

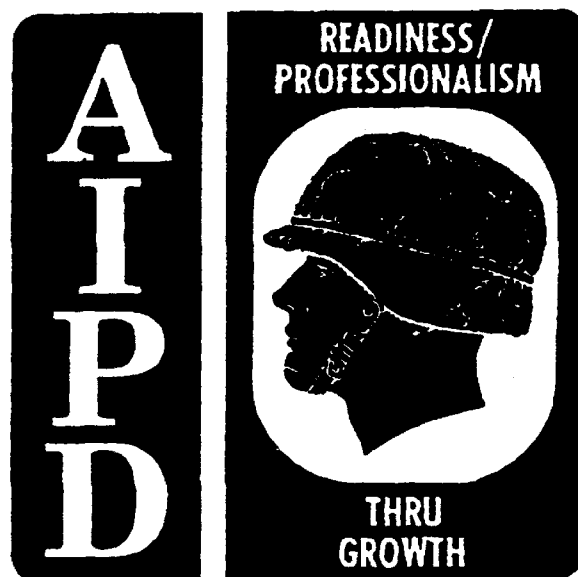
**SUBCOURSE**  
**MM2600**

**EDITION**  
**7**

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**US ARMY AMMUNITION SPECIALIST**  
**MOS 55B SKILL LEVELS 1 AND 2 COURSE**

**HANDLING AMMUNITION AND IDENTIFYING**  
**FIRE AND CHEMICAL HAZARD SYMBOLS**



**US ARMY ORDNANCE**  
**MISSILE AND MUNITIONS CENTER AND SCHOOL**

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**THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT**  
**ARMY CORRESPONDENCE COURSE PROGRAM**

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**US Army Ammunition Specialist  
MOS 55B Skill Levels 1 and 2 Course**

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**HANDLING AMMUNITION AND IDENTIFYING  
FIRE AND CHEMICAL HAZARD SYMBOLS**

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**Subcourse MM2600**  
EDITION 7  
2 CREDIT HOURS  
REVIEWED: 1988

US Army Ordnance Missile and Munitions Center and School  
Redstone Arsenal, Alabama

**MM2600**

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CONTENTS

**INTRODUCTION, v**

Supplementary Requirements, v. Credit Hours, v.

**LESSON 1: AMMUNITION HANDLING AND MATERIALS HANDLING EQUIPMENT (Tasks 093-400-1125, 093-400-1126, 093-400-1129, 093-400-1152, 093-400-1157, 093-400-1162, 093-400-1201, 093-400-1229, and 093-400-1230), 1**

**Identifying Materials Handling Equipment, 1**

Manual Materials Handling Equipment, 1. Powered Materials Handling Equipment, 4. Other Types of MHE, 10. Load Testing, 11.

**Handling Ammunition, 11**

Manual Handling, 11. Handling with Powered MHE, 12. Handling Operations at Railheads, 16. Handling Operations Using Trucks and Trailers, 16. Handling Operations at Storage Sites, 17.

**REVIEW EXERCISES, 18**

**LESSON 2: FIRE SYMBOLS AND CHEMICAL HAZARD SYMBOLS (Task 093-400-1163), 20**

**Identifying Fire Symbols, 20**

**Identifying Chemical Hazard Symbols, 21**

Full Protective Clothing Symbols, 23. Breathing Apparatus Symbol, 23. Apply No Water Symbol, 23. Chemical Agent Symbols, 23.

**Determining Fire Symbols for Chemical Munitions, 24**

**REVIEW EXERCISES, 25**

**EXTRACTS OF TM 9-1300-206, 27**

**EXERCISE SOLUTIONS, 43**

## INTRODUCTION

The primary mission of ammunition specialists is to keep combat units supplied with serviceable ammunition. The average ammunition company is designed to issue, receive, store, and re-warehouse 1,680 tons of ammunition a day. To meet this requirement in the safest and most efficient manner, special handling procedures have been established and a variety of materials handling equipment has been produced.

The most important consideration in an ammunition area is safety. Fire prevention and fire fighting are constantly stressed as the most pertinent of all safety precautions and procedures involving explosives and chemical agents. Fire symbols or chemical hazard symbols, or both, are placed at all storage sites as a guide for fire-fighting personnel. These symbols tell fire-fighting personnel immediately what type of ammunition is stored in a location, the hazard involved, and the means that must be used to extinguish the fire.

As an ammunition specialist, you must be familiar with materials handling equipment and safe handling procedures for ammunition. You must also be able to identify correctly the fire and chemical hazard symbols displayed in ammunition areas and be able to interpret them.

### **Supplementary Requirements**

There are no supplementary requirements in material or personnel for this subcourse. You will need only this book and will work without supervision.

### **Credit Hours**

Two credit hours will be awarded for the successful completion of this subcourse--a score of at least 70 on the end-of-subcourse examination.

## MM2600, Lesson 1

### Lesson 1

#### AMMUNITION HANDLING AND MATERIALS HANDLING EQUIPMENT

**Tasks.** This lesson is based on the following tasks from STP 9-55B12-SM:

- 093-400-1125, Offload Ammunition from Transport.
- 093-400-1126, Process Unit Returns.
- 093-400-1129, Load Ammunition for Transport.
- 093-400-1152, Prepare Ammunition for Storage.
- 093-400-1157, Place Ammunition in Magazine Storage Site.
- 093-400-1162, Issue Ammunition.
- 093-400-1201, Prepare Ammunition for Shipment.
- 093-400-1229, Operate Forklift.
- 093-400-1230, Perform Operator Maintenance on Forklift.

**Objectives.** When you have completed this lesson, you should be able to identify representative types of materials handling equipment and to identify handling safety procedures associated with each type.

**Conditions.** You will have this subcourse book and work without supervision.

**Standard.** You must score at least 70 on the end-of-subcourse examination that covers this lesson and lesson 2.

#### IDENTIFY MATERIALS HANDLING EQUIPMENT

Many types of materials handling equipment (MHE) are used in ammunition units. They are both manual and powered. Some examples of MHE and their uses will be covered in this lesson.

#### Manual Materials Handling Equipment

The most common manual materials handling equipment for ammunition are conveyors, pallet trucks, and field expedients.

**Conveyors.** Conveyors (figure 1-1) are metal platforms made in sections 12 or 16 inches wide and 10 feet long. They are fitted with evenly-spaced rollers or small, uniformly spaced wheels that turn freely in the frame of the platform. The conveyor is a simple device on which single ammunition boxes can be rolled easily from one point to another.

Conveyor sections are equipped with pins and hooks so that the sections may be fastened together to make a conveyor of the length desired. Some conveyors are equipped with adjustable supports (legs), but other means of support are usually used in ammunition handling operations--sand-filled boxes, empty boxes, or wooden stands (horses). Curved 45- and 90-degree sections are also available.

MM2600, Lesson 1

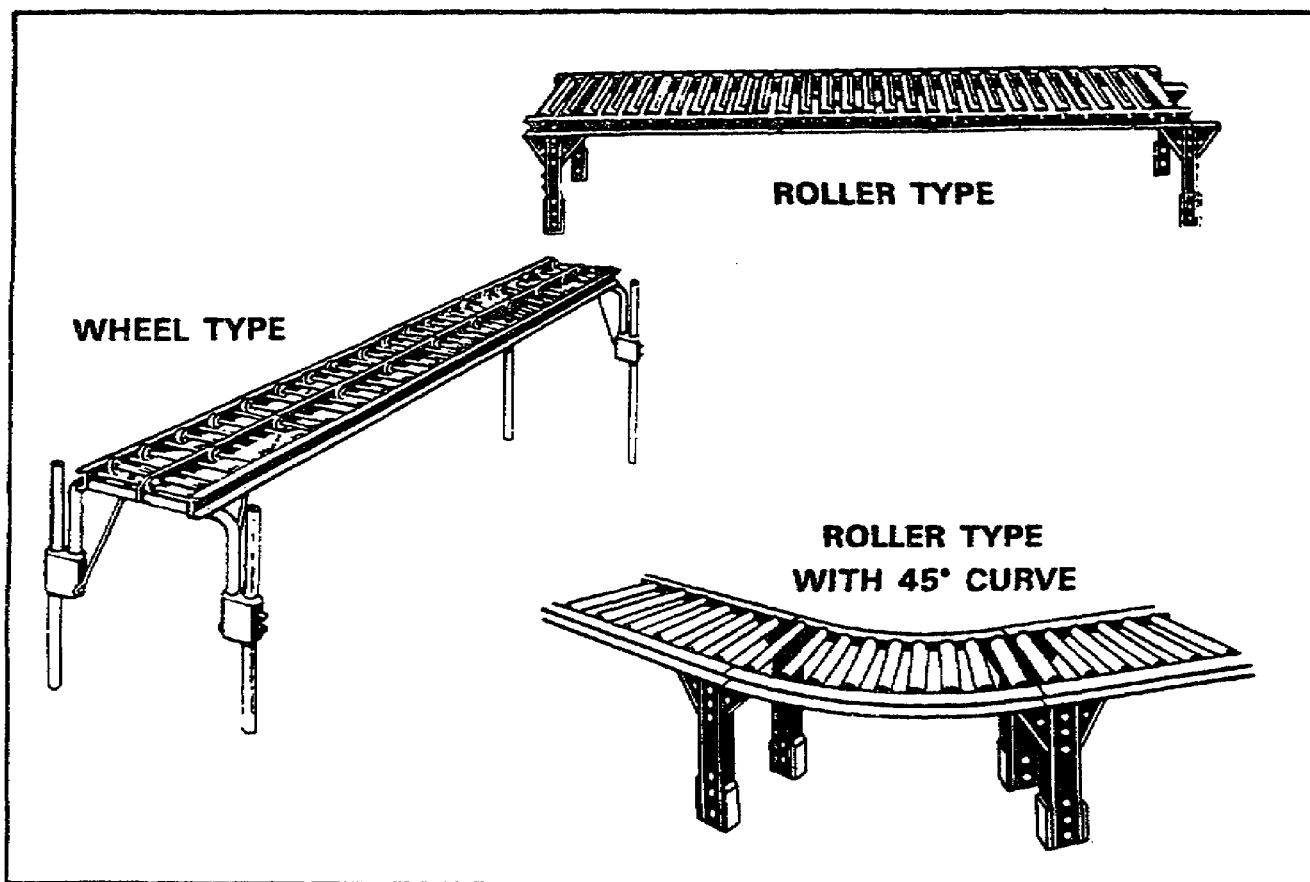


Figure 1-1. Conveyors.

**Pallet Trucks.** Pallet trucks (figure 1-2) are used to move palletized ammunition and large, heavy guided missiles or nuclear special weapons containers on the floor of a magazine, workshop, or railroad car. Two types of pallet trucks are available, the manually powered and the electrically powered. Each type has a load capacity of 4,000 pounds, and each type is steered manually.

The manually-powered pallet truck is used to move loads short distances in confined work areas where a forklift is not practical, such as magazines, railroad cars, and maintenance shops. Its lifting mechanism works by a hand-operated hydraulic lift.

The electrically-powered pallet truck is used to move larger loads longer distances and up and down slopes and ramps. It is equipped with a battery that activates the lifting mechanism and provides power for movement.

**Field Expedients.** Mechanical MHE may not always be available, but the ammunition must still move. There may be times when ammunition personnel must cut banding on pallets and handle the ammunition by hand. Ammunition and transportation personnel must then improvise methods to speed up movement and make the task easier. Some methods that have been used include chutes (figure 1-3) and the ladder slide (figure 1-4).

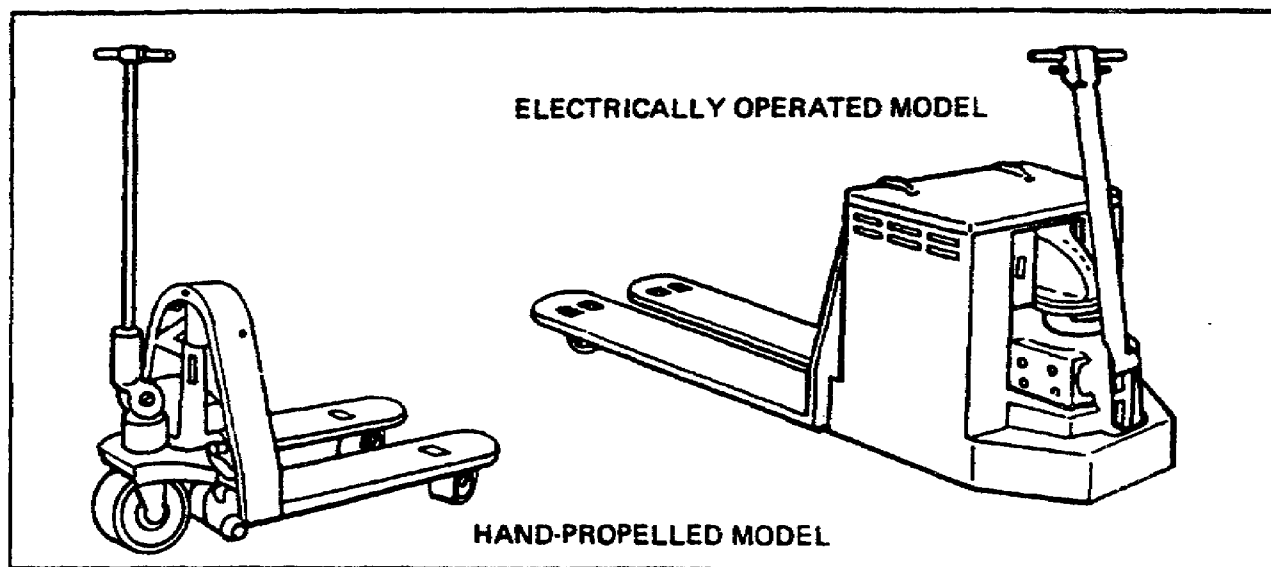


Figure 1-2. Pallet Trucks.

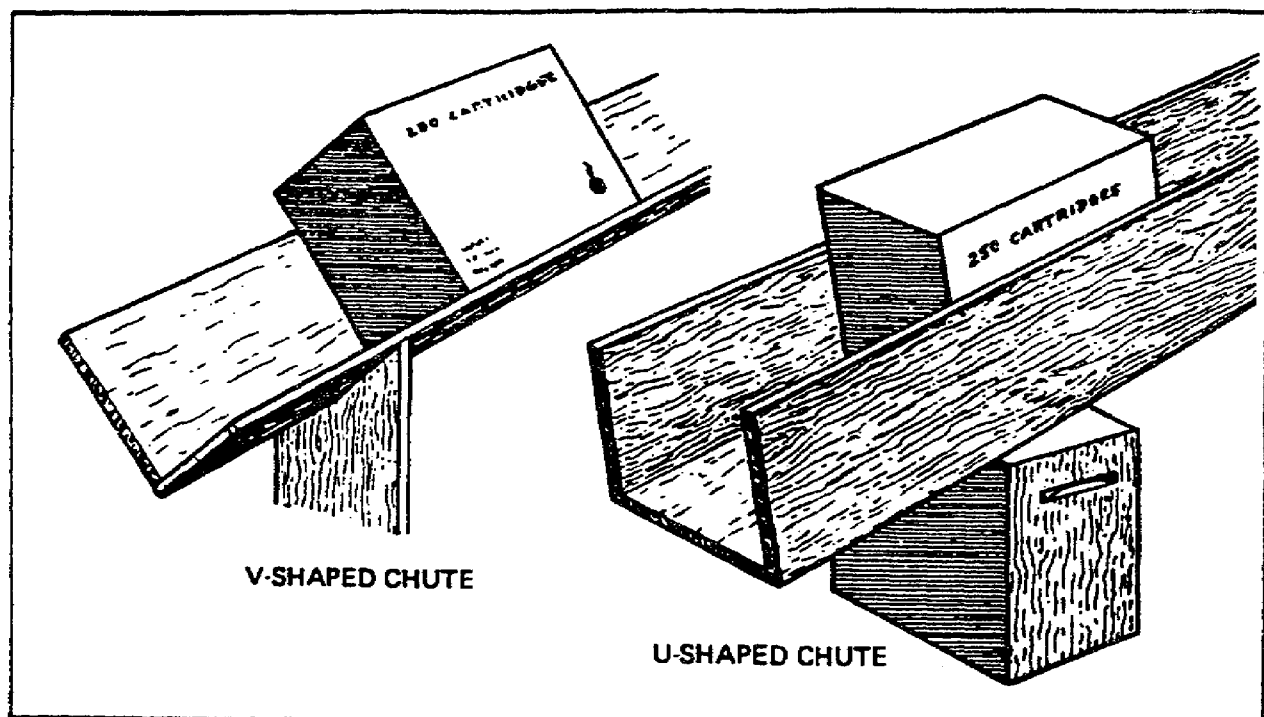


Figure 1-3. Chutes.

