



## DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND  
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IN REPLY REFER TO

8020  
Ser N7121/516  
5 May 00

From: Commander, Naval Sea Systems Command

Subj: CHANGE A TO NAVSEA SW023-AH-WHM-010, SECOND REVISION,  
"HANDLING AMMUNITION AND EXPLOSIVES WITH INDUSTRIAL  
MATERIALS HANDLING EQUIPMENT (MHE)" OF 15 MARCH 2000

Encl: (1) ESTDC CD-ROM of 15 April 2000

1. This letter officially issues Change A of the subject manual on an updated revision of enclosure (1), the Explosives Safety Technical Data Collection.

2. The subject manual incorporates several new or revised safety requirements and general requirements related to the handling of ammunition and explosives with industrial Materials Handling Equipment (MHE). Significant changes include:

a. Replaces references to OPNAVINST 8023.2C with OPNAVINST 8020.14/MCO P8020.11.

b. Excludes, in paragraph 2-1.3, expeditionary force units and war reserve material assets from the requirements of painting existing green rough terrain forklift trucks yellow during the next scheduled painting interval.

c. Revises paragraph 4-7.2.2f to state that performing a battery equalizing charge is needed only if the battery manufacturer requires it and is not mandatory as previously stated if the battery has been out of service or has been in stowage for over five days.

d. Requires operators of all MHE-types in paragraph 6-5.4.4 to inspect units to ensure that battery hold-downs are in place and secured.

3. Users are encouraged to submit feedback regarding any incomplete or incorrect information and recommendations for improvement using NAVSEA Technical Manual Deficiency/Evaluation Report (TMDER) process, which can now be completed and submitted electronically through the Internet. Verbal submissions should only be used when an immediate operational need exists. Changes

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to this publication will be issued as required to include any  
additional information and correct any errors noted.

4. The Naval Ordnance Safety and Security Activity point of  
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By direction

Distribution:  
NAVSURFWARCENDIV IHD Det Earle DL 185

**TECHNICAL MANUAL**

**HANDLING AMMUNITION AND  
EXPLOSIVES WITH INDUSTRIAL  
MATERIALS HANDLING EQUIPMENT (MHE)**



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**THIS PUBLICATION SUPERSEDES NAVSEA SW023-AH-WHM-010 FIRST REVISION  
DATED 15 SEPTEMBER 1996.**

**PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND**

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**1 APRIL 1999  
CHANGE A - 15 MARCH 2000**

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Title/A	A	6-2 thru 6-3	0
Change Record-1/		6-4	A
Change Record-2 Blank	0	6-5 thru 6-12	0
Foreword-1/(Foreword-2 Blank)	A	6-13	A
i thru vi	0	6-14 thru 6-20	0
vii/(viii Blank)	A	A-1 thru A-3	A
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6-1	A	C-31/(C-32 Blank)	0

Date of Issue for Original and Changed Pages is:

Original 0 - 1 April 1999

Change A - 15 March 2000

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A Change A



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## FOREWORD

1. This publication is a safety manual covering the use of industrial materials handling equipment (MHE) and approved attachments at Department of the Navy (DON) units ashore and afloat where ammunition and explosives are present.
2. This publication is not intended to supersede, contravene, or modify any federal, state, municipal, or local laws and their supplements. If any provision of this publication appears to conflict with any other published regulation, this fact should be reported in detail to the Naval Ordnance Safety and Security Activity (N71).
3. This publication supersedes NAVSEA SW023-AH-WHM-010 First Revision, dated 15 January 1996, which should be destroyed.
4. Changes to this manual will be issued as required. Comments or suggestions relative to material to be included in such changes should be forwarded as specified in [chapter 1](#).

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## SAFETY SUMMARY

This publication contains instructions and regulations necessary for the safe usage of materials handling equipment (MHE) at Department of Navy (DON) units ashore and afloat. While the entire content of this publication is a warning to the user, the following warnings appear in the text, and are repeated here for emphasis:

### **WARNING**

Severe burns can be caused by the sulfuric acid contained in batteries. In case of contact, thoroughly flush affected area with clean water. Obtain medical attention immediately. ([Page 4-11.](#))

### **WARNING**

When the mast is fully raised, ensure the operator's hands are clear of controls and the person marking and verifying the height stands to the side of the MHE. An observer must ensure that all personnel are clear of the mast prior to raising the rated load. ([Page 6-16.](#))

The following caution statements appear in the text of this manual, and are repeated here for emphasis:

### **CAUTION**

Do not check radiator coolant level when engine is hot. ([Page 6-4.](#))

### **CAUTION**

Do not attempt to charge a battery when the battery charge indicator window is yellow. ([Page 6-4.](#))

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## CHAPTER 1

### INTRODUCTION

#### 1-1. PURPOSE

The purpose of this publication is to identify the various types of industrial materials handling equipment (MHE) and attachments approved for operational areas where ammunition and explosives are present; procedures to license operators; and procedures to safely operate, store, test and maintain MHE to appropriate specifications.

#### 1-2. SCOPE

This publication is applicable to all Department of Navy (DON) units ashore and afloat where ammunition and explosives are present, and to all personnel operating industrial MHE without regard to employer. All personnel certification requirements must be in accordance with [OPNAVINST 8020.14/MCO P8020.11](#) and local instructions. Marine Corps tactical MHE shall be governed by MCO P11262.2, except for operator licensing which shall comply with the requirements found in [chapter 3](#) of this publication.

#### 1-3. RESPONSIBILITIES AND REGULATIONS

The responsible party for all authorized actions used throughout this publication 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](#). The requirements in this publication 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](#). Advisory requirements are those in which "may" or "should" are used. These advisory requirements shall be followed unless exceptions are authorized by the CO/OIC.

#### 1-4. ORGANIZATION OF PUBLICATION

[Chapter 2](#) begins by identifying the various types and selected operational safety specifications of industrial MHE and associated attachments. [Chapter 3](#) lists the processes to select training, license personnel as powered MHE operators, and authorize personnel as local instructors for the purpose of issuing a license for powered MHE operators. [Chapter 4](#) provides all general, personnel, handling, movement, refueling and battery charging safety precautions. [Chapter 5](#) defines and describes regulations for using MHE in operational and hazardous locations. Finally, [chapter 6](#) concludes with the maintenance, testing and inspection programs required to be performed by operators and maintenance personnel concerned with operating, servicing and repairing MHE.

## 1-5. REFERENCED DOCUMENTS

A list of documents containing technical information referenced throughout this publication is presented in [appendix A](#). These documents are essential for complete understanding of MHE handling procedures contained within this manual.

## 1-6. MHE COST CODES AND SPECIFICATIONS

[Appendix B](#) provides a listing of applicable cost codes and specifications assigned to the various approved types of MHE.

## 1-7. MHE OPERATOR TRAINING COURSE

[Appendix C](#) provides the training course established as the minimum requirements that DON personnel must successfully meet prior to being issued a powered industrial MHE license to handle ammunition and explosives.

## 1-8. MHE MODIFICATIONS

MHE may only be modified using means outlined in this publication. MHE shall not be modified, altered or destroyed in any other way without obtaining written approval from the [Naval Surface Warfare Center, Indian Head Division Detachment Earle, Naval Packaging, Handling, Storage, and Transportation \(PHST\) Center](#) (Code 71), 201 Highway 34 South, Colts Neck, NJ 07722-5023. A copy of the proposed modification shall be forwarded to the Commander, Naval Inventory Control Point (NAVICP), 5450 Carlisle Pike, (Code 1041), P.O. Box 2020, Mechanicsburg, PA 17055-0788. Ships desiring to modify or alter an item of MHE to increase utilization or effectiveness shall submit a justification for the proposed modification or alteration to the PHST Center (Code 71) and NAVICP Mechanicsburg (Code 1041), via type commander (TYCOM), citing in detail the benefits to be obtained. As a part of justification, ships will include a drawing of the proposed modification or alteration to permit review of feasibility and operational safety. In critical or emergency situations, MHE assigned to forces afloat may be modified, with the CO/OIC's written approval, without prior PHST Center/NAVICP Mechanicsburg approval to meet urgent operational requirements. Justification and details of the modification will be furnished to the PHST Center and NAVICP Mechanicsburg as soon as practicable.

## 1-9. MHE ALLOWANCING

All requests for MHE to fill current allowances shall be submitted, via the appropriate TYCOM or major claimant, by letter or message to the nearest Fleet Issue Control Point (FICP) in accordance with SPCCINST's 10490.2 ashore or 10490.3 afloat. These requests should be made at least 30 days in advance of the date the MHE will be required. FICP's, located at designated Fleet Industrial Supply Center (FISC's), will provide replacement MHE from established pools. If requisitions cannot be satisfied by the nearest FICP, the request will be forwarded to NAVICP Mechanicsburg (Code 1041) with a copy to the PHST Center (Code 71). The CO/OIC will certify that the MHE requested will not exceed the authorized allowance.

## 1-10. MHE ALLOWANCE CHANGES

New allowance change requests to existing allowance requirements will require appropriate funding from the TYCOM or major claimant in advance of purchase and issuance of the requested MHE. All change requests shall be submitted to NAVICP Mechanicsburg (Code 1041), via the appropriate TYCOM or major claimant, with a copy to the PHST Center (Code 71).

## 1-11. REPORTING DEFICIENCIES IN MANUAL

Ships, training activities, supply points, depots, naval shipyards and supervisors of shipbuilding 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) (Code 5B00), 4363 Missile Way, Port Hueneme, CA 93043-4307 on NAVSEA Technical Manual Deficiency/Evaluation Report (TMDER), NAVSEA Form 4160/1. A copy of [NAVSEA TMDER Form 4160/1](#) is included at the end of this publication. This form may also be completed and processed by using NSWC/PHD website: <http://nsdsa.nswses.navy.mil/tmder/tmder.htm> for activities with internet access. All feedback comments shall be thoroughly investigated and originators will be advised of action resulting therefrom.

## 1-12. DATE OF PUBLICATION

The date of publication of this technical manual, and of revisions and changes thereto, as shown on the title page, is the estimated date the publication is to be distributed. The manual, revision or change is however, effective upon receipt, regardless of the date shown on the title page.

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## CHAPTER 2

### TYPES OF INDUSTRIAL MATERIALS HANDLING EQUIPMENT

#### 2-1. GENERAL

The various types and selected operational safety specifications of industrial materials handling equipment (MHE) and associated attachments are described in this chapter.

2-1.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) DESIGNATIONS. All MHE is identified by alphabetical designators. NFPA definitions of these designators are as follows:

- a. Type CN. Compressed natural gas-powered, hard rubber or pneumatic tires, having minimum acceptable safeguards against inherent MHE fire hazards.
- b. Type CNS. Type CN MHE with additional safeguards to exhaust, fuel and electrical systems.
- c. Type D. Diesel-powered, hard rubber or pneumatic tires, having minimum acceptable safeguards against inherent MHE fire hazards.
- d. Type DS. Type D MHE with additional safeguards to exhaust, fuel and electrical systems.
- e. Type E. Electrically-powered, hard rubber or pneumatic tires, having minimum acceptable safeguards against inherent and electrical shock hazards.
- f. Type EE. Type E MHE with the electric motor and all other electrical components completely enclosed.
- g. Type EX. Type EE MHE with the electric motor, all other components, and the fittings designed, constructed, and assembled that they may be used in atmospheres containing specially named flammable vapors, dusts, and under certain conditions, fibers. Type EX MHE are specifically tested and classified for use in Class I, Group D (atmospheres containing flammable vapors, referred to as “explosion proof”), or for Class II, Group G (atmospheres containing combustible dust, referred to as “ignition proof”) locations as defined in NFPA 70, National Electrical Code (NEC).
- h. Type G. Gasoline-powered, hard rubber or pneumatic tires, having minimum acceptable safeguards against inherent MHE fire hazards.
- i. Type G/CN. Dual-fuel capable MHE meeting type G or type CN requirements.
- j. Type G/LP. Dual-fuel capable MHE meeting type G or type LP requirements.

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- k. Type GS. Type G MHE having additional safeguards to exhaust, fuel and electrical systems.
- l. Type GS/CNS. Dual-fuel capable MHE meeting type GS or type CNS requirements.
- m. Type GS/LPS. Dual-fuel capable MHE meeting type GS or type LPS requirements.
- n. Type LP. Liquefied petroleum gas-powered, hard rubber or pneumatic tires, and minimum acceptable safeguards against inherent fire hazards.
- o. Type LPS. Type LP MHE with additional safeguards to exhaust, fuel and electrical systems.

2-1.2. **NAVAL DESIGNATIONS.** The Department of Navy (DON) assigned the following MHE alphabetical designators, which are not official NFPA designators:

- a. Type DS/DC. Type DS MHE that meets the minimum Occupational Safety and Health Administration (OSHA) requirements for use in closed spaces ashore and are commonly referred to as “clean burn diesel.”

The following descriptions apply to manually-powered pallet trucks approved for use afloat, as noted in [table 5-1](#):

- b. Type H. Manually-powered pallet truck modified by the addition of a deadman brake system, salt fog protection, lifting points, tiedown points and shock hardening features. They are available through the Fleet Issue Control Point (FICP) and are marked with a USN registration number.
- c. Type HS. Type H pallet truck modified by the addition of hard/solid non-sparking wheels and a means to dissipate static electric charges, minimally two ground straps or two conductive wheels/tires. They are available through the FICP and are marked with a USN registration number.

The following descriptions apply to manually-powered pallet trucks approved for use ashore, as noted in [tables 5-2](#) and [5-3](#):

- d. Type H. Manually-powered pallet truck with solid wheels/tires that are locally procured.
- e. Type HS. Type H pallet truck modified by the addition of hard/solid non-sparking wheels and a means to dissipate static electric charges, minimally two ground straps or two conductive wheels/tires and are locally procured.

2-1.3. **COLOR.** All DON-owned MHE shall be painted yellow in accordance with FED-STD-595, Color No. 13538 or a NAVICP Mechanicsburg approved equivalent. Existing green rough terrain forklift trucks shall be repainted yellow during the next scheduled painting interval, except for expeditionary force units and war reserve material (WRM) assets.

2-1.4. **MARKINGS.** All MHE shall be marked with the following information:

- a. The MHE manufacturer’s nameplate and label, containing the information described in [paragraph 6-2](#).

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- b. Accredited laboratory certification identification, such as Underwriters' Laboratory (UL) or Factory Mutual (FM). On older MHE models, this identification may appear on the manufacturer's nameplate.
- c. The safe working load (SWL) and vehicle weight (VW) must be clearly printed, in minimum 2-inch letters, on both sides and, except for all pallet trucks, must be clearly in view of the operator at all times, normally, on the crossbar of the mast.
- d. Alphabetical designators shall appear on the sides and rear. They shall be decals or painted black in minimum 3-inch block letters. For H and HS type pallet trucks, the alphabetical designators shall be placed in a conspicuous location with minimum 1-inch block letters.
- e. The periodic weight test certification form ([figure 6-6](#)) shall be stenciled or labeled in a location that is visible to the operator upon mounting the MHE and shall comply with the requirements of [paragraph 6-12](#).
- f. Newly procured MHE or existing MHE that has had complete paint removal shall be painted with and labeled with the words "Painted with lead free and chromate free paint on (month/year) by (Contractor Name/Painting Facility)" clearly printed in minimum ¼-inch block letters on each side in a visible, but protected, location.
- g. Type EX MHE shall have a 6-inch blue diagonal stripe painted in a 45° angle (top right to bottom left) along both sides and on the rear, as shown in [figure 2-1](#). This stripe shall be in accordance with FED-STD-595, Color No. 24064, or a NAVICP Mechanicsburg approved equivalent.

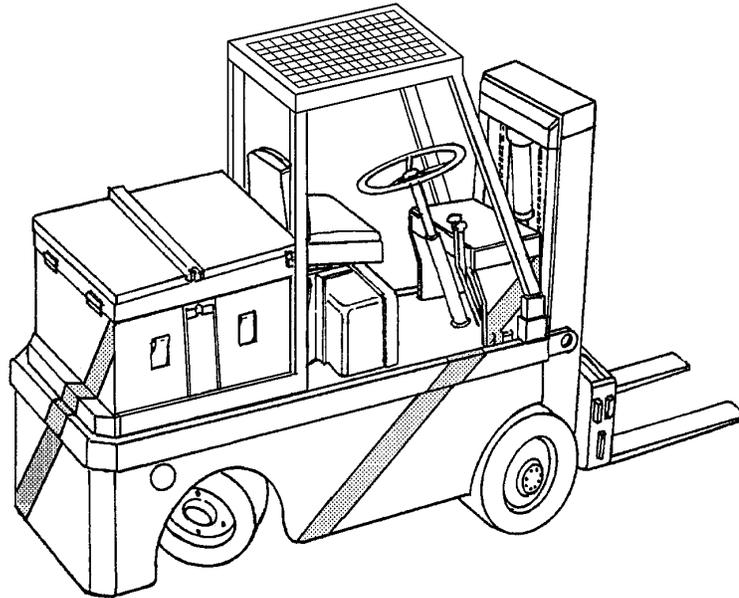


FIGURE 2-1. Type EX Forklift Truck

## 2-2. FORKLIFT TRUCKS

There are several kinds of approved forklift trucks available for use. Forklift trucks are mobile wheeled units used to load, lift, and transport different items. Forklifts come equipped with two forks which are secured to the supporting frame. The forks and frame are located in the front of the truck, with the exception of sideloading trucks. Forks move vertically on the supporting frame and can be tilted forward to pick up a load, and backward to stabilize the load. Several attachments are available for use with forklifts and will be presented within this chapter.

Forklift trucks may be powered by batteries, gasoline, liquid propane gas, diesel or compressed natural gas. They may have pneumatic tires for use over rough terrain, or solid rubber tires for use over smooth and hard surfaces. Specific safety features are built into each type of MHE that allow for safe operations in a variety of areas where ammunition and explosives are present. Spark-enclosed (EE) trucks have provisions to ensure that no spark will escape the generator, motor, or switches. Explosion-Proof (EX) trucks are fully enclosed to prevent energy, such as an electrical spark or heat from accidentally escaping to the surrounding atmosphere and initiating an explosion. Type EX trucks come equipped with non-sparking fork coverings. Diesel-powered forklifts are equipped with spark-arresting devices to ensure safe operation in hazardous areas.

Type DS/DC MHE have a modified diesel engine that reduces the exhaust emissions to an acceptable level for indoor operations and are approved for use in closed spaces ashore. They are subject to federal, state, and local regulations for air quality and noise pollution. Type DS/DC MHE must be marked as such and must meet or exceed the requirements set forth in MIL-T-52932, federal, state, or local regulations for emissions and noise. Hearing protection is required when noise levels are exceeded. Each activity must monitor the emissions of DS/DC MHE in accordance with the manufacturer's recommendations to ensure that exhaust emissions do not exceed allowable levels set forth by federal, state, or local regulations.

**2-2.1. STANDARD FORKLIFT TRUCKS.** Standard forklift trucks are counterbalanced and are equipped with a lifting mechanism that elevates a fork carriage. Two adjustable forks are secured to the fork carriage. An overhead guard is provided for the operator's safety. [Figures 2-1](#) and [2-2](#) provide examples of standard forklift trucks.

**2-2.2. REACHING AND TIERING.** This type of forklift truck uses outriggers vice a counterbalance, reducing size and making them suitable for use in confined spaces. The forks, which are mounted on an extendable mechanism, are elevated by means of a lift mechanism. They are electric-powered and have solid tires. Overhead guards are not normally provided on MHE afloat. Manufacturer-installed spinner knobs are acceptable for these trucks. [Figure 2-3](#) illustrates a reaching and tiering forklift truck.

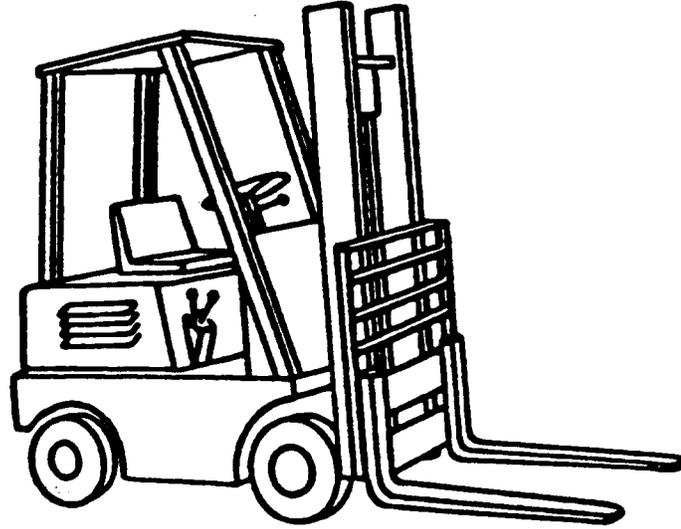


FIGURE 2-2. Type DS Forklift Truck

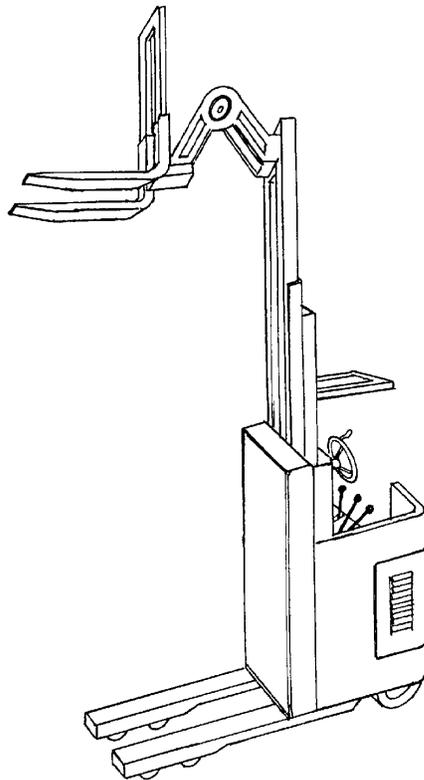


FIGURE 2-3. Reaching and Tiering Forklift Truck

2-2.3. **SIDELoader.** This type of forklift truck is used to handle long ammunition items such as containerized guided missile components. They have flatbed platforms at the end. The uprights for carrying the forks are located in the center. The forks elevate up and down on the mast. The forks and the mast also travel in a vertical and horizontal direction. Some models are equipped with auxiliary forks for extra- long load stabilization. The sideloader has solid tires. [Figure 2-4](#) illustrates a sideloader.

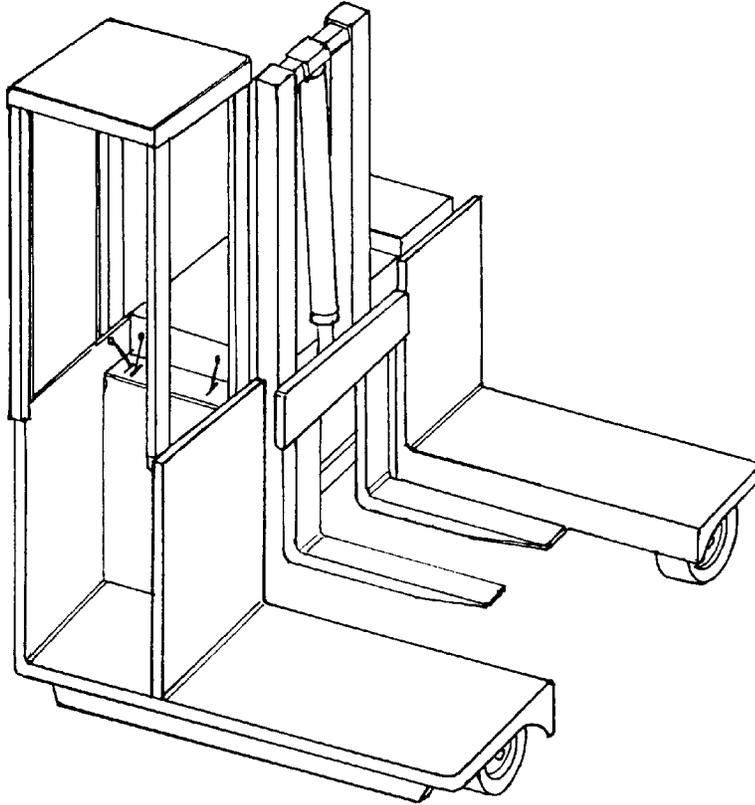


FIGURE 2-4. Sideloader

2-2.4. **ROUGH TERRAIN.** This type of forklift truck is intended for operation on unimproved natural terrain as well as the disturbed terrain of construction sites. These trucks are diesel-powered, two-wheel or four-wheel drive, articulate/rigid frame-type vehicles with pneumatic tires. Rough terrains may be either vertical masts, as shown in [figure 2-5](#), variable reach linkage-type, as shown in [figure 2-6](#), or variable reach boom-type, as shown in [figure 2-7](#).

2-2.5. **FRONT/SIDELoader (SWINGMAST).** The front/sideloader, also identified as swingmast, operates as a forklift and sideloader combined. [Figure 2-8](#) provides an illustration of a front/sideloader (swingmast). Long loads can be transported parallel to the direction of travel, making them easier to maneuver through narrow doorways and aisles. The truck is available in SWL's up to 11,000 pounds. Due to their high wheel loading, front/sideloaders are not approved for shipboard use. This truck is electrically or diesel-engine powered.

