

**SUPERSEDES COPY DATED  
6 APRIL 1981**

**TECHNICAL MANUAL  
DATA SHEETS  
FOR  
GUNS, HOWITZERS, AND MORTARS  
INTEROPERABLE AMMUNITION**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**SEPTEMBER 1986**

**WARNING**

**THE CORE/PENETRATOR OF TARGET PRACTICE ROUNDS CAN CAUSE DAMAGE AND PENETRATE ARMORED VEHICLES.**

TECHNICAL MANUAL )  
 )  
 No. 43-0001-28-3 )

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 Washington, DC, 29 September 1986

DATA SHEETS FOR  
 GUNS, HOWITZERS, AND MORTARS  
 INTEROPERABLE AMMUNITION

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAY-T (D), Dover, New Jersey 07801-5001. A reply will be furnished directly to you.

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**CHAPTER 1**  
**INTRODUCTION**

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**1-1. GENERAL**

As a result of recent agreements between the United States (US) and a number of its NATO allies, it is intended to establish the interoperability of many weapon systems and ammunition of the various countries. The goal is to enable the safe and effective firing of major types of ammunition of the same size from the same compatible size and type weapon of the NATO armies. Interoperability criteria are now required for many weapons and ammunition items in current development. Determinations are now being made to establish which ammunition is compatible with which weapons. As these are completed, ammunition items will be authorized for use in US weapons by changes to the applicable ammunition and weapons manuals. NATO nations will provide similar authorization in their manuals. Only authorized NATO ammunition will be used. Those items covered in this technical manual have been authorized. If a munitions item has not been authorized, it is because (1) it has not yet been determined to be safe to fire from a US weapon system or (2) it has been determined that the munitions item cannot be safely fired from the US weapon system.

**NOTE**

**The interchange of munitions with NATO nations is for combined training exercise, i.e., US Army troops and NATO nation troops. At the conclusion of any training exercise, munitions drawn from NATO nation troops and not consumed (fired) are to be returned to troops of the NATO nation from whom they were obtained.**

**1-2. PURPOSE**

This manual is a reference handbook published as an aid in planning, training, familiarization and identification of interoperable artillery ammunition.

**1-3. SCOPE**

a. For each item of material, there are illustrations and descriptions, together with characteristics and related data. Included in the related data are weights, dimensions, performance data, packing, shipping and storage data, type classification, and logistics control codes (LCC).

b. Information concerning supply, operation, and maintenance of the items will be found in the publications referenced for these items. A complete listing of these publications is maintained in DA PAM 310-1 index.

c. Numerical values, such as weights, dimensions, candlepower, etc., are nominal values, except when specified as maximum or minimum. Actual items may vary slightly from these values. Allowable limits can be obtained from the drawings indicated in the data sheets.

**1-4. METRIC CONVERSION CHART**

For approximate conversions to/from metric measures, see figure 1-1.

**1-5. KEY TO COMMON ABBREVIATIONS AND SYMBOLS**

AP -----	Armor piercing
APC -----	Armor piercing capped
APDS -----	Armor piercing, discarding sabot
APERS -----	Antipersonnel

AT-----	Antitank
BD-----	Base detonating
BE-----	Base ejection
CS-----	A tactical riot control agent
DS-----	Discarding sabot
GB-----	Nonpersistent toxic (casualty) nerve gas
H-----	Mustard gas
HD-----	Distilled mustard gas
HE-----	High explosive
HT-----	Mixture of HD&T
HEAT-----	High explosive antitank
HEAT-T-MP-----	High explosive antitank with tracer, multipurpose
HEDP-----	High explosive dual purpose
HEI-----	High explosive incendiary
HEP-----	High explosive plastic
HERA-----	High explosive rocket assisted
HVAP-----	Hypervelocity, armor piercing
HVTP-----	Hypervelocity, target practice

ILLUM-----	Illuminating
MOD-----	Modified
MK-----	Mark
MP-----	Multipurpose
MT-----	Mechanical time
MTSQ-----	Mechanical time and superquick
MV-----	Muzzle velocity
PD-----	Point detonating
PIBD-----	Point initiating, base detonating
PROX-----	Proximity
PWP-----	Plasticized white phosphorous
RAP-----	Rocket assisted projectile
SD-----	Self destroying
SQ-----	Superquick
T-----	Time fuze or for training only
-T-----	With tracer
TP-----	Target practice
TSQ-----	Time superquick
VX-----	Persistent toxic (casualty) nerve gas
WP-----	White phosphorous

**METRIC CONVERSION CHART**

Approximate Conversions to Metric Measures					
Symbol	When You Know	Multiply by	To Find	Symbol	
<b>LENGTH</b>					
in	inches	2.5	centimeters	cm	
ft	feet	30	centimeters	cm	
yd	yards	0.9	meters	m	
mi	miles	1.6	kilometers	km	
<b>AREA</b>					
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>	
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>	
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>	
m <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>	
	acres	0.4	hectares	ha	
<b>WEIGHT</b>					
oz	ounces	28	grams	g	
lb	pounds	0.45	kilograms	kg	
	short tons (2000 lb)	0.9	tonnes	t	
<b>VOLUME</b>					
tsp	teaspoons	5	milliliters	ml	
Tbsp	tablespoons	15	milliliters	ml	
fl oz	fluid ounces	30	milliliters	ml	
c	cups	0.24	liters	l	
pt	pints	0.47	liters	l	
qt	quarts	0.95	liters	l	
gal	gallons	3.8	liters	l	
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>	
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>	
<b>TEMPERATURE</b>					
Symbol	When You Know	Subtract	Multiply by	To Find	Symbol
°F	Fahrenheit	32	65	Celsius	°C

Approximate Conversions from Metric Measures					
Symbol	When You Know	Multiply by	To Find	Symbol	
<b>LENGTH</b>					
mm	millimeters	0.04	inches	in	
cm	centimeters	0.4	inches	in	
m	meters	3.3	feet	ft	
m	meters	1.1	yards	yd	
km	kilometers	0.6	miles	mi	
<b>AREA</b>					
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>	
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>	
km <sup>2</sup>	square kilometers	0.4	square miles	m <sup>2</sup>	
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres		
<b>WEIGHT</b>					
g	grams	0.035	ounces	oz	
kg	kilograms	2.2	pounds	lb	
t	tonnes (1000 kg)	1.1	short tons		
<b>VOLUME</b>					
ml	milliliters	0.03	fluid ounces	fl oz	
l	liters	2.1	pints	pt	
l	liters	1.06	quarts	qt	
l	liters	0.26	gallons	gal	
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>	
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>	
<b>TEMPERATURE</b>					
Symbol	When You Know	Multiply by	Add	To Find	Symbol
°C	Celsius	1.8	32	Fahrenheit	°F

AR 101380-A

Figure 1-1. Metric conversion chart.

1-6. QUANTITY-DISTANCE CLASSES AND STORAGE COMPATIBILITY GROUPS

Quantity-Distance (QD) classes and Storage Compatibility groups (SCG) listed in this manual are changed. For conversion to new system see Table 1-1 below.

Table 1-1. Quantity-Distance Classes and Storage Compatibility Groups

Quantity-distance hazard class <sup>1</sup>		Storage compatibility group <sup>1,3</sup>
Old	New <sup>2</sup>	Typical - New
8	6.1	
7	1.1	D
6	1.2(18)	E
5	1.2(12)	
4	1.2(08)	F
3	1.2(04)	G
2	1.3	C
1	1.4	S

NOTES:

<sup>1</sup>New QD and SCG's are compatible with classes used by NATO nations.

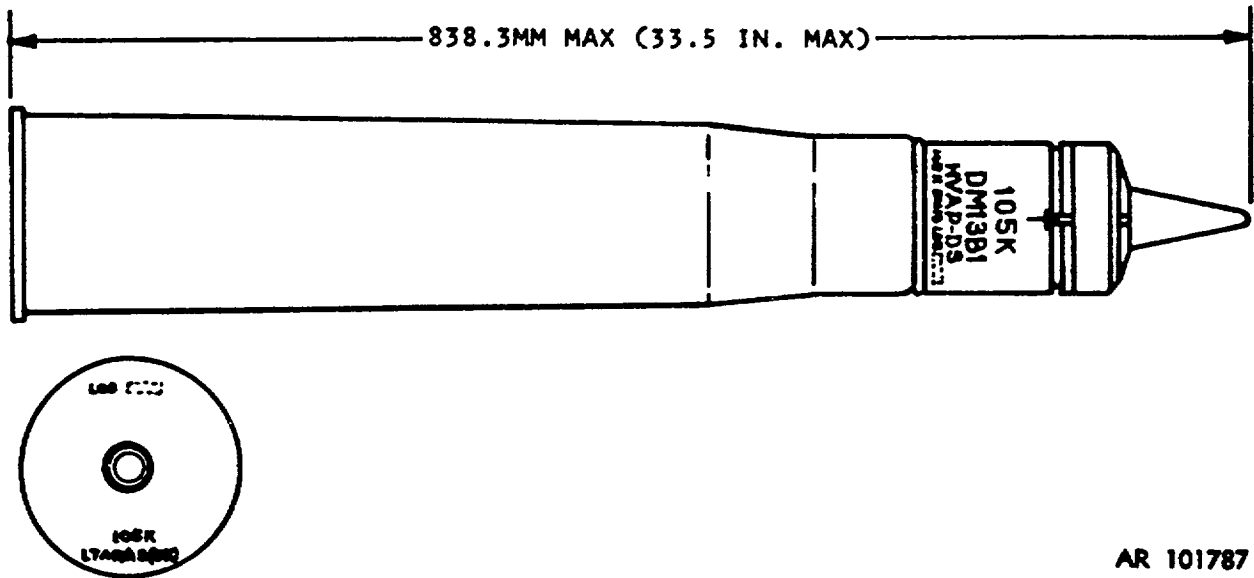
<sup>2</sup>Numbers in parentheses are minimum distances x 100 feet to protect against specific fragment hazards and vary with items and types of ammunition. (Refer to TM 9-1300-206).

<sup>3</sup>There is no simple conversion from old SCG's to new system. The SCG groups listed in this column are typical for the majority of items in the corresponding listed QD class, but do not apply to every individual item in the class. For SCG of individual items, refer to TM 9-1300-206.



**CHAPTER 2**  
**AMMUNITION**  
**FOR**  
**GUNS**

**CARTRIDGE, 105 MILLIMETER: DM13B1, HVAP-DS (GE)**



**AR 101787**

Use:

This cartridge is a hypervelocity armor-piercing type with discarding sabot, intended for use in 105 mm guns against armored targets.

Description:

The projectile consists of a sheathed tungsten carbide core with tracer and a sabot. The core, which is the armor-piercing element, is carried within the sheath with the sabot assembled on the exterior surface. A plastic band is positioned on the outside diameter of the

sabot at the forward end. A fiber rotating band and a rubber obturator are assembled on the outside diameter near the base of the sabot. The igniter tube of the electric primer extends almost the entire length of the propellant loosely packed in the cartridge case.

Functioning:

The electrically initiated primer ignites the propelling charge. Gases produced by the burning propellant propel the projectile from the gun and ignites the tracer which burns for a minimum of 2.5 seconds. Setback, centrifugal, and air pressure forces cause the

sabot to discard upon leaving the gun tube. The sheathed core is spin stabilized and penetrates the target solely by kinetic energy.

Tabulated Data:

Complete round:

Type ----- HVAP-DS (GE)  
 Weight ----- 18.55 kg (40.6 lb)  
 Length----- 838.3mm (33.5 in.)  
 Cannon used with----- 105mm M68 (US)  
 105mm L7A1 (GE)

Projectile:

Body material ----- Tungsten carbide core  
 Color----- Black with white markings

Components:

Cartridge case----- RW-244 (UK)  
 Propelling charge----- NQ/M.044 (UK)  
 Primer ----- L1A4(UK)  
 Tracer----- No. 33, MK1 (UK)

Temperature Limits:

Firing:

Upper limit----- +52°C (+125°F)

Storage:

Upper limit----- +63°C (+145°F)

Packing----- 1 round per metal container, 12 containers per pallet

Pallet:

Weight ----- 488.2 kg (1074.0 lb)  
 Dimensions ----- 1200 x 1000 x 910 mm (48 x 40 x 36.4 in.)  
 Cube----- 1.09m<sup>3</sup> (38.15 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG ----- (08) 1.2C  
 DOT shipping class----- B  
 DOT designation----- AMMUNITION FOR CANNON WITH SOLID PROJECTILES  
 DODAC----- Not available

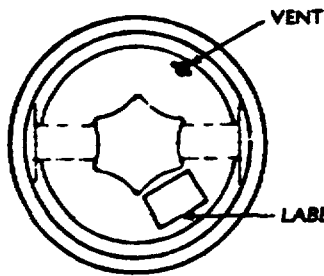
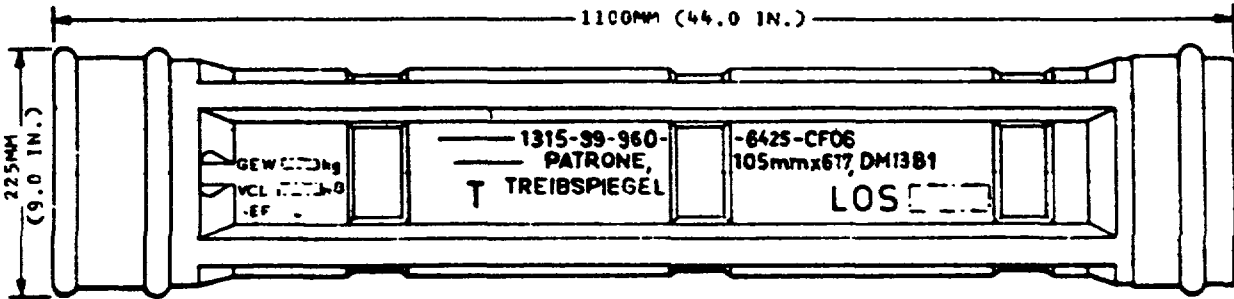
Limitations:

Not available

References:

Not available

METAL CONTAINER FOR CARTRIDGE APDS-T, DM13B1 (GE)



BEFORE REMOVING COVER, LOOSEN AIR VENT (KNOB) IN ORDER TO EQUALIZE VACUUM. SUBSEQUENTLY, CLOSE AIR VENT AGAIN FINGER TIGHT (NO TOOLS REQUIRED).

AR 101788

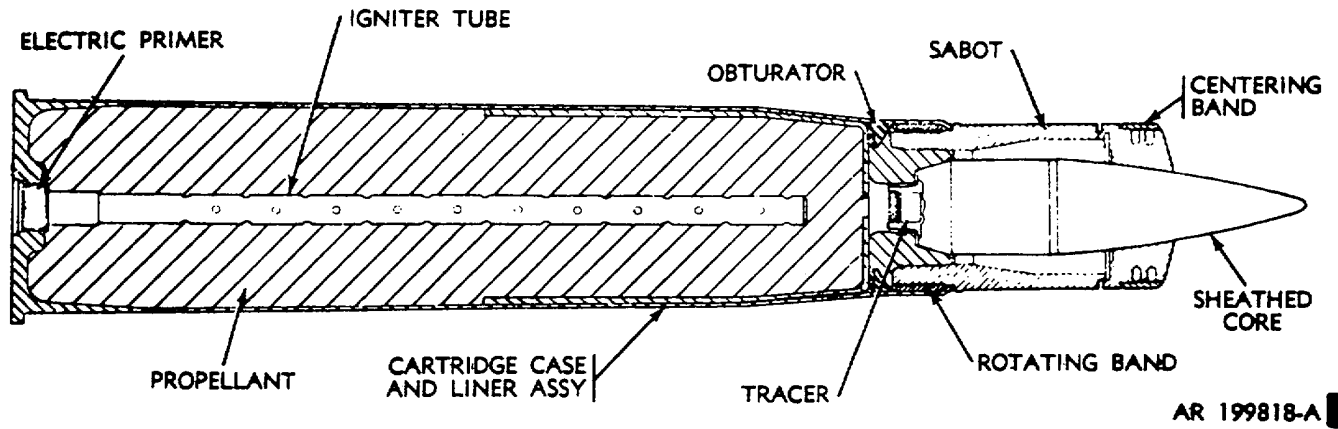
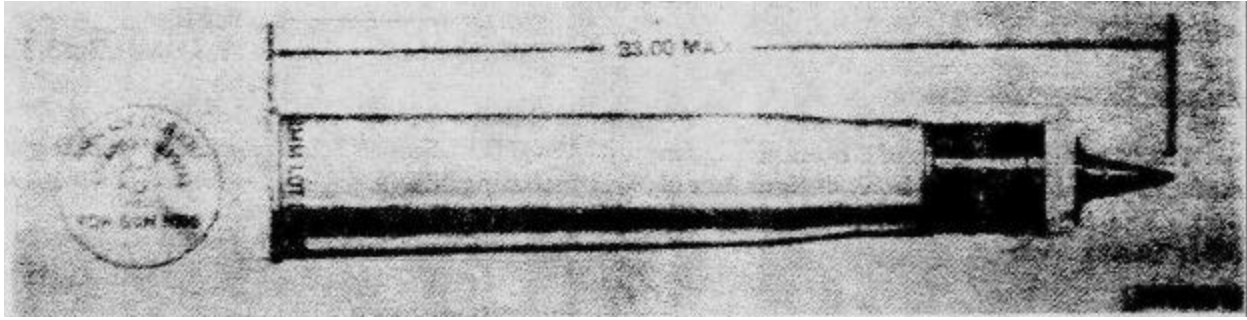
GE 105 mm cartridge APDS-T, DM13B1 is packed one per metal container; 12 containers per pallet.

To open container, loosen air vent (knob) before removing the cover in order to equalize vacuum. Remove cover and cartridge; replace container cover. Close air vent finger tight (no tools required).

GE 105 mm cartridge HEAT-T, M456A1 is packed one cartridge in a fiber container; two containers in a wooden box.

Open wooden box (GE) by cutting metal straps and wire seal. Release hasp or spring latch. Remove containers from box. Strip sealing tape from container, twist end cap and pull it off. Remove any padding from container. While holding hand over open end of container, tilt container to allow cartridge to slide out.

**CARTRIDGE, 105 MILLIMETER: APDS-T, M392A2 AND M392 (DE)**



AR 199818-A

Type Classification:

M39A2----- Std MSR 02787001  
 M392----- Std OTCM 38116, dtd  
 1961

Use:

This cartridge is a hypervelocity armor-piercing type with discarding sabot, intended for use in 105 mm guns against armored targets.

Description:

The projectile consists of a sheathed tungsten

carbide core with tracer and a sabot. The core, which is the armor-piercing element, is carried within the sheath with the sabot assembled on the exterior surface. A plastic band is positioned on the outside diameter of the sabot at the forward end. A fiber rotating band and a rubber obturator are assembled on the outside diameter near the base of the sabot. The igniter tube of the electric primer extends almost the entire length of the propellant loosely packed in the cartridge case.

Functioning:

The electrically initiated primer ignites the propelling charge. Gases produced by the burning propellant propel the projectile from the gun and ignite

the tracer which burns for a minimum of 2.5 seconds. Setback, centrifugal and air pressure forces cause the sabot to discard upon leaving the gun tube. The sheathed core is spin stabilized and penetrates target solely by kinetic energy.

Difference Between Models:

The M392 cartridge is of United Kingdom manufacture and bears the U.K. designation of L36A1. The M392 is fitted with U.K. Primer L4A1 or L4A2.

Tabulated Data:

Complete round:  
 Type ----- APDS-T  
 Weight ----- 41.0 lb  
 Length----- 33.0 in.  
 Cannon used with----- M68  
 Projectile:  
 Body material ----- Tungsten carbide core  
 Color----- Black w/white marking  
 Components:  
 Cartridge case----- M115, M115B1  
 Propelling charge----- M30 (T36)  
 Primer----- M80A1  
 Tracer----- M13  
 Performance:  
 Maximum range----- 36,745 meters (40,162 yd)  
 Muzzle velocity ----- 1,478 mps (4,850 fps)

Temperature Limits:

Firing:  
 Lower limit----- 40°F (-40°C)  
 Upper limit----- +125°F (+52.0°C)  
 Storage:  
 Lower limit----- -80°F (for period not more than 3 days)  
 Upper limit----- +160°F (for period not more than 4 hr/day)

\*Packing----- 1 round per fiber container; 2 containers per wooden box  
 \*Packing Box:  
 Weight ----- 126 lbs.  
 Dimensions ----- 39-7/8 x 14-1/8 x 8-23/32 in.  
 Cube----- 2.8 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class ----- (08) 1.2  
 Storage compatibility group ----- C  
 DOT shipping class----- B  
 DOT designation----- AMMUNITION FOR CANNON WITH SOLID PROJECTILES  
 DODAC ----- 1315-C505, C506  
 Drawing number ----- 8863427

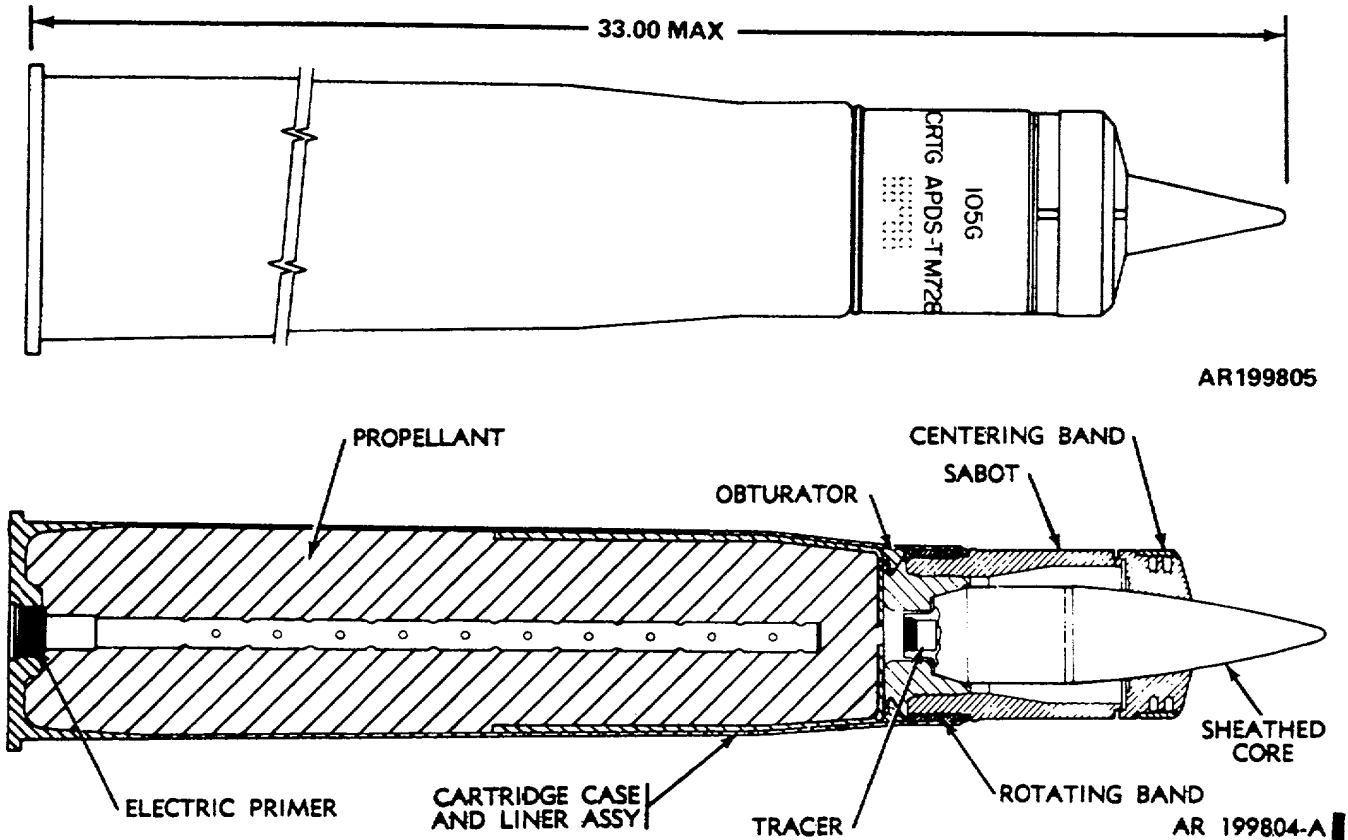
Limitations:

United Kingdom Cartridge L28A1, similar to the M392 except for its primer (L1A2, L1A3 or L1A4) is not to be fired in 105 mm Gun M68, except under combat emergency conditions. The clip will remain on the cartridge case at all times until the cartridge is partially chambered.

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM P 700-3-3  
 TM 9-1000-213-35  
 TM 9-1300-261-20  
 TM 9-2350-215-10

CARTRIDGE, 105 MILLIMETER: APDS-T, M728 (DE)



Type Classification:

Std MSR 02787001

Use:

This cartridge is a high velocity, flat trajectory, discarding sabot round used in 105 mm gun cannons against armored targets.

Description:

The projectile consists of a tungsten, nickel, copper penetrator seated in a steel base with tracer and aluminum forward sheath. These components are encased in an aluminum and magnesium sabot. A plastic centering band encircles the sabot at the forward

end. A fiber rotating band and rubber obturator are mounted toward the base of the sabot. The cartridge case contains a polyurethane laminar additive liner over the forward end of the propellant. The case is loosely packed with propellant, and is fitted with an electric primer.

Functioning:

The primer is electrically initiated to ignite the propelling charge. Gases produced by the burning propellant propel the projectile from the gun and ignite the tracer which burns for a minimum of 2.5 seconds. The sabot discards upon leaving the gun tube by setback, centrifugal, and air pressure forces. The spin stabilized projectile sheathed core penetrates the target solely by kinetic energy.

Tabulated Data:

Complete round:

Type ----- APDS-T  
 Weight ----- 41.70 lb  
 Length ----- 33.0 in.  
 Cannon used with ----- M68

Projectile:

Body material ----- Sabot-magnesium/  
 aluminum penetrator-  
 tungsten/nickel/copper  
 Color ----- Black w/white marking

Components:

Cartridge case ----- M115B1  
 Propelling charge ----- M30  
 Primer ----- M80A1  
 Tracer ----- M13

Performance:

Effective range ----- 5,000 m  
 Maximum range ----- 50,879 m  
 Muzzle velocity ----- 4680 fps

Temperature Limits:

Firing:

Lower limit ----- -60°F (-53.8°C)  
 Upper limit ----- +125°F (+52.0°C)

Storage:

Lower limit ----- -65°F (-53.8°C)  
 Upper limit ----- +145°F (+63°C)

\*Packing ----- 1 round per fiber  
 container; 2 containers  
 per wooden box

\*Packing Box:

Weight ----- 126 lb  
 Dimensions ----- 39-7/8 x 14-1/8 x 8-23/32  
 in.  
 Cube ----- 2.8 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Storage class/SCG ----- (08) 1.2 C  
 DOT shipping class ----- B  
 DOT designation ----- AMMUNITION FOR  
 CANNON WITH SOLID  
 PROJECTILES  
 DODAC ----- 1315-C494  
 Drawing number ----- 9276810

Limitations:

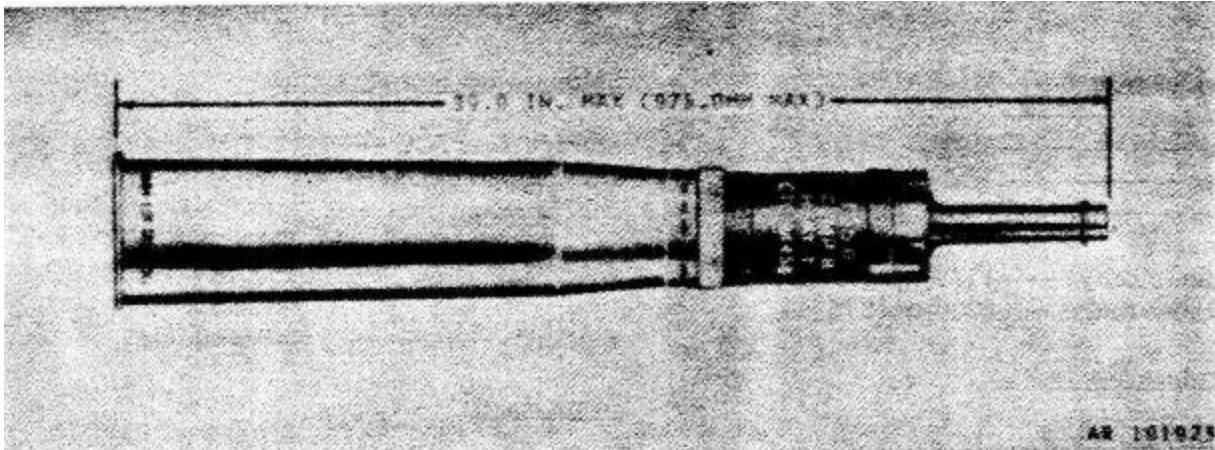
None

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM (AMC)-R 700-3-3  
 TM 9-1000-213-35  
 TM 9-1300-251-20  
 TM 9-2350-215-10



**CARTRIDGE 105 MILLIMETER: HEAT-T, M456A1 (GE, NO, IT\*, BE, SP)**



\*IT manufactured

Use:

This cartridge is identical to the US 105 mm, HEAT-T, M456A1 cartridge. It is a high explosive antitank cartridge against armored targets.

Description:

The steel body projectile is fitted with a plastic obturator, a threaded standoff spike assembly, a fin and boom and a PIBD fuze. A funnel-shaped copper liner within the body shapes the explosive charge of Comp B. A piezoelectric element retained in a nose cap is fitted to the spike assembly, and is connected to the BD fuze in the body. The fin is threaded to receive a tracer.

Functioning:

The electrically-initiated primer ignites the propelling charge. Gases produced by the burning propellant propel the projectile from the gun and ignite the tracer which burns for a minimum of 2.5 seconds. On impact, fuze functioning detonates the projectile and the cone collapses, creating a high velocity focused shock wave and a jet of metal particles that penetrate the target.

Tabulated Data:

Complete round:

Type -----	HEAT-T
Weight -----	21.6 kg (48 lb)
Length-----	975.0mm (39.0 in.)
Cannon used with-----	105mm M68 (US) 105mm L7A1 (GE)

Projectile:  
 Body material ----- Steel  
 Color----- Black with white markings  
 and yellow band  
 Filler and weight----- Comp B, 0.96 kg (2.14 lb)

Components:  
 Cartridge case----- M148A1B1  
 Propellant ----- M30  
 Primer ----- M83  
 Tracer ----- M13  
 Fuze ----- PIBD, M509A1

Performance:  
 Muzzle velocity ----- 1173 mps (3850 fps)  
 Maximum range----- 8200 m (8975 yd)

Temperature Limits:

Firing:  
 Upper limit----- +52°C (+125°F)

Storage:  
 Upper limit----- +63°C (+145°F)  
 Packing----- 1 round per fiber  
 container; 2 containers  
 per wooden box

Packing Box:  
 Weight ----- 59.9 kg (132 lb)  
 Dimensions ----- 1164 x 360 x 223 mm  
 (46.5 x 14.4 x 8.9 in.)  
 Cube----- 0.093m<sup>3</sup> (3.25 ft<sup>3</sup>)

Pallet ----- 10 boxes (20 cartridges)  
 per pallet  
 Weight ----- 599 kg (1318 lb approx)  
 Dimensions ----- 1200 x 1000 x 1050 mm  
 (48 x 40 x 42 in.)  
 Cube----- 1.26m<sup>3</sup> (44.1 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG ----- (12) 1.2E  
 DOT shipping class----- A  
 DOT designation----- AMMUNITION FOR  
 CANNON WITH  
 EXPLOSIVE  
 PROJECTILES  
 DODAC ----- Not available

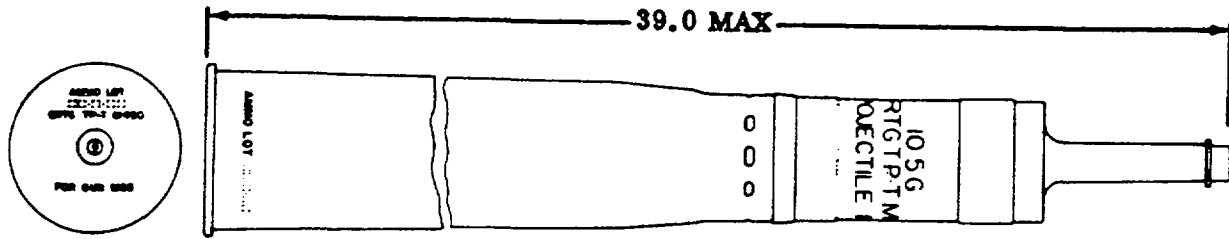
Limitations:

Do not fire Cartridges M456A1 which have been  
 tank-transported at temperatures above +120°F.

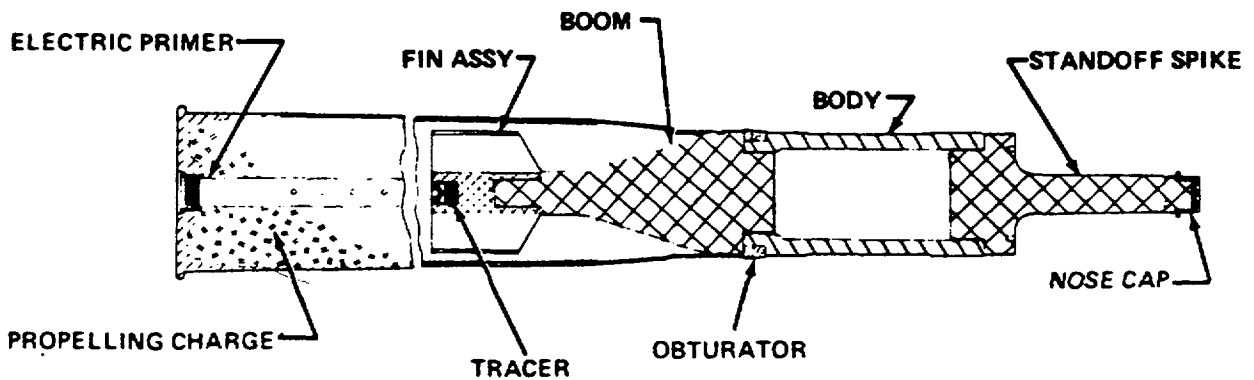
References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM-P 700-3-3  
 TM 9-1300-251-20  
 TM 9-2350-215-10

**CARTRIDGE 105 MILLIMETER: TP-T, M490 (IT, SP)**



AR199813



AR199812

Type Classification:

Std. AMCTC 1103 dtd 1963.

