturbed surfaces.

(2) *Packaging.*

(a) Gun. Completely wrap the gun and barrels in VCI and secure with tape. Overwrap the VCI with waterproof barrier and seal all edges with tape.

(*b) Gun, mid-barrel clamp*. Wrap with VCI and secure with tape.

(*c) Gun muzzle clamp*. Wrap with VCI and secure with tape.

(d) Mount, XM157.

(e) Dummy cartridges. Ensure that 100 dummy cartridges are placed in the XM163 chute.

(f) Ammunition drum and chuting. Shroud the gear drive end of the ammunition drum and connecting chute with polyethylene film and secure shroud with tape. Wrap exposed, preserved surfaces with greaseproof barrier and secure in place with tape.

(g) Backrest and seat. Wrap with waterproof barrier and secure with tape.

(h) Pivot lift points and elevation drive. Secure all areas with filament-reinforced tape.

(i) Electrical components. Clean, dry, and pack per applicable paragraphs of this manual.

(j) Radio set. Remove radio set from crew compartment and process per the paragraph in this manual covering electronic equipment.

(k) Electric connections. After removal of radio set, seal all remaining electrical connections with tape.

(l) Cockpit light. Wrap light with neutral barrier and secure with tape.

(m) Communication control. Insert plastic plugs provided in the open sockets and cover with tape.

(n) System batteries and cables. Process per paragraph 4-135c.

(o) Generator set, gasoline. Process generator set per the applicable requirements of paragraphs 3-3 and 3-4.

(p) Notebook and technical publications. Unit pack submethod IC-3.

(q) Starter rope. Coil starter rope and unit pack submethod IC-3.

(r) Auxiliary gas. Wrap gas line connectors with greaseproof barrier and secure with tape. Coil gas line to a 10-inch diameter and unit pack submethod IC-1.

(s) Cable assembly. Wrap cable assembly W16 connectors with neutral barrier and secure with tape. Coil cable to a 6-inch diameter and unit pack submethod IC-3.

(t) Placement of generator accessories. Place packaged items in the canvas pouch provided with the generator.

(u) Fire control equipment. Package all fire control equipment per the general provisions of paragraph 4-101, and as otherwise indicated for individual components listed in the topical index.

g. Computer, gun direction, M18. No preservative is required. Use reusable container whenever possible and retain for reuse. When reusables are not available, substitute wood or plywood boxes. Use polyethylene foam as interior container cushioning. Pack the computer in a two-box set.

(1) Miscellaneous equipment (box 1 of 2). Place the adapter cable and brackets in the cutout provided in the bottom of the lower cushion insert 4-32 of the reusable container. Position table within the lower cushion insert. Cover table top with neutral barrier. Place computer on the table but DO NOT secure it to the table. Immobilize all loose items in the space available along sides and ends of table. Position container cover onto lower section. Align arrows on exterior container surfaces. Close container and install security seals on the four container latches.

(2) Cable and reel assembly (box 2 of 2). Place item in a wood box (fig 4-2).

h. Filter cleaner, ultrasonic. This system is a complete sonic energy cleaning system consisting of three cabinet-contained units, which are the electric generator and cleaner, rinser, and dryer.

(1) Preserve noncritical, unpainted metal surfaces with P-1.

(2) Process electric motors as prescribed by the general provisions of paragraph 4-101.

(3) Unit pack hose and fittings submethod IC-3. Place hoses and fittings too large and bulky for bags in fiberboard boxes and secure with tape.

(4) Release drive belts from tension but keep them installed.

(5) Cushion control panels with cellulosic cushioning and secure in place with tape.

(6) Place all processed component parts in one or more fiberboard boxes, cushion with cellulosic cushioning, and secure with tape.

(7) Individually pack generator-cleaner, rinser, and dryer in a wood or plywood box. Utilize blocking and bracing to immobilize each component.

i. Fire direction sets.

(1) Case assembly. Fold case assembly compactly with shoulder strap, pads, and billets tucked to the inside. Place in a fiberboard box and seal with tape.

(2) Drawing board and trestle. Place drawing board in a greaseproof barrier bag and close by heat seal. Place trestle in a flat position occupying the smallest cube. Place the drawing board and trestle in individual fiberboard boxes and seal with tape.

(3) Plotting sheets and supply catalog. Sandwich the plotting sheets between two pieces of fiberboard sheet stock and secure fiberboard together with tape. Place plotting sheets together with tape. Unit pack plotting sheets and supply catalog submethod IC-3.

(4) Protractor. Wrap protractor in cellulosic cushioning and secure with tape. Place in a fiberboard box and secure with tape.

(5) Other accessories. Place all other accessories in a fiberboard box, cushion contents with cellulusic cushioning, and secure with tape.

(6) Component packing. Place all items comprising the fire direction set in a wood or plywood box. Block the contents with wood blocking (see figure 4-2).

j. Fuse setters.

(1) Fuse setters with cases. Place fuse in case, close lid, and secure with fasteners. Place a quantity of fuse setters in a fiberboard box and close with tape.

(2) Fuse setters without cases. Wrap one fuse setter in cellulosic cushioning and secure with tape. Place fuse setter in a fiberboard box. Secure with tape. Place a quantity of fuse setters in a fiberboard box and secure with tape.

k. Guns. In addition to process C-3, clean with rifle bore cleaner followed by a solvent wash. Insert a VCI bore tube into the barrel bore. Extend VCI bore tube 1 inch from the end of the barrel bore and bend. Wrap each weapon entirely with VCI and mold to configuration of the item. Unit pack wrapped weapon submethod IC-1.

(1) Guns under 40 pounds. Place one weapon in a fiberboard box, cushion with cellulosic cushioning or bound fiber, and secure with plastic tape. Reinforce fiberboard box by applying filament reinforced tape around the circumference of the box.

(2) Guns 40 pounds and over. Place one weapon in a double-wall fiberboard or wood box, block and brace the weapon per blocking (fig 4-2), and secure with tape (fig 4-3). Reinforce fiberboard box by applying filament reinforced tape around the circumference of the box.

l. Towed (Vulcan).

(1) General requirements. Prepare weapon for shipment in a towed condition. Apply general requirements specified in paragraph 4-102f except remove radar antenna unit from the weapon and package as specified herein. Clean, dry, preserve, and pack gun and its components as specified in f above.

(2) Radar antenna unit. Cover antenna cable connectors and waive guide sections of antenna with greaseproof barrier material and secure with tape. Secure waive guide sections in place with tape. Unit pack antenna attaching hardware submethod IC-1 and attach bag to antenna unit with tape.

CAUTION

Waive guide bends easily. Place the radar antenna unit in a fiberboard box and completely encapsulate the item in polyurethane foam with a minimum 2-inch thickness. Secure box with tape. Place box in the carriage directly in front of the generator and secure to the carriage with filament reinforced tape.

m. Heating and tie-down unit (truck-mounted).

(1) Process unit in a driveaway condition. Preserve all unpainted surfaces with P-1. Seal door seams of the fin box with tape. Fold tie-down strap assemblies of saddle assemblies and secure in place with plastic tape. Secure wheel and tire assembly in its place on the cargo truck.

(2) Put electrical caps in place and draw down finger tight.

(3) Process vehicle chassis per the applicable paragraphs of this manual.

(4) Package electric blanket sections per the general provisions of paragraph 4-102.

n. Hoisting unit. Preserve noncritical, unpainted metal surfaces with P-1. Preserve roller chains, gears, and machined surfaces with P-ll. Wrap all P-ll preserved surfaces with greaseproof barrier material and secure with tape. Process tools per the appropriate provisions of paragraph 4-2. Place processed components and repair parts in a fiberboard box, cushion with cellulosic cushioning, and secure with tape.

(1) Hoists weighing up to 1,000 pounds. Pack one complete hoist with consolidated processed repair parts, tools, and publications in a wood or plywood box (see figure 4-2). Use wood blocking and bracing to immobilize the contents. Securely nail all blocking.

(2) Hoists weighing 1,000 pounds and over. Pack one complete hoist with consolidated processed repair parts, tools, and publications in an open wood crate (fig 4-1). Shroud hoist with waterproof barrier and secure with plastic tape. Block and brace as specified in (1) above.

o. Indicator, connecting rod alignment. Preserve unpainted surfaces with P-7, wrap preserved surfaces with greaseproof barrier material, and secure with tape. Place all components of the indicator in carrying case. Place cellulosic cushioning inside case to prevent movement. Close carrying case cover and secure with fasteners provided. Place carrying case in a fiberboard box and secure with tape.

p. Jack, dolly-type, hydraulic. Preserve exterior, noncritical, unpainted surfaces with P-1 and exposed, critical, ferrous metal surfaces with P-11. Wrap all surfaces preserved with P-ll with greaseproof barrier material and secure in place with tape. Clean accessory tools and preserve, as specified herein, and pack in a fiberboard box. Seal box with tape and secure to the basic unit with

filament reinforced tape. Place one jack in a wood or plywood box (fig 4-2). Block and brace item and nail blocking securely.

q. Launchers, aircraft and ground.

(1) Grenade.

(a) Aircraft. Prior to cleaning the launcher by process C-3, clean and dry critical surfaces, as specified in the special cleaning provisions in paragraph 4-101b. Insert a VCI bore tube in barrel bore. Extend tube 2 inches from muzzle end and bend. Wrap launcher in VCI, molding wrap to configuration of the launcher, overwrap VCI with L-P-378 or equal, and secure with tape. Place one launcher in a wood box. Block and brace item and nail blocking securely.

(b) Ground. Clean, dry, preserve, and apply VCI, as specified in (1) above. Place the wrapped launcher in a plastic bag. Place one or more launchers in a fiberboard double-wall, triple-wall, or wood box. When more than one launcher is packed in a box, separate items with fiberboard sheet stock or bound fiber. Secure box with tape.

(2) Rocket.

(a) Shoulder weapons. Clean optical elements per paragraph 3-3. No preservative is required. Cover optical surface of sight assembly with lens paper and secure with tape. Secure barrels in carrying position with tape. Wrap launchers in polyethylene film and secure with tape. Pack wrapped launchers and sling submethod IA-8. Locate one launcher in a fiberboard box and secure with tape.

(b) Towed weapons. Prepare towed weapons in a towaway condition. Inflate tires to 10 pounds above normal operating pressure. Apply P-ll to unpainted metal surfaces and cover the preservative with greaseproof barrier, securing it in place with tape. Secure handwheels, handles, pins, and chains with wire.

(3) Truck-mounted rocket. Process launcher in a driveaway condition. Preserve unpainted surfaces of the launcher with P-ll and secure elevating, traversing, cross-leveling, and stabilizing jack handwheels in place with wire with launching beam in traveling position. Put electrical caps in place and draw down finger tight. Secure wheel and tire assembly in its place on the cargo truck.

(a) Equilibrators. Wrap preserved junction of the telescoping components with greaseproof barrier and secure to adjacent surfaces with tape.

(b) Traversing mechanism. Wrap preserved surfaces with greaseproof barrier and secure with tape.

(c) Traversing arc. Apply P-ll to the arc, activate through one complete cycle to evenly distribute the preservative, and return to travel 4-34 position. Reapply preservative to disturbed preserved surfaces.

(d) Missile rail. Cover preserved surfaces with greaseproof barrier and secure with tape.

(e) Fire control equipment. Process per the general provisions of paragraph 4-101, and as otherwise prescribed for individual items listed in the topical index.

(f) Vehicle chassis. Process per the applicable provisions of paragraph 3-3.

r. Mortars. In addition to performing cleaning process C-3, scrub barrel bore with a bristle brush or a combination of cloth and bristle brush soaked in rifle bore cleaner followed by a solvent wash.

(1) 60mm. Preserve per paragraph 4-101d.

(a) Traversing assembly. Wrap with VCI and secure with tape.

(b) Bipod assembly. Wrap with VCI and secure with tape.

CAUTION

DO not use VCI to protect plastic, rubber, or painted parts.

(c) Mortar. Place a watervaporproof, barrierwrapped wood disc over muzzle end of mortar and seal and secure disc in place with tape. Wrap mortar feet individually with cellulosic cushioning and secure in place with tape. Unit pack mortar submethod IA-8 exhausting entrapped air. Place one mortar in a wood or plywood box, securing it in place with wood blocking. Use greaseproof barrier or bound fiber between wood surfaces and the watervaporproof bag to prevent bag rupture. Nail all blocking securely.

(2) 81mm. Clean, dry, and preserve mortar as specified in paragraph 4-101d.

(a) Standard. Extend controls of the standard to the limits of their range and apply P-ll to unpainted surfaces. Coat the standard base trunnions with P-11. Point elevating handle toward base and immobilize with filament reinforced tape. Wrap entire standard (except base) with greaseproof barrier. Overwrap standard with waterproof barrier. Fold both wraps in half and drape over the traversing mechanism and down the side of the standard. Fold the two ends of the overwrap together to form a tight seal just below the collar and slightly overlap the initial wrap. Secure edge of the overwrap to the standard with a strip of waterproof tape around the circumference. Secure the overwrap to the standard in two additional places with tape.

(b) Bridge. Coat the tapered cone at the junction of the bridge cup and bridge base, trunnion bearing, and locking nut with P-ll. Wrap

trunnion bearings in greaseproof barrier, overwrap with waterproof barrier, and secure with waterproof tape.

(c) *Base and rotator. Coat the top bearing surface* of the baseplate, large underbearing surface of the rotator into which the bridge is assembled, and expanding pin with P-ll. Wrap preserved surfaces with greaseproof barrier material and secure with waterproof tape.

(d) Muzzle. Apply a wood disc and wrap and tape as specified in (lXc) above. Place one mortar in a wood or plywood box (fig 4-2) and secure it with blocking.

s. Mounts.

(1) Cleaning. Clean by any applicable process.

(2) Preservative application.

(a) Mounts under 25 pounds. Preserve unpainted surfaces with P-9.

(b) Mounts 25 pounds and over. Preserve unpainted surfaces with P-2.

(3) Packaging.

(a) Mount, machine gun, bipod, tripod, pedestal, and pintle. Wrap preserved surfaces with greaseproof barrier material and secure with waterproof tape. Place one mount in a fiberboard box, fill container void with cellulosic cushioning, and close box with waterproof tape.

(b) Mount, recoilless rifle. Wrap preserved surfaces with greaseproof barrier material and secure in place with waterproof tape. Wrap entire mount in waterproof barrier material and secure with waterproof tape. Place one mount in a wood or plywood box (fig 4-2). Secure, block, and brace with wood blocking.

(c) Mount telescope. Wrap preserved surfaces with greaseproof barrier material and secure in place with tape. Wrap entire mount in wrapping paper and secure with tape. Place one mount in a fiberboard, double-wall, or wood box. Use a doublewall or wood box for mounts weighing over 40 pounds. Fill container voids with cellulosic cushioning and seal fiberboard box with waterproof tape (figs 4-4 and 4-3).

(d) Mount, periscope. Wrap preserved surfaces with greaseproof barrier material and secure in place with waterproof tape. Pack loose components/hardware submethod IC-1 and secure to mount with waterproof tape.

1 Mounts up to 80 pounds. Wrap entire mount in greaseproof barrier material and secure with tape. Place one mount in a fiberboard or double-wall box. Use double-wall or wood box for mounts weighing over 40 pounds. Fill container voids with cellulosic cushioning and seal fiberboard box with tape (figs 4-4 and 4-3).

2 Mounts 80 pounds and over. Secure one TM 746-10 mount to a plywood base with bolts, nuts, and washers, or with steel strapping. Place mount in a wood or plywood box (fig 4-2). Shroud the mount with waterproof barrier and block and brace with wood blocking.

(e) Mounts, quad, ring, gun, and carriage. Wrap preserved surfaces with greaseproof barrier material and secure to adjacent metal surfaces with tape.

1 Mounts up to 600 pounds. Place one mount in a wood or plywood box (*fig 4-2).* Block and brace securely with wood blocking.

2 Mounts 600 pounds and over. Place one mount in an open wood create (fig 4-1). Shroud the mount with waterproof barrier and secure with tape. Block and brace mount as specified in (3Xe)l above.

(f) Mount, multiarmament.

1 Disassemble components, as necessary, to accomplish thorough cleaning.

CAUTION

Do not submerge electric motors, sealed bearings, cable assemblies, or other electrical components in solvent.

- Cable assemblies. Package per paragraph 4-114.

- Rack and support assemblies. Package per paragraph 4-102c(11).

- Fire control and sighting equipment. Package per the general provisions of paragraph 4-101 and as otherwise indicated for individual components listed in the topical index.

- Electrical components. Package per the provisions of the applicable paragraphs of this manual.

- Miscellaneous hardware. Preserve unpainted surfaces with P-9. Unit pack small items submethod IC-1 and larger items method I, wrap in greaseproof barrier material, and secure with tape. Place all hardware in a fiberboard box and seal all openings with tape (fig 4-3).

2 Place all components in a wood or plywood box (fig 4-2). Block and brace contents with wood blocking or bound fiber. Nail all wood blocking securely.

(g) Mount, gun, M.G., M55, towed. Process item in a towaway condition.

1 Disassembly. Disassemble the four machine guns from their positions on the mount and package the guns per k above.

2 Generator. Process per paragraph 4-5.

3 Cables and receptacles. Cover receptacle openings and cable ends with tape.

4 Ammunition chests. Pack the four am

munition chests in two packages (two per package), wrap in waterproof barrier, and secure with tape. Place the chests in the gunner's compartment of the mount.

5 Battery cables. Preserve cable ends with P-ll, wrap in greaseproof barrier material, and secure with tape.

6 Mount. Preserve unpainted surfaces with P-ll, wrap preserved surfaces with greaseproof barrier material, and secure with tape.

7 Overall cover. When an overall cover is available, place it over the entire mount and secure it in place with ties provided. When a cover is not available, shroud the entire mount with polyethylene film and secure in place with tape.

t. Pistols, revolvers, rifles, and shotguns. In addition to process C-3, clean weapons with rifle bore cleaner followed by a solvent wash. Preserve entire weapon per paragraph 4-101d. Unit pack wrapped weapon submethod IC-1. Place one or more weapons in fiberboard, wood, or plywood boxes. When more than one weapon is packed in a box, separate weapons by using bound fiber or fiberboard sheet stock. Seal all openings with tape (fig 4-3).

u. Plotting boards. No preservative is required. Place one plotting board between two pieces of fiberboard sheet stock and secure fiberboard together with tape. Unit pack plotting board, carrying case, and manual using submethod IC-3. Place a quantity of packed items in a fiberboard box and seal with tape.

v. Quadrant, gunners and elevation. Preserve unpainted surfaces with P-7. Close level vial cover. Wrap entire quadrant in greaseproof barrier and secure with tape. Preserve mounting hardware with P-7 and unit pack submethod IC-1. Place quadrant and hardware in a fiberboard box, fill void with cellulosic cushioning, and seal with tape.

w. Radar chronograph, M36. No preservative is required. Use reusable containers whenever possible and retain for reuse. When reusables are not available, substitute wood or plywood boxes. Use polyethylene foam as interior container cushioning. Pack radar chronograph in a set of four boxes.

(1) Radar chronograph with mount (box 1 of 4). Attach the mount to radar chronograph and lock. Position in the lower cushion cradle assembly of the reusable container. Position upper cradle assembly over chronograph and secure with straps provided. Position container cover on body of container, alighing arrows on exterior surfaces. Close and install security seals on the four container latches.

(2) Accessory equipment (box 2 of 4).

(a) Tripod assembly. Locate the three auxiliary tripod legs on the bottom of the container cushioning. Position tripod over the legs.

(3) Receiver, radar test, and cable assembly. Wrap receiver in greaseproof barrier material and overwrap with cellulosic cushioning. Unit pack receiver submethod IC-1. Place bag in a fiberboard box lined with a 1-inch minimum thickness of bound fiber. Also, place cable in box and seal with tape.

(c) Microphone assembly. Wrap microphone in neutral barrier material and secure with tape. ace microphone in a fiberboard box and seal all openings with tape (fig 4-3). Place box in provided cushion cavity of the accessory box.

(d) Telescope, XM28 with case. Place telescope in its carrying case and place the case in provided cushion cavity of the accessory box.

(e) Light instrument, M53E1, bracket and clamp. Remove batteries and throw away. Wrap bracket with neutral barrier material and secure with tape. Secure wrapped bracket to light instrument and coil cable around light. Position in the provided cushion cavity of the accessory box.

(f) Chronograph automatic reliability rotor. Place in provided cushion cavity of the accessory box.

(g) TMs and log book. Stow in available space adjacent to tripod.

(h) Cable assembly. Place in its carrying case, close cover, and locate in the tripod area.

(i) Accessory box. Close box and secure all latches. Provide security seals on at least three latches.

(3) Cable and reel assembly (box 3 of 4). Place item in a wood box. Immobilize contents by placing four vertical wood blocks in the box corners. Nail all blocking securely (fig 4-2).

(4) Bracket installation jeep mounting (box 4 of 4). Place item in a wood box. Unit pack installation drawing submethod IC-1. Secure bag to the item inside box with tape.

x. Rangefinders.

(1) Disassembly. Disassemble end housing assemblies from center housing assemblies on the M13 and M17 series. Support legs with tape. Remove tape when ready to place support legs in reusable container.

(2) Cleaning and drying. Clean and dry optical portions per paragraph 4-101.

(3) Mounting hardware. Wrap all mounting hardware together in greaseproof barrier material and unit pack submethod IC-1. Attach bag to rangefinder with tape.

(4) Packaging.

(a) Cover critical mating surfaces of the

rangefinder with greaseproof barrier material and secure with tape.

(b) Close cover of the level vial.

(c) Position rangefinder and secure in reusable container per the instruction sheet located inside the lid of the container.

(d) Place dust shields in a fiberboard box and close box with tape.

(e) Place hardware box and dust shield box on top of rangefinder and secure to the item with tape.

(f) Close reusable container with the fasteners provided on the container. Install a wire seal.

(5) Shipping container alternate. When reusable containers are not available, substitute a plywood box. Line box with a minimum thickness of polyurethane foam specified below on the top, bottom, ends, and sides.

(a) M13 and M17 series. Minimum 2 inch thickness.

(b) Laser-type. Minimum 4 inch thickness.

Note

When a plywood box is used, wrap rangefinder in greaseproof barrier material, insert into a watervaporproof barrier bag, and seal by heat sealing.

y. Recoilless rifles. Clean, dry, and preserve as specified in paragraph 4-102r.

(1) 57mm and 90mm.

(a) Roll a strip of VCI into a tube with treated side out and insert into the bore for its full length. Cover muzzle end of the mortar with VCI and secure in place with tape.

(b) Fold bipod up against the tube and adjust monopod to its shortest position. Wrap weapon records around tube of weapon and secure with tape. Wrap entire weapon with VCI and secure in place with tape.

CAUTION

Do not use VCI to protect plastic, rubber, or painted parts.

(c) Unit pack weapon submethod IA-8.

(d) Place one rifle in a wood or plywood box (fig 4-2). Secure rifle in place with wood blocking.

(2) 106mm.

(a) Clean, dry, and preserve the rifle, including the spotting gun, as specified in r above.

(b) Roll a strip of VCI into a tube with treated side out and insert into each of the rifle and spotting bores for its full length. Fold excess material back over the muzzle.

(c) Seal rifle muzzle with a watervaporproof, barrierwrapped wood disc, with a 4%-inch diameter, and secure it in place with tape.

(d) Cover the remainder of the rifle, spotting gun, and breech vent with VCI and secure in place with tape.

(e) Wrap preserved surfaces of the mount in VCI and secure in place with tape. Cover front and rear legs of the mount with greaseproof barrier material and secure in place with waterproof tape.

CAUTION

Do not use VCI to protect plastic, rubber, or painted parts. Unit pack mount submethod IA-8. Place one rifle in a wood or plywood box. Secure rifle in place with wood blocking.

z. Reproducer signal data. No preservative is required. Secure board extractor tool, log book, and TMs within the cover assembly of the unit. Secure shield assembly above the canister in position. Position front cover on the unit and secure all fasteners.

(1) Reusable container. Position unit within the lower cushion insert. Position cover over the lower case with arrows on the exterior of the case aligned. Close case completely and install security seals.

(2) Nonreusable container. Cushion unit and immobilize in a triple-wall fiberboard box with cushion pads fabricated from polyethylene foam or bound fiber. Seal closure of box with tape and reinforce with filament reinforced tape.

aa. Shop sets, shop equipment, van and trailer mounted; shelters, skid and trailer mounted. Process van and trailer chassis per applicable paragraphs of this manual.

(1) Preservation and packaging within the shelter. Preserve all major and secondary components per paragraph 4-2.

(a) Major components. Mount major components assigned a permanent position within a shelter in position with applicable shock mounts, bolts, nuts, screws, pins, and straps. (This includes mountings on the floor, shelves, or walls.) Place and secure covers over equipment.

(b) Secondary items. Stow processed items within designated compartments of cabinets and drawers to maximum capacity.

(c) Overflow items. After cabinets and drawers are full, pack remaining items in fiberboard boxes. Seal boxes with tape and reinforce heavy boxes with filament, reinforced tape. Place fiberboard boxes into triple-wall boxes and cushion with fiberboard, bound fiber, or wood. Seal all openings with tape (fig 4-4). and reinforce with filament, reinforced tape. Dependent upon floor

space available within the shelter, secure boxes to the floor.

(d) Closing of shelter. Close and secure all windows, blinds, shields over louver vents, and doors. Position and secure fire extinguishers. Unit pack door padlock and keys submethod IC-1. Secure bag in a conspicuous location easily accessible on opening shelter doors. Close and secure doors with truck or railroad security seals or wire.

(2) Packing.

(a) Skid mounted. Place one shelter on a wood skid (para 4-106d) and secure in place with wood blocking, tie-down slings, and "U" bolts, as necessary.

(b) Van and trailer mounted. No additional packing is necesssary.

ab. Telescope, periscope, binoculars.

(1) Cleaning and drying. Clean and dry optical portions per paragraph 4-10lb. Clean all other surfaces by process C-1 and dry by procedure D-1. No preservative is required. Cover eyepiece with a plastic cap or single-face paperboard. Fold lens paper into a pad and cover glass surfaces, securing in place with tape. Wrap each unit with neutral barrier material and overwrap with single-face paperboard, securing overwrap with tape. Unit pack submethod IA-8.

(2) Items up to 40 pounds. Place one unit in a fiberboard box lined with a minimum 1-inch thickness of bound fiber. Seal fiberboard box with tape (fig 4-4).

(3) Items 40 pounds and over. Place one unit in a triple-wall, wood, or plywood box. Completely isolate the unit from container top, sides, and ends with bound fiber. Seal triple-wall box with tape (fig 4-3) and reinforce with filament reinforced tape.

ac. Test sets, computers, and similar equipment.

(1) *Processin*g. Other than the Field Artillery Logic Tester (FALT) System covered in (2), below, process test sets per ad below.

(2) FALT. No preservative is required. Secure cable assemblies to their respective positions in the unit's rear cover. Place extractors and manuals in the front cover of the unit. Position front and rear covers on the computer unit and secure with latches provided. Position FALT test tape kit cartridge assemblies upright in carrying case with the manuals placed on top of cartridges. Immobilize in the case with filler pads of polyurethane foam. Unit pack equipment log book and DA forms submethod IC-3. Position computer logic unit and the FALT test tape kit in the reusable shipping container. Position container cover over the lower section with arrows aligned. Securely latch fasteners. Install security seals. When reusable shipping 4-38 container is not available, substitute wood or plywood box. Line box on top, bottom, sides, and ends with a minimum 4-inch thickness of polyurethane foam to completely encapsulate the unit.

(a) Less than 70 pounds (with tool box). Observe the following requirements concerning tool kit sets or outfit of tools (complete assemblage) including a container (tool box) for carrying such equipment as an outfit:

1 Disassembly and matchmarking. Limit disassembly to the extent necessary to accomplish necessary reduction in cube, protect vulnerable parts, and ensure thorough cleaning. To facilitate reassembly, matchmark removed parts and assemblies with tags when necessary.

2 Cleaning and drying. Clean unpainted, noncritical surfaces by any applicable process.

3 Preservative application. Preserve cleaned, critical, ferrous metal surfaces; gears; mechanisms; and pioneer and handtools with VCI wrap. Preserve cleaned, nonferrous items with P-9.

4 Packing. Wrap ferrous metal items in VCI. Wrap nonferrous items in greaseproof barrier material and secure with tape. Place components in their compartments within the container (tool box) or place components in layers or tiers within the container. Use cellulosic cushioning or wrapping paper to prevent movement. Isolate fragile items or items having cutting edges to prevent contact with other components. Place one or more tool sets or kits in a fiberboard, double-wall, or wood box, dependent upon the weight of each set or kit. Close box with tape. Reinforce fiberboard box with filament reinforced tape.

(b) 70 pounds and over.

1 Disassemble, matchmark, clean, dry, and preserve, as specified in (a)l and 2 above.

2 Do not apply additional packing to items preserved with P-1. Wrap ferrous metal surfaces with VCI. Wrap nonferrous items in greaseproof barrier material and secure with tape.

3 Place small component sets in their carrying cases/tool boxes.

4 Pack abrasives, grinding wheels, and similar-type items in fiberboard boxes, cushion with cellulosic cushioning, and seal all openings with tape (figs 4-3 and 4-4).

5 Pack pole line hardware in fiberboard boxes, where feasible; cushion with cellulosic cushioning or bound fiber; and seal all openings with tape (figs 4-3 and 4-4). Bundle outsized items together, not to exceed 100 pounds per pack, and secure bundles with metallic or nonmetallic strapping or filament reinforced tape.

6 Pack pioneer and handtools in fiberboard boxes, when applicable; cushion with cellulosic cushioning or bound fiber; and seal all openings with tape (figs 4-3 and 4-4). Secure tools not applicable to fiberboard boxes in the packing box with blocking.

7 Cover parts or other openings of electric handtools having armatures and windings with tape.

8 Pack sets of kits furnished in a plastic or leather case submethod IC-1.

9 Pack electronic components per paragraph 4-109.

10 Locate all components of the tool set, shop set, or kit into a wood or plywood box. Arrange contents within the box to provide maximum protection to the components (e.g., place heavier and rugged items on the bottom and lighter and fragile items on the top). Provide cushioning, blocking, and bracing with cellulosic cushioning or bound fiber, and wood blocking, as necessary, to immobilize the contents. Nail all wood blocking securely.

ad. Trainers, field, turret.

(1) Disassemble trainers, as necessary, in order to transport the item.

(2) Apply P-ll or VCI wrap to all unpainted, ferrous metal surfaces. Wrap preserved surfaces with greaseproof barrier material and secure to adjacent surfaces with tape.

(3) Process disassembled components such as missile control assembly, TV camera and lens, optical bench assembly, target projector assembly, and related assemblies per paragraph 4-101, and as otherwise indicated for individual components listed in the topical index.

(4) Pack disassembled components in two or more open wood crates (fig 4-1). Secure components to the crate base by bolting or metallic strapping. Shroud components with waterproof barrier material and secure in place with tape.

Section VIII. ELECTRONIC EQUIPMENT

4-103. General

This section pertains to general field packaging instructions for serviceable, retrograde materiel; unserviceable, economically reparable retrograde materiel; and serviceable materiel to be recycled. Support units will develop procedures to ensure the orderly recovery, collection, and classification, disposition, and packaging of U.S. Army Communications-Electronics Command (CECOM) equipment, as prescribed by this section.

4-104. Definitions

For the purpose of these instructions, the following general definitions apply, as applicable, to each category of equipment:

a. Antenna and tower equipment. Equipment used in the operation of wireless communications equipment for receiving and/or transmitting electromagnetic waves. Components may be provided with carrying bags, canvas rolls, shipping frames, or cases. (For components provided with cases or mounted in shelters, vans or semitrailers, see para 4-105 and 4-106.)

b. Cabinets. A three-sided enclosure, with or without drawers, designed to mount or support electrical or electronic equipment so the equipment may be used without removal.

c. Case. Any container that completely encloses its contents. Examples are carrying cases, transit cases, chests, and cabinets that have fastening devices for closure.

d. Multiple item equipment. Two or more major components of equipment designed to function as a single entity or in combination with other equipment including running spare parts, accessories, or auxiliary equipment that may be contained in cases or chests and shipping or carrying frames. Examples are AN/GRA-4, AN/GRC-103(V), and AN/FTC-31.

e. Radar sets (AN/MPQ-10(II)). Lightweight, transportable equipment installed in or stowed on vehicles. Excluded are *processing* instructions pertaining to the mobility aspect of the transport vehicles and generator sets. Processing and lubrication requirements for this equipment are contained in paragraphs 4-135 and 4-137.

f. Shelters. Transportable structures specifically designed to house CECOM electrical or electronic equipment so the equipment may be used without being removed.

g. Single item equipment. Equipment assembled as one unit. They may or may not have running spares or accessories and are designed to function as a single item. Examples are receivers-transmitters, power supplies, sweep generators, loudspeakers, and tape-recording equipment.

h. Vans or semitrailers. Vehicles (self propelled or towed) having a van-type body with CECOM electrical and/or electronic systems installed. Excluded from this section are processing requirements for vans or semitrailers pertaining to the mobility aspect of the transport vehicles. Processing instructions for transport vehicles are con

tained in paragraphs 4-135 and 4-137.

i. Wire, cable, and cord assemblies.

(1) Nonflexing service-type cable. Designed and intended for installation in a fixed position such as power cables in a conduit system. This type of cable is bent only as required by the nature of the installation.

(2) Repeated flexing service-type cable. Designed and intended for repeated flexing or bending in service such as portable telephone cable.

4-105. Equipment and Components in Cases

a. Clean equipment within each case using process C-1 and dry using procedure D-4.

b. Requires no preservative.

c. Pack equipment and components in cases as follows:

(1) Do not pack items that can be placed in cushioned compartments or other devices within the case or equipment. Secure items in their designated places.

(2) Wind cable or cord assemblies (not on reels) into a coil of the smallest practicable dimension and secure with twine at three places, spaced equidistantly around the circumference. If reels are provided, wind the assemblies uniformly on the reel and secure the connectors wto the reel with locking devices provided. If locking devices are not provided, secure with twine.

(3) Individually wrap each loose spare part or miscellaneous component with corrugated paperboard or cellulosic cushioning material, as required, and secure with tape.

(4) Check all equipment within the case for completeness, tighten all screws and knobs, and ensure that equipment locking devices are engaged.

(5) Place all items inside designated compartments of the case. Place overflow items within close-fitting fiberboard boxes. Fill all void space within the box with cellulosic or foam cushioning material to prevent movement. Seal all seams and joints of the box with tape (see figure 4-3). Place TM in space provided in the cover of the case, or when space is provided, place TM on top of contents directly under the cover of the case.

(6) Close all covers and secure with locking devices provided on the case. Apply markings to a tag as prescribed in paragraph 3-5. Secure the tag to each case or overflow box with tag wire or tape.

(7) Wrap additional components of the stock numbered item, without cases, with corrugated paperboard and cushion with cellulosic cushioning material, as applicable. Secure with tape. Consolidate the cushioned items within a weather-resistant fiberboard box. Place the overflow box and additional components, as applicable, in the same container(s). Fill all void space within the box with cellulosic or foam cushioning material to prevent movement. Close the box and seal all seams and joints with tape (see figure 4-3).

d. Accomplish packing by placing each item, or a quantity of items, within plywood consolidation insert shipping containers, and block and brace the equipment to prevent movement. After packing and closure, apply strapping to consolidation shipping containers.

e. Apply marking to shipping containers per paragraph 3-5.

4-106. Equipment Installed in Vans, Semitrailers, and Shelters

a. Cleaning and drying. Clean and dry each piece of equipment installed in vans, semitrailers, or shelters per process C-1 and procedures D-1 and D-4, respectively.

b. Application of preservatives. Requires no preservative.

c. Packaging. Perform the following functions, as applicable, to the equipment installed in vans, semitrailers, or shelters.

(1) Stow and secure all components in the vans, semitrailers, or shelters. Cushion and wrap insulators and brackets with corrugated paperboard and cellulosic cushioning material, as required. Secure the wrap with tape. Stow the cushioned items in the designated compartments provided.

(2) Pack all spare parts and miscellaneous components. Wrap items with corrugated paperboard and place in weather-resistant fiberboard boxes. Fill all void space with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

(3) Wrap and cushion handsets, headsets, microphones, controls, and similar components, that were not disassembled and are secured to equipment, with corrugated paperboard and then tape them to the unit.

(4) Secure halyards, ropes, and like items in coils with twine.

(5) Wind each cable cord assembly (not on reels) into a coil of the smallest practicable dimension and tie the coil with twine at three places, spaced equidistantly around the circumference. If reels are provided, wind the assemblies uniformly on the reels and secure connectors with locking devices provided. If locking devices are not provided, secure with twine.

(6) Consolidate and place into cloth bags all nuts, bolts, screws, washers, and other hardware and secure to the equipment from which they were removed.

(7) Identify each bundle, box, or unit with a tag reflecting nomenclature, NSN, and status.

(8) Secure mast sections together with metallic strapping and secure within the vans, semitrailers, or shelters.

(9) Do not box folded or bundled antenna sections, but simply apply metallic strapping.

(10) Consolidate the ground rods and strap with metallic strapping.

(11) Stow and secure to the floor boxed items, equipment, and accessories such as ladders, chairs, antennas, and brackets that do not have an assigned location. Refer to the equipment TM for specific details and illustrations that can be used for location planning.

(12) Check to see that all prepacking and stowage in the vans, semitrailers, or shelters are complete.

(13) Close and secure all windows, blackout blinds, louver vents, shields, blower vents, and heating intake door.

(14) Close and secure the mail slot covers.

(15) Close the doors and lock them with padlocks.

(16) Place the keys in a cloth bag and secure to the door handle with cloth back tape.

(17) Secure in place all components that are stored or permanently installed outside the vans, semitrailers, or shelters such as gasoline cans, antenna sections, masts, and air conditioners. Secure canvas covers, dust covers, or other protective devices on the equipment, as applicable.

d. Packing of shelters. Place each shelter in an open crate. Block, brace, and secure the shelter within the crate per figures 4-6 through 4-9.

e. Marking. Apply marking per paragraph 3 5.

4-107. Equipment Installed in Cabinets

a. Clean equipment installed in cabinets using process C-1 and dry using procedure D-4.

b. Requires no preservative.

c. Pack equipment as follows:

(1) Do not pack items such as running spares and tools that can be placed in compartments or other devices within the cabinet. Secure these items within their designated places.

(2) Coil cord and cable assemblies attached to the cabinets and secure to the cabinet with tape.

(3) Wrap and cushion the handsets, headsets, microphones, controls, and similar components, TM 746-10 that were not disassembled and are attached to the cabinet, with corrugated paperboard and secure them to the unit with tape.

(4) Pack all loose spare parts and miscellaneous components. Wrap these items with corrugated paperboard and secure with tape. Place the items within a close-fitting, weather-resistant fiberboard box. Fill all void space with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3). If space is available, stow and secure the carton within the cabinet. Mark the box to reflect contents.

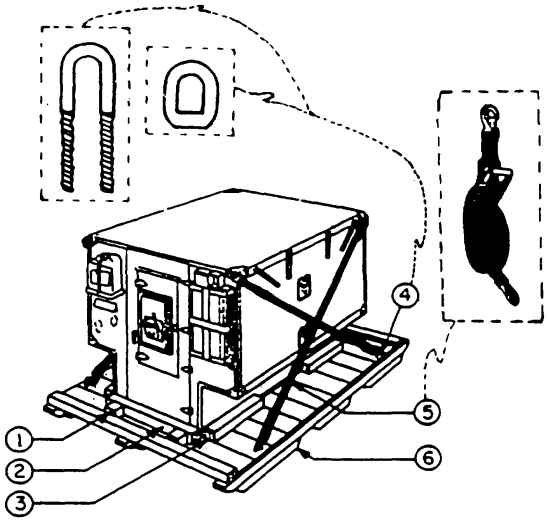
(5) Pack additional components of the stock numbered cabinet when stowage is not provided either in or on the unit as follows: wrap items with corrugated paperboard and cushion with cellulosic cushioning material and secure with tape; consolidate additional components and spare parts box, as applicable, within a close-fitting, weatherresistant fiberboard box; fill all void space with cellulosic cushioning material to prevent movement; and close the box and seal all seams and joints with tape (fig 4-3).

(6) Check to ensure that all installed and stockmounted equipment is secured in place. Check all screws, knobs, clamps, doors, drawers, and cable connections for tightness.

(7) Cushion all corners and face panels of the equipment with corrugated paperboard and secure with tape.

(8) Cushion each cabinet weighing 100 pounds or less, with or without mounting facilities, with a double wrap of cellulosic cushioning material and secure with tape. Place the cabinet together with the spare parts box and the additional components, as applicable, within a weather-resistant fiberboard box. Fill all void space with cellulosic cushioning material to prevent movement. Place the technical literature, when provided, on top of the contents directly under the lid of the box. Close the box and seal all seams and joints with tape (fig 4-4).

(9) Cushion each cabinet weighing over 100 pounds without mounting facilities with a double wrap of cellulosic cushioning material and secure with tape. Wrap the cabinet with a single wrap of corrugated fiberboard and secure with tape. For packing purposes, place cabinet in normal operating position. Fabricate a nailed wood or plywood-cleated box. Place the cabinet on the skid base. Center cabinet on the base so when the box is assembled, there is a 2-inch clearance between the cabinet, sides, ends, and top of the box. Secure cabinet to the wood base by one of the following methods:



ITEM	REQ.	DESCRIPTION
1	4	4″ x 4″ wood block *
2	2	4″ x 4″ wood block (notched as required) *
3	4	4″ x 4″ wood block *
4	4	U-bolts or carriage bolts w/nut eyes
5	4	Tie-down straps
6	3	4″ x 4″ lumber - rubbing strips ea. skid

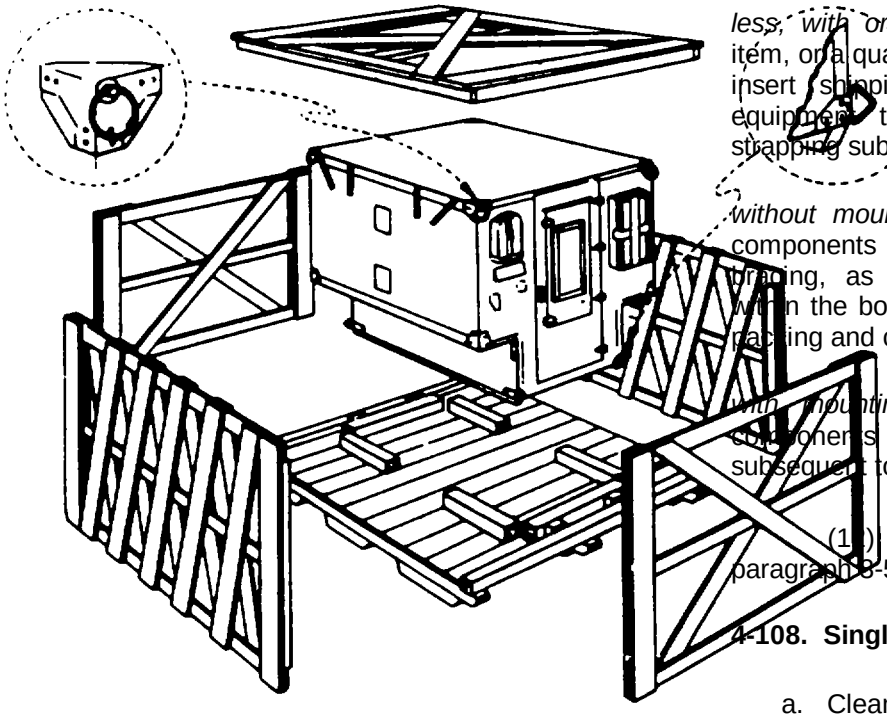
*Two pieces of 2 x 4 inch stock may be substituted to facilitate nailing to base.

Figure 4-6. Shelter Skid Base with Sling Assembly Tiedown (MIL-S-55507).

(a) Block and brace the cabinet to the base of the shipping container using 2by 4-inch lumber. Place pads of corrugated fiberboard between the cabinet and the wood blocking material to prevent abrasion or damage.

(b) Secure the cabinet to the base with metallic strapping using anchor plates to immobilize the cabinet. To prevent abrasion, place corrugated fiberboard pads on all surfaces of the cabinet which come in contact with metallic strapping.

(10) Use the following directions to pack each cabinet weighing over 100 pounds with mounting facilities. Fabricate a nailed wood box or plywood box. Place the cabinet on the skid base. Drill holes through the skid base and the skids to correspond with the mounting holes on the cabinet. Arrange mounting holes so when the cabinet is centered on the skid base and the box is assembled, there is a 2-inch clearance between the cabinet, sides, ends, and top of the box. Insert the bolts through the



NOTE: Blocking at both ends of skid base is simulated to illustrate blocking requirements for shelters with projecting components.

Figure 4-7. Shelter Crate Components (MILS-55507).

holes in the skid base so the bolt heads are recessed in the skids. Ensure that the diameter of the bolt is the same size as the holes in the skid base and the mounting holes on the equipment. Place and secure a flat washer and nut over each bolt, tighten the nut, and upset or double nut the threads protruding over the nut to prevent loosening. Cushion and wrap the cabinet with cellulosic cushioning material and corrugated paperboard and secure with tape.

(11) Pack specific cabinets as follows:

(a) Cabinets weighing 100 pounds or less, with or without mounting facilities. Place each item, or a quantity of items, within plywood consolidation insert shipping containers. Block and brace the equipment to prevent movement. Apply metallic strapping subsequent to packing and closure.

(b) Cabinets weighing over 100 pounds, without mounting facilities. Assemble the remaining components of the box. Apply traditional blocking and bracing, as required, to prevent vertical movement within the box. Apply metallic strapping subsequent to packing and closure.

(c) Cabinets weighing over 100 pounds, with mounting facilities. Assemble the remaining components of the box. Apply metallic strapping subsequent to packing and closure.

(12) Apply marking to shipping containers per paragraph 3-5.

4-108. Single-item Equipment

a. Clean single-item equipment by using process C-1 and dry by using procedure D-4.

b. Requires no preservative.

c. Perform the following functions, as applicable, to each piece of equipment:

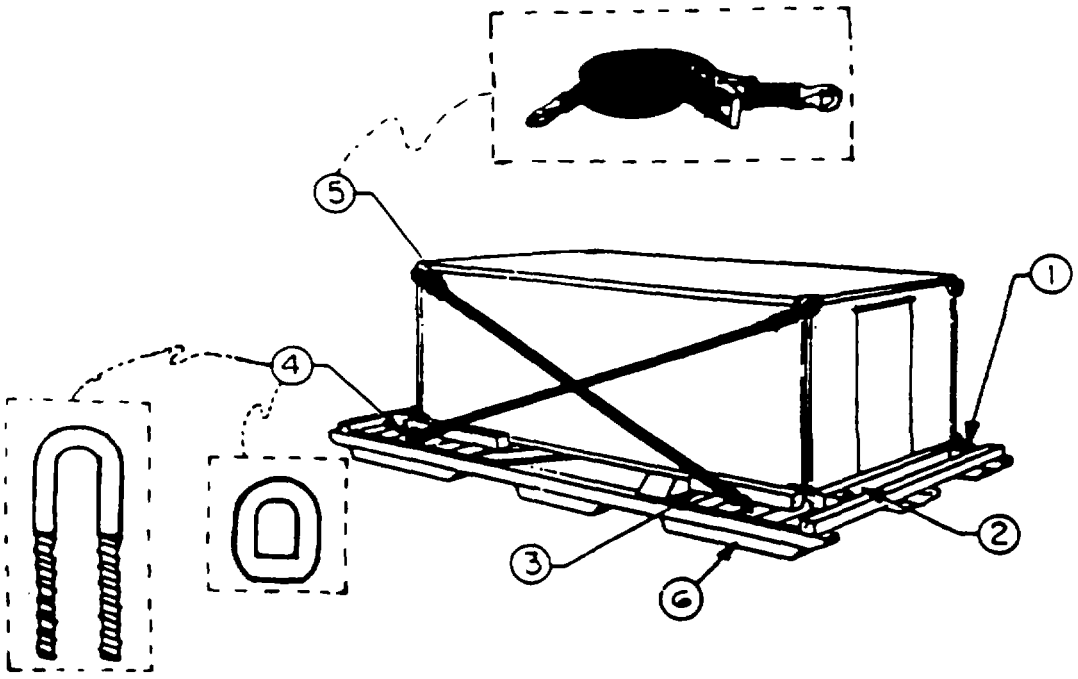
(1) Tighten all screws, knobs, clamps, and tuning devices and ensure that equipment locking devices are engaged.

