IDENTIFICATION OF AMMUNITION

US ARMY ORDNANCE
MISSILE AND MUNITIONS CENTER AND SCHOOL

THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM
IDENTIFICATION OF AMMUNITION

Subcourse Number MM0145
EDITION A

United States Army Ordnance Missile and Munitions Center and School, Redstone Arsenal, Alabama 35897-6000

10 Credit Hours

Edition Date: December 1992

SUBCOURSE OVERVIEW

This subcourse is divided into two lessons. The first lesson is designed to provide you with background information on ammunition markings and color codes. The second lesson is designed to familiarize you with ammunition items that you may encounter in the field.

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine that was current at the time the subcourse was prepared. In your own work situation, always refer to the latest official publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

Terminal Learning Objective

Action: You will identify ammunition items by caliber, type, or purpose based on their markings, color codes, or physical appearance.

Condition: You will have access to extracts from MIL-STD 709C and from relevant TM 43-0001-series documents. This subcourse booklet contains all of the information you will need to complete this subcourse.

Standard: To demonstrate competency on this task, you must achieve a minimum of 70 percent correct on the subcourse examination.
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<td></td>
</tr>
</tbody>
</table>
ADMINISTRATIVE INSTRUCTIONS

Number of lessons in this subcourse: two.

Materials you need in addition to this booklet are a number 2 pencil and the Army Correspondence Course Program (ACCP) Examination Response Sheet and preaddressed envelope you received with this subcourse.

Supervisory Requirements: none.

References: The material contained in this subcourse was derived from the following publications:

TM 9-1300-200, Ammunition, General, 3 October 1969.
TM 43-0001-27, Army Ammunition Data Sheets for Small Caliber Ammunition (FSC 1305), 29 June 1981.
TM 43-0001-30, Army Ammunition Data Sheets for Rockets, Rocket Systems, Rocket Fuzes, Rocket Motors (Federal Supply Class 1340), 1 December 1981.
TM 43-0001-36, Army Ammunition Data Sheets for Land Mines (FSC 1345), 14 February 1977.

These publications provide additional information about the materials in this subcourse. You do not need these materials to complete this subcourse.
LESSON 1
IDENTIFICATION OF AMMUNITION BY MARKINGS AND COLOR CODES
Critical Task: 03-4010.01-0002

OVERVIEW

Lesson Description
In this lesson you will learn to identify ammunition and components based on color codes, markings, or packaging.

Terminal Learning Objective

Action: You will be able to identify ammunition by general type and purpose based on package markings, item markings, color codes, and symbols.

Condition: This lesson contains all the information you need. This required information includes extracts from TM 43-0001-series publications, TM 9-1300-200, and military standards (MIL-STDs). No additional equipment or personnel are required.

Standard: You will identify US military ammunition with 75 percent accuracy as demonstrated by your score on the subcourse examination.

INTRODUCTION

Ammunition identification is a critical basic skill of all ammunition personnel. All of the major tasks accomplished within a Class V storage activity (that is, a magazine area or an ASP) require the ability to identify ammunition properly. There have been cases where misidentified ammunition (such as 105-millimeter high-explosive [HE] rounds) has been issued to using units as practice ammunition. Such mistakes have resulted in needless injuries and deaths.

AMMUNITION PACKAGE MARKINGS

In most cases, ammunition arriving at a storage facility through the supply system will arrive in factory packaging. Depending on the type of ammunition, this packaging will be either wooden boxes, separate-loading projectile pallets, or metal boxes or cans. Regardless of the packaging configuration, each individual container will be stencilled with critical identifying information. The type of container involved may cause some exceptions to the standard package markings; however, the markings will include the following critical information in most cases:

- Standard nomenclature.
- National stock number (NSN).
- Department of Defense identification code (DODIC).
- Lot number.
• Weight zones.
• Rounds per package.
• Package weight and cube.
• Department of Transportation (DOT) hazardous materials information.
• Ammunition color codes.

Standard Nomenclature

The standard nomenclature consists of the technical name and model number for the ammunition item (such as “cartridge, 105-millimeter, high explosive”). Included as part of the standard nomenclature is sufficient additional information to differentiate between items having the same item name. The following paragraphs describe the kinds of additional information that are normally provided.

Model Number. A model number is assigned at the time an item is adopted for use and type-classified. It is an essential part of the item nomenclature. A model number consists of the letter “M” followed by an Arabic numeral (as in “M1”). When an item is accepted under development, the letter “X” is placed in front of the letter “M” (as in “XM1”). When items have received a modification to the basic design, the letter “A” and an appropriate Arabic numeral are added after the existing model number (as in “M1A1,” “M1A2,” and so on). When an item undergoes an experimental modification, the letter “E” and an Arabic numeral are added after the original model number (as in “M1E1,” “M1E2,” and so on).

Model and Type of Fuzing. The nomenclature will indicate whether an item is without a fuze (“W/O fuze”), or with a fuze (“w/fuze”). If it has a fuze, the fuze model number and type (such as “w/fuze M256 PD”) will be indicated.

Weapon in Which Fired. This indicates the weapon or weapons for which the ammunition is designed, or with which it can safely be used (such as “for Gun M2” or “for Howitzer M4, M4A1, M4A2”).

National Stock Number (NSN)

A NSN is assigned when an item is approved for use. It is used to identify the established essential design characteristics of the item that make it different from other items of supply.

The NSN is a thirteen-digit code (such as “1330-00-133-8244”). The first element of the NSN is the Federal supply group (FSG). All ammunition items are in the FSG 1300 series, and guided missiles are in the FSG 1400 series. The last two digits of the FSG are the Federal supply classification (FSC) (such as “30”). The second element of the NSN is a country code (CC). The CC is always 00 or 01 for US items. The last part of the NSN is the National Item Identification Number (NIIN). The NIIN consists of the CC plus a seven-digit code (such as “00-133-8244”) used to identify design features, packing methods, and type of filler.

Department of Defense Identification Code

The DODIC is used as a suffix to the NSN. It consists of a letter and three numerals (as in “C705”) or two letters and two numerals (as in “PA66”). When suffixed to more than one NSN, the DODIC indicates that the items are interchangeable for issue or use.
Lot Number

Lot numbers are assigned when ammunition is manufactured. The lot number identifies an item constructed according to pertinent specifications. It is an essential part of the markings, and is required for record keeping purposes, for preparing reports on the serviceability and functioning of the ammunition, and for reporting accidents in which the ammunition is involved.

There are two lot numbering systems currently found in the ammunition inventory. The older system is being phased out, but it may still be found on items in storage.

The Old Lot Numbering System. This system consists of a manufacturer's identification code, an interfix code, a sequence number, and (in some cases) a lot suffix code. The manufacturer's code is a two-digit code assigned to indicate the specific location of manufacture. The interfix number identifies lots produced by the same manufacturer at the same time and location. The sequence number identifies lots in a specific interfix series according to production sequence. A lot suffix may be added to denote a rework effecting a material change in the original lot. For example, the first rework is identified by the suffix "A," the second rework by a "B," and so forth. A breakdown of lot number LW-06-01A in the old system is given in Table 1-1.

Table 1-1. Lot numbering (old system).

<table>
<thead>
<tr>
<th>Manufacturer's Identification Code</th>
<th>LW</th>
<th>Indicates that the ammunition was manufactured at the Longhorn Army Ammunition Plant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interfix Code</td>
<td>06</td>
<td>Indicates a series of lots that were in production at the same time.</td>
</tr>
<tr>
<td>Sequence Number</td>
<td>01</td>
<td>Indicates that this is the first lot manufactured under interfix code 06.</td>
</tr>
<tr>
<td>Lot Suffix</td>
<td>A</td>
<td>Indicates that this is the first rework of this item.</td>
</tr>
</tbody>
</table>

The New Lot Numbering System. The new lot numbering system is described in MIL-STD 1168A. It consists of a manufacturer's identification code, the year of production, the month of the production run, an interfix number, a sequence number, and (in some cases) a lot suffix. The manufacturer's codes are combinations of one, two, or three letters that indicate the specific location of manufacture. The year of production consists of the last two digits of the year in which the ammunition was manufactured. The month of production code is a single letter (A through M, excluding I) identifying the month in which the ammunition was produced. The interfix code is a three-digit number. It identifies lots of ammunition produced by the same manufacturer at the same time and location. The sequence number is a three-digit number. It identifies ammunition lots within an interfix series according to production sequence. The lot suffix indicates the number of times an item has received a major rework. This new lot numbering system functions much better than the old system to identify ammunition should a defect occur. A breakdown of lot number LOW 91M 006-001B in the new system is given in Table 1-2.
Table 1-2. Lot numbering (new system).

<table>
<thead>
<tr>
<th>Manufacturer’s Identification Code</th>
<th>LOW</th>
<th>Indicates that the ammunition was manufactured at the Longhorn Army Ammunition Plant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of Production</td>
<td>91</td>
<td>Indicates that the ammunition was manufactured during 1991.</td>
</tr>
<tr>
<td>Month of Production</td>
<td>M</td>
<td>Indicates that the ammunition was manufactured in December.</td>
</tr>
<tr>
<td>Interfix Number</td>
<td>006</td>
<td>Indicates a series of lots that were in production at the same time.</td>
</tr>
<tr>
<td>Sequence Number</td>
<td>001</td>
<td>Indicates that this is the first lot manufactured under interfix code 06.</td>
</tr>
<tr>
<td>Lot Suffix</td>
<td>B</td>
<td>Indicates that this is the second rework of this item.</td>
</tr>
</tbody>
</table>

Weight Zones

Weight zones are used to identify the zone requirements for an individual ammunition item. Weight zones are used on weapon-fired munitions ranging from mortars through large artillery. The zones are indicated by the outline of a block with a smaller-diameter circle in the center. There will be one block for each weight zone associated with the item. While weight zones are used primarily by using units for weapons registration, some ammunition requests may depend on ammunition items in certain weight zones.

Rounds Per Package

Most ammunition is packaged in a standard pack configuration. NSNs are based in part on these standard packs. Marking the packaging with the number of rounds or items per package aids in accountability and simplifies issues, receipts, and supply requisitions.

Package Weight and Cube

Marking the package with total weight and cube aids in determining storage and transportation space requirements.

Department of Transportation Hazardous Materials Information

The proper DOT shipping names are used to determine shipment compatibility and firefighting procedures.

Ammunition Color Codes

The appropriate color code for the ammunition within a package may be marked on two opposing corners of the package. Color codes identify the significant hazards involved with specific items. Specific ammunition color codes will be covered later in this lesson.
INDIVIDUAL AMMUNITION ITEM MARKINGS

Once ammunition has been issued to a using unit, it seldom returns to the Class V storage activity in its original condition. Once returned, any ammunition package with a broken or damaged seal must be physically inspected to ensure that the items are in their proper containers. For this reason, and to aid using units once items are unpacked, most ammunition items are individually marked with stencils, stamps, or both.

Stenciled Markings

Examples of stenciled markings are shown in Figure 1-1. Stenciled markings can only be applied to items with a sufficient surface area to contain the necessary information. Small arms rounds and blasting caps, for example, are too small to stencil clearly. All stenciled markings must comply with the applicable color code requirements in effect at the time of manufacture. All stenciled markings on all ammunition must include the following critical information:

- Abbreviated standard nomenclature.
- DODIC.
- Model number.
- Type and model of fuzing (if present).
- Intended weapon or weapons.
- Weight zone markings (if applicable).
- Lot number. (In ammunition utilizing a cartridge case, the lot number for the cartridge case only is usually stenciled on the cartridge case head.)

Figure 1-1. Artillery ammunition markings.
Stamped Markings

Whether it has stenciled markings or not, most ammunition will have stamped markings somewhere on the item body. (Major exceptions to this practice are blasting caps and bulk explosive items.) These markings must, at a minimum, include the caliber or size of the round (such as "105-millimeter") and the model number (such as "M-1"). In some cases, they may also include the filler (such as "HE" or "white phosphorous [WP]"). Care must be taken when using stamped markings for identification purposes. Components attached to a round (such as a cartridge case, fin assemblies, or fusing) will also have stamped markings. The general exception to this is small arms ammunition, which has the manufacturer's symbol and the date of manufacture stamped on the head of the cartridge case.

The following paragraphs describe the general areas where stamped markings are found on various types of ammunition.

- **Small Arms.** The head stamp is located on the cartridge case head.

- **Fixed Artillery and 40-Millimeter Cartridges.** The markings are located just above the rotating band.

- **Semi-Fixed and Separate-Loading Ammunition.** The markings are located just above or below the rotating band.

- **Land Mines.** The markings are located around the edge of the primary fuze well.