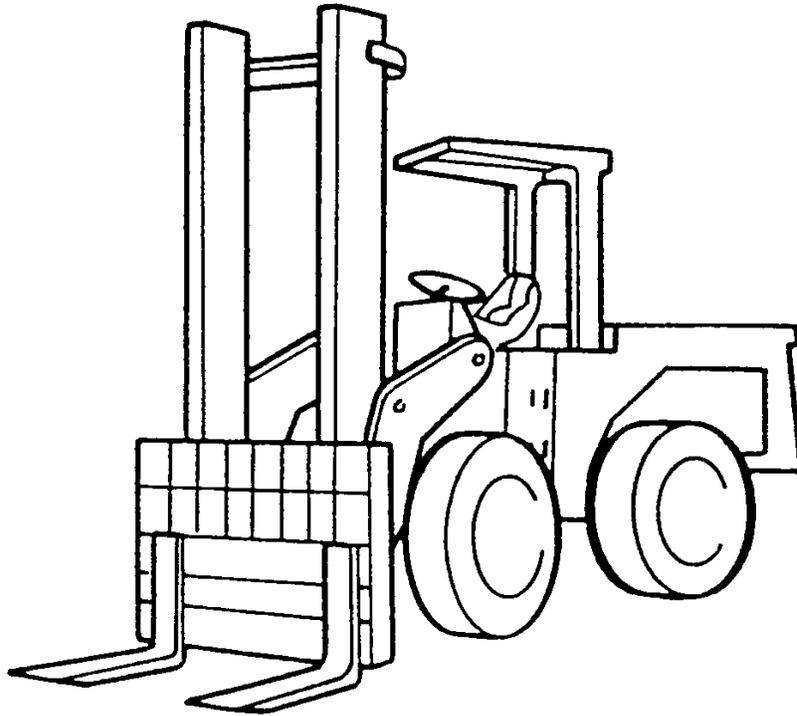


FIGURE 2-5. Rough Terrain Forklift Truck (Vertical Mast)

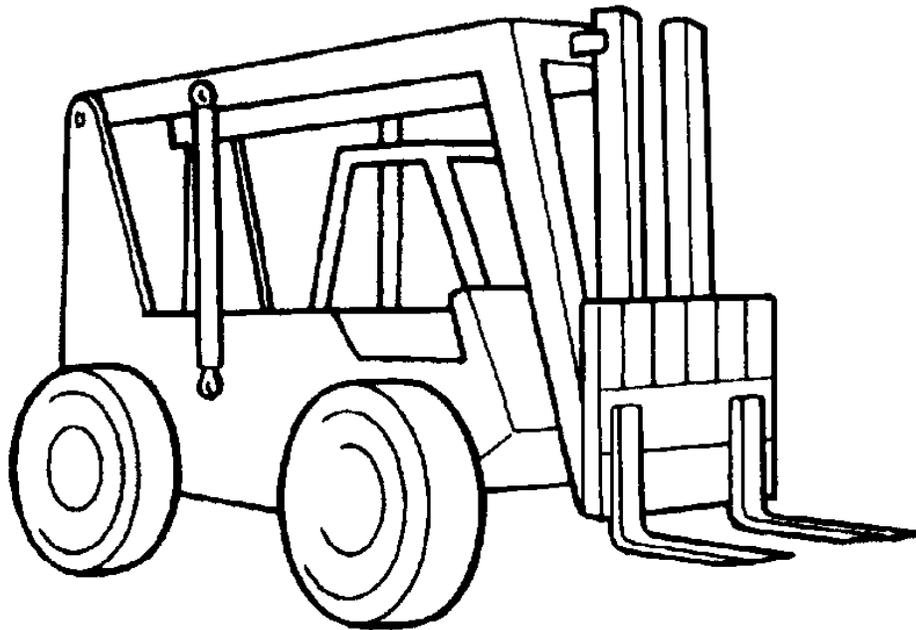


FIGURE 2-6. Rough Terrain Forklift Truck (Variable Reach Linkage-Type)

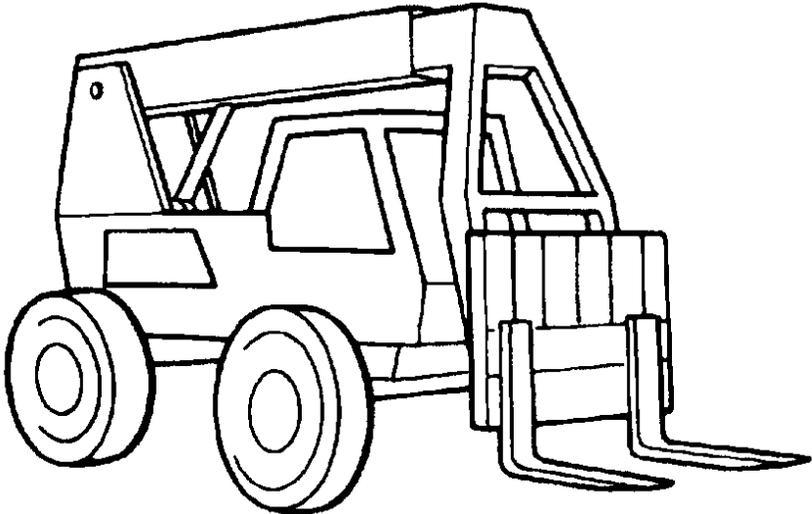


FIGURE 2-7. Rough Terrain Forklift Truck (Variable Reach Boom-Type)

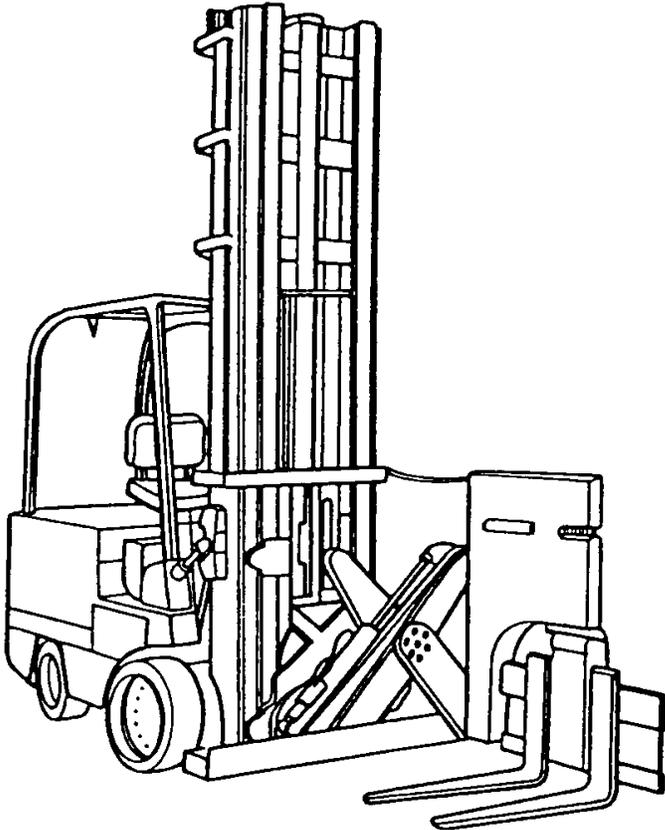


FIGURE 2-8. Front/Sideloader (Swingmast)

## 2-3. FORKLIFT ATTACHMENTS

Forklift attachments may be installed in order to perform specific operations. The following attachments, found in NAVSEA OP 2173, are approved and are not considered to be an alteration to the MHE. Therefore, approval is not required from the original manufacturer, [Naval Surface Warfare Center \(NSWC\), Indian Head Division Detachment Earle, Navy Packaging, Handling, Storage and Transportation \(PHST\) Center](#) (Code 71) or Naval Inventory Control Point (NAVICP) Mechanicsburg (Code 1041).

2-3.1. MK 5 MOD 0 FORKLIFT TRUCK BOOM. Standard forklift trucks can be converted into boom trucks by removing the forks and installing the Mk 5 Mod 0 Forklift Truck Boom using ordnance alteration (ORDALT) 15081. Once the boom is properly installed and complies with the weight test periodicity requirements of [paragraph 6-8.1](#), no additional weight testing is required for such a conversion. The boom is a steel weldment consisting of a fixed pipe welded to a mounting bracket and a telescoping pipe with a safety shank hook. The mounting bracket attaches to the faceplate of various 4,000- and 6,000-pound SWL forklift trucks, after the forks have been removed. The Mk 5 Mod 0 Forklift Truck Boom is used in conjunction with slings and carriers to handle ordnance, especially in low overhead areas with narrow passageways. Refer to [paragraph 4-5.1.1](#) for SWL's at non-standard load centers. [Figure 2-9](#) illustrates the Mk 5 Mod 0 Forklift Truck Boom.

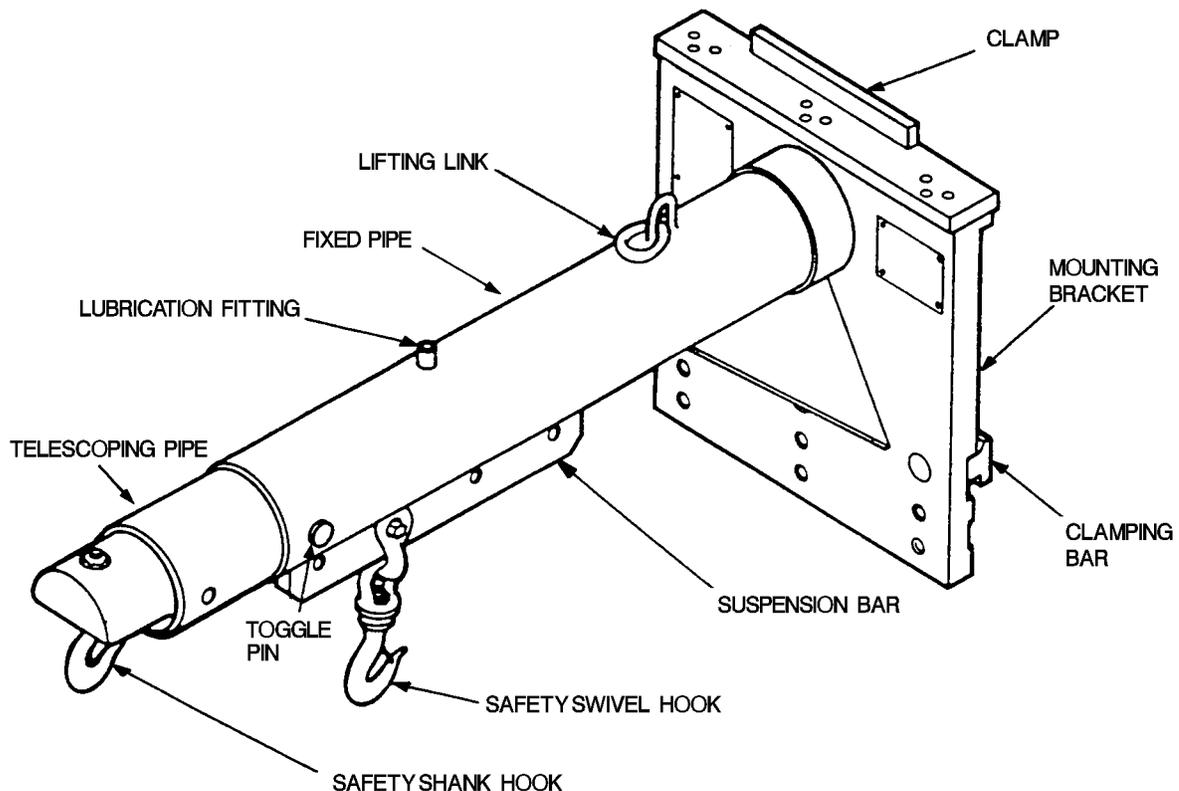


FIGURE 2-9. Mk 5 Mod 0 Forklift Truck Boom

2-3.2. **MK 91 MOD 0 HOOK ADAPTER.** Used for a quick conversion to a boom truck, Mk 91 Mod 0 Hook Adapter consists of a welded steel beam with fork pockets, and two clamping screws to permit attachment to the forks. A swivel safety hook is attached to the beam for lifting and transporting various loads. See [paragraph 4-5.1.1](#) for specific SWL's at non-standard load centers. The Mk 91 Mod 0 Hook Adapter is to be used for lifting only. [Figure 2-10](#) illustrates the Mk 91 Mod 0 Hook Adapter.

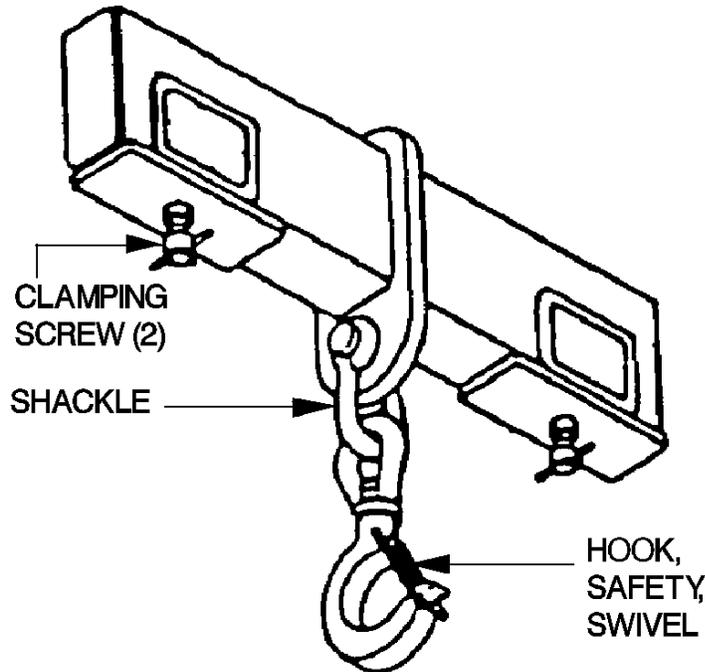


FIGURE 2-10. Mk 91 Mod 0 Hook Adapter

2-3.3. **MK 176 MOD 0 HOOK ADAPTER.** Used for a quick conversion to a boom truck, Mk 176 Mod 0 Hook Adapter consists of a welded steel beam with fork pockets, and two clamping screws to permit attachment to the forks. A swivel safety hook is attached to the beam for lifting and transporting Capsule Launching System (CLS) or Composite Capsule Launching System (CCLS) TOMAHAWK All-Up-Rounds (AUR's). See [paragraph 4-5.1.1](#) for specific SWL's at non-standard load centers. The hook adapter is to be used for lifting only. [Figure 2-11](#) illustrates the Mk 176 Mod 0 Hook Adapter.

2-3.4. **MK 12 MOD 0 FORKLIFT TRUCK TINE EXTENSIONS.** These extensions mount directly on the forks. The extensions provide approximately 20 inches of additional length to the forks, enabling the forklift to handle missiles stacked three-deep on a flatbed conveyance. These extensions permit handling of larger loads with greater load centers. However, the SWL of the forklift is reduced with the use of these extensions. See [paragraph 4-5.1.1](#) for specific SWL's at non-standard load centers. [Figure 2-12](#) illustrates the extensions installed on the forks.

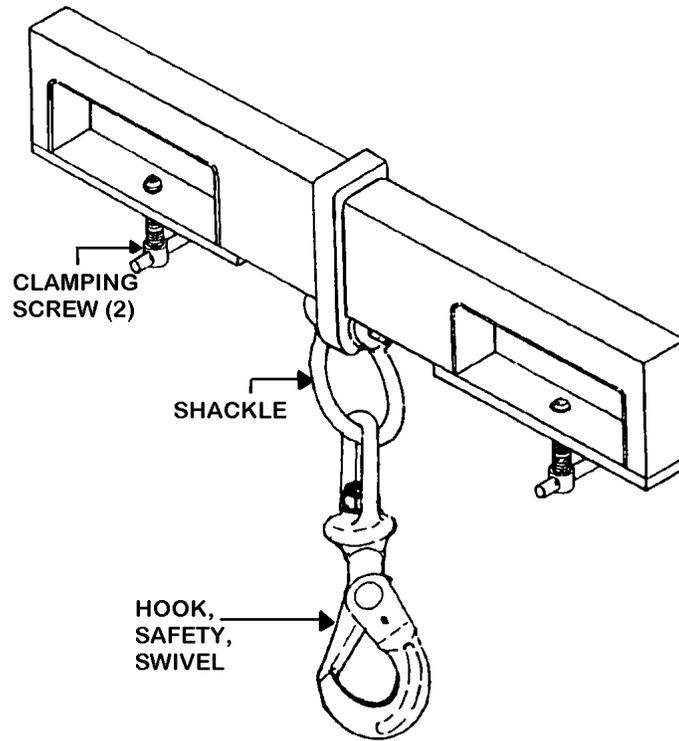


FIGURE 2-11. Mk 176 Mod 0 Hook Adapter

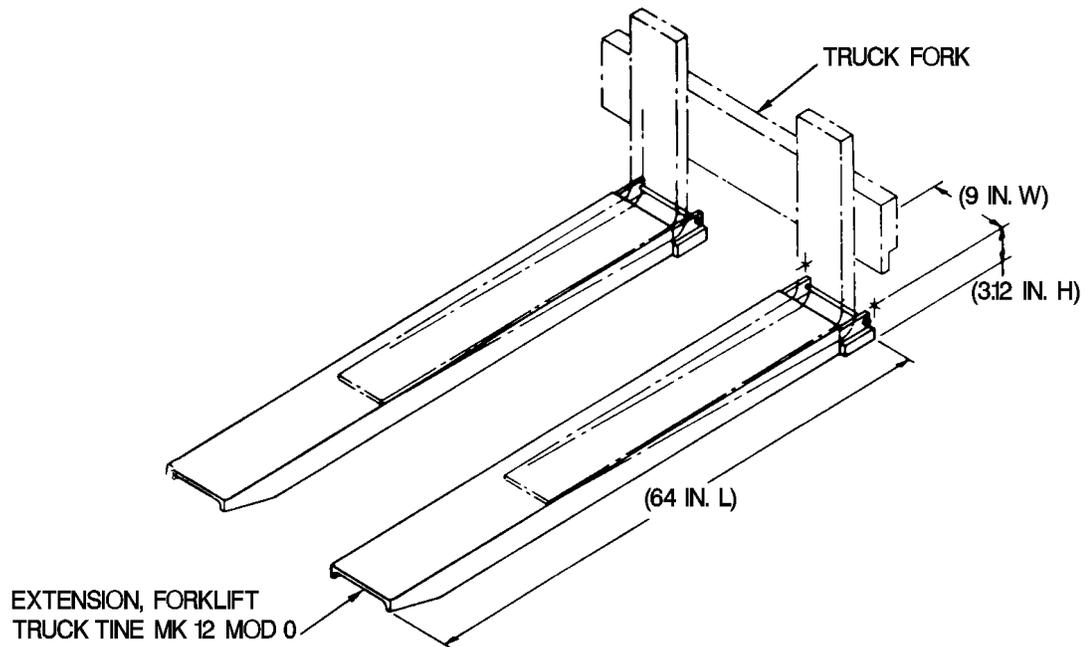


FIGURE 2-12. Mk 12 Mod 0 Forklift Truck Tine Extensions

2-3.5. **FORK STOPS.** Fork stops are used to restrict the forks from extending through and beyond a pallet or container and from damaging or tipping over adjacent containers. Typically, 4 x 4 inch lumber is used for all operations. [Figure 2-13](#) illustrates the fork stop positioned on the forks. The overall fork stop length should be the maximum fork separation (outside to outside) plus 8 inches (4-inch overhang on each side). When operational circumstances dictate otherwise, alternate size lumber with varying overhang lengths are considered acceptable provided the overhang will prevent the fork stops from falling off or interfering with the intended operation.

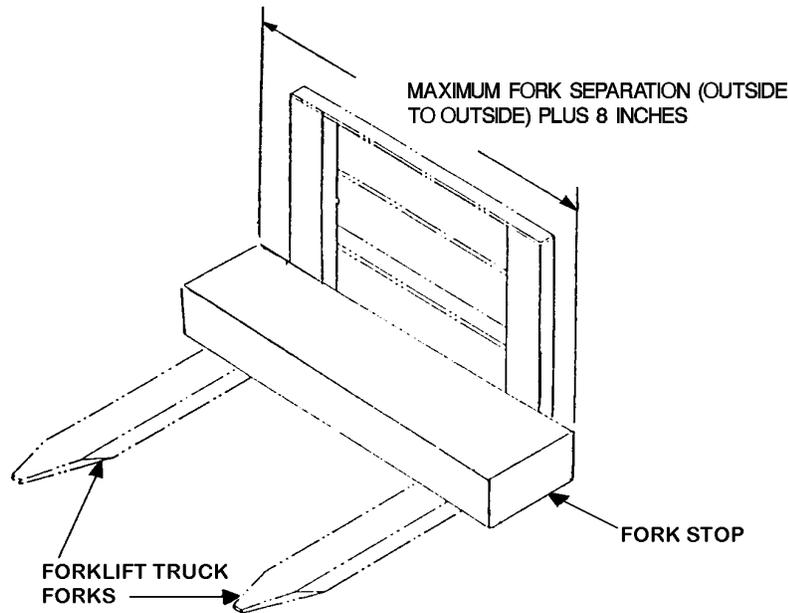


FIGURE 2-13. Fork Stop

## 2-4. STRADDLE CARRIERS

Straddle carriers are designed to raise, lower, support and transport a load that is positioned inside of the straddle carrier's wheel base. [Figure 2-14](#) illustrates a typical straddle carrier. The lifting system, drive wheels, and steering can be either mechanical or hydraulic. They have pneumatic tires.

## 2-5. PALLET TRUCKS

A pallet truck is designed to pick up and transport palletized loads. Unlike forklift trucks, pallet trucks are not counterbalanced and support the entire load within the wheelbase. Pallet trucks cannot stack. They are used primarily in confined areas where stacking is not required. Pallet trucks may be powered by an electric motor or moved manually. Various attachments are available for use with pallet trucks. The trucks are used in areas that have hard and smooth surfaces such as warehouses and magazines.

2-5.1. **ELECTRIC-POWERED RIDER-TYPE.** These pallet trucks require the operator to ride in a standing position. The truck has forks upon which the palletized load is supported. The truck has solid tires and uses a battery for a power source. [Figure 2-15](#) illustrates a typical electric-powered ride-type pallet truck.

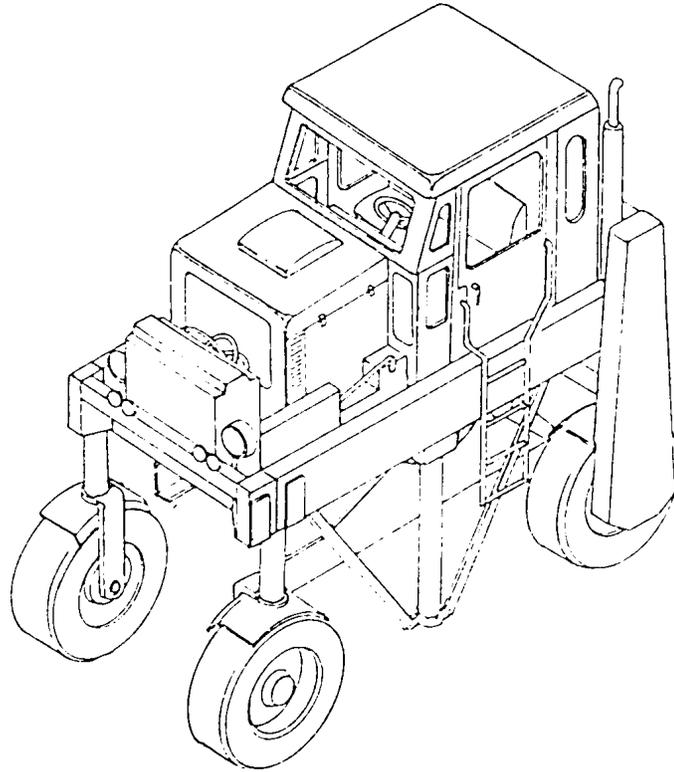


FIGURE 2-14. Straddle Carrier

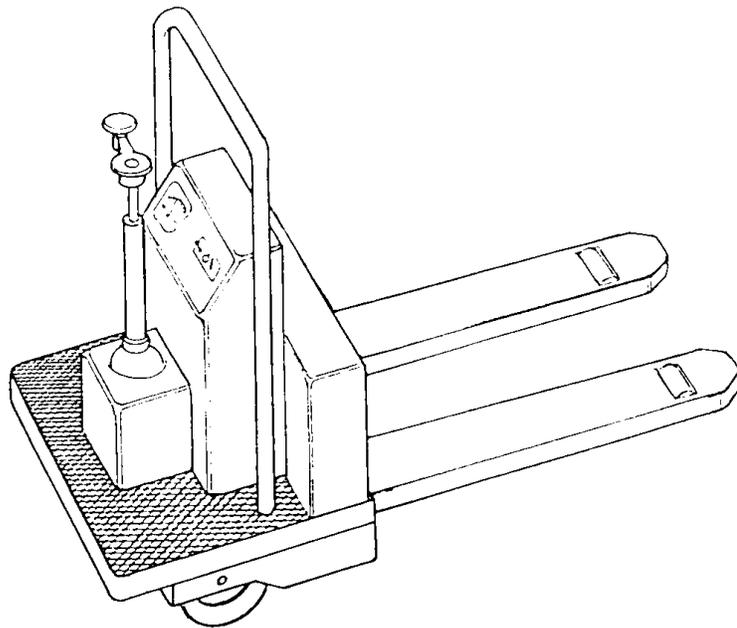


FIGURE 2-15. Electric-Powered Rider-Type Pallet Truck

2-5.2. **ELECTRIC-POWERED WALKIE-TYPE.** In order to use these pallet trucks, the operator must walk behind the truck while steering by hand. The truck has forks upon which the load is supported. The truck has solid tires and a battery for a power source. [Figure 2-16](#) illustrates a typical electric-powered walkie-type pallet truck.

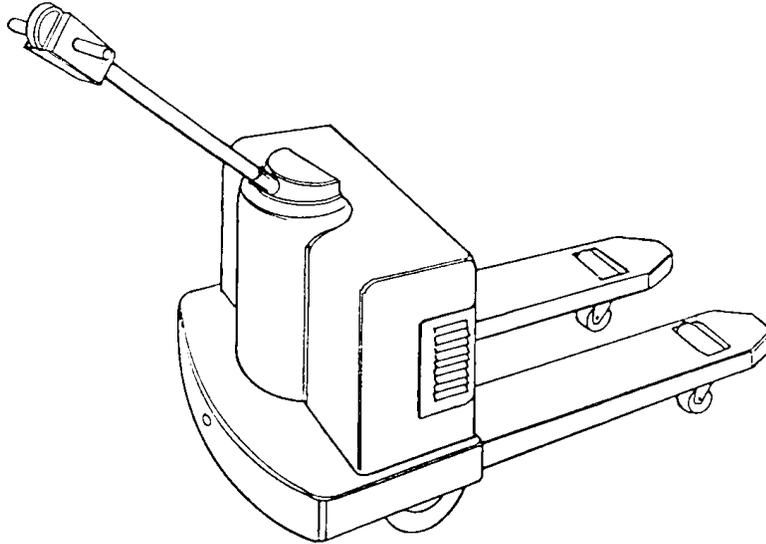


FIGURE 2-16. Electric-Powered Walkie-Type Pallet Truck

2-5.3. **MANUAL PALLET TRUCKS.** These pallet trucks have solid tires, require manual power for locomotion, are equipped with forks that are raised and lowered by a hydraulic or mechanical lift mechanism to support palletized loads, and steering is accomplished by means of a tow handle capable of 90° turns in either direction. [Figure 2-17](#) illustrates a typical manual pallet truck.