(2) Coil and secure cord and cable assemblies which are attached to the unit with tape.

(3) Place the running spares, accessories, or tools, as applicable, within the designated spaces when provided for in the equipment.

(4) Pack equipment as follows:

(a) Individually wrap each loose spare part or miscellaneous component with corrugated paperboard or cellulosic cushioning material, as required, and secure with tape. Place the items



ITEM	REQ.	DESCRIPTION
1	4	4" x 4" wood block *
2	2	4" x 4" wood block (notched as required) *
3	4	4" x 4" wood block *
4	4	U-bolts or carriage bolts w/nut eyes
5	4	Tie-down straps
6	3	4" x 4" lumber - rubbing strips ea. skid

***Two pieces of 2 x 4 inch stock may be substituted to facilitate nailing to base.**

Figure 4-8. Large Shelter Skid Base with Sling Assembly Tiedown (MILS-55507).

within close-fitting, weather-resistant fiberboard boxes. Close the box and seal all seams and joints with tape (see figure 4-3).

(b) Individually wrap each major equipment with corrugated paperboard, cushion with cellulosic cushioning material, and secure with tape. Place the equipment within a close-fitting, weather-resistant fiberboard box. Place the technical literature; packaged spare parts; and miscellaneous components, as applicable, in the same box. Fill all void spaces with cellulosic cushioning material. Close the box and seal all seams and joints with tape (fig 4-3).

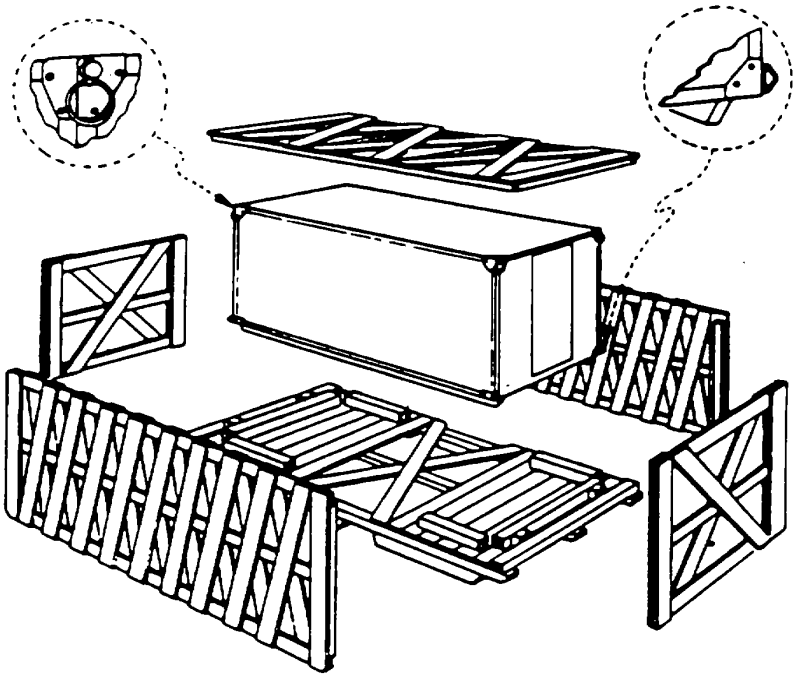
(5) Accomplish packing by placing each item, or a quantity of items, within plywood consolidation shipping containers. Block and brace the equipment to prevent movement. Apply metallic strapping to consolidation shipping containers subsequent to packing and closure.

(6) Apply markings to shipping containers per paragraph 3-5.

4-109. Multiple-item Equipment

a. Clean each piece of equipment by using process C-1 and dry by using procedure D-4.

b. Requires no preservative.



NOTE: Blocking at both ends of skid base is simulated to illustrate blocking requirements for shelters with projecting components.

Figure 4-9. Large Shelter Crate Components (MIL-S-55507).

c. Perform the following functions, as applicable, to the equipment. Excluded is equipment contained in case(s) (para 4-104c).

(1) Do not pack items that can be placed in brackets, compartments, fasteners, or other devices within the equipment. Secure items within their designated places.

(2) Return all tools, running spares, and accessories to accessory bags when provided. No further packaging is required for these items. For tools, running spares, and like items without accessory bags, individually wrap each item with corrugated paperboard and secure with tape. Place the items within a weather-resistant spare parts box or consolidate with the end item in the unit pack container.

(3) Coil cord and cable assemblies attached to the equipment and secure to the equipment with tape.

(4) Wrap and cushion the handsets, headsets, controls, microphones, and similar components, that were not disassembled and are attached to the equipment, with corrugated paperboard and secure to the unit with tape.

(5) Secure together mounting hardware, brackets, and channels with tape.

(6) Consolidate and place into cloth bags all nuts, bolts, screws, washers, and other hardware, and secure them to the equipment from which they were removed.

(7) Wrap the ends of mast sections with corrugated paperboard and secure with tape. Secure the mast section together with the same tape.

(8) Rewind all cable assemblies, cords, and wires on their assigned reels, or, if reels are not provided, coil to the smallest practicable dimension and tie the coil with twine at three places, spaced equidistantly around the circumference.

(9) Check to ensure that all installed and shock-mounted equipment is secured in place. Check all screws, knobs, clamps, and cable connectors for tightness.

(10) Cushion all corners, face panels, glass gauges, knobs, tuning devices, and indicator lamps with corrugated fiberboard and secure with tape.

(11) Wrap each major component with corrugated paperboard, cushion with cellulosic cushioning material, and secure with tape. Consolidate

and place the cushioned components within a close-fitting, weather-resistant fiberboard box. Place the technical literature and the processed spares cushioned with cellulosic material in the same box. Close the box and seal all seams and joints with tape (fig 4-3).

d. Pack each piece of equipment or a quantity of equipment in plywood consolidation insert shipping containers, and block and brace to prevent movement. Apply metallic strapping subsequent to packing and closure.

e. Apply marking to shipping containers per paragraph 3-5.

4-110. Antenna and Tower Equipment

a. Clean antenna and tower equipment using process C-1 and dry by using procedures D-1 and D-4, as applicable.

b. Requires no preservative. Repaint or coat metal surfaces of equipment, as required, where paint has been removed or peeled.

c. Perform the following functions, as applicable, to the equipment. Excluded are items contained in cases or items installed in or on major equipment (para 4-104c, f, and h).

(1) Consolidate and place into cloth bags all nuts, bolts, screws, washers, and other hardware and secure to the equipment from which they were removed.

(2) Assemble the following type items and strap together in three places with metallic strapping to form a convenient size for handling:

(a) Digging bars.
(b) Anchor rods.
(c) Ground rods.
(d) Augers.
(e) Guy stakes.
(f) Davits.

(3) Wind guy lines, hoist lines, and halyards into a coil of the smallest practical dimension and secure with twine or metallic strapping, as applicable, in three places, spaced equidistantly around the circumference.

(4) Place tackle blocks and turnbuckles within close-fitting, weather-resistant fiberboard boxes or nailed wood boxes, as applicable. Do not exceed weight limitation of boxes. Fill all void space within the fiberboard boxes with cellulosic cushioning material to prevent movement or block and brace the item(s) within the wood containers with lumber. Close the boxes, as applicable, with tape or nails.

(5) Assemble like items, i.e., mounting hardware, tie plates, nuts, bolts, or screws, and place within close-fitting, weather-resistant fiberboard boxes or nailed wood boxes, as applicable. Do not 4-46

exceed weight limitation of boxes. Close and seal all seams and joints of fiberboard boxes with tape (fig 4-3). Use metallic strapping, as required, to reinforce the nailed wood boxes.

(6) Package installation kits, tool kits, etc., as specified in paragraph 4-113.

(7) Package all electronic-type spare parts and miscellaneous components. Wrap these items with corrugated paperboard and place within closefitting, weather-resistant fiberboard boxes. Fill all void space with cellulosic cushioning material to prevent movement. Close the boxes and seal all seams and joints with tape (fig 4-3).

(8) Return antenna, mast sections, or tower with carrying or shipping frames to their designated locations within the frame and secure with fasteners provided. Do not repack.

(9) Pack wire, cable, and cord assemblies, as specified in paragraph 4-114.

(10) Fold each collapsible folding tower section to its smallest dimension and immobilize by strapping together once near each corner, and once along the diagonal length, to include stairway, when applicable, with metallic strapping.

(11) Nest tower structural components such as angles, diagonals, and channel supports and bundle to form a convenient size for handling. Secure, as required, with metallic strapping.

(12) Pack antenna reflector sections, reflector support, and horn support assembly as follows. Fabricate an open crate with wood-mounting base and secure the item(s) to the base with bolts if the item(s) has mounting facilities, or, if mounting facilities are not provided, use metallic strapping anchored to the crate base. Protect all metal surfaces with pads of currogated fiberboard where metallic strapping comes in contact with the item. Do not repack.

(13) Process and pack items not identified herein using instructions for similar-type items with the same physical or mechanical characteristics.

d. Pack antenna and tower components as follows:

(1) Pack each item or a quantity of items in plywood consolidation insert shipping containers, as applicable, and block and brace to prevent movement.

(2) Pack in open crates and block and brace to prevent movement of those items in carrying or shipping frames or those items secured in bundles.

(3) Pack antenna reflector sections, reflector supports, horn assemblies, etc., secured on crate bases by assembling the remaining components of the crate. Apply metallic strapping to all shipping containers subsequent to packing and closure.

CAUTION

Place fiberboard, cellulosic, or foam cushioning between the item and all blocking, bracing, and strapping to prevent chafing and corrosion of the item.

e. Apply marking to shipping containers per paragraph 3-5.

4-111. Radar Set AN/MPQ-4

a. Clean radar set and components using process C-1 and dry by using procedures D-1 and D-4, as applicable.

b. Requires no preservative. Repaint or coat metal surfaces of equipment, as required, where paint has been removed or peeled.

c. Perform the following functions to the equipment, as applicable:

(1) Consolidate electronic equipment, and place into cloth bags all nuts, bolts, screws, washers, and other hardware; secure them to the equipment from which they were removed.

(2) Pack installation kits or tool kits as specified in paragraph 4-113.

(3) Pack all loose spare parts and miscellaneous components. Wrap these items with corrugated paperboard and place within close-fitting, weather-resistant fiberboard boxes. Fill all void space with cellulosic cushioning material to prevent movement. Close the boxes and seal all seams and joints with tape (fig 4-3).

(4) Pack wire, cable, and cord assemblies as specified in paragraph 4-114.

(5) Recheck to ensure that all installed and shock-mounted equipment is secured in place. Check all screws, clamps, and cable connectors for tightness.

(6) Fabricate a weather-resistant fiberboard cover for OA-1256/MPQ-4A and secure in place with metallic strapping.

(7) Place 32 units of desiccant in the desiccant chamber and secure in place (fig 4-10).

d. Process as follows:

(1) Lubricate and process generator per section I of this chapter.

(2) Place the handtools and technical literature in the tool box, if space permits, or place the items within a close-fitting, weather-resistant fiberboard box. Close the box, seal all seams and joints with tape, and secure the box to the generator with the same tape.

(3) Place each generator within a close-fitting, weather-resistant fiberboard box and secure with metallic strapping (fig 4-11).

e. Stow, block, brace, and secure equipment on the vehicles and install the canvas cover per figures 4-12 and 4-13. Do not repackage.

f Apply markings per paragraph 3-5 and MIL-STD-129.

4-112. Radar Set AN/MPQ-10

a. Clean radar set and components using process C-1 and dry by using procedures D-1 and D-4, as applicable.

b. Requires no preservative. Repaint or coat metal surfaces of equipment, as required, where paint has been removed or peeled.

c. Perform the following functions to the equipment, as applicable. Excluded are items contained in case(s). Pack items per paragraph 4-105.

(1) Consolidate and place into cloth bags all nuts, bolts, screws, washers, and other hardware and secure to the equipment from which they were removed.

(2) Assemble like items, i.e., mounting hardware, tie plates, nuts, bolts, or screws, and place in weather-resistant fiberboard boxes convenient for handling. Do not exceed weight limitation of boxes. Close the box and seal all seams and joints with tape (fig 4-3). Use filament reinforced tape, as required, to reinforce the boxes.

(3) Pack wire, cable, and cord assemblies as specified in paragraph 4-114.

(4) Check to ensure that all installed and shock-mounted equipment is secured in place such as antenna, outriggers, and tracker mount. Check all locking devices, cable connectors, equipment covers, ventilation intakes, and exhaust parts for tightness.

(5) Process and package items not identified herein using instructions for similar-type items with the same physical or mechanical characteristics.

(6) Cover the radar set mounted on the vehicle carriage with the canvas cover and secure with fasteners provided.

d. Package radar set and components as follows:

(1) Do not repack radar set mounted on vehicle carriage. Recheck to ensure that all equipment is secured in place and the canvas cover is properly tied down.

(2) Consolidate and pack the remaining components within plywood consolidation insert shipping containers, and block and brace to prevent movement. Apply metallic strapping to the consolidation insert shipping containers subsequent to packing and closure.

e. Apply marking to shipping containers per paragraph 3-5 and MIL-STD-129.

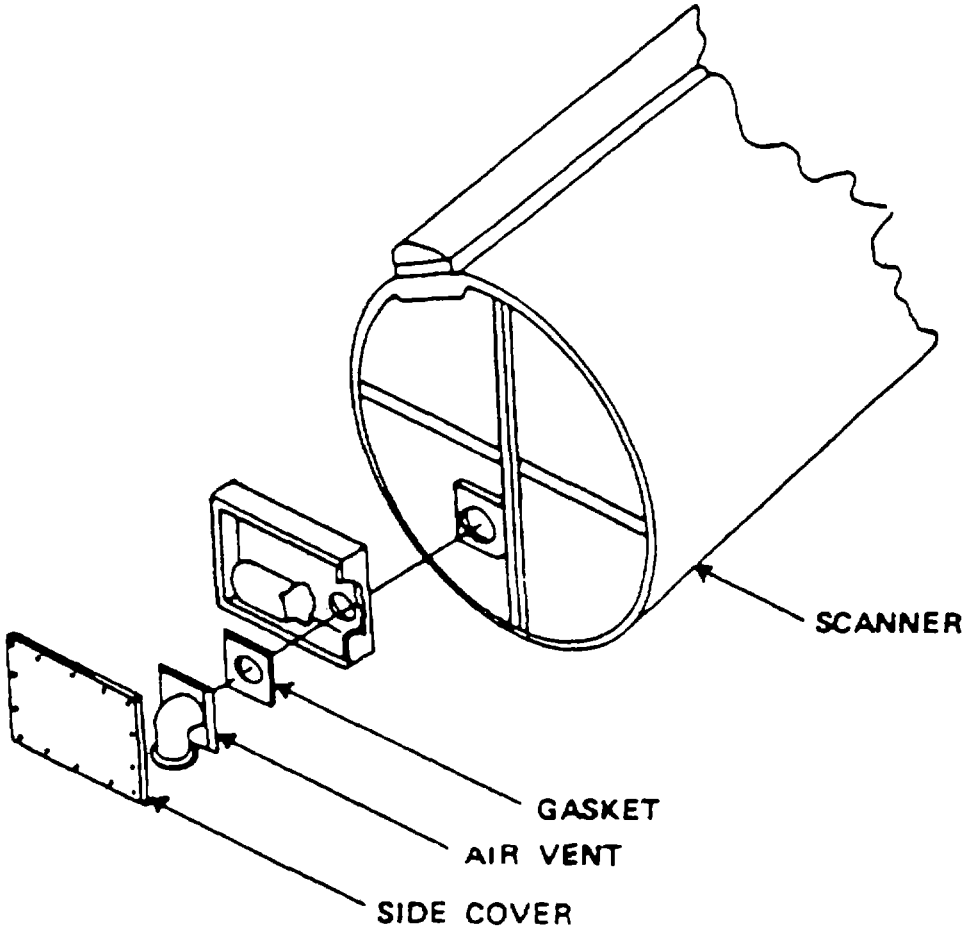


Figure 4-10. Desiccant Chamber.

4-113. Kits, Hardware, Installation, Modification, and Tool

a. Clean each kit using process C-1 and dry by using procedure D-l, D-4, or D-5, as applicable.

b. Except when specified, determine application of preservative based on the criteria in table 4-1.

c. Perform the following functions to the equipment, as applicable:

(1) Preserve common handtools such as hammers, pliers, chisels, and handsaws using P-2 or P-10 on unprotected, ferrous metal surfaces. Wrap, as required, with greaseproof, waterproof barrier material and secure with tape.

(2) Preserve machine tools with precision metal surfaces such as drills, drill presses, thread gauges, and cutting tools using P-2 or P-10 on exposed, unpainted surfaces. Wrap or cover the coated surfaces with greaseproof, waterproof barrier material and secure with tape.

(3) Place portable electric tools such as hand drills, skill saws, and cutting tools in cases, if provided, or wrap with corrugated fiberboard or cellulosic cushioning material, as applicable, and secure with tape. Place each item in a close-fitting, weather-resistant fiberboard box. Fill all void space with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

(4) Protect drive belts, rubber tubing or hose, gaskets, leather products, or items fabricated of plastics as follows:

(a) Either wrap rubber tubing or hose, leather products, or items fabricated of plastics with corrugated fiberboard and secure with tape, or place them directly within close-fitting, weather-resistant fiberboard or paperboard boxes.

(b) Place gaskets fabricated of rubber, neoprene, or felt (flexible type) in greaseproof, waterproof bags, or in close-fitting, weather-resistant paperboard boxes. Sandwich rigid-type gaskets (all types) and gaskets fabricated of cork between two pieces of solid fiberboard and either place them in a greaseproof, waterproof bag and seal or in a weather-resistant fiberboard or paperboard box, as applicable. Ensure that the fiberboard material is one-half inch larger than the gaskets

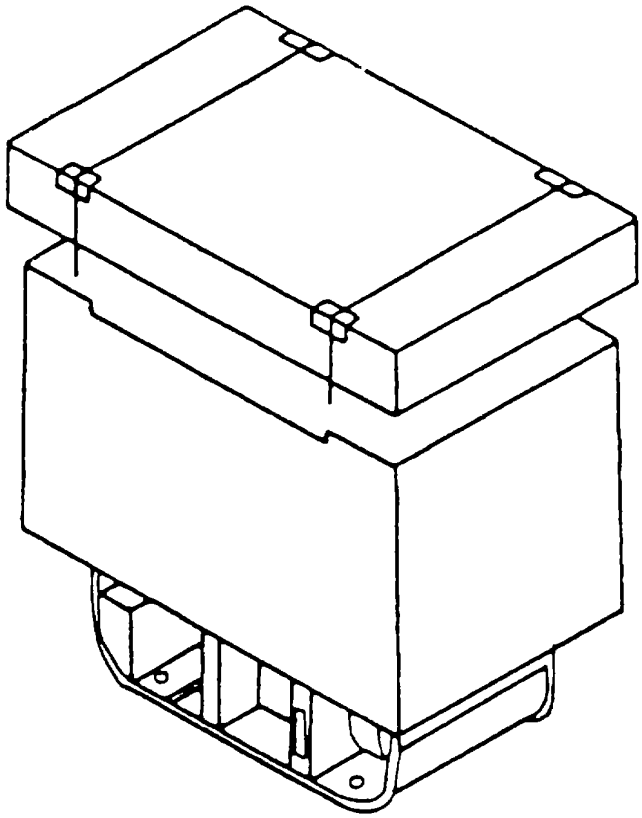


Figure 4-11. Generator Set, Gasoline Engine, PU-107/U.

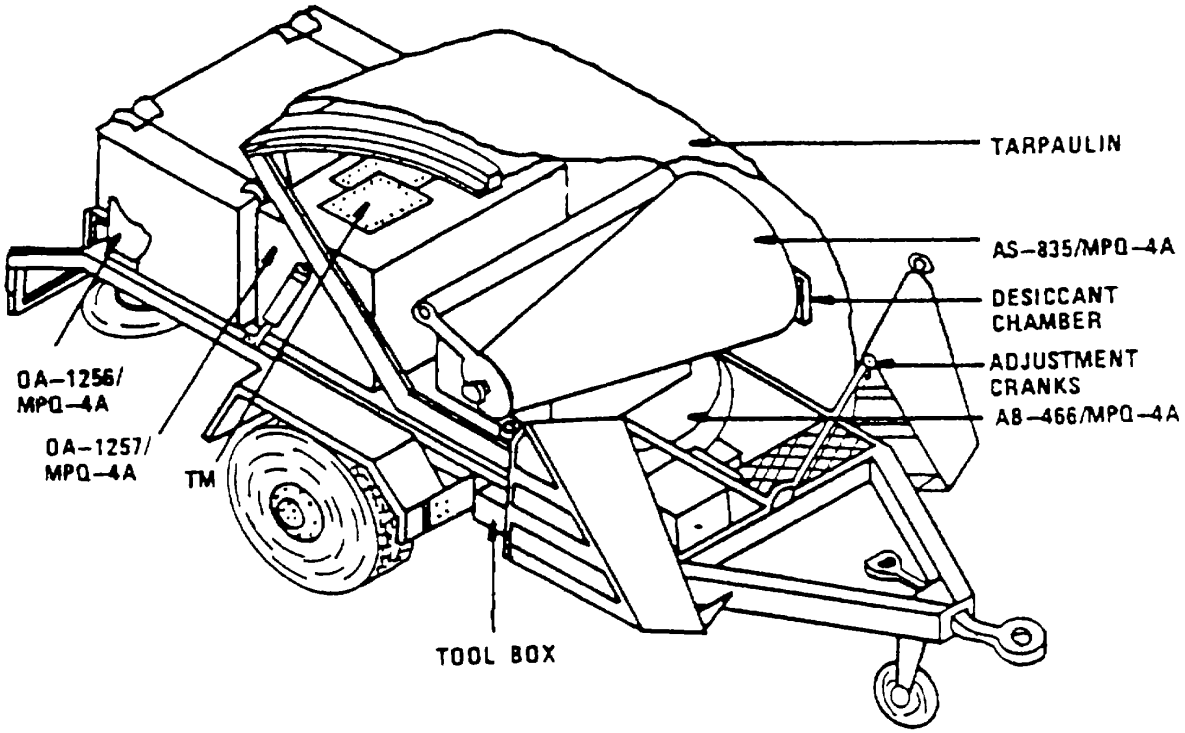


Figure 4-12. Radar Trailer, V130/MPQ-4A.

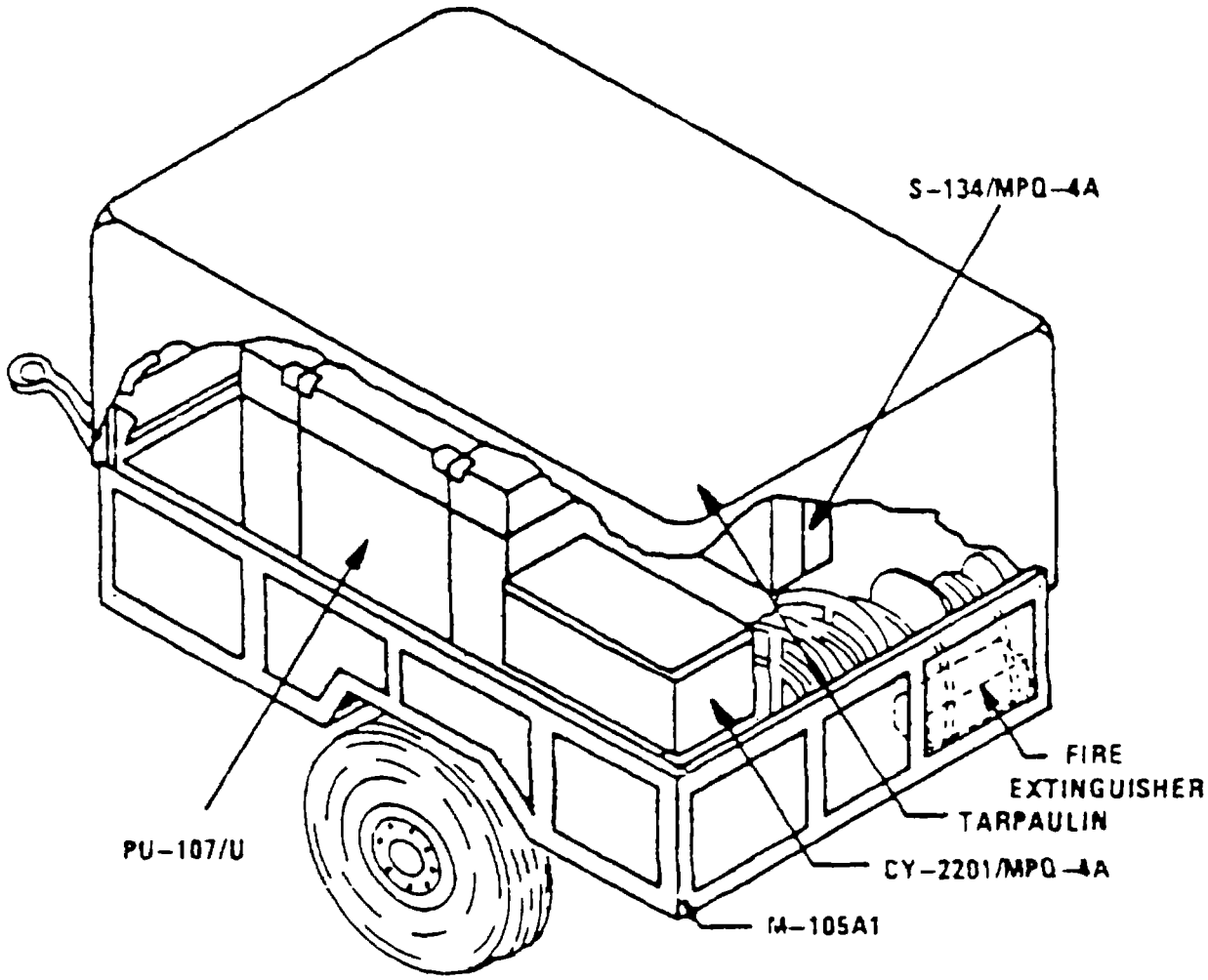


Figure 4-13. Generator Set PU-304/MPQ-4A.

(5) Pack wire cable and cord assemblies as specified in paragraph 4-114.

(6) Place mounting hardware, nuts, bolts, or clamps within cloth bags and secure the drawstring.

(7) Individually wrap electron tubes or lamps with cellulosic cushioning material and place within close-fitting, weather-resistant paperboard boxes.

(8) Process electronic and electrical assemblies, parts, and associated items such as semiconductor devices, micro-miniature components, resistors, receivers, or loudspeakers as follows:

(a) Wrap small items such as semiconductor devices and resistors in corrugated paperboard and place in greaseproof, waterproof bags and seal.

(b) Wrap large items such as receiving units and amplifiers with corrugated fiberboard and cellulosic cushioning material and place within close-fitting, weather-resistant fiberboard boxes. Fill all void space within the box with the same cushioning material. Seal all seams and joints with tape.

d. Unitize each kit component as follows:

(1) Kits, small size. Place each kit, the components of which have a total net weight of under 10 pounds, within close-fitting, weather-resistant fiberboard or paperboard boxes. Fill all void space within the box with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

(2) Kits, medium size. Place each kit, the components of which have a total net weight between 10 and 70 pounds, within close-fitting, weather-resistant fiberboard boxes. Fill all void space within the box with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

(3) Kits, large size. Overpack each kit, the components of which have a total net weight of not less than 70 pounds nor more than 200 pounds, within close-fitting, weather-resistant, triple-wall

boxes. Close the box and seal all seams and joints with waterproof tape. Consolidate kit components, which, when packed, have a total net weight in excess of 200 pounds, in wood or plywood containers, as specified in (2) above.

(4) Stowage within compartments or case. When stowage space is provided in the end item equipment case, stow kit items within the designated compartments or case to the extent practicable. Unitize overflow of processed items, if any, in the manner specified herein.

(5) Kit case. Pack each kit, installation, hardware, modification, or tool stowed within a case, as specified in d above.

e. Pack each kit, or quantity of kits, in plywood consolidation insert shipping containers, and block and brace to prevent movement. Apply metallic strapping to the shipping containers subsequent to packing and closure.

f. Apply markings to shipping containers per paragraph 3-5 and MIL-STD-129.

Table 4-1. Preservative Application Criteria

1. Apply preservatives to those metal surfaces on which corrosion in any form (such as oxides, verdigris, or sulphides) would impair the usefulness of the part or assembly.
2. Do not apply preservatives to noncritical metal surfaces which are inherently resistant to corrosion such as:
   a. Copper, nickel, chromium, brass, bronze, or other corrosion-resistant metals and alloys.
   b. Metals plated or coated with chromium, silver, nickel, cadmium, zinc, or tin.
3. Do not apply preservatives to items which are vulnerable to damage by contact preservatives, such as:
   a. Items fabricated from textiles, cordage, plastics, mica, rubber, paper, felts, leather and leather products, or items such as prelubricated bushings.
   b. Certain types of electrical and electronic parts and equipment such as condensers, electrical connectors, distributor rotors, circuit breakers, fuses, switches, resistors, and rectifiers, or items categorized as ESD items.
   c. Items which would suffer damage to mechanism or structure or where malfunctions or unsafe operational conditions would result from application or removal of the preservation compound.
   d. Items protected with solid film lubricants, vitreous or plastic coatings, or prime coats.

4-114. Wire, Cable, and Cord Assemblies

a. *Clean wire*, cable, and cord assemblies using process C-1 and procedure D-4 for drying.

b. Requires no preservative.

c. Accomplish packaging of wire, cable, and cord assemblies as follows:

(1) Assemblies weighing less than 10 pounds. Coil each assembly, when practicable, and cushion TM 746-10 by wrapping in corrugated fiberboard. Place each assembly within a greaseproof, waterproof bag. Close the bag by staples, adhesive, heat sealing, or waterproof tape. Place a quantity of the packaged assemblies within a close-fitting, weather-resistant fiberboard box. Close the box and seal all seams and joints with tape (figure 4-3).

(2) Assemblies weighing 10 pounds or more. Pack each assembly per one of the following requirements:

(a) Assemblies without reels. Wind the assembly uniformly into a coil, insert the connectors in the eye of the coil, or when not practicable, secure to the coil with twine. Ensure diameter of the coil eye is not less than 14 times the diameter of the cable for nonflexing service-type assemblies and not less than eight times the diameter of the cable for flexible, service-type assemblies. Ensure overall coil height to the coil width is as near unity as possible. Tie each coil with twine in three places spaced equidistantly around the circumference of the coil. Insert connectors in a bag fabricated of greaseproof, waterproof material. Secure the bag to the cable with tape. Place assemblies in weather-resistant, single or triple-wall fiberboard boxes, as applicable. Place fiberboard liner fabricated of the same material against the inside walls of the box and butt its ends in the center of the side panel. Support center of the box by a V-shaped fiberboard insert and position inside so the connectors fit between the two legs of the insert, when practicable. Close the box and seal all seams and joints with tape (fig 4-3).

(b) Assemblies on nonstackable reels. Insert connectors in a bag fabricated of greaseproof, waterproof material. Secure the bag to the cable with tape. Wind the assembly uniformly on the reel. Secure the connectors to the reel with locking devices provided. If the reel does not have locking devices, secure the connectors to the reel with twine. Place assemblies in weather-resistant, single or triple-wall fiberboard boxes, as applicable. Place fiberboard liner fabricated of the same material against the inside walls of the box and butt its ends in the center of side panel. Close the box and seal all seams and joints with tape (fig 4-3).

(c) Assemblies on stackable reels. Insert connectors in a bag fabricated of greaseproof, waterproof material. Secure the bag to the cable with tape. Wind the assembly uniformly in the reel. Secure the connectors to the reel with locking devices provided. If the reel does not have locking devices, secure the connectors to the reel with twine. Overwrap each reel assembly with one thickness of weather-resistant, solid fiberboard of

sufficient width to extend the full distance between the reel flanges and sufficient length to overwrap the ends by at least 6 inches. Secure overwrap with two bands of metallic strapping.

(3) Packing. Pack assemblies per one of the following requirements:

(a) *Assemblies weighing less than 10 pounds, assemblies weighing 10 pounds or more without reels, or assemblies on nonstackable reels*. Place each assembly or a quantity of assemblies within plywood consolidation shipping containers and block and brace to prevent movement. Apply strapping to the shipping containers subsequent to packing and closure.

(*b) Assemblies on stackable reels.* Do not repack assemblies that are on stackable reels.

(4) Markings. Apply markings to shipping containers or reels per paragraph 3-5 and MIL-STD-129.

4-115. Photographic Equipment

a. Photographic equipment may be any device consisting of a camera, with or without accessories, film-processing units, motion-picture projector sets, or photographic accessory kits. Equipment may be provided with accessory bags, carrying bags, or cases, or it may be installed in shelters, vans, or semitrailers. Requires no preservative. Examples are KS-15 and AN/TFQ-7.

b. Individually pack each photographic or sight lens without caps by wrapping with lens paper (fig 4-3). Secure the wrap with tape.

c. Perform the following functions, as applicable, to each piece of equipment. Excluded are photographic equipment in cases or installed in shelters, vans, or semitrailers (paras 4-105 and 4-106).

(1) Tighten all screws, knobs, clamps, and ensure that equipment locking devices are engaged.

(2) Coil and secure cord and cable assemblies that are attached to the unit with twine.

(3) Place the running spares, accessories, or tools, as applicable, within the designated spaces provided for in the equipment.

(4) Cushion and wrap each running spare and miscellaneous component (except photographic lens) with cellulosic cushioning material and corrugated fiberboard, and secure with tape. Place the items within a close-fitting, weather-resistant fiberboard box. Fill all void space within the box with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (see fig 4-3).

(5) Wrap each loose photographic lens not provided with lens caps with antitarnish lens tissue and secure with tape. Place the wrapped lenses within the spare parts box.

(6) Cushion all sharp edges, protrusions, switches, slide holders, bayonet mountings, and focusing devices of each component; wrap with corrugated paperboard; and secure with tape.

d. Perform the following functions, as applicable, to camera equipment:

(1) Cushion each camera and accessories within their accessory bags with cellulosic cushioning material. If accessory bags are not provided, cushion and place the items within weather-resistant fiberboard boxes. Close the box and seal all seams and joints with tape (fig 4-3).

(2) Consolidate the camera set, running spares, and accessories, as applicable, within a close-fitting, weather-resistant fiberboard box. Fill all voids with cellulosic cushioning material to prevent movement. When provided, place technical literature on top of the contents under the lid of the box. Close the box and seal all seams and joints with tape (fig 4-3).

e. Package projector equipment as follows:

(1) Projector equipment with protective covers. Replace the protective covers and secure with fasteners provided. Wrap the projector with cellulosic cushioning material and secure with tape. Place each projector and running spares or miscellaneous components, as applicable, within a close fitting, weather-resistant fiberboard box. Fill all void space with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

(2) Projector equipment without protective covers. Wrap each item with corrugated fiberboard and secure with tape. Cushion the item with a double wrap of cellulosic cushioning material. Place the item, together with the running spares and miscellaneous components, as applicable, within a close-fitting, weather-resistant fiberboard box. Fill all void space with cellulosic cushioning material to prevent movement. Close the box and seal all seams and joints with tape (fig 4-3).

f. Perform packing by placing each item, or a quantity of items, in plywood consolidation insert shipping containers, and block and brace to prevent movement. Apply metallic strapping to the shipping containers subsequent to packing and closure.

g. Apply markings to shipping containers per paragraph 3-5.

Section IX. MISSILE EQUIPMENT, MAJOR COMPONENTS

4-116. General

Specific and detailed requirements provided by the U.S. Army Missile Command (MICOM) for missile systems and missile system selected support items take precedence over instructions included in this section.

a. Missile component items (end items and replacement assemblies or parts other than principal items) for the purpose of this section are listed in groups according to their physical/chemical surfaces and configuration. Each group is categorized according to the minimum method of preservation deemed necessary to protect equipment against deterioration for a period of 180 days.

b. The prescribed methods and submethods of preservation will be accomplished in conjunction with the fundamental principles contained in the TM 38-230-series of preservation and packing manuals.

c. Preservation of vehicles, trailers, semi-trailers, and trailer dolliers will be per paragraphs 4-135 and 4-137.

d. All circuit cards and items identified as ESDS items shall be preserved submethod IA-8 and as specified in section XXIII of chapter 5.

4-117. Category I (Submethod IA-14) Missile Component Items

Accelerometer
Accumulator
Actuator
Alignment fixture
Antipropulsion unit
Astig focus unit
Autocollimator
Autopilot
Azimuth laying set
Azimuth orientation unit
Balance unit
Battery unit
Beta decoder
Binary assembly
Bolometer
Camera
Chassis assembly
Compensator
Controller, pressure
Isomodulator
Junction box
Counter assembly
Cursor
Damper
Delay timer
Distributor
Divider
Drive assembly
Electronic components assembly
Elevon assembly
Fan
Fixed memory assembly
Head assembly
Heat exchange
Heatsink assembly
Horn, waveguide
Igniter
Input-output assembly
Interconnecting box
Irradiance set
Register
Relay assembly
Launcher
Limiter, noise
Load cell
Loudspeaker
Magnetron assembly
Matrix assembly
Microwave kit
Modification kit
Network, sensing
Optical assembly
Simulator
Parameter assembly
Parity assembly
Patchboard assembly
Periscope assembly
Photoelectric cell assembly
Pneumatic test set
Power package
Pressurizing unit
Printer assembly
Processor, signal
Projector assembly
Pulse selector
Radar set
Radio set
Radome
Relay, matrix
Ring assembly
Safety and arming device
Scan converter
Seeker section
Self-test assembly
Servomechanism
Servomotor
Shunt
Slip-ring assembly
Speed control
Speedgate
Stabilizer
Switching unit
Telescope assembly
Transformer
Transmission
Trimming assembly
Tube, launcher
Tunnel section
Turbine assembly
Waveguide assembly
Yoke drive assembly
Zeroing assembly

a. Clean category I missile items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five different procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Do not apply contact preservatives to category I missile items.

d. Unit pack items wrapped and cushioned, as required, submethod IA-14 per recommended procedures in TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations is contained inTM 38-230-2.

4-118. Category II (Submethod IA-15) Missile Component Items

Adapter assembly
Adapter, calibration
Add and subtract sub assembly.
Alarm, temperature
Alignment prism
Aligning tool

Amplitude control board
Arming subassembly
Attenuator
Azimuth control
Azimuth ring
Backplane assembly
Bath, calibration
Bias assembly
Blanker, video
Board, null detector
Brake assembly
Brakeshoe
Bridge, voltage
Buffer, board
Cable assembly
Carburetor
Carrier pen assembly
Cell kit
Coil
Component board
Control assembly
Core assembly
Coupler
Crystal unit
Delay line
Doppler
Electronic switch
Filter assembly
Footpad assembly
Galvanometer
Gate, electronic
Gimbal assembly
Headset assembly
Heater
Indicator
Input assembly
Installation kit
Insulator
Intensifier
Interrupter, fire
Isolator
Kit, cold weather
Lead, electrical
Level assembly
Light assembly
Light switch
Magneto, ignition
Manifold assembly
Manometer
Measurement system
Meter
Mirror assembly
Module assembly
Multimeter
Parts kit
Plotting line
Preselector assembly
Pressure tester
Printed circuit board
Printed wiring assembly
Prism
Probe assembly
Program board assembly
Puller kit
Rack, electrical group
Radiac set
Radio frequency head
Radiometer
Rectifier assembly
Reflector assembly
Regulator, pressure
Resistor assembly
Rotary selector assembly
Selector, firing
Sensor assembly
Sight
Solenoid
Starter
Switch assembly
Thermal isolator
Timer
Velocity control
Voltage regulator
Voltmeter
Winterization kit
Wiring harness

a. Clean category II missile items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five difference procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Do not apply contact preservatives to category II missile items.

d. Unit pack items wrapped and cushioned, as required, submethod IA-15 per procedures in TM 38-230-1.

e. Accomplish packing by packing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38230-2.

4-119. Category III (Submethod IIb) Missile Component Items

AC/DC range unit
Amplifier
Analyzer
Box, distribution
Calibrator
Card reader
Coder
Comparator
Computer
Control, test programmer
Converter
Decoder
Demodulator
Detector
Discriminator
Display module
Distribution box
Duplexer
Firing box
Flight control group
Generator
Guidance section, GM
Gyroscope
Infrared assembly
Instrument assembly
Integrator
Intercommunication station
Inverter
Klystron tube
Lamp driver
Line receiver
Limiter-converter
Logic assembly
Memory unit
Mixer
Modulator
Monitor
Monitoring system
Multiplier
Multivibrator
Null detector assembly
Operator control assembly
Oscillator
Oscilloscope
Oven assembly
Power supply
Power takeoff
Preamplifier
Programmer
Programmer test station
Ranging unit
Rate table assembly
Reader, punched tape
Receiver, signal
Recorder, data
Recorder, readout
Rocket motor
Scanner
Sequencer
Signal generator
Slant range
Synchronizer
Tape reader
Tester assembly
Test set
Theodolite
Tracking unit
Transducer
Transmitter
Transponder
Traversing unit
Tuner

a. Clean category III items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five different procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Do not apply contact preservatives to category III missile items.

d. Unit pack items wrapped and cushioned, as required, submethod IIB per procedures in TM 38-230-1.

e. Accomplish packing by packing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2.

4-120. Category IV (Method III) Missile Component Items

Air conditioner	Hood assembly
Air extractor	Housing assembly
Air vane	Jet vane
Ammeter	Lanyard
Antenna	Linkage
Backlight	Louver, metal
Barricade assembly	Mast
Barometer	Nitrogen tank
Beam, hoisting	Nose assembly
Blanket, electric	Nozzle
Body section, GM	Pallet
Bore brush	Panel, reflector
Cabinet	Rack, storage
Cable and reel assemblies	Reel, cable
Canopy assembly	Reeling machine, cable
Case	Seat, individual
Chair	Shell, body
Compressor	Shield, launcher
Container	Skin assembly
Control surface	Sling assembly
Cooler	Stabilizer platform
Cover	Suspension assembly
Door	Tank assembly
Fin assembly	Tool box
Gauge, pressure	

a. Clean category IV items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five different procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Do not apply contact preservatives to category IV missile items.

d. Unit pack items wrapped and cushioned, as required, method III per the procedures in TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2.

4-121. Category V (Method I, P-19) Missile Component Items

Anchor assembly	Handle assembly
Antenna platform	Holder assembly
Armature, motor	Leg, tripod
Arm, launcher erecting	Mounting base
Arm, towbar	Mount, tripod
Bar, support	Pedestal
Base, cable mast	Platform
Blade assembly	Rail section assembly
Block, torque	Shaft assembly
Boom assembly	Shock absorber
Box, battery storage	Structure assembly
Bracket	Towbar assembly
Bumper assembly	Track
Frame assembly	Tripod
Guide rail assembly	Valve assembly

a. Clean category V items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five different procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Apply P-19 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. Preservatives will not be applied to surfaces of parts or assemblies which are protected with solid film lubricants, plastic coatings, prime coated, or painted; or which are vulnerable to damage by contact preservatives. All items that have had exterior surfaces coated with preservative oil require a wrap of greaseproof barrier material or should be placed directly into a greaseproof bag.

d. Unit pack items, preserved with P-19, wrapped and cushioned, as required, method I per recommended procedures in TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2.

4-122. Category VI (Method I, P11) Missile Component Items

Axle assembly	Harness, lift
Bearing	Hoist
Bearing housing	Hub assembly
Crank, hand	Jack assembly
Dolly assembly	Roller assembly
Gear assembly	Slide assembly
Gearcase, motor	Sprocket assembly
Handwheel assembly	

a. Clean category VI items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of five different procedures defined in TM 38-230-1 provided the item will not be damaged by the procedure.

c. Apply P-11 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. All items that have had exterior surfaces coated with a preservative require a wrap of greaseproof barrier material, or they should be placed directly into a greaseproof bag. Wraps should be secured with tape.

d. Unit pack items, preserved with P-11, wrapped and cushioned, as required, method I per recommended procedures of TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2.

4-123. Category VII (Submethod IId) Missile Component Items

Antenna receiver	Shop equipment
Battery control	Simulator station
Director station	Test equipment
Operations station	Test station
Programmer test station	Tracking station

a. Clean category VII missile items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by procedure D-4 as defined in TM 38-230-1.

c. Apply P-10 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. Preservatives will not be applied to the surfaces of parts or assemblies which are protected with solid film lubricants or plastic coatings, prime coated or painted, or are vulnerable to damage by contact preservatives. All items having their exterior surfaces coated with a preservative require a wrap of greaseproof barrier material. Wraps should be secured with tape.

d. Package category VII items mounted in shelter and van-type trucks and trailers submethod IId per the following instructions and guidelines:

(1) Completely immobilize all miscellaneous carried equipment using provided locking or securing devices. Place cabinet doors, drawers, and trays provided with locking devices in locked position and secure with filament reinforced tape. Apply tape with sufficient tension to ensure adherence and, where practical, interlace between locking devices. Place all operating controls in an OFF or NEUTRAL position.

(2) Place the equipment in controlled humidity shelters or vans. To provide this control, the shelter or van must be a completely sealed unit with the port entry of the free breather the only opening allowing the entry or exit of air. When the above has been accomplished, the free breather assembly is ready for installation (fig 4-14 and 4-15).

(3) Because a standard adapter plate has not been provided, fabricate plate, by required size, according to selected application. Sheet metal may be used for the plate fabrication. The 3-inch outside dimension hole should be centered on the plate as shown in figures 4-14 and 4-15. Figure 4-15 shows one type of adapter plate that is commonly use for the breather installation. Drill a hole into the adapter panel (fig 4-15) and insert a four-spot humidity indicator, NSN 6685-00-618-1822. Secure the adapter plate at the selected ports using available means for securing. Seal the plate using rubber gasket material, NS 8030-00-682-6422, (see fig 4-15).

(4) Fabricate and install breather assembly as follows:

(a) The breather drum (fig 4-14) should be located on the floor of the shelter near the wall vent. Secure drum to floor with metallic or nonmetallic strapping or any suitable blocking material available.

