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8020
Ser N523/1194
9 Aug 13

From: Commanding Officer, Naval Ordnance Safety and Security Activity

Subj: NAVSEA SW023-AG-WHM-010, SIXTH REVISION, "ON-STATION MOVEMENT OF AMMNUNITION AND EXPLOSIVES BY MOTOR VEHICLE"

Ref: (a) NAVSEA SW023-AG-WHM-010, Fifth Revision of 1 June 2009

Encl: (1) Abstract of Significant Changes

1. NAVSEA SW023-AG-WHM-010, Sixth Revision, is hereby promulgated and supersedes reference (a), which should be destroyed.

2. NAVSEA SW023-AG-WHM-010, Sixth Revision, has been updated with regulatory instructions and administrative changes. Enclosure (1) highlights the significant changes that have been incorporated into the basic text of this new revision.

3. The requirements contained in NAVSEA SW023-AG-WHM-010 are continuously monitored to ensure compliance with all applicable regulations. Users are encouraged to submit any recommendations for improving this manual in writing using NAVSEA 4160/1, Technical Manual Deficiency/Evaluation Report (TMDER), located at the end of this publication. Changes to this manual will be issued as required.

4. The Naval Ordnance Safety and Security Activity point of contact is Mr. Mario Harley (N523), commercial (301)744-6066 or Email: mario.harley@navy.mil.

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Distribution:
Explosives Safety Technical Manual (ESTM) DVD-ROM Distribution List

ABSTRACT OF SIGNIFICANT CHANGES

1. Advises the reader in paragraph 2-2.2 to refer to NAVSEA SW023-AH-WHM-010 for the approved types of Materials Handling Equipment (MHE) when handling ammunition and explosives in a given operational area.

2. Identifies staples in paragraph 3-2.3 as an approved type of fastener.

3. Introduces in paragraph 4-4 the Joint Modular Intermodal Container (JMIC) as an approved crate and contains new loading and stacking for storage requirements.

4. Revises Chapter 6, Section I with the current STANDARD Missile variants packaged in the Mk 21 Mod 0 Vertical Launching System (VLS) Canister and introduces the SEASPARROW Missile variants packaged in the Mk 22 Mod 0 VLS Canister supporting flatbed truck and trailer loading instructions.

5. Updates Chapter 6, Section V by correctly identifying the Mk 25 Mod 2 Skid (previously MHU-65/E Universal Cradle) when packaging the Mk 65 Underwater Mine for flatbed truck and trailer loading and transportation instructions.

0640-LP-1013-1089 SIXTH REVISION

ON-STATION MOVEMENT OF AMMUNITION AND EXPLOSIVES BY MOTOR VEHICLE

THIS PUBLICATION SUPERSEDES NAVSEA SW023-AG-WHM-010 FIFTH REVISION DATED 1 JUNE 2009

PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND

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1 MAY 2013

LIST OF EFFECTIVE PAGES

The total number of pages in this manual is 76. They are all original Revision Six pages. The date of issue for all pages in this manual is 1 May 2013. Change bars are included to assist the reader in identifiying areas where changes to requirements or procedures have occurred.

NAVSEA TECHNICAL MANUAL CERTIFICATION SHEET

CERTIFICATION APPLIES TO: NEW MANUAL ___ REVISION 6 CHANGE ___

APPLICABLE TMINS/PUB NO.: NAVSEA SW023-AG-WHM-010

PUBLICATION DATE (MO, DA, YR): 1 MAY 2013

READING GRADE LEVEL (RGL):

TITLE: ON-STATION MOVEMENT OF AMMUNITION AND EXPLOSIVES BY MOTOR VEHICLE

TMCR/TMSR/SPECIFICATION NO.:

CHANGES AND REVISIONS:

PURPOSE: TO UPDATE THE MINIMUM REQUIREMENTS FOR THE SAFE TRANSPORTATION OF AMMUNITION AND EXPLOSIVES DURING ON-STATION MOVEMENT BY MOTOR VEHICLE.

EQUIPMENT ALTERATION NUMBERS INCORPORATED:

TMDER/ACN NUMBERS INCORPORATED:

CONTINUE ON REVERSE SIDE OR ADD PAGES AS NEEDED

CERTIFICATION STATEMENT

THIS IS TO CERTIFY THAT RESPONSIBLE NAVSEA ACTIVITIES HAVE REVIEWED THE ABOVE IDENTIFIED DOCUMENT FOR ACQUISITION COMPLIANCE, TECHNICAL COVERAGE, AND PRINTING QUALITY. THIS FORM IS FOR INTERNAL NAVSEA MANAGEMENT USE ONLY, AND DOES NOT IMPLY CONTRACTUAL APPROVAL OR ACCEPTANCE OF THE TECHNICAL MANUAL BY THE GOVERNMENT, NOR RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY FOR DELIVERING THE TECHNICAL MANUAL IN ACCORDANCE WITH THE CONTRACT REQUIREMENT.

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FOREWORD

1. This technical manual describes the minimum requirements and regulations for the transportation of arms, ammunition, explosives and related hazardous materials (AA&E) on-station by motor vehicle at Department of the Navy (DON) shore activities. It may also be used as a technical base for other allied local documents such as Standard Operating Procedures (SOPs), Surface Missile Processing Descriptions (SMPDs), and Quality Assurance (QA) Plans. Based on the controlled on-station environment, which includes restricted speed limits for conveyances, less dense traffic patterns, trained and qualified vehicle operators, experienced crew members, etc., the blocking and bracing requirements of this manual are less stringent than the requirements for off-station shipments. It is only when these controlled conditions exist and are strictly adhered to that the relaxed blocking and bracing procedures detailed in this manual can safely be used. There is no intent to reduce safety, but rather only to minimize cost by recognizing the unique physical characteristics, operating environments, and trained, qualified and experienced personnel resources that exist on DON shore activities.

NOTE

All regulations specific to the use of railcars for the on-station movement of AA&E is now found in NAVSEA SW023-AK-SAF-010.

2. All off-station shipments of AA&E must conform to the requirements prescribed in the applicable Military Standard (MIL-STD-1320), Weapons Requirement (WR-51) or NAVSEA drawing.

3. The requirements of this manual are applicable to all military, civilian and contractor personnel engaged in the on-station transportation of AA&E at DON shore activities.

4. This manual in not intended to supersede, contravene, or modify any federal, state, municipal, or local laws and their supplements. If any provision of this manual appears to conflict with any other published regulation, it should be reported by completing the Technical Manual Deficiency/Evaluation Report (TMDER) described in paragraph 1-7 of this manual.

5. Copies of the Explosives Safety Technical Manual (ESTM) DVD may be procured from Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division Detachment Picatinny (NSWC IHEODTD, Det Picatinny), Code G13, Building 458, Whittemore Avenue, Picatinny Arsenal, NJ 07806-5000.

6. This manual supersedes NAVSEA SW023-AG-WHM-010 Fifth Revision, 1 June 2009, which should be destroyed. Changes or revisions to this manual will be issued as required.

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

CHAPTER/PARAGRAPH **PAGE**

TABLE OF CONTENTS (CONTINUED)

CHAPTER/PARAGRAPH **PAGE**

TABLE OF CONTENTS (CONTINUED)

CHAPTER/PARAGRAPH **PAGE**

LIST OF FIGURES

LIST OF TABLES

SAFETY SUMMARY

The following are general safety precautions that are related to specific procedures and appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply when loading and dunnaging arms, ammunition, explosives and related hazardous materials (AA&E).

EMPLOYEES WORKING ALONE - No employees shall work alone in a location where assistance from another cannot be given immediately in the event of an accident.

GENERAL HANDLING OF AMMUNITION, EXPLOSIVES OR RELATED HAZARDOUS MATERIALS (A&E) - A&E shall be handled carefully to prevent shock or friction that may cause a fire, explosion or render the item or component unserviceable. Items shall not be thrown, dropped, dragged or tumbled during handling operations. The handling of A&E shall be reduced to a minimum, and every precaution shall be taken to avoid their contact with sand, earth, gravel, and other abrasive or spark-producing substances. A&E shall not be exposed unnecessarily to inclement weather or to direct sunlight. Bale hooks or similar devices shall not be used on military explosives. Any evidence that loads of A&E have been handled roughly shall be reported promptly to the responsible officer or supervisor in accordance with established procedures.

The following warnings appear in the text and are repeated here for emphasis.

WARNING

Plastic bedliners generate static electricity and are not authorized for use in the transport of scrap or bulk explosives in any container, or for the transport of any ammunition or explosive that is not packaged in its approved shipping container. Special care shall be taken to secure all cargo in vehicles with plastic bedliners because of the slippery nature of the liner surface. (Page 5-1).

WARNING

When transporting heavy loads with no lateral restraint (i.e., no side blocking), drivers should exercise caution when going around turns, as sudden lateral shifting of the load could cause the vehicle to overturn. (Page 5-2, 5-3 and 5-6).

The following cautions appear in the text and are repeated here for emphasis.

CAUTION

Do not use a “cheaterbar” (a length of pipe that fits over the handle of the loadbinder to provide additional leverage) in the following procedure. (Page 3-8)

CAUTION

Check webbing tiedown assembly to ensure that it is not in contact with any sharp edge that may cause damage. To avoid such contact, use protective sleeves between tiedown assembly and lading. (Page 3-9)

Notes are also used in the text to emphasize unusual or special procedures and conditions.

CHAPTER 1

INTRODUCTION

1-1 PURPOSE. This manual provides the minimum requirements for the safe transportation of arms, ammunition, explosives and related hazardous materials (AA&E) by motor vehicle on-station. The experience of trained and qualified ordnance, safety and quality assurance personnel prescribed in NAVSEA OP 5 Volume 1 is still a requirement.

1-2 SCOPE. The requirements in this manual are mandatory for all military, civilian, and contractor personnel engaged in the transportation of AA&E on-station, except as provided in paragraph 3-4. The term "on-station" means the area under the control of a Department of the Navy (DON) shore activity's command. This manual does not pertain to AA&E intended for shipment on public roads and highways, for which NAVSEA SW020-AG-SAF-010 and NAVSEA SW020-AF-HBK-010 apply.

NOTE

All regulations specific to the use of railcars for the on-station movement of AA&E are now found in NAVSEA SW023-AK-SAF-010.

1-3 MANDATORY AND ADVISORY REGULATIONS. The responsible party for all authorized actions used throughout this manual is the Commanding Officer/Officer-In-Charge (CO/OIC). The CO/OIC may delegate authority to the lowest level of competence commensurate with the subordinate's assigned responsibilities and capabilities in accordance with OPNAVINST 3120.32 (series). The requirements in this manual that use the commands "shall", "will", or "must" are mandatory, unless they are specifically waived or exempted by the provisions in OPNAVINST 8020.14/MCO P8020.11 (series). Advisory requirements are those in which "may" or "should" are used. These advisory requirements shall be followed unless exceptions are authorized in writing by the CO/OIC.

1-4 SAFETY PRECAUTIONS FOR ON-STATION MOVEMENT. The task of handling A&E is, by nature, hazardous. Accidents occurring during on-station movements kill and injure personnel, destroy essential supplies, damage valuable equipment and property, and reduce the speed and efficiency of the overall operation. Most accidents are avoidable provided the proper safety precautions are followed. All requirements contained in the safety manuals referenced shall be observed, as appropriate, by all personnel at Naval shore activities. In the event of a conflict between safety precautions in this manual and those in the referenced documents, the instructions in the referenced documents shall prevail.

1-5 TERMS AND ABBREVIATIONS. The definitions of terms and abbreviations commonly used in conjunction with on-station movement of AA&E and other explosives safety requirements appears separately on this DVD. These definitions are intended to reduce

ambiguity and to provide uniformity of description and interpretation of technical information throughout this manual.

1-6 REFERENCED DOCUMENTS. A list of documents that contain the technical information referenced throughout this manual and related to other explosives safety technical documentation is presented separately on this DVD. These documents are essential for complete understanding of the requirements contained within this manual governing the on-station movement of AA&E.

1-7 REPORTING DEFICIENCIES IN MANUAL. Naval shore activities, training activities, supply points, and other shore activities are requested to arrange for the maximum practical use and evaluation of NAVSEA technical manuals. All errors, omissions, discrepancies, and suggestions for improvement to NAVSEA technical manuals shall be reported to Commander, Naval Surface Warfare Center, Port Hueneme Division (NSWC/PHD), Naval Systems Data Support Activity (NSDSA), 4363 Missile Way, Port Hueneme, CA 93043-4307 on NAVSEA Technical Manual Deficiency/Evaluation Report (TMDER) Form 4160/1. A copy of NAVSEA TMDER (Form 4160/1) is included at the end of this manual. For activities with internet access, this form should be completed and processed using the NSWC/PHD website: https://nsdsa.nmci.navy.mil. To expedite a response, submit comments, recommendations for change, or requests for clarification directly to: ihdiv_g_estm_pubs@navy.mil. All feedback comments shall be thoroughly investigated and originators will be advised of resolution. If you prefer to submit a TMDER using a word file, click here.

1-8 DATE OF MANUAL. The date of this technical manual, and its revisions and changes, as shown on the title page, is the estimated date of distribution. However, the manual is effective upon receipt, regardless of the date shown on the title page.

CHAPTER 2

OPERATING SAFETY REQUIREMENTS

2-1 GENERAL. This chapter addresses safety requirements when handling arms, ammunition, explosives and related hazardous materials (AA&E) during loading and unloading operations and while in transit. It also includes safety and inspection requirements for motor vehicles.

2-2 SAFETY IN HANDLING. The successful movement of AA&E requires adherence to all regulatory documents and procedures governing the safe handling of these items during loading and unloading, blocking and bracing operations, and while in transit. OPNAVINST 8020.14/MCO P8020.11 (series) establishes the principal Department of the Navy (DON) explosives safety policies, requirements, and procedures for the performance of operations involving AA&E. Qualification and certification of civilian, military, and contractor personnel that handle or physically interact with AA&E shall be accomplished in accordance with OPNAVINST 8023.24 (series) . NOSSAINST 8023.11 (series) provides the policy, guidance, and direction for developing and using Standard Operating Procedures (SOP's) for the processing of expendable (non-nuclear) ordnance at Navy and Marine Corps activities. These activities must develop written SOP's as required in NAVSEA OP 5 Volume 1 prior to starting any operation involving AA&E.

2-2.1 MIXED LOADS OF AMMUNITION, EXPLOSIVES AND RELATED HAZARDOUS MATERIALS (A&E). If a truckload consists of more than one type of A&E, the Commanding Officer/Officer-In-Charge (CO/OIC) shall ensure that it does not contain items that are prohibited from being loaded or transported together. Compatibility shall be strictly maintained. Non-compatible items shall be shipped in separate conveyances except as provided in NAVSEA OP 5 Volume 1. The compatibility classification of A&E may be determined by consulting the appropriate tables found in NAVSEA SW020-AC-SAF-010.

2-2.2 MATERIALS HANDLING EQUIPMENT (MHE). During loading and unloading operations, it is important that only authorized Materials Handling Equipment (MHE) is used. MHE is designed to save time and labor, but improper and careless operation can cause accidents which could result in fatal or serious injury, damage to valuable supplies and property, and reduction in the efficiency of the handling operations. Extra caution should be taken when handling mixed loads or any mixture of unitized and ununitized containers. When using MHE to load or unload flatbed motor vehicles, precautionary measures shall be taken to prevent the accidental knocking over of outboard containers while positioning or removing adjacent containers. One way this can be accomplished is by placing the forks of another MHE against the opposite side of the outboard container(s). NAVSEA SW023-AH-WHM-010 provides safety precautions and the approved types of MHE in a given operational area which shall be observed by all personnel using MHE.

2-2.3 DUNNAGING. During blocking and bracing operations, personnel shall observe the locally established instructions concerning fire extinguishing equipment, protective clothing, safety equipment, smoking, etc. Recommended dunnaging procedures for securing AA&E loads for on-station movement are described in chapters 3, 4 and 5 of this manual.

2-2.4 SAFETY PRECAUTIONS. During the transit of AA&E on-station, safety is the responsibility of the motor vehicle driver or trained personnel operating the conveyance. Safety precautions pertaining to the use of motor vehicles in AA&E movement are contained in:

a. NAVSEA SW020-AF-HBK-010

b. NAVSEA SW020-AG-SAF-010

2-3 MOTOR VEHICLE MODIFICATION. Motor vehicles shall not be modified or altered unless it complies with the requirements described in NAVSEA OP 5 Volume 1.

2-4 MOTOR VEHICLE SAFETY REQUIREMENTS. When loading or unloading a motor vehicle with AA&E, the brakes shall be set and the wheels properly chocked. A stand-alone trailer must always be chocked and have the mechanical brakes set. Approved chocks may be procured from commercial sources provided they meet the requirements of SAE J348 or may be locally fabricated in accordance with NAVSEA Drawing 2642779. An exception may be made for MILVAN/ISO container operations as documented in NAVSEA OP 5 Volume 1.

2-5 MOTOR VEHICLE INSPECTION REQUIREMENTS. The driver shall have the primary responsibility for the safe and efficient transportation of AA&E. In addition, the driver shall share with the equipment and loading inspectors the responsibility for the mechanical condition of the transport vehicle, the proper lading, the compatibility of A&E items, and the security of the vehicle and cargo. Sealed loads are exempt from the driver's responsibility. Each vehicle to be used for the transportation of AA&E shall be inspected daily by the driver before it is used. NAVFAC 9-11240/13, NAVMC 10627, or a locally derived inspection form shall be completed and signed by the inspector. The date and vehicle identification number shall be written on the form. The inspection form shall remain in the vehicle until the end of the day. Inspection forms not indicating any deficiencies can be discarded at the end of the day. When one or more deficiencies are noted, the form shall be turned into the vehicle dispatching office and shall remain on file until the deficiencies are corrected. Locally derived inspection forms, as a minimum, shall require inspection of the following items:

a. Fire extinguisher is filled, sealed, and in good working condition.

b. Electric wiring is in good condition and properly attached.

c. Fuel tank and piping are secure and not leaking.

d. Brakes, steering, exhaust system, lights, horn, and coupling device are in good condition.

e. All tires have at least 1/8-inch of tread. Dual-equipped tires have tread of matching size and type.

f. Engine, body, cab, and chassis are clean and free of excessive oil, grease, debris, trash, and mud.

g. Windshield, windows, and mirrors are not broken, cracked, or missing. Windshield wipers are operable.

h. Cargo space is in good condition containing no rotting wood, protruding nails, exposed electrical wires, etc.

i. If a tool box is to be carried in the vehicle, the criteria presented in NAVSEA SW020-AF-HBK-010 shall be followed.

Refer to NAVSEA SW020-AF-HBK-010 and NAVSEA OP 5 Volume 1 for other motor vehicle inspection criteria.

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CHAPTER 3

DUNNAGE MATERIAL AND DUNNAGE PRACTICES

3-1 GENERAL. The purpose of dunnaging arms, ammunition, explosives and related hazardous materials (AA&E) is to prevent longitudinal, lateral, and vertical motion of the lading relative to the conveyance. Ammunition, explosives and related hazardous materials (A&E) must also be protected from mechanical shock, moisture, high temperature, or any other hazards that could adversely affect it. This chapter gives pertinent background information covering the materials recommended for dunnaging and describes dunnaging practices.

3-2 DUNNAGE MATERIAL SPECIFICATIONS. Dunnage materials for protecting lading during on-station movements consists of lumber, fasteners (nails, spikes, bolts), steel strapping and seals, chains and loadbinders, webbing tiedown assemblies, and, occasionally, pieces of plywood and fiberboard.

3-2.1 LUMBER. All lumber shall be yard lumber conforming to Voluntary Product Standard DOC PS-20-99 (formerly MM-L-751). Unless otherwise specifically indicated, lumber used may be rough or dressed. All blocking and bracing material should be selected free from cross grain, dry rot, knots, knot holes, checks, and splits which will affect its strength or interfere with proper nailing or bolting. Knots, knot holes, cracks, and splits or other defects are permitted in lumber as long as they do not impair the strength of the blocking and bracing. Blocking and bracing personnel shall take particular care in selecting lumber used in struts, gates, cross bracing, side and center bracing, diagonals, holddowns, and K-bracing by upgrading lumber as necessary. Truckloading requirements for dunnage lumber are detailed in the applicable Military Standard (MIL-STD-1320), Weapons Requirements (WR-51) or NAVSEA drawing.

NOTE

Reclaimed lumber which satisfies the requirements described in paragraph 3-2.1 may be used if all split ends and nails are removed. Nail holes are acceptable as long as they have not caused splits in the lumber.

3-2.2 PLYWOOD. All plywood shall be in accordance with A-A-55057, industrial plywood, interior or exterior plywood with exterious glue, Grade C-D. The thickness of the plywood shall be as specified in this manual. If the specific grade is not available, a better interior or exterior grade may be substituted.

3-2.3 FASTENERS. Fasteners are nails, spikes, staples and bolts. Nails, spikes and staples shall be common steel conforming to American Society for Testing and Materials (ASTM) F1667 (NLCMS or NLCMMS), Type I, Style 10, and shall be bright unless otherwise specified. Bolts shall be carbon steel conforming to ASTM A307, Grade A or B. For detailed reference data concerning fasteners on motor vehicle shipments, refer to the specification portion of MIL-STD-1320.