## 2-6. MK 156 MOD 0 ENDLIFT ADAPTER

Mk 156 Mod 0 Endlift Adapter is used as an interface between pallet trucks only and the end of weapon containers and canisters. The other end of the container or canister is maneuvered by another pallet truck with an Mk 156 Mod 0 Endlift Adapter or a Mk 45 Mod 2 Handlift Truck. Refer to NAVSEA OP 2173 for Mk 45 Mod 2 Handlift Truck description and applications. The endlift adapter consists of a hydraulic pump and cylinder assembly, lift angle, and an adjustable bumper. The lift angle is manually lowered and mated with the end fittings of various weapon containers and canisters. The bumper can be adjusted to accommodate varying pallet truck fork lengths. [Figure 2-18](#) illustrates the Mk 156 Mod 0 Endlift Adapter.

## 2-7. PLATFORM TRUCKS

Platform trucks, like pallet trucks, are designed to support the load on the wheelbase. However, instead of forks, loads are placed on a platform. Due to the lack of maneuverability, platform trucks are most efficient for short hauls. [Figures 2-19](#) and [2-20](#) illustrate a rider-type and walkie-type platform truck, respectively.

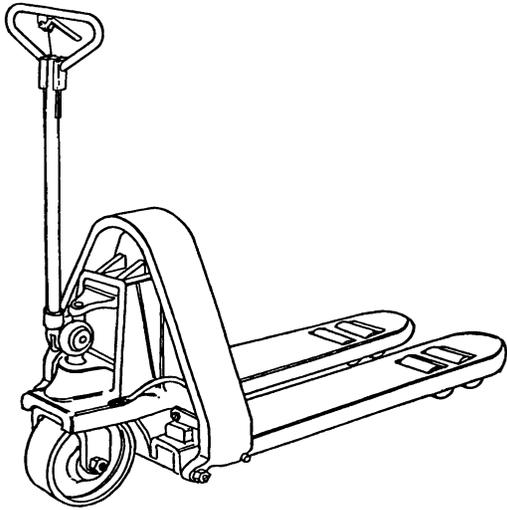


FIGURE 2-17. Manual Pallet Truck

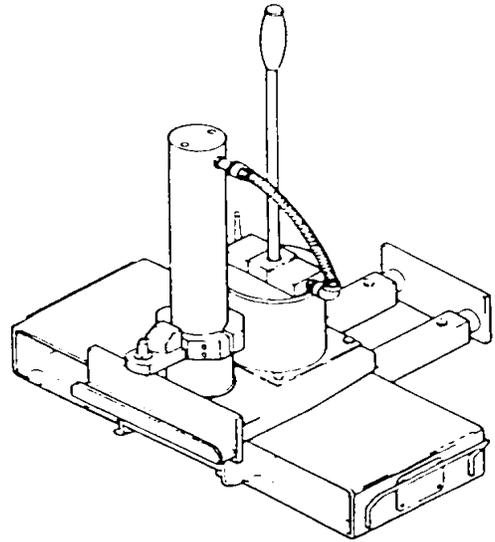


FIGURE 2-18. Mk 156 Mod 0 Endlift Adapter

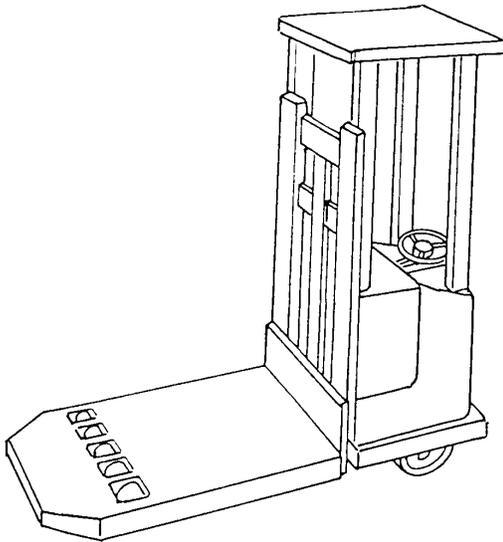


FIGURE 2-19. Rider-Type Platform Truck

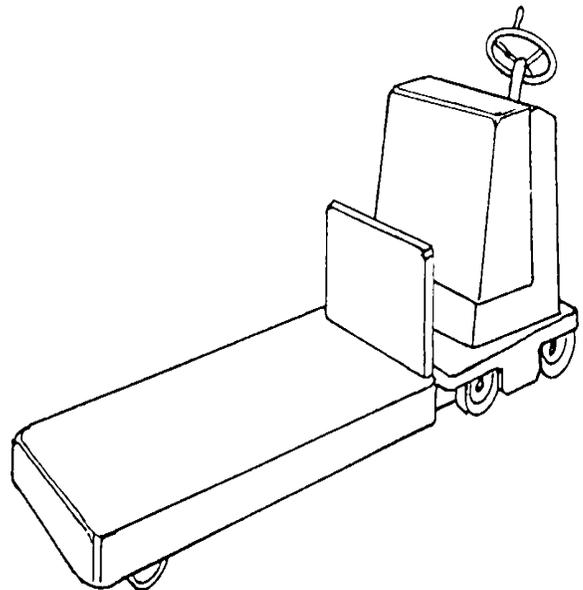


FIGURE 2-20. Walkie-Type Platform Truck

## 2-8. WAREHOUSE TRACTORS

Warehouse tractors are used for towing trailer loads. They are self-propelled vehicles with front wheel steering and rear wheel drive. They are used extensively for handling ammunition and explosives. The tractor is equipped with a coupler in the rear to provide a means of attaching trailers. Several couplers are available such as: single towing eyes for hook hitches, towing eyes for cross chains or hooks, a pin and clevis for trailer loop handles and automatic self-couplers. [Figure 2-21](#) provides an example of an electric-powered tractor with solid tires.

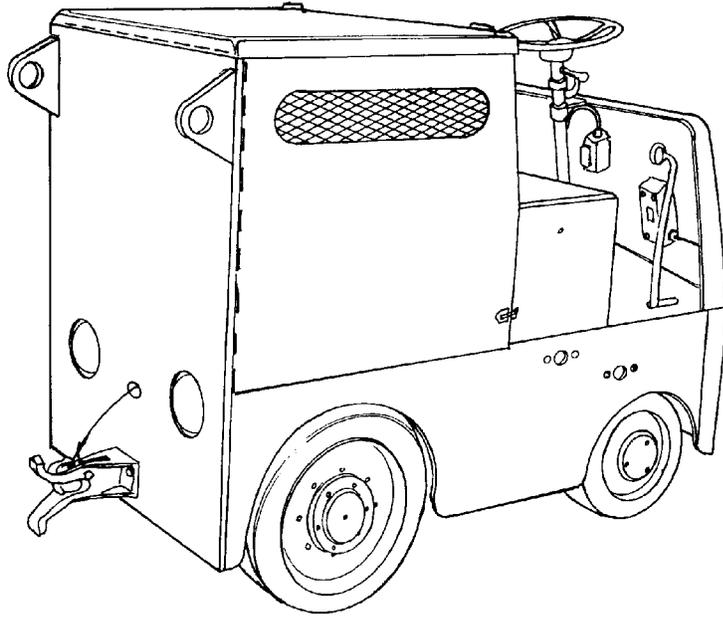


FIGURE 2-21. Warehouse Tractor

## CHAPTER 3

### MATERIALS HANDLING EQUIPMENT LICENSING

#### 3-1. GENERAL

This chapter lists the processes to train and license personnel as powered materials handling equipment (MHE) operators and to authorize personnel as local instructors for the purpose of issuing a license for powered MHE operators. The possession of a valid MHE license, in and of itself, does not authorize any individual to operate MHE to handle ammunition and explosives. Local qualification and certification requirements must be satisfied prior to any handling of ammunition and explosives.

#### 3-2. QUALIFICATIONS

The following minimum qualification requirements must be satisfied to license MHE operators.

3-2.1. **MEDICAL.** Personnel shall pass a periodic physical examination, as specified by Article 15-71B of the Naval Medical Command (NAVMED) P-117. Each MHE operator must possess a current Medical Examiner's Certificate, [figure 3-1](#), or have proof of a current medical examination documented on their license.

<b>MEDICAL EXAMINER'S CERTIFICATE</b>	
(I certify that I have examined)	
John Jackson	
_____ [Driver's name (Print)]	
in accordance with the Federal Motor Carrier Safety Regulations (49 CFR 391.41-391.49) and with knowledge of his duties, I find him qualified under the regulations.	
<input type="checkbox"/>	Qualified only when wearing corrective lenses.
<input type="checkbox"/>	Qualified only when wearing a hearing aid.
A completed examination form for this person is on file in my office at	
21 Oak St., Jamestown, AR 77771	
_____ [Address]	
2-2-88	M. McKenna
_____ [Date of examination]	_____ [Name of examining doctor (Print)]
<i>M. McKenna</i>	
_____ [Signature of examining doctor]	
<i>John Jackson</i>	
_____ [Signature of driver]	
42 Penn Rd., Monroe, AR 77772	
_____ [Address of driver]	

**SAMPLE**

FIGURE 3-1. Medical Examiner's Certificate

3-2.2. INITIAL OPERATOR TRAINING. 29 CFR 1910.178 requires that all MHE operators be trained to a competency level, not a defined number of hours, and allows flexibility in how training is accomplished. To satisfy this requirement, within the scope of this publication, a comprehensive MHE operator licensing course is contained in appendix C. The following requirements must be followed:

- a. The Commanding Officer (CO) or Officer-in-Charge (OIC) shall ensure that appendix C is employed to train MHE operators.
- b. The CO/OIC shall verify that positive administrative controls are in place that will keep MHE operators informed of changes to this publication that could affect the safety of MHE operations.

3-2.3. REFRESHER OPERATOR TRAINING. The CO/OIC is responsible for the content, duration and documentation of refresher training.

- a. MHE operators shall attend refresher training whenever their immediate supervisor or reporting senior makes a determination that such training is warranted.
- b. MHE operators who have not operated MHE within the past 12 months should be given refresher training prior to operating MHE to verify that job skills have not degenerated.

### 3-3. LICENSE

A license is required for all powered MHE operators. A license is not required for manually-powered MHE operators.

3-3.1. FORM OF 346. Form OF 346, U.S. Government Motor Vehicle Operator's Identification Card, figure 3-2, shall serve as the license, is valid for 2 years provided the medical examination certificate has not expired, and indicates:

- a. "Explosive Operator MHE."
- b. "Must Hold Current Medical Certificate" or "Documented Proof of Current Medical Examination on File."
- c. Limitations of the operator due to physical disabilities.
- d. The types of MHE (e.g., reaching and tiering, sideloader, etc.) and their capacity the license is valid for.

3-3.2. ISSUANCE. The CO/OIC shall designate in writing the responsible party authorized to issue licenses. This party is authorized to upgrade a valid MHE license to indicate other types and capacities of MHE based on the operator's satisfactory demonstration of practical operating skills.

3-3.3. REVOCATION. The license may be revoked in writing by the CO/OIC. The reasons for the revocation of and the process required to reissue the license shall be documented.

3-3.4. RENEWAL. The CO/OIC will verify that a process is documented to renew the license.

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OF 346 11/85 USOPM FPM Chapter 930		<b>U.S. Government Motor Vehicle Operator's Identification Card</b>		Card No.	Restrictions												
Name of Operator <i>(Not Transferable)</i>		Sex	Signature of Operator <i>(Not valid until signed)</i>														
			<table border="1"> <tr> <th colspan="3">QUALIFIED TO OPERATE</th> </tr> <tr> <td>Type Vehicle and/or Equipment</td> <td>Capacity</td> <td>Qualifying Official</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>			QUALIFIED TO OPERATE			Type Vehicle and/or Equipment	Capacity	Qualifying Official						
QUALIFIED TO OPERATE																	
Type Vehicle and/or Equipment	Capacity	Qualifying Official															
Date of Birth	Social Security No.	Name and Location of Issuing Unit															
Height	Weight	Hair Color	Eye Color	Signature and Title of Issuing Official													
Date Issued	Date Expires	OTHER RECORDS <i>(Optional)</i>															
The holder of this card is qualified to operate U.S. Government vehicles and/or equipment specified, subject to the restrictions set forth on the other half of this card. Card must be carried at all times when operating Government vehicles.					<table border="1"> <tr> <td align="center">EXPLOSIVE OPERATOR MHE</td> </tr> <tr> <td align="center"><b>MUST HOLD CURRENT MEDICAL CERTIFICATE</b></td> </tr> <tr> <td>NSN 7540-00-634-3999</td> </tr> <tr> <td align="right">50346-101</td> </tr> </table>	EXPLOSIVE OPERATOR MHE	<b>MUST HOLD CURRENT MEDICAL CERTIFICATE</b>	NSN 7540-00-634-3999	50346-101								
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NSN 7540-00-634-3999																	
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**SAMPLE**

FIGURE 3-2. U.S. Government Motor Vehicle Operator's Identification Card

**3-4. INSTRUCTOR TRAINING**

Local activity instructors shall be authorized in writing by the CO/OIC to provide MHE operator training. Authorization shall address the following qualifications:

- a. Completion of a course providing training to become proficient as an instructor. Chief of Naval Education and Training (CNET) course A-012-0023, Shipboard Instructor, meets this requirement. The CO/OIC may accept other equivalent training or prior instructor experience as meeting this requirement.
- b. Possession of the appropriate MHE operators license. The requirement to pass the medical examination, as stated in [paragraph 3-2.1](#), is waived if the instructor only operates MHE with inert loads for the sole purpose of conducting practical demonstrations for the students.

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## CHAPTER 4

### OPERATIONAL SAFETY REGULATIONS

#### 4-1. GENERAL

Materials handling equipment (MHE) is approved for use based on design parameters that allow for the safe and efficient handling of ammunition and explosives in specific operational areas. Careless or improper operation of MHE may result in personnel injury or property damage even if the approved MHE is used. Therefore, it is imperative that all safety precautions and regulations pertaining to the operation of MHE detailed in this chapter are applied and strictly enforced.

#### 4-2. GENERAL SAFETY REGULATIONS

a. Operators shall perform a daily pre-operational and post-operational safety inspection, as described in [paragraph 6-5](#), to ensure the MHE is operating properly. If any MHE is found to be defective, unsafe, or not meeting the safety and operating requirements of this publication, it shall be removed from service until the problem has been properly corrected in accordance with local procedures.

b. All MHE attachments shall be inspected prior to use using applicable maintenance requirement cards (MRC's), properly installed and secured to the MHE in accordance with local procedures.

c. Operators shall not be required to fix or adjust the MHE. However, this rule may be modified at installations where no repairman is employed, and an operator known to have competence to make minor repairs or adjustments is available. In making repairs, the MHE must be made inoperative by removing ignition keys, disconnecting the battery cable (on electrically-powered MHE), or by activating the travel control disconnect device while adjustments or repairs are being performed.

d. MHE shall be kept clean at all times. Special emphasis shall be placed on the removal of rust at load bearing (interface) areas. Rust on these areas and other cosmetic deficiencies, such as chipped or missing paint, shall be corrected as soon as the mission requirements allow and not later than the MHE's next scheduled maintenance interval.

e. In the event that the material being handled is dropped, damaged, or begins to leak, cease all operations, notify personnel in the area, and begin emergency cleanup/containment in accordance with local procedures. Operations shall not resume until approval is granted by the Commanding Officer/Officer-in-Charge (CO/OIC).

f. All MHE shall be secured whenever an emergency or mishap occurs while operating the MHE afloat or ashore, or whenever an emergency arises afloat.

## NAVSEA SW023-AH-WHM-010 SECOND REVISION

g. It is the responsibility of all personnel operating MHE to be aware of unsafe conditions. All unsafe conditions or materials must be reported. Operators must warn others whom they believe to be in danger of known safety hazards or who fail to observe safety precautions. Supervisors shall be made aware of any injury at the workplace.

h. Never subject the MHE to unnecessary water from rain, puddles, snow, washing or other water sources.

i. Spinner knobs are not permitted on MHE, except as noted in [paragraph 2-2.2](#).

j. When operating dual-fueled MHE, the gasoline level in the liquid fuel tank shall be checked daily. The MHE shall not be operated unless the gasoline fuel tank is at least  $\frac{1}{4}$  full.

### 4-3. PERSONNEL SAFETY

a. During handling operations, MHE operators shall wear all necessary personal protective equipment, such as non-metallic safety helmets, safety shoes, eye and ear protection, etc., as specified by local instructions.

b. Personnel shall not stand on or pass under the elevated portion of any MHE, whether the MHE is loaded or empty.

c. Operators shall make sure that there is sufficient headroom to operate the MHE under beams, lights, pipes, sprinkler systems and all overhead installations.

d. Operators shall keep well inside the operating compartment, making sure that feet and arms are inside the running lines of the MHE. Do not put arms or legs between the uprights of a mast.

e. Operators who have completed their prior to use daily safety inspections shall ensure that their hands are not wet or greasy prior to operating MHE.

f. Stunt driving and horseplay are prohibited. Do not spin wheels or race an engine. Never permit riders on MHE or load.

g. If the MHE is equipped with safety belts, they may not be removed, they shall be maintained, and they shall be worn for all operations with the exception of shipboard and pierside operations, which shall be at the discretion of the CO/OIC following an operational assessment.

h. Never leave the driver's seat while the MHE is in motion or when the forks are elevated above the ground/deck.

### 4-4. SAFETY DEVICES

Several kinds of safety devices, depending on the MHE type, are provided to ensure its safe and efficient operation.

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- a. Overhead Guards. [29 CFR 1910.178](#) requires the use of an overhead guard to protect operators from falling objects. MHE, so equipped, may have the overhead guard removed provided the CO/OIC authorizes, in writing, that the provisions of [29 CFR 1910.178](#) are met. A copy of this authorization shall be maintained in the MHE history file.
- b. Batteries. Some explosion-proof batteries contain pressurized air or carbon dioxide which is circulated in the confines of the battery box to dilute and dissipate hydrogen gas generated by the battery. These batteries shall not be operated when they fail to comply with the manufacturer's specifications for gas pressures and gas flows. Carbon dioxide purged batteries are being replaced by free ventilation batteries with specially designed cells and porous composition-type tops that emit gas to the outside, but prevent gas or air infiltration.
- c. Static Discharge Devices. Type EX MHE shall have at least two tires and wheels constructed of electrically-conductive material. Type EE MHE shall have at least two tires and wheels constructed of electrically-conductive material or some other equivalent static discharge device, such as two electrically conductive ground straps. The use of electrically-conductive ground straps, in lieu of conductive tires, is not permitted on EX rated MHE. Conductive tires are factory marked "SC" or Static Conductive, and may also have a Underwriters Laboratories (UL) label. Pallet trucks marked "HS" must have static conductive tires, or two electrically-conductive ground straps.
- d. Load Backrest Extension. [29 CFR 1910.178](#) requires the use of a load backrest extension whenever necessary to minimize the possibility of the load or part of it from falling rearward. MHE, so equipped, may have the load backrest extension removed provided the CO/OIC authorizes, in writing, that the provisions of [29 CFR 1910.178](#) are met. A copy of this authorization shall be maintained in the MHE history file.
- e. Deadman Brake System. All manual pallet trucks afloat shall be fitted with a deadman brake system that will immobilize the pallet truck in the absence or incapacitation of the operator.
- f. Travel Control Disconnect Device.
- (1) All electrically-powered MHE shall be equipped with a device that disconnects the travel circuit automatically when the operator leaves the operating position. A deadman type device meets this requirement.
  - (2) Internal combustion-powered MHE are not required to be equipped with travel control disconnect devices. However, if originally equipped with a deadman-type or travel control disconnect device, it shall be maintained and operable.
- g. Approved Devices. Only special protective devices approved by [Naval Surface Warfare Center, Indian Head Division Detachment Earle, Naval PHST Center](#) (Code 71) shall be used with the MHE. All attachments, such as cabs, windshields, and canopies, which have not been approved, shall be removed from the MHE. Weather protection attachments shall be authorized by the CO/OIC.

## 4-5. HANDLING SAFETY

4-5.1. **SAFE WORKING LOADS.** The majority of forklift trucks are rated at a 24-inch load center to full lift height. Consult the manufacturer's data plate for the actual standard load center. All loads shall be placed against the fork heel or fork stops (if used).

4-5.1.1. **Non-Standard Load Centers.** Loads with load centers greater than the typical 24 inch load center may be encountered. Greater load centers are allowable, subject to the weight limitations provided on the manufacturer's data plate. The values given in [table 4-1](#) are examples for level floor shorebased or steady sea-state operations only. The maximum weights listed in this table are equal to or less than the manufacturer's rating. Do not carry non-standard loads up and down steep inclines or in rough sea conditions. If the load center of the item to be carried falls between the load centers stated in [table 4-1](#), use the next highest load center to determine the maximum weight that can be safely carried. For example, if an item with a 32-inch load center is to be carried on a 4,000-pound safe working load (SWL) counterbalanced forklift truck, the maximum allowable weight of that item is determined by looking up the maximum allowable weight for a 36-inch load center item. In this case, the maximum allowable weight that can be safely carried is 2,667 pounds.

4-5.2. **GENERAL SAFETY PRECAUTIONS.** The following general safety precautions must be observed during all handling operations:

- a. Check the load before fully lifting the forks or moving the MHE. Handle only stable or safely arranged and secured loads.
- b. Each of the adjustable forks should always be spaced an equal distance from the centerline of the MHE.
- c. Do not exceed the SWL of the MHE, which is typically at a 24-inch load center to full lift height. Counter-weighting of MHE to increase lifting capacity is prohibited. If the SWL of the MHE is exceeded, it shall be immediately removed from service. Corrective action to return the MHE to service appears in [chapter 6](#). Use the right MHE for the job as specified in local operating procedures.
- d. Never lift more than one pallet or container unless it is strapped together as a unit load and is within the rated capacity of the MHE.
- e. Never lift loosely stacked loads that extends above fork backrest.
- f. Approved types of personnel baskets installed on MHE shall not be used for handling ammunition and explosives.
- g. Interface between the load and MHE shall be by fork pockets, twist locks, pallets, or similar captured means that will prevent the load from toppling.

Table 4-1. Examples of Non-Standard Load Centers

TYPICAL NON-STANDARD LOAD CENTERS		
Truck Safe Working Load (Pounds)	Load Center (inches)	Maximum Weight (pounds)
4,000	24 (rated)	4,000
	30	3,200
	36	2,667
	42	2,286
	48*	2,000
4,500	24 (rated)	4,500
	30	3,600
	36	3,000
	42	2,571
	48*	2,250
6,000	24 (rated)	6,000
	30	4,800
	36	4,000
	42	3,429
	48*	3,000
8,000	24 (rated)	8,000
	30	6,400
	36	5,333
	42	4,571
	48*	4,000
10,000	24 (rated)	10,000
	30	8,000
	36	6,667
	42	5,714
	48*	5,000
15,000	24 (rated)	15,000
	30	12,000
	36	10,000
	42	8,571
	48*	7,500
20,000	24 (rated)	20,000
	30	16,000
	36	13,333
	42	11,429
	48*	10,000

\*Install the Mk 12 Mod 0 Forklift Tine Extensions to achieve the 48-inch non-standard load center.

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- h. For optimum stability, forks should be adjusted to the maximum width the load will accept.
- i. Insert forks into fork pockets and pallets with care to avoid damage to adjacent loads.
- j. Use approved fork stops to prevent forks from protruding beyond the load and damaging neighboring loads. The use of fork stops can exceed the load center for the SWL of the forklift truck. For guidance, refer to [paragraph 4-5.1.1](#).
- k. Place the load as close to the mast as possible, then slowly raise the load slightly, and carefully tilt mast backward to stabilize the load.
  - l. Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with forks elevated shall be prohibited except to lift a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. Level the load prior to deposit on a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.
- m. Forks can be placed partially under loads for lifting, side shifting and placement, or through the corner of a pallet, provided the following conditions are met:
  - (1) The deck or base surface must be smooth and without obstructions.
  - (2) No metal-to-metal contact is permissible between the pallet and the deck.
  - (3) The forks must be sufficiently beneath the pallet to prevent instability.
  - (4) The load must not exceed the SWL at the rated load center of the forklift truck.
  - (5) The load must be resting on a stable surface. Partial engagement is not permissible when loads are hanging over a ledge or partially supported by a base tier.
  - (6) Partial engagement must only be used to move loads 1 or 2 inches in a given direction and not as the primary method of positioning.
  - (7) Loads will not be bumped in order to be repositioned.

**4-5.3. SAFETY PRECAUTIONS DURING MOVEMENTS.** For vessels afloat, NAVSEA maintains ship design specifications for maximum deck and ramp loads permitted with MHE. For activities ashore, the appropriate local operating procedures shall indicate the proper MHE for the operation. Prior to any movement operation, the following safety precautions must be followed:

- a. Check floors, decks, dockplates, ramps, etc. for breaks, cracks, or other indications of structural weaknesses. Whenever doubts arise regarding the load capacity or integrity of the operational surfaces, the MHE operator shall cease operations and report the discrepancy in accordance with local procedures.

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- b. Prior to any MHE operation, make sure trailers and railcars are properly chocked. Railcars on piers do not require chocking.
- c. Keep one hand on the steering wheel at all times. MHE will not automatically return to straight forward or reverse travel direction.
- d. Observe all traffic and fire regulations, including authorized speed limits. Yield right-of-way to ambulances, fire trucks or other vehicles in emergency situations. Park or store MHE in authorized areas only.
- e. Under all travel conditions, MHE shall be operated at speeds that will allow it to stop in a safe manner.
- f. Keep a clear view in the direction of travel.
- g. Travel with the load as close to floor/deck as practical. Under normal traveling conditions, the forks of loaded or unloaded MHE should be approximately 4 to 6 inches above the ground/floor. The MHE must not be in traveling motion while the load is being raised or lowered except for final positioning.
- h. Do not pass vehicles traveling in the same direction at intersections, blind spots or at other dangerous locations.
- i. Do not travel two MHE abreast unless approved by the CO/OIC.
- j. When following a vehicle, maintain a minimum distance of three MHE lengths between the vehicle in front.
- k. Make all starts, stops, turns, or directional reversals in a smooth manner so as not to shift the load or overturn the MHE.
- l. Operators shall maintain a safe distance from the edge of elevated docks, ramps, platforms, freight cars and safety nets. Operators shall be aware of the “tail swing” motion on rear-steering MHE to avoid driving off the edge of ramps and platforms.
- m. Do not drive MHE onto any elevator unless specifically authorized to do so by local written procedures.
- n. Slow down when approaching danger points such as downgrades, curves, narrow travel areas, wet or oiled floors, wet or slippery railroad tracks, and rough travel surfaces. Do not jam on brakes.
- o. Ascend or descend grades slowly. On all grades, the forks must be tilted back and raised only as far as necessary to clear the floor/deck or road surface. Drive MHE on ramps or inclines with the forks always uphill. Do not turn on an incline.
- p. Do not travel with the load in the side shifted position.