The V-shaped chute eliminates some handling and carrying of boxed ammunition. It is easy to build. It can be constructed from dunnage planks. It may be waxed or greased to facilitate the movement of boxes. The U-shaped chute is similar, but it requires more material for construction. The U-shaped chute is safer to use, but the width of the chute limits the size of boxes it can handle.



## MM2600, Lesson 1

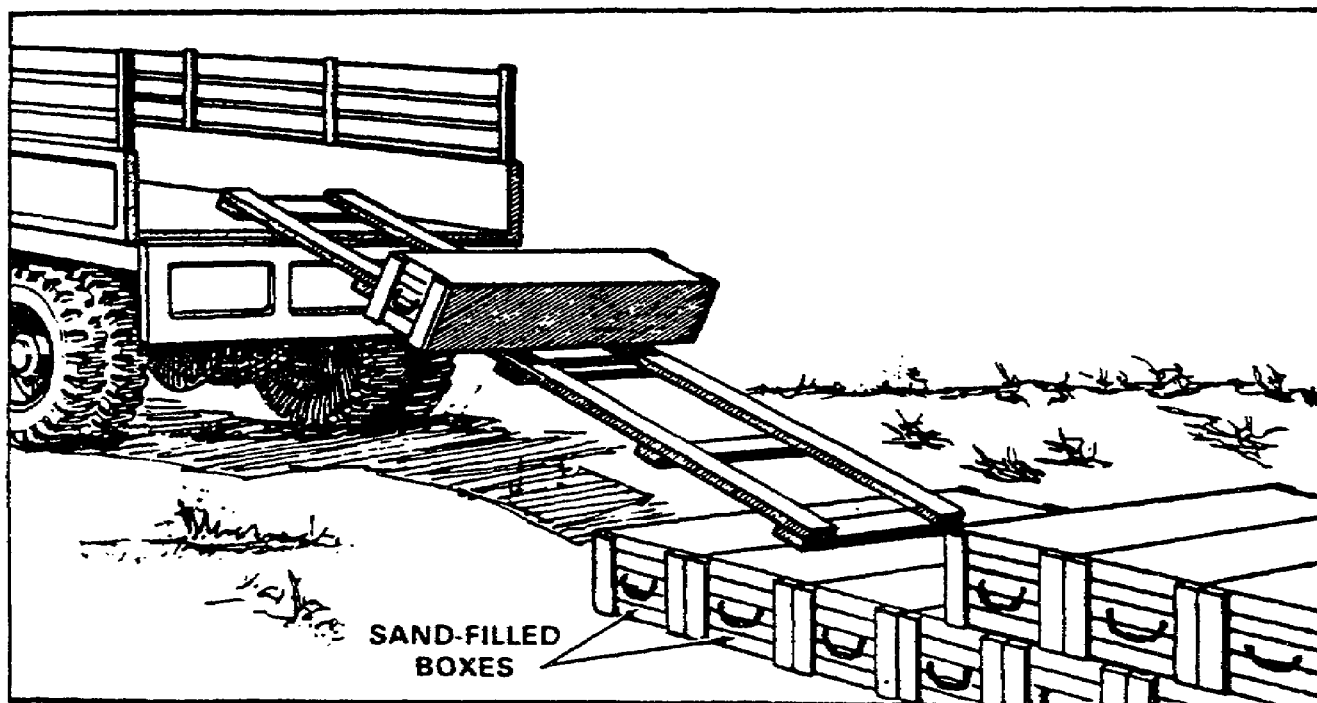


Figure 1-4. Ladder Slide.

The ladder slide is easy to build from 2 x 4 or 4 x 4 dunnage, small tree trunks, or other available material. It may be used to unload boxes from truck to stack, from railroad car to truck, or from railroad car to ground. The most practical length for a ladder slide is 10 feet, and it should be narrow enough to accommodate the boxes being handled. The slide should be well supported by horses or sand-filled boxes, with grease or wax applied to its surface. The slide makes a good improvised conveyor.

### Powered Materials Handling Equipment

Powered by gasoline, diesel fuel, or electricity, this equipment commonly includes cranes and forklifts.

**Cranes.** Some of the cranes now being used in ammunition units include the wrecker crane, M543: the 5-ton crane; and the 20-ton crane.

The wrecker crane (figure 1-5) was designed primarily as a recovery vehicle, but it has proved very useful in ammunition units for handling palletized separate-loading projectiles and large, bulky guided missile and nuclear special weapons containers. It is mounted on a vehicle chassis, is engine powered, is hydraulically operated, and has a telescoping extendable boom 10 to 18 feet long. The crane can rotate 360 degrees with the boom elevated 45 degrees. The chassis has four outriggers that can be lowered to support the weight of heavy loads. Using the outriggers takes all the weight off the wheels and the suspension system. With the outriggers in place and minimum boom extension (10 feet), the maximum lift capacity is 10,000 pounds.

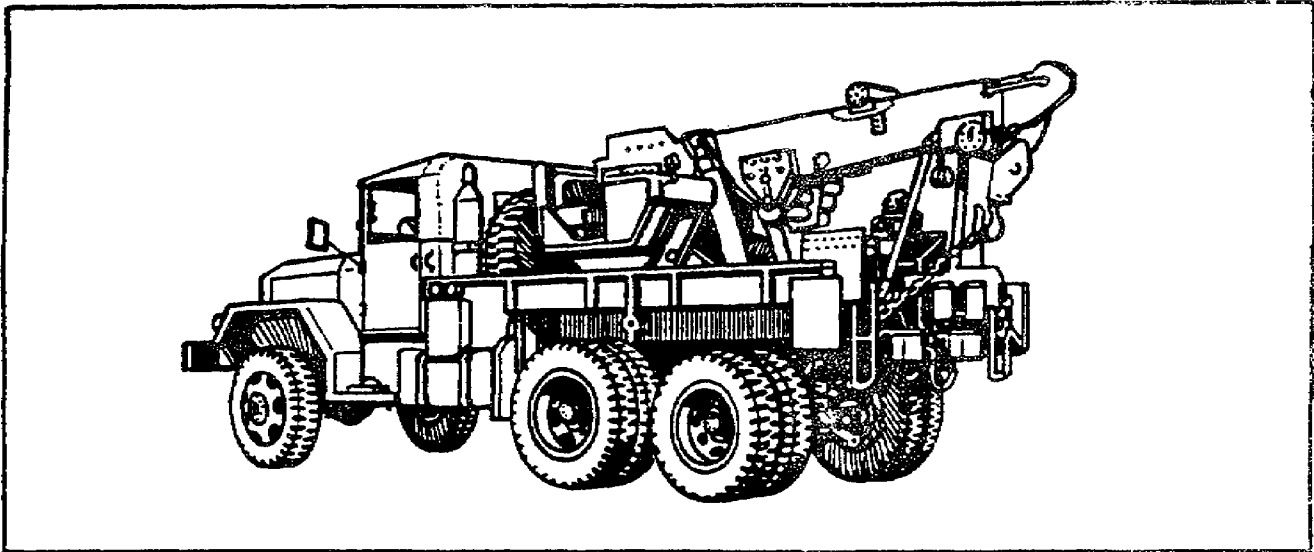


Figure 1-5. Wrecker Crane, M543.

The 5-ton crane (figure 1-6) is powered by a diesel engine. It is wheel mounted and has a telescoping boom, a 6-foot manual boom extension, and a front-end-mounted bulldozer blade. It is designed for rough terrain and can go through water up to 36 inches deep. It is center mounted on its carrier and hydraulically operated. The boom has a full 360-degree continuous rotation capability. When the boom is retracted, it is 12 feet long from the front end to the swing center. When extended, it is 20 feet long. It may be extended another 6 feet by adding the manual extension. The boom is equipped with an hydraulically-operated cable hoist. The carrier is equipped with four independently-operated

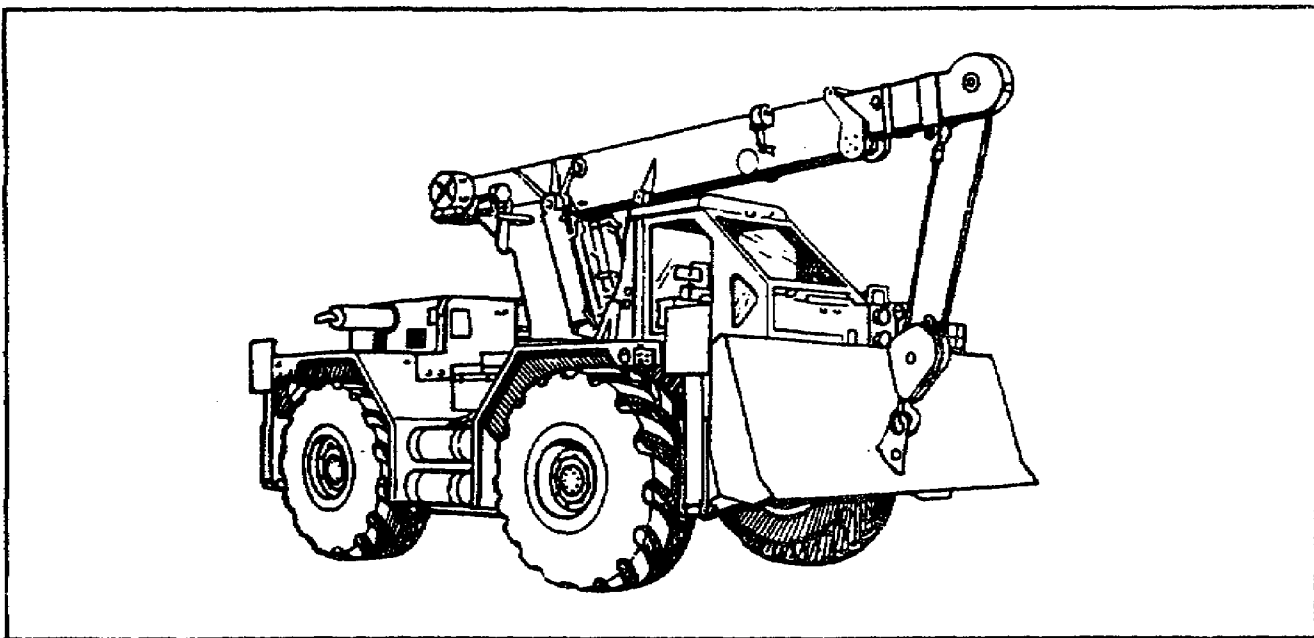


Figure 1-6. 5-ton Crane.

## MM2600, Lesson 1

outriggers that are also hydraulically operated. The outriggers provide stability when operating on a slope or with the boom fully extended. With minimum boom extension and outriggers in place, the crane has a lift capacity of 10,000 pounds. With the boom fully extended without outriggers in place, the lift capacity is 1,800 pounds. Variations in boom extension and outrigger use allow varied lift capabilities between 1,800 and 10,000 pounds. The crane's bulldozer blade is used to clear a path for the crane through normal debris or snow.

The 20-ton wheel-mounted crane is used for handling containerized loads of ammunition, palletized separate-loading projectiles, and large guided missile containers. It is wheel mounted and designed for rough terrain. The boom is a 30-foot girder type, cable-winch operated with a block-and-tackle cable hoist. The cable has a lift capacity of 40,000 pounds (20 tons).

**Forklifts.** Forklifts currently being used in ammunition units may include the 10,000-pound, 6,000-pound, and 4,000-pound rough terrain forklifts and the 4,000-pound electric forklift.

The 6,000-pound rough terrain forklift (RTFL) (figure 1-7) has been the workhorse of the ammunition field for more than a decade. It can operate over all types of terrain. Its fork assembly can hydraulically extend, retract, raise, lower, tilt forward, tilt backward, and tilt sideways. The RTFL has three steering options, using both front and rear axles (figure 1-8). They are standard two-wheel steering; cramp steering, which gives it a short turning radius; and crab steering, which enables it to move sideways at a 20-degree angle. The 6,000-pound RTFL is also equipped with two-wheel and four-wheel drive, enabling it to traverse mud, sand, and steep grades with ease.

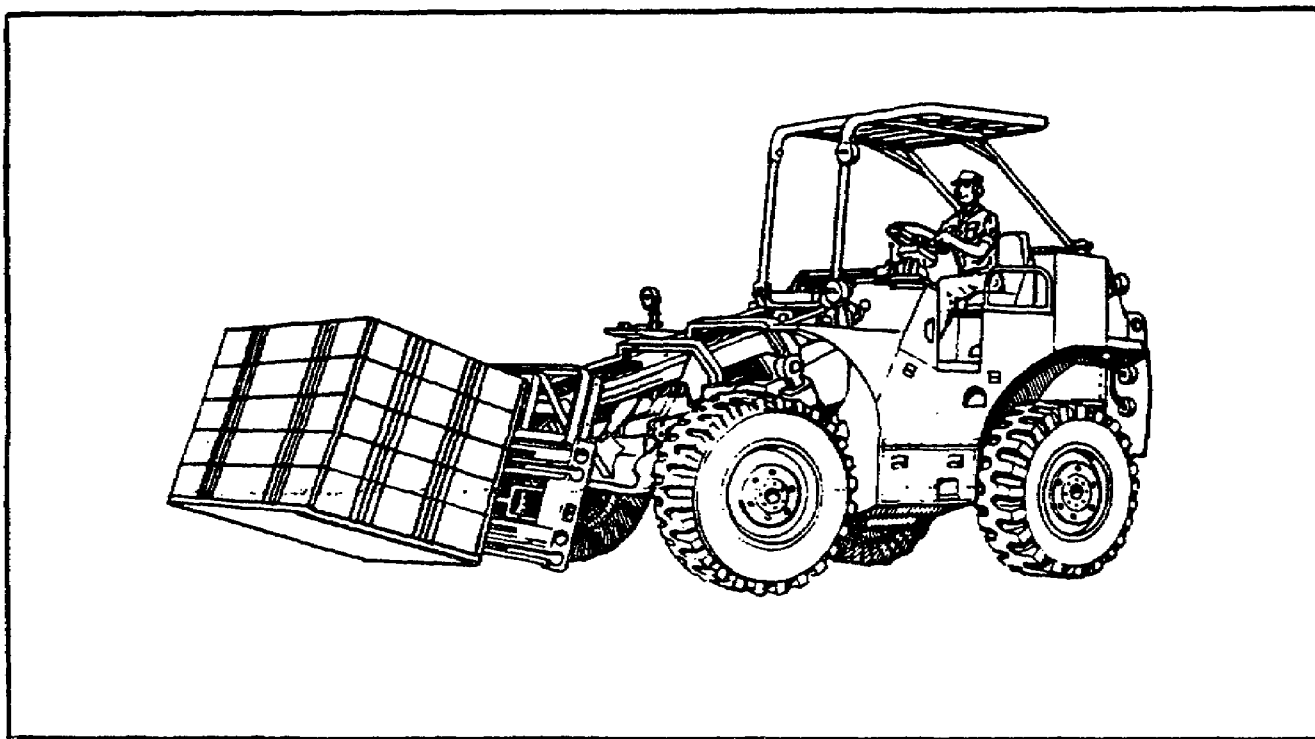


Figure 1-7. 6,000-pound Rough Terrain Forklift.