3-2.4 STEEL STRAPPING. When steel strapping is required, it shall be flat steel strapping conforming to ASTM D3953, Type 1, Heavy Duty, Finish A, B (Grade 2), or C. Unless otherwise specified, all strapping shall be dry (unwaxed) strapping. For motor vehicle requirements, the maximum authorized weight of lading per steel strap is shown in table 3-1. The 2 x .044-inch and 2 x .050-inch strapping are used for lading tiedowns. The 1-1/4 x .031-inch and 1-1/4 x .035-inch strapping are used for bundling (refer to paragraph 5-6.4). If 2-inch wide strapping is not available, the 1-1/4-inch wide strapping can be used for lading tiedowns. However, the number of straps must be increased to properly restrain the total weight of lading. One tiedown is considered a strap that passes over the lading and is attached to both sides of the trailer.

Table 3-1. Maximum Lading Load Per Strap (Motor Vehicles)

Strap Size (inches)	Maximum Allowed Lading Weight Per Strap (pounds)
1-1/4 x .031	5,000
1-1/4 x .035	5,000
2 x .044	10,000
2 x .050	10,000

3-2.5 SEALS. Seals for steel strapping used on flatbed vehicles shall conform to ASTM D3953, Class H, Style I, II, or IV, Finish A, B (Grade 2), or C.

3-2.5.1 Power Equipment. When using power tensioning and sealing equipment, the manufacturer's air pressure and lubrication recommendations shall be maintained at all times to ensure that the above visual inspection conditions are met.

3-2.5.2 Periodic Testing. Periodic testing of tensioning and sealing equipment is not required. However, should doubts arise as to the effectiveness of a particular tool, tests may be performed in accordance with the specification portion of MIL-STD-1323.

3-2.6 CHAINS AND LOADBINDERS. Chains used as a component of a tiedown assembly must conform to the requirements of the National Association of Chain Manufacturers Welded Chain Specification. The strength of the loadbinders and grabhooks used in the tiedown assembly must be equal to or greater than the strength of the chain. Grabhooks shall be of a size compatible with the chain.

3-2.6.1 Chain Grades and Sizes. At least one of each 36 links shall carry the manufacturer’s permanent and unique mark identifying the grade of chain. The approved grades and nominal sizes of chain are:

a. 3/8-inch, Grade 43, High Test Chain

b. 5/16-inch, Grade 70, Transport Chain

c. 3/8-inch, Grade 70, Transport Chain

d. 5/16-inch, Grade 80, Alloy Steel Chain

e. 3/8-inch, Grade 80, Alloy Steel Chain

3-2.6.2 Inspection Procedures. When chains and loadbinders are put into service, periodic weight testing is not required. However, all chains, loadbinders, grabhooks, and associated hardware shall be inspected before use. They shall be inspected for strength, gouging, bent links, wear, and any other noticeable defects. Any deficiency found on a chain, loadbinder, or hardware shall be cause for rejection. Inspection of the chain, loadbinder, and hardware is the responsibility of the loading crew.

3-2.7 WEBBING TIEDOWN ASSEMBLIES. Webbing tiedown assemblies are approved for use on motor vehicles and railcars to properly and safely restrain lading. They may be commercially purchased items that must conform to the requirements specified in 49 CFR 393.108 and to the "Recommended Standard Specifications for Synthetic Webbing Tiedowns" published by the Web Sling and Tiedown Association. The combined safe working load (SWL) or working load limit (WLL) of the commercially procured tiedown assemblies shall be equal to or greater than one half the total weight of lading in that stack. A minimum of two tiedowns shall be used for each stack of lading on a trailer. Additionally, the webbing tiedown assemblies must comply with the general design, fabrication and ratings criteria specified in parts A and C of NAVSEA Drawing 6214037. These commercially purchased webbing tiedown assemblies replace the webbing tiedown assemblies procured under NAVSEA Drawings 6212674 (with chain) and 6212675 (with flat hook), which are now considered obsolescent. Older type webbing tiedowns may continue to be used for on-station movements of AA&E provided they are in serviceable condition.

3-2.7.1 Use and Inspection Criteria. When webbing tiedown assemblies are placed into service, periodic weight testing is not required. All webbing tiedown assemblies shall be inspected prior to use in accordance with part B of NAVSEA Drawing 6214037. Any tiedown assembly that fails any of these inspection conditions shall be tagged non-serviceable and removed from service. Webbing tiedown assemblies are only to be used on smooth surfaces, with the web material lying flat on the lading. If the webbing tiedown passes over a sharp edge or irregular surface which could cause the web material to become punctured, torn, cut, snagged, abraded or crushed, then edge protectors, strapping boards or scuff sleeves must be used.

3-2.7.2 Care and Storage of Tiedowns. In addition to the care and storage requirements found at the end of part A of NAVSEA Drawing 6214037, the following handling and storage procedures shall be observed to maximize the service life of webbing tiedown assemblies:

a. Do not use tiedown assemblies in a manner that exceeds the SWL or WLL.

b. Do not throw or drop tiedown assemblies. Handle them with care.

c. Keep tiedowns away from acids, alkalis, or other chemicals that could damage the webbing.

3-2.7.3 Off-Station Movements. Webbing tiedown assemblies used for off-station motor vehicle movements of AA&E must comply with the requirements specified in the applicable MIL-STD-1320, WR-51, or NAVSEA drawing.

3-3 DUNNAGING PRACTICES. Lading in or on a conveyance is prevented from movement that could cause damage by blocking and bracing with wood members and structures and securing it with fasteners, steel straps, chain and load binders, or webbing tiedown assemblies.

3-3.1 LUMBER. After determining the blocking and bracing requirements, dimensional lumber must be cut to the required lengths before nailing or bolting in place. Whenever possible, lumber should be cut and assembled in the shop. When using bolts for blocking and bracing, the required holes must be properly drilled through the lumber. The amount of sawing at the loading site should be kept to a minimum. Where fit is important, such as tight fitting of struts, the lumber may be cut at the loading site. If plywood is required or needed as part of the dunnage system, the same rules apply as stated for lumber.

3-3.2 NAILS. Nails should be of such length as to give the necessary holding power and ample penetration into the floors and bracing and blocking materials. To obtain the most holding power, nails should be of such length that they nearly penetrate but do not protrude through the piece holding the point of the nail. Nails shall not be so large as to cause splitting. The general rule of thumb is that the nail should be twice as long as the thickness of the piece holding the head of the nail, but the nail point should not protrude beyond the second piece unless clinching is required. All nails should be driven into the side of the grain of the lumber; end grain nailing should be avoided. Balanced nailing is important. Stagger nails along the piece being nailed. Do not nail along one grain of wood. Whenever possible, drive nails straight; do not toenail unless otherwise specified.

3-3.2.1 Nailing Practices. Generally no nail shall be driven closer to the end of a piece of lumber than the thickness of that piece or closer to the edge than half the thickness of the piece holding the nail head. When pieces are of different thicknesses, if manually possible, the nailhead should be in the thinner piece. When the density of the wood is such that diamond-point nails cause splitting that could weaken the dunnage structures, the nails should be blunted before use. Nail heads should be set flush with the nailing surface, but if deeper penetration occurs, it should not be more than 1/8-inch the thickness of the piece retaining the head. When driving nails near AA&E, extreme care must be taken to ensure that the nails are not directed, or likely to be deflected, toward or into the lading.

3-3.2.2 Pneumatic Nailers. Pneumatic nailers may be used for fastening lumber on pre-fabricated dunnaging. When used for backup cleats or side blocking (sleepers), four nails shall be used for every three nails specified since their sizes are often smaller. Length and quantity of backup cleats shall be increased to maintain spacing between nails. Refer to NAVSEA OP 5 Volume 1 for pneumatic nailer safety regulations.

3-3.3 BOLTS. When bolts are used in end blocking as described in paragraph 5-6.1, they shall be 1/2-inch diameter minimum, shall be of such length to completely pass through the lumber, and can be properly secured to the underside of the truck bed (deck) using the appropriate hardware (e.g., nuts, washers). There shall be five equally distributed bolts used with each header (crossmember) as shown in figure 5-6.

3-3.4 STEEL STRAPPING. Steel strapping is used in transportation for several purposes which include tiedown on motor vehicles or flatcars, unitizing containers, and stabilizing of loads.

3-3.4.1 Notching and Crimping. The ends of steel straps are joined together by steel seals and secured by either notching or crimping. In a notched joint, the tool actually cuts the strap and seal resulting in a secured joint. In a crimped joint, the strap and seal are deformed but not cut to immobolize the joint. Figure 3-1 shows a properly crimped joint and a notched joint. An investigation conducted in 1993 (NWSE Technical Report 93004) concluded that the most important element in the adequacy of a strapping joint is the ability of the person sealing the joint to properly operate the notching/crimping tool. Therefore, the following guidelines shall be adhered to when applying strap seals.

a. Both strapping ends being joined must extend completely through the seal.

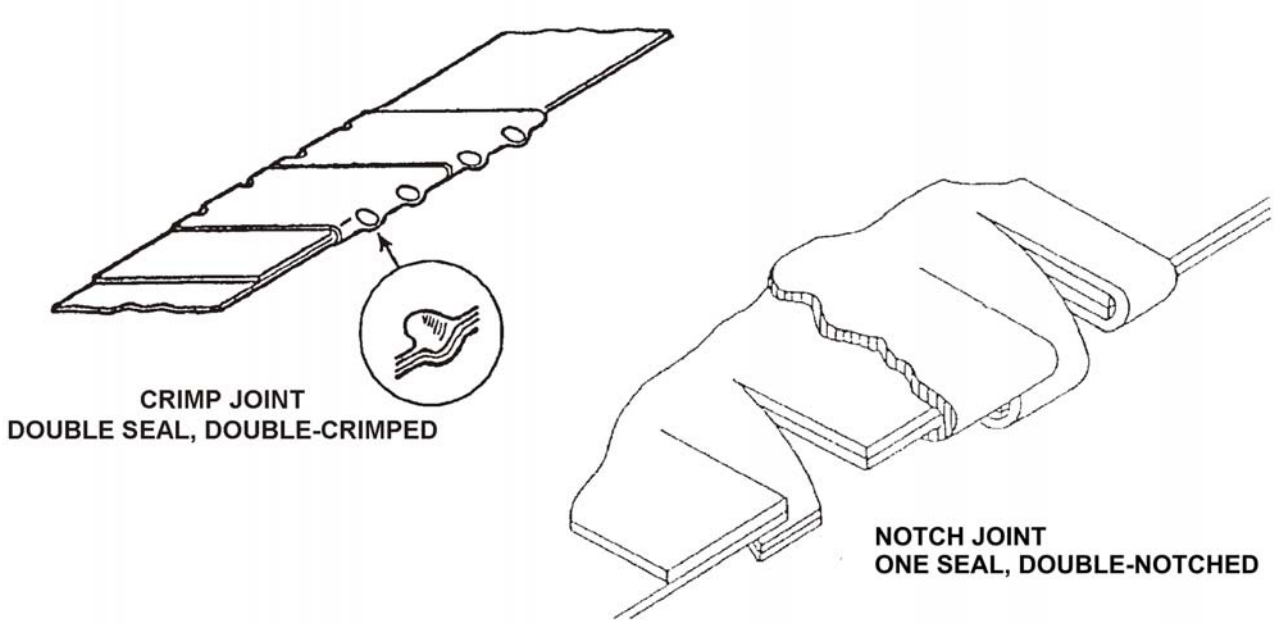

FIGURE 3-1. Types of Strap Joints

b. There shall be two notches/crimps per seal which are approximately equally spaced and centered along the length of the seal. This means that neither notch/crimp is too close to either end of the seal and also that the seals are not too close to each other.

c. Operators shall be certain to completely close the notching/crimping tool, thus ensuring a full cut/depression into the strap and seal material.

3-3.4.2 Steel Strapping Used as Tiedown. Steel strapping used for tiedown is approved for use on flatcars and flatbed trucks and trailers. All strapping joints shall be secured with seals that are either double-crimped or double-notched. The ends of each strap are secured with one seal double-notched or two seals double-crimped. One end of the strap is passed around the tiedown attachment point (usually a stake pocket) and secured by making a loop back on itself and sealed with two double-crimped seals or one double-notched seal. The seal is located approximately 18 inches above the floor. The strap passes over the lading or through the lading as necessary, and is secured in the same manner to the tiedown attachment point on the opposite side of the conveyance. Figure 3-2 illustrates a typical single-threaded tiedown of steel strapping with seals double-crimped. Each 2 x .050-inch or 2 x .044-inch steel strap applied in this manner can restrain up to 10,000 pounds of lading. Each 1-1/4 x .035-inch or 1-1/4 x .031-inch strap can restrain up to 5,000 pounds.

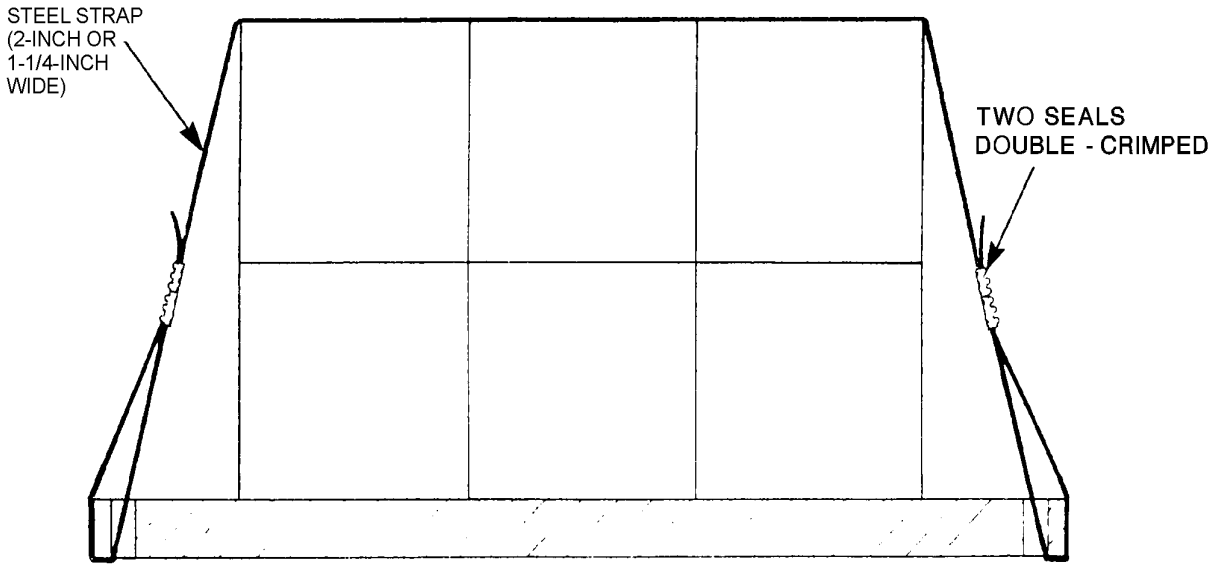

FIGURE 3-2. Typical Single-Threaded Tiedown Strapping

3-3.4.3 Steel Strapping Used to Unitize Containers. When transporting containers stacked more than one high on the conveyance, the containers in each vertical row shall be unitized with steel strapping. For a two-high stack, the containers are held together with a minimum of two straps, one passing through each fork pocket of the upper and lower containers. The ends of each strap are secured with one seal double-notched or two seals double-crimped. Third and higher stacked containers are secured to the uppermost container in the same manner.

NOTE

Shipping containers equipped with new interlocking features are authorized to be secured together in accordance with the appropriate fleet issue unit load without the need for additional steel strapping (banding) and seals. See figure 3-3.

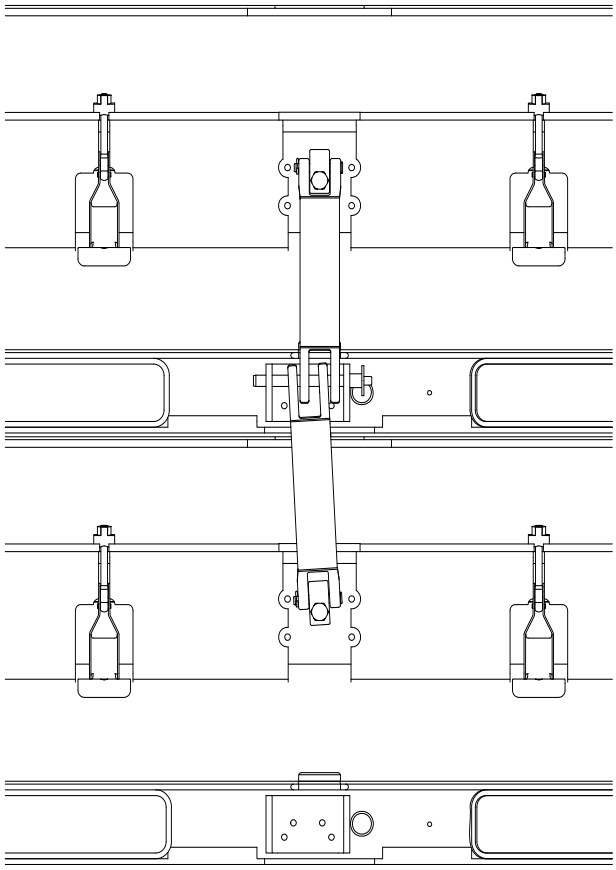

FIGURE 3-3. Close-up of Container Interlocking Feature

3-3.5 CHAIN AND LOADBINDERS. Chain and loadbinders may be used to tiedown AA&E on flatbed motor vehicles and railcars. The chain should be of sufficient length to pass over the lading from one side of the vehicle to the other, with sufficient additional length to permit the attachment of the chain to the body of the vehicle and permit the loadbinder to be used. The following procedures should be used:

a. Attach one end of the chain to the side of the vehicle using the stake pocket, rub-rail, or tiedown ring as available.

b. Pass the chain over the lading or as otherwise indicated. When lading may be damaged by the chain, place a “protector board” consisting of a two inch by six inch piece of lumber of sufficient length to span the width of the lading, under the chain.

c. Attach the remaining end of the chain to the side of the vehicle using the stake pocket, rub-rail or tiedown ring as available.

CAUTION

Do not use a “cheaterbar” (a length of pipe that fits over the handle of the loadbinder to provide additional leverage) in the following procedure.

d. With the loadbinder in the open position, attach both ends to the chain in such a manner that almost all slack is removed from the chain, and the excess chain is between the binder hooks. The desired location for the loadbinder is just above the vehicle floor. Close the loadbinder by hand. If the loadbinder is too difficult to close by hand, allow more slack by moving one loadbinder hook back on the chain one link at a time. If the chain is not taut, move one loadbinder hook up on the chain one at a time until the chain becomes taut. Each chain tiedown applied as shown in figure 3-4 can hold 5,000 pounds of lading. Loadbinders should be safety-wired using 0.800-inch diameter wire (ASTM A853; annealed at finish, black oxide finish, grade 1006 or better).

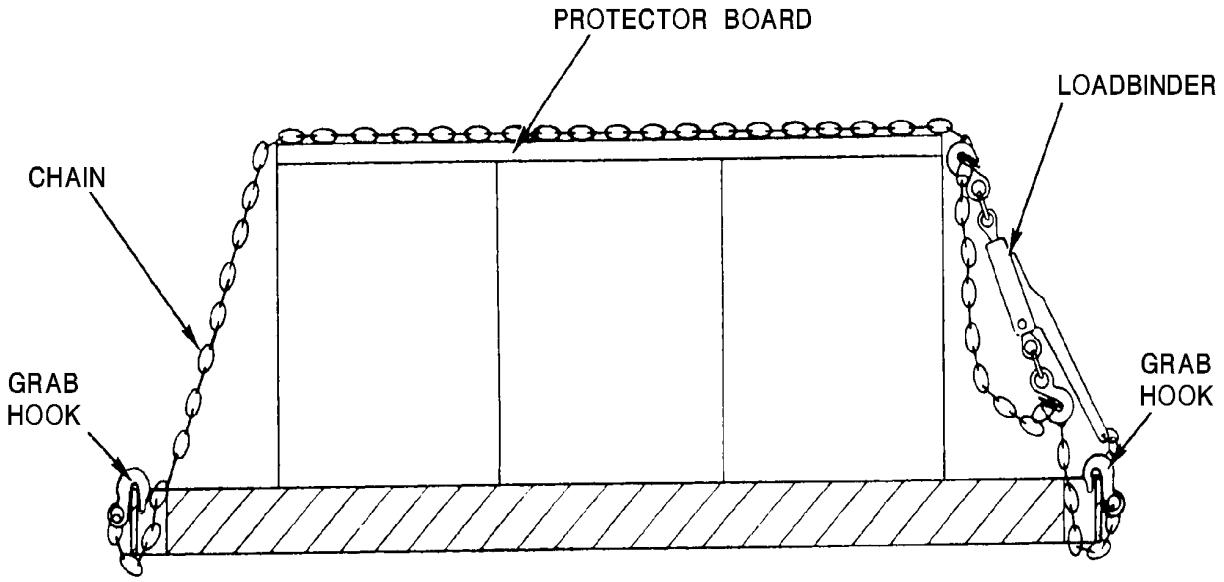

FIGURE 3-4. Typical Tiedown Using Chain and Loadbinders

3-3.6 WEBBING TIEDOWN ASSEMBLIES. Webbing tiedown assemblies may be used to tie down AA&E on flatbed motor vehicles. The assembly must be of sufficient length to pass over the lading from one side of the trailer to the other with sufficient additional length to permit operation of the hand-operated ratchet buckle. The following procedures should be used.

a. Attach the long end of the assembly to one side of the vehicle using the stake pocket, rub-rail or other appropriate attachment point.

b. Pass the tiedown assembly over the lading or as otherwise indicated.

c. Attach the short (ratchet) end of the assembly to the other side of the vehicle using the stake pockets, rub-rail or other appropriate attachment point. Thread the tiedown assembly through the shaft in the ratchet spindle and take up the slack in the tiedown or strap.

