DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 9-1305-200
TO 11A13-1-101

SMALL-ARMS AMMUNITION

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

JUNE 1961

TECHNICAL MANUAL
No. 9-1305-200
TECHNICAL ORDER
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DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *14 June 1961*

SMALL-ARMS AMMUNITION

*This manual supersedes TM 9-1990, 15 September 1947, including C 1, 26 August 1952; and C 2, 6 February 1956.

CHAPTER 1

GENERAL

Section I. INTRODUCTION

1. Purpose and Scope

a. This manual is intended for instruction and the dissemination of such general and technical information concerning small-arms ammunition as may be necessary for proper care, handling, and use. The information contained in this manual is for guidance only and subject to change, therefore, the latest applicable drawings, specifications, and references take precedence.

b. Ammunition used in small-arms weapons is described in this manual. Ammunition for aircraft guns is contained in TM 9-1901-1/TO 11A-1-39. General information of all types of conventional ammunition is contained in TM 9-1900/TO 11A-1-20. General information on care, handling, preservation, and destruction of ammunition is contained in TM 9-1903/TO 11A-1-37.

c. The appendix contains a list of current references, including supply and technical manuals, forms, and other available publications applicable to this material.

d. This manual covers the characteristics, specific data, means of identification, precautions in handling and use, general information on packing and shipping, and methods of destruction to prevent enemy use of small-arms ammunition.

e. This manual differs from TM 9-1990, 15 September 1947 including, Changes No. 1, 26 August 1952, and Changes No. 2, 6 February 1956, as follows:

(1) Adds information on —

CARTRIDGE, CALIBER .22: ball, long rifle, Western super match, Mk III.

CARTRIDGE, CALIBER .22 HORNET: ball, M65.

CARTRIDGE, CALIBER .30: match, M72.

CARTRIDGE, CALIBER .30 DUMMY: M40.

CARTRIDGE, 7.62 MILLIMETER: NATO, armor-piercing, M61.

CARTRIDGE, 7.62 MILLIMETER: NATO, ball, M59.

CARTRIDGE, 7.62 MILLIMETER: NATO, ball, M80.

CARTRIDGE, 7.62 MILLIMETER: NATO, test, high-pressure, M60.

CARTRIDGE, 7.62 MILLIMETER: NATO, tracer, M62.

CARTRIDGE, 7.62 MILLIMETER BLANK: NATO, XM82.

CARTRIDGE, 7.62 MILLIMETER BLANK: NATO, M63.

CARTRIDGE, GRENADE: 7.62 MILLIMETER, NATO, M64.

CARTRIDGE, CALIBER .45, BLANK, LINE-THROWING: M32.

CARTRIDGE, CALIBER .50: ball, M33.

CARTRIDGE, CALIBER, .50: spotter-tracer M48 and M48A1.

CARTRIDGE, CALIBER .32: ball, metal-jacketed, 88-grain bullet.

CARTRIDGE, CALIBER .38 SPECIAL: ball, M41, 130-grain bullet.

CARTRIDGE, CALIBER, .38 SPECIAL: ball, revolver, mid-range, 146-148-grain, lead, clean-cutting bullet, Western super match.

CARTRIDGE, .410-GAGE SHOTGUN: all aluminum, loaded with No. 7½ copper-coated shot.
CLIP, CARTRIDGE, 7.62 millimeter, 5-round.
LINK, CARTRIDGE: 7.62 millimeter, M13.
LINK, CARTRIDGE: Caliber .50, M15.

(2) Revises, rearranges, and adds information in text and tables cartridges and components.

(3) Deletes information on —
Field Artillery Trainer Ammunition.
CARTRIDGE, CALIBER .30 DUMMY: M2.
CARTRIDGE, GRENADE: auxiliary, M7.
Caliber .30 Subcaliber Ammunition (Seacoast).
CARTRIDGE, CALIBER .45: shot, M12.
CARTRIDGE, CALIBER .45: shot, M15.
CARTRIDGE, CALIBER .50: armor-piercing-incendiary, T49.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 7½ chilled shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 8 chilled shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 9 chilled shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 0 buckshot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 4 drop shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 5 shot (chilled or drop).
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 6 chilled shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 6 drop shot.
CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 8 chilled shot and tracer.
Machine Gun Trainer, AA, M9 Ammunition.
CARTRIDGE, CALIBER .38 SPECIAL: 200-grain bullet.
CARTRIDGE, CALIBER .38 SPECIAL: tracer, 120-grain bullet.
CARTRIDGE, CALIBER .38 SPECIAL: tracer, 158-grain bullet, steel jacket.
CARTRIDGE, CALIBER .38 SPECIAL: blank.
16-GAGE Shotgun Ammunition.
20-GAGE Shotgun Ammunition.
CARTRIDGE, .410-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 7½ chilled shot, for 2½-inch chamber.
CARTRIDGE, .410-GAGE SHOTGUN: paper loaded with smokeless powder and No. 7½ chilled shot, for 3-inch chamber.

2. Forms and Reports

a. The forms generally applicable to units operating or maintaining this materiel are listed in the appendix. For a listing of all forms, refer to DA Pam 310-2. For instructions on the use of these forms, refer to FM 9-5.

b. Any errors or omissions will be forwarded on DA Form 2028 direct to the Commanding Officer, Raritan Arsenal, ATTN: ORDJR-OPRA, Metuchen, N. J.

Section II. GENERAL DISCUSSION

3. Definitions

a. Cartridge. A complete assembly consisting of all the components necessary to fire a weapon once; i.e., the cartridge case, primer, propellant, and bullet or shot. A small-arms cartridge and terminology of its components are shown in figure 1.

b. Cartridge Case. A container designed to hold an ammunition primer and propellant to which a bullet may be affixed. Its profile and

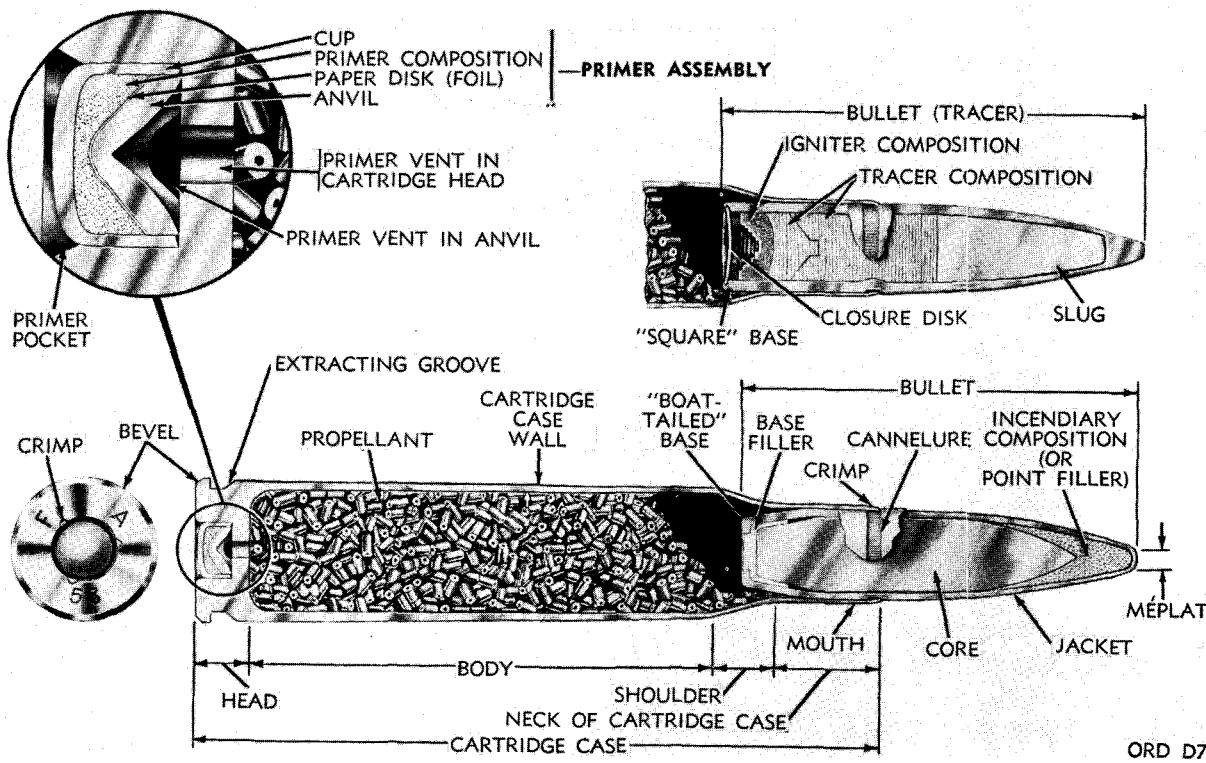


Figure 1. Cartridge terminology.

size conform to that of the chamber of the weapon in which the cartridge is fired.

c. Primer. An assembly which ignites the propellant.

d. Propellant. A low explosive substance of fine granulation which, through burning, produces gases at a controlled rate to provide the energy necessary to propel a bullet or missile.

e. Bullet. A projectile fired, or intended to be fired from a small-arms weapon.

f. Shot. A mass or load of numerous, relatively small, lead pellets used in a shotgun cartridge, as birdshot or buckshot.

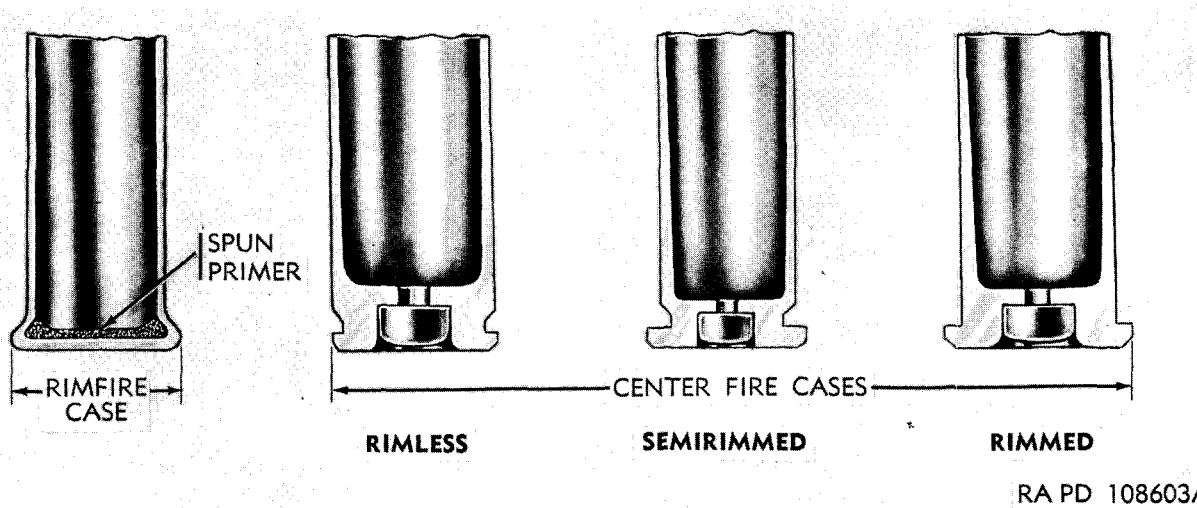


Figure 2. Types of cartridge cases.

4. Classification

a. Small-arms cartridges, based upon type of case, are classified as *centerfire or rimfire.* In a centerfire cartridge, the primer is located in a small well or pocket, in the center of the cartridge case head. A rimfire cartridge differs in that its priming mixture is loaded in the flat rim at the base of the cartridge case. This rim also serves to properly locate the cartridge in the chamber and as a means of extracting the cartridge case after firing. The caliber .22 cartridge (other than hornet) is the only current rimfire type used for military purposes. Centerfire cartridges may be classified as rimless, semirimmed, or rimmed. Types of cartridge cases are illustrated in figure 2.

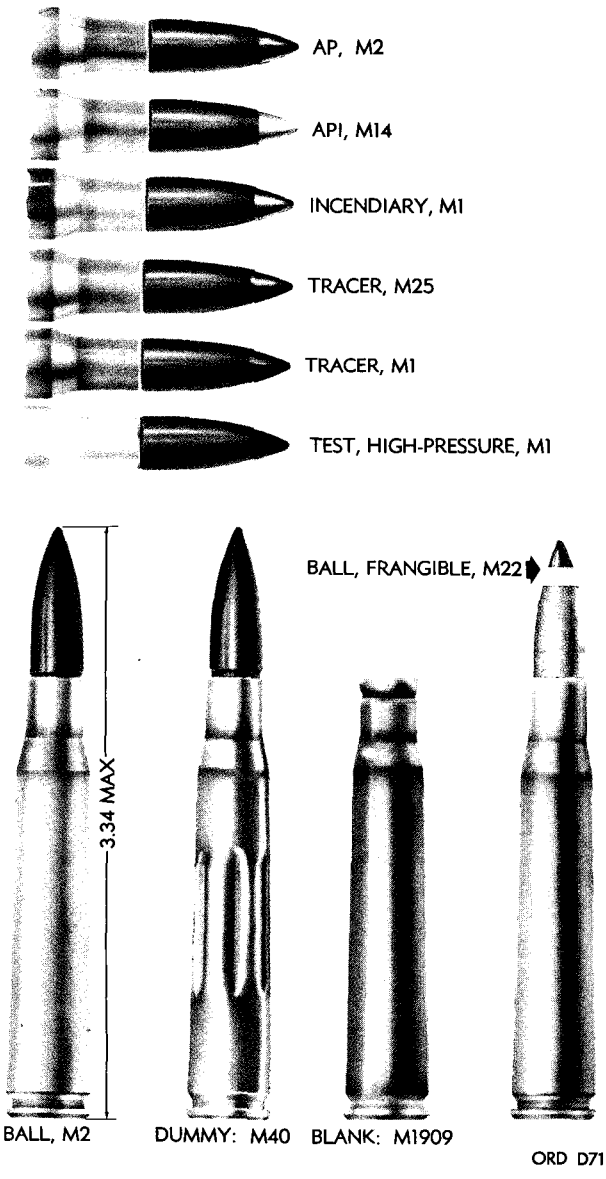


Figure 3. Caliber .30 cartridges.

b. Depending upon its purpose, small-arms cartridges are classified according to type as follows:

Combat (service)	*Noncombat (special)*
Armor-piercing	Blank
Armor-piercing-incendiary	Dummy
Armor-piercing-incendiary-tracer	Frangible
Ball	High-pressure test
Ball, hornet	Line-throwing
Grenade cartridges	Match
Incendiary	Practice
Shotgun cartridge	Shotgun cartridge
Spotter-tracer	
Tracer	

5. Identification

a. General. Small-arms ammunition (figs. 3-6) is identified completely, except as to grade, by packing and marking including the ammunition lot number, on original packing containers. Applicable grade of the small-arms ammunition lot is indicated by the Federal stock number. When ammunition is removed from its original packing containers, the full identity of the ammunition, including the lot number, nomenclature, and model designation, should be noted on issue slips, temporary containers, or by means of tags attached to ammunition belts.

b. Federal Stock Number and Department of Defense Codes. The Federal stock number (FSN) has replaced the ammunition identification code (AIC) symbol and the Ordnance stock number formerly used. There is a different FSN for each item of supply as packaged. An FSN, once properly assigned and published, will never be changed. The first four digits of an FSN are always the Federal supply classification (FSC) class in which an item belongs. The FSN for an item of supply consists of a 4-digit FSC class code number and a 7-digit Federal item identification number (FIIN). Thus, in the case of an item for which the FSN is 1305-096-3155, "1305" is the FSC class in which the item belongs, and "096-3155" is the FIIN which identifies the item and distinguishes it from every other item of supply. A Department of Defense identification code (DODIC), consisting of a letter and three digits, has been added as a suffix to FSN's in FSC group 13 to indicate interchangeability

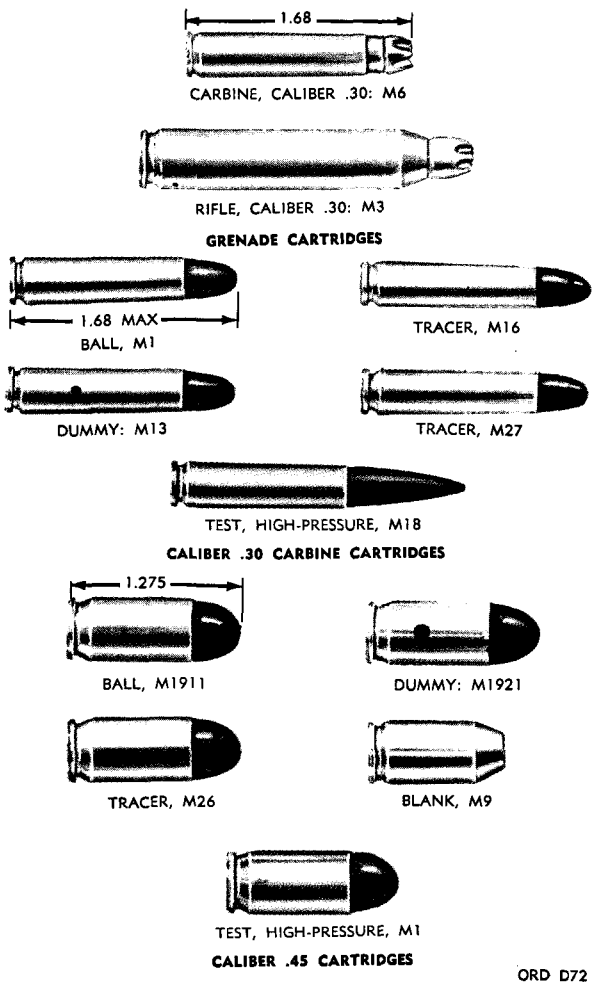


Figure 4. Grenade, carbine, and caliber .45 cartridges.

of ammunition and explosive items. The same four character code number is assigned to those items within the class which are interchangeable as to function and use. When the DODIC is attached as a suffix to the FSN, the DODIC is shown in parentheses, e.g., 1305-096-3155 (C605). In addition to the preceding, there is a Department of Defense (DOD) ammunition code defined as an 8 character semi-significant number divided into 2 parts separated by a dash; the first part consisting of the FSC and the second part consisting of the DODIC, e.g., 1305-C605. The DOD ammunition code is used for requisitioning purposes.

c. Model. To identify a particular design, a model designation is assigned at the time the model is classified as an adopted type. The model designation becomes an essential part of the item name and is included in the marking of the item. Model designation consists of the letter "M" followed by an Arabic numeral, e.g., "M1." Modifications are indicated by adding the letter "A" and the appropriate Arabic numeral. Thus "M1A1" indicates the first modification of an item for which the original model designation was "M1." Wherever the letter "B", followed by an Arabic numeral, appears in a model designation, it indicates an item of alternative (or substitute) design, material, or manufacture. Major modifications of small-arms ammunition are generally assigned a new model designation instead of following this pattern. The suffix "XM" followed by an Arabic numeral is used to identify an item during its development. Upon acceptance as an adopted type, the letter "X" is dropped leaving the letter "M" followed by the Arabic numeral. The suffix "T" followed by an Arabic numeral was used to identify development type items prior to 1958. A design modification which has not been standardized is indicated by the addition of the letter "E" and an Arabic numeral. Some of the older designed cartridge models are designated by the year in which the design was adopted.

d. Ammunition Lot Number. When ammunition is manufactured, an ammunition lot number, which becomes an essential part of the marking, is assigned in accordance with pertinent specifications. This lot number is marked on all packing boxes containing carton-packed cartridges and on the cartons packed therein. It is required for all purposes of record, grading, use, and reports on condition, functioning, and accidents in which the ammunition might be involved. To provide for the most uniform functioning, all of the components in any one lot are manufactured under as nearly identical conditions as practicable. Since it is impracticable to mark the ammunition lot number on each individual cartridge, every effort should be made to preserve, by tagging and marking, the ammunition lot number or the functional lot number of the cartridges once they are removed from their original packing. Cartridges for which the ammunition lot number has been lost automatically become grade 3. Therefore, when cartridges are removed from

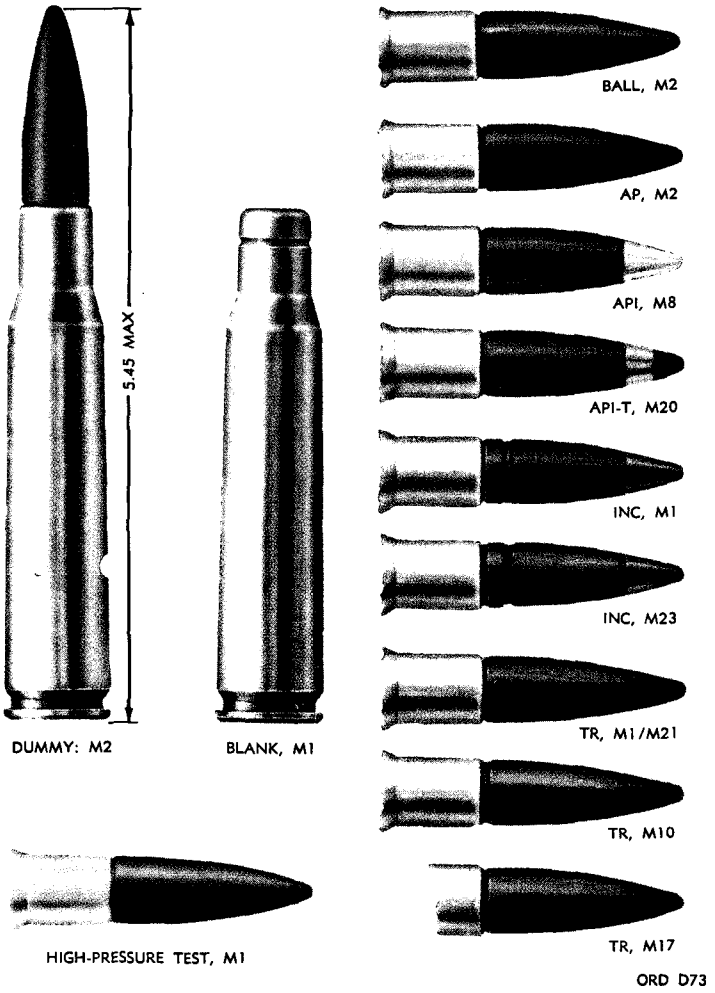


Figure 5. Caliber .50 cartridges.

their original packings they should be so marked that the ammunition lot number or the functional lot number may be preserved.

e. Functional Lot Numbers. When small-arms ammunition is functionally packed in either metallic link or web belts, the component lot numbers are replaced by a functional lot number. This functional lot number is used solely for identifying the ammunition for accounting and storage purposes, and does not reflect the quality of the ammunition. These functional lot numbers contain the interfix "B" or "L" to denote whether the ammunition is packed in web or metallic link belts respectively.

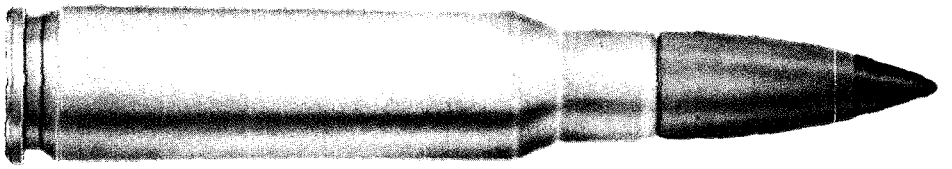
f. Small-Arms Ammunition Removed From Functional Packs. Whenever small-arms ammunition is removed from functional packs, the component ammunition lots will revert to the original grade classification.

g. Painting. Some small-arms ammunition bullet tips are painted in various colors (table I) to provide a ready means of identification.

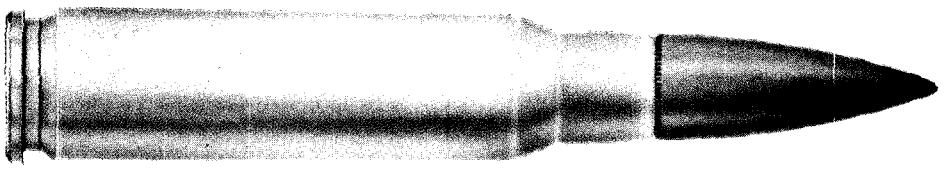
h. Marking. Small-arms ammunition has the manufacturer's initials and year of manufacture stamped in the metal on the head of the cartridge case. The year is denoted by two figures except that ammunition manufactured in 1944 is stamped either "44" or "4." Match ammunition has the word "MATCH" stamped alongside the loading date. Subsequent to 15 May 1954, caliber .30 and caliber .50 functional lots will have the component lot in addition to the functional lot number stenciled on the exterior of the hermetically sealed cans or the metal ammunition boxes.

6. Identification in Aerial Target Practice

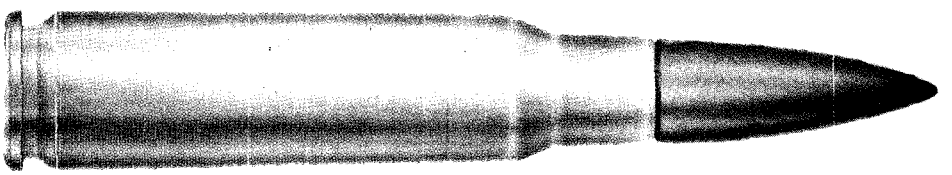
The tips of bullets are coated with litho-



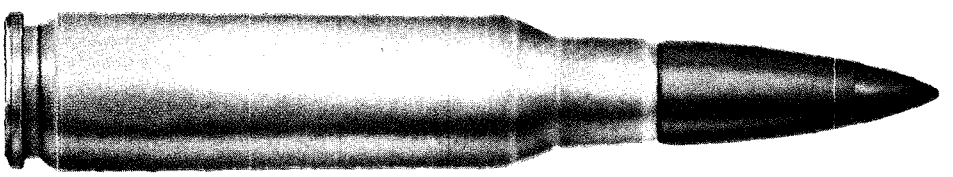
CARTRIDGE, 7.62 MILLIMETER: AP, NATO, M61



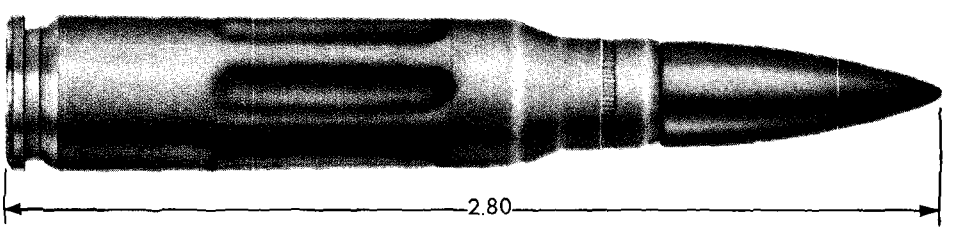
CARTRIDGE, 7.62 MILLIMETER: BALL, NATO, M59 AND M80



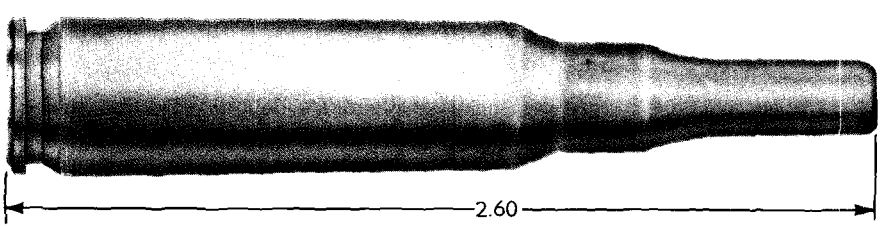
CARTRIDGE, 7.62 MILLIMETER: TEST, HIGH PRESSURE, NATO, M60



CARTRIDGE, 7.62 MILLIMETER: TRACER, NATO, M62



CARTRIDGE, 7.62 MILLIMETER: DUMMY, NATO, M63



CARTRIDGE, 7.62 MILLIMETER BLANK: NATO, XM82

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Figure 6. 7.62 Millimeter cartridges.

Table I. Color Identification of Small-Arms Cartridges

Color of tip of bullet	Type of cartridge
Black	Armor-piercing, cal. .50, M2, cal. .30, M2, and 7.62-mm, M61.
Aluminum color	Armor-piercing-incendiary, cal. .50, M8 and cal. .30, M14.
Red with aluminum color annulus to the rear	Armor-piercing-incendiary-tracer, cal. .50, M20.
None	Ball, cal. .50, M2, and M33; cal. .45, M1911; cal. .30, M2, carbine, M1; 7.62-mm, M59 and M80; cal. .22, M65; and cal. .38, M41.
None (4 holes in cartridge case)	Dummy, cal. .50, M2.
None (fluted case)	Dummy, cal. .30, M40 and 7.62-mm, M63.
Green with white annulus to the rear (bullet has mottled appearance)	Frangible, cal. .30, M22.
None (tinned cartridge case)	High-pressure test, cal. .50, M1; cal. .45, M1; cal. .30, M1; carbine, M18 and 7.62-mm, M60.
Light Blue	Incendiary, cal. .50, M1, and cal. .30, M1.
Blue with light blue annulus to the rear	Incendiary, cal. .50, M23.
Yellow with a red annulus to the rear	Spotter-tracer, cal. .50, M48 and M48A1.
Red	Tracer, cal. .50, M1, headlight, M21, cal. .45, M26, cal. .30, M1, and carbine, M16.
Orange	Tracer, cal. .50, M10, cal. .30, M25, carbine, M27, and 7.62-mm, M62.
Brown or maroon	Tracer, cal. .50, M17.

graphic ink before target practice so that the number of hits on the target can be determined when more than one machinegun is used for one target. The bullets of the cartridges for each weapon or group of weapons are coated with a distinctive color of ink, which, upon striking the target, leaves a smear indicating the source of fire. Cartridges that have been so coated must have the ink removed before they are returned to storage. Lithographic marking ink is available in seven colors: orange, red, green, yellow, brown, black, and blue.

7. Grades

a. When ammunition is manufactured, each lot is assigned a grade designation primarily on the qualities which make the lot especially suited for use in a particular class of weapons, and is normally packed for the use intended, in accordance with pertinent specifications. For example, caliber .30 ammunition assigned grade R, excepting carbine ammunition, is usually packed in 5- or 8-round clips, dependent upon the rifle for which intended; grade MG ammunition normally is packaged in web or metallic link belts and is especially suited for use in ground machineguns. Current grades of all existing lots of small-arms ammunition are established by the Chief of Ordnance and are published in TB 9-AMM 4. Only those lots of appropriate grade will be fired. Grade 3 indicates unserviceable ammunition that will not be issued or fired, or cartridges for which the ammunition lot has been lost. However, ammunition placed in grade 3 because of loss of ammunition lot number, but which can be identified as having been in serviceable lots issued to a specific organization may be reissued after visual inspection, but only for local training purposes.

b. Prior to 1 July 1952, caliber .30 ammunition lots other than those for caliber .30 carbine were classified as grade AC, grade AC or R, grade R, grade MG, and grade 3. Due to limited aircraft requirements and to facilitate assignment of FSN's and stock issues, caliber .30 designations of grade AC and grade AC or R have been discontinued. Serviceable caliber .30 ammunition other than caliber .30 carbine will, in the future, be designated as grade R or grade MG only. As indicated in section II, TB 9-AMM 4, caliber .30 ammunition lots listed

as grade R with a number symbol (#) and footnote indicating suitability also for aircraft use are equivalent to the former grade AC or R. Similarly, lots listed as grade MG with a number symbol (#) and footnote indicating suitability also for aircraft use are equivalent to the former grade AC. Grades most appropriate for the different requirements for specific types of weapons are assigned in accordance with the following:

Caliber .30

Grade	Weapon
MG#	Aircraft and antiaircraft machineguns.
R#	Aircraft and antiaircraft machineguns or rifles.
R	Rifles and carbines.
MG	Ground machineguns.
3	Unserviceable (not to be issued or used).

Caliber .45

Grade	Weapon
1	Pistols and submachineguns.
3	Unserviceable (not to be issued or used).

Caliber .50

Grade	Weapon
AC	Aircraft and antiaircraft machineguns.
MG	Machineguns.
3	Unserviceable (not to be issued or used).

7.62 Millimeter NATO

Grade	Weapon
R	Rifle.
MG	Machinegun.
3	Unserviceable (not to be issued or used).

c. The following grades of caliber .30, 7.62 millimeter NATO, caliber .45, and caliber .50 ammunition may be used in the weapons specified below. They are listed in the order of priority of issue and use.

Caliber .30 (Except Carbine)

Grade	Weapon
R	Antiaircraft machineguns.
R; R#	Rifles, semiautomatic and automatic rifles.
MG; MG#; R; R#	Ground machineguns.
3	Not to be issued or used.

Caliber .30 Carbine

Grade	Weapon
R	Carbine.
3	Not to be issued or used.

7.62 Millimeter NATO

Grade	Weapon
R	Rifle.
MG	Machinegun.
3	Not to be issued or used.

Caliber .45

Grade	Weapon
1	Pistols and submachineguns.
3	Not to be issued or used.