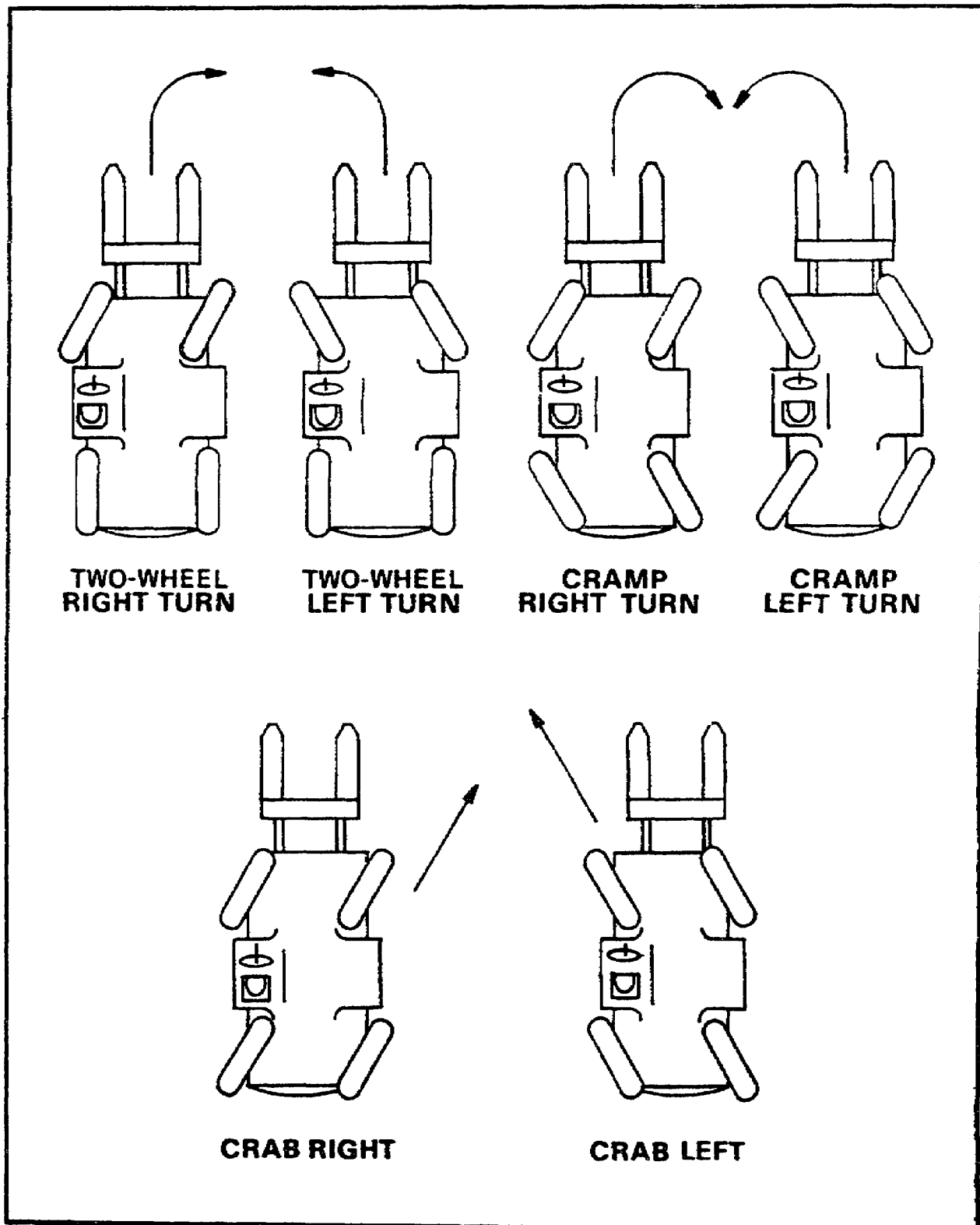


Figure 1-8. Steering Options of the 6,000-pound Rough Terrain Forklift.

MM2600, Lesson 1

As more and more ammunition was containerized in large, military-owned, demountable containers (MILVAN) for overseas shipment, a special MHE was designed to stuff and unstuff the containers--the 4,000-pound rough terrain forklift (figure 1-9). This RTFL is a diesel-powered, four-wheel-drive, hydraulically-operated forklift with a 4,000-pound lift capacity. Its size enables it to go into a MILVAN container. The fork assembly is equipped to raise or lower, tilt forward or backward, shift right or left, and tilt right or left. Steering is accomplished with the entire front axle pivoting under hydraulic power on a swivel immediately behind the driver's seat. In effect, it steers by a hinge in the chassis that "bends" the forklift in the middle. This system causes it to require a larger turning radius but reduces the number of moving parts. In addition, the system makes it simpler to maneuver the RTFL on a ramp or inside a MILVAN container.

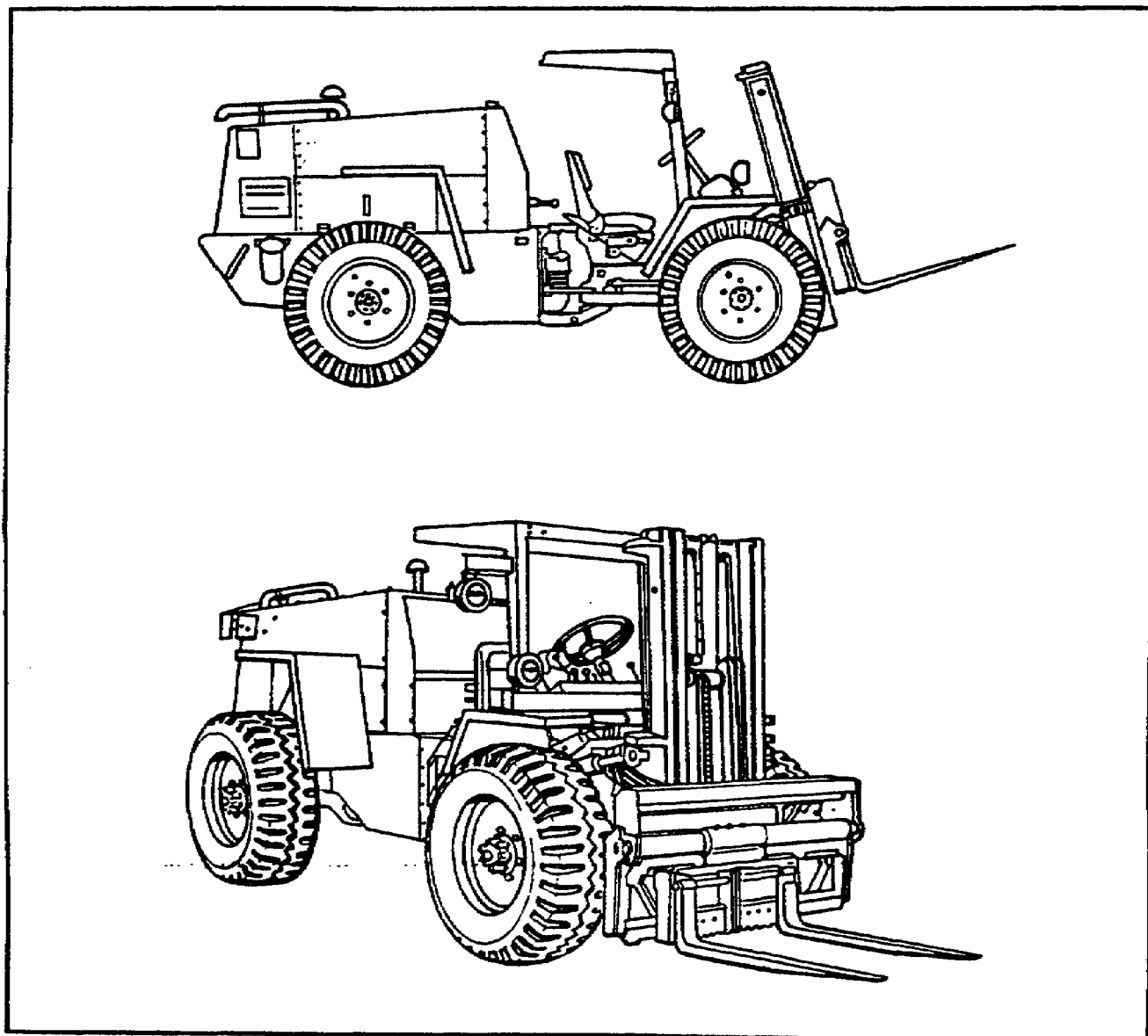


Figure 1-9. 4,000-pound Rough Terrain Forklift.

Because internal combustion engines create a fire hazard, electrically-operated forklifts were designed to use inside magazines and operating buildings (workshops) to reduce safety hazards of sparks and gases. The 4,000-pound electric forklift (figure 1-10) is powered by an electric motor using a large storage battery pack. The batteries must be recharged periodically. Under normal operations, a full battery charge will provide approximately 10 operating hours. Most models have solid rubber tires designed for use on hard surfaces only. The fork assembly can only raise or lower and tilt forward or backward.

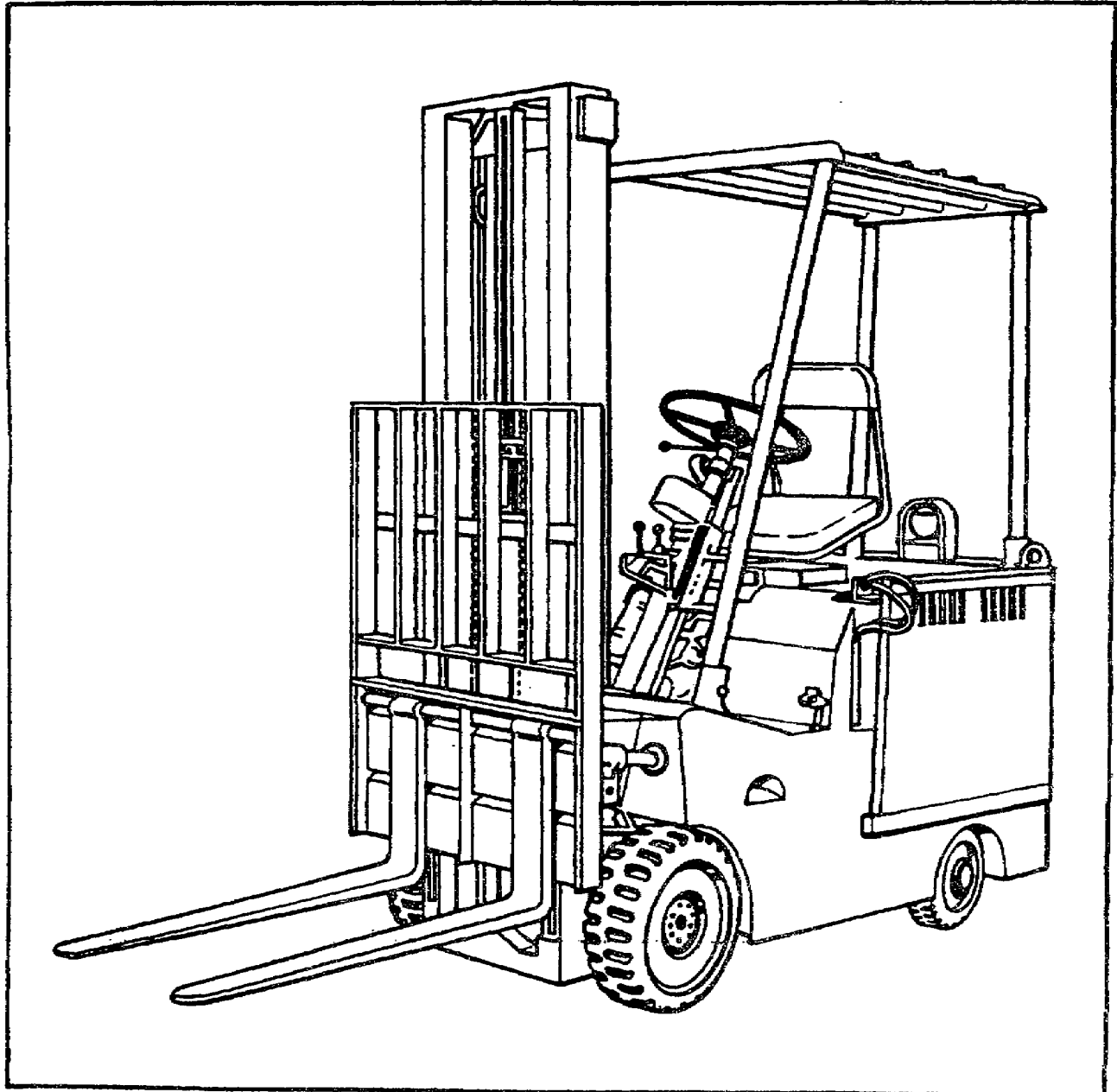


Figure 1-10. 4,000-pound Electric Forklift.

## MM2600, Lesson 1

### Other Types of MHE

Other types of MHE are used for specific missions and specific types of ammunition items. They include yard-type forklifts, the 50,000-pound rough terrain container handler and the mobile landing ramp.

**Yard-type Forklifts.** In installations where most of the handling takes place on hard surfaces, you may see yard-type forklifts. They look like the 4,000-pound electric forklift, but they may be gasoline or diesel powered and they often have pneumatic tires. Lift capacities for yard-type forklifts range from 3,000 to 6,000 pounds.

**50,000-pound Rough Terrain Container Handler.** Where containerized shipments are common, a new type of MHE is being used on an experimental basis. It is the 50,000-pound rough terrain container handler (RTCH) (figure 1-11); which resembles a large version of a rough terrain forklift. It is equipped with a special holder assembly, for handling MILVAN containers filled with ammunition. The RTCH is specially designed to handle containers 8 feet wide, up to 40 feet long, and with weights of up to 50,000 pounds. Since the RTCH alone weighs approximately 100,000 pounds, field units have found operating it on soft earth surfaces difficult.