- **Rockets and Guided Missiles.** Most of these items are currently stored in sealed containers or pods. However, these items have stamped markings on their bodies just forward of the warhead/rocket motor junction.

**AMMUNITION COMPONENT TRACKING**

As previously mentioned, many components physically attached to a round of ammunition have model numbers or lot numbers stamped on them. These numbers identify the components only. In addition to the obvious components, an item may also contain numerous internal components. In order to track an ammunition component, a DD Form 1650 (Ammunition Data Card) is used. An example of a completed DD Form 1650 is shown in Figure 1-2. The DD Form 1650 is generated at the time the ammunition item is loaded, assembled, or packed. With the exception of small arms ammunition, a DD Form 1650 is prepared for each lot of ammunition manufactured. It is prepared by the manufacturer and furnished to each recipient of a shipment of that ammunition. The DD Form 1650 also provides a brief history of any reworks performed on the item.

The completed DD Form 1650 should contain the following information:

- The complete item nomenclature, NSN, DODIC, lot number, and quantity.

- Manufacturer, drawing, specification, and packaging data.

- Components, including nomenclature, model numbers, lot numbers, and component drawing numbers.

- Remarks regarding any reworks or modifications accomplished on the items.
Figure 1-2. Example of a completed DD Form 1650 (front and back).
AMMUNITION COLOR CODING SYSTEMS

Ammunition items are painted for three reasons. The first and foremost of these reasons is to protect the ammunition and prevent rust or corrosion. The second reason is for camouflage, and the third reason is to aid in identifying the ammunition. Color coding is used to indicate the primary use of ammunition items and to emphasize the specific explosive, flammable, or toxic hazards associated with the items.

Two color coding systems are described in MIL-STD 709, MIL-STD 709A, MIL-STD 709B, and MIL-STD 709C. An extract of MIL-STD 709C showing the colors used in both systems is provided in the Appendix at the end of this subcourse booklet. Ammunition manufactured prior to 1962 used the color coding system described in MIL-STD 709A and MIL-STD 709B. This lesson will address only the newer color coding system, which is described in MIL-STD 709C.

Color coding is used for all ammunition items, except for the following:

- Small arms ammunition (discussed later in this subcourse).
- Blank ammunition.
- Cartridge cases.
- Propelling charges.
- Fuze.
- Propellant-actuated devices.
- Pyrotechnic devices. (However, color is used to indicate the pyrotechnic effect. The color is marked on the top of ground signals.)
- Demolition accessories and ammunition components that do not require color coding for identification purposes.

Ammunition color coding is interpreted according to the combination of the base color, the color of the markings, and the color of any special ammunition marking symbols present.

AMMUNITION MARKING SYMBOLS

Before describing the color coding system, some basic symbols need to be explained. The seven symbols are shown in Figure 1-3. These symbols are used in combination with the current color coding system to identify specific munition features. The following paragraphs describe what each symbol indicates about the ammunition on which it is used.

**Diamond Band**

When a band of diamond-shaped symbols is painted around the body of a projectile, the color of the diamonds shows the type of payload in the projectile. White diamonds indicate that the munition is filled with inert items (such as flechettes or slugs). A yellow band accompanying the white diamonds indicates the presence of an HE charge to scatter the flechettes or slugs. Yellow diamonds indicate that the munition is filled with explosive submunitions (such as grenades) to be expelled during flight. These munitions are referred to as improved conventional munitions (ICM).

**Triangle Band**

Yellow triangles forming a band around a munition indicate that the item is filled with small explosive mines to be expelled during flight.
Figure 1-3. Special ammunition markings.
Broken Band

A broken band around the circumference of a munition indicates that it is a binary item. Binary items contain two components that require mixing to achieve their intended effect. Either component may have specific hazards associated with it. A dark-green broken band indicates the presence of binary toxic chemical agents. Note: Do not confuse these bands with the weight zone markings previously discussed.

Broken Band of "T"s

A broken band of "T"s around the circumference of a munition indicates that it contains a tracer element. The color of the "T"s will be marked in the same color as the tracer flame.

Broken Band of "C"s

A broken band of "C"s around the circumference of a munition indicates that it contains a color-bursting chemical. The color of the "C"s will be the color of the burst. This marking will only be used on flash-type signal devices.

Broken Band of "D"s

A broken band of "D"s around the circumference of a munition indicates that it contains a dye load. The color of the "D"s will indicate the dye color involved.

Solid Bands

Solid bands are used to indicate the presence of a specific hazardous filler that is not indicated by the primary-use color code. For example, a WP smoke round would be painted light green to indicate a smoke cartridge. It would have red markings to identify its incendiary characteristics (caused by the WP filler). It would also have a solid yellow band to identify the HE hazard. The band colors and their meanings are as follows:

- Yellow—high explosive.
- Brown—low explosive.
- Dark green—toxic chemical.
- Dark red-riot—control chemical.
- Violet—in capacitating chemical.
- White—illuminating.
- Black—armor-defeating.

The current color coding system uses a combination of base color, colored markings, and colored special symbols to identify the hazards associated with a munition. With the special symbols it is easier to identify additional hazards not previously included in the markings.

AMMUNITION COLORS

Olive-drab, the most common base color, has no identification significance. It is used primarily to protect and camouflage the munition. The color white has no significance when used on guided missiles, mine dispensers, and rocket launchers. Black or white lettering also has no identification significance.
The base colors used to indicate the primary use of ammunition items are as follows:

- Yellow—high explosive.
- Brown—low explosive.
- Gray—chemical.
- Light green—smoke.
- Light red—incendiary.
- White—illuminating (pyrotechnic).
- Black—armor-defeating.
- Aluminum (silver)—countermeasure.
- Blue—practice.

COLOR CODING FOR SMALL ARMS AMMUNITION

Small arms ammunition uses a separate color coding system. Although the colors are similar, their uses and purposes are totally different.

There are three major components to small arms ammunition. These are the cartridge case, the bullet, and the primer (as shown in Figure 1-4). The colors used for coding are applied to the bullet tip.

Figure 1-4. Typical cartridge (sectioned).
There are three small arms items that do not use any color code. These are standard ball, national-match grade, and high-pressure-test rounds. The standard ball cartridge has no special markings. The national-match-grade round always has the letters "NM" stamped on the cartridge head. The high-pressure-test cartridge has the letters "HPT" stamped on the cartridge case head.

The color codes and possible combinations for small arms ammunition are provided in Table 1-3.

Table 1-3. Small arms color coding.

<table>
<thead>
<tr>
<th>COLOR</th>
<th>PURPOSE</th>
<th>MARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Dummy—inert-loaded</td>
<td>Both bullet and cartridge case are black</td>
</tr>
<tr>
<td>Black</td>
<td>Armor-piercing, (AP)</td>
<td>Bullet tip or entire bullet is black (cartridge case is NOT black)</td>
</tr>
<tr>
<td>Silver</td>
<td>Armor-piercing, incendiary (API)</td>
<td>Silver bullet tip</td>
</tr>
<tr>
<td>Red</td>
<td>AP</td>
<td>Red tip with silver ring</td>
</tr>
<tr>
<td>Blue</td>
<td>Incendiary</td>
<td>Blue or dark blue tip with a light blue ring</td>
</tr>
<tr>
<td>Orange, Brown, Red, or Purple</td>
<td>Tracer</td>
<td>Depending on the vintage, an orange, brown, red, or purple tip</td>
</tr>
<tr>
<td>Green</td>
<td>Duplex</td>
<td>Green tip, 7.62-millimeter only</td>
</tr>
<tr>
<td>Green</td>
<td>Heavy ball</td>
<td>5.56-millimeter, green tip only, for use with M16A2 and squad automatic weapon (SAW)</td>
</tr>
<tr>
<td>Green</td>
<td>Ball frangible</td>
<td>Green tip with white ring</td>
</tr>
</tbody>
</table>
LESSON 1
PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed this exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. When are the letter “M” and an Arabic numeral assigned to an ammunition item?
   A. When it starts development.
   B. When it receives a modification to the basic design.
   C. When it receives an experimental or non-certified modification.
   D. When it is adopted for use.

2. How many digits does the NIIN contain?
   A. 13.
   B. 11.
   C. 9.
   D. 4.

3. What is indicated when a DODIC is assigned to more than one NSN?
   A. That the items belong in the same Federal supply class.
   B. That the items are interchangeable for use and issue.
   C. That the items are from the same lot.
   D. That the items have the same model number.

4. What do the first two or three characters in a lot number indicate?
   A. The lot suffix number.
   B. The month of the production run.
   C. The year of production.
   D. The manufacturer's identification code.

5. Which two ammunition items are exempt from stenciled ammunition marking requirements?
   A. Small arms ammunition and blasting caps.
   B. Blasting caps and bulk explosive items.
   C. Grenades and small arms ammunition.
   D. Grenades and bulk explosives.

6. Where is the stamped marking located on small arms ammunition?
   A. On the cartridge case head.
   B. On the cartridge case body.
   C. On the bullet body just above the cannelure.
   D. On the bullet emplat.

7. What is the most important reason for painting ammunition?
   A. To aid in munitions identification.
   B. To camouflage munitions.
   C. To protect the ammunition.
   D. To enhance nomenclature visibility.
8. What document is used to identify the internal components in a round of ammunition?
   A. SB 709 series.
   B. DD Form 1650.
   C. TM 43-0001 series.
   D. SB 708-4 (microfiche).

9. Which symbol is used to indicate the presence of an explosive burster?
   A. A solid dark-green band.
   B. A solid yellow band.
   C. A broken brown band.
   D. A broken white band.

10. When identifying small arms ammunition, what special purpose is indicated by an orange tip on the bullet?
    A. Dummy.
    B. Armor-piercing incendiary (API).
    C. Tracer.
    D. 5.56-millimeter heavy ball.
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<tr>
<th>Item</th>
<th>Correct Answer and Feedback</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>D. When it is adopted for use. (page 1-2)</td>
</tr>
<tr>
<td>2.</td>
<td>C. 9. (page 1-2)</td>
</tr>
<tr>
<td>3.</td>
<td>B. That the items are interchangeable for issue and use. (page 1-2)</td>
</tr>
<tr>
<td>4.</td>
<td>D. The manufacturer's identification code. (page 1-3)</td>
</tr>
<tr>
<td>5.</td>
<td>A. Small arms ammunition and blasting caps. (page 1-5)</td>
</tr>
<tr>
<td>6.</td>
<td>A. On the cartridge case head. (page 1-6)</td>
</tr>
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LESSON 2
IDENTIFICATION OF AMMUNITION BY PHYSICAL CHARACTERISTICS
Critical Task: 03-401.01-0002

OVERVIEW

Lesson Description
In this lesson you will learn to use ammunition data sheets and to identify ammunition and components based on their physical characteristics.

Terminal Learning Objective
Action: You will be able to identify ammunition items by general type and purpose based on their physical appearance, their color coding, and their markings.
Condition: This lesson contains all the information you need. This information includes extracts from a variety of ammunition-related publications. No additional equipment or personnel are required.
Standard: You will identify US military ammunition with 75 percent accuracy as demonstrated by your score on the subcourse examination.

INTRODUCTION
This lesson begins with a description of ammunition data sheets and their uses. It then describes all of the different types of ammunition currently in the US Army inventory. Ammunition items are grouped into three families—placed munitions, projected munitions, and dropped munitions.

AMMUNITION DATA SHEETS
Before discussing specific ammunition items, it is necessary to establish a basic understanding of ammunition data sheets. Ammunition data sheets are published in the TM 43-0001 series. They are reference documents designed to aid in ammunition planning, training, familiarization, and identification. Ammunition items are grouped into families for publication of the data sheets. An example of an ammunition data sheet from TM 43-0001-28 is provided in the Appendix at the back of this subcourse booklet.

Each ammunition data sheet contains a table of contents identifying its contents by size or type and model number. Each is written in a standardized format that provides most of the information required by transportation, storage, or using-unit personnel. A normal format is as follows:

- Item identification (nomenclature).
- A picture or drawing of the item.
- The type classification of the item.
• The item's use.
• A description of the item.
• The functioning of the item.
• Differences between models (if applicable).
• Tabulated data.
• Shipping and storage data.
• Ballistics data.
• References.

PLACED MUNITIONS

Placed munitions include demolition materials (and associated components) and land mines.

Demolition Materials

Demolition materials are used for the destruction of structures, facilities, or materials to accomplish a military objective. The data sheets for demolition explosives and associated materials are contained in TM 43-0001-38. Demolition materials require some form of initiating explosive or priming device in order to function.

Blasting Caps. Two standard blasting caps may be used. They are the M7 non-electric blasting cap and the M6 electric blasting cap. Both of these items are shown in Figure 2-1. Neither item will be marked or color coded. Both are silver or chrome-colored. The DODIC for the M7 non-electric blasting cap is M131. The DODIC for the M6 electric blasting cap is M130.