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q. Sound horn at places such as cross aisles, intersections, congested areas and other locations where vision is obstructed. Also, sound the horn before proceeding around corners or into elevators when the view is obstructed. Operators must sound horn before moving rearward. Stop and sound horn at building exits and entrances.

r. Do not attempt to back up when rear wheels are turned 90 degrees.

s. Do not ride or slip the clutch.

t. Do not use reverse control plugging for slowing down or stopping unless recommended by the manufacturer.

u. MHE shall be completely disengaged from the load when MHE is not being operated.

v. Do not attempt to enter a building through partially opened doors. The doors shall be fully opened and secured before proceeding.

w. MHE shall not be used for opening or closing railcar door, magazine doors or to disassemble fastened dunnage.

x. Cross railroad tracks diagonally whenever possible. Do not park closer than 8 feet from the center of the railroad tracks.

y. Before driving over a dockboard or bridgeplate, be sure it is properly secured from lateral movement. Drive carefully and slowly across dockboards or bridgeplates.

z. Do not run over loose objects, bumps or potholes on the running surface.

aa. Never tow or push other MHE, vehicles or freight cars.

bb. When using a warehouse tractor, never exceed its rated towing capacity. The maximum number of trailers permitted in a trailer train shall be determined by the local CO/OIC, except for the following:

(1) Three is the maximum number of loaded trailers permitted to towed when ascending or descending ramps.

(2) Never tow more than four bomb and/or torpedo trailers in a train.

cc. All warehouse tractor operators must comply with the following regulations:

(1) Do not weave or whip train.

(2) Allow sufficient time to get into position to make turns and allow for proper clearance of last trailer.

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(3) The height of the load on the trailers shall not obstruct the rear view of the operator nor create the possibility of material falling on the operator.

(4) When a permanent passenger seat is provided, one passenger may be transported. No person shall be allowed to occupy a temporary seat or ride any part of the tractor or trailer. No person shall be permitted to ride the trailer train.

dd. Never drive faster than a spotter can walk.

ee. Spotter requirements are as follows:

(1) To assist in all MHE requirements, whenever possible.

(2) To ensure that the forks are extended at least  $2/3$  of the length of the forks into the load being lifted.

(3) Whenever engaging or disengaging a load, unless a mechanical method is employed to ensure proper load location.

(4) Whenever the operator's forward view is obstructed and driving in reverse is not practical, and when moving long loads, such as missile and torpedo containers.

(5) Whenever operating a straddle carrier.

(6) Must position themselves such that they have a clear view of the operator; a clear view of the load being handled and any obstructions to be avoided; and an unobstructed path to exit the area in case the load shifts, falls or other emergencies.

ff. When the temperature of any part of the MHE exceeds its normal operating temperature, the MHE shall be removed from service.

### **4-6. SAFETY DURING REFUELING.**

The following safety precautions apply during the refueling of MHE:

4-6.1. LOCATION. The following areas are authorized for refueling:

4-6.1.1. Afloat. MHE shall be refueled in CO/OIC designated areas only and in accordance with local procedures.

4-6.1.2. Ashore. MHE shall be refueled in accordance with [NAVSEA OP 5](#) requirements for gas-powered vehicles.

4-6.2. GENERAL SAFETY REGULATIONS. The followings are general regulations associated with refueling MHE:

## NAVSEA SW023-AH-WHM-010 SECOND REVISION

- a. Fueled containers shall not be dropped, thrown, rolled, dragged or overfilled.
- b. Only trained and designated personnel shall refill or exchange fueled containers.
- c. Refueling shall be accomplished from approved dispensing pumps only.
- d. Emergency refueling shall be from approved safety cans only.

4-6.2.1. CNS/LPS Type MHE Fueled Containers. The fueled containers shall be examined before refilling for the following defects or damage that would weaken the material structure. Such conditions would render it unsafe for use, shall be removed from service, and, if practical, shall be repaired by qualified personnel before using the container.

- a. Dents, scrapes and gouges of the pressure vessel.
- b. Damage to the various valves and liquid level gauge.
- c. Debris in the relief valve.
- d. Damage to or loss of the relief valve cap.
- e. Indication of leakage at the valves or threaded connections.
- f. Deterioration, damage or loss of flexible seals in the filling or servicing connections.

4-6.2.2. CNS/LPS Type MHE Refueling Requirements. The following refueling requirements specifically apply for CNS and LPS type MHE:

- a. A cylinder shall not be charged in excess of its maximum allowable working pressure at normal operating temperature.
- b. Only trained and designated personnel shall refill the fuel supply container, verify the working pressure and ensure that the containers are retested according to the required schedule.

### **4-7. BATTERY CHARGING, TESTING AND MAINTENANCE.**

4-7.1. **ASHORE.** The following requirements apply for battery charging, testing and maintenance ashore:

- a. At least one specific area shall be designated by the CO/OIC for the charging, testing, and routine maintenance of lead-acid batteries in powered MHE.
- b. Battery charging, testing, and routine maintenance shall only be performed in areas designated specifically for that purpose.

c. All battery charging, testing and maintenance areas shall comply with [OPNAVINST 5100.23](#) and [29 CFR 1910.132](#).

d. When battery charging, testing and maintenance facilities are in proximity to ammunition and explosives operations, the provisions of [NAVSEA OP 5](#) shall be met and operating procedures shall be posted.

e. [NAVSEA OP 5](#) addresses other issues concerning battery charging stations ashore.

4-7.2. AFLOAT. The following requirements apply for battery charging, testing and maintenance afloat:

a. At least one specific area shall be designated by the CO/OIC for the charging, testing, and routine maintenance of lead-acid batteries in powered MHE.

b. Battery charging, testing, and routine maintenance shall only be performed in areas designated specifically for that purpose.

c. Battery charging, testing, and routine maintenance shall not be performed in magazines or other spaces where ammunition and explosives are present.

d. [NAVSEA OP 4](#) addresses other issues concerning battery charging stations afloat.

4-7.2.1. General Safety Precautions Afloat. The following are general safety precautions that shall be applied prior to and during battery charging operations.

**WARNING**

Severe burns can be caused by the sulfuric acid contained in batteries. In case of contact, thoroughly flush affected area with clean water. Obtain medical attention immediately.

a. In the event that electrolyte should spill, cease all operations, notify personnel in the area, and begin emergency clean-up/containment in accordance with local procedures.

b. Fire protection apparatus shall be provided.

c. Charging apparatus shall be protected from physical damage by MHE.

d. Adequate ventilation must be provided for the dispersal of fumes from gassing batteries.

e. An emergency shower/eyewash fountain will be available, as required by [OPNAVINST 5100.19](#).

f. Safe and effective devices, such as a tilter siphon or pump, shall be used to handle electrolyte.

g. Use of personal protective equipment shall be based on the industrial hygiene survey, as stated in [OPNAVINST 5100.19](#).

h. Ensure all battery vent plugs are present and firmly in place. Vent plugs shall only be removed when adding water or taking hydrometer and temperature readings. Ensure vent caps are functioning by washing them periodically with water and blowing through the bottom with air at a low pressure.

i. Open battery's compartment cover to increase ventilation during charging.

j. MHE shall be properly positioned on a level surface and brakes applied before batteries are charged or changed.

#### 4-7.2.2. Battery Installation and Removal Afloat.

a. Ensure the battery compartment is clean and free of any water, oil, dirt and other foreign matter.

b. Ensure the battery compartment has drainage holes located in the floor.

c. A conveyor, overhead hoist or equivalent handling equipment (e.g., beam, strongback, etc.) shall be used for handling batteries. The Mk 141 Mod 0 Battery Sling, [figure 4-1](#), is one example of an approved piece of handling equipment designed for battery loading and removal. This sling may be used in conjunction with a beam or strongback to prevent the bending of the battery lifting lugs. The SWL for the Mk 141 Mod 0 Battery Sling is 3,000 pounds. When an authorized/approved battery lifting device is not available and fleet commitments dictate that a battery must be removed or replaced, an alternate lifting device may be used to lift the battery. This alternate device may be used only after interim approval has been granted by the [Naval PHST Center](#) (Code 71) and the following requirements are met:

(1) Cover the exposed lead cell connectors with an insulating material, such as plywood or thick rubber.

(2) The lifting device has two hooks which are electrically insulated from each other to prevent short circuits.

d. Remove the battery from stowage area and install into MHE.

e. Battery shall be properly positioned and secured in the MHE. Battery should be blocked, not wedged, to allow for 1/8-inch minimum clearance on all sides for easy removal from the battery compartment.

f. During stowage, a battery may lose some of its charge. Maintain battery in accordance with the battery manufacturer's instructions.

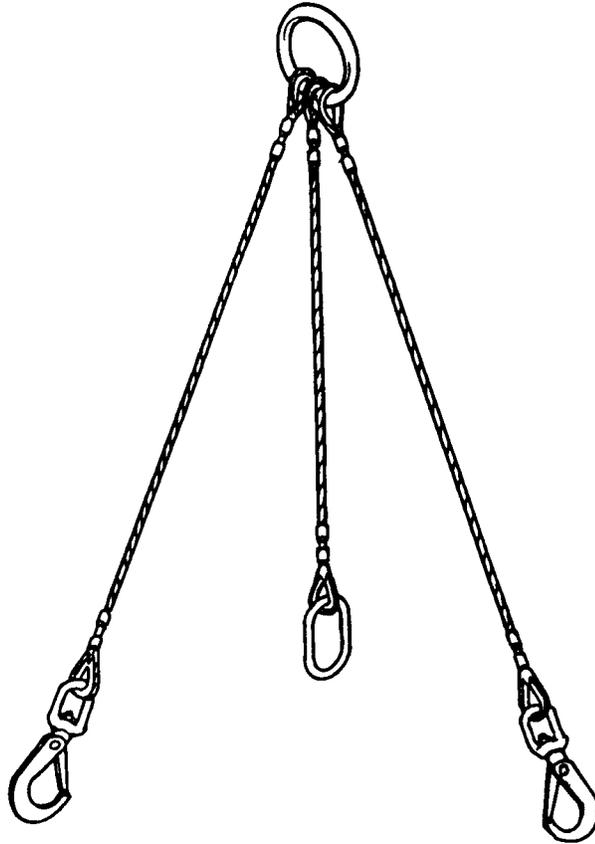


FIGURE 4-1. Mk 141 Mod 0 Battery Slingshot

g. Ensure all connections on the battery are clean and free of debris. When cleaning battery connections, verify the lead coating is not removed from terminals exposing copper.

h. Connect the battery to MHE. Ensure all the connections are tight. Due to vibration, handling and temperature change, all bolted connections will loosen during normal operation. All bolted connections should be inspected and tightened in accordance with applicable MRC.

i. Once the battery installation is completed, coat all bolted connections and terminals with grease (MIL-G-23827).

**4-7.3. FIRE SAFETY REGULATIONS.** Fire extinguishing equipment shall be installed and maintained in all battery charging areas in accordance with the local fire bill. Extinguishers installed on MHE can satisfy this requirement. The type of extinguisher required, location, training requirements for emergency use and other pertinent safety information afloat and ashore shall be contained in local procedures covering MHE operations. Table A-2-1, in the [National Fire Protection Association \(NFPA\) 10](#), contains guidance in selecting the type of extinguisher required for a specific fire hazard.

#### 4-8. INCIDENT AND MISHAP REPORTING

Any accident, incident or explosion mishap shall be reported in accordance with [OPNAVINST 5102.1](#), [OPNAVINST 8600.2](#) or OPNAVINST 5100.21, as appropriate. Found defects (e.g., holes in containers, leakage, etc.) regardless of cause or origin shall be immediately reported to the supervisor. Fires at shore activities shall be reported in accordance with [OPNAVINST 11320.25](#). Mishaps resulting from fires shall be reported in accordance with OPNAVINST 5100.21, as appropriate.

## CHAPTER 5

### REGULATIONS FOR USING MATERIALS HANDLING EQUIPMENT IN HAZARDOUS LOCATIONS

#### 5-1. GENERAL

Selection of the specific type of materials handling equipment (MHE) approved for an operating area is based on the hazardous classification in the area in which the MHE is being operated (e.g., possible presence of explosive vapors/dusts in the areas), the hazards of the materials being handled (e.g., palletized load of 5-inch projectiles), and the hazards associated with the MHE (e.g., carbon monoxide exhaust fumes or propane fuel tank leaks). The improper assessment of either hazard or the use of unapproved MHE may result in an incident.

#### 5-2. MHE APPROVED MATERIAL CATEGORIES AFLOAT AND ASHORE

5-2.1. FUEL AIR EXPLOSIVES/HYPERGOLICS (FAE/HYP). Conventional ordnance that contains a FAE or both ingredients of a hypergolic fuel system.

5-2.2. AMMUNITION AND EXPLOSIVES (A&E). All other conventional ordnance, ammunition, explosives, or explosive material/item/device/hazardous waste classified or being developed to be classified as a Hazard Class 1, Divisions 1 through 6 item.

#### 5-3. MHE APPROVED OPERATIONAL AREAS AFLOAT

[Table 5-1](#) identifies the approved MHE afloat for the specific materials to be handled in a given operational area.

5-3.1. BELOW DECK. All magazines and stowage compartments within the skin of the vessel. Stowage of containerized FAE/HYP ordnance shall be only in a certified magazine, as described in NAVSEA S9000-AB-GTP-010.

5-3.2. CLOSED LIGHTERS. YFN and modified YFN lighters.

5-3.3. TOP SIDE. All open decks, hangar decks, decks with forced air or flow through ventilation, and open lighters.

#### 5-4. MHE APPROVED OPERATIONAL AREAS ASHORE

The Commanding Officer/Officer-in-Charge (CO/OIC) is responsible for determining the hazardous classified environment of each operating area where MHE will be used, as specified in the National Fire Protection Association (NFPA) 70, Article 500. Due to the numerous types of floor and ramp conditions

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that may be encountered, the MHE approved for use in [tables 5-2](#) and [5-3](#) requires CO/OIC authorization as documented in the appropriate local operating procedures. If an activity desires to use MHE not identified in either [tables 5-2](#) or [5-3](#), they are permitted to do so provided a hazards analysis is performed and maintained, and the activity complies with the provisions of NFPA 505, [29 CFR 1910.178](#) and [OPNAVINST 5100.23](#).

### NOTE

The use of powered MHE is forbidden in areas where dust vapors are known to, or can reasonably be expected to, reach explosive limits during routine operations (i.e., mixing, bulk weighing, screening, etc.)

Certain types of MHE, as identified in chapter 2, require the installation of gas/vapor detection systems. For MHE not listed in [tables 5-2](#) and [5-3](#), refer to [29 CFR 1910.178](#). Dual-fueled forklift trucks, such as G/CN, GS/CNS, etc., shall only be used in areas authorized by the most restrictive designation.

5-4.1. **CLOSED.** Buildings, structures, magazines, internal rooms and bays, etc., that have restricted ventilation that could allow the formation of a hazardous environment.

5-4.2. **PARTIAL.** Railcars, motor vehicles, loading ramps, platforms, etc., that have relatively unrestricted ventilation but could allow the formation of a hazardous environment.

5-4.3. **OPEN.** Piers, wharves, areas or structures that may have a roof but has no walls that would not restrict ventilation nor allow the formation of a hazardous environment.

**Table 5-1. Approved MHE Afloat**

Material	Operational Area		
	Below Deck	Closed Lighters	Top Side
FAE/HYP	EX, HS	EX, HS	DS,DS/DC, EE, EX, H, HS
A&E	EE, EX, HS	DS/DC, EE, EX, HS	DS, DS/DC, EE, EX, H, HS

**Table 5-2. Approved MHE Ashore (Packaged)\***

Material	Operational Area		
	Closed	Partial	Open
FAE/HYP	DS/DC, EE, EX, H, HS	DS, DS/DC, EE, EX, H, HS	CNS, DS, DS/DC, EE, EX, GS, H, HS, LPS
A&E	DS/DC, EE, EX, H, HS	DS, DS/DC, EE, EX, H, HS	CNS, DS, DS/DC, EE, EX, GS, H, HS, LPS

\*This table is only valid when the explosive materials are prevented from contacting the ambient environment, i.e., containerized/palletized according to the applicable MIL-STD, all-up-rounds, raw materials in the original shipping container, or sealed component parts.

**Table 5-3. Approved MHE Ashore (Other)\***

Material	Operational Area		
	Closed	Partial	Open
FAE/HYP	EX, HS	EX, HS	EX, HS
A&E	EX, HS	EX, HS	EX, HS

\*This table is valid when the explosive materials may be exposed to the ambient environment as a part of normal operations.

**5-5. TEMPORARY PARKING**

a. Whenever the operator leaves the MHE, forks/booms shall be lowered to the floor/deck, controls shall be placed in the neutral position, parking brake shall be set and the ignition switch shall be turned off.

b. Whenever the operator leaves the MHE unattended (is out of sight of the MHE or more than 25 feet away from the MHE, as defined by ASME B56.1), forks/booms shall be lowered to the floor/deck, controls shall be placed in the neutral position, parking brake shall be set, the ignition switch shall be turned off, and the wheels chocked if the MHE is on an incline.

**5-6. STORAGE OF MHE IN APPROVED OPERATIONAL AREAS ASHORE.**

a. The MHE shall meet the requirements of [paragraph 5-5b](#), be positioned such that it does not block normal or emergency exits/access, the battery cable connector on electrically-powered MHE shall be disconnected, and the key shall be removed and stored in a controlled limited access area in accordance with local procedures.

b. Liquefied petroleum gas (LPS) and compressed natural gas (CNS) powered MHE shall not be parked near sources of heat, open flames, or similar sources of ignition. LPS type MHE shall not be stored near open pits, underground entrances, elevator shafts or other similar areas. The service valve of LPS or CNS fuel containers shall be closed whenever the MHE is parked overnight or stored indoors.

c. Only electric and manually powered MHE are authorized to be stored with ammunition and explosives in closed areas. The MHE shall be stored as far away from the ammunition and explosives as practical.

d. All types of MHE identified in [tables 5-2](#) and [5-3](#) are approved for storage with ammunition and explosives in partial and open areas. The MHE shall be stored as far away from the ammunition and explosives as practical.

**5-7. STOWAGE OF MHE IN SHIPBOARD MAGAZINES**

When ammunition and explosives are present, stowage of MHE types, approved in [table 5-1](#), is permitted under the following conditions:

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- a. MHE shall meet the requirements of [paragraph 5-5b](#).
- b. MHE shall be stowed in the fore and aft directions, whenever possible.
- c. The battery must be disconnected.

d. A minimum of four tiedowns (e.g., wire rope, chain, universal deck tiedown, etc.) shall be used to secure each MHE. Nylon webbing tiedown assemblies or other nylon-type tiedowns shall not be used to secure MHE. Tiedowns shall be crisscrossed such that the front left tiedown is secured to the deck near the rear left side of the MHE, and the rear left tiedown is secured to the deck near the front left side of the MHE. This process is the same for the right side tiedowns. Stanchion deck tracks are not authorized to tiedown MHE.

## CHAPTER 6

### MAINTENANCE, TEST AND INSPECTION PROGRAM

#### 6-1. GENERAL

Maintenance, tests and inspection are crucial elements involved in the safe operation of materials handling equipment (MHE). Adequate maintenance, tests and inspections will improve the overall condition of the MHE and lessen the possibility of accidents. The requirements of this chapter shall be observed by operators and maintenance personnel, as applicable, concerned with operating, servicing and repairing MHE.

6-1.1. MHE HISTORY FILE. A history file shall be initiated and maintained by the activity for each piece of MHE. This file shall include, as a minimum, all inspection, maintenance, repair, and testing documentation. If the MHE is transferred to another activity, the history file shall accompany the MHE. The history file shall be maintained throughout the MHE life cycle.

#### 6-2. MANUFACTURER WEIGHT TESTING

All new MHE is tested by the manufacturer prior to shipment, is labeled by the manufacturer “STRUCTURALLY TESTED 'DATE' BY 'MANUFACTURER OR FACILITY',” and need not be retested until 18 months from that date. An activity may mark the MHE with a test expiration date using the manufacturer's test date as the start of the testing cycle.

#### 6-3. GENERAL INSPECTION CRITERIA

MHE and attachments, referenced in [paragraph 2-3](#), shall be inspected, maintained, and tested periodically in accordance with instructions in manufacturer's technical manuals. Additional information may be obtained from Navy Ships Technical Manuals (NSTM), MHE maintenance manual (NAVSUP Publication 538) and Maintenance Material Management (3M) Systems as delineated by [OPNAVINST 4790.4](#).

#### 6-4. MAINTENANCE INDEX PAGES AND ASSOCIATED MAINTENANCE REQUIREMENT CARDS

Shipboard maintenance for MHE and attachments will be accomplished using the Navy's Planned Maintenance System (PMS), consisting of Maintenance Index Pages (MIP's) and associated Maintenance Requirements Cards (MRC's). Shore activities will use MIP's and MRC's, when available, or equivalent documentation.

MIP's provide information on maintenance intervals and identify the applicable MRC's. MRC's provide detailed descriptions of visual inspections, maintenance tasks and intervals, manpower and tooling requirements for routine and preventive maintenance to assure the MHE is operational. MRC's are

arranged sequentially by work area and system. MRC's do not include repairs. MRC's are used to supplement the technical documentation provided with the MHE. MIP's and MRC's can be obtained by contacting Commanding Officer, Fleet Technical Support Center Pacific (FTSCPAC), Code 401A, P.O. Box 85548, San Diego, CA 92186-5548.

## 6-5. PRE-OPERATIONAL AND POST-OPERATIONAL INSPECTIONS

### 6-5.1. POWERED MHE OPERATORS.

a. The first operator shall conduct a daily pre-operational safety inspection of the MHE, as described in [paragraph 6-5.4](#), by completing the "START" portion of the MHE Inspection Form ([figure 6-1](#)). If the MHE passes all required inspections and functional tests, the MHE Inspection Form shall be signed and dated by the operator and shall be attached to the MHE.

b. When operational circumstances requires more than one operator to use the MHE during the course of a shift or evolution, the subsequent operators shall review the completed "START" portion of the MHE Inspection Form. If the MHE is found acceptable, the original MHE Inspection Form shall remain with the MHE.

c. The last operator shall conduct a daily post-operational safety inspection of the MHE, as described in [paragraph 6-5.4](#), by completing the "FINISH" portion of the MHE Inspection Form. If no defects are noted, the MHE Inspection Form shall be maintained in accordance with local procedures.

d. All operators shall record all defects on the MHE Inspection Form, notify immediate supervisor of defects, and turn in the MHE for repairs in accordance with local procedures.

6-5.2. NON-POWERED MHE OPERATORS. Operators of non-powered MHE shall conduct inspections and functional tests in accordance with applicable MRC's (afloat) or manufacturer's technical manuals (ashore). Completion of the MHE Inspection Form is not required by the operator. If defects are found, notify immediate supervisor of defects and turn in the MHE for repairs in accordance with local procedures.

6-5.3. LOCAL PROCEDURAL REQUIREMENTS. As a minimum, all local procedures established shall stipulate the following:

a. A safety deficiency tag is placed on the MHE in a conspicuous location.

b. The MHE is removed from service until repairs are made.

c. The MHE Inspection Form is kept in the MHE history file only if defects are found and until repairs have been completed.

6-5.4. INSPECTION PROCEDURES (MHE INSPECTION FORM). Wherever applicable, the following steps delineate the pre-operational and post-operational inspections and functional tests:

#### NOTE

The following 25 pre-operational and post-operational sub-paragraphs coincide with the inspection steps found in the MHE Inspection Form ([figure 6-1](#)).

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**MHE INSPECTION FORM**

DATE

REGISTRATION No. (USN)

**POWERED MHE TO BE CHECKED DAILY BY OPERATOR**

NOTES

1. USE THIS FORM WHEN INSPECTING MHE BEFORE AND AFTER OPERATION. CHECK ( X ) IN APPROPRIATE COLUMNS TO INDICATE SATISFACTORY OR UNSATISFACTORY CONDITIONS.
2. NOT APPLICABLE INSPECTION PROCEDURES MAY BE OBLITERATED FOR THAT PARTICULAR MHE TYPE.
3. IF DEFECTS ARE FOUND, REMOVE MHE FROM SERVICE, NOTIFY IMMEDIATE SUPERVISOR AND MAINTAIN FORM IN HISTORY FILE UNTIL REPAIRS ARE MADE.
4. IF NO DEFECTS ARE FOUND:
  - (A) INITIAL OPERATOR: SIGN AND DATE FORM. ATTACH TO MHE.
  - (B) LAST OPERATOR: MAINTAIN FORM IN ACCORDANCE WITH LOCAL PROCEDURES.
5. THIS FORM IS NOT AVAILABLE IN THE SUPPLY SYSTEM. REPRODUCTION OF THIS FORM FROM THIS MANUAL IS AUTHORIZED.

SHIFT HR-METER Reading	
END	
START	
DIFF.	

		START		FINISH		
		SAT	UNSAT	SAT	UNSAT	
1	Tires and Rims					1
2	Engine Oil and Fluid Levels					2
3	Radiator Coolant Level					3
4	Battery					4
5	Fuel System					5
6	Unusual Engine Noises					6
7	Arcing of Contactors					7
8	Lights					8
9	Horn					9
10	Hoist					10
11	Tilt and Side Shift					11
12	Transmission/Clutch					12
13	Directional Controls					13
14	Brake System					14
15	Steering					15
16	Steer Axle Stops					16
17	Gauges/Meters					17
18	Fire Extinguisher					18
19	Seat Belts					19
20	Forks					20
21	Fork Positioning Locks and Stops					21
22	Overhead Guards					22
23	Ground Straps/Static Conductive Tires/Wheels					23
24	Structural Cracks/Broken Weldments					24
25	Valid Weight Test Certification Information					25

AREA

OPERATOR'S SIGNATURE

SEE REMARKS ON CONTINUATION SHEET (Number and remark same as inspection item to which it applies)

FIGURE 6-1. MHE Inspection Form

6-5.4.1. **Tires and Rims.** Inspect tires for excessive wear and damage. Remove foreign material from tire treads. Reject tires for illegible or missing markings or labels, as specified in [paragraph 4-5c](#), until the MHE is retested and locally remarked. When the local activity is remarking the tire, use the same nomenclature provided by the manufacturer. When the manufacturer's nomenclature is unknown, but the tires pass the required static discharge test of [paragraph 6-9.3](#), mark the tire "SC" (for static conductive). Reject pneumatic tires when the tire tread has worn down to the tread wear mark or if fabric is exposed through the sidewall. For suspect solid rubber tires, the calculations below may be used, whenever manufacturer's specifications are not available, to determine acceptable tire wear to maintain the capacity, shock absorption and safety factor designed in the tires:

- a. Using a new tire, subtract the inside diameter (I.D.) from the outside diameter (O.D.) and multiply by 30% (.30) to obtain the recommended tire wear (X).  $[(O.D. - I.D.) \times .30 = X]$
- b. Subtract the recommended tire wear (X) from the O.D. of a new tire to obtain the allowable worn tire diameter.  $[O.D. - X = \text{worn tire diameter}]$
- c. Measure the O.D. of the current tire. The tire shall be replaced if the O.D. measurement is less than the allowable calculated worn tire diameter.