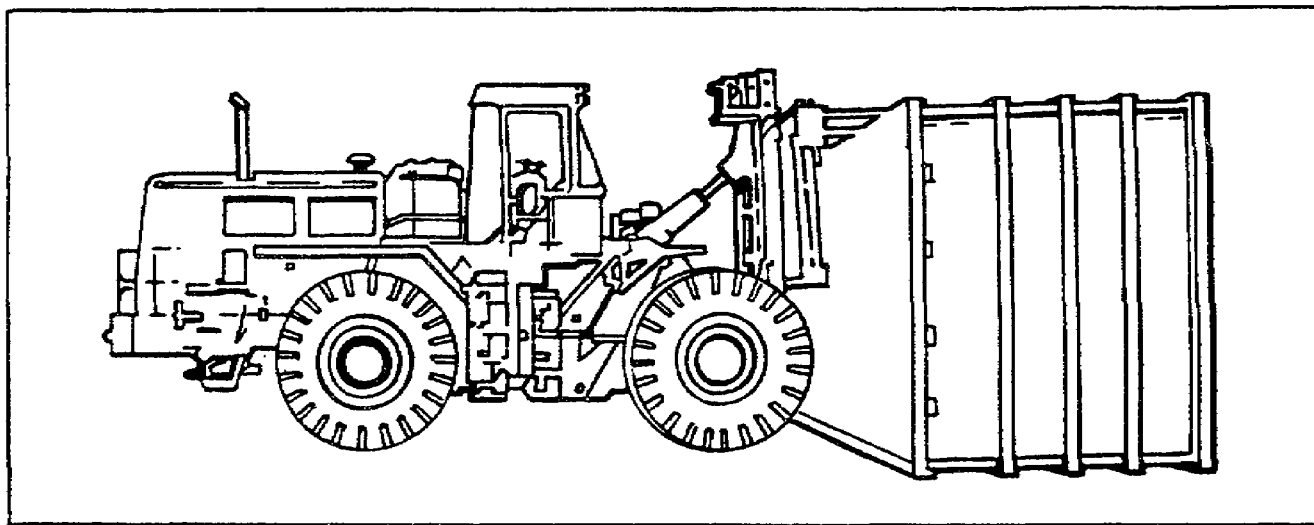


Figure 1-11. 50,000-pound Rough Terrain Container Handler.

**Mobile Loading Ramp.** The mobile loading ramp (figure 1-12) simplifies stuffing and unstuffing MILVAN containers while the container is still secured to the truck carrier. The ramp is mounted on wheels with a tow hitch, making it movable with a towing vehicle. It is 36 feet long and 96 inches wide, and its height is adjustable from 46 inches to 65 inches. It weighs 6,000 pounds and will support a maximum weight of 16,000 pounds. The mobile loading ramp is ideal for use with the 4,000-pound RTFL, because the ramp will not be overloaded. The RTFL weighs 9,725 pounds; and with a maximum load of 4,000 pounds, the total weight is 13,725 pounds.

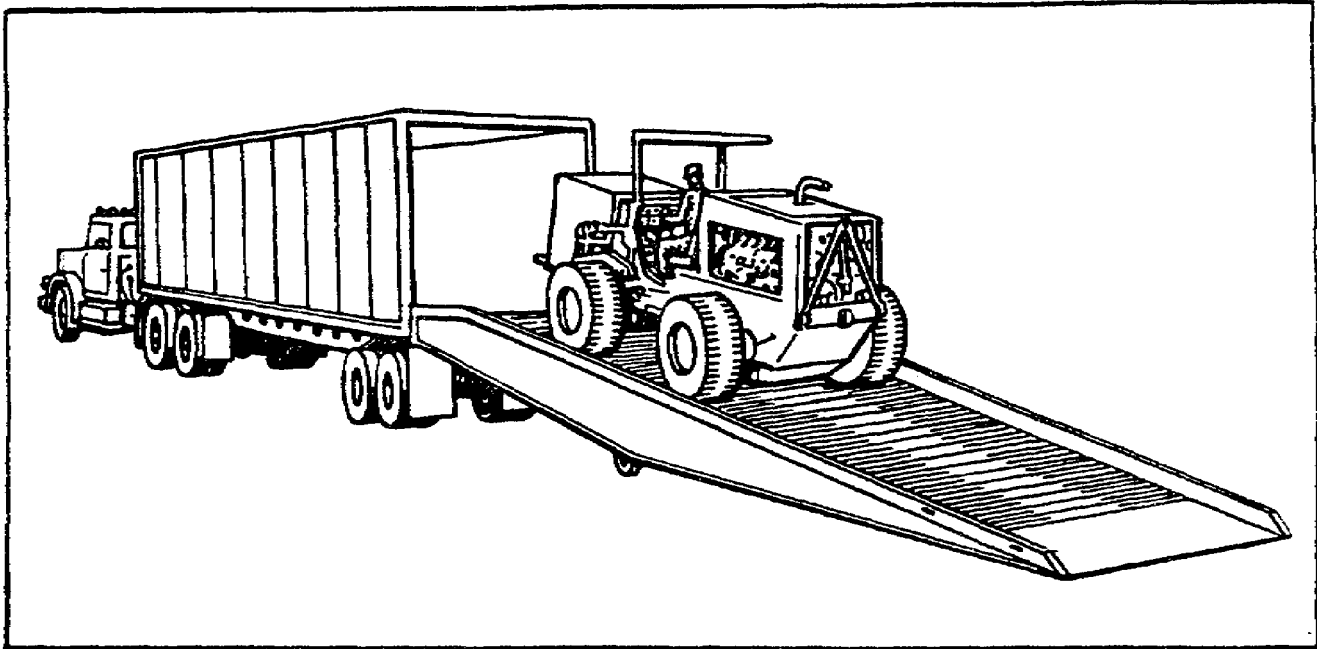


Figure 1-12. Mobile Loading Ramp.

## Load Testing

All MHE used for handling ammunition and explosives must be periodically load tested to insure that lift capacity is within the safety limits for the specific type. Wreckers, cranes, forklifts, and pallet trucks each have a specified time interval and a specified load capacity for testing. After testing, the test capacity, the date of the test, and the date of the next test due are stenciled clearly on the equipment. No items of MHE will be used to handle ammunition if the load test interval has expired.

## HANDLING AMMUNITION

### Manual Handling

When ammunition is handled manually, certain safety precautions must be observed.

**Proper Lifting Practices.** Lifting will be done with the knees bent and back straight so that thigh muscles will assume most of the load. If the item being lifted is too awkward or too heavy to use the proper position, additional help will be obtained. Lifting will be made vertically and close to the body. Side lifts or off-balance lifts can cause muscle strains. Loads that obstruct vision will not be carried by only one person.

**Protective Clothing and Equipment.** Steel-toed shoes or approved foot protection will be worn by personnel in handling operations hazardous to the feet or toes. Protective gloves, aprons, and other items will be worn when working with items that have sharp edges, abrasive surfaces, or splinters, or that contain corrosive materials.



## MM2600, Lesson 1

**Hand Tools.** Hand tools used during ammunition handling operations will be kept in good repair and maintained in a safe condition. The proper tools should be selected for each task. For example, only spark-resistant tools will be used when explosives are exposed where a spark may cause a fire or explosion. Handles of such tools as hammers will be securely fastened; and they will be replaced immediately when cracked, split, or broken. Power tools, such as electric saws for cutting dunnage, should be equipped with guards enclosing their moving parts. Electrical contacts should be enclosed, with all wiring well insulated. Electrically-powered tools will be provided with grounding where necessary. Hand tools will always be kept in the proper place to eliminate hazards caused by forgotten or misplaced tools.

**Conveyors.** Each section of a conveyor should be checked for good operating condition before the conveyors are emplaced. Conveyor sections must be securely locked together to prevent separation during the handling operation. Conveyors must be placed on solid, stable supports that will support the weight of the conveyors and the ammunition load. *Boxes containing ammunition will not be used as supports.* Spacing between boxes on the conveyor will be maintained to prevent overloading. Positive stops will be placed at the end of the conveyor to prevent boxes from falling off. Enough personnel should be positioned along the conveyor line to keep boxes moving and to prevent them from falling off the sides.

**Pallet Trucks.** Pallet trucks will be kept in good repair and maintained for serviceability. Load test date, date next load test due, and lift capacity will be stenciled clearly on pallet trucks. Pallet trucks must be removed from the work area when not in use.

### Handling with Powered MHE

**Forklifts.** When forklifts are being used in ammunition handling operations, hazards may be increased and ammunition may be damaged unless proper procedures and precautions are observed.

The forklift must be checked before, during, and after operation to insure safety. It must be checked for oil leaks, excessive oil and grease, condition of hydraulic hoses and batteries, and any other faulty condition that may cause a hazard in ammunition handling.

The forklift must have a serviceable fire extinguisher with a minimum rating of 1-BC. The fire extinguisher must have an intact seal attached.

The forklift must be load tested within the specified time period. The date of the test, date of next test due, and load capacity must be stenciled on the boom or mast.

The forklift operator must be qualified and licensed according to local command policy, always demonstrate safe and responsible operation, always use hearing protection while operating the forklift, and follow the signals from the ground guide (figure 1-13). A ground guide will be used to direct the forklift during all forklift handling operations.

The guide must be positioned in clear view of the operator, but not in a dangerous position. The fork assembly will be lowered before moving, whether the forks are loaded or empty. The horn will be sounded before backing up if the forklift is not equipped with an automatic backing alarm. *No riders or equipment will be carried on the forklift.*

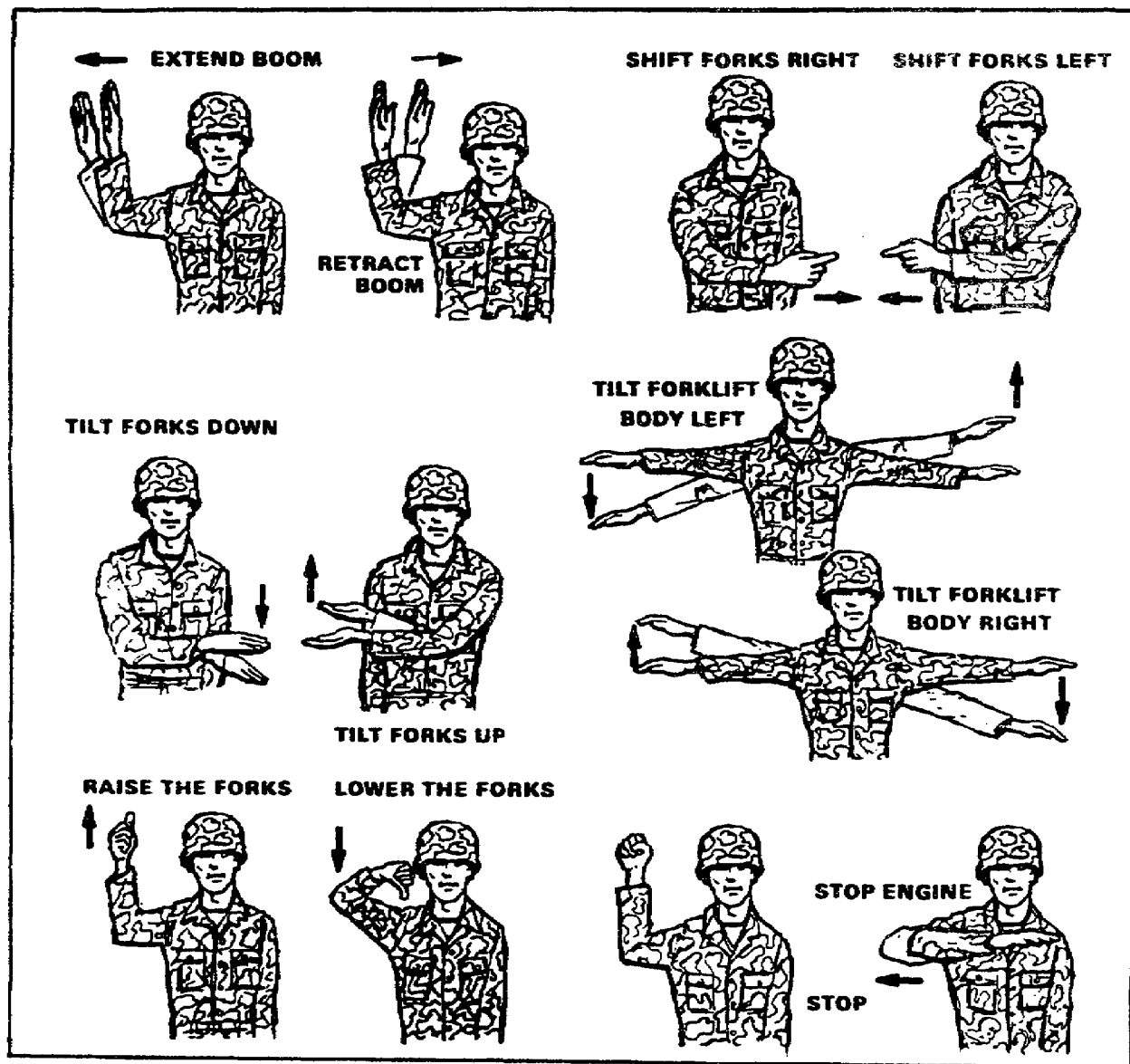


Figure 1-13. Hand Signals for Rough Terrain Forklift.

**Cranes.** When cranes are used, the capability is increased and safety precautions and practices become more important. A crane must be checked before, during, and after operation to insure that it remains safe to handle heavy, bulky ammunition loads and large guided missile containers. It must be checked for fuel leaks or oil leaks, conditions

MM2600, Lesson 1

that may affect safety. A crane must be load tested within the specified time period and have the boom stenciled, like the forklift. It must also have a serviceable fire extinguisher with a minimum rating of 1-BC that has an intact seal.

Requirements for a crane operator are the same as those for the forklift operator. The operator must be qualified and licensed, must perform responsible operation, must wear hearing protection, and must follow the signals of the ground guide. Hand signals are shown in figure 1-14.

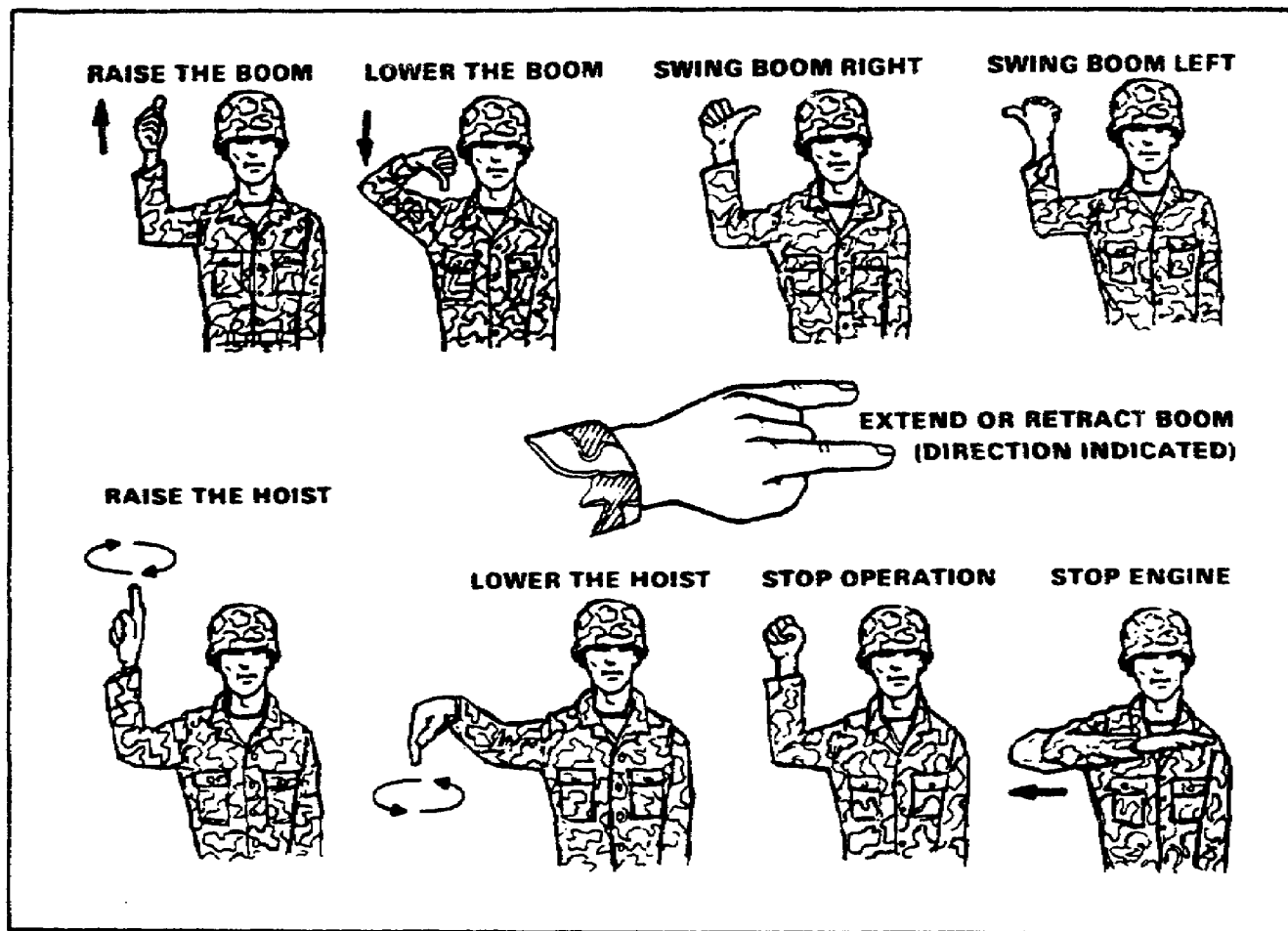


Figure 1-14. Hand Signals for Wrecker Crane.