Bulk Demolition Charges. The four basic types of demolition explosives used are trinitrotoluene (TNT) block charges, M112 blocks, M118 blocks (FLEX-X), and special-purpose charges.

TNT block charges come in three different sizes, as shown in Figure 2-2. The 1/4-pound (DODIC M030) charge is round, and is used primarily for training. The 1/2-pound (DODIC M031) and 1-pound (DODIC M032) charges are rectangular, and are used for general demolition work. All three charges have waterproof cardboard containers, metal ends, and a threaded cap well in one end. All three are olive-drab with yellow markings.

M112 blocks (shown in Figure 2-3) are packaged in two configurations. One configuration consists of 30 individual blocks packed in a wire-bound box. The other is the M183 demolition charge assembly, which consists of 16 M112 blocks. The M112 block is used primarily for cutting and breaching demolition work. An M112 block consists of 1 1/4 pounds of composition C-4 packed in a Mylar-film container with pressure-sensitive tape on one side. Its color code is olive-drab with yellow markings. The DODIC for the boxed M112 blocks is M023. The DODIC for the M183 demolition charge assembly is M757.

M118 blocks (FLEX-X) also come packaged in two configurations, as shown in Figure 2-4. The first is the M118 demolition charge (DODIC M024), commonly referred to as sheet explosive. It is packaged in 1/2-inch sheets, four sheets to a package, 20 packages to a box. The second configuration is the M186 roll demolition charge (DODIC M060). M186 blocks come 50 per roll on a plastic spool, rather than in sheet form. Both configurations are designed to be used as cutting charges, especially against steel targets. The color code for both is olive-drab with yellow markings.
Figure 2-1. M6 and M7 blasting caps.
The 40-pound cratering charge (DODIC M039) is packaged in a watertight cylindrical metal container, as shown in Figure 2-5. It has two priming tunnels located on the outside midway between the ends. One tunnel is for use with a blasting cap. The other is for use with...

Three types of demolition charges are called special-purpose charges because, while they function well against the specific targets for which they are designed, they do not lend themselves to general demolition operations. The following paragraphs describe these special-purpose charges and their functions.

Figure 2-2. TNT block demolition charges.

Figure 2-3. M112 block demolition charge.
NOTE: The exact type of explosive contained in M118 demolition charges will vary with the manufacturer. Some manufacturers currently use PETN as a basic explosive. Other use RDX. Charges in the future may include other explosives.

NOTE: The exact type of explosive contained in M186 demolition charges will vary with the manufacturer. Some manufacturers currently use PETN as a basic explosive. Other use RDX. Charges in the future may include other explosives.

Figure 2-4. M118 and M186 demolition charges.

detonating cord. A metal ring located on the top of the container is used when lowering the charge into a hole. The cratering charge is used to blow craters and to dig ditches. The container is olive-drab with yellow markings.

M2- and M3-series shaped charges, shown in Figure 2-6, are used to bore holes in earth, metal, masonry, concrete, and road surfaces. They differ mainly in size. The M2-series charges weigh 15 pounds, and the M3-series charges weigh 40 pounds. M2-series charges are packed in a moisture-resisting, molded-fiber container, and use a fiber base to accomplish standoff. M3-series charges use a metal container and a metal tripod to effect standoff. Both types of charge are olive-drab with yellow markings. The DODIC for the M2 series is M420. The DODIC for the M3 series is M421.
Figure 2-5. A 40-pound ammonium nitrate block demolition charge (cratering charge).

Figure 2-6. Typical shaped charges.
Land Mines

Land mines are used primarily as a barrier for area denial. The two basic types of mines are antipersonnel and anti-tank/anti-vehicular (AT/AV). Scatterable mines are covered separately later in this lesson.

**Antipersonnel Mines.** As the name implies, antipersonnel mines are primarily intended for use against enemy personnel. They are usually small enough to be carried in one hand. They may be constructed of either plastic or metal. They may be either externally or internally fuzed, depending on the model. In one case, the mine is fuzed for command detonation. The paragraphs that follow describe the two types of antipersonnel mines (bounding and nonbounding).

Bounding-type mines are all constructed of metal. Examples of this type are shown in Figure 2-7. All are singularly fuzed. M16-series mines have external fuzing, and can be functioned either by direct pressure or by trip wires. M16-series mines have an olive-drab body with yellow markings. The DODIC for the M16 series is K092. The M86 mine has internal fuzing. It is manually armed by removing the safety clip. Approximately 60 seconds after the safety clip is removed, the mine arms itself fully and deploys trip wires. Disturbing the armed mine or any of the trip wires will function the mine. The M86 has an olive-drab body with black markings. Its DODIC is K152.

Non-bounding-type antipersonnel mines may be of either metal or plastic construction. Examples of mines of this type are shown in Figure 2-8. They can use single or multiple fuzing that is either internal or external.

The M18 is the only directional antipersonnel mine in use. It is used primarily in defense of bivouac areas and outposts or against infiltration tactics, and is effective against non-armored vehicles. It has a plastic body and two fuze wells. It can be set up to function by command detonation or by trip wire. It has an olive-drab body with black markings. The DODIC for the M18 is K143.

M14 antipersonnel mines are used when small, non-detectable, concealable mines are required. The M14 has an all-plastic body and uses internal fuzing. It can only be functioned by direct pressure. It has an olive-drab body with yellow markings. The DODIC for the M14 is K121.

The M74 antipersonnel mine is emplaced only by the ground vehicle, mine dispenser, M128. It is used in mixed mine fields to protect anti-tank (AT) mines. The M74 mine is constructed of metal. It has an internal fuze, and is partially armed through the emplacement process. Approximately 60 seconds after being emplaced, the mine deploys trip wires and becomes fully armed. It will function as a result of being disturbed, by trip wire, or by self-destructing. It has a green (not olive-drab) body with black markings. The DODIC for the M74 is K151.

**Anti-Tank/Anti-Vehicular Mines.** AT/AV mines, shown in Figure 2-9, are primarily intended for use against tanks and armored vehicles. They are larger and heavier than antipersonnel mines. They may be constructed of either metal or plastic, and they may use either internal or external fuzing. When external fuzing is used, the mine will often use multiple fuze wells that allow for multiple fuzing or booby trap devices.

The M15 AT mine is round and constructed of metal. It has three fuze wells—one primary well located on the top center, one secondary well located on the side, and one secondary well on the bottom. It is manually armed, and functions by direct pressure on the fuze. Because it is an AT mine, it requires heavy pressure (350 to 750 pounds) to function. The color code of the M15 is an olive-drab body with yellow markings. Its DODIC is K180.
Figure 2-7. Bounding-type antipersonnel mines.
Figure 2-8. Non-bounding-type antipersonnel mines.
Figure 2-9. Antitank/anti-vehicular mines.
The M19 mine and the fuze it uses are constructed almost entirely of plastic. This means that it is non-detectable to metallic-mine detectors. This mine uses one internal fuze and two activator wells (one on the side and one on the bottom) for booby-trapping. The fuze is manually armed, and requires 300 to 500 pounds of direct pressure to function. Its color code is an olive-drab body with yellow markings. The DODIC for the M19 is K250.

The ground-burst M75 mine is emplaced only by the ground vehicle, mine dispenser, M128. It may be used in mixed mine fields, and is constructed of metal. It has an internal fuze that is partially armed through the emplacement process. The mine is fully armed approximately 60 seconds after being emplaced. It will function if a vehicle passes over it, if it is physically disturbed, if the self-destruct time expires, or if its battery power runs down. Its color code is a green (not olive-drab) body with black markings. The DODIC for the M75 is K184.

The M21 is a cylindrical metal mine. This mine has a single internal fuze with a dual-function capability. It can be fused with or without a fuze extension rod. If the rod is used, the fuze will function when a horizontal force of greater than 3.75 pounds is applied. If the rod is not used, a direct force of 290 pounds is required to function the fuze. Its color code is an olive-drab body with yellow markings. The DODIC for the M21 is K181.
**Scatterable Mines.** These mines are designed for accurate dispersion over a designated area by rotary or fixed-wing aircraft, by artillery projectile, and by ground dispenser. The two mines deployed by ground dispenser have already been discussed. This portion of the lesson will cover only those mines delivered by aircraft or artillery. These are shown in Figure 2-10.

The only aircraft-delivered mine currently in the supply system is part of the M56 mine dispensing system designed for use with the UH-1H helicopter. Each dispenser contains 80 AT/AV mines. These mines use an internal fuze that arms itself through ejection and impact with the ground. The fuze will function if disturbed, tampered with, or run over by a vehicle. These mines also contain a self-destruct mechanism. Whenever these mines are found out of the dispenser, they should be considered armed and functioning. The DODIC for the M56 dispensing system is K020.

Artillery-delivered mines are contained in M718-series and M741-series projectiles. These projectiles are used to deliver AT mines in front of enemy armored forces to deny or delay access to a particular area for a specific length of time.

The difference between the M718-series and M741-series rounds is that the M718 series carries long-delay mines, and the M741 series carries short-delay mines. The mines contained in both projectiles are otherwise identical. Whenever these mines are found out of the projectile, they should be considered armed and functioning. The color code for the projectile is an olive-drab body with yellow markings. The DODIC for the M718 is D503, and the DODIC for the M718A1 is D515. The DODIC for the M741 is D509, and the DODIC for the M741A1 is D514.

**PROJECTED MUNITIONS**

Projected munitions are weapon-delivered ammunition. They include small arms ammunition, grenades, mortars, 40-millimeter cartridges, munitions for tank guns and howitzers, recoilless rifle ammunition, small rockets, and guided missiles.

**Types of Projected Munitions**

For ease of handling and loading, projected munitions are classified according to the complete-round principle. A complete round of service ammunition includes all components used in firing a weapon one time—the projectile, cartridge case, propelling charge, primer, and fuze. The three types of round are fixed, semi-fixed, and separate-loading. An example of each type is shown in Figure 2-11.

The first type of projected munition we will address is the fixed round. In this type of ammunition, the complete round is issued with the cartridge case (which contains a nonadjustable propelling charge and a primer) permanently crimped or otherwise attached to the projectile. The round is loaded into the weapon as a unit. Fixed rounds are used in guns, cannons, and in recoilless rifles.

The second type of projected munition we will discuss is the semi-fixed round. Semi-fixed ammunition is used in howitzers and mortars. In this type of ammunition, the configuration in which the complete round is issued depends on the weapon system it is used with. In howitzer ammunition, the cartridge case is loosely fitted over the base of the projectile. The propelling charge, bagged inside the cartridge case, is in increments and can be adjusted. In mortar ammunition, an adjustable propelling charge is attached to the mortar fins. The complete round is loaded into the weapon as a unit (in the same way a fixed round is loaded).
Figure 2-10. Scatterable mine systems.
Figure 2-11. Examples of fixed, semi-fixed, and separate-loading projectiles.
The last type of projected munition is separate-loading. In separate-loading ammunition, the major components (the projectile, the propelling charge, the primer, and the fuze) are issued individually. After the fuze is assembled to the round and the propelling charge is adjusted for the proper range, the components are loaded into the weapon system one by one.

Physical Characteristics of Projected Munitions

An understanding of the physical characteristics of a round of ammunition is important because of the relationship between these characteristics and the round's designed purpose. As shown in Figure 2-11, these characteristics include the ogive (or windshield), the bourrelet, the body, the rotating band, the obturating band, the base, the base plug, and the base cover.

**Ogive (or Windshield).** The ogive (or windshield) is used to provide desirable ballistic qualities to a round. The ogive is the forward part of a round, from the tip of the round to the bourrelet. Due to the blunt nose on armor-piercing, kinetic-energy rounds, a windshield is used as a false ogive.

**Bourrelet.** The bourrelet is that portion of a round that bears on the rifling lands and grooves of a weapon. It centers the front end of a projectile as it travels through the bore. The bourrelet is usually located on the forward section of the projectile, immediately behind the ogive. Larger-caliber projectiles may have two bourrelets, one in front and one in the rear.

**Body.** The word “body” is generally applied to the entire length of the projectile. However, the term is specifically used to designate that portion of the projectile between the bourrelet and the rotating band. It is normally machined to a smaller diameter than the bourrelet to reduce the surface of the projectile that comes in contact with the bore. The body of the round contains its filler.