Inspect the rims for dents, bends, and cracks.

6-5.4.2. **Engine Oil and Fluid Levels.** Check the engine oil, hydraulic, transmission and brake fluid levels. If oil/fluid levels are low, add oil/fluid to raise the level to the full mark

**CAUTION**

Do not check radiator coolant level when engine is hot.

6-5.4.3. **Radiator Coolant Level.** Check the radiator coolant level. If coolant is low, add coolant to raise the level to the full mark.

**CAUTION**

Do not attempt to charge a battery when the battery charge indicator window is yellow.

6-5.4.4. **Battery.** Check the condition of the battery or batteries. Ensure that the battery cables are not damaged or loose and that the connector lugs are clean and properly attached. For a maintenance free battery, check that the vent hole on the side of the battery is clear. In newer models, a green indicator in the battery charge indicator window indicates a properly charged battery, and a dark or black battery charge indicator window indicates that the battery needs charging. If the battery charge indicator window is yellow, have it checked by a qualified maintenance person. Do not attempt to charge a battery when the battery charge indicator window is yellow. Finally, check the battery terminals and cables for corrosion, exposed cables and loose connections. Ensure all battery hold downs are secured and in place.

6-5.4.5. Fuel System. Visually inspect the entire fuel system assembly for any leaks or any abnormal odors. Where accessible, inspect the fuel tank or gas cylinder for leakage, denting, bulging or evidence of rough usage.

6-5.4.6. Unusual Engine Noises. Start the engine. Should any unusual noises be noted with the engine running, turn off the MHE and discontinue the check.

6-5.4.7. Arcing of Contactors. Visually inspect to ensure that there is no arcing (sparking) of the contactors in electrical connections, such as limit or light switches.

6-5.4.8. Lights. Check that the headlights and brake lights are working. When the brake pedal is depressed, the brake lights should be visible. All lights must operate properly for night work.

6-5.4.9. Horn. Depress the horn push button to verify that the horn is operating properly.

6-5.4.10. Hoist. Raise and lower hoist to ensure the hoist, assembly and controls operate smoothly.

6-5.4.11. Tilt and Side Shift. Tilt forward and backward to ensure the tilt operates smoothly. Operate side shift to move the carriage to the left and then to the right directions. Operation should be immediate and smooth. Any additional accessory controls installed on the MHE shall be verified for proper operation in accordance with the manufacturer's recommendations.

6-5.4.12. Transmission/Clutch. Verify that the transmission/clutch operates smoothly with no unusual noises. Where applicable, test the neutral start switch on most fuel-powered MHE. Ensure that the parking brake is set and that no one is in front of or behind the MHE. This switch is incorporated into the shift mechanism and is designed to prevent engine start-up except when the shifting gear is in neutral. A periodic check can be made by attempting to start the engine with the directional control lever in either the forward or reverse position. If the engine starts, the MHE shall be rejected.

6-5.4.13. Directional Controls. Shift directional controls into forward, neutral and reverse directions to ensure the MHE operates properly and smoothly. [Figure 6-2](#) shows a typical example of the directional controls.

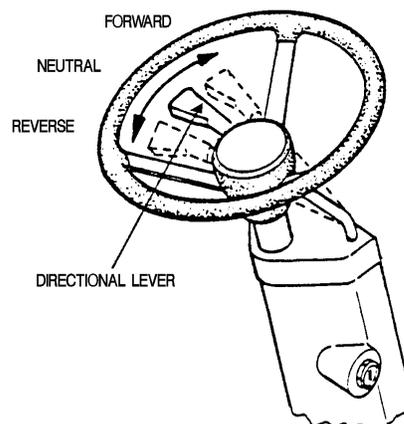


FIGURE 6-2. Directional Controls (Example)

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6-5.4.14. **Brake System.** Check that the parking brake can be firmly set. With the brake engaged, attempt to drive the MHE forward by applying a moderate amount of power to the MHE and verify that the MHE does not move. Visually inspect that no fluid is leaking from the brake system. Check the service brakes to ensure they stop the MHE smoothly and evenly without pulling or binding. Where applicable, check the deadman brake or travel control disconnect device for proper operation.

6-5.4.15. **Steering.** The steering wheel should turn smoothly and freely.

6-5.4.16. **Steer Axle Stops.** Check the steer axle stops by turning the wheels to the full right and full left positions. Rubbing or contact with suspension components or chassis is unacceptable.

6-5.4.17. **Gauges/Meters.** Inspect the following applicable gauges/meters:

a. **Warning Indicators.** With the engine running at normal operating temperature, check the oil pressure gauge for normal operating pressure in accordance with manufacturer's specifications. There are two types of oil pressure gauges, as shown in [figure 6-3](#). Check warning indicators (where applicable) in accordance with the manufacturer's instructions. A cold engine will normally have a higher oil pressure than a warm engine. If any warning indicator lights signal a malfunction, the MHE shall not be used until repaired.

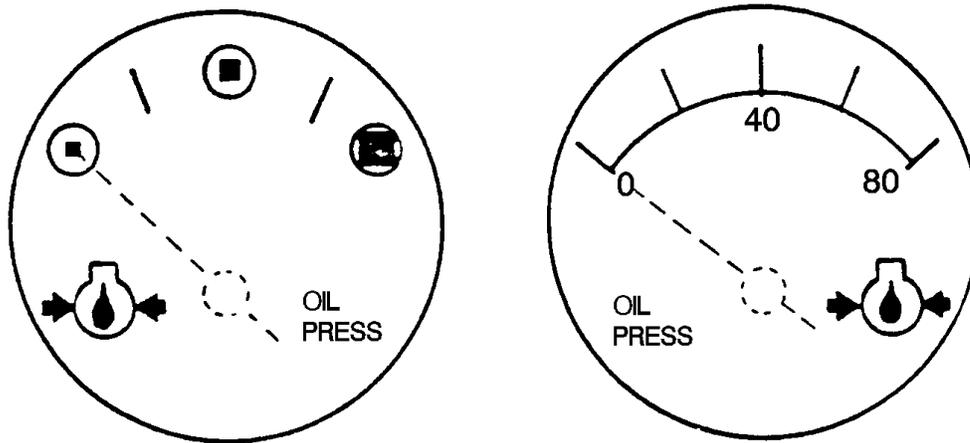


FIGURE 6-3. Oil Pressure Gauges (Example)

b. **Coolant Temperature Gauge.** With the engine running at normal operating temperature, check that the gauge is indicating within the proper indicating range.

c. **Fuel Gauge.** Check the fuel gauge for proper reading (i.e., a full fuel tank should have gauge indicating full level). On types LP and CN MHE, the mechanical-type fuel gauge may be mounted directly on the gas tank. Dual-fueled MHE shall not be operated unless the gasoline fuel tank is at least  $\frac{1}{4}$  full.

d. Voltmeter/Ammeter. With the engine running, check the voltmeter/ammeter to ensure the alternator/generator is charging the battery. It should be in the green range when the engine is running at any speed above 550 rpm.

e. Hourmeter. Ensure that the hourmeter is registering while the engine is running. The hourmeter registers accumulated engine running time to 9999.9 hours and then resets. The digit on the far right registers tenths of an hour. Refer to [figure 6-4](#).

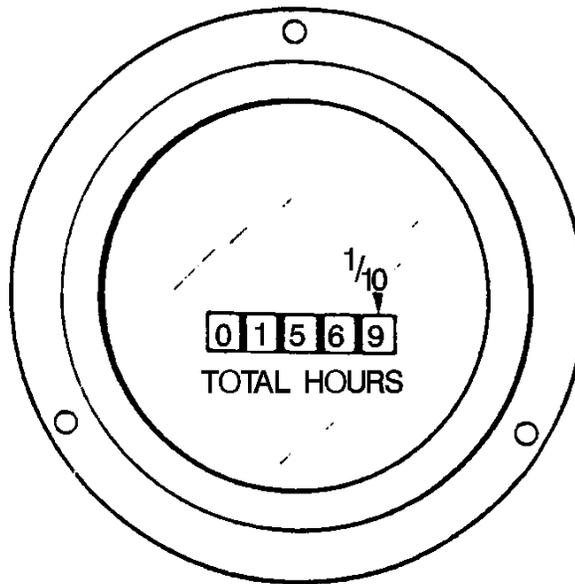


FIGURE 6-4. Engine Hourmeter

f. Weight Scales. Where applicable and required by local procedures, check the weight scales to ensure they read zero when the MHE is empty. Zero the weight scale indicator in accordance with the applicable MIP or manufacturer's instructions. An inoperative or suspect weight scale does not restrict MHE use, provided that the indicator assembly is fully covered and tagged nonserviceable (yellow tag: NSN 0105-LF-641-3001). Repair or calibrate at the earliest opportunity.

6-5.4.18. Fire Extinguisher. Where applicable, examine the cylinder for dents. Ensure that the extinguisher is properly charged by checking the gauge (if so equipped) and check that the wire seal has not been broken. Ensure periodic checks are current.

6-5.4.19. Seat Belts. If MHE is equipped with seat belts, they shall be inspected to verify that they fully extend out, can be properly secured and fully retract back. They shall not exhibit any evidence of wear or damage.

6-5.4.20. Forks. Visually examine the forks to ensure that there are no surface cracks. Ensure that the blades and shank are straight, proper rated forks are installed, and the tips of the forks are even. Raise forks and check heel portion for stress cracks. Should surface cracks appear on the forks, the MHE shall not be used until the forks are replaced.

6-5.4.21. Fork Positioning Locks and Stops. Verify that the fork positioning lock secures the in position. Verify that the fork stop will prevent the fork from becoming disengaged from the forklift carriage.

6-5.4.22. Overhead Guards. Inspect all welds and hardware attaching the overhead guard to the MHE. Ensure that all hardware is in place, and all structural members are secured.

6-5.4.23. Ground Straps or Static Conductive Tires/Wheels. For EE type MHE, verify that two ground straps are present and touch the floor/deck or two conductive tires/wheels are present. For EX type MHE, verify the presence of two conductive tires/wheels.

6-5.4.24. Structural Cracks/Broken Weldments. Before operating the MHE, inspect for any defects such as structural cracks or broken weldments that may pose a potential safety hazard.

6-5.4.25. Valid Weight Test Certification Information. Verify that the MHE contains a current stenciled or labeled periodic weight test certification form (figure 6-6) with the required information found in paragraph 6-12. Expired, illegible, incorrect or missing information shall be a cause for rejection.

## 6-6. FORK MAINTENANCE INSPECTION PROCEDURES

Forks shall be inspected and documented in the MHE's history file at intervals of not more than 12 months or whenever any defect or permanent deformation is detected. Any fork defect shall be a cause for the MHE to be removed from service until the fork is repaired or replaced. Ensure that the manufacturer's safe working load (SWL) is marked and legible on each fork. Older forks may not have the manufacturer's SWL markings and there is no requirement to mark them. The SWL of each fork shall be at least half of the manufacturer's SWL at the rated load. Center, as shown on the MHE nameplate. Only the fork manufacturer or their designated representative shall be authorized to repair forks. The following are required fork inspection procedures:

a. Surface Cracks. The forks shall be thoroughly inspected for cracks and, if necessary, be subjected to a non-destructive crack detection process with special emphasis on the heel and welds attaching all mounting components to the fork.

b. Straightness of Blade and Shank. The straightness of the upper face of the blade and the front face of the shank shall be checked. The deviation from the straightness shall not exceed 0.5 percent of the length of the blade and/or height of the shank, respectively.

c. Fork Angle (upper face of the blade to load face of the shank). Any fork that has a deviation of greater than 3 degrees from the original specification.

d. Difference in Height of Fork Tips. The difference in height of one set of forks when mounted on the fork carrier shall be checked. The difference in tip height shall not exceed 3% of the length of the blade.

e. Positioning Locks and Stops (when originally provided). Verify that the positioning locks and stops are in good condition and operate properly. Stops shall prevent the forks from becoming disengaged from the carriage during fork adjustment.

f. Fork Blade and Shank. The fork blade and shank shall be thoroughly inspected for wear with emphasis on the vicinity of the heel. Excluding the tapered ends, the thickness shall not be reduced by 10 % of the original thickness. Refer to the manufacturer's technical manual to obtain original thickness.

g. Fork Hooks (when originally provided). The support face of the top hook and the retaining face of both hooks shall be inspected for wear, crushing and other deformations. The clearance between the forks and the fork carrier shall not exceed the manufacturer's tolerances.

h. Plated Forks. The plated forks on EX type MHE shall be inspected and maintained in accordance with manufacturer's instructions.

## 6-7. REPAIR OF MHE

When making repairs to MHE, the following regulations must be followed:

a. All repairs shall be made by authorized personnel following manufacturer's instructions and using replacement parts that meet the manufacturer's specifications.

b. All repairs shall be done in areas approved by the Commanding Officer/Officer-in-Charge (CO/OIC) as required by [29 CFR 1910.178](#).

c. Components removed, such as covers, panels, etc., must be reinstalled upon completion of repairs to maintain the integrity of the safety rating.

d. When parts are replaced, an entry shall be recorded in the MHE history file identifying the replaced part(s) by manufacturer's name, catalog and part number. The name of the person replacing the part(s), the date, and the activity shall be entered.

## 6-8. PERIODIC TESTING

### NOTE

Using the testing arrangements found in [NAVSEA SG420-AP-MMA-010](#) and the requirements of [paragraph 6-9](#), written operating procedures are required for periodic weight testing operations of forklift attachments and MHE, respectively.

6-8.1. PERIODIC WEIGHT TESTING OF FORKLIFT ATTACHMENTS. Each Mk 5 Mod 0 Forklift Truck Boom and Mk 91 Mod 0 and Mk 176 Mod 0 Hook Adapters, as identified in [paragraph 2-3](#), shall be subjected to a periodic weight test whenever one of the following conditions occur:

a. Every 48 months (afloat or ashore) after the handling equipment is initially put into service.

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- b. Less than 48 months when it is necessary to coincide with the ship's deployment.
- c. After the handling equipment has undergone repairs affecting the load bearing components.

Periodic weight testing shall be conducted by authorized intermediate or depot levels of maintenance in accordance with [NAVSEA SG420-AP-MMA-010](#). Ordnance handling equipment (OHE) passing periodic weight testing must indicate the following information on the equipment:

**TEST FACILITY:** \_\_\_\_\_  
(testing activity name)

**TEST EXPIRATION DATE:** \_\_\_\_\_  
(month/year)

**SAFE WORKING LOAD:** \_\_\_\_\_ **POUNDS**  
(number)

New marking/test tag information must be applied as the equipment is periodically tested or at the time the test tag is changed upon receipt of new equipment as detailed in [NAVSEA OP 5](#) or [NAVSEA OP 4](#).

No periodic weight testing is required for the Mk 12 Mod 0 Fork Tine Extension and the Fork Stop.

**6-8.2. PERIODIC OPERATIONAL TESTING OF MHE.** Periodic operational testing of MHE shall be conducted in accordance with [paragraph 6-9](#) whenever one of the following conditions occur:

- a. Every 18 months after the MHE is initially placed into service.
- b. Less than 18 months when it is necessary to coincide with the ship's deployment.

**6-8.3. OVERLOAD WEIGHT TESTING OF MHE.** Overload weight testing of MHE, with the exception of pallet trucks and straddle carriers, shall be conducted whenever the MHE has undergone repairs or modifications affecting the load-bearing components. Refer to [paragraph 6-10](#) for overload test procedures.

**6-8.4. LIFTING EYES TESTING OF MHE.** Lifting eyes testing of MHE, with the exception of straddle carriers, shall be conducted whenever they have been repaired or replaced. Refer to [paragraph 6-11](#) for inspections and test procedures.

**6-8.5. MHE TEST LOADS.** Known values of test weights shall be used for testing. Dynamometers, or other recording equipment, are not permitted in lieu of dead weights. The assembled test load, including rigging, shall be accurate within +5/-0 percent of the nominal test load. The weights shall be measured using calibrated equipment with a minimum accuracy of  $\pm 2$  percent (of scale) traceable to the National Institute of Standards and Technology.

**6-8.5.1. Marking of Test Loads.** The test weight(s) shall be marked (e.g., steel stamping, etching, engraving, raised metal deposit, or stenciling) with a unique identification number and the weight in pounds.

## 6-9. GENERAL PERIODIC TESTS FOR MHE

[Table 6-1](#) denotes the applicable 18-month periodic tests for each type of MHE. Reference should be made to this table prior to conducting any periodic tests. The following pages describe what tests must be conducted for certification of each piece of MHE. The MHE Safety Certification Form ([figure 6-5](#)) or a CO/OIC approved equivalent shall be completed and maintained in the MHE history file until the next scheduled test. Certification shall be based on the conditions in specifications and tests prescribed. Upon completion of the required tests, refer to [paragraph 6-12](#) for MHE certification information.

**6-9.1. CERTIFYING OFFICIAL.** The certifying official shall be designated in writing by the CO/OIC of the activity. This official shall be responsible to ensure that the MHE is inspected and tested in accordance with the requirements herein, and that the MHE issued is safe to use for its intended purpose.

**6-9.2. BRAKE TESTING (EXCEPT STRADDLE CARRIERS AND MANUAL PALLET TRUCKS).** Brake test course shall be level, clean asphalt, brushed concrete, level non-skid, or equivalent surfaces, and of adequate length to permit safe conduct of the test.

a. Load forks with a rated load (100% of the MHE's SWL). Test load shall bear against load backrest, shank of forks, or carriage and need not be at the rated load center. Ensure the test load is centered laterally. For MHE with tilt capability, the forks may be tilted to stabilize the load.

b. Determine the maximum speed of the MHE. This may be accomplished by determining the time it takes the MHE to pass through a 25-foot course as follows: Measure a 25-foot straight course. Transverse the course in reverse at maximum speed from a running start. Using an appropriate means to measure time (e.g., stop watch), note the time it takes for a reference point on the MHE to move from the start of the course to the end. Alternately, the maximum speed may be measured using a device such as a radar/laser gun.

c. With the MHE at maximum speed and after passing through the 25-foot course, if applicable, apply the service brakes to achieve maximum deceleration without sliding the tires. Record the stopping distance measured from the point of brake application.

d. Using [table 6-2](#), find the maximum allowable stopping distance associated with the speed or the 25-foot course time.

e. The MHE shall be rejected if the recorded distance exceeds the maximum allowable stopping distance.

**6-9.2.1. Other Causes For Rejection.** In addition to [table 6-2](#), MHE shall be rejected after performing the brake test if the pedal travels over half the distance to the floor, or travels gradually to the floor (spongy brakes) after the brakes are applied, or brakes do not gradually engage (grabbing) causing sudden or immediate stops. Leakage of brake fluid, exceeding manufacturer's specifications or standard industrial maintenance practices, or component failure is cause for rejection.

Table 6-1. Periodic Tests for MHE

Test	Forklift/ Swingmast (Electric)*	Forklift/ Swingmast (Fuel)**	Rough Terrain (Fuel)**	Sideloader (Electric)*	Reach & Tier (Electric)*	Pallet Truck (Electric* or Manual)	Straddle Carrier (Fuel)**
Brake Tests (6-9.2)	X	X	X	X	X	X Electric only	
Static Discharge Test (6-9.3)	X			X	X	X HS and Electric only	
Fuel System (6-9.4)		X	X				X
Spark Emission (6-9.5)	X	X	X	X	X	X Electric only	X
Instruction and Nameplate (6-9.6)	X	X	X	X	X	X	X
Operational Weight Test (6-9.7)	X	X	X	X	X		
Operational Weight Test (6-9.8)						X Electric only	
Carriage Reach and Roller Inspection (6-9.9)					X		
Drive Control Test (6-9.10)						X Electric only	
Lifting Weight Test (6-9.11)							X
King Pin (6-9.12)							X
Brakes (6-9.13)							X
Warning Devices (6-9.14)	X	X	X	X	X	X Electric only	X
Neutral Start Switch (6-9.15)		X	X				X

\*Electric-powered MHE contain designations E, EE, or EX.

\*\*Fuel-powered MHE contain designations CN, CNS, D, DS, DS/DC, G, G/CN, GS, GS/CNS, LP, LPS, G/LP, or GS/LPS.

# NAVSEA SW023-AH-WHM-010 SECOND REVISION

## MHE SAFETY CERTIFICATION

USN/NSN NO.	MHE TYPE:	CAPACITY:
-------------	-----------	-----------

1. TEST PROCEDURE: NAVSEA SW023-AH-WHM-010 MAST (Downward and Tilt Drift)  
 TEST LOAD 100% \_\_\_\_\_ lbs. AT RATED LOAD CENTER FROM FORK/BOOM FACE, FULL HEIGHT, HOLD FOR 2 MINUTES

### TEST RESULTS

MAST DOWN DRIFT _____ inches (max. 1-3/4 inches in 2 minutes)	MAST TILT DRIFT _____ degree (max. 1 inch in 2 minutes)
---	---

2. TEST PROCEDURE: NAVSEA SW023-AH-WHM-010 (For Full Operating Range)  
 TEST LOAD 100% \_\_\_\_\_ lbs. AT RATED LOAD CENTER FORK/BOOM FACE

### TEST RESULTS (After Repairs)

CONDITION OF FORKS/BOOM, SUPPORT POINT WELDS ___ SATISFACTORY ___ UNSATISFACTORY	CRACKS	PERMANENT DEFORMATION	FAILURE
---	--------	-----------------------	---------

3. TEST PROCEDURE: NAVSEA SW023-AH-WHM-010 (Brakes)  
 TEST LOAD 100% \_\_\_\_\_ lbs. TRAVEL BACKWARDS, FULL SPEED, RATED LOAD IN DOWN POSITION, APPLY BRAKES NORMALLY.

### TEST RESULTS

STOPPING DISTANCE _____ FT.	PEDAL FEEL: _____ SPONGY _____ TRAVEL _____ BRAKES GRAB _____ FLUID LEAKS _____ SATISFACTORY
-----------------------------	--

GRADING	SATISFACTORY	UNSATISFACTORY	INSPECTION SATISFACTORY
4. TRUCK LIFTING EYES (150% STRESS) IF REQUIRED			
5. BATTERY BOX LIFTING EYES (150% STRESS) IF REQUIRED			
6. WARNING DEVICE (HORNS, BELLS, LIGHTS)			
7. FUEL SYSTEM			
8. INSTRUCTIONS AND NAMEPLATE			
9. BOOM LIFTING ATTACHMENTS IF REQUIRED			
<b>10. SPARK EMISSION</b>			
11. STATIC DISCHARGE (RECORD READING IN APPROPRIATE COLUMN)			
12. NEUTRAL START SWITCH			

### EQUIPMENT RATING (Check Appropriate Box Below)

EQUIPMENT	E	EE	EX	D	DS	H	HS	OTHER
FORKLIFT								
REACH AND TIER								
PALLET TRUCK								
OTHER								

LOAD TEST DATE	SATISFACTORILY LIFTED % LOAD
CERTIFICATION EXPIRATION DATE	BOOM HOOK N.D.T. EXPIRATION DATE

THIS IS TO CERTIFY THAT THE ABOVE MHE WAS INSPECTED AND LOAD TESTED ON THE INDICATED DATES IAW NAVSEA SW023-AH-WHM-010, CHAPTER 6, FOR A SAFE WORKING LOAD OF: \_\_\_\_\_ lbs. AT RATED LOAD CENTER FROM FORK FACE

CERTIFIED BY:

FIGURE 6-5. MHE Safety Certification Form

Table 6-2. Braking Distance Chart

Using a 25-foot course the following maximum allowable stopping distances apply		
Time (seconds)	Speed (mph)	Maximum (approximate) Allowable Stopping Distance (feet)*
1.0	17.0	38.82 or 38 ft. 9-3/4 in.
1.5	11.4	17.25 or 17 ft. 3 in.
2.0	8.5	9.7 or 9 ft. 8-1/4 in.
2.5	6.8	7.59 or 7 ft. 7 in.
3.0	5.7	6.33 or 6 ft. 3-3/4 in.
3.5	4.9	5.42 or 5 ft. 5 in.
4.0	4.3	4.74 or 4 ft. 8-3/4 in.
4.5	3.8	4.22 or 4 ft. 2-1/2 in.
5.0	3.4	3.8 or 3 ft. 9-1/2 in.
5.5	3.1	3.45 or 3 ft. 5-1/4 in.
6.0	2.8	3.16 or 3 ft. 1-3/4 in.
6.5	2.6	2.92 or 2 ft. 11 in.
7.0	2.4	2.71 or 2 ft. 8-1/2 in.
7.5	2.3	2.53 or 2 ft. 6-1/4 in.
8.0	2.1	2.37 or 2 ft. 4-1/4 in.
8.5	2.0	2.23 or 2 ft. 2-3/4 in.
9.0	1.9	2.11 or 2 ft. 1-1/4 in.
9.5	1.8	2.0 or 2 ft.
10.0	1.7	1.9 or 1 ft. 10-3/4 in.
11.0	1.5	1.73 or 1 ft. 8-3/4 in.
12.0	1.4	1.58 or 1 ft. 6-3/4 in.
13.0	1.3	1.46 or 1 ft. 5-1/2 in.
14.0	1.2	1.36 or 1 ft. 4-1/4 in.

Table 6-2 distances based on ASME B56.1

\* Stopping distance converted to nearest 1/4 inch.

6-9.2.2. **Parking Brake Test.** Test the parking brake by engaging the parking brake on the unloaded MHE. Attempt to drive the MHE forward by applying a moderate amount of power to the MHE. If the MHE moves, adjust the parking brake, and repeat the parking brake test. The MHE shall be rejected if proper adjustments cannot be achieved.