Caliber .50

Grade	Weapon
AC	Aircraft machineguns.
AC; MG	Antiaircraft machineguns.
MG; AC	Ground machineguns.
3	Not to be issued or used.

d. Grades are not assigned to grenade cartridges, shotgun cartridges, dummy, and high pressure test cartridges. All lots of these types are considered serviceable for issue and use, unless specifically designated grade 3.

e. Grades, as listed in SM 9-5-1305 under the appropriate FSN, will be used for lots of recent manufacture not yet published in TB 9-AMM 4, and for lots on development type items which have not been standardized by the Chief of Ordnance.

f. The proper grade of any authorized round

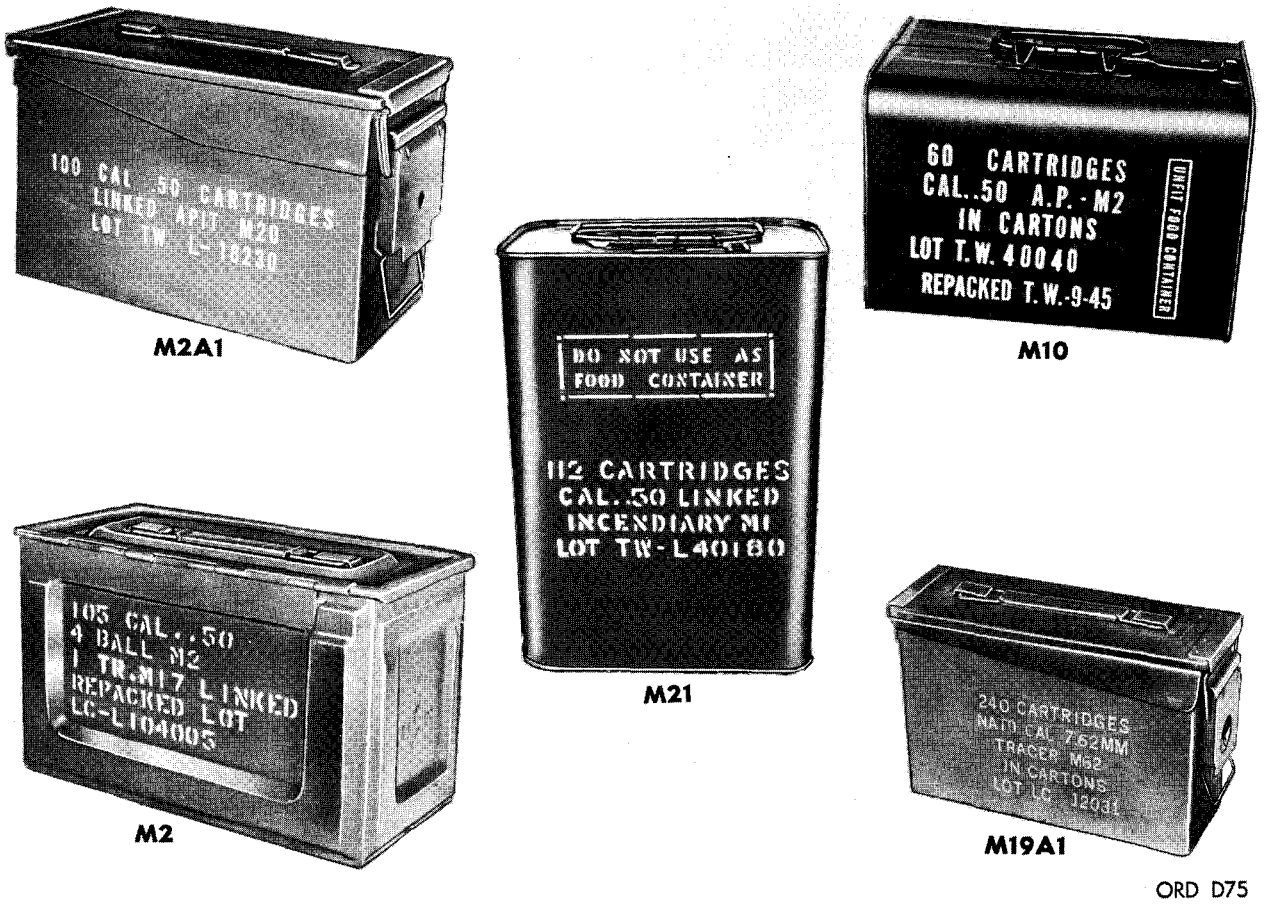


Figure 7. Packing containers small-arms ammunition.

of ammunition or authorized substitute will be used at all times. If for any reason the current grade of any *lot* cannot be determined by referring to TB 9-AMM 4, it may be obtained from the Ordnance Ammunition Command, ATTN: ORDLY-QT, Joliet, Ill. Since each lot of ammunition is graded, it is necessary that all paintings and markings shown on packing containers, be preserved, especially the lot number. Any packing containers which are damaged should be repaired and the original markings restored.

8. Packing and Marking

a. The containers and methods for packing small-arms ammunition are given in drawings, specifications, and appropriate supply manuals. Containers presently being manufactured have been reduced to a few standard types designed to withstand all conditions commonly encountered in handling, storing, and transportation of ammunition (figs. 7-11). A listing of standard boxes and containers and their contents, dimensions, cubic displacement, and weights are contained in SM 9-5-1305.

b. In general, small-arms ammunition is packed in either watertight metal liners, plain or wax sealed cartons, metal-foil envelopes, hermetically sealed cans, or in metal boxes having hinged covers sealed by means of a rubber gasket. These containers are overpacked in cleated wooden boxes or wire-bound wooden boxes. Dependent upon the intended use, the ammunition within the immediate container may either be bulk packed in cartons or functionally packed in clips in bandoleers or in link or web belts.

c. Packing containers for small-arms ammunition are listed in supply manuals covering FSC group 81. Box components which are classed as hardware, such as wingnuts and screwhooks, are listed in supply manuals cover-

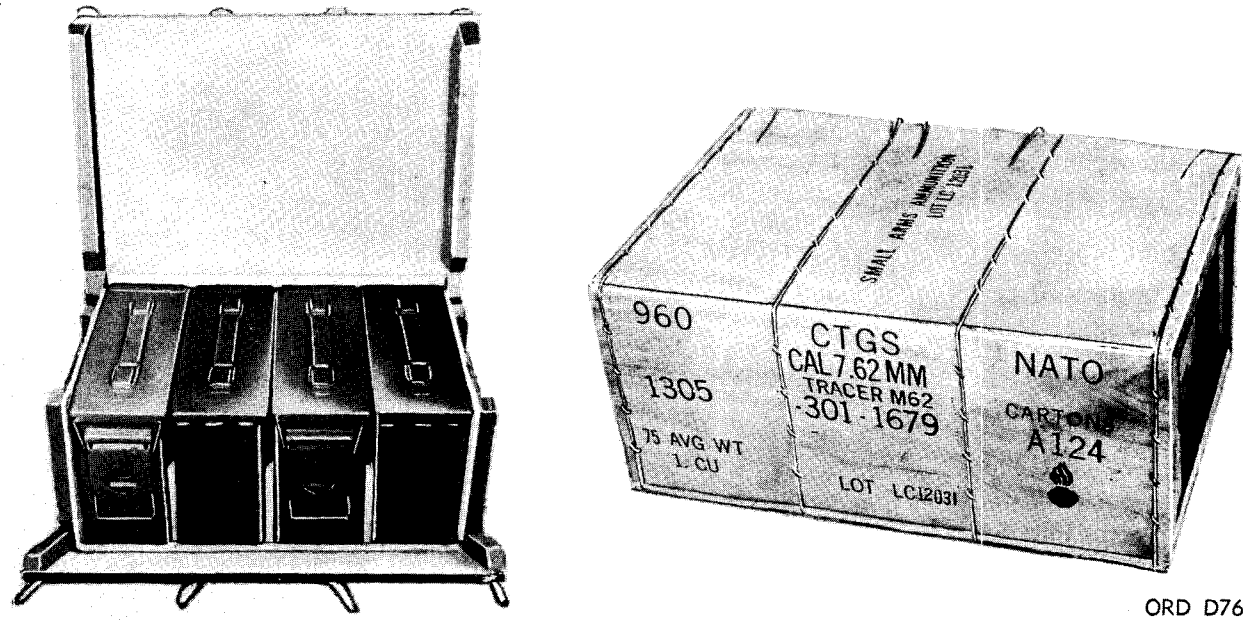


Figure 8. Wirebound box with 7.62-mm ammunition in metal containers M19A1.

ing FSC group 53. Cartridge clips, cartridge links, and bandoleers, used for functional packs, are listed in SM 9-5-1305.

d. Each outer shipping container and all inner containers down to the smallest unit container are fully marked to identify the ammunition contained therein. These markings include the Federal stock number, descriptive nomenclature of the ammunition included, ammunition lot number, and the number of rounds. In addition to the above, the outer shipping container also is marked with the Federal stock number, Department of Defense identification code, Interstate Commerce Commission shipping name, weight, cube, and Ordnance insignia.

e. Metal boxes and cans are painted olive drab and marked in yellow. Some outer containers are stained light brown and marked in yellow. Those of current manufacture are unstained and marked in black. Specific lots when selected for rifle or pistol match requirements will be marked "MATCH" on the nomenclature side and top of outer shipping containers. Boxes containing functionally packed ammunition (ammunition packed in rifle clips, web belts, or link belts) have figure symbols stenciled on the container for quick identification of the type of inner pack.

9. Care, Handling, and Preservation

a. Small-arms ammunition is not dangerous to handle. This ammunition is packed to withstand conditions ordinarily encountered in the field; moisture-resistant containers and suitable packing boxes are used to provide protection for shipment and storage. Care must be taken to prevent these packings from becoming broken or damaged. All broken packings must be repaired immediately with careful attention given to the transfer of all markings to the new parts. Metal liners and metal cans should be sealed and air-tested if equipment for this work is available.

b. Boxes should be opened carefully as they are to be used as long as they are serviceable.

c. Ammunition boxes should not be opened until the ammunition is required for use. Ammunition removed from airtight containers, particularly in damp climates, is apt to corrode, thereby rendering the ammunition unserviceable.

d. Cartridges should be protected from high temperatures and the direct rays of the sun for any considerable length of time. Such exposure is likely to affect the firing qualities of the cartridges. The combination of high temperatures and a humid atmosphere is particularly detrimental to the stability of the

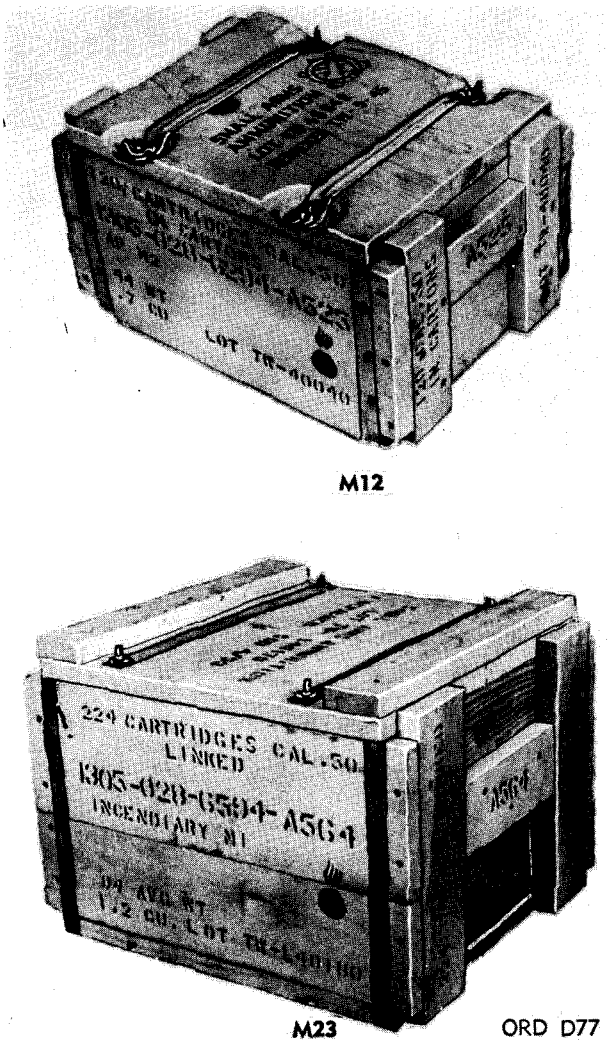


Figure 9. Packing-boxes small-arms ammunition.

propellant powder and to tracer mixture in tracer ammunition.

e. Cartridges should be protected from sand, mud, moisture, frost, snow, ice, oil, grease, or other foreign matter. If cartridges get wet or dirty, they should be wiped off at once. If verdigris or light corrosion forms on cartridges, it should be wiped off with a clean dry cloth. Cartridges should not be polished to make them look better or brighter.

f. The use of oil or grease on small-arms cartridges is prohibited. Oil or grease might cause injurious abrasives to collect in automatic weapons and produce excessive and hazardous chamber pressures when fired.

g. Whenever practicable, small-arms ammunition should be stored under cover. This applies particularly to tracer and shotgun ammunition. Tracer ammunition is subject to rapid deterioration if it becomes damp. When it is necessary to store this ammunition in open storage, raise it on dunnage at least 6 inches from the ground and cover it with a double thickness of paulin, leaving enough space for the circulation of air. Where practicable, dunnage strips should be placed under each layer of ammunition boxes to prevent mildew and rot. Suitable trenches should be dug to prevent water from running under the pile.

h. Ammunition when stored, should be segregated by caliber, type, and ammunition lot.

i. When only a part of a box of ammunition is issued or used, the ammunition remaining in the box should be protected by firmly fastening the cover.

j. Ammunition removed from the original packing should be tagged or marked so as to preserve the ammunition lot number. Such identification is necessary to prevent otherwise serviceable ammunition from falling into grade 3 through loss of identity (ammunition lot number).

k. Complete information pertaining to care, handling, and preservation of ammunition is contained in TM 9-1903/TO 11A-1-37.

10. Precautions in Firing Combat (Service) Ammunition

a. The general precautions concerning the firing and handling of ammunition in the field as prescribed in AR 385-63 and TM 9-1900/TO 11A-1-20 will be observed. The precautions given in the following subparagraphs should be closely observed in order to prevent injury to personnel or damage to materiel.

b. Small-arms ammunition, other than caliber .22 cartridges, shotgun cartridges, and blank ammunition (except as noted in par. 11*c*) will not be fired until it has been identified by ammunition lot number and grade as published in the latest revision or change to TB 9-AMM 4/TO 11A13-1-3. The grade of lots of recent manufacture not yet published in the above technical bulletin will be as indicated by the FSN or other notation on the box and shown in SM 9-5-1305. Grade 3 ammunition will be fired only under special instructions published in the above technical bulletin.

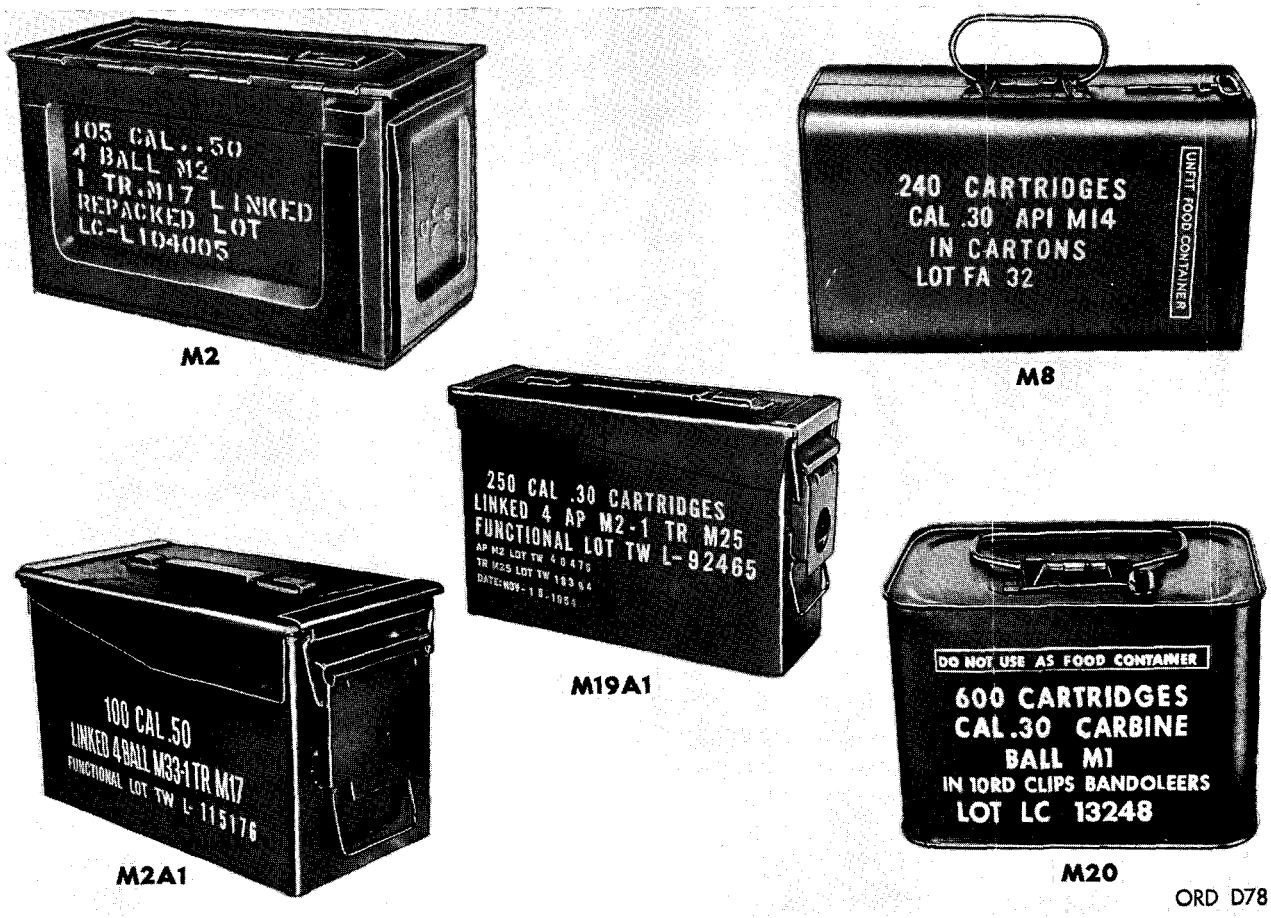


Figure 10. Packing containers small-arms ammunition.

c. Ammunition which is seriously corroded should not be fired.

d. Brass cartridge cases are easily dented and should be protected from hard knocks and blows. Dented cartridge cases may cause incomplete obturation, jamming in the chamber, and difficulty in extraction.

e. Cartridges which have been seriously damaged, or those having loose bullets, should not be used.

f. The cartridges should be free of sand, mud, moisture, frost, snow, ice, oil, grease, or other foreign matter before loading into the magazine of the weapon.

g. The use of armor-piercing ammunition is prohibited in demonstration in which tanks are used.

h. In using armor-piercing ammunition, it is well to remember that the core of a bullet that fails to penetrate the target may rebound. The radius of rebound for armor-piercing ammunition depends on several factors but may safely be taken at a maximum of 100 yards for caliber .30 and 7.62 millimeter cartridges and 200 yards for caliber .50 cartridges.

i. Small-arms ammunition graded and marked "FOR TRAINING USE ONLY," will not be fired over the heads of troops under any circumstances.

j. Do not fire cartridges which have become overheated due to exposure to the direct rays of the sun or other sources of high temperature. Such cartridges, if fired, may develop hazardous chamber pressures.

k. If, at any time firing is interrupted, a cartridge is in the chamber of a very hot weapon, the cartridge should be removed promptly to prevent the possibility of a cookoff.

l. Misfires, hangfires, and cookoffs will be handled as indicated in AR 385-63.

11. Precautions in Firing Blank Ammunition

a. It is dangerous to fire blank cartridges at personnel at distances less than 20 yards as

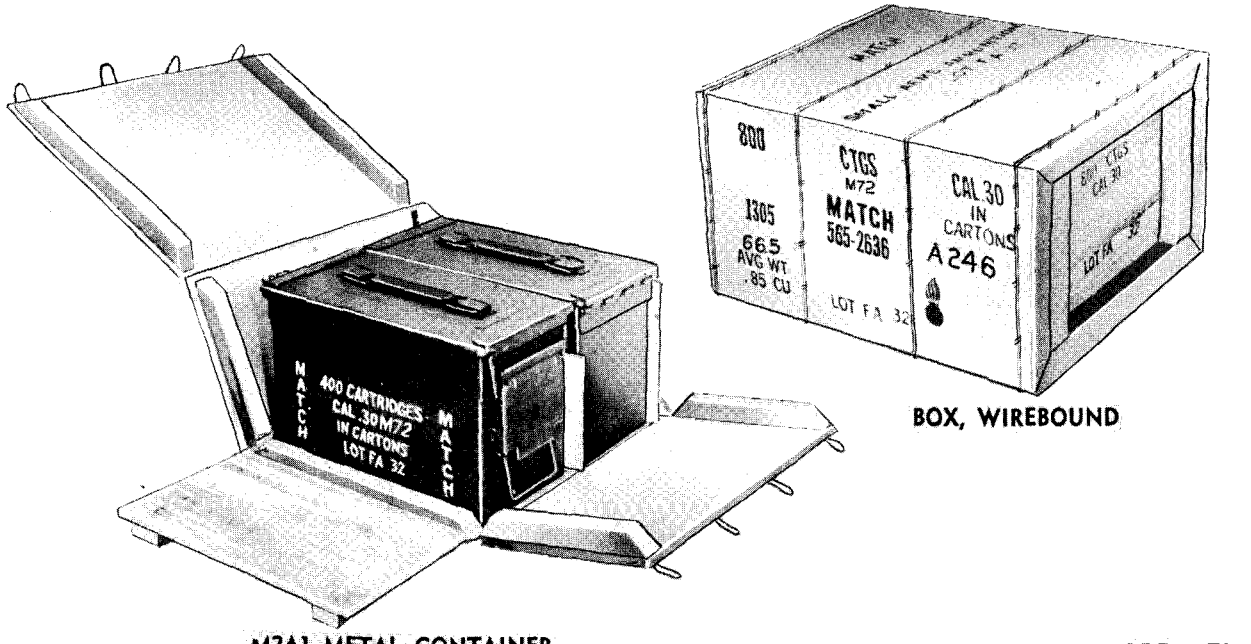


Figure 11. Wirebound box showing metal container M2A1.

the wad or paper cup may fail to break up and the propellant may not be completely consumed.

b. No blank cartridges, other than those authorized in SM 9-5-1305 and SM 9-5-1330 will be used for blank firing. Precautions prescribed in the following subparagraphs will be observed carefully.

(1) All packing containers are plainly marked and markings should be carefully checked before the ammunition is issued. The M1909 blank cartridge is similar in appearance to some of the caliber .30 grenade cartridges which are used for propelling rifle grenades. The markings on the containers, however, show the difference.

(2) Bore obstructions may cause the blank cartridge to develop excessive pressures which may result in injury to personnel and/or damage to the weapon. To avoid such possibilities, all weapons should be thoroughly examined to ascertain the absence of any obstructions within the bore of the barrel.

(3) Lots of CARTRIDGE, CALIBER .30, BLANK: M1909 (formerly known as CARTRIDGE, blank, cal. .30, M1909) manufactured subsequent to January 1925 and 7.62. millimeter blank cartridges contain thin paper cups or paper disks, whereas lots manufactured prior to that date were assembled with felt or thick paper wads. For a comparison of closing wads, cups, and disks, see figure 27.

(4) Only ammunition containing the paper cup will be used in automatic weapons.

c. Malfunctions in which the primer explodes but fails to ignite the propellant are dangerous when blank ammunition is fired in automatic arms. In such malfunctions, some of the propellant is blown into the bore of the weapon. A series of such rounds will result in an accumulation of powder sufficient to cause serious damage when ignited by the firing of a normal cartridge. When malfunctions are encountered in blank ammunition in excess of 5 percent, the lot is withdrawn and reported to the Ordnance officer.

d. When firing CARTRIDGE, grenade, carbine, caliber .30, M6, which is authorized for issue and use in CARBINE, caliber .30, M1, M1A1, M2, and M3 as a blank round, the following will be observed:

(1) Personnel or materiel must not be within a radius of 10 yards forward of the muzzle of the carbine.
(2) Adequate safety precautions must be taken to guard against possible injury or damage from ignition of any accumulation of unburned powder grains deposited in front of carbines firing numerous rounds of this cartridge.

12. Misfire, Hangfire, and Cookoff

a. Misfire. A misfire is a complete failure to fire. A misfire in itself is not dangerous but since it cannot be immediately distinguished from a delay in the functioning of the firing mechanism or from a hangfire (*b* below), it should be considered as a possible delay in firing until such possibility has been eliminated. Such delay in the functioning of the firing mechanism, could result from the presence of foreign matter such as sand, grit, frost, ice, or improper or excessive oil or grease. These might create a partial mechanical restraint which, after some delay, is overcome as a result of the continued force applied by the spring, and the firing pin then driven into the primer in the normal manner. In this connection, no round should be left in a hot weapon any longer than the circumstances require because of the possibility of a cookoff (*c* below).

b. Hangfire. A hangfire is a delay in the functioning of a propelling charge at the time of firing. The amount of delay is unpredictable but, in most cases, will fall within the range of a split second to several minutes. Thus, a hangfire cannot be distinguished immediately from a misfire and therein lies the principal danger of assuming that a failure of the weapon to fire immediately upon actuation of the firing mechanism is a misfire whereas, in fact, it may prove to be a hangfire. It is for this reason that the time intervals prescribed in the manuals of operation of specific weapons should be observed before opening the bolt after a failure to fire. These time intervals, based on experience and consideration of safety, have been established to minimize the danger associated with a hangfire and to prevent the occurrence of a cookoff.

Warning: **During the prescribed time intervals, the weapon will be kept trained on the target and all personnel will stand clear of the muzzle.**

c. Cookoff. A cookoff is a functioning of any or all of the components of a round chambered in a very hot weapon due to the heat from the weapon. If the cartridge propellant should cookoff, the projectile will be propelled from the weapon with normal velocity even though no attempt was made to fire the primer by actuating the firing mechanism. In such a case, there may be uncertainty as to whether or when the round will fire, and precautions should be observed the same as those prescribed for a hangfire. To prevent a cookoff, a round of ammunition which has been loaded into a very hot weapon should be fired immediately, or removed after a lapse of 5 seconds and within 10 seconds.

d. Precautions in handling ammunition, including procedures to be followed in case of misfires, hangfires, and cookoffs are found in AR 385-63, TM 9-1900/TO 11A-1-20, TM 9-1903/TO 11A-1-37, and in the various technical manuals and field manuals pertaining to particular weapons.

13. Priority of Issue

a. Subject to special instructions from the Chief of Ordnance, limited standard ammunition of appropriate type and model will be issued prior to standard ammunition. Following this rule, ammunition which has the longest or least favorable storage will be issued first whenever practicable; this procedure includes lots of ammunition marked "Repacked, liners not sealed."

b. Priority of issue for lots of small-arms ammunition is established by the Chief of Ordnance and published in TB 9-AMM 4, or in special instructions. Within any one grade, priority of issue and use will be given to lots indicated in TB 9-AMM 4, and to lots containing less than 20,000 rounds.

14. Cartridges with Deteriorated Tracer Elements

Armor-piercing-incendiary-tracer and tracer types of cartridges with deteriorated tracer elements, as listed in SM 9-5-1305, may be substituted for ball ammunition for training requirements within the continental United States.

15. Field Report of Accidents

If an accident or malfunction involving the use of ammunition occurs during training or combat, the range officer for a unit in training or the officer or noncommissioned officer in charge of the firing unit in combat will immediately discontinue firing ammunition of the lot which malfunctions. The officer will then report the occurrence and all pertinent facts of the accident or malfunction to the technical service officer under whose supervision the ammunition for the unit involved is maintained or issued, in order that action prescribed in AR 700-1300-8 and AR 385-63 can be taken. It is particularly helpful if the evidence of a malfunctioning cartridge or cartridges can be preserved for study by designated Ordnance surveillance personnel. If conditions of combat preclude immediate compliance, the action prescribed above will be taken as soon as practicable.

Section III. SURVEILLANCE

16. General

Surveillance includes in part, the observation, inspection, test, study, and classification of ammunition, ammunition components, and explosives in movement, storage, and use. All acceptance test firing of small-arms ammunition is done using specified weapons and methods in accordance with applicable procedures. The Chief of Ordnance exercises general supervision over the surveillance of all ammunition; prescribes the technical methods for inspections, investigations, and tests; maintains records of the condition and serviceability of all lots in storage and use; and prescribes requirements for repair or disposition of unserviceable items.

17. Small-Arms Ammunition Tests

a. General. Tests to which small-arms ammunition is subjected for acceptance and subsequently, for surveillance and grading include visual examinations, velocity test, waterproof test, pressure test, functioning and casualty tests in specified weapons; hangfire test, action time test, accuracy test, trace function test, incendiary function test, stripping test, penetration test, caliber .38 fit test, screen perforation test for blank ammunition; pattern test for shotgun cartridges; bullet pull test and mecurous nitrate and salt spray test. Some of these tests are described below.

b. Visual Inspection. Examination of samples for season cracks, corrosion, or other visual defects is described in paragraph 18.

c. Velocity Test. Standard methods are used for conducting velocity tests. Screens are placed a definite distance apart and the velocity of the bullet is calculated and recorded electronically at the time of flight in traveling from the first screen to the second.

d. Waterproof Test. Cartridges are immersed in water for 24 hours and fired in the appropriate velocity weapon, and the difference between the wet and the dry velocity is noted.

e. Pressure Test. This test is conducted in a pressure barrel. The barrel chamber is drilled with a small hole into which is inserted a metal piston. On firing the cartridge, the pressure of the gases forces the piston against a copper cylinder and compresses it. The amount of compression of the cylinder is an index of the pressure developed. When firing for pressure, velocities are usually taken at the same time for a check.

f. Machine Gun Functioning Test. A quantity of cartridges are fired from a machinegun to determine the number of cartridge defects or gun malfunctions.

g. Rifle Functioning Test. A number of rounds are fired in a rifle whose headspace is specified and observed for defects.

h. Trace Function Test. Tracer ammunition is fired single shot from a weapon and each shot is observed for its behavior as far as trace is concerned. Each shot is observed for blind or dim trace and length of trace.

i. Accuracy Test. A number of targets, usually 10 shots for each, are fired at a given range from an accuracy weapon mounted in a fixed rest. The mean radii are determined for the shots in each target and an average of all targets is obtained. This value is a measure of the dispersion or accuracy of firing of a lot of ammunition.

j. Stripping Test. In this test it is determined whether the jackets of bullets strip from the core or slug during flight. This test is only made if stripping occurs in the general firing of the accuracy, velocity, or pressure test.

k. Penetration (Impact) Test. This test is conducted to determine the ability of bullets fired at armor plate to penetrate or perforate (as required in specifications). This is usually done against an armor plate properly mounted and supported. The angle of impact should be 85° to 90° between the longitudinal axis of the bullet and the plate.

l. Caliber .38 Bullet Fit. This test is used to determine whether the bullet in the cartridge case is so held as to prevent its forward motion in the cylinder of a revolver while the other cartridges in the cylinder are being fired.

m. Screen Perforation, Blank Ammunition. This test is used to determine whether the shellacked cup or wad of blank cartridges or unburned propellant grains will penetrate a paper screen placed 15 feet in front of the muzzle of a caliber .30 and 20 feet in front of a 7.62 millimeter weapon.

n. Pattern Test for Shotgun Cartridges. The number of pellets falling within a circle of 30-inch diameter is counted and its percentage of the total number of pellets in the ammunition is determined. For shotgun cartridges, the distance of the target from the muzzle is 40 yards.

o. Bullet Pull. This test is made in a mechanical device which registers the force required to pull the bullet from the cartridge case. The following are the required bullet pulls for the different calibers of ammunition:

(1) Caliber .22 long rifle—not less than 28 pounds.
(2) Caliber .30 and caliber .30 carbine—not less than 45 pounds.
(3) Caliber .45—not less than 40 pounds.
(4) Caliber .50—not less than 200 pounds.
(5) 7.62 millimeter NATO—not less than 60 pounds.

18. Defects Found on Visual Inspection

a. Small-arms cartridges are given a percentage inspection prior to issue. The cartridges in a minimum of three boxes from each lot, depending on the size of the lot, will be inspected for physical defects. Lots having more than 5 percent defective cartridges will be subjected to 100 percent inspection if authorized by higher authority, and visually defective rounds will be culled out. A complete report of such findings will be made through command channels to Chief of Ordnance. Ammunition having less than 5 percent visually defective rounds may be issued without further inspection. The defects in table II may be found in cartridges during inspection.

b. The following defects may be found in belted ammunition for use in machineguns:

(1) The cartridges are not properly alined in the belts.
(2) There is an improper proportion or spacing of incendiary and/or tracer ammunition with ball ammunition.
(3) Web belts may be soiled, wet, or damaged.
(4) Cartridge links in link belts may have broken, cracked, or stretched loops.
(5) Link belts not packed with double loop on top. When loading belts into machineguns, the end of the belt with double link must be inserted first (points of the bullets are toward the front and the double loop of each link is to the right).
(6) A stiff or improperly sewed web belt, or improper packing, may cause dents in the cartridges in the folds of the packed belt, severe enough to interfere with chambering.