CAUTION

Check webbing tiedown assembly to ensure that it is not in contact with any sharp edge that may cause damage. To avoid such contact, use protective sleeves between the tiedown assembly and the lading.

d. Protect the tiedown assembly from all sharp edges on lading using the assembly's protective sleeves, as shown in figure 3-5. Use a protector board under the tiedown assembly, if needed.

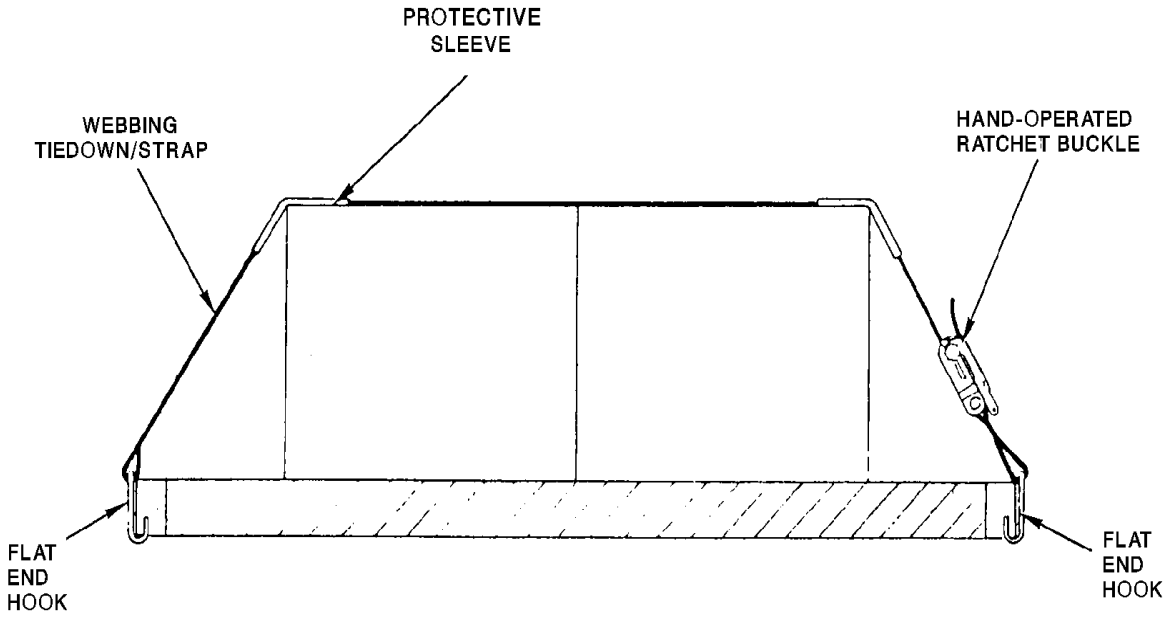

FIGURE 3-5. Typical Tiedown Using Webbing Tiedown Assembly

e. Tension the assembly by hand using the hand operated ratchet buckle. At least two full turns of the tiedown assembly shall be around the buckle shaft when the assembly is fully tensioned.

f. Check tensioned assembly to assure end fittings are fully engaged and that the tiedown assembly is in a straight line and perpendicular to the vehicle floor.

3-4 USE OF ALTERNATE/REDUCED DUNNAGING METHODS. In order to reduce labor and material consumption, on-station AA&E shipments may be conducted using dunnaging methods that are not in accordance with the requirements of this publication (or no dunnage at all). Before such shipments are commenced however, written authorization from the activity's Commanding Officer or Officer-In-Charge (CO/OIC) must be obtained. Each station has the ultimate responsibility for authorizing such nonconforming loading procedures based on past proven experience and good judgement. An example of such a situation might be untiered loads in the less than full truckload quantity being transported on a flat, smooth, straight, and level road at controlled speeds between magazines within the same group. If an activity is

unsure as to whether desired alternate materials or reduced dunnage methods are safe, it may want to consider conducting trial shipments using inert loads of similar size and weight before commencing shipment of live A&E. Truckloading procedures contained in MIL-STD-1320 series documents may be used without the CO/OIC written approval.

CHAPTER 4

APPROVED CRATES FOR ON-STATION MOVEMENT

4-1 GENERAL. This chapter identifies the types of approved crates used at Department of the Navy (DON) installations for on-station movement of loose ammunition, explosives and related hazardous materials (A&E), e.g., projectiles, cartridge and powder tanks up to six inches in diameter, boxed ammunition and inert items when palletizing is impractical or inefficient. Each approved crate is illustrated in NAVSEA OP 2173/NAVAIR 19-100-1.1 and is accompanied by a description, application and associated equipment paragraph, a technical reference table pertinent to the physical description and safe usage of the equipment, and applicable reference documents to obtain maintenance information. The following paragraphs detail these specific types of crates.

4-2 MK 108 MOD 1 AMMUNITION SECURITY PALLET CRATE.

4-2.1 LOADING. When a load of A&E does not fill the Mk 108 Mod 1 Ammunition Security Pallet Crate and is subject to shifting, wood dunnage should be inserted between the crate sides and the load. Mk 108 Mod 1 Ammunition Security Pallet Crates may be loaded to a maximum of two units high for transportation. Upon completion of loading the pallet crate, ensure the cover is properly secured prior to movement.

4-2.2 STACKING FOR STORAGE. Loaded or unloaded Mk 108 Mod 1 Ammunition Security Pallet Crates can be stacked to a maximum of four units high in storage. Care should be taken during stacking to ensure that the upper and lower units are positioned properly; this will keep the crates from toppling over and possibly causing injury to personnel.

4-3 AMMUNITION PALLET CRATE (MIL-C-21215).

4-3.1 LOADING. When a load of A&E does not fill the Ammunition Pallet Crate (MIL-C-21215) and is subject to shifting, wood dunnage should be inserted between the crate sides and the load. Ensure that all latches are securely fastened before loading. Ammunition Pallet Crates (MIL-C-21215) may be loaded in single units only for transportation. When unloading, ensure that the pallet crate inclines slightly away from the side to be opened before releasing the latches. Failure to do so can cause spilling of cargo and injury to personnel.

4-3.2 STACKING FOR STORAGE. Loaded or unloaded Ammunition Pallet Crates (MIL-C-21215) can be stacked to a maximum of four units high in storage. Care should be taken during stacking to ensure that the wire sides of the lower unit fit evenly into the deck support notches of the upper unit.

4-4 JOINT MODULAR INTERMODAL CONTAINER (JMIC).

4-4.1 LOADING. When using the JMIC to contain a load of A&E follow the applicable Special Packaging Instruction (SPI) SPI-PHST-226 or SPI-PHST-228 to prepare the load for safe handling and transport. Loaded JMICs can be stacked and locked together in a 2-high arrangement using the procedures found in NAVSEA Drawing 8411075 for transport.

4-4.2 STACKING FOR STORAGE. Loaded (erected) JMICs can be stacked and locked together to a maximum of 4-high in storage. Unloaded (collapsed) JMICs can be stacked and locked together 3-high. Each 3-high arrangement of JMICs can be stacked and locked together 4-high (up to 12 collapsed JMICs) for storage. Refer to NAVSEA Drawing 8411075 for stacking requirements and to the applicable SPI (either SPI-PHST-226 or SPI-PHST-228) for erecting/ collapsing the JMIC.

4-5 OTHER SIMILAR CRATES. There are other cargo containers currently in use by DON shore activities which resemble the approved Ammunition Pallet Crate, but do not conform to Military Specification MIL-C-21215. These types of crates include commercially available items known by a variety of trade names such as “Cargotainer,” “Wiretainer,” and “Palletainer.” Some of these cargo containers are equipped with padeyes for lifting while others are not. These items may be employed for ammunition handling operations within certain restricted conditions. A brief description and use restrictions of these pallet containers follows:

4-5.1 CARGOTAINER. This item is identified by the commercial trademark “CARGOTAINER” found on a nameplate and is identical in appearance to the Ammunition Pallet Crate, except there are not structural runners between the pallet legs. It is equipped with lifting eyes and may be used for intrastation handling and transportation operations subject to the following restrictions:

a. No lifting by sling. To prevent accidental use of the lifting eye, it shall be stencilled in red: “DO NOT LIFT”. In lieu of stenciling, the lifting eyes may be welded closed by installing a permanent closure.

b. The capacity for handling A&E shall be 80% of the manufacturer’s rated capacity. The rated capacity as assigned by the manufacturer shall be used for inert items.

c. The transportation and handling capacity must not exceed 20 pounds per square foot.

4-5.2 WIRETAINER AND PALLETTAINER. These items are identified by suitable nameplates attached to the wire frame of the pallet containers. They are not approved for handling live ordnance, but may be employed for the transportation and handling of inert items only up to their rated capacity of the crate.

CHAPTER 5

MOTOR VEHICLE TRANSPORTATION

5-1. GENERAL. This chapter provides guidance on motor vehicle transporation of arms, ammunition, explosives and related hazardous materials (AA&E) on-station. Regulations governing the types of authorized vehicles, loading and dunnaging closed-body (vans) and open-top (flatbed) trailers and trucks, use of tarpaulins, applications of placards, and speed restrictions are presented within this chapter.

WARNING

Plastic bedliners generate static electricity and are not authorized for use in the transport of scrap or bulk explosives in any container, or for the transport of any ammunition or explosive that is not packaged in its approved shipping container. Special care shall be taken to secure all cargo in vehicles with plastic bedliners because of the slippery nature of the liner surface.

5-2. TYPES OF VEHICLES. Motor vehicles most commonly used for on-station movement of AA&E are van-type, stake-body, and flatbed trucks and semi-trailers. Pickup trucks and utility vehicles may be used for moving limited quantities of AA&E. Refer to paragraphs 5-7 and 5-7.1 for further details. Lowboy-trailers may also be used to transport explosive material as long as the material can be blocked, braced, and tied down in the same manner as if it were being shipped on a regular flatbed trailer. Therefore, the portion of the trailer on which the lading is loaded must have a wood deck to accommodate nailing or bolting and stake pockets for tiedown attachment.

5-3. FUEL TYPE RESTRICTION. Motor vehicles using compressed natural gas (CNG), liquid petroleum gas (LPG), propane, or butane for propulsion may be used for transporting AA&E under certain conditions in accordance with NAVSEA SW020-AG-SAF-010, NAVFAC P-300, and Department of Transportation (DOT) requirements. The vehicle design must be reviewed and approved by the Transportation Equipment Management Center, Naval Facilities Engineering Command, Atlantic Division (Code 12).

5-4. LOADING AND DUNNAGING CLOSED-BODY TRUCKS. When van-type motor vehicles are used for on-station movement of AA&E, it is recommended that they be equipped with a forward blocking assembly that is permanently secured to the front wall of that van. (See figure 5-1.) A permanent forward blocking assembly not only squares off the front of the vehicle while distributing the load, it also eliminates the necessity of constructing a new forward blocking assembly for every AA&E movement. Only those single and unitized containers that can be placed crosswise in the van may be loaded; those that are too large should be loaded on flatbed vehicles.

WARNING

When transporting heavy loads with no lateral restraint (i.e., no side blocking), drivers should exercise caution when going around turns as sudden lateral shifting of the load could cause the vehicle to overturn.

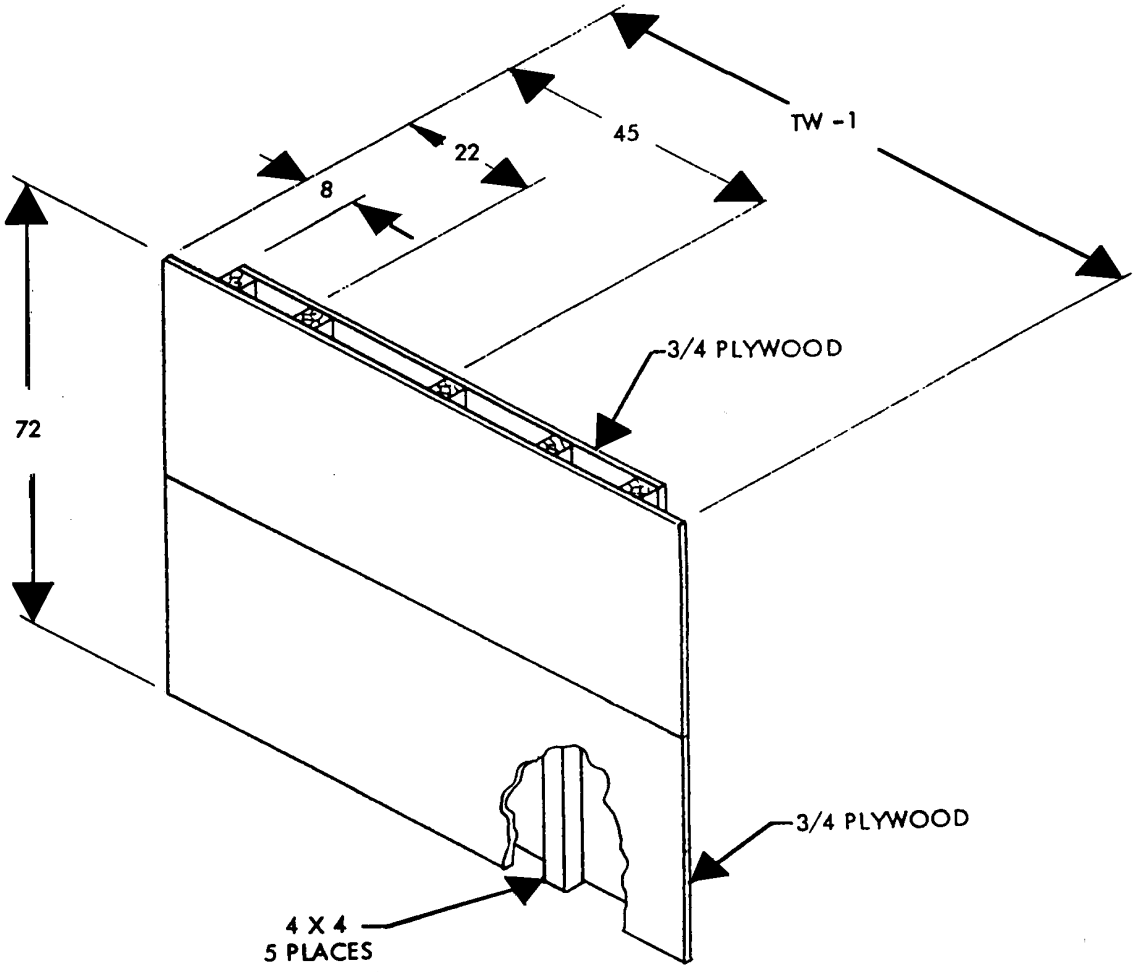

FIGURE 5-1. Permanent Forward Blocking Assembly (Van)

5-4.1 UNIT LOADS. Unit loads may be transported in van-type vehicles arranged in single-row or double-row load patterns.

NOTE

Unless otherwise specified in this document, unit loads shall not be loaded more than one high unless they are restrained in accordance with paragraph 3-3.4.2.

5-4.1.1 Single-Row Pattern. Unit loads are positioned in a van-type vehicle using the single-row pattern when:

a. The width of the unit load is such that two-unit loads cannot be placed across the van.

b. The weight of the unit load is such that a double-row pattern would produce a load that exceeds the capacity of the vehicle.

c. The unit load is limited to two-way entry by forklift truck and can only be loaded into a van using the single row pattern.

When loading in a single-row pattern, position the unit loads down the center of the van with the first load against the forward blocking assembly. When the sum of the spaces on both sides of the unit load is less than 20 inches, side blocking (sleepers) to control lateral motion are not required. Use side blocking if lateral shifting could cause hard points to disengage or slacken. Figure 5-2 shows a typical single-row, one-high van load. Use the principles shown to block and brace loads of this type.

WARNING

When transporting heavy loads with no lateral restraint (i.e., no side blocking), drivers should exercise caution when going around turns as sudden lateral shifting could cause the vehicle to overturn.

5-4.1.2 Double-Row Pattern. Unit loads may be positioned into a van using a double-row pattern when:

a. The width of the unit load is such that two-unit loads can be placed across the van.

b. The unit load is not too long or its design such that it cannot be adequately handled using a forklift truck.

c. The weight of the unit loads in the double-row pattern does not exceed the capacity of the vehicle.

When loading in a double-row pattern, position the two rows down each side of the van with the first unit load against the forward blocking assembly. When the space between the unit loads is less than one-half the width of a unit load, side blocking is not required to control lateral motion. Use side blocking if lateral shifting could cause hard points to disengage or slacken. Figure 5-3 shows a typical double-row, one-high van load. Use the principles shown to block and brace loads of this type.

5-4.2 SINGLE AND UNIT LOADS OF CONTAINERS. Single containers and unit loads of containers that are too long to be positioned crosswise in a van should be moved on flatbed vehicles. Those that are not too long may be moved in vans. The containers should be positioned in a van with the length crosswise to the van and in a single row pattern.

NOTES

1. THIS FIGURE ILLUSTRATES THE PRINCIPLES OF BLOCKING AND BRACING A SINGLE ROW OF UNIT LOADS IN VAN-TYPE VEHICLES. THE UNIT LOAD SHOULD MEET THE REQUIREMENTS OF PARAGRAPH 5-4.1.1.

2. SIDE BLOCKING (SLEEPERS) IS NOT REQUIRED WHEN THE SUM OF THE SPACES BETWEEN THE UNIT LOADS AND VEHICLE SIDE WALLS IS LESS THAN 20 INCHES. SIDE BLOCKING SHOULD BE USED IF THERE IS A DANGER THAT LATERAL SHIFTING MIGHT CAUSE HARD POINTS TO DISENGAGE OR SLACKEN.

3. ADDITIONAL LAYERS SHOULD BE ADDED TO THE HEADERS (CROSSMEMBERS), WHEN REQUIRED, TO PROVIDE A MINIMUM OF 1-1/2 INCHES OF RETENTION SURFACE.

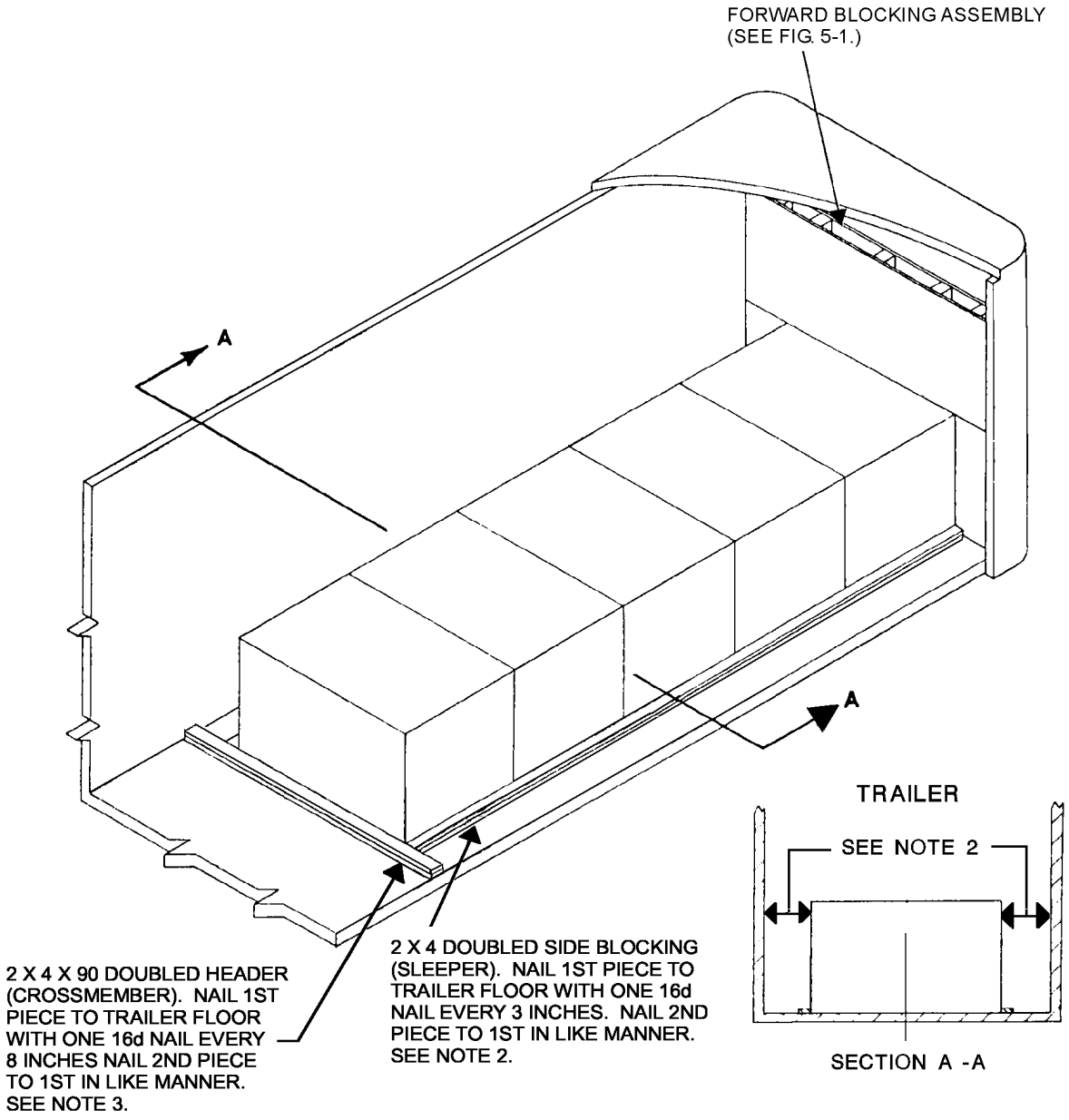

FIGURE 5-2. Typical One-High, Single-Row Van Load

NOTES

1. THIS FIGURE ILLUSTRATES THE PRINCIPLES OF BLOCKING AND BRACING A DOUBLE ROW OF UNIT LOADS IN VAN-TYPE VEHICLES. THE UNIT LOAD SHOULD MEET THE REQUIREMENTS OF PARAGRAPH 5-4.1.2.

