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AMMUNITION RESTRAINT SYSTEMS FOR COMMERCIAL AND MILITARY INTERMODAL CONTAINERS (ASSEMBLY, INSTALLATION, REMOVAL AND OPERATION)

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

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PAGE

CHAPTER	1.	INTRODUCTION	
Section	I.	General	1-1
Paragraph	1-1.	Scope	1-1
	1-2.	Maintenance Forms and Records	1-1
	1-3.	Reporting of Errors	1-1
Section	II.	Description and Data	1-1
Paragraph	1-4.	Description	1-1
	1-5.	Tabulated Data	1-1
CHAPTER	2.	WOOD DUNNAGE SYSTEM FOR COMMERCIAL INTERMODAL CONTAINERS	
Paragraph	2-1.	Assembly	2-1
	2-3.	Removal	2-2
CHAPTER	3.	INTERNAL RESTRAINT SYSTEM KIT FOR COMMERCIAL INTERMODAL CONTA INER S (IR SKIT)	
Paragraph	3-1.	Assembly	3-1
	3-2.	Installation and Operation	3-1
	3-3.	Removal	3-2
CHAPTER	4.	INTERNAL RESTRAINT SYSTEM FOR MILVANS	
Paragraph	4-1.	Assembly	4-1
	4-2.	Installation and Operation	4-1
	4-3.	Removal	4-1
APPENDIX A.		REFERENCES	A-1

LIST OF ILLUSTRATIONS

Figure No.	Title	Page
1-1	Typical loaded container with wood dunnage system installed	1-3
1-2	Typical loaded container with I RSKIT hardware and wood dunnage installed	1-5
1-3	Typical loaded container with internal restraint system for MILVANS installed	1-7

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope.

This manual is published for guidance and use by Department of Defense personnel responsible for loading, blocking, bracing, and unloading shipments of Class V ammunition items and ammunition components in military and commercial 20 foot intermodal containers.

1-2. Maintenance Forms and Records.

Equipment maintenance forms and procedures for their use are explained in TM 38-750.

1-3. Reporting of Errors.

You can improve this manual by recommending improvements, using DA Form 2028-2, Recommended Changes to Publications and Blank Forms or comparable Navy or Air Force forms and for-warding directly to Director, US Army Defense Ammunition Center and School, ATTN: SARAC-DEO, Savanna, IL 61074.

Section II. DESCRIPTION AND DATA

1-4. Description.

Ammunition restraint systems approved for use in either commercial or military intermodal containers are to be discussed in the following pages with regard to their assembly, installation, removal and operation. The containers intended for use in the shipment of ammunition using these restraint systems must be inspected and found acceptable with MIL-HDBK-138 (AR), Container Inspection Handbook for Commercial and Military Containers (Dry Cargo Type). These systems are used in Inter-national Organization for Standardization (ISO) 20’ long by 8’ wide by 8’ or 8.5’ high, steel, aluminum or fiberglass-reinforced-plywood commercial or military containers with a maximum allowable gross weight (container plus contents) of 44,800 lbs. See Figures 1-1, 1-2, and 1-3, respectively, for typical views of installed systems.

NOTE

Even though some commercial containers are equipped with a mechanical load securing system, they are being excluded from this manual since they have not been approved for shipment of ammunition items. In order for these restraint systems to be acceptable for use when shipping ammunition items or components in commercial or military containers, they must be used in accordance with an approved applicable service drawing. These approved service drawings are listed in three government publications, Department of Army Pamphlet No. 310-24, Index of Storage and Outloading Drawings for Ammunition Commodities, MIL-STD-1386 (Navy), Loading of Hazardous Material in MILVAN Containers, and Military Standardization Handbook, MIL-HDBK-236 (Navy), Index to Standards for Palletizing, Truckloading, Rail Car Loading and Container Loading of Hazardous Materials, TO 11A-1-61 (Air Force), Technical Manual, Storage and Outloading Instructions.

1-5. Tabulated Data.