Use:

This cartridge is for use in 105mm gun cannons for training in marksmanship.

Description:

The cartridge is similar in external appearance and ballistically similar to HEAT-T Cartridge M456 series. The projectile consists of a steel body, an aluminum standoff spike, and a boom and fin assembly with tracer. The cartridge case is filled with loosely packed propellant and is fitted with an electric primer.

Functioning:

The electrically initiated primer ignites the propelling charge. Gases produced by the burning propellant propel the projectile from the gun and ignite the tracer which burns for a minimum of 2.5 seconds.

Tabulated Data:

<u>Complete round:</u>	
Type .....	TP-T
Weight .....	45 lb
Length .....	39.0 in.
Canon used with .....	M68
<u>Projectile:</u>	
Body material .....	Steel

Projectile: continued  
 Color----- Blue w/white marking  
 Components:  
 Cartridge case----- M148A1B1, M148A1  
 Propelling charge----- M30  
 Primer----- M83  
 Tracer----- M13  
 Performance:  
 Maximum range----- 8,207 m (8,975 yd)  
 Muzzle velocity----- 1,170 mps (3,850 fps)

Temperature Limits:

Firing:  
 Lower limit----- -40°F (-40°C)  
 Upper limit----- +125°F (+52.0°C)  
 Storage:  
 Lower limit----- -80°F (for period not more  
 than 3 days) (-62.2°C)  
 Upper limit----- +160°F (for period not  
 more than 4 hr/day)  
 (+71.1°C)  
 \*Packing----- 1 round per fiber  
 container; 2 containers  
 per wooden box  
 \*Packing Box:  
 Weight ----- 132 lb  
 Dimensions ----- 45-7/8 x 14-1/4 x 8-3/4 in.  
 Cube----- 3.3 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Storage class/SCG ----- (08) 1.2C  
 DOT shipping class----- B  
 DOT designation----- AMMUNITION FOR  
 CANNON WITH INERT  
 PROJECTILES  
 DODAC----- 1315-C511  
 Drawing number ----- 8865533

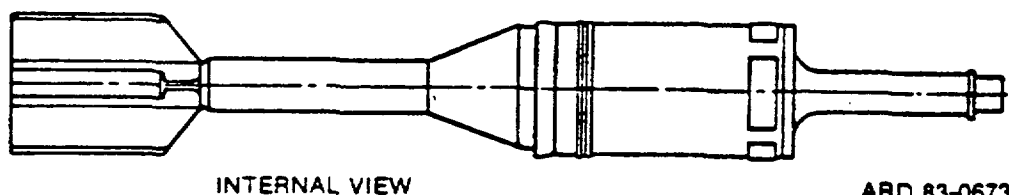
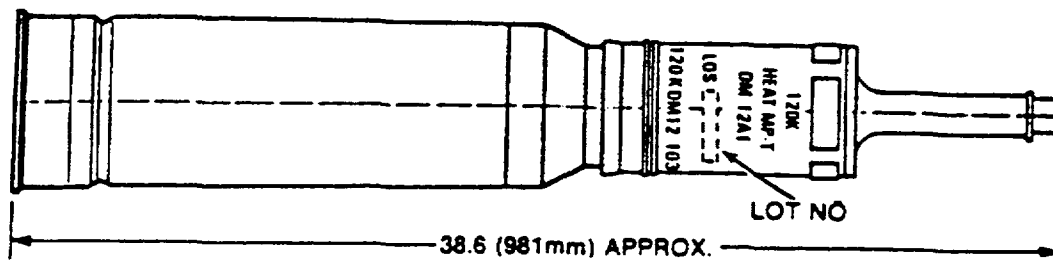
Limitations:

Cartridges M490 manufactured prior to January 1967 have a cartridge case liner which utilizes a low-melt wax. Do not fire cartridges which have been transported at temperatures above +120°F (+49°C).

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM (AMC)-R-700-3-3  
 TM 9-1300-251-20  
 TM 9-2350-215-10

## CARTRIDGE, 120K: HEAT-MP-T, DM12A1

Use:

This cartridge is a high explosive multipurpose cartridge which has antiarmor and antipersonnel capabilities. The cartridge is fired from the 120 mm smooth bore cannon.

Description:

The 120K HEAT-MP-T, DM12A1 is a chemical energy round having both antiarmor and antipersonnel capabilities. The round consists of a steel body loaded with explosive surrounding a copper shaped charge liner and wave shaper. The projectile embodies a steel spike and nose cap which initiates a base detonating fuze located at the rear of the projectile body. The projectile body has a boom and fin assembly for flight stabilization and the fin contains a tracer for projectile to target visual tracking.

The propellant system utilizes a DM10 steel stub base case with a rubber obturator at the stub case mouth and a combustible wall which encapsulates stick propellant.

Functioning:

The DM12A1 is loaded and fired in the normal manner from the 120 mm smooth bore tank gun. When the electric primer in the breech of the weapon is initiated, the resulting flash ignites the propelling charge and combustible case. This generates gases which drive the projectile from the gun and ignite the tracer element.

Upon impact, the nose cap is crushed, initiating the fuze which detonates the high explosive shaped charge which collapses the cone assembly creating a high velocity focused shock wave and a jet of metal particles that penetrate the target. Antipersonnel capability results from fragmentation of the projectile body sidewall.

Tabulated Data:

Complete round:

Type ----- Fixed, High Explosive  
 Antitank, Multipurpose  
 w/Tracer  
 Weight ----- 50.7 lb (23.0 kg)  
 Length ----- 38.6 in. (981 cm)  
 Color ----- Black w/Yellow markings

Temperature Limits:

Firing:

Lower limit ----- -40.0°F (-40.0°C)  
 Upper limit ----- +140.0°F (+60.0°C)

Storage:

Lower limit ----- -65.0°F (-53.8°C)  
 Upper limit ----- +160.0°F(+71.1°C)

Performance:

Chamber pressure ----- psi @ 70°F bars @ 21°C  
 (1 bar = 14.5 psi)

\*Packing----- 1 round per fiber  
 container; 1 fiber  
 container per wooden box

Packing Box:

Weight ----- 89 lb  
 Dimensions ----- 45.6 in. x 9.02 in. x 10.24  
 in.  
 Cube ----- 2.4 cu ft

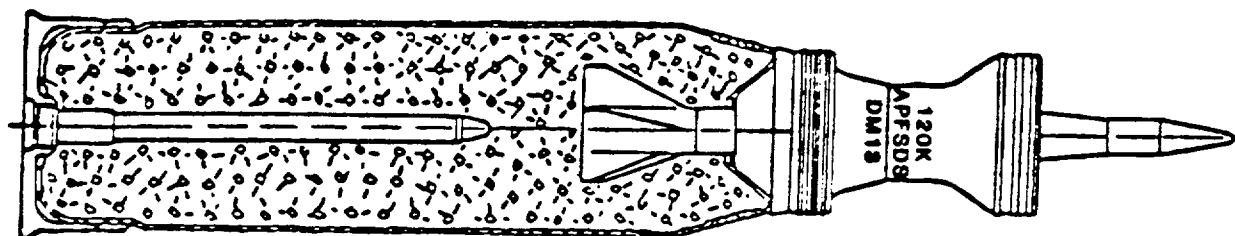
**\*Note: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

DOT Hazard Class ----- (12) 1.2E  
 DOT shipping class ----- A  
 DOT designation ----- AMMUNITION FOR  
 CANNON WITH  
 EXPLOSIVE  
 PROJECTILES

DODAC ----- Not assigned  
 Dwg. No. ----- Not available

## CARTRIDGE, 120K: APFSDS-T, DM13 AND DM23



ARD 83-0674-A

Use:

The 120K (120mm) DM13 and DM23 cartridge is used to engage single and multiple plated layered, armored targets. It has a fin stabilized subcaliber projectile and a cartridge case of combustible material.

Description:

The complete round contains a propulsion system consisting of a DM10 stub case with combustible sidewall, propellant and DM72A2 primer while the projectile consists of the subprojectile and aluminum sabot. The KE penetrator is a two piece core of heavy metal which is screwed and pressed into the sabot. The sabot is made of aluminum and consists of three segments with internal threads. The segments are held together by the obturating, sealing band and sleeve seal. The fin assembly of the subprojectile is a single piece with five fins and a tracer assembly.

Functioning:

The flame of the burning propellant charge ignites the igniter composition of the tracer. The projectile is forced out of the tube of the weapon by the pressure of the propellant charge gases on the base of the sabot and the fin assembly. The cartridge case and cartridge cover burn at the same time.

The air resistance acting in the air pocket of the sabot presses the three segments of the sabot outward. The sabot segments separate from the KE penetrator and fall to the ground after a short time. The KE penetrator continues to travel and is stabilized by the fin assembly (subcaliber projectile).

The target armor material is plastically deformed by the subcaliber projectile impacting at high velocity and the associated high energy effect and displaced by the KE penetrator.

Tabulated Data:

Complete round:  
 Type ----- Fixed, APFSDS-T  
 Weight ----- 18.7 kg  
 Projectile weight ----- 7.22 kg  
 Prop chg weight ----- 7.3 kg  
 Muzzle velocity ----- 1650 m/s  
 Max gas pressure  
 (21°C) ----- 5100 bar  
 Max range ----- 98.7 km

Temperature Limits:

Firing	<u>DM13</u>	<u>DM23</u>
Lower limit -----	+32°F	-40°F
Upper limit -----	+130°F	+140°F

Storage:

Lower limit ----- -40°F (-40°C)  
 Upper limit ----- +140°F (+60°C)

\*Packaging: ----- 1.3 C class B Explosive.

One cartridge with insert, ammunition packaging material (INSERT) DM 79060 in a CONTAINER, AMMUNITION, FIBER MATERIAL (BEHFA) DM79057:1 BEHFA DM79057 (1 cartridge) in a BOX, AMMUNITION (KIMU) DM79058.

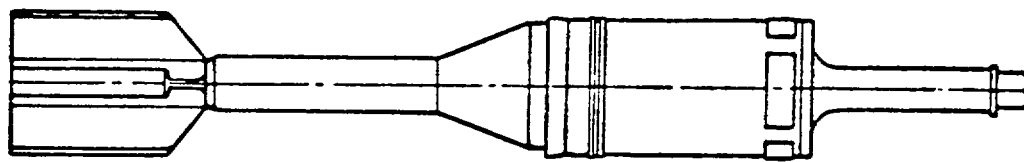
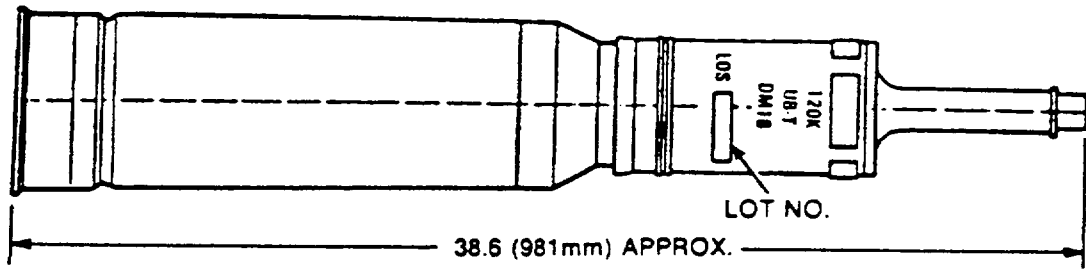
\* Ammunition for Cannon with Solid Projectiles.

Supply Information:

Stock No. ----- 1315-12-178-2867  
 Ammunition Code ----- CR02



**CARTRIDGE, 120K: UB-T, DM18  
(Übungsgeschoss-Leuchtspur/Training Projectile with Tracer)**



INTERNAL VIEW

ARD 83-0671

Use:

The 120K (120mm) DM18 cartridge is a target practice round used to simulate the ballistics of the high explosive antitank multipurpose with tracer ammunition. The cartridge is fired from the 120mm smooth bore cannon.

Description:

The DM18 cartridge external appearance is identical to that of the DM12 HEAT-MP-T service round. Internally the round does not contain any explosives, shaped charge liner base fuze or nose cap. The round consists of a steel body with aluminum spike and plastic obturator, in addition to a fin and boom assembly with tracer. The complete round propellant system

comprises a metal cartridge case base with combustible sidewall and DM72A2 primer. The propellant is a single perforated stick propellant, both bagged and unbagged with additional segments fitted over each fin.

Functioning:

The DM18 is loaded and fired in the normal manner from the 120mm smooth bore tank gun. When the electric primer in the breech of the weapon is initiated, the resulting flash ignited the propelling charge and combustible case. This generates gases which drive the projectile from the gun and ignite the tracer element. The flight characteristics simulate those of the service round, but does not result in an explosion or penetration upon impact.

Tabulated Data:

Complete round:

Type ----- Fixed, target practice  
 Weight ----- 50.7 lb (23 kg)  
 Length----- 38.6 in. (981 mm)  
 Color----- Blue w/white markings

Temperature Limits:

Firing:

Lower limit----- -8°F (-22.2°C)  
 Upper limit----- +127°F (+52.3°C)

Storage:

Lower limit----- -40°F (-40°C)  
 Upper limit----- +140°F (+60°C)

Performance:

Chamber pressure:

Bar----- 14.5 psi

\*Packing----- 1 round per fiber  
 container: 1 container per  
 wooden box

Packing Box:

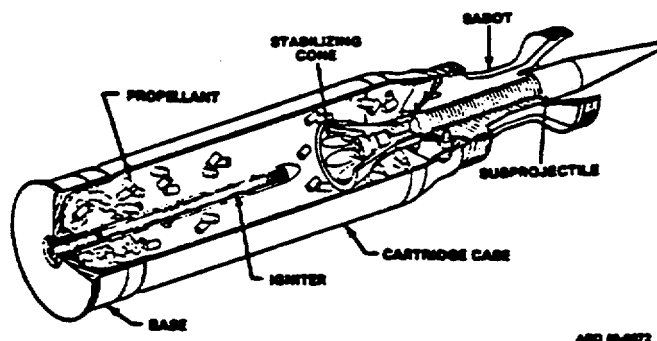
Weight ----- 89 lb  
 Dimensions ----- 45.6 in. x 9.02 in. x 10.24  
 in.  
 Cube----- 2.4 cu ft

**\*Note: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

DOD Hazard Class ----- (08) 1.2 C  
 DOT shipping class----- B  
 DOT designation----- AMMUNITION FOR  
 CANNON WITH EMPTY  
 PROJECTILES  
 DODAC----- To be assigned

**CARTRIDGE, 120K: ÜB-T, DM38**  
**(Übungsgeschoss-Leuchtspur/Training Projectile with Tracer)**



Use:

This cartridge is a kinetic energy, target practice round for use with the 120mm smooth bore cannon. It is designed to provide duplication of the service round characteristics at reduced maximum ranges to allow practice firings on short-range proving grounds and training areas.

Description:

The complete round contains a propulsion system consisting of a metal cartridge case base with combustible sidewall, granular propellant, and DM72A2 primer while the projectile consists of the subprojectile and aluminum sabot. The core is a one piece steel design with a tail cone assembly which is assembled into the sabot by means of threads. The tail cone contains nine holes which, in conjunction with the cone, provide stabilization. A reduction of range is obtained by the aerodynamic blocking effect of the holes. The tail cone assembly also contains a tracer. The aluminum sabot is composed of three 120° noninterchangeable segments with internal screw threads matching them on the outer

diameter of the subprojectile. The sabot has a silicone rubber seal at the rear to prevent gas leakage.

The weight of the complete cartridge is approximately 18.4 kg (40.6 lb) and the weight of the subprojectile is approximately 3.2 kg (7.1 lb).

Functioning:

The DM38 is loaded and fired from the 120mm tank gun in the normal manner. Upon initiation of the electric primer in the breech of the weapon, the resulting flash ignites the propelling charge and combustible case generating gases which drive the projectile from the gun and ignite the tracer. The rear seal of the sabot prevents gas leakage between the sabot segments and the driving forces (gas) propelling the subprojectile down bore. Upon leaving the gun, aerodynamic forces cause the sabot to separate from the subprojectile allowing the subprojectile to continue to target while the sabot segments fall quickly to earth. The tail cone segment of the subprojectile, due to the nine hole arrangement, causes aerodynamic slowing of the subprojectile to limit its range to 7500m.

Tabulated Data:

Complete round:

Type -----Fixed, TPCSDS-T  
Weight -----40.6 lb (18.4 kg)  
Color-----Blue w/white markings

Temperature Limits:

Firing:

Lower limit-----35°F (-31.6°C)  
Upper limit-----+125.0°F (+51.7°C)

Storage:

Lower limit-----50.8°F (-46.0°C)  
Upper limit-----+145.4°F (+63.0°C)

Performance:

Chamber pressure -----56500 psi @ 70°F  
(3900 bars @ 21°C)

Packaging: Standard German Packaging as Supplied  
(Government Furnished Material)

\*Packing-----1 round per fiber container;  
1 container per wooden  
box

Packing Box: Standard German Packaging (Wooden  
Box) as Supplied (Government Furnished Material)

Weight -----78 lb  
Dimensions -----45.6 in. x 9.02 in. x 10.24 in.  
Cube-----2.4 cu ft

**\*Note: See SC for complete packing data including  
NSN's.**

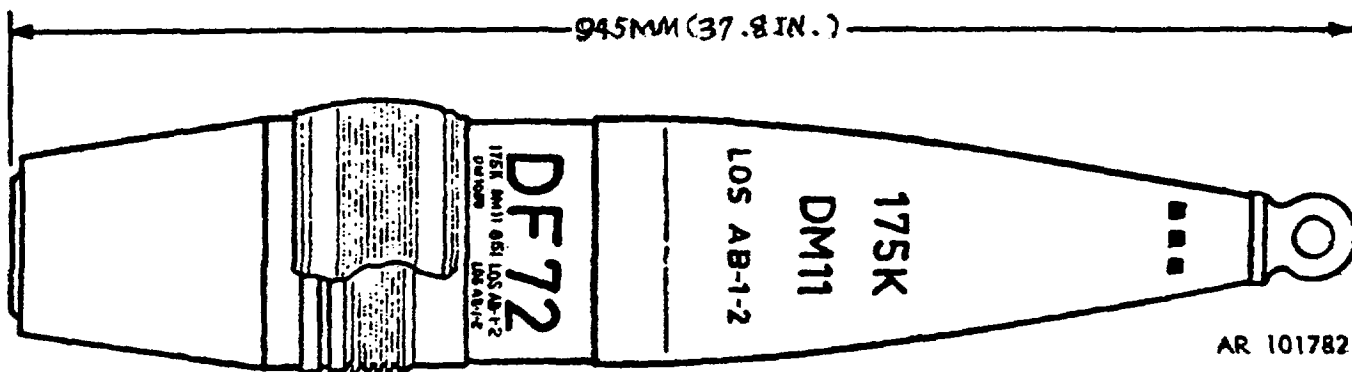
Shipping and Storage Data:

DOD Hazard Class -----(08) 1.2  
Storage compatibility  
group -----C  
DOT shipping class-----B  
DOT designation-----AMMUNITION FOR  
CANNON WITH SOLID  
PROJECTILES  
DODAC-----Not assigned

**WARNING**

**THE CORE/PENETRATOR OF  
TARGET PRACTICE ROUNDS CAN  
CAUSE DAMAGE AND PENETRATE  
ARMORED VEHICLES.**

PROJECTILE, 175 MILLIMETER: HE, DM11 (GE)



Use:

This projectile is used for fragmentation, blast, and mining in support of ground troops and armored columns.

Description:

The projectile consists of a hollow steel forging with a boattailed base, a streamlined ogive, a gilding metal rotating band, and a nylon obturating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The nose of the projectile is fitted with a threaded eye bolt lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with a deep fuze cavity and is loaded with Composition B. Deep cavity projectiles contain a supplementary charge in the fuze cavity. A cardboard spacer is placed in the fuze cavity

between the supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling. The rotating band is protected by a removable grommet. The loaded projectile is zoned into one of four weight zones ranging from 64.7 to 66.8 kg (142.3 to 146.9 lb). The weight zone of the projectile is indicated by the number of yellow squares and prick punch marks on the ogive of the projectile.

Functioning:

When the weapon is fired, Primer M82 ignites the igniter pad of the propelling charge. The burning pad ignites the black powder in the core assembly. Sparks and flame flash through perforations in the igniter core tubes in a pattern designed to assure uniform ignition of the propellant increments. Gases generated by the burning propellant force the projectile through the gun tube with the velocity required to reach the target. The rotating band engages the barrel rifling to impart spin

for stabilization in flight. The obturating band expands to prevent leakage of gas pressure past the projectile, and is discarded upon leaving the weapon. The projectile is detonated on impact.

Tabulated Data:

Projectile:

Type -----HE

Weight Zone Information:

Loaded Projectile  
(w/o Fuze)

Zone	kg ----- (lb)		Marking Yellow Squares
	Over	Up to & Incl	
1	64.7(142.3)	65.3(143.6)	□
2	65.2(143.4)	65.8(144.7)	□ □
3	65.7(144.5)	66.3(145.8)	□ □ □
4	66.2(145.6)	66.8(146.9)	□ □ □ □

Length:

W/o lifting plug -----867mm (34.68 in.)

W/lifting plug -----945mm (37.81 in. max.)

Cannon (Weapon)

used with -----M113, M113A1 (M107)

Body material -----Forged steel

Color -----Olive drab w/yellow markings

Filler and weight:

M437A2 -----Comp. B 14.0 kg (31 lb);  
Supp Chg. 0.14 kg (0.30 lb) TNT

Components:

Propelling charge -----DM22 (2 Increment)

Propelling charge -----DM32 (3 Increment)

Primer -----M82 (US M107 weapon)

Primer -----DM191A1 (GE M107 weapon)

Fuze -----DM241

Temperature Limits:

Firing:

Upper limit -----+52°C (+125°F)

Storage:

Upper limit -----+63°C (+145°F)

Packing -----6 projectiles per pallet

Pallet:

Weight -----430 kg (4.0 lb)

Dimensions -----650 x 425 x 1080mm (26 x 17 x 43.2 in.)

Cube -----0.3m<sup>3</sup> (10.5 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG -----(21) 1.1 D

DOT shipping class -----A

DOT designation -----EXPLOSIVE PROJECTILE

DODAC -----DF72

Limitations:

Not available

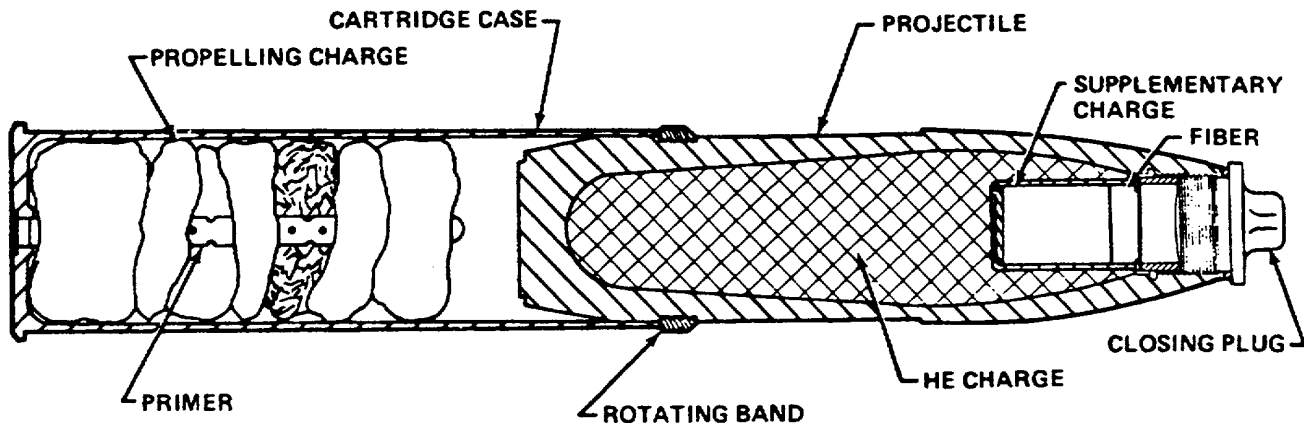
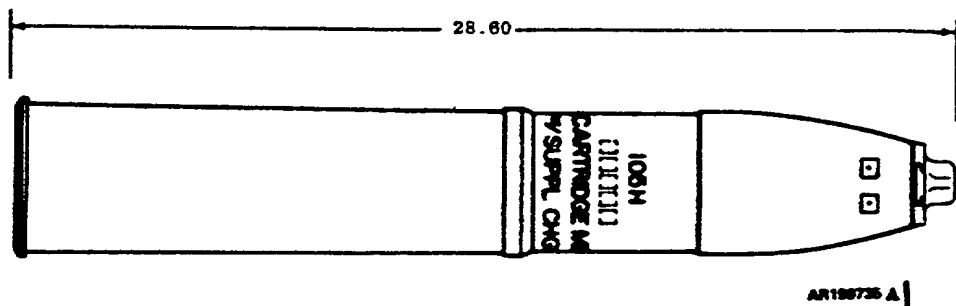
References:

Not available

**CHAPTER 3**

**AMMUNITION FOR HOWITZERS**

CARTRIDGE, 105 MILLIMETER: HE, M1 (GR, SP)



AR199734

Type Classification:

Std AMCTC 4181 dtd 1966

Use:

The projectile of this cartridge contains high explosive and is used for fragmentation, blast, and mining in support of ground troops and armored columns.

Description:

The projectile consists of a hollow steel forging with a boattail base, a streamlined ogive, and gilding metal rotating band. A base cover is welded to the base

of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The high explosive (HE) filler within the projectile may be either cast TNT or Composition B. A fuze cavity is either drilled or formed in the filler at the nose end of the projectile. This cavity may be either shallow or deep. A cavity liner, to preclude dusting of HE during transportation and handling, is seated in the cavity and expanded into the lower projectile fuze threads. A supplementary charge is placed in the fuze cavity of projectiles having deep cavities. Projectiles with shallow cavities or deep cavities containing a supplementary charge use only short intrusion fuzes, PD, or MT. Those with deep cavities will accept the long intrusion proximity fuze after removing the supplementary charge. Projectiles may be shipped with a PD or MTSQ fuze or



with a closing plug. When shipped with a closing plug, a chip board spacer is assembled between the supplementary charge and plug to limit movement of the former during transportation and handling

The cartridge case contains a percussion primer assembly and seven individually bagged and numbered propelling charge increments. The base of the cartridge case is drilled and the primer assembly is pressed into the base. The percussion primer assembly consists of a percussion ignition element and a perforated flash tube containing black powder. The seven numbered increment bags are tied together, in numerical order, with acrylic cord. These are assembled into the cartridge case, around the primer flash tube, with Increment 1 at the base of the cartridge case and Increment 7 toward the mouth of the cartridge case.

Functioning:

If the projectile is unfuzed, the closing plug is removed and a fuze assembled to the projectile prior to adjusting the charge and loading the cartridge into the weapon. Impact of the weapon firing pin results in the initiation of the percussion primer which, in turn, ignites the black powder in the flash tube. The flash tube provides for uniform ignition of the propelling charge producing a rapid expansion of the propellant gas which propels the projectile out of the weapon tube. Engagement of the projectile rotating band with the rifling of the weapon tube imparts spin to the projectile providing inflight stability. Projectile functioning is dependent upon the fuze used and may function on impact (instantaneous or delay), function above ground either at a predetermined height based upon time of flight or function in proximity with the target area. Fuze function detonates the HE projectile filler resulting in projectile fragmentation and blast.

Tabulated Data:

Complete round:

Type -----HE  
 Weight -----39.92 lb  
 Length-----W/closing plug 28.60 in.  
 max

Cannon (weapon)

used with-----M49 (M52, M52A1) M2A1,  
 M2A2 (M101, M101A1),  
 M103 (M108), M137  
 (M102)

Projectile:

Body material -----Forged steel  
 Color-----Olive drab w/yellow marking

Filler weight:

Comp B:  
 Normal cavity-----5.08 lb  
 Deep cavity -----4.60 lb  
 TNT:  
 Normal cavity-----480 lb  
 Deep cavity -----4.25 lb

Weight Zone:

Loaded Shell w/Suppl Charge (with- out fuze)	Up to Over & Incl lb	Zones	Mark- ing
Pounds	29.90 30.60	1	
	30.50 31.20	2	
	31.10 31.80	3	

**NOTE: Comp B filled projectiles fall in weight zone 2-1/2.**

Cartridge Case

<u>Model</u>	<u>Matl</u>	<u>Wt (lb) (approx)</u>
M14	Brass	5.9
M14B1	Steel, Drawn	5.4
M14B3	Steel, 5 pc spiral wrap	4.7
M14B4	Steel, 3 pc spiral wrap	4.7

Propelling charge:

Model-----M67

Components:

Increment No.	Prop Comp & Type	Web Size in. approx	Wt oz Approx
1	M1, Type II	.014	8.6 Single Perf
2	M1, Type II	.014	1.4 Single Perf
3	M1, Type I	.026	2.5 Multi Perf
4	M1, Type I	.026	3.8 Multi Perf
5	M1, Type I	.026	5.8 Multi Perf
6	M1, Type I	.026	8.8 Multi Perf
7	M1, Type I	.026	14.3 Multi Perf

Weight, Total Increments 1-7 -----2.83 lb

Percussion primer assembly:

	M28A2	M28B2
Primer	M61	M61
Black powder	CI 1, Spec MIL-P-223 (Note B)	CI 1, Spec MIL-P-223 (Note B)
Weight (lb) (primer)	.00014	.00014
(BP)	.043	.043
Body	Brass, Type 1	Steel, Type 2

Fuzes-----PD, M557, M78 Series, M739 Series, MTSQ, M582 Series, M564; Prox. M513 Series, M728, M732

Performance:

Using M52, M52A1 and M101/M101A1 howitzers.

Charge	Muzzle Velocity (fps)	Muzzle Velocity (mps)	Maximum (mtr)	Range (yd)
1	650	198.1	3510	3840
2	710	216.4	4110	4495
3	780	237.7	4860	5315
4	875	266.7	5950	6505
5	1020	310.9	7650	8370
6	1235	376.4	9380	10,260
7	1550	472.4	11,270	12,330

Maximum range-----11,270 mtr (12,330 yd)  
Muzzle velocity-----472.4 mps (1550 fps)

Using M102 and M108 howitzers.

Charge	Muzzle Velocity (fps)	Muzzle Velocity (mps)	Maximum (mtr)	Range (yd)
1	673	205	3700	4040
2	732	223	4300	4700
3	810	247	5200	5690
4	912	278	6300	6890
5	1066	325	8100	8500
6	1289	393	9600	10,500
7	1621	494	11,500	12,590

Maximum range-----11,500 mtr (12,590 yd)  
Muzzle velocity-----494 mps (1621 fps)

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
Upper limit-----+125°F (+52.0°C)

Storage:

Lower limit-----80°F (for periods not exceeding three days) (-62.2°C)  
Upper limit-----+160°F (for periods not exceeding 4 hr/day) (+71.1°C)

\*Packing-----1 round in fiber container; 2 containers in wooden box

\*Packing Box:

Weight w/cartridge -----120 lb  
Dimensions -----37-1/4 x 11-15/16 x 7-19/32 in.  
Cube-----2.0 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class -----(12) 1.2  
 Storage compatibility  
 group -----E  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION           FOR  
   CANNON                WITH  
   EXPLOSIVE  
   PROJECTILES  
 DODAC-----1315-C445  
 Drawing number -----9211611 (shipped without  
   fuze)

VT Fuze M728, for proximity or impact action, Zones 1 through 6. Zone 7 for proximity action only in a combat emergency.

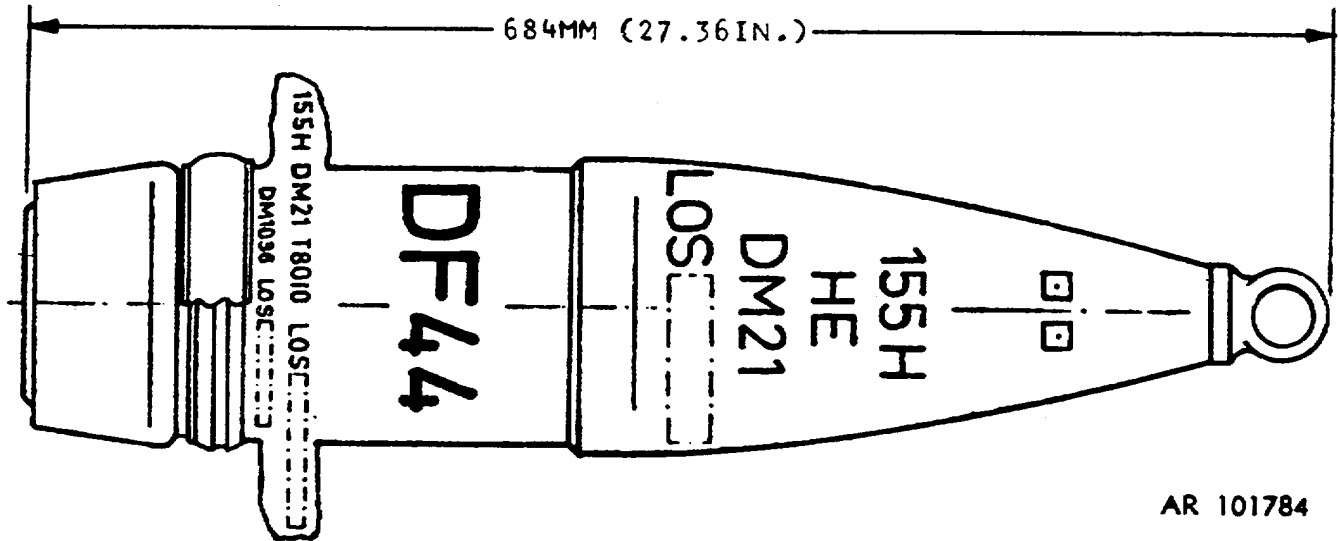
Limitations:

For proximity mode, VT M513 proximity fuzes are limited to Zones 2 through 6. Zone 7 in combat emergency only. For Impact Action, Zones 4 through 6 only.