(b) Attach the hose (fig 4-14) to breather drum and wall vent; secure with clamps. (THE NEXT TWO STEPS SHOULD BE PERFORMED WITH THE DOOR OF THE SHELTER CLOSED.

(c) Charge the breather drum, with bulk desiccant (MIL-D-3716) in the drum bag; close the drum; and secure the lid with the locking ring.

(d) Fill desiccant sleeves for the static load with an equal amount of desiccant as required in MIL-D-3464. Suspend the sleeves above the load equally distributed through the length of the shelter or van.

(e) Using tape, secure a three-spot humidity indicator, MS 20003-2, to a piece of barrier material (either MIL-B-121 or MIL-B-131) and tape to the inside of the main entry door. The barrier material will be at least one-half inch larger on all sides than the indicator card and will be taped to the entry door so it is between the door and the indicator card.

(f) Secure the main door with tape according to MIL-STD-22085 or caulk all door seams using caulk with NSN 8030-00-682-6422.

(5) Crate the shelter in order to provide physical protection. Fabricate the crate by following

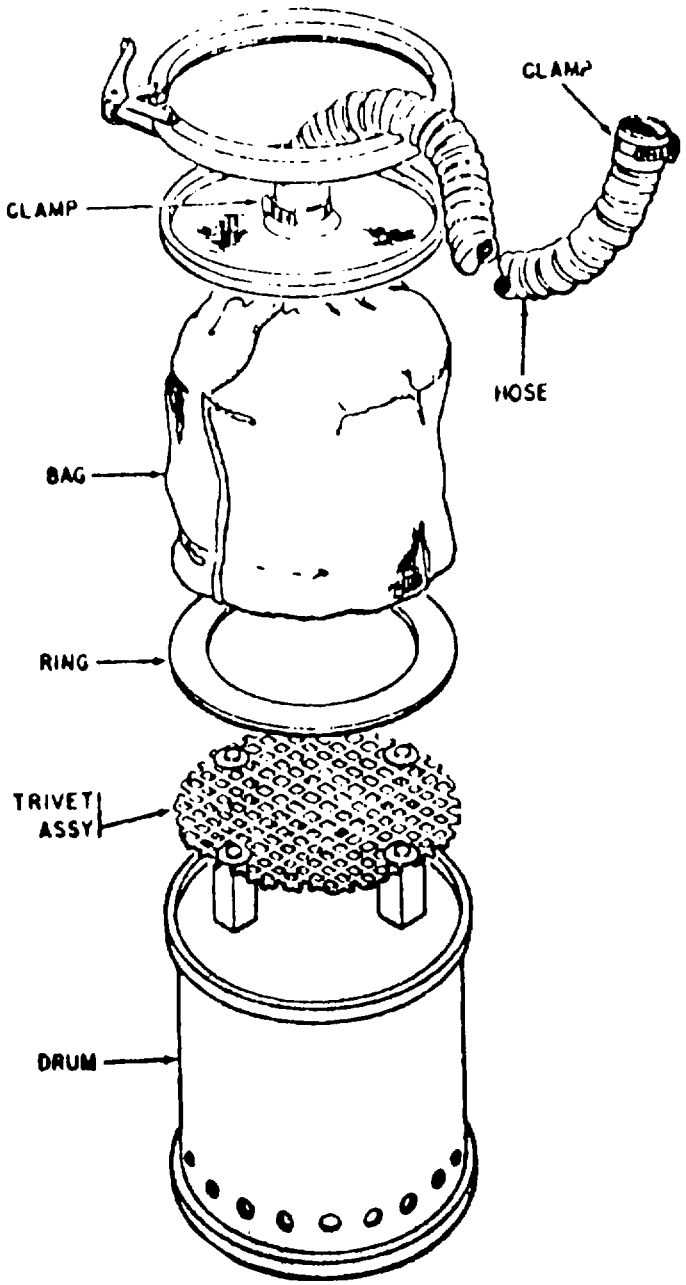


Figure 4-14. Breather Assembly-Exploded View.

instructions in TM 38-230-2 for a type I (nailed) skid base. The crate, when fully assembled, is 204 inches by 97 inches by 92 inches. Position the shelter on the crate base and secure it, using suitable securing means. Wood blocking, secured to the base along the sides and ends, normally provides sufficient securement. Assemble the crate panels to the base. Using cement-coated nails, 16d, follow instructions provided in TM 38-230-2 for assembly of the crate.

(6) Apply markings to the crate per paragraph 3-5. Apply special markings as follows and as directed by appropriate authority. Stencil on main door: "HUMIDITY INDICATOR ATTACHED TO INSIDE OF DOOR." Secure tag or label to main entry door stating: "THIS EQUIPMENT PRESERVED WITH A 3-INCH FREE BREATHING PORT THROUGH A DESICCANT BED. FOR STORAGE OR RESHIPMENT THE HUMIDITY INDICATOR WILL BE INSPECTED AND, IF NECESSARY, THE DESICCANT REPLACED."

(7) Complete log book, preparation instruction sheets, and other required forms; place inside a watervaporproof bag; and secure to the container

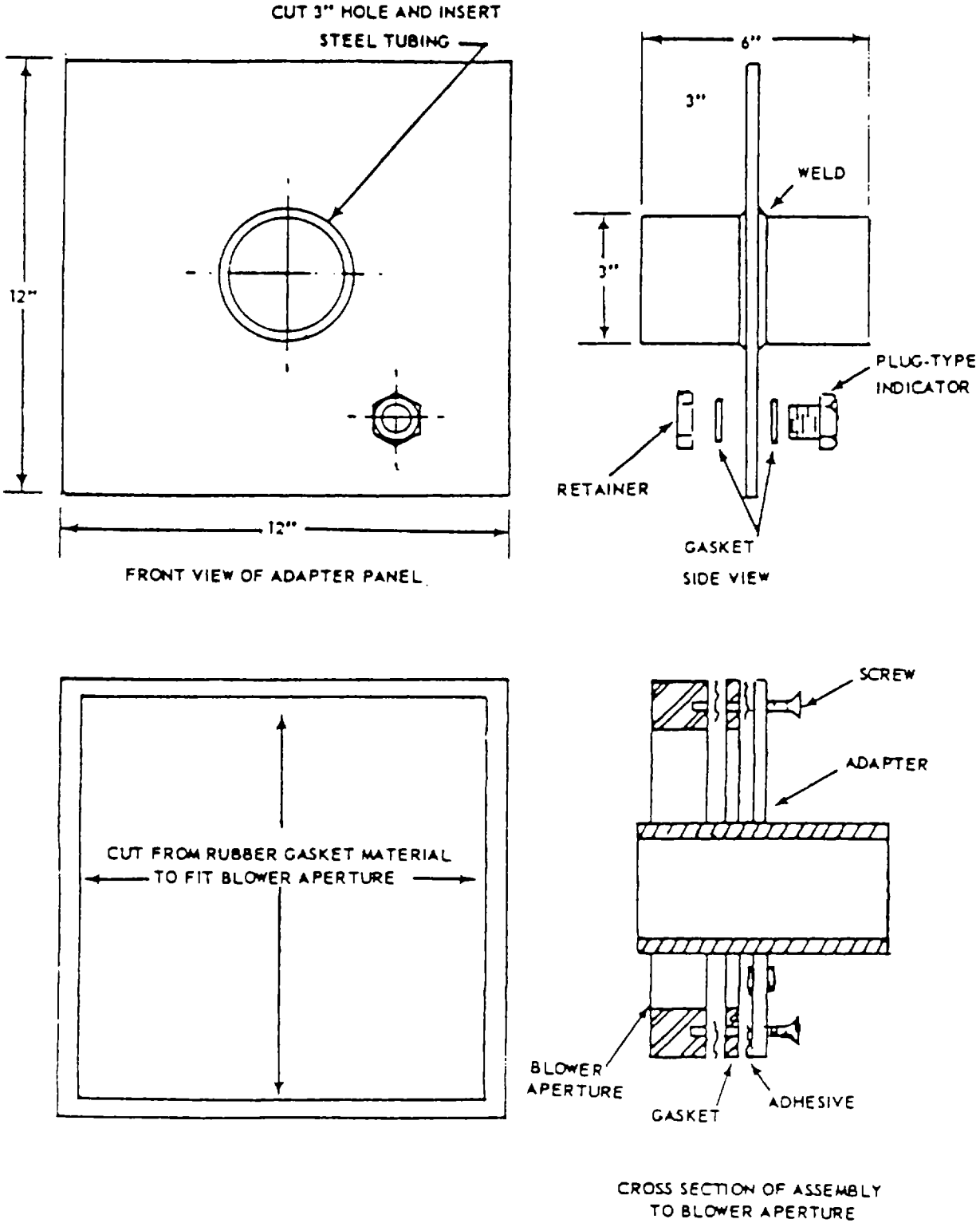


Figure 4-15. Adapter Panel for Breather Assembly.

or equipment in a conspicuous location.

(8) Prior to reactivation of category VII missile items, follow deprocessing action in reverse of the procedures stated above. Responsible personnel will inventory all BII, and, where appropriate, submit shortage reports to the national inventory control point (NICP). Retain the free breather assembly for subsequent shipments.

4-124. Category VIII (Submethod lib) Missile Component Items

Accessory kit	Fault locator
Alignment set	Firing device
Azimuth laying set	Interconnecting group
Console, assault	Launcher rocket subsystems
Control box	Modification kit
Control indicator	Simulator
Control S-58 simulator	Test box
Control set	Test equipment
Conversion kit	Test kit
Data converter	Test set
Detector radio	

a. Clean category VIII items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, when required, immediately after cleaning by procedure D-4 as defined in TM 38-230-1.

c. Apply P-10 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. Preservatives will not be applied to the surfaces of parts or assemblies which are protected with solid film lubricants or plastic coatings, prime coated or painted, or are vulnerable to damage by contact preservatives. All items that have had exterior surfaces coated with preservatives require a wrap of greaseproof barrier material. Wraps should be secured with tape.

d. As required, unit pack missile items, wrapped and cushioned, submethod IIb per recommended procedures in TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into an exterior container. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2.

4-125. Category IX (Method I, P-2) Missile Component Items

Antenna mast	Kit boom
Antenna receiver	Kit torque
Cable sets	Pallet loading
Cart assembly	Rack loading
Charger battery	Radar
Cradle assembly	Rail launching
Display set	Ramp set
Dolly set	Starter assembly
Filler hydraulic	Test stand
Gas servicing	Tie-down unit
Handling unit	Training set
Hoisting unit	Truck body section
Jack set	Truck nose section

a. Clean category IX items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, when required, immediately after cleaning by procedure D-4 or D-5 as defined in TM 38-230-1.

c. Apply P-2 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. Preservatives will not be applied to the surfaces of parts or assemblies which are protected with solid film lubricants or plastic coatings, prime coated or painted, or are vulnerable to damage by contact preservatives.

d. Unit pack items method I per recommended procedures in TM 38-230-1.

e. Accomplish packing by placing a quantity of unit packed components into a wood or plywood box. Guidance in box fabrication, cushioning, blocking, bracing, strapping, and weight limitations for the box is contained in TM 38-230-2

Section X. MISSILE EQUIPMENT, MAJOR ITEMS

4-126. General

Specific and detailed requirements provided by MICOM for missile systems and missile selected support items take precedence over instructions included in this section.

a. Listings of major missile items and ancillary missile equipment include both mounted and unmounted items, in some instances, identified by similar generic nomenclature.

b. Selection of the appropriate submethod for application of basic method II preservation will be per procedures outlined in TM 38-230-1 and paragraph 4-123 herein.

c. Guidelines for preservation and processing of vehicles and vehicle chassis are contained in paragraphs 4-135 and 4-137.

d. Circuit cards and ESDS items shall be preserved submethod IA-8 and as specified in section XXIII of chapter 5.

4-127. Ancillary Equipment

Accessory kit
Alignment set
Antenna mast
Azimuth laying
Azimuth set
Battery control
Blanket
Cable
Cable set
Cart assembly
Charger battery
Console
Control box
Control central
Control indicator
Control set
Conversion kit
Cradle
Data converter
Ramp set
Rotary launcher
Servicing unit
Shop equipment
Shop set
Simulator
Simulator group
Starter assembly
Detector radio
Display set
Distribution set
Dolly
Electronic equipment
Fault locator
Filler hydraulic
Firing device
Hoisting unit
Interconnecting group
Jack set
Kit boom
Kit torque
Launcher
Launcher monorail
Main assemblies
Modification kit
Rack loading
Rail launching
Test box
Test equipment
Test kit
Test set
Test stand
Test station
Training set
Truck

4-128. Unmounted Equipment

Programmer
Shop equipment
Test kit
Test kit

4-129. Mounted Equipment

Acquisition radar
Antenna-receiver
Cable
Carrier
Control central
Data processing
Director station
Electronics shop
Handling unit
Intercept aerial
Packaging shop
Pallet
Radar
Radar set
Semitrailer
Shop equipment
Simulator station
Supply office
Test equipment
Test station
Launcher
Launching control
Launching station
Loader
Mobility kit
Operations station
Tie-down unit
Tracking station
Trailer
Trailer rocket
Truck

4-130. Preservation and Packing

a. Clean equipment per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by procedure D-4 or D-5.

c. Apply P-10 to those metal surfaces on which corrosion in any form would impair the usefulness of the part or assembly. Preservatives will not be applied to the surfaces of parts or assemblies which are protected with solid film lubricants or assemblies which are protected with solid film lubricants or plastic coatings, prime coated or painted, or are vulnerable to damage by contact preservatives.

d. Package mounted or unmounted equipment cited in this section per guidance in TM 38-230-1 and paragraph 4-123 herein for the selected submethod II preservation.

(1) Completely immobilize all miscellaneous carried equipment using provided locking or securing devices. Place cabinet doors, drawers, and trays provided with locking devices in lock position and secure with filament reinforced tape. Apply tape with sufficient tension to ensure adherence, and, where practical, interlace between locking devices. Place operating controls in an OFF or NEUTRAL position.

(2) Install missile electronic equipment in controlled humidity shelters or vans. To provide this control, the shelter or van must be a completely sealed unit with the port entry of the free breather the only opening allowing the entry or exit of air. When the above has been accomplished, the free breather assembly is ready for installation (fig 4-14 and 4-15).

(3) For fabrication and installation of the free breather system refer to paragraphs 4-123d(2) through 4-123d(7).

Section XI. AIRCRAFT AND AIRCRAFT ITEMS

4-131. General

a. The preservation and packing guidance furnished in this section is applicable to aircraft items categorized under a generic nomenclature. TMs 38-230-1 and -2 should be used for guidance in preserving and packing all items. Volume I (38-230-1) provides guidance for preservation, and Volume II (38-230-2) contains approved packing procedures. Unit and intermediate containers will be considered as exterior containers unless packing is specified for the item.

b. Marking will be per paragraph 3-5 and MIL-STD-129. For the items in this section, each unit container shall have an appropriate materiel condition code tag or label attached in addition to the labeling called for in paragraph 3-5.

c. The minimum requirements for materiel condition tags or labels are one tag/label on the item and one tag/label on the shipping container. If more than one like item is packaged in a single container, each item will be labeled or tagged.

d. Preservation, packing, and marking for serviceable retrograde materiel; serviceable materiel to be recycled; and unserviceable, economically reparable, retrograde materiel will be the same except that unserviceable materiel will include a "condition code F" marking.

4-132. Packaging Instructions, Aircraft

Refer to the publications or instructions listed in table 4-2 for preparation of whole aircraft for shipment and storage. These publications or instructions provide guidance for preparing each type of aircraft for all types of shipment and storage. In those instances where referenced publications are not listed, special instructions, as indicated, are provided by the NICP.

Table 4-2. Packaging Instructions

Model	NSN	Preparation for shipment	Preparation for storage
AH-1E	1520-01-192-2478	TM 55-1500-339-S	TM 55-1520-236-23-3 appendix E
AH-1F	1520-01-168-4260	TM 55-1500-339-S	TM 55-1520-236-23-3 appendix E
AH-1G	1520-00-999-9821	TM 55-1500-339-S	NICP INSTRUCTION
AH-1P	1520-01-168-4259	TM 55-1500-339-S	TM 55-1520-236-23-3 appendix E
AH-1S	1520-00-504-9112	TM 55-1500-339-S	TM 55-1520-234-23-2 appendix E
AH-64	1520-01-106-9512	TM 55-1520-238-S	TM 55-1520-238-23-7 appendix E
C-12A	1510-01-005-5461	NICP INSTRUCTION	NICP INSTRUCTION
C-12C	1510-01-070-3661	NICP INSTRUCTION	NICP INSTRUCTION
C-12D	1510-01-087-9129	NICP INSTRUCTION	NICP INSTRUCTION
C-12F	1510-01-235-5840	NICP INSTRUCTION	NICP INSTRUCTION
CH-47A	1520-00-633-6836	TM 55-1520-241-S	NICP INSTRUCTION
CH-47B	1520-00-990-2941	TM 55-1520-241-S	TM 55-1520-227-23-5 appendix E
CH-47C	1520-00-871-7308	TM 55-1520-241-S	TM 55-1520-227-23-5 appendix E
CH-47D	1520-01-088-3669	TM 55-1520-241-S	TM 55-1520-240-23-1 chapter 1
CH-54A	1520-00-964-9601	TM 55-1520-217-S	TM 55-1520-217-23-1-3 appendix E
CH-54B	1520-00-113-5776	TM 55-1520-217-S	TM 55-1520-217-23-2-3 appendix E
EH-1H	1520-00-368-8442	TM 55-1520-242-S	TM 55-1520-210-23-3 appendix E
EH-1X	1520-01-042-9396	TM 55-1520-242-S	TM 55-1520-210-23-3 appendix E
EH-60A	1520-01-082-0686	TM 55-1520-237-S	TM 55-1520-237-23-4
OH-6A	1520-00-918-1523	TM 55-1520-214-S	TM 55-1520-214-23 appendix E
OH-58A	1520-00-169-7137	TM 55-1500-338-S	TM 55-1520-228-23 appendix E
OH-58C	1520-01-020-4216	TM 55-1500-338-S	TM 55-1520-228-23 appendix E
OH-58D	1520-01-125-5476	TM 55-1520-248-S	TM 55-1520-248-23-6 appendix E
OV-1B	1510-00-715-9379	TM 55-1510-217-S	TM 55-1510-204-23-4 appendix E
OV-1C	1510-00-715-9380	TM 55-1510-217-S	TM 55-1510-204-23-4 appendix E
OV-1D	1510-00-869-3654	TM 55-1510-217-S	TM 55-1510-213-23-3 appendix E
RU-21A	1510-00-587-3375	TM 55-1510-200-S	TM 55-1510-209-23-2 appendix E
RU-21B	1510-00-878-4338	TM 55-1510-220-S	TM 55-1510-214-23 appendix E
RU-21C	1510-00-878-4336	TM 55-1510-200-S	TM 55-1510-214-23 appendix E
RU-21D	1510-00-804-3641	TM 55-1510-200-S	TM 55-1510-209-23-2 appendix E
RU-21E	1510-00-453-9451	TM 55-1510-200-S	TM 55-1510-215-23-2 appendix E
RU-21H	1510-00-394-3320	TM 55-1510-200-S	NICP INSTRUCTION
RU-21J	1510-00-124-0914	NICP INSTRUCTION	NICP INSTRUCTION
RV-1C	1510-00-434-8983	TM 55-1510-217-S	TM 55-1510-204-23-4 appendix E
RV-1D	1510-00-368-8440	TM 55-1510-217-S	TM 55-1510-213-23-3 appendix E
T-41B	1510-00-929-1012	NICP INSTRUCTION	NICP INSTRUCTION
T-42A	1510-00-872-7908	NICP INSTRUCTION	NICP INSTRUCTION
TH-1G	1520-00-804-3635	TM 55-1500-339-S	NICP INSTRUCTION
TH-55A	1520-00-758-0289	NICP INSTRUCTION	NICP INSTRUCTION
U-3A	1510-00-033-6312	NICP INSTRUCTION	NICP INSTRUCTION
U-3B	1510-00-024-5063	NICP INSTRUCTION	NICP INSTRUCTION
U-8D	1510-00-574-7938	TM 55-1510-201-S	TM 55-1510-201-20 chapter 16
U-8F	1510-00-701-2233	TM 55-1510-201-S	TM 55-1510-201-20 chapter 16
U-8G	1510-00-912-4084	TM 55-1510-201-S	TM 55-1510-201-20 chapter 16
U-1OA	1510-00-964-9780	NICP INSTRUCTION	NICP INSTRUCTION
U-21A	1510-00-933-8223	TM 55-1510-200-S	TM 55-1510-209-23-2 appendix E

Table 4-2. Packaging Instructions-Continued

Model	NSN	Preparation for shipment	Preparation for storage
U-21G	1510-00-169-0295	TM 55-1510-200-S	TM 55-1510-215-23-2 appendix E
U-21F	1510-00-140-1627	TM 55-1510-200-S	TM 55-1510-215-23-2 appendix E
UH-1B	1520-00-713-9912	TM 55-1520-242-S	NICP INSTRUCTION
UH-1D	1520-00-859-2670	TM 55-1520-242-S	TM 55-1520-210-23-3 appendix E
UH-1H	1520-00-087-7637	TM 55-1520-242-S	TM 55-1520-210-23-3 appendix E
UH-1M	1520-00-809-2631	TM 55-1520-242-S	TM 55-1520-220-23-3 appendix E
UH-1V	1520-01-0434949	TM-55-1520-242-S	TM 55-1520-210-23-3 appendix E
UH-60A	1520-01-035-0266	TM 55-1520-237-S	TM 55-1520-237-23-4
UV-18A	1510-01-011-1462	NICP INSTRUCTION	NICP INSTRUCTION
UV-20A	1510-01-079-3915	NICP INSTRUCTION	NICP INSTRUCTION

4-133. Packaging Aircraft Major Components

a. Absorbers.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Package method I. Place item in an overseas-type plywood box using wood blocking and bracing that has been padded with bound fiber material to prevent damage from movement in handling and shipment.

b. Actuators, actuator cylinders, and servo cylinders.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap in greaseproof barrier material, and secure with tape. If the item contains hydraulic fluid, drain fluid, plug or cap all openings, and attach a warning tag stating that item does not contain operating fluid.

(2) If the item is mechanically or electromechanically operated, wrap in greaseproof barrier material and secure with tape.

(3) Package hydraulic items submethod A-5. If a suitable metal container is not available, unit pack the item submethod IC-1. Cushion with cellulosic cushioning material to prevent damage to the barrier material

(4) Place one each submethod IC-1 package weighing less than 25 pounds and not exceeding 1 cubic foot with no dimension greater than 16 inches in a weather-resistant fiberboard box. Place one each submethod IC-1 pack exceeding any of these dimensions and weight limitations in an overseas-type plywood box. Cushion submethod IC-1 packs in a fiberboard or plywood box with sufficient bound fiber material to prevent movement and protect the item from shock.

(5) Package electromechanical or mechanical items submethod IId using bound fiber cushioning pads. Insulate the desiccant from the item with greaseproof barrier material. If suitable metal containers are not available, unit pack the items submethod IIc. Place one submethod IIc package weighing less than 25 pounds and not exceeding 1 cubic foot with no dimension greater than 16 inches in a weather-resistant fiberboard box. Place one submethod IIc unit pack exceeding any of these dimensions and weight limitations in an overseas-type plywood box. Cushion submethod IIc unit packs in a fiberboard or plywood box with bound fiber material to prevent movement and protect against shock.

c. Adapters.

(1) Apply P-2 to bare, exposed, and uncoated, metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a weather-resistant fiberboard box and cushion with bound fiber material to prevent damage from movement in handling and shipment.

(3) Pack a number of unit packed items in an overseas-type plywood box. Block and brace to prevent damage from movement and shipment.

d. Aircraft, airfan, structural components, struts, trim tabs and jacks, doors, cowling, pods, and firewalls.

(1) Apply P-2 to bare, exposed, and unpainted surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place items that do not require containers with any dimension greater than 16 inches and not exceeding 25 pounds in a weather-resistant fiberboard box. Cushion with bound fiber material. Place larger items that fit in a container of no more than 9-inch depth (inside measurement) and not exceeding 40 pounds in a shallow box of wood and plywood. Pack items exceeding the above weight and dimension limitations in an overseas-type plywood box.

(3) Pack a number of unit packed items in fiberboard in an overseas-type plywood box.

e. Air filters.

(1) Unit pack method III. Wrap item in greaseproof barrier material and place in a fiberboard box.

(2) Pack a number of unit packed items in an overseas-type plywood box.

f. Amplifiers, meters, etc.

(1) Unit pack submethod IIb. Cushion any protrusions with cellulosic material, wrap with greaseproof barrier material, and secure with tape. Place item in a fiberboard box and cushion top, bottom, and sides with sufficient bound fiber material to protect item from movement and shock. Position proper amount of desiccant. Enclose box in a heat-sealed bag of watervaporproof barrier material. Place sealed bag in a fiberboard box.

(2) Pack a number of unit packed items in an overseas-type plywood box.

g. Bearings, antifriction.

(1) Coat with P-2, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IA-8. Place wrapped and cushioned item in watervaporproof bag and heat seal.

(3) Pack a number of unit packed items in an overseas-type plywood box.

h. Bell cranks.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a weather-resistant fiberboard box. Cushion with bound fiber material to prevent damage from movement in handling and shipment.

(3) Pack a number of unit packed items in an overseas-type plywood box.

i. Boots deicer.

(1) Unit pack method III in a fiberboard box.

(2) Pack a number of unit packed items in an overseas-type plywood box.

j. Brakes, main rotor, magnetic and hydraulic.

(1) Unit pack submethod IIe. Wrap item in greaseproof barrier material. Cushion with cellulosic material. Place in heat sealed bag of watervaporproof barrier material. Insert proper amount of desiccant in bag before heat sealing. Place bagged item in a fiberboard box.

(2) Pack a number of unit packed items in an overseas-type plywood box.

k. Carburetors.

(1) Fill with P-10 and drain. Unit pack submethod IId. Place item in reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Use proper amount of desiccant.

(2) If reusable metal container is not available, unit pack submethod IIc. Place item in watervaporproof barrier material and heat seal. Put bagged item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

l. Carburetor parts, miscellaneous.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape. Place wrapped item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient cellulosic or bound fiber material to prevent damage from shock or shipment.

(2) Pack a number of unit packed items in an overseas-type plywood box.

m. Clutches.

(1) Flush item with operating fluid and drain.

Cap or plug all openings. Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or shipment. Insert proper amount of desiccant before sealing reusable metal container.

n. Clutch shoe assemblies.

(1) Unit pack method III. Wrap item in greaseproof barrier material and secure with tape.

(2) Place item in a fiberboard box and cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or shipment.

(3) Pack a number of unit packed items in an overseas-type plywood box.

o. Compressors, turbine engines.

(1) Wrap item in greaseproof barrier material and secure with tape.

(2) Unit pack submethod IId. Place item in reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or shipment. Insert proper amount of desiccant before sealing container.

p. Connecting links.

(1) Unit pack submethod IA-8. Wrap item in greaseproof barrier material and secure with tape. Place item in a bag of watervaporproof barrier material. Heat seal bag and place in fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or shipment.

(2) Pack a number of unit packed items in an overseas-type plywood box.

q. Control surfaces and flaps.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in plywood box. Block and brace with wood, as needed, and

cushion at blocking and bracing points with sufficient bound fiber material to prevent damage from shock or shipment.

r. Coolers and heat exchangers.

(1) Apply P-10 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape. Plug or seal all openings.

(2) Unit pack method I in an overseas-type plywood box. Block and brace with wood, as needed, and cushion at blocking and bracing points with sufficient bound fiber material to prevent damage from shock or shipment.

s. Cuff and trunnion assemblies.

(1) Unit pack submethod IC-1. Place in bag made of greaseproof barrier material and heat seal bag.

(2) Pack a number of unit packed items in an overseas-type plywood box.

t. Cylinder and piston assembly.

(1) Spray or coat assembly with P-10, wrap with waterproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Place assembly in reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Use proper amount of desiccant.

u. Cylinder, hydraulic.

(1) Preserve with operating fluid, wrap in greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IA-8. Place item in watervaporproof barrier material bag. Heat seal bag and place in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Secure box with tape.

(3) Pack a number of unit packed items in an overseas-type plywood box.

v. Dampeners and damper assemblies.

(1) Do not remove operating fluid. Plug, cap, or seal all openings. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap coated areas with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IA-5. Place item in applicable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. If metal container is not available, place item in a fiberboard box and cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

(3) If item is unit packed in a fiberboard box, place a number of fiberboard boxes in a plywood shipping container.

w. Drive shaft.

(1) Apply P-2 to all bare and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Insulate item from cushioning with greaseproof barrier material

(3) If suitable metal container is not available, unit pack submethod IA-8. Seal item in bag of watervaporproof barrier material and place in plywood container. Use wood blocking and bracing to prevent damage from movement and shock.

x. Ducts.

(1) Unit pack method III. Wrap item with greaseproof barrier material and secure with tape. Place item in weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

(2) Pack a number of unit packed items in an overseas-type plywood box.

y. Electrical control equipment.

(1) Unit pack method IIc. Wrap item with greaseproof barrier material. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Place item in a heat sealed bag of watervaporproof barrier material.

(2) Pack a number of bagged items in an overseas-type plywood box.

z. Empennages and fairings.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Pack items that do not require a container with any dimension greater than 16 inches and weight not exceeding 25 pounds in a fiberboard box. Cushion the top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Pack larger items that do not exceed 40 pounds in weight and will properly fit in a 9-inch deep container in a shallow wood box with plywood top and bottom. Pack items exceeding the above weight and dimension limitations in a plywood box.

aa. Engine exhaust system.

(1) Wrap with greaseproof barrier material and secure with tape. Pad sharp edges having protuberances with cellulosic cushioning material.

Pack items that can be fitted in a container with no dimension greater than 16 inches in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage

from shock or movement. Pack larger items that properly fit in a container of no more than 9-inch depth in a shallow box of plywood and wood. Pack other items in an overseas-type plywood box.

(2) Place a number of unit packed items in an overseas-type plywood box.

ab. Engine mounts, pedestals, etc.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces. Wrap preserved areas with greaseproof barrier material and secure with tape.

(2) Unit pack method I in an overseas-type plywood box. Secure item with wood blocking and bracing to prevent damage from shock or movement. Cushion blocking and bracing contact points with polyethylene foam.

ac. Engine, aircraft, reciprocating.

(1) Unit pack method II. Spray the crankcase with corrosion-preventive compound MIL-C-6529, type II. Remove rocker covers and spray rocker arms and push rods with MIL-C-6529, type II. Spray MIL-C-6529, type II into the interior of each cylinder through spark plug openings. If possible, rotate crankshaft four times while spraying each cylinder. Spray each cylinder again, as is, without moving crankshaft. Clean and reinstall rocker box covers and drain plugs. Apply corrosion-preventive compound P-2 to all machined surfaces such as power shaft, accessory drives, and threaded surfaces. Wrap or cover surfaces coated with the preservative compound with watervaporproof barrier material and secure with tape. Spray all inlet and exhaust openings with MIL-C-6529, type II. Seal all openings to engine using caps, plugs, blanks or tape, as necessary.

Flush fuel system (carburetor, fuel lines, fuel pumps, and injectors) with lubricating oil, MIL-L-6081, grade 1010. Seal all openings, as necessary.

(2) Unit pack submethod IId. Place engine in applicable container. If applicable, place fuel system components in appropriate container. Ensure that item is properly cushioned or blocked and braced to prevent movement during shipment. Place correct amount of desiccant in container.

ad. Reciprocating engine, miscellaneous parts.

(1) Unit pack method I. Internally coat item with corrosion-preventive compound MIL-C-6529, type II. Apply P-2 to all exposed, machined and threaded surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Place small items, of less than 10 pounds and with the sum of the width and length less than 42 inches, in a sealed bag. Cushion all sharp edges and protrusions with cellulosic material. Place larger items in a weather-resistant fiberboard box. Cushion top, bottom, and sides with TM 746-10 sufficient bound fiber material to prevent damage from shock or movement.

(3) Pack a number of bagged or boxed items in an overseas-type plywood box.

ae. Engine, aircraft, turbine.

(1) Drain lubricating oil. Flush and drain with fresh lubricating oil. Plug, tape, or cap all lines and openings. Flush fuel control and fuel manifold lines with MIL-L-6081, grade 1010. Plug, cap, or tape all lines and openings. Coat all exposed shafts, splines, and machined surfaces with P-2.

Wrap or cover preserved areas with waterproof barrier material and secure with tape.

(2) Unit pack submethod IId. Place engine in applicable container. If fuel control has been removed and is to be shipped separately, place fuel control in applicable container. Make certain that engine is properly cushioned with necessary blocking and bracing to prevent damage from shock or movement. Position proper amount of dry desiccant in container.

af. Fans.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack fans with electric motors attached submethod IIb. For fans that have no dimension greater than 16 inches or cube not exceeding 1 cubic foot and weighing less than 26 pounds, use weather-resistant fiberboard boxes as the outer container. For fans exceeding these dimensional and weight limitations, use plywood boxes as the outer container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent movement or shock. Unit pack fans without motors attached submethod IA-14, subject to the preceding dimensional and weight limitations.

(3) Place a number of fiberboard boxed unit containers in an overseas-type plywood box.

ag. Filters, screens, and strainers.

(1) Wrap with greaseproof barrier material and secure with tape.

(2) Unit pack method III. Place item in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

(3) Place a number of fiberboard boxes in an overseas-type plywood box.

ah. Fire extinguishers.

(1) Unit pack method III. Wrap in greaseproof barrier material and secure with tape.

(2) Place in an overseas-type plywood box.

Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

ai. Fittings.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and seal with tape.

(2) Unit pack method I. Place wrapped item in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

(3) Place a number of fiberboard boxes in an overseas-type plywood box.

aj. Flight controls.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in fiberboard box and cushion with cellulosic cushioning material.

(3) Place a number of unit packed items in an overseas-type plywood box.

ak. Fuel controls and governors, turbine engines.

(1) Flush internally with MIL-L-6081, grade 1010. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape. Cap, plug, or seal all openings.

(2) Unit pack submethod IId. Place item in applicable reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant within the container.

al. Fuel pumps and lube pumps.

(1) Flush internally with MIL-L-6081, grade 1010. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape. Cap or plug all openings.

(2) Unit pack submethod IId. Place item in applicable reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant within the container.

am. Fuselage panels, cargo ramps, floors, and miscellaneous fuselage parts.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap or cover preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a plywood or wood box. Block and brace with wood. Cushion contact points with bound fiber material. Make sure item is properly secured to prevent damage from shock or movement.

an. Gauges and indicators.

(1) Wrap item with greaseproof barrier material. Pad sharp edges and projections with cellulosic cushioning material

(2) If rigid metal container is available, unit pack submethod IA-5. If rigid metal container is not available, unit pack submethod IC-1. Place wrapped and cushioned item inside of greaseproof, barrier-material bag and heat seal. Place heat sealed bag in fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

(3) Place a number of unit packed items in an overseas-type plywood box.

ao. Gear boxes.

(1) Drain lubricant from transmission. Flush with clean operating fluid. Cap or plug all openings.

(2) Unit pack submethod IId. Secure item in reusable metal container with container-mounted holding devices or firmly cushion top and bottom with molded fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant. If metal container is not available, unit pack submethod IIb. The outer container may be a fiberboard or plywood box.

ap. Generators. Pack item in reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Distribute and secure correct amount of desiccant. If metal container is not available, unit pack submethod IIc. Cushion item with cellulosic material and place in heat sealed bag. Properly position correct amount of desiccant. Place desiccated, sealed bag in a plywood box.

aq. Heaters. Unit pack submethod IA-14. Place item in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Place box in a heat-sealed bag of watervaporproof barrier material. Place box in an overseas-type plywood box.

ar. Hoists and winches.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Pack items weighing 25 pounds or less having no dimension greater than 16 inches and cube not exceeding 1 cubic foot submethod IIb. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant. Seal inner container in a watervaporproof bag and place in a fiberboard box. Pack items that exceed either the weight or dimension requirements submethod IIa. Cap or plug all openings. Place in an overseas-type

plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant.

(3) Place a number of fiberboard boxed items in an overseas-type plywood box.

as. Housing, clutch.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Seal all joints with tape (see fig 4-3).

(3) Place a number of fiberboard boxed items in an overseas-type plywood or wood box.

at. Hydraulic motors and pumps.

(1) Apply P-10 (MIL-C-6529, grade II) to bare, exposed, and uncoated metal surfaces, wrap or cover preserved areas with greaseproof barrier material, and secure with tape. Cap or plug all openings.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.
Place correct amount of desiccant in reusable metal container.

au. Instruments.

(1) Wrap instrument with greaseproof barrier material and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.
Place correct amount of desiccant in reusable metal container.

av. Landing gear and wheels.

(1) Coat any exposed portion of the piston rods with operating fluid. Apply P-2 to all other bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place items that do not have any dimensions larger than 16 inches and weigh less than 25 pounds in a fiberboard box.

Place larger or heavier items in a plywood or wood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

(3) Place a number of fiberboard boxed items in an overseas-type plywood box.

aw. Magnetos. Unit pack submethod IId. Cushion the top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Place correct amount of desiccant in reusable metal container.

ax. Masts.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with waterproof barrier material, and secure with tape.

(2) Unit pack submethod IA-8. Place wrapped item in bag. Cushion with cellulosic material and heat seal bag. Place item in a plywood or wood box (a combination plywood and wood box may be used). Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

ay. Manifold, hydraulic.

(1) Flush manifold with MIL-H-6083 hydraulic fluid. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Place item in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock.

(3) Place a number of fiberboard boxed items in a plywood or wood box.

az. Modular assemblies, hydraulic.

(1) Preserve internally with normal operating fluid. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place preserved and wrapped item in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Seal box with tape (fig 4-4).

(3) Place a number of fiberboard boxed items in an overseas-type plywood or wood box.

ba. Motors, electric. Unit pack submethod IId.
Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant in reusable metal container.

bb. Nozzles, turbine engines, first and second stage.
Pack method III. Use applicable plastic container. If not available, place in a plywood box.
Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

bc. Oxygen equipment, miscellaneous parts.

(1) Unit pack method III. Wrap item with greaseproof barrier material and secure with tape.

Place in fiberboard box. Cushion sufficiently with cellulosic material to prevent damage from movement or shock. Seal box with tape.

(2) Place a number of fiberboard boxed items in an overseas-type plywood or wood box.

bd. Panels, fault and indicating.

(1) Unit pack submethod IA-8. Wrap item with greaseproof barrier material and secure with

tape. Place item in a bag of watervaporproof barrier material. Seal bag and place in weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient cellulosic material to prevent damage from shock or movement. Seal box with tape (fig 4-3).

(2) Place a number of fiberboard boxed items in an overseas-type plywood box.

be. Parachutes and parachute bags.

(1) Unit pack method III. Wrap item with greaseproof barrier material and secure with tape. Place in a fiberboard box. Cushion top, bottom, and sides with sufficient cellulosic material to prevent damage from shock or movement. Seal box with tape (fig 4-3).

(2) Place a number of fiberboard boxed items in an overseas-type plywood or wood box.

bf: Particle separators. Unit pack method III.

Wrap with greaseproof barrier material. Place in an overseas-type plywood box. Use wood blocking and bracing with contact points insulated with polyethylene foam to prevent damage from shock or movement.

bg. Pin, hollow, horizontal.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place preserved and wrapped item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Seal with tape (fig 4-4).

(3) Place a number of unit packed items in an overseas-type plywood box.

bh. Pod, universal, helicopter. Refer to TM 55-1520-217-S for instructions.

bi. Propellers and propeller blades.

(1) Do not remove operating fluid. Do not perform any disassembly unless specifically required due to the nature of available container. Coat all bare, exposed, and uncoated metal surfaces with P-2, wrap preserved areas with waterproof barrier material, and secure with tape. Make sure tape does not contact metal.

(2) If applicable container is available, unit pack submethod IId. Use cushioning or bound fiber material to position item firmly in place to prevent damage from shock or movement. Insulate between cushioning and item with greaseproof barrier material. Distribute and secure correct amount of desiccant. If reusable metal container is not available, unit pack method I. Place preserved and wrapped item in an overseas-type plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Insulate between item and cushioning with greaseproof barrier material.

bj. Propeller parts and accessories.

(1) Do not remove operating fluid. Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with waterproof barrier material, and secure with tape.

(2) Unit pack method I. If applicable reusable container is not available, place item in an overseas-type plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

bk. Pylons.

(1) Apply P-6 to any bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a MIL-C-52950 type III, style B crate. Secure item with wood blocking and bracing. Cushion blocking and bracing contact points with bound fiber cushioning to prevent damage from shock or movement.

bl. Quills.

(1) Flush item with operating fluid and drain. Plug, cap, or tape all openings. Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

Distribute and secure correct amount of desiccant in reusable metal container.

bm. Racks and related parts, aircraft.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Pack a number of unit packed items in an overseas-type plywood box. Secure item with wood blocking and bracing. Cushion blocking and bracing contact points with bound fiber cushioning to prevent damage from shock or movement.

bn. Rotor hubs and heads.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) If applicable metal container is available, unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant in container. If reusable metal container is not available, unit pack submethod IIc. Wrap item with greaseproof barrier material and secure with tape. Cushion all protrusions and sharp edges with cellulosic material. Place item in bag of watervaporproof barrier material. Properly position correct amount

of desiccant and seal the bag. Place sealed bag in an overseas-type plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

bo. Rotor blades, main, and tail.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with waterproof barrier material, and secure with tape.

(2) Unit pack method I in appropriate reusable metal or wood container. Cushion with bound fiber material to prevent damage from shock or movement.

bp. Scissors and sleeves.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in an overseas type plywood box. Cushion with sufficient bound fiber material to prevent damage from shock or movement.

bq. Seats, aircraft.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in an overseas type plywood box. Cushion with sufficient bound fiber material to prevent damage from shock or movement.

br. Shop sets, ground handling, and servicing.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Pack a number of small items in a plywood box. Cushion each item individually from other items with sufficient bound fiber material to prevent damage from shock or movement.

(3) Reduce large items to their smallest cube by minimum disassembly. Attach drain bars and other parts of wheeled items, if removed, to the shop set with metal strapping. Strap items reduced to their smallest cube in that position.

(4) Preserve units powered by gasoline engines such as generators, as specified in paragraph (1) above, and by fogging the fuel tank with preservative oil. Place unit in plywood box and secure with wood blocking and bracing to prevent damage from shock or movement.

(5) Load all units of shop sets in MILVANs for shipment. Block all wheeled items to prevent movement.

bs. Shop sets, neither group handling nor trailer mounted.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Pack a number of small items in a plywood box. Cushion with sufficient bound fiber material to prevent damage from shock or movement. Protect the lens of optical items by wrapping with lens tissue.

(3) Pack large, heavy items such as compressors, lathes, drill presses, and similar items in individual plywood or wood boxes.

(4) Remove handles and wheels from electric power units, if practicable. Place power units with removed handles and wheels in plywood or wood boxes. Block and brace with wood. Cushion blocking and bracing contact points with polyethylene foam to prevent damage from shock or movement.

bt. Skis and pontoons.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved area with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in an overseas-type plywood box. Block and brace with wood. Cushion blocking and bracing contact points with polyethylene foam to prevent damage from movement or shock.

bu. Starter generators.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with waterproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Place correct amount of desiccant in reusable metal container. When appropriate metal container is not available, pack item submethod IIc. Cushion item with polyethylene foam. Place in a bag of watervaporproof barrier material. Properly place correct amount of desiccant. Heat seal bag. Place sealed bag in an overseas-type plywood box. Secure item to prevent damage from movement or shock.

bv. Starter, hydraulic.

(1) Flush item with operating fluid and drain. Plug, cap, and tape all openings. Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved area with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IA-5. Cushion item with sufficient bound fiber material to prevent damage from shock or movement. If metal container is not available, unit pack method I. Place item in an overseas-type plywood box. Cushion with sufficient bound fiber material to prevent damage from shock or movement.

bw. Starters, engine, elective. Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from movement or shock. Place correct amount of desiccant in reusable metal container. If appropriate

reusable metal container is not available, unit pack submethod IIc. Cushion item with polyethylene foam. Place in a bag of watervaporproof barrier material. Properly place correct amount of desiccant and heat seal bag. Place sealed bag in an overseas-type plywood box. Secure item in box to prevent damage from movement or shock.

bx. Steps and ladders.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in an overseas-type plywood box. Use wood blocking and bracing padded with polyethylene foam to prevent damage from shock or movement.

by. Supports and brackets.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in an overseas type plywood box. Block and brace with wood cushioned with polyethylene foam. Secure item to prevent damage from shock or movement.

bz. Swashplates.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Distribute and secure correct amount of desiccant in reusable metal container. When appropriate metal container is not available, unit pack item submethod IIc. Cushion item with polyethylene foam and place in a bag of watervaporproof barrier material. Distribute and secure correct amount of desiccant. Heat seal bag. Place sealed bag in an overseas-type plywood box. Secure item to prevent damage from shock or movement.

ca. Swashplate collars.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place preserved and wrapped item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Seal container with tape.

(3) Place a number of fiberboard boxes in an overseas-type plywood box.

cb. Tailbooms, fuselages, and pylon assemblies.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in a plywood box. Block and brace with wood. Cushion with polyethylene foam to prevent damage from shock or movement.

cc. Tanks, fuel.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in an overseas type plywood box. Block and brace with wood. Cushion with polyethylene foam to prevent damage from shock or movement.

cd. Tanks, oil and hydraulic.

(1) Flush with operating fluid. Plug, cap, or tape all openings. Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Pack items that do not have any dimensions greater than 16 inches and weight not exceeding 25 pounds in a fiberboard box. Cushion with bound fiber material. Pack larger items that properly fit in a container of no more than 9-inch depth and weight not exceeding 40 pounds in a shallow box of wood and plywood. Pack items exceeding the above weight or dimension limitations in a plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

(3) Pack a number of unit packed items in an overseas-type plywood box.

ce. Tires, pneumatic. Unit pack method III. Pile a number of tires in an open crate slightly larger than the diameter of the tires.

cf: Trainers (flight simulators ejection seat and maintenance, aircraft fire. Pack method III. Place in an overseas-type plywood or wood box. Securely block and brace with wood. Cushion with polyethylene foam to prevent damage from shock or movement.

cg. Transmissions.

(1) Drain transmission and flush with clean operating fluid. Cap, plug, or tape all openings.

(2) Unit pack submethod IId. Place transmission in appropriate reusable metal container. Secure item and place correct amount of desiccant. If container is not available, unit pack method I. Apply P-2 to bare, exposed, and uncoated metal surfaces and wrap preserved areas with greaseproof barrier material. Place in overseas-type plywood box. Block and brace with wood. Cushion with polyethylene foam to prevent damage from shock or movement.

ch. Turbine engine parts and accessories.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Package items that

have no dimensions greater than 16 inches and weight not exceeding 25 pounds in a fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Pack larger items that weigh less than 40 pounds and that properly fit in a container of no more than 9-inch depth in a shallow wood box. Pack items exceeding the above weight or dimension limitations in a plywood box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement.