Before a crane is used in handling ammunition, outriggers will be positioned and secured. Wheels will be chocked. When large, bulky loads are being handled, guy lines will be used to guide and stabilize the load. See figure 1-15. When cable slings (figure 1-16) are used to handle ammunition in crane operations, the hooks on the cable sling will be snap safety hooks only. Slings must also be load tested within the specified time period. A tag must be attached showing the date of the test, date of next test due, and load capacity. *Personnel will not walk under the boom during crane operations.*

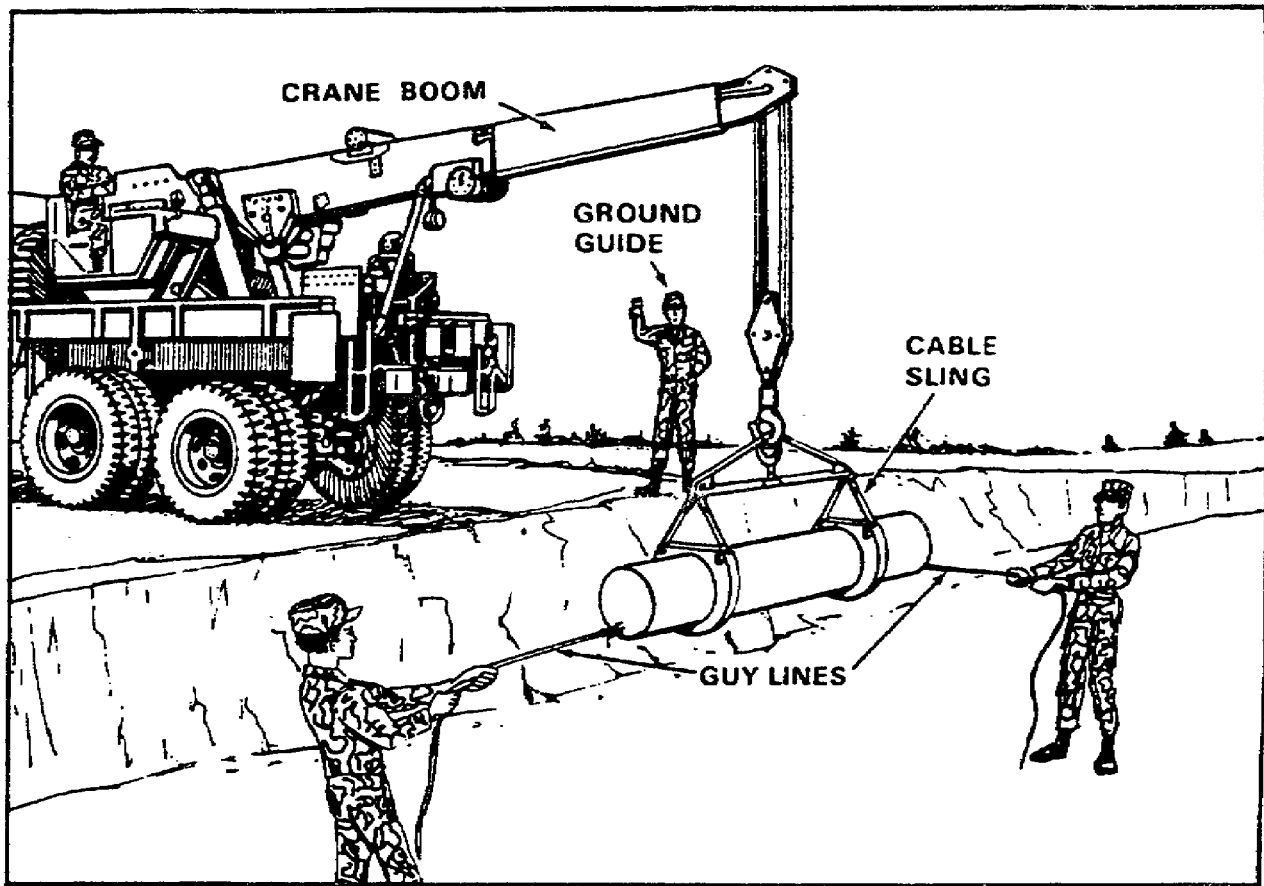


Figure 1-15. Crane Operations.

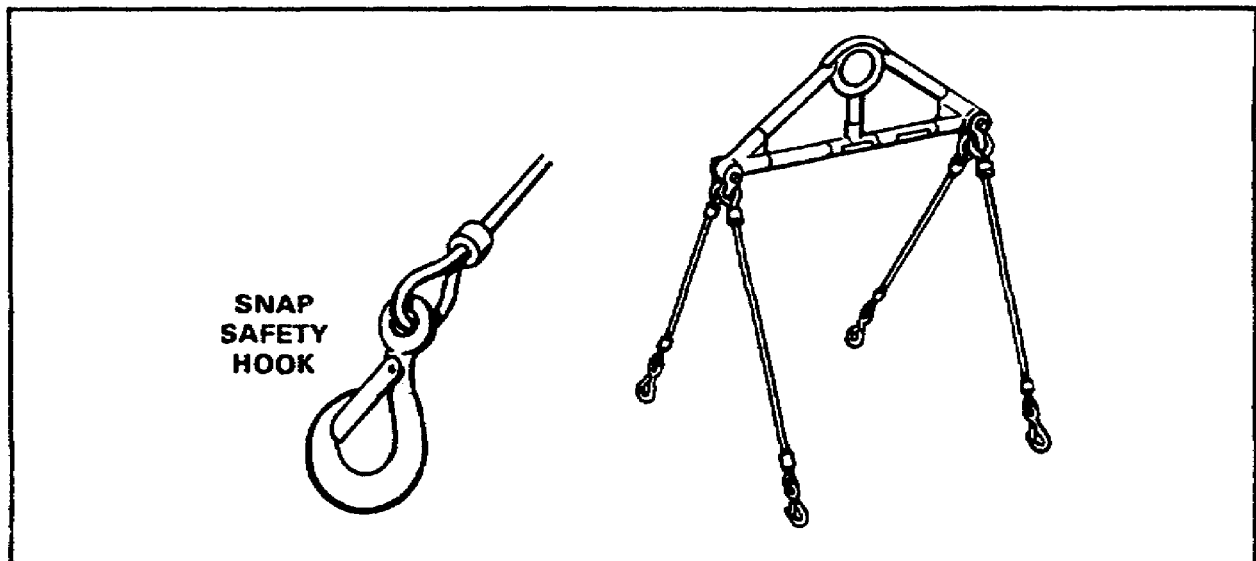


Figure 1-16. Cable Sling Used in Crane Operations.

## MM2600, Lesson 1

### Handling Operations at Railheads

When ammunition is being loaded on or offloaded from railroad cars, some specific safety practices apply.

**Before Loading and Offloading.** Before loading and offloading, the railroad car should be checked to insure that the brakes are set and the wheels are chocked. Blue warning flags must be placed on both ends of the car to advise transportation personnel that it is not to be moved. The proper fire hazard symbol, chemical hazard symbol, or both, must be posted at each entrance to the railhead area. (Fire symbols and chemical hazard symbols are covered in lesson 2 of this subcourse.) Adequate firefighting equipment will be available at the site before cars are loaded or offloaded.

**During Loading and Offloading.** During the railhead operation, the area must be kept constantly policed. Dunnage scraps from blocking and bracing will not be allowed to accumulate. Dunnage stacks will be kept separated from ammunition stacks and railroad cars loaded with ammunition by at least a hundred feet. The railhead site will not be allowed to become congested with ammunition, equipment, personnel, or anything else that may hinder the operation. Established explosive limits, personnel limits, and quantity distance standards will be observed at all times during the railhead operation.

**After Loading and Offloading.** After each car is loaded, the load will be blocked and braced according to the applicable ammunition outloading drawing. (Drawings are covered in subcourse MM 2602.) The blue flags will then be removed, and the inspector will be notified. After each car is offloaded the blue flags will be removed, the car will be cleaned, and excess dunnage will be policed.

### Handling Operations Using Trucks and Trailers

When handling operations involve the loading or offloading of trucks or trailers, the practices and precautions that follow must be observed.

**Before Operations.** Before a motor vehicle is loaded with ammunition, a check must be made to verify that the driver has a valid SF 46 (US Government Motor Vehicle Operator's Identification Card). The driver must also have a valid DD Form 626 (Motor Vehicle Inspection), which certifies that the vehicle has been inspected and approved for transporting ammunition. The vehicle must be checked to insure that it is equipped with the right number and type of fire extinguishers. If it is going to transport ammunition over public highways, it must be equipped with one fire extinguisher rated Class 10-BC. If the vehicle is not going off post, it must be equipped with two Class 1-BC portable fire extinguishers as a minimum. Placards bearing the proper fire hazard symbol, chemical hazard symbol, or both, will be placed on both sides, the front, and the rear before the vehicle is loaded.

**During Operations.** When motor vehicles are being loaded and offloaded, they must be checked constantly to insure that the engine is shut off, that the brakes are set, and, if on a grade, that one wheel is chocked. When loading and offloading trailers detached

from a tractor, all wheels must be chocked. As the vehicle is loaded, compatibility of the items loaded must be observed. (Ammunition items that are compatible and may be loaded on the same vehicle are covered in subcourse MM2603.)

**After Operations.** After a motor vehicle has been loaded, the load must be properly blocked, braced, and tied down according to the applicable outloading drawing or local policy.

### **Handling Operations at Storage Sites**

Handling operations that involve placing ammunition in storage facilities, removing ammunition from storage facilities, or re-warehousing require observance of the precautions and practices that follow.

**Before Storage Operations.** Before storage operations are begun, proper fire symbols, chemical hazard symbols, or both, must be posted at the location. Fire barrels and pails or other water-type fire-fighting equipment will be present. If the storage structure is a double-door type, both doors must be open and be clear of vehicles, ammunition, or anything else that may hinder the operation.

**During Storage Operations.** When handling operations at the storage site are in progress, established personnel limits will be observed. All personnel will use protective clothing and equipment as directed. Damaged containers will be repaired or replaced at least 90 feet away from the storage location.

**After Storage Operations.** When handling operations at the storage site are complete, the area inside and outside the storage structure must be left in a high state of police. Excess dunnage, dunnage scraps, tools, paint, conveyors, and pallet trucks will be removed from the area. Doors will be secured.

## MM2600, Lesson 1

### REVIEW EXERCISES

1. You are working in an ammunition handling operation at a railhead. Palletized boxed ammunition must be unloaded from trucks and then loaded on railroad cars. The following materials handling equipment is available to you:

- One wrecker crane
- One 5-ton crane
- One 20-ton crane
- One 6,000-pound forklift. RTFL
- Two 4,000-pound forklifts. RTFL
- One 4,000-pound electric forklift
- Two mobile loading ramps
- Two pallet trucks, manual
- One pallet truck, electric
- One improvised ladder slide
- Four conveyor sections, roller

- a. What materials handling equipment (MHE) is required? (You may select only two items from the list.)
- b. As the trucks arrive at the railhead, what must be done before unloading?
- c. What safety precautions must be taken before a railroad car is loaded?
- d. How can you determine whether or not the load test is current on the MHE you selected?

2. You are working at a forward ammunition supply point (ASP) in a combat zone during wartime.
  - a. A convoy of six MILVAN trucks containing palletized boxed ammunition arrives at your ammunition supply point. What MHE do you need (from the list with question 1) to unload this ammunition?
  
  
  
  
  
  
  
  
  
  
  - b. A using unit arrives at your ASP to pick up 200 rounds of 81 mm mortar ammunition. All mortar ammunition at your ASP is palletized and stored on outdoor storage pads. All of your powered MHE is deadlined for maintenance. How can the crew issue this ammunition?
  
  
  
  
  
  
  
  
  
  
  - c. What protective clothing and/or equipment should be used by the crew in question 2b?
  
  
  
  
  
  
  
  
  
  
  - d. You are using a 6,000-pound RTFL in your ASP. What is the minimum rating for the fire extinguisher carried on this forklift?

Recheck your answers to the Review Exercises. When you are satisfied that you have answered every question to the best of your ability, check your answers against the Exercise Solutions. If you missed three or more questions, you should retake the entire lesson, paying particular attention to the areas in which your answers were incorrect.



MM2600, Lesson 2

Lesson 2

FIRE SYMBOLS AND CHEMICAL HAZARD SYMBOLS

**Task.** This lesson is based on the following task from STP 9-55B12-SM: 093-400-1163, Identify Fire Symbols and Chemical Hazard Markers for Ammunition.

**Objective.** When you have completed this lesson, you should be able to identify fire symbols and chemical hazard symbols for an ammunition area.

**Conditions.** You will have this subcourse book and work without supervision.

**Standard.** You must score at least 70 on the end-of-subcourse examination that covers this lesson and lesson 1.

IDENTIFYING FIRE SYMBOLS

A fire symbol is a symbol displayed in ammunition storage areas to provide a guide for fire-fighting forces. Ammunition is divided into four fire divisions according to the danger created by the type of ammunition involved in a fire. The divisions are identified by the numbers 1, 2, 3, and 4. Fire symbol 1 indicates the greatest hazard. The hazard decreases as the fire division number increases. As a fire symbol, each number is displayed on a specially-shaped placard for better visibility at long distances. See the chart on this page and figure 2-1.

Fire symbols are displayed on all buildings and at all outdoor storage sites. They are easily visible to approaching fire-fighting forces while the forces are still at a safe distance.

When railroad cars and motor vehicles are loaded with ammunition and not destined for off-post movement, they are considered temporary storage sites and must therefore display at least two fire symbols. All fire symbols displayed must indicate the hazard according to the type of ammunition stored in the location.