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM P 700-3-3  
 TM 9-1015-203-12  
 TM 9-1300-251-20  
 TM 9-2350-217-10

## PROJECTILE, 155 MILLIMETER: HE DM21 (GE)

Use:

This projectile is fired from 155mm howitzers and is used for blast effect, fragmentation, and mining.

Description:

The projectile is a hollow steel shell filled with TNT. The shape is ogival with a boattail for aerodynamic efficiency. A supplementary charge of 0.135 kg (0.3 lb) TNT is sealed in an aluminum container placed in the fuze cavity of the projectile. A threaded lifting plug closes the fuze cavity at the nose of the projectile for handling. A point detonating fuze is used with this projectile. A rotating band encircles the shell





casing near the base and is protected by a grommet before loading. A steel plate (base cover) is welded over the base to prevent entry of hot propellant gases into the projectile interior.

Functioning:

When the weapon is fired, the burning propellant charge generates rapidly expanding gases to propel the projectile through the barrel with the velocity required to reach the target. The soft alloy rotating band engages the barrel rifling to impart spin to the projectile for stability in flight. Upon impact, the fuze and its booster detonates the high explosive filler.

Tabulated Data:

Weight Zone Information:

Zone	Loaded Projectile w/o Fuze		Marking Yellow Squares
	kg Over	(lb) Up to & Incl	
2	40.8(89.7)	41.4(91.0)	
3	41.3(90.8)	41.9(92.1)	
4	41.7(91.7)	42.5(93.5)	
5	42.3(93.0)	42.9(94.3)	

Complete round:

Type -----HE  
 Length w/lifting plug -----684mm (27.36 in.) max  
 Length w/o lifting  
 plug-----607mm (24.28 in.)  
 Weapon -----M109, M109A1, M109A3  
 Cannon-----M126 and M185

Projectile:

Body material -----Forged steel  
 Color-----Olive drab w/yellow  
 markings

Filler and weight:

TNT -----6.6 kg (14.5 lb)

Primers:

For (Weapon):  
 M109, M109A1,  
 M109A3-----M82 (US only)  
 M109G-----DM191A1 (GE only)

Propelling charges -----DM62, DM42B1

Fuze -----DM211

Temperature Limits:

Firing:

Upper limit-----+52°C (+125°F)

Storage:

Upper limit-----+63°C (+145°F)

Packing-----8 projectiles on pallet

Pallet

Weight -----362 kg (796.4 lb)

Dimensions -----685mm x 340mm x 815mm  
 (27.4 in. x 13.6 in. x 32.6  
 in.)

Cube-----0.190m<sup>3</sup> (6.6 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG----- (18) 1.1D

DOT shipping class-----A

DOT designation-----EXPLOSIVE  
 PROJECTILES

DODAC-----DF44

Assembly Dwg. No. -----Not available

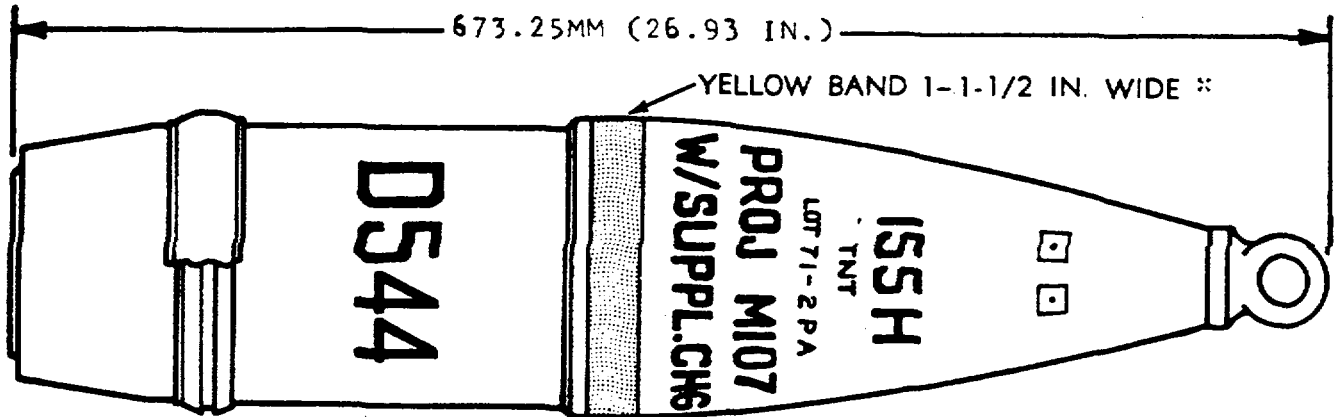
Limitations:

Not available

Reference(s):

Not available

PROJECTILE, 155 MILLIMETER: HE, M107 (NORMAL AND DEEP CAVITY) (UK, CA, NL, DA, NO, IT, GR, BE, FR)



\* PROJECTILES, AS MANUFACTURED, DO NOT HAVE THIS BAND.  
IT IS ADDED ONLY WHEN PROJECTILE IS RENOVATED. (UK ONLY)

AR 101789-A

Use:

This projectile is fired from 155mm howitzers and is used for blast effect, fragmentation, and mining.

Description:

The projectile is a hollow steel shell filled with 6.57 kg (14.6 lb) of TNT. The shape is ogival with a boattail for aerodynamic efficiency. A supplementary charge of 0.135 kg (0.3 lb) TNT is sealed in an aluminum container placed in the projectile with deep fuze cavity. A threaded lifting plug closes the fuze cavity at the nose of the projectile for handling. Point detonating fuzes are used with this projectile. A rotating band encircles the shell casing near the base and is protected by a grommet before loading. A steel plate (base cover) is

welded over the base to prevent entry of hot propellant gases into the projectile interior.

**NOTE:** With the exception of a yellow hazard band around the body of renovated projectiles, these UK munitions are identical to US munitions.

Functioning:





When the weapon is fired, the burning propellant charge generates rapidly expanding gases to propel the projectile through the barrel with the velocity required to reach the target. The soft alloy rotating band engages the barrel rifling to impart spin to the projectile for stability in flight. Upon impact, the fuze and its booster detonate the high explosive filler.

Difference between models:

155mm HE Projectile M107 (Normal Cavity) has a shallower fuze cavity and cannot accommodate proximity fuzes.

Tabulated Data:

Weight Zone Information:

Zone	Loaded Projectile w/o Fuze		Marking Yellow Squares
	kg Over	(lb) Up to & Incl	
2	40.5(90.0)	41.0(91.3)	
3	40.9(91.1)	41.5(92.4)	
4	41.4(92.0)	42.1(93.7)	
5	41.9(93.3)	42.5(94.6)	

Complete round:

Type -----HE  
 Length w/lifting plug -----673.25mm (26.93 in.) max  
 Length w/o lifting plug -----597.25mm (23.89 in.)

Weapon used with -----M109, M109A1, M109A3  
 Cannon -----M126 and M185

Projectile:

Body material -----Forged steel  
 Color -----Olive drab w/yellow markings

Filler and weight:

TNT -----6.57 kg (14.6 lb)

Primer for weapons  
 M109, M109A1, and  
 M109A3 -----M82

Fuzes, Point Detonating -----M557 and L85A2

Temperature Limits:

Firing:

Lower limit -----40°C (-40°F)  
 Upper limit -----+52°C (+125°F)

Storage:

Lower limit -----62°C (-80°F) (for periods not more than 3 days)  
 Upper limit -----+71°C (+160°F) (for periods not more than 4 hr/day)

Packing -----8 projectiles on pallet

Pallet:

Weight -----358.6 kg (797 lb)  
 Dimensions -----678 x 340 x 800mm (27-1/8 x 13-5/8 x 32 in.)  
 Cube -----0.20m<sup>3</sup> (6.8 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----(18) 1.1 D  
 DOT shipping class -----A  
 DOT designation -----EXPLOSIVE PROJECTILES

DODAC:

Deep Cavity -----1320-D544  
 Normal Cavity -----1320-D571

Assembly Dwg. No.:

Deep Cavity -----9216352  
 Normal Cavity -----Not available

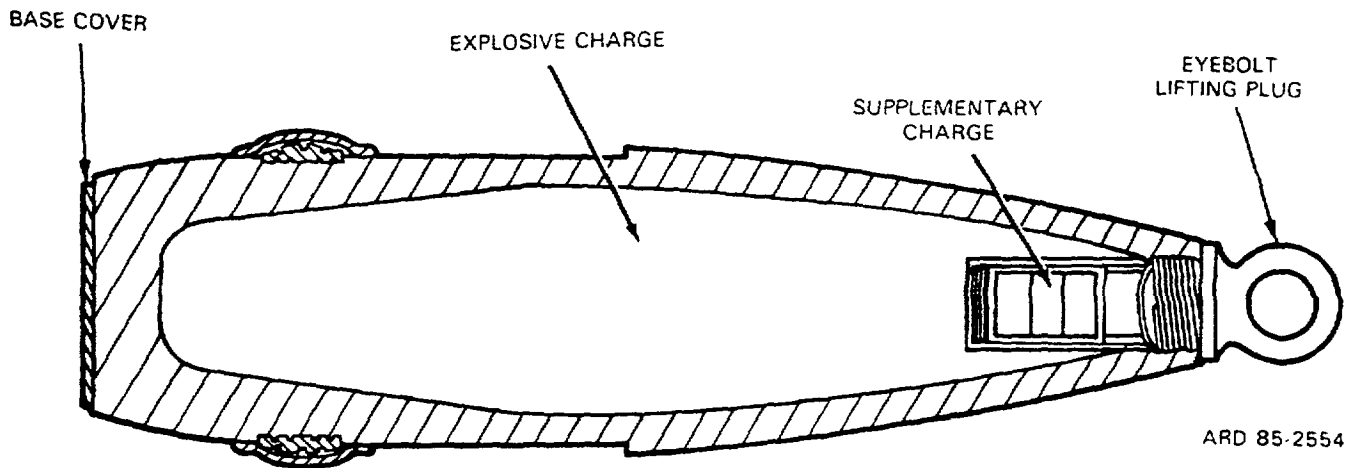
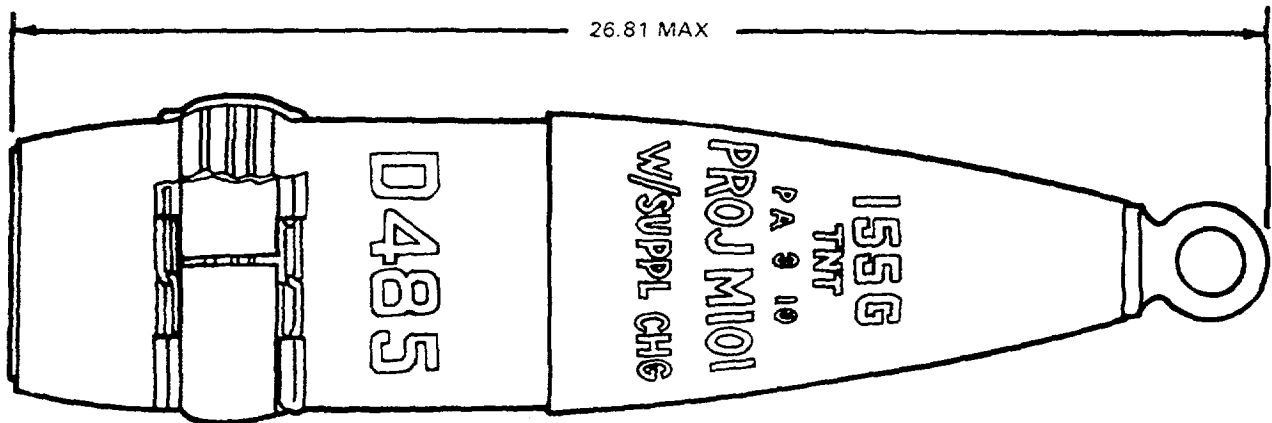
Limitations:

Not available

Reference(s):

DARCOM-P 700-3-3	TM 9-1300-251-20
SC 1305/30IL	TM 9-2350-217-10
SB 700-20	TM 9-2350-217-10N
TM 9-1025-200-12	

PROJECTILE, 155 MILLIMETER: HE, M107B2 (GR, NL)



Use:

This high explosive projectile is used for fragmentation, mining, and blast.

Description:

This projectile was originally the M101 designed for use with the M46 gun. It has now been modified for use with all 155mm howitzers and is designated M107B2. The rotating band has been modified for howitzer acceptance. The projectile consists basically of a forged steel body containing an explosive charge of

14.16 pounds of TNT. A deep fuze cavity in the nose of the projectile contains a supplementary charge of 0.30 pound of TNT in an aluminum liner. The design of the fuze cavity and the presence of the supplementary charge adapt the projectile for use with either proximity, mechanical time or point-detonating fuzes. A single rotating band (protected by a grommet during storage and handling) encircles the projectile approximately 3.5 inches forward of the boattailed base. The base itself is fitted with a protective cover which gives added assurance that the propellant gases will not penetrate the base. The projectile is issued unfuzed with an eyebolt lifting plug threaded in the nose.



Functioning:

Up to the point of fuze functioning, all 155mm ammunition functions in the same manner. When the weapon is fired, gases generated by the burning propellant force the spin-stabilized projectile out of the gun tube and propel it to the target. The fuze functions at a preset time, on approach to the target, or on impact, depending upon the type of fuze employed.

Precautions in firing:

Before loading the weapon, check the firing lock to assure that the primer expended in the previous firing has been removed.

Tabulated Data:

Complete round:

Type -----HE  
 Length w/lifting  
 plug-----26.81 in.  
 Weight -----95.6 lb  
 Cannon used -----M1, M1A1, M1A2, M45,  
 M126, M185

Projectile:

Body material -----Forged steel  
 Color-----Olive drab w/yellow  
 markings

Filler and weight:

TNT -----14.16 lb  
 Primers -----Mk2A4 or M82  
 Propelling charges -- -----M3, M4A1  
 Fuze -----PD M557

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52°C)

Storage:

Lower limit-----80°F (-62°C) for periods of  
 not more than 3 days  
 Upper limit-----+160°F (+71.1°C) for  
 periods of not more than 4  
 hours per day

Packing-----8 projectiles on pallet

Pallet:

Weight -----797 lb  
 Dimensions -----27-1/8 x 13-5/8 x 32 in.  
 Cube-----6.8 cu ft

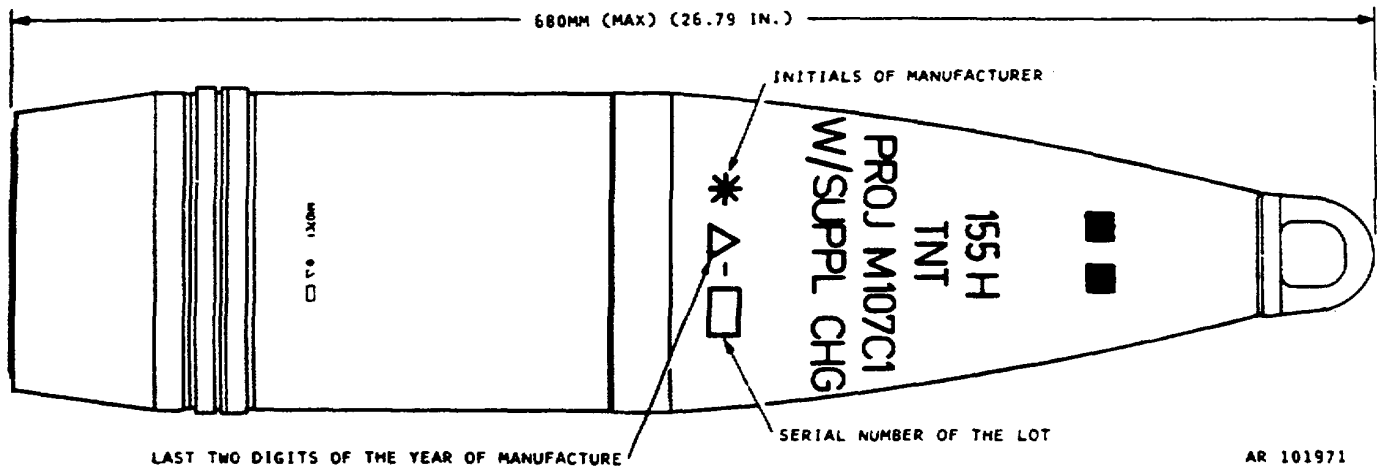
Shipping and Storage Data:

Quantity-distance  
 class----- (18) 1.1  
 Storage compatibility  
 group -----D  
 DOT shipping class-----A  
 DOT designation-----EXPLOSIVE PROJECTILE

Reference(s):

DARCOM-P-700-3-3  
 TM 9-1300-203

PROJECTILE, 155 MILLIMETER: HE, M107C1 (NL)



Use:

This projectile is fired from 155mm howitzers and is used for blast effect, fragmentation, and mining.

plate (base cover) is welded over the base to prevent entry of hot propellant gases into the projectile interior.

Description:

The projectile is a hollow steel shell filled with 14.6 lb of TNT. The shape is ogival with a boattail for aerodynamic efficiency. A threaded lifting plug closes the fuze cavity at the nose of the projectile for handling and storage. Pint detonating time or proximity (deep cavity only) fuzes may be used with this projectile. A rotating band encircles the shell casing near the base and is protected by a grommet before loading. A steel

Functioning:

When the weapon is fired, the burning propellant charge generates rapidly expanding gases to propel the projectile through the barrel with the velocity required to reach the target. The soft alloy rotating band engages the barrel rifling to impart spin to the projectile for stability in flight. If a point detonating fuze or time fuze is employed the fuze detonates the supplementary charge on impact (PD) or at the preset time (MT), and the supplementary charge detonates the projectile filler.

Tabulated Data:

Weight Zone Information:

Zone	Loaded Projectile w/o Fuze Kg (lb)		Marking Yellow Squares
	Over	Up to & Incl	
2	40.823(90.0)	41.413(91.3)	□ □
3	41.322(91.1)	41.912(92.4)	□ □ □
4	41.731(92.0)	42.502(93.7)	□ □ □ □
5	42.320(93.3)	42.910(94.6)	□ □ □ □ □

Complete round:

Type -----HE  
 Length w/lifting  
 plug-----680mm (26.79 in.) (max)  
 Length w/o lifting  
 plug-----604.5mm (23.81 in.) (max)  
 Cannon used with-----M126, M126A1, M185

Projectile:

Body material -----Forged steel  
 Color-----Olive drab w/yellow  
 markings

Filler and weight:

TNT-----6.57 kg (14.6 lb)

Primer for Weapons

M109, M109A1,  
 M109A2,  
 M109A3-----M82

Propelling charges -----M4A1, M3C1\*, M4C3\*

Fuze -----PD, M557C1\*

\*NI, manufacture

Temperature Limits:

Firing:

Lower limit-----52°C (-65°F)  
 Upper limit-----+62°C (+145°F)

Storage:

Lower limit-----62°C (-80°F) (for periods  
 not more than 3 days)  
 Upper limit-----+71°C (+160°F) (for periods  
 not more than 4 hr/day)

Packing-----8 projectiles on pallet

Pallet:

Weight -----360 kg (793.8 lb)  
 Dimensions -----840 x 705 x 353mm (33.0 x  
 27.7 x 13.9 in.)  
 Cube-----0.209m<sup>3</sup> (7.3 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----(18) 1.1 D  
 DOT shipping class-----A  
 DOT designation-----EXPLOSIVE  
 PROJECTILES  
 DODAC-----Not available  
 Assembly Dwg. No. -----Not available

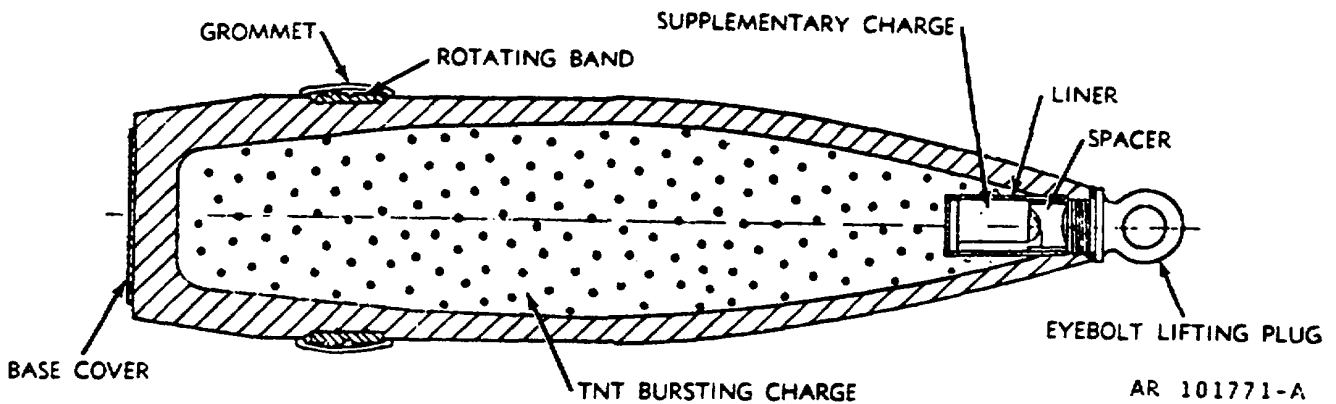
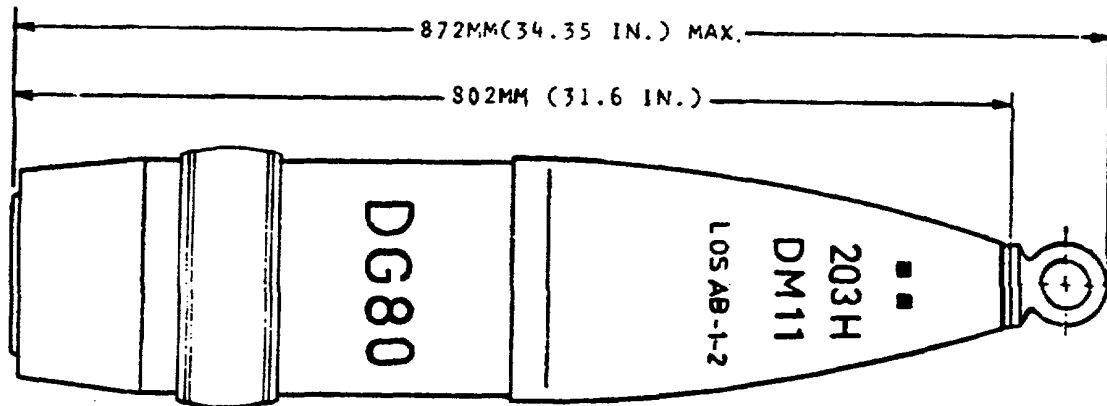
Limitations:

Not available

Reference(s):

Not available

PROJECTILE, 203 MILLIMETER, (8-INCH) DM11 (GE)



Use:

This projectile is used against personnel and materiel, producing blast and fragmentation at the target.

Description:

The projectile consists of a hollow steel forging with a boattailed base, a streamlined ogive, and a gilding metal rotating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The nose of the projectile is fitted with a threaded

eyebolt lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with either a shallow or deep fuze cavity and is loaded with TNT. Deep cavity projectiles contain a supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling. The rotating band is protected by a removable grommet. The loaded projectile is zoned into one of five weight zones ranging from 86.8 to 92.7 kilograms (191.4 to 204.3 pounds). The weight zone of the projectile is indicated by a number of squares and prick punch marks on the ogive of the projectile.

Functioning:

The grommet and lifting plug are removed from the projectile and the projectile is fitted with the authorized fuze and rammed into the weapon chamber. Fuze arming occurs after firing, during projectile flight downrange. The fuze functions detonating the projectile on impact, either superquick (SQ) or with 0.05 second delay.

Tabulated Data:

Weight Zone Information:

Zone	Over	Loaded Projectile w/o Fuze kg (lb)	Up to & Incl	Marking Yellow Squares
2	86.8(191.4)	88.1(194.3)		□ □
3	87.9(193.9)	89.3(196.9)		□ □ □
4	89.1(196.4)	90.4(199.3)		□ □ □ □
5	90.2(198.9)	91.6(201.9)		□ □ □ □ □
6	91.4(201.4)	92.7(204.3)		□ □ □ □ □ □

Complete round:

Length:

W/o lifting plug -----802mm (31.6 in.)  
 W/lifting plug -----872mm (34.35 in. max) □

Diameter:

Rotating band -----210mm (8.28 in. max)  
 Bourrelet -----203mm (7.998 in. max)

Body material -----Steel

Color -----Olive drab w/yellow markings

Filler and weight -----TNT 16.5 kg (36 lb)

Supplementary

charge -----TNT 0.14 kg (0.3 lb)

Grommet -----3 types - metal w/wire ties,  
 fiberglass or plastic  
 w/metal lever

Weapon -----M110, M110A1, M110A2

Cannon -----M2A2 (M2A1E1), M201,  
 M201A1

Propelling charges -----DM12, DM22  
 Primer\* -----M82  
 Fuze -----Point detonating, DM241

\*The US M82 Primer is not interchangeable with the GE M191A1 Primer because of variations in the breech mechanism. GE weapons must use DM191A1 Primers and US weapons must use M82 Primers.

Temperature Limits:

Firing:

Upper limit -----+52°C (+125°F)

Storage:

Upper limit -----+63°C (+145°F)

Packing -----6 projectiles on pallet

Pallet:

Weight -----635 kg (1400 lb)

Dimensions -----720 x 480 x 972mm (28.4 x  
 18.9 x 38.3 in.)

Cube -----0.336m<sup>3</sup> (11.8 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG -----1.1D

DOT shipping class -----A

DOT designation -----EXPLOSIVE PROJECTILE

Drawing number -----Not available

DODAC -----DG80

Firing Tables (US):

FT 8-0-5 -----M110, Cannon M2A2  
 (M2A1E1)

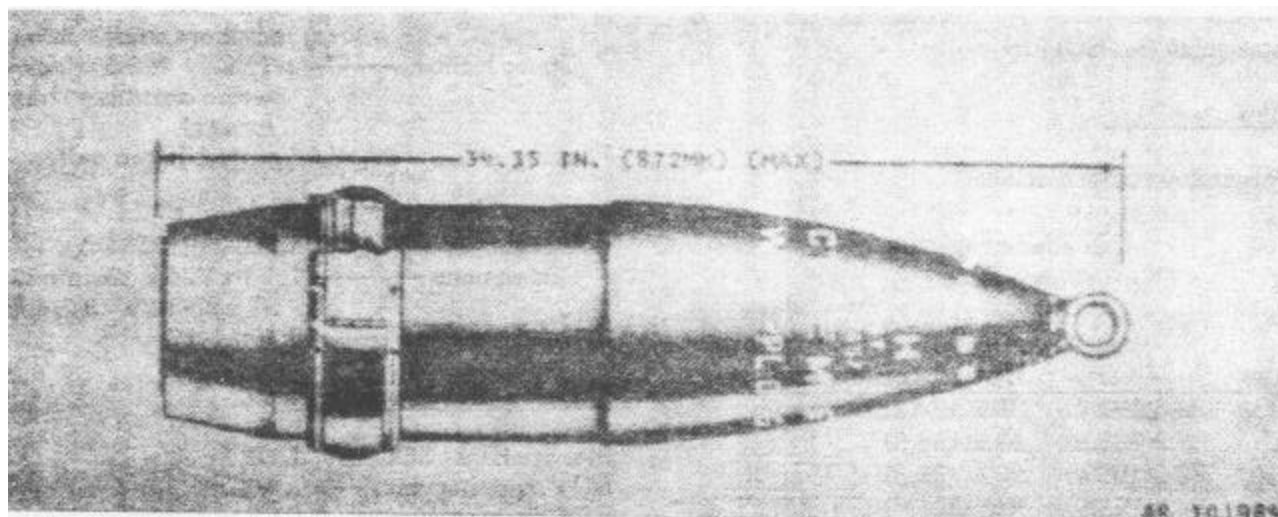
FT 8-Q-1 -----M110A1, Cannon M201,  
 M110A2, Cannon  
 M201A1

Limitations:

Not available

References:

Not available

**PROJECTILE, 203 MILLIMETER (8-INCH): HE, M106 (NL\* GE, SP, BE\*, DA, IT\*\*, GR, UK\*)**

\*US manufacture

\*\*Some US manufacture

Use:

This projectile is used against personnel and materiel, producing blast and fragmentation at the target.

Description:

The projectile consists of a hollow steel forging with a boattailed base, a streamlined ogive, and a gilding metal rotating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The nose of the projectile is fitted with a threaded eyebolt lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with

either a shallow or deep fuze cavity and may be loaded with TNT or Composition B. Deep cavity projectiles contain a supplementary charge in the fuze cavity. A cardboard spacer is placed in the fuze cavity between the supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling. The rotating band is protected by a removable grommet. The loaded projectile is zoned into one of five weight zones ranging from 86.8 to 92.6 kg (191.4 to 204.3 lb). The weight zone of the projectile is indicated by the number of squares and punch prick marks on the ogive of the projectile.

Functioning:

The grommet and lifting plug are removed from the projectile and the projectile is fitted with one of the

authorized fuzes and rammed into the weapon chamber. Fuze arming occurs after firing, during projectile flight downrange. Depending upon the type of fuze fitted, the fuze functions, detonating the projectile on impact with a point detonating (PD) fuze or after an elapsed time with a mechanical time and superquick (MTSQ) fuze.

Tabulated Data:

Weight Zone Information:

Zone	Loaded Projectile w/o Fuze		Marking Yellow Squares
	kg Over	(lb) Up to & Incl	
2	86.8(191.4)	88.1(194.3)	□ □
3	87.9(193.9)	89.3(196.9)	□ □ □
4	89.1(196.4)	90.4(199.3)	□ □ □ □
5	90.2(198.9)	91.6(201.8)	□ □ □ □ □
6	91.4(201.4)	92.7(204.3)	□ □ □ □ □ □

Type -----HE

Length:

W/o lifting plug -----798mm (31.43 in.)  
 W/lifting plug -----872mm (34.35 in.) max

Diameter:

Rotating Band -----210mm (8.28 in.)  
 Bourrelet -----203mm (7.998 in.) max

Body material -----Steel

Color -----Olive drab w/yellow markings

Filler and weight -----TNT 16.5 kg (36.3 lb) Comp  
 B 17.6 kg (38.8 lb)

Supplementary

charge -----TNT 0.136 kg (.3 b)

Weapon -----M110, M110A1, M110A2

Cannon -----M2A2, M201, M201A1

Grommet -----3 types, metal w/wire ties,  
 fiberglass or plastic  
 w/metal lever

Temperature Limits:

Firing:

Lower limit -----40°C (-40°F)  
 Upper limit -----+52°C (+125°F)

Storage:

Lower limit -----62°C (-80°F) (for period not  
 more than 3 days)  
 Upper limit -----+70°C (+160°F) (for period  
 not more than 4 hr/day)

Packing -----6 projectiles on pallet

Pallet

Weight -----568.8 kg (1253 lb)  
 Dimensions -----1003 x 724 x 489mm (39-12  
 x 28-1/2 x 19-1/4 in.)  
 Cube -----0.36m<sup>3</sup> (12.4 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG -----1.1D  
 DOT shipping class -----A  
 DOT designation -----EXPLOSIVE PROJE CTILE  
 DODAC -----Not available  
 Dwg. No. -----Not available

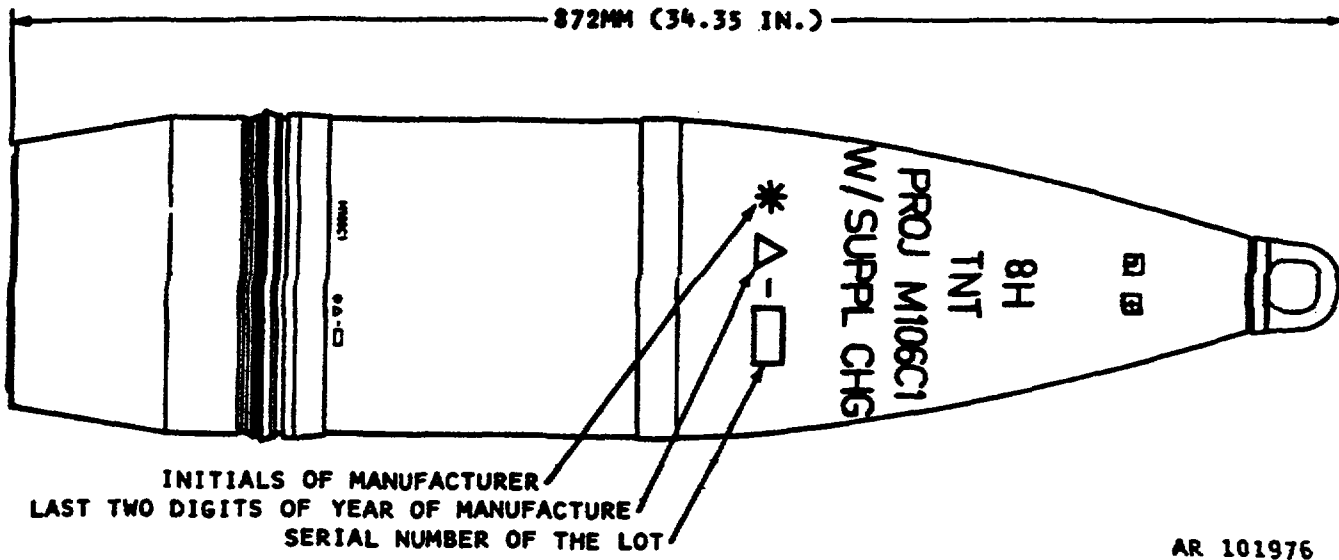
Limitations:

Not available

Reference(s):

TM 9-1300-206  
 TM 9-1300-251-20  
 TM 9-1300-251-34

PROJECTILE, 203 MILLIMETER (8-INCH): HE, M106C1 (NL)



Use:

This projectile is used against personnel and materiel, producing blast and fragmentation at the target.

Description:

The projectile consists of a hollow steel forging with a boattailed base, a streamlined ogive, and a gilding metal rotating band. A bas cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The nose of the projectile is fitted with a threaded eyebolt lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with either a shallow or deep fuze cavity and loaded with TNT. Deep cavity projectiles contain a supplementary charge in the fuze cavity. A cardboard spacer is placed

in the fuze cavity between the supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling. The rotating band is protected by a removable grommet. The loaded projectile is zoned into one of five weight zones ranging from 86.8 to 92.6 kg (191.4 to 204.3 lb). The weight zone of the projectile is indicated by the number of squares and prick punch marks on the ogive of the projectile.