(3) Pack a number of unit packed items in an overseas-type plywood box.

ci. Turbochargers and turbosuperchargers.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack submethod IId. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Place correct amount of desiccant in reusable metal container. When appropriate metal container is not available, unit pack submethod IIc. Cushion item with polyethylene foam. Place in a bag of watervaporproof barrier material, insert correct amount of desiccant, and heat seal bag. Place sealed bag in an overseas-type plywood box. Secure item to prevent damage from shock or movement.

cj. Valves, other than electrical.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient cellulosic or bound fiber material to prevent damage from shock or movement. Seal box with tape.

(3) Place a number of fiberboard boxes in an overseas-type plywood box.

ck. Valves, solenoid and electrically-operated. Unit pack submethod IIb. Wrap with greaseproof barrier material and secure with tape. Place item in a fiberboard box. Cushion top, bottom, and sides with sufficient polyethylene foam to prevent damage from shock or movement. Place correct amount of desiccant in box. Enclose fiberboard box in a heat-sealed bag of watervaporproof barrier material and further enclose in a weather-resistant fiberboard box. Seal the box with tape.

cl. Winding, generator. Unit pack submethod IId. Wrap with greaseproof barrier material. Place in an appropriate reusable metal container. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement. Place correct amount of desiccant.

cm. Wings, parts and assemblies.

(1) Apply P-2 to all bare, exposed, and uncoated metal surfaces, wrap with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place in an overseas type plywood box. Cushion top, bottom, and sides with bound fiber material to prevent damage from movement or shock.

cn. Wobble plates.

(1) Apply P-2 to bare, exposed, and uncoated metal surfaces, wrap preserved areas with greaseproof barrier material, and secure with tape.

(2) Unit pack method I. Place preserved and wrapped item in a weather-resistant fiberboard box. Cushion top, bottom, and sides with sufficient bound fiber material to prevent damage from shock or movement and seal with tape (see fig 4-4).

(3) Place a number of fiberboard boxes in an overseas-type plywood box.

Section XII. COMBAT SUPPORT EQUIPMENT

4-134. Application

This section applies to tactical, combat-support equipment including trucks and truck tractors, dollies and dolly sets, and trailers and semi-trailers. General instructions of this section also apply to automotive and land mobility portions of other wheeled vehicles. This section is intended as general instructions for field use in preparing equipment for shipment and immediate use.

4-135. General

Processing should begin after preventive maintenance checks and services (PMCS) are complete. Operational fluids and lubricants must be per the lubrication order/technical manual (LO/TM) applicable to the equipment. Grease and oil must be applied after cleaning and drying. A notice should be completed to record the preservation applied and deprocessing required. The completed notice should be sealed in a bag and attached in a conspicuous location on the equipment.

a. Disassembly. Equipment will be disassembled or reconfigured when necessary to meet transport clearance requirements. Equipment may also be disassembled when such disassembly will provide for more efficient and economical transportation. Parts removed from the equipment will be labeled

and matchmarked to aid reassembly.

b. Cleaning and drying. Using barrier material, tape, or plugs, protect areas that are susceptible to damage during cleaning. Remember to remove barrier material, tape, and plugs after cleaning is complete.

(1) Exterior. Using power spray equipment as required and a solution of water and detergent, wash exterior of the vehicle. Spray should not be directed at areas susceptible to damage. Rinse with clear water.

(2) Engine compartment. Using a solution of water and detergent, clean engine compartment. Do not use petroleum solvents on nonmetallic parts. Rinse with clean water.

(3) Crew/drivers compartment. Using solution of water and detergent, clean interior surfaces. Rinse with clean water.

(4) Operational fluids. Operational fluids of component systems must be free of contamination. Any maintenance checks of hydraulic fluids and any oil analysis requirements must be current. Fuel must comply with applicable fuel quality standard.

(5) Drying. Equipment surfaces should be allowed to dry. Where processing is done out-of doors, the processing schedule should consider climatic conditions. Precipitation and windborn dust may require delay or recleaning. Water collected in undrained areas should be wiped or vacuumed dry.

c. Preservation. Each critical surface and component susceptible to corrosion or deterioration by environmental conditions should be protected by application of compatible preservatives per MIL-P-116. Preservative for coating exterior, unpainted, ferrous surfaces should be grade 4 of MIL-C-16173. Interior component surfaces should be preserved with operational fluids and lubricants as specified in the applicable LO/TM. Battery box preservative should be composition G, type II of MIL-C-450.

(1) Cooling system. Engine cooling system should be processed to prevent deterioration and to provide protection from anticipated environmental conditions per the applicable TM.

(2) Tires. Tires should be inflated to the maximum operating pressure.

(3) Fuel tanks, gasoline. Gasoline should be completely drained from all tanks except as required for transportation loading.

(4) Fuel tanks, diesel. Diesel fuel should be drained to the extent required for transportation. Unless otherwise specified for transportation, fuel tanks will contain sufficient fuel for loading and unloading.

d. Packaging. Items of the current hand receipt, BII, components of end item (COEI), and additional items shipped with the equipment will be processed per methods specified in MIL-P-116. Items with preserved critical surfaces and other items which require protection from water or dust will be processed per method IC of MIL-P-116. Each large item requiring only physical and mechanical protection will be processed per method III of MIL-P-116.

(1) Wraps and barrier material. Packaging wraps and barrier material will be type II, grade A, class 2 of MIL-B-121.

(2) Bags. Bags will be style 2, type I, class B of MIL-P-117 for preservation of items per method IC of MIL-P-116.

(3) Cushioning. Cushioning material will be per PPP-P-1752.

(4) Blocking and bracing. Fiberboard material for blocking and bracing will be weather-resistant (WR) corrugated fiberboard (CF) and will be type CF and class WR of PPP-F-320. Domestic class fiberboard may be used within bags in lieu of the weather-resistant class. Lumber for blocking and bracing will conform to MIL-STD-731. Plywood will be per the requirements of NN-P-530. All blocking and bracing shall conform to MIL-STD-1186.

(5) Containers. Fiberboard boxes for unit packaging will be type CF and class WR of PPP-B-636. The domestic class of box may be used within bags in lieu of the class WR.

e. Packing. Items of the current hand receipt, BII, COEI, and additional items shipped with the equipment shall be packed in exterior shipping containers. Boxes for packing should be overseas types of PPP-B-601 or PPP-B-621. Where items are stowed within the vehicle, fiberboard boxes conforming to type CF and class WR of PPP-F-320 may be used if the net weight and size do not exceed box limitations.

f Marking. Marking should be accomplished per MIL-STD-129 and will indicate protection level B.

(1) BII. Each unit package will be marked per MIL-STD-129 and will contain the following additional identification data: "ASSORTED BII FOR (NSN), (U.S. Army Registration Number)." Special handling marking shall be applied and packaging list shall be prepared per MIL-STD-129.

(2) COEI. Unit packaging of COEI and additional items shipped with the equipment will be marked per MIL-STD-129. Consolidation shipping containers will also be marked per MIL-STD-129 and will contain the following additional identification data: "ASSORTED COEI FOR (NSN), (U.S. Army Registration Number)." Special handling

marking shall be applied and packing lists shall be prepared per MIL-STD-129.

g. Stowage. Items stowed aboard the equipment shall meet carrier and transportation requirements. Stowed items including blocking and bracing shall provide clearance for sling cables and tie-down cables. Securement shall meet strength and clearance requirements of the shipment medium and shall conform to requirements of the applicable transportation guidance TM.

Section XIII. CLOSE COMBAT EQUIPMENT

4-136. Application

This section applies to tracked, close-combat equipment including tanks, recovery vehicles, and carriers. General instructions of this section also apply to automotive and land mobility portions of other tracked vehicles. This section is intended as general instructions for field use in preparing equipment for shipment and immediate use.

4-137. General

Processing should begin after PMCSs are complete. Operational fluids and lubricants must be per LO/TM applicable to the equipment. Grease and oil must be applied after cleaning and drying. A notice should be completed to record the preservation applied and deprocessing required. The completed notice should be sealed in a bag and attached in a conspicuous location on the equipment.

a. Disassembly. Equipment will be disassembled or reconfigured when necessary to meet transport clearance requirements. Equipment may also be disassembled when such disassembly will provide for more efficient and economical transportation. Parts removed from the equipment will be labeled and matchmarked to aid reassembly.

b. Cleaning and drying. Using barrier material, tape, or plugs, protect areas susceptible to damage during cleaning. (Remove barrier material, tape, and plugs after cleaning is complete.)

(1) Exterior. Using power spray equipment as required and a solution of water and detergent, wash exterior of the vehicle. Spray should not be directed at areas susceptible to damage. Rinse with clean water.

(2) Engine compartment. Using a solution of water and detergent, clean engine compartment. Do not use petroleum solvents on nonmetallic parts. Rinse with clean water.

(3) Crew/drivers compartment. Using solution of water and detergent, clean interior surfaces. Rinse with clean water.

(4) Operational fluids. Operational fluids of component systems must be free of contamination. Any maintenance checks of hydraulic fluids and any oil analysis requirement must be current. Fuel must comply with applicable fuel quality standard.

(5) *Drying*. Equipment surfaces should be allowed to dry. Where processing is done out-of doors, the processing schedule should consider climatic conditions. Precipitation and windborn dust may require delay or recleaning. Water collected in undrained areas should be wiped or vacuumed dry.

c. Preservation. Each critical surface and component susceptible to corrosion or deterioration by environmental conditions should be protected by application of compatible preservatives per MIL-P-116. The preservative for coating exterior, unpainted, ferrous surfaces should be grade 4 of MIL-C-16173. Interior component surfaces should be preserved with operational fluids and lubricants as specified in the applicable LO/TIM. Battery box preservative should be composition G, type II of MIL-C-450.

(1) Cooling system. Engine cooling systems should be processed to prevent deterioration and to provide protection from anticipated environmental conditions per the applicable TM.

(2) Fuel tanks, gasoline. Gasoline should be completely drained from all tanks except as required for transportation loading.

(3) Fuel tanks, diesel. Diesel fuel should be drained to the extent required for transportation. Unless otherwise specified for transportation, fuel tanks will contain fuel sufficient for loading and unloading.

d. Packaging. Items of the current hand receipt, BII, COEI, and any additional items shipped with the equipment will be processed per the methods specified in MIL-P-116. Items with preserved, critical surfaces and other items which require protection from water or dust will be processed per method IC of MIL-P-116. Each large item which requires only physical and mechanical protection will be processed per method III of MIL-P-116.

(1) Wraps and barrier material. Barrier material and wraps used for packaging will be type II, grade A, class 2 of MIL-B-121.

(2) Bags. Bags will be style 2, type I, class B of MIL-P-117 for preservation of items per method IC of MIL-P-116.

(3) Cushioning. Cushioning material will conform to the requirements of PPP-C-1752.

(4) Blocking and bracing. Fiberboard material for blocking and bracing will be type CF and class WR of PPP-F-320. The domestic class of fiberboard may be used within bags in lieu of the class WR. Lumber for blocking and bracing will be per MIL-STD-731. Plywood will conform to NN-P-530. All blocking and bracing shall conform to MIL-STD-1186.

(5) Containers. Fiberboard boxes for unit packaging will be type CF and class WR of PPP-B-636. The domestic class of box may be used within bags in lieu of the class WR.

e. Packing. Items of the current hand receipt, BII, COEI, and additional items shipped with the equipment shall be packed in exterior shipping containers. Boxes for packing should be overseas types of PPP-B-601 or PPP-B-621. Where items are stowed within the vehicle, fiberboard boxes conforming to type CF and class WR of PPP-F-320 may be used if the net weight and size do not exceed box limitations.

f: Marking. Marking should be accomplished per MIL-STD-129 and will indicate protection level B.

(1) BII. Each unit package will be marked per MIL-STD-129 and will contain the following additional identification data: "ASSORTED BII FOR (NSN), (U.S. Army Registration Number)." Special handling marking shall be applied and packing lists shall be prepared per MIL-STD-129.

(2) COEI. The unit packaging of COEI and additional items shipped with the equipment will be marked per MIL-STD-129. Consolidation shipping containers will be marked per MIL-STD-129 and will contain the following additional identification data: "ASSORTED COEI FOR (NSN), (U.S. Army Registration Number)." Special handling marking shall be applied and packing lists shall be prepared per MIL-STD-129.

g. Stowage. Items stowed aboard the equipment shall meet carrier and transportation requirements. Stowed items including blocking and bracing shall provide clearance for sling cables and tie-down cables. Securement shall meet strength and clearance requirements of the shipment medium. Securement shall also conform to the requirements of the applicable transportation guidance TM.

Section XIV. CHEMICAL MATERIEL (OTHER THAN CLASS V)

4-138. Disperser, Riot Control Agent

a. General. This paragraph pertains to the following dispersers:

(1) Disperser, portable, M3.

(2) Disperser, helicopter or vehicle mounted, M5.

(3) Disperser, portable 450 CFM, M106.

b. Serviceable retrograde materiel.

(1) Cleaning and drying. Prior to disassembly of the disperser, release air from pressure tanks. Drain the agent tank of all residual material.

Note

Wear a mask, gloves, and hood during this process. Disassemble the disperser to the extent necessary to allow complete cleaning of agent tank, hose assemblies, and gun. Flush and rinse exterior of agent tank, hoses, and gun barrel with water, as necessary, to remove all agent material. Thoroughly dry all surfaces with clean cloths or sponges.

CAUTION

Dispose of all residual agent, cleaning material, and cloths in an area designated as safe by the unit commander.

(2) Preservative application. Paint all areas of the disperser where paint has been scratched or scraped off, using the same type and color originally applied. Wrap all unpainted, ferrous metal surfaces with vapor phase inhibitor (VPI) wrap. Insert bore strips into the gun bore. An alternate method shall be to apply P-10 to all unpainted, bare, ferrous metal surfaces and wrap with greaseproof barrier material and secure with tape.

(3) Unit pack. Cover ends of hose assemblies and gun barrel with tape. Separately wrap the following in waterproof barrier material: preformed packing, safety head connector, rubber gloves, and check valve assembly. Secure the wraps with tape. Separately wrap hand tools, mark hoods and gun in flexible corrugated paperboard, and secure with tape.

(4) Packing.

(a) General. Pack each disperser with accessory equipment and components inside its storage and shipping chest. Include applicable TM and packing list. Immobilize and cushion items inside the chest with cellulosic cushioning material. Apply two %-inch galvanized steel straps girthwise around the chest, with each strap located one-sixth

the length of the chest from each end. When the original chest is not available, fabricate a wood box and block and brace the disperser within the box with wood or fiberboard.

(b) *M3 and M5 dispersers*. Pack the dispersers individually in a wood or plywood box. Cushion and immobilize all items within the container. Close container using cement-coated nails and apply %-inch galvanized steel strapping.

(c) *Unserviceable, economically reparable retrograde materiel*. Clean, dry, preserve, pack, and mark the same as for serviceable, retrograde materiel, as specified in b, above, except include condition code "F" in the marking.

(d) *Serviceable materiel to be recycled*. Clean, dry, preserve, and pack per paragraph 4-138b and as specified in paragraph 3-3. Mark per paragraph 3-5 and MIL-STD-129.

4-139. Heater, Water, Liquid Fuel, M2

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all component items of the heater using process C-1. Clean exterior of the water heater with water under pressure or steam.

CAUTION

Do not direct water under pressure, steam, or compressed air into precision equipment or instruments.

(2) Preservative application.

(a) Boiler (low-pressure). Preserve the internal area of the boiler with P-9 by spraying, fogging, or filling with the preservative. Drain boiler of excess oil. Touch up chipped or scratched painted surfaces with paint of the same type and color originally applied. Apply P-9 to all exposed metal and threaded surfaces. Seal all threaded openings by applying metal or plastic plugs or tape.

(b) Removable panels. Remove the panels from the heater and coat the fasteners with P-9. Remove the excess oil and place the panels back on the heater; secure the panel fasteners. Cover the seams around the doors using tape.

(c) Electrical system and components (nonremovable). Cover the heater electrical components with waterproof barrier material and secure in place with tape. Cover exposed ends of all electrical wiring terminals with tape.

(d) Instrument panel. Cover and protect the instrument panel using cellulosic cushioning material. Secure the cushioning material in place using tape.

(e) Repair parts and tools. Preserve parts and tools, as applicable, with P-2 preservative compound and wrap each item with waterproof, greaseproof barrier material. Secure barrier material in place with tape. Place the tools in the tool carrier and stow along with the repair parts and technical publications inside the hose compartment of the heater.

(f) Pump. Drain the fuel pump and add P-10. Activate the pump by hand while applying the preservative oil to ensure coating of all interior surfaces. Drain off all excess preservative oil. Apply P-10 to the drain and filler plug threads. Seal off all other openings using tape. Apply P-10 to all unpainted, exterior metal surfaces of the pump.

(3) Unit pack. Do not apply additional packaging.

(4) Packing. Pack the heater within its original crate, if available. Otherwise, pack the heater within a fabricated, skid-base sheathed crate. Anchor the heater to the skid base using bolts, washers, and nuts. Place a waterproof shroud over the heater after it is secured to the skid base, using all-temperature, flexible barrier material. Secure the shroud to the bottom of the heater using tape.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable, retrograde materiel, as specified in paragraph 4-139a, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per paragraph 4-139a. Mark per paragraph 3-5.

4-140. Alarm, Chemical Agent

a. General. This paragraph pertains to portable and automatic chemical agent alarms M8 through M18.

b. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean and dry all component items of the alarm system using cleaning process C-1 and drying procedure D-4.

(2) Preservative application. Paint all areas of the alarms where paint has been scratched or scraped off using the same type and color originally applied. Cover all electrical connectors with caps provided and cover all electrical connectors without caps with tape.

(3) Unit pack. Unit pack the components listed in the following subparagraph method III. Individually wrap the components in greaseproof, waterproof barrier material and secure with tape. Place each component in a water-resistant fiberboard box and cushion with a minimum of 1-inch thick

bound fiber cushioning material. Close the box with tape (see fig 4-3).

(a) Components comprising the M8 through M18 alarm, chemical agent, automatic and portable are as follows:

M42 alarm unit,
M43 detector unit,
M74 test set,
M168 cable assembly, power, electric,
M228 mounting kit,
M182 mounting kit,
M10 power supply,
M229 refill kit.

(b) Vehicular adaptation kits include BB 501/U rechargeable battery; installation kits for 1/4-ton, 3/4-ton, 2 1/2-ton vehicles; and M113 personnel carrier and M114 command post vehicle.

Note

These items, although components of the alarm system, are not included within any of the systems and will be packed separately. These items are components of the winterization kit M253.

(4) *Packing*. Each alarm system (M8 through M18) consists of a combination of components listed in paragraph 4-140b(3Xa). Pack each system in wood boxes in the combinations outlined in (a) through (j) below. Use boxes of minimum cube. Fill all voids within each box using cellulosic cushioning material. Close boxes and apply galvanized steel strapping. The combinations to be packed are as follows:

(a) *M8 alarm (less batteries).*
1 ea. M42 alarm
1 ea. M43 detector
1 ea. M229 refill kit

(b) *M10 alarm (less batteries).*
a ea. M42 alarm
1 ea. M43 detector
1 ea. M229 refill
1 ea. M10 power supply

(c) *M11 alarm (less batteries).*
1 ea. M42 alarm
1 ea. M43 detector
1 ea. M229 refill kit
1 ea. M228 mounting kit
1 ea. installation kit for 1/4-ton vehicle

(d) *M12 alarm (less batteries).* Pack same as M11 except installation kit for 3/4-ton vehicle.

(e) *M13 alarm (less batteries).* Pack same as M11 except installation kit for 2 1/2-ton vehicle.

(f) *M14 alarm (less batteries).*
1 ea. M42 alarm
1 ea. M43 detector
1 ea. M229 refill kit
1 ea. M182 mounting kit
1 ea. installation kit for M113 personnel carrier

(g) *M15 alarm (less batteries).* Pack same as M14 except installation kit for M14 command post vehicles.

(h) *M16 alarm (less batteries).*
1 ea. M42 alarm
1 ea. M43 detector
1 ea. M229 refill kit
1 ea. M10 power supply
1 ea. M228 mounting kit
1 ea. installation kit for 1/4-ton vehicle

(i) *M17 alarm (less batteries).* Pack same as M16 except installation kit for 3/4-ton vehicle.

(j) *M18 alarm (less batteries).* Pack same as M16 except installation kit for 2½-ton vehicle.

c. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in *b* above, except include condition code "F" in the marking.

d. Serviceable materiel to be recycled. Clean, dry, preserve and pack per *b* above. Mark per paragraph 3-5.

Note

The above items do not require consideration in meeting special Department of Transportation hazard classification requirements.

4-141. Refill Kit, Analyzing Components, CBR Agent Sampling and Analyzing Kit, M33

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean and dry all items by process C-1 and procedure D-4, respectively.

(2) Preservative application. Apply P-9 to the bare metal surfaces of the item.

(3) Unit pack. Wrap preserved items in greaseproof, waterproof barrier material and secure with tape. Individually package the kit items in a heat-sealable, watervaporproof bag. Place all of the kit items into a weather-resistant fiberboard box and secure with tape (fig 4-3).

(4) Packing. Pack four unit-packed kits within a cleated-plywood shipping container. Place fiber-board pads between the contents and inside surfaces of the wood box to fill any voids and ensure a tight pack. Close the box and apply galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable, retrograde materiel, as specified in this paragraph except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a. Mark per paragraph 3-5.

4-142. Flame-thrower, Portable, M2A1-7 and M9E1-7

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Prior to cleaning, bleed air pressure from fuel and pressure tanks. Drain fuel tanks of residual fuel. Clean all exterior surfaces by wiping with a clean cloth. Clean hose by wiping with a clean cloth.

(2) Preservative application. Pour 1 quart of P-10, grade 30, into fuel tanks and invert and shake several times to coat interior of tanks. Connect the hose and gun to the tanks and drain the oil through the hose and gun into a container. Do not discard the oil because the drained oil can be used for preserving other tanks. Disconnect the hose and gun from the tanks after they are preserved internally.

(3) Unit pack. Seal all openings, couplings, and ends of hoses using tape.

(4) Packing. When original packing chests are available, pack each flame-thrower within the chest. Strap each packing chest using two 34-inch steel straps. In the event packing chests are not available, pack each flame-thrower in a box fabricated from wood or plywood. Block and brace the flame-thrower within each box using wood or fiberboard pads. Close the box and apply 3/4-inch galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per paragraph 4-142a. Mark per paragraph 3-5.

4-143. Generator, Smoke, Mechanical Pulse Jet, M3A3

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all components of the generator using process C-1; then dry, using procedure D-1 or D-4, as applicable. Clean nonmetallic items by wiping with a clean, dry cloth. In the event steam, compressed air, or water under pressure is used for cleaning the generator, adhere to the following precautionary note:

EXERCISE CAUTION

Do not direct water under pressure, steam, or compressed air onto precision components or instruments.

(2) Preservative application. Repaint all damaged portions of painted surfaces with the same type and color paint originally applied. Use P-2 preservation compound to coat unpainted, exposed metal surfaces including exposed threaded areas. Close off all fuel valves and fill the fuel tank with P-10, type I, grade 30. Open all fuel valves. Disconnect the flexible fuel tube from the flowjector and permit the preservative oil to run through the flexible fuel tube. Close off fuel valves. Connect the flexible fuel tube to flowjector. Tape all outlet nozzles and openings. Remove the engine head and dip it in P-10, grade 1, and permit the engine head to drain. Reinstall the engine head. Wrap spare engine heads removed from their original package in barrier material and tape securely.

(3) Packing. Pack the smoke generator in its original shipping crate (cleated-plywood), if available. Otherwise, use a fabricated cleated plywood crate with a skidded base. Secure the smoke generator using hold-down plates, nuts, and washers. Retract the carrying handles and lock them in place with the locking pins attached to the unit. Stow the hose on the frame and secure it using the spring fasteners furnished with the unit. Stow the flexible nozzle tube and bung wrench on the base of the crate and secure them using the clamps furnished with the unit. In the event the clamp or spring fasteners are missing from the unit, secure the items using reinforced filament tape. Lower the top of the crate over the smoke generator and bolt it to the base of the crate using lag bolts and washers.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable, retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-144. Sampling Retrograde Materiel

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all items by process C-1 and dry by procedure D-4.

(2) Preservation application. Preserve all bare metal surfaces with P-9. Wrap preserved items with greaseproof, waterproof barrier material and secure with tape. Place all items in their respective

compartment within the kit carrying case and cushion with cellulosic cushioning material. Close the carrying case and secure latches.

(3) *Unit pack*. Place each carrying case into a weather-resistant fiberboard box. Cushion top and bottom of case within the box with bound-fiber cushioning material. Close the box with tape.

(4) *Packing*. Place each kit in a nailed wood box or cleated plywood box. Immobilize the pack within the box with filler pads to restrict movement. Close the box and apply galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-145. Detector, Concealed Personnel, Aircraft Mounted, M3

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean the detector and related components by process C-1 and dry by procedure D-4. Clean and dry nonmetallic components by wiping with a clean cloth.

(2) Preservative application. Repaint damaged, chipped, and scratched portions of painted surfaces with the same type and color paint originally applied. Preserve bare, ferrous metal surfaces with P-9, wrap with greaseproof, waterproof barrier material, and secure with tape. Cover electrical connectors with dust caps or apply waterproof barrier material secured with tape. Cover ends of air hoses with waterproof barrier material and secure with tape.

(3) Unit pack. Individually pack the following components or a combination of like components, as indicated below, using fiberboard boxes, ensuring that their size is compatible to the inside dimensions of the metal shipping container (drum):

Miscellaneous metallic components .....1 box
Detector assembly .....1 box
Detector base.....1 box
Observer control box.....1 box
Cable assemblies.....1 box
Miscellaneous nonmetallic components .....1 box
Sheet metal components.....1 box

Coil air hose the same inside dimension of metal shipping container. Use a sufficient amount of cellulosic cushioning material inside each of the above packs to prevent movement of the components inside. Use the same material to fill all voids to prevent movement of components packed inside the metal shipping container.

(4) Packing. Pack the components listed in paragraph 4-145a(3) inside the original shipping container (drum) for the detector in the following manner:

(a) Place a minimum thickness of 2 inches of uncompressed, bound fiber cushioning material in the bottom of the metal shipping container.

(b) Position the packed components in the metal shipping container in the following manner:

1 Place the unit packed detector assembly inside the metal shipping container first.

2 Place the packed observer's control boxes (one on top of the other) beside the detector assembly package.

3 Place the packed cable assemblies and the packed miscellaneous nonmetallic components on top of the observer's control boxes.

4 Place the unit packed detector base plate on its edge and stow along side the detector assembly package.

5 Place the packed sheet metal components also on edge and stow on the other side of the detector assembly.

6 Place the unit packed miscellaneous metallic components directly on top of the detector pack.

7 Place a sheet of plastic (approximately 36 inches by 50 inches) over the packed components.

8 Place the coiled air hose on top of the plastic sheet. Fold the sheet over, both inside of and under the coil. Secure the folded plastic sheet using tape.

9 Place and secure the cover and locking ring on the metal shipping container and seal with a lead seal and wire assembly.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per b above. Mark per paragraph 3-5.

4-146. Filter Unit, Gas Particulate

a. General. This paragraph pertains to the following gas particulate filter units:

(1) Filter unit, 12 CFM, ABC-M7A1.
(2) Filter unit, 12 CFM, ABC-M8A2.
(3) Filter unit, 12 CFM, ABC-M8A3.
(4) Filter unit, EMD, 20 CFM, ABC-M13 and M13A1.

(5) Filter unit, armored ambulance, M14.

b. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all metallic parts by immersion in dry cleaning solvent or by wiping, using a clean cloth saturated with the same solvent. Drain and dry with compressed air or by wiping with a clean, dry cloth. Clean all nonmetallic parts by wiping, using a cloth.

(2) Preservative application. Repair damaged, chipped, and scratched portions of painted surfaces with the same type and color paint originally applied. Preserve bare, ferrous metal surfaces with P-9, cover with greaseproof, waterproof barrier material, and secure in place with tape.

CAUTION

Do not immerse or clean filter with solvent. Wipe with clean, dry cloth only.

(3) Unit pack. Cover glass instruments and panels with cellulosic cushioning material and secure in place with tape. Coil hoses and cable assemblies and secure with twine or tape. Place all clamps, screws, washers, and other miscellaneous hardware in a waterproof bag and identify contents. Place each of the following components in individual watervaporproof bags:

Components	Filter units
Air purifier	M7A1, M8A2, M8A3, M14
Precleaner and housing assembly	M13, M13A1
Frame assembly	M8A2, M8A3, M13, M13A1, M14
Switch assemblies	M8A2, M8A3, M13, M14
Transformer	M7A1
Heater	M13, M13A1
Hoses	ALL
Hardware	ALL
Head pieces	M7A1, M14

Heat seal bags or close by applying tape. Place each bagged unit and assembly in a weather-resistant fiberboard box and immobilize with cellulosic cushioning material. Close each box with tape. Place a copy of the operator/organizational maintenance TM with the M7A1 and M14 gas particulate filter units.

(4) Packing. Pack each filter unit and components in a wood or plywood box.

CAUTION

Do not mix components of one type filter with another. Close box and apply galvanized steel strapping.

c. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in paragraph 4-146b, except include condition code "F" in the marking.

d. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per paragraph 4-146b. Mark per paragraph 3-5.

4-147. Maintenance Kit, CBR Equipment, M14

a. Serviceable retrograde materiel.

(1) *Cleaning and drying*. Clean all metal surfaces of the kit components using a cleaning solvent. Accomplish drying by wiping, using a clean, dry cloth. Wipe nonmetallic surfaces using a clean, dry cloth.

(2) *Preservative application*. Coat all unpainted metal surfaces with P-9.

(3) *Unit pack.* Secure the press handle with filament-reinforced tape. Wrap the press and attaching tools with waterproof barrier material and secure with tape. Place the press and attaching tools inside the tool box, lock the box, and secure keys to the box with tape. Cover the gauge dial of the hydrostatic volumetric test jet with fiberboard and secure in place with tape.

(4) *Packing*. Place all unit packed and wrapped components of the kit into the original box or fabricate a wood or plywood box. Immobilize the items within the box with cellulosic cushioning material. Close the box and apply 3/4-inch galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-148. Compressor, Reciprocating, Power-driven, AN-M4

a. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all component items of the compressor using process C-1. Clean the exterior of the compressor with water under pressure or steam.

CAUTION

Do not direct water under pressure, steam, or compressed air into precision equipment or instruments.

Dry the compressor using procedure D-1 or D-4, as applicable. Clean nonmetallic items by wiping with a clean, dry cloth.

(2) Preservative application. Drain engine crankcase and compressor pump, fuel tank, fuel system, air cleaner, and water separator. Remove the air cleaner and coat interior with P-10, grade 30. Reinstall the air cleaner. Remove spark plug and fog one-half ounce of P-10 into the combustion chamber. Reinstall the spark plug. Fog the interior of the fuel tank using the same preservative oil. Seal all openings (air cleaner, oil dipstick, exhaust, etc.) to the interior of the engine using tape.

(3) Packing. Pack each compressor in a box fabricated from wood or plywood. Block and brace the compressor to restrict movement within the box by using wood or fiberboard pads. Close the box and apply 3/4-inch galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-149. Decontaminating Apparatus, Power-driven

a. General. This paragraph pertains to the following decontaminating units:

(1) Truck mounted, M9.

(2) Skid mounted, 500 gallon, M12A1.

b. Serviceable retrograde materiel.

(1) Cleaning and drying. Clean all component items of the decon apparatus using process C-1. Clean exterior of the truck-mounted and skidmounted decon apparatus with water under pressure or steam. Dry using procedure D-1 or D-4, as applicable. Clean nonmetallic items by wiping with a clean, dry cloth. Clean interior of tank, tank agitator pipe, and blender pipe by flushing with water.

CAUTION

Do not direct water under pressure, steam, or compressed air into precision equipment or instruments.

Drain the system and repeat, as necessary, to ensure a clean system.

(2) Preservative application. Apply P-2 to all bare, metal machined surfaces of each decontaminating apparatus, hand tools, and other accessories. Drain the pump and flush with P-10, grade 30. Preserve truck chassis and pump unit engine, as described in paragraphs 4-135 and 4-137.

(3) *Unit pack.*

(a) *Truck-mounted decontaminating apparatus.* Wrap preserved areas, hand tools, and other accessories with greaseproof, waterproof barrier material and secure with tape. Place hand tools and other accessories in their respective compartments. Cover glass surfaces with tape. Seal all openings to the pump interior, fire extinguisher nozzles, fitting, hoses, seams of storage chest, edges of hopper, pump compartment, and hood with tape. Secure the discharge hoses in place on the reels with the same tape. Coil the 30-foot length of hose and secure the coil in three places with filament-reinforced tape. Place the coil on the left-hand rail and secure it with straps provided. Secure the power take-off lever in the disengaged position with filament-reinforced tape.

(b) *Skid-mounted decontaminating apparatus*. Cover the louvers on the water heater with watervaporproof barrier material and secure with tape. Cover the heater control panel with weather-resistant fiberboard or Y4-inch plywood and secure in place with tape. Completely drain tank assembly, components of personnel shower assembly, and suction and blender hoses. Insert blender hose into suction hose. Cover ends of the suction hose with greaseproof, waterproof barrier material and secure with tape. Coil the hoses on top of the tank assembly and secure with clamps provided. Seal ends of the exhaust extensions with tape. Coil the exhaust extensions and place inside the coiled suction hose and secure to the suction hose with filament-reinforced tape. Seal all openings to the tank assembly with tape. Close tank drain valve and back off two turns. Place personnel shower piping in weather-resistant fiberboard boxes and close with tape. Secure the pump unit battery in battery carrier with tape.

(4) *Packing.* Do not apply additional packing.

c. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, and pack per b above. Mark per paragraph 3-5.

4-150. Mask, Chemical-biological and Gas

a. General. This paragraph pertains to the following masks:

(1) Chemical-biological, M9, M9A1, M14A2, M16, M17, M17A1, M18, M22, M24, M25, and M25A1.

(2) Mask, gas, M10, M11A1, M12, M21, and M26A1.

(3) Mask, riot control agent, M23.

(4) Mask, CBR, ND, MK5.

b. Serviceable retrograde materiel.

(1) *Cleaning and drying*. Clean each mask, faceforms, straps, lens, and other mask accessories using clean, soft, nonabrasive cloth.

(2) *Preservative application*. Insert faceforms, straps, and other mask accessories that are normally stowed inside the mask. Wrap each mask in paper-backed cellulosic cushioning material and secure with tape.

(3) *Unit pack*. Pack each mask in a weather-resistant fiberboard box and cushion and immobilize with cellulosic cushioning material, and close with tape.

(4) *Packing*. Pack like quantities of the same type masks in a wood or plywood box. Immobilize packages within the box with water-resistant fiberboard pads. Close box and apply %-inch galvanized steel strapping.

c. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel, as specified in b above, except include condition code "F" in the marking.

d. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per b above. Mark per paragraph 3-5.

4-151. Service Kit, Portable Flame-thrower Riot Control Agent Disperser, M27

a. Serviceable retrograde materiel.

(1) *Cleaning and drying.* Clean all components of the kit by wiping with a clean, dry cloth.

Drying procedures are not applicable for any of the components in the kit.

(2) *Preservative application.* Application of a preservative is not required.

(3) *Unit pack.* Wrap each component of the kit, except the hose, in cushioning material using single-face corrugated paperboard. Coil the hose and secure using tape.

(4) *Packing*. Pack all the components of the kit inside the service kit chest in their respective places. If chest is not available, pack kit components in a wood or plywood box. Immobilize contents with fiberboard or cushioning material. Apply two %-inch galvanized steel straps to the chest. If boxes are used, close the boxes and apply %-inch galvanized steel strapping.

b. Serviceable, economically reparable retrograde materiel. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-152. Decontaminating Apparatus, Portable, ABC-M 11

a. Serviceable retrograde material.

(1) Cleaning and drying. Clean the decontaminating apparatus using process C-1 and dry using procedure D-4. Clean and dry nonmetallic items using a clean cloth. Empty the apparatus container and clean it.

CAUTION

Dispose of the residual DS2 decontaminating agent and all wiping cloths in an area designated as safe by the unit commander.

(2) *Preservative application*. Coat the interior of the container with 0.2 grams of VPI. Apply antiseize thread compound to the threads in the top of the container. Assemble the spray head to the empty container for storage. Install a nitrogen filled cylinder in the spray head body. Install a lead seal through the pull ring of the captive safety pin and the hole in the handle. Draw the wire tight and crimp the wire in the lead seal. Install the apparatus in the mounting bracket.

(3) *Unit pack.* Pack each apparatus and mounting bracket in a water-resistant fiberboard box. Place fiberboard filler pads inside the box (top and sides), as necessary, to restrict any movement of the apparatus within the box. Close the box using tape on all seals including the manufacturer's joint (see fig 4-4).

(4) *Packing*. Pack 12 apparatuses unit packed, as specified in paragraph 4-152a(3), inside a nailed wood box using an arrangement of 3 rows or 4 each. Position filler pads using weather-resistant fiberboard, as necessary, inside the box to restrict free movement of the packages. Close the box and apply 3-inch galvanized steel strapping.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, pack, and mark the same as for serviceable, retrograde materiel, as specified in a, above except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

4-153. Service Unit, Flame-thrower, Truck-mounted, ABC-M4A2

a. Serviceable retrograde materiel.

(1) *Cleaning and drying.* Clean all component items of the service unit using cleaning process

C-1. Clean the exterior of the service unit with water under pressure or steam.

CAUTION
Do not direct water under pressure, steam, or compressed air into precision equipment or instruments.

Dry the service unit using procedure D-1 or D-4, as required. Clean nonmetallic items by wiping with a clean, dry cloth.

(2) Preservative application. Paint all areas of the service unit where paint has been scratched or scraped off using the same type and color of paint. Apply a light coat of grease to all unpainted, ferrous metal and machined surfaces using P-19. Preserve other major components in the following manner:

(a) *Mixing tank*. Flush tank with dry cleaning solvent and spray inside using P-9. Check for correct amount of antifreeze (permanent ethylene glycol) in the heating system. Seal all openings except the vent-and-overflow pipe using tape.

CAUTION
Do not seal vent-and-overflow pipe. Wrap the temperature-regulating valve using flexible greaseproof barrier material and secure with tape. Open all fuel lines.

(b) *Compressor*. Drain all the oil from the crankcase. Cover the air cleaner intake opening using waterproof barrier material and secure in place using tape.

(c) *Power takeoff* Lubricate all bearings using P-11.

(d) *Clutch*. Disengage, secure, and block the compressor clutch shifting lever.

(e) *Cover*. Install the canvas cover provided over the entire unit.

(3) *Unit pack.* Place all service unit accessories in the accessories compartment of the hose and accessories box. Seal the ends of the hose with tape. Coil the hose and place inside the same box.

(4) *Packing.* Do not apply additional packing.

b. Unserviceable, economically reparable retrograde materiel. Clean, dry, preserve, and pack the same as for serviceable retrograde materiel, as specified in a above, except include condition code "F" in the marking.

c. Serviceable materiel to be recycled. Clean, dry, preserve, and pack per a above. Mark per paragraph 3-5.

CHAPTER 5

PRESERVATION AND PACKING OF RECOVERABLE REPAIR PARTS

Section I. INTRODUCTION

5-1. Purpose
This chapter provides general field packaging instructions for all recoverable repair parts identified as serviceable retrograde materiel; unserviceable, economically reparable retrograde materiel; and serviceable materiel to be recycled.

5-2. General
The cleaning, drying, preserving, packing, and marking of the materiel identified above shall be accomplished as specified in the paragraphs that follow. If specific items that require field packing are not covered in this chapter, these operations should be performed per instructions given in chapter 3 of this manual and in TM 38-230-1 and TM 38-320-2. When those items and operations are not specified either herein or -in the above listed manuals, instructions given for items with the same or similar physical and mechanical characteristics may be followed. However, every attempt should first be made to locate the prescribed requirements in the aforementioned references. When performing preservation techniques, preservatives shall be applied to those metal surfaces in which corrosion may occur and which may subsequently impair the usefulness of the part or assembly. Preservatives shall not be applied to the surfaces of parts or assemblies which are protected with solid film lubricants, vitreous plastic coatings, prime or paint coatings, or which are vulnerable to damage by contact preservatives.

5-3. Disassembly
In the case of an assembled item when it is impossible to coat all critical areas with required preservatives, disassemble the item to the extent necessary to ensure thorough cleaning, drying, and preservation of all critical areas. Disassembly will be limited to instances where a reduction in cube will result.

5-4. Marking
Marking shall be per the requirements specified in paragraph 3-5 of this manual and in MIL-STD129.

Section II. FEDERAL SUPPLY GROUP (FSG) 14, MISSILE EQUIPMENT AND COMPONENTS

5-5. General
a. This section pertains to missile equipment repair parts and components.

b. For the purpose of this section, missile repair parts are listed in groups according to their configuration and the physical and chemical properties of their surfaces. Each group is categorized according to the minimum method of preservation necessary to protect equipment against deterioration for a period of 180 days.

c. Except for those items specified individually in this section, FSG 14 component items will be preserved and packed per instructions contained in paragraphs 3-3 and 3-4 and in TM 38-230-1 and TM 38-230-2.

5-6. Category I (Submethod IIb) Missile Repair Parts

AC/DC range unit
Amplifier
Analyzer
Box, distribution
Calibrator
Card reader
Coder
Comparator
Computer
Control, test programmer
Converter
Decoder
Demodulator
Detector
Instrument assembly
Integrator
Intercommunication station
Inverter
Klystron tube
Lamp driver
Line receiver
Limiter-converter
Logic assembly
Memory unit
Mixer
Modulator
Monitor
Monitoring system
Preamplifier
Programmer test station
Ranging unit
Rate table assembly
Reader, punched tape
Receiver, signal
Recorder, data
Recorder, readout
Rocket motor
Scanner
Sequencer
Signal generator
Slant range

Discriminator
Display module
Distribution box
Duplexer
Firing box
Flight control group
Generator
Guidance section, GM
Gyroscope
Infrared assembly
Multiplier
Multivibrator
Null detector assembly
Operator control assembly
Oscillator
Oscilloscope
Oven assembly
Power supply
Power takeoff
Programmer
Synchronizer
Tape reader
Tester assembly
Test set
Theodolite
Tracking unit
Transducer
Transmitter
Transponder
Traversing unit
Tuner

a. Clean items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of the five different procedures defined in TM 38-230-1, provided the item will not be damaged by the procedure.

c. Do not apply preservatives to category I missile repair parts.

d. Unit pack items, wrapped and cushioned, as required, submethod IIb per the procedures in TM 38-230-1.

e. Pack a quantity of unit-packed repair parts in a wood or plywood box. Instructions for accomplishing the proper box fabrication, cushioning, blocking, bracing, and strapping and the weight limitations imposed may be found in TM 38-230-2.

5-7. Category II (Submethod IA-14) Missile Repair Parts

Accelerometer
Accumulator
Actuator
Alignment fixture
Antipropulsion unit
Astig focus unit
Autocollimator
Autopilot
Azimuth laying set
Azimuth orientation unit
Balance unit
Battery unit
Beta decoder
Binary assembly
Bolometer
Camera
Chassis assembly
Compensator
Controller, pressure
Counter assembly
Cursor
Damper
Delay timer
Distributor
Divider
Drive assembly
Electronic components assembly
Elevon assembly
Fan
Fixed memory assembly
Head assembly
Heat exchanger
Heatsink assembly
Horn, waveguide
Input-output assembly
Interconnecting box
Irradiance set
Isomodulator
Junction box
Launcher
Limiter, noise
Loudspeaker
Load cell
Magnetron assembly
Matrix assembly
Microwave kit
Modification kit
Network, sensing
Optical assembly
Parameter assembly
Parity assembly
Patchboard assembly
Periscope assembly
Photoelectric cell assembly
Pneumatic test set
Power package
Pressurizing unit
Printer assembly
Processor, signal
Projector assembly
Pulse selector
Radar set
Radio set
Radome
Register
Relay assembly
Relay, matrix
Ring assembly
Safety and arming device
Scan converter
Seeker section
Self-test assembly
Servomechanism
Servomotor
Shunt
Simulator
Slip ring assembly
Speed control
Speedgate
Stabilizer
Switching unit
Telescope assembly
Transformer
Transmission
Trimming assembly
Tube, launcher
Tunnel section
Turbine assembly
Waveguide assembly
Yoke drive assembly
Zeroing assembly

a. Clean items per process C-1 as described in TM 38-230-1.

b. Accomplish drying as required, immediately after cleaning by one or more of the five different procedures defined in TM 38-230-1, provided the item will not be damaged by the procedure.

c. Do not apply preservatives to category II missile repair parts.

d. Unit pack items, wrapped and cushioned, as required, submethod IA-14 per the procedures in TM 38-230-1.

e. Pack a quantity of unit-packed category II repair parts in a wood or plywood box. Instructions for accomplishing proper box fabrication, cushioning, blocking, bracing, and strapping and the weight limitations imposed may be found in TM 38-230-2.

5-8. Category III (Method III) Missile Repair Parts

Air conditioner
Air extractor
Air vane
Ammeter
Antenna
Backlight
Barricade assembly
Barometer
Beam, hoisting
Blanket, electric
Body section, GM
Bore brush
Cabinet
Cable and reel assemblies
Canopy assembly
Case
Chair
Compressor
Container
Control surface
Cooler
Cover
Door
Fin assembly
Gauge, pressure
Hood assembly
Housing assembly
Jet vane
Lanyard
Linkage
Louver, metal
Mast
Nitrogen tank
Nose assembly
Nozzle
Pallet
Panel, reflector
Rack, storage
Reel, cable
Reeling machine, cable
Seat, individual
Shell, body
Shield, launcher
Skin assembly
Sling assembly
Stabilizer platform
Suspension assembly
Tank assembly
Tool box

a. Clean items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of the five different procedures defined in TM 38-230-1, provided the item will not be damaged by the process.

c. Do not apply preservatives to category III missile repair parts.

d. Unit pack items, wrapped and cushioned, as required, method III per the procedures in TM 38-230-1.

e. Pack a quantity of unit-packed category III repair parts in a wood or plywood box. Instructions for accomplishing proper box fabrication, cushioning,

blocking, bracing, and strapping and the weight limitations imposed may be found in TM 38-230-2.

5-9. Category IV (Method I) Missile Repair Parts

Air distributor
Air purification assembly
Air servicer
Air test equipment
Anchor assembly
Antenna platform
Armature, motor
Arm, launcher erecting
Arm, towbar
Axle assembly
Bar, support
Base, cable mast
Bearing housing
Bearing
Blade assembly
Blast tube
Block, torque
Blower
Boom assembly
Box, battery storage
Bracket
Bumper assembly
Crank, hand
Cylinder assembly
Dolly assembly
Frame assembly
Gear assembly
Gearcase, motor
Guide rail assembly
Handle assembly
Handwheel assembly
Harness, lift
Hoist
Hose assembly
Holder assembly
Hub assembly
Jack assembly
Latch assembly
Leg, tripod
Lock assembly
Mounting base
Motor
Mount, tripod
Pedestal
Platform
Pump assembly
Rail section assembly
Reservoir, hydraulic
Roller assembly
Shaft assembly
Shock absorber
Slide assembly
Sprocket assembly
Structure assembly
Towbar assembly
Track
Tripod
Trunnion assembly
Truss assembly
Tube assembly, metal
Valve assembly

a. Clean items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of the five different procedures defined in TM 38-230-1, provided the item will not be damaged by the procedure.

c. Apply an appropriate P-type preservative, as described in TM 38-230-1, to all unpainted, ferrous metal surfaces.

d. Unit pack items, wrapped and cushioned, as required, method I per the procedures in TM 38-230-1.

e. Pack a quantity of unit-packed category IV repair parts in a wood or plywood box. Instructions for accomplishing proper box fabrication, cushioning, blocking, bracing, and strapping and the weight limitations imposed may be found in TM 38-230-2.