2. SIDE BLOCKING (SLEEPERS) ARE NOT REQUIRED WHEN THE SPACE BETWEEN UNIT LOADS IS LESS THAN ONE HALF THE WIDTH OF A SINGLE UNIT LOAD. USE SIDE BLOCKING IF THERE IS A DANGER THAT LATERAL SHIFTING MIGHT CAUSE HARD POINTS TO DISENGAGE OR SLACKEN.

3. ADDITIONAL LAYERS SHOULD BE ADDED TO THE HEADERS (CROSSMEMBERS), WHEN REQUIRED, TO PROVIDE A MINIMUM OF 1-1/2 INCHES OF RETENTION SURFACE.

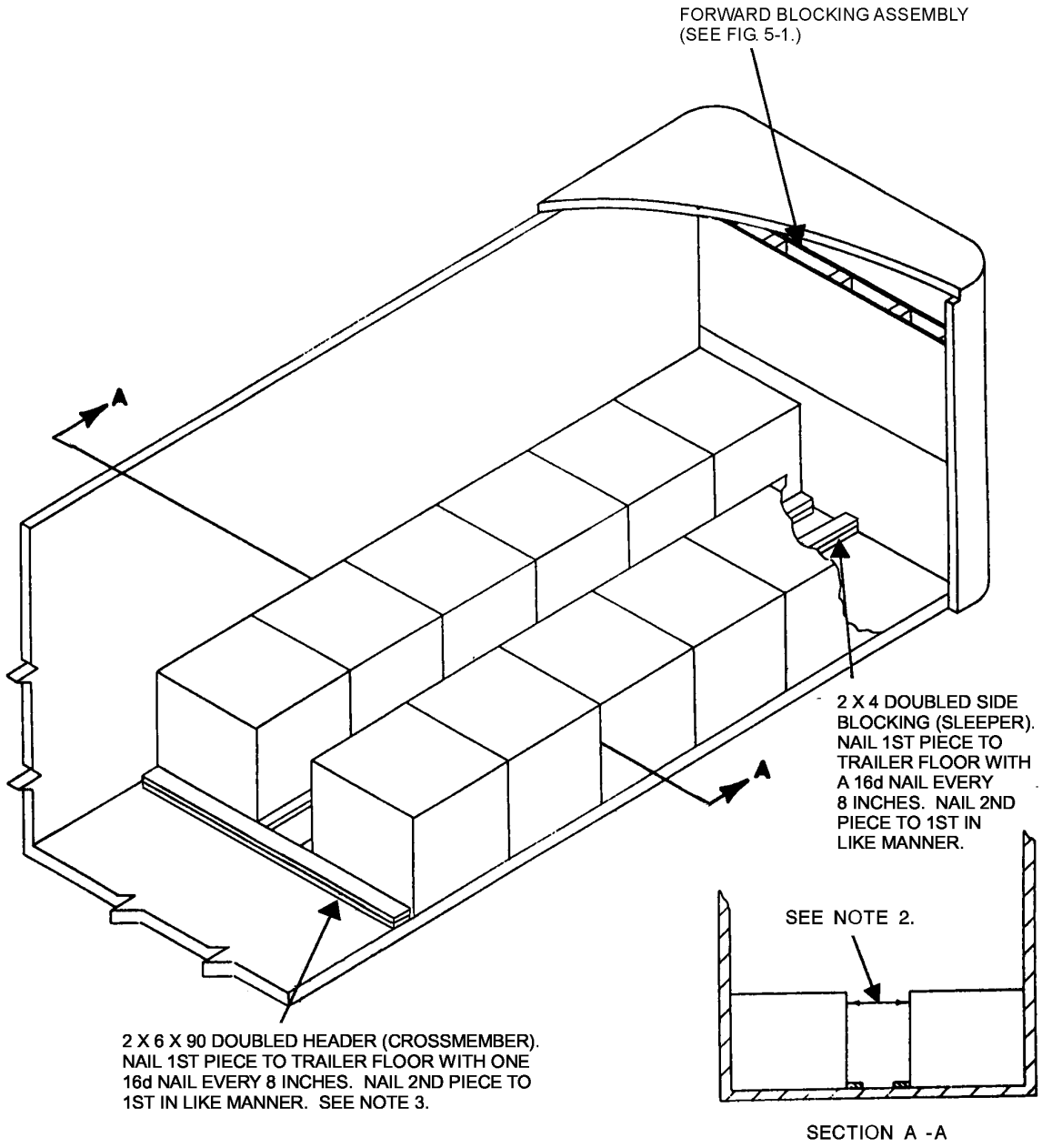

FIGURE 5-3. Typical One-High, Double-Row Van Load

WARNING

When transporting heavy loads with no lateral restraint (i.e., no side blocking), drivers should exercise caution when going around turns as sudden lateral shifting of the load could cause the vehicle to overturn.

NOTE

Unless otherwise specified in this document, containers shall not be loaded more than one high unless they are restrained in accordance with paragraph 3-3.4.2.

5-4.2.1 Single-Row Pattern. Due to the size, shape, and handling characteristics, the single-row pattern is the only pattern used when loading single and unit loads of containers in vans. Position the containers down the center of the van with the first container against the forward blocking assembly. When the sum of the spaces on both ends of the containers is less than 20 inches, side blocking (sleepers) to control lateral motion are not required. Use side blocking if lateral shifting could cause hard points to disengage or slacken. Figure 5-4 shows a typical container load using the one-high, single-row pattern. Use the principles shown to block and brace loads of this type.

5-5. LOADING AND DUNNAGING STAKE-BODY TRUCKS. Stake-body vehicles may be used for on-station movement of AA&E. These vehicles shall be loaded, blocked, and braced the same as flatbeds. Stake body sides may be left in place as long as they do not interfere with the tiedowns. Stake body sides shall not be used in place of side blocking (sleepers) as a means of lateral load restraint.

5-6. LOADING AND DUNNAGING FLATBED MOTOR VEHICLES. Flatbed motor vehicles are preferred over vans when it is necessary to load the vehicle from the sides. Flatbed motor vehicles are authorized for movement of AA&E when one or more of the following conditions exist:

a. The length of the unit loads or containers is greater than the inside width of available vans. Long containers shall not be skidded into vans.

b. There are no vans available.

c. There is no loading dock or ramp at either the loading or the unloading site, making it impossible for forklift trucks to drive into a van.

When loading a flatbed motor vehicle, the containers or unit loads shall be arranged in stacks and located so that the permissible gross axle weights are not exceeded. All of the containers or unit loads shall be within the perimeter of the trailer. All rows of unit loads or containers shall be centered equally and positioned against each other on the conveyance. The load shall form a solid stack that will not shift during transportation. Palletized units shall not be stacked on flatbed trailers.

5-6.1 END BLOCKING. End blocking is nailed or bolted to the floor against the forward and rear ends of the load to prevent the load from shifting forward and backward. Such restraint consists of positioning a header (crossmember) against the end of the lading. 2 x 6-inch lumber nailed or bolted two or more layers high shall be used for headers (crossmembers). Figure 5-5 shows a typical end blocking assembly made up of a header (crossmember). Headers (crossmembers) shall be placed between each stack of lading as well.

NOTES

1. THIS FIGURE ILLUSTRATES THE PRINCIPLE OF BLOCKING AND BRACING CONTAINERS POSITIONED CROSS-WISE IN A VAN-TYPE VEHICLE.
2. CONTAINERS THAT ARE UNITIZED IN ACCORDANCE WITH A MILITARY STANDARD (MIL-STD), WEAPONS REQUIREMENT (WR) OR NAVSEA DRAWING ARE LOADED AS ONE-HIGH UNITS.
3. SIDE BLOCKING (SLEEPERS) IS NOT REQUIRED WHEN THE SUM OF THE SPACES BETWEEN THE ENDS OF THE CONTAINERS AND THE VEHICLE WALLS IS LESS THAN 20 INCHES. USE SIDE BLOCKING IF THERE IS A DANGER OF LATERAL SHIFTING CAUSING HARD POINTS TO DISENGAGE OR SLACKEN.
4. CONTAINERS HAVING SKIDS WITH CURVED ENDS MAY REQUIRE TRIPLED SIDE BLOCKING (SLEEPERS). WHEN INSTALLING TRIPLED SIDE BLOCKING, THE FIRST LAYER SHOULD BE 6-INCH-WIDE LUMBER WITH THE REMAINING LAYERS 4-INCH-WIDE LUMBER.
5. ADD LAYERS TO THE HEADERS (CROSSMEMBERS) WHEN REQUIRED TO PROVIDE A MINIMUM OF 1-1/2 INCHES OF RETENTION SURFACE.

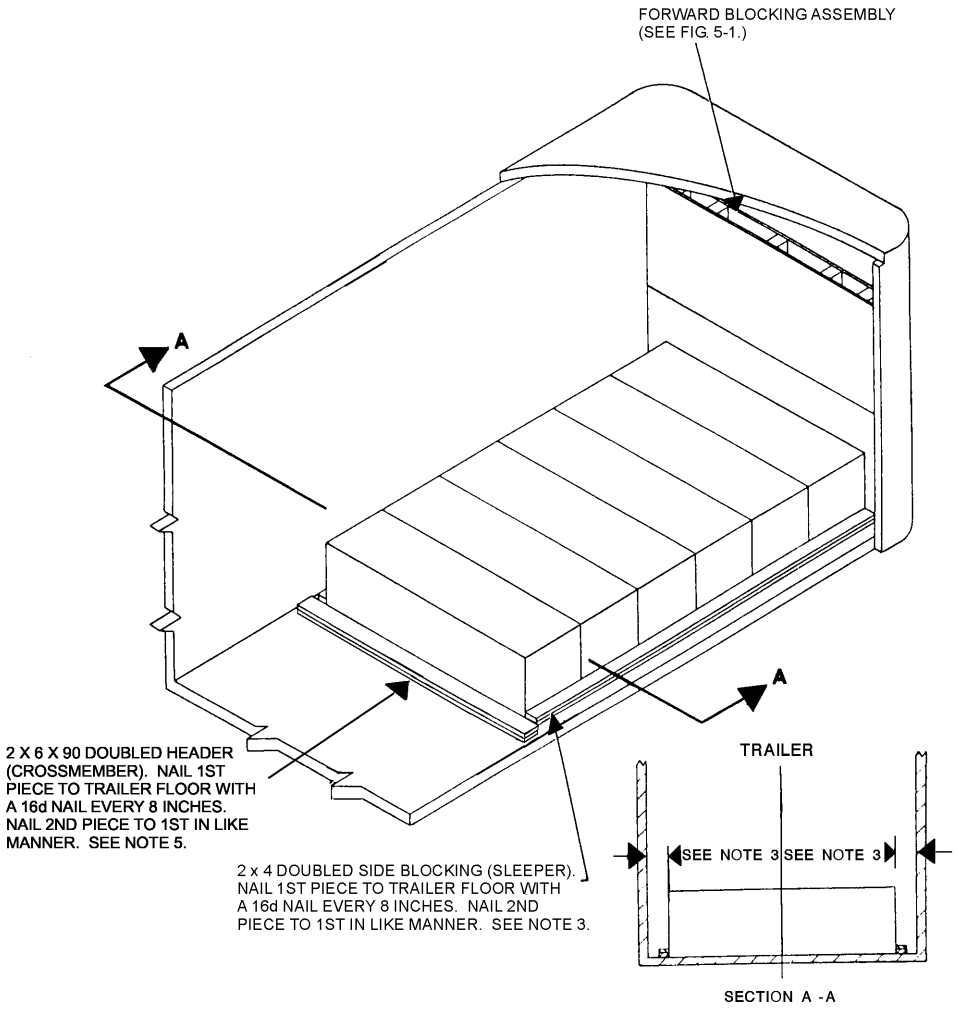

FIGURE 5-4. Typical Van Load of One-High, Single-Row Containers

5-6.1.1 Headers (Crossmembers). The length of headers, formerly crossmembers, shall be at least the combined width of the containers but not longer than the width of the flatbed. Each layer of a header shall be nailed with one 10d nail every 6 inches as in figure 5-5. As an alternate, 2 x 6-inch or 4 x 6-inch headers may be fastened to the floor using bolts, provided they comply with paragraph 3-3.3.

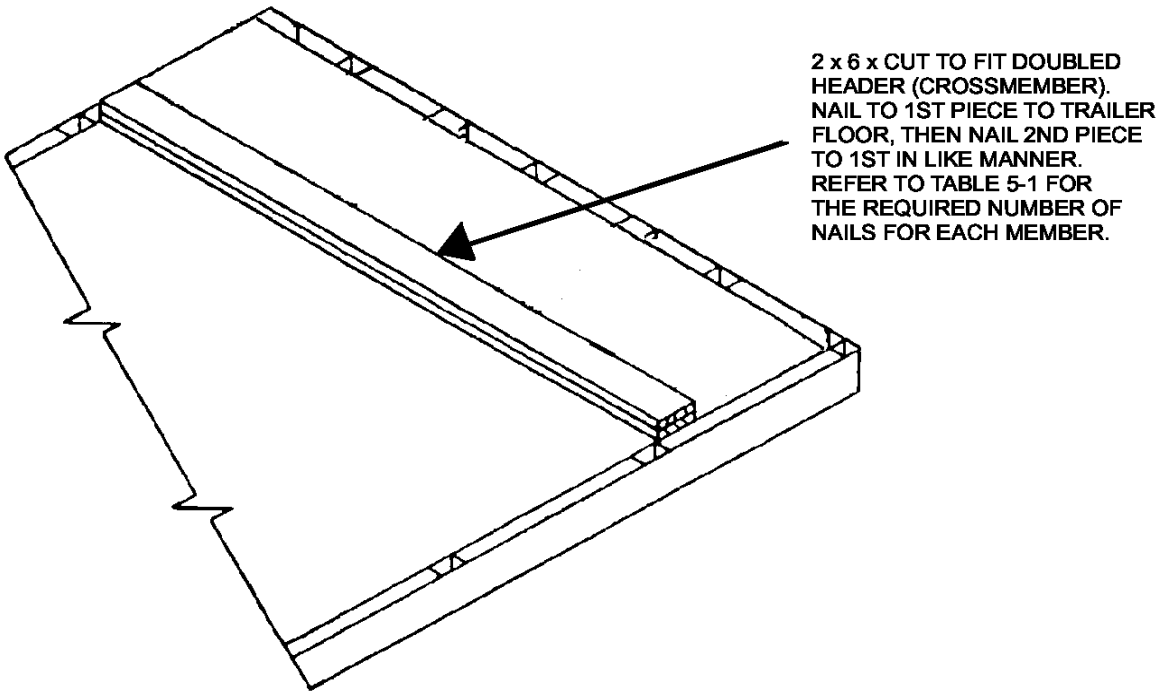

FIGURE 5-5. Permanent Forward Floor Blocking (Flatbed)

5-6.1.2 Permanent Forward End Blocking. As a means of reducing lumber consumption and labor costs, it is recommended that each vehicle is fitted with a forward blocking assembly to support a load equal to the vehicle's weight capacity. This assembly can be left on the vehicle and re-used until it shows significant signs of rotting, cracking, or other damage affecting its strength. Treated wood should be used as a means of extending the life of such assemblies. As an alternate permanent forward blocking, a 6 x 8-inch wood member may be fastened to the floor using bolts as shown in figure 5-6, provided they comply with paragraph 3-3.3.

5-6.2 SIDE BLOCKING (SLEEPERS). Side blocking, formerly called sleepers, shall consist of doubled 2 x 4-inch or 2 x 6-inch lumber nailed to the floor against both sides of each stack to prevent lateral shifting. Each stack will have doubled side blocking on each side. Nailing will be with 10d nails in each layer. The quantity of nails and the length of the lumber, based on the weight of the load, is shown in table 5-1.

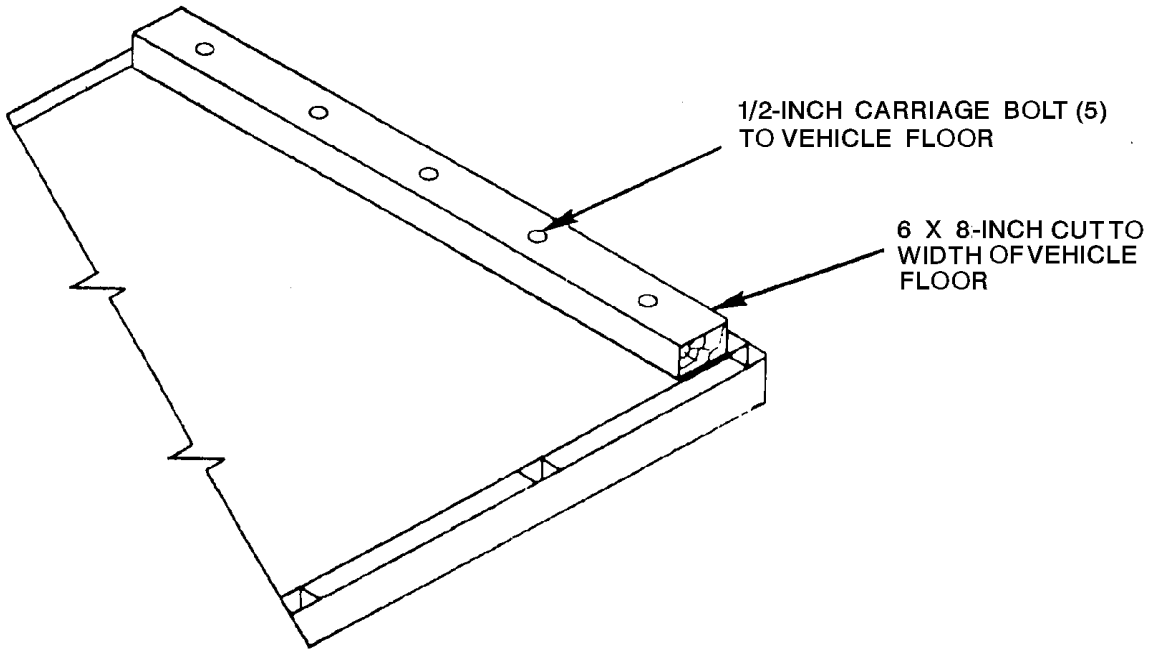

FIGURE 5-6. Alternate Forward Floor Blocking (Flatbed)

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Table 5-1. Lumber Length and Number of Nails for Side Blocking

Length Each Member (inches)	Number of Nails Each Member	Maximum Load Weight Per 2 Members (pounds)
12	4	10,000
18	5	12,500
24	6	15,000
30	8	20,000

5-6.3 UNITIZING CONTAINERS. When a stack consists of two or more layers, each vertical row must be strapped together as described paragraph 3-3.4.3.

5-6.4 BUNDLING STRAPS. When containers are loaded two or more high, the containers in the uppermost layer shall be bound together by at least one 1-1/4 x .031 or 1-1/4 x .035-inch steel strap. One strap is required for every 5,000 pounds of lading in the stack or fraction thereof. When only one strap is required, it shall be located as close to the midpoint of the stack as possible.