6-9.2.3. **Travel Control Disconnect Test.** Test the travel control disconnect by moving the unloaded MHE forward at a moderate speed (less than 5 mph) and engage the travel control disconnect. The MHE shall be rejected if the system fails to engage and bring the MHE to a stop.

6-9.3. **STATIC DISCHARGE TEST (TYPE EE, EX, AND HS MHE ONLY).** Place a conductive plate on the deck/floor so that the static conductor rests upon it. Using a Megohmmeter (e.g., James G. Biddle, Model 21159) in accordance with manufacturer’s recommendations, place one electrode on the plate and the other on an unpainted section of the chassis. Apply 500 volts and take the resistance

reading. The MHE shall be rejected if the resistance is greater than 250,000 ohms. Record discharge reading on the MHE Safety Certification Form, [figure 6-5](#).

#### **6-9.4. FUEL SYSTEM.**

**6-9.4.1. Gasoline and Diesel.** Visually inspect the entire fuel system for leaks while the MHE is operating. The MHE shall be rejected if any fuel leaks are discovered.

#### **6-9.4.2. Compressed Natural Gas and Liquefied Petroleum Gas.**

a. The complete fuel system assembly shall be leak tested, when pressurized, with a non-ammonia soap solution or a leak detector instrument. The MHE shall be rejected if any leaks are discovered.

b. In the event CNS or LPS type MHE is involved in an accident or fire causing damage to any part of the fuel system or fuel tank, or the fuel tank is subjected to a pressure greater than 125% of the service pressure, the MHE shall be removed from service until all necessary repairs and retesting have been completed.

**6-9.5. SPARK EMISSION (ALL POWERED MHE).** Visually inspect for spark emission in a dark location. For fuel-powered MHE, inspect with the engine on and in neutral. Special attention should be given to the entire exhaust systems (pipes), the ignition wiring, the alternator/generator housing, and the area under the MHE where the engine is located. For electric-powered MHE, inspect while operating each electrical motor (e.g., drive motor, hydraulic, etc.). The drive wheels may be raised off the deck/floor to test the drive motor. Special attention should be given to the area around the covers and under the MHE where the wiring, contactors, and motors are located. The MHE shall be rejected if there is any spark emission.

**6-9.6. INSTRUCTIONS, NAMEPLATE AND MARKINGS.** For all MHE, visually inspect to ensure that the applicable tags/decals (e.g., manufacturer's plate, periodic weight test certification form, etc.) are legible, applicable and correct. If SWL is missing or incorrect, or the controls are improperly marked, the MHE shall not be used until corrected.

**6-9.7. OPERATIONAL WEIGHT TEST (ALL FORKLIFT TRUCKS).** The following procedures are required to perform the operational weight test:

a. Ensure the MHE is on a level surface.

b. Position a rated load (100% of the MHE's SWL) on the forks with the center of mass at the load center. Ensure the load is centered laterally. If weights are used and stacked more than two high, the safety officer or supervisor shall determine whether the weights are stable prior to proceeding with these tests. If instability of weights has been determined, they must be secured with steel strapping or chains. Raise the forks 6 inches off the deck/floor, tilt full back, and hold for 2 minutes.

**WARNING**

When the mast is fully raised, ensure the operator's hands are clear of controls and the person marking and verifying the height stands to the side of the MHE. An observer must ensure that all personnel are clear of the mast prior to raising the rated load.

c. Shift lateral to full limits and then raise load to full mast extension. Repeat lateral shift operation and then return load to deck/floor.

The following steps must be performed with the hydraulic system at normal operating temperatures. This may be accomplished by raising and lowering the mast five times.

d. With the mast vertical, forks centered and rated load on the forks, raise the forks to the maximum height. Mark a reference point on the mast or measure the carriage to a reference point on the fixed portion of the mast. If the forklift truck has a tilting mast (e.g., standard forklift truck), mark a reference point on the tilt cylinders or obtain an initial measurement on the mast angle.

e. After 2 minutes, measure the downward and tilt drift, as applicable, from the reference points.

NOTE

Perform steps f through h on forklift trucks that have tilting carriages (e.g., sideloader and reaching and tiering forklift trucks).

f. Lower the forks to just above the outriggers or to the lowest point allowed by the centering limit switch, if so equipped.

g. Tilt the carriage rearward to its limit. Release the tilt lever.

h. After 2 minutes, tilt the fork carriage rearward again. Note any movement.

i. Lower and remove the load.

The forklift truck shall be rejected if the mast drifts vertically more than 1-3/4 inches. If equipped with a tilting mast, the forklift truck shall be rejected if it tilts more than one degree. If equipped with a tilting carriage, the forklift truck shall be rejected if any movement is noted when tilting the carriage rearward the second time. The forklift truck shall be rejected if it lifts, shifts or tilts the load too slowly or unevenly, the hoses and tubing have bulgings or distortions, the frame and mast assembly have fractures or broken welds, or if the forklift truck leaks hydraulic fluid. When raising or lowering the mast, if the forklift truck does not operate freely and/or binds or catches on the overhead guard or any other component, it shall be rejected.

**6-9.8. OPERATIONAL WEIGHT TEST (ALL POWERED PALLET TRUCKS).** The following procedures are required to perform the operational weight test:

- a. Position a rated load (100% of the MHE's SWL) on the forks with the mass centered on the forks. Raise the forks to maximum height.
- b. After 2 minutes, lower and remove the test load.
- c. The pallet truck shall be rejected if leakage of hydraulic fluid is found, if the forks do not raise smoothly to full height, or if the forks do not lower smoothly in a controlled decent.

**6-9.9. CARRIAGE REACH AND ROLLER INSPECTION (REACH AND TIER TRUCKS ONLY).** With the forks retracted and centered, raise forks just above outriggers. Fully extend the fork carriage and measure the carriage reach and the distance of the roller from the top of the roller guide track. The reach and tier truck shall be rejected if the carriage reach or roller exceeds the manufacturer's technical manual specifications or tolerances.

**6-9.10. DRIVE CONTROL TEST (POWERED PALLET TRUCKS ONLY).** Verify the drive control is disabled in the park/deadman position by actuating the drive control in both forward and reverse directions at all speeds. For control arm type pallet trucks, the arm shall be vertical. For fixed controls, the deadman pedal shall be up or the parking brake engaged, as applicable. The pallet truck shall be rejected if it moves forward or backward. Verify that the drive control operates properly when the control arm is at a 45 degree angle, the deadman pedal is actuated, or parking brake released, as applicable. Actuate the drive control in both forward and reverse directions at all speeds. The pallet truck shall be rejected if it does not move at all speeds in both forward and reverse directions.

**6-9.11. LIFTING WEIGHT TEST (STRADDLE CARRIERS ONLY).** Engage the rated load (100% of the MHE's SWL) with the lifting shoes. Lift and lower the rated load. The straddle carrier shall be rejected if the shoes do not attain full lift smoothly and evenly, or the shoes do not return smoothly and evenly to their lowest position. If the lifting shoes exhibit signs of permanent deformation or evidence of failure, the straddle carrier shall be rejected.

**6-9.12. KING PIN (STRADDLE CARRIERS ONLY).** When a king pin exists, visually inspect the pin for signs of deformation or fracture. The straddle carrier shall be rejected if there is any deformation or evidence of failure.

**6-9.13. BRAKES (STRADDLE CARRIERS ONLY).** Verify that the brakes are adjusted in accordance with the manufacturer's recommendations. The straddle carrier shall be rejected if they are not adjusted in accordance with the manufacturer's recommendations.

**6-9.14. WARNING DEVICES (POWERED MHE ONLY).** Verify that all warning devices, such as horns, bells, lights, etc., fitted on MHE are operational. Repair or replace any inoperable device.

**6-9.15. NEUTRAL START SWITCH (FUEL-POWERED MHE ONLY).** Where applicable, test the neutral start switch by attempting to start the engine with the directional control lever in either the forward or reverse position. If engine starts, the MHE shall be rejected.

## 6-10. OVERLOAD WEIGHT TESTING OF MHE (ALL FORKLIFT TRUCKS)

### NOTE

Overload weight testing of MHE is not required, except under the conditions stated in [paragraph 6-8.3](#). Test results shall be documented on the MHE Safety Certification Form, [figure 6-5](#), or a CO/OIC approved equivalent form, and maintained in the MHE history file.

- a. Ensure MHE is on a level surface. Blocks or steel stands may be used under front axle or frame to relieve strain on tires when overload is placed on forks.
- b. Secure the aft end of the MHE to prevent vertical movement. This may be accomplished using 3/8-inch chain or 1/2-inch wire rope and shackles or hooks through the rear lifting points.
- c. Position a test rated (100% of the MHE's SWL) on the forks with the center of mass at the load center. Ensure the load is centered laterally. If weights are used and they are stacked more than two high, the safety officer or supervisor shall determine whether the weights are stable prior to proceeding with this test. If instability of weights has been determined, they must be secured with steel strapping or chains. Raise the forks 6 to 12 inches above the deck/floor.
- d. Hold the rated load for 2 minutes.
- e. Inspect tiedown devices and counterweights to ensure an additional test load can be safely applied to the forks.
- f. Apply an additional test load(s) so the forks are supporting 150% of the MHE SWL. Ensure the center of the test load mass is at the rated load center of the MHE and centered laterally. Do not attempt to tilt or lift the test load when the MHE is loaded above 100% of the SWL, which may damage the MHE hydraulic system.

### NOTE

Due to the differences in the design of the MHE hydraulic system, adjustment of the safety relief valve may be required.

- g. If the fork carriage lowers or tilts due to the relief valve opening, loosen the jam nut on the safety valve adjustment screw and turn the safety relief valve adjustment screw clockwise, at least 1/2 turn, to prevent the relief valve from opening during 150% loading. After adjusting the relief valve, repeat steps c through f.
- h. Hold test load for 2 minutes.
- i. Inspect hydraulic system for leaks. Inspect hoses and tubing for bulging and distortion.

j. If the relief valve was adjusted during this test, readjust the relief valve in accordance with manufacturer's specifications or by removing the test loads so that the rated load (100% of the MHE's SWL) is now on the forks. Raise the load to maximum height. Turn the safety relief valve adjustment screw counterclockwise until the test load begins to drift downward. Then turn the safety relief valve adjustment screw clockwise 1/4 turn. Tighten the jam nut under the safety relief valve adjustment screw.

k. Lower and remove the load.

l. Remove tiedowns. Remove blocks from axle or frame, if applicable.

m. Inspect the MHE structure, frame, mast assembly for deformation, fractures and broken welds.

#### **6-11. MHE LIFTING EYES INSPECTION AND TEST (EXCEPT STRADDLE CARRIERS)**

Prior to hoisting MHE, the lifting eyes shall be visually inspected for evidence of deformation (bends, elongation, etc.) and excessive corrosion. If any discrepancy is found, the MHE shall be tagged and removed from service, repaired or replaced, and tested as follows:

a. Apply a vertical lifting force of 1-1/2 times the weight of the MHE to the attachments using an appropriate lifting device (e.g., sling). This can be accomplished in the following manner:

(1) Tie the MHE down to the deck/floor without using the lifting eyes by running cable or chain over the forks at the heel and running another cable or chain between the battery well and the counterweight.

(2) Apply force with suitable hoisting equipment (crane with a sling capable of lifting the MHE plus 50% overload) and a dynamometer in series until the dynamometer registers 1-1/2 times the vehicle weight.

b. Hold the force for 2 minutes.

c. Lower the MHE and remove the lifting device. Examine the lifting lugs and points where attached to the MHE.

The MHE shall be rejected if the lifting attachments and points to which they are secured to the MHE exhibit elongation, permanent deformation, fractures or other evidence of failure. MHE containing lifting eyes, but not intended to be lifted, shall be marked, "NOT FOR LIFTING" and need not be tested.

#### **6-12. CERTIFICATION OF MHE (EXCEPT TYPE H PALLET TRUCKS)**

MHE that has satisfactorily passed the required periodic tests, specified in [paragraph 6-9](#), shall be legibly stenciled or labeled, 1/4-inch minimum, with the information identified in [figure 6-6](#). The testing activity's name and the expiration date (month/year), which indicates the date that the MHE should be scheduled for its next 18 month periodic test, shall be completed in the appropriate blanks on the certification form. Labels must be locally procured.

<b>SAFETY CERTIFICATION/WEIGHT TEST ACCOMPLISHED BY:</b>  
<b>IAW NAVSEA SW023-AH-WHM-010</b>
<b>EXPIRES</b> _____.

FIGURE 6-6. Periodic Weight Test Certification Form

## APPENDIX A

### REFERENCE DOCUMENTS

#### A-1. GENERAL

This appendix contains all the publications referenced in this manual, as well as publications which may provide further information on ammunition and explosives handling and safety matters.

#### A-2. NAVAL PUBLICATIONS AND FORMS CENTER

The publications and instructions in this section are available from the Defense Distribution Depot Susquehanna Pennsylvania, 05 E Street, Mechancisburg, PA 17055-5003. Publications must be ordered in accordance with NAVSUP Publication 600, "Unabridged Navy Index of Publications and Forms."

##### A-2.1. NAVAL AIR SYSTEMS COMMAND (NAVAIRSYSCOM).

###### A-2.1.1 NAVAIR Publications.

A1-NAOSH-SAF-000/P-5100-1 - NAVAIROSH Requirements for the Shore Establishment

##### A-2.2. NAVAL SEA SYSTEMS COMMAND (NAVSEASYSKOM)

###### A-2.2.1 NAVSEA Ordnance Pamphlets (OP's).

4 - Ammunition and Explosives Safety Afloat

5 - Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping, Volume 1

2173 - Approved Handling Equipment for Weapons and Explosives, Volumes 1 and 2

###### A-2.2.2 NAVSEA Technical Manuals (TMs).

S9000-AB-GTP-010 - Shipboard Safety and Damage Control Facilities for Stowage of Hypergolic Fueled Missiles and Fuel-Air Explosives (FAE) Bombs

SW020-AC-SAF-010 - Transportation and Storage Data for Ammunition, Explosives and Related Hazardous Materials

SW020-AF-ABK-010 - Motor Vehicle Driver and Shipping Inspector's Manual for Ammunition, Explosives and Related Hazardous Materials

SW020-AG-SAF-010 (formerly OP 2165) - Navy Transportation Safety Handbook for Ammunition, Explosives and Related Hazardous Materials

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SW023-AG-WHM-010 (formerly OP 4461) - On-Station Movement of Ammunition and Explosives By Truck and Railcar

SG420-AP-MMA-010 - Periodic Testing Arrangements for Ordnance Handling Equipment

### A-2.2.3 NAVSEA Instructions.

8023.11 - Standard Operating Procedures (SOP's) for the Processing of Expendable Ordnance at Navy and Marine Corps Activities

### A-2.3. NAVAL SUPPLY SYSTEMS COMMAND (NAVSUPSYSCOM).

#### A-2.3.1 NAVSUP Publications.

284 - Storage and Materials Handling

538 - Materials Handling Equipment Maintenance Manual

572 - Joint Service Manual (JSM) for Storage and Materials Handling

600 - Unabridged Navy Index of Publications and Forms

724 - Conventional Ordnance Management; Policies and Procedures

#### A-2.3.2 NAVSUP Instructions.

10490.33 - Materials Handling Equipment; Administration and Control of

### A-2.4. OFFICE OF THE CHIEF OF NAVAL OPERATIONS (OPNAV).

#### A-2.4.1 OPNAV Instructions.

3120.32 - Standard Organization and Regulations of the U.S. Navy

4790.2 (series) - The Naval Aviation Maintenance Program (NAMP)

4790.4 (series) - Ships' Maintenance and Material Management (3M) Manual

5100.19 - Navy Occupational Safety and Health (NAVOSH) Program for Forces Afloat

5100.21 - Afloat Mishap Investigation and Reporting

5100.23 - Navy Occupational Safety and Health (NAVOSH) Program for Shore Activities

5102.1 - Mishap Investigation and Reporting

8020.14 - Department of the Navy Explosives Safety Policy Manual

8600.2 - Naval Airborne Weapons Maintenance Program (NAWMP)

11320.25 - Reporting of Fire and Related Emergencies at Naval Shore Activities and Marine Corps Facilities

A-2.5. DOD INSTRUCTIONS

4145.19 - R-1 Storage and Materials Handling

A-2.6. NAVPERS PUBLICATIONS.

15560 - Naval Military Personnel Manual

A-2.7. NAVAL MEDICAL COMMAND (NAVMED).

A-2.7.1 NAVMED Publications.

P-117 - Manual of the Medical Department for the U.S. Navy

A-2.8. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC).

A-2.8.1 NAVFAC Publications.

P-300 - Management of Transportation Equipment

A-2.9. NAVAL INVENTORY CONTROL POINT (NAVICP)  
[Formerly Ships Parts Control Center (SPCC)]

A-2.9.1 SPCC Instructions (SPCCINST).

10490.2 - Materials Handling Equipment (MHE) for Naval Shore Establishments and Land-Based Operating Forces; Administration and Control of

10490.3 - Materials Handling Equipment (MHE) for Forces Afloat (Including Military Sealift Command Ships) and Fleet Issue Control Point (FICP's); Administration and Control of

### A-3. STANDARDIZATION DOCUMENT ORDER DESK

The following military handbooks and other standardization documents are available from the Department of Defense Specifications and Standards, Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

#### A-3.1. MILITARY SPECIFICATIONS.

MIL-G-23827 - Grease, Aircraft and Instrument, Gear and Actuator Screw

MIL-S-3794 - Shoes, Conductive

MIL-T-3977 - Truck, Fixed Platform, Internal Combustion Engine Powered, Pneumatic Rubber Tires, General Specification for

MIL-T-10010 - Tractor, Four Wheeled, Sit Down, Warehouse, Electric-Motor Driven, Solid Rubber Tires

MIL-T-16101 - Trucks, Straddle-Carry, Diesel, 30,000-pound (13.605 kg) Capacity, Pneumatic Rubber Tires, General Specification for

MIL-T-17491 - Trucks, Hand, Lift, Pallet, Manual-Hydraulic for Shipboard Use (6,000-pound Capacity)

MIL-T-17760 - Trucks, Pallet, Powered: Electric, Non-Tiering, Industrial; Walkie, Walkie-Rider, Hand Guided

MIL-T-21643 - Trucks, Lift, Fork, Reaching and Tiering, Narrow Aisle, Electric, 3,000- (1360 kg) and 4,000-Pound (1820 kg), Capacity

MIL-T-21868 - Trucks, Lift, Fork, Diesel; Shipboard, General Specification for

MIL-T-21869 - Trucks, Lift, Fork, Electric, Sit-Down, Front Wheel Drive, Rear Wheel Steer; General Specification for

MIL-T-21876 - Truck, Lift, Fork, Electric, Sideloader Four -Directional, Shipboard, Missile-Carrying, 4,000-pound Capacity

MIL-T-40629 - Truck, Fork, Reaching and Tiering, Continuous Duty, Narrow Aisle, Electric, Non-Pallet Straddling Shipboard General Specification for

MIL-T-40632 - Truck, Forklift, Diesel Engine Driven, DS Safety Rated, Pneumatic Rubber Tires, Rough Terrain, for Shipboard Use

MIL-T-52864 - Truck, Lift, Fork, Diesel-Engine Driven, Pneumatic-Tired, 10,000-pound Capacity at 48-inch Load Center

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MIL-T-52931 - Tractor, Wheeled, Warehouse, Internal Combustion Engine, Pneumatic-Tired.

MIL-T-52932 - Trucks, Lift, Fork, Internal Combustion Engine, 2,000-, 4,000-, 6,000-pound Capacity, General Specification for

MS 3367 - Strap, Tiedown, Electrical Components, Adjustable, Self-Clinching, Plastic, Type 1, Class I

### A-3.2. FEDERAL STANDARDS.

FED-STD-595 - Colors Used in Government Procurement

### A-4. SUPERINTENDENT OF DOCUMENTS

The following publications are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

#### A-4.1. CODE OF FEDERAL REGULATIONS.

Title 29, Part 1910 - Labor

Title 49, Part 171 - General Information, Regulations and Definitions

Title 49, Part 172 - Hazardous Materials Tables and Hazardous Materials Communications Regulations

Title 49, Part 173 - Shippers: General Requirements for Shipments and Packaging

Title 49, Part 176 - Carriage By Vessel

### A-5. MARINE CORPS (MC)

Requests for Marine Corps Publications should be directed to CMC (HQSP-2), Washington, DC 20380-1775, and should be submitted in accordance with the current edition of MCO P5600.31

#### A-5.1. MC ORDERS (MCOS).

P5102.1 - Marine Corps Ground Mishap Reporting

P8020.11 - Department of the Navy Explosives Safety Policy Manual

P11262.2 - Inspection, Test and Certification of Tactical Ground Loading Equipment

### A-6. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

The following standards can be obtained from American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

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### A-6.1. ASME STANDARDS.

B56.1 - Safety Standard for Low Lift and High Lift Trucks

B56.5 - Safety Standard for Guided Industrial Vehicles

B56.6 - Safety Standard for Rough Terrain Forklift Trucks

### A-7. UNDERWRITERS LABORATORY (UL)

The following standards are available from Underwriter's Laboratories, 333 Pfingsten Road, Northbrook, IL 60062.

#### A-7.1. UL STANDARDS.

UL 558 - Industrial Trucks, Internal Combustion Engine Powered

UL 583 - Electric-Battery Powered Industrial Trucks

### A-8. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

The following NFPA documents can be obtained from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

#### A-8.1. NFPA PAMPHLETS.

10 - Portable Extinguishers

30 - Flammable and Combustible Liquids Code

52 - Compressed Natural Gas (CNG) Vehicular Fuel Systems

58 - Standard for the Storage and Handling of Liquefied Petroleum Gases

70 - National Electrical Code

505 - Fire Safety Standard for Powered Industrial Trucks, Including Type Designations, Areas of Use, Maintenance, and Operation.

### A-9. AMERICAN GAS ASSOCIATION (AGA)

The following AGA documents can be obtained from American Gas Association, 1515 Wilson Boulevard, Arlington, VA 22209.

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### A-9.1. AGA STANDARDS.

ANSI/AGA NGV1 - Compressed Natural Gas Vehicle (NGV) Fueling Connection Devices

ANSI/AGA NGV2 - Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers

### A-10. AGA LABORATORIES

The following AGA laboratories requirements can be obtained from American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131.

#### A-10.1. AGA LABORATORIES REQUIREMENTS.

Requirements No. 1-85 - Natural Gas Vehicle (NGV) Conversion Kits

Requirements No. 2-90 - Natural Gas Vehicle (NGV) Fueling Appliances

### A-11. COMPRESSED GAS ASSOCIATION (CGA)

The following standard is available from Compressed Gas Association, Inc., 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102, telephone (703) 412-0900.

#### A-11.1. CGA STANDARDS.

CGA C-6 - Standards for Visual Inspection of Steel Compressed Gas Cylinders

CGA C-6.1 - Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders

CGA C-6.2 - Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders

### A-12. NATIONAL PROPANE GAS ASSOCIATION (NPGA)

The following bulletins are available from the National Propane Gas Association, 1600 Eisenhower Lane, Suite 100, Lisle, IL 60532, telephone (630) 515-0600.

#### A-12.1. NPGA BULLETINS.

NPGA C602 - Safe Use of LP - Gas in Industrial Trucks

NPGA C611 - Recommended Safe Filling Procedures for Forklift Fuel Cylinders (Containers)

NPGA 0055 - Refueling LP-Gas Powered Vehicles Safety

### **A-13. MHE TRAINING VIDEOS**

The following MHE training videos, identified in appendix C, are available from the Naval Ordnance Safety and Security Activity (NAVORDSAFSECACT), N7124, DSN 354-1936 ext. 130, Commercial (301) 744-1936, ext. 130.

- a. Port Chicago Story
- b. Forklift Safety
- c. Lest They All Died In Vain (Parts 1 and 2)
- d. Supervisor Awareness
- e. Color of Danger

**APPENDIX B**

**MATERIALS HANDLING EQUIPMENT**

<b>Cost Code</b>	<b>Equipment</b>	<b>Type Rating*</b>	<b>Rated Capacity at 24-inch Load Center</b>	<b>Applicable Specification</b>	<b>See Notes</b>
1100	Tractor	G, GS	4,000	MIL-T-52931	H, L
1100	Tractor	D, DS	4,000	MIL-T-52931	H, L
1105	Tractor	LP, LPS	4,000	MIL-T-52931	H, L
1110	Tractor	G, GS	7,500	MIL-T-52931	H, L
1115	Tractor	LP, LPS	7,500	MIL-T-52931	H, L
1120	Tractor	E, EE	up to 4,000	MIL-T-10010	J, L
1300	Forklift	G, GS	4,000, 6,000	MIL-T-52932	B, C, H
1305	Forklift	LP, LPS	4,000, 6,000	MIL-T-52932	B, C, H
1310	Forklift	G, GS	10,000, 15,000, 20,000	-----	D, H
1315	Forklift	LP, LPS	10,000, 15,000, 20,000	-----	D, H
1320	Forklift	G, GS	4,000, 6,000	MIL-T-52932	B, C, J
1325	Forklift	LP, LPS	4,000, 6,000	MIL-T-52932	B, C, J
1330	Forklift	D, DS	4,000, 6,000	MIL-T-52932	B, C, H
1330	Forklift	DS	6,000	MIL-T-21868	E, H
1340	Forklift	D, DS	10,000, 15,000, 20,000	MIL-T-52864	C, J
1340	Forklift	DS	15,000, 20,000	MIL-T-21868	E, H
1350	Forklift	D, DS	4,000, 6,000	MIL-T-52932	B, C, J
1350	Forklift	DS	6,000	MIL-T-21868	E, J
1351	Forklift	DS	6,000	MIL-T-21868	F, J
1360	Forklift	E	4,000, 6,000	MIL-T-21869	J, K
1370	Forklift	EE	4,000, 6,000	MIL-T-21869	J, K
1380	Forklift	EX	4,000, 6,000	MIL-T-21869	J, K
1390	Reaching/Tiering	E, EE	3,000, 4,000	MIL-T-21643	J
1390	Reaching/Tiering	EE	4,000, 4,500	MIL-T-40629	E, J

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<b>Cost Code</b>	<b>Equipment</b>	<b>Type Rating*</b>	<b>Rated Capacity at 24-inch Load Center</b>	<b>Applicable Specification</b>	<b>See Notes</b>
1400	Fixed Platform	G, GS	2,000, 4,000	MIL-T-3977	H, K
1410	Fixed Platform	E, EE	2,000	MIL-T-3977	H
1420	Elevating Platform	E, EE	4,000, 6,000	MIL-T-3977	J
1440	Fixed Platform	D, DS	2,000, 4,000	MIL-T-3977	H, K
1500	Straddle	D	30,000 to 60,000	MIL-T-16101	G, H
1600	Pallet Truck	E	4,000, 6,000	MIL-T-17760	A, J
1610	Pallet Truck	EE	4,000, 6,000	MIL-T-17760	A, J
1820	Fork Rough Terrain	D, DS	4,000	-----	G, H
1820	Fork Rough Terrain	D, DS	6,000	MIL-T-40632	G, H
1820	Fork Rough Terrain	D, DS	10,000	MIL-T-40632	G, H
1860	Fork Sideloader	D	15,000, 30,000	-----	G, H
1880	Fork Sideloader	E, EE	4,000	MIL-T-21876	E, J
1880	Fork Sideloader	E, EE	6,000, 8,000, 11,000	-----	G, J
1890	Fork Front Sideloader	E, EE	up to 11,000	-----	G, J
1895	Fork Front Sideloader	D, DS	6,000	-----	G, H
1900	Pallet Truck	H, HS	up to 6,000	MIL-T-17491	I

\*Refer to [paragraphs 2-1.1](#) and [2-1.2](#)

**NOTES:**

- A. Shipboard electric pallet trucks are purchased under NAVICP Mechanicsburg Purchase Description. MIL-T-17760 applies to warehouse electric pallet trucks only.
- B. In an attempt to limit and standardize equipment sizes, 2,000-pound capacity trucks are no longer being procured except for special requirements.
- C. Truck stability is limited to warehouse type operations and meets the requirements of ASME B56.1. When greater stability is required, MIL-T-21868 (specification is limited to 600-, 15,000-, and 20,000-pound capacities) should be used.
- D. Military specifications for ECC 1310 are no longer available. This size equipment is normally equipped with a diesel type engine. However, gasoline type engines can be procured by special order if the requirement exists.
- E. This specification is used for shipboard application and where shipboard type stability is required for land-based operation.
- F. Shipboard low silhouette model.
- G. These trucks are procured under NAVICP Mechanicsburg purchase descriptions and can be procured by contacting NAVICP Mechanicsburg, Code 1041.
- H. Pneumatic tires.
- I. Solid rubber/neoprene tires.
- J. Solid tires.
- K. Other sizes may exist in the system but are not standard.
- L. Rated capacity (lbs.) drawbar pull.