19. Defects Found During and After Firing

a. Cartridge Case Defects. Splits and ruptures may be found in the neck, shoulder, body section, head, or extractor groove of the cartridge case.

b. Misfire. Misfired cartridges should be handled with care as subsequent rough handling may cause the cartridge to explode. Misfires fall into the following categories:

(1) The primer shows a normal impression of the firing pin indicating that a blow sufficiently hard to ignite a primer in perfect condition has been delivered. Such a misfire indicates that the

primer is defective. This defect may be caused by —

(*a*) Thick metal in the base of the primer cup.

(*b*) Thick primer pellet which cushions the blow.

(*c*) No primer mixture or insufficient primer mixture.

Table II. Defects Found on Visual Inspection Before Firing

Name of defect	How to recognize	Causes — effects — precautions
Cartridge Short Rounds.	Bullet seated too deep	Not serious unless it is so deep as to affect density of charge and chamber pressure. May not function machine-gun unless short round device is present.
Cartridge Case Corrosion.	Coloring of cases, (green, blue, yellow, or white colors). Also appearance of chemical deposit. Not to be confused with normal discoloration or blackening of case due to annealing.	Metal eaten into and weakened will cause rupture when cartridge is fired. Deposit interferes with chambering. Cartridges showing advanced corrosion should not be fired.
Season Crack	Split in neck of case. Definite longitudinal cracking when exposed to severe weathering conditions or certain reagents. Check by pressing diagonally down on the bullet end.	Due to distortion of the normal crystalline structure of the metal as a result of drawing or tapering operations (not to be confused with split necks occurring after firing).
Dent and Bur	Indentions and burring	Rough handling. Dangerous pressure only if dent is large. Cartridges may fail to chamber.
Bullet Loose Bullet.	Bullet is loose in case. A defect if bullet can be moved by twisting, pushing, or pulling while cartridge is held in hand (exception-caliber .22 long rifle).	May cause short round stoppage or bullet may remain in bore if cartridge is removed from gun without firing. Should not be fired.
Split Bullets (tracer).	Longitudinal cracks in the bullet	Do not use for overhead fire, i.e., infiltration courses, etc.

(*d*) No anvil.

(*e*) No vent.

(*f*) Excess moisture.

(*g*) Various combinations of these defects.

(2) Primer shows light impression of firing pin indicating that the force of the blow struck was not sufficient to ignite the primer. This may be caused by —

(*a*) A mechanical defect in the weapon.

(*b*) A short or broken firing pin.

(*c*) A weak firing-pin spring.

(*d*) The bolt of the weapon is not being completely locked.

(*e*) Grease in the firing pin hole which cushions the blow of firing pin.

(*f*) A very short primer cup inserted in a very deep primer pocket, in which case the primer travels deeper into the pocket with the motion of the firing pin.

(*g*) Primer seated too deep in the primer pocket.

(*h*) Improper angle of the shoulder of the cartridge case allowing the cartridge case to go forward.

(*i*) A defective primer as in (1) above.

(3) Primer shows normal impression of firing pin, but off center. This is caused by a defect in the weapon.

c. Primer Shows Heavy Impression of Firing Pin. This defect may be due to —

(1) Primer too high in primer pocket.

(2) A long firing pin.

(3) Excessively high chamber pressure.

d. Partial Ignition of Propellant. The propellant fails to ignite properly and pressure is developed sufficient only to drive the bullet from the cartridge case but not entirely through the

gun barrel. The excessive pressure developed by the following round due to the obstruction in the bore of the gun may cause the barrel to burst or bulge at the point where the first bullet is lodged. This defect may be caused by —

(1) Insufficient primer mixture in the primer.
(2) Excessive moisture in the primer or propellant.
(3) Excessive coating of propellant grains or other retarding cause in the propellant.
(4) Light blow of firing pin.

e. Hangfire. Delayed ignition of the propellant in the cartridge may be caused by a small or decomposed primer pellet, damp propellant, or a light blow of the firing pin caused by dirt or a defect in the weapon. A hangfire is a serious defect if the delay is long enough to permit the bolt to be opened before the propellant burns completely. Such delay is rarely found in practice. Should a hangfire of several seconds occur, and the bolt be opened before the propellant ignites, injury to the firer or damage to the weapon, or both, may result. For precautions to be observed in case of hangfire, see paragraph 12*b*.

f. Pierced Primer (Perforation of the Primer Cup by the Firing Pin). This may be caused by an imperfect pin or very thin, hard, or defective metal in the base of the primer cup. There are various degrees of this perforation. A very small perforation will show, by means of a discoloration around the indent made by the firing pin. Hot gases escaping through such perforated primers will cause erosion and roughening of the firing pin and thereby result in subsequent perforations of subsequent primers.

g. Primer Leak. Gas generated by the explosion of the propellant escapes between the walls of the primer cup and the primer pocket, causing discoloration around the primer and the head of the cartridge case. The discoloration may be slight, indicating a small primer leak, or heavy, indicating a large primer leak. The primer leak may be the result of the primer being too small, the primer hole being too large, defective or hard metal, or excessive pressure generated by the propellant.

h. Loose Primer. There are various degrees of this defect, the most serious being the falling out of the primer when the bolt is retracted after firing. In addition, there may be the failure of the primer cup to obturate gases from the explosion of the cartridge. This may be caused by a primer of too small a diameter, too large a primer pocket, or metal of the primer cup being too hard. This defect should not be confused with a "blown primer." This defect is normally prevented by crimping primers into their primer seats at time of manufacture.

i. Blown Primer. On firing the cartridge, the primer is blown completely from the pocket of the cartridge case and both the cartridge case head and primer pocket are enlarged and distorted. This is a serious defect, seldom encountered. It is caused by excessive pressure, too quick burning of the propellant, or a case with a soft head.

j. Primer Setback. Pressure developed by the explosion of the propellant forces the primer back against the face of the bolt. On examination it will be seen that the primer protrudes above the head of the cartridge case. The setback of the primer may be slight or heavy and is due to a defective cartridge, excessive pressure, or improper headspace.

k. Leak in Back of Case. The gas escapes into the action of the weapon. The discoloration due to this escape is along the body of the cartridge case. It is caused by draw scratch, season crack, scale, corrosion, soft or otherwise defective metal.

l. Failure of Case to Extract. This may be due to a defective extractor, a defective cartridge, or dust in the chamber.

m. Blowback. An escape of gas under pressure to the rear is commonly referred to as blowback. Pierced primer, primer leak, blown primer, and ruptured or split cartridge cases may result in blowback.

n. Split Neck. The neck of the cartridge case splits in firing and is accompanied by an escape of gas. This should not be confused with a split neck due to a season cracking which can be observed before firing.

o. Split Body. A more or less regular longitudinal split in the body of the case allows gas to escape, thereby reducing the velocity of the bullet. This defect is generally found in cartridge cases which have a deep draw scratch

or in those which are made from defective brass or steel.

p. Stretch. A continuous ring around the body of a fired cartridge case shows that the metal was stretched to such an extent when the cartridge was fired that slightly more stretching would probably result in a partial or complete rupture. This is generally due to improper timing, failure of bolt to lock, or improper headspace.

q. Complete Rupture. This is circumferential separation of the metal completely around the body of the fired cartridge case causing it to separate into two parts. If such a rupture occurs, upon extraction, the forward portion of the fired cartridge case remains in the chamber of the weapon. This is a serious defect, and will cause the next round of ammunition to jam. It is usually due to bad bolt locking, improper timing, excessive headspace, a defective cartridge case, or a combination of these.

r. Partial Rupture. This is a partial circumferential separation around the body of the fired cartridge case. Like a complete rupture this is a serious defect. This defect is also usually due to improper timing, bad bolt locking, excessive headspace, or a defective cartridge case.

s. Stripped Jacket. The jacket of the bullet separates from the slug or core of the bullet on leaving the muzzle. This is caused by the gas, under high pressure, entering between the jacket and core due to some inherent defect in the jacket.

t. Fluting Near Shoulder. A characteristic fluting may be found near the shoulder indicating excessive pressure resulting from grease or oil in the chamber or on the case.

u. Deformed Cartridge Case. This may take the form of stretching of the body, shortening of the neck, or an annular bulge toward the base of the cartridge case. This is generally due to excessive headspace, defective chamber, or improper timing. An annular bulge immediately forward from the thick head section may be due to excessive pressure and is generally accompanied by flattening of the primer cup.

CHAPTER 2

CARTRIDGE COMPONENTS AND ACCESSORIES

Section I. COMPONENTS

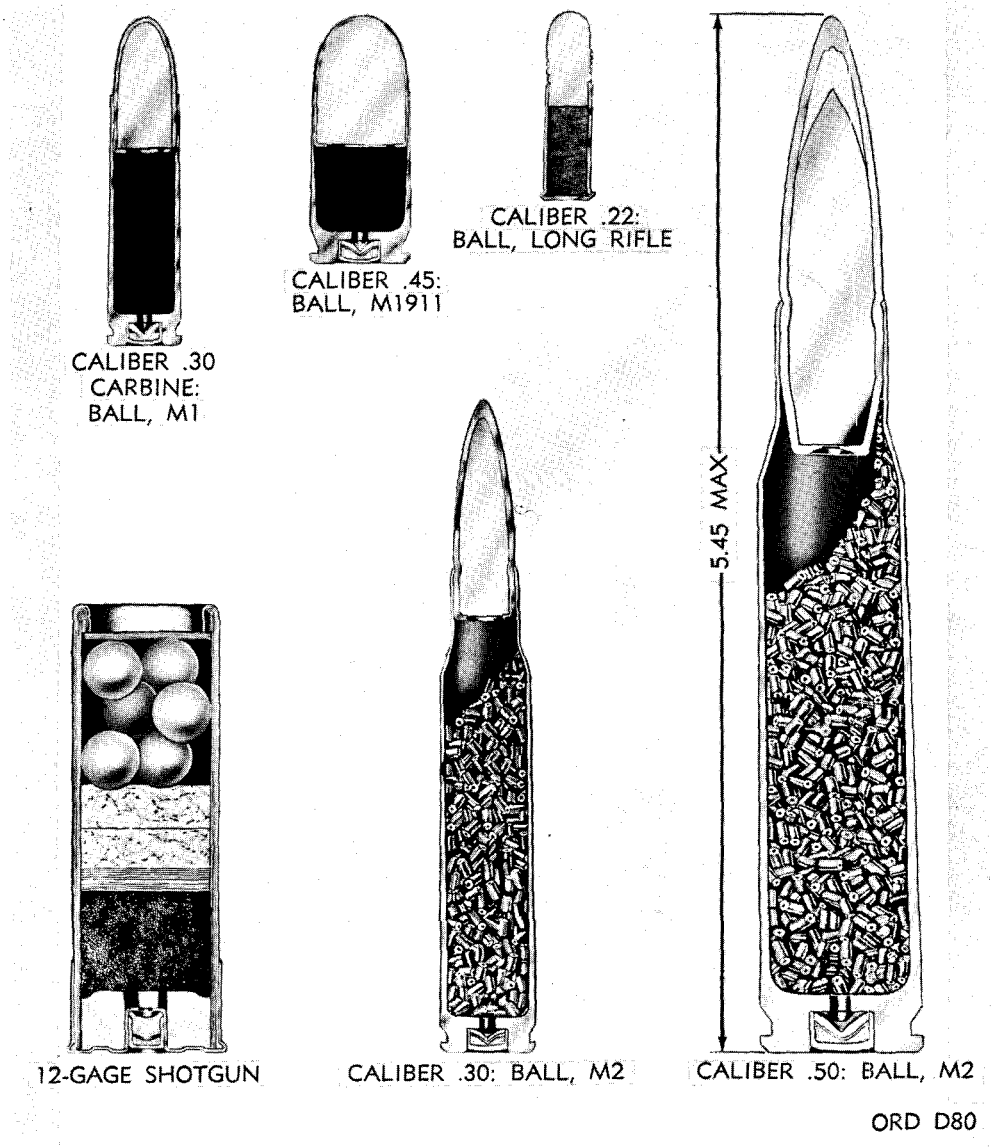


Figure 12. Types of cartridges—sectioned.

20. General

a. In most types of small-arms ammunition, a cartridge consists of a cartridge case, primer, propellant, and bullet. A shotgun cartridge differs in that it contains shot, pellets, or a single slug. Construction of a typical cartridge and its components is illustrated in figure 1. Types of cartridges are shown externally in figures 3, 4, 5, and 6 and sectioned in figure 12.

b. Cartridge components are described in this section. Details of construction and assembly for specific cartridges are described and illustrated in chapters 3 and 4.

21. Cartridge Case

a. Classification. Small-arms cartridge cases are either of the centerfire or rimfire type (fig. 2). Centerfire cases are rimmed, semirimmed, or rimless (fig. 2) and have either solid or folded heads (fig. 13). Semirimmed and rimless cases always have solid heads, whereas rimmed cases used for low pressure loading may have either solid or folded heads.

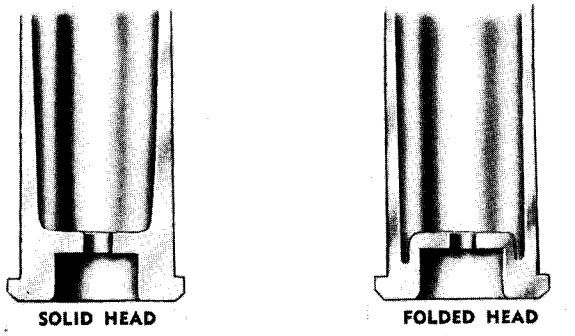


Figure 13. Types of cartridge case heads.

From the standpoint of shape, cases are known as straight, straight taper, or bottleneck.

b. Functions. The cartridge case has three functions. It is the means whereby the other components; primer, propellant, and bullet are assembled into a unit. It provides a waterproof container for the propellant and primer. Another of its functions is to expand and seal the chamber against the escape of gases to the rear when the cartridge is fired. This process of sealing by expansion is termed obturation. An extractor groove or rim, turned in the head of the cartridge case, provides a means of removing the case from the chamber of the weapon. Shotgun cartridges and other cartridges are manufactured with a rim at the cartridge case head to facilitate extraction of the fired case from the weapon.

c. Assembly. The primer is pressed into the primer pocket of the cartridge case and staked or crimped, and the joint is sealed by a thin film of lacquer or varnish. The cartridge case is then loaded with a charge of propellant powder and the inside of the neck coated with lacquer or other waterproofing compound. The bullet is then inserted, and the mouth of the case crimped into the cannelure of the bullet. For caliber .30 carbine and caliber .45 cartridges, the mouth of the case is not crimped to the bullet but is held in place by its tight fit in the case. In some revolver cartridges a cannelure in the case prevents the bullet from being seated too deeply.

d. Propellant Space. Propellant space is the total inside volume of the case with the bullet seated. Propellant space is important in the design of the cartridge because it determines the maximum quantity of propellant that may be used. The pressure of the expanding gases resulting from the burning of the propellant is dependent upon this volume. The manner in which the propellant burns is influenced by any empty space left in the case after the charge is loaded. Shotgun cartridges differ as to propellant space, depending upon specific kind or formula of propellants used. The wad and construction of the base of these cartridges are regulated in manufacture so that there may be space left in the case.

e. Headspace.

(1) The term "headspace" is defined as the linear distance from the face of the fully closed bolt of a weapon to one of several different reference points, depending upon the gun chamber design.

(2) For rimless, bottleneck cartridges, such as caliber .30, caliber .50, and 7.62 millimeter, headspace is the distance from the shoulder of the chamber against which the shoulder of the cartridge case rests to the face of the closed bolt.

(3) For other rimless cartridges, such as caliber .30 carbine and caliber .45, headspace is the distance from the

shoulder of the chamber against which the neck of the case rests to the face of the closed bolt. It is thus very nearly equal to the length of the cartridge case.

(4) For rimfire, rimmed, and semirimmed centerfire cartridges, such as caliber .22, caliber .38, and shotgun cartridges, the extractor rim of the case stops the forward motion of the cartridge. Therefore, headspace is equal to the distance from the rear face of the chamber to the face of the closed bolt. This is very nearly equal to the thickness of the extractor rim.

f. Shotgun Cartridge Cases. The shotgun cartridge case consists of a brass or steel head and a paper case or shell body, or the case may be made entirely of brass or aluminum. The head is reinforced by a base of compressed paper in which the primer pocket is formed (fig. 12). Some paper body cartridges have a steel reinforcement called the lining, under the metal head. The paper body cartridge is waterproofed. The head is attached to the cartridge body by crimping.

22. Primer

The primer assembly of centerfire cartridges consists of a brass or gilding-metal cup that contains a primer composition pellet of sensitive explosive, a paper disk (foil), and a brass anvil. A blow from the firing pin of a small-arms weapon on the center of the primer cup compresses the primer composition violently between the cup and the anvil, thus causing the composition to explode. The holes or vents in the anvil allow the flame to pass through the primer vent in the cartridge case, thereby igniting the propellant. The primer composition in the cup is held in place and protected from moisture and electrolytic action by a paper disk. The brass anvil is inserted last. Primers of the noncorrosive type are now being used in the manufacture of small-arms ammunition. Table III lists initial lots of small-arms ammunition assembled with noncorrosive (lead styphnate type) primers. In order that primers may function properly, they must be free from such surface defects as folds, wrinkles, scratches, scales, or dents. Other primer defects in cartridges are cocked, broken, or inverted anvils; scratched, torn, or dirty cups; and missing anvils, disks, or pellets. Rimfire ammunition, such as the caliber .22 cartridge, does not contain a primer assembly; the primer composition is spun into the rim of the cartridge case and the propellant is in intimate contact with the composition. In firing, the firing pin strikes the rim of the case and thus compresses the primer composition and initiates its explosion. Figure 14 shows primer components separated and figure 15 shows details of several primers.

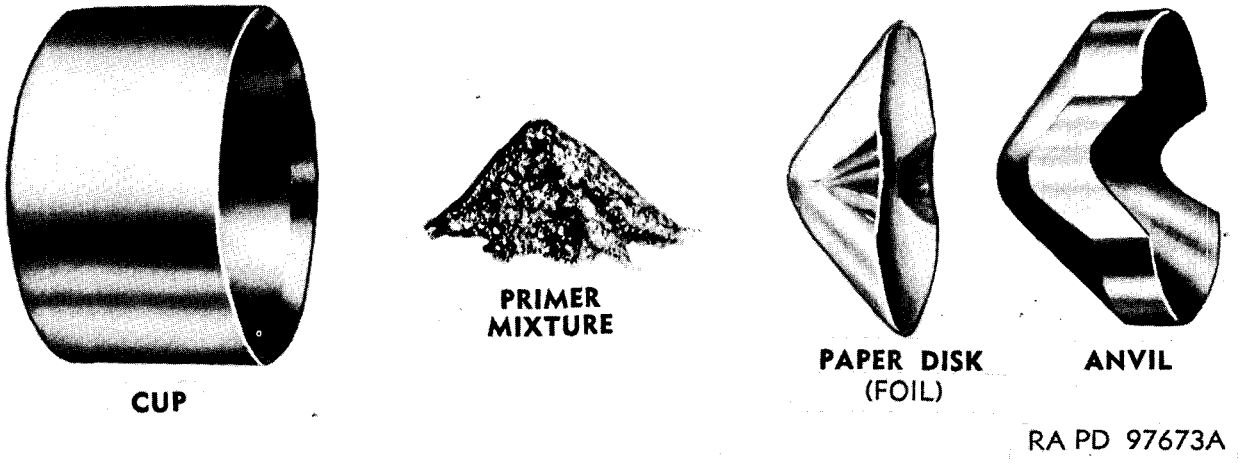


Figure 14. Components of primers—separated.

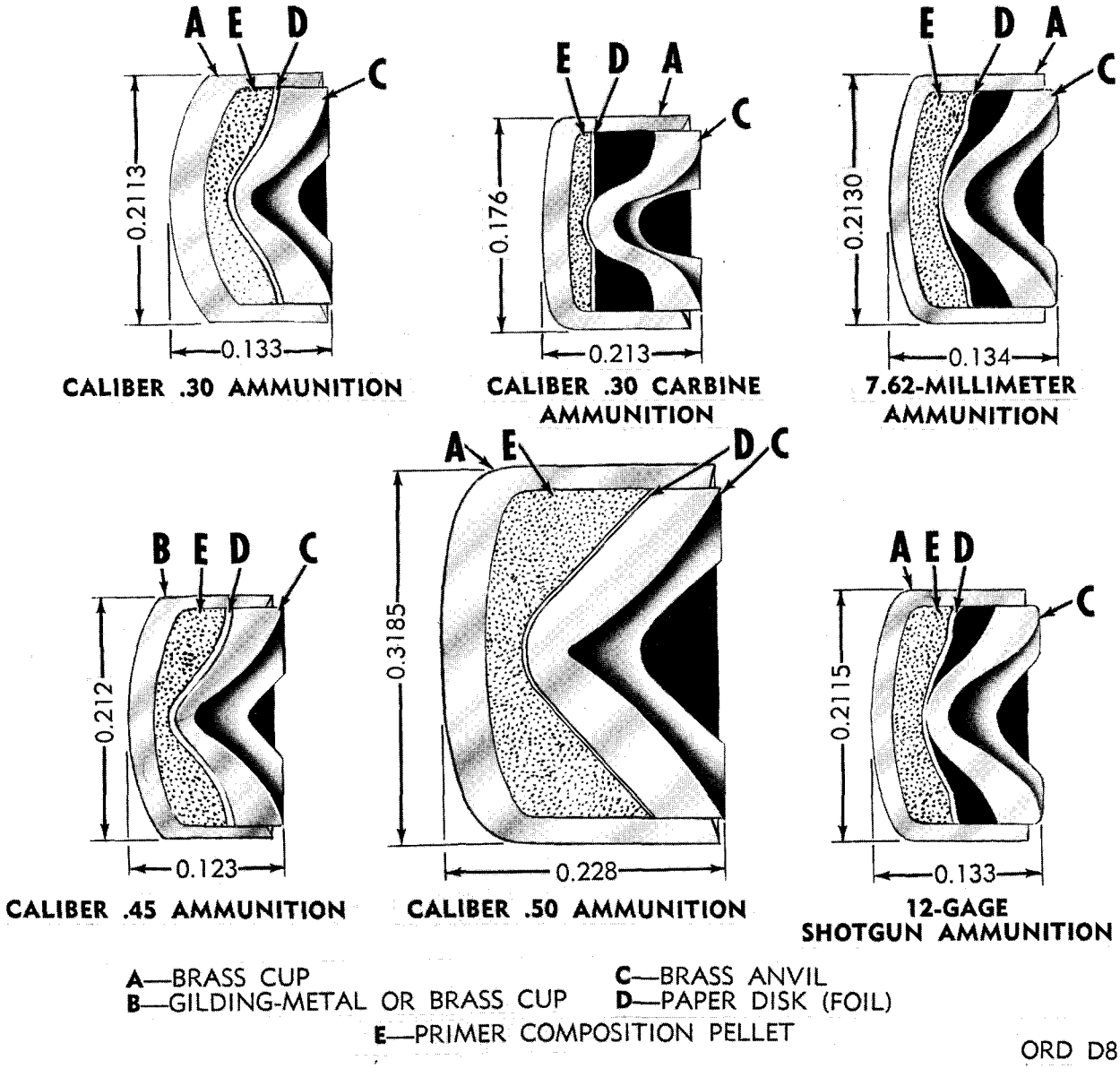


Figure 15. Primers—sectioned.

23. Propellant

a. General. There are two types of small-arms propellants (table IV) generally used, the single-base (nitrocellulose) type and the double-base (nitrocellulose and nitroglycerin) type. The weight of the propellant charge and granulation of the propellant of a particular composition are in accordance with specification requirements. The weight of the propellant charge is not constant: this weight is adjusted for each propellant lot to give the required muzzle velocity with the associated chamber pressure within the limits prescribed for the weapon in which it is fired. This charge is assembled loosely in the cartridge case. Small-arms propellants are manufactured in the form of small flakes, pellets, sheets, spherical (ball) grains, or perforated tubular grains. Acceptance requirements for small-arms propellants are outlined in Military Specifications MIL-P-3984. Since the propellant grains of these charges are small, they are subject to more rapid deterioration than larger grains under abnormal temperature conditions. Small-arms

propellants is not as sensitive to friction as black powder, but precautions used in handling black powder should be observed for this propellant.

b. Single-Base Propellant. Single-base propellant is composed mainly of nitrocellulose with a small quantity of tin and/or potassium sulfate added to act as an antiflashing agent. This composition is coated with dinitrotoluene which acts as a moisture-proofing agent, causes the first phase of the burning process to take place at a relatively slower rate, and has some antiflashing action. The coated propellant is glazed with graphite to facilitate the uniform action of automatic loading machines and to avoid the development of large static charges in blending and loading. Single-base propellant is of a high order of extreme temperature stability and is particularly resistant to the effects of atmospheric moisture. This propellant is granulated as single perforated grains.

c. Double-Base Propellant. Double-base propellant has two major ingredients, nitrocellulose and nitroglycerin. These basic ingredients are usually coated with dinitrotoluene, dibutylphthalte, or centralite and glazed with graphite in the same manner and for the same purposes as in single-base propellant. This propellant is granulated as either spherical or single perforated grains. Double-base propellants of early manufacture have approximately 40 percent nitroglycerin content. This nitroglycerin content has been reduced to 10 to 20 percent to make the propellant more stable, cause less erosion of rifle barrels, and have less tendency to flash.

d. Ball-Grain Propellant. Double-base propellants are manufactured in the form of spherical pellets or balls approximately 0.02 or 0.03 inch in diameter. These ball-grains are rapidly replacing other forms of grains in loading small-arms ammunition because of the rapidity and economy of manufacture and the flexibility of the process. Ball-grains are produced by dissolving wet nitrocellulose in a solvent, such as ethyl acetate, and adding diphenylamine and chalk. For double-base propellants, nitroglycerin would be added to the above composition. By adding a protective colloid and agitating the composition, the solution is dispersed in the form of small globules. When the solvent is removed by heating, the propellant solidifies in the form of spherical pellets or balls. These balls of propellant are coated with dinitrotoluene, centralite, or diphenylphthalate to slow the initial phase of the burning process and to act as a moisture proofing agent. The propellant is then dried and coated with a glaze of graphite.

e. Black Powder. Black powder is not used as a basic charge for small-arms ammunition. Its only use in small-arms ammunition at the present time is as an ingredient in manufacturing Lesmok powder for use as a propellant in caliber .22 cartridges, blank cartridges, and to facilitate ignition in grenade cartridges.

f. Characteristics. Smokeless powder for small-arms ammunition is usally glazed with graphite to facilitate machine loading, and thus presents a black polished appearance. Single-perforated grains are usually used as military small-arms propellants. For caliber .30 rifle ammunition, the diameter is approximately 0.032 inch. Since the propellant grains are small, they ignite more rapidly and burn more quickly than cannon propellant. When moisture is present or abnormal temperatures prevail, small-arms propellants are subject to more rapid deterioration than larger grains. Smokeless powder is not as sensitive to friction as black powder, but all precautions used in handling black powder should be observed for small grain propellants. A more complete description of smokeless powders in general will be found in TM 9-1900/TO 11A-1-20, Ammunition General and TM 9-1910/TO 11A-1-34, Military Explosives.

24. Bullet

a. General. Two types of bullets are described in this manual, the lead bullet and the metal jacketed bullet. Lead bullets were originally manufactured in the shape of a ball, but with the advent of rifling in weapons, this ball was replaced by a cylindrically shaped lead bullet which would engage the rifling. Lead balls or shot are still used in shotgun cartridges. Lead cylindrical bullets of modern design are used in caliber .22 ammunition and in many revolver cartridges. Modern military cartridges and pistol cartridges have bullets which consist of metal jackets surrounding the lead alloy or steel core.

Table III. Styphnate Primed Small-Arms Ammunition Initial Production Lots

Manufacturer symbol and lot data		.30 caliber					.45 caliber		.50 caliber							
		Ball M2	AP M2	API M14A1	Tracer M25	Blank M1909	Ball M1911	Tracer M26	Ball M2	Ball M33	API M8	APIT M20	INC M23	AP M2	Tracer M17	Blank
FA	Lot number	4149[1]	887	62	44	985	1542	41		S-2	117	112			11	
	Acceptance date	10-51	10-51	11-53	10-51	7-54	7-54	3-53		12-51	7-55	7-51			4-51	
RA	Lot number	33853			5000		5544		5962	5000[2]					5000	
	Acceptance date	11-51			4-51		9-52		10-49	6-51					3-52	
WCC	Lot number	6428			6000		6375									
	Acceptance date	6-51			2-51		11-52									
SL	Lot number	9420	9467		7025					7000	8070	7015			7000	
	Acceptance date	5-52	7-52		9-52					9-52	4-53	5-53			1-53	
LC	Lot number	13700	13158	12000	12004	12000				12000	12683	12090			12103	
	Acceptance date	6-51	4-52	5-52	5-52	4-52				5-51	2-52	12-52			10-51	
TW	Lot number	19362	19776	18000	18013	18712	18000	18000		18000	19391	18088	18070		18017	18040
	Acceptance date	12-50	2-52	12-52	12-51	9-51	8-53	10-53		10-51	10-51	1-52	9-54		9-51	4-53
WRA	Lot number	23201	22007	22000		22000	22198[3]			22000					22409	
	Acceptance date	8-51	6-54	2-53		9-53	11-51			11-51					11-50	
VC	Lot number	42000														
	Acceptance date	4-45														
DAQ	Lot number	44000														
	Acceptance date	8-45														
FCC	Lot number							1801								
	Acceptance date							11-53								

[1] Odd lots assembled with P-4 or styphnate primers since 1947.
[2] Lots 5967-5999 starting in 7-50 contain styphnate.
[3] Steel cased lots S-22000-22007 also w/styphnate.
Note. All caliber .30 carbine lots contain azide or styphnate primers.
Note. All 7.62 millimeters and caliber .50 spotter-tracer cartridges contain styphnate or noncorrosive primers.