Functioning:


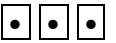
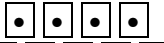


The grommet and lifting plug are removed from the projectile and the projectile is fitted with one of the authorized fuzes and rammed into the weapon chamber. Fuze arming occurs after firing, during projectile flight downrange. Depending upon the type of fuze fitted, the



fuze functions detonating the projectile on impact, after an elapsed time or on sensing of the target.

Tabulated Data:

Weight Zone Information:

Zone	Over	Loaded Projectile w/o Fuze Up to & Incl	Marking Yellow Squares
2	86.8(191.4)	88.1(194.3)	
3	87.9(193.9)	89.3(196.9)	
4	89.1(196.4)	90.4(199.3)	
5	90.2(198.9)	91.6(201.8)	
6	91.4(201.4)	92.7(204.3)	

Complete round:

Type -----HE  
 Length:  
 W/o lifting plug -----798mm (31.43 in.)  
 W/lifting plug -----872mm (34.35 in.) max

Diameter:

Rotating Band -----210mm (8.28 in.)  
 Bourrelet -----203mm (7.998 in.) max

Body material -----Steel

Color -----Olive drab w/yellow markings

Filler and weight -----TNT, 16.5 kg (36.3 lb)

Supplementary

charge -----TNT 0.136 kg (0.3 lb)

Weapon -----M110, M110A1, M110A2

Cannon -----M2A2, M201, M201A1

Grommet -----3 types, metal w/wire ties,  
 fiberglass or plastic  
 w/metal lever

Temperature Limits:

Firing:

Lower limit -----40°C (-40°F)  
 Upper limit -----+52°C (+125°F)

Storage:

Lower limit -----62°C (-80°F) (for period not  
 more than 3 days)  
 Upper limit -----+70°C (+160°F) (for period  
 not more than 4 hr/day)

Packing -----6 projectiles on pallet

Pallet:

Weight -----565 kg (1246 lb)  
 Dimensions -----1020 x 720 x 497mm (40.2  
 x 28.3 x 19.6 in.)  
 Cube -----0.365m<sup>3</sup> (12.7 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG -----1.1D  
 DOT shipping class -----A  
 DOT designation -----EXPLOSIVE  
 PROJECTILES  
 DODAC -----Not available  
 Dwg No. -----Not available

Limitations:

Not available

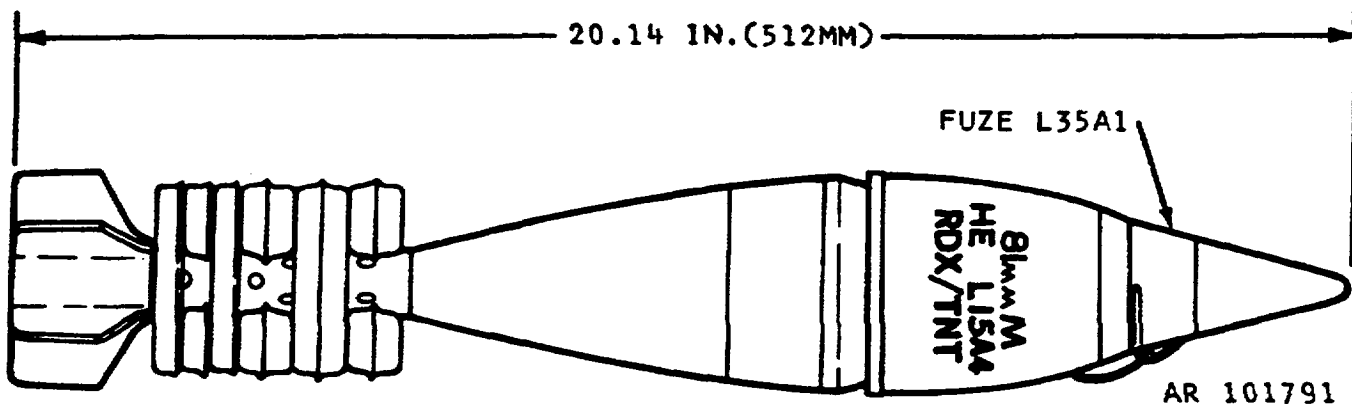
Reference(s):

TM 9-1300-206  
 TM 9-1300-251-20  
 TM 9-1300-251-34

**CHAPTER 4**

**AMMUNITION FOR MORTARS**

CARTRIDGE, 81 MILLIMETER: HE, L15A4 (UK) (CA)



Use:

This cartridge is similar to US 81mm Cartridge: HE, M374A2 and M374A3 and can be fired in US mortars M29 and M29A1. It is used against personnel and materiel, providing both blast and fragmentation effects.

RDX/TNT. The projectile body is threaded at the base to accept the fin assembly and has a nose adapter which accepts the percussion PD fuze L35A1. The aluminum ignition cartridge L33A1 consists of a flash tube, cap holder and propellant container filled with propellant. The ignition cartridge fits inside the cartridge housing of the fin assembly.

Description:

The complete round consists of a projectile body, percussion (point detonating (PD)) fuze, fin assembly, and the Mark 2 propelling charge system.

The Mark 2 propelling charge system is composed of the ignition cartridge L33A1 and six propellant increments. These increments, which are horseshoe-shaped celluloid containers filled with propellant, are placed with their open ends staggered along the cartridge housing of the fin assembly. Three L32A1 increments containing 180 grains (11.7 g) of propellant are placed next to the fin. Three L34A2 increments containing 285 grains (18.5 g) of propellant are placed next to the projectile body. Propelling charge No. 1 consists of the ignition cartridge L33A1 and one increment L32A1; No. 3 with ignition cartridge L33A1 with L32A2 increments; No. 5, with the L33A1 ignition cartridge plus three L32A1 and two L34A2 increments.

**NOTE**

**The above illustration shows the projectile as issued with six increments. As issued, this projectile is fuzed with Model 162 fuze. However, to illustrate the round as fuzed for US use the L35A1 fuze as shown.**

The projectile body, machined from ductile iron casting, is filled with approximately 1.5 lb (0.675 kg) of

When firing cartridge L15A4 in the M29 and M29A1 cannon, the maximum propellant charge is limited to five increments. Therefore, the increment L34A2 nearest the projectile body must be removed before firing for maximum charge.

All rounds are issued with a polystyrene protector cover over the propellant increments. The tail assembly is protected with a rubberized waterproof cover.

Functioning:

When the cartridge is placed in the mortar tube, it slides down until the percussion primer in the hub of the fin assembly strikes the firing pin in the base cap of the mortar. The primer flashes through the central hole in the cartridge housing to ignite the ignition cartridge. The cartridge ignites the propellant charge, and rapidly expanding gases from the burning propellant expel the projectile from the tube and propel it to the target. The projectile is fin-stabilized in-flight. Functioning of the fuze detonates the fuze booster charge and, in turn, the high explosive charge. The projectile bursts on the target producing near optimum fragmentation and blast effect.

Tabulated Data:

Complete round:

Type -----HE  
 Weight -----4.32 kg (9.523 lb)  
 Length-----512mm (20.14 in.)  
 Cannon used with-----UK L16A1, L16A2 US M29, M29A1

Projectile:

Body material -----Ductile cast iron casting (Hollow)  
 Color-----Deep bronze green w/golden yellow hazard band  
 Filler and weight-----RDX/TNT, 60/40, 0.675 kg (1.5 lb)

Projectile - continued:

Fuze -----L35A1  
 Fin assembly-----TV180

Propelling charge:

Primary (ignition) cartridge-----L33A1  
 Augmenting cartridge (increments)-----L34A2, three cartridges; L32A1, three cartridges  
 Performance-----Use UK Firing Tables

Temperature Limits:

Firing:

Lower limit-----40.0°F (-40.0°C)  
 Upper limit-----+52°C (+125°F)

Storage:

Lower limit-----not available  
 Upper limit-----not available

Packing-----two rounds per plastic container; two containers per steel box

Packing Box:

Weight -----32.4 kg (72.0 lb)  
 Dimensions -----575 x 255 x 259mm (23 x 9-3/4 x 10-3/8 in.)  
 Cube-----0.04m<sup>3</sup> (1.34 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----(08) 1.2 E  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION FOR CANNON WITH EXPLOSIVE PROJECTILES  
 DODAC-----1315-C256

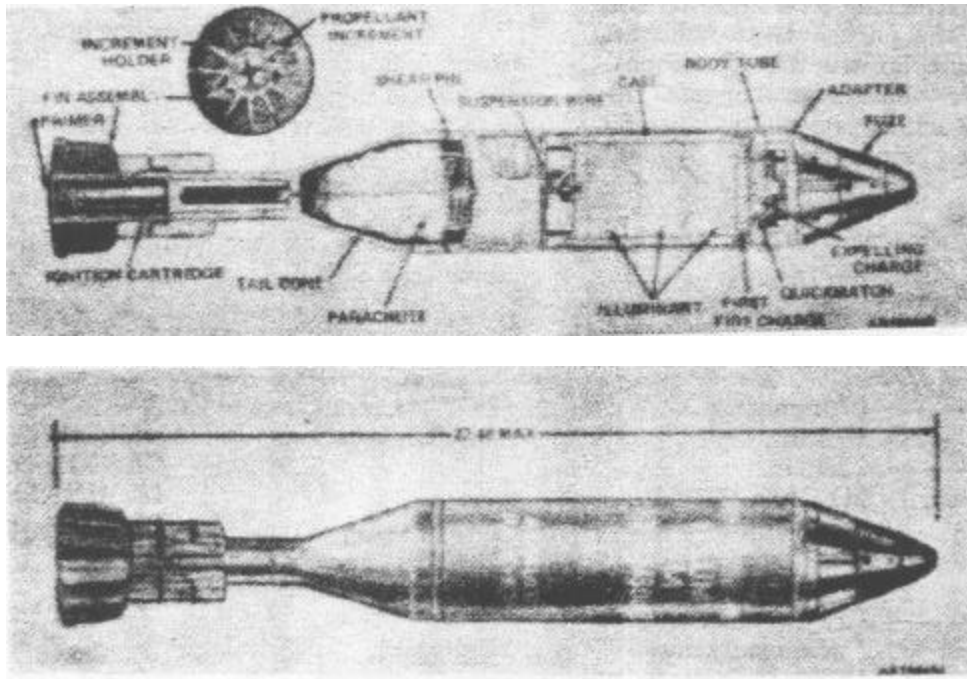
Limitations:

Not available

References:

Not available

**CARTRIDGE, 81 MILLIMETER: ILLUMINATING, M301A2 AND M301A1 (NO)**



Type Classification:

CONT MSR 11756003.

Use:

This cartridge is used for illuminating a desired point or area.

Description:

The complete round consists of a body tube and tail cone assembly, an illuminant candle and parachute assembly, a time fuze with a built-in expelling charge, a fin assembly with propellant charge, and an ignition cartridge with percussion primer. The nose of the thin-walled steel tubing body is fitted with a steel adapter and internally threaded to accept the fuze. The tail cone is

internally threaded to accept the fin assembly, and is attached to the body tube with four equally spaced shear pins. The illuminant assembly, consisting of a first-fire charge and an illuminant charge, is contained in a boxboard case and attached to the parachute with a 30-inch suspension line.

Functioning:

When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The primer ignites the ignition cartridge, and the cartridge ignites the propellant charge. Rapidly expanding gases from the burning propellant expel the projectile from the tube and propel it to the desired height. The projectile is fin-stabilized in flight. Functioning of the time fuze detonates the expelling

charge and ignites the first-fire charge by means of a length of quick match. The expelling charge separates the co from the tube allowing the illuminant candle and parachute to fall free. The first-fire charge ignites the illuminant, and the parachute deploys to support the burning candle. Burning time is at least 60 seconds with a minimum of 500,000 candlepower.

Difference Between Models:

Cartridge M301A1 has gas check bourrelet grooves and some minor dimensional differences in metal parts.

Tabulated Data:

Complete round:

Type -----Illuminating  
 Weight -----10.7 lb  
 Length-----22.48 in.  
 Cannon used with-----M1, M29, M29A1

Projectile:

Body material -----Steel tube  
 Color:  
 Old-----Gray w/white band & white markings  
 New-----White w/black markings  
 Filler and weight-----Illuminating, 1.37 lb

Components:

Ignition cartridge-----M6  
 Propellant charge-----M2A1  
 Percussion primer -----M34  
 Fin assembly -----M4A1  
 Fuze -----Time, M84

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52.0°C)

Storage:

Lower limit-----80°F (for period not more than 3 days) (-62.2°C)  
 Upper limit-----+160°F (for period not more than 4 hr/day) (+71.1°C)

\*Packing-----One round in jungle wrapped fiber or metal container; three fiber metal containers in wooden box

\*Packing Box:

Weight -----53.6 lb  
 Dimensions -----30-9/16 x 13-15/16 x 6-25/32 in.  
 Cube-----1.9 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance  
 class------(08) 1.2  
 Storage compatibility  
 group -----G  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION FOR CANNON WITH ILLUMINATING PROJECTILES  
 DODAC-----1315-C226  
 Drawing number -----8865058

Ballistics:

Charge	Muzzle Velocity (fps)	Range to burst	
		(mtr)	(yd)
2*	440	1000	1094
3	517	1600	1750
4	595	2150	2350

\*Charge 2 is the ignition cartridge and two increment charges; Charge 4 is the ignition charge and four increment charges.

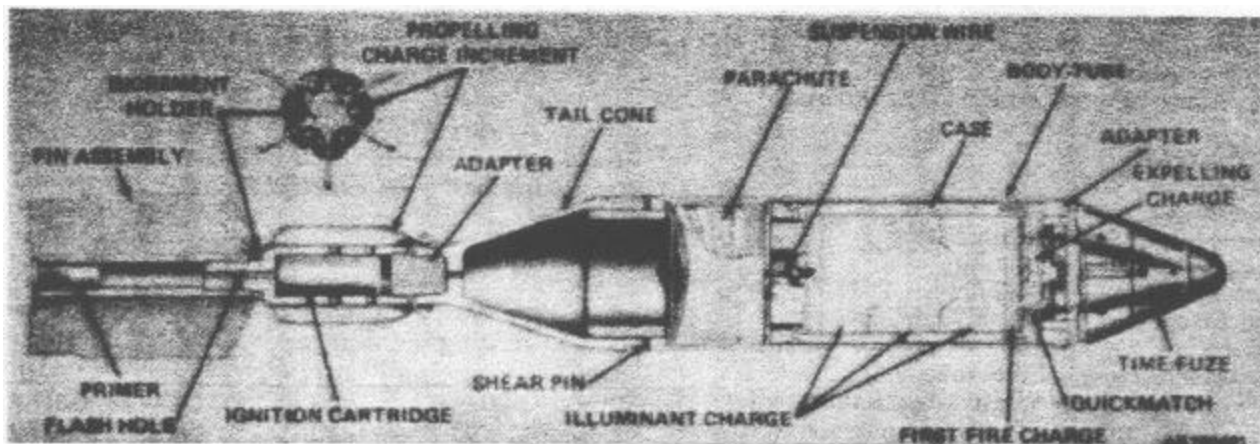
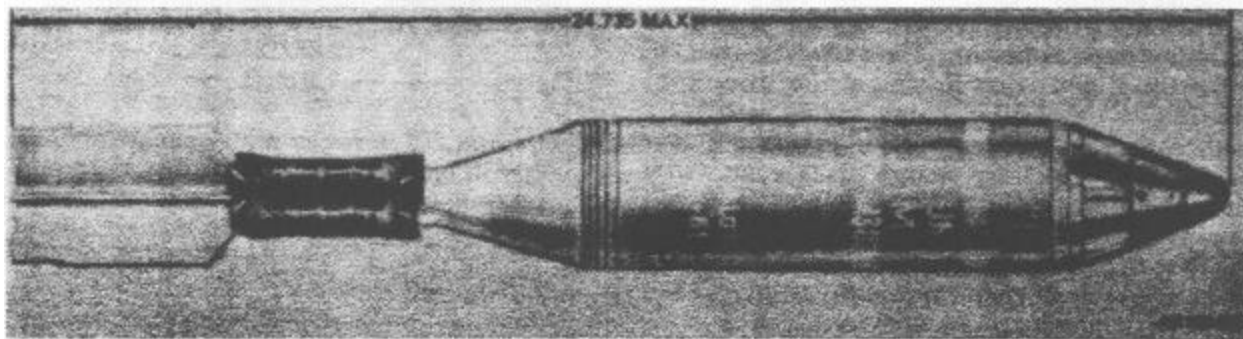
Limitations:

Firing with less than two propellant increment charges (Charge 2) is not authorized.

References:

DARCOM-P 700-3-3                      TM 9-1300-251-20  
 SB 700-20                                  TM 9-3071-1  
 SC 1305/30-IL  
 TM 9-1015-200-12

**CARTRIDGE, 81 MILLIMETER: ILLUMINATING, M301A3 (DE, IT)**



Type Classification:

Std AMCTC 6390, dtd 1968.

Use:

This cartridge is used for illuminating a desired point or area.

Description:

The complete round consists of a body tube and tail cone assembly, an illuminant candle and parachute assembly, a time fuze with a built-in expelling charge, a fin assembly with a cartridge housing and propellant increment charges, and an ignition cartridge with percussion primer. The nose of the thin-walled steel tubing body is fitted with a steel adapter and internally

threaded to accept the fuze. The tail cone may be internally or externally threaded, depending upon the model. Models that are internally threaded require an adapter for attaching the fin assembly. The tail cone is attached to the body with four equally spaced shear pins. The illuminant assembly, consisting of a first-fire charge and an illuminant charge, is contained in a boxboard case and attached to the parachute with a 30-inch suspension line.

Functioning:

When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the hub of the fin assembly strikes the firing pin in the base cap of the mortar. The burning primer flashes through the central flash hole in the cartridge housing, igniting the ignition cartridge. The cartridge ignites the propellant,

and rapidly expanding gases from the burning propellant expel the projectile from the tube and propel it to the desired height. The projectile is fin-stabilized in flight. Functioning of the time fuze detonates the expelling charge and ignites the first-fire charge by means of a length of quickmatch. The expelling charge also separates the cone from the tube, allowing the illuminant candle and parachute assembly to fall free. The first-fire charge ignites the illuminant, and the parachute deploys to support the candle. Burning time is at least 60 seconds with a minimum of 500,000 candlepower.

Difference Between Models:

Fin assembly attaches with or without adapter, depending upon design of the tail cone.

Tabulated Data:

Complete round:

Type -----Illuminating  
 Weight -----10.1 lb  
 Length-----24.735 in.  
 Cannon used with-----M1, M29, M29A1

Projectile:

Body material -----Steel tube  
 Color-----White w/black markings  
 Filler and weight-----Illuminating, 1.37 lb

Components:

Ignition cartridge-----M66E1  
 Propellant charge-----M185  
 Percussion primer -----M71A2  
 Fin assembly -----M158  
 Fuze -----Time, M84A

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52.0°C)

Storage:

Lower limit-----80°F (for period not more than 3 days) (-62.2°C)  
 Upper limit-----+160°F (for period not more than 4 hr/day) (+71.1°C)

\*Packing-----One round in jungle wrapped fiber or metal container; three fiber/metal containers in wooden box

\*Packing Box:

Weight -----53.6 lb  
 Dimensions -----30-9/16 x 13-15/16 x 6-25/32 in.  
 Cube-----1.9 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance  
 class----- (08) 1.2  
 Storage compatibility  
 group -----G  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION FOR CANNON WITH ILLUMINATING PROJECTILES  
 DODAC-----1315-C226  
 Drawing number -----9220705

Ballistics:

Charge	Fuze Setting (sec)	Horizontal Range (mtr)	Height of burst (mtr)	Elevation (mil)
3*	20.6	250	600	1501.1
3	19.93	250	600	1501.1
3	15.9	1050	600	1042.1
4	19.8	1550	600	1004.3
5	22.1	2050	600	942.6
6	26.1	2450	600	967.4
7	27.6	2950	600	904.7
8	29.8	3150	600	883.9

\*Charge 3 is the ignition cartridge and three increment charges; Charge 8 is the ignition cartridge and eight increment charges.

Limitations:

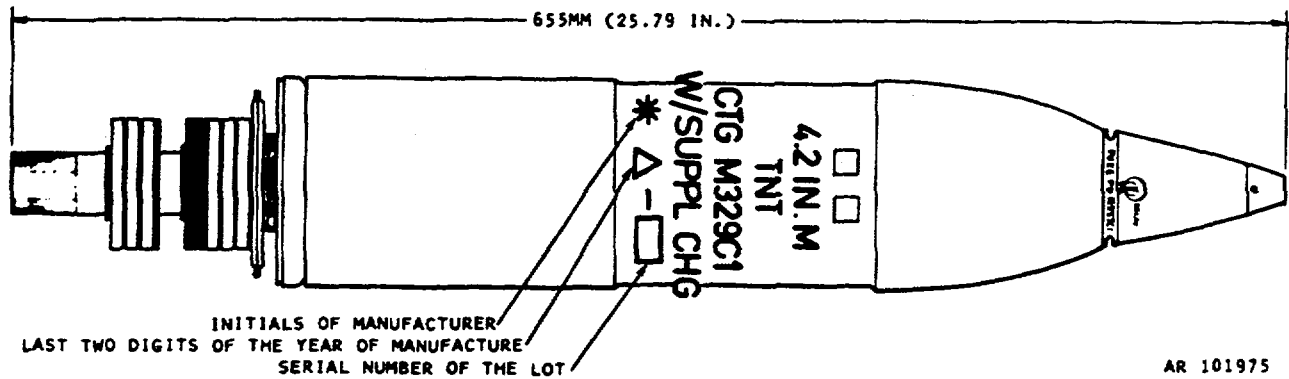
Firing with less than three propellant increment charges (Charge 3) is not authorized. Exposure of the propelling charge to moisture can produce short rounds.

References:

DARCOM-P 700-3-3                      TM 9-1015-200-12  
 SB 700-20                                  TM 9-1300-251-20  
 SC 1305/30-IL                              TM 9-3071-1



**CARTRIDGE, 107 MILLIMETER (4.2 INCH): HE, M329C1 (NL)**



Use:

This cartridge is used against personnel and materiel, providing both fragmentation and blast effect.

Description:

The complete round consists of a projectile body, a fuze, and a tail assembly. The steel body is designed to accommodate a point detonating (PD) fuze. A deep fuze well in the nose is fitted with a supplementary charge of TNT. The tail assembly includes a pressure plate and rotating disc, a propelling charge, a cartridge container, and ignition cartridge, and a striker nut assembly.

Functioning:

When the cartridge is released, it slides down the mortar tube until the percussion primer strikes the firing pin. The flash from the primer ignites the ignition cartridge, which, in turn, ignites the propelling charge. The gases from the propelling charge exert pressure on the pressure plate at the base of the projectile which expands the rotating disc, engaging it in the rifling of the

tube. The spin, imparted to the projectile as it leaves the weapon, stabilizes it in flight. The functioning of the fuze detonates the supplementary charge, and, in turn, the high explosive charge. The projectile bursts on target producing near optimum fragmentation and blast effect.

Tabulated Data:

Complete round:

Type -----HE  
 Weight -----12.29 kg (27.07 lb)  
 Length-----655mm (25.79 in.)

Projectile:

Body material -----Steel  
 Color-----Olive drab w/white markings  
 Filler and weight-----3.2 kg (7.08 lb) TNT

Supplementary

charge-----0.165 kg (0.365 lb) TNT

Components:

Ignition cartridge-----M2A2  
 Propelling charge-----M36A1  
 Fuze -----Point detonating, M557 or M557C1

Performance (full charge):

Maximum range-----5650m (6215 yd)  
Muzzle velocity-----299 mps

Temperature Limits:

Firing:

Lower limit-----40°C (-40°F)  
Upper limit-----+52°C (+125°F)

Storage:

Lower limit-----62°C (-80°F) (for period not  
more than 3 days)  
Upper limit-----+70°C (+160°F) (for period  
not more than 4 hr/day)

Container-----M251

Packing-----1 round in fiber container; 2  
fiber containers in wooden  
box

Packing Box:

Weight-----37.0 kg (81.5 lb)  
Dimensions-----813 x 281 x 183mm (32 x  
11 x 7.2 in.)  
Cube-----0.04m<sup>3</sup> (1.46 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG-----1.1 E  
DOT shipping class-----A  
DOT designation-----AMMUNITION FOR  
CANNON WITH  
EXPLOSIVE PROJECTILES  
DODAC-----Not available at this time  
Dwg No.-----Not available at this time

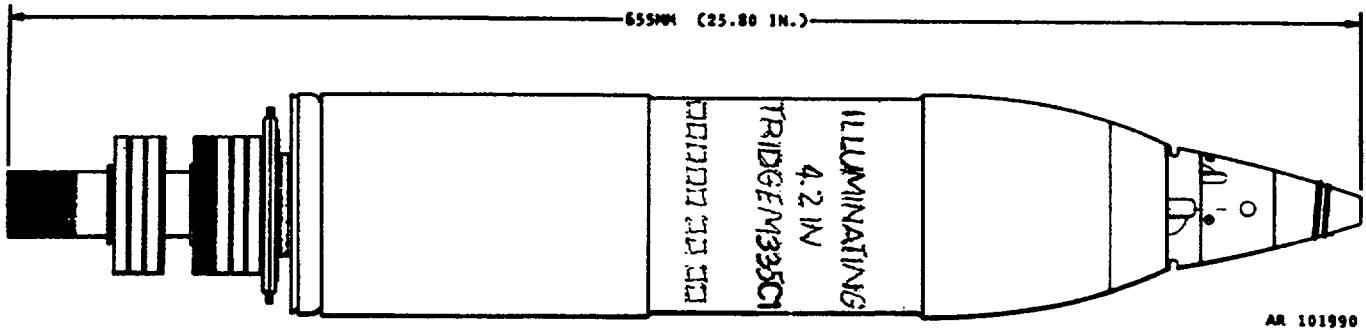
Limitations:

Short rounds may occur in firing with fewer than 10 increments.

References:

Not available

## CARTRIDGE, 107 MILLIMETER (42-INCH): ILLUMINATING, M335C1 (NL)

Use:

This cartridge is used for target and battlefield illumination at night and during other periods of low visibility.

Description:

The complete round consists of a projectile body with a detachable base plug, a mechanical time (MT) fuze, an illuminant assembly attached to a parachute assembly, and a tail assembly. The steel tube body is designed to accommodate an expelling charge immediately below the fuze, and the base plug is attached with four equally spaced shear pins. The illuminant assembly consists of a first-fire charge and an illuminant charge, contained in a canister fitted with anti-rotational brakes to reduce canister spin at the time of

ejection and prevent twisting of the parachute suspension lines. The tail assembly includes a pressure plate and rotating disc, a propelling charge, a cartridge container and ignition cartridge; and a striker nut assembly.

Functioning:

When the cartridge is released, it slides down the mortar tube until the percussion primer strikes the firing pin. The flash from the primer ignites the ignition cartridge which, in turn, ignites the propelling charge. The gases from the propelling charge exert pressure on the pressure plate at the base of the projectile which expands the rotating disc, engaging it in the rifling of the tube. The spin imparted to the projectile as it leaves the weapon stabilizes it in flight. Upon functioning of the MT

fuze, the expelling charge is ignited, expelling the illuminant and parachute assemblies from the projectile body and igniting the first-fire charge in the illuminant canister. The first-fire charge ignites the illuminant charge, the spring-loaded brakes extend to stop rotation, and the parachute deploys. Burning time is approximately 70 seconds at 500,000 candle-power.

Tabulated Data:

Complete round:

Type -----Illuminating  
 Weight -----11.8 kg (26 lb)  
 Length-----655mm (25.80 in.)  
 Cannon used with-----M30

Projectile:

Body material -----Steel  
 Color-----White w/black markings  
 Filler and weight-----Illuminant, 1.5 kg (3.31 lb)  
 Expelling charge-----Black powder, 0.8 kg (0.18 lb)

Components:

Ignition cartridge-----M2A2  
 Propelling charge-----M36A1  
 Fuze -----MT, NR151

Performance (full charge):

Maximum range-----5290m (5819 yd)  
 Muzzle velocity-----301.7 mps

Temperature Limits:

Firing:

Lower limit-----40°C (-40°F)  
 Upper limit-----+52°C (+125°F)

Storage:

Lower limit-----62°C (-80°F) (for period not more than 3 days)  
 Upper limit-----+70°C (+160°F) (for period not more than 4 hr/day)

Packing-----1 round in fiber container; 2 containers in wooden box

Packing Box:

Weight -----38.3 kg (84.5 lb)  
 Dimensions -----813 x 281 x 193mm (32 x 11 x 7.2 in.)  
 Cube-----0.04m<sup>3</sup> (1.4 ft<sup>3</sup>)

Shipping and Storage Data:

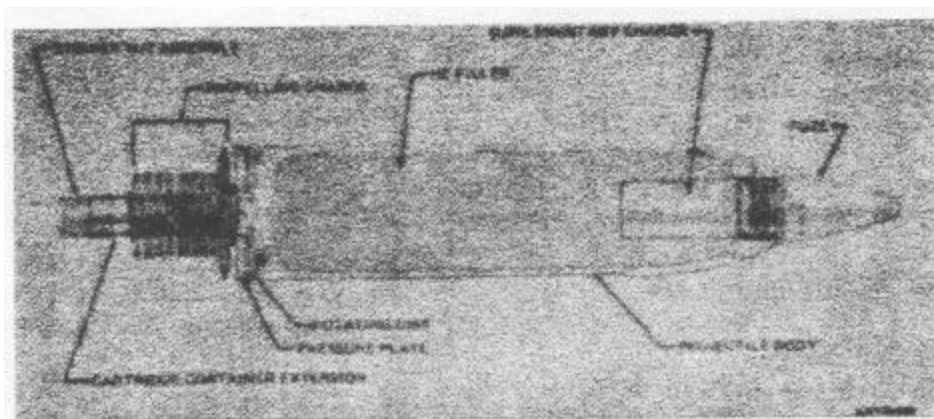
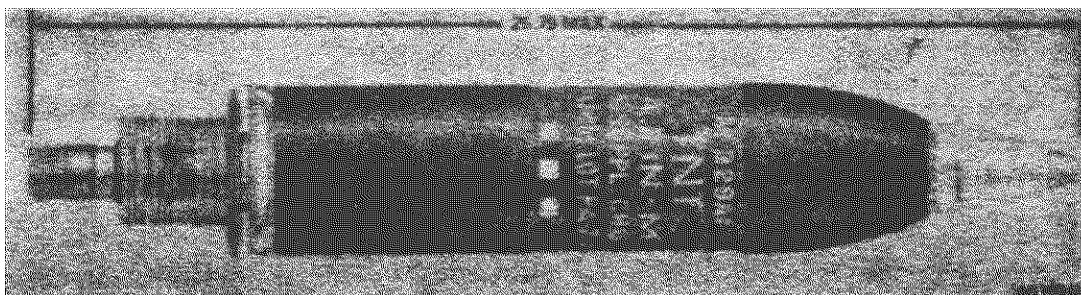
Storage Class SCG----- (08) 1.2G  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION FOR CANNON WITH ILLUMINATING PROJECTILES  
 DODAC-----Not available at this time  
 Dwg No. -----Not available at this time

Limitations:

Not available

References:

Not available

**CARTRIDGE, 42 INCH: HE, M329A1 (NL)**Type Classification:

Std (LCC-B) 01756003

Use:

This cartridge is used against personnel and materiel, providing both fragmentation and blast effect.

Description:

The complete round consists of a projectile body, a fuze, and a tail assembly. The steel body is designed to accommodate an impact, delay, or proximity fuze. A deep fuze well in the nose is fitted with a supplementary charge of TNT; this charge is removed to accommodate certain proximity fuzes. The tail assembly includes a pressure plate and rotating disc, a propelling

charge, a cartridge container and ignition cartridge, and a striker nut assembly.

Functioning:

When the cartridge is released, it slides down the mortar tube until the percussion primer strikes the firing pin. The flash from the primer ignites the ignition cartridge, which, in turn, ignites the propelling charge. The gases from the propelling charge exert pressure on the pressure plate at the base of the projectile which expands the rotating disc, engaging it in the rifling of the tube. The spin, imparted to the projectile as it leaves the weapon, stabilizes it in flight. The functioning of the fuze detonates the supplementary charge and, in turn, the high explosive charge. Depending on the type of fuze used, the projectile bursts either over or on target, producing near optimum fragmentation and blast effect.