AMMUNITION FIRE DIVISIONS, SHAPES, AND HAZARDS		
FIRE DIVISIONS	AUTHORIZED SHAPES	HAZARDS INVOLVED
1	Octagon (eight-sided) or "stop sign" shape	Mass detonation
2	Cross shape or X-shape	Explosion with fragmentation
3	Inverted-triangle shape	Mass fire
4	Diamond shape	Moderate fire

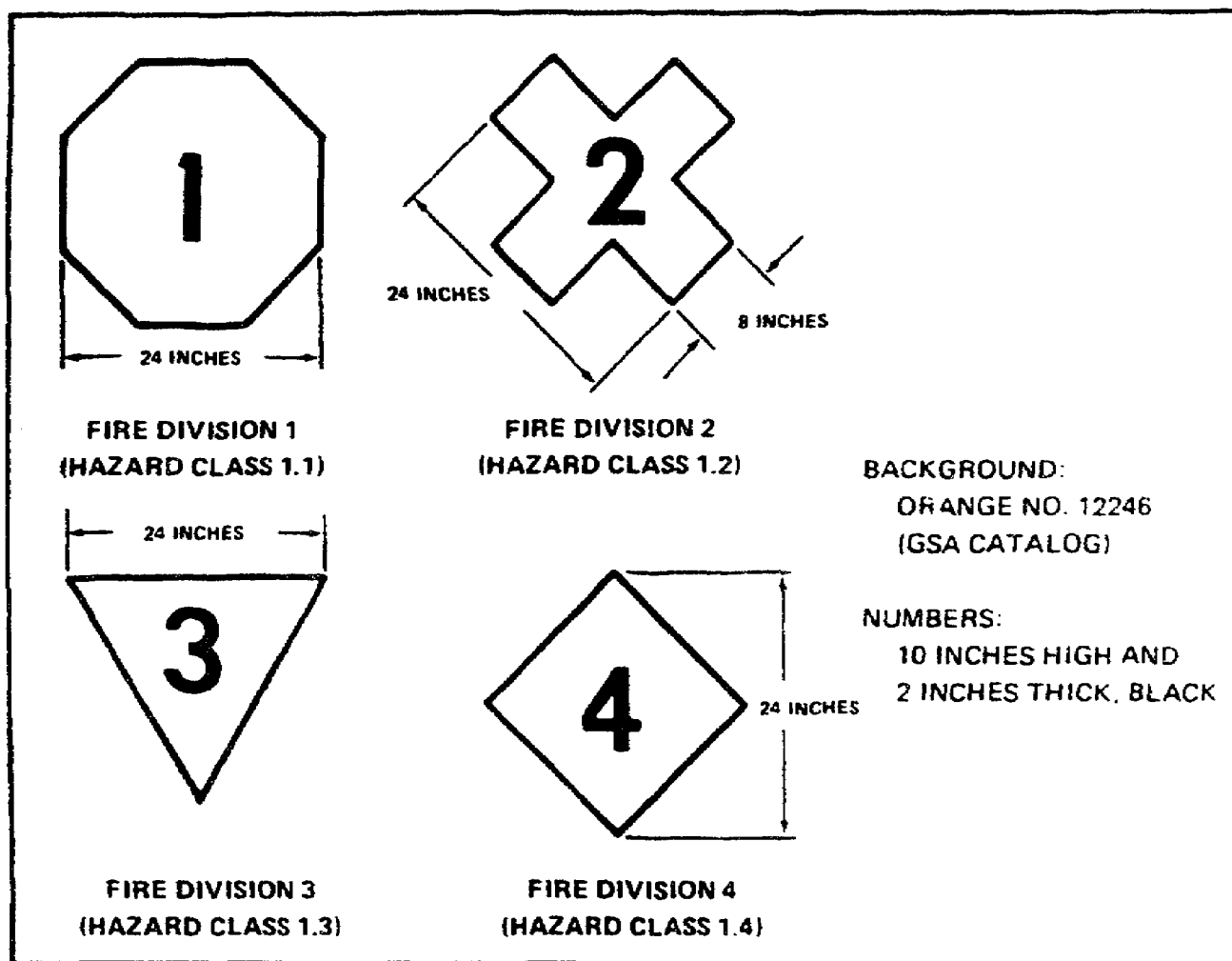


Figure 2-1. Fire Symbols.

Normally, only items in the same fire division are stored in one location. If ammunition items of two or more fire divisions are stored in the same location, the fire symbol displayed will indicate the most hazardous material stored there.

To find out exactly what ammunition is in each fire division, you must refer to the tables in TM 9-1300-206 (see the extracts on pages 27-33). Note the column headed "Quantity distance class" in Table 5-21. For almost all ammunition, the number to the left of the decimal point is 1, which means explosive. The number to the right of the decimal point indicates the fire division, or the division of hazard, which is the number used on the fire symbol.

### IDENTIFYING CHEMICAL HAZARD SYMBOLS

When chemical ammunition is involved in a fire, there may be a chemical hazard in addition to the fire hazard, depending on the type of chemical ammunition. Any magazine

MM2600, Lesson 2

or storage pad containing chemical ammunition must have at least two symbols displayed, one to indicate the fire hazard and the other to indicate the chemical hazard, which may also indicate precautions to be taken while fighting the fire. All of the chemical hazard symbols are shown in figure 2-2.

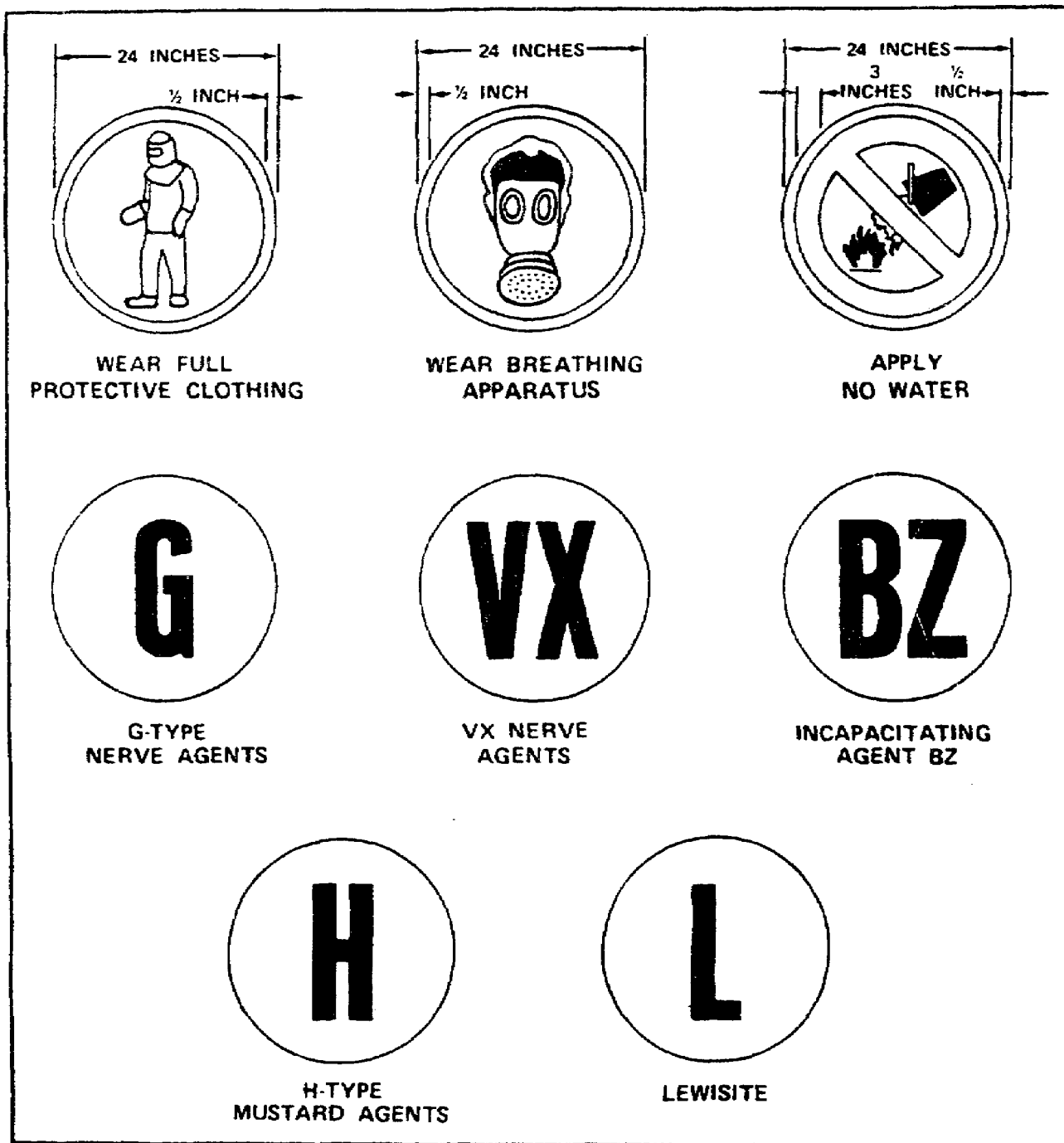


Figure 2-2. Chemical Hazard Symbols.

### Full Protective Clothing Symbols

Full protective clothing symbols are divided into sets 1, 2, and 3. The different sets are indicated by different colors of the figure and of the rim. When this symbol has a blue background with a red figure and a red rim, it indicates the presence of highly toxic chemicals that can cause bodily harm or even death. When a location marked with this symbol is involved in a fire, personnel in the area must wear full protective clothing identified as Set 1, which consists of the following: M9 series protective gas mask or self-contained breathing apparatus, impermeable suit, impermeable hood, impermeable boots, treated undergarments, coveralls, protective footwear, and impermeable gloves. When the same symbol is painted with a blue background with a yellow figure and a yellow rim, it indicates the presence of harassing chemicals such as riot-control agents and smoke. When a storage location marked with this symbol is involved in a fire, personnel in the area must wear full protective clothing identified as Set 2, which consists of the following: M9 series protective gas mask or self-contained breathing apparatus, coveralls, and protective gloves. The same symbol painted with a blue background with a white rim indicates the presence of white phosphorous and other spontaneously combustible material. When an ammunition location marked with this symbol is involved in a fire, personnel in the area must wear full protective clothing identified as Set 3, which consists of the following: M9 series protective gas mask or self-contained breathing apparatus, flame-resistant coveralls, and flame-resistant gloves.

### Breathing Apparatus Symbol

When this symbol is posted at a storage location, it indicates the presence of incendiary and readily-flammable chemical agents that present intense radiant heat when burning. When these items are involved in a fire, a protective mask or a self-contained breathing apparatus must be worn to prevent inhalation of smoke. This symbol is blue with a white figure and a white rim.

### Apply No Water Symbol

When this symbol is displayed at a storage site, it means that if the items stored are involved in a fire, applying water to extinguish the fire will cause a dangerous reaction. Mixing water with some burning elements could produce a more combustible mixture or it may spread the fire. This symbol has a white background, a red circle and diagonal line, and black figures.

### Chemical Agent Symbols

There are five additional symbols that may be displayed to indicate the chemical agent contained in the items stored at a location. These symbols are all 24 inches in diameter and have a yellow background and 12-inch-high black letters.

Two of the chemical agent symbols indicate the presence of nerve agents. Symbol G indicates a GB or nonpersistent nerve agent. Symbol VX indicates a VX or persistent

**MM2600, Lesson 2**

nerve agent. Both nerve agents are highly toxic and can cause death. The symbol BZ indicates the presence of an incapacitating agent, one that causes disorientation for a period of time but has no lasting or dangerous effects. Two symbols indicate the presence of agents that blister skin. Symbol H indicates mustard gas, which may have H, HT, or HD marked on the item or container. Symbol L indicates lewisite, which is similar to mustard gas.

**Determining Symbols To Be Displayed.** To determine which symbol to display, use table 3-1 in TM 9-1300-206. Turn to the extract of this table on page 34. You find the agent in the first column--GB, for example. Read to the right of GB until you find the block with the letter X. Read up from the X and you find that a protective clothing symbol and a chemical agent symbol are required: full protective clothing Set 1 and the symbol G.

**DETERMINING FIRE SYMBOLS FOR CHEMICAL MUNITIONS**

To find out which fire division the various types of chemical ammunition belong in, go to table 4-2 of TM 9-1300-206 (see the extract on pages 35 and 36). First find the chemical group that the item is in. Read down the left-hand column of the table until you find the chemical agent you are looking for. Then read to the right under the chemical group column. Note that GB is in chemical group A, CS is in group B, WP is in group C, and NP is in group D. These chemical groups are listed in the tables in TM 9-1300-206 that give the fire divisions.

Let's say you have a magazine at your installation in which HC smoke grenades are stored. Your job is to find out what fire symbol and chemical hazard symbols must be displayed at this location. You would go through the following steps to find out:

- *Step 1.* Turn to table 5-21 of TM 9-1300-206 (see the extract on pages 27-33) and find "Grenade, smoke, HC."
- *Step 2.* Find the quantity-distance class. Grenade, smoke, HC is in class 1.3, which means that it belongs in hazard class 1.3. The fire symbol to use is symbol 3.
- *Step 3.* Turn to table 3-1 of TM 9-1300-206 (extract on page 34 ). Find "HC" in the left-hand column and read to the right. The chemical hazard symbols required are marked with the letter X.

The magazine with HC smoke grenades must have three symbols displayed: fire symbol 3, the apply no water symbol, and the breathing apparatus.

**NOTE**

**Some items of chemical ammunition are only listed by chemical group in table 5-21, not by their individual names. In such cases, you must first determine the chemical group by referring to table 4-2 of TM 9-1300-206 (see extract on pages 35 and 36).**

REVIEW EXERCISES

Use figure 2-3 and the extracts on pages 27-36 to answer these questions. Use the letter or letters identifying the symbols in your answers (A, B, C, etc.).

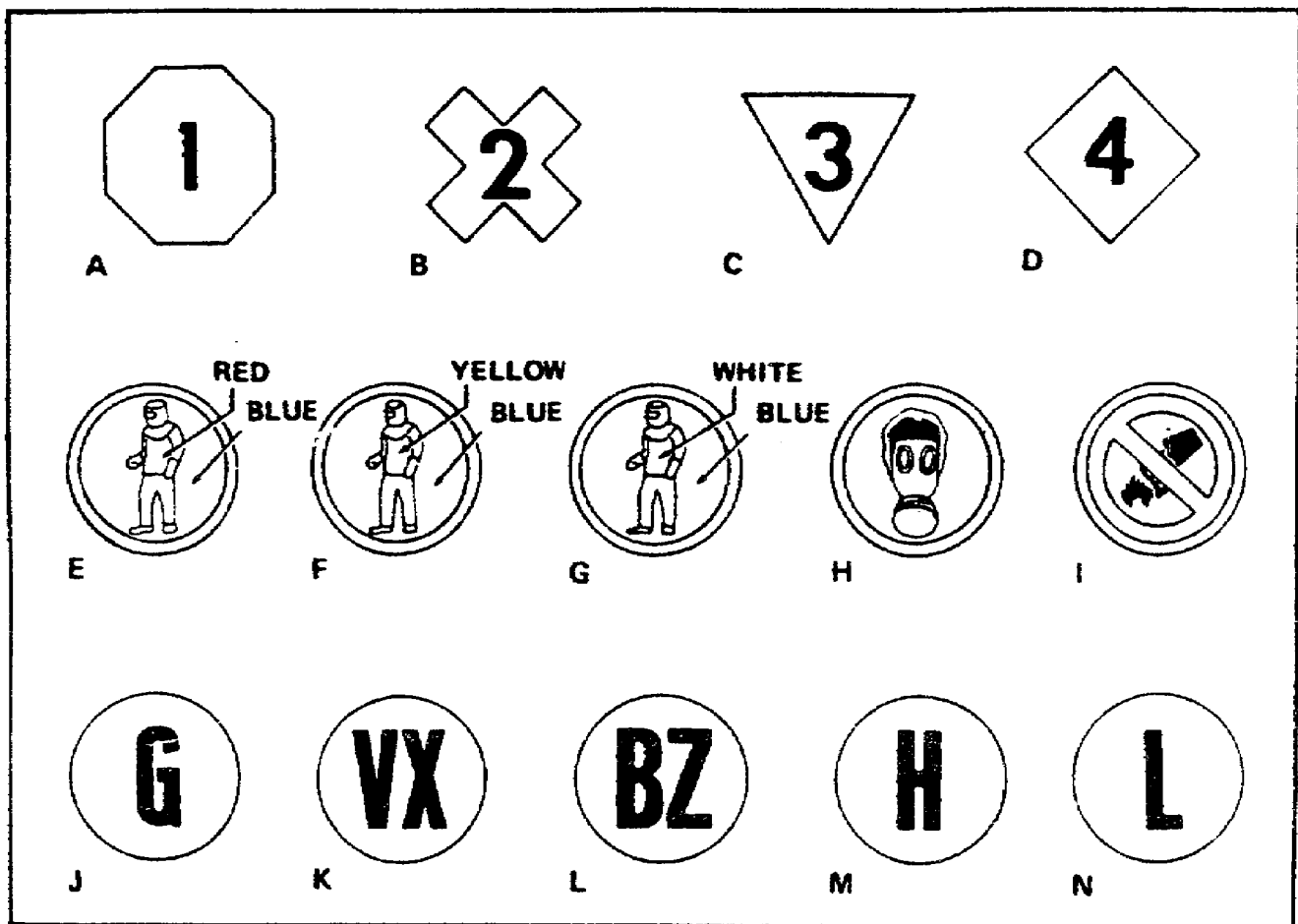


Figure 2-3. Fire and Chemical Hazard Symbols.