Typical major components of each of the restraint systems are listed in Tables 1-1, 1-2, and 1-3. Assembly, installation, removal and operation of the restraint systems are described in Chapters 2, 3, and 4.

TABLE 1-1

SYSTEM	SYSTEM MAJOR COMPONENTS
Wood Dunnage for Commercial Intermodal Containers	(a) Forward Blocking Assembly (b) Side Blocking Assembly (c) Rear Blocking Assembly (d) Door Post Vertical (e) Door Post Vertical Retainer (f) Door Spanner (g) Fill Material (h) Spanner Piece Cleat (i) Spanner Piece (j) Splice for Tie Pieces NOTE: Component (e) is a steel weldment; all other components are constructed of wood.

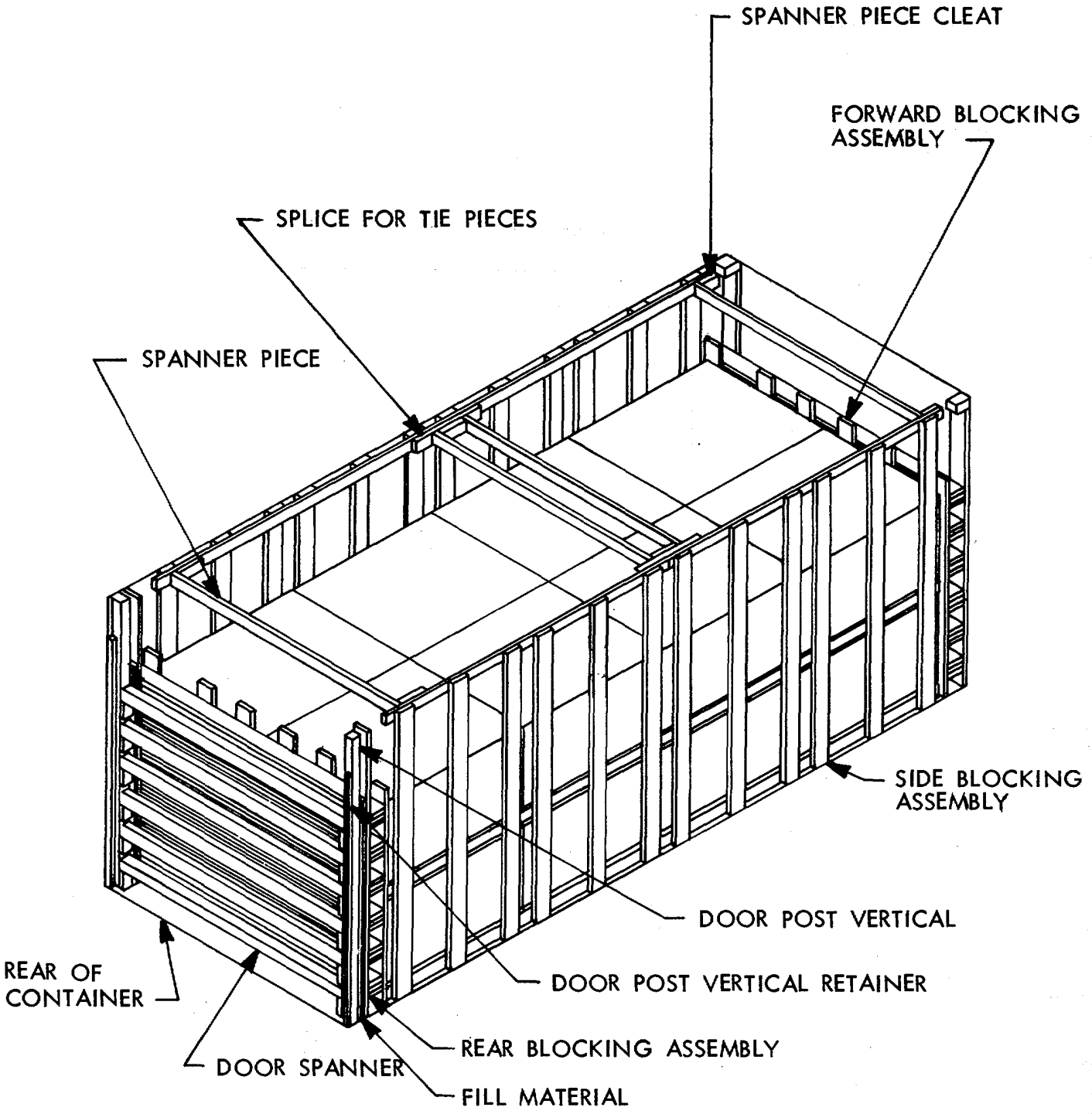

Figure 1-1. Typical loaded container with wood dunnage system installed.