Table IV. Small-Arms Propellants

Caliber and type	Propellants	Type	Average charge (grains)
Caliber .22 long rifle, M24	Lesmok A	Single-base	1.7
	(Western) ball	Double-base	12.6
Hornet, M65 short (high-velocity).	———	Single-base	1.5
Cal. .30 ball	I.M.R. 4676	Single-base	53.0
AP	(Western) ball	Double-base	
tracer.			
Cal. .30 ctg, frangible M22(T44).	S.R. 4759	Single-base	11.3
Cal. .30 ball	I.M.R. 4395	Single-base	
AP	(Western) ball	Double-base	50.2
tracer			
incendiary.			
Cal. .30 AP, M2.	I.M.R. 5065	Single-base	52.0
	(Western) ball	Double-base	
Cal. .30 ball	I.M.R. 6971	Single-base	52.5
AP	(Western) ball	Double-base	
tracer			
incendiary.			
Cal. .30 ball	WC 852	Double-base, ball.	51.0
Cal. .30 tracer AP.	WC 850	Double-base, ball.	53.0
Cal. .30 ball tracer.	WC 855	Double-base, ball.	52.0
Cal. .30 ball tracer AP.	WC 852	Double-base, ball.	52.0
Cal. .30 blank M1909.	WC blank type II	Double-base, ball.	12.0
Cal. .30 carbine ball tracer.	Herc. 3950 SB type I	Double-base, flake.	13.0
Cal. .30 carbine grenade ctg, m6.	I.M.R. 4809	Single-base	20.0
Cal. .30 carbine ball.	WC 820 type II	Double-base, ball.	14.0
7.62-mm, NATO	SR 4759	Single-base	18.5
7.62-mm, NATO	WC 846	Double-base, ball.	49.0
7.62-mm, NATO	WC 848	Double-base, ball.	49.0
Cal. .32 S&W	Bullseye	Double-base	1.4
Cal. .32 Colt auto	Bullseye	Double-base	2.3
	Pistol No. 5	Single-base	2.6
	Pistol No. 6	Single-base	2.2
9-mm (parabellum)	SR 4898	Single-base	
Cal. .38 auto. (9-mm short).	Bullseye	Double-base	2.5

Table IV. Small-Arms Propellants—Continued

Caliber and type	Propellants	Type	Average charge (grains)
Cal. .38 super auto. Colt.	Bullseye	Double-base	4.0
	Pistol No. 5	Single-base	5.0
Cal. .38 short Colt	Bullseye	Double-base	2.5
	Pistol No. 5	Single-base	3.5
Cal. .38 S & W	Pistol No. 5	Single-base	3.8
Cal. .38 special	Bullseye	Double-base	3.6
	Pistol No. 5	Single-base	5.0
	Pistol No. 6	Single-base	4.0
Cal. .45 ball, tracer.	P4768	Single-base	6.0
Cal. .45 ball, tracer.	WC 460	Double-base	5.0
Cal. .50, ball, AP	I.M.R. 4814	Single-base	235.0
Cal. .50 incendiary, tracer.	I.M.R. 4903	Single-base	230.0
Cal. .50 ball, M2 AP, M2 API, M8 tracer, M10 incendiary M23.	I.M.R. 5010	Single-base	236.0
Cal. .50 incendiary M23.	I.M.R. 6231	Single-base	240.0
	I.M.R. 5010	Single-base	236.0
	I.M.R. 6231	Double-base	235.0
	I.M.R. 4831	Single-base	237.0
Cal. .50 tracer, M48.	I.M.R. 4831	Single-base	237.0
Cal. .50 blank	WC 150	Double-base, ball.	4.6
Cal. .50 ball, M2 AP, M2 tracer, M10.	WC 860	Double-base, ball.	242
Cal. .50 spotter-tracer, M48A1.	EX-7383 I.M.R. 4831.	Single-base	114

Note. Several propellants may have been used in the manufacture of these rounds, however, the ones listed above are representative of the types used.

b. Lead Alloy Bullets. The lead used in this type bullet is combined with tin, antimony, or both, for hardness. This alloying reduces "leading" of the barrel of the weapon, that is, the tendency of the lead to adhere to the barrel in patches. It also helps to prevent the bullet from "stripping," that is, jumping the rifling of the weapon. Lead bullets are generally lubricated with a grease or lubricating compound which further prevents leading of the barrel. Two or more cannelures, or grooves, around the bullet contain the lubricant. Outside lubricated bullets, like the caliber .22 and caliber .38 short Colt, have cannelures and lubricant on the outside when the bullet is assembled in its cartridge case. The cannelures and lubricant of inside lubricated bullets are beneath the neck of the cartridge case and, hence, are not visible in the assembled cartridge.

c. Jacketed Bullets. Jacketed bullets have a lead or steel core covered by an outside jacket of gilding metal or gilding-metal-clad steel and are used to obtain high velocities since lead bullets are not suited for this purpose. Metal-

jacketed bullets are used in automatic pistols since lead bullets may be damaged by the loading mechanism. A cannelure may be cut or rolled in the jacket to provide a recess into which the mouth of the case may be crimped at assembly. The cannelure also serves to hold the jacket and core together more firmly. An extra cannelure may be added to identify the bullets prior to assembly.

d. Caliber. The caliber of a weapon is the diameter of the bore of the weapon measured from the surface of one land to the surface of the land directly opposite. Caliber is usually expressed in inches or in millimeters. When expressed as a decimal without an indication of the unit, the unit inches is understood. For example, a caliber .30 cartridge has a bullet which is about 0.3085 inch in diameter. The lands of the rifling of a weapon are the raised spiral portions of the rifling formed by cutting spiral grooves, generally 0.003 or 0.004 inch deep, into the surface of the bore. The diameter of a lead alloy bullet is generally 0.003 inch greater than the bore diameter between grooves. The diameter of a jacketed bullet generally should not be more than 0.001 inch greater than the diameter between grooves. Bullet diameters for cartridges described in this manual are listed in table V.

Table V. Bullet Diameters

Caliber and type	Nominal diameter (in inches)
Cal. .22	0.225
Cal. .30 carbine	.3075
Cal. .30	.3085
Cal. .32 auto. Colt (7.65-mm)	.314
Cal. .32 S & W	.314
9-mm (Parabellum)	.3555
Cal. .380 auto. (9-mm short)	.356
Cal. .38 auto. Colt	.359
Cal. .38 short Colt	.375
Cal. .38 S & W	.359
Cal. .38 special	.359
Cal. .45	.4505
Cal. .50	.5110
7.62-mm	.3085

e. Shape. The body of the bullet is cylindrical. The nose may be round, as in the carbine, pistol, and revolver bullets, or ogival (curved taper) as in service rifle and machinegun bullets. The length of ogive or taper for caliber .30 and caliber .50 bullets is approximately 2½ times the bullet diameter. The base may be square (cylindrical) or boattailed (having a conical taper). A special type of bullet is the wad cutter, or mid-range, which has a cylindrical body and a square nose with a sharp edge in order that it may cut the target cleanly.

f. Types.

(1) *Ball.* Ball bullets are of the lead alloy or the metal-jacketed type described in *b* and *c* above respectively. The metal-jacketed ball bullets have cores or slugs of various compositions, depending on the intended use. Most metal-jacketed ball bullets have a lead-antimony slug. The caliber .50 ball bullet is a metal-jacketed bullet containing a soft steel core with a lead-antimony point filler to assure similar ballistic properties for ball and armor-piercing cartridges when used in functional packs. The 7.62 millimeter ball bullet of the cartridge, M59, is a gilding-metal jacketed bullet containing a core of plain carbon steel with a lead-antimony point and base filler.

(2) *Armor-piercing.* Armor-piercing bullets are jacketed and have a core of hardened steel which may be made of tungsten-chromium or manganese-molybdenum steel. The 7.62-mm AP bullet has both a point and base filler of lead-antimony. The caliber .30 armor-piercing bullet has a point filler of lead and a gilding-metal base filler between the core and the jacket, whereas the caliber .50 armor-piercing bullet has only a lead-antimony point filler. These bullets have smooth cannelures cut into the jacket for crimping of the cartridge case.

(3) *Armor-piercing-incendiary.* These bullets have a hardened steel core and a point filler of incendiary mixture instead of lead.

(4) *Armor-piercing-incendiary-tracer.* These bullets are similar to the armor-piercing-incendiary bullets but in addition, have a tracer composition in the base end.

(5) *Incendiary.* These bullets contain a core of incendiary mixture with a lead-antimony slug at the base end. A hollow steel cylindrical body or a clad steel container may be inserted within the jacket and in front of the base slug. The presence of two knurled cannelures is a characteristic of caliber .50 incendiary bullets.

(6) *Tracer.* These bullets contain a lead-antimony slug in the forward position and a tracer composition in the rear. They have either square or boattailed bases. The bullet jackets are made of gilding-metal or gilding-metal-clad steel. An igniter composition is also present, which is ignited by the burning propellant gases which, in turn, ignites the tracer composition. Some tracer bullets are visible the instant of firing while others have a dim trace for a short distance from the muzzle of the gun and then a bright trace thereafter. Spotter-tracer bullets contain a tracer element, and an incendiary charge which give off a puff of smoke and a flash on impact with the target.

25. Shot

a. General. Shotgun cartridges contain a charge of small pellets or shot instead of a single bullet with the exception of the 10-gage blank cartridge.

b. Gage. Shotgun cartridges are identified as to size by gage. The gage of a shotgun refers to the number of lead balls or shot of the diameter of the bore required to weigh 1 pound. The .410-gage shotgun is an exception in that the diameter of the bore is 0.410 inch. The bore of a 12-gage shotgun measures 0.729 inch in diameter, thus 12 balls or pellets of 0.729 inch would weigh one pound. See table VI for gage used in shotgun cartridges.

Table VI. Shotgun Gages

Gage	Diameter of bore (in.)
10	0.775
12	.729
.410	.410

CHILLED AND DROP SHOT

ACTUAL SIZE	SIZE NO.*	CHILLED SHOT NO./OZ.	DROP SHOT NO./OZ.	DIAMETER (IN.)*
	7-1/2	345	338	.09-1/2
	6	223	218	.11

*DISREGARDING DECIMAL POINTS, SIZE NO. PLUS DIAMETER IN INCHES EQUALS 17. THUS, FOR NO. 6 SHOT, 6+11=17.

BUCK SHOT

ACTUAL SIZE	EASTERN SIZE NO.	APPROX NO./LB	DIAMETER (IN.)
	00	122	.34

Figure 16. Comparison of shot.

c. Types of Shot. Shot is classed as soft or drop shot if it is made of lead and as chilled shot if it is made of the harder lead-antimony alloy.

d. Sizes of Shot. The sizes and weights of various chilled, drop, and buck shot are given in figure 16 together with illustrations of the actual size of the shot.

Section II. PENETRATION

26. Penetration Data

Penetration of light armor depends upon the hardness of the bullet material or slug and core, the shape of the bullet, the ballistic stability of the bullet, the striking energy, the type of armor plate, and the angle of impact. Penetration is adversely affected by yaw or wobble in flight. Greatest penetration occurs at normal, that is, head-on impact. Up to angles of 20° from normal, the degree of penetration is affected very little; over 45° from normal, ricochets and slight penetration may be expected. For armor-penetration data, see chapter 3 of this manual and TM 9-1907.

27. Danger Zones and Protection of Personnel

AR 385-63 prescribes the regulations for firing ammunition in time of peace. It specifies the minimum thickness of various kinds of cover required for positive (maximum) protection against bullets fired from small-arms weapons (table VII).

Section III. ACCESSORIES

28. General

Accessories used with small-arms ammunition such as clips and metallic belt links are described below. These items are listed and packed as indicated in SM 9-5-1305.

29. Clips

a. General. Caliber .30 cartridges for use in the service rifle M1903 are assembled in 5-round clips; those for the rifle M1 are assembled in 8-round clips. Ammunition for 7.62-mm lightweight rifle, M14, is assembled in 5-round clips.

b. Clip, Cartridge, Caliber .30, 5-Round. The 5-round clip (fig. 17) consists of a body and a spring. Stop lugs on the exterior side of the body seat the clip in its slots in the receiver of the rifle. The top edges of the sides are folded inward, forming flanges which fit into the grooves in the cartridge case heads, thereby holding the cartridge in place. The spring is provided with narrow tongues which, when the clip is filled, are pressed into the grooves of the end cartridges, holding them securely in the clip. This clip is 2.37 inches long and 0.63 inch wide.

c. Clips for Dummy Cartridges. Caliber .30 dummy cartridges were formerly assembled in a special 5-round clip. Present practice is to use the standard 5-round clip without tongues, marked for use with dummy cartridges.

Table VII. Minimum Cover Thickness for Positive Protection

Nature of cover	Thickness (in.)	
	Caliber .30	Caliber .50
Concrete (5,000 psi)	7	12
Broken stone	20	30
Dry sand	24	32
Wet sand	36	48
Logs wired together (oak)	40	60
Earth, packed or tamped	48	60
Undisturbed compact earth	52	66
Earth, freshly turned	56	72
Plastic clay	65	100

d. Clip, Cartridge, Caliber .30, 8-Round for U.S. Rifle, Caliber .30, M1. This clip (fig. 17) consists only of a case made of steel. It is indented near the base along the sides to form an inner rib which engages the extractor groove in the cartridges. The sides are inclined sufficiently to clamp the cartridges firmly in place. The cartridges are held in two staggered rows. Experience has proven that it is preferable to have the uppermost cartridge in the right side of the clip although the follower slide of the gun

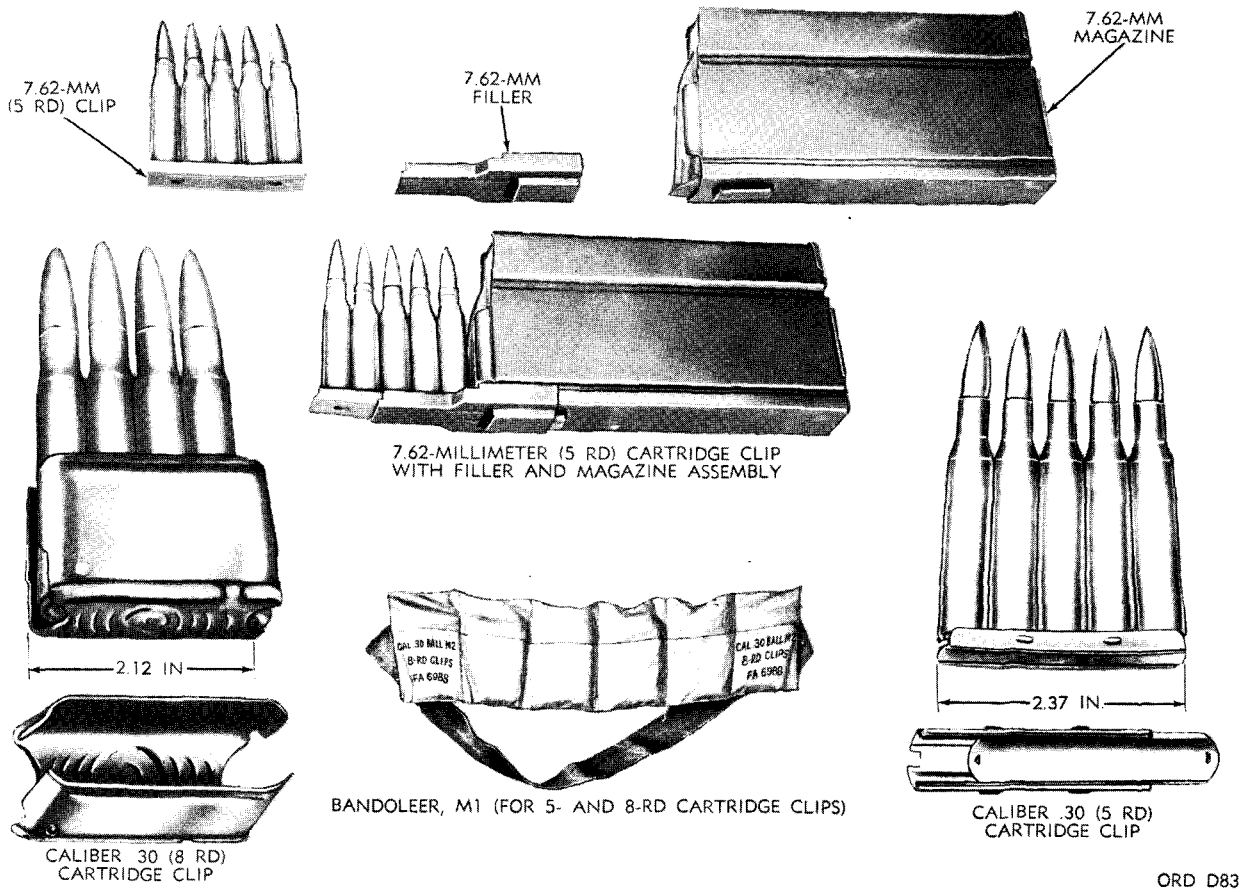


Figure 17. Bandoleer, magazine, filler, and clips.

adjusts itself for loading on either left or right side. The sides are curved at the ends to hold the cartridges securely in the clip. The 8-round clip is 2.12 inches long and 1.06 inches wide.

e. Clip, Cartridge, 7.62-Millimeter, 5-Round. This clip (fig. 17) consists of a channel shaped body containing a spring, and holds five cartridges. The purpose of this clip is to facilitate the loading of magazines (fig. 17) for the 7.62-millimeter rifle, M14. Loaded clips are fitted into the top of the rifle receiver and the cartridges are pressed by thumb pressure into the magazine assembly. Separate magazines may also be loaded with clipped ammunition by means of a magazine filler (fig. 17) which merely adapts the clip to the magazine. This clip is 2.36 inches long.

30. Cartridge Belts

a. Metallic Link Belt. Ammunition for use in machineguns is issued in metallic link or web belts (*b* below). The link belts are made up of unit cartridge links (figs. 18 and 19) and cartridges, one link for each cartridge. Each link has 2 loops fitting about 1 cartridge and a third loop fitting around 1 adjacent cartridge. Thus, each cartridge in a metalic link belt excepting the end cartridges, has two links attached to it (fig. 20). Cartridge links are made of steel which has been processed to prevent rusting. They are manufactured and tested to assure satisfactory ammunition feed and functioning under all service conditions.

(1) *Closed loop links.* Caliber .30, M1 and caliber .50, M2 and M9 cartridge links are manufactured with closed loops (fig. 18). When assembled with the cartridges in belts, these links seat on the shoulder of the cartridge (fig. 20) to hold them in proper alinement for feeding into the weapon. This design requires the cartridge to be extracted from the rear and dropped into position for moving into the chamber for

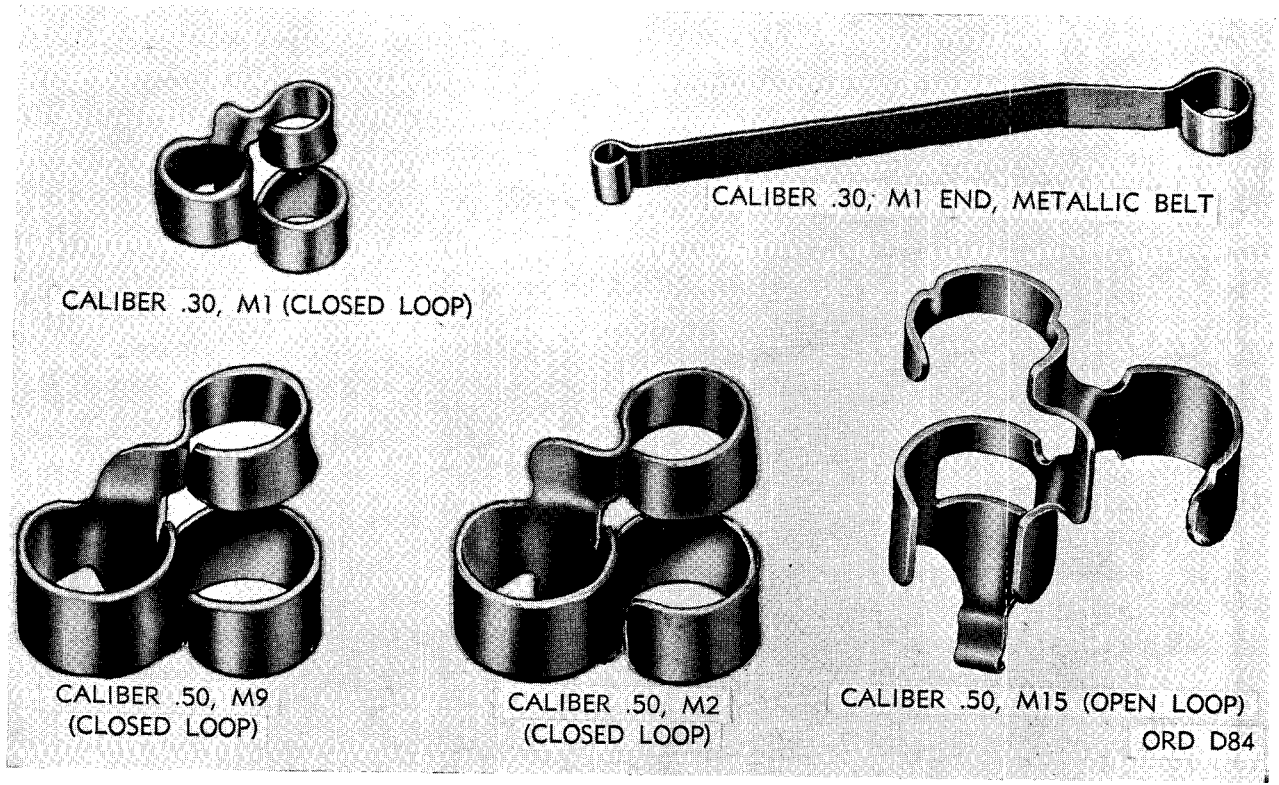


Figure 18. Cartridge links and metallic belt end.

firing. Weapons designed for this type link require additional space in the rear of the receiver for retraction.

(2) *Open loop links.* The 7.62-millimeter, M13 (fig. 19) and the caliber .50, M15 (fig. 18) links are manufactured with partially open loops and have a positioning finger on one side which snaps into the extractor groove of the cartridge. This design permits the bolt of the weapon to push the cartridge forward and out of the link into the chamber for firing. Weapons using this type link are manufactured with a shorter receiver.

(3) *Metallic belt ends.* A metallic belt end, caliber .30, M1 (fig. 18) is attached to metallic link belts of caliber .30 cartridges packed in metal boxes for ground machinegun use. The belt end facilitates starting the belt of cartridges through the gun, as well as aiding in locating the end of the belt in the box.

b. Web ammunition belts. Web ammunition belts of cotton fabric are used in caliber .30

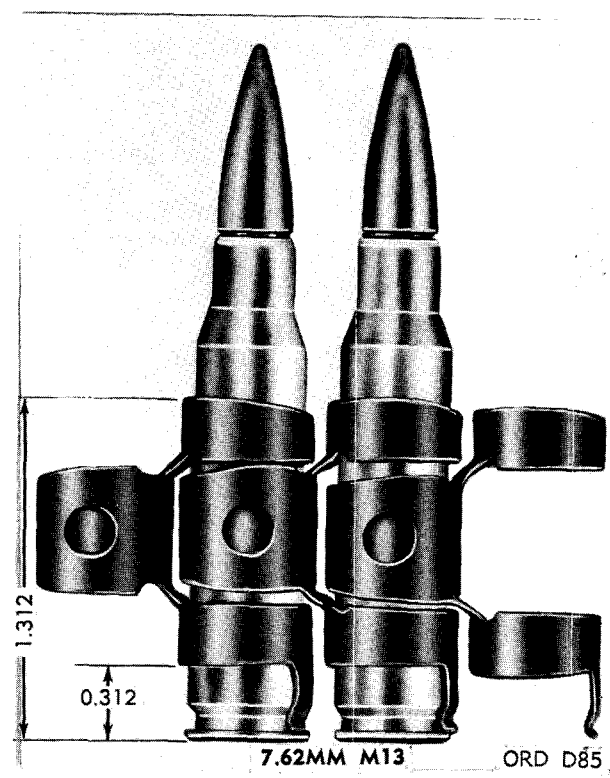
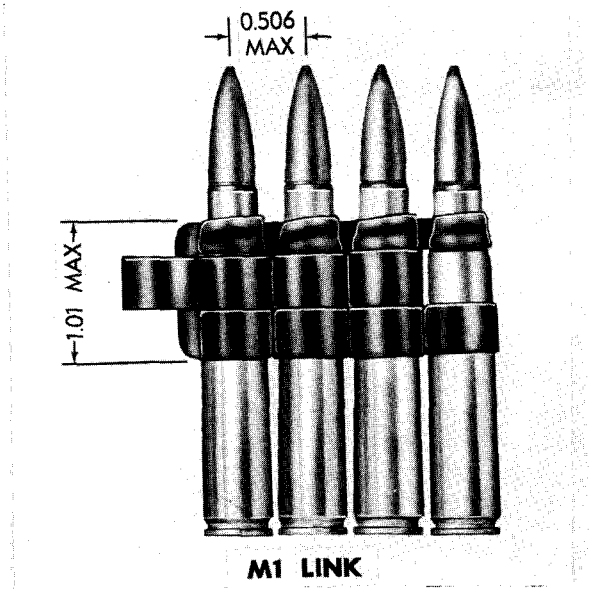


Figure 19. Link cartridges, M13, with 7.62 millimeter ammunition.



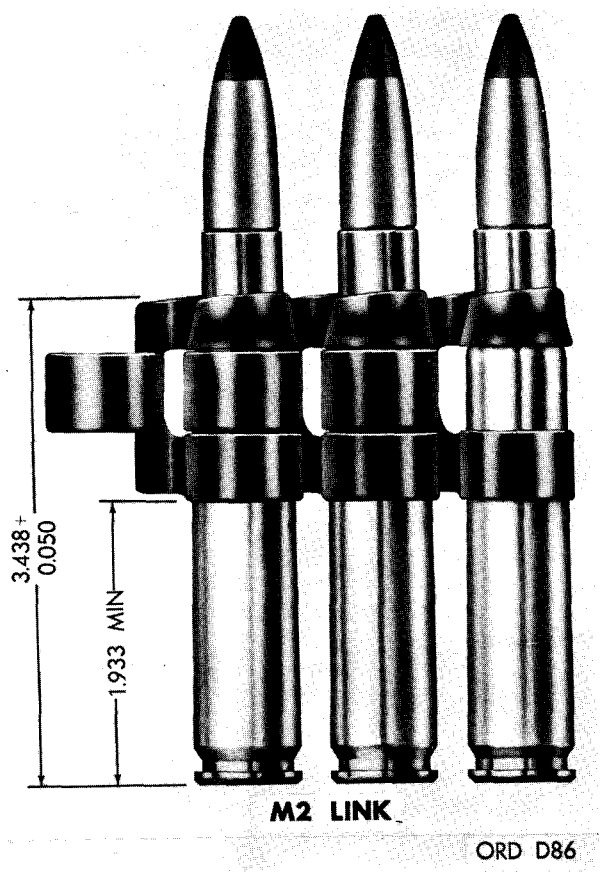


Figure 20. Link cartridges with caliber .30 and caliber .50 ammunition.

machineguns. These belts are made of two strips of cotton stitched together so as to form pockets for individual cartridges. The empty belts weighs 0.4 pound and its length is 15½ feet. The belt must present an extraction pull of 3 to 11 pounds. This type belt is no longer used for packing new ammunition. Ammunition packed in web belts is restricted to issue and use within the continental United States for training purposes only.

CHAPTER 3

AMMUNITION FOR MILITARY WEAPONS

Section I. CALIBER .22 AMMUNITION

31. General

a. Ammunition for caliber .22 weapons is shown in figure 21. Caliber .22 bullets are shown in figure 22. Table VIII lists the component parts of these cartridges and table IX lists the weight of cartridges and components.

b. Caliber .22 cartridges, except hornet, are the only rimfire type used for military purposes.

32. CARTRIDGE, CALIBER .22: Ball, Long Rifle (Lead Bullet)

a. Cartridge. This cartridge (fig. 21) is an item of issue for use in caliber .22 rifles; Remington Models 52, 53, and 513T, Stevens Model 416-2 and Winchester Model 75; in machinegun trainers M3 and M4; in pistols for gallery practice and training purposes, and in caliber .22 subcaliber rifles. This cartridge has no model designation as it is of commercial design and is procured from several commercial manufacturers. The cartridges are all of the same general appearance, but differ slightly in the shape of the bullet, primer composition and propellant used, and ballistic qualities. This ammunition contains noncorrosive, nonmercuric, primer composition. Containers of this ammunition are marked by the manufacturer with the caliber, type of ammunition, type of propellant, and the applicable trade name, together with the manufacturer's lot number. The cartridge is 0.984 inch long.

b. Cartridge Case. The cartridge case is made of brass, copper, or gilding-metal and is of the rimfire type. Cartridges of recent manufacture may have zinc-plated or phosphatized and oiled cartridge cases. These cases are 0.613 inch long.

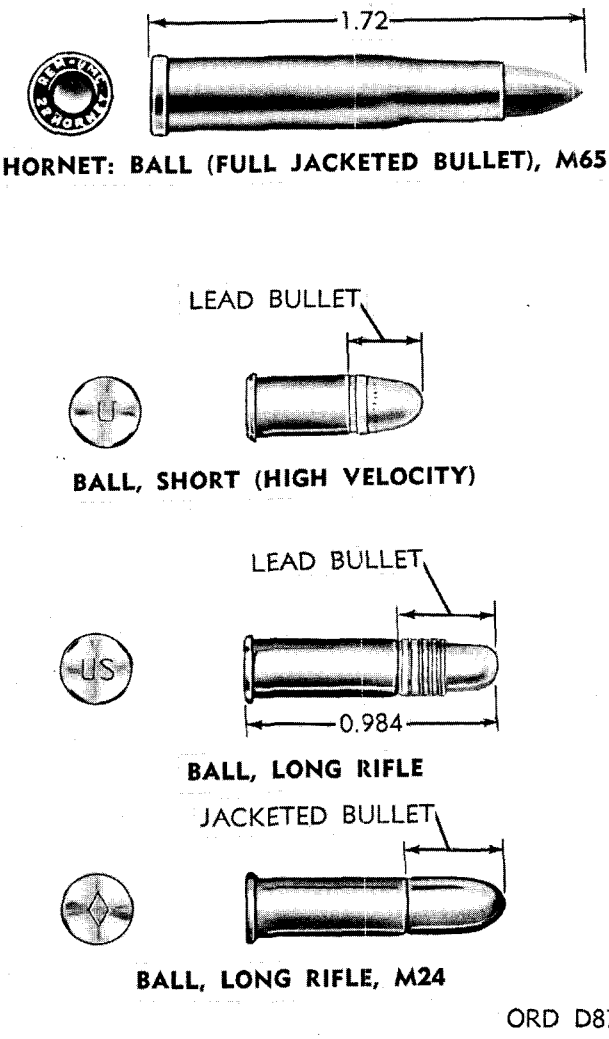


Figure 21. Caliber .22 ammunition.

c. Bullet. The bullet is made of lead or lead alloy and contains grease or wax in its cannelures for lubrication purposes in the bore

of the weapon. The bullet is 0.460 inch long.

d. Accuracy. The extreme spread of all targets at time of acceptance is not greater than 2.2 inches at 100 yards range.

Table VIII. Component Parts of Caliber .22 Ammunition

Cartridge	Cartridge case	Propellant	Bullet	
			Jacket	Slug
Long rifle (lead bullet).[1]	Brass[2]	Smokeless or Lesmok A.	.....	Lead or lead alloy.
Long rifle, M24.[1]	Brass[2]	Smokeless or Western Ball	Gilding-metal.	Lead-antimony.
Long rifle (commercial).[1]	Brass	Smokeless	Gilding metal or lead.	Lead or lead alloy.
Short (high-velocity).[1]	Brass, copper, or gilding metal.	Smokeless	.....	Lead-antimony.
Hornet, ball, M65.[3]	Brass	Western Ball	Gilding-metal.	Lead-antimony.

[1] Rimfire type primer.
[2] Cartridges may have steel cases.
[3] Commercial centerfire primer.

Table IX. Weights of Caliber .22 Ammunition (in Grains; Maximum Permitted in Manufacture)

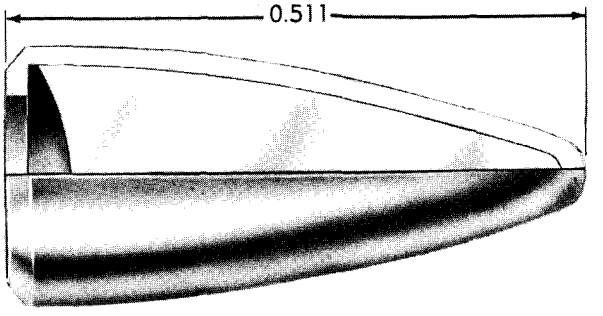
Cartridge	Complete cartridge (approx)	Cartridge case	Propellant (approx)	Bullet		
				Complete	Jacket	Slug
Long rifle (lead bullet).	52.0[1] 53.5[2]	10.0	1.7[1] 3.0[2]	40.0	.....	.....
Long rifle, M24.	53.0	10.0	2.5	40.5	6.5	34.0
Long rifle (commercial).	51.9	9.8	2.1	40.0	.....	.....
Short (high velocity).	36.6	6.1	1.5	29.0	.....	.....
Hornet, ball, M65.[3]	103.0	53.0	12.6	35.0	12.5	22.5

[1] For smokeless powder load.
[2] For Lesmok A load.
[3] Weight of commercial primer 3.5 grains (approx).

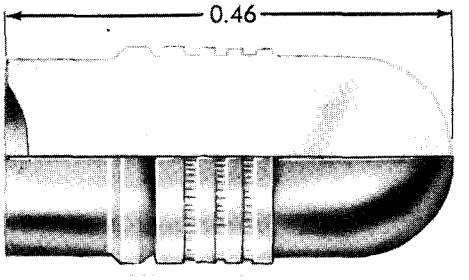
e. Penetration. When fired into 1-inch pine boards, spaced 1 inch apart at a range of 15 feet, the bullet will penetrate the first 5 boards and ⅛ inch into the sixth board.

33. CARTRIDGE, CALIBER .22: Ball, Long Rifle, M24

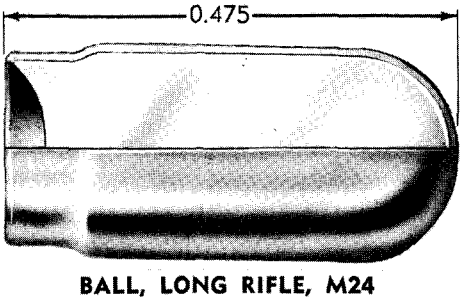
a. Cartridge. This cartridge is intended for use in caliber .22 long rifle survival weapons and is provided in Air Force survival kits. Its primary purpose is for hunting small game. The components are the same as those described in paragraph 32, except for the bullet,



HORNET: BALL, M65



BALL, LONG RIFLE



BALL, LONG RIFLE, M24

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Figure 22. Caliber .22 bullets—sectioned.

which is jacketed. The cartridge is 0.995 inch long.

b. Cartridge Case. This cartridge case is made of brass, is the rimfire type, and is 0.613 inch long.

c. Bullet. The bullet consists of a gilding-metal jacket with a lead-antimony slug and is 0.475 inch long.

d. Accuracy. At time of acceptance, the extreme spread of all targets at 100 yards is not greater than 1.25 inches.