5-10. Category V (Submethod IA-15) Missile Repair Parts

Adapter assembly
Adapter, calibration board
Add and subtract subassembly
Alarm, temperature
Alignment prism
Crystal unit
Delay line
Doppler
Electronic switch
Filter assembly
Footpad assembly
Galvanometer
Gate, electronic
Gimbal assembly
Headset assembly
Heater
Indicator
Input assembly
Installation kit
Insulator
Intensifier
Interrupter, fire
Isolator
Kit, cold weather
Kit, hold-down
Lead, electrical
Level assembly
Light assembly
Light switch
Magneto, ignition
Manifold assembly
Manometer
Measurement system assembly
Meter
Mirror assembly
Module assembly
Multimeter
Parts kit
Plotting board
Preselector
Program board assembly
Puller kit
Rack, electrical group
Radiac set
Radio frequency head
Radiometer
Rectifier assembly
Reflector assembly
Regulator, pressure
Resistor assembly
Rotary joint assembly
Rotary selector assembly
Selector, firing
Sensor assembly
Sight
Solenoid
Starter
Switch assembly
Thermal isolator
Timer
Velocity control
Voltage regulator
Voltmeter
Winterization kit
Wiring harness

a. Clean items per process C-1 as described in TM 38-230-1.

b. Accomplish drying, as required, immediately after cleaning by one or more of the five different procedures defined in TM 38-230-1, provided the item will not be damaged by the procedure.

c. Do not apply preservatives to category V missile repair parts.

d. Unit pack items, wrapped and cushioned, as required, submethod IA-15 per the procedures in TM 38-230-1. Package circuit cards submethod IA-8 and as specified in section XXIII herein.

e. Pack a quantity of category V repair parts in a wood or plywood box. Instructions for accomplishing the proper box fabrication, cushioning, blocking, bracing, and strapping and the weight limitations imposed may be found in TM 38-230-2.

5-11. Category VI (FSG 14) Miscellaneous Components

a. Valves weighing 5 pounds or less. Cushion valves with cellulosic cushioning and individually pack submethod IC-1.

b. Valves weighing 70 pounds or less. Cushion with cellulosic cushioning and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

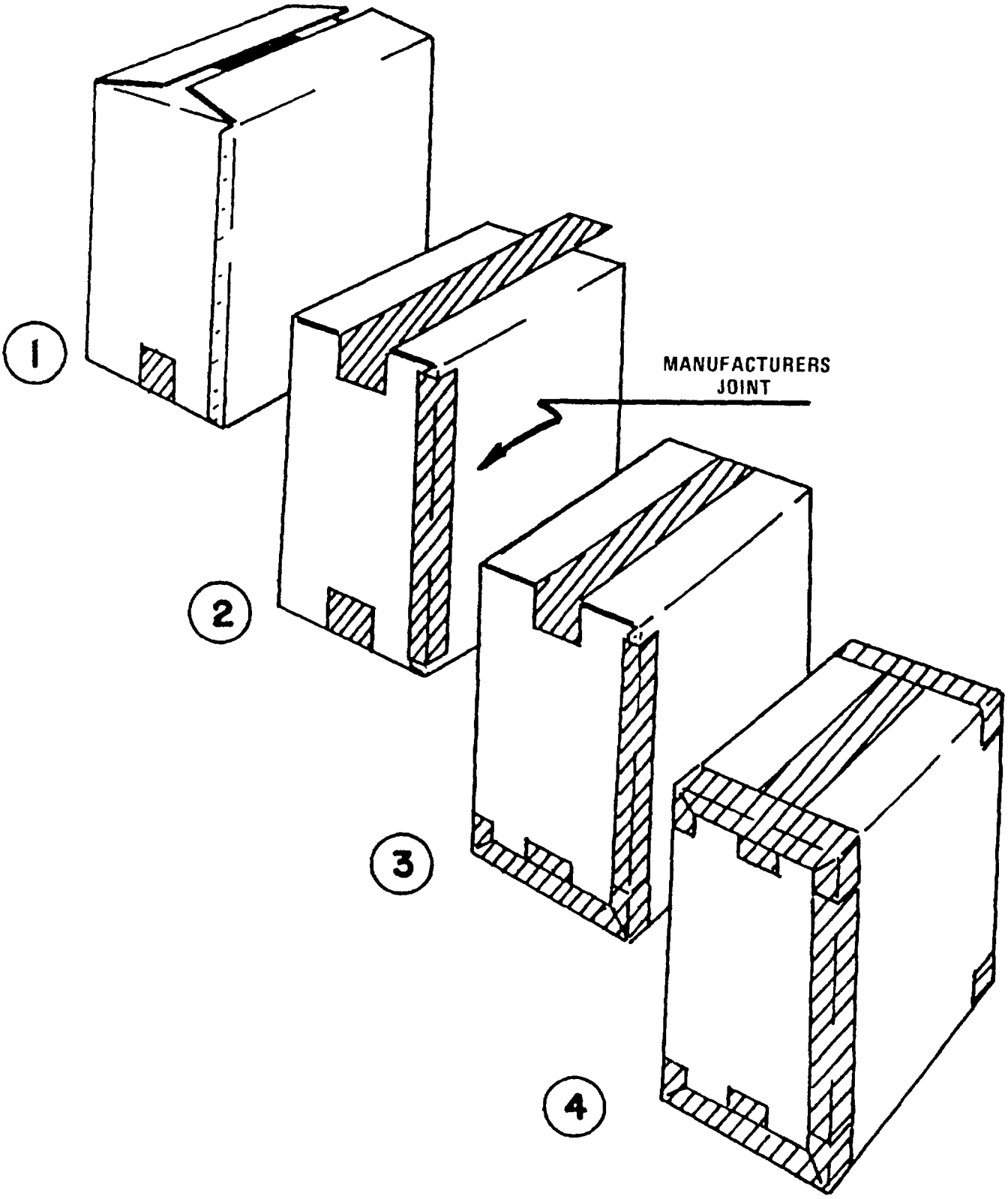


Figure 5-1. Fiberboard Box Tape Closure.

c. Values weighing more than 70 pounds. Cushion with cellulosic cushioning and individually pack in double or triple-wall fiberboard boxes. Close and seal box with tape (see figure 5-1).

d. Turbine, cooling. Cushion with cellulosic cushioning and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

e. Cable assemblies, power. Coil power cable assemblies, secure with tape or twine, and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (see figure 5-1).

f. Cylinder assemblies.

(1) Coat interior surfaces of the cylinder assemblies with operating fluid and allow to drain.

(2) Coat exposed portions of piston rods with P-11 and wrap with greaseproof barrier material. Extend the wrap approximately 2 inches on the cylinder head and secure with tape.

(3) Coat exposed surfaces of clevis pins and clevis pin holes with P-1.

(4) Seal openings in cylinders with tape. Install dust caps when so equipped.

g. Compressors. Preserve and pack compressors per paragraphs 3-3 and 3-4.

h. Purification systems.

(1) Coil hoses on their respective reels and secure to prevent uncoiling.

(2) Coil unattached hoses, secure with tape or twine, and individually pack in weather-resistant fiberboard boxes.

(3) Completely drain the units and seal openings in the purification system with tape.

i. Pump, hydraulic and buffer assemblies.

(1) Coat interior surfaces of the item with operating fluid and allow to drain.

(2) Cover openings with tape or a combination of tape and greaseproof barrier material

(3) Coat exterior machined surfaces of the item with P-10, cover coated surfaces with greaseproof barrier material, and secure in place with tape.

j. Distribution boxes. Cushion distribution boxes with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes.

k. Control panels, actuators, ducts, carrier assemblies, and control assemblies weighing 5 pounds or less.

(1) Coat pins with P-10, wrap with greaseproof barrier material, and secure in place with tape.

(2) Cushion items with cellulosic cushioning material and individually pack submethod IC-1.

I. Shield assemblies, shock absorbers, door assemblies, electric panels, and box assemblies.

(1) Coat unpainted, exterior metal surfaces of shock absorbers with P-10, cover with greaseproof barrier material, and secure in place with tape.

(2) Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

Section III. FSG 17, AIRCRAFT GROUND HANDLING EQUIPMENT, AND FSG 19, SHIPS, SMALL CRAFT, PONTOONS, AND FLOATING DOCKS

5-12. Blower, Rotary and Tank Assemblies

a. Coat exterior machined surfaces of the blowers with P-10, cover with greaseproof barrier material, and secure in place with tape.

b. Cushion blowers and tanks with cellulosic cushioning material and individually package in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

5-13. Boat, Storm

Coat unprotected, ferrous metal surfaces with P-1. When required, pack boats in an upside-down position in open crates.

5-14. Lifeboat, Inflatable

a. Lightly dust each lifeboat with powdered talc, keeping accessory equipment stowed in its proper place. Fold the inflatable lifeboat per folding instructions and place in the carrying case provided.

b. Cushion, with cellulosic cushioning material, those metal surfaces which may chafe the lifeboat cloth when the boat is in the folded position.

c. Pack each lifeboat in its carrying case in a triple-wall fiberboard or cleated-plywood box.

5-15. Pontoons

a. Coat unpainted, exterior surfaces of pontoons with P-1.

b. Ship assembled pontoons and ramps loose as individual items. Bundle knocked-down pontoons and any other large items of a similar nature in a manner that is convenient to handle and store. Bundles should not be too heavy or too large to lift using normal equipment. Restrict the weight of such bundles to 3,000 pounds or less. Next, arrange and secure the items with 1¼-inch metallic strapping, bolts, or suitable wood blocking and battens in combination with metallic strapping or

bolting, as required, to form compact nonshifting bundles. Staple strapping to any convenient wood blocking or battens.

c. Pack loose components, accessories, and any other similar small items that require a container for safe and convenient handling and stowing in wood or cleated plywood boxes.

d. Mark per paragraph 3-5.

Section IV. FSG 20, SHIP AND MARINE EQUIPMENT

5-16. Shafts and Propellers (70 Pounds or Less)

a. Coat ferrous metal surfaces of shafts and propellers with P-10, wrap with greaseproof barrier material, and secure in place with tape.

b. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (see fig 5-1).

5-17. Shafts and Propellers (More than 70 Pounds)

Coat machined, ferrous metal surfaces of shafts and propellers with P-11, wrap with greaseproof barrier material, and secure in place with tape. Coat other unpainted or unprotected, ferrous metal surfaces with P-1.

5-18. Assemblies (Transmission, Converter, Differential, Drive, Transfer, Gear, Housing, Planetary, Axle, Cylinder, and Winch Drums)

a. Coat interior surfaces of assemblies with operating lubricant and allow to drain.

b. Coat water coolant passages with P-9 and allow to drain.

c. Coat exposed machined shafts with P-10, wrap with greaseproof barrier material, and secure in place with tape.

d. Coat nonprecision metal surfaces with P-1.

e. Seal openings with tape. Cover large openings with greaseproof barrier material and secure in place with tape.

5-19. Valves (5 Pounds or Less)

Preserve and pack valves per paragraph 5-11a.

5-20. Valves (70 Pounds or Less)

Preserve and pack valves per paragraph 5-11b.

5-21. Pumps (Jet Propulsion, Sump, and Cargo Well) Preserve and pack pumps per paragraph 4-4.

5-22. Assemblies; Circle Roller, Auxiliary Ratchet, and Gear (5 Pounds or Less)

a. Coat all ferrous metal surfaces with P-10, wrap with greaseproof barrier material, and secure in place with tape.

b. Cushion items with cellulosic cushioning and individually pack submethod IC-1.

5-23. Mechanical Items and Assemblies (70 Pounds or Less)

a. Coat all ferrous metal surfaces of steering controls, power takeoffs, drive motors, flow dividers, helm units, helical gear shafts, steering gears, cylinders, couplings, propeller pullers, shafts, control units, bevel gear hubs, and assemblies (e.g., housing, gear, pinion, and clutch) with P-10. Wrap with greaseproof barrier material and secure in place with tape.

b. Coat interior surfaces of hydraulic-type items with operating fluid.

c. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (see figure 5-1).

5-24. Mechanical Items and Assemblies (More than 70 Pounds)

Coat all unpainted, ferrous metal surfaces of clutch assemblies, clutches, steering nozzles, stand assemblies, rudder assemblies, and nozzle assemblies with P-10. Wrap or cover preserved areas with greaseproof barrier material and secure with tape.

5-25. Curtain (Cockpit)

Pack cockpit curtains individually by submethod IC-1.

5-26. Windows (Metal) and Bulwark Assemblies

Cushion items with cellulosic cushioning material and package individually in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

5-27. Miscellaneous Marine Equipment

a. Coat exposed, unpainted, metal surfaces of drums, barrel capstan assemblies, ratchets, hanger assemblies, hoist bases, winch drums, anchors, end bar assemblies, boom pawls, circle segments, ramp angles, pneumatic wheels, boat cradles, and masts with P-1.

b. Ship large circle assemblies, anchors, boat cradles, and wheels (pneumatic) loose or secured to a skid-type base for ease in handling.

5-28. Gangplanks

a. Remove canopies, side skirts, bows, slats, and ropes from their installed location.

b. Coat exposed, unpainted, ferrous metal surfaces with P-1 and wrap with greaseproof paper.

c. Individually pack canvas and ropes by method III, using single-, double-, or triple-wall, water-resistant fiberboard boxes. Seal box with tape (fig 5-1).

d. Bundle disassembled components of similar description with metallic strapping.

e. Secure packed canvas, rope, and bundled components to the gangplank with metallic strapping.

Section V. FSG 22, RAILWAY EQUIPMENT

5-29. Shaft Assemblies

Preserve and pack shaft assemblies per paragraph 5-16 or 5-17, as applicable.

5-30. Valves

Preserve and pack valves per paragraph 5-11, as applicable.

5-31. Miscellaneous Railway Equipment (70 Pounds or Less)

a. Coat exposed, machined, metal surfaces of compressor intercoolers, piston assemblies, adjuster (slack brake), horns, gears, couplings, master cylinders, governors, and damper assemblies with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Coat interior surfaces of hydraulic-type items with operating fluid.

c. Cushion each item with cellulosic cushioning material and individually pack in weatherresistant fiberboard boxes. Close and seal box with tape (fig 5-1).

5-32. Armatures, Traction Motors, Generators, Exciters, and Exhausters (Vacuum)

a. Coat exterior machined surfaces with P-10, wrap with greaseproof barrier material, and secure in place with tape.

b. Coat interior metallic surfaces, as required, with P-10.

c. Cover openings that may permit direct entry of water with tape.

5-33. Couplers, Frames, Intercooler Compressors, Winches, and Duplex Brake Cylinders

a. Coat exposed machined surfaces with P-10, wrap or cover with greaseproof barrier material, and secure in place with tape.

b. Coat other exposed, unpainted, ferrous metal surfaces with P-1.

c. Cover openings that may permit direct entry of water with tape.

5-34. Wheel Sets, Wheels, and Axles

Coat exposed machined surfaces with P-1. Although packing is not required, items may be skidded to provide a means of handling.

5-35. Transmission and Gear Box Assemblies

Preserve and pack assemblies per paragraph 5-18.

5-36. Compressors

Preserve and pack compressors per paragraphs 3-3 and 3-4.

5-37. Cabs

a. Coat unpainted metal surfaces with P-1.

b. Coat rubber seals around doors with powdered talc.

c. Cushion windows with cellulosic cushioning material and secure in place with tape.

5-38. Truck Assemblies or Railway Car Trucks

a. Coat exposed machined surfaces with P-1.

b. Coat interior surfaces of journal boxes with P-10. Seal openings into journal box lids with tape.

c. Fill traction, motor-gear housings to the proper level with operating lubricant.

d. Cover openings into the traction motors with tape. Cover large openings with a double thickness of greaseproof barrier material and secure in place with tape.

5-39. Brake Cylinders

Cushion cylinders with cellulosic cushioning material and individually pack in triple-wall fiberboard boxes.

Section VI. TANK-AUTOMOTIVE COMPONENTS

5-40. Application

This section applies to tank-automotive and land mobility components of close-support equipment. This section is intended as general instructions for field use in preparing components for shipment and immediate use.

5-41. General Instructions

Preparation of components for shipment should begin immediately after required functional testing and inspection to determine the condition of the item.

a. Disassembly. Components will be disassembled or reconfigured when necessary to meet transport clearance requirements. Components may also be disassembled when such disassembly will provide for more efficient and economical transportation. A disassembled component should not be shipped if the receiving activity will not be able to reassemble the component. Parts removed from a component will be labeled and matchmarked to aid reassembly/disassembly.

b. Cleaning and drying. Components should be clean and free of foreign matter. Critical surfaces should be cleaned to remove corrosion, soil, grease, perspiration, and any acid or alkaline residue. Petroleum base solvents should not be used on interior parts of air, oxygen, or vacuum systems, and petroleum solvents should not be used in hydraulic systems. Cleaning methods should be per MIL-P-116. Cleaning materials and cleaning operations must conform to safe practices. Cleaning must be compatible with component composition and intended use.

c. Preservation. Each critical surface susceptible to corrosion or deterioration by environmental conditions should be protected by application of compatible preservatives per MIL-P-116. Internal component surfaces shall be preserved with operational fluids and lubricants. Methods of preservation conforming to MIL-P-116 should be applied per the chemical and physical characteristics of the component. Items which require only physical and mechanical protection and do not require a preservative shall be prepared per method III. Items which require maximum protection from watervapor such as certain electromechanical, electrical, and hydroscopic components shall be prepared per method II. Other items which require watervaporproof protection shall be prepared per method IA. Items which require only water resistant protection and items which require only a preservative for protection from water shall be prepared per method IC and method I, respectively. Exterior, unpainted, ferrous surfaces shall be preserved with thin film preservative, grade 4 of MIL-C-16173. Unpainted ferrous surfaces which will be protected from water by sealed barrier material such as in methods II, IA, or IC shall be preserved with preservative oil, VV-L800.

d. Packaging. Each component which requires mechanical or physical protection shall be packaged to complete the required method of preservation and provide protection for the component. Components should also be packed to protect other components in the same shipment and to provide efficient handling. Items protected by application of a preservative shall be wrapped in a barrier material conforming to type II, grade A, class 2 of MIL-B-121. Small components requiring cushioning shall be wrapped in PPP-C-1752. Small components requiring blocking shall be provided with fiberboard pads conforming to type CF of PPP-F-320. Small components shall be placed in bags conforming to MIL-P-117 or placed in fiberboard boxes conforming to PPP-B-636. The domestic class of fiberboard is used inside bags, and weather-resistant class is used outside bags. Large components or assemblies requiring method II protection such as engines, transmissions, and final drives shall be packaged in their reusable container, properly sealed, and secured. Large components and assemblies not having a reusable container shall be protected by barrier material

conforming to MIL-E-6060 and shall be packaged in wood boxes conforming to PPP-B-601 (plywood) or PPP-B-621 (lumber).

e. Packing. Components should be consolidated or grouped for shipment and placed in shipping containers or on pallets for handling.

f. Marking. The unit packaging and packing should be marked per MIL-STD-129.

Section VII. FSG 34, METALWORKING MACHINERY, AND FSG 35, SERVICE AND TRADE EQUIPMENT

5-42. Welding Machine and Welding Sets

Preserve and pack items per paragraph 4-24.

5-43. Miscellaneous Service Equipment

Preserve and package washer extractors, dryer tumbler assemblies, water heater assemblies, air heater tumblers, and shoe repair and clothing repair shops per instructions prescribed in section I of chapter 4 for utility and support equipment.

5-44. Cylinder Assemblies

Preserve and pack cylinder assemblies per paragraph 5-llf.

5-45. Miscellaneous Components (5 Pounds or Less)

Cushion air cylinder assemblies and formula controls with cellulosic cushioning material and individually unit pack submethod IC-1.

5-46. Miscellaneous Components (70 Pounds or Less)

a. Coat machined surfaces of blower exhaust assemblies, drive brake assemblies, drive shaft cylinders, and spider weldments with P-10. Wrap preserved surfaces with greaseproof barrier material and secure in place with tape.

b. Cushion items with cellulosic cushioning, individually pack in weather-resistant fiberboard boxes, close and seal with tape (see figure 5-1), and mark per paragraph 3-5.

5-47. Main Bearing

Coat machined surfaces with P-10, wrap with greaseproof barrier material, and secure in place with tape.

Section VIII. FSG 36, SPECIAL INDUSTRY MACHINERY

5-48. Bellows Assembly

Cushion bellows assembly with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape.

5-49. Printing Presses, Offset

Preserve and pack offset printing presses per paragraph 4-47.

5-50. Cylinder Assemblies

Preserve and pack cylinder assemblies per paragraph 5-llf.

5-51. Conversion-storage-charging Unit, Carbon-dioxide (Semitrailer-mounted)

Preserve and pack carbon-dioxide units per paragraph 4-28.

5-52. Air Compressors Preserve and pack air compressors per paragraph 4-3.

5-53. Hopper Assemblies

Clean and dry hopper assemblies per paragraph 3-3 and as specified in MIL-C-52211. Preserve and pack items per provisions contained in paragraph 4-28 for oxygen-nitrogen generating plants and related equipment.

5-54. Generator Assembly, Acetylene

Preserve and pack acetylene generator assemblies per paragraph 4-28.

5-55. Water Pumps

Preserve and pack water pumps per paragraph 4-4.

5-56. Oxygen-nitrogen Related Equipment

Clean and dry manifold chargings, pump assemblies, refrigeration exchangers, precoolers, vaporizer assemblies, and heat exchangers per paragraph 3-3 and as specified in MIL-C-52211. Preserve and pack items per provisions contained in paragraph 4-28 for oxygen-nitrogen related equipment.

5-57. Pump Assembly, Oil

a. Coat interior surfaces with operating fluid and allow to drain.

b. Coat exterior, unpainted, ferrous metal surfaces of items with P-10, wrap with greaseproof barrier material, and secure in place with tape.

c. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-58. Panel Assemblies

a. Cushion dial glasses and control knobs with cellulosic cushioning material and secure in place with tape.

b. Seal opening into items that permit direct entry of water with tape or a combination of tape and greaseproof barrier material.

Section IX. FSG 38, CONSTRUCTION, MINING, EXCAVATING, AND HIGHWAY MAINTENANCE EQUIPMENT

5-59. Cylinder Assemblies

Preserve and pack cylinder assemblies per paragraph 5-11*f*

5-60. Valves and Mechanical Assemblies

Preserve and pack four-way valves, valve assemblies, sprocket drive assemblies, traction drives, winch assemblies, drive assemblies, and housing assemblies per paragraphs 5-18 and 5-19.

5-61. Paving Breakers, Air Motors, and Control Valve Assemblies

Preserve and pack items per paragraph 4-2.

5-62. Miscellaneous Construction Equipment

Preserve and pack pneumatic drills, roll crushers, push beam assemblies, A-frames, blade assemblies, fairleaders, rotary tillers, drill-rig assemblies, strikeoff assemblies, reducers, and drive and rotor assemblies per provisions contained in section II of chapter 4 for construction equipment.

5-63. Mechanical Assemblies and Components (70 Pounds or Less)

a. Coat exposed, machined surfaces of lubricator assemblies, chuck assemblies, chest valve drifters, backheads, crank assemblies, and motor and clutch assemblies with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion items with cellulosic cushioning, individually pack in weather-resistant fiberboard boxes, close and seal with tape (fig 5-1), and mark per paragraph 3-5.

5-64. Oil Pump, Hydraulic

a. Coat interior surfaces with operating fluid and allow to drain.

b. Coat exterior, unpainted, ferrous metal surfaces of the item with P-10, wrap with greaseproof barrier material, and secure in place with tape.

c. Cushion items with cellulosic cushioning, individually pack in weather-resistant fiberboard boxes, close and seal with tape (fig 5-1), and mark per paragraph 3-5.

5-65. Outrigger Crane

Coat unprotected metal surfaces with P-1.

5-66. Pressure-reducing Stations

a. Coat exterior unprotected metal surfaces with P-1.

b. Seal openings with tape or a combination of tape and greaseproof barrier material.

5-67. Heater, Concrete Mixer

Preserve and pack items per provisions contained in section II of chapter 4 for construction equipment.

Section X. FSG 39, MATERIALS HANDLING EQUIPMENT

5-68. Truck, Lift, Fork

Preserve and process forklift trucks per paragraph 4-37.

5-69. Cylinder Assemblies

Preserve and pack cylinder assemblies per paragraph 5-18.

5-70. Crane Attachments

Preserve and pack crane attachments per paragraph 4-45.

5-71. Pump, Hydraulic

a. Coat interior surfaces with operating fluid and allow to drain.

b. Coat exterior, unpainted, ferrous metal surfaces of hydraulic pumps with P-10. Wrap coated surfaces with greaseproof barrier material and secure in place with tape.

c. Cushion pumps with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-72. Miscellaneous Components

Preserve and pack drive assemblies, transmissions, hydraulic motor assemblies, winches, and chain hoists per paragraphs 5-18.

5-73. Elevator Buckets

Preserve and pack elevator buckets per instructions contained in section II of chapter 4 for construction equipment.

Section XI. FSG 41, REFRIGERATION, AIR-CONDITIONING, AND AIR-CIRCULATING EQUIPMENT, AND FSG 42, FIREFIGHTING, RESCUE, AND SAFETY EQUIPMENT

5-74. Refrigeration Components

Preserve and pack refrigeration units, refrigerators, air conditioners, compressors, and condensing unit per the instructions contained in section I of chapter 4.

5-75. Fan Assemblies and Power Supplies

a. Coat exterior, unpainted, ferrous metal surfaces with P-10. Wrap coated surfaces with greaseproof barrier material and secure in place with tape.

b. Seal openings into the items with tape or a combination of tape and greaseproof barrier material.

5-76. Pumping Unit Assemblies and Hose Reels

a. Coat interior surfaces of pumps with P-9 and allow to drain.

b. Coat exterior, unprotected metal surfaces with P-1.

c. Seal openings into the items with tape or a combination of tape and greaseproof barrier material.

5-77. Regulator Assemblies

Cushion assemblies with cellulosic cushioning, individually pack in a weather-resistant fiberboard box, close and seal box with tape (fig 5-1), and mark per paragraph 3-5.

Section XII. FSG 43, PUMPS AND COMPRESSORS

5-78. Compressors

Preserve and pack compressors per paragraph 4-3.

5-79. Crankshafts

Preserve and pack crankshafts per paragraph 5-41.

5-80. Cylinder Assemblies

Preserve and pack cylinder assemblies per paragraph 5-11*f.*

5-81. Vacuum Pumps

a. Coat exterior, unpainted, ferrous metal surfaces of vacuum pumps with P-10. Wrap coated surfaces with greaseproof barrier material and secure in place with tape.

b. Seal openings into the items with tape or a combination of tape and greaseproof barrier material.

5-82. Intercoolers

a. Coat exposed, unpainted, metal surfaces with P-1.

b. Seal openings with tape.

5-83. Compressor Rotor Assembly Blowers and Coolers (70 Pounds or Less)

a. Coat exposed, machined surfaces of rotor assemblies with P-10, wrap coated surfaces with greaseproof barrier material, and secure in place with tape.

b. Cushion items with cellulosic cushioning material and secure in place with tape.

5-84. Hydraulic Motor and Oil Pumps and Hydraulic Pumps

a. Coat interior surfaces with operating fluid and allow to drain.

b. Coat exterior, unpainted, ferrous metal surfaces with P-10. Wrap coated surfaces with greaseproof barrier material and secure in place with tape.

c. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-85. Valve Assemblies

Preserve and pack valve assemblies per paragraph 5-11.

5-86. Pumps (Water and Petroleum)

Preserve and pack pumps per the instructions contained in paragraph 4-4.

5-87. Filter Separators and Purifiers

a. Coat exterior, unpainted, ferrous metal surfaces of items with P-1.

b. Leave water drain valves open for complete draining.

c. Cushion sight gauges with cellulosic cushioning material and secure in place with tape.

d. Seal openings into units, except drain valves, with tape or a combination of tape and greaseproof barrier material.

Section XIII. FSG 44, FURNACE, STEAM PLANT, DRYING EQUIPMENT, AND NUCLEAR REACTORS; FSG 45, PLUMBING, HEATING, AND SANITATION EQUIPMENT; AND FSG 46, WATER PURIFICATION AND SEWAGE TREATMENT EQUIPMENT

5-88. Miscellaneous Components

a. Drain the entire water and fuel system including pumps, line strainers, valves, lines, and all connections of heat exchangers, exchanger assemblies, core assemblies, fluid coolers, boilers, and evaporator shell assemblies. Reassemble fuel systems, leave drain valves open, and dry fuel and water systems with dry compressed air.

b. Preserve water pumps per paragraph 4-4.

c. Seal openings into units, excluding drain valves, with tape or a combination of tape and greaseproof barrier material.

d. Cushion gauges with cellulosic cushioning material and secure in place with tape.

e. Coat exterior, unpainted metal surfaces with P-1.

f. Cushion parts weighing 70 pounds or less with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Mark per paragraph 3-5.

g. Preserve and pack items not specifically identified using instructions for similar-type items possessing the same physical or mechanical characteristics.

5-89. Heaters and Compressors

Preserve and pack heaters and compressors per the instructions contained in section I of chapter 4.

5-90. Oil Burners

a. Coat interior and exterior surfaces with P-10, wrap with greaseproof barrier material, and secure in place with tape.

b. Cushion oil burners with cellulosic cushioning material and individually pack in triple-wall fiberboard boxes. Seal with tape (fig 5-1). Mark per paragraph 3-5.

Section XIV. FSG 48, VALVES, AND FSG 49, MAINTENANCE AND REPAIR SHOP EQUIPMENT

5-91. Valves (70 Pounds or Less)

Preserve and pack valves (70 pounds or less) per paragraph 5-11b.

5-92. Valves (More than 70 Pounds)

a. Coat interior surfaces with P-10 and allow to drain.

b. Coat exterior surfaces with P-1.

c. Seal openings with tape or a combination of tape and greaseproof barrier material.

d. Pack in triple-wall, wood, or cleated-plywood boxes. Mark per paragraph 3-5.

5-93. Component Items (5 Pounds or Less)

a. Coat the interior and exterior surfaces of oil pumps with P-10, wrap with greaseproof barrier material, and secure in place with tape.

b. Cushion oil pumps, leakage testers, hose test blocks, panel indicators, oil pump assemblies, and test block assemblies with cellulosic cushioning material and individually unit pack submethod IC-1. Mark per paragraph 3-5.

5-94. Body, Pneumatic Gun, and Panel Assemblies

Coat unprotected metal surfaces with P-1, pack in weather-resistant fiberboard boxes, and seal box with tape. Mark per paragraph 3-5.

5-95. Component Items (70 Pounds or Less)

a. Coat machined surfaces of hydraulic block assemblies, test block assemblies, blower tool kits, reciprocating cylinders, and reel and hose assemblies with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion items with cellulosic cushioning and individually pack in weather-resistant fiberboard boxes. Seal box with tape (see figure 5-1). Mark per paragraph 3-5.

5-96. Calibrator Sets and Pressure Testers

a. Coat exterior, unpainted, ferrous metal surfaces with P-10. Wrap with greaseproof barrier material and secure with tape.

b. Seal openings with tape or a combination of tape and greaseproof barrier material.

5-97. Rack Railway Valves

Coat unprotected metal surfaces with P-1.

Section XV. FSG 54, PREFABRICATED STRUCTURES AND SCAFFOLDING

5-98. Inflatable Structures and Structural Components

a. Disassemble inflatable T-section corridors, end panel assemblies, inflatable shelters, and air chambers per TM 10-5410-222-13.

b. Fold items per the folding instructions provided for placement in shelter containers.

c. Cushion with cellulosic cushioning material those metal surfaces which may chafe the parts when folded.

d. Pack items in shelter containers when available. When shelter containers are not provided, pack items in cleated-plywood boxes. Mark per paragraph 3-5.

5-99. Component Hardware

a. Coat unpainted, ferrous metal surfaces of fitting plates, ejection plugs, outboard motor brackets, and extrusion decks with P-1.

b. Pack items in weather-resistant fiberboard boxes or wood boxes subject to the weight limitations of the containers. Mark per paragraph 3-5.

5-100. Net Rope Assemblies

Individually pack nets in weather-resistant fiberboard boxes. Mark per paragraph 3-5.

5-101. Hydraulic Cylinders

Preserve and pack hydraulic cylinders per paragraph 5-11.

5-102. Axle and Carrier, Transmission and Marine-drive Assemblies

Preserve and pack items per paragraph 5-18.

5-103. Component Items (70 Pounds or Less)

a. Coat exposed machined surfaces of pin assemblies, slip clutches, panel assemblies, spider clutches, roller connectors, and female eye assemblies with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-104. Hydraulic Motors

a. Coat interior surfaces with operating fluid and allow to drain.

b. Coat exterior, unpainted, ferrous metal surfaces with P-10. Wrap motors with greaseproof barrier material and secure in place with tape.

c. Cushion items with cellulosic cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-105. Valve Assemblies (More than 70 Pounds)

Preserve and pack valves per paragraph 5-92.

5-106. Straight Shafts (More than 70 Pounds)

Preserve and pack shafts per paragraph 5-24.

5-107. Rear Wheel and Suspension Installations

a. Coat interior surfaces with operating fluid and drain.

b. Coat exterior, unpainted, ferrous metal surfaces with P-10. Wrap with greaseproof barrier material and secure with tape.

5-108. End Sections and Truss Assemblies

Coat unprotected metal surfaces with P-1.

Section XVI. FSG 58, COMMUNICATION, DETECTION, AND COHERENT RADIATION EQUIPMENT, AND FSG 59, ELECTRICAL AND ELECTRONIC EQUIPMENT COMPONENTS

5-109. Electronic Components (5 Pounds or Less)

Cushion items with cellulosic cushioning material and individually unit pack method IC-3.

CAUTION

Circuit cards and other electronic components that have been identified as ESDS items shall be preserved submethod IA-8 and as specified in section XXIII herein.

5-110. Relay Boxes (70 Pounds or Less)

Cushion items with cellulosic cushioning and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

Section XVII. FSG 61, ELECTRIC WIRE AND POWER DISTRIBUTION EQUIPMENT

5-111. Generators, Motors, and Alternators

Preserve and pack generators, motors, alternators, starter motors, and motor generators per instructions contained in sections II and VI of this chapter.

5-112. Electric and Electronic Components (5 Pounds or Less)

a. Coat exposed machined surfaces of panel assemblies, electrical chassis, contact assemblies, regulators, motors, check valves, converters, relay subassemblies, rectifier assemblies, voltage regulator assemblies, cooler assemblies, and governors with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion all items with cellulosic cushioning material and individually unit pack submethod IC-1.

5-113. Electric and Electronic Components (100 Pounds or Less)

a. Coat exterior, unpainted, ferrous metal surfaces of accessory cases, alternators, amplifiers, armatures, battery chargers, box assemblies, breakers, cables, coils, control boxes, control units, doors, electrical rings, exciters, frame and stators,

generators, governors, housing assemblies, motors, power supplies, protective panels, racks, rectifiers, regulators, relays, rotors, sensing units, static exciters, stators, switchboards, transducers, winterization kits, and wiring harnesses with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion items with cellulosic cushioning and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1).

5-114. Electric and Electronic Components (More than 100 Pounds)

a. Coat exterior nonprecision surfaces of armatures, commutators, control boxes, controllers, distribution mains, exciters, motor field windings, panels, power distribution panels, power supplies, regulators, rotors, stator core mains, stator frame, and stator assemblies or components with P-1.

b. Coat precision surfaces of the item with P-10. Wrap with greaseproof barrier material and secure with tape.

c. Seal openings into housings or enclosures with tape or a combination of tape and greaseproof barrier material.

d. Shroud items that require additional protection from the weather with waterproof barrier material prior to packing. Secure the barrier with tape.

5-115. Storage Batteries

a. Wrap ends of cables with greaseproof barrier material and secure in place with tape. Coil removed cables and secure with three equally spaced ties of tape or twine. Secure the removed cables to the battery in a manner that prevents movement or damage during handling and transit.

b. Protect batteries shipped in a charged condition against short circuiting with tape or any other suitable means.

c. Preserve and pack sulfuric acid electrolyte per 0-5-801.

d. Pack batteries in a manner to ensure that they will be in an upright position during handling, shipment, and storage. Pack batteries weighing less than 1,000 pounds in wood boxes. Pack batteries weighing 1,000 pounds or more in sheathed crates. Construct boxes or crates per instructions contained in TM 38-230-2. Mark per paragraph 3-5.

Section XVIII. FSG 62, LIGHTING FIXTURES AND LAMPS, AND FSG 63, ALARM AND SIGNAL SYSTEMS

5-116. Supplementary Equipment and Light Sets

Preserve and pack supplementary equipment and light sets per instructions contained in paragraph 4-36.

5-117. Ship Indicator

Cushion item with cellulosic cushioning material and pack individually in triple-wall fiberboard boxes. Seal box with tape (fig 5-1). Mark per paragraph 3-5.

Section XIX. FSG 66, INSTRUMENTS AND LABORATORY EQUIPMENT, AND FSG 67, PHOTOGRAPHIC EQUIPMENT

5-118. Laboratory and Photographic Equipment (5 Pounds or Less)

a. Coat exterior, unpainted, ferrous metal surfaces of amplifiers, ammeters, armatures, ball and stud assemblies, bushings and brackets, chronometer cases, compensation networks, corsair compasses, connectors and caps, crystal oscillators, data detectors and receivers, distribution boards, dividers, double dividers, electronic frequency converters, end plates, flow thermostats, fluid regulators, frequency counters and meters, gauges, generators, humidity indicators, heading indicators, integrators, meters, microwave packages, mounting flanges, oil indicators, oscillators, phase detectors, power supplies, pressure dial gauges, process timers, pyrometers, radio frequency data, safety locks, shipping cans, steering valves, strut master cylinders, tachometers, temperature indicators, thermostats, transformers, transmitters, tuning klystrons, valves, voltmeters, and wattmeters with P-10. Wrap the preserved areas with greaseproof barrier material and secure in place with tape.

b. Cushion each item with cellulosic cushioning and individually unit pack submethod IC-1.

5-119. Laboratory Equipment (100 Pounds or Less)

a. Coat exterior, unpainted, ferrous metal surfaces of adapter casters, barometers, casters, con-

trol panels, cylinder and control assemblies, frequency converters, gyromirrors, gyrosupport jigs, hydrographs, master compasses, microwave units, power supplies, pumps, sensitive elements, servomechanisms, unit brake controls, and universal joints with P-10. Wrap preserved areas with greaseproof barrier material and secure in place with tape.

b. Wrap each item with cellulosic cushioning material and individually pack in weatherresistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-120. Gyrocontrol Unit and Magnetic Sensors

Place items in carrying cases and individually unit pack submethod IC-1. When a carrying case is not furnished, cushion the items with nondusting cushioning material and individually pack in weather-resistant fiberboard boxes. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-121. Chronometers

Package each chronometer with its carrying case in a weather-resistant fiberboard box. Cushion the chronometer with six weather-resistant fiberboard inserts placed on each end, side, top, and bottom. Close and seal box with tape (fig 5-1). Mark per paragraph 3-5.

5-122. Sextants and Compasses

Cushion each item with cellulosic cushioning, individually pack in weather-resistant fiberboard box, close and seal box with tape (fig 5-1), and mark per paragraph 3-5.

5-123. Gyrocompasses

Seal openings of the item that permit direct entry of water with tape or a combination of tape and greaseproof barrier material. Pack each compass in a cleated plywood box. Cushion, block, and brace, as required, per instructions contained in TM 38-230-2. Mark per paragraph 3-5.

5-124. Tester Flexural Strength

a. Coat exterior, unpainted, ferrous metal surfaces with P-1.

b. Oil parts of the unit that require lubrication with P-10 and secure in place to prevent movement and damage.

c. Place the gauge bar unit or proving ring and gauges in the provided carrying cases. Cushion the items within the carrying cases with cellulosic cushioning material to prevent movement.

d. Coat exterior surfaces of the jack housing with operating fluid.

e. Place parts, tools, and accessories in the carrying cases provided.

5-125. Sink, Photoprocess

a. Cushion repair parts with cellulosic cushioning material and unit pack submethod IC-2. Place the package in the storage compartment and secure with tape to prevent movement during shipment.

b. Secure storage compartment doors with filament-reinforced tape.

Section XX. WEAPONS AND RELATED ITEMS

5-126. General

This section provides preservation and packing instructions for weapons and related items which have been assigned to the U.S. Army Armament, Munitions, and Chemical Command as the NICP.

5-127. Altimeters, Voltmeters Multimeters, Distribution Boxes, Regulators, Control Panels, Analyzers, Counters, and Solenoids

a. Preservative. Do not apply preservative.

b. Items weighing less than 40 pounds.

(1) Wrap each item in wrapping paper and secure with tape. Overwrap item in cellulosic or unicellular (closed cell) polypropylene foam cushioning and secure with tape.

(2) Unit pack submethod IA-8.

(3) Place a quantity of items, each weighing 5 pounds or less, in a fiberboard box, cushion with cellulosic cushioning, and close with tape (fig 5-1).

(4) Individually pack items weighing over 5 pounds each in a fiberboard box and close with tape (see figure 5-1).

c. Items weighing 40 to 80 pounds.

(1) Wrap individual items in neutral wrapping paper and overwrap in cellulosic or unicellular (closed cell) polypropylene cushioning. Unit pack submethod IA-8.

(2) Pack one item in a doubleor triple-wall fiberboard box. Cushion with cellulosic or unicellular (closed cell) polypropylene cushioning. Close double-wall fiberboard boxes with tape. Close triple-wall fiberboard boxes with tape and reinforce with metallic or nonmetallic strapping or

filament-reinforced tape. Mark per paragraph 3-5.

d. Items weighing 80 pounds and over.

(1) Wrap individual items in neutral wrapping paper, overwrap with waterproof barrier material, and secure with tape.

(2) Pack one item in a wood or plywood box. Immobilize each item with bound fiber or wood blocking. Nail and secure wood braces or holddowns per TM 38-230-2.

5-128. Arm Racks

a. Preserve unpainted surfaces with P-1. Secure locking device firmly in place with wire.

b. Pack one or more arm racks in an open wood crate and separate the racks with waterproof barrier material. Racks may be transported for short distances without open, wood-crate protection when controlled transportation is used.

5-129. Barrels and Barrel Assemblies

a. Clean with petroleum solvent, process C-3, and dry with any of the procedures described in TM 38-230-2.

b. Preserve the barrel with VCI wrap. Insert VCI bore strip into the barrel bore and wrap entire assembly with VCI wrap. An alternate method shall be to preserve all bare metal surfaces with P-9, then thoroughly drain. After draining, wrap with greaseproof barrier material and secure with tape.

c. Close barrier bag by heat sealing.

d. Pack 10 barrels in a fiberboard box in 2 layers, with 5 barrels in each layer. Place a sheet of fiberboard between the layers. Close and seal the box with tape (fig 5-1). Mark per paragraph 3-5.

5-130. Blades, Trails, Drawbars, Floats, Cradles, and Related Large Assemblies

a. Clean by using any of the processes in TM 38-230-1 that will not harm the item.

b. Preserve unpainted surfaces with P-1.

c. Pack items weighing less than 40 pounds one each in a fiberboard box. Cushion with cellulosic cushioning or bound fiber to immobilize the item. Close and seal the box with tape (fig 5-1).

d. Pack items weighing 40 pounds or more one each in a wood or plywood box or open wood crate. Immobilize with wood blocking and bracing.

e. Shroud items packed in open crates with heavy duty waterproof barrier material and secure with tape.

5-131. Blankets, Electric

a. Do not apply preservative.

b. Fold each blanket section compactly to its minimum dimension. Exercise care to ensure that electrical cables in the blanket are not kinked or broken during folding.

c. Unit pack each blanket section individually method III in a fiberboard box and close and seal with tape (fig 5-1).

5-132. Bushings, Bearings, Races, Gears, Gear Sectors, and Turret Rings

a. Clean by process C-5 and dry by any of the procedures described in TM 38-230-1 that will not harm the item.

b. Apply P-11. However, prelubricated items require no additional preservative.

c. Individually wrap items weighing less than 10 pounds in a greaseproof barrier material and unit pack submethod IC-1.

d. Pack a quantity of like items in a fiberboard box and close and seal with tape (fig 5-1).

e. Wrap items weighing 10 pounds or more in a greaseproof barrier material, overwrap with neutral wrapping paper, and secure with tape.

f. Unit pack by method III each item weighing 10 pounds or more in a fiberboard box and close with tape (fig 5-1).

g. Pack a quantity of like packages in a wood or plywood box. Mark per paragraph 3-5.

5-133. Cable Assemblies, Cables, or Wiring Harnesses

a. Unit pack items less than 10 inches in length one each in a film bag and close by heat seal, staple, or tape.

b. Unit pack all other units method III in coils of approximately 12 inches in diameter and secure in at least two places with tape.

c. Depending on the size of the item, pack a quantity of like items in a fiberboard box and seal with tape (fig 5-1). Mark per paragraph 3-5.

5-134. Cannon (Tube)

a. Clean interior bore surfaces of the cannon by process C-5. Clean exterior, unpainted surfaces by process C-3. In addition, clean cannon bore with brushes or cloth saturated with rifle bore cleaner and follow with a solvent wash.

b. Roll a strip of VCI material into a tube with the treated surfaces to the outside. Insert the VCI tube into the cannon bore through the entire length of the bore and chamber. However, do not

allow the VCI tube to obstruct the bore or chamber because of either kinking or forcing. Cover the preserved exterior surfaces with waterproof/greaseproof wraps, folding the horizontal seams downward. Secure all seams with waterproof tape. Insert a watervaporproof, barrier-wrapped wood muzzle plug or close tolerance into the end of the cannon. Seal all seams and edges of the plug and secure to the adjacent surfaces of the cannon with waterproof tape. Cover the breech end of the cannon with a watervaporproof, barrier-wrapped wood plug and seal all seams and edges to adjacent surfaces with tape. Preserve unpainted exterior surfaces with P-9.

c. Do not apply additional packing to mounted cannons.

d. Pack one light or medium cannon tube (76 mm to 165 mm, inclusive) in a wood or plywood box (fig 5-2). Securely fasten tube in place with wood blocking and bracing.

e. Pack one heavy cannon tube (175 mm, 8-inch) on a shipping skid base (fig 5-3). Immobilize cannon to wood blocking of the shipping skid with five 2-inch metallic straps.

f. Unit pack weapon records submethod IC-3 and secure bag in a conspicuous location to the cannon tube with tape.

5-135. Canvas, Covers, Leather or Rubber Components, Hoses, and Similar Items

a. Clean leather components with saddle soap and warm water. Clean metal components such as rivets and buckles with a wire brush while protecting the leather or other nonmetallic components with a sheet metal guard.

b. Compactly fold qualified, flexible items. Roll hoses and like items into coils of minimum dimension but not to the extent where rolling will kink or crack the material. Secure rolled items in coils with tape.

c. Unit pack small hoses method III in greaseproof barrier bags and close by heat seal, staple, or tape.

d. Package larger items method III in fiberboard boxes and seal box with tape (fig 5-1).

e. Pack a quantity of like, packaged items in doubleor triple-wall fiberboard boxes. Close double-wall and triple-wall fiberboard boxes with tape and reinforce the boxes with filament reinforced tape or metallic or nonmetallic strapping. Mark all shipping containers per paragraph 3-5.