5-6.5 TIEDOWNS. Tiedowns are used to hold the load down against the trailer floor. Procedures for applying tiedowns are given in paragraph 3-3.6. There shall be at least two tiedowns used for each stack of lading. Additional tiedowns shall be used as necessary such that the sum of the rated capacities of the tiedowns are equal to or greater than the weight of the lading in the stack. The restraining capacities of the approved types of tiedowns are listed as follows:

a. Web tiedown assemblies - varies depending on tiedown width (refer to NAVSEA Drawing 6214037)

b. Chain and loadbinder - 5,000 pounds

c. 1-1/4 x .035-inch or 1-1/4 x .031-inch steel strap (single pass) - 5,000 pounds

d. 2 x .050-inch or 2 x .044-inch steel strap (single pass) - 10,000 pounds

5-7. LOADING AND DUNNAGING PICKUP TRUCKS. AA&E may be transported on-station using pickup trucks, provided the weight of the load does not exceed the capacity of the vehicle. Use of pickup trucks for on-station movement should be kept to a minimum and used only when closed vehicles are not readily available. The following guidelines shall be followed when using pickup trucks to transport AA&E on-station.

a. If the pickup truck is not equipped with a nailable floor, a false floor suitable for nailing shall be installed by completely covering the non-nailable floor. A structure of at least two-inch thick lumber shall be used.

b. The floor blocking requirements for AA&E in pickup vehicles is the same as that for van-type vehicles, therefore, the blocking and bracing requirements of paragraph 5-4 should be followed. A forward blocking assembly is not required when the forward wall of the cargo area is high enough to retain the load.

c. AA&E items more than twice the height of the pickup's sides and ends shall be blocked and braced as if they were loaded onto a flatbed. In order to transport such loads, the pickup must be equipped with tiedown rings or other load securing points having equal or greater capacity to restrain the gross weight of the intended cargo.

d. The load shall be evenly distributed and arranged so that the load’s center of gravity is located along the longitudinal centerline of the vehicle.

e. The tailgate shall always be up and properly secured when the vehicle is in motion.

5-7.1 WEBBING TIEDOWN ASSEMBLIES. Webbing tiedown assemblies may be used when the load's overall height is not more than twice that of the pickup truck's sides and ends. This can only be accomplished if the vehicle is equipped with tiedown rings or other load securing points having equal or greater capacity to restrain the gross weight of the intended cargo. When using webbing tiedown assemblies, the floor blocking criteria presented in paragraph 5-7(b) above is not required.

5-7.2 UTILITY VEHICLES. The use of utility vehicles (i.e. the Carryall 294 Clubcar or similar type conveyances) to transport limited quantities of AA&E on-station has been approved. Activities planning to use utility vehicles shall be required to conduct an operational risk management (ORM) analysis. The ORM analysis shall address unique vehicle features, required safety equipment (seat belts, warning flags for low profile vehicles, fire extinguishers, tie-downs, etc), and operational restrictions such as maximum speed and capacity. The ORM shall also address compliance with the applicable regulations of this manual and NAVSEA SW020-AF-HBK-010, such as those outlined below:

a. All vehicle inspection and driver training criteria of NAVSEA SW020-AF-HBK-010 chapters 2 and 4 shall be followed.

b. Cargo must be in its designated approved packaging and meet the applicable compatibility criteria of NAVSEA SW020-AF-HBK-010.

c. The weight of the load must not exceed the capacity of the vehicle. All regulations governing the loading and dunnaging of pick-up trucks used for movement of AA&E on-station shall be followed.

d. The cargo space shall have a wood deck, and the vehicle shall have an appropriate placard holder. All placarding requirements shall be met.

Use of utility vehicles should be kept to a minimum and used only when closed vehicles are not readily available.

5-8. LOADING AND DUNNAGING OF MIXED AMMUNITION AND EXPLOSIVES. The following guidelines shall be followed when loading and dunnaging mixed A&E on the same motor vehicle:

a. All items must be compatible for transport on the same vehicle as described in NAVSEA SW020-AC-SAF-010.

b. The loads shall be arranged such that the load's center of gravity is located along the trailer's longitudinal centerline.

c. When unlike items with protruding objects are placed against one another, separator gates or plywood shall be placed between the items if the possibility exists for the protruding objects to be damaged by, or cause damage to, adjacent items.

5-9. USE OF TARPAULINS. When AA&E are transported on flatbed or open vehicles during inclement weather, the load must be completely covered by a tarpaulin. The tarpaulin shall be of fire- and water-resistant material and securely fastened to the vehicle to fully protect the load from sparks, fire and moisture. Authorization is granted to forego these tarpaulin requirements during inclement weather subject to the following conditions:

a. The AA&E are packaged in water-resistant containers. This requirement does not apply to AA&E packaged in wooden or fiberboard boxes, unit loads of palletized aerial bombs, or separated and separate loading gun ammunition in skidded unit loads.

b. The total motor vehicle on-station movement is planned to ensure expeditious execution with minimal delay while in transit to avoid prolonged exposure to the inclement weather conditions. Overnight parking is prohibited.

c. The loading and offloading operations at the origin and final destination are planned to facilitate expeditious handling. The cargo will be immediately placed inside the shelter of the receiving facility (e.g., magazine, operating building, ship, alternate conveyance unit) with comparable dispatch.

d. Station written operating procedures are strictly enforced during electrical storm conditions.

5-10. APPLICATION OF PLACARDS. Every motor vehicle containing any quantity of A&E shall be placarded as required by NAVSEA SW020-AG-SAF-010. An exception to this requirement is for vehicles carrying Class/Division 1.4, 1.5 and 1.6 A&E containing an aggregate gross weight of less than 1,001 pounds (454 kilograms). Additionally, the explosive 1.4 placard is not required for those Class/Division 1.4 Compatibility Group S (1.4S) materials that are not required to be labeled 1.4S. The placards shall be located on each side, on the front, and on the rear of the vehicle. The placards shall be attached so that they can be removed or covered whenever the vehicle is not loaded with A&E. The placard shall be in accordance with NAVSEA SW020-AG-SAF-010.

5-11. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions be obeyed. Failure to obey these speed limitations is an unsafe practice and could result in an explosive incident.

CHAPTER 6

SPECIALIZED HANDLING AND TRANSPORT CONFIGURATIONS

Section I

VERTICAL LAUNCHING SYSTEM (VLS) CANISTERS

6-1. GENERAL. Truckloading instructions are provided for on-station movement of the following Vertical Launching System (VLS) missiles packaged in their respective canisters:

a. Mk 13 Mods Vertical Launching System Canister with STANDARD (SM-2 Blk II or Blk III variants) Missile (figure 6-1).

b. Mk 14 Mods Vertical Launching System Canister with TOMAHAWK Missile (figure 6-1).

c. Mk 15 Mods Vertical Launching System Canister with Vertical Launch ASROC (VLA) Missile (figure 6-1).

d. Mk 19 Mod 0 Vertical Launching System Canister with STANDARD (Trainer) Missile (figure 6-1).

e. Mk 21 Mods Vertical Launching System Canister with STANDARD (SM-2 Blk IV, SM-3 Blk I or SM-6 variants) Missile (figure 6-1).

f. Mk 22 Mod 0 Vertical Launching System Canister with SEASPARROW Missile (figure 6-1).

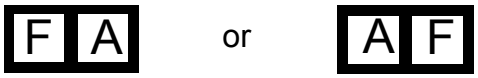
g. Mk 25 Mod 0 Vertical Launching System Canister with Evolved SEASPARROW Missile (figure 6-1).

6-2. FLATBED TRUCKS AND TRAILERS. The instructions are intended for flatbed trucks and trailers 28 feet and longer in length. The number of canisters that can be loaded on a vehicle varies with the length of the cargo area and are as follows:

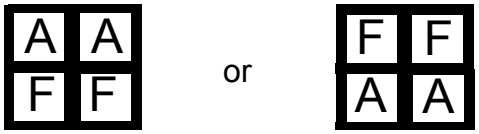
- Length of cargo area - over 28 feet - 1 or 2 stacks
- Length of cargo area - over 45 feet - 4 stacks

For loading four Mk 14 Mods and Mk 21 Mods VLS Canisters, the length of cargo area is a minimum of 50 feet. Refer to figure 6-2 for all truckloading arrangements.

6-2.1 STACKING. Mixed loads of canisters are permitted provided the longitudinal centerline of the stacks are on the longitudinal centerline of the vehicle. Adjacent Mk 14 Canisters shall be positioned forward to aft:



Unless stacked then:



6-2.2 TRUCKLOADING. Depending on the number of canisters, figure 6-3 illustrates the truckloading requirements for the VLS canisters. Figures 6-4 and 6-5 provide two alternate methods of truckloading VLS canisters.

6-3. PLACARDS. All motor vehicles shall have placards located on the front, sides and rear of the vehicle. The placards shall be attached so that they can be removed or covered whenever the vehicle is empty. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010.

6-4. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions are obeyed for on-station motor vehicle movements.

VLS CANISTERS (MISSILE SYSTEM)	LENGTH (Inches)	WIDTH (Inches)	HEIGHT (Inches)	WEIGHT (Pounds)	SHIPPING CUBE (Cubic Feet)
MK 13 MODS [STANDARD (SM-2 BLK II OR III)]	242	40	43	4301	240.9
MK 14 MODS (TOMAHAWK)	280	40	43	7404	278.7
MK 15 MODS (VERTICAL LAUNCH ASROC)	242	40	43	4381	240.9
MK 19 MOD 0 [STANDARD (TRAINER)]	242	40	43	4301	240.9
MK 21 MODS [STANDARD (SM-2 BLK IV, SM-3 Blk I, or SM-6)]	280	40	43	7359	278.7
Mk 22 Mod 0 (SEASPARROW)	242	40	43	3900	240.9
MK 25 MOD 0 (EVOLVED SEASPARROW)	242	40	43	7042	240.9

NOTE:

SKID ENDS SHALL BE IN THE "DOWN" POSITION

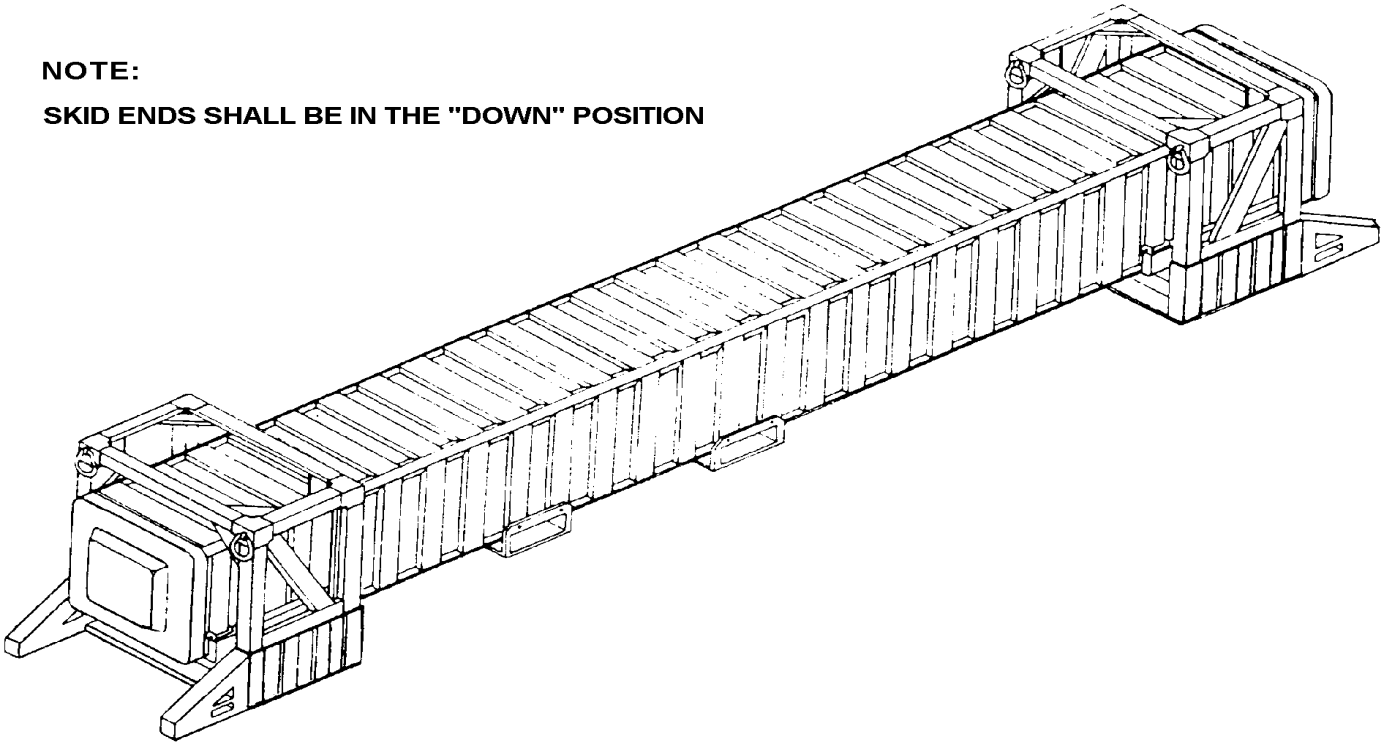
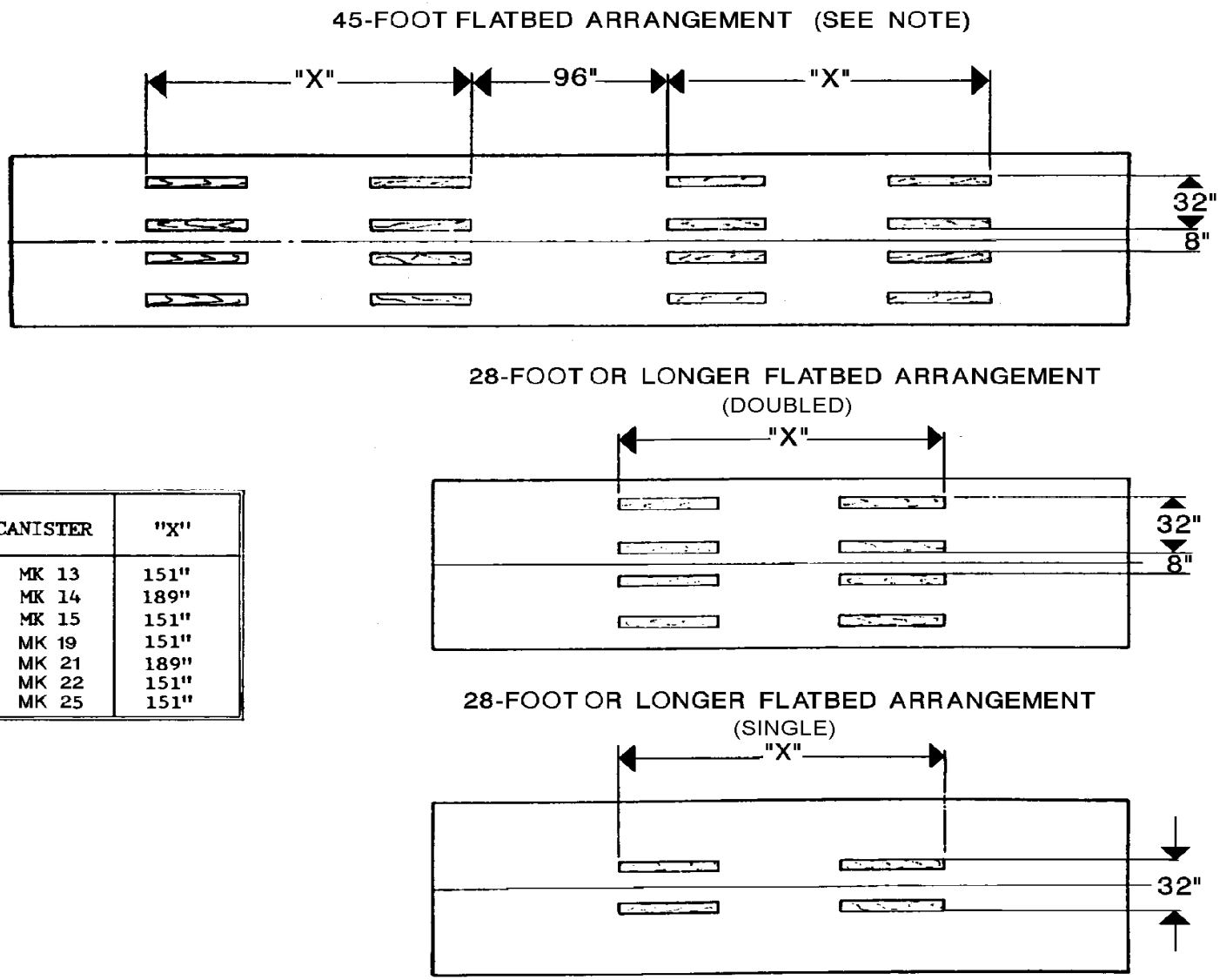


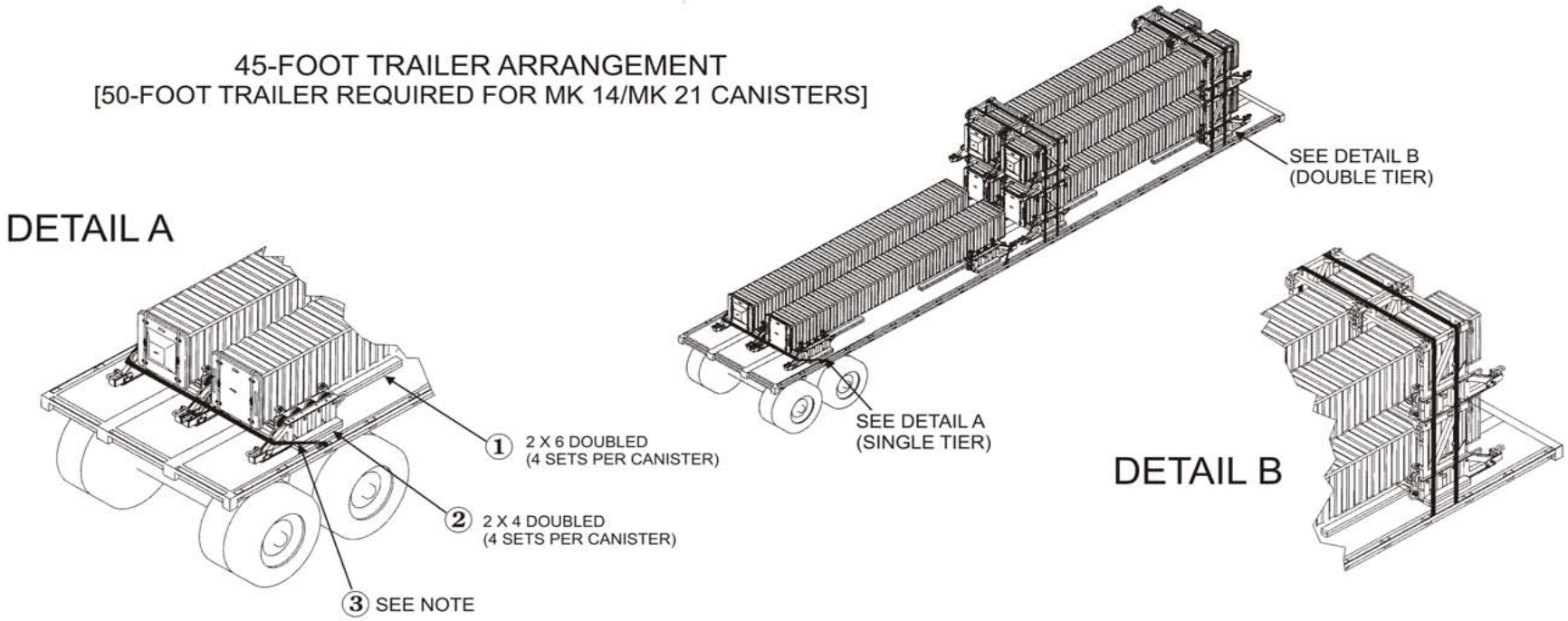
FIGURE 6-1. Typical Vertical Launching System Canister



CANISTER	"X"
MK 13	151"
MK 14	189"
MK 15	151"
MK 19	151"
MK 21	189"
MK 22	151"
MK 25	151"

NOTE
50-FOOT FLATBED REQUIRED FOR MK 14 AND MK 21 CANISTERS

FIGURE 6-2. Truckloading Arrangements for On-Station Movement of Mk 13, Mk 14, Mk 15, Mk 19, Mk 21, Mk 22 and Mk 25 Mods Vertical Launching System Canisters

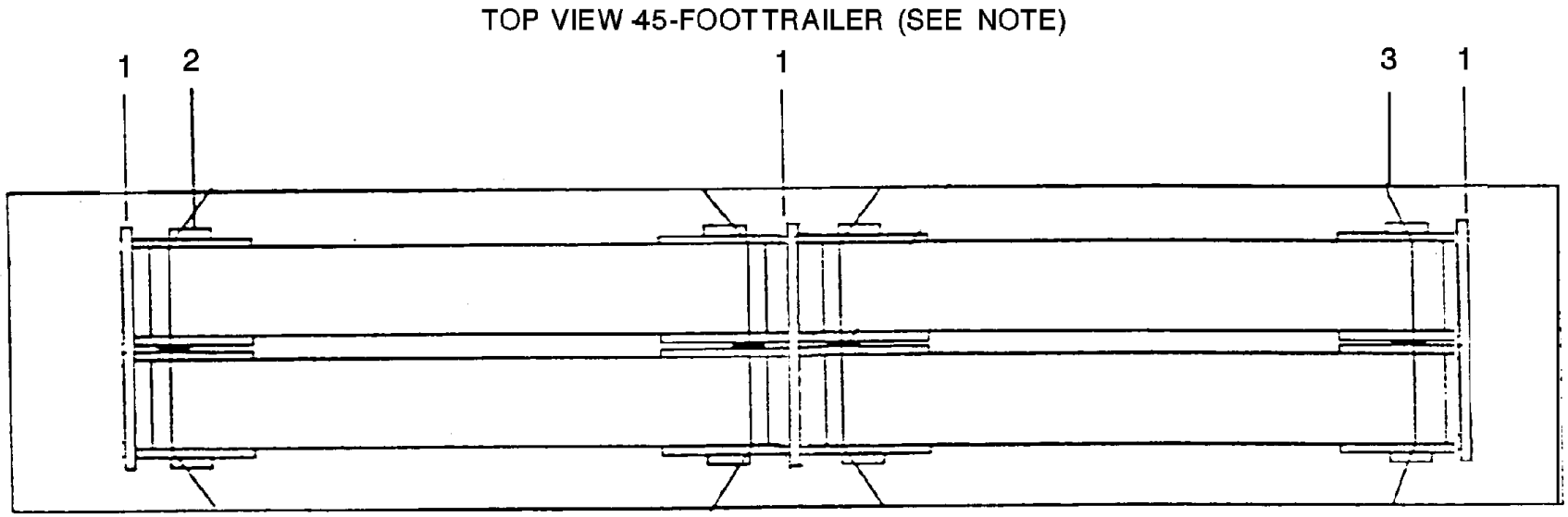


NOTE

IF MK 5 MOD 0 STACKING FRAMES ARE INSTALLED ON EACH CANISTER, THEN ONE NYLON STRAP, ITEM 3, SHALL BE POSITIONED AND SECURED OVER EACH STACKING FRAME RATHER THAN ON EACH SHOCK ISOLATION SKID.