TABLE 1-2

SYSTEM	SYSTEM MAJOR COMPONENTS
Internal Restraint System Kit for Commercial Containers (IRSKIT)	(a) Four 5/8” Steel Wire Rope Assemblies (b) Four Steel Anchor Blocks (c) Four 1” -8 UNC x 48” Threaded Steel Rods (d) Four Steel Washer Plates (e) Eight Shackles (f) Two Structural Aluminum Angles- 8” x 6” x 83” Long, 11.7 lbs per foot (g) Forward Blocking Assembly (h) Forward Filler Assembly (i) Side Blocking Assembly (j) Rear Blocking Assembly Note: Components (g) thru (j) are constructed of wood.

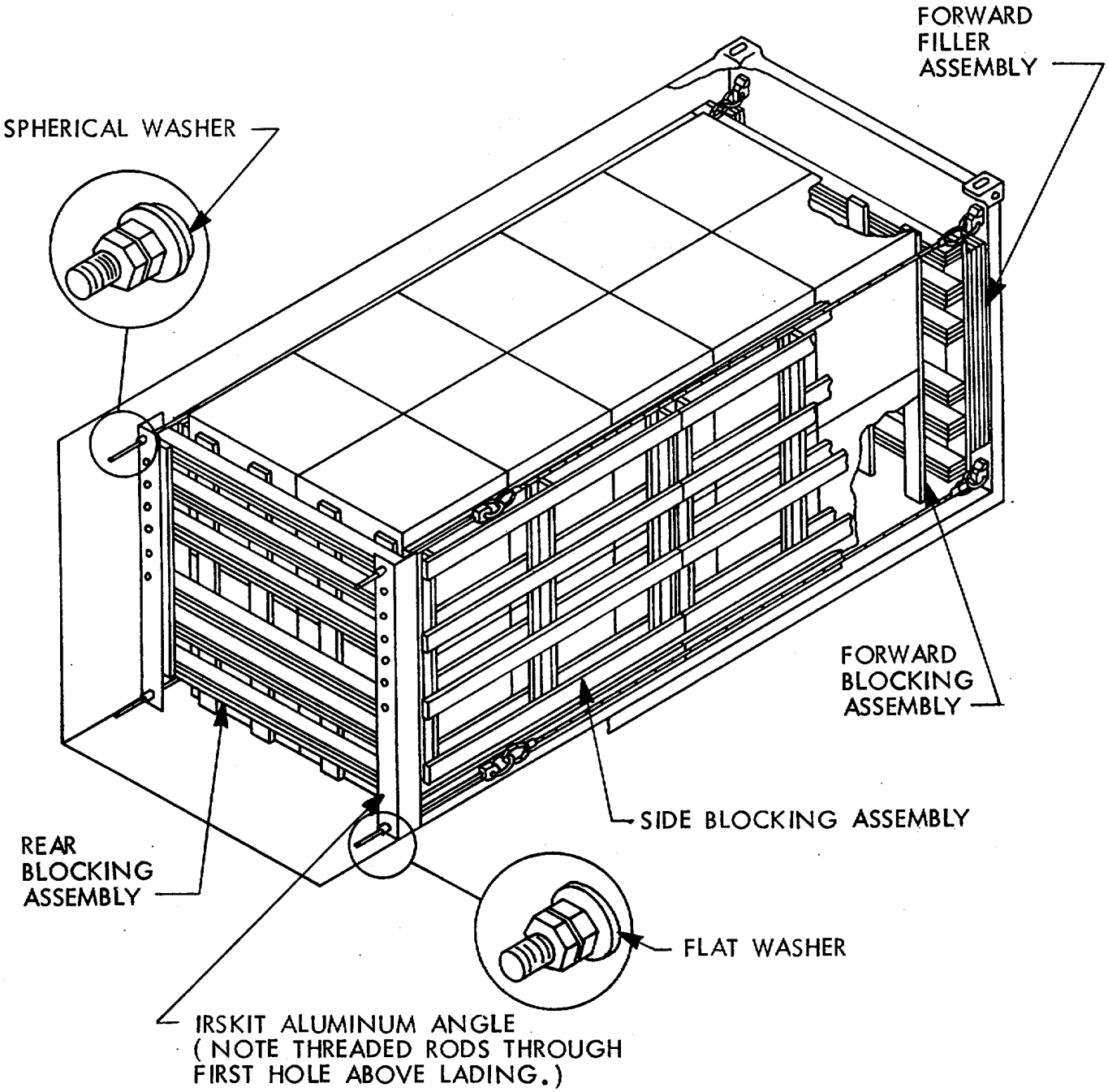

Figure 1-2. Typical loaded container with IRSKIT hardware and wood dunnage installed.

TABLE 1-3

SYSTEM	SYSTEM MAJOR COMPONENTS
Internal Restraint System for MILVANS	(a) Cross Member (steel/ aluminum) (b) Horizontal Rail (steel) (c) Sway Bracing or Side Fill Gate (d) Load Bearing Gate (e) Center Fill Gate NOTE: Components (c) thru (e) are constructed of wood.