34. CARTRIDGE, CALIBER .22: Ball, Short, (High Velocity)

a. Cartridge. This cartridge is primarily intended for use in those weapons chambered for its use, although it can also be fired in weapons chambered for the caliber .22 long rifle cartridge. This cartridge is 0.69 inch long.

b. Cartridge Case. This cartridge case is the same as the long rifle cartridge except for its length, which is 0.42 inch long.

c. Bullet. The bullet is of lead-antimony alloy and is shorter and lighter than the caliber .22 long rifle bullet. The caliber .22 short bullet is 0.36 inch long.

d. Accuracy. At time of acceptance, the average of the extreme spread of all targets at 100 yards is not greater than 2.5 inches.

35. CARTRIDGE, CALIBER .22: Ball, Long Rifle, Western Super Match, MK III or Equal (Commercial)

a. Cartridge. This cartridge is procured from various manufacturers for use in caliber .22 rifles, Winchester rifles Models 52, 75; Remington models, M40X, 513T; automatic Colt, Caliber .22; Woodsmen, automatic pistol; Hi-Standard, Caliber .22; H-D, revolver, Colt, Caliber .22; Officers, Model Target; revolver, Harrington & Richardson, Caliber .22 Sportsman Model, No. 999; and machinegun trainer, Caliber .22, M3 or M4. The complete cartridge is nearly 1-inch long.

b. Cartridge Case. The cartridge case is made of brass and is .613 inch in length.

c. Bullet. The bullet is made of lead or lead alloy and is approximately 0.46 inch long. The bullet weighs nearly 40 grains.

d. Accuracy. At time of acceptance, the average of the extreme spread of all targets at 100 yards is not greater than 2.5 inches.

36. CARTRIDGE, CALIBER .22 HORNET: Ball, M65

a. Cartridge. This cartridge is for use in the M4 and M6 survival weapons. It was procured to replace Cartridge, Caliber .22 Hornet: ball, soft point, M39. The ball cartridge M39 may be issued and used until present stocks are depleted. The ball cartridge M65 has improved wounding power compared with that of the ball cartridge M39, and thus will be more effective against small game for which it is basically designed. The cartridge is 1.723 inches long.

b. Cartridge Case. The cartridge case is made of brass and is 1.403 inches long. This cartridge case is assembled with a commercial primer.

c. Bullet. The bullet has a gilding-metal jacket over a lead-antimony slug. The bullet has a 6 caliber ogive and weighs nearly 35 grains.

d. Accuracy. At time of acceptance, the average of the extreme spread of all targets at 100 yards is not greater than 2.5 inches.

Section II. CALIBER .30 CARBINE AMMUNITION

37. General

a. Ammunition for caliber .30 carbines is shown in figure 23. Caliber .30 carbine bullets are shown in figure 24. Table X gives the component parts of these cartridges and table XI gives the weights of the cartridges and components.

b. The cartridge case for carbine cartridges has a slight taper from the head to a short distance from the mouth and is cylindrical for the remaining portion of its length. Present cases have a taper of 0.027-inch inclination to the cylindrical portion which extends 0.32 inch at the mouth end of the case. Cases manufactured prior to 11 June 1943 had a taper of 0.031-inch which extended 0.39-inch at the mouth end of the case. The case is not crimped to the bullet. Steel cartridge cases are restricted

Table X. Component Parts of Caliber .30 Carbine Ammunition (Centerfire Primers are used in all Cartridges Listed Below)

Cartridge	Cartridge case	Propellant	Bullet		
			Jacket	(Slug)	Base filler
Ball, M1	Brass or steel.	Ball or Hercules Flake.	Gilding-metal or Gilding-metal-clad steel.	Lead-antimony.	
Dummy, M13.	Brass or steel.	.....	Gilding-metal or Gilding-metal-clad steel.	Lead antimony.	
High-pressure test, M18.	Brass	Ball or Hercules Flake.	Gilding-metal-clad steel.	Lead-antimony.	
Tracer, M16.	Brass	Ball or Hercules Flake.	Gilding-metal-clad steel.	Lead-antimony.	Tracer and igniter composition.
Tracer, M27.	Brass	Ball or Hercules Flake.	Gilding-metal-clad steel.	Lead-antimony.	Tracer and igniter composition.

for use within the continental United States. The brass cartridge case may be used without this restriction.

38. CARTRIDGE, CALIBER .30, CARBINE: Ball, M1

a. Cartridge. This cartridge is for use in caliber .30 carbines. The cartridge is intended for use against personnel and unarmored targets for ranges up to 300 yards. The completed cartridge is 1.68 inches long.

b. Bullet. The bullet consists of a gilding-metal or gilding-metal-clad steel jacket with a lead-antimony slug. The bullet is 0.690 inch in length and has a similar profile to the caliber .45 ball bullet M1911. Bullets manufactured prior to 14 February 1942 had a hollow cup formation in the base of the core. Those of present manufacture have a solid flat base core.

Table XI. Weights of Caliber .30 Carbine Ammunition (In Grains; Maximum Permitted in Manufacture)

Cartridge	Complete (approx)	Cartridge case	Propellant (approx)	Bullet				
				Primer	Complete	Jacket	Core (slug)	Tracer and igniter composition
Ball, M1	193	71 [1]	13	3	111 or 108.	28 or 25.	83	
Dummy, M13	177	66	....	....	111 or 108.	28 or 25.	83	
High-pressure test, M18	234	71	14	3	152	34 or 49.5.	118 or 102.5.	
Tracer, M16	187	71	13	3	107	40.5	55	11.5
Tracer, M27	183	71	13	3	101	40.5	55	7

[1] Steel cartridge cases weigh 57 grains.

c. Accuracy. At the time of acceptance, the average of the mean radii of all targets at 100 yards is not greater than 1.5 inches.

d. Penetration. The bullet will penetrate 12 pine boards ⅞-inch thick at 100 yards, 8 boards at 200 yards, and 7 boards at 300 yards.

39. Cartridge, Blank

No blank cartridges, as such, have been developed for carbines. However, CARTRIDGE, Grenade, caliber .30, M6, is authorized for issue and use for blank firing purposes in the carbines.

40. CARTRIDGE, CALIBER .30 CARBINE: Tracer, M16

a. Cartridge. This cartridge is for use in caliber .30 carbine. The tracer cartridge M16 is intended for use against personnel and unarmored targets and has an incendiary effect as well as illuminating the path of trajectory. The length of the cartridge is 1.68 inches.

b. Bullet. The bullet consists of a gilding-metal-clad steel jacket, a lead-antimony slug, and a tracer and igniter composition. The over-all length of this bullet is 0.88 inch and the point is painted red for a distance of approximately ⅛ inch.

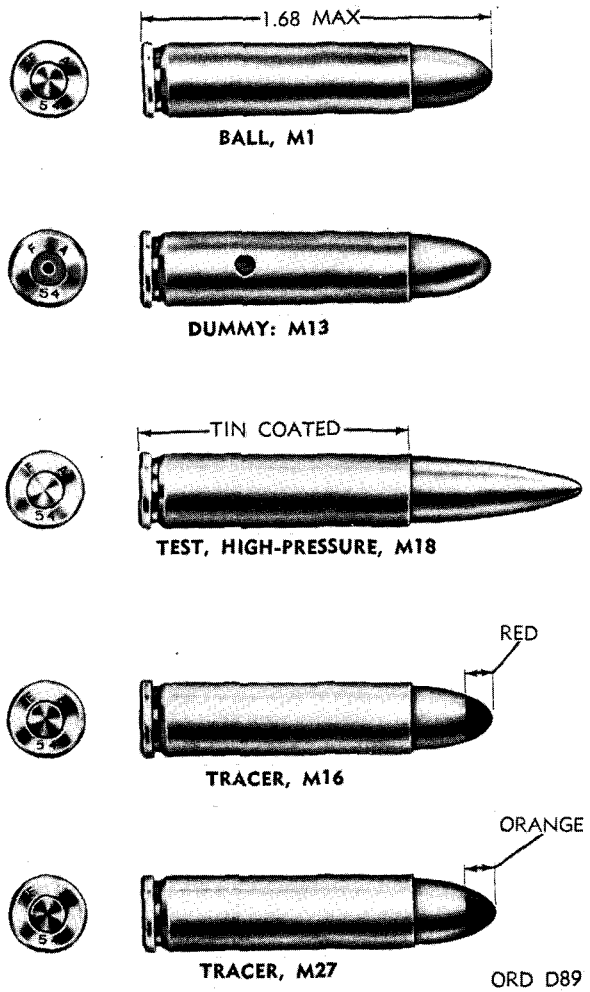


Figure 23. Caliber .30 carbine ammunition.

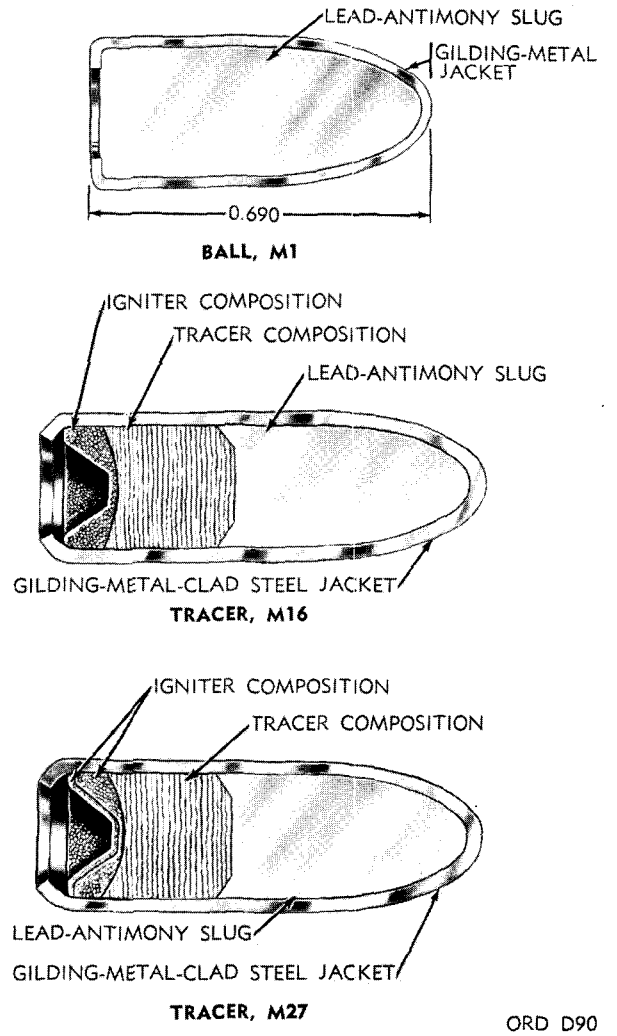


Figure 24. Caliber .30 carbine bullets—sectioned.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 100 yards is not greater than 3.67 inches.

d. Penetration. The bullet will penetrate 11 pine boards ⅞ inch thick at 100 yards, 8 boards at 200 yards, and 7 boards at 300 yards.

41. CARTRIDGE, CALIBER .30 CARBINE: Tracer, M27

a. Cartridge. This cartridge is for use in caliber .30 carbines. The tracer cartridge M27 is intended for use against personnel and unarmored targets and has a tracer composition to illuminate the path of trajectory. The cartridge has a dim tracer for a short distance of flight from the muzzle to conceal the gun location and is followed by a bright trace. The length of the cartridge is 1.68 inches.

b. Bullet. The bullet consists of a gilding-metal-clad steel jacket, a lead-antimony slug, and a tracer and igniter composition. The overall length of this bullet is 0.880 inch and the point is painted orange for a distance of approximately ⅛ inch.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 100 yards is not greater than 3.5 inches.

42. CARTRIDGE, CALIBER .30 CARBINE: Dummy, M13

a. Cartridge. This cartridge is used for training personnel in the operation of loading and unloading carbines and simulating carbine fire. The cartridge is 1.68 inches long. The item can be identified by two holes drilled in

the cartridge and an empty primer pocket. This cartridge was previously known as CARTRIDGE, CALIBER .30, DUMMY: M1 and was used only in the inspection of weapons. The dummy cartridge is completely inert.

b. Bullet. The bullet consists of a gilding-metal or gilding-metal-clad steel jacket with a lead-antimony slug. It is 0.69 inch in length.

43. CARTRIDGE, CALIBER .30 CARBINE: Test, High Pressure, M18

a. Cartridge. This cartridge is used for proof firing of carbines. The HPT cartridge M18, is loaded with a quantity of propellant sufficient to produce a chamber pressure from 45,000 to 50,000 psi. Due to this excessive pressure and the consequent danger involved in firing, the guns under test are fired from a fixed rest under a hood by means of a mechanical device. This cartridge will be fired only by authorized personnel. The length of the cartridge is 2.0 inches and can be identified by the tinned case.

b. Bullet. The bullet has a square base and consists of a gilding-metal jacket with a lead-antimony slug. This bullet differs in appearance from the ball bullet in that it has a pointed nose. The bullet is 1.114 inches long.

Section III. CALIBER .30 RIFLE AND MACHINEGUN AMMUNITION

44. General

Ammunition for caliber .30 rifles and machineguns is shown in figures 25 and 27. Caliber .30 bullets are shown in figure 26. Table XII lists the component parts of these cartridges and table XIII lists the weights of cartridges and components.

45. Ballistics

All caliber .30 service types of ammunition match their ballistics at 600 yards. The time of flight to this distance does not differ by more than 0.1 second under specified conditions.

46. CARTRIDGE, CALIBER 30: Armor-Piercing, M2

a. Cartridge. This cartridge is for use in machineguns and rifles. The AP cartridge M2 is intended for use against personnel and light armored and unarmored targets. The length of the complete round is 3.34 inches. The cartridge can be identified by its black bullet tip.

b. Bullet. The bullet consists of a gilding-metal jacket, a hard steel core, a lead T-shot point filler and a gilding-metal base filler. The bullet is 1.39 inches long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 10 inches.

d. Penetration. See table XIV.

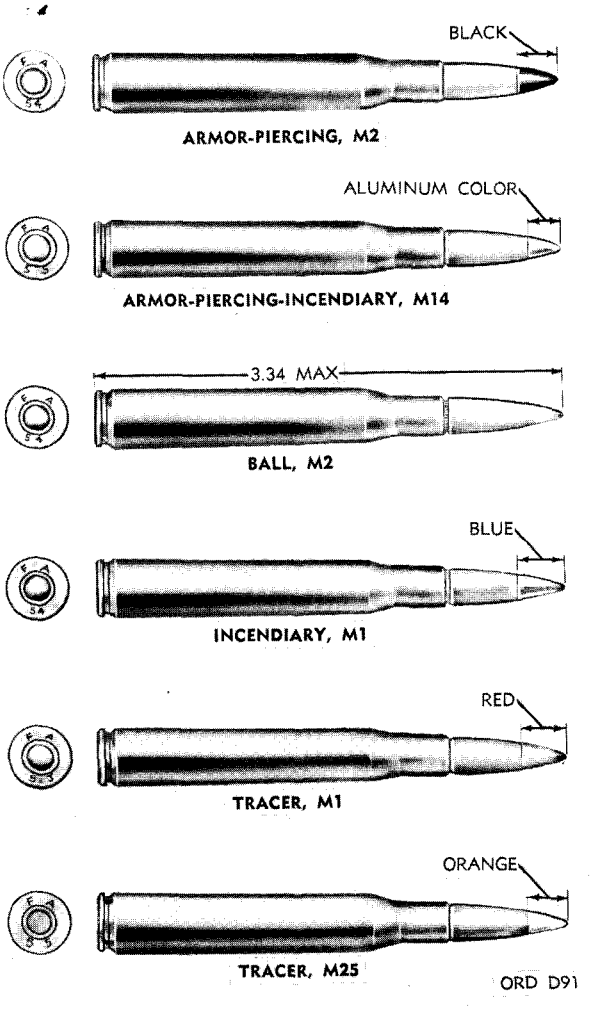


Figure 25. Caliber .30 cartridges.

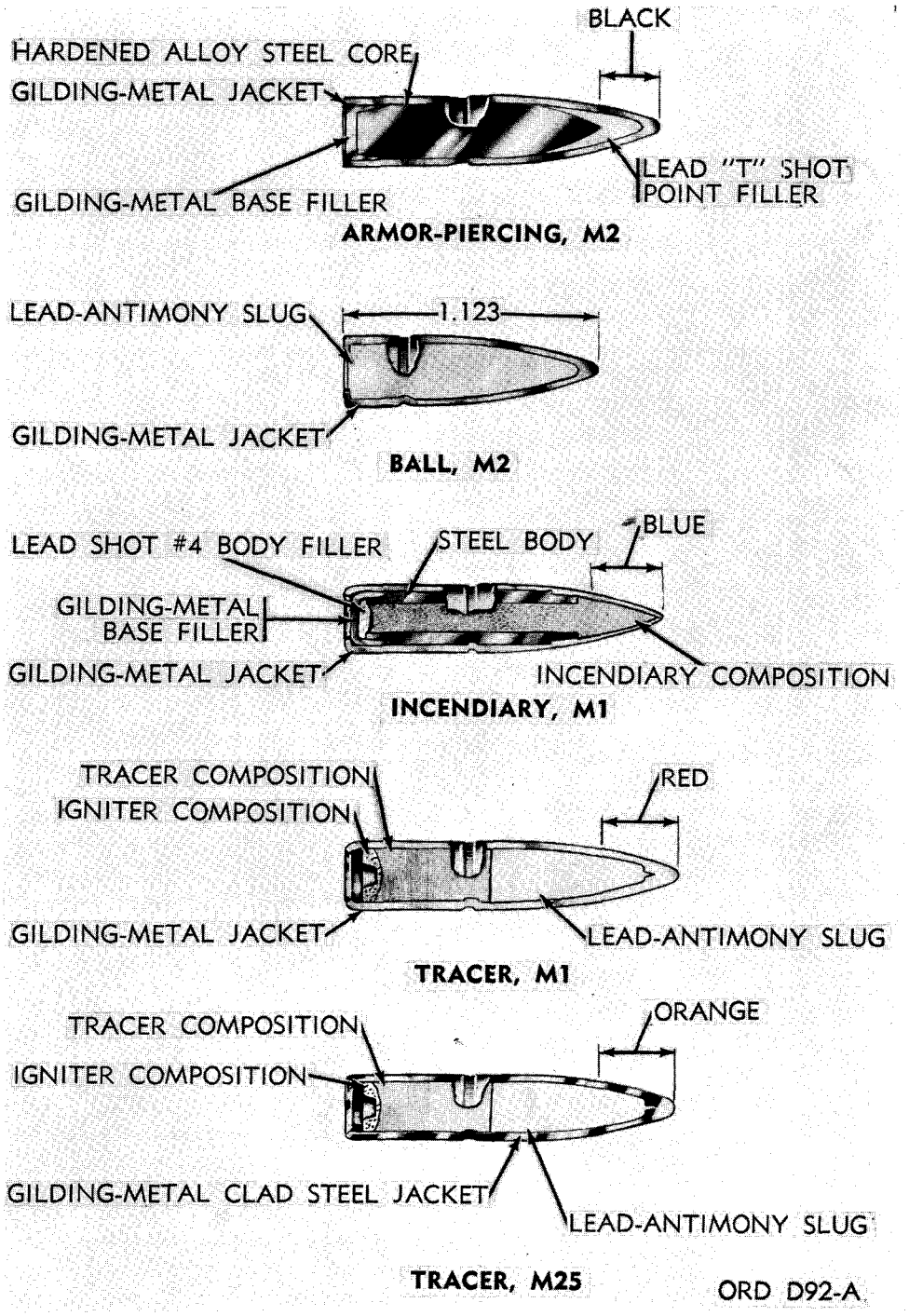


Figure 26. Caliber .30 bullets—sectioned.

47. CARTRIDGE, CALIBER .30: Armor-Piercing-Incendiary, M14

a. Cartridge. This cartridge is for use in machineguns in lieu of using both armor-piercing and incendiary cartridges. The cartridge is 3.34 inches in length. This cartridge can be identified by the aluminum colored bullet tip.

b. Bullet. The bullet contains the same core as the armor-piercing bullet, caliber .30, M2, excepting the lead point filler is replaced by an incendiary composition. This bullet is 1.44 inches in length.

Table XII. Component Parts of Caliber .30 Ammunition
(Corrosive and Noncorrosive Primers Have Been Used in all Cartridges Listed Below)

Cartridge	Cartridge case	Propellant	Bullet			
			Jacket	Core or slug	Point filler	Base filler
AP, M2	Brass	Smokeless	Gilding-metal	Steel	Lead T-shot	Gilding-metal.
API, M14	Brass	Smokeless	Gilding-metal	Steel	Incendiary composition.	Lead-antimony.
Ball, M2	Brass or steel.	Smokeless	Gilding-metal or gilding-metal-clad steel.	Lead-antimony.		
Match, M72	Brass	Smokeless	Gilding-metal	Lead-antimony.		
Blank M1909	Brass or steel.	EC blank.				
Dummy, M40	Brass or steel.	None	Gilding-metal-clad-steel.			
HPT, M1	Brass	Smokeless	Gilding-metal or steel.	Lead-antimony.		
Incendiary, M1.	Brass	Smokeless	Gilding-metal	Lead-shot No. 4 body filler.	Incendiary composition.	Gilding-metal.
Tracer, M1	Brass	Smokeless	Gilding-metal or steel.	Lead-antimony.		Tracer and igniter-comp.
Tracer, M25	Brass	Smokeless	Gilding-metal-clad steel.	Lead-antimony.		Tracer and igniter-comp.
Frangible, M22	Brass	SR 4759 single base.	Bakelite-BM 17078 Natural.			Tracer and igniter-comp.

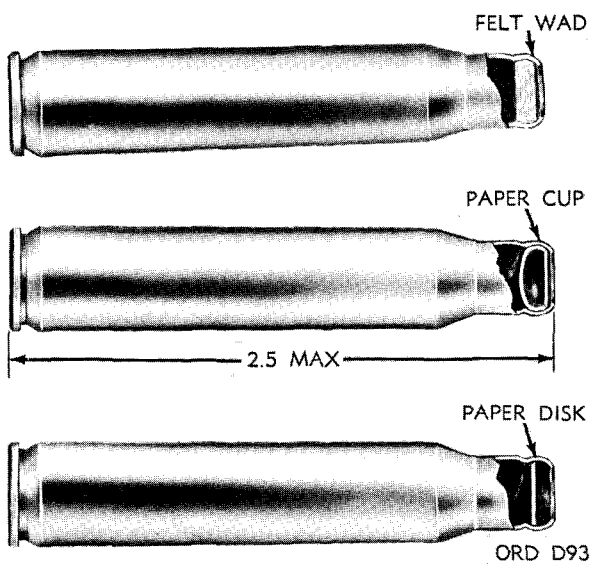


Figure 27. Cartridge, caliber .30 blank: M1909.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 15 inches.

d. Penetration. At normal impact at 100 yards against ⅞-inch homogeneous armor plate, penetration is 0.35 inch. At 30° angle of impact at 100 yards against ⅜-inch face-hardened plate, penetration is 0.094-inch.

48. CARTRIDGE, CALIBER .30: Ball, M2

a. Cartridge. This cartridge is for use in machineguns and rifles against personnel and unarmored targets. The item is also authorized for guard purposes. The length of the ball cartridge M2 is 3.34 inches. The bullet tip of this cartridge is unpainted and can be identified by the natural jacket finish.

b. Bullet. The bullet consists of a gilding-metal or a gilding-metal-clad steel jacket and a lead-antimony slug. The bullet has a square base and is 1.123 inches long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 7.5 inches.

d. Penetration. Penetration data are shown in table XV.

Table XIII. Weights of Caliber .30 Ammunition (in Grains; Maximum Permitted in Manufacture)

Cartridge	Complete (approx)	Cartridge case	Propellant (approx)	Primer	Bullet				
					Complete	Jacket	Core or slug	Point filler	Base filler
AP, M2	412	200	53	5.594	165.7	65	81	12	7.7
API, M14 or M14A1.	404	200	50	5.594	150	63	82	....	4
Ball, M2	396	200	50	5.594	152	59	99		
Match, M72	425	200	50	5.594	175.5	60	115.5		
Blank, M1909 or alt.	207 or 187.	200 or 180.	13	5.594	(wad, 0.25).				
Dummy, M40	268	200	....	.....	68	68			
HPT, M1	420	200	52	5.594	174.5	59	115.5		
Incendiary, M1	388	200	54	5.594	140				
Tracer, M1	396	200	50	5.594	152	83	52.5	....	17
Tracer, M25	390	200	50	5.594	146.5	74	52.5	....	16
Frangible, M22	314	200	11.3	5.594	108.5				

Table XIV. Penetration in Inches for Cartridge, Armor-Piercing Caliber .30, M2 (MV 2,765 Feet Per Second)

Material	At 200 yards		At 600 yards		At 1,500 yards	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
Armor plate (homogeneous).	.....	0.5	.....	0.3	.....	0.1
Armor plate (face hardened).	.....	0.3	.....	0.2	.....	0.1
Sand (100 lb. dry weight/cu ft).	7	8	9	11	7	9
Clay (100 lb. dry weight/cu ft).	16	18	13	15	9	10

49. CARTRIDGE, CALIBER .30: Incendiary, M1

a. Cartridge. This cartridge is for use in caliber .30 machineguns. It is 3.35 inches long and may be identified by the blue bullet tip.

b. Bullet. The bullet is similar in size and shape to the caliber .30 armor-piercing bullet. It contains a lead shot No. 4 or lead-antimony body plug and a tubular steel body. The core and point of the bullet contain an incendiary composition.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 15 inches.

50. CARTRIDGE, CALIBER. 30: Match, M72

a. Cartridge. This cartridge is for use in rifles chambered for the M1 or M2 caliber .30 (.30-06) cartridges. The length of the complete round is 3.34 inches. Externally, this cartridge can be identified by the following characteristics: (1) the cartridge head-stamp bears the word "MATCH"; (2) the noncorrosive primer is uncrimped; (3) the bullet has no crimping cannelure; (4) the case is not crimped to the bullet. The bullet is inserted into the case by the application of pressure on its point. This cartridge is not authorized for use in automatic weapons.

Table XV. Penetration in Inches for Cartridge, Ball, Caliber .30, M2 (MV 2,800 Feet Per Second)

Material	At 200 yards		At 600 yards		At 1,500 yards	
	Over	Max.	Over	Max.	Over	Max.
Armor Plate (homogeneous).	.....	0.3	.....	.....	.....	.....
Sand (100-lb. dry weight/cu ft).	6	7	8	10	6	7
Clay (100-lb. dry weight/cu ft).	14	16	12	14	7	9
Concrete (1:2½:5, cement: sand: crushed stone).	.....	1	.....	1	.....	1
Oak (2½ in. by 12 in. joists to give thickness of 24 in.)	13	18	11	15	10	11

b. Bullet. The bullet consists of a gilding-metal jacket and a lead-antimony slug. The

bullet has a boattailed base and is 1.312 inches long, and has no cannelure.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 3.5 inches.

51. CARTRIDGE, CALIBER .30: Tracer, M1

a. Cartridge. This cartridge is for use with other ammunition to show the gunner, by its trace, the path of the bullets. While tracer cartridges were primarily intended for machine-gun use, there are cases wherein they can be advantageously used in rifles, such as for signaling and incendiary purposes, target designation, range estimation, and target practice. The cartridge is 3.34 inches long and can be identified by its red bullet tip, red indicating the color of the trace.

b. Bullet. This bullet consists of a gilding-metal or gilding-metal-clad steel jacket, a lead-antimony slug, a closure cup, and a tracer and igniter composition. The length of the bullet is 1.45 inches. The bullet has a square base and contains a flamable substance which is ignited by the propelling charge when the cartridge is fired. The tracer composition burns with a bright red flame which enables the gunner to observe the path of the trajectory. The bullet will trace continuously from a point not more than 125 yards from the muzzle of the weapon to a point not less than 900 yards.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 15 inches.

52. CARTRIDGE, CALIBER .30: Tracer, M25

a. Cartridge. This cartridge is designed for use in ground machineguns. It differs from the tracer cartridge, M1 (par. 51) in having a dim trace, for a short distance of flight from the muzzle, which is followed by a bright trace. The length of this cartridge is 3.34 inches. The cartridge can be identified by its characteristic orange bullet tip indicating the dim trace type of tracer bullet.

b. Bullet. The bullet consists of a gilding-metal-clad steel jacket, a lead-antimony point filler, a closure cup, and a tracer and igniter composition. The tracer bullet M25 is very nearly the same in weight and components as the tracer bullet M1 with a gilding-metal-clad steel jacket. The bullet is 1.35 inches long. The tracer bullet M25 differs principally from the tracer bullet M1 in containing a dim trace as well as a standard tracer composition. Dim trace begins at 35 to 50 yards from the muzzle and continues to 150±75 yards where the bright trace begins and continues to approximately 1,000 yards. The minimum acceptable distance for range of trace is 900 yards.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 18 inches.

53. CARTRIDGE, CALIBER .30 BLANK: M1909

a. Cartridge. This cartridge is for use in rifles for simulated fire during maneuvers, for signaling purposes, and for firing salutes. The blank cartridge M1909 is also used in machine-guns and automatic rifles equipped with blank firing attachments, in order to operate these weapons for instructional purposes. The cartridge is 2.494 inches in length, and can be identified by having no bullet, and by having a cannelure in the neck of the case. See paragraph 11 for precautions in firing blank ammunition.

b. Components. In manufacture, a paper cup or wad of thin paper is inserted in the neck of the case against the cannelure and sealed in place with lacquer (fig. 27). The mouth of the case is then crimped to keep the cup or wad in place. Cartridge cases having minor imperfections, or reused cartridge cases can be used in the assembly of this type of ammunition. Steel cases are approved as a substitute when the supply of brass is critical.

54. CARTRIDGE, CALIBER .30 DUMMY: M40

a. Cartridge. This cartridge (fig. 3) was designed to replace the CARTRIDGE, CALIBER .30 DUMMY: M2. The dummy cartridge M40 is used for the training of personnel in the operation of loading or unloading rifles, simulating rifle fire, and in the inspection of weapons. The cartridge is 3.34 inches long. This cartridge differs from the dummy cartridge M2 in that it has 6 longitudinal corrugations 0.05 inch deep and 1 inch long located ⅝ inch from the cartridge case head, whereas

the dummy M2 had 3 holes drilled in its cartridge case sidewall and a hole in the primer pocket. The dummy cartridge M40 has a double cannelure on the bullet to improve resistance to debulleting and has no flash hole in the primer pocket.

b. Components. The dummy cartridge, M40 consists only of a cartridge case and bullet. The bullet consists of a gilding-metal-clad steel jacket. Cartridge cases containing imperfections may be used in the assembly of this cartridge.

55. CARTRIDGE, CALIBER .30: Test, High-Pressure, M1

a. Cartridge. This cartridge is used for proof firing of rifles, automatic rifles, machineguns, and barrels. The HPT cartridge M1 is loaded with propellant sufficient to give a chamber pressure of 65,000 to 70,000 psi. Due to this excessive pressure and the consequent danger involved in firing, the gun under test is fired from a fixed rest under a hood by means of a mechanical firing device. This cartridge will be fired only by authorized personnel. The cartridge is 3.34 inches long and can be distinguished from other caliber .30 cartridges by its tinned cartridge case.

b. Cartridge Case. The cartridge case is similar to those used in service cartridges. An alternative cartridge case which is lighter (200 grains total weight) than the standard high-pressure test case (213 grains total weight) may also be used, since it has thicker metal at the head but thinner metal for the rest of the case. Some model cartridge cases have the words "TEST" or "H. P. Test" while others have the year of manufacture stamped on the head.

c. Bullet. The bullet consists of a gilding-metal or gilding-metal-clad steel jacket encasing a lead-antimony slug, and has a cylindrical base. The overall length of the bullet is 1.23 inches.

Section IV. CALIBER .30 FRANGIBLE AMMUNITION

56. General

Frangible ammunition will not be used for training purposes on indoor firing ranges in view of the toxic hazard that may be involved. The bullet of this ammunition disintegrates on contact with the target without injuring personnel. It is used by Army Field Forces, National Guard organizations, and Reserve Corps for tank training. The weapon in which this ammunition is fired is an antiaircraft machinegun modified by the addition of a short round device and a muzzle booster to operate at velocities lower than service ammunition velocities. The only cartridge for use in this weapon is shown in figure 28. Component parts and weights are listed in table XVI.

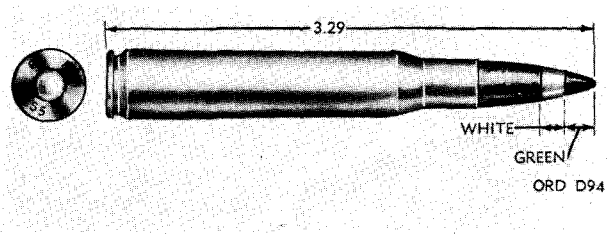


Figure 28. Cartridge, caliber .30: ball, frangible, M22.