3	2	2	4	NYLON STRAP	--
2	8	8	16	SIDE BLOCKING (SLEEPER)	2 x 4 x 18
1	8	16	32	CLEAT	2 x 6 x 36
ITEM	1	2	4	DESCRIPTION	SIZE (INCHES)
	NO. OF CANISTERS				

FIGURE 6-3. Truckloading for On-Station Movement of Mk 13, Mk 14, Mk 15, Mk 19, Mk 21, Mk 22 or Mk 25 Mods Vertical Launching System Canisters

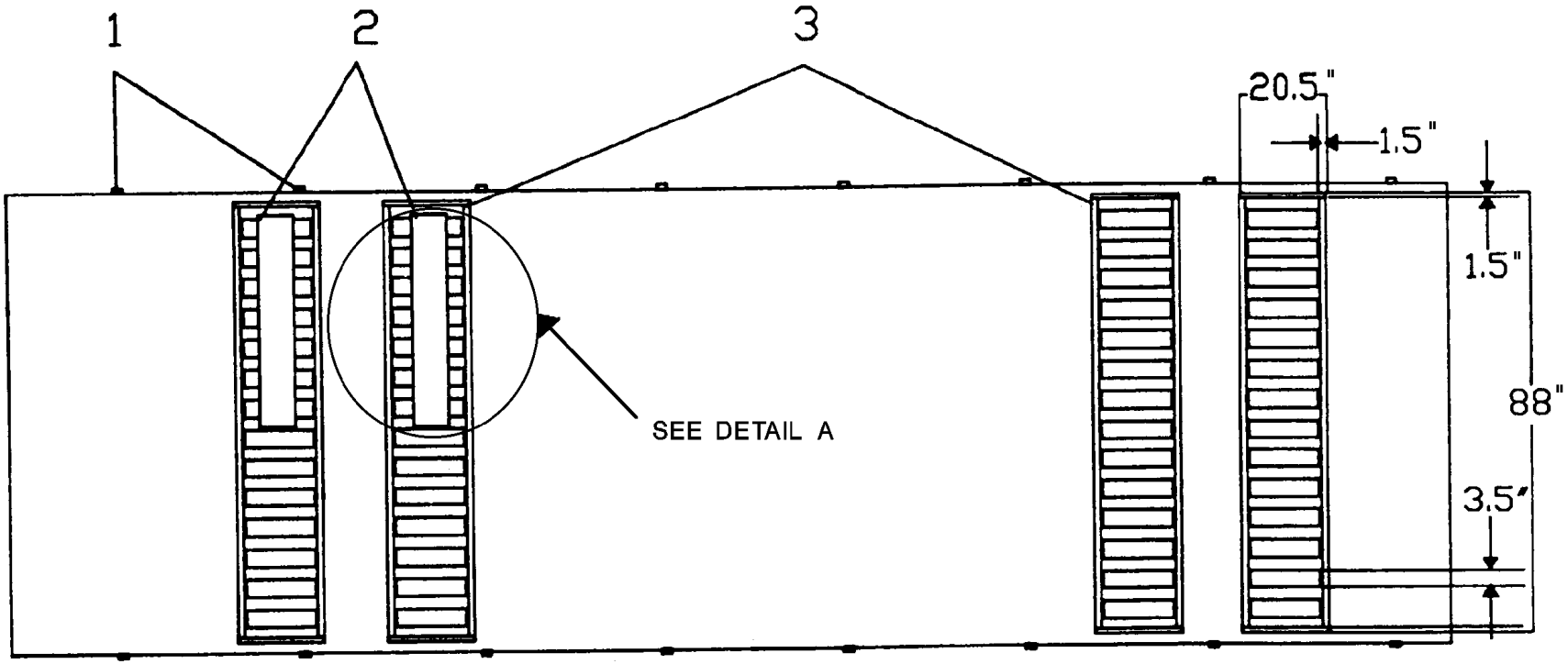


ITEM	NO. OF CANISTERS 1	NO. OF CANISTERS 2	NO. OF CANISTERS 4	DESCRIPTION	SIZE (INCHES)
3	2	2	4	CHAIN OR NYLON STRAP	--
2	8	8	16	SIDE BLOCKING (SLEEPER)	2 x 4 x 18
1	4	8	12	HEADER (CROSSMEMBER)	2 x 6 x 48

NOTE

50-FOOT FLATBED REQUIRED FOR MK 14 AND MK 21 CANISTERS

FIGURE 6-4. Alternate #1 – Truckloading for On-Station Movement of Mk 13, Mk 14, Mk 15, Mk 19, Mk 21, Mk 22 or Mk 25 Mods Vertical Launching System Canisters



ITEM	QTY	DESCRIPTION	SIZE (INCHES)
3	4	ROLLER CONVEYER	SEE DETAIL A
2	8	CONTAINER RESTS	2 x 8 x 42
1	14	ARRESTOR RAILS	2 X 4 X 52

NOTE

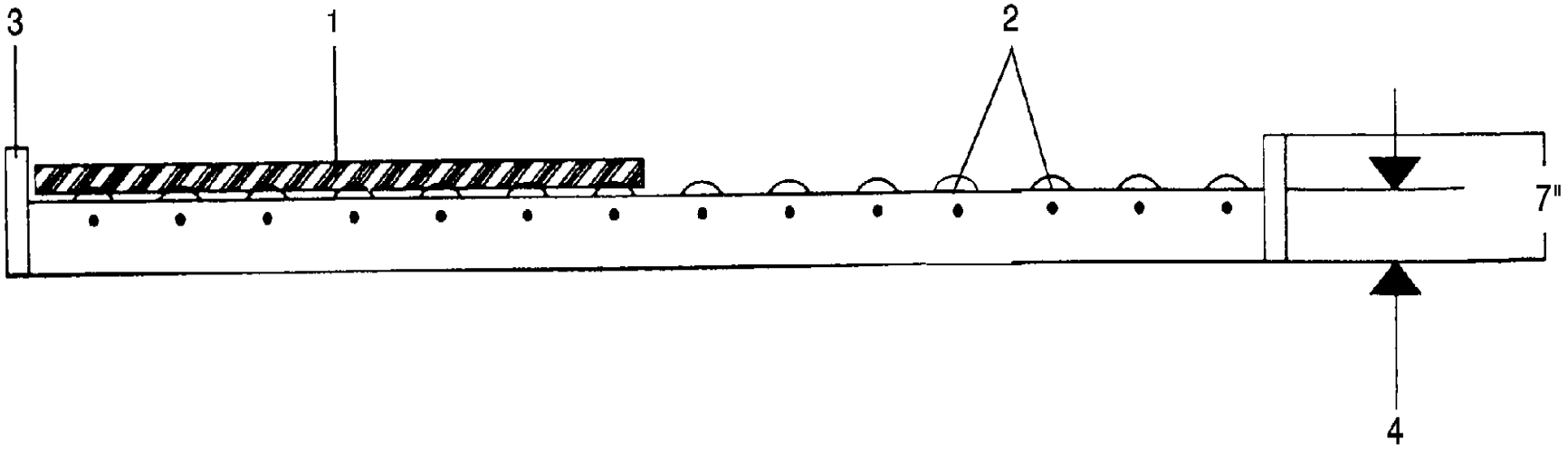
ARRESTOR RAILS, ITEM 1, ARE PLACED EVERY SIX FEET ALONG THE LENGTH OF THE TRUCK.

FIGURE 6-5. Alternate #2 – Truckloading for On-Station Movement of Mk 13, Mk 14, Mk 15, Mk 19, Mk 21, Mk 22 or Mk 25 Mods Vertical Launching System Canisters (Sheet 1 of 2)

NOTE

END BLOCK, ITEM 3,
IS PART OFTHE
ROLLER ASSEMBLY

DETAIL A - ROLLER CONVEYER (SIDE VIEW)



ITEM	DESCRIPTION	SIZE (INCHES)
3	END BLOCK (SEE NOTE)	8 X 1.5
2	STEEL ROLLERS	3.5" DIAMETER
1	CONTAINER REST BOARD	2 X 8 X 42

FIGURE 6-5. Alternate #2 – Truckloading for On-Station Movement of Mk 13, Mk 14, Mk 15, Mk 19, Mk 21, Mk 22 or Mk 25 Vertical Launching System Canisters (Sheet 2 of 2)

Section II

TOMAHAWK TORPEDO TUBE LAUNCHED (TTL) CONTAINER

6-5. GENERAL. Truckloading instructions are provided for on-station movement of TOMAHAWK (TTL) missiles packaged in the CNU-308/E Shipping and Storage Container, figure 6-6.

6-6. FLATBED TRUCKS AND TRAILERS. These instructions are intended for flatbed trucks and trailers 28 feet and longer in length. A maximum of two containers is permitted on each motor vehicle.

6-6.1 STACKING. Due to limited blocking and bracing requirements, stacked loads are not permitted for on-station movement. The longitudinal centerline of the block shall be on the longitudinal centerline of the vehicle. The container end shall be equidistant from the front and back ends of the cargo area. Missiles shall be loaded with the forward end of one container beside the aft end of the second container.

6-6.2 TRUCKLOADING. Depending on the number of containers, figure 6-7 illustrates the truckloading requirements for the CNU-308/E Containers.

6-7. PLACARDS. All motor vehicles shall have placards located on the front, sides, and rear of the vehicle. The placards shall be attached so that they can be removed or covered whenever the vehicle is empty. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010.

6-8. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions are obeyed for on-station motor vehicle movements.

MISSILE (IN CONTAINER) DATA

LENGTH.....264.68 INCHES
WIDTH.....33.38 INCHES
HEIGHT.....35.13 INCHES
WEIGHT.....5987 POUNDS
SHIPPING CUBE.....179.6 CU. FT.

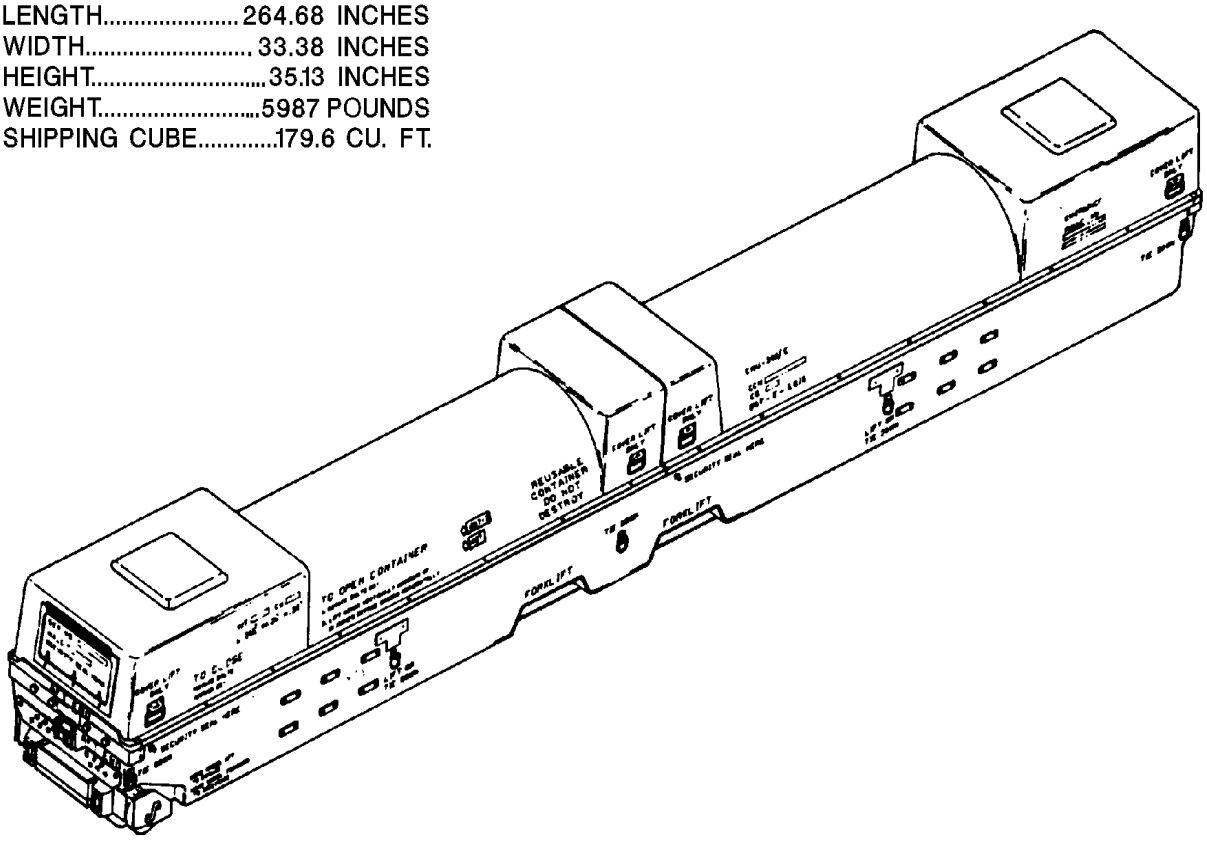
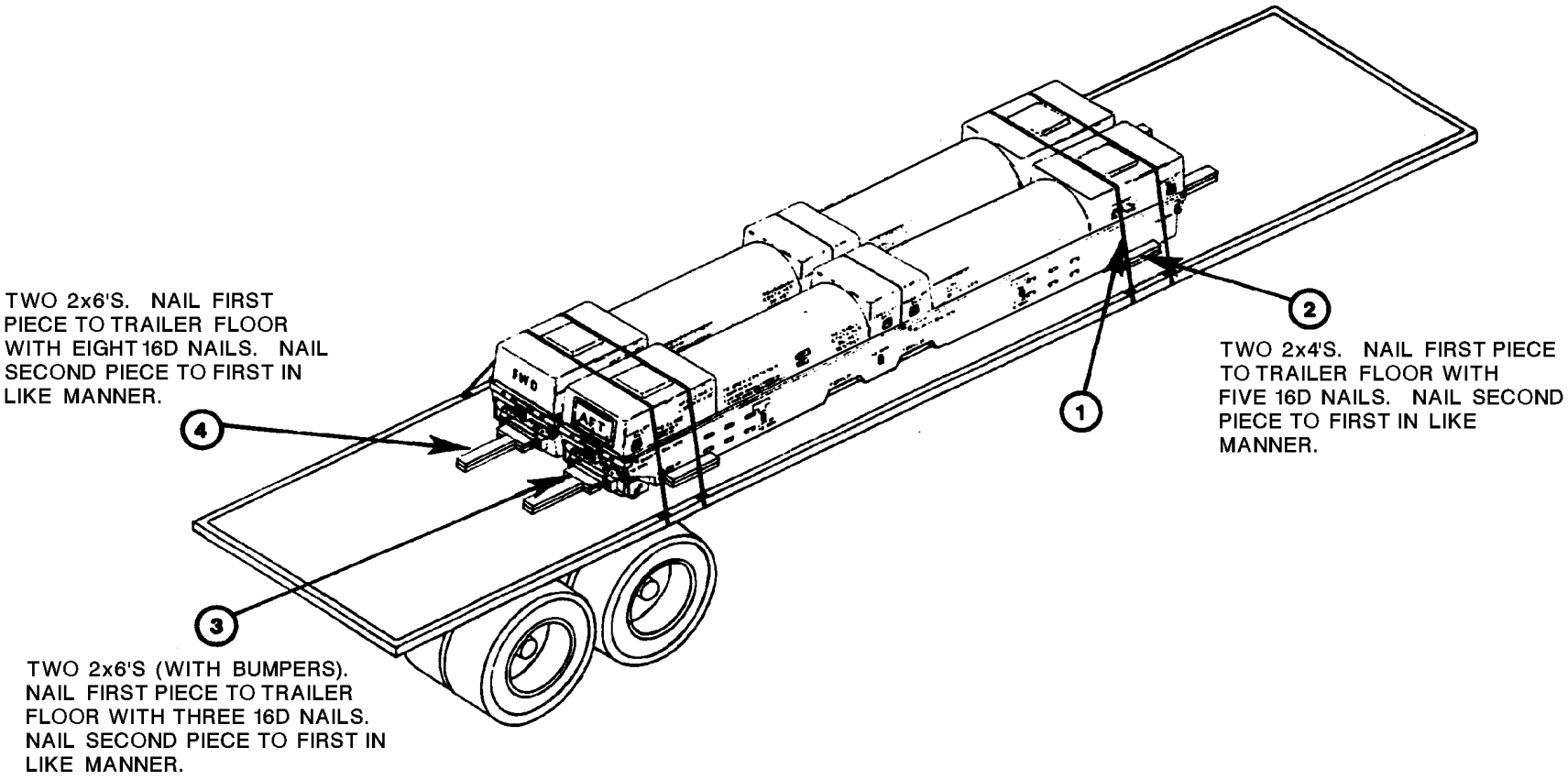


FIGURE 6-6. CNU-308/E Shipping and Storage Container with TOMAHAWK (TTL) Missile



ITEM	(2 CNTRS) QUANTITY	(1 CNTR) QUANTITY	DESCRIPTION	SIZE (INCHES)
4	8	4	CLEAT	2 X 6 X 24
3	8	4	HEADER (CROSSMEMBER)	2 X 6 X 12
2	16	8	SIDE BLOCKING (SLEEPER)	2 X 4 X 24
1	4	2	NYLON STRAPS	1-3/4

FIGURE 6-7. Truckloading for On-Station Movement of CNU-308/E Shipping and Storage Container

Section III

TOMAHAWK CAPSULE LAUNCH SYSTEM (CLS)

6-9. GENERAL. Truckloading instructions are provided for on-station movement of TOMAHAWK CLS missiles, CLS capsules, and empty CLS ballast cans. The following subparagraphs address each of these truckloading scenarios.

6-10. TOMAHAWK CLS MISSILES. TOMAHAWK CLS missile packaged in the Mk 30 Mods Shipping Skid is illustrated in figure 6-8.

6-10.1 FLATBED TRUCKS AND TRAILERS. These instructions are intended for flatbed trucks and trailers 28 feet and longer in length. A maximum of two skids is permitted on each motor vehicle.

6-10.2 STACKING. Due to limited blocking and bracing requirements, stacked loads are not permitted for on-station movement. The longitudinal centerline of the block shall be on the longitudinal centerline of the vehicle. The skid ends shall be equidistant from the front and back ends of the cargo area. Missiles shall be loaded with the forward end of one skid beside the aft end of the second skid.

6-10.3 TRUCKLOADING. Depending on the number of skids to be loaded, figure 6-9 illustrates the truckloading requirements for the Mk 30 Mods Skid.