**Rotating Band.** The rotating band is a cylindrical ring of comparatively soft metal or a similar substance. However, it may also be of steel and pressed into grooves near the base of the projectile. As the projectile moves forward, the rotating band engages the lands of the weapon and imparts spin to the projectile. The rotating band also provides obturation for the projectile, which means that it prevents the escape of the propellant gases forward of the projectile by completely filling the grooves of the rifling. In the case of recoilless rifle rounds, the rotating band is pre-engraved. Some projectiles may be provided with two rotating bands, or a rotating band and an obturating band. Mortars may have either a rotating band or, more commonly, an obturating band.

**Obturating Band.** All spin-stabilized mortar rounds use obturating bands as gas check bands. The obturating band swells to provide a positive gas stop between the mortar tube walls and the body of the round.

**Base.** There are three types of bases used on projectiles. When the round remains the same cylindrical diameter all the way to the end of the base, it is described as having a square base. If the base is tapered or conical, it is described as a boattail base. Non-rotating projectiles have a tail boom and fins instead of a base.

**Base Plug.** Base plugs are used with base-ejection projectiles. Base plugs are steel, and they may be either threaded into the projectile or secured through the use of shear pins. Rounds with base plugs may contain leaflets, chemical compounds (either illumination or smoke), or submunitions. Some armor-piercing rounds also have base plugs. Base plugs may contain a tracer element.
Base Cover. Since HE rounds have a solid base, they do not use a base plug. However, they do have a device called a base cover attached to the solid base. The base cover is a thin metal disk that is either crimped, caulked, or welded to the base. It provides additional assurance that hot gases from the propelling charge will not penetrate into the projectile cavity. Caulking or sealing rings rather than base covers are ordinarily provided for projectiles with HE fillers and base-detonating (BD) fuzes.

Small Arms Ammunition

Small arms ammunition ranges in size from .22-caliber through 30-millimeter. It includes 5.56-millimeter through 7.62-millimeter and shotgun gauges. These cartridges are fired from various individual and crew-served weapons, including rifles, pistols, revolvers, shotguns, submachine guns, and machine guns. The primary components of a small arms round are the cartridge case (with propellant and primer) and the bullet. (Refer to Figure 1-4 on page 1-11.)

Dummy Rounds. The physical characteristics of small arms ammunition depend on the caliber of the item. However, all dummy ammunition is identified either by holes drilled through the cartridge case or by fluted sections in the cartridge case and no primer components. Examples of dummy small arms rounds are shown in Figure 2-12.

Blank Rounds. The features of blank small arms ammunition differ depending on the caliber involved. (Refer to Figure 2-12.) For example, the blank 5.56-millimeter round has no bullet and uses a red rose-petal crimp to seal the end of the cartridge case. It closely resembles the 5.56-millimeter grenade cartridge. While there are no more rifle-launched grenades in the system, there may still be some grenade cartridges, so the single most important feature of the blank is a grooved ring in the cartridge case approximately one-third of the way up from the cartridge head. The 7.62-millimeter blank round has no bullet, but has an elongated neck sealed with a red ring. The .50-caliber blank round also has no bullet. It has a red sealing disk in the cartridge case mouth.

Ball Ammunition. All ball ammunition is constructed the same regardless of caliber. The only way to distinguish between ball ammunition and any other type round is by the color of the bullet tip, as already discussed.

Grenades

Grenades are classified according to their method of projection (either hand, rifle, or weapon) and according to their intended use (either fragmentation, offensive, chemical smoke [burning or bursting], illuminating, or practice). Hand grenades are small items that may be held in one hand and thrown like a baseball. They have a single fuze with a pull ring and safety clip (spoon) assembly. It should be noted that, while there are no rifle grenades currently produced for general Army use, there are specialized units authorized to use rifle grenades that are procured from other sources.

Fragmentation Hand Grenades. Fragmentation hand grenades may be used as offensive or defensive weapons. They are normally used to supplement small arms fire in close-combat situations. An example of a fragmentation hand grenade is shown in Figure 2-13. The M67 grenade is made of steel and is spherical in shape. It uses a standard pyrotechnic delay fuze that functions 4 to 5 seconds after the safety lever is released. The color code for the M67 is an olive-drab body with yellow markings. Its DODIC is G881.
DUMMY ROUNDS

Dummy

7.62 mm
Copper-colored cartridge with case ridges or flutes, no primer

Dummy

.50 cal
Holes drilled in case

BLANK ROUNDS

Blank

5.56 mm
Rose-petal crimped case with groove around cartridge case, no primer composition and no bullet

Blank

7.62 mm
No bullet, long slender nose

Blank

.50 cal
No bullet, red sealer, disk in cartridge case mouth

BALL AMMUNITION

Ball

7.62 mm
No color

Figure 2-12. Small arms identification features.
Figure 2-13. Fragmentation and offensive hand grenades.
**Offensive Hand Grenades.** The only offensive hand grenades in the supply system are in the Mark 3 (MK3) series. MK3-series grenades are used for offensive purposes due to their blast effect. They can also be used for demolition purposes. An MK3-series grenade is similar in size to a fragmentation grenade, but it has a cylindrical body made of pressed fiber. It uses a single pyrotechnic delay fuze that functions 4 to 5 seconds after the safety lever is released. The color code for the MK3 series is a black body with yellow markings. Its DODIC is G911.

**Smoke Hand Grenades.** Smoke grenades may be either burning- or bursting-type munitions. They are used to provide smoke for screening small-unit activities and for ground-to-air signaling. Examples of smoke grenades are shown in Figure 2-14.

Burning-type grenades include the AN-M8 smoke grenade. The AN-M8 grenade’s body is a cylinder of thin sheet metal. It uses a single pyrotechnic delay fuze. A percussion primer ignites the burning element, which then emits a white smoke screen for approximately 105 to 150 seconds. The color code for the AN-M8 is a light-green body with black markings. Its DODIC is G930.

Another burning-type smoke grenade is the M48. The M48 is a special-purpose training grenade. Its body consists of two rubber hemispheres vulcanized together. The M48 contains red smoke. The color code for the M48 is a light-green body with black markings and a black band. The DODIC for the M48 is G932.

Bursting-type smoke grenades are used for screening, signaling, and, because of their WP filler, as incendiary devices. The M15 has a cylindrical sheet-steel body. It uses a pyrotechnic-delay detonating fuze, and emits a smoke screen for approximately 60 seconds. Pieces of WP will ignite any flammable substance they contact. The color code for the M15 is a gray body with one yellow band and yellow markings. Its DODIC is G935.

Another bursting-type smoke grenade is the M34. It is cylindrical in shape and has a serrated-steel body. It uses a pyrotechnic-delay detonating fuze. The color code for the M34 is a light-green body with one yellow band and light-red markings. The DODIC for the M34 is G937.

**Riot-Control Hand Grenades.** Riot-control grenades are used in counterinsurgency and other tactical missions. Their body construction may be of rubber, metal, or plastic. Examples of riot-control hand grenades are shown in Figure 2-15. They may be either burning- or bursting-type grenades. Burning-type riot-control hand grenades include the M7 series, the M47, and the M58. The ABC-M25 series are bursting-type grenades.

M7-series grenades have cylindrical bodies constructed of thin sheet metal. They use a pyrotechnic-delay igniting fuze, and are very similar to the AN-M8 smoke grenade in configuration. The filler used in M7-series grenades is CN. Their color code is a gray body with one red band and red markings. The DODIC for the M7 series is G960.

The M47 grenade is used for riot control and for counterinsurgency actions. Its body is constructed of two rubber hemispheres vulcanized together. It uses a pyrotechnic-delay igniting fuze, and is very similar to the M48 smoke grenade in configuration. Its filler is CS. The color code for the M47 grenade is a gray body with one red band and red markings. The DODIC for the M47 is G922.

The body of the M58 grenade is a thin-walled, two-piece, aluminum cylinder. The M58 uses a pyrotechnic-delay igniting fuze. The filler used in the M58 is CS. Its color code is a gray body with one red band and red markings. The DODIC for the M58 is G933.
Figure 2-14. Smoke grenades.
Figure 2-15. Riot-control grenades.
ABC-M25-series grenades are bursting-type grenades. They are constructed of two plastic hemispheres cemented together, and use a pyrotechnic-delay, detonating-type fuze. The filler in ABC-M25 series grenades is CS1. The color code for the ABC-M25 series is a gray body with one red band and red markings. The DODIC for the ABC-M25 series is G924.

**Illuminating Hand Grenades.** Illuminating grenades are used for illuminating and signaling. They may also be used for incendiary purposes against flammable targets. An example of an illuminating grenade is shown in Figure 2-16. The MK1 illuminating grenade is constructed of two pieces of metal pressed together. It uses a pyrotechnic-delay igniteing fuze. The color code for the MK1 is either all-white or olive-drab with one solid band and black markings. The DODIC for the MK1 is G895.

**Incendiary Hand Grenades.** Incendiary hand grenades are primarily used to destroy equipment. An example of an incendiary grenade is shown in Figure 2-16. The AN-M14 grenade has a cylindrical body constructed of thin sheet metal. It uses a pyrotechnic-delay igniter fuze. The color code for the AN-M14 is a light-red body with black markings. Its DODIC is G900.

**Special-Purpose (Launched) Grenades.** Miscellaneous special-purpose grenades are designed to provide a self-screening smoke capability for armored tactical vehicles. Examples of such grenades are shown in Figure 2-17. L8-series grenades use red phosphorous (RP) screening smoke. They have a cylindrical, butyl-rubber body with a metal base. These items are used with the M239 grenade-launcher system mounted on tactical vehicles. L8-series grenades have electrically actuated primers. The body of L8-series grenades is black. The metal base is light-green with a brown band and black markings. The DODIC for grenades in the L8 series is G815.

M76 grenades use infrared (IR) screening smoke. They have a cylindrical, plastic main body with a metal base. These items are used with the M250, M239, and M243 launch systems. M76 grenades have electrically actuated primers. Their color code is a light-green body with black markings. The DODIC for the M76 grenade is G826.

**40-Millimeter Cartridges**

The paragraphs that follow describe the family of 40-millimeter cartridges according to their functions and uses.

**40-Millimeter Fragmentation Cartridge.** These munitions are designed to inflict personnel casualties by their ground-burst effects. They may be fired from single-shot weapons such as the M203, or from automatic weapons such as the M75, the M129, and the MK19. Examples of 40-millimeter fragmentation cartridges are shown in Figure 2-18.

The M381 HE cartridge consists of an aluminum cartridge case and a projectile. It is used only with M79 and M203 weapons. It is fired from the weapon by a percussion primer, and uses an internal point-detonating (PD) fuze to function upon impact. The color coding for the M381 is an olive-drab cartridge case with yellow markings and a yellow ogive. Its DODIC is B568.

M397-series cartridges have an aluminum cartridge case with a steel projectile. They are also used only with M79 and M203 weapons. They are fired from the weapon by a percussion primer, and use an internal PD fuze to function upon impact. The color coding for the M397 is an olive-drab cartridge case with yellow markings and a yellow ogive. The DODIC for the M397 is B569.

M383 40-millimeter HE cartridge has an aluminum cartridge case and a steel projectile. It is used only in the M75, M129, and US Navy MK19 machine guns. This munition
Figure 2-16. Illumination and incendiary grenades.
Figure 2-17. Special-purpose grenades.

is assembled in linked belts. It is fired from the weapon by percussion primer, and uses an internal PD fuze to function upon impact. The color code for the M383 is an olive-drab cartridge case with white markings and a yellow ogive. The DODIC for the M383 is B571.

The M430 is a high-explosive, dual-purpose (HEDP) round. It is designed for use against armored targets, and has the additional capability of inflicting personnel casualties in the target area. It is used with the MK19 mod 3 machine gun only. The M430 round consists of an aluminum cartridge case and a steel projectile. It is fired from the weapon by a percussion primer, and uses an internal point-initiating, base-detonating (PIBD) fuze to function upon impact. The color coding for the M430 is an olive-drab cartridge case with yellow markings and a yellow ogive. The DODIC for the M430 is B542.

40-Millimeter Antipersonnel Cartridge. The only 40-millimeter antipersonnel munition in the supply system is the M576 multiple-projectile cartridge. It is used with the M79 and M203 gun systems. This round is designed for use in counterinsurgency and conventional operations that are conducted in poor-visibility areas (such as jungle environments). The M576 consists of an aluminum cartridge case with a polyethylene sabot assembly projectile. The projectile has a sabot-type carrier with a center cavity containing a plastic cup filled with 20 metal pellets. This round is fired from the weapon by a percussion primer, and uses the setback force from the cartridge ignition to free the pellets. The M576 cartridge does not use any fuzing. Its color code is a black cartridge case with white markings. The DODIC for the M576 cartridge is B536.
Figure 2-18. 40mm HE cartridges.
40-Millimeter Illuminating and Smoke Cartridges. Forty-millimeter illuminating and smoke rounds are used for illumination and for signaling. Examples of these rounds are shown in Figure 2-19.