1. Which symbols indicate the presence of blister agents?
2. Which fire symbol indicates a mass fire hazard?
3. Which fire symbol indicates a mass detonation hazard?

## MM2600, Lesson 2

4. A storage magazine contains thermite (TH) incendiary grenades without explosive components. Which three symbols must be displayed at this site?
  
5. A storage magazine contains separate-loading HE projectiles and antipersonnel mines (bounding type). These two items are in separate fire divisions. Which fire symbol should be displayed at this site?
  
6. A storage magazine contains white phosphorous (WP) projectiles with high-explosive bursters. Which two symbols must be displayed at this site?
  
7. Which two symbols indicate the presence of nerve agents?

Recheck your answers to the Review Exercises. When you are satisfied that you have answered every question to the best of your ability, check your answers against the Exercise Solutions. If you missed two or more questions, you should retake the entire lesson, paying particular attention to the areas in which your answers were incorrect.

EXTRACTS

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-19. Storage Compatibility Groups for Explosives and Ammunition-Continued

GROUPS - Continued

- Firing devices
- Fuse lighters
- Fuse, safety
- Grenade hand Practice M69
- Squibs, commercial
- Thruster, cartridge activated, M25

5-19. Hazard Classification and Compatibility Groups

between storage compatibility groups and quantity-distance divisions. Examples of specific ammunition and explosives in these divisions and groups are indicated in table 5-21.

Table 5-20 provides examples of the relationship

Table 5-20. Hazard Classifications/Compatibility Groups

Items	SCG	Q-D Class I Division
1. Initiating explosives	A	1
2. Detonators and similar initiating devices	B	1, 2, or 4
3. Bulk propellants, propellant propelling charges, and devices containing propellant with or without means of ignition.	C	1, 2, 3, or 4
4. Black powder, high explosives, and HE ammunition without its own means of initiation and without a propelling charge.	D	1 or 2
5. HE ammunition without its own means of initiation, with a propelling charge.	E	1 or 2
6. HE ammunition with its own means of initiation, with or without a propelling charge.	F	1 or 2
7. Fireworks and illuminating, incendiary, smoke, or tear producing ammunition other than ammunition that is activated by exposure to water or the atmosphere.	G	1, 2, 3, or 4
8. Ammunition containing white phosphorus or other pyrophoric material with or without explosives.	H	2 or 3
9. Ammunition containing flammable liquid or gel filler with or without explosives	J	3
10. Ammunition containing toxic chemical agents with or without explosives.	K	2 (See Note)
11. Ammunition, not included in other groups, requiring separate storage.	L	1, 2, 3, or 4
12. Ammunition which presents no significant hazards	S	4 or None

Note: Without explosives these items are in Hazard Class 6.1

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups

Item	Store compatibility group	Quantity-distance class
Adapter booster	D	1.1
Aluminum powder (in original shipping container or equivalent).	L	1.4
Aluminum powder (not in original shipping container or equivalent).	L	1.3
Ammonium nitrate (in original shipping container or equivalent).	L <sup>5</sup>	1.4
Ammonium nitrate (not in original shipping containers or equivalent) exposed to fire hazards only or to detonation hazards at more than intraline distance	L <sup>6</sup>	1.3
Ammonium nitrate (not in original shipping containers or equivalent) exposed to detonations hazards at less than intraline distance	L <sup>6</sup>	1.1
Ammonium perchlorate (particle size 15 microns or less).	L <sup>6</sup>	1.1

See notes at end of table.

Change 7 5-45



MM2600

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity-distance class
Ammonium perchlorate (particle size over 15 microns) in original shipping containers or equivalent.	L <sup>6</sup>	1.4
Ammonium perchlorate (particle sizes over 15 microns) not in original shipping containers or equivalent, exposed to fire hazards only or exposed to detonation hazards at more than intraline distance.	L <sup>6</sup>	1.3
Ammonium perchlorate (particle sizes over 15 microns) not in original shipping containers or equivalent, exposed to detonation hazards at less than intraline distance.	D	1.1
Ammonium picrate (Explosive D)	D	1.1
Ammunition, blank and saluting, cannon	C	1.3
Ammunition, small arms, less than .50 caliber, except .30 caliber API	S	1.4
Ammunition, .50 caliber, except API and incendiary rounds.	C	1.4
Ammunition, .30 and .50 caliber API and incendiary	G	1.4
Ammunition, 20mm, HE, HEI and functional packs containing HE and HEI	E	(04) 1.2
Ammunition, 20mm, practice and high pressure test	C	1.4
Ammunition, 20mm, incendiary and functional packs containing incendiary, except those containing HE or HEI	G	(04) 1.2
Ammunition, 20mm, API	G	1.4
Ammunition, 25mm, with inert projectile	C	1.4
Ammunition, 27mm, caseless	C	1.4
Ammunition, 30mm, ball and high pressure test	C	(04) 1.2
Ammunition, 30mm, practice and training	C	1.4
Ammunition, 30mm, HEDP	E <sup>-</sup>	(04) 1.2
Ammunition, 37mm, HE	E	(08) 1.2
Ammunition, 37mm, and 40mm, TP and AP	C	(08) 1.2
Ammunition, 40mm, HE RDX loaded	E	(12) 1.1
Ammunition, 40mm, riot control and pyrotechnic loaded, except WP smoke	G	1.3
Ammunition, 40mm, canister and multiple projectile	S	1.4
Ammunition, 40mm, practice, M407A1, M382 and M385	C	(04) 1.2
Ammunition, 40mm, HE, M381, M386, M406, M441 and M463	E	(04) 1.2
Ammunition, 40mm, HEDP, except M430 and M433	E	1.1
Ammunition, 40mm, HEDP, M430 and M433	E	(04) 1.1
Ammunition, 57mm through 81mm, except WP smoke, 57mm HEAT, 75mm HEAT, HEP and blank	E	(08) 1.2
Ammunition, 57mm HEAT, 75mm HEAT, and 105mm HEAT M341	E	1.1
Ammunition, fixed and semifixed, 90mm through 106mm, loaded with ammonal, amatol, explosive D, composition B or TNT, except 105mm HEAT, M341	E	(12) 1.2
Ammunition, HEP	E	1.1
Ammunition, pentolite loaded	L	1.4
Bangalore torpedoes	D	1.1
Baratol	D	1.1
Batteries, thermal or squib activated	S	1.4
Benite	C	1.1
Black powder, bulk	D	1.1
Blasting caps	B	1.1
Bombs, demolition	D	1.1
Bombs, fragmentation	D	(12) 1.1
Bombs, general purpose	D	1.1
Bombs, photoflash (except M122, w/o burster)	G	1.1

See notes at end of table

5-46 Change 7

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity distance class
Bombs, photoflash, M122, w/o burster	G	1.3
Boosters	D	1.1
Boosters, auxiliary	D	1.1
Baron potassium nitrate	C	1.1
Bursters	D	1.1
Cartridge cases, primed (w/o propellant)	G	1.4
Cartridge, heavy mortar, over 81mm (including 81mm M56), except chemical loaded	E	1.1
Cartridge, igniter, M2	G	1.4
Cartridge, illuminating	G	(08) 1.2
Cartridge, light mortar, 81mm or less (excluding 81mm M56) except chemical loaded	E	(08) 1.2
Cartridge, 90mm, canister, AP	C	(08) 1.2
Cartridge, photoflash	G	1.1
Cartridges, practice, over 40mm	C	(08) 1.2
Catapults, aircraft ejection seat, M3A1	C	(08) 1.2
Catapults, aircraft ejection seat, M4A1 and M5	C	1.4
Charge, demolition, snake	D	1.1
Charge, igniter assembly, for practice hand grenades	G	(04) 1.2
Charge, propelling, not assembled to projectiles	C	1.3 or 1.1
Charge, spotting, AP, practice, M8	G	1.4
Charge, springing earth rod, blast driven	D	1.1
Charge, supplementary, HE	D	1.1
Chemical ammunition, group A, w/o explosive components	K	6.1
Chemical ammunition, group A, w/explosive components	K	(12) 1.2 <sup>2</sup>
Chemical ammunition, group B, w/o explosive components, designed for toxic or incapacitating effects more severe than lachrymation	K	6.1
Chemical ammunition, group B, with explosive components, designed for toxic or incapacitating effects greater than lachrymation	K	(12) 1.2 <sup>2</sup>
Chemical ammunition, group B, tear or smoke producing, w/o explosive components	G	1.4
Chemical ammunition, group B, tear or smoke producing, with explosive components, over 40m	G	(12) 1.2
Chemical ammunition, group C, w/o explosive components	H	1.3
Chemical ammunition, group C, with explosive components	H	(12) 1.2
Chemical ammunition, group D, containing flammable liquids or gels, w/o explosive components	J	1.3
Chemical ammunition, group D, fixed and semifixed rounds, containing flammable liquids or gels with explosive components	J	(12) 1.2
Chemical ammunition, group D, containing flammable solids, except for TEA or TPA w/o explosive components	G	1.3
Chemical ammunition, group D, fixed or semifixed rounds, containing flammable solids, except for TEA or TPA with explosive components	G	(12) 1.2
Chemical ammunition, group D, TEA or TPA, w/o explosive components	L	1.3
Chemical ammunition, group D, TEA or TPA, with explosive components	L	(12) 1.2
Chlorates in (original shipping containers or equivalent)	L	1.4
Chlorates (not in original shipping container or equivalent)	L	1.3
Compositions A, A-2, A-3, A-4	D	1.1
Clusters, incendiary bomb, M31 and M32 (w/o fusing components)	G	1.3
Compositions, B and B-3	D	1.1
Compositions, C, C-2, C-3 and C-4	D	1.1

See notes at end of table

Change 7 5-47

MM2600

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity distance class
Cutter, cable, M1	D	1.1
Cutter, reefing line	S	1.4
Cyclonite (RDX), dry	A	1.1
Cyclonite (RDX), wet cyclotol	D	1.1
Demolition blocks	D	1.1
Destroyer, file, M4	G	1.3
Destructor, HE, M10	D	1.1
Detonating cord (Primacord), exposed to detonation hazard at less than intraline distance	D	1.1
Detonating cord (Primacord), exposed to fire hazard only or to detonation hazard at more than intraline distance	C	1.3
Detonation simulator, explosive M80	G	1.1
Detonator, concussion type, M1	B	(04) 1.2
Detonators (except concussion type, M1)	B	1.1
DNT - exposed to detonation hazard at less than intraline distance	L	1.1
DNT exposed at more than intraline distance	L	1.3
Dynamite (commercial type)	D	1.1
Dynamite (military type)	D	1.1
Ec Powder	C	1.1
Ednatol	D	1.1
Explosive bellows	S	1.4
Explosives, cratering	D	1.1
Explosive D	D	1.1
Firing devices	S	1.4
Fuel (solid), emergency power unit	C	1.1
Fuse lighters	S	1.4
Fuse, safety	S	1.4
Fuzes (packed in accordance with approved drawings depicting issue package) w/o boosters, of the following series: PD M48, PD M51, PD M57, PD M78, PD M81, PD T177, PD M507, PD M508, PD M527, MTSQ M500, MTSQ M501, MTSQ M502, MTSQ M518, MT M43, MT M61, MT M67, MT T316E2, MT T342, MT M522, MT M523, and TSQ M55	B	1.4
Fuzes (packed in accordance with approved drawings depicting issue package, except box (crate), wirebound packing) - fuzes with boosters assembled thereto of the following series: PD M48, PD M51, PD M52, PD M57, PD M78, PD M81, PD T177, PD M507, PD M508, PD M525, MTSQ M500, MTSQ M501, MTSQ M502, MTSQ M518, MT M43, MT M61, MT M67, MT T316E2, MT T342, MT M522, MT M523, and TSQ M55; artillery-type proximity fuzes with boosters, and other fuzes w/o boosters, except fuzes chemically actuated containing ampoules which may initiate, directly or indirectly, explosives and explosives loaded components, which are assembled in the conventional manner to form the finished explosive fuze.	B	(04) 1.2
Fuzes, proximity, artillery type (not packed in accordance with approved drawings)	B	1.1
Fuzes, Class (04) 1.2 when packed in box (crate), wirebound packing, and fuzes of series other than listed as Class (04) 1.2 with boosters (except chemical-actuated fuzes containing ampoules which may initiate, directly or indirectly, explosives and explosives loaded components which are assembled in the conventional manner to form the finished explosive fuze)	B	1.1
Fuzes, chemically-actuated, containing ampoules which may initiate directly or indirectly, explosives and explosives loaded components which are assembled in the conventional manner to form the finished explosive fuze	L	1.2

See notes at end of table

5-48 Change 7

## Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity distance class
Fuzes with 2 or more safety features	D	1.1
Grenades, fragmentation	F	(04) 1.1
Grenades, hand offensive	F	1.1
Grenades, hand, CN, M7A1, w/Fuze M201A1	G	1.4
Grenades, hand, CS, M7A3, w/Fuze M201A1	G	1.4
Grenades, hand, CN1, ABC, M25A1, w/Fuze C12	G	1.4
Grenades, hand, DM1, ABC, M25A2, w/Fuze C12	G	1.4
Grenade, hand, smoke, HC, M8	G	1.3
Grenades, illuminating & incendiary, except WP	G	1.3
Grenades, practice, w/spotting charge	G	(04) 1.2
Grenade, hand practice, M69	S	1.4
Grenades, WP, except grenades rifle, WP, M19	H	(08) 1.2
Grenade, smoke, WP, hand and rifle	H	(04) 1.2
Grenades, rifle, AT (pentolite loaded)	L	1.1
Grenades, rifle, AT (except pentolite loaded)	D	1.1
Grenades, rifle, smoke, XM48E1 & M22 & M23	G	1.4
Grenades, riot control, CS1, M25A2	G	1.4
Grenades, smoke (except HC, WP & PWP)	G	1.4
Grenades, smoke, HC	G	1.3
HMX, dry	A	1.1
HMX, wet	D	1.1
Igniters for rocket motors (e.g., M12, M18 and M20)	G	(04) 1.2
Igniters for rocket motors (e.g., M29)	G	1.1
Igniter, spotting charge	G	1.1
Ignition cartridge for trench mortar ammunition	G	1.4
Illuminating compositions (consolidated in final press operations)	G	1.3
Lead azide, wet	A	1.1
Lead styphnate, wet	A	1.1
Magnesium powder (in original shipping container or equivalent)	L	1.4
Magnesium powder (not in original shipping container or equivalent)	L	1.3
Mercury fulminate, wet	A	1.1
Mine, APERS, NM, M14 (w/integral fuze)	D	1.1
Mines, antipersonnel (bounding type)	D	(08) 1.2
Mines, antipersonnel (cast iron block)	D	1.1
Mines, HEAT	D	1.1
Mines, practice, AP, M17	B	1.4
Mines, practice, w/spotting charge and/or fuze	G	(04) 1.2
Nitrates (inorganic), except ammonium nitrate (in original shipping container or equivalent)	L	1.4
Nitrocellulose, wet, containing 8-30 per cent water, that is exposed to detonation hazards at less than intraline distances	C and D	1.1
Nitrocellulose, wet, containing 8-30 per cent water, that is exposed only to such fire hazard materials as other class 1.3 items	C	1.3
Nitroguanidine	D	1.1
Nitrostarch	D	1.1
Nuclear fire marker device 11-F2	G	1.1
Octol	D	1.1
PBX	D	1.1
Pentolite	D	1.1
See notes at end of table		