Table XVI. Component Parts and Weights of Cartridge, Ball, Frangible, Caliber .30 (Weights in Grains; Maximum Permitted in Manufacture)

Clear	Component parts	Weights (approx.)
Complete cartridge	.....	314
Cartridge case	Brass	200
Propellant	SR 4759	11.3
Primer	Primer, No. 26	5.594
Bullet	50% Bakelite: 50% BM 17073.	108.5

57. CARTRIDGE, CALIBER .30: Ball, Frangible, M22

a. Cartridge. This cartridge is for use in machinegun trainers, caliber .30, T9 and T9E3, and is also used in caliber .30 tank machineguns, firing single shot, for training in tank gunnery. It is identified by the bullet tip which is painted green with a white annulus to the rear. This bullet has a slightly mottled appearance. The cartridge is 3.29 inches long. The cartridge case and primer are identical to

those used with other caliber .30 rifle and machinegun ammunition. Safety regulations for firing this cartridge at fixed terrestrial targets prescribe a minimum radius of sector of 2,100 yards. Approximate maximum range is 1,900 yards and muzzle velocity is 1,360 fps.

b. Bullet. The bullet is composed of 50 percent powdered lead bonded with 50 percent bakelite, and has approximately the same profile as the ball bullet, caliber .30, M2. The frangible ball bullet is 1.185-inches long. The bullet will break up completely on normal contact with 3/16-inch high strength aluminum alloy sheet at 100 yards normal impact.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 100 yards is not greater than 2 inches.

Section V. 7.62 MILLIMETER (NATO) AMMUNITION

58. General

Ammunition for 7.62-millimeter weapons was developed with the intended purpose of replacing the caliber .30 carbine, and caliber .30 rifle ammunition in order to standardize their use with all North Atlantic Treaty Organization (NATO) countries and to facilitate supply and interchangeability. Figure 29 illustrates 7.62-millimeter cartridges, table XVII lists components of these cartridges, and table XVIII lists weights of the cartridges.

59. CARTRIDGE, 7.62 MILLIMETER: NATO, Armor-Piercing, M61

a. Cartridge. This cartridge is for use in the 7.62-mm rifles and machineguns. It is intended for use against light armored targets. The length of the cartridge is 2.80 inches. The cartridge case is made of annealed brass. This cartridge can be identified by the black bullet tip.

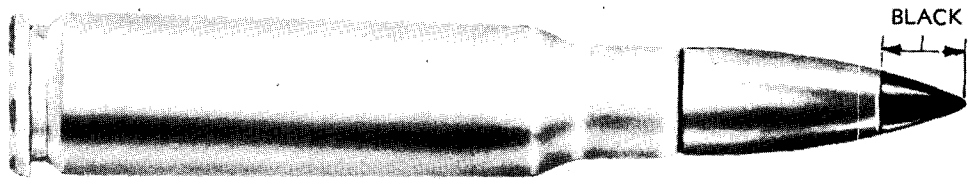
b. Bullet. The bullet is boattailed and consists of a gilding-metal-clad jacket, a steel core, and a lead-antimony base and point filler. The overall length of this bullet is 1.28 inches.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 7.5 inches.

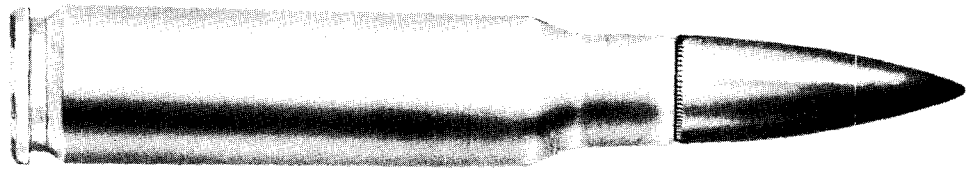
d. Penetration. The average depth of penetration of cores fired at a range of 100 yards will not be less than 0.38 inch in homogeneous ⅞-inch thick armored steel plate.

Table XVII. Component Parts of 7.62 Millimeter Ammunition
(Primer No. 36 or Equivalent Used in Cartridges Listed Below)

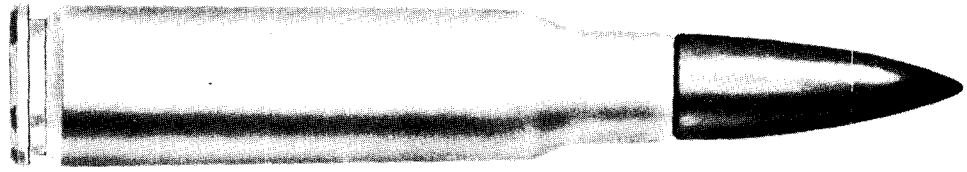
Cartridge	Cartridge case	Propellant	Bullet			
			Jacket	Core or slug	Point filler	Base filler
Ball, M59	Brass	Double-base, Western ball.	Gilding-metal	Steel	Lead-antimony	Lead-antimony
Ball, M80	Brass	Double-base, Western ball.	Gilding-metal or gilding-metal-clad steel.	Lead		
HPT, M60	Brass	Double-base, Western ball.	Gilding-metal	Lead-antimony		
AP, M61	Brass	Double-base, Western ball.	Gilding-metal	Steel	Lead-antimony	Lead-antimony
Tracer, M62	Brass	Double-base, Western ball.	Gilding-metal-clad steel.	Lead-antimony		Tracer, sub-igniter and igniter comp 8
Blank, XM82	Brass	SR 4759				
Dummy, M63	Brass	None	Gilding-metal-clad steel.			
Grenade, M64	Brass	Double-base, Western ball.				



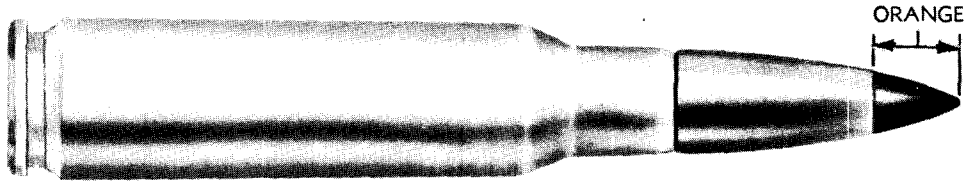
CARTRIDGE, 7.62 MILLIMETER: AP, NATO, M61



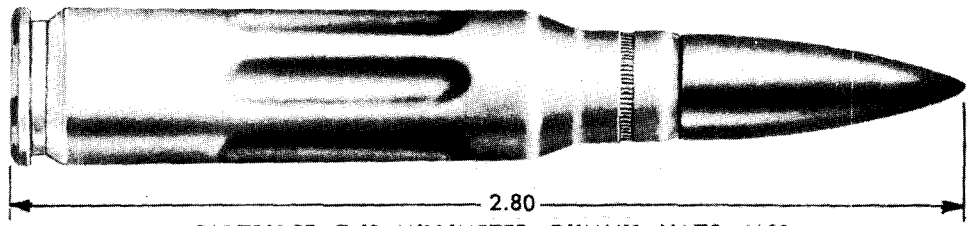
CARTRIDGE, 7.62 MILLIMETER: BALL, NATO, M59 AND M80



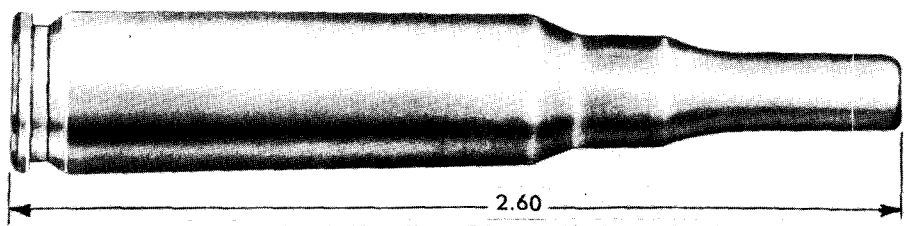
CARTRIDGE, 7.62 MILLIMETER: TEST, HIGH PRESSURE, NATO, M60



CARTRIDGE, 7.62 MILLIMETER: TRACER, NATO, M62



CARTRIDGE, 7.62 MILLIMETER DUMMY: NATO, M63



CARTRIDGE, 7.62 MILLIMETER BLANK: NATO, XM82

ORD D95

Figure 29. Cartridges for 7.62-MM weapons.

Table XVIII. Weights of 7.62-Millimeter (NATO) Ammunition (In Grains: Maxima Permitted in Manufacture)

Cartridge	Complete (approx)	Cartridge case (approx)	Propellant (approx)	Primer	Bullet				
					Complete	Jacket	Core or slug	Point filler	Base filler
Ball, M59	388	185	47	Noncorrosive	150.5	57	55	24	14.5
Ball, M80	388	190	47	Noncorrosive	149	38	111	....	.....
HPT, M60	403	185	MIL-P-3984	Noncorrosive	174.5	59	115.5	....	.....
AP, M61	388	185	47	Noncorrosive	150.5	57	55	24	14.5
Tracer, M62	388	185	47	Noncorrosive	141	60	72	....	.....
Blank, XM82	805	201	19	Noncorrosive	.....	....	....	....	.....
Dummy, M63	253	185	....	.....	(*)	68	....	....	.....
Grenade, M64	231	185	41	Noncorrosive	.....	....	....	....	.....

*Salvaged or reclaimed bullets meeting the requirements of drawing number 755706, may also be used.

e. Velocity. The basic velocity will be 2,750 ± 30 fps at 78 feet from gun muzzle.

60. CARTRIDGE, 7.62 MILLIMETER: NATO, Ball, M59

a. Cartridge. This cartridge is for use in 7.62-mm rifles and machineguns. It is intended for use against personnel and unarmored targets. The length of this cartridge is 2.80 inches and the bullet is unpainted.

b. Bullet. The bullet is boattailed and consists of a gilding-metal jacket, a steel core, and a lead-antimony point and base filler. The overall length of this bullet is 1.28 inches.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 7.5 inches.

d. Pressure. The average pressure will not exceed 50,000 psi.

e. Velocity. The basic velocity will be 2,750 fps at 78 feet from gun muzzle.

61. CARTRIDGE, 7.62 MILLIMETER: NATO, Ball, M80

a. Cartridge. This cartridge is for use in 7.62-mm rifles and machineguns. The cartridge case is made of brass and the bullet is unpainted. It is intended for use against personnel and unarmored targets. The cartridge is 2.80 inches long. This cartridge is restricted for use in the temperate zone only at the present time.

b. Bullet. The bullet consists of a gilding-metal or gilding-metal-clad steel jacket with a lead-antimony slug. The bullet is 1.140 inches long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 7.5 inches.

d. Pressure. The average chamber pressure may vary from 45,000 psi to 65,000 psi, depending on the temperature.

62. CARTRIDGE, 7.62 MILLIMETER: NATO, Test, High-Pressure, M60

a. Cartridge. This cartridge is used for proof-firing of rifles, machineguns, and barrels. It is loaded with a propellant charge sufficient to give higher chamber pressure than other 7.62-millimeter cartridges. Due to this excessive pressure, and the consequent danger involved in firing, the guns under test are fired from a fixed rest under a hood by means of a mechanical firing device. The cartridge will be fired only by authorized personnel. The tinned cartridge case is made of brass and the bullet is unpainted. The complete cartridge case is 2.80 inches long.

b. Bullet. The bullet consists of a gilding-metal jacket and a lead-antimony slug.

c. Pressure. The average chamber pressure will not be less than 65,000 psi nor exceed 70,000 psi.

63. CARTRIDGE, 7.62 MILLIMETER: NATO, Tracer, M62

a. Cartridge. This cartridge is for use in 7.62-mm rifles and machineguns, and is 2.80 inches in length. The cartridge case is made of brass and the bullet tip is painted orange for a distance of 5/16 inch.

b. Bullet. The bullet is boattailed and consists of a gilding-metal-clad steel jacket, a lead-antimony point, a tracer, a subigniter and igniter composition, and a closure cup. The overall length of this bullet is 1.35 inches.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

d. Pressure. The average pressure will not exceed 50,000 psi.

e. Velocity. The basic velocity will be 2,750 + 30 fps at 78 feet from the muzzle.

64. CARTRIDGE, 7.62 MILLIMETER BLANK: NATO, XM82

This cartridge is used in rifles and machineguns for Army training programs for 7.62-mm weapons. This cartridge consists of a primer and propellant contained in a brass cartridge case which is shaped to conform approximately to the configuration of a bulleted combat cartridge. The propellant is held in the cartridge by a wad. The mouth of the cartridge is sealed with a drop of red lacquer and then crimped to protect against air and moisture. The overall length of the cartridge is 2.61 inches.

65. CARTRIDGE, 7.62 MILLIMETER DUMMY: NATO, M63

This type of cartridge which is completely inert, is used to train personnel in the handling and loading of 7.62-mm rifles and machineguns. The cartridge case is made of brass and has six longitudinal corrugations approximately one-third the length of the case. This cartridge simulates service ammunition in sufficient detail to meet drill requirements. The length of the cartridge is 2.80 inches. The bullet is 1.35 inches in length.

Section VI. GRENADE CARTRIDGES

66. General

By use of special blank cartridges (fig. 30), rifles assembled with launchers are used to project antitank, high explosive, fragmentation, illuminating, smoke, and chemical grenades; and ground signals. Thus, the range between that which can be reached by throwing a grenade and the minimum range for light mortar fire is covered. The grenade cartridges can be identified by the characteristic five petal rose crimp of the mouth of the case and the absence of a bullet. Additional technical data on grenade cartridges can be found in FM 23-30, TM 9-1900/TO 11A-1-20, and SM 9-5-1330.

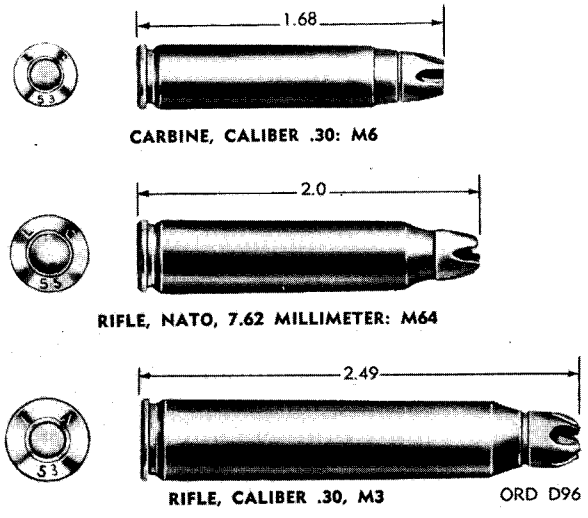


Figure 30. Caliber .30 and 7.62-mm grenade cartridges.

67. CARTRIDGE, GRENADE: Carbine, Caliber .30, M6

This grenade cartridge is loaded with approximately 20 grains of propellant. It is authorized for blank fire for training purposes. The brass cartridge case is 1.29 inches long and is loaded with approximately 21 grains of I.M.R. 4809 propellant and black powder. The complete cartridge weighs 103 grains and is 1.68 inches long. The case itself weighs 77 grains.

68. CARTRIDGE, GRENADE: Rifle, Caliber .30, M3

This cartridge is loaded with 51 grains of I.M.R. 4895 propellant. The complete cartridge weighs approximately 246 grains and is 2.49 inches long. The case weighs 200 grains.

69. CARTRIDGE, GRENADE: Rifle, 7.62-Millimeter; NATO, M64

The grenade cartridge, M64 is 2.0 inches long. It is loaded with #A4 black powder and propellant, I.M.R. 4895. The case weighs approximately 185 grains and the propellant nearly 41 grains. The cartridge was designed for use in 7.62-mm rifle M14 for projecting grenades.

Section VII. CALIBER .45 AMMUNITION

70. General

a. Ammunition for caliber .45 weapons is shown in figure 31. Caliber .45 bullets are shown in figure 32. Table XIX lists the component parts of these cartridges and table XX lists the weights of cartridges and components.

b. A caliber .45 blank line-throwing cartridge, which is different from the caliber .45 pistol cartridge, is also described in this section.

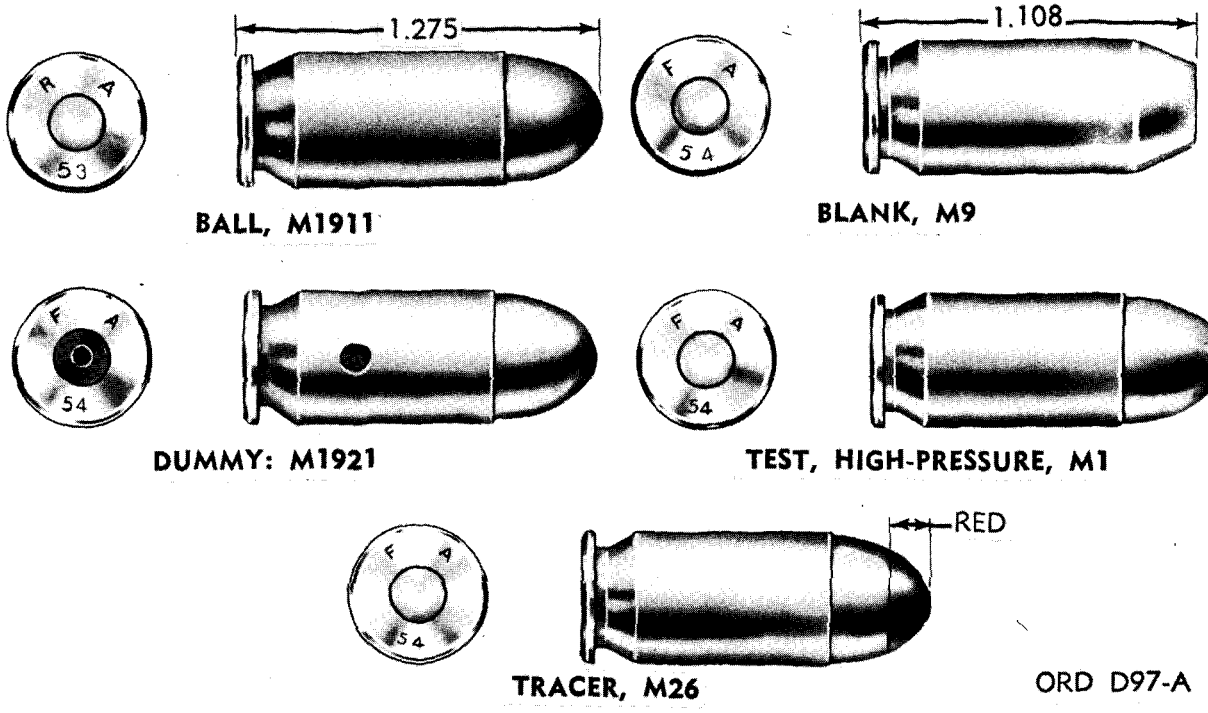


Figure 31. Caliber .45 cartridges.

71. CARTRIDGE, CALIBER .45: Ball, M1911

a. Cartridge. This cartridge is for use in caliber .45 automatic pistols and submachine-guns. This cartridge is also authorized for guard purposes. The cartridge is 1.275 inches long.

b. Bullet. The bullet consists of a gilding-metal-clad steel, or copper-plated steel jacket, and a slug of lead-antimony. The length of the bullet is 0.68 inch.

c. Accuracy with Muzzle Rest. The average of the mean radii of all targets at time of acceptance at 50 yards is not greater than 2 inches.

d. Penetration. Penetration, using the automatic pistol M1911 and M1911A1, in white pine is given in table XXI.

Table XIX. Component Parts of Caliber .45 Ammunition
(Corrosive and Noncorrosive Primers are Used in Cartridges Listed Below)

Cartridge	Cartridge case	Propellant	Bullet		
			Jacket	Slug	Tracer
Ball, M1911	Brass or steel	Single-base	Gilding-metal or gilding-metal-clad steel.[1]	Lead-antimony	
Blank, M9	Brass or steel	W. C. blank or ball.			
Dummy, M1921	Brass or steel		Gilding-metal or gilding-metal-clad steel.[1]	Lead-antimony	
HPT, M1	Brass or steel	Single-base	Copper-plated steel	Lead-antimony	
Tracer, M26	Steel	Single-base	Steel.[1]	Lead-antimony	Tracer and igniter composition.

[1] Copper-plated steel or gilding-metal-clad steel.

Table XX. Weights of Caliber .45 Ammunition (in Grains; Approx)

Cartridge	Complete (approx)	Cartridge case	Propellant	Primer	Bullet			
					Complete	Jacket	Slug	Tracer
Ball, M1911	319 [1] or 310.[2]	87 or 78.	5	4.5	234 or 231.	37 or 34.	197	
Blank, M9	91	87	7	4.5	(0.6)[3]			
Dummy, M1921	313 [1] or 301.[2]	87 or 78.			234 or 231.	37 or 34.	197	
HPT, M1	324 [1] or 312.[2]	87 or 78.	7	4.5	234 or 231.	37 or 34.	197	
Tracer, M26	291	78	6	4.5	208	34	171	5

[1] Brass case and gilding-metal-jacketed bullet.
[2] Steel case and gilding-metal-clad steel-jacketed bullet.
[3] Weight of closing wad.

Table XXI. Penetration in White Pine for Cartridge, Caliber .45, M1911, Fired from Pistol

Range	Depth
Yards	Inches
25	6.0
50	5.8
75	5.6
100	5.5
150	5.2
200	4.6
250	4.0

The penetration in moist loam at 25 yards is about 10 inches and in dry sand at 25 yards, it is about 8 inches.

e. Special, Reduced Load. This cartridge, with a reduced charge of propellant, is used in the inspection and testing of weapons.

72. CARTRIDGE, CALIBER .45: Tracer, M26

a. Cartridge. This cartridge is for use in all caliber .45 weapons for observation of fire, incendiary, and signal purposes. It is essentially the ball bullet M1911 with a tracer-filled cavity in the base. Early manufacture of this tracer cartridge was similar to that of cartridge, caliber .45: tracer M1, except for a steel cartridge case and a different type of propellant. The cartridge is 1.275 inches long and the tip of the bullet is painted red for identification purposes.

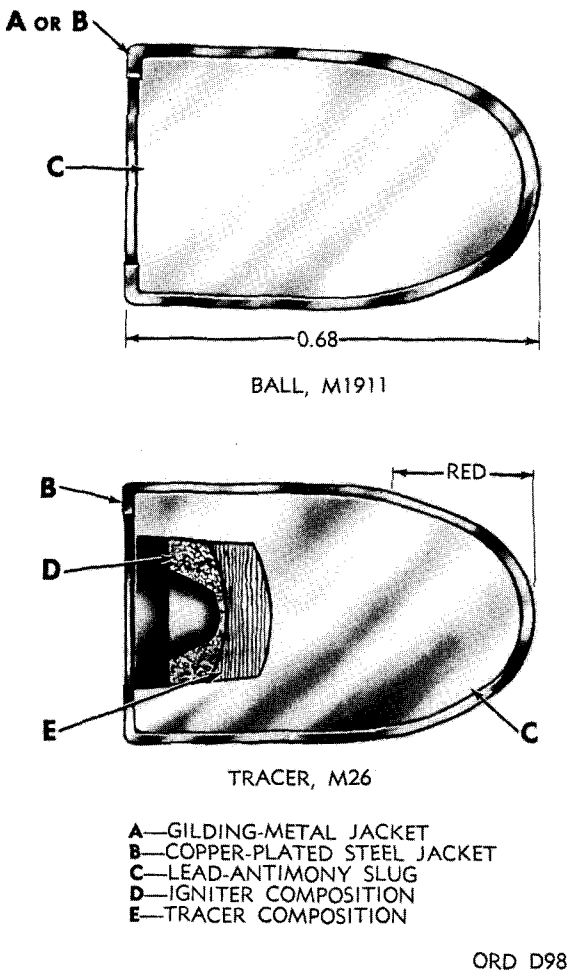


Figure 32. Caliber .45 bullets—sectioned.

b. Bullet. The bullet consists of a copper-plated steel, or gilding-metal-clad steel jacket, a slug of lead-antimony in the forward portion of the jacket, a tracer and igniter mixture in the rear portion, and a base closure seal which is made of gilding-metal. The bullet is 0.680-inch long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 50 yards is not greater than 5 inches.

73. CARTRIDGE, CALIBER .45 BLANK: M9

This cartridge is for use in caliber .45 automatic pistols. It is used in military animal training program where simulated fire is desired. The blank cartridge can be fired in the automatic pistol only by manual operation of the slide. The cartridge is 1.108-inches long and can be identified by the absence of a bullet and the tapered mouth of the case.

74. CARTRIDGE, CALIBER .45 DUMMY: M1921

a. Cartridge. This cartridge is used to train personnel in the operation of loading and unloading caliber .45 weapons and to simulate firing. It is also used as a range dummy cartridge in the automatic pistol. In this latter use, the dummy cartridge M1921 is mixed with live ammunition in pistol magazines, the purpose being to detect and correct flinching and faulty trigger squeeze. The cartridge is 1.275-inches long. The cartridge case may be made of brass or steel. The brass case can be identified by the empty primer pocket and two holes drilled in the side of the case. The steel case has no holes drilled in the side of the case and is zinc-plated and chromate treated.

b. Bullet. The bullet is the same as that used for the ball cartridge, M1911.

75. CARTRIDGE, CALIBER .45: Test, High-Pressure, M1

This cartridge is used for the proof firing of caliber .45 weapons and barrels at the place of manufacture. It contains a propellant which will develop a chamber pressure of 22,000 ± 1,000 psi. This pressure is approximately 4,000 pounds in excess of that required in caliber .45 service ammunition. Due to the danger involved in firing, this cartridge should be fired only from fixed rest under a hood by means of a mechanical firing device, and only by authorized personnel. The cartridge is 1.275-inches long. This cartridge case may be made of brass or steel. The brass case is stannic stained. The steel case is zinc-plated for identification purposes and to serve as a protective coating. The bullet is identical to the one used for the ball cartridge M1911.

76. CARTRIDGE, CALIBER .45, LINE-THROWING: Blank, M32

The cartridge (fig. 33) consists of a standard commercial cartridge case, 45-70 Government, fitted with a noncorrosive primer and a propellant. The propellant is covered with one or more felt wads. A waterproof compound, applied to the outermost wad, secures it in place and seals the cartridge against the entrance of moisture.

The cartridge will fire a 256-gram (approx. ½ lb.) projectile attached to a standard Navy line for a minimum of 75 yards at 30° elevation. The mouth of the cartridge case has a slight roll crimp to prevent the end of the line-carrying projectile from entering the case.

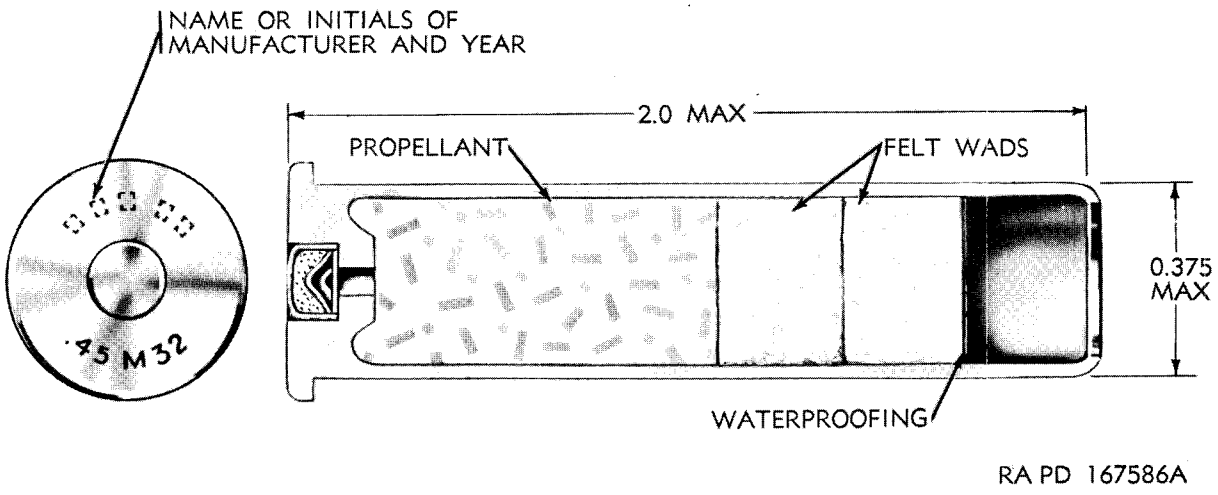


Figure 33. Cartridge, caliber .45, line-throwing: blank, M32.

Section VIII. CALIBER .50 AMMUNITION

77. General

Ammunition for caliber .50 machineguns is shown in figures 34 through 37. Ammunition for the caliber .50 spotting rifle, M8, which is used as a special purpose spotting rifle for 106-millimeter recoilless rifle, is shown in figure 38. Caliber .50 bullets are shown in figures 39 and 40. Table XXII lists component parts of these cartridges and table XXIII lists the weights of cartridges and components. Additional information relative to caliber .50 aircraft ammunition can be found in TM 9-1900 and TM 9-1901-1.

Table XXII. Component Parts of Caliber .50 Ammunition
(Corrosive and Noncorrosive Type Primers Used in all Cartridges Listed Below)

Cartridge	Cartridge case	Propellant	Bullet			
			Jacket	Core or slug	Point filler	Base filler
AP, M2	Brass	Single-base or double-base ball.	Gilding-metal	Manganese-molybdenum steel.	Lead-antimony	
API, M8	Brass	Single-base	Gilding-metal	Tungsten-chrome steel.[1]	Incendiary comp.	Lead-antimony.
API-T, M20	Brass	Single-base	Gilding-metal	Tungsten-chrome steel.[1]	Incendiary comp.	Tracer and igniter comp.
Ball, M2	Brass	Single-base or double-base ball.	Gilding-metal	Steel	Lead-antimony	
Ball, M33	Brass	Single-base or double-base ball.	Gilding-metal	Steel	Sodium carbonate monohydrate.	Lead-antimony.
Blank, M1	Brass	Double-base ball				
Dummy, M2	Brass [2]	None	Gilding-metal-clad steel or gilding metal.	([3])	([3])	

See footnotes at end of table.

Table XXII. Component Parts of Caliber .50 Ammunition — Continued
(Corrosive and Noncorrosive Type Primers Used in all Cartridges Listed Below)

Cartridge	Cartridge case	Propellant	Bullet			
			Jacket	Core or slug	Point filler	Base filler
HPT, M1	Brass	Single-base	Gilding-metal	Front and rear lead-antimony.		
Incendiary, M1.	Brass	Single-base	Gilding-metal	Steel body w/ lead-antimony slug.	Incendiary comp.	Lead-antimony.
Incendiary, M23.	Brass	Single-base or double-base ball.	Gilding-metal	Gilding-metal-clad steel container w/lead-antimony slug.	Incendiary comp.	
Tracer, M1	Brass	Single-base or double-base ball.	Gilding-metal-clad steel or gilding-metal.	Lead-antimony		Tracer and igniter comp.
Tracer, M10	Brass	Single-base or double-base ball.	Gilding-metal-clad steel.	Lead-antimony		Tracer and igniter comp.
Tracer, M17	Brass	Single-base	Gilding-metal-clad steel.	Lead-antimony		Tracer and igniter comp.
Tracer, headlight, M21.	Brass	Single-base	Gilding-metal or gilding-metal-clad steel.	Lead-antimony		Tracer and igniter comp.
Spotter, Tracer, M48,M48A.	Brass	Single-base	Gilding-metal	Lead-antimony	Aluminum-alloy-container and incendiary comp.	Tracer and igniter comp.

[1] Alternative material is manganese-molybdenum steel.
[2] May also be manufactured with steel cartridge case.
[3] After 1 January 1943, no core, slug, or filler was used in manufacture of dummy bullets, M2.

Table XXIII. Weights of Caliber .50 Ammunition
(In Grains; Maximum Permitted in Manufacture)

Cartridge	Complete (approx)	Cartridge case	Propellant (approx)	Primer	Bullet				
					Complete	Jacket	Core or slug	Point filler	Base filler
AP, M2	1,822 or 1,812.	850	235	19.06	[1]178 or 708.	253	[1]410 or 400.	56.5	
API, M8	[1]1,739 or 1,726.	850	233	19.06	[1]622 or 649.	235	375	15	11.5
API-T, M20	[1]1,698 or 1,636.	850	230	19.06	[1]624 or 612.	235	355	14	14
Ball, M2	1,813	850	235	19.06	709.5	253	400	56.5	
Ball, M33	1,768	850	237	19	661.5	235	400	15	11.5
Blank, M1	891	850	46	19.06				(wad, 1.5)	
Dummy, M2									
w/clad steel bullet	1,214	[2]850			364	364	([3])	([3])	
w/gilding-metal bullet.	1,248	[2]850			404	404	([3])	([3])	

See footnotes at end of table.