![Image of 40mm illuminating and smoke rounds.](image)

**Figure 2-19. 40mm illuminating and smoke rounds.**

The illuminating series includes the M583A1 white star parachute (DODIC B535), the M661 green star (DODIC B504), and the M662 red star (DODIC B505). These items have aluminum bodies with plastic ogives. The plastic ogives are embossed with raised lettering for nighttime identification. They are used with the M79 or the M203 only. They are fired from the weapon by a percussion primer, and they function in the air after a delay of approximately five seconds. The color code for these items is a white body with black markings.

The M676 smoke round is designed to mark the position of personnel located beneath moderately thick foliage for aerial observation. Its body is constructed of aluminum, and it also
has a plastic ogive. The color of the ogive denotes the smoke color. This item is used only with the M79 or the M203. It is fired from the weapon by a percussion primer, and it functions in the air after a delay of approximately two seconds. The color code for the M676 cartridge is a light-green body with black markings. Its DODIC is B475.

**Mortars**

Mortar cartridges range in size from 60-millimeter to 120-millimeter. Because they have adjustable propellant increments, all mortar rounds are considered semi-fixed. To maintain stabilization in flight, mortars are either spin-stabilized or fin-stabilized. The only spin-stabilized mortar in the inventory is the 4.2-inch round. It will not be discussed in this lesson because it is being replaced by the 120-millimeter fin-stabilized system. Mortars may have HE, base-ejected illuminating, bursting chemical, or burning chemical fillers. The following paragraphs describe the various mortar systems and fuzes.

**60-Millimeter Mortars.** Sixty-millimeter mortars are lightweight, platoon-support weapons. They are used against troops, light vehicles, and light bunkers, as well as for illumination and spotting purposes. Examples of 60-millimeter mortar cartridges are shown in Figure 2-20.

The M720 is a 60-millimeter HE cartridge. It consists of an alloy-steel projectile body, a multi-option fuze, a fin assembly, and propelling charges. It is used with the M224 lightweight company mortar system. The fuze functions near the surface (proximity), on impact, or after a preset delay, depending on the setting used. The color code for the M720 is olive-drab with yellow markings. Its DODIC is B642.

The M721 is a 60-millimeter illuminating cartridge. It consists of an alloy-steel, base-ejecting projectile body with a mechanical-time, superquick (MTSQ) fuze, a fin assembly, and propelling charges. It is used with the M224 lightweight company mortar system. Its color code is a white body with black markings. The DODIC for the M721 cartridge is B647.

The M722 is a 60-millimeter WP smoke cartridge. It consists of an alloy-steel projectile body with a PD fuze, a fin assembly, and propelling charges. It is also used with the M224 lightweight company mortar system. Its color code is a light-green body with one yellow band and red markings. The DODIC for the M722 cartridge is B646.

**81-Millimeter Mortars.** These are lightweight, company-support weapons. They are used against troops and light material targets, as well as for illumination and spotting purposes. Examples of 81-millimeter mortar cartridges are shown in Figure 2-21.

The M821 is an 81-millimeter HE cartridge. It consists of a spheroidal cast-graphite body with a multi-option fuze, a fin assembly, and propelling charges. It is used in the M252 improved 81-millimeter mortar system. The fuze functions near the surface (proximity), on impact, or after a preset delay, depending on the setting used. The color code for the M821 is an olive-drab body with yellow markings. Its DODIC is C868.

M375-series cartridges contain a WP bursting smoke filler. They are used to produce screening smoke and as incendiary devices against personnel and material. M375-series cartridges consist of a forged-steel or cast-iron body with a PD fuze, a fin assembly, and propelling charges. They are used with M1 and M29-series mortars. The fuze functions upon impact. The color code for these items is a light-green body with one yellow band and light red markings. The DODIC for M375-series cartridges is C276.
Figure 2-20. 60mm mortar cartridges.
Figure 2-21. 81mm mortar cartridges.
M853-series cartridges are base-ejecting, illuminating cartridges. They have an aluminum body with an MTSQ fuze, a fin assembly, and propelling charges. They are used in the M252 improved 81-millimeter mortar system. Their color code is a white body with black markings. The DODIC for M853-series cartridges is C871.

**120-Millimeter Mortars.** These are heavy company-support weapons. They are used against personnel, to provide illumination, and to provide screening smoke. These mortars replaced the 4.2-inch mortar system. Examples of 120-millimeter mortar cartridges are shown in Figure 2-22.

The M57 is a 120-millimeter cartridge with an HE filler. It consists of a high-fragmentation steel body with a PD (superquick or delay) fuze, a fin assembly, and propelling charges. The fuze functions upon impact. The color code for the M57 cartridge is an olive-drab body with white markings. Its DODIC is C788.

The M91 is a base-ejecting, illuminating, 120-millimeter cartridge. It consists of a steel body with an MTSQ fuze, a fin assembly, and propelling charges. Its color code is a white body with black markings. The DODIC for the M91 cartridge is C790.

The M68 cartridge contains a bursting WP smoke filler. It consists of a steel body with a PD (superquick or delay) fuze, a fin assembly, and propelling charges. The fuze functions upon impact. The color code for the M68 cartridge is a light-green body with black markings. Its DODIC is C789.

**Mortar Fuzes.** Some mortar cartridges are issued as complete rounds (including fuzing), and some are issued without fuzes. For fuze-cartridge combinations, refer to TM 43-0001-28, Appendix A.

Fuzes are classified according to how they function (such as PD, mechanical-time [MT], MTSQ, proximity [PRX], and multi-option). The paragraphs that follow describe some of the fuzes that may be encountered with mortars.

Examples of PD fuzes are shown in Figure 2-23. The M524-series PD fuze is used with HE and WP 81-millimeter mortar cartridges. This fuze is designed to provide dual-purpose (DP) functioning (upon impact or upon grazing) with a superquick action.

The M525-series PD fuze is used with 60-millimeter and 81-millimeter HE, practice, and WP cartridges. This fuze is designed to function upon impact or superquick.

The M745 PD fuze is used with the 60-millimeter WP smoke cartridge (M722). This fuze functions upon impact only.

Examples of time fuzes are shown in Figure 2-24. The M768 MT fuze provides a variable-time capability for use on the illuminating and smoke cartridges for the M252 improved 81-millimeter mortar. The time on the fuze is preset by the loading crew.

The M776 MTSQ fuze is designed for use with the M721 60-millimeter illuminating cartridge. The time on the fuze is preset by the loading crew. This fuze includes an impact back-up that functions if the time device fails or the time setting exceeds the time of flight.

Examples of proximity fuzes are shown in Figure 2-25. The M517 proximity fuze is designed for use with M362-series 81-millimeter HE mortar cartridges (when used against surface targets). This fuze is armed during flight, and uses an impact back-up system.

The M532 proximity fuze is designed for use with 81-millimeter HE and WP mortar cartridges. This is a dual-purpose (proximity or PD) fuze. The setting is selected by the loading crew, and cannot be reset once selected.
Figure 2-22. 120mm mortar cartridges.
Figure 2-23. PD fuzes for mortars.
The M734 multi-option fuze is designed to provide a selectable-function capability for use with mortar cartridges. The four settings are PRX, near-surface burst (NSB), impact (IMP), and delay (DLY).

**Recoilless Rifle Cartridge**

There is only one recoilless rifle cartridge currently in the supply system. It is the 84-millimeter M136 (AT4) and launcher, shown in Figure 2-26. The M136 system is a replacement weapon for the 66-millimeter light antitank weapon (LAW). The AT4 is issued as a complete round of ammunition. It is loaded with one 84-millimeter high-explosive,
Figure 2-25. Proximity and multi-option fuses for mortars.
antitank (HEAT) round, and has a disposable launcher. The AT4 consists of a fiberglass launching tube fitted with a firing mechanism, a sight, a carrying sling, and protective covers. The projectile body is made of aluminum. The color code for the M136 (AT4) is a black body with yellow markings. Its DODIC is C995.

![Figure 2-26. Recoilless rifle cartridge.](image)

**Tank Ammunition**

Tank ammunition is available in three calibers-90-millimeter, 105-millimeter, and 120-millimeter. This type of ammunition is often referred to as gun ammunition. Tanks are direct-fire weapons, and their ammunition is designed to be used against armored targets, light material, and personnel, as well as to provide smoke for screening and spotting purposes. It is always fixed-type ammunition.

**105-Millimeter Tank Ammunition.** This ammunition is used in M60 and M1 tanks. It includes explosive and non-explosive AT rounds, antipersonnel rounds, and smoke rounds.

Examples of 105-millimeter AT cartridges are shown in Figure 2-27. One type of 105-millimeter tank ammunition is the M393-series AT round. These are plasticized HE cartridges with tracers designed for use against armored targets, light material, and personnel. The projectile body is a thin-walled steel cylinder with a short, blunt ogive and a flat base. The base of the projectile is fitted with a base-detonating (BD) fuze and a tracer. The projectile is assembled to a brass or steel cartridge case and to an electrical primer. The color code for M393-series projectiles is an olive-drab body with one black band and yellow markings. The DODIC for the M393 series is C429.

M456-series rounds are HEAT cartridges with tracers. They are designed for use against armored targets. M393-series projectiles have a steel body fitted with a plastic obturator, a threaded standoff spike, a fin and boom assembly, a point-initiating, base-detonating (PIBD) fuse, and a cartridge case with an electrically initiated primer. The color code for M393-series projectiles is a black body with one yellow band and white markings. The DODIC for the M456 series is C508.

The M735 is an armor-piercing, fin-stabilized, discarding-sabot cartridge with tracer. Other than the primer and the propellant, this cartridge uses no explosives. It is a high-velocity, flat-trajectory cartridge designed for use against armored targets. The projectile section
CARTRIDGE, 105 MILLIMETER: HEP-T, M393A2 AND M393A1

CARTRIDGE, 105 MILLIMETER: HEAT-T, M456 SERIES

CARTRIDGE, 105 MILLIMETER: APFSDS-T, M735

Figure 2-27. 105mm AT cartridges.

consists of a sub-projectile, a sabot assembly, and a cartridge case. The sub-projectile is constructed of a nickel-steel body that houses a tungsten core with an aluminum windshield and fin assembly. The sabot assembly consists of three 120-degree aluminum sections assembled to the sub-projectile. The cartridge case contains an electrically initiated primer. The color code for the M735 cartridge is a black body with white markings. Its DODIC is C521.
The 105-millimeter antipersonnel round is the M494 cartridge with tracer. The M494 cartridge is shown in Figure 2-28. It is designed for close-in defense against massed personnel assaults and for offensive fire against exposed enemy personnel. Its secondary use is against light armor and low-flying aircraft. The projectile consists of an aluminum body and a steel base with a fuze and four detonators. The projectile contains flechettes and a yellow dye marker. The cartridge case contains an electrically initiated primer. The color code for the M494 projectile is an olive-drab body with one yellow band, a row of white diamonds, and white markings. Its DODIC is C519.

Figure 2-28. 105mm antipersonnel and smoke cartridges.

The 105-millimeter smoke round is the M416 WP smoke cartridge with tracer. It is shown in Figure 2-28. This cartridge is designed to provide screening smoke or spotting fire with limited incendiary effects. The thin-walled, steel projectile is cylindrical in shape. It has a
blunt ogive with two rotating bands, a BD fuze, and an extended tracer element. The cartridge case contains an electrically initiated primer. Its color code is a light green body with one yellow band and light red markings. The DODIC for the M416 cartridge is C512.

**120-Millimeter Tank Ammunition.** This type of ammunition is used in the newer M1A1-series tanks. It includes explosive AT, non-explosive AT, air defense, and practice rounds. Both types of AT round are shown in Figure 2-29.

The M830-series rounds are high-explosive, anti-tank, multi-purpose (HEAT-MP) cartridges with tracers. Designed for use against armored targets and helicopters, they are fired from the M256 120-millimeter smoothbore cannon. The baseline design contains a propulsion system consisting of a metal case base, a combustible cartridge case, a case adapter, and a primer. The projectile consists of a fin-stabilized subcaliber projectile, a three-piece aluminum sabot, and a fuzing system. The fuzing system includes a base element with a flexible communication circuit, a frontal impact switch assembly (FISA), and a proximity switch. The nose of the projectile contains the proximity switch, which is coupled to the FISA. The FISA, in turn, is coupled to the warhead body. This fuzing will function upon impact or by proximity when an air target is detected. The DODIC for the M830 series is C791.

The M829 is a 120-millimeter kinetic-energy cartridge. It is designed for use as an armor-piercing AT round. The round consists of a metal cartridge case with a combustible sidewall, a primer, and a projectile. The projectile consists of a depleted-uranium sub-projectile, aluminum fins with tracers, and an aluminum sabot. The color code for this munition is a black body with white markings. The DODIC for the M829A1 is C380.