5-136. Chests, Ammunition Boxes, and Carrying Cases (Metallic and Nonmetallic)

a. Coat exposed, unpainted, ferrous metal surfaces such as latches or hinges with P-9 or wrap with VCI.

b. Place one item in a fiberboard box, immobilize the item with bound fiber or cellulosic cushioning, and close and seal the box with tape (fig 5-1).

c. Reinforce boxes containing heavy items with filament reinforced tape.

5-137. Cylinders, Replenishers, Equilibrators, Recuperator Assemblies, Buffer Assemblies, and Variable Recoil Mechanisms

a. Preserve unpainted metal surfaces with P-2, wrap preserved surfaces with greaseproof barrier material, and secure to adjacent surfaces with tape.

b. Wrap items weighing 40 pounds or less in cellulosic cushioning or bound fiber and place in a fiberboard box. Close box with tape (fig 5-1).

c. Pack items weighing more than 40 pounds in a wood or plywood box. Securely block and brace with nailed wood blocking to immobilize items. Use neutral wrapping paper between wood and metal surfaces.

5-138. Fairings, Shields, Access Panels, and Covers (Metallic and Nonmetallic)

a. Preserve unpainted, ferrous metal surfaces with P-1.

b. Pack in a singleor double-wall fiberboard box. Fill container voids with cellulosic cushioning or bound fiber and close with tape (fig 5-1).

5-139. Gymnasticator, Portable (Exerciser)

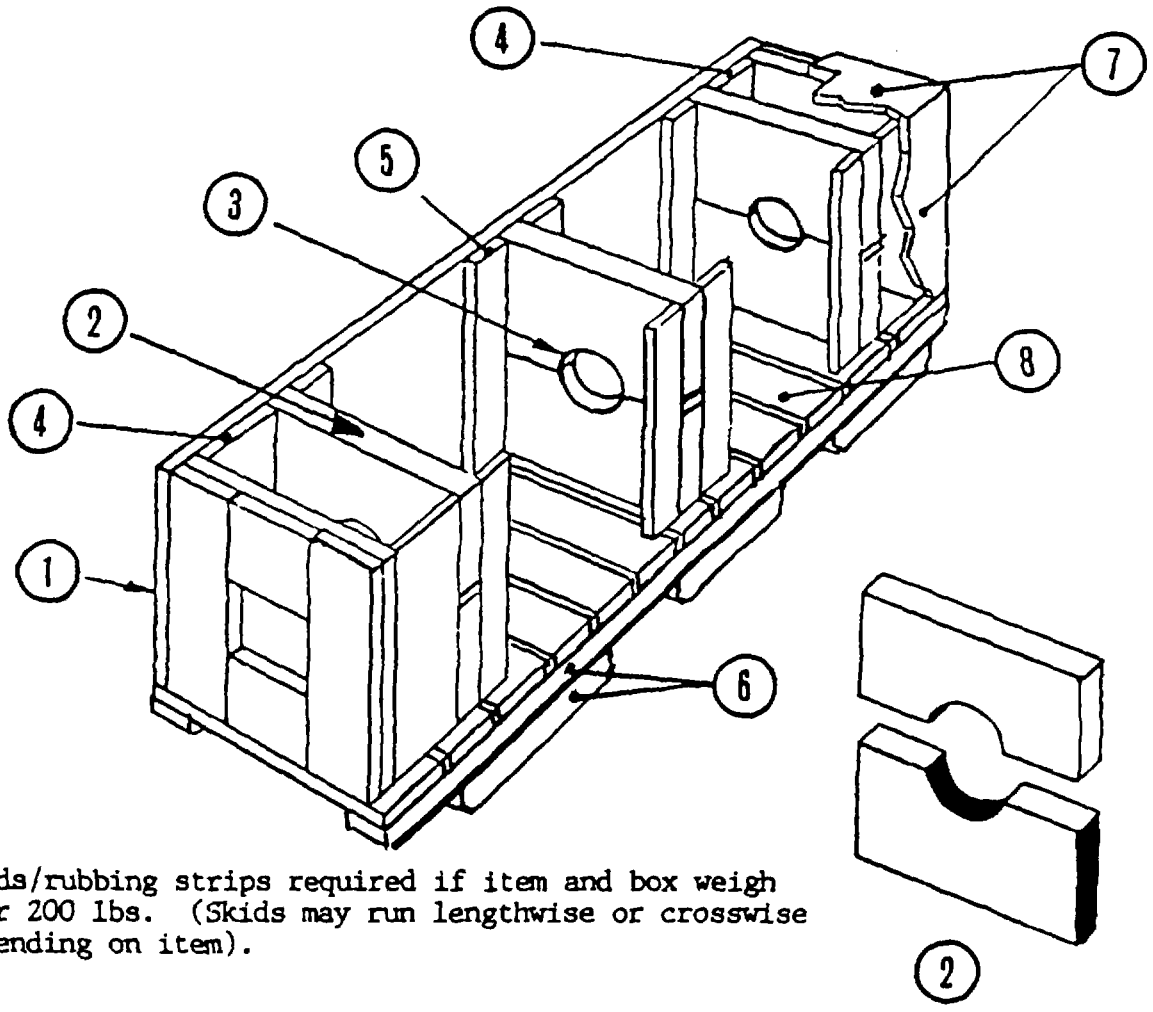
a. Process the exerciser for towaway condition.

b. Flush recoil oil through the system with its own source of supply. Close metal door (hood) of trailer and secure with fasteners provided. Seal all hose connections and openings with tape.

c. Process the gasoline engine per paragraph 5-41. Process the battery and trailer per paragraph 4-135.

CRANKSHAFTS, RODS, GUN TUBES & RELATED EQUIPMENT
Legend

REFERENCE No.	NOMENCLATURE
1	Nailed wood box
2	Supports - wood or plywood
3	Cut-out (size and shape per item)
4	Block - wood or plywood
5	Cleat, vertical - wood
*6	Skid - wood (size and location per item)
7	Sheathing - wood or plywood
8	Floor - wood (spacing ¼-½ inch)
9 (not shown)	Wedge - wood (drive in place between item and end of container to prevent lateral movement. Secure with duplex head nail).



*NOTE: Skids/rubbing strips required if item and box weigh over 200 lbs. (Skids may run lengthwise or crosswise depending on item).

Figure 5-2. Blocking, Bracing, and Anchoring Rods and Tube Shapes.

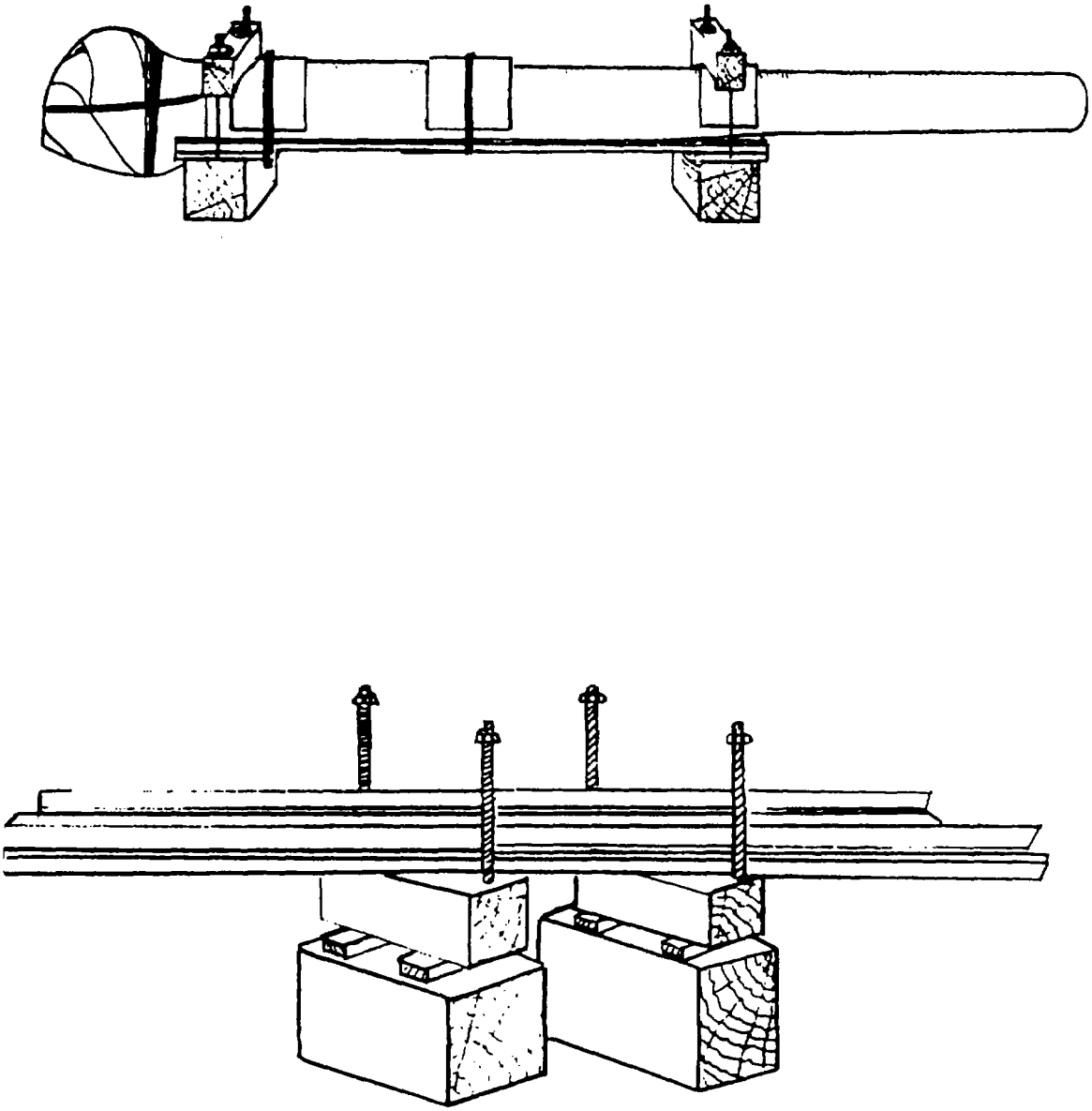


Figure 5-3. Skid With Breech Housing Cover.

5-140. Hardware (Small Nuts, Bolts, Screws, Washers, Pins, Retainers, Etc.)

a. Preserve with P-9.

b. Place a quantity of like items in a greaseproof barrier bag and unit pack submethod IC-1. If quantity appears too heavy and may rupture the bag, wrap the items in greaseproof barrier material prior to placing them in the bag.

c. Pack a quantity of bags in a fiberboard box and close with tape (see figure 5-1).

5-141. Handling Beams, Test Fixtures, Etc

a. Preserve critical items with P-11 and noncritical surfaces with P-1. Wrap P-11 preserved surfaces with greaseproof barrier material and secure with tape.

b. Pack items weighing 600 pounds or less individually in a wood or plywood box. Block and brace with nailed wood blocking (fig 5-4).

c. Pack items weighing more than 600 pounds individually in open wood crates (see figure 5-5). Block and brace with nailed wood blocking. Shroud item with waterproof barrier material and secure with tape.

5-142. Housings

a. Preserve unpainted surfaces with P-2, wrap preserved surfaces with greaseproof barrier mate

TRANSMISSION

Find No.	Qty	Nomenclature
1	1	Box, PPP-B-621, class 2, style 4
2	1	Block
3	2	Block
4	1	Block
5	4	Block
6	2	Brace

NOTE. All lumber sizes nominal except FIND No. 2.

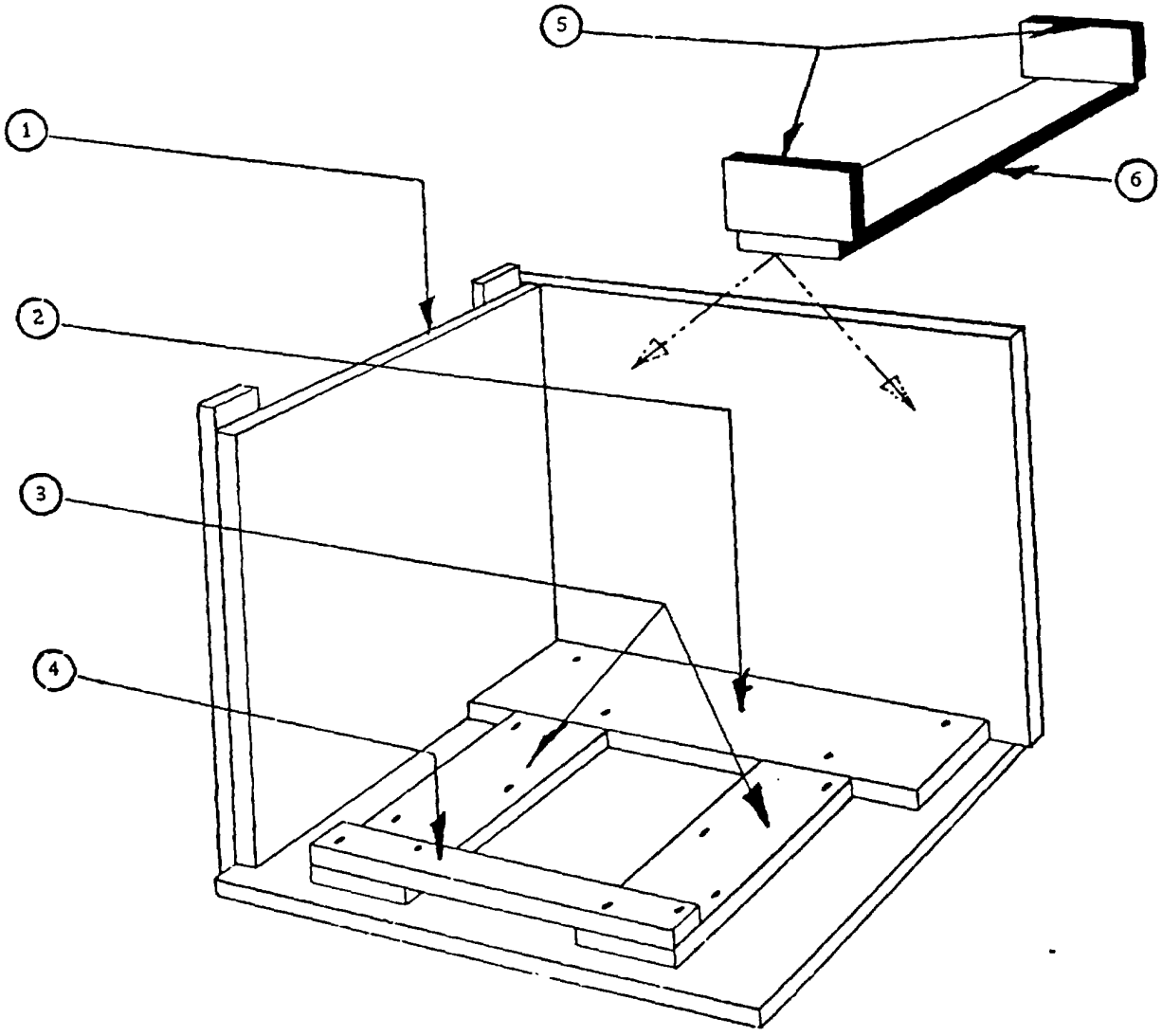


Figure 5-4. Loading, Blocking, and Bracing.

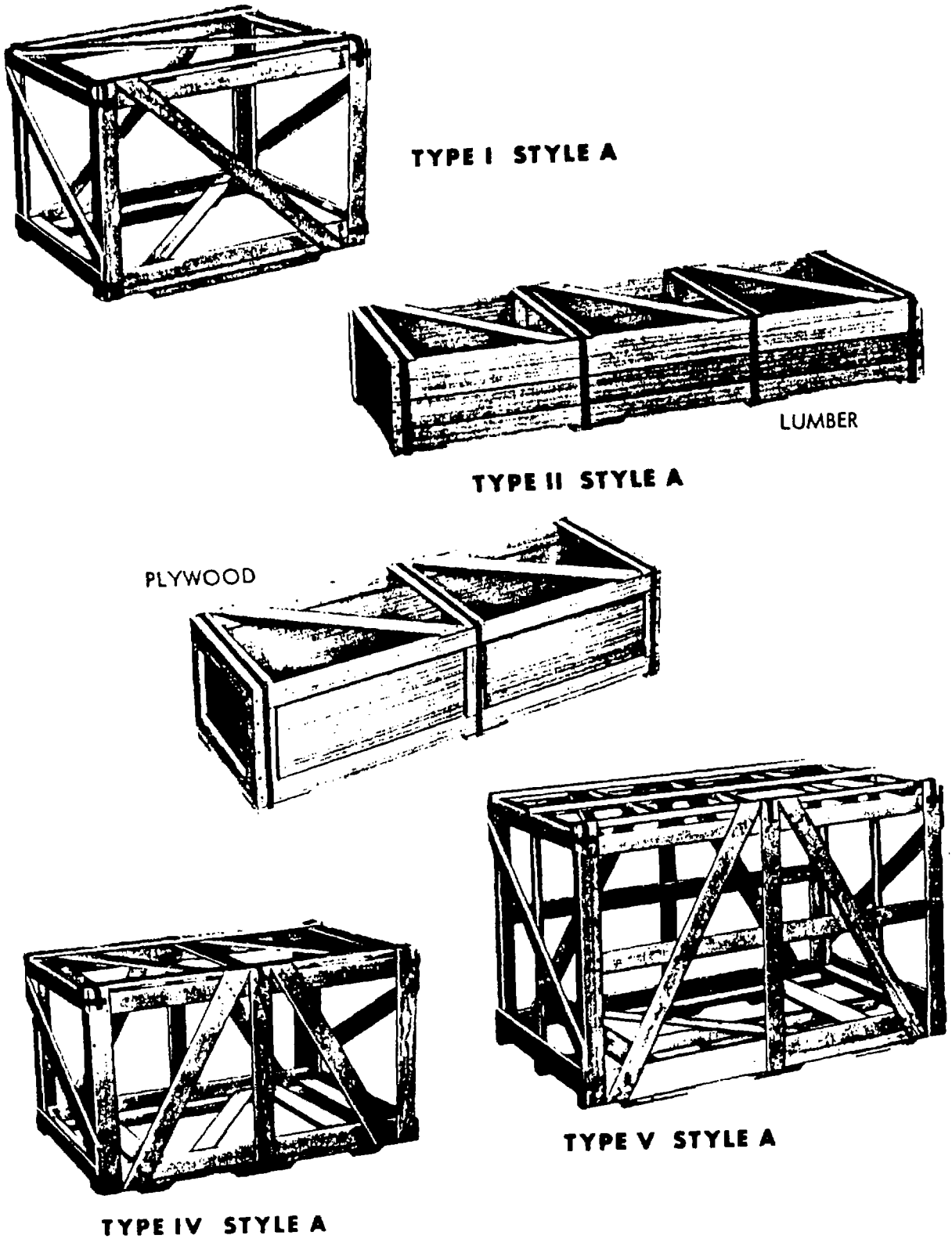


Figure 5-5. Open Crate, Nailed or Bolted

rial, and secure with tape.

b. Pack items weighing up to 40 pounds individually in a fiberboard box and cushion with cellulosic cushioning or bound fiber. Close box with tape (see figure 5-1). Mark per paragraph 3-5.

c. Pack items weighing more than 40 pounds individually in a wood or plywood box. Block and brace with nailed wood blocking (see figure 5-6).

5-143. Glassware, Prisms, and Vision Blocks

a. Clean and dry critical items (with optical surfaces) as described in paragraph 3-3. Do not apply a preservative.

b. Fold lens paper into a pad and cover optical surfaces. Secure pad in place with plastic caps or

DIFFERENTIAL

Find No.	Qty	Nomenclature
1	1	Nailed Wood Box W/ 3" X 4" Skids
2	1	Wood Block
3	2	Wood Block
4	2	Wood Block
5	2	Wood Block
6	2	Wood Block

NOTE: All blocking secured by nailing, lumber sizes nominal

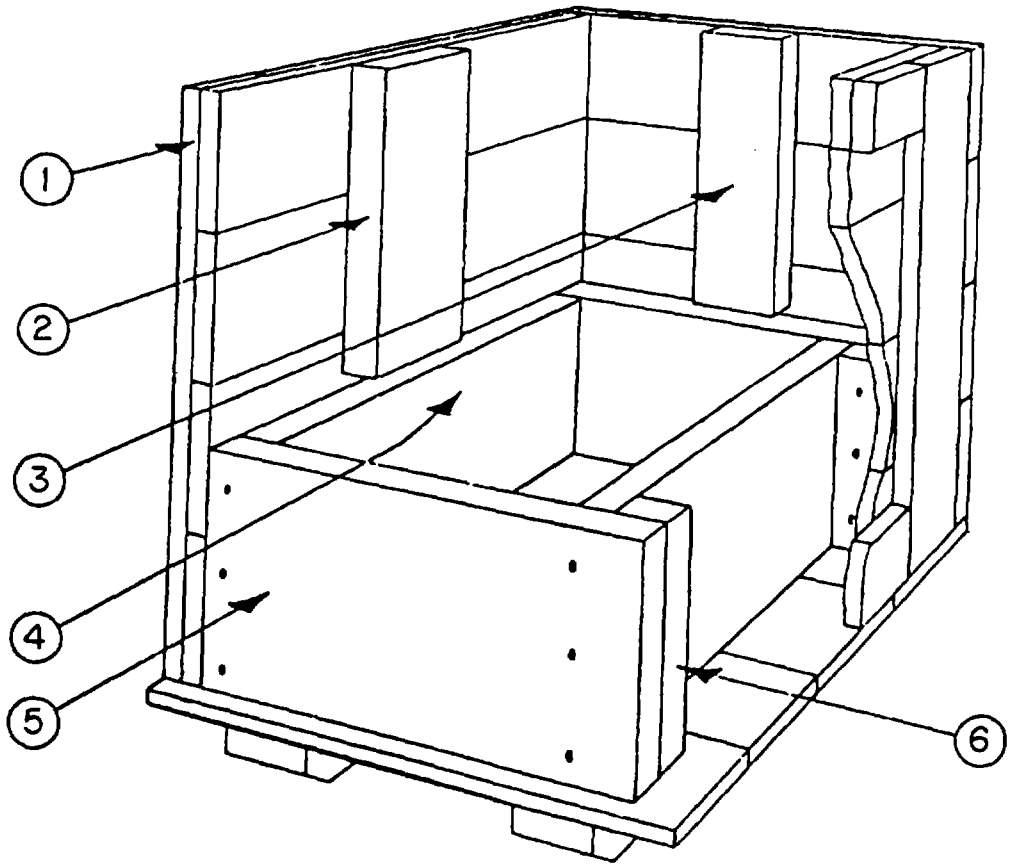


Figure 5-6. Loading, Blocking, Bracing, and Anchoring.

tape. Wrap each unit with neutral wrapping paper and secure with tape. Unit pack submethod IC-1.

c. Pack items weighing 10 pounds or less individually in a fiberboard box and immobilize with cellulosic cushioning. Close box with tape (see figure 5-1).

d. Pack items weighing more than 10 pounds individually in a fiberboard box and immobilize contents with bound fiber. Close box with tape (see figure 5-1).

e. Do not apply additional preservative to noncritical items (no optical surfaces). Pack as referenced above, except delete the lens paper.

5-144. Light Instruments, Blackout Lamps, Tail and Stop Lights, and Related Equipment

a. Do not apply a preservative.

b. Pack instruments with cases in their respective compartments and close with provided fasteners.

c. Wrap each instrument without a case in single-face paperboard and secure with tape. Pack a quantity of instruments in a singleor doublewall fiberboard box and close with tape (fig 5-1). Mark per paragraph 3-5.

5-145. Pistons, Buffer Pistons, Recoil Rods, Valve Assemblies, Glands, and Similar Equipment

a. Clean by process C-8. Be sure that all highly polished surfaces are thoroughly cleaned.

b. Preserve unpainted surfaces of items weighing up to 20 pounds with P-9 or wrap the entire item in VCI. Overwrap with greaseproof wrapping paper and unit pack submethod IC-1. Pack one or more items in a fiberboard box. Separate heavier items with bound fiber or fiberboard sheets. Close box with tape (fig 5-1).

c. Preserve unpainted surfaces of items weighing 20 pounds or more with P-11. Wrap preserved surfaces with greaseproof barrier material and secure with tape. Pack items weighing less than 60 pounds in a double-wall fiberboard box. Pack items weighing more than 60 pounds in a wood or plywood box. Block and brace with either fiberboard sheet stock or bound fiber within the doublewall box or nailed wood blocking within the wood boxes Close double-wall box with tape (fig 5-1) and reinforce with filament-reinforced tape. Mark per paragraph 3-5.

5-146. Printed Circuits, Circuit Card Assemblies, and Extender Cards

Package per paragraphs 5-168 to 5-170, inclusive.

5-147. Recoil Adapters, Crossover Assemblies, Feeders, and Drive Units

a. Preserve with P-9 or wrap each unit in VCI material and wrap with greaseproof barrier material.

b. Cushion item within a fiberboard box with cellulosic cushioning or bound fiber. Close box with tape (fig 5-1).

5-148. Recoil Mechanisms

a. Clean highly finished surfaces by process C-5. Preserve all unpainted metal surfaces with P-11. Wrap preserved surfaces with greaseproof barrier material and secure in place to adjacent painted surfaces with tape.

b. Pack one 105 mm recoil mechanism in wood or plywood box. Block and brace item with securely nailed wood blocking to immobilize the item (fig 5-7).

c. Pack one 155 mm recoil mechanism in an open crate. Block and brace item with securely nailed wood blocking to immobilize the item. Shroud mechanism with waterproof barrier material and secure in place with tape.

5-149. Saddles, Saddle Assemblies, Clamp Assemblies, and Related Items

a. Preserve unpainted surfaces with P-1.

b. Pack one or more units, dependent upon size and weight, into a fiberboard or wood box. Cushion within the fiberboard box with bound fiber and block and brace within the wood box with securely nailed wood blocking and close with tape (fig 5-1). Mark per paragraph 3-5.

5-150. Sights, Reflex, and Similar Sights and Sighting Stations

a. Clean, dry, and pack as prescribed in paragraph 5-154.

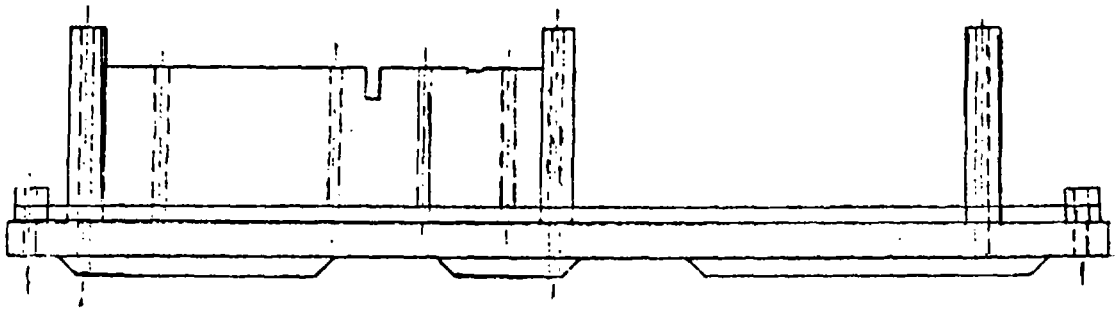
b. Do not apply a preservative.

c. Pack in reusable metal or plastic containers when available in lieu of the fiberboard box and cushioning prescribed in paragraph 5-151 for training aids.

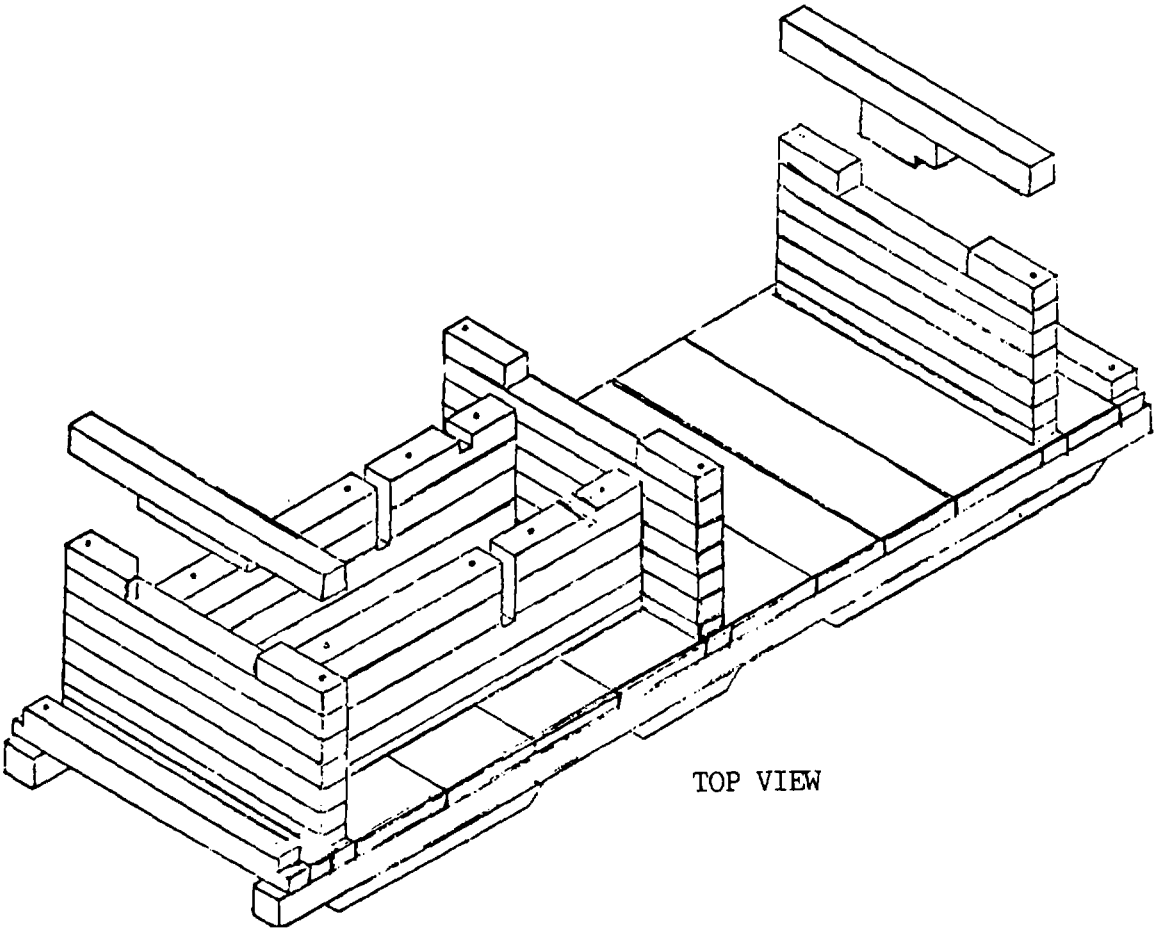
5-151. Training Aids

a. Do not apply a preservative.

MOUNTS AND RECOIL MECHANISM SKIDS



SIDE VIEW



TOP VIEW

Figure 5-7. Blocking, Bracing, and Anchoring.

b. Unit pack training aid posters, paper products, and similar items submethod IC-3. Papers requiring stiffeners will be strengthened by inserting a sheet of fiberboard stock into the bag prior to closure.

c. Pack wood components, easels, and other accessories submethod IC-3 in a fiberboard box. Close with tape (fig 5-1). Mark per paragraph 3-5.

5-152. Wire Cables, Chains, and Tiedowns

a. Preserve entire item with P-1.

b. Pack items weighing less than 40 pounds in a fiberboard box and close with tape (fig 5-1). Reinforce with filament-reinforced tape.

c. Pack items weighing 40 pounds and over in wood or plywood boxes.

5-153. Breech Bolt, Cartridge Stop, Bolt Stop, and Similar Small Items

a. Preserve with P-9.

b. Wrap a number of noncritical similar items in VCI and unit pack submethod IC-1.

c. Wrap each critical item with VCI and individually pack submethod IC-1.

d. Pack a number of submethod IC-1 packages in a fiberboard box and close with tape (fig 5-1).

5-154. Borescope, Head Illuminating and Objective Tube

a. Clean and dry optical surfaces as specified in paragraph 3-3.

b. Fold lens paper into a pad and cover optical surfaces. Secure pads in place with plastic caps or tape. Wrap each unit with wrapping paper and secure with tape. Place item in a watervaporproof bag and unit pack submethod IA-8.

c. Pack items weighing less than 10 pounds one each in a fiberboard box and immobilize with cellulosic cushioning. Close with tape (fig 5-1).

d. Pack items weighing 10 pounds or more one each in a fiberboard box and immobilize the contents with bound fiber. Close with tape (fig 5-1).

5-155. Brushes, Cleaning

a. Clean by process C-3. Preserve unpainted, ferrous metal surfaces and phosphate-coated surfaces with P-11. Wrap each brush with greaseproof barrier material and secure with tape.

b. Package brushes one each in a fiberboard box and close with tape (fig 5-1).

c. Pack a quantity of packaged brushes in a wood, plywood, or triple-wall fiberboard box.

5-156. Training Aids, Weapons

a. Do not apply a preservative.

b. Disassemble the model from its stand to reduce cube per the disassembly instructions of paragraph 3-2.

c. Pack the training aid in its carrying case, cushion with cellulosic cushioning, and close with fasteners provided.

d. Pack models without carrying cases one each in a doubleor triple-wall fiberboard box or wood or plywood box. Cushion components with cellulosic cushioning or bound fiber. Close double-wall and triple-wall fiberboard boxes with tape and reinforce with filament-reinforced tape.

Section XXI. ELECTRONIC EQUIPMENT

5-157. General

This section provides preservation and packing instructions for electronic, recoverable repair parts which are assigned to CECOM as the designated NICP. For preservation and packaging instructions for ESDS items, refer to paragraphs 5-168 to 5-170.

5-158. Cleaning and Drying

Clean and dry electronic repair parts per instructions contained in paragraph 3-3 and in TM 38-230-1.

5-159. Preservation Application

Do not apply preservatives to electrical or electronic equipment or items which are prime-coated, vitreous, or plastic-coated or to items which may be damaged by contact preservatives.

5-160. Preservation

a. Wrap all items which are not ESDS items weighing more than half a pound in a greaseproof barrier material.

b. Use cellulosic cushioning material for filling voids in paperboard or fiberboard boxes and also for cushioning items weighing more than 1 pound.

c. Pack items weighing 2% pounds or less in a greaseproof, waterproof bag.

d. Place items weighing 10 pounds or less but more than 2 1/2 pounds in paperboard boxes and place in greaseproof, waterproof bags.

e. Pack items weighing 20 pounds or less but

more than 10 pounds in weather-resistant paperboard boxes.

f. Pack items weighing 50 pounds or less but more than 20 pounds in weather-resistant fiber-board boxes.

g. Close greaseproof bags with staples, tape, adhesive, or heat seal. Close weather-resistant fiberboard boxes by sealing all seams and joints with tape (fig 5-1).

5-161. Intermediate Packing

Place the maximum quantity of similar items (packaged in bags or packages less than 64 cubic inches) in weather-resistant paperboard or fiber-board intermediate containers. Do not exceed the weight limitations of the containers. Close box by sealing all seams and joints with tape (fig 5-1).

5-162. Packing

Pack each item or a quantity of items in a plywood, consolidation insert, shipping container or nailed wood box. Block and brace items within the shipping container per guidelines contained in TM 38-230-2.

5-163. Marking

Identify and mark unit packages, intermediate containers, and shipping containers per paragraph 3-5.

Section XXII. CHEMICAL MATERIEL (LESS CLASS V)

5-164. General

a. Instructions in this section pertain to chemical materiel classified as recoverable support items such as repair parts, tools, and test equipment.

b. Chemically managed repair parts are defined under the following Federal Supply Classes (FSC):

FSC	*Title*
3655	Gas Generating and Dispensing Systems, Fixed or Mobile
4140	Fans, Air Circulators, and Blower Equipment
4230	Decontaminating and Impregnating Equipment
4240	Safety and Rescue Equipment
4310	Compressors and Vacuum Pumps
4320	Power and Band Pumps
4410	Industrial Boilers
4810	Valves, Powered
4820	Valves, Nonpowered
6110	Electrical Control Equipment
6650	Optical Instruments
6655	Geophysical and Astronomical Instruments
6680	Liquid and Gas Flow, Liquid Level, and Mechanical Motion Measuring Instruments
6685	Pressure, Temperature, and Humidity Measuring and Controlling Instruments
8140	Ammunition, Nuclear Ordinance Boxes, Packages, and Specialized Containers

5-165. Serviceable Retrograde Materiel

a. Cleaning and drying. Clean all items by process C-1 and dry by procedure D-1, D-4, or D-5, as applicable. Exercise caution in selecting the proper cleaning process and drying procedure. For example, clean nonmetallic items, precision equipment, or gauges with a clean, dry cloth. Clean exterior surfaces of electrical equipment such as starters, motors, or generators by wiping with a solvent-dampened cloth or with a clean, dry cloth. Do not direct water under pressure, steam, or compressed air into precision equipment or instruments. Seal all openings to interior surfaces of items by using tape over small openings and watervaporproof barrier material secured with tape over large openings prior to cleaning with water or steam. Do not direct dry compressed air, when used for drying, into precision equipment or instruments. Ensure that all water or solvent is completely removed from the items when drying is accomplished by draining.

b. Preservative application. Apply P-2 to all exterior, bare, machined, and threaded surfaces. Apply P-11 to exposed metal surfaces of operational parts such as gears and shafts. Apply P-10, grade 10, to highly machined finished surfaces of parts and precision equipment. Drain all gear housings and fill or fog interior surfaces with P-10, grade 30. Completely drain after filling or fogging.

c. Unit packing.

(1) Wrap all exterior surfaces that have been coated with P-2, P-10, and P-11 with greaseproof, waterproof barrier material and secure with tape. Cushion all sharp corners or protrusions with cellulosic cushioning material and secure with tape.

(2) Unit pack items by method III that are completely prime-coated and painted or are not susceptible to damage or deterioration from corrosion. Seal all small openings with tape and use watervaporproof barrier material secured with tape for large openings. Cushion, block, and brace items to prevent movement within the unit package container.

(3) Unit pack items method I which do not have exposed, critical, machined finished surfaces and are not precision equipment and have been partially or completely coated with a preservative. Accomplish sealing of openings and cushioning, blocking, and bracing as described for method III in (2) above.

(4) Unit pack items that have exposed, highly machined-finished surfaces and have been partially or completely coated with a preservative and metallic and nonmetallic items that require protection from moisture by submethod IC-1 or submethod IC-2. Base the selection of the submethod on the weight of the items. Pack items weighing up to 10 pounds by submethod IC-1. Provide items having sharp corners, protrusions, or weighing over 2 pounds with an additional wrap of greaseproof, waterproof barrier material or cellulosic cushioning material prior to placing the items into the bags.

(5) Unit pack precision instruments, precision equipment, and items with critical, machined surfaces, with or without preservatives, submethod IA-8, IA-14, IA-15, or IA-16. Weight limitations and cushioning instructions described for submethod IC-1 in (4) above are also applicable when submethod IA-8 is used. Provide submethods IC-1, IA-8, and IA-15 with additional protection prior to placing in a wood or plywood shipping container to prevent abrasion of the barrier material. Provide the additional protection by use of an overwrap of greaseproof, waterproof barrier material or by placing the bagged item into a box fabricated from weather-resistant fiberboard.

d. Packing. Place a quantity of the same item in a plywood, wood, or fiberboard box.

e. Marking. In addition to any special markings, mark as prescribed in paragraph 3-5.

5-166. Unserviceable, Economically Reparable Retrograde Materiel

Clean, dry, preserve, package, pack, and mark the same as for serviceable retrograde materiel described in paragraph 5-165, except include condition code "F" in the identification markings as discussed in paragraph 3-5.

5-167. Serviceable Materiel to be Recycled

Clean, dry, preserve, pack, and mark the same as for serviceable retrograde materiel described in paragraph 5-165.

Section XXIII. ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) MATERIEL

5-168. General

a. This section provides instructions for the preservation and packing of all retrograde, serviceable, economically reparable electronic items that are susceptible to damage or deterioration from ESD, including all circuit cards and items within FSCs 5905, 5955, 5961, 5962, 5963, and 7042.

b. Many electronic devices are highly susceptible to damage and deterioration from ESD even at levels which can be neither seen nor felt. ESD affects many components such as transistors, integrated circuits, and metal oxide semiconductors. Device failures are not always immediately catastrophic or observable. The component is often only slightly weakened, but it is less able to withstand subsequent ESD exposure and may fail with continued use. Packaging, handling, and maintenance personnel are the prime carriers of static electricity and its enormous potential for damaging sensitive devices. Activities such as walking, working at a bench, sitting on a chair, or simply combing your hair can generate thousands of volts of electricity. Awareness and control of this phenomenon shall be maintained throughout the packaging process to positively ensure that the item can be used for the purpose for which it was designed.

5-169. ESD Field Service Kit

a. All field unit packaging and unpackaging of ESDS materiel shall be accomplished by using an ESD field service kit. ESDS items shall not be removed from the unit container until the device is being installed in the end item or the next higher assembly and a field service kit is available.

b. The complete ESD field service kit shall consist of a wrist strap, portable conductive table mat, and a grounding device for the mat. Materials and instructions are shown in figure 5-8.

c. Unpreserved ESDS items shall be handled only by trained personnel who can effectively employ the protective materials and equipment provided.

5-170. Packaging

a. Select all ESD packaging materials from appendix A of this manual.

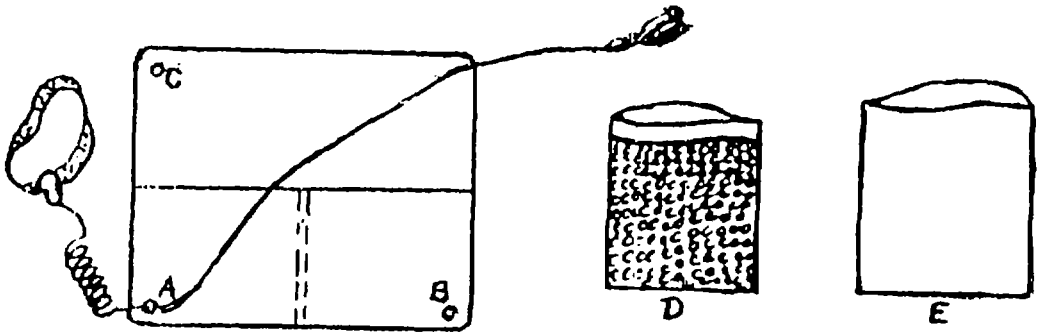
b. Accomplish cleaning by process C-1 and perform drying by procedure D-1 of MIL-P-116.

INSTRUCTIONS

CAUTION: Only trained personnel shall handle unpreserved ESDS items. Disconnect all power before handling any item.

STEPS:

1. Place unfolded workmat on table or floor near work area or service location.
NOTE: Remove all material from pockets and away from mat.
2. Attach ground cord to mat fastener A, B, or C; attach bulldog clip to mainframe, chassis, or other bare metal surface near item to be replaced or removed. This surface must be a part of unit assembly containing item.
3. The wrist strap coil cord containing resistor, shall be attached to the same mat fastener as the ground connector A, B, or C; adjust wrist strap over wrist against bare skin.



4. Proceed now to remove, replace, or handle the ESDS item only on the mat surface. Keep all other tools or non-ESDS items off the mat.

5. ESDS items to be returned (e.g., condition code F) for repair or otherwise removed from the static dissipating mat shall be packaged to prevent any further deterioration. This procedure is the only technique where the reuse of ESD preservation material is encouraged. Place item in pouch D, made from material conforming to MIL-P-81997, type II. Fold over opening and place in shielding bag E, made from material conforming to MIL-B-81705, type I. Fold the opening, and place a rubber band over this shielding bag. Do not use adhesive tape. Item can now be handled as you would any other non-ESDS item.

NOTE: Do not disassemble the field service kit until all procedures have been completed.

Figure 5-8. Field Service Kit and Instructions.

c. Wrap the item with barrier material conforming to MIL-B-81705, type II, or cushion sharp edges and extrusions with material conforming to PPP-C-1842, type III, style A or B.

d. Place the wrapped or cushioned item in a bag (MIL-B-117, type I, class F, style I) made from material conforming to MIL-B-81705, type I. The bag shall be made of one piece of material folded in half and heat sealed on three sides. This becomes the unit pack which can be handled as you would any non-ESDS item.

e. Place a sensitive electronic device unit pack label (fig 5-10) on the unit pack as illustrated in figure 5-9. In the absence of NSNs, local purchase procedures shall be followed when ordering this unit pack sensitive electronic device label. When

this label is temporarily unavailable, unit packs may be marked with the sensitive-electronic device symbol and the following statement: "DO NOT OPEN EXCEPT AT APPROVED FIELD FORCE PROTECTIVE WORK STATION."

f. Most ESDS items such as circuit cards, resistors, and semiconductors can utilize 1 of the 12 reusable PPP-B-1672, type II, style D, folding convoluted "fast packs," which are the only fast packs authorized for ESDS items (fig 5-9). ESDS items that will not fit into 1 of the 12 authorized fast packs will be packed according to prescribed packaging instructions or into PPP-B-636 fiberboard containers. Allowing for antistatic cushioning, measure for the desired size of the fiberboard container. If box-making equipment is available,

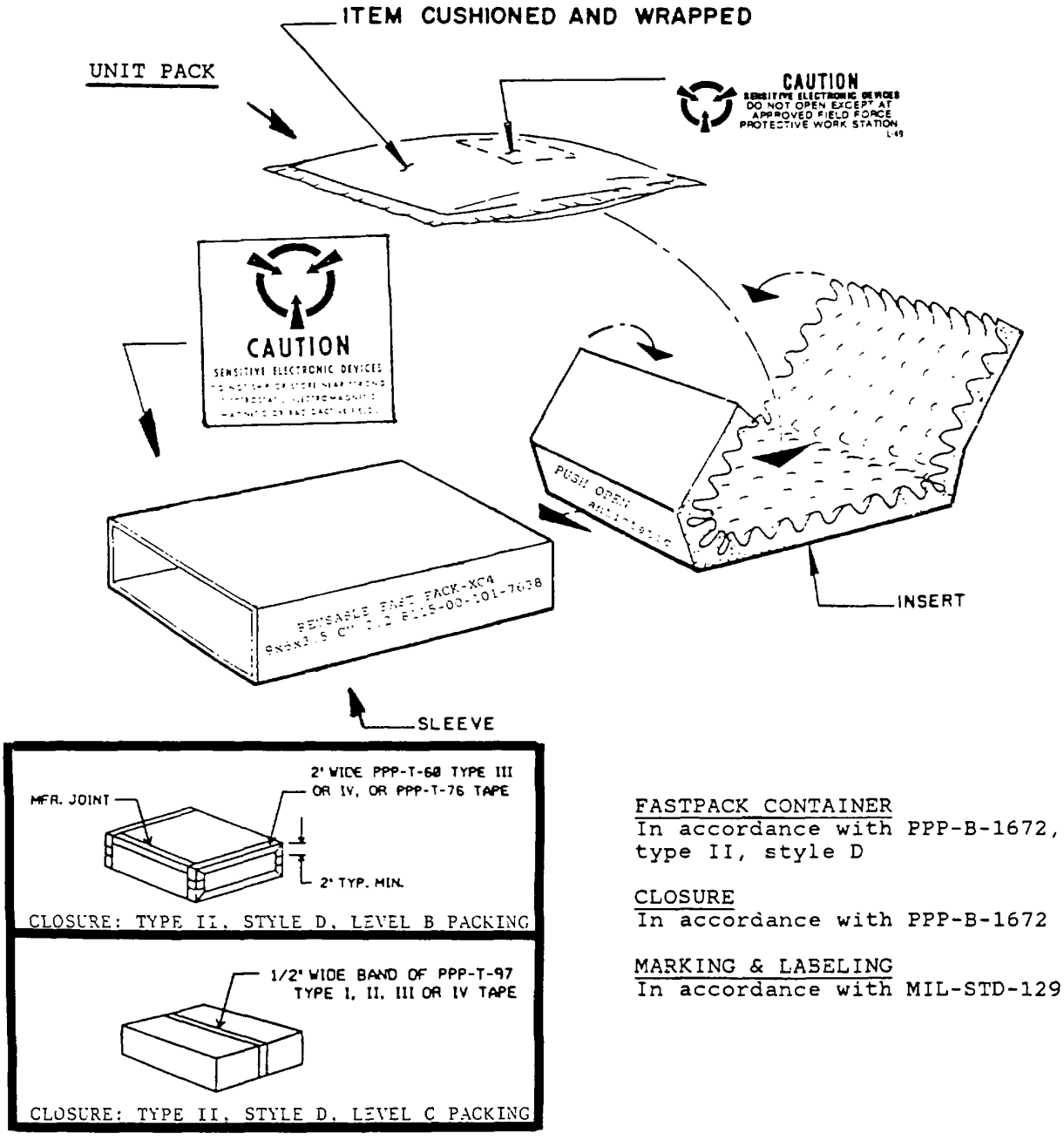


Figure 5-9. Closure of Unit and Intermediate Pack.

containers shall be fabricated per PPP-B-636. Also per PPP-B-636, apply a sensitive, intermediate or exterior, electronic device caution label on the appropriate container after closure (figs 5-9 and 5-10). Label and mark per MIL-STD-129.

g. The field service kit is a field expedient and contains only the minimum requirements for ESDcontrol. This supplemental handling procedure for repair type ESDS items will be the only interim technique where the reuse of ESD preservation material is encouraged.