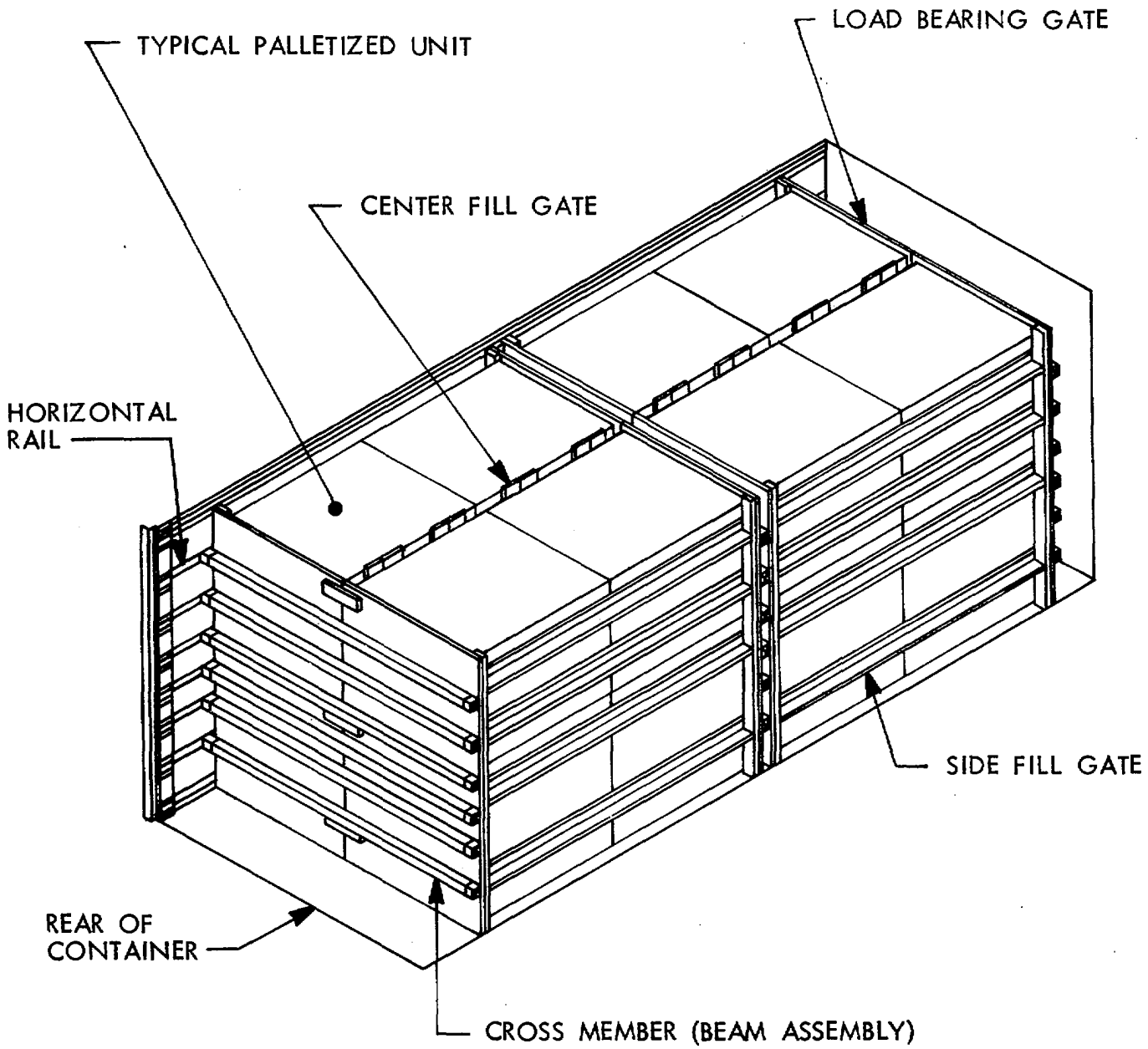

Figure 1-3. Typical loaded container with internal restraint system for MILVANS installed.

(1-7/1-8 Blank)

CHAPTER 2
WOOD DUNNAGE SYSTEM FOR COMMERCIAL INTERMODAL CONTAINERS

2-1. Assembly.

The Wood Dunnage System is comprised of wood assemblies and wood or steel components installed in the container. The function of the system is to hold the lading' in place during shipment. For a typical Wood Dunnage System, see Figure 1-1.'The major assemblies of the system can be assembled prior to the loading of the lading into the container and then be placed in 'the appropriate position during loading. Typical assemblies that may be constructed prior to installation are defined as follows:

NOTE:

Quantity, size, and location of dimensional lumber making up the following blocking and bracing assemblies depends on the actual configuration, weight, and size of the lading. For the actual blocking and bracing assembly configurations for a specific ammunition item, refer to the approved applicable service drawing listed in either DA PAM No. 310-24, MIL-STD-1386 (Navy), MIL-HDBK-236 (Navy), or TO 11 A-1 -61 (Air Force).

a. Forward Blocking Assembly - The Forward Blocking Assembly consists of horizontal beams and vertical members used to transmit the forces developed by the lading during shipment to the strong areas of the front wall of the container, specifically the corner posts.