**Howitzer Ammunition**

Howitzer ammunition includes 105-millimeter cartridges and 155-millimeter/8-inch rounds. The medium-sized (105-millimeter) cartridges may be either fixed or semi-fixed. The large-sized (155-millimeter and 8-inch) rounds are always separate-loading.

**105-Millimeter Cartridges.** Although howitzers are designed as indirect fire weapons, ammunition has been designed to provide the 105-millimeter howitzer with a direct-fire capability. This ammunition is designed primarily for self-defense against armor or massed-personnel attacks. The 105-millimeter ammunition most commonly encountered includes HE, antipersonnel, and chemical (bursting- or burning-type smoke). The paragraphs that follow describe these types of howitzer ammunition.

Some AT cartridges for howitzers are fixed munitions designed for direct-fire use. Examples of such 105-millimeter AT rounds are shown in Figure 2-30. M327-series cartridges are plasticized HE rounds with tracers. They are designed for AT and antipersonnel use. The projectile is a thin-walled steel cylinder with a short ogive, a flat base with a BD fuze, and a tracer element. The cartridge case is made of either brass or steel, and has a percussion primer and a non-adjustable propellant charge. The color code for M327-series cartridges is an olive-drab projectile with one black band and yellow markings. Their DODIC is C448.

The M622 is a HEAT round with tracer. It is designed for use against armor and other hard targets. The projectile consists of a cylindrical steel body with a threaded standoff spike, a plastic obturating band, and a tail boom and fin assembly with a tracer and a PIBD fuze. The cartridge case is constructed of a two-piece spiral wrap with a percussion primer and a nonadjustable propelling charge. The color code for the M622 cartridge is a black projectile with yellow markings. Its DODIC is C472.

HE howitzer munitions used for indirect fire are semi-fixed ammunition rounds with adjustable propelling charges. Examples of such 105-millimeter HE cartridges are shown in Figure 2-31.
Figure 2-29. 120mm AT cartridges.
Figure 2-30. 105mm howitzer direct-fire fixed rounds.

The M1 HE round is designed to provide both fragmentation and blast. The projectile is constructed of a cylindrical, forged-steel body with a boattail base, a streamlined ogive, and a metal rotating band. The base of the projectile has a sealed cover for added protection against hot gases entering the explosive cavity. The M1 round is issued unfuzed. Its cartridge case may be of either drawn steel or spiral wrap with a percussion primer and an adjustable propellant charge. The color code for the M1 cartridge is an olive-drab projectile with yellow markings. Its DODIC is C445.

The M760 is also an HE round. It is currently authorized for use only with the M119 105-millimeter light towed howitzer. The projectile is constructed of a hollow steel forging similar to that of the M1. The cartridge case is a three-piece steel spiral wrap that uses a percussion primer and a non-adjustable propelling charge. The color code for the M760 is an olive-drab body with yellow markings. Its DODIC is C473.

The XM913 is a high-explosive, rocket-assisted (HERA) round with extended-range capabilities. It is designed to provide both fragmentation and blast. The projectile consists of two pieces, a streamlined warhead and a rocket-motor body with boattail design. This round is
Figure 2-31. 105mm semi-fixed HE and extended-range cartridges.
issued unfuzed. The cartridge case is constructed of a three-piece steel spiral wrap with a percussion primer and an adjustable propelling charge. The color code for the XM913 is a forest-green projectile with yellow markings. Its DODIC is C463.

The antipersonnel rounds for the 105-millimeter howitzer are all semi-fixed munitions that use adjustable propelling charges. Examples of 105-millimeter antipersonnel howitzer cartridges are shown in Figure 2-32. They are used to deliver a payload of submunitions (antipersonnel grenades) on target.

Figure 2-32. 105mm howitzer antipersonnel cartridges.

The M413 uses a cylindrical, forged-steel, base-ejection projectile with an MTSQ fuze to deliver a total of eighteen M35 grenades. The M35 grenades will be covered later in this lesson. The M413’s cartridge case can be made of either brass, drawn steel, or spiral wrap, and it has a percussion primer. Its color code is an olive-drab projectile with yellow markings. The DODIC for the M413 antipersonnel cartridge is C469.

The M444 antipersonnel cartridge uses a cylindrical, forged-steel, base-ejection projectile with modified M548 or M565 MTSQ fuzes to deliver eighteen M39 grenades. The M39 grenades will also be covered later in this lesson. The cartridge case may be either drawn steel.
or spiral wrap, and it has a percussion primer and an adjustable propelling charge. The color code for the M444 cartridge is an olive-drab projectile with one band of yellow diamonds and yellow markings. Its DODIC is C462.

The 105-millimeter chemical rounds are semi-fixed munitions that use adjustable propelling charges. Examples of cartridges of this type are shown in Figure 2-33. They are used for screening, for signaling, and for spotting. They may be either bursting-type or base-ejection, burning-type.

M60-series rounds are bursting-type WP smoke munitions. They have the additional feature of providing limited incendiary effects. The projectile has a cylindrical forged-steel body with a streamlined ogive and a boattail base. The base has a cover welded onto it to prevent hot gases from entering the body cavity. The cartridge case is either drawn steel or spiral wrap, and it has a percussion primer. There are two possible color codes for this series, depending on the vintage of the particular item. Older items have a gray projectile with yellow markings. Newer ones have a light-green projectile with one yellow band and red markings. The DODIC for M60-series cartridges is C454.

M84-series rounds are burning-type, base-ejection, smoke munitions. Depending on the model, the smoke may be white (HC), red, yellow, or green. The projectile body is a forged-steel cylinder with a boattail base, a streamlined ogive, and an MT or an MTSQ fuze. The cartridge case is either drawn steel or a three-piece steel spiral wrap, and it has a percussion primer. The color code is a light-green body with black markings. The DODIC for M84-series cartridges is C452.

Riot-control cartridges are intended to harass enemy personnel. They are semi-fixed munitions with base-ejection-type projectiles. An example of a 105-millimeter riot-control cartridge is shown in Figure 2-33. The M629 round has a CS filler. The projectile has a forged-steel, cylindrical body with a streamlined ogive and a flat, pinned-steel base plug. It is fuzeed with an MT or an MTSQ fuze. The cartridge case is either brass, drawn steel, or spiral-wrapped steel, and it has a percussion primer. The color code is a gray projectile with one red band, one yellow band, and red markings. The DODIC for the M629 cartridge is C473.

Illuminating rounds are designed for signaling and for illuminating a designated area. They are semi-fixed munitions, and use base-ejection-type projectiles. An example of a 105-millimeter illuminating cartridge is shown in Figure 2-34. The M314-series projectile has a forged-steel body, a streamlined ogive, and a flat, pinned base plug. It can be issued with either a closing plug, an MT fuze, or an MTSQ fuze. The cartridge case is either of brass or three pieces of spiral-wrapped steel, and it has a percussion primer. The color code is a white projectile with black markings. The DODIC for the M314 series is C449.

Large-Caliber Howitzer Cartridges. The 155-millimeter and 8-inch howitzer cartridges are all indirect-fire rounds. They are all separate-loading, and are issued as separate items. Projectiles, propellant, primers, and fuzes are required to assemble a complete round. Included are HE, AT, antipersonnel, and chemical (bursting and burning-type) munitions. The paragraphs that follow address the 155-millimeter munitions and the 8-inch munitions separately.

155-Millimeter Cartridges. All 155-millimeter HE projectiles are designed for blast and fragmentation. They are used primarily against personnel and against fortified positions. Examples of 155-millimeter HE projectiles are shown in Figure 2-35. The M107 is an HE projectile that has fuze cavities of two different depths, described as normal and deep cavities. It uses PD or time fuzes for normal-cavity, and proximity fuzes for deep-cavity. The projectile is a steel cylinder with a long ogive and a boattail base. There is a steel base cover welded over the base to prevent hot gases from entering the explosive cavity. This
Figure 2-33. 105mm howitzer chemical smoke and riot-control cartridges.
projectile is issued with an eyebolt lifting plug in the nose. Its color code is an olive-drab body with yellow markings. The DODIC for the M107 normal-cavity projectile is D571. The DODIC for the M107 deep-cavity projectile is D544.

M549-series projectiles are high-explosive, rocket-assisted (HERA) rounds. (See Figure 2-35.) The rocket motor provides an extended-range capability. These projectiles are
designed for use in the M109-series self-propelled howitzer and the M114A2 and M198 towed howitzers. M549-series projectiles consist of two components, the projectile body and the rocket motor. The projectile body is a steel cylinder with a long ogive and an eyebolt lifting plug in the nose. The color code for M549-series munitions is an olive-drab body with yellow markings. Their DODIC is D579.

Some 155-millimeter projectiles are designed to deliver AT mines on or in front of enemy armored formations to deny or delay access to a particular area for a specific time period. Examples of 155-millimeter AT projectiles are shown in Figure 2-36.

M718-series 155-millimeter AT projectiles have a forged-steel body with an ogive. They are issued with a fusible lifting plug in the nose. The fusible plug may be of either the yellow type or the universal type, depending on the vintage of the item. M718-series munitions are base-ejection projectiles that carry nine long-delay AT mines. "Long-delay" means that the mines will self-destruct some time after a 24-hour delay. The mines are ejected during flight, and arm instantly after coming to rest on the ground. They use an internal proximity fuze to function. The color code for M718-series projectiles is an olive-drab body with yellow markings. Their DODIC is D515.

M741-series 155-millimeter AT projectiles have a forged-steel body with an ogive, a base plug, and a fusible lifting plug in the nose. The fusible plug may be of either the yellow type or the universal type, depending on the vintage of the item. The M741 series are base-ejection projectiles that carry nine short-delay AT mines. "Short-delay" means that the mines will self-destruct within 24 hours of arming. The mines are ejected during flight, and

Figure 2-36. 155mm AT projectiles.
arm instantly after coming to rest on the ground. They use an internal proximity fuze to function. The color code for M741-series projectiles is olive-drab with yellow triangles and markings. The DODIC for the M741 series is D514.

Antipersonnel 155-millimeter projectiles are designed to deliver antipersonnel grenades or mines to a designated target area. Examples of 155-millimeter antipersonnel projectiles are shown in Figure 2-37.

M449-series HE projectiles are designed to deliver a concentration of antipersonnel grenades. They have a forged-steel body with a base plug, an ogive, and an eyebolt lifting plug in the nose. They are base-ejection projectiles that carry 60 M43-series grenades. The grenades are ejected during flight, and, upon impact with the ground, they expel a submunition that detonates approximately 4 to 6 feet in the air. The color code for these projectiles is an olive-drab body with yellow diamonds and markings. The DODIC for the M449 and M449E1 is D561. The DODIC for the M449A1 and M449E2 is D562.

The M692 is an HE projectile designed to deliver antipersonnel mines called Area Denial Artillery Munitions (ADAMs). The projectile has a forged-steel body with a base plug, an ogive, and a fusible lifting plug in the nose. It is a base-ejection projectile that carries 36 mines that are ejected during flight. Shortly after impact with the ground, the mines arm themselves, deploy trip wires, and start a self-destruct timer. The mine will function if it is disturbed, if triggered by trip wire, or after a predetermined time limit expires. The color code for the M692 is olive-drab with yellow triangles and markings. Its DODIC is D501.

The M731 is another HE projectile designed to deliver antipersonnel ADAMs. Its body is constructed of forged steel, and it has a base plug, an ogive, and a lifting plug. The lifting plug may be of the yellow type or the universal type. This is a base-ejection projectile that carries 36 mines. The mines are ejected during flight. Shortly after impact with the ground, the mines arm themselves, deploy trip wires, and start a self-destruct timer. The mine will function if disturbed, if triggered by trip wire, or after a predetermined time limit expires. The color code for the M731 is an olive-drab body with yellow triangles and markings. Its DODIC is D502.

Dual-purpose (DP) 155-millimeter projectiles are designed to deliver DP (armor-defeating and antipersonnel) submunitions on target. Examples of DP projectiles are shown in Figure 2-38.

M483-series HE projectiles are designed to deliver M42 and M46 grenades. They have a forged-steel and aluminum body with a base plug, an ogive, and a fusible lifting plug in the nose. The lifting plug may be of the yellow fusible type or the universal type. These are base-ejection projectiles that carry 88 DP grenades (64 M42 grenades and 24 M46 grenades). The grenades themselves provide the projectiles' dual capability. However, a third effect can be achieved by replacing the original expelling charge with a spotting charge designed to detonate the entire projectile as if it were a bulk-loaded HE item. The grenades are normally expelled at a predetermined time in flight. They are armed while falling, and function upon impact. The color code for M483-series projectiles is an olive-drab body with yellow diamonds and markings. Their DODIC is D563.