## APPENDIX C

### MATERIALS HANDLING EQUIPMENT OPERATOR TRAINING COURSE

#### C-1. PURPOSE

This training course establishes the minimum requirements that Department of Navy (DON) personnel must successfully meet prior to being issued a powered industrial materials handling equipment (MHE) license to handle ammunition and explosives.

#### C-2. SCOPE

This course identifies the various types of MHE approved for handling ammunition and explosives afloat and ashore, defines the operational areas in which the MHE can be operated, addresses operational safety precautions, and concludes with a test that assesses the students knowledge of safety requirements and operational proficiency. Upon satisfactorily completing this course and the medical qualification requirements found in [paragraph 3-2](#), students may be issued a license under the provisions of [paragraph 3-3](#).

#### C-3. COURSE VARIATIONS

Commanders, Commanding Officers or Officers-in-Charge (CO/OIC), at their discretion and under their documented approval, may authorize variations as needed to adopt this course to train and license MHE operators to handle materials other than ammunition and explosives.

#### C-4. CONTENT AND DURATION

For scheduling purposes, this course is approximately 40 hours in length. Given a class size of 2 to 10 students with different experience levels, it takes 8 hours of classroom time to cover the various types of MHE, transportation and storage requirements for ammunition and explosives, operating and reporting requirements, mandatory inspection requirements, bulk storage, operation in confined areas, and the handling of various containers. The classroom time occurs on the first day and is enforced throughout the week during the practical exercises. Past experience indicates that 24 hours are required for practical exercises covering flatbed, trailer, railcar, ramp, dock and magazine handling operations. These hours are broken down as follows: 8 hours of basic operating and lifting techniques, 4 hours of handling bulk items, 4 hours of maneuvering in confined areas, and 8 hours of handling different size containers. The final 8 hours is a proficiency test consisting of a written test and an operational skills demonstration.

C-4.1. MODIFICATIONS. It is not possible for this course to cover every training scenario for all types of MHE in use, the operational environments encountered, and the abilities of the individual students. For these reasons, satisfactory completion of the classroom material is mandatory and instructors are permitted to modify the practical exercises to accommodate the MHE used and the operational environments encountered at each activity. For example, to issue a license to an individual to operate a 6,000-pound DS Rough Terrain Forklift Truck, the instructor would eliminate operational areas

that it would not be used in (a railcar, trailer, etc.) and have the practical exercises performed in appropriate rough terrain (steep ramps) conditions.

**C-5. TRANSFER OF COMMAND**

If this same MHE operator is subsequently transferred to another activity that has only 4,000-pound EE Reaching/Tiering and 6,000-pound DS Front/Sideload Forklift Trucks, then, at the discretion of the CO/OIC of the gaining activity, this operator's license may be upgraded based solely on a proficiency demonstration. The individual may be required to complete the gaining activity's licensing course.

## LESSON NO. 1

### Introduction

#### Day 1 - Classroom 1.0 Hour

1. Good morning. My name is \_\_\_\_\_. Welcome to the course on “Handling Ammunition and Explosives with Industrial Materials Handling Equipment (MHE).”

a. Each student will complete the Course Completion Form. Upon successful completion of this course, I will sign the form indicating that you have successfully completed the training requirements. Your command may then issue you an MHE operator’s license.

2. COURSE REQUIREMENTS.

a. Lecturers and demonstrations are given at the start of each day. Tardiness will not be tolerated.

b. This course shall not be canceled due to inclement weather.

c. Students must attend the classroom, practical demonstrations, and a proficiency test to pass this course.

d. Students may be dropped from this course at the discretion of the instructor.

e. If disruptive, students shall be dismissed from class.

3. TELEPHONE NUMBERS.

a. Emergency \_\_\_\_\_

b. Safety \_\_\_\_\_

c. Others \_\_\_\_\_

4. COURSE CONTENT AND HOURS.

a. The course shall consist of 8 hours of classroom material, 24 hours of practical exercises and concludes with 8 hours of proficiency tests.

(1) Classroom material will consist of identifying the approved types of MHE and forklift attachments, discussing the licensing requirements, reviewing all safety precautions and regulations, reviewing the regulations for using MHE in various hazardous locations, reviewing pre- and post-operational inspection and functional test requirements, identifying human failures that cause accidents, procedures on what to do in the event of an accident or incident, and completing accident reports.

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(2) Practical exercises will consist of performing the required pre-operational and post-operational inspections and functional tests, stow and break out various types of unit loads, operating MHE through designated obstacle courses, loading and unloading a boxcar, and bulk storage.

(3) The proficiency test is given in two parts consisting of a written portion and an operational skills demonstration. Students must score 75 percent or better on each part to pass.

b. Course starts at \_\_\_\_\_ and ends at \_\_\_\_\_.

c. Lunch will be from \_\_\_\_\_ to \_\_\_\_\_.

### 5. REGULATIONS.

a. Uniform requirements: Military students must wear the uniform of the day; civilian students must wear proper attire.

b. Smoking regulations: Smoking is allowed only in designated areas.

c. Privately-owned vehicles: Shall be accordance with local law.

d. Housekeeping: Students are responsible for keeping the classroom and workroom clean.

### 6. TRANSPORTATION (Explain to the class any special requirements)

a. Mornings

b. To and from lunch

c. Evenings

### 7. PERSONAL PROTECTIVE EQUIPMENT. The following personal protective equipment (PPE) is “mandatory” for this course (students must furnish):

a. Hard hat

b. Safety shoes

### 8. INTRODUCTION TO NAVSEA SW023-AH-WHM-010. A complete overview of [chapters 1 through 6](#) of this manual will be provided by the instructor.

### 9. INSTRUCTIONAL AIDS.

a. VHS playback capability

b. Chalkboard

c. Overhead projector

d. Various handouts

10. FORMS.

a. MHE Inspection Form ([figure 6-1](#))

b. OF 346 Form - U. S. Government Motor Vehicle Operator's Identification Card

11. RECOMMENDED VIDEOS.

Lesson 1 - Port Chicago Story (25 min.)

Lesson 2 - Forklift Safety (15 min.)

Lesson 3 - Lest They All Died In Vain, Parts 1 (36 min.) and 2 (34 min.)

Lesson 4 - None

Lesson 5 - Supervisor Awareness (14 min.)

Lesson 6 - None

Lesson 7 - Color of Danger (16 min.)

Lesson 8 - None

## LESSON NO. 2

### Types of Industrial Materials Handling Equipment

#### Day 1 - Classroom 1.0 Hour

1. OBJECTIVE. Students shall be introduced to the various types of approved MHE and forklift attachments for handling ammunition and explosives.
2. LESSON OUTLINE. Review [chapter 2](#) in detail.
3. TEACHING PROCEDURES. Instructor lectures.
4. INSTRUCTIONAL AIDS (CLASSROOM).
  - a. Chalkboard
  - b. Overhead projector
  - c. Handouts
  - d. Movie (Forklift Safety)
5. EQUIPMENT AND MATERIALS. As required.

## LESSON NO. 3

### Explosive Classes, Transportation And Storage

#### Day 1 - Classroom 1.0 Hour

1. **OBJECTIVE.** Students shall be instructed to recognize the dangers of incorrectly handling ammunition and explosives, the hazards associated with the operational environments, and the reporting of accidents and incidents.
2. **LESSON OUTLINE.** All CONUS (continental U.S.) surface transportation of ammunition and explosives are controlled by the [Code of Federal Regulations \(CFR\) 49](#). Ammunition and explosives are normally moved by truck or by rail, hence explosive compatibility in transmit must be correct. All hazardous materials bear a DOT hazards classification marking designating it by Class and Division. Ammunition and explosives fall into one of the following:
  - a. Class 1.1 - materials are considered to be mass-detonating hazards. When the item functions as designed, either intentionally or accidentally, damage is primarily caused by concussion or blast. Specific minimum distances are maintained between piles of these materials in order to minimize the possibility of sympathetic detonation.
  - b. Class 1.2 - materials are considered to be non-mass-detonating fragment producing hazards. When the item functions as designed, either intentionally or accidentally, damage is primarily caused by fragment or blast, either individually or in combination, depending on storage configurations, type of packing, and quantity. Specific minimum distances are maintained between piles of these materials in order to minimize the possibility of fragment damage or initiation.
  - c. Class 1.3 - materials are considered to be mass fire hazards. When the item functions as designed, either intentionally or accidentally, damage is primarily caused by heat and flames from vigorous burning that is very difficult if not impossible to extinguish and low order blast and fragment effects. Specific minimum distances are maintained between piles of these materials in order to minimize the possibility of propagation from fire.
  - d. Class 1.4 - materials are considered to be moderate fire, no blast hazards. When the item functions as designed, either intentionally or accidentally, damage is primarily caused by heat and flames from vigorous burning that is very difficult if not impossible to extinguish. There may be minor fragments without a blast effect. Specific minimum distances are maintained between piles of these materials in order to minimize the possibility of propagation from fire.
  - e. Class 1.5 - materials are extremely insensitive detonating substances (EIDS) and EIDS ammunition. EIDS are Class 1.1 items that although mass detonating, are so insensitive that there is negligible probability of initiation or transition from burning to detonation in storage.

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f. Class 1.6 - materials contain EIDS that have been demonstrated through tests described in DOD 6055.9-STD, that mass and confinement effects of the ammunition case are negligible on the probability of initiation or transition from burning to detonation.

The amount and types of ammunition and explosives that may be loaded on a truck or rail or into a magazine are determined on the basis of net explosives weight (NEW) and compatibility. NAVSEA SW020-AC-SAF-010 covers transportation compatibility. NAVSEA OP 4 covers stowage compatibility afloat. NAVSEA OP 5 covers storage compatibility ashore.

3. GENERAL HANDLING, TRANSPORTING AND STORAGE/STOWAGE REGULATIONS. The utmost care and discretion shall be exercised by everyone engaged in the handling, transporting and storage/stowage of all ammunition, explosives, and ammunition components. The following regulations are applicable:

a. Ammunition and explosives in containers, in bulk, or loaded into projectiles, cartridges or ammunition components shall be handled in a manner so as to prevent shock or friction that may cause a fire, explosion or damage to the material. These materials shall not be thrown, dropped, dragged or tumbled over floors/decks or over other containers.

b. Handling of ammunition and explosives shall be reduced to a minimum in order to prevent damage and the creation of hazardous conditions. Precautions shall be taken to avoid the contact of ammunition and explosives with sand, earth, gravel and other abrasive or spark-producing substances and to avoid unnecessary exposure to inclement weather or direct sunlight.

c. Containers of bulk ammunition and explosives shall be handled carefully to avoid rupture of the containers or the container seams and to prevent undue friction between the containers. If any container is found in an unsatisfactory condition, after inspection by Explosive Ordnance Disposal (EOD) or other qualified personnel, its contents shall be transferred to a proper container that is in material condition Code A in accordance with NAVSUP Publication 724 and the containers shall be properly relabeled.

d. Ammunition and explosives shall be handled in a manner to avoid obliterating or defacing the identification markings.

e. Employees may become complacent and careless when continually engaged in work with ammunition and explosives. As long as no accident occurs, they may be inclined to drift gradually into neglect of necessary precautions. Vigilance on the part of the officers and supervisors in charge will ensure observance by the employees of the precautions, rules and regulations necessary to avoid accidents. These safety regulations should be made the subject of periodic lectures. All employees should be indoctrinated in the necessity for strict compliance.

f. Anyone who is engaged in the handling, transportation or storage/stowage of ammunition and explosives must always think safety. Work safely until it becomes a habit. Accidents usually result from failure to observe regulations, failure to understand hazards or failure to take necessary precautions.

g. Safety regulations are explicit and shall be followed at all times.

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4. ACCIDENT. An accident is defined as any unplanned or unintended event, no matter how minor, that interrupts or interferes with the orderly sequence of actions and results in personal injury or property damage.

a. Accidents are usually one of five categories:

(1) Operator error - operator unaware of the precautions required; operator was aware of the precaution but proceeded anyway; operator was preoccupied (losing sight of the real situation); failure to recognize any unsafe condition; failure to consider the consequences of an unsafe act; and failure to observe all rules, regulations and procedures for MHE.

(2) Mechanical failure

(3) Forces of Nature

(4) Lack of proper training

(5) Lack of proper supervisory instruction

b. Reporting accidents or incidents involving dropped or mishandled ammunition and explosives shall:

(1) Be reported immediately to the supervisor in accordance with local written procedures. Ammunition and explosives shall not be moved or handled until the safety determination has been made, unless not moving the ammunition or explosives increases the risk of further mishap.

(2) A formal report shall be submitted in accordance with [OPNAVINST 5102.1](#).

(3) Local material disposition procedures shall be followed.

c. Found defects (e.g., holes in containers, leakage, etc.) regardless of cause or original must be immediately reported to supervisor.

5. INSTRUCTIONAL AIDS

a. Hazardous Materials Load and Segregation Chart [Available commercially from J.J.Keller & Associates at (800) 327-6868]

b. Movie (Lest They All Died In Vain, Parts 1 and 2)

## LESSON NO. 4

### Operational Safety Regulations

#### Day 1 - Classroom 2.0 Hours

1. OBJECTIVE. Students shall be knowledgeable to all MHE safety precautions and regulations, and in securing MHE.
2. LESSON OUTLINE.
  - a. Operating approved MHE in a proper and safe manner.
  - b. Properly securing MHE when finished.
  - c. Review [chapters 4](#) and [5](#) in detail.
3. TEACHING PROCEDURES. Instructor lectures on MHE safety precautions and MHE usage in hazardous locations.
4. INSTRUCTIONAL AIDS.
  - a. Classroom
  - b. Chalkboard
  - c. VHS playback capability
  - d. Overhead projector
5. EQUIPMENT AND MATERIALS. As required

## LESSON NO. 5

### MHE Inspection

#### Day 1 - Classroom 0.5 Hour, Worksite 1.0 Hour

1. OBJECTIVE. Students shall be instructed on the required procedures to perform pre-occupational and post-operational tests and inspections on MHE using MHE Inspection Form ([figure 6-1](#)).
2. LESSON OUTLINE. Review [chapter 6](#) ([paragraphs 6-1](#) through [6-5](#)) in detail. Make mention of [paragraphs 6-6](#) through [6-12](#).
3. TEACHING PROCEDURES. Instructor lectures, has students inspect actual MHE and completes MHE Inspection Form ([figure 6-1](#)). All MHE controls and their functions shall be explained and demonstrated by the instructor.
4. INSTRUCTION AIDS.
  - a. Movie (Supervisor Awareness)
5. EQUIPMENT AND MATERIALS.
  - a. MHE Inspection Form ([figure 6-1](#))
  - b. Applicable MHE

## LESSON NO. 6

### Basic Operation Of Forklift Trucks

#### Day 2 - Worksite 8.0 Hours

1. OBJECTIVE. Students are required to learn the proper procedures for lifting a unit load, skills in handling and maneuvering the forklift truck over designated obstacle courses, spotter requirements, and securing MHE.
2. SAFETY PRECAUTIONS TO BE OBSERVED. Instructor shall review selected areas from [chapter 4](#).
3. LESSON OUTLINE.
  - a. Pre-operational inspection on the forklift truck using MHE Inspection Form ([figure 6-1](#)) and inspection procedures identified in [chapter 6](#).
  - b. Lifting a pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds).
    - (1) Approach the pallet squarely, aligning forks between the top and the bottom decking and equal distance from the center stringer.
    - (2) Enter forks squarely, penetrating not less than three-quarters of the pallet, with or without stops, and shall not extend through the pallet.
    - (3) Lift the pallet approximately two inches and tilt back.
    - (4) Raise the pallet approximately 6 inches above the ground/deck.
    - (5) Look over both shoulders, sound horn and back straight away.
    - (6) Stop and lower pallet approximately 4 inches above the ground/deck.
    - (7) Move the pallet to the desired location.
  - c. Setting the pallet down.
    - (1) Position the pallet at the proper storage/stowage location.
    - (2) Level the pallet.
    - (3) Lower the pallet to the ground/deck.

(4) Look back over both shoulders, sound horn and back straight away from the pallet until the forks clear the pallet.

d. Using the above instructions, lift the same pallet and drive the following pre-designated obstacle courses in both forward and reverse directions as demonstrated by the instructor. These obstacle courses will simulate entering a boxcar from a loading dock, loading onto a flatbed truck, and double stacking unit loads.

(1) A 40-foot long by 52-inch wide straight aisle. (Refer to [figure C-1](#)).

(2) A 32-½ foot diameter (16 feet, 3-inch radius) circle passing obstacles alternately on the left and the right. (Refer to [figure C-2](#)).

(3) Continue driving the prescribed obstacle courses, observing all the safety regulations, until all students have experienced operating the forklift truck and have undertaken the spotter's responsibilities.

e. Upon completion of step d, perform a post-operational inspection using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#). Lastly, secure the MHE.

4. TEACHING PROCEDURES. Instructors shall demonstrate:

a. The proper method of lifting and setting down the pallet.

b. How to operate the forklift truck with a unit load in both forward and reverse directions using the pre-designated obstacle courses.

c. The proper positioning and signaling for a spotter.

5. EQUIPMENT AND MATERIALS.

a. Worksite

b. 4,000/6,000-pound Forklift Truck

c. Palletized unit loads, as required

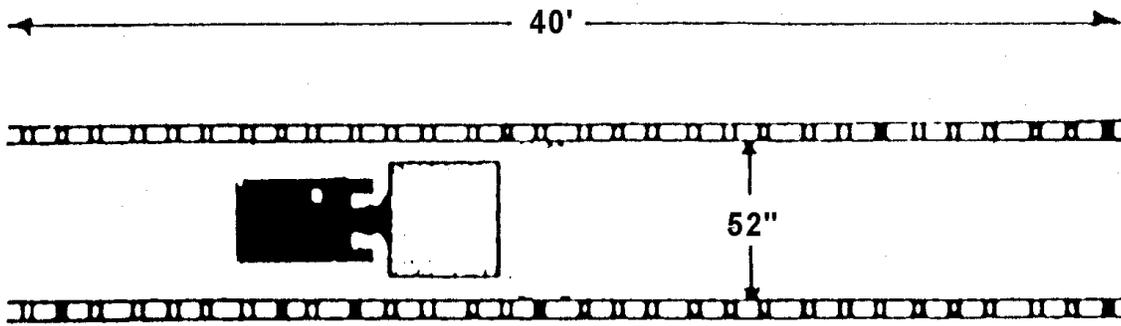


FIGURE C-1. Straight Aisle Course

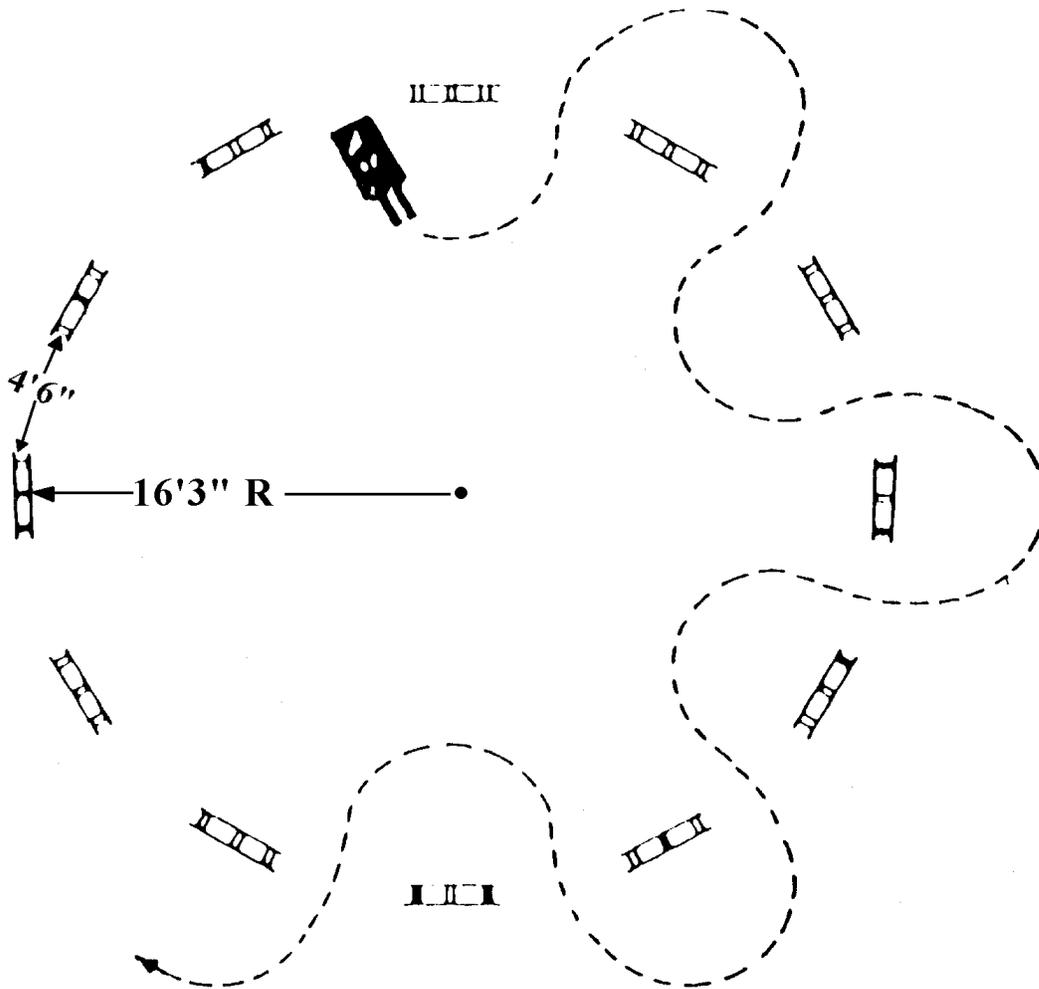


FIGURE C-2. Weaving Obstacle Course

## LESSON NO. 7

### Storage/Stowage

#### Day 3 - Classroom 0.5 Hours, Worksite 3.5 Hours

1. OBJECTIVE. Students will be instructed to safely operate MHE, properly store/stow unit loads, spotter requirements and securing MHE.
2. SAFETY PRECAUTIONS TO BE OBSERVED. Instructor shall review selected areas from [chapter 4](#).
3. LESSON OUTLINE.
  - a. Pre-operational inspection on the forklift truck using MHE Inspection Form ([figure 6-1](#)) and inspection procedures identified in [chapter 6](#).
  - b. Each student will move 6 unit loads (nominal 48 x 40 x 36 inches weighing at least 500 pounds), one pallet at a time, using the following procedures: [unit loads will be arranged three high by two wide]
    - (1) Using a forklift and fork stops, if required, approach within 6 inches of the stack of pallets.
    - (2) Stop forklift truck and raise forks to proper height of highest tiered pallet.
    - (3) Enter pallet fully and stop.
    - (4) With foot on the brake, raise the pallet approximately 2 inches and tilt back.
    - (5) Look over both shoulders, sound horn and back straight away until you've cleared the stack or any other obstructions.
    - (6) Stop forklift truck and, with foot on the brake, lower the pallet approximately 4 inches above the ground/deck.
    - (7) Move the pallet to the staging area to begin block stow and stop. The first pallet must be square on the ground/deck. All other pallet must be aligned tight to the first pallet.
    - (8) With foot on the brake, raise the pallet 6 inches above the stow location.
    - (9) Level the pallet and drive forward to the proper location where the pallet is to be set down and stop.
    - (10) With foot on the brake, set the pallet down.

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(11) Look over both shoulders, sound horn and back straight away clearing the pallet and any other obstructions. Drive the empty forklift truck to transport remaining pallet loads.

(12) Lift next pallet load repeating the same steps. Continue these procedures until all six pallet loads have been moved and stacked three high by two wide.

(13) Continue driving the prescribed driving requirements, observing all the safety regulations, until all students have experienced operating the forklift truck and have undertaken the spotter's responsibilities.

c. Upon completion of step b, perform a post-operational inspection using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#). Lastly, secure the MHE.