Tabulated Data:

Complete round:

Type -----HE  
 Weight -----27.07 lb  
 Length-----25.79 in.  
 Cannon used with-----M2, M30

Projectile:

Body material -----Steel tube  
 Color-----Olive drab w/white markings  
 Filler and weight-----TNT, 7.08 lb

Supplementary

charge-----TNT, 0.365 lb

Components:

Ignition cartridge-----M2A2\*  
 Propelling charge-----M36A1\*  
 Fuze -----PD, M557; M739 MTSQ,  
 M520 series or M564;  
 Prox., M513 series M728,  
 M732

**\*NOTE: See separate data sheets.**

Performance (full charge):

Maximum range-----6180 yd (5650 mtr)  
 Muzzle velocity-----981 fps (299 mps)

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52°C)

Storage:

Lower limit-----80°F (-62.2°C) (for period  
 not more than 3 days)  
 Upper limit-----+160°F (+71.1°C) (for  
 period not more than 4 hr/  
 day)

\*Packing-----1 round in fiber container; 2  
 fiber containers in wooden  
 box

\*Packing Box:

Weight -----76 lb  
 Dimensions -----31-5/16 x 1 -13/16 x 7-38 in.  
 Cube-----1.6 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance  
 class-----1.1  
 Storage compatibility  
 group -----E  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION FOR  
 CANNON WITH  
 EXPLOSIVE  
 PROJECTILES  
 DODAC-----1315-C704 w/Fuze  
 DODAC-----1315-C705 w/o Fuze  
 Drawing number -----8863685

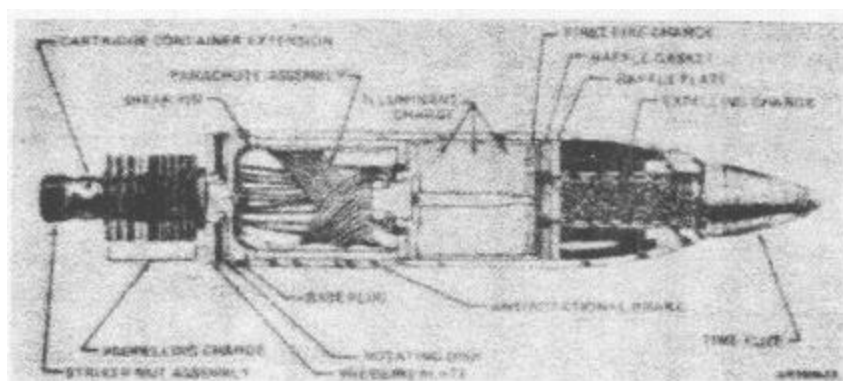
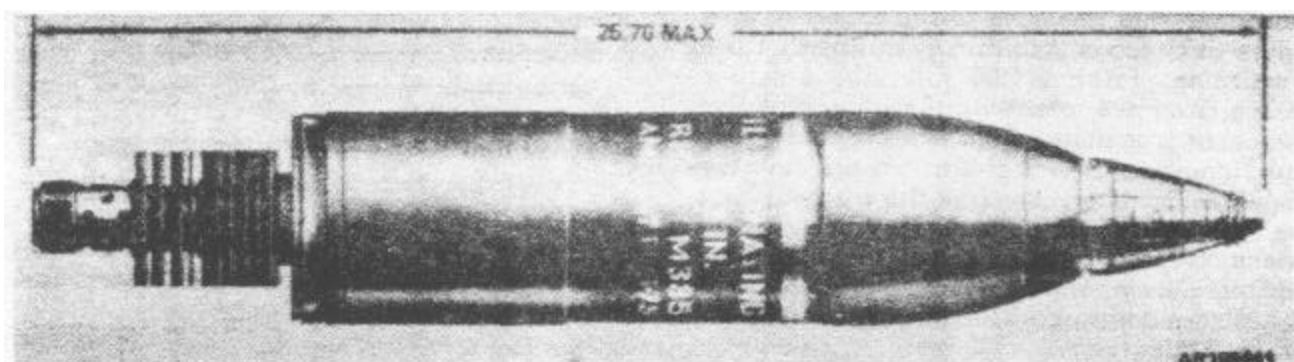
Limitations:

Short rounds may occur when firing with fewer than 10 increments. Minimum charge for firing with a proximity fuze is 10 increments.

References:

SC 1305/30-IL  
 TM 9-1015-215-12  
 TM 9-1300-251-20  
 TM 9-1320-241-12

### CARTRIDGE, 4.2-INCH: ILLUMINATING, M335A1 AND M335 (GR)



#### Type Classification:

M335A1: Std AMCTC 3881 dtd 1965  
M335: Cont AMCTC 9546 dtd 1972

#### Use:

This cartridge is used for target and battlefield illumination at night and during other periods of low visibility.

#### Description:

The complete round consists of a projectile body with a detachable base plug, an MTSQ fuze, an illuminant assembly attached to a parachute assembly, and a tail assembly. The steel tube body is designed to accommodate an expelling charge immediately below

the fuze, and the base plug is attached with four equally spaced shear pins. The illuminant assembly consists of a first-fire charge and an illuminant charge, contained in a canister fitted with antirotational brakes to reduce canister spin at the time of ejection and prevent twisting of the parachute suspension lines. The tail assembly includes a pressure plate and rotating disc, a propelling charge, a cartridge container and ignition cartridge, and a striker nut assembly.

#### Functioning:

When the cartridge is released, it slides down the mortar tube until the percussion primer strikes the firing pin. The flash from the primer ignites the ignition cartridge which, in turn, ignites the propelling charge. The gases from the propelling charge exert pressure on the pressure plate at the base of the projectile which

expands the rotating disc, engaging it in the rifling of the tube. The spin imparted to the projectile as it leaves the weapon stabilizes it in flight. Upon functioning of the MTSQ fuze, the expelling charge is ignited, expelling the illuminant and parachute assemblies from the projectile body and igniting the first-fire charge in the illuminant canister. The first-fire charge ignites the illuminant charge, the spring-loaded brakes extend to stop rotation, and the parachute deploys. Burning time is approximately 70 sec at 500,000 candlepower for the M335A1, and 60 sec for the M335.

Differences between Models:

M335A1 and M335 are similar except for ignition cartridges and propelling charges. See separate data sheets for detailed descriptions of Ignition Cartridges M2A1 and M2, and Propelling Charges M36A1 and M36.

Tabulated Data:

Complete round:

Type -----Illuminating  
 Weight -----26.00 lb  
 Length-----25.70 in.  
 Cannon used with-----M2, M30

Projectile:

Body material -----Steel  
 Color-----White w/black markings  
 Filler and weight-----Illum., 3.31 lb  
 Expelling charge-----BP, 0.18 lb

Components:

	<u>M335</u>	<u>M335A1</u>
Ignition cartridge-----	M2*	M2A1*
Propelling charge-----	M36*	M36A1*
Fuze -----	MTSQ, M501	MT, M562

Performance (full charge):

	<u>M335</u>	<u>M335A1</u>
Maximum range-----	5251 yd (4800 mtr)	5787 yd (5290 mtr)
Muzzle velocity -----	952 fps (290 mps)	990 fps (301.7 mps)

**\*NOTE: See separate data sheets.**

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52.0°C)

Storage:

Lower limit-----80°F (-62.2°C) (for period  
 not more than 3 days)  
 Upper limit-----+160°F (+71.1°C) (for  
 period not more than 4  
 hr/day)

\*Packing-----1 round in fiber container: 2  
 containers in wooden box

\*Packing Box:

Weight -----76.0 lb  
 Dimensions -----31-516 x 11-13/16 x 7-5/8  
 in.  
 Cube-----1.6 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance

class----- (08) 1.2

Storage compatibility

group -----G

DOT shipping class-----A

DOT designation-----AMMUNITION FOR  
 CANNON WITH  
 ILLUMINATING  
 PROJECTILES

DODAC-----1315-C706

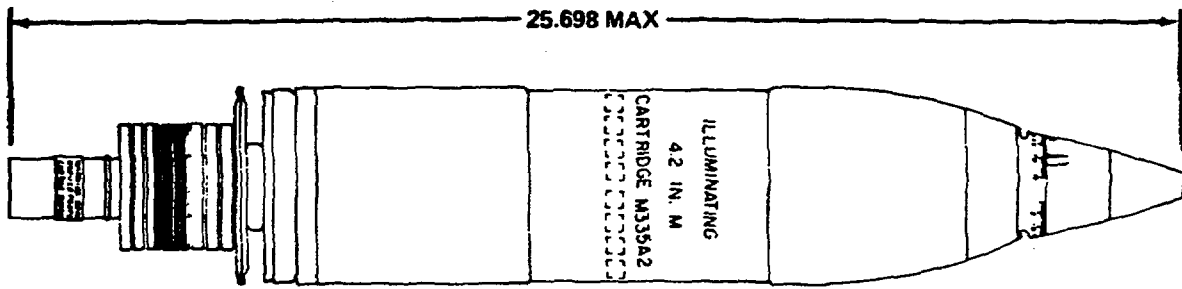
Drawing number -----8833724 (M335A1)  
 8833741 (M335)

References:

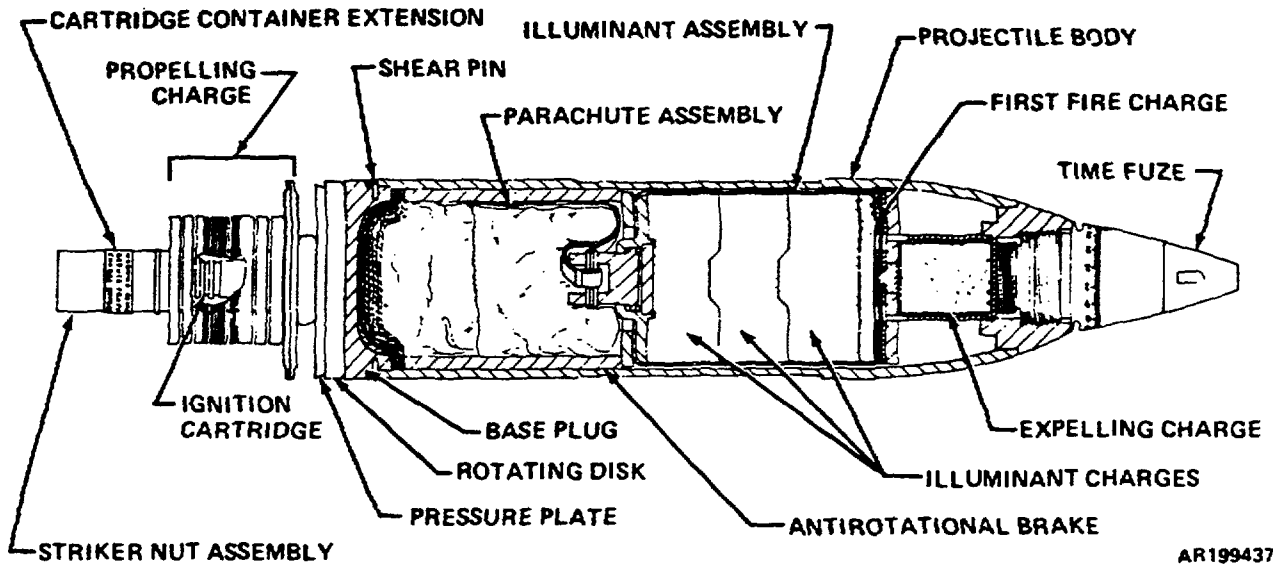
SC 1305/30-IL  
 TM 9-1015-215-12  
 TM 9-1300-251-20  
 TM 9-1320-241-12



CARTRIDGE, 4.2 INCH ILLUMINATING: M335A2 (GR, BE, NO)



AR199438



AR199437

Type Classification:

Std AMCTC 3881 dtd 1965

Use:

This cartridge is used for target and battlefield illumination at night and during other periods of low visibility.

Description:

The complete round consists of a projectile body with a detachable base plug, a time fuze, an illuminant assembly attached to a parachute assembly, and a tail assembly. The steel tube body is designed to accommodate an expelling charge immediately below the fuze, and the base plug is attached with four equally spaced shear pins. The illuminant assembly consists of a first-fire charge and an illuminant charge, contained in

a canister fitted with antirotational brakes to reduce canister spin at the time of ejection and prevent twisting of the parachute suspension lines. The tail assembly includes a pressure plate and rotating disc, a propelling charge, a cartridge container and ignition cartridge, and a striker nut assembly.

Functioning:

When the cartridge is released, it slides down the mortar tube until the percussion primer strikes the firing pin. The flash from the primer ignites the ignition charge. The gases from the propelling charge exert pressure on the pressure plate at the base of the projectile which expands the rotating disc, engaging it in the rifling of the tube. The spin imparted to the projectile as it leaves the weapon stabilizes it in flight. Upon functioning of the fuze, the expelling charge is ignited, expelling the illuminant and parachute assemblies

through the base of the projectile body and igniting the first-fire charge. The first-fire charge ignites the illuminant charge; the spring-loaded brakes extend to stop rotation, and the parachute deploys. Burning time is approximately 90 sec at 850,000 candlepower.

Tabulated Data:

Complete round:

Type -----Illuminating  
 Weight -----26.00 lb  
 Length-----25.698 in.  
 Cannon used with-----M2, M30

Projectile:

Body material -----Steel  
 Color-----White w/black markings  
 Filler and weight-----Illuminating, 3.31 lb  
 Expelling charge-----BP, 0.18 lb

Components:

Ignition cartridge-----M2A2\*  
 Propelling charge-----M36A1\*  
 Fuze -----MT, M565, MTSQ M577

**\*NOTE: See separate data sheets.**

Performance (full charge):

Maximum range-----6006 yd (5490 mtr)  
 Muzzle velocity-----1001 fps (305.1 mps)

Temperature Limits:

Firing:

Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52°C)

Storage:

Lower limit-----80°F (-62.2°C) (for period not more than 3 days)  
 Upper limit-----+160°F (+71.1°C) (for period not more than 4 hr/day)

\*Packing-----1 round in fiber container; 2 fiber containers in wooden box

\*Packing Box:

Weight -----76.0 lb  
 Dimensions -----31-5/16 x 11-13/16 x 7-5/8 in.  
 Cube-----1.6 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class----- (08) 1.2  
 Storage compatibility group -----G  
 DOT shipping class-----A  
 DOT designation-----AMMUNITION CANNON ILLUMINATING PROJECTILES FOR WITH  
 DODAC-----1315-C706  
 Drawing number -----8886595

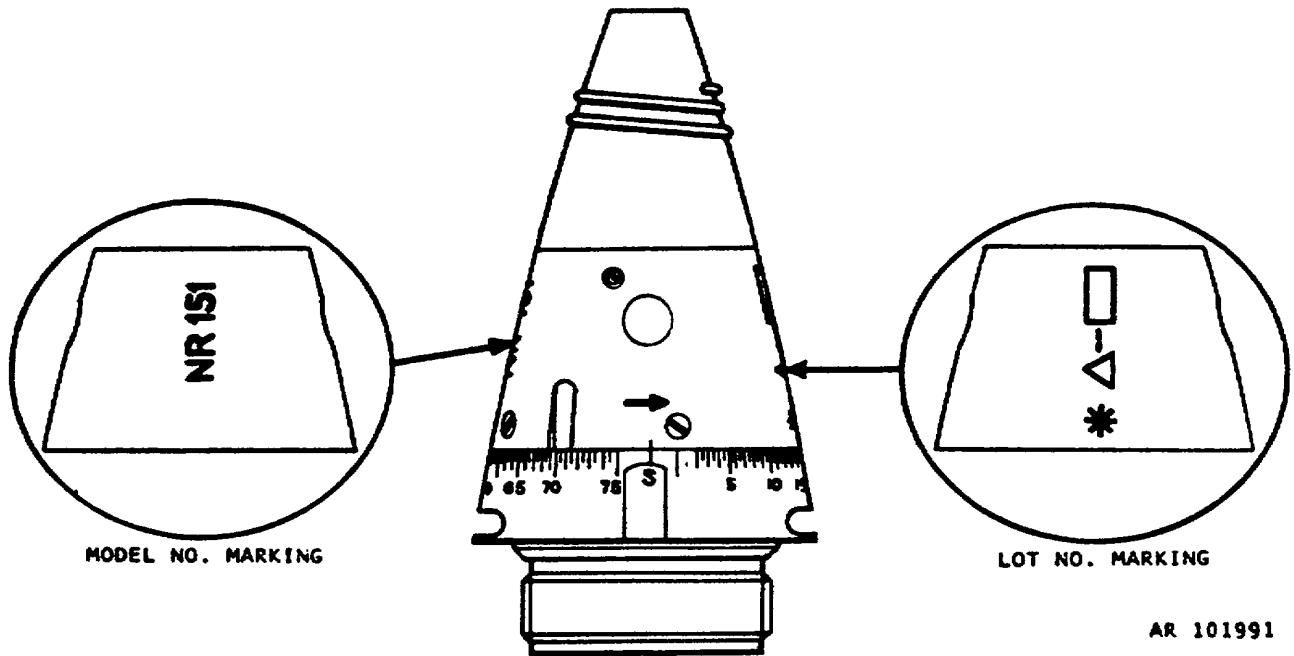
References:

- SC 1305/30-IL
- TM 9-1015-215-12
- TM 9-1015-215-20&P
- TM 9-1015-215-34
- TM 9-1015-215-34&P
- TM 9-1300-251-20
- TM 9-1300-251-34

**CHAPTER 5**

**FUZES**

FUZE, MECHANICAL TIME: NR151: (NL)\*



\*NL manufacture.

Use:

Mechanical Time (MT) Fuze NR151 is used to detonate spin-stabilized projectiles fired from a 107mm (4.2 in.) mortar when a timed action is required.

Description:

The major portion of the movement assembly, providing the timing and firing functions of the fuze, is contained in the brass lower cap. The aluminum fuze body contains the explosive elements consisting of a primer and a relay, and carries the time setting scale graduated from 2 to 75 sec inscribed on the exterior. The threaded fuze base is assembled directly into the

projectile without a booster. A pull wire extending through the body and the setback pin provide safety for shipping and handling.

Functioning

When the fuze is set, turning the lower cap rotates the timing disc by means of the setting pin, engaged in a raised lug on the disc. Upon firing, setback permits the hammer spring to strike the raised lug and release the timing disc from the setting pin. Centrifugal force from projectile spin withdraws the interrupter and releases the detents securing the timing mechanism. When the timing disc has rotated for the time set, a notch turns the firing arm and permits the firing pin to strike the primer. The primer initiates the explosive train through a relay to the projectile.

Tabulated Data:

Type -----Mechanical Time (MT)  
Weight -----0.64 kg (1.41 lb)  
Length:  
Visible -----95.2mm (3.75 in.)  
Overall -----115.8mm (4.56 in.)  
Thread size -----43mm (1.70 in.) 14NS-1

Temperature Limits:

Firing:  
Lower limit -----40.0°C (-40.0°F)  
Upper limit -----+52°C (+125°F)  
Storage:  
Lower limit -----62°C (-80°F) (for not more than 3 days)  
Upper limit -----+70°C (+160°F) (for not more than 4 hr/day)  
Packing -----8 fuzes in metal container; 2 containers in a wirebound box

Packing Box:

Weight -----19.9 kg (43.8 lb)  
Dimensions -----371 x 325 x 232mm (14-5/8 x 12-13/16 x 9-1/8 in.)  
Cube -----0.03m<sup>3</sup> (1.0 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----1.4B  
DOT shipping class -----C  
DOT designation -----TIME FUZES - HANDLE CAREFULLY  
DODAC -----Not available at this time  
Dwg No. -----Not available at this time

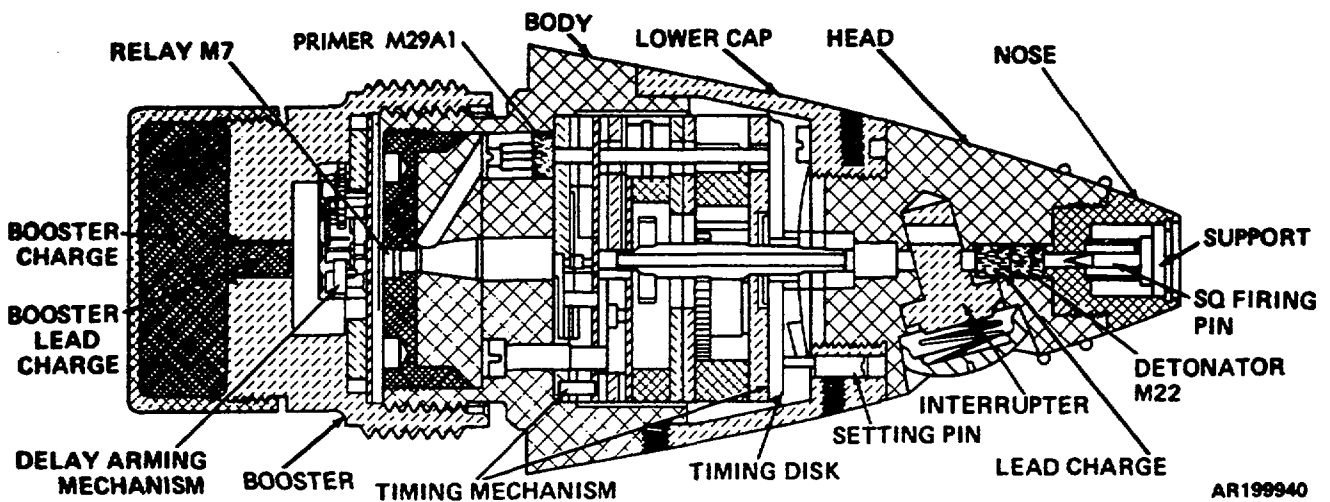
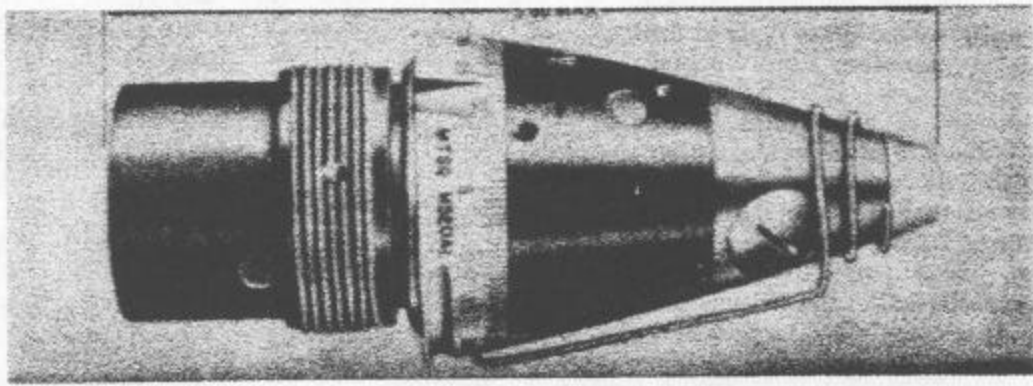
Limitations:

Do not use a fuze with a loose or cocked lower cap. Firing during heavy rainfall may result in premature functioning.

References:

Not available

**FUZE, MECHANICAL TIME AND SUPERQUICK: M520A1 (IT) AND M520 (UK)**



Type Classification:

Std AMCTC 6697 dtd 1969.

Use:

These dual purpose, mechanical time and superquick fuzes are used with ammunition calibers 90mm through 280mm, except 175mm. The fuze can be used to achieve either airburst or superquick impact detonation of the projectile.

Description:

The fuzes consist of a movement assembly, a point detonator assembly, a lower cap, a body and a booster. The movement assembly contains a clockwork

mechanism operated by centrifugal force acting on two gear segment weights. Springs assist in overcoming the inertia of the weights to assure functioning of the fuze at low projectile spin rates. The point detonator assembly housing the superquick element consists of the nose of the fuze containing firing pin and support and the head of the fuze containing an interrupter, a detonator, and booster lead charge. The brass lower cap contains provisions for releasing and setting the timing disk of the arming mechanism, and the cap is rotatable by a setting slot to provide for fuze time setting. The aluminum body houses a percussion primer and a relay. Graduations from S (for SAFE) to 0.5 through 75 seconds appear around the exterior. Fuzes are shipped with the SAFE mark aligned with the setting index on the lower cap, and with a pull wire attached to prevent inadvertent movement.

Functioning:

Turning the lower cap to set desired time in seconds prior to detonation simultaneously rotates the timing disk of the internal clockwork mechanism to correspond. Upon weapon firing, setback and centrifugal force release the mechanism until the timing disk has rotated to the preset time for detonation. Also upon weapon firing, centrifugal force withdraws the interrupter to arm the superquick detonation train, and actuates the delay arming of the booster. The purpose of the booster delay is to provide safe arming distance from the muzzle after weapon firing. When superquick impact action is desired, the fuze can be used as shipped, i.e., set in the S position, or may be set to a time greater than the projectile flight time.

Difference Between Models:

Fuze M520A1 is assembled with Booster M125A1 which provides a delay arming distance of 200 ft. Fuze M520 uses Booster M125 which provides 150 ft.

Tabulated Data:

Type -----MTSQ  
 Weight -----2.06 lb  
 Length:  
     Visible-----3.75 in.  
     Overall -----5.96 in.  
 Thread size -----2 in. - 12NS-1  
 Assembly Dwg. Nos.:  
 M520A1 -----8594044 Rev A  
 M520 -----8594044 Rev O

Temperature Limits:

Firing:  
     Lower limit-----40°F (-40°C)  
     Upper limit-----+125°F (+52°C)  
 Storage:  
     Lower limit-----80°F (for period not more than 3 days)  
     Upper limit-----+160°F (for not more than 4 hr/day)  
 \*Packing-----8 fuzes in metal container; 2 metal containers in wirebound box

**\*NOTE: Fuze may be shipped attached to a cartridge.**

\*Packing Box:

Weight -----55.8 lb  
 Dimensions -----14-7/8 x 12-13/16 x 9-1/8 in.  
 Cube-----1.04 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class ----- (04) 1.2  
 Storage compatibility group -----B  
 DOT shipping class-----A  
 DOT designation-----DETONATING FUZES - CLASS A EXPLOSIVES - HANDLE CAREFULLY. DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVES  
 DODAC-----1390-N280

Explosive Components:

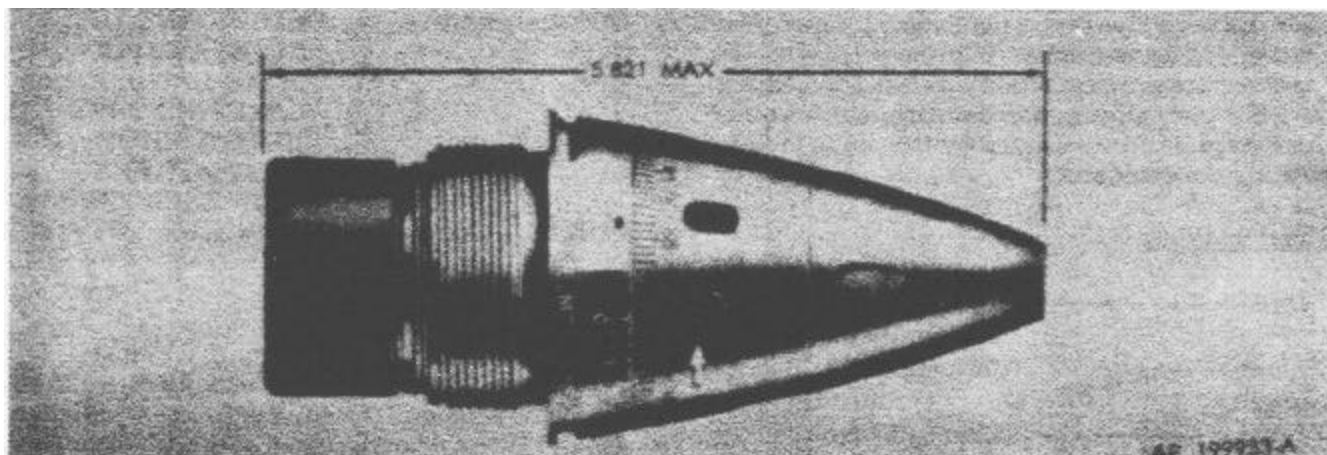
Time Action -----Primer M29A1, Relay M7, Detonator M17, and tetryl booster charge.  
 SQ Action-----Detonator M22, detonator lead charge, Relay M7, Detonator M17, and tetryl booster charge.

Limitations:

Firing during heavy rain may cause premature functioning of the fuze. Failure may occur when fuzes are set for airburst firing from 155mm Howitzers M1, M1A1, or M45 with firing charges 1 or 2, because setback may not be sufficient to release the timing mechanism. Such projectiles will detonate on impact through the superquick element.

References:

- TM 9-1300-251-20
- TM 9-1300-254-12
- TM 9-2300-216-10
- TM 9-2350-215-10
- TM 9-2350-217-10
- TM 9-2350-224-10

**FUZE, MECHANICAL TIME AND SUPERQUICK: M564 (BE, IT, DE, GR)**

\*US manufacture

Use:

Mechanical Time and Superquick Fuze M564 is used with 105mm, 155mm, and 8-inch (203mm) projectiles when a choice between time and superquick action is desired.

Description:

The fuze consists of a head, lower cap, body, and safety adapter. The head contains the point detonating assembly, consisting of firing pin and support cup, and superquick (SQ) detonator. The rotatable lower cap has a time scale graduated from 0 to 100 seconds and contains the setting pin and hammer spring parts of the timing movement. The greater part of the movement is a clockwork mechanism for controlling the time of fuze functioning and is located in the fuze body. The body also contains the time firing pin, a detonator

and a relay, and is inscribed externally with a vernier scale and zero line for time settings. The safety adapter assembled to the base consists of a booster featuring a delayed arming mechanism and housing a detonator, a booster lead charge, and a 330 grain (21.4g) tetryl booster charge.

Functioning:

When the fuze is set, turning the lower cap rotates the timing disc proportionately by means of the setting pin, engaged in a raised lug on the disc. Setback upon firing releases the hammer spring to strike the raised lug, releasing the timing disc from the setting pin. As projectile spin rate increases, centrifugal force moves the detents securing the movement, and the timing mechanism begins to run. At the same time, centrifugal force starts the delayed arming mechanism in the safety adapter (booster). The time required for booster arming will take the projectile at least 200 feet (60m) from the muzzle of the cannon. When the timing disc has rotated



to the preset time, a notch in the disc engages the firing arm. The firing arm turns, moving the firing pin safety plate and causing the firing pin to strike the detonator and initiate the explosive train through the relay, detonator, booster lead charge, and booster charge to the projectile. In the event superquick action (fired as shipped, set on "S") or timing mechanism malfunctions detonation will be initiated by the SQ firing pin striking the detonator.

Tabulated Data:

Type -----Mechanical Time and Superquick (MTSQ)  
 Weight -----0.95 kg (2.10 lb)  
 Length:  
     Visible-----95.2mm (3.75 in.)  
     Overall -----147.8mm (5.821 in.)  
 Thread size -----2-12UNS-1A

Temperature Limits:

Firing:  
     Lower limit-----40°C (-40°F)  
     Upper limit-----+52°C (+125°F)  
 Storage:  
     Lower limit-----62°C (-80°F) (for not more than 3 days)  
     Upper limit-----+71°C (+160°F) (for not more than 4 hr/day)  
 Packing-----8 fuzes in metal containers in wirebound box  
 Packing Box:  
     Weight -----28.6 kg (63 lb)  
     Dimensions -----371 x 325 x 232mm (14-5/8 x 12-13/16 x 9-1/8 in.)  
     Cube-----0.028m<sup>3</sup> (1 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.1D  
 DOT shipping class-----A  
 DOT designation-----DETONATING FUZES - CLASS A EXPLOSIVES - HANDLE CAREFULLY - DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVES  
 DODAC-----Not available

Limitations:

Fuzes manufactured prior to 1970 are to be set for 90 seconds if superquick (impact) action is desired; fuzes manufactured after 1970 can be fired or received (set "S") if SQ action is desired.

Premature functioning may occur downrange when the fuzes are fired in rainfall.

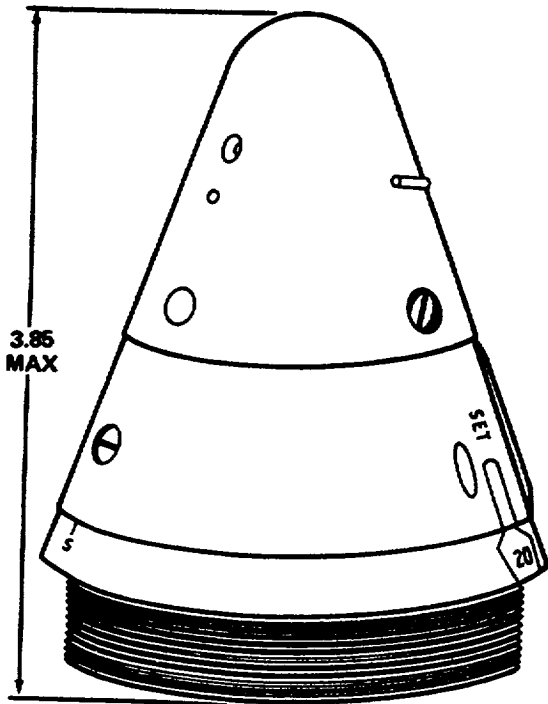
Fuzes are not to be set or times less than 2 seconds.

To avoid accidental functioning of the PD element, do not drop, roll or strike fuzes under any circumstances; packaged, unpackaged, or assembled projectile, and do not strike fuzed round against breech of weapon.

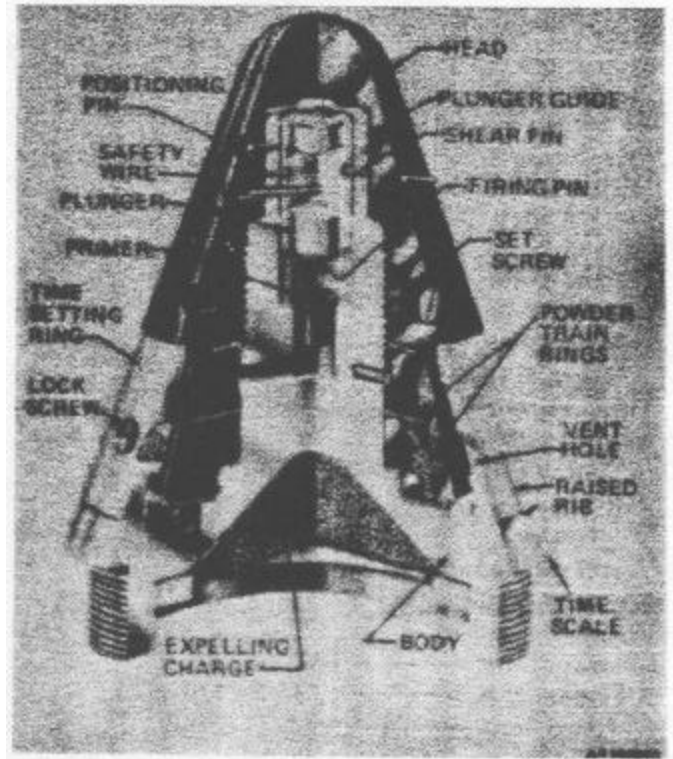
References:

- SB 700-20
- SC 1305/30-IL
- TM 9-1300-251-20
- TM 9-2300-216-10
- TM 9-1025-200-12
- TM 9-1015-203-12
- TM 9-1015-234-12
- TM 9-2350-217-10
- TM 9-2350-217-10N

FUZES, TIME: M84 (NO, IT) and M84A1 (DE, IT)



AR198011



Type Classification:

Std AMCTC 6390 dtd 1965.

Use:

Time Fuzes M84 and M84A1 are the single-purpose, powder train, selective-time type and are used with 81mm illuminating cartridges.

Description:

The fuze has a brass head containing an inertial plunger acting from setback and a brass body containing a primer, variable-time powder train rings, and a black powder expelling charge. An outer adjustment ring on the body has six vent holes and six raised ribs to adapt to fuze setter M25, and a setting rib for alignment with the desired time setting as chosen from the 0 to 25 second scale on the base. The time scale is in 1 second

increments and 5 second increments are indicated by bosses. The raised setting rib and the body bosses enable the fuze to be set in the dark. As issued, the fuze is equipped with a safety wire to be removed before firing.