The M864 is an extended-range DP projectile that is also designed to deliver M42 and M46 grenades. It has a forged-steel body with a base plug, an ogive, and a universal lifting plug. It is a base-ejection projectile that carries 72 DP grenades (48 M42 grenades and 24 M46 grenades). The grenades provide the projectile's dual capability. However, a third effect can be achieved by replacing the original expelling charge with a spotting charge designed to detonate the entire projectile as if it were a bulk-loaded HE item. Once fired, the propellant ignites the base burner unit, which expels hot gas and increases the projectile's range. At the
Figure 2-37. 155mm antipersonnel projectiles.
predetermined time in flight, the grenades are expelled, and they arm themselves while falling. They function upon impact. The color code for the M864 projectile is an olive-drab body with yellow diamonds and markings. Its DODIC is D864.

Chemical projectiles are used for screening, signaling, spotting, and illumination. Those containing WP have an added incendiary effect.

Examples of 155-millimeter smoke projectiles are shown in Figure 2-39. M110-series projectiles contain a WP smoke filler. Their bodies have a base, an ogive, and a lifting plug. These are bursting-type munitions that may be fuzed with an MTSQ or a PD fuze. Their color code is a light-green projectile with one yellow band and red markings. The DODIC for the M110 series is D550.

M825-series munitions are also WP smoke projectiles. They have an all-steel body with a lifting plug in the nose. These are burning-type, base-ejection projectiles that use the M577 MT fuze only. In flight, the functioning of the MT fuze ignites the expelling charge, causing ejection of the payload. The major difference between models in the M825 series is that the M825A1 has an improved payload and uses a steel base, while the M825 uses an aluminum base. The color code for the M825 is a light-green body with one yellow band and light-red markings. The color code for the M825A1 is the same, except that it also has a light-red band near the nose of the projectile. The DODIC for both projectiles is D528.

M116-series projectiles have a white (HC) smoke filler. They are constructed of steel, and have a threaded and pinned base plug and a lifting ring. These are a base-ejection, burning-type projectiles. They are fuzed with MT and MTSQ fuzes. Their color code is a light-green body with black markings. An additional band of three white "C"s grouped together indicates the color of the smoke. The DODIC for the M116A1 is D506. The DODIC for the M116 and the M116B1 is D548.
Figure 2-39. 155mm smoke projectiles.
Riot-control projectiles are designed to harass enemy personnel by emitting CS irritant fumes. An example of a 155-millimeter riot-control projectile is shown in Figure 2-40. The XM631 is a base-ejection, burning-type, tactical CS projectile. It has a steel body with a pressed-in and pinned base plug and an eyebolt lifting plug. It uses an MTSQ fuze. Its color code is a gray body with two red bands and red markings. The DODIC for the XM631 is D581.

Illuminating projectiles are designed to illuminate the battlefield at night or during periods of reduced visibility. An example of an illuminating projectile is shown in Figure 2-40. M485-series projectiles have a forged-steel body with a pinned base plug and an eyebolt lifting plug. This is a base-ejection, burning-type projectile. The color code for older projectiles of this type is an olive-drab body with white markings. Newer projectiles have an olive-drab body with one white band and white markings. The DODIC for M485-series projectiles is D505.

Cannon-launched guided projectiles are designed for use against tanks, armored vehicles, and other hardened targets. The M712 Copperhead (shown in Figure 2-41) is a cannon-launched, HEAT, guided projectile. It is designed for the use with the M109A1/A2/A3, the
M198, and the M114A2 howitzers. This projectile has a manufacturer-installed internal fuze, but in all other ways it is the same as any other separate-loading projectile. A propelling charge and a primer are still required to assemble a complete round. The projectile consists of three main sections—the guidance section, the all-steel warhead section, and the control section. After launch, the projectile receives and decodes laser energy from the target, and guides itself to impact. The target is laser-illuminated by a separate designator. The color code for the M712 Copperhead projectile is a black body with yellow markings. Its DODIC is D510.

![PROJECTILE, 155MM: HEAT, CANNON-LAUNCHED, GUIDED, M712](image)

Figure 2-41. 155mm Copperhead.

**8-Inch Cartridges.** These projectiles are designed for use against personnel and material. They produce both blast and fragmentation effects.

An example of an 8-inch HE projectile is shown in Figure 2-42. The M106 projectile has forged-steel body with a streamlined ogive, a boattail base, and an eyebolt lifting plug. A base cover is welded to the base for added protection against hot gases entering the explosive cavity. The color code for the M106 is an olive-drab body with yellow markings. Its DODIC is D680.
Figure 2-42. 8-inch HE and HERA projectiles.

The M650 is an 8-inch HERA projectile with an extended-range capability. (Refer to Figure 2-42.) It is intended for use against targets at ranges beyond those currently attainable with M106 projectiles. The M650 projectile consists of three major components. These are the aluminum ogive, the steel warhead, and the steel-alloy rocket motor section. It is fitted with a lifting plug at the nose for handling. Its color code is an olive-drab body with yellow markings. The DODIC for the M650 is D624.

Antipersonnel projectiles are designed to deliver a concentration of antipersonnel grenades on a designated target. Examples of 8-inch antipersonnel projectiles are shown in Figure 2-43.

The M404 is an 8-inch, HE, base-ejection-type projectile that is designed to deliver 104 M43 antipersonnel grenades. It has a forged-steel body with a streamlined ogive, a threaded base plug, and an eyebolt lifting plug. At a predetermined time in flight, the fuze functions, expelling the grenades. Upon ground impact, submunitions are ejected 4 to 6 feet above the ground, where they detonate. The color code for the M404 is an olive-drab body with yellow diamonds and markings. Its DODIC is D684.

M509-series munitions are 8-inch, HE, base-ejection-type projectiles designed to deliver 180 M42 antipersonnel/anti-material grenades. They have a forged-steel body with an aluminum-alloy ogive and base plug. They use a universal fusible lifting plug for handling. At a predetermined time in flight, the fuze functions, expelling the grenades. Upon ground or target impact, the submunitions detonate. Another effect available with M509-series projectiles is achieved by replacing the original expelling charge with a spotting charge designed to detonate the entire projectile as if it were a bulk-loaded HE projectile. The color code for M509-series munitions is an olive-drab body with yellow diamonds and markings. Their DODIC is D651.
Howitzer Fuzes. Since all howitzer cartridges are issued as separate-loading items, fuzes must be matched to the projectile bodies. Fuze and projectile combinations are given in TM 43-0001-28, Appendix A. Fuzes are classified according to the method by which they function (PD, MT, MTSQ, electronic time [ET], and PRX). The paragraphs that follow list and describe some of the fuzes that may be encountered with howitzer projectiles.

Examples of PD fuzes are shown in Figure 2-44. The M557-series PD fuzes can be used with all types of howitzer projectiles. They are designed to function on impact or superquick, depending on the option selected. The M739-series PD fuzes are designed to be used with all standard HE artillery cartridges. These fuzes can function on impact or superquick, depending on the option selected.

Examples of MT and MTSQ fuzes are shown in Figure 2-45. The M565 MT fuze is designed to detonate a variety of spin-stabilized projectiles. The M565 fuze is a straight MT fuze. It does not use a superquick function.

The M571 MT fuze is designed especially for use with the M494 flechette-loaded 105-millimeter cartridge. It is a straight MT fuze, but it is graduated in meters rather than in seconds.

M520-series MTSQ fuzes are designed for use with a variety of projectiles to achieve either an air burst or superquick action upon impact.

Figure 2-43. 8-inch antipersonnel projectiles.
The M548 MTSQ fuze may be used with a variety of projectiles. It is used when a choice between timed and superquick action is required.

The M582 MTSQ fuze is designed for use with 105-millimeter HE, HERA, and WP projectiles, as well as with 8-inch HE projectiles. It provides straight time and superquick action. The settings for this fuze can be seen through a window on the fuze ogive.

Examples of ET fuzes are shown in Figure 2-46. The M724 ET fuze is used only with base-ejection-type improved conventional munitions (ICM) projectiles. The time must be set by the loading crew, and, once fired, the fuze is powered by an internal battery.

The M767 ET fuze is used with HE and bursting-type howitzer projectiles. The fuze time is set by hand, and is displayed in a liquid-crystal display (LCD) on the fuze ogive. This fuze uses a reserve lithium battery, and arms itself fully after launch. The M767 fuze may also be set for PD action.

An example of a PRX fuze is shown in Figure 2-47. The M513-series PRX fuzes are designed for use in deep-cavity 105-millimeter howitzer projectiles. These fuzes function on or near the surface (for proximity) or upon impact (superquick or delayed), depending on the mode selected.
Figure 2-45. MT and MTSQ fuzes for howitzer projectiles.
Figure 2-46. ET fuzes for howitzer projectiles.

Figure 2-47. PRX fuze for howitzer projectiles.
Rockets

Rockets range in size from small AT weapons such as the 66-millimeter LAW through the 298-millimeter multiple-launch rocket system (MLRS). They are classified into two types based on their mode of employment. One type is fired from the ground. The other type is aircraft-delivered (such as the 2.75-inch Hydra system).

66-Millimeter LAW. One of the two small ground-to-ground rockets currently in the Army inventory is the 66-millimeter LAW, shown in Figure 2-48. The M72-series HEAT rocket is designed for use against armored targets, bunkers, and other light field fortifications. It is issued as a single-shot, shoulder-fired weapon consisting of a launcher and a rocket. The rocket body is constructed of steel, and has an aluminum ogive and a PIBD piezoelectric fuze. The fuze has a mechanical inertial graze element for secondary functioning. The rocket is fin-stabilized during flight. The color code for the rocket is a black body with yellow markings. The DODICs for the M72 series depend on the specific model number. They are H553, H554, H555, H557, and H568.

M74 Incendiary Rocket. The other small ground-to-ground rocket is the M74. This is an incendiary (TPA/TEA) rocket used to defeat or neutralize hard, soft, or jungle targets. It is issued in four-round clips. This rocket has an aluminum body and a BD fuze with a graze element. This rocket is also fin-stabilized. The color code for the M74 rocket is a red body with yellow markings. Its DODIC is H110.

Multiple-Launch Rocket System. The only large ground-to-ground rocket currently in use is the 298-millimeter MLRS. The MLRS rocket is a tube-launched, fin-stabilized, indirect-fire, free-flight (unguided) rocket. There are two warheads used on the MLRS. One warhead contains 644 M77 submunitions. The other contains 28 AT2 mines. There are six rockets per launch pod, and the self-propelled launcher-loader (SPLL) can hold two pods. The SPLL and the launch pod are shown in Figure 2-49. The color code for the MLRS pod is olive-drab with yellow squares on opposing corners and yellow or white markings.

2.75-Inch Hydra Rocket System. The 2.75-inch rockets are the only air-to-ground Army rockets currently in use. These rockets may be issued in a pod configuration, assembled, or unassembled. They are designed to be fired from various fixed-wing and rotary-wing aircraft. The 2.75-inch rocket is classified as a low-spin, folding-fin, aircraft rocket (LSFFAR). The paragraphs that follow describe the various warheads used with the 2.75-inch rockets.

The M151 warhead, shown in Figure 2-50, is a general-purpose HE warhead. It is issued under six different DODICs based on various fuze and motor combinations. This warhead body is constructed of steel. Its nose is threaded to accept a fuze, and its base is threaded for the rocket motor. The available fuzes include PD, PRX with a PD or MTSQ backup, and an electronic multi-option fuze with settings for delay or superquick action. This warhead's color code is olive-drab with yellow markings. The DODICs for the M151 warhead are H470, H471, H489, H490, H161, and H485.

The M247 warhead, also shown in Figure 2-50, is an HEDP warhead. It is designed to defeat enemy armor and for use against enemy personnel. The M247 may be used only with the M438 PIBD fuze. Its color code is black with yellow markings. The DODIC for the M247 is H826.
Figure 2-48. 66mm rocket system.
Figure 2-49. Multiple Launch Rocket System.
The M261 is an HE, multi-purpose submunition (MPSM) warhead. An M261 warhead is shown in Figure 2-51. It is designed for use against personnel, material, and light armor. This item is issued as a complete round consisting of a warhead, a fuze, and a rocket motor. The warhead has a plastic nose cone, a hollow extruded-aluminum body, and a metal base that is attached to the body with shear pins. The M261 warhead carries nine M73 submunitions, which are independently fuzed with ram-air-decelerator (RAD) fuzes. The warhead itself uses an ET fuze, which is energized by the aircraft, and, after launch, ejects the payload from the base of the warhead. The color code for the M261 is an olive-drab body with one yellow band and yellow markings. Its DODIC is H464.