6-10.3.1 Alternate Truckloading Configuration(s). Alternate truckloading configurations for securing both loaded and empty Mk 30 Skids to flatbed trailers 40 feet and longer in length, using tiedowns with no required floor blocking, have been approved. Activities desiring to use this alternate truckloading method(s) shall have well-maintained roads, short travel distances, level terrain and controlled access. Refer to NAVSEA Drawing 7516890 (loaded) and 7516892 (empty) for complete loading requirements and other applicable regulations.

6-11. TOMAHAWK CLS CAPSULES. Complete instructions for the loading and transport of TOMAHAWK CLS Capsules (All-Up-Round and other non-warhead configurations) are found in NAVSEA Drawing 7517028. These instructions are intended for flatbed trailers 40 feet and longer in length. ISO flatracks (40 feet) may be used in lieu of flatbed trailers provided the additional requirements found on NAVSEA Drawing 7517028 are met. Vehicles shall not exceed 20 miles per hour.

6-12. LOADING OF EMPTY CLS BALLAST CANS. Truckloading instructions are provided for on-station movement of empty TOMAHAWK CLS ballast cans. A maximum of four ballast cans, two wide and two lengthwise, are permitted on each truckload. A 48 foot trailer is required to transport three or four ballast cans. Refer to NAVSEA Drawing 7516909 for complete loading requirements and other applicable regulations.

6-13. PLACARDS. All motor vehicles shall have placards located on the front, sides, and rear of the vehicle. The placards shall be attached so that they can be removed or covered

whenever the vehicle is empty. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010.

6-14. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions are obeyed for on-station motor vehicle movements.

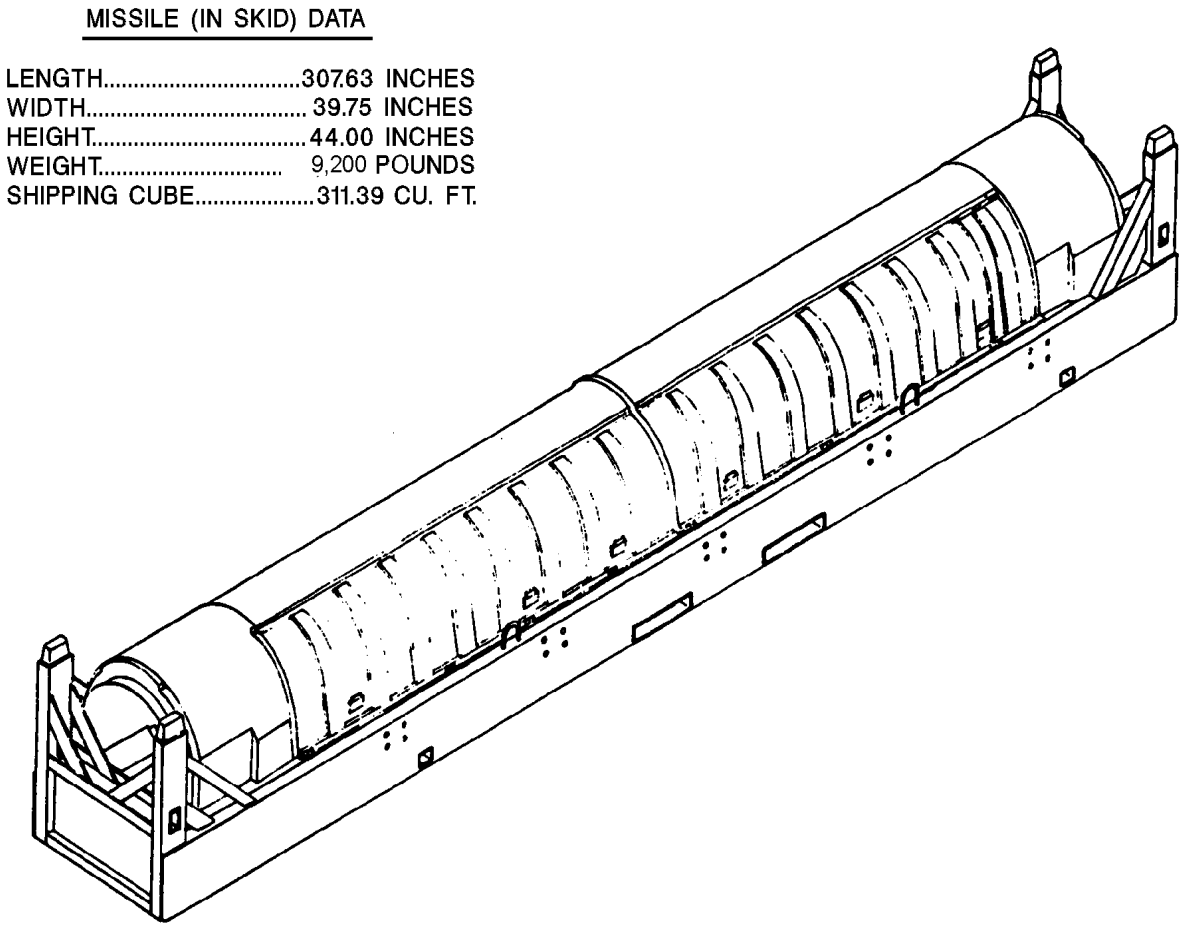
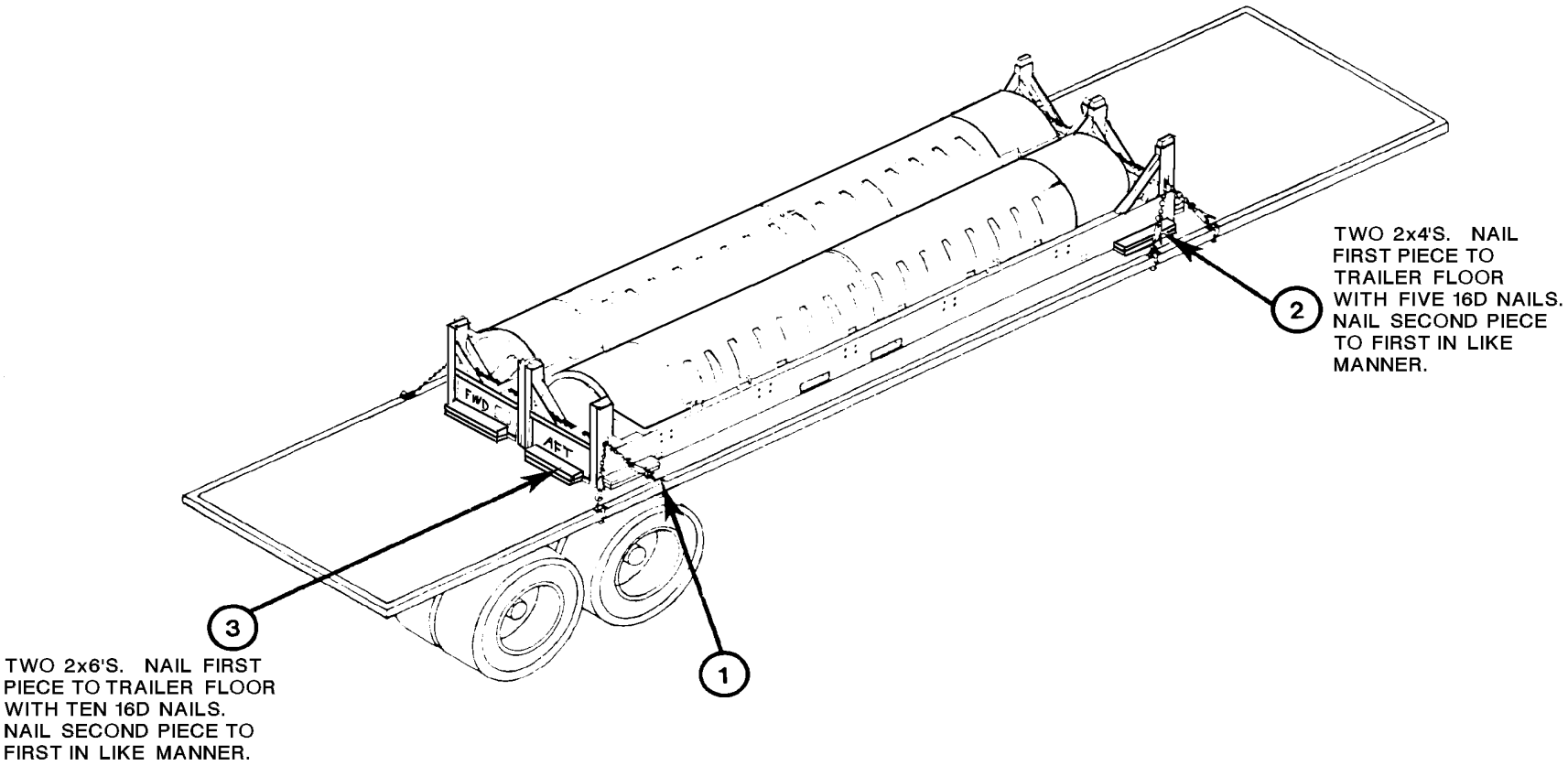


FIGURE 6-8. Mk 30 Mods Shipping Skid with TOMAHAWK (CLS) Missile



ITEM	(2 SKIDS) QUANTITY	(1 SKID) QUANTITY	DESCRIPTION	SIZE (INCHES)
3	8	4	HEADER (CROSSMEMBER)	2 X 6 X 24
2	8	4	SIDE BLOCKING (SLEEPER)	2 X 4 X 24
1	4	2	CHAIN LOAD BINDER	

FIGURE 6-9. Truckloading for On-Station Movement of Mk 30 Mods TOMAHAWK CLS Shipping Skid.

Section IV

STANDARD (MR) MISSILES ON MK 20 MODS STOWAGE CRADLE

6-15. GENERAL. Truckloading instructions are provided for on-station movement of STANDARD Medium Range (MR) Missiles on Mk 20 Mods Stowage Cradle, figure 6-10.

6-16. FLATBED TRUCKS AND TRAILERS. The instructions are intended for flatbed trucks and trailers having cargo areas over 16 feet in length. The number of stacks of missiles that can be loaded on a vehicle varies with the length of the cargo area as follows:

- Length of cargo area - 16 to 35 feet - 1 stack
- Length of cargo area - over 35 feet - 2 stacks

6-16.1 STACKING. When one stack of missiles is loaded on a vehicle, position the stack on the vehicle so that the ends of the missiles are approximately equidistant from the front and back ends of the cargo area. The longitudinal centerline of the stacks shall be on the longitudinal centerline of the vehicle. The forward end of the missiles shall point aft. When two stacks of cradles are to be loaded, position the first stack so that the ends of the missiles on the top layer are 12 inches from the front end of the vehicle. Position the second stack to the rear leaving 12 inches between the missiles.

CAUTION

Do not over-tension the chain. This could cause damage to the forklift pockets and result in a poorly secured load.

6-16.2 TIEDOWNS. Two 3/8- or 5/16-inch chains and loadbinders are used to secure the stack to the vehicle. The chain passes through the forklift pockets of the top layer of cradles and angles forward or aft, as shown in figure 6-11. Tension the chain using the loadbinders. Only chains shall be used as tiedowns.

6-16.3 FRAMING AND TARPAULINS. Covering the missiles on the vehicle is not required when it has been established that they will remain on the vehicle less than 72 hours. When the missiles are to remain on the vehicle for a longer period of time, they shall have a suitable frame constructed to provide support for tarpaulins or plastic film to cover the vehicle loads, as shown in figure 6-12.

6-16.3.1 Frame Construction. Figure 6-13 details the frame construction for the end and an eight- foot section of framing. Repeat the construction shown until the desired length framing is obtained. Splicing of longitudinal members is permissible when required length members are not available. Splicing should be accomplished by overlapping the continuing member by a minimum of 24 inches. Join with 10d nails clinched. Nail all joints with three nails per joint using appropriate nail sizes. Nails that penetrate through shall be clinched. Modifications to the framing may be made to accommodate trailer variances. Structural integrity shall be maintained.

6-16.3.2 Tarpaulin Requirements. The framing shall be covered with a waterproof, fire resistant tarpaulin or a static conductive plastic film .010 inches thick or greater. Pad all sharp edges and corners. Top, sides, and ends shall be covered. When more than one covering piece is used, they shall be overlapped sufficiently to be waterproof. The tarpaulin should cover the framing and be secured to the trailer body. Plastic film should cover the framing and be secured to the lower horizontal members by rolling it around a 1 x 4-inch batten and nailing it to the bottom horizontal. The covered framing does not have to cover the entire length of the trailer, only the weapons. It shall extend 12 inches past each stack. The 2 x 4-inch uprights are trimmed to fit into the stake pockets and extend four inches through the pocket. Drive a 12d nail into the lower four inches with the head allowed to extend 1/2 inch to prevent the piece from working upward.

6-17. PLACARDS. Every motor vehicle shall have placards located on the front, sides, and rear of the vehicle. The placards shall be attached so that they can be removed or covered whenever the vehicle is empty. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010.

6-18. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions are obeyed for on-station motor vehicle movements.

MISSILE	MISSILE ON CRADLE WT. (LBS) APPROX.	DIMENSIONS			CUBE CU. FT.
		L	W	H	
STANDARD (MR)	1555	176	24	26	63.6

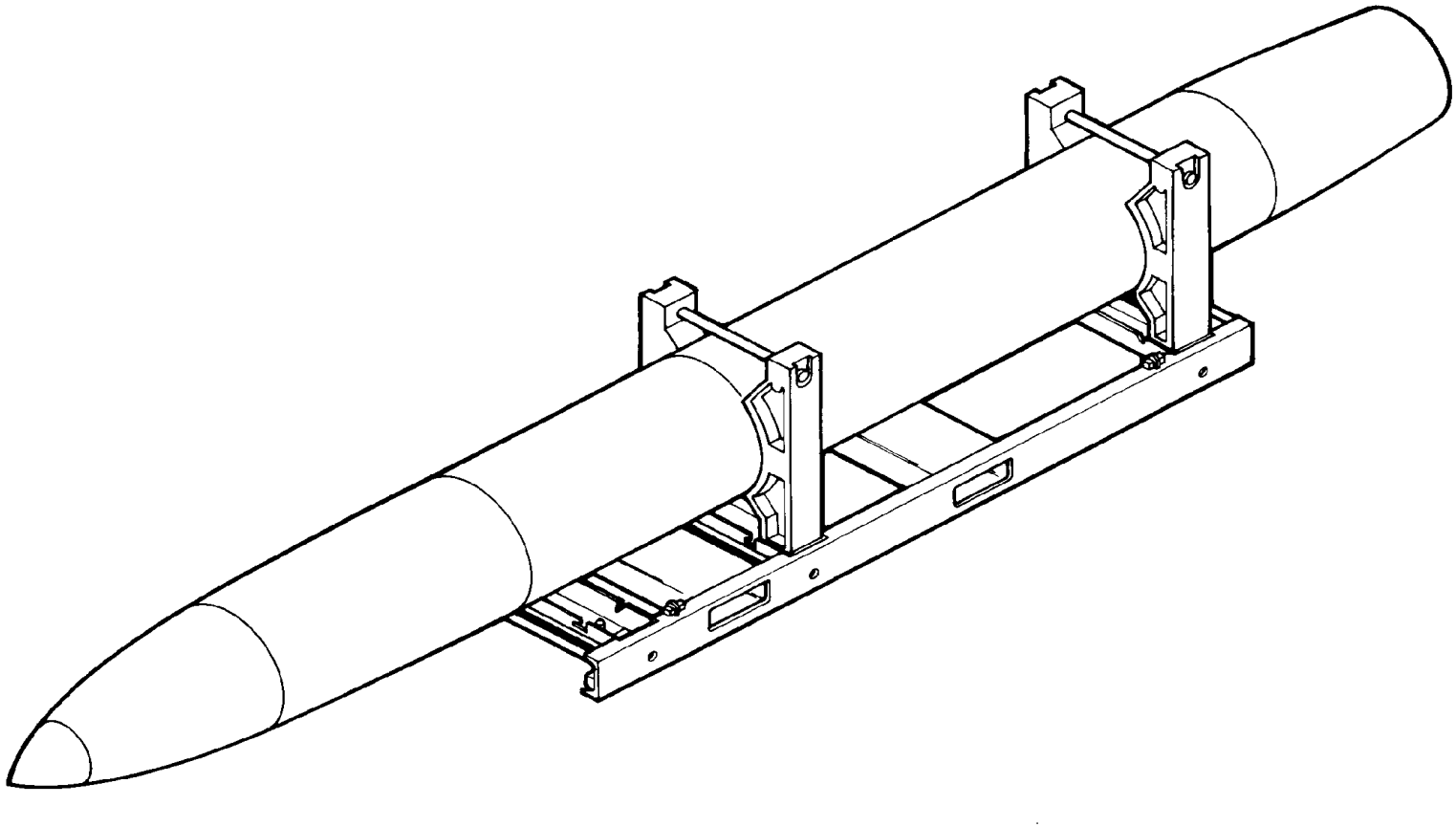
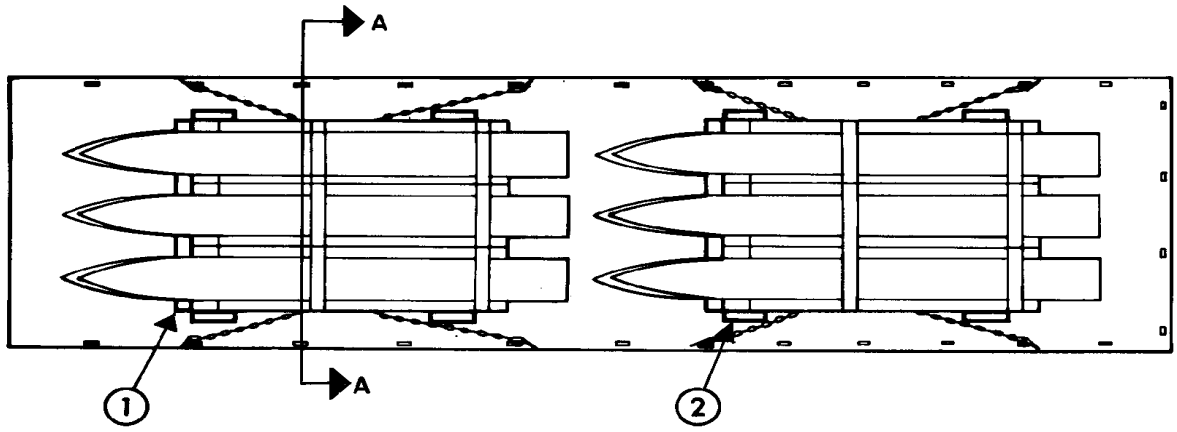
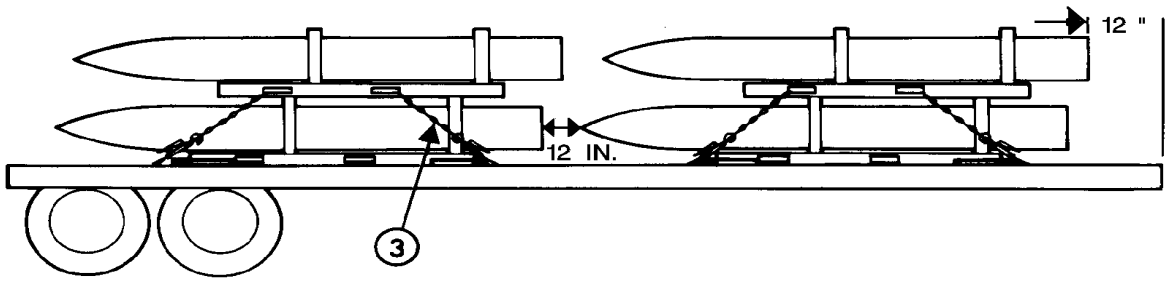
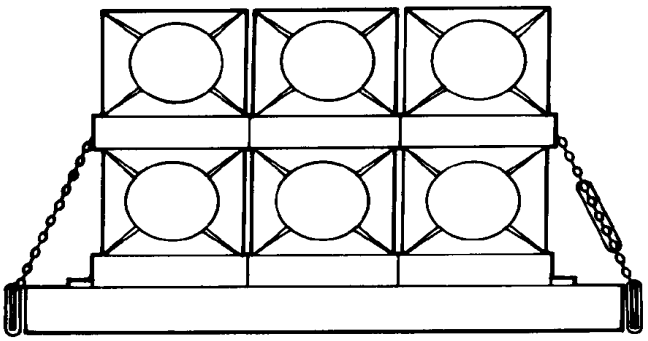


FIGURE 6-10. STANDARD (MR) Missile on Mk 20 Mods Stowage Cradle







TRUCKLOAD DATA

MISSILE	NUMBER OF MISSILES	TRUCKLOAD WT. LBS. (APPROX.)
STANDARD MR	12	18,660

PIECE NO.	DESCRIPTION	SIZE (INCHES)	NO. OF PCS REQ.	NAIL TO	NUMBER	SIZE
					NAILS	
3	CHAIN AND LOADBINDER	5/16 OR 3/8	4	-	-	-
2	SIDE BLOCKING (SLEEPER)	2 x 6 x 16	8	SEE FIELD NOTE		
1	HEADER (CROSSMEMBER)	2 x 4 x 82	4	SEE FIELD NOTE		