Sensitive electronic device caution label.
(unit pack)

NOTE: Currently this label has not been assigned an NSN (see 5.2c).

Sensitive electronic device caution label.
(intermediate and exterior packs)

NSN	SIZE	OPTIONAL FORMS
7540-01-109-8815	2- by 2-inch	87
7540-01-110-4906	4- by 4-inch	87A

Figure 5-10. Sensitive Electronic Device Labels.

APPENDIX A

MATERIALS AND REFERENCES FOR PACKAGING OPERATIONS

A list of often used, common packaging materials is given in table A-1, below. These materials are universally and fundamentally used to package various types of items. The listing is not all-inclusive, and a support unit will not necessarily use all of the materials given. However, the table does list materials necessary to maintain a basic packaging operation. In addition, cartons, wood boxes, skids, crates, and other packages can be fabricated from the materials shown. Table A-2 lists the abbreviation codes used in table A-1. A list of all publications referenced throughout the basic manual is contained in table A-3.

Table A-1. Packaging Materials

Nomenclature	Specification	Unit of issue	Quantity description	NSN
Barrier material, greaseproof, waterproof, and noncorrosive (heat sealable)	MIL-B-121, grade A, type I, class 1	RO	600 FT/L 36 IN/W	8135-00-233-3871
	MIL-B-121, grade A, type II, class 1	RO	600 FT/L 36 IN/W	8135-00-224-8885
Barrier material, greaseproof, waterproof, and noncorrosive	MIL-B-121, grade A, type II, class 2	RO	600 FT/L 36 IN/W	8135-00-226-3124
Paper, wrapping, chemically neutral, flat	MIL-P-17667, type I	RO	300 FT/L 33 INIW	8135-00-558-1242
Paper, wrapping, chemically neutral, creped	MIL-P-17667, type II	RO	300 FT/L 33 IN/W	8135-00-558-1245
Barrier material, watervapor-proof, flexible, heat sealable	MIL-B-131, class 1	RO	600 FT/L 36 IN/W	8135-00-282-0565
Barrier material, waterproof, flexible	PPP-B-1055, class L-2	RO	600 FT/L 48 IN/W	8135-00-171-0980
		RO	600 FT/L 60 IN/W	8135-00-171-0981
	PPP-B-1055, class B-2	RO	600 FT/L 36 IN/W	8135-00-171-1019
	PPP-B-1055, class C-1	RO	600 FT/L 36 IN/W	8135-00-171-1559
		RO	600 FT/L 72 IN/W	8135-00-526-1907
Barrier material, antistatic	MIL-B-81705, type I	RO	600 FT/L 3 FT/W	8135-00-092-3220
MIL-B-81705, type II		SH	48 IN/L 48 IN/W	8135-00-158-7786
		SH	36 IN/L 24 IN/W	8135-00-163-3486
Plastic film, polyethylene, colorless	L-P-378, type I, grade A, finish 1	RO	100 FT/L 10 FT/W .004 IN/THK	8135-00-855-3387
Plastic film, polyethylene	L-P-378, type I, grade A, finish 2	RO	500 FT/L 12 FT/W .006 IN/THK	8135-00-058-6196
Paperboard, wrapping, cushioning, type III	PPP-P-291	RO	250 FT/L 24 IN/W	8135-00-281-3920
		RO	250 FT/L 36 IN/W	8135-00-242-5610
Cushioning material, packaging, cellulose wadding	PPP-C-843, type II, class B	RO	167 FT/L 24 IN/W 3/4 IN/THK	8135-00-855-6969
		RO	125 FT/L 24 IN/W 1 IN/THK	8135-00-808-6446
Cushioning material, uncompressed bound fiber	PPP-C-1120, type III, class A	SH	72 IN/L 36 IN/W 2 IN/THK	8135-00-985-7313
	PPP-C-1120, type IV, class A	SH	96 IN/L 48 IN/W 4 IN/THK	8135-00-989-9888

Table A-1. Packaging Materials-Continued

Nomenclature	Specification	Unit of issue	Quantity description	NSN
Cushioning material, electrostatic free (w/top laminate)	PPP-C-1842, type III, style A	BD	625 INIL 48 IN/W 1/8 INID	8135-01-088-3845
		BD	625 IN/L 24 INIW 1/8 IN/D	8135-01-088-3846
		BD	625 IN/L 12 IN/W 1/8 IN/D	8135-01-088-3847
Cushioning material, electrostatic free (w/o top laminate)	PPP-C-1842, type III, style B	BD	375 IN/L 12 INIW 1/4 IN/D	8135-01-087-3603
		BD	375 IN/L 48 IN/W 1/4 IN/D	8135-01-088-3850
		BD	375 IN/L 6 IN/W 1/4 INI/D	8135-01-088-3851
Corrosion preventive compound, solvent cutback, cold-application (P-l)	MIL-C-16173, grade 1	GL DR	1 GL 55 GL	8030-00-231-2345 8030-00-244-1300
Do (P-2)	MIL-C-16173, grade 2	GL CN DR	1 GL 5 GL 55 GL	8030-00-244-1297 8030-00-244-1298 8030-00-244-1295
Do (P-3)	MIL-C-16173, grade 3	GL CN DR	1 GL 5 GL 55 GL	8030-00-244-1296 8030-00-244-1293 8030-00-244-1294
Lubricating oil, GP (P-7)	MIL-L-3150	QT CN	1 QT 5 GL	9150-00-231-2361 9150-00-231-2356
Lubricating oil, GP (P-9)	VV-L-800	CN QT CN DR	4 OZ 1 QT 5 GL 55 GL	9150-00-273-2389 9150-00-231-6689 9150-00-231-9062 9150-00-281-2060
Lubricating oil, engine, grade 10 (P-10)	MIL-L-21260, type I	CN DR	5 GL 55 GL	9150-00-111-3199 9150-00-111-0208
Do grade 30		CN DR	5 GL 55 GL	9150-00-111-0209 9150-00-111-0210
Do grade 50		CN DR	5 GL 55 GL	9150-00-111-0211 9150-00-111-0214
Do grade 10	MIL-L-21260, type II	CN	5 GL	9150-00-186-6668
Grease, automotive and artillery corrosion, salt spray and water resistant (P-11)	MIL-G-10924	CN CN DR	5 LB 35 LB 120 LB	9150-00-190-0905 9150-00-190-0907 9150-00-530-7369
Corrosion preventive compound (P-14)	MIL-C-10382	GL DR	1 GL 55 GL	8030-00-251-5048 8030-00-260-1053
Paper, volatile corrosion-class 1, style A (P-18),	MIL-P-3420, type I	RO	600 FT	8135-00-664-4010
class 2, style A,		RO	600 FT	8135-00-664-4012
class 2, style B,		RO	600 FT	8135-00-810-0481
Inhibitor, corrosion vapor barrier-crystalline form (P-18)	MIL-I-22110, type I	CN	1 LB	6850-00-368-5233
Corrosion preventive compound, cold application solvent cutback hard film (P-19)	MIL-C-16173, grade 4	CN DR	5 GL 55 GL	8030-00-526-1605 8030-00-526-1604
Lubricating oil, corrosion inhibited (P-20)	MIL-P-46002, grade 1	CN	5 GL	9150-00-985-7293
Corrosion preventive compound, solvent cutback (P-21)	MIL-C-16173, grade 5	CN	5 GL	8030-00-137-1671
Corrosion preventive oil, gas turbine engine, aircraft synthetic base	MIL-C-8188	CN	5 GL	6850-00-273-2395
Preservative oil, contact and volatile corrosion-inhibited	MIL-P-46002	DR QT CN	55 GL 1 QT 5 GL	9150-00-407-0973 9150-00-889-3523 9150-00-985-7293

Table A-1. Packaging Materials-Continued

Nomenclature	Specification	Unit of issue	Quantity description	NSN
Corrosion preventive, aircraft engine	MIL-C-6529	DR	55 GL	6850-00-209-7234
		CN	5 GL	6850-00-281-2031
		CN	5 GL	6850-00-209-7235
Lubricating oil, jet engine 7031	MIL-L-6081	GL	BULK	9150-00-985-
		DR	55 GL	9150-00-231-6676
		CN	1 QT	9150-00-273-2388
		CN	1 QT	9150-00-273-8810
		CN	1 GL	9150-00-273-8811
		CN	1 GL	9150-00-273-8807
Grease, automotive and artillery	MIL-G-10924	CN	25 LBS	9150-00-190-0906
		CN	14 OZ	9150-00-935-1017
		CN	35 LBS	9150-00-190-0907
		CN	6.50 LBS	9150-00-190-0905
		CN	1.75 LBS	9150-00-190-0904
		TU	2.25 OZ	9150-00-065-0029
		DR	120 LBS	9150-00-530-7369
Coating compound bituminous solvent type, black	MIL-C-450	CN	5 GL	8030-00-290-5140
		CN	1 GL	8030-00-664-7105
		CN	1 GL	8030-00-290-5141
Chlorination kit, water purification (for treatment of drinking water)	O-C-289	KT	1 EA	6850-00-270-6225
Disinfectant, food service	MIL-D-11309	BX	12 EA (box)	6840-00-810-6396
		BG	3.55 OZ	6840-00-270-8172
Solvent, dry cleaning	P-D-680	DR	55 GL	6850-00-285-8012
Corrosion-preventive fingerprint remover	MIL-C-15074	CN	5 GL	8030-00-252-8300
		DR	55 GL	8030-00-252-8301
Hydraulic fluid, petroleum base	MIL-H-6083	GL	1 GL	9150-00-935-9808
		CN	5 GL	9150-00-935-9809
		DR	55 GL	9150-00-935-9810
Cleaning compound, rifle bore	MIL-C-372	GL	1 GL	6850-00-224-6663
		DR	55 GL	6850-00-753-4806
Note: The following pressure-sensitive tapes that are referred to throughout the manual only as "tape" are designated for specific applications and should only be used for the purposes described in the manual.				
Tape, pressure-sensitive, adhesive, masking	A-A-883	RO	60 YD/L 1 IN/W	7510-00-266-6712
		RO	60 YD/L 2 IN/W	7510-00-266-6710
Note: The above tape is used for closing paperboard, chipboard, and domestic (nonweather-resistant) cartons and for securing barrier and cushioning materials in place when applied to an item being packaged.				
Tape, paper, water-resistant	PPP-T-76	RO	120 YD/L 2 IN/W	7510-00-297-6655
Note: The above tape is used for closing weather-resistant cartons that are to be afforded the additional protection of being packed in exterior containers or placed within equipment. PPP-T-60, type III, class 1 tape may also be used for this purpose.				
Tape, pressure-sensitive, adhesive, film	PPP-T-60, type III class 1	RO	60 YD/L 2 IN/W	7510-00-266-6715
		RO	60 YD/L 3 IN/W	7510-00-281-2700
Note: The above tape can be used, as specified, for PPP-T-76 and the closing of weather-resistant cartons not afforded additional protection. It can also be used for securing item components to equipment or for holding certain materials in a coiled position, as specified.				
Tape, pressure-sensitive, adhesive, cloth	PPP-T-60, type IV, class 1 2 IN/W	RO	60 YD/L	7510-00-663-0196
		RO	60 YD/L 3 IN/W	7510-00-079-7905
Note: The above tape is used for effecting a closure that seals openings into items or equipment and to secure waterproof barriers to items or equipment for the same purpose.				
Tape, pressure-sensitive adhesive, filament-reinforced	PPP-T-97, type IV 1 IN/W	RO	60 YD/L	7510-00-053-0942
Tape, pressure-sensitive adhesive, preservation and sealing	MIL-T-22085 3 IN/W	RO	36 YD/L	7510-00-926-8939
Adhesive, water-resistant (for sealing waterproofed paper)	MMM-A-260 CN	GL	1 GL	8040-00-273-8703
			5 GL	8040-00-273-8704
Steel strapping, flat, nailless, organic, type I, class A	QQ-S-781, 3/4 IN/W	CL	100 LB	8135-00-285-4748
	QQ-S-781, 1 1/4 IN/W	CL	100 LB	8135-00-531-7721

Table A-1. Packaging Materials-Continued

Nomenclature	Specification	Unit of issue	Quantity description	NSN
Seal, steel strapping, thread-on, steel	QQ-S-781, 1/4 IN/W	BX	1,000 EA	8135-00-290-1077
Staple, strapping, cement coated	QQ-S-781, 3/4 IN/W 5/8 INI/L	LB	N/A	5315-00-161-9830
Twine, cotton, color natural, type I	T-T-871	LB	N/A	4020-00-233-5990
Twine, jute, 125-lb breaking strength	T-T-911	LB	N/A	4020-00-242-4074
Antifreeze, arctic-type	MIL-A-11755	DR	55 GL	6850-00-174-1806
Inhibitor, corrosion, liquid cooling system	0-I-00490	CN	12 OZ	6850-01-076-8810
		CN	6 OZ	6850-00-753-4967
Dye, liquid, for the detection of leaks in aircraft fuel systems	MIL-D-81298	GL	1 GL	6820-00-001-4192
		BT	2 OZ	6820-00-926-8887
		DR	30 GL	6820-00-965-2502
		GL	1 GL	6820-00-412-2296
		DR	30 GL	6820-00-787-5258
Desiccants, activated for dynamic dehumidification	MIL-D-3716	DR	100 LBS	6850-00-616-9146
Desiccants, activated, bagged, packaging use and static dehumidification	MIL-D-3464	DR	200 LBS	6850-00-264-6572
Sulfuric acid, electrolyte, for storage batteries	O-S-801	BT	1 GL	6810-00-236-0702
		CB	6.50 GL	6810-00-551-5231
		DR	5 GL	6810-00-843-1640
		BT	1 GL	6810-00-249-9354
		CB	200 LBS	6810-00-264-6725
		EA	BULK	6810-00-264-6723
		BT	1 GL	6810-00-823-8008
		DR	5 GL	6810-00-823-8007
		DR	5 GL	6810-00-904-9372
		DR	15 GL	6810-00-893-8138
		BT	1.525 GL	6810-00-900-1487
		BT	1 GL	6810-00-913-6857
		BT	5 GL	6810-00-988-8924
Lumber, softwood	MM-L-751	BF	1 IN X 4 IN	5510-00-220-6078
			1 IN X 6 IN	5510-00-220-6080
			1 IN X 8 IN	5510-00-220-6082
			1 IN X 10 IN	5510-00-220-6084
			1 IN X 12 IN	5510-00-220-6086
			2 IN X 4 IN	5510-00-220-6194
			2 IN X 6 IN	5510-00-220-6196
			2 IN X 8 IN	5510-00-220-6198
			2 IN X 10 IN	5510-00-220-6200
			2 IN X 12 IN	5510-00-220-6202
			4 IN X 4 IN	5510-00-554-7760
			4 IN X 6 IN	5510-00-167-6857
			4 IN X 8 IN	5510-00-167-6858
Plywood, flat panel, 4 IN X 8 IN X % IN	NN-P-530	SD	80 SH	5530-00-904-2258
		SD	60 SH	5530-00-904-2259
		SD	40 SH	5530-00-904-2261

Table A-2. Abbreviation Codes Used in Table A-1

BD-bundle	DR-drum	QT-quart
BF-board foot	EA-each	RO-roll
BG-bag	FT-foot	SD-skid
BT-bottle	GL-gallon	SH-sheet
BX-box	IN-inch	THK-thick
CB-carboy	KT-kit	TU-tube
CL-coil	L-long	W-wide
CN-can	LB-pound	YD-yard
D-deep	OZ-ounce	A-A-900

Table A-3. Publications Referenced Throughout This Manual

Specifications	
Federal	
A-A-208	-Ink, Marking, Stencil, Opaque (Porous & Non-porous Surfaces)
A-A-529	-Adhesive and Sealing Compound, Cellulose Nitrate Base Solvent Type
A-A-883	-Tape, Pressure Sensitive Adhesive, Masking
	-Tag, Shipping (Paper)

Table A-3. Publications Referenced Throughout This Manual Continued

Specifications Federal	
L-P-378	-Plastic Sheet and Strip, Thin Gauge, Polyolefin
O-C-289	-Chlorination Kit, Water Purification, (For Treatment of Drinking Water)
O-S-801	-Sulfuric Acid, Electrolyte, For Storage Batteries
NN-P-530	-Plywood, Flat Panel
QQ-S-781	-Strapping, Steel, and Seals
TT-E-515	-Enamel, Alkyd, Lusterless, Quick-drying
TT-V-121	-Varnish, Spar, Water Resisting
UU-T-81	-Tag, Shipping and Stock
VV-L-800	-Lubricating Oil, General Purpose, Preservative (Water-displacing, Low Temperature)
MMM-A-260	-Adhesive, Water-resistant (for Sealing Waterproofed Paper)
NNN-P-40	-Paper, Lens
PPP-B-601	-Boxes, Wood, Cleated Plywood
PPP-B-621	-Box, Wood, Nailed and Lock-corner
PPP-B-636	-Box, Shipping, Fiberboard
PPP-B-1055	-Barrier Material, Waterproofed Flexible
PPP-B-1672	-Boxes, Shipping, Reusable with Cushioning
PPP-C-843	-Cushioning Material, Cellulosic
PPP-C-1120	-Cushioning Material, Uncompressed Bound Fiber for Packaging
PPP-C-1752	-Cushioning Material, Packaging, Unicellular Polyethylene Foam, Flexible
PPP-C-1842	-Cushioning Material, Plastic, Open Cell (For Packaging Applications)
PPP-E-540	-Envelope, Water Resistant, for Packing Lists and Shipping Documents
PPP-F-320	-Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes
PPP-P-291	-Paperboard, Wrapping and Cushioning
PPP-P-700	-Protector, Packing List
PPP-T-60	-Tape, Packaging, Waterproof
PPP-T-70	-Tape, Packaging, Plastic Film
PPP-T-76	-Tape, Pressure Sensitive Adhesive, Packaging/paper (For Carton Sealing)
PPP-T-97	-Tape, Pressure Sensitive, Filament Reinforced
MILITARY	
MIL-C-104	-Crate, Wood, Lumber and Plywood Sheathed, Nailed and Bolted
MIL-P-116	-Preservation, Methods of
MIL-P-117	-Bag, Sleeve and Tubing-Interior Packaging
MIL-B-121	-Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-B-131	-Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat Sealable
MIL-C-450	-Coating-compound, Bituminous Solvent Type, Black (For Ammunition)
MIL-P-3420	-Packaging Materials, Volatile Corrosion Inhibitor, Treated, Opaque
MIL-D-3464	-Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification
MIL-D-3716	-Desiccants, Activated for Dynamic Dehumidification

Table A-3. Publications Referenced Throughout This Manual Continued

MILITARY	
MIL-E-6060	-Envelope, Packaging, Water Vapor Proof, Flexible
MIL-L-6081	-Lubricating Oil, Jet Engine
MIL-H-6083	-Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-C-6529	-Corrosion Preventive, Aircraft Engine
MIL-C-10382	-Corrosion Preventive, Petrolatum, Spraying Application, For Food Handling Machinery and Equipment
MIL-D-11309	-Disinfectant, Food Service
MIL-P-13983	-Paint, Temporary, Lusterless, Gasoline Removable
MIL-C-15074	-Corrosion Preventive, Fingerprint Remover
MIL-C-16173	-Corrosion Preventive Compound, Solvent Cutback, Cold Application
MIL-C-17504	-Coating Compound, Acrylic, Clear
MIL-P-17667	-Paper, Wrapping, Chemically Neutral (Non Corrosive)
MIL-L-21260	-Lubricating Oil, Internal Combustion Engine, Preservative and Break-in
MIL-T-22085	-Tape, Pressure Sensitive, Adhesive, Preservation & Sealing
MIL-I-22110	-Inhibitor, Corrosion, Volatile, Crystalline Powder
MIL-L-46002	-Preservative Oil, Contact and Volatile Corrosion-inhibited
MIL-C-52211	-Components and Assemblies for Industrial Gas Production, Storage and Transportation Equipment, Packaging of
MIL-C-52950	-Crate, Wood, Open and Covered
MIL-B-81705	-Barrier Materials, Flexible, Electrostatic Free Heat Sealable
MIL-F-83671	-Foam-in-Place Packaging Materials, General Specifications for
MIL-F-87075	-Foam-in-Place Packaging, System for Shipboard Use
STANDARDS FEDERAL	
FED-STD-595	-Color (Requirements for Individual Color Chips (3x5 Supplements) (NOTE: Should be submitted to the Naval Publications and Forms Center, citing FED-STD-595 together with appropriate chip number as shown in the Federal standard)
MILITARY	
MIL-STD-129	-Marking for Shipment and Storage
MIL-STD-147	-Palletized Unit Loads
MIL-STD-731	-Quality of Wood Members for Containers and Pallets
MIL-STD-1186	-Cushioning, Anchoring, Bracing, Blocking, and Waterproofing, with Appropriate Test Methods
MIL-STD-1191	-Foam-in-Place Packaging, Procedures for
JOINT MILITARY	
AR 700-15/NAVSUP INST4030.28/AFR 71-6/MC04030.33/ DLAR4145.7	-Packaging of Materiel

Table A-3. Publications Referenced Throughout This Manual Continued

JOINT MILITARY	
DOD 4000.25-2-M	-Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP)
DOD 4500.32-R	-Military Standard Transportation and Movement Procedures (MILSTAMP) Volume I
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)	
ASTM D996	-Standard Terminology of Packaging and Distribution Environments
ASTM D3950	-Standard Specification for Strapping, Plastic (and Seals)
ASTM D3953	-Standard Specification for Strapping, Flat Steel (and Seals)

APPENDIX B

EQUIPMENT REQUIREMENTS FOR MATERIEL PROCESSING

B-1. General

The packaging equipment and associated tools listed herein are recommended to unit-level packaging facilities because of their affordability, availability, and usefulness in manual operations. Most of the equipment such as carpentry tools and wrench sets are multifunctional, and their uses are self-explanatory. Other equipment listed such as the equipment used for stretch wrapping, heat sealing, or for foam-in-place application have only singular packaging functions. Various configurations of packaging equipment are offered by several manufacturers and should be selected by the users to meet the criteria of the individual packaging facility requirements. Indeed, a high level of cost-effective packaging can be accomplished at field activities by using the equipment recommended herein.

B-2. Packaging Equipment

a. FIP equipment. FIP equipment is designed to provide easy application of FIP blocking and bracing or cushioning techniques and can be readily adapted to field activities. The foam material used with this equipment offers adequate protection for the item, and the equipment, itself, requires minimum user operational training.

b. Heat-sealing equipment. Heat-sealing (barrier-sealing) equipment is designed for use in fabrication of waterproof and watervaporproof bags, pouches, and barriers. Although most items preserved and packaged at the unit level are ones that need repair, the items should be packaged to meet the requirements of normal shipment, handling, and storage. Many other items in the Army's inventory require maximum protection to prevent any further damage or deterioration and the resultant increase in the cost of repair. The heat-sealing equipment recommended herein is hand-operated and is easily adaptable to field activities.

c. Stretch-wrap equipment. Stretch wrapping is presently the most cost-effective means for securing palletized loads and tire bundles in the field. Functionally, stretch wrap is a consumable item and is not categorized as equipment. It is listed in this text because it is applied without the aid of any other equipment and because it is an appropriate bonding method for palletizing unit loads as shown in MIL-STD-147.

B-3. Tools and Equipment

In figure B-1, tools and equipment are illustrated and listed alphabetically by description. Also provided are the NSN, unit of issue, and procurement source. The tools and equipment are available through the General Services Administration (GSA) catalog or through the supply catalog (SC) for the various FSCs. The quantity of each item should be determined by individual users to meet their own requirements. Some tools or equipment may be substituted depending on their availability in specific areas.

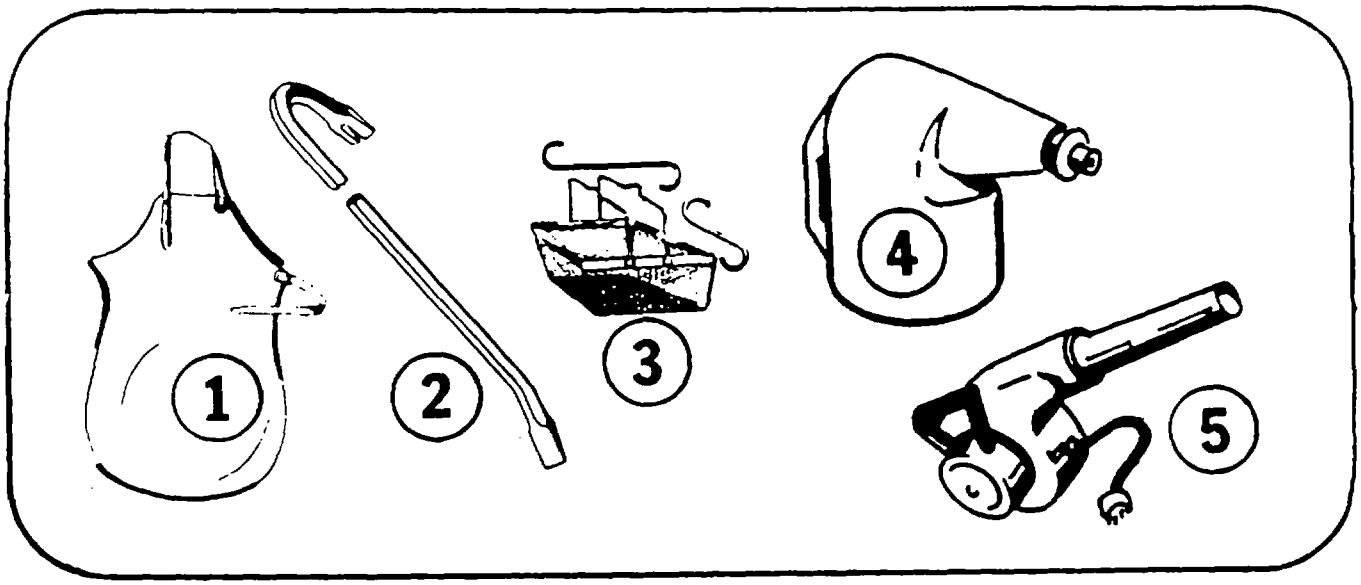
B-4. Equipment Application Table

Table B-1 contains an alphabetical list of equipment to assist the user in determining which tools and equipment shall be employed for the various packaging functions which must be performed and how much of that equipment is required.

B-5. Selection/Ordering Guide for Fast-Pack Containers

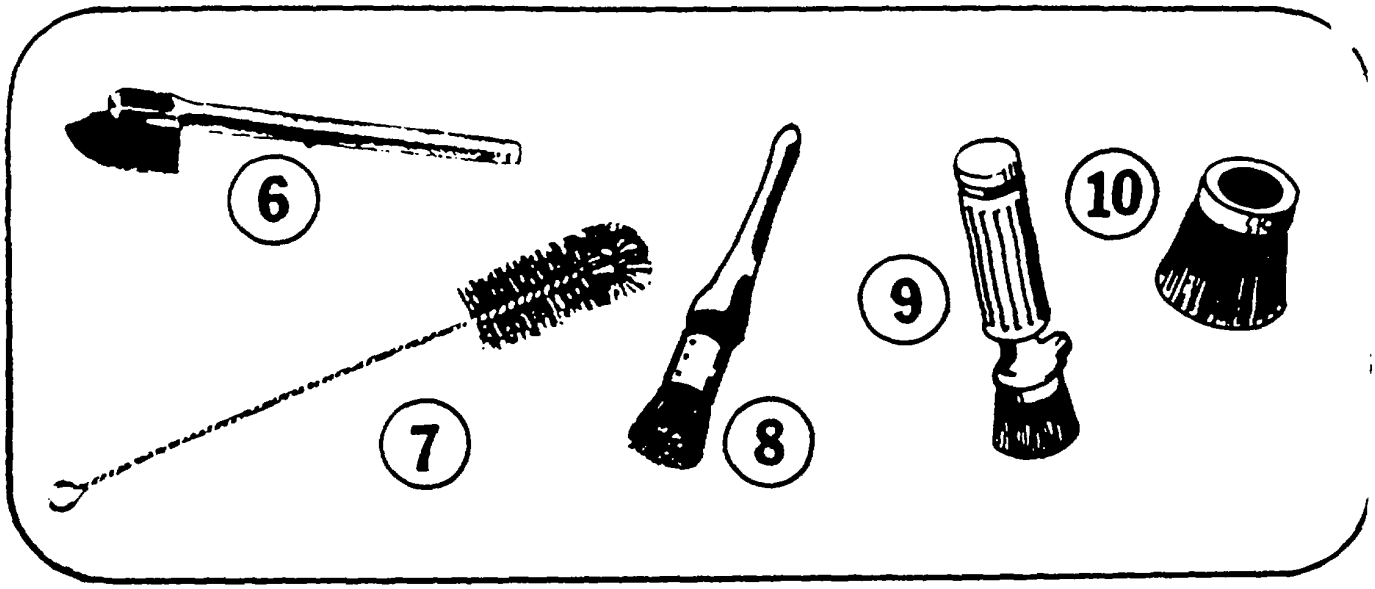
The fast-pack containers in figure B-2 are listed separately from those in table A-1 because of their high quantity usage. These containers shall be considered for use for all serviceable and economically reparable materials whose weight and dimensional characteristics are such that they can be used appropriately (para 1-9d).

Note. Other fiberboard boxes conforming to PPP-B-636 are listed in the GSA supply catalog, which is updated annually.



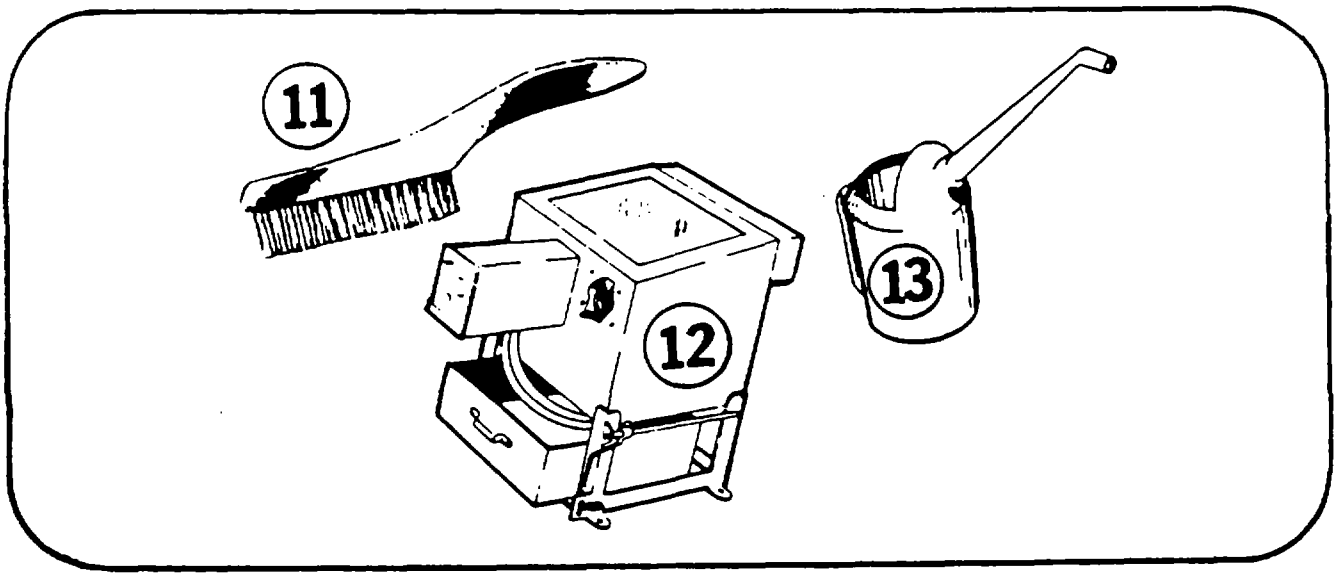
ILL No	NSN	DESCRIPTION	UI	SOURCE
1	8415-00-715-0450	APRON, LABORATORY: Plastic; Stain Resistant; Colorless; Bib; Tape Tie Fastener; 45" L X 36" W; MIL-A-41801, Type I	EA	GSA
2	5120-00-224-1393	BAR, WRECKING: Offset Pinch Point; 3 3/4" X 24"	EA	GSA
3	3426-00-522-9051	BASKET, DRIP-DRAIN: Steel Cadmium; 2 Handles; 14" L X 12" W Top; 12" L X 10" W Bottom; 6" Deep; MERDC D-9985-7	EA	SC
4	6140-00-752-2184	BATTERY FILLER, GRAVITY: 2 Qt Water Container	EA	GSA
5	4940-00-449-8626	BLOWER, ELECT, PTBL: 95 CFM; 1 Speed; 11,500 rpm; AC/DC, 115V, Sgl Phase, 60 Hz; Rubber Nozzle (12835) No. F10 (or equal)	EA	SC

Figure B-1. Tools and Equipment.



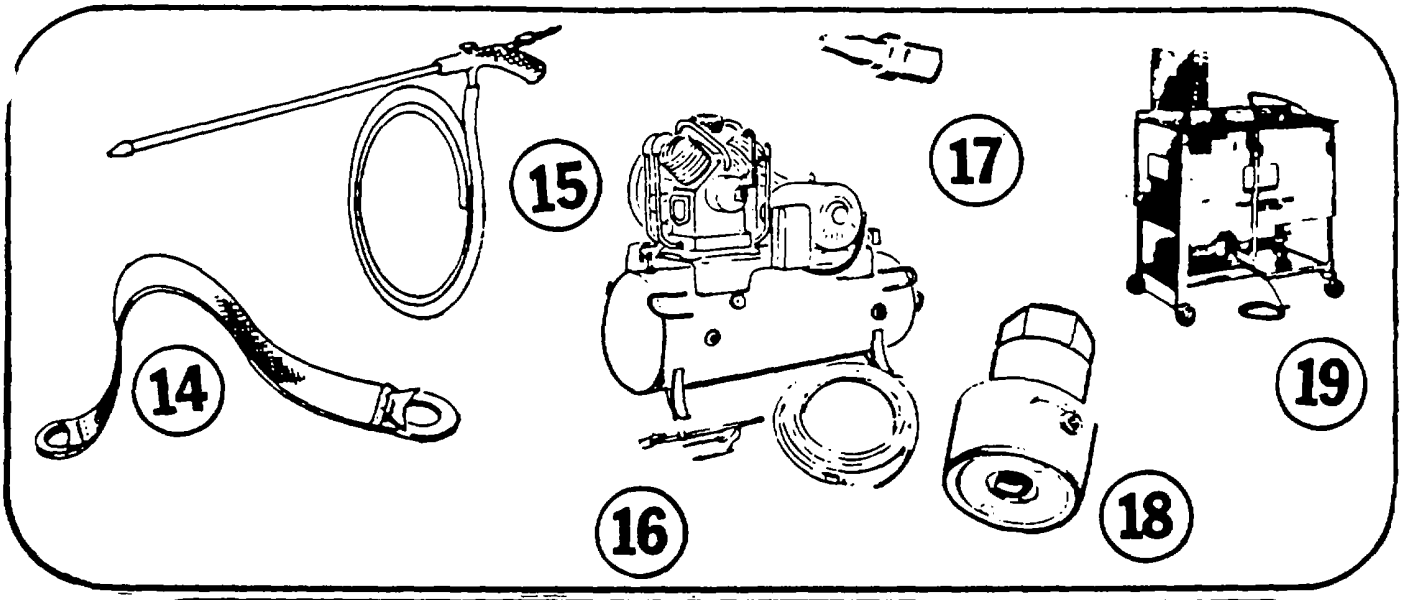
ILL No	NSN	DESCRIPTION	UI	SOURCE
6	7920-00-205-2401	BRUSH, CLEANING: Round, 2 7/8" Tampico Fiber Bristles, 1" Dia Metal Ferrule, Varnished Hardwood Tapered Handle, 6" L	EA	GSA
7	7920-00-753-5183	BRUSH, CLEANING: H-B-1051, For open-end tubes, 5/8" Dia X 17 1/2" L, Long Brush, Type II, Style B	EA	GSA
8	7520-00-223-8000	BRUSH, STENCIL OR CLEANING: 3/4" X 1", Type L, H-B-621	EA	GSA
9	7520-00-248-9285	BRUSH, STENCIL, FOUNTAIN TYPE: W/Metal Cover and Reservoir in Handle, 2 Oz, Type F, H-B-621	EA	GSA
10	7520-00-369-7414	BRUSH, REPLACEMENT TIP for 7520-00-248-9285	EA	GSA

Figure B-1. Tools and equipment-Continued.



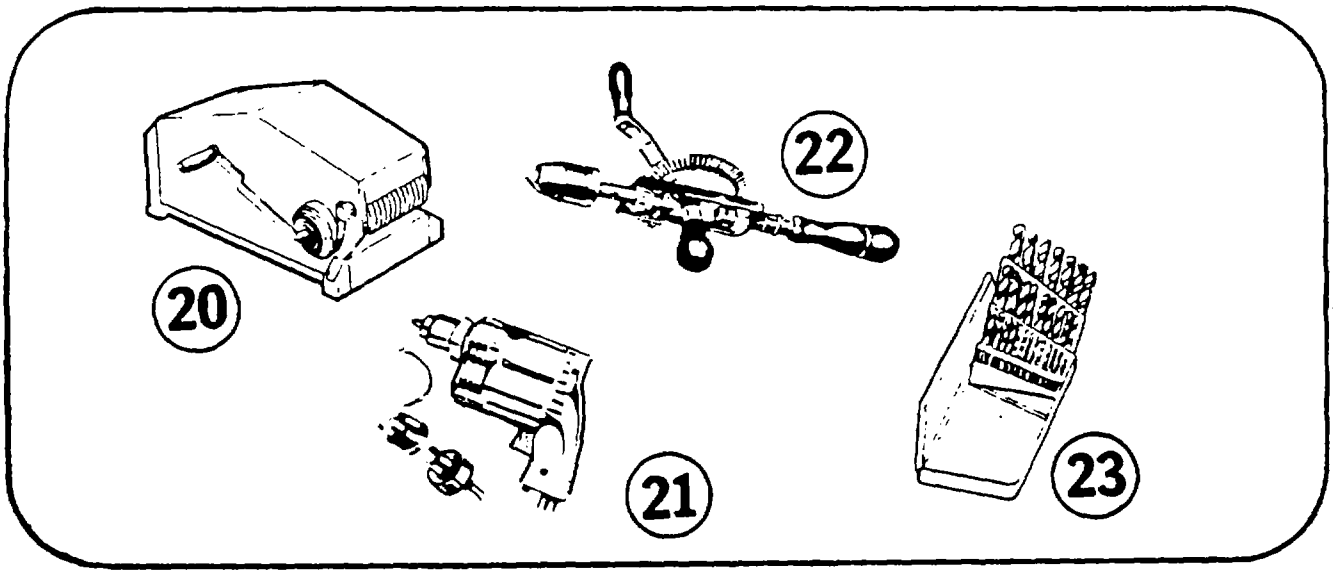
ILL No	NSN	DESCRIPTION	UI	SOURCE
11	7920-00-291-5815	BRUSH, WIRE, SCRATCH, STEEL: For removing paint, rust, and acid stains. About 1 1/4" Trim, H-B-178. Curved Handle, 4" X 18" rows, Type II, Class 1	EA	GSA
12	4940-00-293-9183	CABINET, BLAST: 80 Lb Air Pressure; Accom Casting 10" X 10" X 10"; w/: 1 EA COLLECTOR, DUST 1 EA DRAWER, SAND REMOVAL 1 EA TUNGSTEN NOZZLE: 1/2" MIL-B-45022, Type II, Style A; MERDC D-9989-11-12; Class 1	EA	SC
13	7240-00-499-8028	CAN, RADIATOR FILLING: 9 Qt Plastic Can with Protective finish; Spout for easy pouring of liquids into automobile radiators and other water-cooling systems; With Handle, 13 1/2" H, Type 1, MIL-C-43522	EA	GSA

Figure B-1. Tools and equipment-Continued.



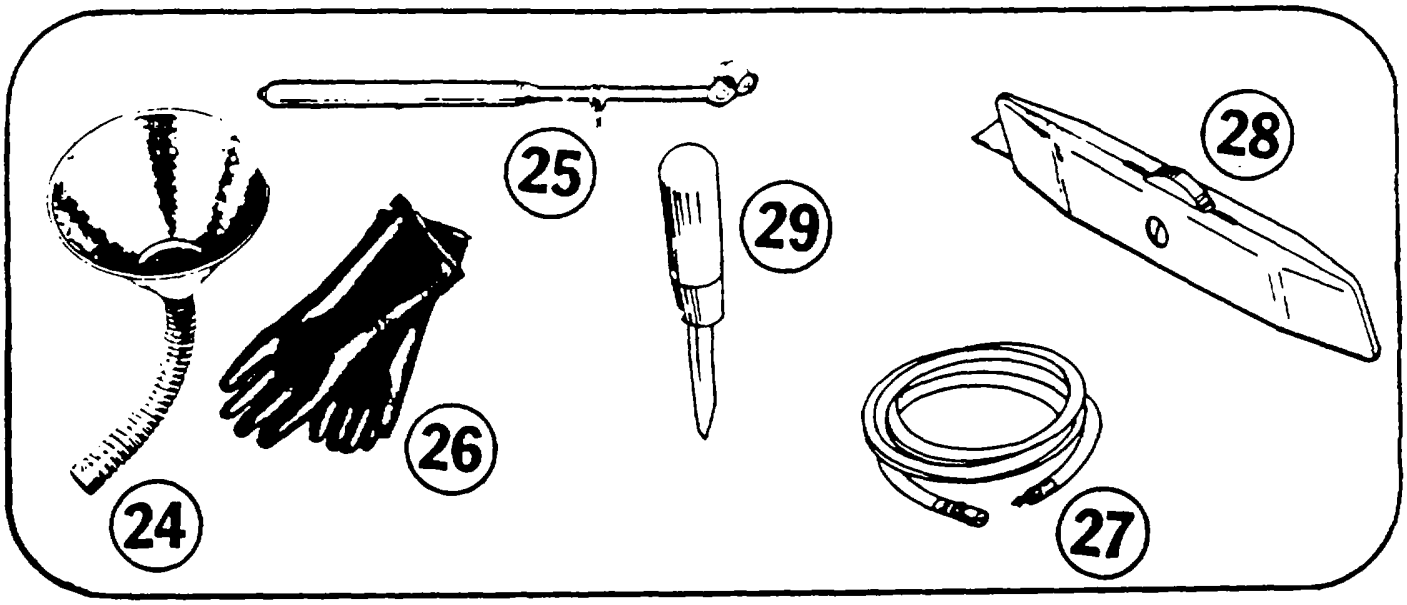
ILL No	NSN	DESCRIPTION	UI	SOURCE
14	5120-00-529-4124	CARRIER, STORAGE BATTERY: Type 1, GGG-C-1968, Size 12	EA	GSA
15	4940-00-910-2687	CLEANING GUN, PNEU: 3DGD520 w/Hose	EA	SC
16	4310-00-204-2595	COMPRESSOR UNIT: Reciprocating Power Driven; Air Rec Mtd; AC, 220/440V, 3 HP, 60 Hz, 10 HP, 25 CFM Free Air Del; 175 psi Dis; w/ Air Hose, Gauge, Chucks; MIL-C-13847	EA	SC
*17	4730-00-142-1960	COUPLING HALF: Quick Disconnect, Male; Push-Pull	EA	SC
*18	4730-00-595-1813	COUPLING HALF: Quick Disconnect, Female; Push-Pull	EA	SC
19	4940-00-449-6689	DEGREASER, PTBL: Solvent Type, 1/4 HP; 115V; 60 CY; Sgl Phase; 20 Gal; 20" X 18" X 36"	EA	SC

Figure B-1. Tools and equipment-Continued.