Functioning:

After removal of the safety wire, the inertial plunger is held by two shear pins passing through the plunger guide. Setback from weapon firing causes the plunger to shear these pins and strike the percussion primer at the base of the plunger guide. Ignition of the primer starts burning of the variable time powder train selected according to the time setting. The burning powder train then ignites a black powder pellet and the expelling charge. The expelling charge ejects the parachute and illuminant assemblies through the base of the projectile.

Difference Between Models:

Fuze M84A1 has a tungsten compound delay train and a graduated scale of 50 seconds in two-second intervals. Otherwise, models M84 and M84A1 are identical.

Tabulated Data:

Type -----T  
 Weight -----1.82 lb  
 Length:  
   Visible-----3.25 in.  
   Overall -----3.85 in.  
 Thread size -----2.4-18NS-1  
 Assembly Dwg. Nos.:  
   M84A1 -----9232784  
   M84 -----9205598

Temperature Limits:

Firing:  
 Lower limit-----65°F (-53.8°C)  
 Upper limit-----+145°F (+62.8°C)

Storage:

Lower limit-----65°F (-53.2°C)  
 Upper limit-----+145°F (+62.8°C)

Packing-----Fuze is assembled with the cartridge and is not a separate item of issue.

Shipping and Storage Data:

Not Applicable

Explosive Components:

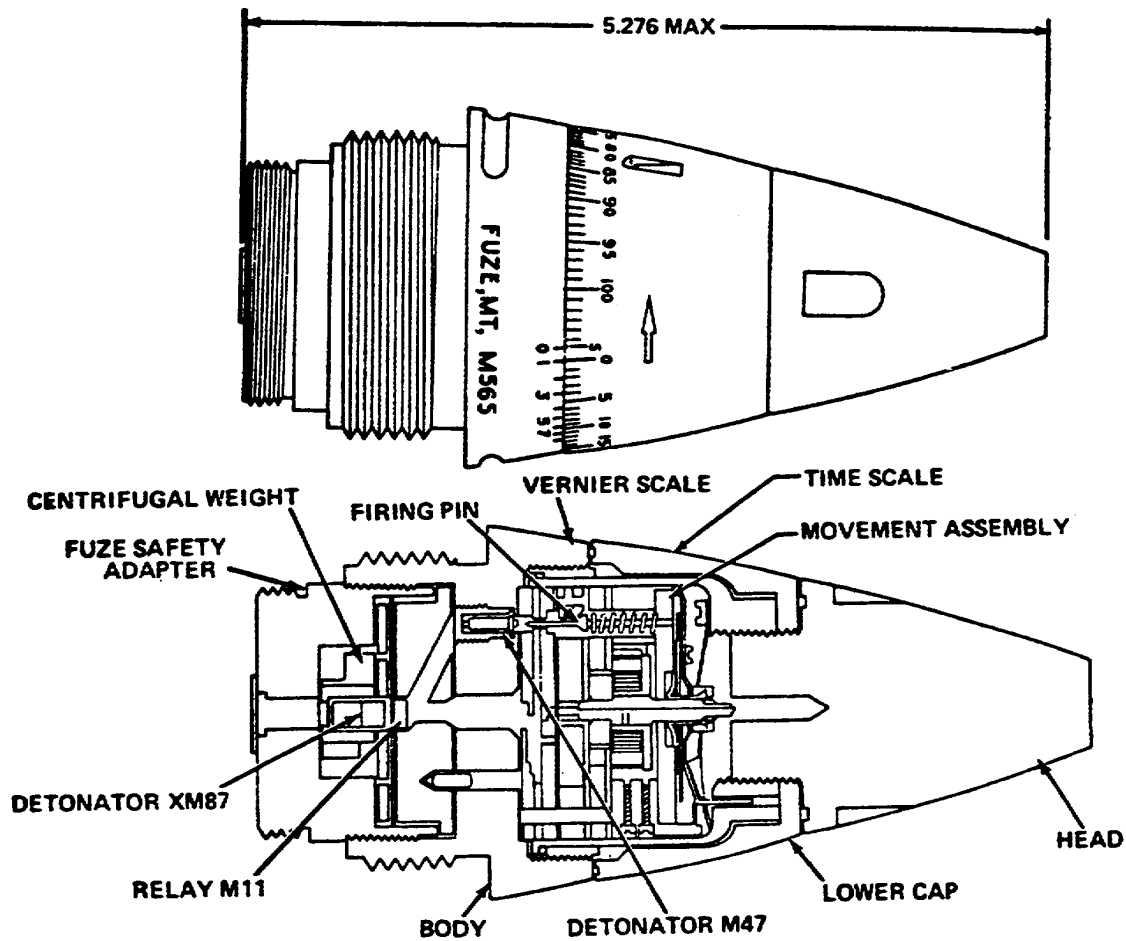
M84: Primer M39A1, black powder time-train rings, black powder pellet, and black powder expelling charge.

M84A1: Primer M39A1, tungsten compound time-train rings, black powder pellet and black powder expelling charge.

References:

TM 9-1015-200-12

**FUZE, MECHANICAL TIME: M565 (NO, GR)**



Type Classification:

Std AMCTC 1874 dtd 1964

Use:

Mechanical Time Fuze M565 is used to detonate a variety of spin-stabilized projectiles for cannons of 105mm through 8-inch, except 175mm, when superquick point detonating capability is not a requirement.

Description:

The fuze consists of a solid steel head threaded into a steel lower cap containing the timing movement,

and a steel body containing a detonator. A safety adapter containing a relay and a detonator in addition to an interrupter assembly is threaded into the base of the fuze body. The timing movement is a spring-driven clockwork mechanism secured in the unarmed position by setback pins and centrifugal detents. A time scale graduated from 0 to 100 seconds is inscribed on the rotatable lower cap, and a vernier scale to permit setting accuracy to 0.1 second appears on the base. The safety adapter interrupter mechanism in the base consists of two centrifugal weights which prevent alignment of the detonator with the relay until a safe arming distance of at least 200 feet from the muzzle is reached.

Functioning:

Upon firing, setback causes the hammer spring to strike the upraised lug of the timing disk, flattening the lug and releasing the disk from the setting pin. When sufficient centrifugal force has developed, the detents holding the escapement lever of the movement assembly and the rotor of the delayed-arming safety adapter move outward, leaving the escapement components free to run. Simultaneously, centrifugal force actuates the arbor lock, which disengages from the arbor and thus releases the mainspring. As the mainspring drives the movement, the rate of rotation of the arbor and, therefore, of the timing disk is governed by the escapement through the gear train. When the notch in the rotating timing disk reaches the upright of the firing arm, the firing arm turns permitting the firing pin safety plate to swing out from under the firing pin flange, allowing the firing pin to strike the detonator. Detonator M47 initiates the explosive train through the relay and detonator to the projectile.

Tabulated Data:

Type -----MT  
 Weight -----2.05 lb  
 Length:  
     Visible-----3.77 in.  
     Overall -----5.276 in.  
 Thread size -----200 in-12NS-1(R)  
 Assembly Dwg. No. -----10522991

Temperature Limits:

Firing  
     Lower limit-----40°F(-40°C)  
     Upper limit-----+125°F (+52°C)  
 Storage:  
     Lower limit-----80°F (for not more than 3 days)  
     Upper limit-----+160°F (for not more than 4 hrs/day)  
 \*Packing-----8 fuzes in meal container 2 container in a wirebound box

\*Packing Box:

Weight -----54.6 lb  
 Dimensions -----17/8 x 12-13/16 x 9-18 in.  
 Cube-----1.0 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class -----1.4  
 Storage compatibility group -----B  
 DOT shipping class-----C  
 DOT designation-----TIME FUZES - HANDLE CAREFULLY  
 DODAC-----1390-N248

Explosive Components:

Detonator M47, Relay M11, and Detonator XM87.

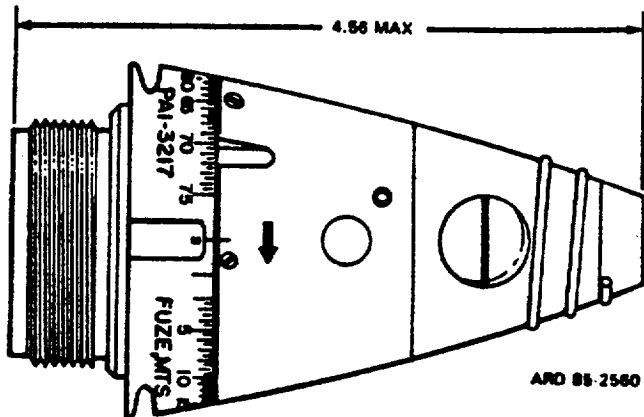
Limitations:

None

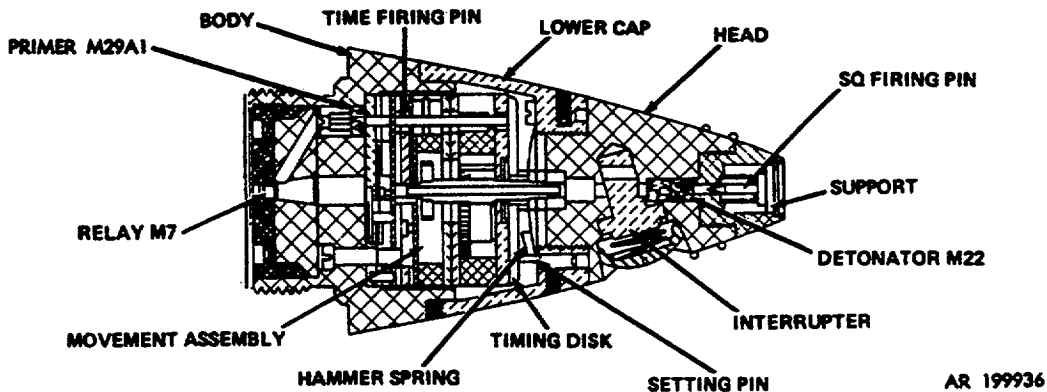
References:

SC 1340/98-IL  
 TM 9-1300-251-20  
 TM 9-1300-254-12  
 TM 9-1015-203-12  
 TM 9-1015-234-12  
 TM 9-1025-200-12  
 TM 9-2300-216-10  
 TM 9-2350-210-12  
 TM 9-2350-215-10  
 TM 9-2350-217-10  
 TM 9-2350-217-10N

**FUZE, MECHANICAL TIME AND SUPERQUICK: M501A1 (OR M501) (GR)**



ARD 85-2580



AR 199936

Type Classification:

Cont-MSR11756003-M501A1  
 OBS-MSR11756003-M501

Use:

Mechanical Time and Superquick Fuzes M501A1 and M501 are a dual purpose type used to detonate spin-stabilized projectiles fired from 105mm and 155mm howitzers and from 4.2 inch mortars when a choice of timed or superquick action is required.

Description:

The aluminum head of the fuze houses the superquick point detonating assembly consisting of firing pin and support; a detonator, and a lead charge. An

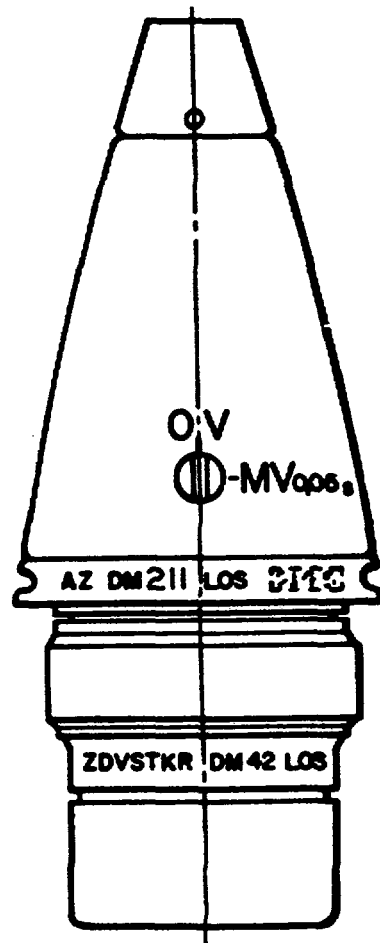
interrupter activated by centrifugal force from projectile rotation provides bore safety. The major portion of the movement assembly, providing the timing and firing functions of the fuze, is contained in the brass lower cap. The aluminum fuze body contains the explosive elements consisting of a primer and a relay, and carries the time setting scale graduated from 2 to 75 sec inscribed on the exterior. The threaded fuze base is assembled directly into the projectile without a booster. A pull wire extending through the body and the setback pin provide safety for shipping and handling.

Functioning:

When the fuze is set, turning the lower cap rotates the timing disc by means of the setting pin, engaged in a raised lug on the disc. Upon firing, setback



**FUZE, POINT DETONATING: DM211 (GE) AND NORWAY (NO)**



**AR 101919**

Use:

Point Detonating Fuze DM211 is intended for use only with 155mm and 203mm HE projectiles at all charges, and is structurally designed to withstand the acceleration forces involved.

Description:

Fuze DM211 is similar to the US Fuze M557. A superquick (SQ) element in the head consists of a firing pin, firing pin support and detonator. A thin wall ogive surrounding the superquick flash tube is assembled to the fuze body. The fuze body contains a delay plunger assembly and a selective setting device for superquick

or delay action. The delay plunger assembly includes a firing pin and delay element, consisting of a primer, black powder delay charge and a relay. The DM42 booster consists of a body having external threads to fit projectiles having 2-inch diameter, 12 threads per inch cavities. The DM42 booster internal configuration and mechanism is designed to delay booster arming until the projectile is approximately 50m (55 yd) from the muzzle of the weapon.

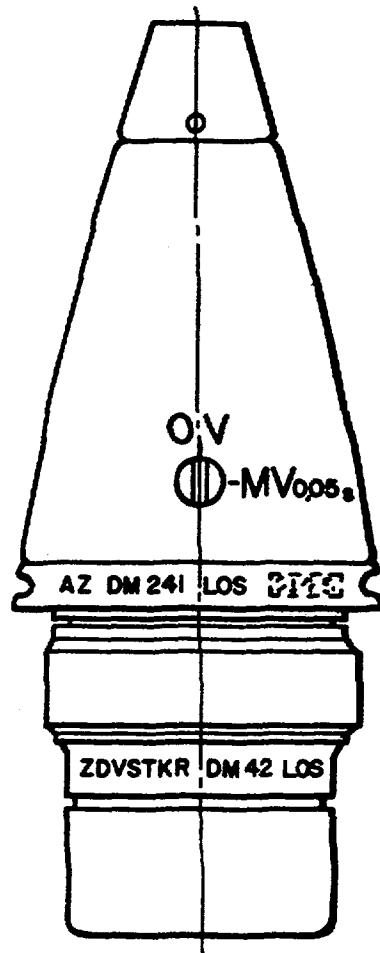
Functioning:

After the projectile has left the muzzle of the gun, centrifugal force releases the flash tube interrupter, thus opening the flash tube. At the same time, the delay





**FUZE, POINT DETONATING: DM241 (GE)**



**AR 101778**

Use:

Point Detonating Fuze DM241 is intended for use only with 175mm and 203mm HE projectiles at all charges, and is designed to withstand structurally the acceleration forces involved.

Description:

Fuze DM241 consists essentially of Fuze DM211 modified with an epoxy filler in the ogive cavity for reinforcement. A superquick (SQ) element in the head consists of a firing pin, firing pin support and detonator. The body of the fuze is epoxy filled within the thin-walled ogive. The fuze body contains a delay

plunger assembly and a selective setting device for superquick or delay action. The delay plunger assembly includes a firing pin and delay element consisting of a primer, black powder delay charge and a relay. The DM42 booster consists of a brass booster body having external threads to fit projectiles having 51mm (2-in.) diameter, 12 threads per inch cavities, and internal threads to receive fuzes having 43mm (1.7-in.) diameter, 14 threads per inch. An aluminum booster cup containing a tetryl booster pellet is threaded to the booster body. The DM42 booster internal configuration is that of an eccentric rotor containing a detonator held in an unarmed (out of line) position by centrifugal detents and a gear train mechanism which provides for delayed arming of the booster assembly until the projectile is

approximately 66m (72.6 yd) from the muzzle, depending upon the weapon and charge being fired.

Functioning:

No action occurs until after the projectile has left the muzzle of the gun, when centrifugal force releases the flash tube interrupter, thus opening the flash tube. At the same time, the delay plunger is armed in preparation for impact by withdrawal of the plunger pins, also by centrifugal force. The delay mechanism of the booster provides an arming distance of 66 meters. Upon impact, the superquick firing pin is driven against a detonator, exploding the projectile. Should the superquick element fail, the delay train will still function, thus avoiding a dud. When the fuze has been preset for delay, the superquick element will still function but will have no effect because the interrupter blocks the flash tube. Projectile detonation will occur through the delay element.

Tabulated Data:

Type -----PD  
 Weight -----0.988 kg (2.17 lb)  
 Length:  
     Visible -----96mm (3.84 in.)  
     Overall -----152mm (6.08 in.)

Temperature Limits:

Firing:  
     Upper limit-----+52°C (+125°F)  
 Storage:  
     Upper limit-----+71°C (+160°F)  
 Packing-----15 fuzes per box  
 Packing Box:  
     Weight -----22.5 kg (49.5 lb)  
     Dimensions -----420 x 240 x 220mm (16.8 x  
                                     9.6 x 8.8 in.)  
     Cube-----0.022m<sup>3</sup> (0.78 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----1.1 B  
 DOT shipping class-----A  
 DOT designation-----DETONATING FUZES -  
                                     CLASS A EXPLOSIVES -  
                                     HANDLE CAREFULLY -  
                                     DO NOT STORE OR  
                                     LOAD WITH ANY HIGH  
                                     EXPLOSIVES  
 DODAC-----Not available

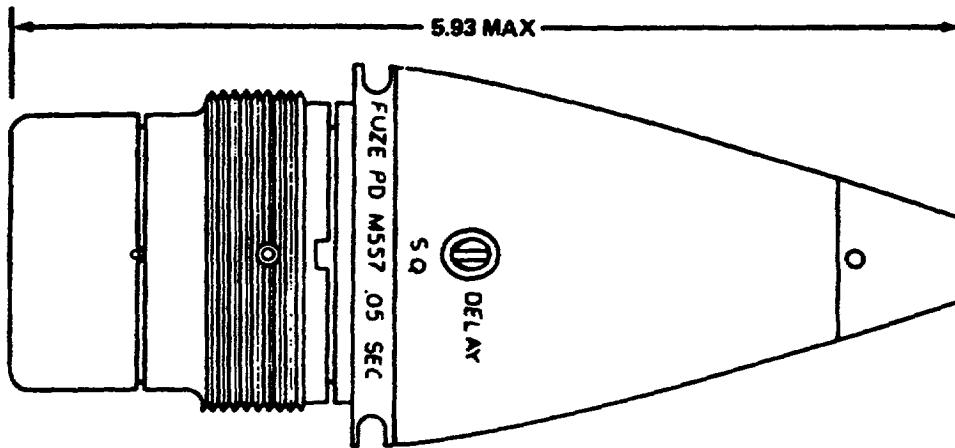
Limitations:

Premature functioning can occur when fuzes are fired in heavy rainfall.

References:

Not available

**FUZE, POINT DETONATING: M557 (NL\*, BE\*, IT, GR, SP)**



AR198805

\*US manufacture

Use:

Point Detonating Fuze M557 is a selective superquick or 0.05 second delay impact fuze designed for use in ammunition for guns of 75mm through 155mm; 75mm and 105mm rifles; 75mm through 8-inch (203mm) howitzers and for 4.2-inch (107mm) mortars.

Description:

The M557 fuze consists of Fuze M48A3 assembled with the M125A1 booster. The point detonating head assembly contains a firing pin support which prevents initiation of Detonator M24 until impact. The body contains an M1 delay plunger assembly and an interrupter assembly with a setting sleeve which provides a means of setting or selecting superquick (PD) or delay functioning. The delay plunger assembly includes a firing pin and Delay Element M2. The delay element includes Primer M54, a black powder delay charge and Relay M7. The head assembly is attached

to the body by means of the flash tube which also positions the fuze windshield or ogive. The ogive is a thin-walled steel stamping utilized to provide an aerodynamic shape to the fuze. The M125A1 booster consists of a brass booster body having external threads to fit projectiles having 2-inch (51mm diameter, 12 threads per inch and internal threads to receive fuzes having 1.7 inch (43mm) diameter, 14 threads per inch. An aluminum booster cup containing a (340 grain) (22g) tetryl booster pellet is threaded to the booster body. The M125A1 booster configuration is that of an eccentric rotor containing an M17 detonator held in an unarmed (out of line) position by centrifugal detents and a gear train mechanism which provides for delayed arming of the booster assembly for approximately 200 feet (60m) depending upon the weapon and charge being fired.

Functioning:

Upon firing, centrifugal force is utilized to arm the fuze. Centrifugal force retracts the detents holding the rotor in the unarmed position allowing it to turn

against the gear train mechanism which controls the turning speed of the rotor until the rotor is in the armed position. Once in the armed position, the rotor is locked in position by a spring loaded pin and the M17 detonator is aligned with the detonation train of the fuze. Simultaneously, centrifugal force will arm the delay plunger assembly and retract the flash tube interrupter unless the fuze is set delay. If the fuze is set delay, the flash tube interrupter will not retract and the flash from the superquick element will be prevented from initiating the explosive train of the booster. The fuze is initiated upon impact with the target the firing pin is driven into the M24 detonator which flashes through to the M17 detonator, activating the lead charge and booster pellet. If set delay, the flash tube is blocked and the M17 detonator is activated by the delay element. The delay mechanism of the booster provides an arming distance of approximately 200 feet (60m), depending upon the weapon employed.

Tabulated Data:

Type -----Point Detonating (PD)  
 Weight -----0.98 kg (2.15 lb)  
 Length:  
     Overall -----150.6mm (5.93 in.)  
     Visible-----94.5mm (3.72 in.)

Temperature Limits:

Firing:  
     Lower limit-----53°C (-65°F)  
     Upper limit-----+71°C (+160°F)  
 Storage:  
     Lower limit-----62°C (-80°F) (for not more than 3 days)  
     Upper limit-----+71°C (+160°F) (for not more than 4 hr/day)

Packing-----8 fuzes in metal container; 2 containers in wooden box

Packing Box:  
     Weight -----25.3 kg (55.8 lb)  
     Dimensions -----371 x325 x 232mm (14-5/8 x 12-13/16 x 9-1/8 in.)  
     Cube-----0.028m<sup>3</sup> (1 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.1B  
 DOT shipping class-----A  
 DOT designation-----DETONATING FUZES - CLASS A EXPLOSIVES - HANDLE CAREFULLY - DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVES  
 DODAC-----Not available  
 Dwg. No. -----Not available

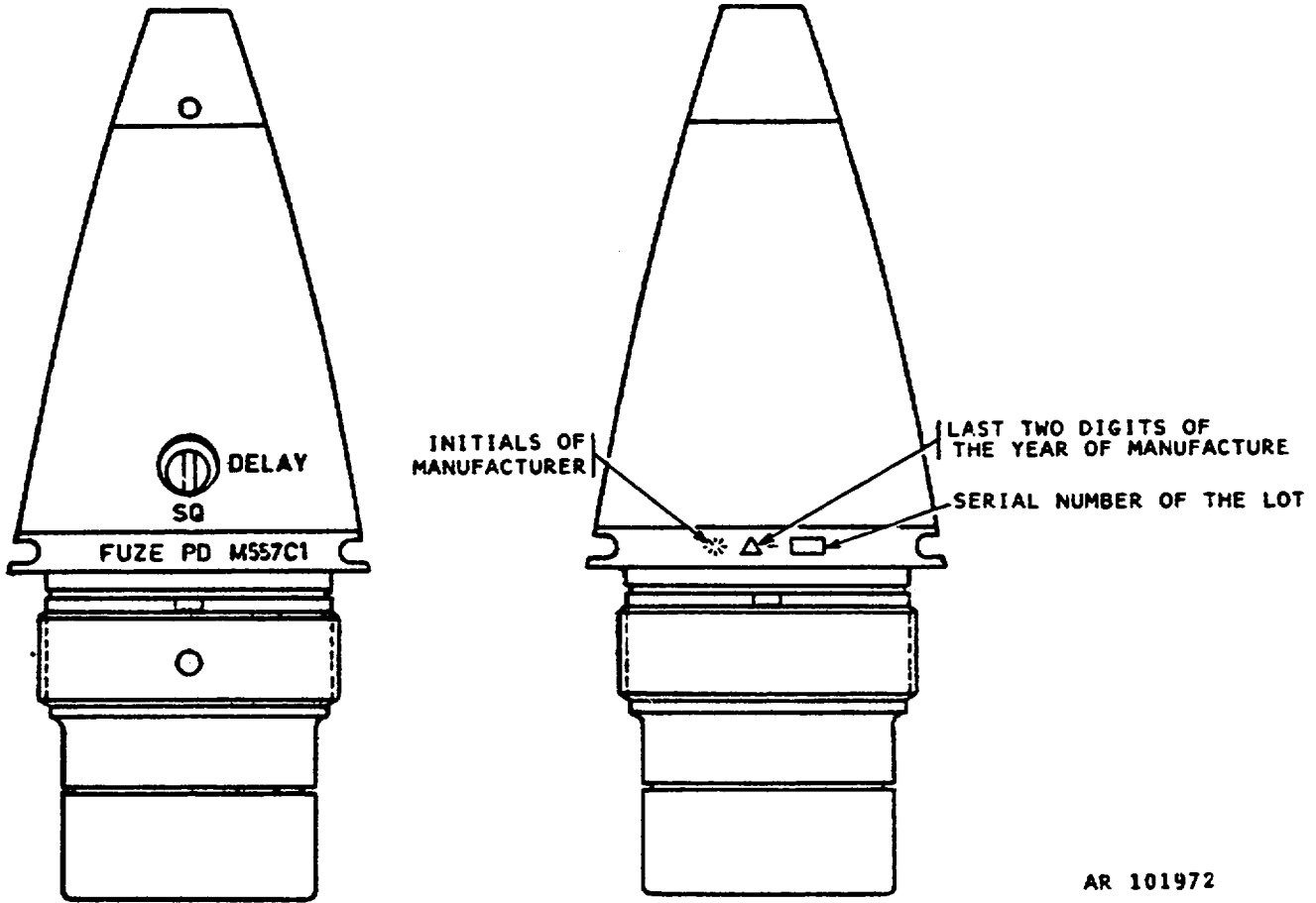
Limitations:

Premature functioning can occur when fuzes are fired in heavy rainfall. Duds may occur when set for delay in low zones of fire (155mm and 8-inch (203mm) Zones 1 and 2). When set SQ normal functioning can be expected. To prevent duds in 4.2-inch (107mm) cartridges, fire zones (increments) should not be fewer than seven.

References:

- SC 1340/95-IL
- SB 700-20
- TM 9-1015-203-12
- TM 9-1015-234-12
- TM 9-1025-200-12
- TM 9-1300-251-20
- TM 9-2300-216-10
- TM 9-2350-217-10
- TM 9-2350-217-10N

**FUZE, POINT DETONATING: M557C1 (NL, DE)**



AR 101972

Use:

Point Detonating (PD) Fuze M557C1\* is a selective superquick or 0.05 sec delay impact fuze. It is designed for use in ammunition for 75mm through 155mm guns; 75mm and 105mm rifles; 75mm through 203mm (8-in.) howitzers and 107mm (4.2-in.) mortars.

\*PD Fuze M557C1 is a US M557 fuze with booster M125C1 of Italian manufacture. This booster is the same design as the US M125A1 except it is fitted with a setback pin which locks one of the spin locks.

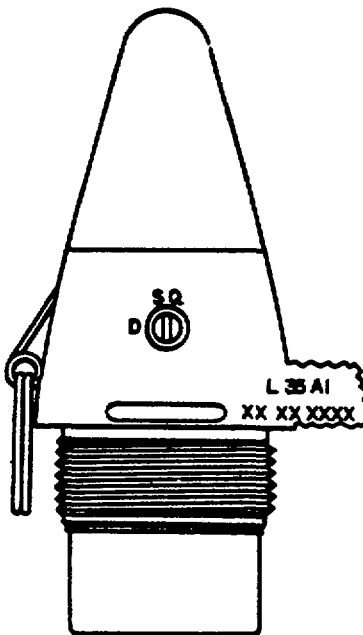
Description:

The M557C1 Fuze consists of Fuze M48A3 assembled with the M125C1 booster. The PD head

assembly contains a firing pin held in position by a firing pin support which prevents initiation of Detonator M24 until impact. The fuze body contains an M1 delay plunger assembly and an interrupter assembly with a setting sleeve which provides a means of setting or selecting PD (Superquick) or delay functioning. The delay plunger assembly includes a firing pin and Delay Element M2. The delay element includes Primer M54, a black powder delay charge and Relay M7. The head assembly is attached to the body by means of the flash tube which also positions the fuze windshield or ogive. The ogive is a thin-walled steel stamping utilized to provide an aerodynamic shape to the fuze. The M125C1 booster consists of a brass booster body having external threads to fit projectiles having 51mm (2-in.) diameter, 12 threads per inch and internal threads to receive fuzes having 43mm (1.7-in.) diameter, 14



**FUZE, PERCUSSION (PD): L35A1 (UK) (CA)**



AR 101910

Use:

The interoperability agreement authorizes the L15A4 cartridge fuze with the L35A1 fuze to be fired from the US M29 and M29A1 mortar.

Description:

The L35A1 fuze is a percussion point detonating (PD) type with the setting bolt permitting the selection of optimal superquick or delayed actin detonation.

Tabulated Data:

Type -----Percussion (PD)  
 Length:  
     Visible -----0.58 kg (1.27 lb) approx  
     Overall -----94.25mm (3.77 in.)  
 Thread size -----2.0-12U-NS-1A

Temperature Limits:

Firing:  
     Lower limit -----53°C (-65°F)  
     Upper limit -----+73°C (+165°F)

Storage:  
     Lower limit -----not available  
     Upper limit -----not available

Packing -----50 fuzes/wooden box

Packing Box:  
     Weight (approx) -----33.0 kg (73.5 lb)  
     Dimensions -----not available  
     Cube -----not available

Shipping and Storage Data:

Storage class/SCG -----1.1 B  
 DOT shipping class -----A  
 DOT designation -----1390-N308 (PDM524)  
   1390-N334 (PDM567)  
 DETONATING FUZES  
 CLASS A EXPLOSIVE -  
 HANDLE CAREFULLY -  
 DO NOT STORE OR  
 LOAD WITH ANY HIGH  
 EXPLOSIVES.



Limitations:

Not available

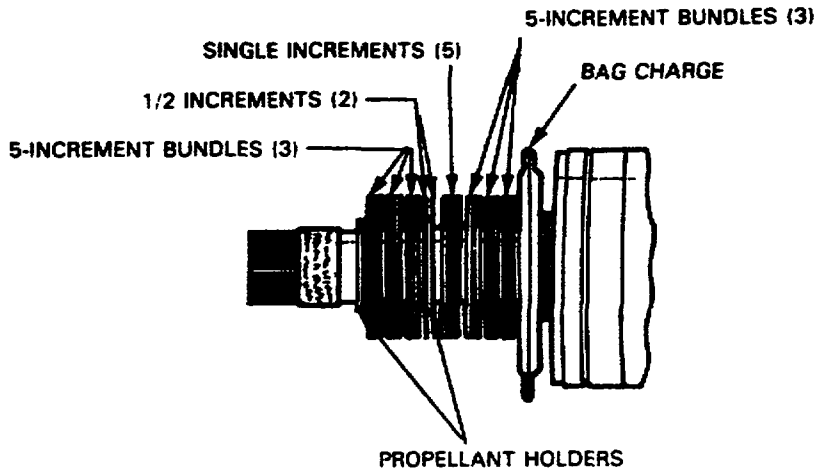
References:

Not available

**CHAPTER 6**

**MISCELLANEOUS**

**CHARGE, PROPELLING, 107 MILLIMETER (4.2-INCH): M36A1 (NL)**



ARD 85-2555

Use:

This charge is a component of High Explosive Cartridge M329C1 and Illuminating Cartridge M335C1.

Description:

A full charge consists of 36 increments of M8 sheet propellant and a doughnut-shaped bag of M9 flake propellant arranged in the following order: one bag charge, three 5-increment bundles, five single increments, two 1/2-increments, and three 5-increment bundles. This full charge is assembled on the cartridge as issued. Individual increments or bundles may be removed as required for fire adjustment as indicated in the appropriate firing charts, but the bag charge will not be removed at any time. Two wire holders are used to secure the increments to the cartridge container and extension. Removal of the extension when firing at reduced charge does not require relocation of the ignition cartridge.

Functioning:

The flash from the detonation of the M2A2 ignition cartridge passes through the vents in the cartridge container, providing direct ignition of the propelling charge.

Tabulated Data:

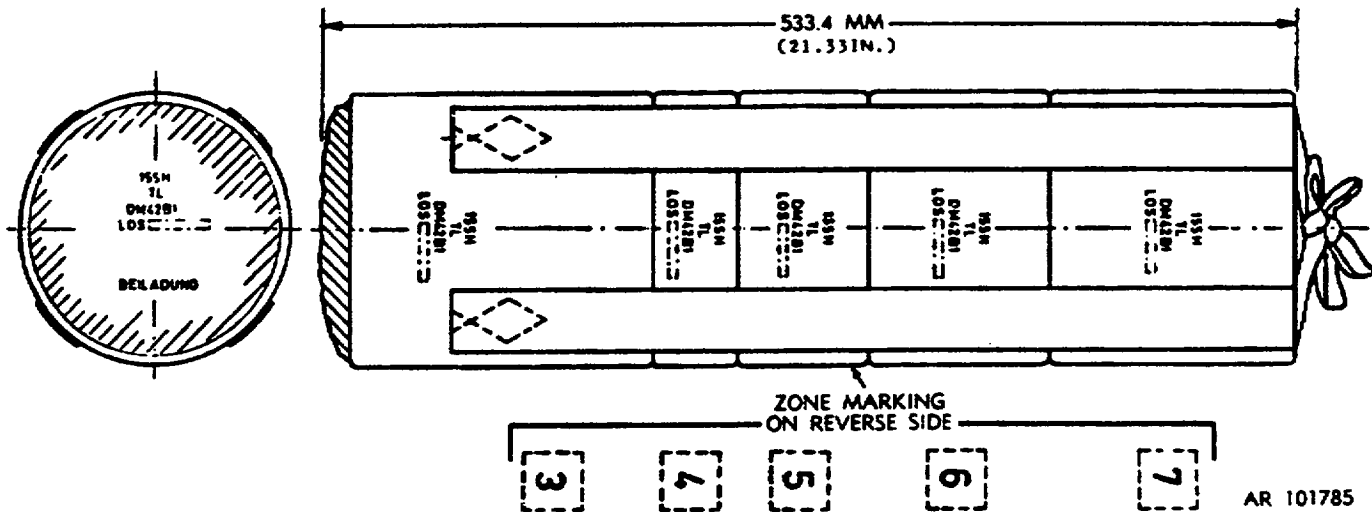
Propellant type-----M8 and M9  
 Weight (full charge)-----0.27kg (0.60 lb)  
 Ignition cartridge  
     used with-----M2A

Shipping and Storage Data:

Storage class/SCG -----1.1C  
 DOT shipping class-----A



CHARGE, PROPELLING, 155 MILLIMETER: DM42B1 (GE)



Use:

The DM42B1 propelling charge is a white bag type designed for use in 155mm howitzers for firing in Zones 3, 4, 5, 6, and 7.