The WDU-4A/A, also shown in Figure 2-51, is another antipersonnel warhead for the 2.75-inch rocket. This item is issued as a complete round. The warhead has a plastic nose cone, a hollow extruded-aluminum body, and a BD fuze. It contains 2,200 flechettes, which are expelled through its nose. The color code for the WDU-4A/A is an olive-drab body with white markings. Its DODIC is H459.

The M156, shown in Figure 2-52, is a WP smoke warhead. It is issued under four different DODICs, depending on fuze and motor combinations. This warhead is used to provide smoke for target-marking and incendiary purposes. It can be used with PD or PRX fuzing. The color code for the M156 warhead is a light-green body with one yellow band and yellow markings. The DODICs for the M156 are H472, H519, H486, and H593.
Figure 2-51. Antipersonnel warheads for the 2.75-inch rocket.

The M259, also shown in Figure 2-52, is a WP smoke warhead that is designed to provide a screening smoke. This warhead has an aluminum casing, a nose cone, and a mechanical, set-back-actuated, fixed-time fuze. Its color code is light green with red markings. The DODIC for the M259 is H116.

The M257 is an illuminating warhead. (Refer to Figure 2-52.) It is designed to provide helicopters with the ability to illuminate a target from a safe standoff distance. The warhead body is of aluminum, and contains a set-back-actuated, fixed-time fuze. Its color code is an olive-drab body with white markings. The DODIC for the M257 is H180.

**Guided Missiles**

The term "guided missile" refers to a missile that can be directed to its target either by self-reacting devices (laser guided), by command from outside the missile, or through wire links between the missile and an aiming device. Guided missiles may be shipped completely assembled or as major components to be assembled in the field. They are classified according to their launch origins and target destinations, and also according to their missions. The basic designations based on origin and destination are surface-to-surface missile (SSM), surface-to-air missile (SAM), and air-to-surface missile (ASM). The basic designations based on mission are HE, HEAT, and anti-aircraft. Only the smaller guided missiles will be covered in this subcourse.

**Dragon.** The M222 Dragon is a medium HEAT SSM. Shown in Figure 2-53, it is issued with a launcher as a complete round. It is fired from the shoulder or from ground vehicles. This missile is infrared-tracked and wire-guided to the target. Upon impact, a
Figure 2-52. Smoke and illuminating warheads for the 2.75-inch rocket.

Crush switch in the nose sends a detonation signal to the warhead. The M222 Dragon has an olive-drab launcher body. The warhead end of the launcher has one black band and one yellow band, while the propulsion end has one brown band. The DODIC for the M222 is PL23.

**TOW.** The tube-launched, optically tracked, wire-guided (TOW) missile is a heavy AT guided missile. It is shown in Figure 2-54. When fired from a ground mount or a vehicle mount, it is classified as an SSM. When fired from rotary-wing aircraft, it is classified as an ASM. The TOW missile is issued as a complete round consisting of the TOW missile encased in a launch container. This complete round is placed into the weapon launcher when it is required for use. The BGM-71-series missile includes eleven different HE warhead combinations. The color code for the TOW is an olive-drab encased missile with four
2-inch yellow squares 90° apart, or one 2-inch yellow band on the warhead section and four 2-inch brown squares 90° apart, or one 2-inch brown band on the propulsion section. All markings are in white or yellow.

**Redeye.** The Redeye missile system, shown in Figure 2-55, is designed for use against low-flying aircraft. It is a shoulder-fired weapon consisting of an M41-series missile sealed inside its launcher. It is issued as a complete round, and is packaged in two configurations. One configuration is in an aluminum shipping container (called a monopak). The other is in a polystyrene container (called a unipak). The Redeye uses infrared (heat-sensitive) homing guidance. It has an impact warhead and a self-destruct backup. Its color code is an olive-drab missile launcher with four 1-inch yellow squares placed 90° apart on the propulsion section and yellow markings.
Figure 2-55. Redeye missile system.

**Stinger.** The Stinger missile system, shown in Figure 2-56, is designed for use against low-flying aircraft. It is a shoulder-fired weapon consisting of an FIM-92-series air defense guided missile (ADGM) sealed inside its launch tube. It is issued as a complete round, and is packaged in two configurations. One configuration is in an aluminum shipping container (called a weapon round). The other is in a wooden box (called a missile round). The Stinger uses infrared (heat-sensitive) homing guidance. It has an impact-fuzed warhead and a self-destruct backup. Its color code is a forest-green launcher with two 1/2-inch yellow squares on the warhead section and yellow markings.

Figure 2-56. Stinger missile system.

**Chaparral.** The Chaparral missile system is designed for use against low- to medium-altitude aircraft. It is shown in Figure 2-57. This is a crew-served weapon system consisting of an MIM-72-series missile and an M54 launching station. It can be issued as a complete round in the M570 container or as separate components to be assembled by the using unit. The Chaparral is a lightweight, supersonic, passive-homing weapon that uses the infrared radiation from the target for tracking and missile guidance. Its color code is an olive-drab missile body and wings with yellow markings.
DROPPED MUNITIONS

Dropped munitions are those that are dispensed or dropped from aircraft, regardless of their type or purpose. These munitions consist of a carrier or dispenser of some sort that is filled with a payload of submunitions. Some dispensers are reusable, and some are one-time-use items. All dispensers are issued loaded as complete rounds; however, reloading kits are also issueable items for some dispensers. Submunitions are classified as either grenades or mines. The submunitions used include HE, AT/AV, antipersonnel, DP, bursting WP smoke, burning HC smoke, practice, and dummy.

The M56 Mine Dispensing System

There is currently only one dispensing system used by the Army: the M56 mine dispensing system. It dispenses M56 AT/AV mines. The M56 dispensing system is shown in Figure 2-10 on page 2-13.

Air Force and Navy Dispensers

The rest of the dispensers are deployed by either Air Force or Navy aircraft; however, joint service agreements may require that Army personnel provide or assist in item storage. The Navy and Air Force marking systems differ from the Army system. For example, the Navy uses the Mark/Mod System in lieu of "M" numbers used by the Army. The Air Force uses its own system (for example: BDU for bomb dummy unit, BLU for bomb live unit, and CBU for clustered bomb unit).
The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What does the first line of an ammunition data sheet show?
   A. The item's nomenclature.
   B. A picture or drawing of the item.
   C. The item's classification.
   D. The use of the item.

2. Which of the following is classified as a placed munition?
   A. An M42-series bomblet dropped by a 155-millimeter projectile.
   B. An M14 antipersonnel mine.
   C. A 2.75-inch rocket.
   D. An M25-series hand grenade.

3. What is the DODIC for boxed M112 blocks?
   A. M032.
   B. M060.
   C. M023.
   D. M757.

4. How is the M56 mine dispensing system deployed?
   A. By the M128 ground vehicle mine dispenser.
   B. By artillery projectile.
   C. By hand.
   D. By rotary-wing aircraft.

5. What is the major design difference between M718-series and M741-series projectiles?
   A. M718-series projectiles deliver antipersonnel mines, and M741-series projectiles deliver AT mines.
   B. M718-series projectiles deliver a straight HE mine, and M741-series projectiles deliver submunitions.
   C. M718-series projectiles deliver long-delay mines, and M741-series projectiles deliver short-delay mines.
   D. M718-series projectiles are tank-fired, and M741-series projectiles are howitzer-fired.

6. What is the size range for small arms ammunition?
   A. From .22-caliber to 30-millimeter (including 5.56-millimeter through 7.62-millimeter and shotgun gauges).
   B. From .22-caliber to 40-millimeter.
   C. From .22-caliber to 20-millimeter.
   D. From 5.56-millimeter to 7.62-millimeter.
7. Which weapon types use fixed rounds of ammunition?
   A. Guns, cannons, and recoilless rifles.
   B. Howitzers and rocket launchers.
   C. Guns, rifles, and mortars.
   D. Guns, howitzers, and mortars.

8. What purpose does an obturating band accomplish?
   A. It provides a ballistic counterweight and improves the projectile's aerodynamics.
   B. It swells to provide a gas stop between the round and the weapon walls.
   C. It clamps the two sections of the munition body together.
   D. It engages the lands and grooves of the weapon to lock in propellant gases and impart spin to the round.

9. How many fuzes do hand grenades use?
   A. One.
   B. Two.
   C. Three.
   D. Four.

10. What type of primer is used to launch 40-millimeter cartridges from a weapon?
    A. Pyrotechnic-delay.
    B. Electrically primed.
    C. Burning base-ejection.
    D. Percussion.

11. What is the smallest mortar in the Army inventory?
    A. 120-millimeter.
    B. 81-millimeter.
    C. 60-millimeter.
    D. 40-millimeter.

12. What is the color code for the M91 120-millimeter mortar cartridge?
    A. An olive-drab body with white markings.
    B. An olive-drab body with black markings.
    C. A white body with black markings.
    D. A white body with markings in the color of the smoke emitted.

13. What settings are available on the M734 multi-option mortar fuze?
    A. MT, MTSQ, IMP, and long-delay.
    B. PRX, near-surface burst, IMP, and delay.
    C. MTSQ, IMP, MT, and concrete-piercing.
    D. Variable-time, IMP, short-delay, and long-delay.

14. What is the filler for the M494 105-millimeter tank cartridge?
    A. HE.
    B. M42 antipersonnel grenades.
    C. Flechettes and a dye marker.
    D. WP.

15. How are large-caliber howitzer rounds classified?
    A. As fixed rounds.
    B. As semi-fixed rounds.
    C. As separated rounds.
    D. As separate-loading rounds.
16. What is the model number of the 155-millimeter Copperhead projectile?
   A. M712.
   B. M613.
   C. M505.
   D. M412.

17. What are the modes of employment for US Army rockets?
   A. Ground-to-ground and ground-to-air.
   B. Ground-to-air and air-to-ground.
   C. Ground-to-ground and air-to-ground.
   D. Ground-to-ground, ground-to-air, and air-to-ground.

18. How many different HE warheads are used with the BGM-71-series missile?
   A. 11.
   B. 9.
   C. 7.
   D. 5.

19. How are the submunitions carried by dispensers classified?
   A. As AT or antipersonnel.
   B. As grenades or mines.
   C. As HE or smoke.
   D. As service or training.

20. What is the only mine-dispensing system delivered by US Army aircraft?
   A. The CBU-14/A.
   B. The CBU-38/A.
   C. The BLU-66/B.
   D. The M56.
<table>
<thead>
<tr>
<th>Item</th>
<th>Correct Answer and Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A. The item's nomenclature.   (page 2-1)</td>
</tr>
<tr>
<td>2.</td>
<td>B. An M14 antipersonnel mine.  (page 2-7)</td>
</tr>
<tr>
<td>3.</td>
<td>C. M023.  (page 2-2)</td>
</tr>
<tr>
<td>4.</td>
<td>D. By rotary-wing aircraft.  (Specifically, by the UH-1H helicopter.)  (page 2-12)</td>
</tr>
<tr>
<td>5.</td>
<td>C. M718-series projectiles deliver long-delay mines, and M741-series projectiles deliver short-delay mines.  (page 2-46)</td>
</tr>
<tr>
<td>6.</td>
<td>A. From .22-caliber to 30-millimeter (including 5.56-millimeter through 7.62-millimeter and shotgun gauges).  (page 2-16)</td>
</tr>
<tr>
<td>7.</td>
<td>A. Guns, cannons, and recoilless rifles.  (page 2-12)</td>
</tr>
<tr>
<td>8.</td>
<td>B. It swells to provide a gas stop between the round and the weapon walls.  (page 2-15)</td>
</tr>
<tr>
<td>9.</td>
<td>A. One.  (page 2-16)</td>
</tr>
<tr>
<td>11.</td>
<td>C. 60-millimeter.  (page 2-27)</td>
</tr>
<tr>
<td>12.</td>
<td>C. A white body with black markings.  (page 2-30)</td>
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<tr>
<td>13.</td>
<td>B. PRX, near-surface burst, IMP, and delay.  (page 2-33)</td>
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<td>14.</td>
<td>C. Flechettes and a dye marker.  (page 2-37)</td>
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<td>15.</td>
<td>D. As separate-loading rounds.  (page 2-43)</td>
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<td>16.</td>
<td>A. M712.  (page 2-51)</td>
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<td>17.</td>
<td>C. Ground-to-ground and air-to-ground.  (page 2-58)</td>
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<td>18.</td>
<td>A. 11.  (page 2-63)</td>
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<td>19.</td>
<td>B. As grenades or mines.  (page 2-66)</td>
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<td>20.</td>
<td>D. The M56.  (page 2-12)</td>
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