FIGURE 6-11. Typical Two-Stack Tiedown Load

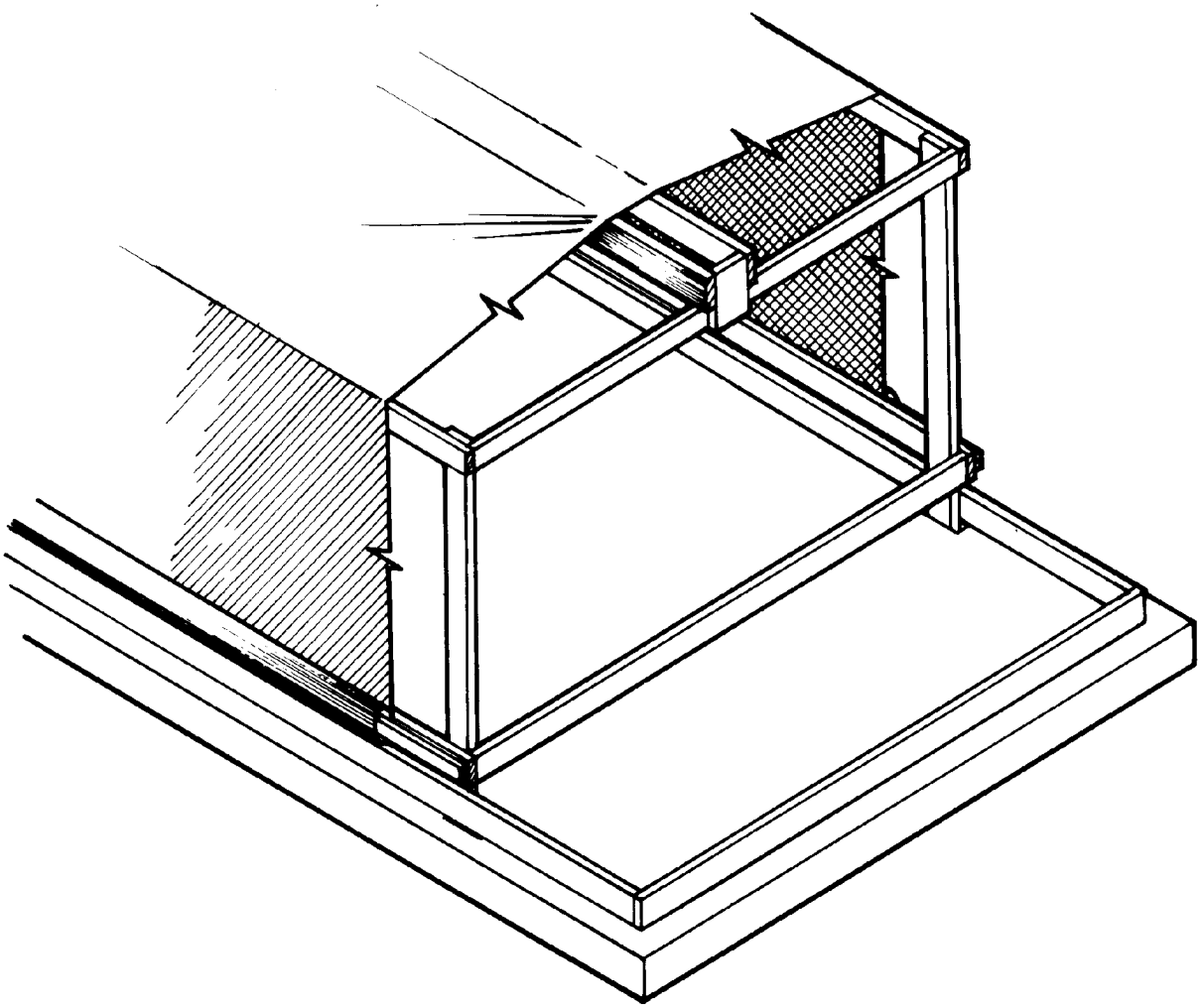


FIGURE 6-12. Framing Installed on Flatbed Vehicle

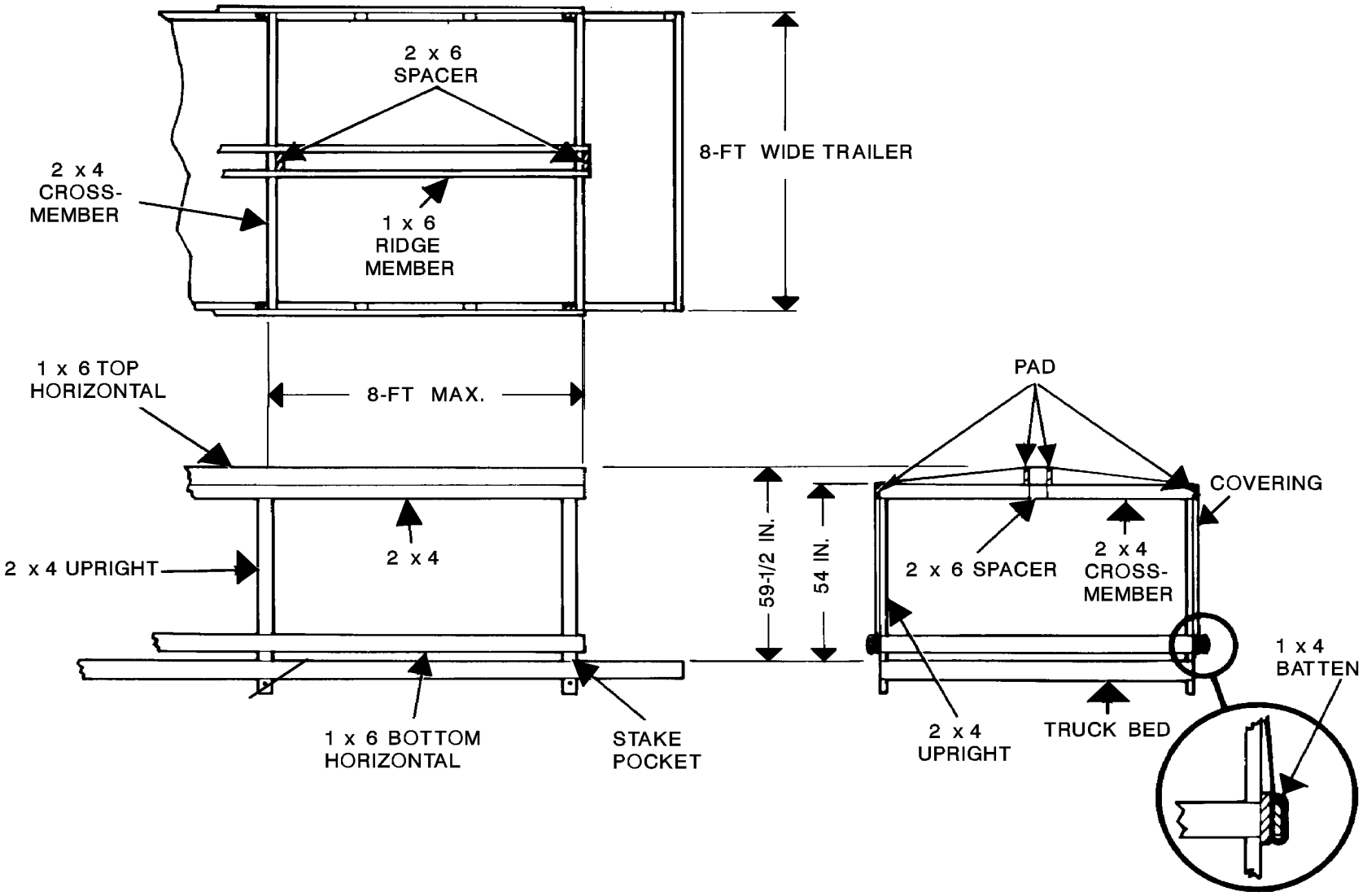


FIGURE 6-13. Frame Construction Details

Section V

MK 65 UNDERWATER MINE ON MK 25 MOD 2 SKID

6-19. GENERAL. Truckloading instructions are provided for on-station movement of the Mk 65 Underwater Mine on Mk 25 Mod 2 Skid, figure 6-14.

6-20. FLATBED TRUCKS AND TRAILERS. The instructions are intended for flatbed trucks and trailers having cargo areas over 14 feet in length. The number of stacks of mines that can be loaded on a vehicle varies with the length of the cargo area as follows:

- Length of cargo area - 14 to 24 feet - 1 stack
- Length of cargo area - 25 to 35 feet - 2 stacks
- Length of cargo area - 36 to 40 feet - 3 stacks

6-20.1 STACKING. When loading a stack of mines, position the mine nose forward, starting the first stack a minimum of 12 inches from the forward end of the cargo area. The following is a suggested sequence for each stack (refer to figure 6-15):

a. Load the first mine on the centerline of the vehicle.

WARNING

Extreme care must be taken to avoid striking the weapon when nailing.

b. Position and nail spacers against the skid.

c. Position and nail the four backup cleats against the ends of the skid.

d. Position and nail the two inboard back up cleats for the second and third mines of the stack to be loaded.

e. Position the second and third mines, nose forward, on the vehicle with the skid against the spacer and between the prepositioned back up cleats.

f. Position and nail the remaining backup cleats.

g. Install webbing tiedown or strap assemblies over the mines, one for each of the skid support assemblies.

6-20.2 BLOCKING AND TIEDOWNS. Blocking and tiedowns for loads of one, two, or three stacks shall be accomplished in the same manner as the three-stack load shown in figure 6-15. Allow 12 inches between stacks. Only webbing tiedown assemblies shall be used to secure the mines to the vehicle as specified in paragraph 3-2.7.

6-21. PLACARDS. All motor vehicles shall have placards located on the front, sides, and rear of the vehicle. The placards shall be attached so that they can be removed or covered whenever the vehicle is empty. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010.

6-22. SPEED RESTRICTIONS. It is mandatory that the local speed restrictions are obeyed for on-station motor vehicle movements.

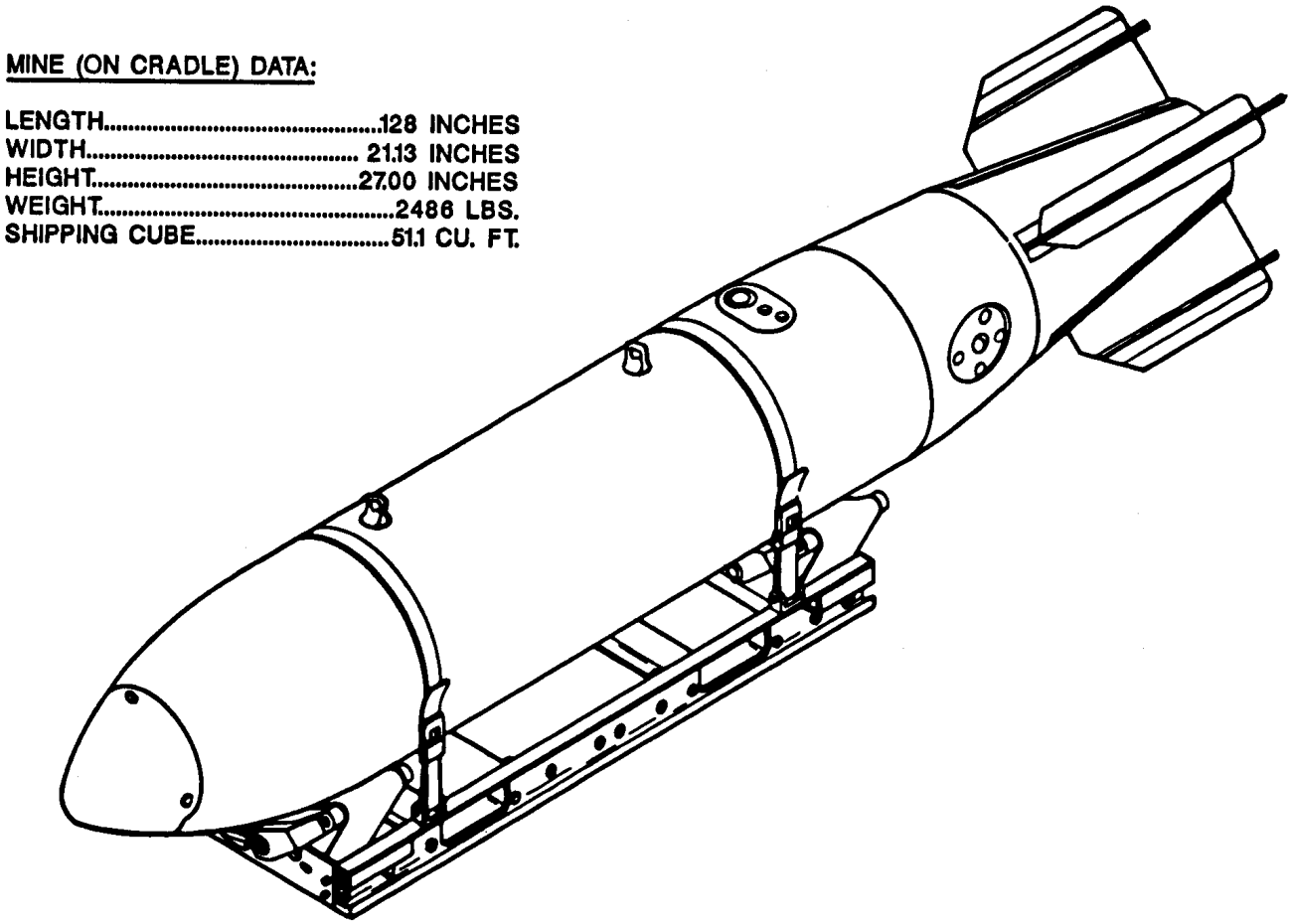
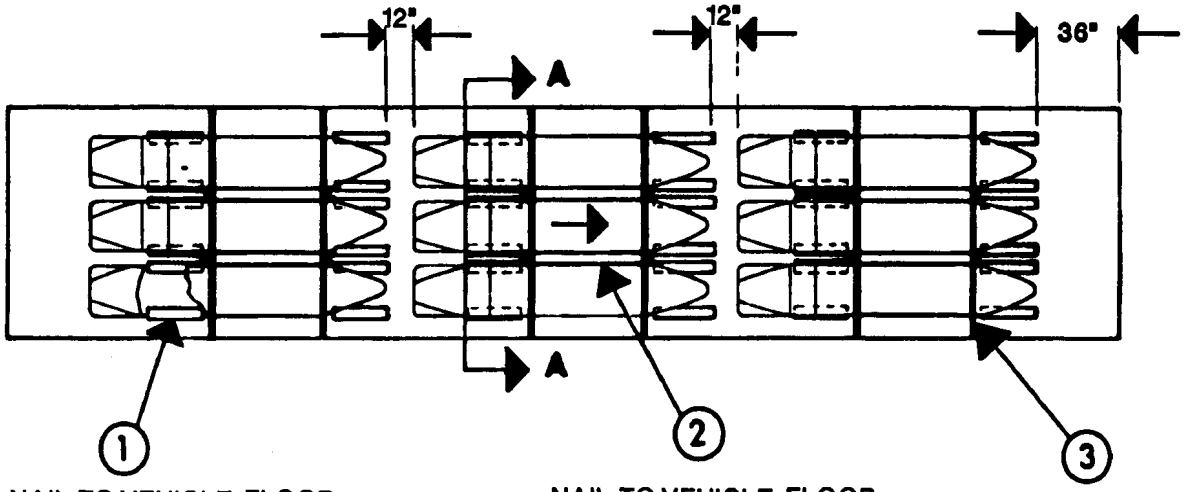
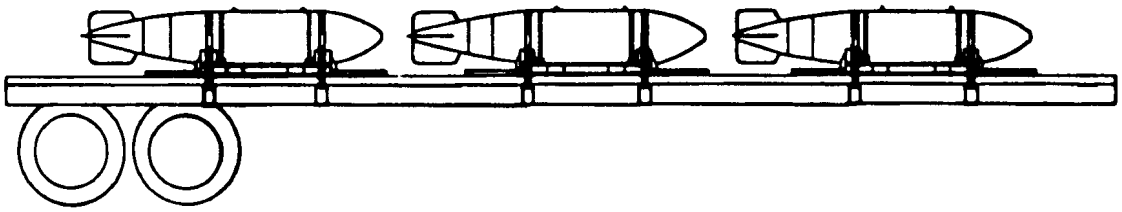


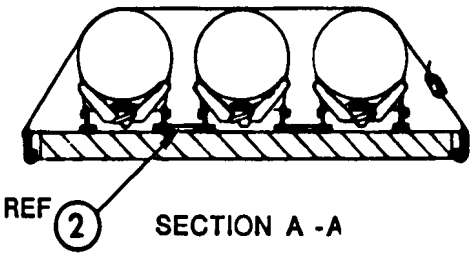
FIGURE 6-14. Mk 65 Underwater Mine on Mk 25 Mod 2 Skid





TRUCKLOAD DATA

NUMBER OF MINES.....9
WEIGHT (APPROX.).....22,383 LBS.



3	WEBBING TIEDOWN ASSEMBLY	1-3/4 WIDE	6	SEE PARAGRAPHS 3-2.6 & 3-3.5		
2	SPACER	2 x 6 x 56	6	SEE SECTION A - A		
1	BACKUP CLEAT	2 x 4 x 24	36	SEE FIELD NOTE		
PIECE NO.	DESCRIPTION	SIZE (INCHES)	NO. OF PCS REQ.	NAIL TO	NUMBER	SIZE
					NAILS	
LIST OF MATERIALS AND NAILING DATA						

FIGURE 6-15. Typical Three-Stack Load on 40-Foot Trailer

Section VI

COUNTERMEASURES SET ACOUSTIC (CSA) POD AND STOWAGE CRADLE ON AERO 51 MUNITIONS TRAILER

6-23. GENERAL. Detailed instructions for the loading and on-station movement of the CSA POD and Stowage Cradle on AERO 51 Munitions Trailer (figure 6-16) are provided in NAVSEA Dwg. 7516339.

6-24. PRE-LOADING INSPECTION. Preloading inspection, as required by NAVSEA SW020-AG-SAF-010, shall include inspection of chains, fittings and load binders for stretch, gouging, bent links, wear and other noticeable defects. Web strapping assemblies shall be inspected according to NAVSEA Dwg. 6214037. Results of these inspections shall be recorded on the motor vehicle inspection form. Any deficiency shall be cause for rejection.

6-25. PLACARDS. Any approved vehicle used for towing the AERO 51 Munitions Trailer shall have placards located on the front, sides and rear of the vehicle. The placards shall be in accordance with NAVSEA SW020-AG-SAF-010 and shall be attached so that they can be removed or covered whenever the motor vehicle is not in use.

6-26. SPEED RESTRICTION. The maximum speed of the trailer shall not exceed 10 mph.

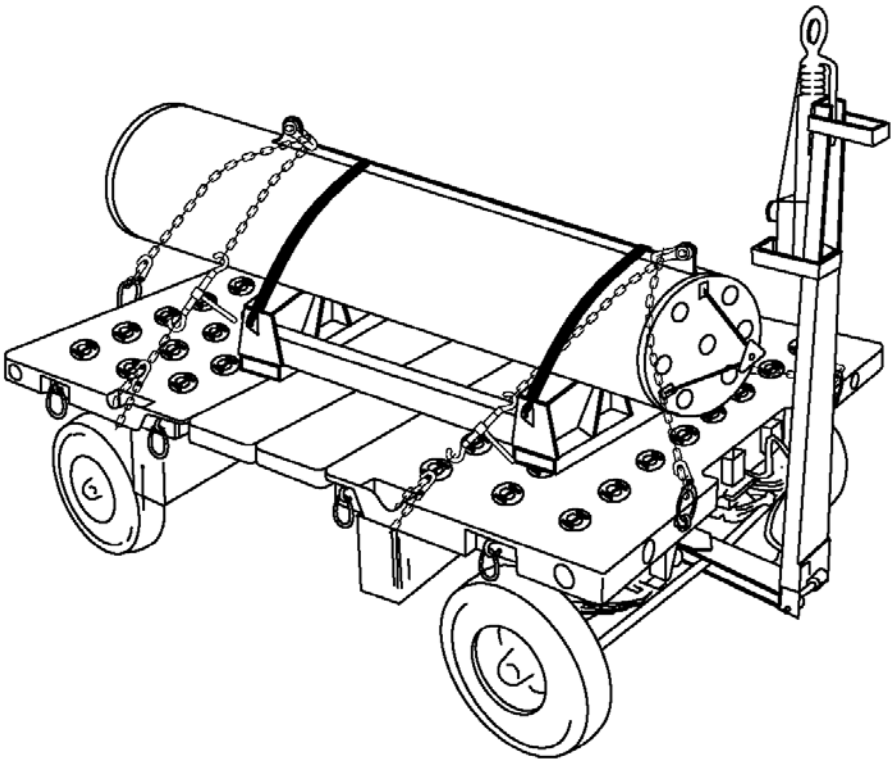


FIGURE 6-16. CSA Pod and Stowage Cradle on AERO 51 Munitions Trailer

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