Description:

The total charge consists of 6.3 kg (13.8 lb) of propellant and is divided between a base charge and four unequal increments loaded in white cloth bags. The increments are connected by four cloth tapes sewn to the base and tied on top of Increment No. 7. The igniter is 70g (2.45 oz) of clean burning igniter (CBD) in a red or brown cloth pad sewn to the bottom of the base charge. A flash reducer pad containing one ounce (0.30 kg) of potassium nitrate or potassium sulphate is assembled at the front end of the base pad (Increment No. 3). The seams in the base pad are inverted so that the edges of the cloth are inward to reduce residue after firing.

Functioning:

When the weapon is fired, the primer ignites the igniter charge, and the igniter charge ignites the propelling charge. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target. The flash reducer pads serve to limit breech flareback as well as muzzle flash and blast overpressure.

Tabulated Data:

Complete round:

Type	-----	Separate loading, white bag
Weight	-----	6.3 kg (13.8 lb)
Length	-----	533.4mm x 138mm x 138mm (21.3 x 5.5 x 5.5 in.)
Color	-----	White w/black markings
Cube	-----	0.01m <sup>3</sup> (0.35 ft <sup>3</sup> )
Weapon used with	-----	M109, M109A1, M109A2, M109A3
Cannon	-----	M126, M185

Temperature Limits:

Firing:

Upper limit-----+52°C (+125°F)

Storage:

Upper limit-----+63°C (+145°F)

Packing-----1 charge in metal container,  
20 metal containers per  
pallet

Container:

Weight -----14 kg (30.8 lb)

Dimensions -----698mm x 191mm x 191mm  
(27.9 x 7.6 x 7.6 in.)

Cube-----0.03m<sup>3</sup> (1.05 ft<sup>3</sup>)

Explosive per  
container-----12.24 kg (29.6 lb)

Pallet:

Dimensions -----698.5 x 803 x 1155mm  
(27.94 x 32.12 x 46.2 in.)

Cube-----0.648m<sup>3</sup> (22.68 ft<sup>3</sup>)

Weight -----325 kg (715 lb)

Shipping and Storage Data:

Storage Class/SCG-----1.3C

DOT shipping class-----B

DOT designation-----PROPELLANT  
EXPLOSIVES SOLID  
CLASS B

DODAC-----Not available

Assembly Dwg. No. -----Not available

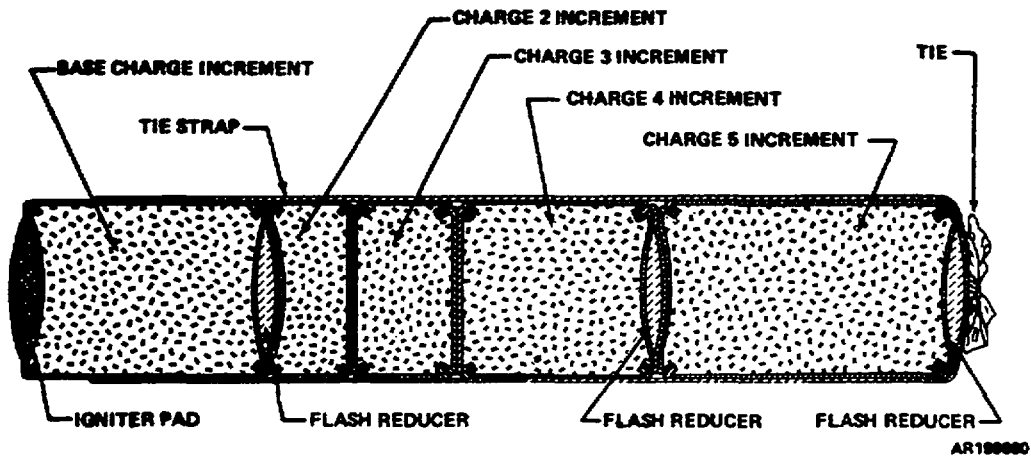
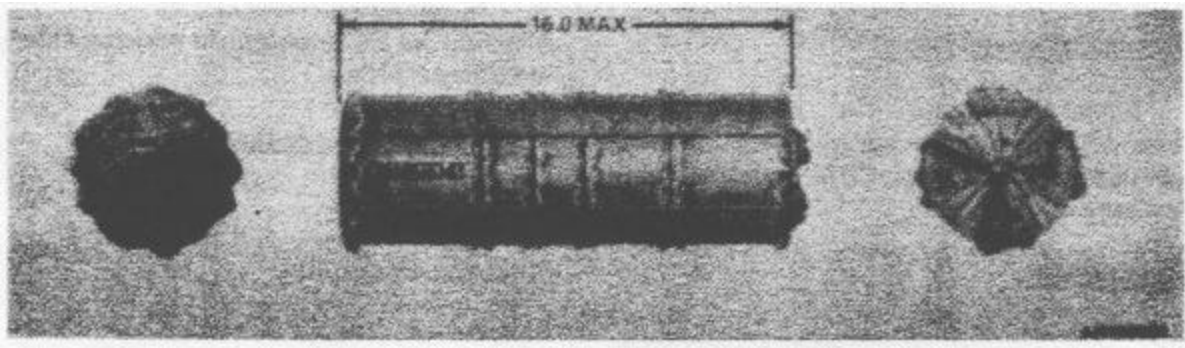
Limitations:

Not available

References:

Not available

**CHARGE, PROPELLING, 155 MILLIMETER: M3 SERIES (BE, DE, GR, IT, UK)**



Type Classification:

M3A1: Std AMCTC 4633 dtd 1966  
 M3: Std AMCTC 4633 dtd 1966

Use:

The M3 series propelling charges are green bag type designed for use in 155mm howitzers for firing in Zones 1 through 5.

Description:

The full charge consists of approximately 5.50 pounds propellant including a base charge and four unequal increments loaded in cloth bags. The bags are fastened together with four cloth straps sewn to the base and tied on top of Increment 5. Charge M3 is assembled without flash reducer pads. Charge M3A1 includes 3

flash reducer pads containing potassium nitrate or potassium sulphate. A 2-ounce pad is assembled forward of the base charge and there are two 1-ounce pads forward of Increments 4 and 5. The igniter charge of the M3A1 is 3.5 ounces of clean burning igniter (CBI) in a red cloth bag sewn to the rear of the base section. The igniter charge of the M3 is 3 ounces of black powder. The seams of the base charge section are inverted on the M3A1 only so that the edges of the cloth are inside to reduce residue after firing.

Functioning:

The primer ignites the igniter pad, and the igniter charge, in turn, ignites the propellant charge. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target or function point. The flash reducer pads serve to limit breech flareback as well as muzzle flash and blast overpressure.

Difference Between Models:

Model M3 does not include flash reducers. The igniter charge is 3 ounces of black powder instead of CBI, and the base seams are not inverted.

Tabulated Data:

Type -----Green bag, separate loading  
 Weight -----6.2 lb  
 Length-----16 in.  
 Color Green w/black markings  
 Propellant-----M1 (5.6 lb explosive)  
 Cannon used with-----M1, M1A1, M45, M126, M126A1, M185, M199

Temperature Limits:

Firing:  
 Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52°C)  
 Storage:  
 Lower limit-----80°F (for periods not more than 3 days)  
 Upper limit-----+160°F (for periods not more than 4 hr/day)  
 \*Packing-----2 propelling charges in container M14  
 \*Container  
 Weight -----29.0 lb  
 Dimensions -----33-34 x 6-3/8 x 6-3/8 in.  
 Cube-----0.89 cu ft

Explosive per container-----11.5 lb

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class -----1.3  
 Storage compatibility group -----C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVE SOLID CLASS B WITH CANNON PRIMERS AND IGNITERS  
 DODAC-----1320-D540  
 Assembly Dwg. Nos.:  
 M3A1-----8887277  
 M3-----8864405

Preparation for Firing:

No preparation is required other than adjusting the charge according to the firing zone.

Limitations:

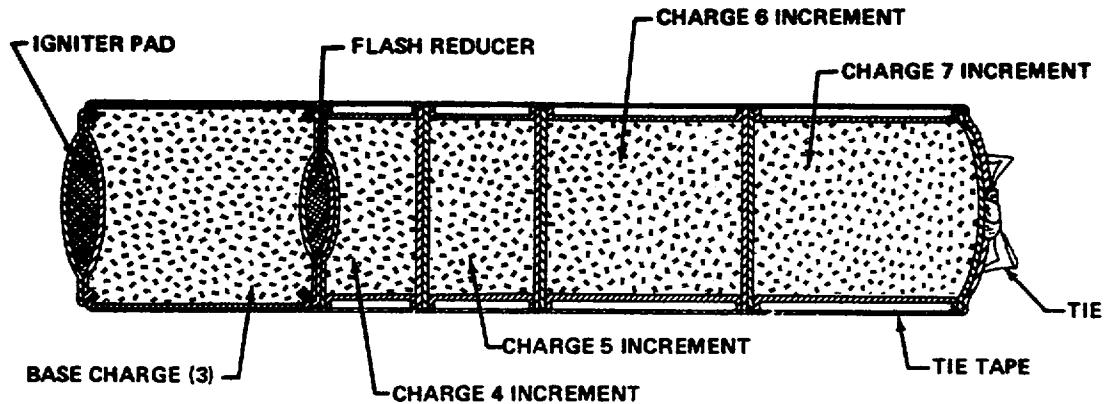
Increments of green bag charges may not be mixed with white bag increments.

References:

- SC 13051/30-IL
- SB 700-20
- DARCOM-P 700-3-3
- TM 9-1300-251-20
- TM 9-1025-200-12
- TM 9-2350-211-10
- TM 9-2350-217-10N



**CHARGE, PROPELLING, 155 MILLIMETER: M4 SERIES  
(M4A1 - DE, GR, FR, BE)  
(M4A2 - UK, SP, CA, IT)**



Type Classification:

M4A2: Std AMCTC 4633 dtd 1966  
M4A1: Std AMCTC 4633 dtd 1966

Use:

This white bag propelling charge is used in 155mm howitzers for firing in Zones 3, 4, 5, 6 and 7.

Description:

The total charge (M4A2 Prop. Charge) consists of 13 pounds of propellant and is divided between a base charge and four unequal increments loaded in white cloth bags. The increments are connected by four

cloth tapes sewn to the base and tied on top of Increment 7. The igniter for Charge M4A2 is 3.5 ounces of clean burning igniter (CBD) in a red cloth pad sewn to the bottom of the base charge. A flash reducer pad containing one ounce of potassium nitrate or potassium sulphate is assembled at the front end of the base increment (Increment 3). The seams in the base pad are inverted so that the edges of the cloth are inward to reduce residue after firing.

Functioning:

When the weapon is fired, the primer ignites the igniter charge, and the igniter charge ignites the propelling charge. The burning propellant generates rapidly expanding gases to propel the projectile through

the barrel and to the velocity required to reach the target. The flash reducer pads serve to limit breech flareback as well as muzzle flash and blast overpressure.

Difference Between Models:

Model M4A1 is similar to Model M4A2 except that the igniter charge is 3.0 ounces of black powder instead of CBI, the base charge seams are not inverted, and the charge does not include a flash reducer. Flash Reducer M2 may be used with Charge M4A1 when required, but is a separate item of issue.

Tabulated Data:

Complete round:

Type ----- Separate loading, white bag  
 Weight ----- 14.0 lb  
 Length ----- 21.0 in. max.  
 Color ----- White w/black markings  
 Cannon used with ----- M1, M1A1, M45, M126, M126A1, M185, M199  
 Propellant ----- M1 (13.4 lb explosive)

Temperature Limits:

Firing:

Lower limit ----- 40°F (-40°C)  
 Upper limit ----- +125°F (+52°C)

Storage:

Lower limit ----- 80°F for periods not more than 3 days)  
 Upper limit ----- +140°F for periods not more than 4 hr/day

\*Packing ----- 1 charge in metal container M13

\*Container:

Weight ----- 30.5 lb  
 Dimensions ----- 27-3/4 x 7-3/8 x 7-3/8 in.  
 Cube ----- 0.87 cu ft

Explosive per container ----- 13.7 lb

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class ----- 1.3  
 Storage compatibility group ----- C  
 DOT shipping class:  
 M4A2 ----- B  
 M4A1 ----- B  
 DOT designation:  
 M4A2 ----- PROPELLANT EXPLOSIVES SOLID CLASS B  
 M4A1 ----- PROPELLANT EXPLOSIVES SOLID CLASS B  
 DODAC ----- 1320-D541  
 Assembly Dwg. No.:  
 M4A2 ----- 9207624  
 M4A1 ----- 71-9-180

Preparation for Firing:

No preparation is required except adjustment of the charge according to the firing zone intended.

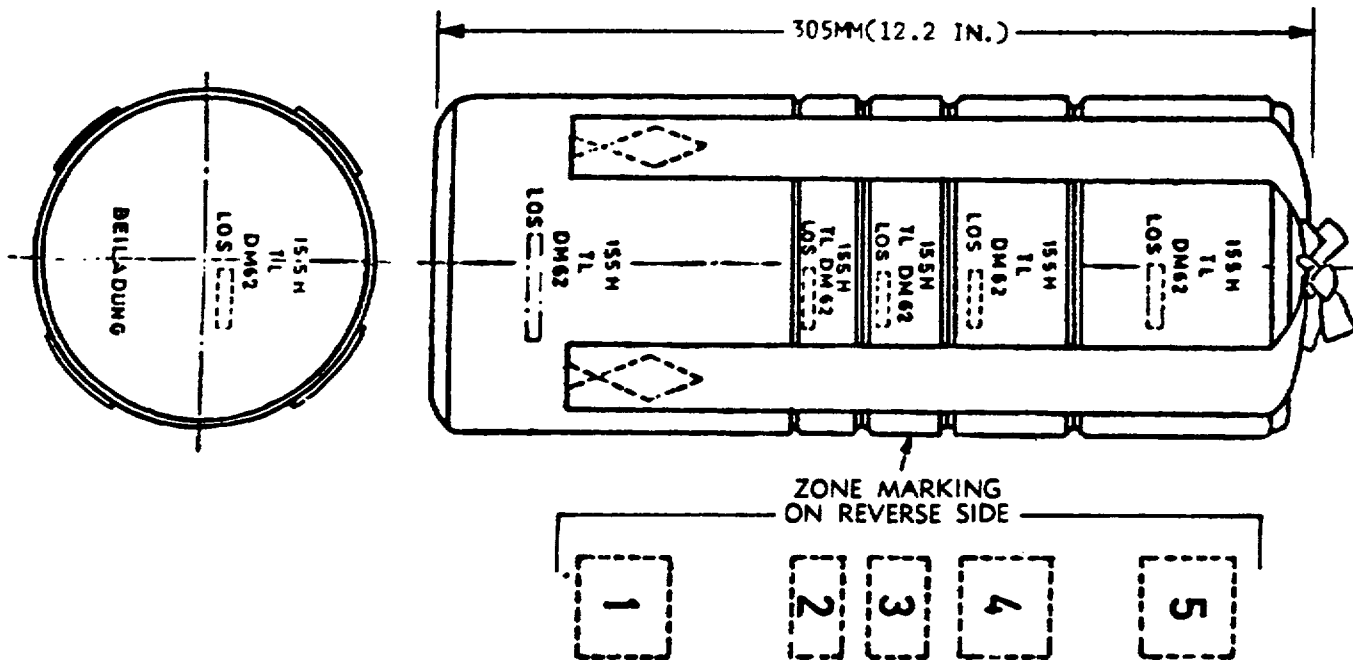
Limitations:

Erratic range results may be expected when firing M4 series charge in Zones 3 and 4, so Green Bag M3 series charge should be used for those zones when available.

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM P 700-3-3  
 TM 9-1300-251-20  
 TM 9-1025-200-12  
 TM 9-2350-217-10  
 TM 9-2350-217-10N

CHARGE, PROPELLING, 155 MILLIMETER: DM62 (GE)



AR 101786

Use:

The DM62 propelling charge is a green bag type designed for use in 155mm howitzers for firing in Zones 1 through 5.

Description:

The full charge consists of propellant including a base charge and four unequal increments loaded in cloth bags. The bags are fastened together with four cloth straps sewn to the base and tied on top of Increment No. 5 (1 to 1.5 percent potassium sulphate is incorporated in propellant grains). The igniter charge of the DM62 is 80g (2.8 oz) of clean burning igniter (CBI) in a red or brown cloth bag sewn to the rear of the base section. The seams of the base charge section are inverted so that the edges of the cloth are inside to reduce residue after firing.

Functioning:

The primer ignites the igniter pad, and the igniter charge, in turn, ignites the propellant charge. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target or function point,

Tabulated Data:

Type	-----Green bag, separate loading Zones 1 - 5
Weight	-----2.380 kg (5.2 lb)
Length	-----305mm (12.2 in.)
Color	-----Green w/black markings
Propellant	-----M30A1, Type II
Weapon used with	-----M109, M109A1, M109A3
Cannon	-----M126 and M185

Temperature Limits:

Firing:  
 Upper limit-----+52°C (+125°F)

Storage:  
 Upper limit-----+63°C (+145°F)

Packing-----2 charges per metal  
 container, 20 containers  
 (40 charges) per pallet

Container:  
 Weight -----1 kg (24.2 lb)  
 Dimensions -----950mm x 170mm x 170mm  
 (38 x 6.8 x 6.8 in.)  
 Cube-----0.027m<sup>3</sup> (0.96 ft<sup>3</sup>)  
 Explosive per  
 container-----5.2 kg (11.4 lb)

Pallet:  
 Dimensions -----952 x 880 x 880mm (38 x  
 35 x 35 in.)  
 Cube-----0.73m<sup>3</sup> (25.5 ft<sup>3</sup>)  
 Weight -----255 kg (561 lb)

Shipping and Storage Data:

Storage class/SCG -----1.3 C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVE  
 SOLID CLASS B WITH  
 CANNON PRIMERS AND  
 IGNITERS  
 DODAC-----Not available  
 Assembly Dwg No.-----Not available

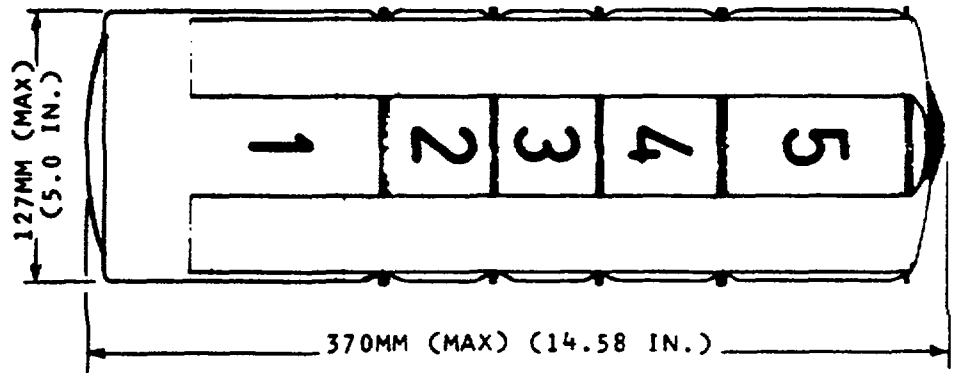
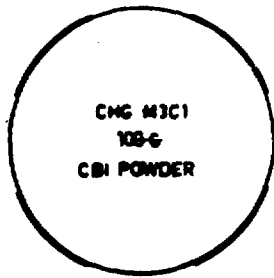
Limitations:

Not available

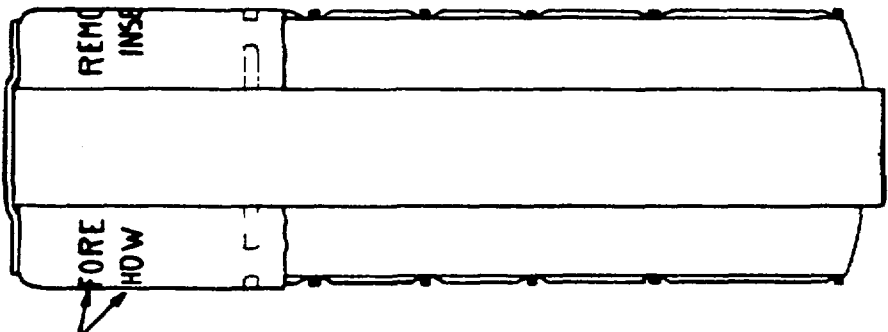
References:

Not available

CHARGE, PROPELLING, 155 MILLIMETER: M3C1 (NL)



NOTE: LOT NO. OF ASSEMBLED PROPELLANT CHARGE IS SHOWN ON THE GROUND CHARGE AND ALL SUPPLEMENTAL CHARGES.



REMOVE CAP BEFORE INSERTING IN HOWITZER

AR 101973

Use:

The M3C1 propelling charge is a green bag type designed for use in 155mm howitzers for firing in Zones 1 through 5.

Description:

The full charge consists of approximately 2.8 kg (6.2 lb) of propellant including a base charge and four unequal increments loaded in cloth bags. The bags are fastened together with four cloth straps sewn to the base and tied on top of Increment 5. Charge M3C1 includes three flash reducer pads containing potassium nitrate or potassium sulphate. A two ounce pad is assembled forward of the base charge and there are two 1-ounce

pads forward of Increments 4 and 5. The igniter charge of the M3C1 is 3.5 ounces of clean burning igniter (CBI) in a red cloth bag sewn to the rear of the base section. The seams of the base charge section are inverted so the edges of the cloth are inside to reduce residue after firing.

Functioning:

The primer ignites the igniter pad, and the igniter charge, in turn, ignites the propellant charge. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target or function point. The flash reducer pads serve to limit breech flareback as well as muzzle flash and blast overpressure.

Tabulated Data:

Type ----- Separate loading, green bag  
 Weight ----- 28 kg (6.2 lb)  
 Length ----- 370mm (14.58 in.) max  
 Color ----- Green w/black markings  
 Propellant ----- M1 (5.6 lb explosive)  
 Cannon used with ----- M126, M126A1, M185

Temperature Limits:

Firing:  
 Lower limit ----- 40°C (-40°F)  
 Upper limit ----- +52°C (+125°F)

Storage:  
 Lower limit ----- 62°C (-80°) (for periods not more than 3 days)  
 Upper limit ----- +70°C (+160°F) (for periods not more than 4 hr/day)

Packing ----- 6 propelling charges in container

Container:  
 Weight ----- 31.8 kg (70.1 lb)  
 Dimensions ----- 630 x 525 x 185mm (24.8 x 20.6 x 7.3 in.)  
 Cube ----- 0.06m<sup>3</sup> (2.14 ft<sup>3</sup>)  
 Explosive per container ----- 15.7 kg (34.5 lb)

Shipping and Storage Data:

Storage Class/SCG ----- 1.3C  
 DOT shipping class ----- B  
 DOT designation ----- PROPELLANT EXPLOSIVE SOLID - CLASS B WITH CANNON PRIMERS AND IGNITERS  
 DODAC ----- Not available  
 Assembly Dwg. No. ----- Not available

Preparation for Firing:

No preparation is required other than adjusting the charge according to the firing zone.

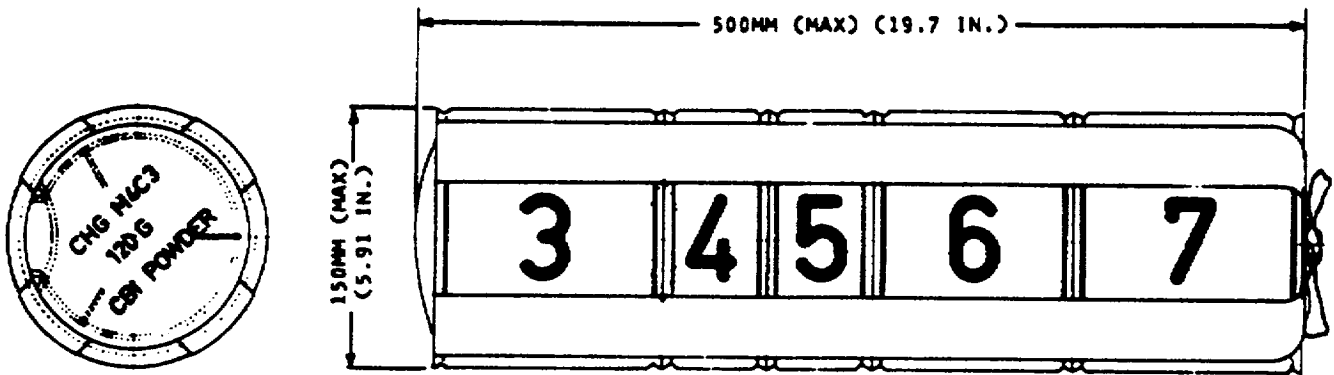
Limitations:

Increments or green bag charges may not be mixed with white bag increments.

References:

Not available

CHARGE, PROPELLING, 155 MILLIMETER: M4C3 (NL)



NOTE: LOT NO. OF ASSEMBLED PROPELLANT CHARGE IS SHOWN ON THE GROUND CHARGE AND ALL SUPPLEMENTAL CHARGES.



AR 101974

Use:

This white bag propelling charge is used in 155mm howitzers for firing in Zones 3, 4, 5, 6, and 7.

Description:

The total charge consists of 13.4 pound of propellant and is divided between a base charge and four unequal increments loaded in white cloth bags. The increments are connected by four cloth tapes sewn to the base and tied on top of Increment 7. The igniter for Charge M4C3 is 3.5 ounces of clean burning igniter (CBI) in a red cloth pad sewn to the bottom of the base charge. A flash reducer pad containing one ounce of

potassium nitrate or potassium sulphate is assembled at the front end of the base increment (Increment 3). The seams in the base pad are inverted so the edges of the cloth are inside to reduce residue after firing.

Functioning:

When the weapon is fired, the primer ignites the igniter charge, and the igniter charge ignites the propelling charge. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target. The flash reducer pads serve to limit breech flareback as well as muzzle flash and blast overpressure.

Tabulated Data:

Complete round:

Type ----- Separate loading, white bag  
 Weight ----- 6.4 kg (14.0 lb)  
 Length ----- 500mm (19.7 in.) (max)  
 Cannon used with ----- M126, M126A1, M185  
 Propellant ----- M1 (13.4 lb explosive)

Temperature Limits:

Firing:

Lower limit ----- 40°C (-40°F)  
 Upper limit ----- +52°C (+125°F)

Storage:

Lower limit ----- 62°C (-80°F) (for periods  
 not more than 3 days)  
 Upper limit ----- +60°C (+140°F) (for periods  
 not more than 4 hr/day)

Packing ----- 4 propelling charges in  
 container

Container:

Weight ----- 41 kg (90.4 lb)  
 Dimensions ----- 630 x 525 x 185mm (24.8 x  
 20.6 x 7.3 in.)  
 Cube ----- 0.06m<sup>3</sup> (2.14 ft<sup>3</sup>)

Explosive per

container ----- 24.9 kg (54.8 lb)

Shipping and Storage Data:

Storage class/SCG ----- 1.3C  
 DOT shipping class ----- B  
 DOT designation ----- PROPELLANT EXPLOSIVE  
 SOLID - CLASS B  
 DODAC ----- Not available  
 Assembly Dwg No. ----- Not available

Preparation for Firing:

No preparation is required except adjustment of  
 the charge according to the firing zone intended.

Limitations:

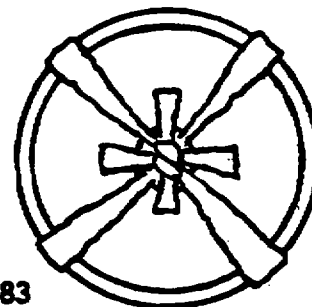
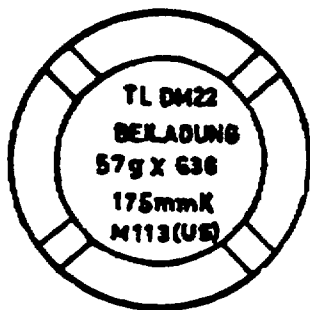
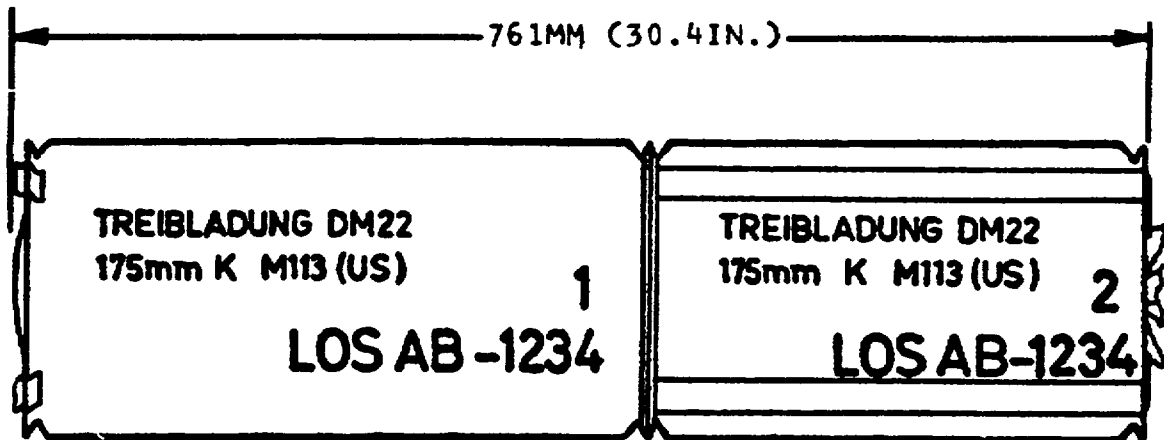
Erratic range results may be expected when  
 firing M4C3 propelling charge in Zones 3 and 4, so  
 Green hag M3C1 charge should be used for these zones  
 when available.

References:

Not available



CHARGE, PROPELLING, 175 MILLIMETER: DM22 (GE)



AR 101783

Use:

DM22 propelling charge is used in the 175mm M107 Self-Propelled Weapon System.

Description:

The charge is a two-increment white bag type. The bags are tied together by four tying straps attached to the top of Increment No. 1 and knotted on top of Increment No. 2. Each propelling charge has an igniter core assembly extending through the center of the charge. The core assembly consists of two rigid polyurethane tubes containing bagged igniter cores of black powder. A red or brown cloth igniter pad, filled with black powder, is sewn to the base of Increment No. 1. The igniter core for Increment No. 1 is sewn to the

igniter base pad and is loose in the Increment No. 1 igniter tube. The core for Increment No. 2 is tied inside the igniter tube. An igniter protective cap is placed over the igniter base pad for protection in shipment and storage.

Functioning:

When the primer is initiated in the breech-block of the gun, flash ignites the black powder in the igniter pad. The flame proceeds through the powder in the igniter tubes to accomplish uniform ignition of the propelling charge through both increments. The burning propellant generates rapidly expanding gases to propel the projectile through the gun tube at the velocity required to reach the target.

Tabulated Data:

Propelling Charge:

Type -----White bag, separate loaded  
propelling charge  
Weight -----17 kg (37.4 lb)  
Length-----761mm (30.4 in.)  
Diameter -----203mm (8.12 in.)  
Cannon (Weapon)  
used with-----M13, M113A1 (M107)

Propellant:

Composition -----M6  
Grain type -----7 perforated cylinder, L/D =  
2.35  
Weight -----16 kg (35.2 lb)  
Web-----2mm (0.08 in.)  
Primer-----DM191A (GE M107)  
Primer-----M82 (US M107)

Temperature Limits:

Firing:

Upper limit-----+52°C (+125°F)

Storage:

Upper limit-----+63°C (+145°F)

Packing (Propelling

Charge)-----1 charge per metal  
container 12 metal  
containers per pellet

Container:

Weight -----27.8 kg (61.1 lb)  
Dimensions -----950 x 250 x 250mm (38 x  
10 x 10 in.)  
Cube-----0.06m<sup>3</sup> (2.1 ft<sup>3</sup>)

Pallet:

Weight -----353 kg (776.6 lb)  
Dimensions -----950 x 750 x 1155mm (38 x  
30 x 46.2 in.)  
Cube-----0.82m<sup>3</sup> (28.7 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.3C  
DOT shipping class-----B  
DOT designation-----PROPELLANT  
EXPLOSIVES SOLID  
CLASS B  
DODAC-----Not available

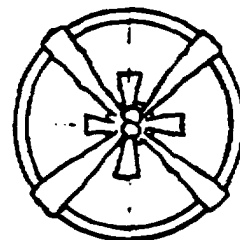
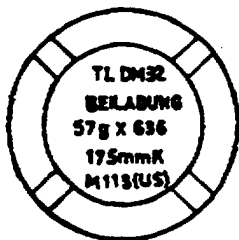
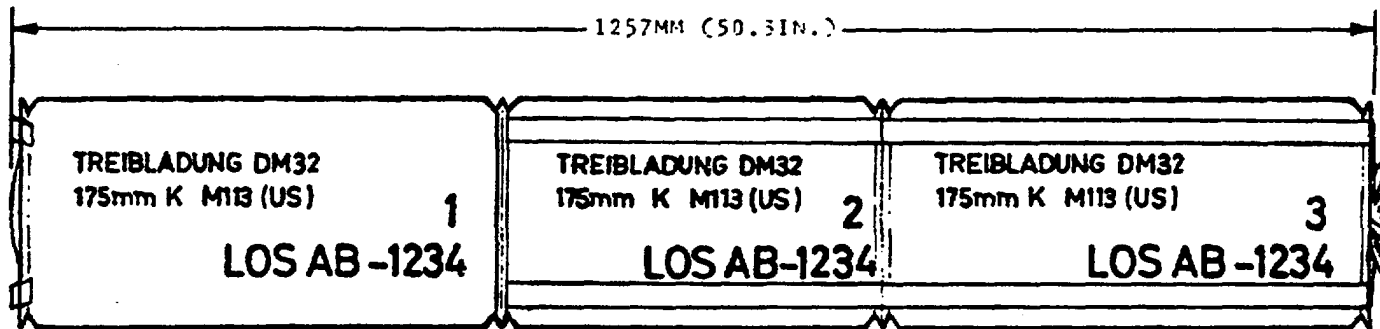
Limitations:

Not available

References:

Not available

CHARGE, PROPELLING, 175 MILLIMETER: DM32 (GE)



Use:

DM32 propelling charge is used in the 175mm M107 Self-Propelled Weapon System.