b. Side Blocking Assembly - The Side Blocking Assembly consists of wood members nailed together to form an assembly that contacts the lading and the container side wall at the strong areas of each. This type of blocking is required to more uniformly distribute the lateral forces developed by the lading during shipment onto the container side walls and to fill up any lateral void between the lading and the side walls of the container.

c. Rear Blocking Assembly - The Rear Blocking Assembly consists of horizontal beams and vertical members similar to the Forward Blocking Assembly. This assembly is used to prevent the lading from moving towards the doors during shipment and to transfer the forces developed by the lading during shipment to the strong areas (corner posts) at the rear of the container.

d. Door Post Vertical and Door Post Vertical Retainer - The Door Post Vertical consists of a wood vertical member with a series of- small blocks (strut ledgers) nailed to it. The Door Post Vertical Retainer, a steel vertical member with predrilled holes for nailing purposes, is then nailed to the Door Post Vertical. This 'assembly with wood filler pieces placed in front of it, transmit the forces developed by the lading during' shipment from the Rear Blocking Assembly to the strong areas of the rear of the container, specifically the rear corner posts.

e. Door Spanner, Fill Material, Spanner Piece Cleat, Spanner Piece and Splice for Tie Pieces - These typical components are a part of the entire Wood Dunnage System, but do not require assembly prior to loading the lading in the container.