Table XXIII. Weights of Caliber .50 Ammunition — Continued
(In Grains; Maximum Permitted in Manufacture)

Cartridge	Complete (approx)	Cartridge case	Propellant (approx)	Primer	Bullet				
					Complete	Jacket	Core or slug	Point filler	Base filler
HPT, M1	2,108	850	240	19.06	999	263	Front-325 Rear-411	.....	.....
Incendiary, M1	1,703	850	240	19.06	633	235	137	34	.....
Incendiary, M23	1,581	850	237	19.06	512	235	Container 85.	90	102
Spotter-tracer, M48A1.	1,651	890	112	19	823	284	324	.....	.....
Tracer, M1									
w/gilding-metal jacket.	1,785	850	240	19.06	681	398	207	.....	70
w/clad steel jacket.	1,750	850	240	19.06	641	365	207	.....	.....
Tracer, M10	1,752	850	240	19.06	643	365	207	.....	70
Tracer, M17	1,742	850	225	19.06	643	365	207	.....	70
Tracer, headlight, M21									
w/gilding-metal jacket.	1,808	850	240	19.06	699	398	207	.....	93
w/clad steel jacket.	1,775	850	240	19.06	666	365	207	.....	.....

[1] Weight with alternate manganese-molybdenum steel core.
[2] Steel cartridge case which may be used weighs 750 grains.
[3] After 1 January 1943, no bullet core, slug, or filler was used in manufacture of dummy cartridges, M2.

78. Ballistics

The trajectories of caliber .50 service types of ammunition, except the incendiary M23 for aircraft use, match at 600 yards. The time of flight does not differ by more than 0.1 second under specified conditions. The incendiary M23 bullet weighs nearly 500 grains and has a muzzle velocity of 3,450 fps. Ballistic data are given in Firing Tables 0.50-H-1 and 0.50AA-T-1. Additional information is contained in the paragraph on each cartridge.

79. CARTRIDGE, CALIBER .50: Armor-Piercing, M2

a. Cartridge. This cartridge is for use in caliber .50 machineguns. The AP M2 cartridge is designed for use against armored aircraft, armored vehicles, concrete shelters, and similar bullet-resisting targets. The cartridge is 5.45 inches long and can be identified by its black bullet tip.

b. Bullet. The bullet consists of a gilding-metal jacket, a hardened core of manganese-molybdenum steel, and a point filler of lead-antimony. The overall length of the bullet is 2.31 inches. The bullet has a boattailed base.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 10 inches.

d. Penetration. Penetration data are given in tables XXIV and XXV.

80. CARTRIDGE, CALIBER .50: Armor-Piercing-Incendiary, M8

a. Cartridge. This cartridge is for use in caliber .50 machineguns. The API M8 cartridge was designed to replace the incendiary cartridge M1 and armor-piercing cartridge M2. This cartridge is 5.45 inches long and can be identified by its aluminum color bullet tip.

b. Bullet. The bullet contains the same core as the armor-piercing bullet, caliber .50: M2, but the point filler is replaced by an incendiary composition and the bullet also contains a lead-antimony base filler seal. The length of the bullet is 2.31 inches.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

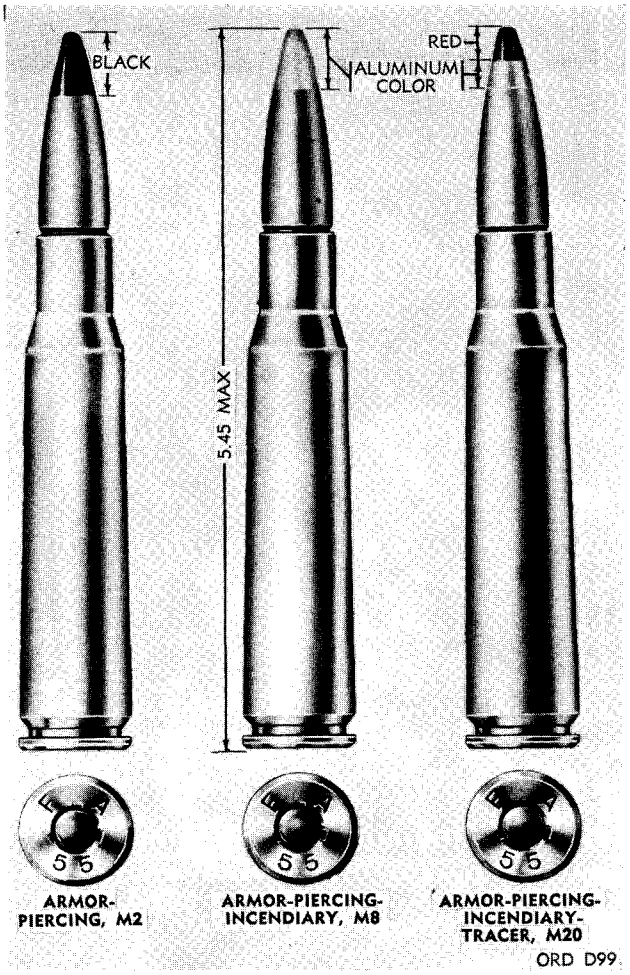


Figure 34. Caliber .50 cartridges.

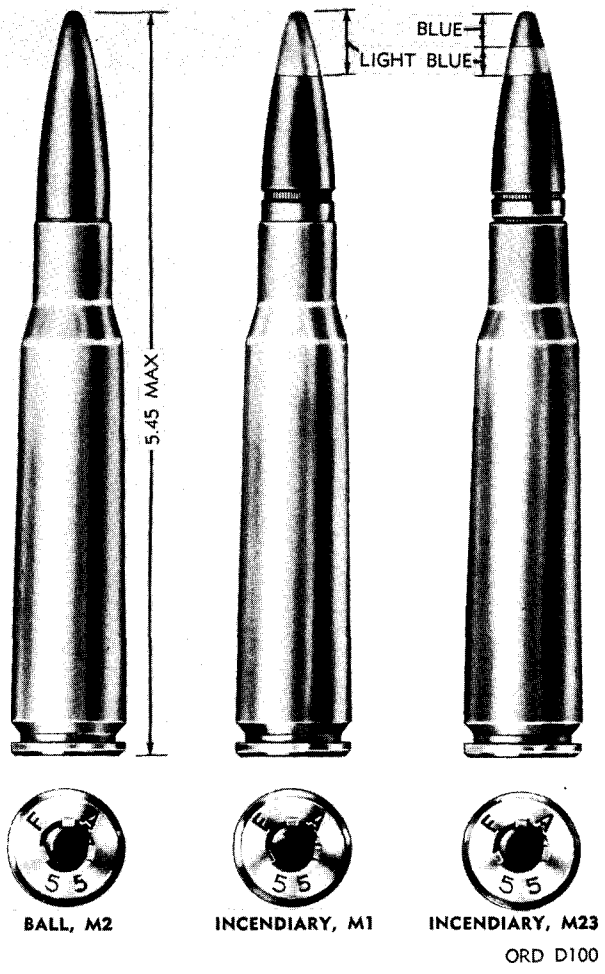


Figure 35. Caliber .50 cartridges.

d. Penetration. Penetration ability is almost equal to that of the armor-piercing bullet, caliber .50, M2. The bullet will perforate ⅞-inch thick homogeneous armor plate at normal impact at 100 yards, and ⅝-inch face hardened plate at 30° impact at 100 yards. The ballistic limit at normal impact against ⅜-inch face-hardened plate is 2,467 fps, the ballistic limit at 30 degrees from normal is 2,264 fps.

81. CARTRIDGE, CALIBER .50: Armor-Piercing-Incendiary-Tracer, M20

a. Cartridge. This cartridge is for use in caliber .50 machineguns. The API-T, cartridge M20 is similar to the armor-piercing-incendiary caliber .50, M8 cartridge with the addition of a tracer element. The use of this cartridge makes tracer ammunition unnecessary in machinegun belts. The cartridge is 5.45 inches long and can be identified by the tip of its bullet which is painted red with an aluminum annulus to the rear.

b. Bullet. The bullet is similar to the armor-piercing-incendiary bullet, caliber .50, M8 but it differs in having a tracer. Visible trace begins at approximately 100 yards from the muzzle to approximately 250 yards, where it changes to a bright trace which continues to approximately 1,750 yards, but not less than 1,600 yards.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

d. Penetration. Complete penetration of ⅞-inch thick homogeneous armor plate, normal angle of incidence, is obtained at 100 yards.

82. CARTRIDGE, CALIBER .50: Ball, M2

a. Cartridge. This cartridge is for use in caliber .50 machineguns. It is 5.45 inches long.

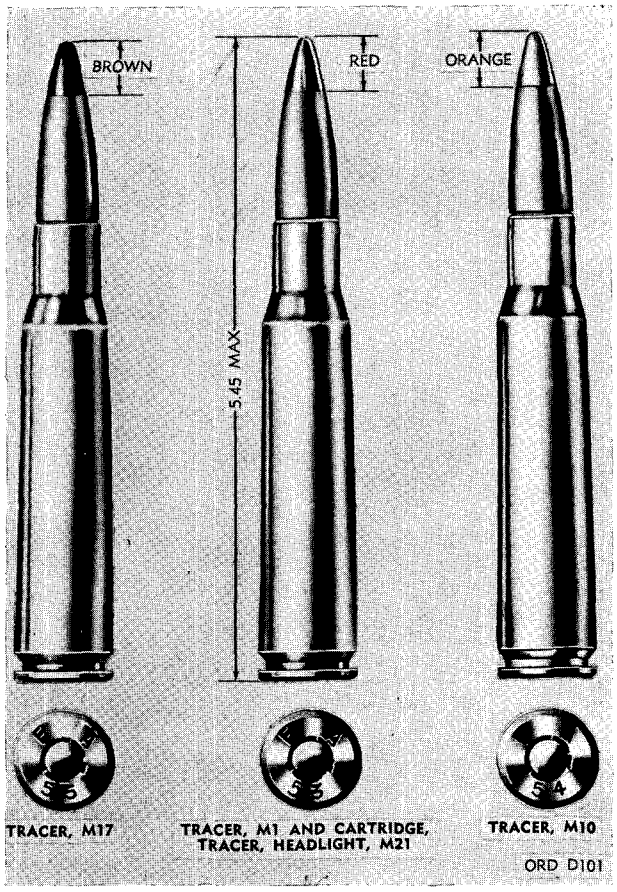


Figure 36. Caliber .50 cartridges.

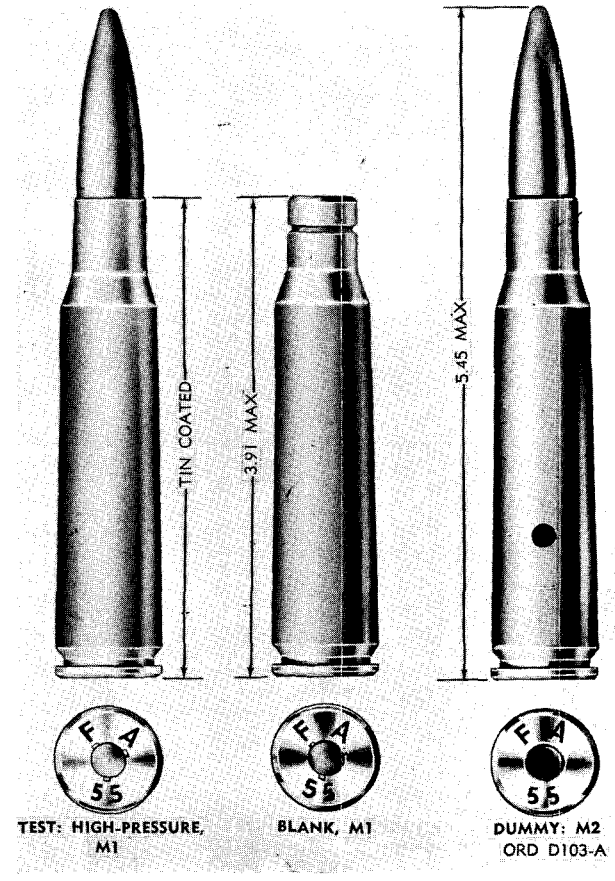


Figure 37. Caliber .50 cartridges.

The tip of the bullet is unpainted.

b. Bullet. The bullet consists of a gilding-metal jacket, a soft steel core, and a point filler of lead-antimony alloy. The bullet is boattailed and is 2.31 inches long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 9 inches.

d. Penetration. Penetration data are given in table XXVI.

83. CARTRIDGE, CALIBER .50: Ball, M33

a. Cartridge. This cartridge was designed to replace the ball caliber .50 cartridge M2 and to duplicate ballistics of an inert API caliber .50 cartridge M8. The ball cartridge M33 is designed for general use where tracer, incendiary, or armor penetration characteristics are not important considerations. The cartridge is 5.45 inches long. The external appearance of this cartridge is the same as the ball cartridge M2. The ball cartridge M33 can be identified by markings stenciled on the packing containers.

b. Bullet. The bullet consists of a jacket of gilding-metal or gilding-metal-clad steel, a soft steel core, and a loose or pelletized sodium carbonate monohydrate point filler. The bullet is 2.31 inches long and has a boattailed base.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

84. CARTRIDGE, CALIBER .50: Incendiary, M1

a. Cartridge. This cartridge is for use in caliber .50 machineguns. The cartridge is 5.45 inches long. It can be identified by the bullet tip, which is painted light blue, and by a second knurled cannelure rolled into the bullet jacket.

b. Bullet. The bullet is similar in size and shape to the armor-piercing bullet, caliber .50, M2. The incendiary bullet, caliber .50, M1 consists of a gilding-metal jacket, a hollow cylindrical steel body, a lead-antimony base slug, and a point filler of incendiary composition.

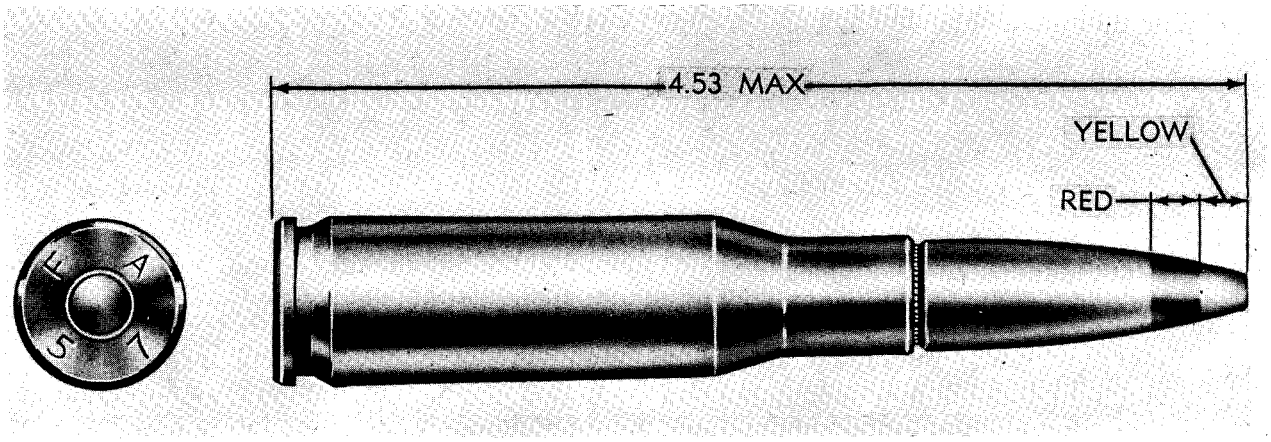


Figure 38. Caliber .50 cartridges.

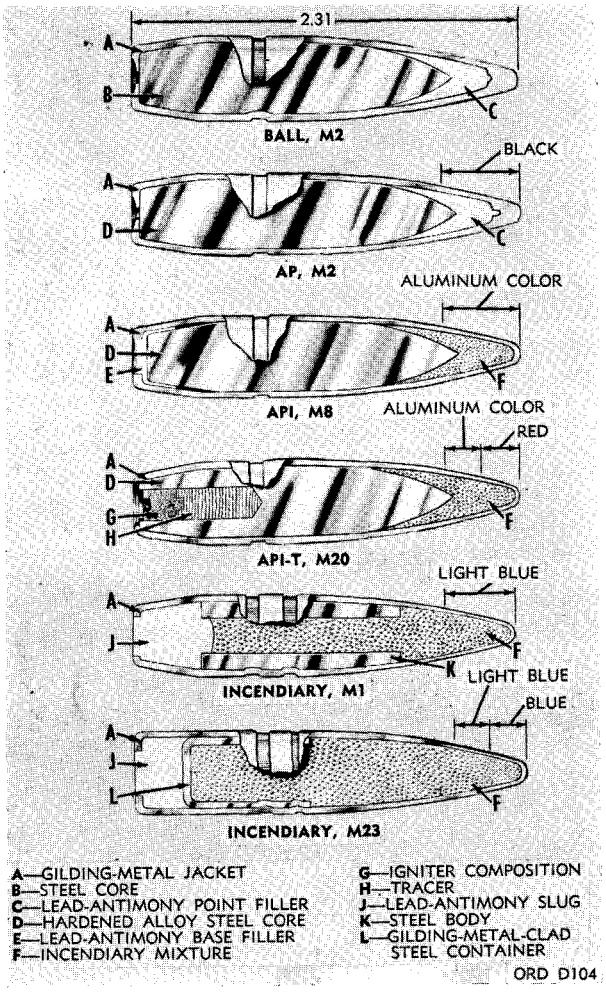


Figure 39. Caliber .50 bullets—sectioned.

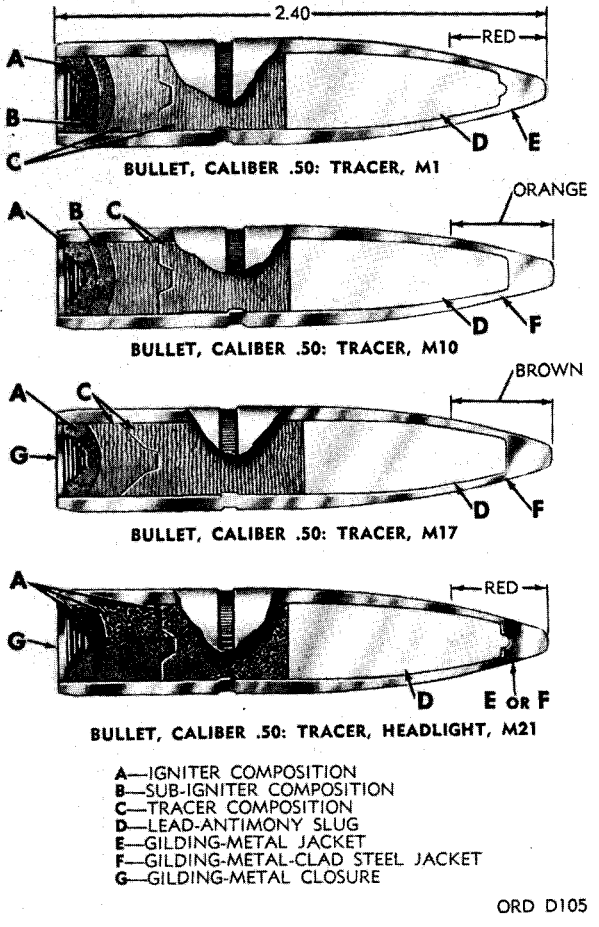


Figure 40. Caliber .50 bullets—sectioned.

The bullet has a boattailed base and is 2.09 inches long.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

85. CARTRIDGE, CALIBER .50: Incendiary, M23

a. Cartridge. This cartridge is for use only in caliber .50 aircraft machineguns. The incendiary cartridge, M23 has a higher velocity than the incendiary cartridge M1 and is more effective as an incendiary against aviation kerosene. The cartridge is 5.45 inches long and can be identified by the bullet tip, which is painted medium blue with a light blue annulus to the rear.

Table XXIV. Penetration in Inches for Caliber .50 Armor-Piercing Cartridge, M2, in 45-Inch Barrel (MV 2935 fps)

Material	Inches at:		
	200 yards	600 yards	1,500 yards
Armor plate (homogeneous)	1.0	0.7	0.3
Armor plate (face-hardened)	0.9	0.5	0.2
Sand (100 lb dry wt/cu ft)	14	12	16
Clay (100 lb dry wt/cu ft)	28	27	21

Table XXV. Number of Armor-Piercing Cartridges, Caliber .50, M2 Required to Defeat Reinforced Concrete at 25° Obliquity

Thickness of concrete (feet)	Range	
	100 yards	200 yards
2	300	1,200
3	450	1,800
4	600	2,400
5	750	3,000

Table XXVI. Penetration in Inches for Ball Cartridges, Caliber .50, M2 in 45-Inch Barrel (MV 2,935 fps)

Material	Inches at:		
	200 yards	600 yards	1,500 yards
Sand (100 lb dry wt/cu ft)	14	12	16
Clay (100 lb dry wt/cu ft)	28	27	21
Concrete	2	1	1

b. Bullet. The bullet is similar in external appearance to the incendiary bullet M1. The incendiary bullet M23 consists of a gilding-metal jacket, a gilding-metal-clad steel container, a lead-antimony base slug, and a point filler of incendiary composition. The weight of incendiary composition is greater than that in the incendiary bullet M1. The bullet is 2.29 inches long and has a square base.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 12 inches.

86. CARTRIDGE, CALIBER .50: Spotter-Tracer, M48

This cartridge differs from the spotter-tracer cartridge described in paragraph 87 in that the cartridge case does not utilize a flash tube and the propellant is composed of double-base small-arms propellant.

87. CARTRIDGE, CALIBER .50: Spotter-Tracer, M48A1

a. Cartridge. This cartridge is used in the caliber .50 spotting rifle, M8, for spotting the target for the gunner before firing the 106-millimeter rifle, M40 Series. The brass cartridge case is 4.53 inches long. It contains approximately 117.5 grains of extruded single-base tubular propellant and a percussion primer. The case is crimped to the bullet by means of a 360° roll crimp. This case is fitted with a flash tube 0.984 inch long and an orifice diameter of 0.093 inch. The flash tube extends from the primer vent toward the mouth of the case. This cartridge can be identified by its bullet tip which is painted yellow with a red annulus to the rear. This cartridge is not authorized for other caliber .50 rifles and will not chamber in these weapons.

b. Bullet. The bullet has a gilding-metal jacket containing an incendiary charge in an aluminum alloy container and a tracer and igniter composition in a steel container. Upon contact with a target, the bullet will produce a flash and a light puff of smoke. The trace begins at a distance not greater than 100 yards from the muzzle and continues to a distance of approximately 1,500 yards. The bullet is 2.70 inches long.

c. Accuracy. The average of the mean radii of all targets at the time of acceptance at 600 yards is not greater than 5 inches.

88. CARTRIDGE, CALIBER .50: Tracer, M1

a. Cartridge. This cartridge is used for observation of fire in caliber .50 ground machineguns. It is limited to use in the continental United States for training purposes only. It is replaced in combat use by the CARTRIDGE, CALIBER .50: tracer, M17. Care must be exercised when using this cartridge to prevent it from igniting dry vegetation on the range. This cartridge is 5.45 inches long and can be identified by the tip of its bullet which is painted red.

b. Bullet. The bullet consists of a gilding-metal or a gilding-metal-clad steel jacket, a lead-antimony slug which fills the forward end of the jacket, and the tracer and igniter compositions which fill the balance. Unlike the bullets for armor-piercing and ball cartridges, this bullet is cylindrical to the base which is open to permit the propelling charge to ignite the tracer composition. The overall length of the bullet is 2.40 inches. The trace begins at a distance not greater than 250 feet from the weapon and the range of trace is 1,600 to 1,800 yards.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 20 inches.

89. CARTRIDGE, CALIBER .50: Tracer, M10

a. Cartridge. This cartridge is for observation of fire in all caliber .50 aircraft machineguns. The tracer cartridge M10 serves the same purposes as the tracer cartridge, M1 (par. 88). The cartridge is 5.45 inches long and can be identified by the bullet tip, which is painted orange.

b. Bullet. The description and exterior ballistics for the tracer bullet M1 with gilding-metal-clad steel jacket are applicable to the tracer bullet M10, except that the M10 has a dim or invisible trace for the first 225 yards of flight followed by a bright trace to a distance of not less than 1,600 yards from the gun.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 20 inches.

90. CARTRIDGE, CALIBER .50: Tracer, M17

a. Cartridge. This cartridge can be used as a substitute for cartridge, caliber .50: API-T, M20, except that penetration is not so great. This type ammunition was designed to replace the tracer cartridge, M1, for use in caliber .50 ground and aircraft machineguns. The cartridge is 5.45 inches long and can be identified by the bullet tip, which is painted brown. The tips of the bullets manufactured prior to 1952 were painted maroon.

b. Bullet. The description and exterior ballistics for the tracer bullet M1 with gilding-metal-clad steel jacket are applicable to the tracer bullet, M17, except that the M17 bright traces to approximately 2,450 yards of flight. Trace begins at a point not greater than 250 yards from the weapon. Tracer cartridges M17 manufactured since 1950 contain a gilding-metal cup or a vinylite disk, designated as a bullet base closure seal, in the base of the bullet. This seal is intended to prevent chemical action between the bullet tracer composition and the residual moisture in the propellant and, accordingly, to prolong the shelf life of this cartridge.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 20 inches.

91. CARTRIDGE, CALIBER .50: Tracer, Headlight, M21

a. Cartridge. This cartridge is for caliber .50 aircraft machineguns for use in combat against other aircraft. When viewed from the front, its trace due to the use of certain igniter composition instead of tracer composition such as is used in tracer bullet M1, is three times as brilliant as the light of the tracer bullet M1. The tracer M21 has some incendiary effect at 150 to 350 yards, but is negligible at 600 yards. The cartridge is 5.45 inches long and can be identified by the bullet tip, which is painted red.

b. Bullet. The description and exterior ballistics of the tracer bullet M1 are applicable to the tracer bullet M21, except that the M21 has a very bright trace to approximately 550 yards.

c. Accuracy. The average of the mean radii of all targets at time of acceptance at 600 yards is not greater than 20 inches.

92. CARTRIDGE, CALIBER .50: Test, High-Pressure, M1

a. Cartridge. This cartridge is an item of issue and is used for proof firing of caliber .50 machineguns at the place of manufacture or rebuild. The cartridge is loaded with a propellant charge sufficient to develop a chamber pressure from 60,000 to 65,000 psi. Due to this excessive pressure and the danger involved in firing, the guns under test are fired from a fixed rest under a hood by means of a mechanical firing device. This cartridge should be fired only by authorized personnel. The cartridge is 5.45 inches long. The HPT, M1 cartridge differs from other caliber .50 cartridges in that it has a tinned cartridge case.

b. Bullet. The bullet consists of a gilding-metal jacket and a core made up of two lead-antimony alloy slugs, a front slug and a rear slug. The length of the bullet is 2.42 inches. The bullet has a square base.

93. CARTRIDGE, CALIBER .50 BLANK: M1

This blank cartridge is for use in caliber .50 aircraft machineguns when these weapons are fitted with blank firing attachments for training operations. The cartridge is 3.910 inches long and can be identified by the absence of the bullet. The cartridge case has a slight annular groove about ¼ inch from the mouth. This groove serves as the seat for the wad. The wad is a disk punched out of a kraftboard or strawboard sheet 1/16 inch thick and it is lacquered on both sides before insertion into the mouth of the case. After loading, a heavy coat of vermillion lacquer is applied to the wad and the mouth is crimped.

94. CARTRIDGE, CALIBER .50 DUMMY: M2

a. Cartridge. This cartridge is for use in all caliber .50 machineguns for training purposes. The dummy cartridge M2 may also be used for testing the mechanism of weapons. The cartridge is 5.45 inches long. The cartridge case may be made of steel or brass. This cartridge can be identified by three holes drilled in the side of the case and an empty primer pocket.

b. Bullet. The bullet has a gilding-metal or gilding-metal-clad steel jacket making it lighter than older types which had a steel core and lead point filler. The bullet is 2.40 inches long and has a square base.

95. Cartridges with Deteriorated Tracer Elements

Armor-piercing-incendiary-tracer and tracer-types of caliber .50 cartridges with deteriorated tracer elements, as listed in SM 9-5-1305 may be substituted for ball ammunition for training requirements within the continental United States.

Section IX. SHOTGUN AMMUNITION

96. General

Shotgun cartridges are procured commercially by the Ordnance Corps for use in shotguns of various gages. These cartridges are used for combat, guard, and survival purposes. All shotgun cartridges have the same general appearance and may be identified by the stamping on the head, body, and closing wad. Shotgun cartridges are further identified by the markings on the packing containers and boxes. The weights of various shotgun cartridges and their components are listed in table XXVII, and the intended uses of different loadings are given in table XXVIII. Standardized shotgun cartridges are shown in figures 41 through 44.

Table XXVII. Weights of Shotgun Ammunition (Noncorrosive Metal Primers are used in all Cartridges)

Cartridge	Complete approx (grain)	Propellant charge (grain)	Shot (on)	Number of shot
No. 00 buckshot, all brass, M19, 12-gage.	930	[1]26	1⅛	9
No. 00 buckshot, paper 12-gage.	800	[1]26	1⅛	9
No. 6 for 3-inch chamber, .410-gage.	430	[2] 7	¾	170
No. 7½ for 3-inch chamber.	430	[2] 7	¾	260

[1] Weight in grains of dense smokeless propellant of which a 26-grain charge is a 3¾-dram equivalent of bulk propellant.
[2] Progressive burning commercial smokeless powder.

Table XXVIII. Intended Use of Different Shotgun Cartridges

Shotgun cartridges loaded with	Use	
	Combat (Service) and training	Hunting
No. 00 buckshot, brass case, 12-gage.	Combat and guard.	
No. 00 buckshot, paper case, 12-gage.	Combat and guard.	
No. 6 copper-coated shot, aluminum case, .410-gage.	.....	Small game for survival purposes.
No. 6 chilled shot, paper case. .410-gage.	.....	Small game for survival purposes.
No. 7½ chilled shot, paper case, .410-gage.	.....	Small game for survival purposes.

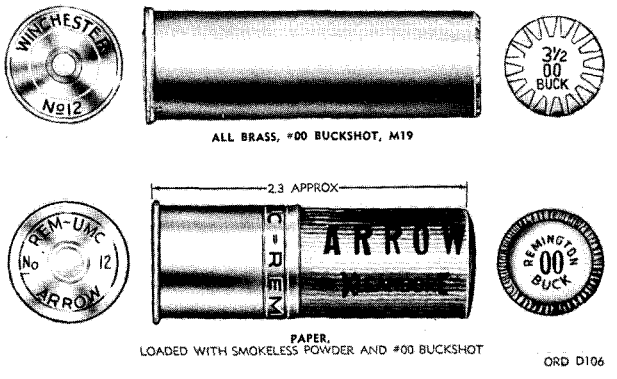


Figure 41. 12-Gage shotgun cartridges.

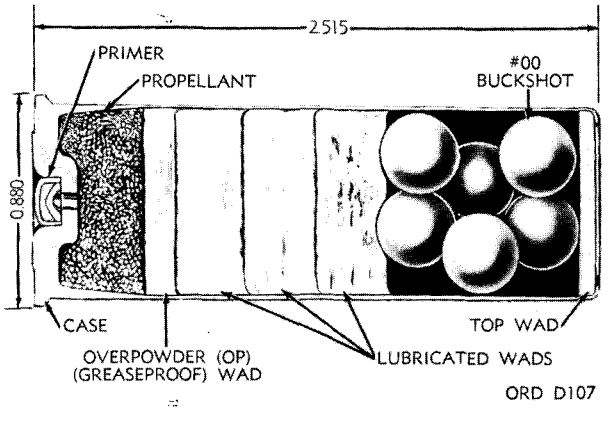


Figure 42. 12-Gage shotgun cartridges—sectioned.

97. 12-Gage Shotgun Ammunition

a. General. Some 12-gage shotguns of earlier manufacture have 2⅝-inch chambers. Shotgun cartridges made to be fired in these 2⅝-inch chamber shotguns may be fired in the standard 2¾-inch chamber shotguns. Shotgun cartridges must not be fired in the shotguns having a chamber length less than those for which designed and those marked on packing cartons and boxes, because dangerously high chamber pressures may develop. Shotgun cartridges should be fired only in authorized issue shotguns. Upon proper authorization the cartridges may be fired in shotguns chambered for the particular cartridges described, having fluid steel barrels, and having actions in good condition. Under no circumstances should these shotgun cartridges be fired in shotguns having Damascus or other twist steel barrels.

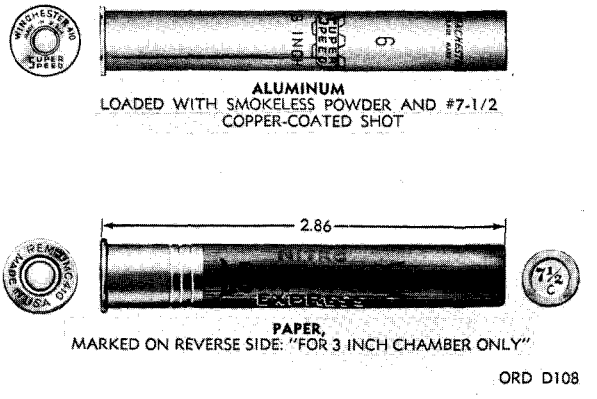


Figure 43. .410-Gage shotgun cartridges.

b. Description. Shotgun cartridges consist of a brass or steel head, a primer, a paper or metal body, a propelling charge, cardboard or felt wads, a load of lead shot, and a closing wad. The paper cases or bodies are waterproofed. The cartridge, 12-gage shotgun, M19, which is made of all brass, is used for guard and combat purposes only. Standardized 12-gage shotgun cartridges are —

(1) CARTRIDGE, 12-GAGE SHOTGUN: all brass, No. 00 buckshot, M19.