4. TEACHING PROCEDURES. Instructor shall demonstrate each step in the lesson outline.

5. INSTRUCTIONAL AIDS.

a. Movie (Color of Danger)

6. EQUIPMENT AND MATERIALS.

a. Worksite

b. 4,000/6,000-pound Forklift Truck

c. Palletized unit loads, as required

## LESSON NO. 8

### Operating MHE In Confined Areas

#### Day 3 - Classroom 1.0 Hour, Worksite 3.0 Hours

1. OBJECTIVE. Students shall be instructed to safely operate MHE in confined areas, such as small magazines and railcars.
2. SAFETY PRECAUTIONS TO BE OBSERVED. Instructor shall review selected areas from [chapter 4](#).
3. LESSON OUTLINE.
  - a. Inspect the following items on the boxcar:
    - (1) Wheels are chocked before any loading or unloading operation, except for pier wharf or MILVAN/ISO Container operations.
    - (2) Doors on loading dock are fully opened.
    - (3) Floor is in good condition with nails and dunnage removed.
  - b. Using local procedures, ensure the correct bridgeplate is used. Inspect the bridgeplate for the following:
    - (1) Enough strength to support the load and the forklift truck.
    - (2) No broken welds or other deformations.
    - (3) Properly positioned and secured.
    - (4) Correct bridgeplate (inboard or outboard).
  - c. Pre-operational inspection on the forklift truck using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#).
  - d. Students will move 8 unit loads (nominal 48 x 40 x 36 inches weighing at least 500 pounds), one load at a time, into the boxcar using the following procedures:
    - (1) Ensure the fork carriage is centered.
    - (2) With foot on the brake, lift the unit load and tilt back.
    - (3) Approach the corner of the boxcar parallel to and within 2 inches of the side.

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- (4) With foot on the brake, level the unit load.
- (5) Drive squarely up to and touch the end of the boxcar.
- (6) With foot on the brake, move the unit load to the left or right until touching the side of the boxcar.
- (7) With foot on the brake, lower the unit load to the floor. Unit load should be flush against the side/end of the boxcar.
- (8) Look back over both shoulders, sound horn and back straight away until forks are clear of the pallet.
- (9) Repeat steps d(1) through d(8) for the opposite corner of the boxcar.
- (10) Repeat steps d(1) through d(8) for the opposite end of the boxcar.
- (11) For stacking unit loads, two tier high, repeat steps d(1) through d(4).
- (12) Stop forklift truck within 6 inches of the previously positioned unit load.
- (13) Raise unit load approximately 6 inches above the previously positioned unit load.
- (14) Repeat steps d(6) and d(7).
- (15) Repeat these procedures until all 8 unit loads have been positioned in the boxcar. Continue with this training exercise, observing all the safety regulations, until all students have experienced operating the forklift truck.

e. Upon completion of step d, perform a post-operational inspection using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#). Lastly, secure the MHE.

#### 4. TEACHING PROCEDURES.

- a. Instructor shall demonstrate each step in the lesson outline.

#### 5. EQUIPMENT AND MATERIALS.

- a. 4,000/6,000-pound Forklift Truck
- b. Two DODX railcars or, if not available, two simulated railcars.
- c. Eight palletized unit loads.
- d. Two bridgeplates.
- e. Loading dock.

## LESSON NO. 9

### Handling Containers

#### Day 4 - Classroom 1.0 Hour, Worksite 3.0 Hours

1. OBJECTIVE. Students shall be instructed in the handling of missile and other long containers with MHE and spotter requirements.
2. SAFETY PRECAUTIONS TO BE OBSERVED. Instructor shall review selected areas from [chapter 4](#).
3. LESSON OUTLINE.
  - a. Pre-operational inspection on the forklift truck using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#).
  - b. Verify that the trailer wheels are chocked to prevent vehicle movement.
  - c. Verify that the trailer loading area is free of nails and dunnage.
  - d. Position 6 Mk 372 Mods Containers onto a flatbed trailer (three containers wide and two high) using MIL-STD-1320-18.
    - (1) Align forklift truck with container; ensure forks are properly spaced to fit into fork pockets.
    - (2) If required, ensure fork stops are properly installed to prevent forks from protruding through the container.
    - (3) Insert forks though fork pockets, lift container approximately 2 inches, and tilt back.
    - (4) Look over both shoulders and back away from the stack until clear.
    - (5) Lower the container approximately 4 inches from the ground/deck. Move the container to the desired location on the flatbed trailer.
    - (6) With foot on the brake, level forks and raise the container high enough to clear the bed of the trailer.
    - (7) Following the spotter's directions, drive forward and lower the container in the desired position on the flatbed trailer.

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(8) Look back over both shoulders, sound horn and back forklift truck straight away until forks clear the container and the flatbed trailer. Lower forks approximately 4 inches above the ground/deck.

(9) Repeating steps d(1) through d(8) to position the second container on the opposite side of the trailer.

(10) Repeating steps d(1) through d(8), position the third container on top of the first container, fourth container on top of second container, etc., ensuring the interlocks between the containers are fully engaged.

(11) Repeat the above steps to stack the containers on both sides of the trailer, ensuring that they are flush against the blocking and aligned properly fore and aft on the flatbed trailer.

(12) Continue with this training exercise, observing all the safety regulations, until all students have experienced operating the forklift truck.

e. Upon completion of step d, perform a post-operational inspection using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures identified in [chapter 6](#). Lastly, secure the MHE.

#### 4. TEACHING PROCEDURES.

a. Instructor shall demonstrate each step in the Lesson Outline.

#### 5. INSTRUCTIONAL AIDS

a. Classroom - Chalkboard

b. Worksite - Area, as required

#### 6. EQUIPMENT AND MATERIALS (Worksite)

a. 4,000/6,000-pound Forklift Truck

b. 6 Mk 372 Mods Container or other available containers.

c. One flatbed trailer or raised platform.

## LESSON NO. 10

### Operating Electric Pallet Trucks

#### Day 4 - Worksite 4.0 Hours

1. OBJECTIVE. Students shall learn the proper procedures for inspecting, operating and skills in maneuvering an electric pallet truck over pre-designated obstacle courses.
2. SAFETY PRECAUTIONS TO BE OBSERVED. Instructor shall review selected areas from [chapter 4](#).
3. LESSON OUTLINE.
  - a. Perform a pre-operational inspection on the electric pallet truck using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures found in [chapter 6](#).
  - b. Lifting and lowering a pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds).
    - (1) Approach the pallet squarely, aligning forks between the top and bottom decking and an equal distance from the center stringer.
    - (2) Enter forks squarely into the pallet, penetrating not less than three-quarters through the pallet. Prior to lifting the pallet, verify that the pallet's base is not resting on the pallet truck's wheels.
    - (3) With brakes on, lift the pallet approximately 2 inches above the ground/deck.
    - (4) Lower pallet to the ground/deck.
    - (5) Look back over both shoulders and, if equipped, sound horn and back straight away from the pallet until the forks are clear of the pallet.
  - c. Designated obstacle courses. Using the above instructions, lift the same pallet and drive the following designated obstacle courses in the forward and reverse directions as demonstrated by the instructor.
    - (1) A 40-foot long by 52-inch wide straight aisle. (Refer to [figure C-1](#)).
    - (2) A 32-½ foot diameter (16 feet, 3-inch radius) circle passing obstacles alternately on the left and the right. (Refer to [figure C-2](#)) An alternate obstacle course for ships, such as cruisers, frigates and destroyers, that have limited deck space is shown in [figure C-3](#).
    - (3) Continue driving the prescribed obstacle courses, observing all the safety regulations, until all students have experienced operating the forklift truck and have undertaken the spotter's responsibilities.

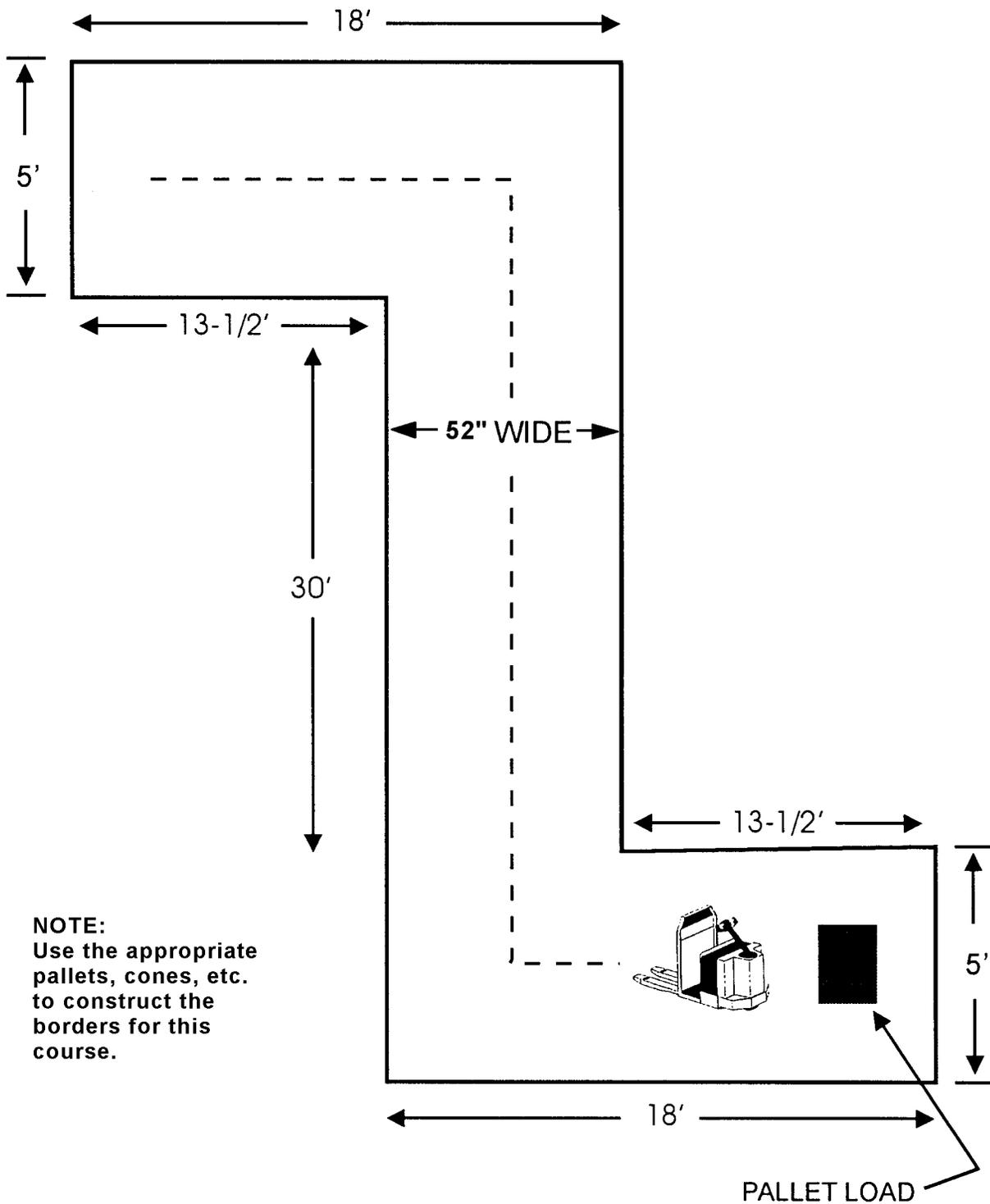


FIGURE C-3. Alternate Shipboard Obstacle Course

d. Upon completion of step c, perform a post-operational inspection, using MHE Inspection Form (figure 6-1) and the inspection procedures identified in chapter 6, and secure pallet truck.

4. TEACHING PROCEDURES.

a. Instructor shall demonstrate each step in the Lesson Outline.

5. EQUIPMENT AND MATERIALS.

a. NAVSUP Form 1280

b. Type E/EE Electric Pallet Truck.

c. Pallet loads.

d. Pallets, cones, etc. (as appropriate to similar obstacle course borders).

## LESSON NO. 11

### Proficiency Test

#### Day 5 - Jobsite 8.0 Hours

1. OBJECTIVE. Students shall satisfactorily pass a written test and, while observing all safety precautions and regulations, satisfactorily complete an operational skills demonstration consisting of inspecting, operating, and securing MHE.

2. LESSON OUTLINE. This proficiency test shall be conducted in two sections: written and operational skills demonstration. The instructor shall prepare a local written test or request one from the Naval PHST Center (Code 71). This test shall minimally consist of 25 multiple choice questions based on the operational safety regulations in [chapter 4](#). The retention of the graded written test is at the discretion of the instructor's CO/OIC in accordance with local procedures. The operational skills demonstration shall consist of six parts given in a continuous sequence as follows:

a. Part 1 - Students shall perform a pre-operational MHE inspection using MHE Inspection Form ([figure 6-1](#)) and the inspection procedures found in [chapter 6](#). The students shall verbally address each inspection criteria to the instructor. The instructor shall deduct one point for each inspection criteria not reported or performed.

b. Part 2 - Students shall break out one pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds) from a stack of four pallets (two high by two wide) or two pallets (side-by-side) for electric pallet trucks only. The instructor shall deduct one point for each of the following applicable infractions:

- (1) Failure to fasten seat belt, if equipped.
- (2) Improper use of spacer.
- (3) Bumping a pallet.
- (4) Improper penetration of forks.
- (5) Forks protruding through pallet.
- (6) Lifting pallet with tilt control.
- (7) Failure to look back over both shoulders before traveling in reverse direction.
- (8) Failure to sound horn before traveling in reverse direction.
- (9) Failure to have full tilt on load before traveling in any direction.
- (10) Dragging pallet to be lifted across the top of the remaining pallet.

## NAVSEA SW023-AH-WHM-010 SECOND REVISION

(11) Failure to lower pallet approximately 4 inches above the ground/deck before traveling.

(12) Foot not on brake when lifting and tilting.

c. Part 3 - Students shall drive with a pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds) in the forward and reverse directions through a straight aisle course (40 foot long x 52 inch wide) with 12 pallets, cones, etc., equally spaced along each side. Refer to [figure C-1](#) for straight aisle course illustration. If the student hits 2 or more pallets, cones, etc., then the student shall not continue the test.

d. Part 4 -

(1) Students shall drive one pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds) through a 32-½ foot diameter obstacle course. The circle's perimeter is formed by placing 12 pallets, cones, etc., at an equal distance spaced 4 feet 6 inches apart from each other. Refer to [figure C-2](#) for the obstacle course illustration. Students will be required to weave in and out between the pallets, cones, etc., in the forward and reverse directions. If the student hits two or more pallets, cones, etc., the student shall not continue this test.

(2) Alternate (Electric Pallet Trucks Only). Aboard ships with limited deck space, such as cruisers, frigates, destroyers, etc., the alternate obstacle course shall be configured in accordance with [figure C-3](#). Students shall lift one pallet (nominal 40 x 40 x 36 inches weighing at least 500 pounds), travel with the load in the reverse direction to the final destination, and then drive in the forward direction back to the original location. The course's borders shall be configured using the appropriate pallets, cones, etc. If the student hits two or more pallets, cones, etc., the student shall not continue the test.

e. Part 5 - Students shall restow one pallet (nominal 48 x 40 x 36 inches weighing at least 500 pounds) onto a stack of four pallets (two high by two wide) or two pallets (side-by-side) for electric pallet trucks only. The instructor shall deduct one point for each of the following applicable infractions:

- (1) Failure to restow pallet from opposite side.
- (2) Failure to level pallet within 6 inches of stow.
- (3) Failure to land pallet squarely.
- (4) Lowering pallet with tilt.
- (5) Bumping pallet into position.
- (6) Failure to look before backing.
- (7) Dragging pallet.
- (8) Failure to lower forks.

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(9) Improper use of spacer.

f. Part 6 - Students shall return the pallet to the original starting position and secure MHE. The instructor shall deduct one point for each of the following applicable infractions:

(1) Failure park MHE in the designated area.

(2) Failure to lower forks to the ground/deck.

(3) Failure to set the parking brake.

(4) Failure to neutralize controls.

(5) Failure to disconnect battery connector cable (electric only) after dismounting MHE.

(6) Failure to remove key.

(7) Each item verbally not reported or performed by the student to the instructor during the post-operational inspection of the MHE, using MHE Inspection Form ([figure 6-1](#)) and the procedures found in [chapter 6](#).

3. INSTRUCTIONAL PROCEDURES. Instructor shall read the instructions to the students, emphasizing that the students must have the ability to understand and follow written and verbal instructions.

4. INSTRUCTION AIDS.

a. Operational skill test raw score sheet.

b. MHE operator training certificate.

c. MHE operator written test.

5. EQUIPMENT AND MATERIALS.

a. Forklift truck or electric pallet truck, 4000/6000-pound capacity.

b. Four pallets (nominal 48 x 40 x 36 inches weighing at least 500 pounds).

c. MHE Inspection Form ([figure 6-1](#)).

d. Pallets, cones, etc. (as appropriate to simulate the obstacle course borders).

**OPERATIONAL SKILL TEST RAW SCORE SHEET**

<b>PART ONE: Pre-Operational Inspection</b>		<b>Deductions</b>
Color, Markings	Type	
	Restrictions	
	Test Date	
	Capacity	
Battery		
Static Tires or Straps		
External Conditions	Weldments	
	Loose or Missing Bolts	
	Lift Chains	
	Hoses - Leaks	
	Cylinders Leaks	
	Fork Stops	
	Forks	
	Fork Pins	
Battery Connector Cable		
Hydraulic Cylinders	Hoist	
	Tilt	
	Sideshift	
Brakes	Parking Brake	
	Foot Brake	
	Seat Brake	
Seat Belt		
Warning Device (Horn)		
TOTAL DEDUCTIONS PART ONE		

<b>PART TWO: Breakout Pallet</b>	<b>Deductions</b>
Seat belt not fastened	
Improper use of spacer	
Bumping pallet	
Improper penetration of forks	
Forks protruding through pallet	
Lifting pallet with tilt control	

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<b>PART TWO: Breakout Pallet</b>		<b>Deductions</b>
Failure to look before backing		
Failure to sound horn before backing		
Failure to have full tilt on pallet		
Dragging pallet		
Failure to lower pallet approximately 4 inches before traveling		
Foot not on brake when lifting and fitting		
<b>TOTAL DEDUCTIONS PART TWO</b>		

<b>PART THREE: Driving Through Straight Aisle</b>		<b>Deductions</b>
Forward	Pylons Hit	
	Stops/Slows	
Reverse	Pylons Hit	
	Stops/Slows	
<b>TOTAL DEDUCTIONS PART THREE</b>		

<b>PART FOUR: Obstacle Course</b>		<b>Deductions</b>
Forward	Pylons or Pallet Hit	
	Stops/Slows	
Reverse	Pylons or Pallet Hit	
	Stops/Slows	
<b>TOTAL DEDUCTIONS PART FOUR</b>		

<b>PART FIVE: Restow Pallet</b>		<b>Deductions</b>
Failure to restow pallet from opposite side		
Failure to level pallet within 6 inches of stow		
Failure to land pallet squarely		
Lowering pallet with tilt		
Bumping pallet into position		
Failure to look before backing		
Dragging pallet		
Failure to lower forks		
Improper use of spacer		
<b>TOTAL DEDUCTIONS PART FIVE</b>		

**NAVSEA SW023-AH-WHM-010 SECOND REVISION**

<b>PART SIX: Secure MHE</b>		<b>Deductions</b>
Failure to park in designated area		
Failure to lower forks to the ground/deck		
Failure to set parking brake		
Failure to neutralize controls		
Failure to disconnect battery connector cable (electric drive only) after dismounting MHE		
Failure to remove key		
<b>Post-Operational Inspection</b>		<b>Deductions</b>
Color, Markings	Type	
	Restrictions	
	Test Date	
	Capacity	
Battery		
Static Tires or Straps		
External Conditions	Weldments	
	Loose or Missing Bolts	
	Lift Chains	
	Hoses - Leaks	
	Cylinders Leaks	
	Fork Stops	
	Forks	
	Fork Pins	
Battery Connector Cable		
Hydraulic Cylinders	Hoist	
	Tilt	
	Sideshift	
Brakes	Parking Brake	
	Foot Brake	
	Seat Brake	
Seat Belt		
Warning Device (Horn)		
<b>TOTAL DEDUCTIONS PART SIX</b>		

**NAVSEA SW023-AH-WHM-010 SECOND REVISION**

The total number of deductions from the six parts must be 25 or less to pass the operational skill test.

PART 1	PART 2	PART 3	PART 4	PART 5	PART 6	TOTAL

This form is provided as an example and its use is at the instructors' discretion. The retention of this information is at the discretion of the instructors CO/OIC in accordance with local procedures.

**MHE OPERATOR TRAINING CERTIFICATE**

The student named below successfully completed the written and operational skill demonstration tests and I recommend that the command issue the appropriate MHE license in accordance with NAVSEA SW023-AH-WHM-010.

Student Name (*last, first, middle initial*)

SSN	Rank/Grade	Parent Command
-----	------------	----------------

Instructor Name (*last, first, middle initial*)

SSN	Rank/Grade	Parent Command
-----	------------	----------------

MHE Types/Capacities that student initially demonstrated proficiency on	1.
	2.
	3.
	4.

Instructors' Signature and Date:

The student named above successfully demonstrates proficiency on the following MHE on the dates indicated and I recommend that the command upgrade the appropriate MHE license in accordance with NAVSEA SW023-AH-WHM-010.

MHE Type/Capacity	Instructor Signature and Date
MHE Type/Capacity	Instructor Signature and Date
MHE Type/Capacity	Instructor Signature and Date
MHE Type/Capacity	Instructor Signature and Date

This certificate is an example of the documentation that must be maintained by the parent command issuing the MHE license. The information must be documented and maintained, however the format is optional.

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<b>NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)</b>			
INSTRUCTION: Continue on 8 1/2" x 11" paper if additional space is needed.			
1. USE THIS REPORT TO INDICATE DEFICIENCIES, PROBLEMS, AND RECOMMENDATIONS RELATION TO PUBLICATIONS. 2. FOR CLASSIFIED TMDERS, SEE OPNAVINST 5510H FOR MAILING CLASSIFIED TMDERS.			
1. PUB NO. <b>SW023-AH-WHM-010</b>	2. VOL/PART	3. REV. NO./DATE OR TM CH. NO./DATE <b>2nd Rev/1 APR 1999 Change 1/15 MAR 2000</b>	4. SYSTEM/EQUIPMENT IDENTIFICATION
5. TITLE <b>Handling Ammunition and Explosives With Industrial Materials Handling Equipment (MHE)</b>			6. REPORT CONTROL NUMBER
7. RECOMMENDED CHANGES TO PUBLICATION			
PAGE NO. A	PARA- GRAPH B	C. RECOMMENDED CHANGES AND REASONS	
8. ORIGINATOR'S NAME AND WORK CENTER (Please Print)		9. DATE	10. DSN/COMM NO.
			11. TRANSMITTED TO
12. SHIP HULL NO. AND/OR STATION ADDRESS (Do Not Abbreviate)			

PLEASE CLOSE WITH TAPE - DO NOT STAPLE - THANK YOU

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## Operation Tips:

Hypertext Links are distinguished by the color blue. When positioned on a link, the mouse pointer will change shape to a hand pointing with the index finger. A single click will execute the link.

To backtrack your steps through the document, use the double arrow buttons on the tool bar. The left arrows move backwards. The right arrows move forwards.

Find utility is the large binocular button on the tool bar. The find is limited to the part of the document that is currently open.

Search utility is the small binocular over a page button on the tool bar. The search utility will search the entire text of the document. A results window will show which parts of the document that have hits. The files are listed in order of percentage of hits to the size of text, not the number of hits in a file. The pie chart over a page button on the tool bar will pop up the search results window. The button with a page and an arrow will take you to the next hit. Left arrow moves to the previous hit. Right arrow moves to the next hit. The search utility is only available in the Acrobat Reader with Search version. If the version of Acrobat Reader you have installed does not have the search utility, uninstall the Acrobat Reader and run the ESTDC CD-ROM installation again. Reference Search Tips below for more details.

To copy text from Acrobat, click on the abc button located on the tool bar. This will change the cursor from a hand to line. Now you will be able to highlight text and copy it to the clipboard and then paste it into other applications.

TMDRS can be populated electronically using the Acrobat Reader. The user types the information on the TMDR form and then prints that page. This information can be saved by using File->Save As... from the menu bar. You must save the file to a drive other than the CD-ROM.

## Printing Reference Documents:

Select Shrink to Fit option on the bottom of the Print Window. This will insure that the document will fit on the page. Some images scanned into Acrobat as the wrong size. If the paper size shows greater than 8.5 x 11, you must choose this option for the page to print without information being truncated.

## Search Tips:

### Searching for a NSN.

The FSC and NIIN which make up the NSN are on separate lines. To find the item you are looking for it is suggested you search for only the NIIN. The NIIN is the last 9 digits of the NSN.

### Searching for a NIIN.

You must include the dashes in the search string (ex. 01-234-5678).

### Searching for a numeric NALC.

You most likely will receive many hits for this search. The SW020 table file is split into multiple PDF files. They are named SW020 Text and the range NALCs of each section of table 3-1. View the item where your NALC falls within the range (letters precede numbers).

### Searching for character strings.

When searching for a character string, it is recommended to use wildcards around it. For example, it is recommended you do the following when looking for the MJU-8 decoy flare.

If you use the search the string **MJU-8**, you may find everything containing the string MJU-8. Some times Acrobat Search will hit on all occurrences of MJU-8 in the text, other times it won't. To ensure you hit on all occurrences of MJU-8, surround it with wildcards using the search string **\*MJU-8\***.

POINTS OF CONTACT:

Installation/Operation of CD-ROM: Greg Faczak  
COM (732) 866-2949, DSN 449-2949  
email: faczakgj@phst.navy.mil

Technical Data Inquiries: for NAVSEA OP3565 (HERO Manual),  
NAVSEA SW020-AC-SAF-010,  
NAVSEA OP5 Volume 1 (Explosive Safety Ashore),  
Truckloads, Railcar, and Unit Loads Index

Jeri DiMaggio  
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email: dimaggiojj@phst.navy.mil

for NAVSEA S9571-AA-MMA-010 (UNREP Manual)  
NAVSEA OP 4 (Explosive Safety Afloat),  
NAVSEA SW023-AH-WHM-010 (MHE Manual)

Mike Kraynick  
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for NAVSEA SW020-AF-ABK-010  
(Drivers and Inspectors Manual)  
NAVSEA SW020-AG-SAF-010  
(Transportation Safety Handbook)

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