2-2. Installation and Operation.

The following installation sequence is a typical ex-ample of loading a container with an ammunition item or component and the Wood Dunnage System applicable to it.

NOTE:

For a concise listing of the Wood Dunnage System components for a specific item, refer to the approved applicable service drawing.

a. Place the Forward Blocking Assembly against the front wall of the container.

b. Place the forward Side Blocking Assemblies against the side walls of the container and install the forward most Spanner Piece Cleats and associated Spanner Piece.

c. Load the lading to the rear end of the forward Side Blocking Assemblies.

d. Install rear Side Blocking Assemblies. Connect forward and rear Side Blocking Assemblies with the Splice for Tie Pieces.

e. Install the Center Spanner Piece Cleat and the two associated Spanner Pieces.

f. Load the lading to the rear end of the container.

g. Install the Rear Spanner Piece Cleats and associated Spanner Piece.

h. Place the Rear Blocking Assembly against the rear of the lading.

i. Place the Door Post Vertical/Door Post Vertical Retainer assemblies in the rear corners of the container.

j. Install the top and bottom Door Spanners

k. Install Fill Material between the Rear Blocking Assembly and the Door Post Vertical/Door Post Vertical Retainer Assemblies.

I. Install the remaining Door Spanners.

2-3. Removal.

a. Removal of the Wood Dunnage System and lading from a container can be accomplished by using the installation sequence in reverse, or by any method the receiving activity deems safe and appropriate.

b. The major assemblies of the Wood Dunnage System should be retained for future use if they can be economically stored or shipped to a reuse point. All other wood dunnage is expendable and can either be reused as is, if deemed appropriate, or reclaimed and reused.

CHAPTER 3

INTERNAL RESTRAINT SYSTEM KIT FOR COMMERCIAL INTERMODAL CONTAINERS (IRSKIT)

3-1. Assembly.

The Internal Restraint System Kit for commercial intermodal containers (IRSKIT) is comprised of wood assemblies and metal components installed in the container. The function of the system is to hold the lading in place during' shipment. For a typical (IRSKIT) load, see Figure 1-2. Various system components or assemblies will require assembly prior to installation in the container. For IRSKIT components requiring assembly and/or installation prior to loading the container, see MIL-STD-1663 (Navy). The wood dunnage components and assemblies will also require assembly prior to installation in the container. Detailed dimensions and sizes of the wood dunnage components and assemblies depends on the actual configuration, weight and size of the lading. Refer to the approved applicable service drawings listed in either DA PAM 310-24, MIL-STD-1386 (Navy), MIL-HDBK 236 (Navy), or TO 11A-1-61 (Air Force) for the actual wood dunnage assembly configurations for each ammunition item.

NOTE

Many of the wood dunnage components or assemblies used in the IRSKIT system are either the same as those used in the wood dunnage system or contain minor modifications to avoid contact with the metal IRSKIT components. Typical wood dunnage assemblies that may be constructed prior to installation are defined as follows:

a. Forward Blocking Assembly - The Forward Blocking Assembly consists of horizontal beams and vertical members used to transmit the forces developed by the lading during shipment to the strong areas of the front wall of the container, specifically the corner posts. This assembly is constructed so that the horizontal and vertical members do not interfere with any of the metal IRSKIT components.

b. Forward Filler Assembly - The Forward Filler Assembly consists of laminated vertical members and horizontal members and is placed between the front wall of the container and the Forward Blocking Assembly. This assembly is only required when the center of gravity of the load does not fall within 12" of either side of the center of gravity-of the container. As with the Forward Blocking Assembly, the Forward Filler Assembly must be constructed so that it does not interfere with any of the metal IRSKIT components.