(2) CARTRIDGE, 12-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 00 buckshot.

c. Identification.

(1) *Case.* These cartridges may have waterproofed paper cases and metal heads or may be all brass. Most cartridges for guard and combat use have

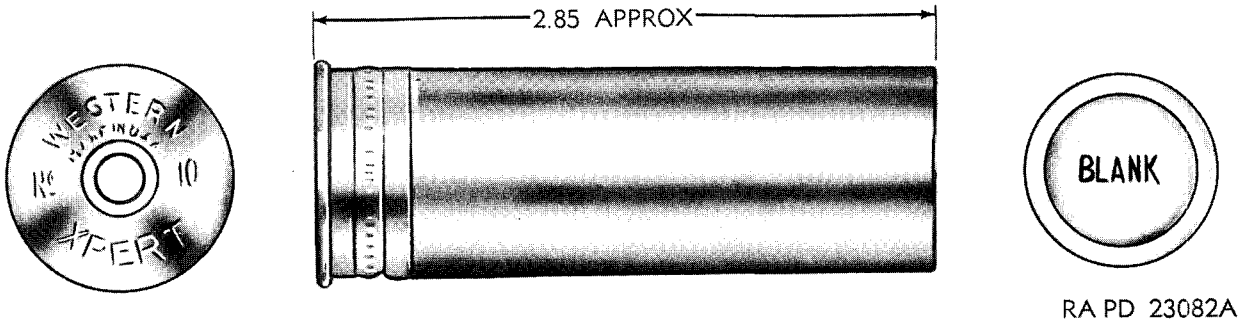


Figure 44. 10-Gage blank shotgun cartridge.

metal heads 0.80-inch or more in length; however, some have low metal heads of 0.35-inch length. Dimensions for the 12-gage case are 0.797 inch in diameter at the mouth and 0.880 inch in diameter at the rim.

(2) *Marking on top wad.* Numerals and letters marked on top wads indicate the quantity of propellant and the weight and size of shot load; e.g., "3-1 1/8-6C" indicates 3 drams equivalent of bulk propellant and 1⅛ ounces of #6 chilled shot. In addition, the name or symbol of the manufacture of the cartridge and of the propellant may be stamped on the top wad.

(3) *Marking on metal head and case.* The stamping on the metal head of the cartridge case generally consists of initials or symbols of the manufacturer, gage size of the cartridge, and trade name for the particular type of shotgun cartridge. The trade name and type of load is sometimes stamped on the case.

(4) *Packing containers.* Cases and cartons of this ammunition bear the commercial markings of the manufacturer and also the lot number, type of load, and the phrase "U. S. PROPERTY." These markings generally include manufacturer's name and address, quantity, gage size, gun chamber length, type of ammunition, type of propellant, and trade names.

d. Ballistic Data.

(1) *Patterns.* Shotguns and shotgun cartridges are so designed or chosen as to produce the desired pattern of pellets at the desired distance. Patterns are generally expressed as the percentage of total shot falling within a 30-inch circle at a distance of 40 yards from the muzzle. The type of barrel boring of the weapon is classified to patterns as given in table XXIX. To about 20 feet, there is little difference in patterns for any type of barrel boring or degree of choke. After the shot has traveled from 10 to 15 yards, the pattern begins to spread rapidly and to show the effect of type of barrel boring.

(2) *Table of fire.* Table XXX indicates the pattern or dispersion as a percentage of the total number of shot falling within a circle of a 30-inch diameter at the range indicated. The approximate pattern spread is also indicated. These values are only approximate since there is considerable variation in shotgun ballistics. This variation may be due not only to a particular loading but also to atmospheric conditions.

Table XXIX. Type of Barrel Boring Used in Shotguns

Barrel boring	Pattern percentage in 30-inch circle at 40 yards
Full choke	70%
Modified choke	60%
Improved cylinder	50%
Cylinder	40%

Table XXX. Percentage of Shot in 12-Gage Shotgun Cartridge Falling within a 30-inch Diameter Circle

Range in yards	Guard or combat load[1]		Range in yards	Guard or combat load[1]	
	Fired in 30-inch full choke barrel	Fired in 26-inch cylinder bore barrel		Fired in 30-inch full choke barrel	Fired in 26-inch cylinder bore barrel
5	100%	100%	35	90%	70%
10	100%	100%	40	75%	60%
15	100%	100%	45	.....	.....
20	100%	100%	50	50%	38%
25	100%	100%	55	.....	.....
30	100%	100%	60	35%	25%
Maximum effective range.	60-70 yds	60-75 yds	Maximum effective range.	60-70 yds	60-75 yds
Pattern spread per yard.	¾ inch	1 inch	Pattern spread per yard.	¾ inch	1 inch

[1] Contains 9 (1⅛ oz.) No. 00 buckshot.

98. .410-Gage Shotgun Ammunition

Shotgun cartridges of .410-gage (fig. 43) are for use in the rifle/shotgun, survival, caliber .22/.410-gage, M6 with 3-inch chamber. The description, use, identification, patterns, and ranges are similar to those for 12-gage shotgun cartridges. The diameter of the .410-gage cartridge case at the head is 0.53 inch and at the mouth is 0.448 inch. Standardized .410-gage shotgun cartridges are —

a. CARTRIDGE, .410-GAGE SHOTGUN: all aluminum, loaded with smokeless powder and No. 6 copper-coated shot, M35 (T135).

b. CARTRIDGE, .410-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 6 chilled shot.

c. CARTRIDGE, .410-GAGE SHOTGUN: paper, loaded with smokeless powder and No. 7½ chilled shot.

99. CARTRIDGE, 10-GAGE, BLANK

This blank cartridge (fig. 44) is authorized for optional use for reveille and retreat salutes in 3-inch gun, 75-mm gun, 75-mm howitzer, or the 105-mm howitzer. This cartridge is similar to the shotgun cartridges described in the preceding paragraphs. It has a propelling charge of approximately eight grains of black powder which is kept in place by means of dry felt pads. A chipboard closing cup or palmetto pulp plug is inserted in the mouth of the cartridge case and sealed to hold the propelling charge in place. This cartridge is 2.85 inches long and weighs approximately 290 grains.

CHAPTER 4

MISCELLANEOUS SMALL-ARMS AMMUNITION

Section I. CALIBER .32 AMMUNITION

100. General

Caliber .32 cartridges may be fired from both pistols and revolvers. A typical cartridge of this type is shown in figure 45. Ballistic data for these cartridges are given in table XXXI.

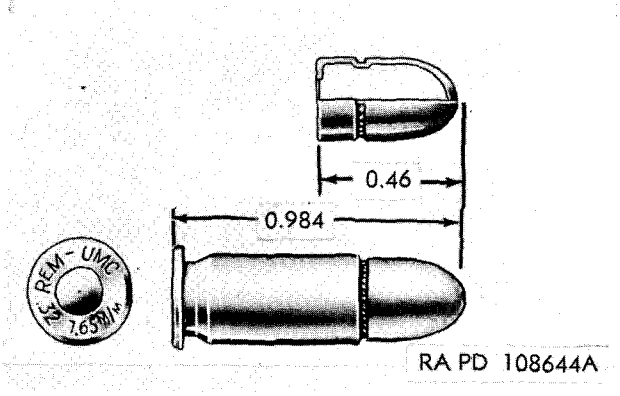


Figure 45. Cartridge, caliber .32: ball, colt automatic pistol, 71- or 74-grain bullet.

101. CARTRIDGE, CALIBER .32: Ball, Colt Automatic Pistol, 71- or 74-Grain Bullet

a. Cartridge. This cartridge is for use in caliber .32 automatic pistols and is also known as the 7.65-mm automatic pistol cartridge. This cartridge is 0.984 inch long and the case is 0.680 inch long. The diameter of the case at the head is 0.354 inch and at the mouth 0.331 inch. The complete cartridge weighs nearly 115 grains.

b. Bullet. The bullet consists of a gilding-metal jacket and a lead-alloy slug. The jacket is cannelured at the point where the case is crimped to the bullet. The bullet is 0.46 inch long. It will penetrate five ⅞ inch thick pine boards.

102. CARTRIDGE, CALIBER .32: Ball for Revolver S. & W., 88-Grain

a. Cartridge. This cartridge is for use in revolvers chambered for the caliber .32 S. & W. cartridge, such as the caliber .32 S. & W. revolver, but may also be used in weapons chambered for the caliber .32 S. & W. long cartridge. This cartridge is not adapted to revolvers chambered for .32 short Colt. The cartridge is 0.92 inch long and the case is 0.60 inch long. Diameter of the case at the head is 0.374 inch and at the mouth, 0.336 inch.

b. Bullet. The bullet is made of lead-antimony and is inside lubricated, i.e., the bullet cannelure containing the lubricating compound is hidden by the neck of the case in the assembled cartridge. The bullet is 0.54 inch long. It will penetrate 3½ pine boards, each ⅞ inch thick.

103. CARTRIDGE, CALIBER .32: Ball, Metal Jacketed for Revolver S. & W., 88-Grain

This cartridge is essentially the same as the cartridge described in paragraph 102 with the exception of the bullet which consists of a metal jacket and a lead-antimony slug.

Section II. 9 MILLIMETER AMMUNITION

104. General

The 9-millimeter cartridge may be fired in the submachinegun M3 converted to 9-mm operation by changing bolt and barrel; in Soumi submachineguns; in British 9-mm Sten and Lancaster machine carbines; in German

9-mm Pistole 08 (Luger), Pistole 38 (Walther), Machine Pistole 38 and 40, and Bergman and Solathurn machine carbines; and in Italian 9-mm (parabellum) Pistola 08 and Berretta machine carbine Mod 38.

105. CARTRIDGE, 9 MILLIMETER: Ball, M1, 116-Grain Bullet (Parabellum)

a. Cartridge. This cartridge is 1.155 inches long and the case is 0.754 inch long. Diameter of the case at the head is 0.394 inch and at the neck, 0.377 inch. Table XXXII lists the weights of cartridges and components.

b. Bullet. The bullet consists of a gilding-metal jacket and lead-antimony slug, and is 0.60 inch long.

c. Ballistic Data. Ballistic data for this cartridge are given in table XXXIII.

d. Penetration. The bullet will penetrate ten ⅞ inch pine boards.

Section III. CALIBER .38 AMMUNITION

106. General

Ammunition, cartridges, and bullets, for caliber .38 weapons are shown in figure 46 and for caliber .38 special revolvers in figure 47. Table XXXIV lists the weights of cartridges and components.

107. Ballistic Data

Ballistic data for caliber .38 ammunition are given in table XXXV and in FM 23-35.

108. CARTRIDGE, CALIBER .380: Ball, Automatic Pistol, 95-Grain Bullet, (9-mm Short)

a. Cartridge. This cartridge may be fired from caliber .380 automatic pistols, such as Colt, Remington, Webley, Savage, Browning, Bayard, Italian 9-mm (Short) Berretta Pistola, Mod. 34, and others. This cartridge cannot be fired from Colt caliber .38 automatic pistols.

Table XXXI. Ballistic Data for Caliber .32 Ammunition

Cartridge	Average maximum chamber pressure (psi)	Average velocities (fps)	
		Muzzle	At 25 feet
Cal. .32 A.C.P.	14,000	980	950
Cal. .32 S&W.	8,000	720	700

Table XXXII. Weights of Cartridge, 9 Millimeter, Ball, M1 (In grains: maxima permitted in manufacture)

Complete cartridge, approx	182
Cartridge case	57
Propellant, approx	6
Primer, approx	3.00
Bullet	116
Jacket	24.5
Slug	91.5

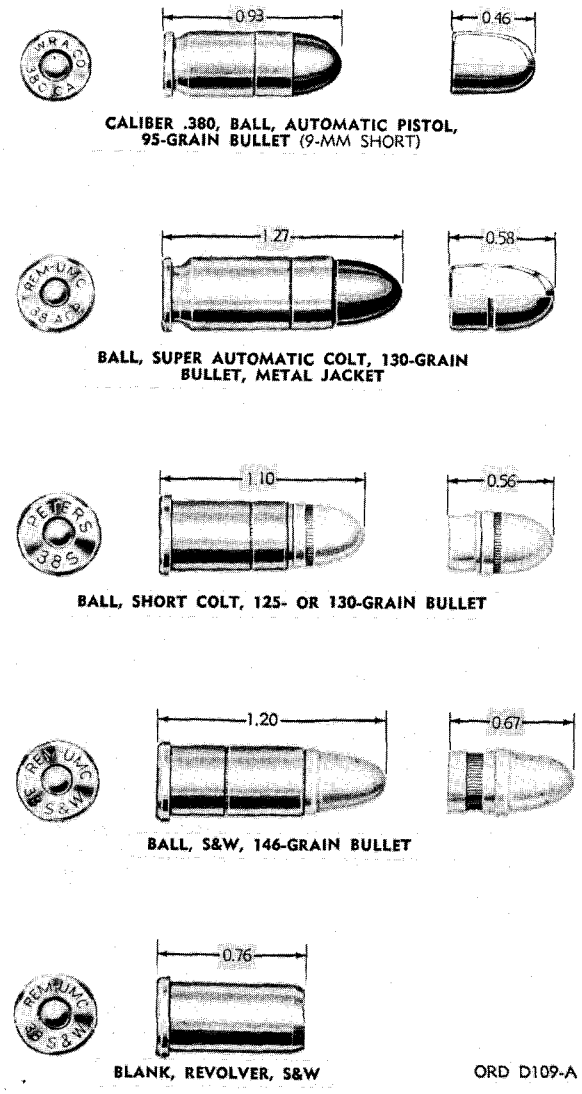


Figure 46. Caliber .38 cartridges.

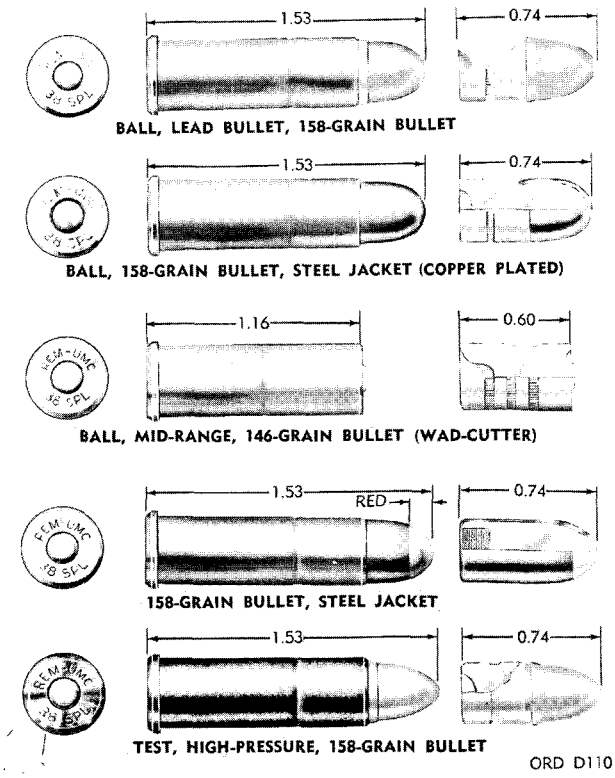


Figure 47. Caliber .38 special cartridges.

Table XXXIII. Ballistic Data for Cartridge, 9 Millimeter, Ball, M1

Average maximum chamber pressure (psi)	40,000
Average velocities (fps):	
At muzzle	1,400
At 25 feet	1,390 ± 25

The cartridge is 0.93-inch long and the rimless cylindrical case is 0.68 inch long. The diameter of the case head and body is 0.372 inch.

b. Bullet. The bullet consists of a metal jacket and lead-alloy slug. This bullet has no cannelure, is 0.46 inch long, and will penetrate 5½ pine boards, each ⅞ inch thick.

109. CARTRIDGE, CALIBER .38: Ball, Super Automatic Colt, 130-Grain Bullet, Metal Jacket

a. Cartridge. This cartridge is a high velocity, semirimmed type, resembling the 9-mm Parabellum cartridge in size and appearance. It may be fired from Colt caliber .38 super automatic pistols. The cartridge is 1.27 inches long and its case is 0.90 inch long. Diameter

Table XXXIV. Weights of Caliber .38 Ammunition (In Grains) (A Small Pistol Primer, 0.175 Inch Diameter, 3.065 Grain Weight is Used in These Cartridges)

Cartridge	Complete cartridge (approx)	Cartridge case	Propellant (approx)	Complete bullet (approx)
Cal. .380, auto. pistol, ball (9-mm short).	146	48	[1]2.5	95
Cal. .38 revolver, short Colt, ball.	168	37	[1]2.5 [2]3.5	125 or 130.
Cal. .38 S. & W., revolver, ball.	218	....	[1]2.3 [2]3.8	146
Cal. .38 special, revolver:				
Ball	231	70	([3])	158
Ball, M41	203	63.5	.....	132
Ball, (jacketed)	231	70	([3])	158
Ball (wad-cutter)	218	70	.....	146
Tracer	231	70	.....	158
Blank	75	70	.....	(wad)
High-pressure test	232	70	.....	158

[1] Bullseye.
[2] Pistol powder No. 5.
[3] Weights and types of propellant may be any of the following:
a. 3.6 Bullseye.
b. 5.0 Pistol powder No. 5.
c. 4.0 Pistol powder No. 6.
d. 7.0 Du Pont No. 80.

of the case head is 0.403 inch and the case body is 0.382 inch.

b. Bullet. The bullet consists of a metal jacket and a lead-alloy slug. It has a knurled cannelure into which the neck of the case is crimped. The bullet is 0.58 inch long and will penetrate 10 pine boards, each ⅞ inch thick.

110. CARTRIDGE, CALIBER .38: Ball, Revolver S. & W., 145- or 146-Grain Bullet

a. Cartridge. This cartridge may be fired from weapons chambered for the caliber .38 S. & W. regular, for example: Colt Police Positive and Banker's Special, and S. & W. Regulation Police and Terrier models. The cartridge known as the caliber .38 Colt New Police is the same as the S. & W. cartridge, except that the bullet used is flat-pointed. The S. & W. cartridge is 1.20 inches long and the case is 0.76 inch long. Diameter of the case head is 0.433 inch and of the case body is 0.383 inch.

Table XXXV. Ballistic Data for Caliber .38 Ammunition

Cartridge	Average maximum chamber pressure (psi)	Average velocities (fps)		Range of trace (yd)
		Muzzle	At 25 feet	
Cal. .380 auto. pistol, ball (9-mm short).	.....	970	940	
Cal. .38, super auto. Colt, ball.	28,000	1,300	1,250	
Cal. .38, S. & W. revolver, ball.	15,000	745	725	
Cal. .38, revolver, short, Colt, ball.	.....	770	750	
Cal. .38, special revolver: 130-grain ball	16,000	950	923	
158-grain ball jacketed.	18,000	870	850	
146-grain ball (wad-cutter).	14,000	770	750	
158-grain tracer.	18,000	870	850	353
158-grain ball	18,000	870	750	

b. Bullet. The bullet is of lead alloy and is inside-lubricated. One knurled cannelure is located below the point of crimping in the assembled cartridge. The bullet is 0.67 inch long. It will penetrate 5 pine boards, each ⅞ inch thick.

111. CARTRIDGE, CALIBER .38: Ball, Revolver, Short Colt, 125- or 130-Grain Bullet

a. Cartridge. This cartridge may be fired from the Colt Double Action Revolver. The cartridge will also fire from the Colt caliber .38 revolvers chambered for the caliber .38 long Colt cartridge, and from all revolvers chambered for the caliber .38 special cartridge. The rimmed cartridge is 1.10 inches long and the case is 0.69 inch long. The diameter of the case head is 0.433 inch and the case body is 0.383 inch.

b. Bullet. The bullet is of lead alloy and is outside-lubricated. One knurled cannelure is located above the crimp of the case to the bullet. The bullet is 0.56 inch long.

c. Penetration. The bullet will penetrate four pine boards, each ⅞ inch thick.

112. CARTRIDGE, CALIBER .38 BLANK: Revolver, S. & W.

This cartridge is used for simulated fire and signaling in weapons chambered for the caliber .38 S. & W. regular, for example: Colt Police Positive and Banker's Special, S. & W. Regulation Police and Terrier models. This cartridge uses the same case and primer as the service cartridge but has no bullet. The mouth is closed by a wad and crimped. This blank cartridge is 0.76 inch long.

113. CARTRIDGES FOR CALIBER .38 SPECIAL REVOLVERS

These cartridges (fig. 47) may be fired from the following Colt and S. & W. caliber .38 special revolvers: Colt Official Police, New Police, Officer's Model Target, New Service, Shooting Master, Police Positive Special, Detective Special, Single Action Army S. & W. Military and Police, 38-44, Outdoorman, and Magnum. These cartridges may also be fired in revolver, lightweight, caliber .38 special, M12 (aircrewman's).

114. CARTRIDGE, CALIBER .38 SPECIAL: Ball, M41, 130-Grain Bullet

a. Cartridge. This cartridge is an item of issue for use in caliber .38 lightweight revolver M13. The cartridge is 1.550 inches long. Diameter of the case head is 0.433 and at the mouth is .379 inch. The total weight of the cartridge is approximately 203 grains.

b. Bullet. The bullet consists of a gilding-metal jacket and a lead-antimony slug. The bullet weighs 132 grains. The cartridge case is crimped into a groove in the bullet. The length of the bullet is .593 inch.

c. Velocity. The basic velocity will not be less than 950 fps at 15 feet. The average velocity will not vary from the basic velocity by more than 25 fps.

d. Pressure. The average pressure will not exceed 16,000 psi.

e. Accuracy. The average of the mean radii of all targets at time of acceptance at 50 yards is not greater than 2 inches.

115. CARTRIDGE, CALIBER .38 SPECIAL: Ball, Lead Bullet, 158-Grain Bullet

a. Cartridge. This cartridge is authorized for issue to the Counter Intelligence Corps and

Military Police only. It is for zone of interior training use. This cartridge is 1.53 inches long.

b. Bullet. This S. & W. special 158-grain bullet has a round tip, whereas the Colt special 158-grain bullet has a flattened tip. The bullet is made of lead and its base end is cupped. The bullet is inside-lubricated, having one cannelure containing a lubricant which lies below the neck of the case in the assembled cartridge. The cartridge case is crimped into a groove in the bullet.

c. Penetration. The bullet will penetrate 7 pine boards, each ⅞ inch thick. The bullet is 0.74 inch long.

116. CARTRIDGE, CALIBER .38 SPECIAL: Ball, 158-Grain Bullet, Steel Jacket (Copper-Plated)

a. Cartridge. This cartridge is similar to that described in paragraph 115 above except for the bullet which has a copper-plated steel jacket. This cartridge is for operational use by the Counter Intelligence Corps and Military Police.

b. Penetration. The bullet will penetrate 7½ pine boards, each ⅞ inch thick.

117. CARTRIDGE, CALIBER .38 SPECIAL: Ball, Revolver, Midrange, 146- or 148-Grain, Lead Clean-Cutting Bullet, Western Super Match or Equal

a. Cartridge. This cartridge is used for target practice and contains a reduced charge of propellant for midranges.

b. Bullet. The bullet is entirely inclosed in the cartridge case and it has three cannelures, a deep cup formation in the base of the bullet, and a flat front. The bullet weighs 146- to 148-grains and is of lead alloy. Blunt, but with a sharp shoulder or corner, the bullet will cut a clean hole through target paper, thus making a hit easier to spot and score. It is sometimes called a wad cutter or clean-cutting bullet, and is inside-lubricated.

118. CARTRIDGE, CALIBER .38 SPECIAL: Test, High-Pressure, 158-Grain Bullet

This cartridge is for use only in inspection of weapons. Except for the increased propelling charge, the same components as those in the 158-grain lead bullet, caliber .38 special cartridge are used. Since this ammunition develops dangerously high chamber pressures, 21,600 to 24,000 psi, the HPT cartridge will not be used for any other purpose. Because of the danger involved in firing this cartridge, it should be fired only from a fixed rest under a hood by means of a mechanical device, and only by authorized personnel. This cartridge is 1.53 inches long and can be identified by its case which has a mottled brownish-black coating.

CHAPTER 5

DESTRUCTION OF AMMUNITION TO PREVENT ENEMY USE

119. General

a. Destruction of ammunition described herein, when subject to capture or abandonment in the combat zone, will be undertaken by the using arm only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the Army commander.

b. The information which follows is for guidance only. The conditions under which destruction will be effected are command decisions and may vary in each case, dependent upon a number of factors, such as the tactical situation, security classification of the ammunition (AR 380-5), quantity and location of the ammunition, facilities for accomplishing destruction, and time. In general, destruction of ammunition can be accomplished most effectively by burning or detonation, or a combination of these. Selection of the particular method of destruction requires imagination and resourcefulness in utilization of the facilities at hand under the existing circumstances. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, ammunition and its components must be damaged so badly that they cannot be restored to a usable condition in the *combat* zone. Equally important, the *same* essential components of all ammunition must be destroyed so that the enemy cannot assemble complete rounds from undamaged components.

d. If destruction of ammunition is directed, due consideration should be given to —

(1) Accomplishment of the destruction in such a manner as to cause the greatest obstruction to enemy movement and also prevent hazard to friendly troops from fragments.

(2) Observance of appropriate safety precautions.

120. Method

Ammunition can be destroyed most quickly by burning or detonation. The burning method is considered the most satisfactory for destruction of small-arms ammunition to prevent enemy use. Remove from packing containers and stack the ammunition in a pile. Stack or pile wood or gasoline and oil in cans and drums around the ammunition. Throw onto the pile all available flammable material such as brush, rags, and wood. Gasoline or oil should be poured over the pile. Sufficient flammable material must be used to insure a very hot fire. Ignite by means of an incendiary grenade fired from a safe distance, a combustible train of a suitable length, or other appropriate means. Take cover immediately.

Warning: **When igniting gasoline, due consideration should be given to the highly flammable nature of gasoline and its vapor. Carelessness in its use may result in painful burns.**

Fires should be sufficiently intense to render ammunition in metal containers unserviceable. Rounds that are not completely destroyed by fire will be classified as duds, i.e., in a dangerous condition.

APPENDIX

REFERENCES

1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this manual.

Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.	DA PAM 108-1
Military Publications:	
Index of Administrative Publications.	DA PAM 310-1
Index of Blank Forms	DA PAM 310-2
Index of Graphic Training Aids and Devices.	DA PAM 310-5
Index of Supply Manuals — Ordnance Corps.	DA PAM 310-29
Index of Tables of Organization and Equipment, Type Tables of Distribution and Tables of Allowances.	DA PAM 310-7
Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.	DA PAM 310-4
Index of Training Publications	DA PAM 310-3

2. Supply Manuals

The following supply manuals of the Department of the Army pertain to this material:

a. Ammunition.

Ammunition and Explosives Ammunition Through 30 Millimeter.	SM 9-5-1305
Grenades, Hand and Rifle, and Related Components.	SM 9-5-1330
Stock List of All Items, Price List (Type 2): Ammunition and Explosives.	SM 9-2-1300

b. Destruction to Prevent Enemy Use.

Ammunition: Explosives, Bulk Propellants, and Explosive Devices.	SM 9-5-1375

c. General.

Introduction	SM ORD 1

d. Maintenance and Repair.

Containers, Packaging, and Packing Supplies.	SM 9-1-8100-series
Hardware and Abrasives	SM 9-1-5300-series
Tool Kit: Explosive Disposal Field Maintenance (5180-754-0644).	SM 9-4-5180-A15
Tool Set, Ammunition Renovation Platoon Field Maintenance (3470-754-0710).	SM 9-4-3470-A02

3. Forms

The following forms pertain to this material:

DA Form 468, Unsatisfactory Equipment Report.
DA Form 2028, Recommended Changes to Department of the Army Technical Manual Parts Lists or Supply Manual 7, 8, 9 (cut sheet).
DD Form 6, Report of Damaged or Improper Shipment.
DD Form 517, Ammunition Condition Report.

4. Other Publications

The following explanatory publications contain information pertinent to this ammunition and associated equipment:

a. Ammunition.

Ammunition for Aircraft Guns	TM 9-1901-1/ TO 11A-1-39
Ammunition for Recoilless Rifles	TM 9-1300-204
Ammunition for Training	TA 23-100
Ammunition, General	TM 9-1900/ TO 11A-1-20
Ammunition Renovation	TM 9-1905
Ammunition; Restricted or Suspended.	TB 9-AMM-2
Care, Handling, Preservation, and Destruction of Ammunition.	TM 9-1903/ TO 11A-1-37
Demolition Materials	TM 9-1946
Disposal of Supplies and Equipment: Ammunition.	SR 755-140-1
Explosives and Demolitions	FM 5-25
Explosives: Disposal by Dumping at Sea.	SR 75-70-10

Issues of Supply and Equipment: Preparation, Processing, and Documentation for Requisitioning, Shipping, and Receiving. AR 725-5

Operation and Organizational Maintenance:
- Caliber .50 Spotting Rifle M8C; 106-mm Rifles M40A1 and M40A1C; 106-mm Rifle Mounts T173 and M79; and Tripod T26. TM 9-1000-205-12
- 7.62-mm Machinegun, M60 and Machinegun Tripod Mount M122. TM 9-1005-224-12
- 7.62-mm Rifle, M14 ..... TM 9-1005-223-12

Military Explosives ..... TM 9-1910/ TO 11A-1-34

Qualification in Arms: Qualification and Familiarization. AR 370-5

Safety:
- Coordination with Armed Services Explosive Safety Board. SR 385-15-1/ AFR 14-12
- Identification of Inert Ammunition and Ammunition Components. AR 385-65
- Regulations for Firing Ammunition for Training, Target Practice, and Combat. AR 385-63/ AFR 50-13

Small-Arms Accidents, Malfunctions, and their causes. TM 9-2210

Small-Arms Ammunition, Lots and Grades. TB 9-AMM-4

Small-Arms Materiel and Associated Equipment. TM 9-2200

Supply Control: Distribution of Ammunition for Training. AR 710-1300-1

Transportation and Travel:
- Military Traffic Management Regulation. AR 55-355
- Transportation by Water of Explosives and Hazardous Cargo. AR 55-228

b. Camouflage.

Camouflage, Basic Principles and Field Camouflage. FM 5-20

c. Decontamination.

Decontamination ..... TM 3-220

Small Unit Procedures in Atomic Biological, and Chemical Warfare. FM 21-40

d. Destruction to Prevent Enemy Use.

Explosives and Demolitions ..... FM 5-25

e. General.

Ammunition: Supply Within the Continental United States. SB 9-AMM-6

Inspection of Ordnance Materiel in Hands of Troops. TM 9-1100

Installations:
- Administration ..... AR 210-10
- Report of Loss, Theft, and Recovery of Government Property in the Continental United States. AR 210-84
- Malfunctions Involving Ammunition and Explosives. AR 700-1300-8
- Unsatisfactory Equipment Report. AR 700-38

Military Security: Safeguarding Defense Information. AR 380-5

Military Symbols ..... FM 21-30/ AFM 55-3

Military Terms, Abbreviations, and Symbols:
- Authorized Abbreviations and Brevity Codes. AR 320-50
- Dictionary of United States Army Terms. AR 320-5

Military Training ..... FM 21-5

Ordnance Ammunition Service ..... FM 9-5

Ordnance Major Items and Major Combinations and Pertinent Publications. SB 9-1

Ordnance Service in the Field ..... FM 9-1

Safety: Accident Reporting and Records. AR 385-40

Supply and Service Installations and Activities: Organization and Command Relationship. AR 780-10

Targets, Target Material, and Training Course Lay-Outs. TM 9-855

Techniques of Military Instruction .... FM 21-6

f. Maintenance and Repair.

Maintenance of Supplies and Equipment: Spot Check Inspection and Reports; Ordnance Corps Materiel. AR 750-925

Ordnance Maintenance: Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Material, and Related Materials including Chemicals. TM 9-247

g. Shipment and Limited Storage.

General Packaging for Ordnance General Supplies. TM 9-200

Logistics (General): Report of Damaged or Improper Shipment. AR 700-58

Marking and Packing of Supplies and Equipment: Marking of Supplies for Shipment. AR 746-80

Protection of Ordnance General Supplies in Open Storage. TB ORD-379

INDEX

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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To be distributed in accordance with DA Form 12-7 requirements for TM 9-series (unclas) plus the following formula:

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9-22 (2)
9-26 (2)
9-76 (2)
9-86 (2)
9-367 (2)
9-500 (AA,BC,BD,DC) (2)
9-510 (AA,AB,BA,BB,DA,EB) (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used see AR 320-50.

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