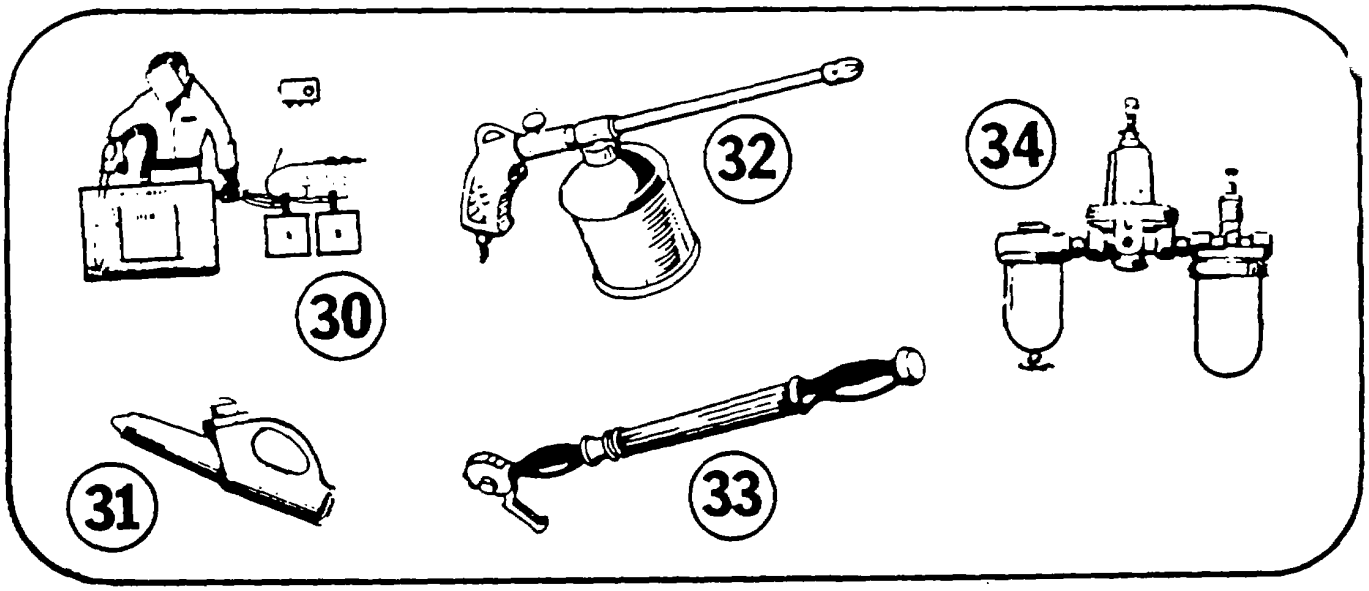
ILL No	NSN	DESCRIPTION	UI	SOURCE
20	7520-00-285-8078	DISPENSER, PRESSURE-SENSITIVE ADHESIVE TAPE: Metal Body; Cellulose Acetate Cellophane-Cloth-Plastic Tape; 4" W, 8 1/2" OD Roll, 3" ID Core; Lever-Operated; Manual Cut-off; GG-D-458, Type I, Class 1	EA	SC
21	5130-00-935-7354	DRILL, ELECTRIC: Double Insulated Variable Speed Drill, Reversible 0-1,000 rpm (min) - 0-2,000 rpm (max), No Load Speed, 3/8" Capacity, Keyed Jaw Chuck, Ball or Roller Bearing Construction, 120V AC, Single Phase, 2.7 Amps min Rating, min HP at Rated Load. 0.185 min Stall Torque at Spindle Shaft 5.4 Ft Lbs	EA	GSA
22	5110-00-293-3411	DRILL, HAND: W/Eight Wood Bits; GGG-D-671	EA	GSA
23	5133-00-293-0981	DRILL SET: Twist 1/16 to 9/32; No. 2B, Type B, Class 1	EA	GSA

Figure B-1. Tools and equipment-Continued.



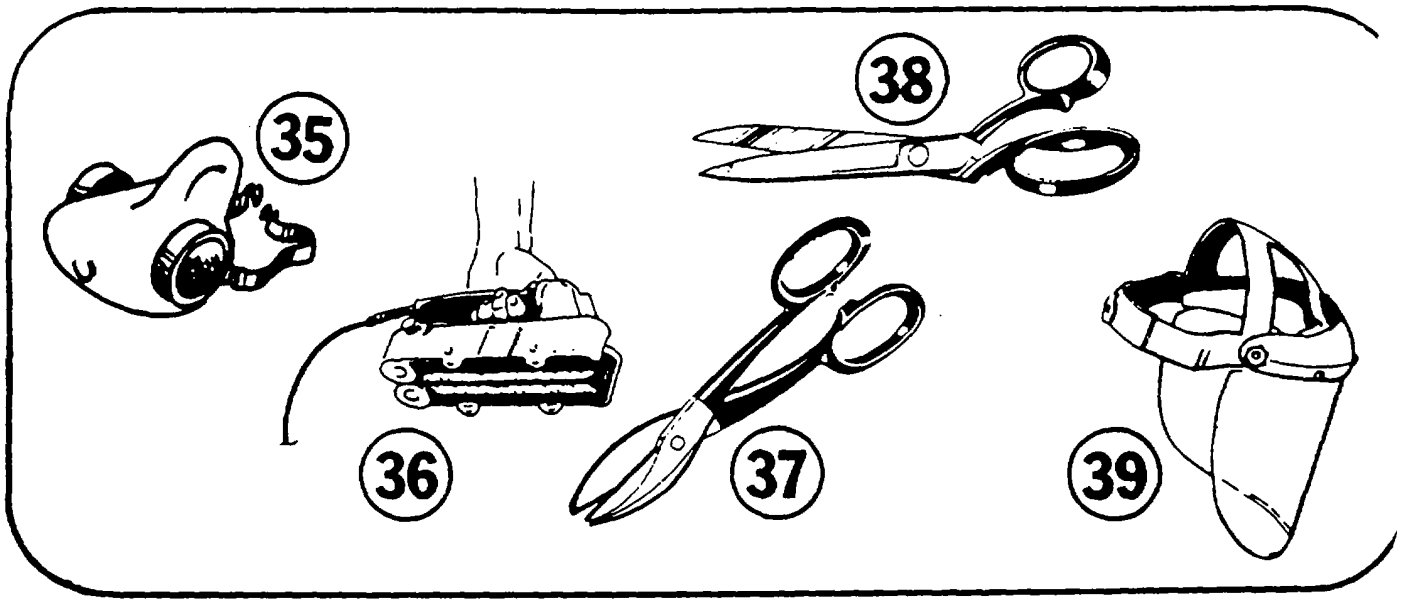
ILL No	NSN	DESCRIPTION	UI	SOURCE
24	7420-00-559-7364	FUNNEL: 8" Flexible Spout; A-A-1068	EA	GSA
*25	4910-00-204-3170	GAUGE, TIRE: 20-60 psi; 6" Extension, Type II, Class A, Style 2, GGG-91	EA	GSA
26	8414-00-266-8677	GLOVES, RUBBER: Acid Resistant; Gauntlet Cuff, ZZ-G-381, Type III, Class 2	PR	GSA
*27	4720-00-356-8557	HOSE, RUBBER; AIR: 1/4" ID, 25' L	EA	SC
28	5110-00-892-5021	KNIFE, CRAFTSMAN'S; GEN: 5 1/2" L, Retractable w/5 Blades	EA	GSA
29	5110-00-240-7073	KNIFE, GENERAL: 2 1/2" Blade, 7" Overall Length	EA	GSA

Figure B-1. Tools and equipment-Continued.



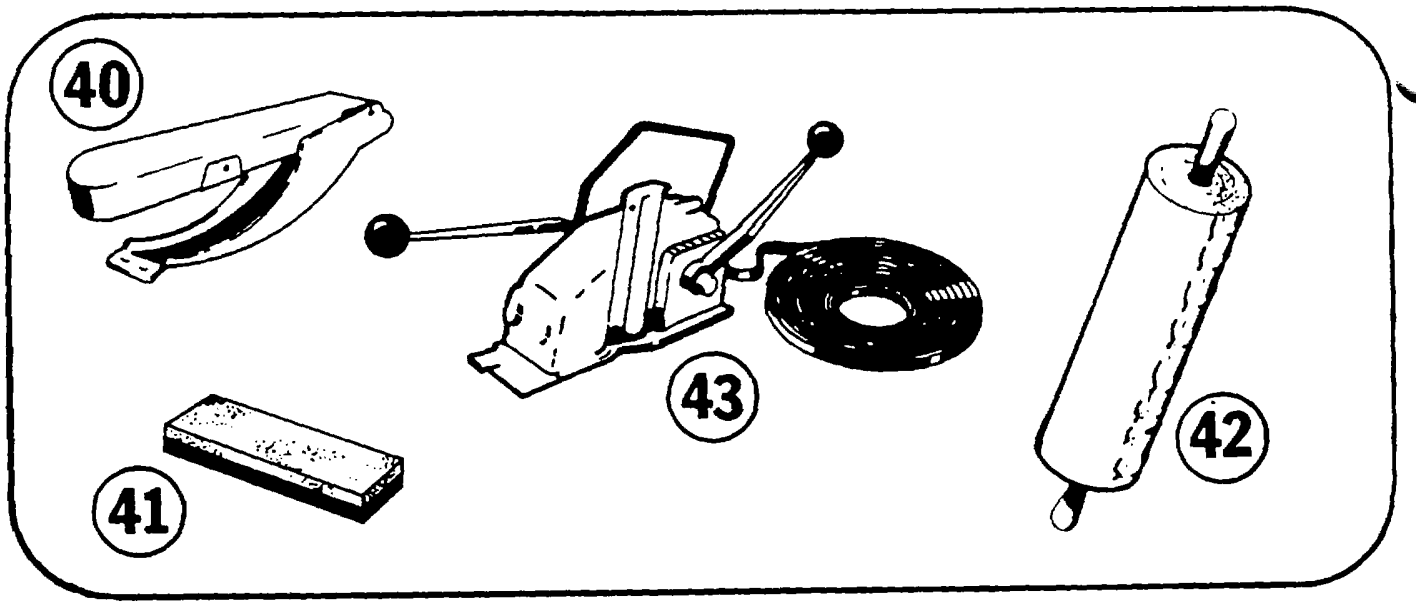
ILL No	NSN	DESCRIPTION	UI	SOURCE
**30	SEE 3-6e.	MACHINE, FOAM-IN-PLACE		
31	4940-00-333-5541	NOZZLE, AIR BLAST: Button Operated, 30 psi Discharge Press w/Coupling	EA	SC
32	4930-00-222-2975	OIL GUN, PNEU: (See App C)	EA	SC
33	5120-00-542-4828	PULLER, NAIL STD: Removable Jaw, Type I, Class 1, GGG-P-791	EA	GSA
*34	5130-00-322-5911	REGULATOR FILTER: 250 psi Capacity (Air), Canorgren Co., No. 35BAD2 or equal	EA	SC

Figure B-1. Tools and equipment-Continued



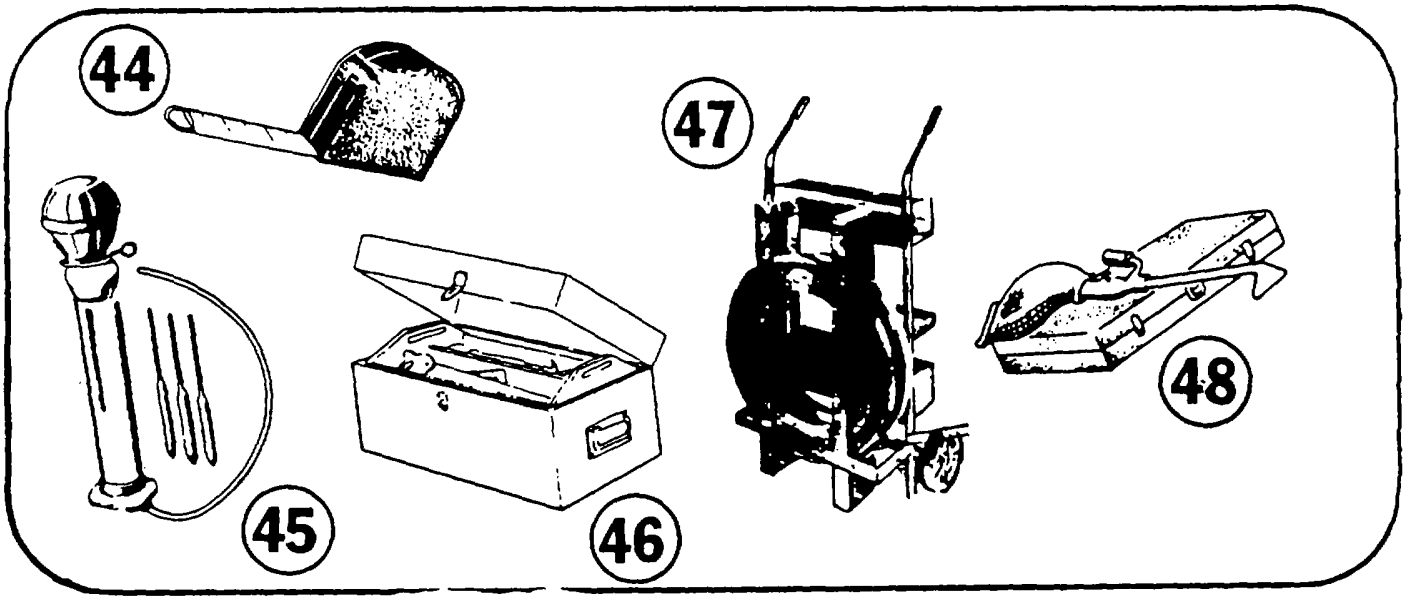
ILL No	NSN	DESCRIPTION	UI	SOURCE
35	4240-00-022-2524	RESPIRATOR, AIR FILTERING: Half Piece Type; Cartridge w/Accessories, GGG-M-125, Type IV, Class 4	EA	SC
36	3540-00-819-8837	SEALER, HAND: See Section VI, Figure 2		
37	5110-00-293-0089	SHEARS, METAL CUTTING; STRAIGHT CUT: 1 3/4" X 2 3/8" Cut, Style B; 8"	EA	GSA
38	5110-00-223-6370	SHEARS, TRIMMING: 12", Type I, Class 4, GGG-S-278	EA	GSA
39	4240-00-542-2048	SHIELD, FACE: Clear Plastic 9" L X 18" W, Headgear Type, L-F-36	EA	GSA

Figure B-1. Tools and equipment-Continued.



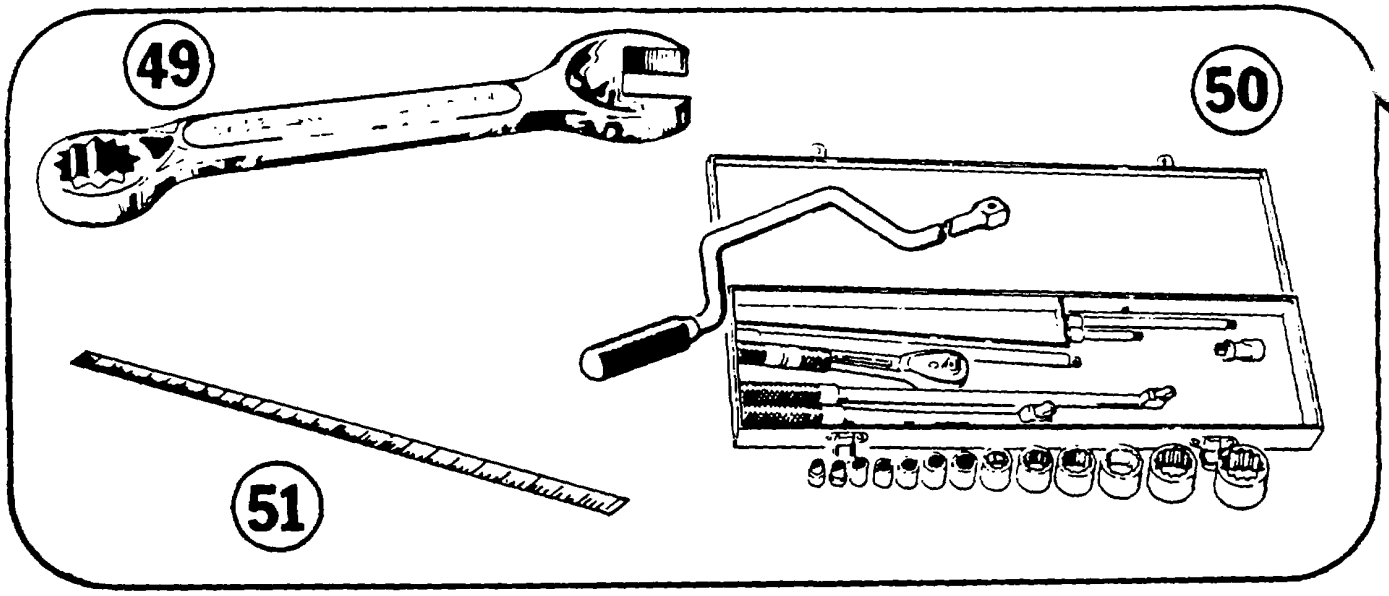
ILL No	NSN	DESCRIPTION	UI	SOURCE
40	7520-00-240-5727	STAPLER, PLIER TYPE: Std Duty. Use 7510-00-272-9662, 1/4" X 1/2" Staples	EA	GSA
41	5345-00-198-8048	STONE, SHARPENING: Silicon Carbide; Unmounted; Type II, Style 1	EA	GSA
**42	GSA Contract No. GS-005-71011	STRETCH WRAP for securing palletized loads	RL	GSA
43	3540-00-565-6243	STRAPPING AND SEALING KIT; MANUAL: W/Stretcher, Sealer Box, 90 Lb of Strapping and Seals, 3/4" W, Type IV, MIL-S-43104	EA	GSA

Figure B-1. Tools and equipment-Continued.



ILL No	NSN	DESCRIPTION	UI	SOURCE
44	5210-00-081-4719	TAPE, MEASURING: Steel Body, 8 Ft, Type V, Class A	EA	GSA
45	6630-00-247-2968	TESTER, ANTIFREEZE: Float Type w/Thermometer and Conversion Table	EA	GSA
46	5180-00-293-2875	TOOL KIT, CARPENTERS: 60 PC w/Chest	SE	GSA
47	3540-00-273-8821	TRUCK, HAND STRAPPING COIL: Two Wheel w/Tool Tray for Strap Dispensing, Type II, Class E, MIL-R-43448	EA	GSA
48	7910-00-807-3704	VACUUM, PNEU: Hand: 60 psi min Air Press w/Tube Extender, A1625	EA	SC

Figure B-1. Tools and equipment-Continued.



ILL No	NSN	DESCRIPTION	UI	SOURCE
49	5120-00-935-7310	WRENCH SET: Set of Nine; Combination Box and Open End, 6 Point Without Box, OSH-709	EA	GSA
50	5120-00-322-6231	WRENCH SET, SOCKET: 3/8 Sq Dr, 23 PC w/Metal Box; 12 Point Sockets, GGG-W-641	SE	GSA
51	5210-00-985-6610	YARDSTICK, ALUMINUM: Type II, GGG-Y-35	EA	GSA

*The air compressor recommended in this listing is equipped with this item.

**NSNs not available. For procurement and technical assistance for these items write to Director, AMCPSCC, ATTN: SUSTO-TP-P, Tobyhanna, PA 18466-5097, or call AV 795-7682, Commercial 717-894-7682.

Figure B-1. Tools and equipment-Continued

ITEM	NSN	CLEANING/DRYING	PRESERVATION & PACKAGING	CONTAINER OPENING/CLOSURE	BAG SEALING	FOAM-IN-PLACE	BOX/CARTON FABRICATION	VEHICLE PREPARATION
APRON	8415-00-715-0450	X				X		X
BAR, WRECKING	5120-00-224-1393			X				
BASKET, DRIP, DRAIN	3426-00-522-9051	X						
BATTERY FILLER, GRAVITY	6140-00-635-3824							X
BLOWER, ELECT	4940-00-449-8626	X						
BRUSH, CLEANING	7920-00-205-2401	X						X
BRUSH, CLEANING	7920-00-753-5183	X						X
BRUSH, STENCIL	7520-00-223-8000	X						X
BRUSH, STENCIL	7520-00-248-9285			X		X		
BRUSH, WIRE	7920-00-291-5815	X						X
CABINET, BLAST	4920-00-293-9183	X						
CAN, RADIATOR FILL	7240-00-254-4173							X
CARRIER, STORAGE BAT	5120-00-529-4124							X
CLEANING GUN, PNEU	4940-00-910-2687	X						X

Table B-1. Equipment Application.

ITEM	NSN	CLEANING/DRYING	PRESERVATION & PACKAGING	CONTAINER OPENING/CLOSURE	BAG SEALING	FOAM-IN-PLACE	BOX/CARTON FABRICATION	VEHICLE PREPARATION
COMPRESSOR, AIR	4310-00-204-2595	X			X	X		X
COUPLING HALF	4730-00-142-1960	X			X	X		X
COUPLING HALF	4730-00-595-1813	X			X	X		X
DEGREASER, PTBL	4940-00-449-6689	X						X
DISPENSER, TAPE	7520-00-285-8078		X	X	X	X	X	
DRILL, ELECT, PTBL	5130-00-935-7354			X			X	
DRILL, HAND	5110-00-293-3411			X			X	
DRILL SET, TWIST	5133-00-293-0981			X			X	
FUNNEL	7240-00-559-7364	X						X
GAUGE, TIRE	4910-00-204-3170							X
GLOVES, RUBBER	8414-00-266-8677	X				X		X
HOSE, AIR, RUBBER	4720-00-356-8557	X			X	X		X
KNIFE, CRAFTSMAN'S, GENERAL	5110-00-892-5071		X	X	X	X	X	
KNIFE, GENERAL	5110-00-240-7073		X	X	X	X	X	

Table B-1. Equipment Application-Continued.

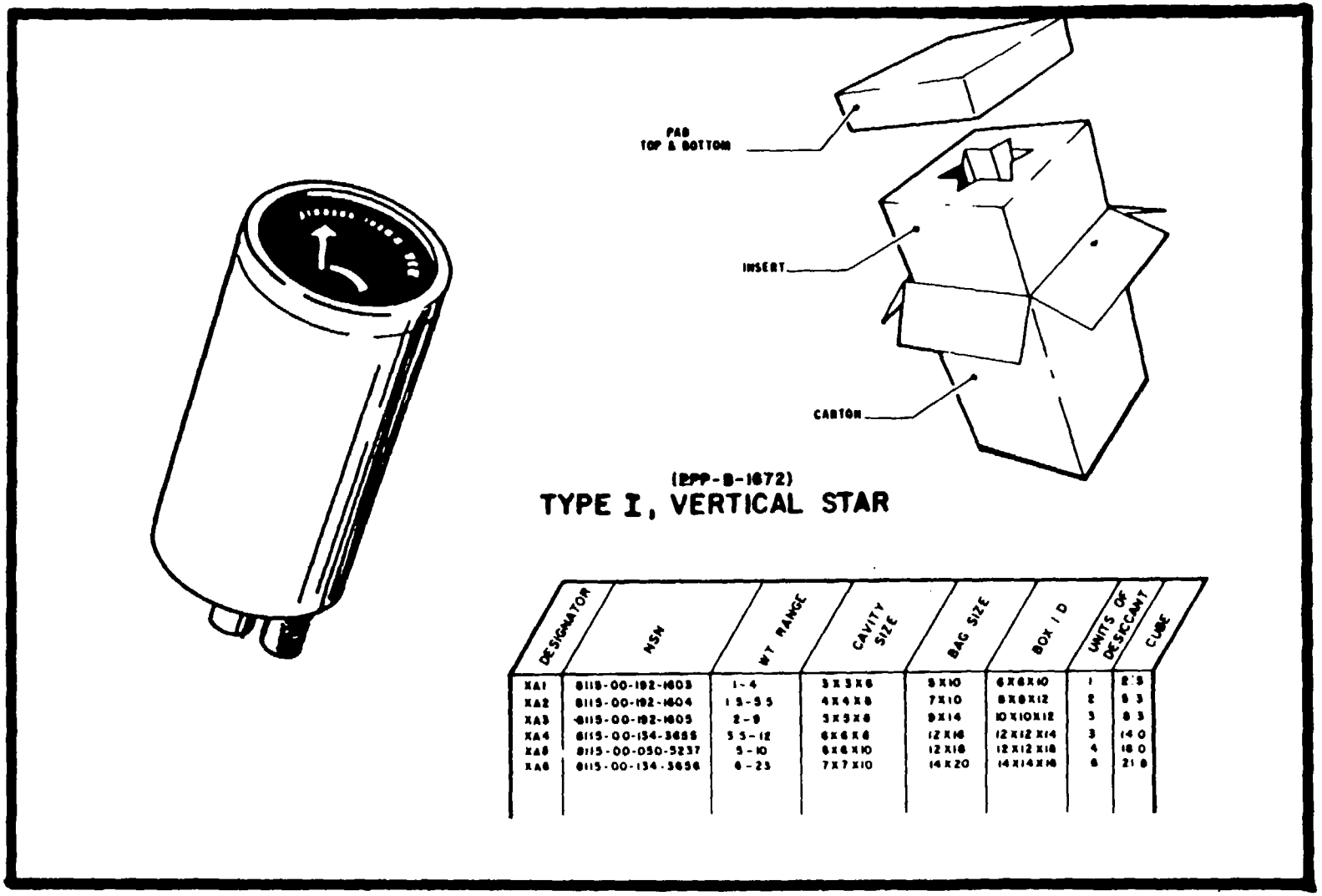
ITEM	NSN	CLEANING/DRYING	PRESERVATION & PACKAGING	CONTAINER OPENING/CLOSURE	BAG SEALING	FOAM-IN-PLACE	BOX/CARTON FABRICATION	VEHICLE PREPARATION
MACHINE, FOAM-IN-PLACE						X		
NOZZLE, AIR BLAST	4940-00-333-5541	X						X
OIL GUN, PNEU	4930-00-222-2975	X						X
PULLER, NAIL	5120-00-542-4828			X				
REGULATOR/FILTER	5130-00-322-5911	X			X	X		X
RESPIRATOR	4240-00-022-2524	X						X
SEALER, HAND	3540-00-819-8817				X			
SHEARS, METAL	5110-00-293-0089			X				
SHEARS, TRIMMING	5110-00-223-6470		X	X	X	X		
SHIELD, FACE	4240-00-542-2048	X				X		X
STAPLER	7520-00-240-5727		X	X	X	X		
STONE, SHARPENING	5345-00-198-8048		X	X	X	X		
*STRETCH WRAP	GSA #GS-005-71011							
STRAPPING KIT	3540-00-565-6243			X				

*Used for securing containers to pallets.

Table B-1. Equipment Application-Continued.

ITEM	NSN	CLEANING/DRYING	PRESERVATION & PACKAGING	CONTAINER OPENING/CLOSURE	BAG SEALING	FOAM-IN-PLACE	BOX/CARTON FABRICATION	VEHICLE PREPARATION
TAPE, MEASURING	5210-00-081-4719		X	X	X	X	X	
TESTER, ANTIFREEZE	6630-00-247-2968							X
TOOL KIT	5180-00-293-2875		X	X		X	X	
TRUCK, HAND STRAPPING	3540-00-273-8821			X				
VACUUM, PNEU	7910-00-807-3704	X	X	X	X			
WRENCH SET	5120-00-935-7310			X			X	
WRENCH SET	5120-00-322-6231			X			X	
YARDSTICK	5210-00-985-6610		X	X	X	X	X	

Table B-1. Equipment Application-Continued.

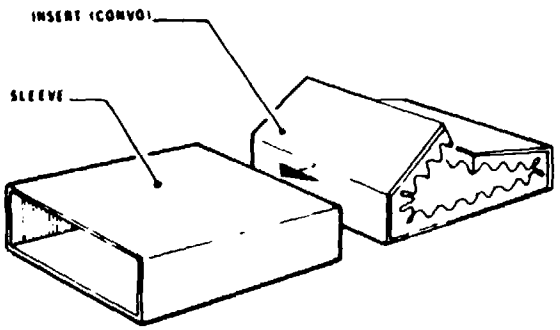


DESIGNATOR	NSN	WT RANGE	CAVITY SIZE	BAG SIZE	BOX I D	UNITS OF DESICCANT	CUBE
XA1	8115-00-192-1603	1-4	5 X 5 X 6	5 X 10	6 X 6 X 10	1	2.5
XA2	8115-00-192-1604	1 5-5 5	4 X 4 X 8	7 X 10	8 X 8 X 12	2	5 3
XA3	8115-00-192-1605	2-9	5 X 5 X 8	9 X 14	10 X 10 X 12	3	8 3
XA4	8115-00-134-3655	5 5-12	6 X 6 X 8	12 X 16	12 X 12 X 14	3	14 0
XA5	8115-00-050-5237	5-10	8 X 8 X 10	12 X 18	12 X 12 X 18	4	18 0
XA6	8115-00-134-3656	8-23	7 X 7 X 10	14 X 20	14 X 14 X 16	6	21 0

Figure B-2. Selection/Ordering Guide for Fast Packs.

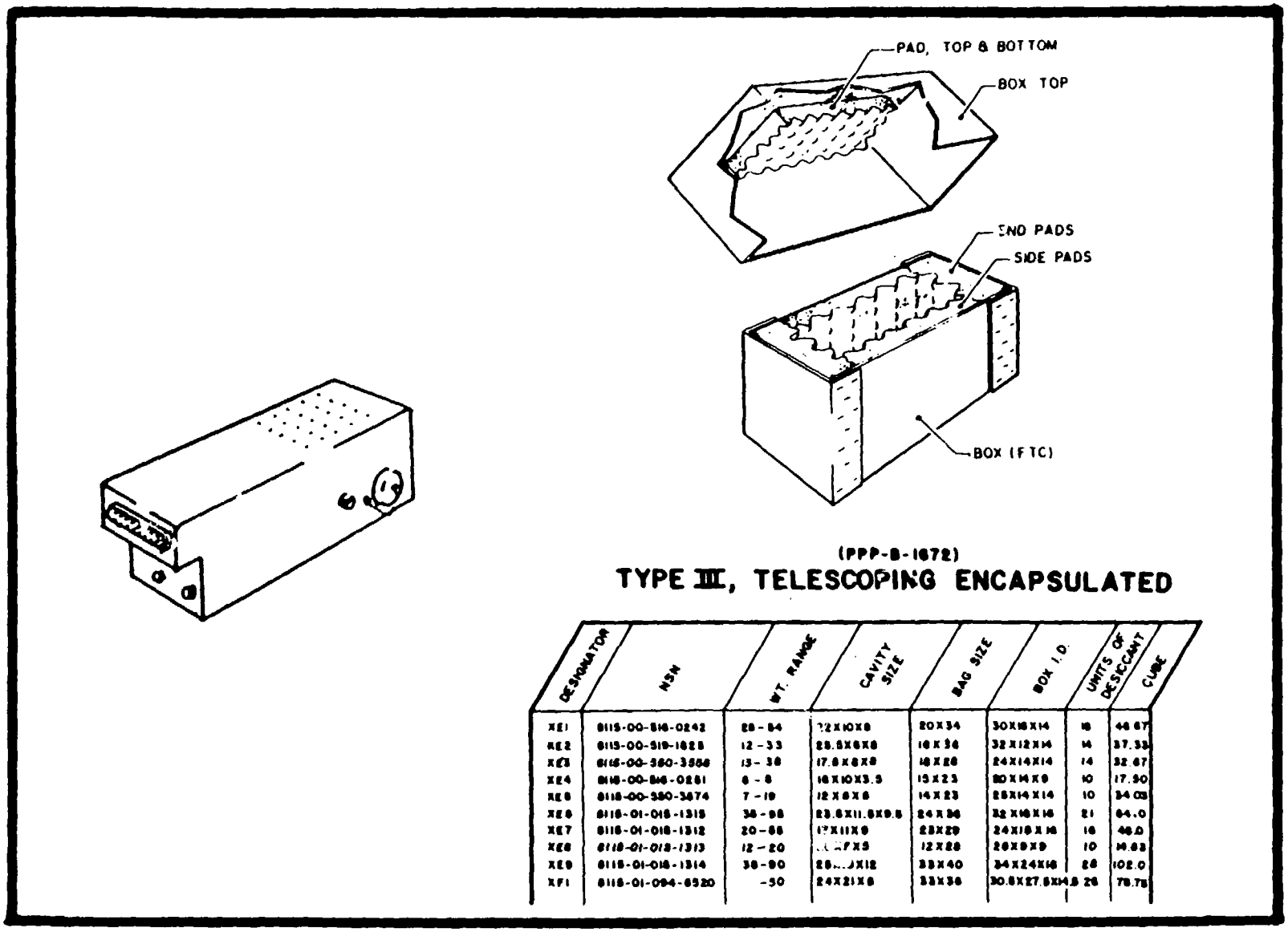
(PPP-B-1672)

TYPE II, FOLDING CONVOLUTED



DESIGNATOR	NSN	WT RANGE	CAVITY SIZE	BAG SIZE	BOX I D	UNITS OF DESICCANT	CUBE
XC1	8115-00-782-2142	5	5 X 4 5 X 1 25	6 X 8	6 X 5 X 2 5	1	52
XC2	8115-00-787-2147	1	9 X 4 5 X 2 25	7 X 10	6 X 9 X 3 5	2	73
XC3	8115-00-101-7647	1	8 X 5 5 X 1 25	7 X 10	9 X 6 X 2 5	2	94
XC4	8115-00-101-7638	1 8	8 X 5 5 X 2 25	8 X 12	9 X 8 X 3 5	2	1 31
XC5	8115-00-787-2146	1 8	11 X 7 X 1 25	9 X 14	12 X 8 X 2 5	3	1 67
XC6	8115-00-787-2148	3 6	11 X 7 X 2 25	10 X 16	12 X 8 X 3 5	4	2 35
XC7	8115-01-019-4085	4 3	17 X 11 5 X 1 25	13 X 22	18 X 12 X 2 5	6	3 78
XC8	8115-01-019-4084	8 6	17 X 11 5 X 2 25	14 X 24	18 X 12 X 3 6	7	5 25
XC9	8115-01-057-1244	4 0	9 X 8 X 2 25	13 X 15	10 X 10 X 3 5	4	2 43
XD1	8115-01-057-1243	6 0	12 X 12 X 2 25	16 X 18	13 X 13 X 3 5	6	4 11
XD2	8115-01-057-1245	9 0	15 X 15 X 2 25	18 X 22	16 X 16 X 3 5	9	6 22
XD3	8115-01-085-3750	10 0	23 X 15 X 2 25	22 X 32	24 X 15 25 X 3 5	7	9 33

Figure B-2. Selection/Ordering Guide for Fast Packs--Continued.



(PPP-B-1672)

TYPE III, TELESCOPING ENCAPSULATED

DESIGNATOR	NSN	WT. RANGE	CAVITY SIZE	BAG SIZE	BOX I.D.	UNITS OF DESICCANT	CUBE
XE1	8115-00-816-0242	28 - 84	22X10X8	20X34	30X16X14	16	46.67
XE2	8115-00-819-1828	12 - 33	28.5X6X8	16X36	32X12X14	14	37.33
XE3	8115-00-880-3566	13 - 38	17.8X8X8	18X26	24X14X14	14	32.67
XE4	8115-00-816-0281	6 - 8	16X10X3.5	15X23	20X14X9	10	17.50
XE5	8115-00-880-3674	7 - 19	12X8X8	14X23	28X14X14	10	34.03
XE6	8115-01-018-1315	36 - 98	23.5X11.5X9.5	24X36	32X16X16	21	64.0
XE7	8115-01-018-1312	20 - 55	17X11X9	23X29	24X18X16	16	48.0
XE8	8115-01-018-1313	12 - 20	[illegible]	12X28	28X9X9	10	34.63
XE9	8115-01-018-1314	36 - 90	28[illegible]X12	33X40	34X24X16	28	102.0
XF1	8115-01-094-6520	-50	24X21X8	33X36	30.5X27.5X14.5	26	78.75

Figure B-2. Selection/Ordering Guide for Fast Packs-Continued

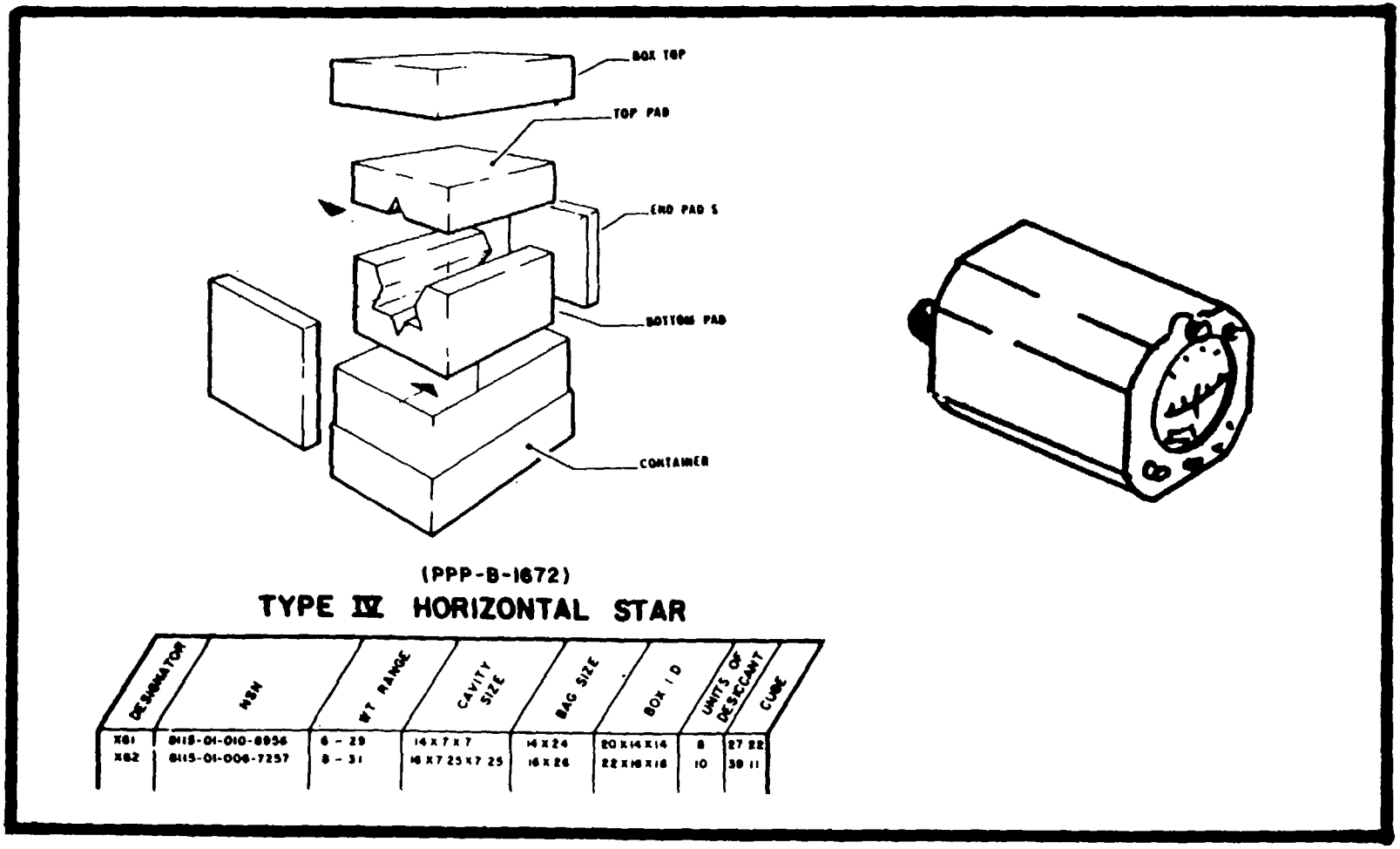


Figure B-2. Selection/Ordering Guide for Fast Packs-Continued

APPENDIX C
AUTHORIZED SUBSTITUTES FOR PACKAGING MATERIALS

C-1. Substitution List for P-type Preservatives

When determining the proper preservative to be used as a substitute when the originally specified material is not available, certain factors should be considered. They area.

a. Characteristics of the item. These include composition, surface finish, complexity of construction, size, and shape.

b. Characteristics of the preservative. These include chemical composition, chemical consistency (thickness or thinness), hard drying (or not), and method of application (hot or cold).

c. Extent of protection desired. If the item is to be used within a relatively short period of time, only a light, temporary preservative is required. However, if the item is to be stored for a long period of time, then a longer lasting protective coating is required.

d. Ease of removal. Whether or not someone in the field is able, with normal resources, to remove the preservative with little difficulty. Preservative substitutes listed in table C-1 shall be used only when the specified material is not available.

Table C-1. Preservative Substitutes (P-type)

P-type preservative	specifications	Applicable Substitute (only if a shortage exists)
P-1	MIL-C-16173, grade I	*
P-2	MIL-C-16173, grade II	*
P-3	MIL-C-16173, grade III	MIL-C-81309
P-6	MIL-C-11796, class III	*
P-7	MIL-L-3150	*
P-9	V V-L-800	MIL-L-2105 MIL-L-7870 MIL-L-14107
P-10	MIL-L-21260, type I, grade 10, 30 or 50; or type II, grade 10 or 30	*
P-11	MIL-G-10924	MIL-G-23827 MIL-G-81322 MIL-G-81827
P-14	MIL-C-10382	*
P-15	Hydraulic preservative oil. Not listed in MIL-P-116. Use is subject to approval by applicable major subordinate command (MSC)	*
P-17	MIL-L-6085	MIL-L-7870
P-18	MIL-P-3420, MIL-B-22019, MIL-B-22020, MIL-I-22110	*
P-19	MIL-C-16173, grade IV	*
P-20	MIL-P-46002	MIL-I-23310
P-21	MIL-C-16173, grade V	*

*Substitute is not available.

Note: If a suitable substitute is not available, consider upgrading the method of preservation. For example, use method IC instead of method I, method IA instead of method IC, or method II instead of method IA. However, method substitution does not replace the preservative requirement.

C-2. Substitution List for Barrier Materials (Including Bags and Wraps)

Materials in column one of table C-2 are commonly referred to as "barrier materials" throughout this manual. The prescribed substitutes, listed in column two, also apply when the packaging reference specifies the use of bags, sleeves, or tubing as interior wraps. When fabricating bags, refer to MIL-B-117 for information on the type, grade, and class and on the weight and size limitations.

Table C-2. Barrier Material Substitutes

Prescribed specification and title	Substitues (only if material shortage exists)	Type	Grade	Class
L-P-378, Plastic Sheet and Strip, Thin Gauge, Polyolefin	MIL-B-121	ALL	ALL	1
	MIL-B-131	I	NA	1&2
	MIL-B-22191	ALL	NA	ALL
	MIL-B-81705	ALL	NA	NA
MIL-B-121, Barrier Material, Greaseproofed, Waterproofed, Flexible	PPP-B-10655*	NA	NA	C-1
	MIL-B-131*$	I	NA	1&2
	MIL-B-81705*$	ALL	NA	NA
MIL-P-130, Paper, Wrapping, Laminated and Creped	MIL-B-121	ALL	A	1
	MIL-B-131	I	NA	1&2
	MIL-P-17667	I&II	NA	1&2
	MIL-B-22191	ALL	NA	ALL
	MIL-B-81705	ALL	NA	NA
MIL-B-131, Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat Sealable	MIL-B-22191	I	NA	ALL
	MIL-B-81705	I	NA	NA
MIL-P-3420, Packaging Materials, Volatile Corrosion Inhibitor, Treated, Opaque	MIL-B-22019	ALL	NA	NA
	MIL-B-22020	NA	NA	1&2
	MIL-B-40028	NA	NA	NA

*Waterproof protection.
$Watervaporproof, greaseproof protection.

C-3. Substitution List for Cushioning Materials

Semirigid FIP (0.5 density) is acceptable for limited cushioning, and rigid foam (2.0 density) is acceptable for blocking and bracing materials. Substitute materials that can be used when foam is not available are listed in table C-3. When selecting a substitute for interior cushioning (against a bare item), three requirements must be met. The cushioning must be as dry as practical; it must be noncorrosive; and, if the item is coated with a preservative, it must first be wrapped with a greaseproof barrier material.

Table C-3. Cushioning Material Substitutes

Specification	Title
C-F-202	Felt Sheet (Hair) and Felt Roll (Hair)
PPP-C-795	Cushioning Material, Packaging (Flexible Cellular Plastic Film) for Packaging Applications
PPP-C-843	Cushioning Material, Cellulosic
PPP-C-850	Cushioning Material, Polystyrene Expanded, Resilient (for Packaging Uses)
PPP-C-1120	Cushioning Material, Uncompressed Bound Fiber for Packaging
PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes
PPP-P-291	Paperboard, Wrapping and Cushioning
MIL-H-9884	Honeycomb Material, Cushioning Paper

C-4. Substitution List for Tapes

Specified tapes used in container closure are listed in column one of table C-4. Column five contains a list of substitute tapes that can be used when the required tapes are not available. If substitute tapes cannot be obtained, MMM-A-250, Adhesive, Water-resistant, may be used for closing both interior and exterior containers.

C-5. Label Adhesive and Transparent Tape (for Applying Printed Labels to a Container)

MIL-STD-129 authorizes the use of printed, paper labels for marking interior packages, shipping containers, and loose or unpacked items. When using these labels, securely affix them with water-resistant label adhesive or transparent tape. Table C-5 lists substitute materials that can be used when specified materials are not available.

Table C-4. Closure Tape Substitutes

Specification and title	Type	Grade	Class	Suitable Substitute	Type	Grade	Class
A-A-883,* Tape, Pressure Sensitive Adhesive, Masking	I&II	NA	NA	Substitute not available			
PPP-T-45, Tape, Gummed, Paper Re-inforced and Plain, for Sealing and Securing	ALL	NA	2	PPP-T-60	III	NA	1&2
PPP-T-60,* Tape, Packaging, Water-proof	III& IV	NA	1&2	A-A-884 PPP-T-45$ PPP-T-70	NANANA	NA NA NA	NA 2 NA
PPP-T-70,* Tape, Packaging Pastic Film	1&2	NA	NA	PPP-T-60	III	NA	2
PPP-T-76,* Tape, Pressure Sensitive Adhesive, Packaging/paper (for Car-ton Sealing)	NA	NA	NA	PPP-T-45 PPP-T-60 PPP-T-60 PPP-T-70	IIIIIIVNA	NA NA NA NA	2 1&2 1 NA

*Pressure sensitive.
$Water activated.

Table C-5. Label Adhesive and Transparent Tape Substitutes

Specification	Type	Grade	Class	Title
MMM-A-105	I	NA	NA	Adhesive and Sealing Compounds Cellulose Nitrate Base, Solvent Type
MMM-A-179	NA	NA	NA	Adhesive: Paper Label
MMM-A-250	II	NA	NA	Adhesive, Water-resistant (for Closure of Fiberboard Boxes)
MMM-A-260	II	B	2	Adhesive, Water-resistant (for Sealing Water-proofed Paper)
PPP-T-60*	III	NA	2	Tape, Packaging, Waterproof
PPP T-70*	NA	NA	NA	Tape, Packaging, Plastic Film

*Not applicable for wood containers.

C-6. Substitution List for Exterior Containers

Container specifications listed in table C-6 are in order of maximum allowable weights. Any container can be used in place of the one listed above it. Fiberboard containers can be substituted, one type for another, based on weight limits set in the applicable container specification. For example, WC- or WS-type boxes can be used instead of VC or VS-type material or vice versa. When selecting a container, the following factors should be considered:

a. Type of load.
b. Container size limitation.
c. Style of container.
d. Mode of transportation.
e. Type of commodity to be contained.

Table C-6. Exterior Container Substitutes

Specification	Title
PPP-B-576	Box, Wood, Cleated, Veneer, Paper Overlaid
PPP-B-585	Box, Wood, Wirebound
PPP-B-591	Boxes, Shipping, Fiberboard, Wood-cleated
PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-621	Box, Wood, Nailed and Lock-corner
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-640	Box, Fiberboard, Corrugated, Triple-wall
MIL-D-6054	Drum, Metal-Shipping and Storage
MIL-D-83667	Drum, Fiber, for Domestic and Overseas
(USAF)	Shipments of Military Assemblies or Parts

INDEX
(GENERAL INFORMATION)

INDEX-Continued
(TOPICAL)

INDEX-Continued

INDEX-Continued

INDEX-Continued

INDEX-Continued

INDEX-Continued

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