c. Side Blocking' Assembly - The Side Blocking Assembly consists of wood members nailed together to form an assembly that contacts the lading and the container side wall at the strong areas of each. This type of blocking is required to more uniformly distribute the lateral forces developed by the lading during shipment onto the container side walls and to fill up any lateral void between the lading and the side walls of the container. It should also be noted that even though the configuration of an IRSKIT Side Blocking Assembly may be the same as a Wood Dunnage System assembly, the minimum thickness of the wood members is greater for the IRSKIT assembly due to required wire rope clearance.

d. Rear Blocking Assembly - The Rear Blocking Assembly consists of horizontal beams and vertical members similar to the Forward Blocking Assembly. This assembly is used in conjunction with the metal components of the IR SKIT to prevent the lading from moving toward the container doors during transit. Although this assembly is constructed to provide a flat bearing surface for one leg of the structural aluminum angles, the vertical and horizontal pieces must be of such a configuration so as to not interfere with any other metal component of the IRSKIT.

3-2. Installations and Operation.

a. Container Preparation - Containers which have not previously been adapted to the I RSKIT must be prepared by drilling holes in the forward corner posts of the container through which the IRSKIT anchor block fitting assemblies are attached. For guidance regarding the drilling of the holes and hole location, see M I L-STD-1663 (Navy).

b. Preliminary IRSKIT Equipment Installation - Certain components (anchor blocks, washer plates, shackles, wire rope assemblies, and threaded rods) of the IRSKIT will require installation in the container prior to wood dunnage and lading installation. Refer to MIL-STD-1663 (Navy) for specific installation guidance.

c. Wood Dunnage and Lading Installation - The following installation sequence is a typical example

of loading a container with an ammunition item or component and the wood dunnage portion of the IRSKIT applicable to it.

NOTE

For a concise listing of the wood dunnage components or assemblies of the IRSKIT system for a specific item, refer to the approved applicable service drawing.

(1) Place the Forward Filler Assembly in the front of the container against the container- corner posts.

(2) Place the Forward Blocking Assembly against the Forward Filler Assembly.

(3) Position the forward Side Blocking Assemblies against the container side walls and the Forward Blocking Assembly.

(4) Load the lading to the rear of the forward Side Blocking Assemblies.

(5) Position the rear Side Blocking Assemblies against the container side walls and the rear end of the forward Side Blocking Assemblies.

(6) Load the remainder of the lading.

(7) Place the Rear Blocking Assembly against the rear of the lading. *d.* Final IRSKIT Equipment Installation-With the lading and wood dunnage in place, install the remaining IRSKIT equipment (structural aluminum angles) and connect with the other components of the system by means of placing threaded rods through the appropriate holes in the angles and tightening. For detailed angle installation and wire rope tensioning, see the guidance provided in MIL-STD-1663 (Navy).

3-3. Removal

a. Removal Sequence - Removal of the IRSKIT System and lading from a container can be accomplished by using the installation sequence in reverse, or by any method the receiving activity deems safe and appropriate.

b. General - All metal IRSKIT equipment is reusable and must be retained for future use. The equipment may be stored in and returned with the empty container if the container is to be used for shipment of Department of Defense ammunition items or components, or it may be returned using appropriate return shipping instructions and packing it in a wooden box constructed in accordance with Federal Specification PPP-B-621. Special care should be taken to assure that small loose items such as washers and nuts are attached to another part of the IRSKIT equipment, thereby reducing the chance for small item loss. Forward and Rear Blocking Assemblies should be retained if there is a possibility of future use and they can be economically stored or shipped to a reuse point. All remaining wood dunnage is expendable and can either be reused as is, if deemed appropriate, or reclaimed and reused.

c. Container Corner Post Repair - When the metal IRSKIT components are removed from a container, the holes in the front corner posts of the container must be plug-welded, smooth finished and painted prior to the container being returned to the lessor.