Change 7 5-49

MM2600

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity distance class
Perchlorates <sup>3</sup> (in original shipping container or equivalent)	L	1.4
Perchlorates <sup>4</sup> (not in original shipping container or equivalent)	L	1.3
Percussion elements	B	1.4
Peroxides, solid (in original shipping container or equivalent)	L	1.4
Peroxides, solid (not in original shipping container or equivalent)	L	1.3
PETN, wet	D	1.1
PETN, Dry	A	1.1
Photoflash powder	C	1.1
Picratol	D	1.1
Picric acid	D	1.1
Primers, artillery and cannon, percussion and electric	G	(04)1.2
Primer detonators	B	(04)1.2
Projectiles, HE, fuze or unfuzed, 155mm	D	(18)1.1
Projectiles, HE, fuze or unfuzed, 175mm	D	(21)1.1
Projectiles, HE, (explosive D loaded) fuze or unfuzed	B	(18)1.2
Projectiles, illuminating	G	1.3
Propellant, single base, multi-perforated, w/web thickness greater than 0.019 inch (excluding single base propellant containing 98 percent or more nitrocellulose (NC))	C	1.3
Propellant, single base, containing 98 percent or more NC	C	1.1
Propellant, single base, single perforated, rifle	C	1.3
Propellant, single base (FNH and NH compositions), single perforated, cannon, w/web thickness not greater than 0.0035 inch	C	1.3
Propellant, single base, low pressure, for pistols and shotguns, etc.	C	1.3
Propellant, double base, containing not more than 20 percent nitroglycerin, w/web thickness of 0.0075 inch or greater	C	1.3
Propellant, double base (for artillery ammunition) containing over 20 percent NG	C	1.1
Propellant, double base, w/web thickness less than 0.0075 inch, regardless of nitroglycerin content	C	1.1
propellant, multiperforated, cannon and rifle, w/web thickness not greater than 0.019 inch	C	1.3
Propellant, double base and composite grains that have been determined to be min-mass detonating in tests conducted in accordance with TB 700-2	C	1.3
Propellant, double base and composite grains that have been determined to be mass detonating in tests conducted in accordance with TB 700-2	C	1.1
Propellant, triple base, M15 and M17	C	1.3
Propellant grains, polysulfide-perchlorate, containing not more than 74 percent oxidizer	C	1.3
Propellant, type N5, in carpet rolls	C	1.3
Propellant, case, PNJ	C	1.3
Propellant, M7, LAW	C	1.3
RDX (Cyclonite), dry	A	1.1
RDX (Cyclonite), wet	D	1.1
Redeye guided missiles, packaged three complete rounds w/launcher	E	1.1
Rockets, HEAT, 3.5-inch, complete round	E	1.1
Rockets, toxic chemical agents, complete rounds	K	(12)1.2
Rockets, HE, 2.75-inch (in LAU-3/A rocket launcher)	E	(12)1.2
Rockets, practice, 3.5-inch	C	(12)1.2
Rocket heads, HE and HEAT (except pentolite loaded) w/motors	D	1.1
Rocket heads, pentolite loaded, w/motors	L	1.1

See notes at end of table

5-50 Change 7

Extract of TM 9-1300-206

TM 9-1300-206

Table 5-21. Summary of Quantity-Distance Classifications and Compatibility Groups-Continued

Item	Store compatibility group	Quantity-distance class
Rocket motors, M3, M5, M6, M10, M26, M30, M42, M53; Pershing 1st and 2nd stages; Spartan 1st, 2nd and 3rd stages	C	1.3
Rocket motors, M13, M26, M37 and M66	C	1.1
Rocket, Riot Control Agent, CS, 2.75" FFAR, XM99	G	1.3
Shaped charges	D	1.1
Simulators, M110, M117, M116 and M119	G	1.3
Simulators, M142	G	1.1
Simulator, M116A1 and M115A2	G	(04) 1.2
Smoke pots	G	1.3
Spotting charges (cartridge for miniature practice bombs)	G	1.3
Squibs, commercial	S	1.4
Tetracene (Wet)	A	1.1
Tetranitrocarbazole (TNC)	D	1.1
Tetryl	D	1.1
Tetrytol	D	1.1
Thruster, cartridge activated, M25	S	1.4
Torpex	D	1.1
Trisonal	D	1.1
TNT	D	1.1
Zirconium (types I and II, spec. FED 1665), in original shipping container or equivalent	L	1.4
Zirconium (types I and II, spec. FED 1665), not in original shipping container or equivalent	L	1.3

**NOTES**

<sup>1</sup>When stored in stacks containing not more than 5000 lbs of HE that are separated from each other by at least 2 feet, safety distances may be based on the quantity of HE in the single stack requiring the greatest distances.

<sup>2</sup>Minimum permissible quantity-distances. Specific groups A and B chemical agents may require greater agent distances as indicated in DARCOM series for specific agents (e.g., GB and VX).

<sup>3</sup>See separate listings for smoke grenades and CS filled 2.75-in. Rocket.

<sup>4</sup>Excluding ammonium perchlorate.

<sup>5</sup>Class 1.3 applies when stored in metal-lined wooden boxes; when stored in all metal containers not specifically designed for quick release of pressure, Class 1.1 applies.

<sup>6</sup>Although SCG L indicates separate storage, any type of ammonium nitrate may be stored with any type ammonium perchlorate.

(4) When the Chemical Hazard Symbol ordering the wearing of full protective clothing (symbol 1 of figure 3-2) is colored with a yellow rim and figure, the symbol indicates the presence of harassing agents (riot control agents and smokes). The following protective clothing, identified as Set 2 in figure 3-2 and column 3 of table 3-1 should be used: M9 series protective gas mask or self-contained breathing apparatus, coveralls, and protective gloves.

(5) When the Chemical Hazard Symbol ordering the wearing of full protective clothing (symbol 1 of figure 3-2) is colored with a white rim and figure, the symbol indicates the presence of white phosphorus and other spontaneously combustible material. The following protective clothing, identified as Set 3 in figure 3-2 and column 4 of table 3-1, should be used: flame-resistant coveralls, flame-resistant gloves, M9 series protective gas mask or self-contained breathing apparatus.

(6) The Chemical Hazard Symbol ordering the wearing of breathing apparatus (symbol 2 of figure 3-2) indicates the presence of incendiary and readily flammable chemical agents which present an intense radiant heat hazard and may be posted together with any of the other symbols, if required. Protective masks to prevent inhalation of smoke from burning incendiary mixture should be used.

(7) Firefighting personnel equipped with normal heat-resistant clothing (bunker suit) and gas mask/self-contained breathing apparatus do not require the protective clothing identified as sets 2 and 3 when fighting fires involving material in which sets 2 or 3 are specified in table 3-1.

(8) The Chemical Hazard Symbol warning against applying water (symbol 3 of figure 3-2) indicates a dangerous reaction will occur if water is used in an attempt to extinguish fire. This chemical hazard symbol may be posted together with any of the other symbols, if required.

Table 3-1. Chemical Agents and Fillers Contained in Ammunition and the Chemical Hazard Symbols Required in Storage

Chemical agents and fillers contained in ammunition	Full protective clothing			Breathing Apparatus	Apply no water	G	VX	HZ	H	L
	Set 1	Set 2	Set 3							
GB	X					X				
VX	X						X			
H, HD, HT	X								X	
L	X									X
CL, CG, CK, CN, CNS, CS, BBC, DA, DC, DM, FS, FM		X								
HC				X	X					
BZ		X						X		
WP, PWP			X							
TH, PT				X	X					
IM, NP				X						
TEA, TPA			X		X					
Colored smokes				X						

Extract of TM 9-1300-206

TM 9-1300-206

Table 4-2. Storage Information and Shipping Classification for Chemical Agents

Agent symbol	Common name	Action of agent	Visual ID	Chemical group	Storage compatibility group	DOT hazard class	Color coding identification**
GB	Sarin	Nerve agent	Colorless to amber liquid	Group A	Group K	Poison A	GREY base coat. GB in Dark GREEN. One Dark GREEN band.
VX	None	Nonpersistent Nerve agent	Colorless to straw liquid	Special hazard Group A	Group K	Poison A	GREY base coat. VX in Dark GREEN. One Dark GREEN band.
H	Levinstein Mustard	Persistent Blister agent	Colorless to pale yellow liquid	Special hazard Group A	Group K	Poison A	GREY base coat. H in Dark GREEN. One Dark GREEN band.
HD	Distilled Mustard	Blister agent	Colorless to pale yellow liquid	Group A	Group K	Poison A	GREY base coat. HD in Dark GREEN. One Dark GREEN band.
HT	Mustard T Mixture	Blister agent	Clear yellow liquid	Group A	Group K	Poison A	GREY base coat. HT in Dark GREEN. One Dark GREEN band.
L	Lewisite	Blister agent	Yellow gas	Group A	Group K	Poison A	GREY base coat. L in Dark GREEN. One Dark GREEN band.
CL	Chlorine	Choking agent	Yellow gas	Group B	Group K	Poison A	GREY base coat. CL in Dark Green. One Green band.
CG	Phosgene	Choking agent	Colorless gas	Group H	Group K	Poison A	GREY base coat. CG in Dark Green. One Green band.
CK	Cyanogen Chloride	Blood agent	Colorless gas	Group B	Group K	Poison A	GREY base coat. CK in Dark Green. One Green band.
AC	Hydrogen Cyanide	Blood agent	—	Group H	Group K	Poison A	GREY base coat. AC in Dark Green. One Green band.
BZ	None	Incapacitating agent	White crystalline solid	Group B	Group K	Poison A	GREY base coat. BZ on VIOLET. One VIOLET band.
CN	Chloroacetophenone	Tear agent	White crystalline solid	Group B	Group G	Irritant	GREY base coat. CN in RED. One RED band.
CNS	Chloroacetophenone in chloroform & chloroform	Tear agent	Liquid	Group B	Group G	Irritant	GREY base coat. CNS in RED. One RED band.
CS	None	Tear agent	White crystalline solid	Group H	Group G	Irritant	GREY base coat. CS in RED. One RED band.
BBC	Bromobenzylcyanide	Tear agent	Liquid	Group B	Group G	Irritant	GREY base coat. BBC in RED. One RED band.
DA	Diphenylchlorarsine	Vomiting agent	—	Group B	Group G	Irritant	GREY base coat. DA in RED. One RED band.
DC	Diphenylcyanarsine	Vomiting agent	—	Group B	Group C	Irritant	GREY base coat. DC in RED. One RED band.
DM	Adamsite	Vomiting agent	Yellow to green solid	Group H	Group G	Irritant	GREY base coat. DM in RED. One RED band.

See notes at end of table

Change 7

4-15



MM2600

Extract of TM 9-1300-206

TM 9-1300-206

Table 4-2. Storage Information and Shipping Classification for Chemical Agents. Continued

Agent symbol	Common name	Action of agent	Visual ID	Chemical group	Storage compatibility group	DMT hazard class	Color coding identification**
FS	Sulfur Trioxide Chlorosulfonic acid solution	Smoke	Heavy colorless liquid	Group B	Group G	Corrosive	LIGHT GREEN base coat. FS & other information in BLACK.
FM	Titanium tetrachloride	Smoke	Heavy colorless liquid	Group B	Group G	Corrosive	LIGHT GREEN base coat. FM & other information in BLACK.
HC	Aluminum zinc oxide hexachloro methane	Smoke	—	Group H	Group G	Flammable solid	LIGHT GREEN base coat. HC & other information in BLACK.
WP	White Phosphorous	Incendiary and smoke	Pale yellow solid	Group C	Group H	Flammable solid	LIGHT GREEN base coat***. WP & other information in LIGHT RED.
WPJ	Plasticized White Phosphorous	Incendiary and smoke	Pale yellow like putty	Group C	Group H	Flammable solid	LIGHT GREEN base coat***. WP & other information in LIGHT RED.
TH	Thermite or Thermate	Incendiary	Light to dark grey	Group D	Group G	Flammable solid	LIGHT RED base coat. TH & other information in BLACK.
IM	Isobutyl methacrylate-ethyl	Incendiary	—	Group D	Group J	Flammable liquid	LIGHT RED base coat. IM & other information in BLACK.
NP	Nepalin	Oil component Incendiary Gel	Light tan to brown jelly	Group D	Group J	Flammable liquid	LIGHT RED base coat. NP & other information in BLACK.
PI	Pyrotechnic material	magnesium inventory mixture	Light Grey	Group D	Group G	Flammable solid	LIGHT RED base coat. PI & other information in BLACK.
TEA or IFA	Trichyl Aluminum	Spontaneously flammable	Clear liquid	Group D	Group L	Flammable liquid	LIGHT RED base. TEA or IFA and other information in BLACK.

4-16 Change 7

\* For additional properties of chemical agents, refer to TM 3-250  
 \*\* For detailed color specifications, see MIL-D-709C. To indicate presence of explosive elements, the following additional marking will be used:  
 HIGH EXPLOSIVES - One YELLOW band  
 LOW EXPLOSIVES - One BROWN band  
 \*\*\* Separate handling ammunition for use on limited ships will be color coded; light green body; WP, PWP, and marking in black and one light red band.

## EXERCISE SOLUTIONS

### LESSON 1

1. a. A forklift to move pallets from the truck to the railroad car, and a manual pallet truck to place the pallets inside the car. (See pages 6, 8, and 2.)
- b. The engines must be shut off, the brakes set, and a wheel chocked (when trucks are on an incline). (See page 16.)
- c. The brakes must be set, the wheels chocked, and blue warning flags placed on each end of the car. (See page 16.)
- d. MHE must have the date of the last load test, date of the next load test due, and load capacity stenciled on its boom, mast, or another conspicuous place. (See page 11.)
2. a. A 4,000-pound RTFL and a mobile loading ramp. (See page 10.)
- b. The strapping on palletized ammunition may be removed and the boxes manually handled individually. Gravity conveyors may be used if they are available. (See page 2.)
- c. Leather gloves and steel-toed shoes (or other toe protection). (See page 11.)
- d. Class 1-BC. (See page 12.)

### LESSON 2

1. M, N. (See page 24.)
2. C. (See chart on page 20.)
3. A. (See chart on page 20.)
4. C, H, I. (See extracts on pages 29, 34, and 36.)
5. A. (See extract on page 31.)
6. G, B. (See extracts on pages 29 and 34.)
7. J, K. (See pages 23-24.)