CHAPTER 4

INTERNAL RESTRAINT SYSTEM FOR MILVANS

4-1. Assembly

The Internal Restraint System for MI LVANS is comprised of slotted steel horizontal rails fastened to the MILVAN side walls, steel/aluminum cross members (beam assemblies) which lock into the slots of the horizontal rails, and various wood dunnage assemblies or components which act as fillers for any voids in the lading or transmitters of lading force developed during shipment to the strong areas of the container. For a typical Internal Restraint System for MIL-VANS, see Figure 1-3. Parts of the MI LVAN restraint system, just as parts of the previous two restraint systems, can be assembled prior to the loading of the lading into the container. Typical assemblies that may be constructed prior to installation are defined as follows:

NOTE

Quantity, size, and location of dimensional lumber making up the following blocking and bracing assemblies depends on the actual configuration, weight, and size of the lading. For the actual blocking and bracing assembly configurations for a specific ammunition item, refer to the approved applicable service drawing listed in either DA Pam 310-24, MIL-STD-1386 (Navy), MIL-HDBK-236 (Navy), or TO 11A-1-61 (Air Force).

a. Load Bearing Gate - The Load Bearing Gate is constructed of either vertical and horizontal members or a solid sheet of plywood, depending upon the lading configuration. This assembly is used to transmit forces developed by the lading during shipment to the load bearing members of the container, the cross members and horizontal rails.

b. Sway Bracing or Side Fill Gate - Depending upon the size and configuration of the lading, either Sway Bracing or Side Fill Gates can be used to fill the lateral voids in the container which in turn retains the lading from lateral movement. In filling these voids, lateral forces developed by the lading during shipment are transmitted thru either the strong areas of the lading or the dunnage to the strong areas of the container side walls.

c. Center Fill Gate - A Center Fill Gate may be used when the configuration of the lading allows it to be placed directly against the container sidewall, or it may be used in conjunction with a Side Fill Gate to eliminate any lateral voids in the container lading and transmit any lateral forces developed by the lading during shipment to the strong areas of the lading adjacent to the gate.

4-2. Installation and Operation

The following installation sequence is a typical example of loading a container with an ammunition item or component and the MILVAN Internal Restraint ‘System applicable to it. See Figure 1-3 for a typical MILVAN Internal Restraint System.

NOTE

For a concise listing of the MILVAN Internal Restraint System-for a specific item, refer to the approved applicable service drawing.

a. Fasten the forward Cross Members to the slotted rail locations shown in the applicable approved service drawing. The quantity of cross members required for a particular container load depends upon the configuration and the weight of the lading.

b. Install forward Load Bearing Gate, forward Side Fill Gates, forward lading, forward Center Fill Gates, and center Load Bearing Gate.

c. Fasten center Cross Members to the slotted rail locations shown in applicable service drawing. Fill Material, 1” X 4” or 2” X 4” shall be wire tied to the Cross Members when the void between the Cross Members and the lading is greater than one inch.

d. Repeat steps a thru c until a full container load is obtained.

4-3. Removal

a. Removal of the Internal Restraint System for MILVANS and the lading can be accomplished by using the installation sequence in reverse, or by any method the receiving activity deems safe and appropriate.

b. The Cross Members of the MILVAN Internal Restraint System are to be retained and returned with the MILVAN after completing a shipment. The Cross Members also, must be locked into the horizontal rails prior to the return of the MILVAN. The wood-dunnage assemblies may be retained for future use if they can be economically stored or shipped to a reuse point, or they may be reclaimed and reused, whichever is deemed appropriate.

APPENDIX A

REFERENCES

A-1. Drawings

DA PAM 310-24	Index of Outloading and Storage Drawings for-Ammunition Commodities
MIL-STD-1386 (Navy)	Loading of Hazardous Material in MI LVAN Containers
MIL-HDBK-236 (Navy)	Index to Standards for Palletizing, Truckloading, Rail Car Loading and Container Loading of Hazardous Materials
TO 1 1A-1-61 (Air Force)	Technical Manual, Storage and Outloading Instructions

A-2. Installation

MIL-STD-1663 (Navy)	Loading and Restraint of Ammunition and Explosives in Commercial Intermodal Containers Utilizing the Internal Restraint System Kit

A-3. Maintenance

TM 55-8115-200-23&P	Container, General Cargo; MILVAN (NSN 8115-00-168-2275) and Container, W/Mechanical Load Bracing System; MILVAN (NSN 8115-00-151-9953)

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