Description:

The charge is a three-increment white bag type, multiperforated Propellant M6 in acrylic viscose-rayon bags. The bags are tied together by four tying straps attached to the top of Increment No. 1 and knotted on top of Increment No. 3. The tying straps are reinforced by cord tied tightly around the junction of Increment Nos. 2 and 3. Each propelling charge has an igniter core assembly extending through the center of the charge. The core assembly consists of three rigid polyurethane

tubes containing bagged igniter cores of black powder. The igniter tubes for Zones 1 and 3 contain bell shaped ends which assemble over the ends of the igniter tube in Increment No. 2. A red or brown cloth igniter pad, filled with black powder, is sewn to the base of Increment No. 1. The igniter core for Increment No. 1 is sewn to the igniter base pad and is loose in the Increment No. 1 igniter tube. The cores for Increment Nos. 2 and 3 are tied inside the igniter tubes for these increments. An igniter protective cap is placed over the igniter base pad for protection in shipment and storage. An additive jacket is issued separately for assembly over Increment No. 3 when firing full charge. All charges are packed with a percussion primer. The flash reducer which is a part of the DM32, is located between Increment No. 2 and No. 3.

A bore-wear-reducing additive jacket, assembled to Increment No. 3, is used when firing a full charge. It consists of two 267mm x 460mm (10.6 x 18.4 in.) cloth-backed sheets of additive mixture stitched together. The additive mixture is composed of 47 percent titanium dioxide and 53 percent wax. The cloth backing, which is bonded to and overlaps the sheets of additive mixture, is stitched to an unbonded tough plastic film casing which serves as a jacket liner. When compressed along the seams, the jacket arches to form a cylinder with a diameter of approximately 190mm (7.6 in.).

**NOTE: If the additive mixture is cracked or the plastic sheet is ripped, the additive jacket is still acceptable for use. Use the additive jacket over Increment No. 3 only.**

Functioning:

When the primer is initiated in the breech-block of the gun, flash ignites the black powder in the igniter pad. The flame proceeds through the powder in the igniter tubes to accomplish uniform ignition of the propelling charge through all three increments. The burning propellant generates rapidly expanding gases to propel the projectile through the gun tube at the velocity required to reach the target. When the additive jacket is employed for full charge firing, the mixture of titanium dioxide and wax in the cloth backing serves to reduce bore wear at the origin of rifling in the cannon.

Tabulated Data:

Propelling Charge:

Type -----White bag, separate loaded propelling charge  
 Weight -----25.4 kg (55.8 lb)  
 Length-----1257mm (50.3 in. max)  
 Diameter -----203mm (8.12 in. max)  
 Cannon (Weapon used with)-----M13, M13A1 (M107)

Propellant:

Composition -----M6  
 Grain type -----7 perforated cylinder, L/D = 2.35

Weight -----24.9 kg (55 lb)  
 Web-----2mm (0.08 in.)  
 Primer -----DM191A1 (GE M107)  
 Primer -----M82 (US M107)

Temperature Limits:

Firing:  
 Upper limit-----+52°C (+125°F)

Storage:  
 Upper limit-----+63°C (+145°F)

Packing (Propelling Charge)-----1 charge with additive jacket in metal container, 12 metal containers per pallet

Container:  
 Weight -----44 kg (96.8 lb)  
 Dimensions -----140 x 250 x 250mm (56 x 10 x 10 in.)  
 Cube-----0.0875m<sup>3</sup> (3.06 ft<sup>3</sup>)

Pallet:  
 Weight -----548 kg (1.205 lb)  
 Dimensions -----1400 x 760 x 130mm (56 x 30.4 x 45.2 in.)  
 Cube-----1.2m<sup>3</sup> (42.0 ft<sup>3</sup>)

Shipping and Storage Data:

Quantity-distance class -----1.1  
 Storage compatibility group -----C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVES SOLID CLASS B  
 DODAC-----Not available

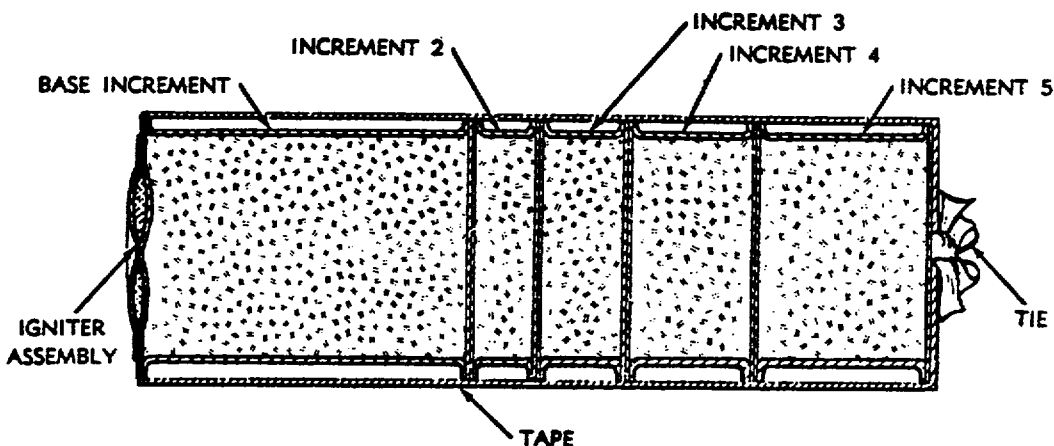
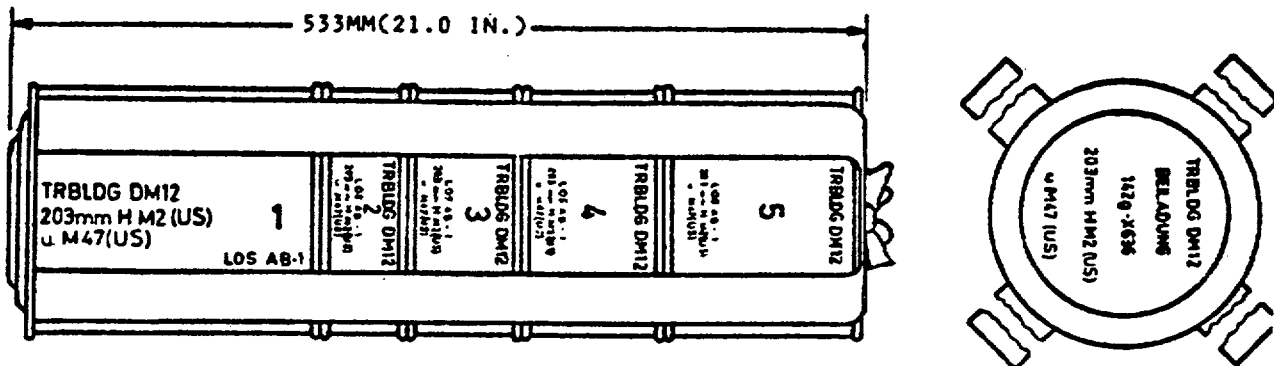
Limitations:

None available.

References:

None available

CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): DM12 (GE)



AR 101772-A

Use:

203mm (8-in.) Green Bag Propelling Charge DM12 is used for zone firing with Charges 1 to 5 in M110 Howitzer Weapons System.

Description:

The charge consists of a base section (Charge 1) and four unequal increments (2 thru 5) of propellant in green cloth bags. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 1 and tied over the top of

Increment 5. An igniter pad containing 142g (4.9 oz) of black powder is sewn to the base of Increment 1. Each increment of the charge and the igniter pad is identified by black stencil markings.

Functioning:

The flash from the primer ignites the black powder igniter pad, which in turn ignites the propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target.

Tabulated Data:

Type -----Green Bag, separate loaded propelling charge  
 Weight -----6.1 kg (13.4 lb)  
 Length-----533mm (21.0 in.) max  
 Diameter -----165mm (6.50 in.) max  
 Color Green w/black marking  
 Propellant  
     Composition -----M1  
     Grain type -----1 perforated L/D = 4.6  
     Weight -----6.2 kg (13.6 lb)  
     Web -----0.43mm (0.017 in.)  
 Weapon -----M110, M110A1  
 Cannon -----M2A2 (M2A1E1), M201

Temperature Limits:

Firing:  
     Upper limit-----+52°C (+125°F)  
 Storage:  
     Upper limit-----+63°C (+145°F)  
 Packing-----1 charge in metal container;  
                     16 containers per pallet  
 Container -----M18A2  
     Weight -----15.4 kg (34 lb)

Dimensions -----214mm x 668mm (8.2 in. x 26.2 in.)  
 Cube-----0.029m<sup>3</sup> (1.0 ft<sup>3</sup>)  
 Pallet:  
     Weight -----258.7 kg (570 lb) (approx)  
     Dimensions -----667.5mm x 860mm x 1011mm (max) (26.4 x 33.9 x 39.8 in.)  
     Cube-----0.58m<sup>3</sup> (20.3 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.3C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT  
                                     EXPLOSIVES - SOLID  
                                     CLASS B  
 DODAC-----Not available  
 Dwg. No. -----Not available

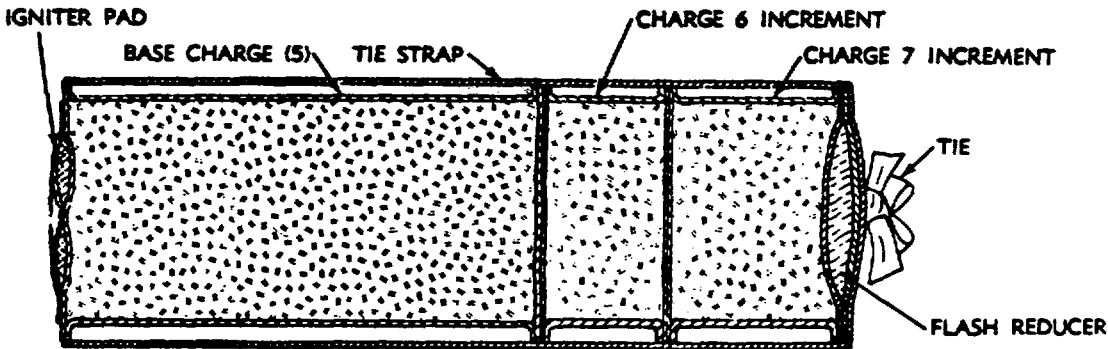
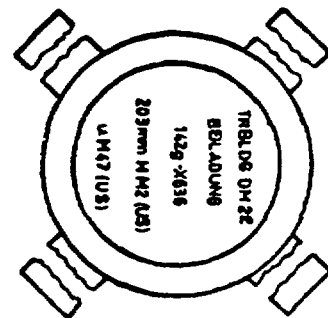
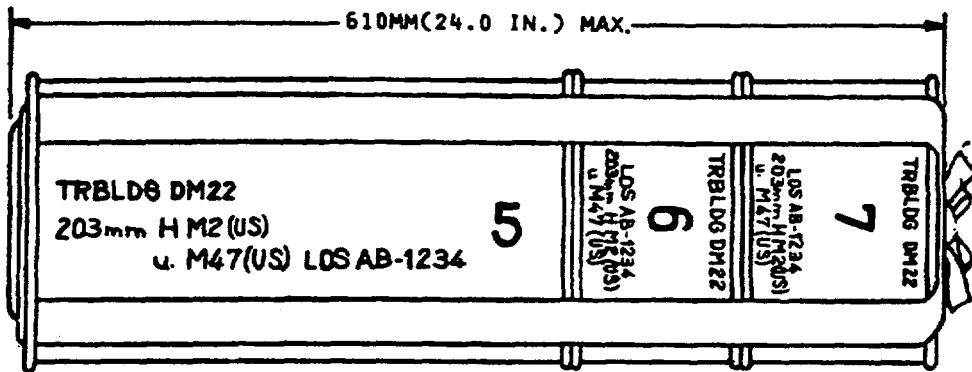
Limitations:

Not available

References:

Not available

CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): DM22 (GE)



Use:

203mm (8-in.) White Bag Propelling Charge DM22 is used for zone firing with Charges 5 thru 7 in M110 Howitzer Weapons System.

Description:

The charge consists of a base section (Charge 5) and two unequal increments (Charges 6 and 7) for zone firing. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 5 and tied over the top of Increment 7. A red cloth igniter pad containing 142g (4.97 oz) of black powder is sewn to the base of Increment 5. Each increment of the charge and the

igniter pad is identified by black stencil markings. In use a DM1 Flash Reducer is inserted under the tie straps at the forward end of the charge. Flash Reducer DM1 is a separate item of issue to be used when firing all zones of the DM22 Propelling charge. It consists of a square pad of red cloth containing a 453.6g (1 lb) mixture of potassium sulfate and black powder.

Functioning:

The flash from the primer ignites the black powder igniter pad, which in turn ignites the propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target. The flash reducer serves to reduce the amount of blast overpressure at the muzzle.

Although the flash reducer increases the quantity of smoke, it must be used in daylight firing as well as night firing unless it is tactically impossible.

Tabulated Data:

Type -----White bag, separate loading  
 Weight -----13.6 kg (30 lb)  
 Length-----610mm (24.0 in.) (max)  
 Diameter -----203.8mm (8.12 in.) (max)  
 Color White w/black markings  
 Propellant:  
     Composition -----M1  
     Grain type -----7 perforated cylinder  
     Weight -----12.9 kg (28.5 lb)  
     Web -----0.109mm (0.004 in.)  
 Primer -----M82.  
 Weapon -----M110, M110A1  
 Cannon -----M2A2 (M2A1E), M201

Temperature Limits:

Firing:  
     Upper limit -----+52°C (+125°F)  
 Storage:  
     Upper limit -----+63°C (+145°F)  
 Packing-----1 charge in metal container,  
                     12 metal containers per  
                     pallet  
 Container -----M19A2  
     Weight -----23.7 kg (52 lb)  
     Dimensions -----250mm x 744mm (9.8 x  
                             29.3 in)  
     Cube-----0.046m<sup>3</sup> (1.6 ft<sup>3</sup>)

Pallet:  
     Weight -----292 kg (644 lb) (approx)  
     Dimensions -----755mm x 744mm x  
                             1151mm (max) (29.7 x  
                             29.3 x 45 in.)  
     Cube-----0.64m<sup>3</sup> (22.6 ft<sup>3</sup>)

Shipping and Storage Data (Propelling Charge):

Storage Class/SCG -----1.3C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVE  
                                     - SOLID CLASS B  
 DODAC-----Not available  
 Dwg. No. -----Not available

Shipping and Storage Data (DM1 Flash Reducer):

Storage Class/SCG -----1.1D  
 DOT shipping class-----A  
 DOT designation-----BLACK POWDER  
 DODAC-----Not available  
 Dwg. No. -----Not available

Limitations:

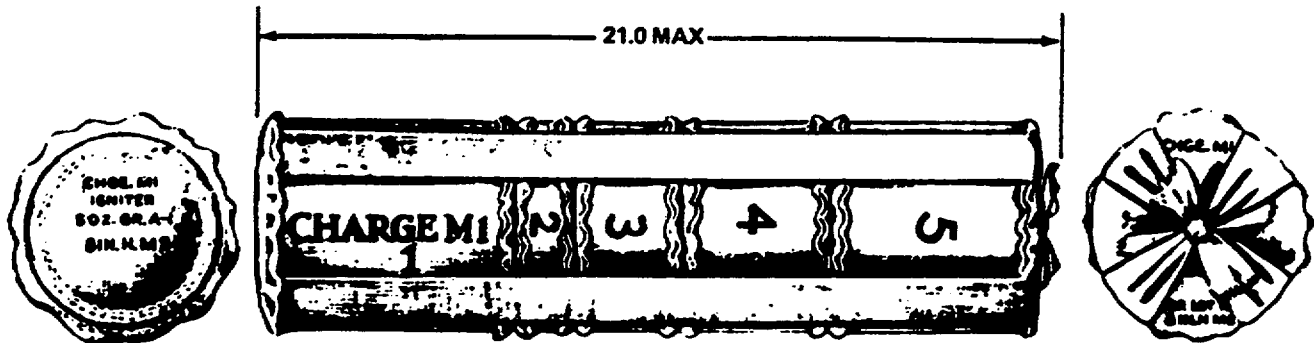
The DM22 propelling charge must be used with a DM1 flash reducer. If flash reducers are not available, occasional blast overpressure and excessive flash may be experienced.

References:

Not available



**CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): M1 (NL\*, BE\*, IT\*\*, DE, GR, UK\*, SP)**



AR199701

\*US manufacture  
 \*\*Some US manufacture

Use:

203mm (8-in.) Green Bag Propelling Charge M1 is used for zone firing with Charges 1 thru 5 in 203mm (8-in.) howitzer cannons.

Description:

The charge consists of a base section (Charge 1) and four unequal increments (2 thru 5) of propellant M1 in green cloth bags. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 1 and tied over the top of Increment 5. A red igniter pad containing 140g (5 oz) of black powder is sewn to the base of Increment 1. Each increment of the charge and the igniter pad is identified by black stencil markings.

Functioning:

The flash from the primer ignites the black powder igniter pad, which in turn ignites the propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target.

Tabulated Data:

Type -----	Green Bag, separate loaded propelling charge
Weight -----	6.8 kg (15.0 lb)
Length-----	535mm (21 in.) (max)
Diameter -----	165.1mm (6.50 in.)
Color -----	Green w/black markings
<b>Propellant:</b>	
Composition -----	M1
Grain type -----	1 perforated L/D = 4.6
Weight -----	6.18 kg (13.6 lb)
Web-----	0.43mm (0.017 in.)

Primer -----MK2A4, M82  
 Weapon -----M110, M110A1  
 Cannon -----M2A2, M201

Temperature Limits:

Firing:

Lower limit -----40°C (-40°F)  
 Upper limit -----+52°C (+125°F)

Storage:

Lower limit -----62°C (-80°F) (for period of  
 not more than 3 days)  
 Upper limit -----+71°C (+160°F) (for not  
 more than 4 hr/day)

Packing -----1 charge in metal container;  
 50 metal containers per  
 pallet

Container -----M18A2  
 Weight -----15.4 kg (34 lb)  
 Dimensions -----667.5 x 213.5 x 213.5mm  
 (8-13/32 x 26-9/32 in.)  
 Cube -----0.03m<sup>3</sup> (1.1 ft<sup>3</sup>)

Pallet:

Weight -----749.1 kg (1650 lb)  
 Dimensions -----1117.6 x 1320 x 1270mm  
 (44 x 52 x 50 in.)  
 Cube -----1.81m<sup>3</sup> (67.2 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG -----1.3C  
 DOT shipping class -----B  
 DOT designation -----PROPELLANT  
 EXPLOSIVES SOLID -  
 CLASS B  
 DODAC -----Not available  
 Dwg. No. -----Not available

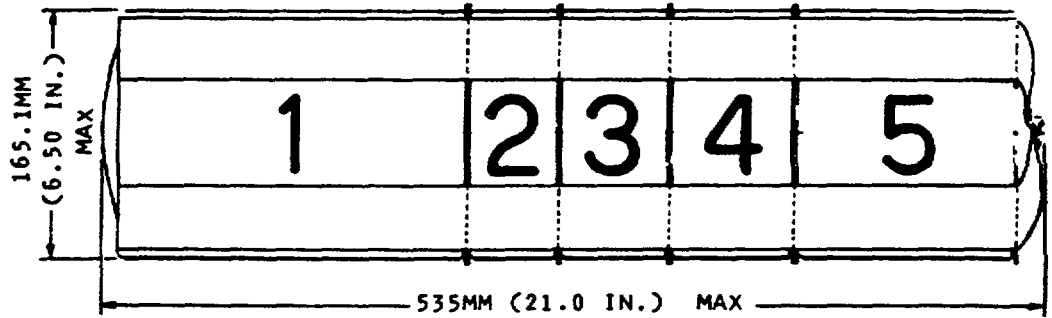
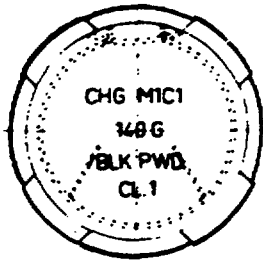
Limitations:

Not available

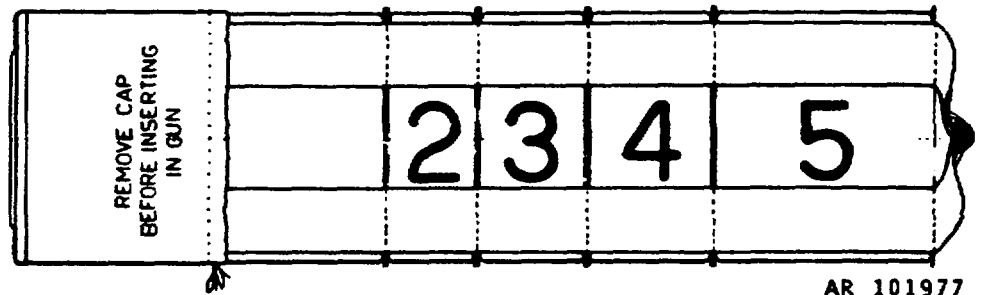
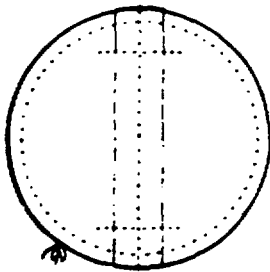
References:

SC 1305/30-IL  
 SB 700/20  
 DARCOM (AMC)-R 700-3-3  
 TM 9-1300-250  
 TM 9-1300-206  
 TM 9-1300-251-20  
 TM 9-1300-251-34

CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): MC1 (NL)



NOTE: LOT NO. OF ASSEMBLED PROPELLANT CHARGE IS SHOWN ON THE GROUND CHARGE AND ALL SUPPLEMENTAL CHARGES.



Use:

203mm (8 in.) Green Bag Propelling Charge M1C1 is used for zone firing with Charges 1 to 5 in 203mm (8 in.) howitzer cannons.

Description:

The charge consists of a base section (Charge 1) and four unequal increments (2 thru 5) of propellant in green cloth bags. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 1 and tied over the top of

Increment 5. A red igniter pad containing 140g (5 oz) of black powder is sewn to the base of Increment 1. Each increment of the charge and the igniter pad is identified by black stencil markings.

Functioning

The flash from the primer ignites the black powder igniter pad, which in turn ignites the M1 propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target.

Tabulated Data:

Type -----Green bag, separate loaded propelling charge  
 Weight -----6.8 kg (15.0 lb)  
 Length-----535mm (21.0 in.) max  
 Diameter -----165.1 mm (6.50 in.) max  
 Color-----Green w/black markings  
 Propellant:  
     Composition -----M1  
     Grain type -----1 perforated L/D = 4.6  
     Weight -----6.18 kg (13.6 lb)  
     Web-----0.43mm (0.017 in.)  
 Primer -----M82, MK2A4  
 Weapon -----M110, M110A1  
 Cannon-----M2A2 (M2A1E1), M201

Temperature Limits:

Firing:  
     Lower limit-----40°C (-40°F)  
     Upper limit-----+52°C (+125°F)  
 Storage:  
     Lower limit-----62°C (-80°F) for periods of not more than 3 days  
     Upper limit-----+70°C (+160°F) for not more than 4 hr/day  
 Packing-----4 charges in metal container

Container:

Weight -----40 kg (88.2 lb)  
 Dimensions -----630 x 525 x 185mm (24.8 x 20.7 x 7.3 in.)  
 Cube-----0.06m<sup>3</sup> (2.14 ft<sup>3</sup>)

Shipping and Storage Data:

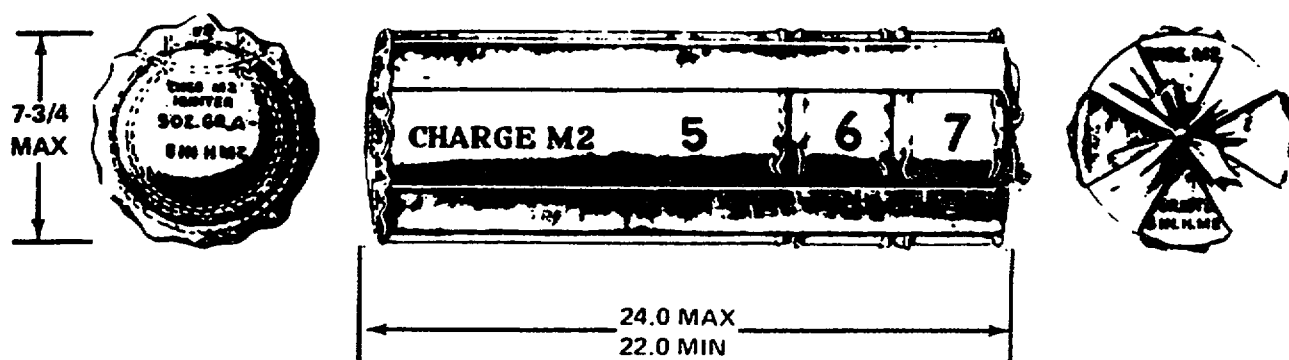
Storage Class/SCG-----1.3C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVE SOLID - CLASS B  
 DODAC-----Not available  
 Dwg. No. -----Not available

Limitations:

Not available

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM (AMC)-R 700-3-3  
 TM 9-1300-250  
 TM 9-1300-206  
 TM 9-1300-251-20  
 TM 9-1300-251-34  
 TM 9-2300-216-10

**CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): M2 (NL, AND BE\*, IT\*\*, DA, GR, UK\*, SP)**

AR 199699

\*US manufacture

\*\*Some US manufacture

Use:

203mm (8 in.) White Bag Propelling Charge M2 is used or zone firing with Charges 5 thru 7 in 203mm (8 in.) howitzer cannons.

Description:

The charge consists of a base section (Charge 5) and two unequal increments (Charges 6 and 7) for zone firing. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 5 and tied over the top of Increment 7. A red cloth igniter pad containing 140g (5 oz) of black powder is sewn to the base of Increment 5. Each increment of the charge and the igniter pad is identified by black stencil markings. In use an M3 flash

reducer is inserted under the tie straps at the forward end of the charge. M3 flash reducer is a separate item of issue to be used when firing all zones of the M2 propelling charge. It consists of a square pad of red cloth containing a 460g (1 lb) mixture of potassium sulfate and black powder.

Functioning:

The flash from the primer ignites the black powder igniter pad, which in turn ignites the M1 propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target. The flash reducer serves to reduce the amount of blast overpressure at the muzzle. Although the flash reducer increases the quantity of smoke, it must be used in daylight firing as well as night firing unless it is tactically impossible.

Tabulated Data:

Type -----White bag, separate loaded  
propelling charge  
Weight -----13.6 kg (30 lb)  
Length-----610mm (24 in.) (max)  
Diameter -----197mm (7.76 in.) (max)  
Color-----White w/black markings  
Propellant:  
Composition -----M1  
Grain type -----7 perforated cylinder  
Weight -----12.9 kg (28.5 lb)  
Web-----1.09mm (0.043 in.)  
Primer-----MK2A4, M82  
Weapon -----M110, M110A1  
Cannon-----M2A2, M201

Temperature Limits:

Firing:  
Lower limit-----40°C (-40°F)  
Upper limit-----+52°C (+125°F)  
Storage:  
Lower limit-----62°C (-80°F) (for periods of  
not more than 3 days)  
Upper limit-----+71°C (+160°F) (for periods  
not more than 4 hr/day)  
Packing-----1 charge in metal container;  
32 metal containers per  
pallet  
Container -----M19A2  
Weight -----24.5 kg (54 lb)  
Dimensions -----249 x 742mm (9-13/16 x 29-  
9/32 in.)  
Cube-----0.046m<sup>3</sup> (1.6 ft<sup>3</sup>)

Pallet:

Weight -----786.3 kg (1732 lb)  
Dimensions -----1117.6 x 1435 x 1194mm  
(44 x 58-1/2 x 47 in.)  
Cube-----2.1m<sup>3</sup> (70 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.3C  
DOT shipping class-----B  
DOT designation-----PROPELLANT EXPLOSIVE  
SOLID - CLASS B  
DODAC-----Not available

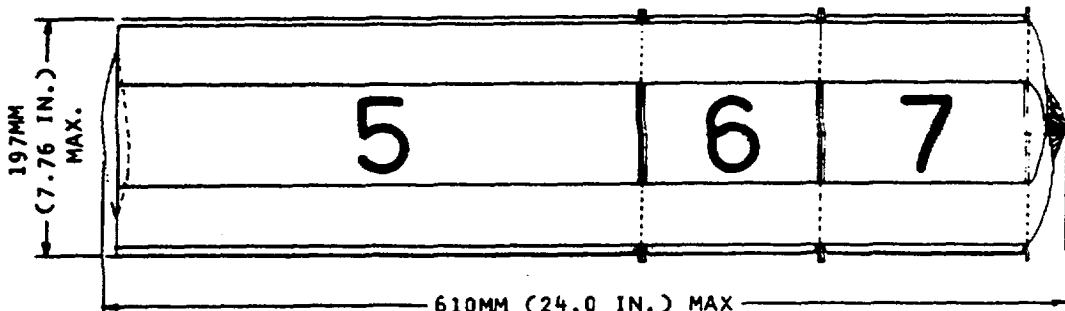
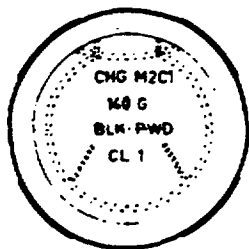
Limitations:

The M2 propelling charge must be used with an M3 flash reducer. If flash reducers are not available, occasional blast overpressure and excessive flash may be experienced.

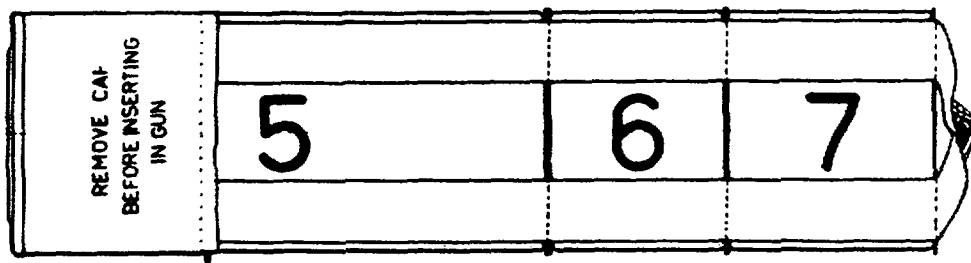
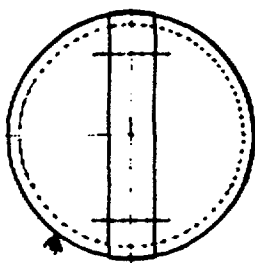
References:

SC 1305/30-IL  
SB 700/20  
DARCOM (AMC)-R 700-3-3  
TM 9-1300-206  
TM 9-1300-250  
TM 9-1300-251-20  
TM 9-1300-251-34  
TM 9-2300-216-10

**CHARGE, PROPELLING, 203 MILLIMETER (8 INCH): M2C1 (NL)**



**NOTE: LOT NO. OF ASSEMBLED PROPELLANT CHARGE IS SHOWN ON THE GROUND CHARGE AND ALL SUPPLEMENTAL CHARGES.**



AR 101978

Use:

203mm (8 in.) White Bag Propelling Charge M2C1 is used for zone firing with Charges 5 thru 7 in 203mm (8 in.) howitzer cannons.

Description:

The charge consists of a base section (Charge 5) and two unequal increments (Charges 6 and 7) for zone firing. The increments are assembled end to end in sequence, and held in place by four tying straps sewn to the base of Increment 5 and tied over the top of Increment 7. A red cloth igniter pad containing 140g (5 oz) of black powder is sewn to the base of Increment 5. Each Increment of the charge and the igniter pad is

identified by black stencil markings. In use a flash reducer is inserted under the tie straps at the forward end of the charge. The flash reducer is a separate item of issue to be used when firing all zones of the M2C1 Propelling Charge. It consists of a square pad of red cloth containing a 460g (1 lb) mixture of potassium sulfate and black powder.

Functioning:

The flash from the primer ignites the black powder igniter pad, which in turn ignites the propellant in the charge. The burning propellant generates gases which force the projectile out of the gun tube at a velocity required to reach the target. The flash reducer serves to reduce the amount of blast overpressure at the muzzle.

Although the flash reducer increases the quantity of smoke, it must be used in daylight firing as well as night firing unless it is tactically impossible.

Tabulated Data:

Type -----White Bag, separate loaded propelling charge  
 Weight -----13.6 kg (30 lb) (approx)  
 Length-----610mm (24.0 in.) max  
 Diameter -----197mm (7.76 in.) max  
 Color-----White w/black markings  
 Propellant  
     Composition -----M1  
     Grain type -----7 perforated cylinder  
     Weight -----12.17 kg (26.8 lb) (approx)  
     Web-----1.09m (0.043 in.)  
 Primer -----M82, MK2A4  
 Weapon -----M110, M110A1  
 Cannon-----M2A2 M201

Temperature Limits:

Firing:  
     Lower limit-----40°C (-40°F)  
     Upper limit-----+52°C (+125°F)  
 Storage:  
     Lower limit-----62°C (-80°F) for periods of not more than 3 days  
     Upper limit-----+71°C (+160°F) for not more than 4 hr/day  
 Packing-----3 charges in metal container

Container:  
     Weight -----55 kg (121.2 lb)  
     Dimensions -----630 x 525 x 235mm (24.8 x 20.7 x 9.3 in.)  
     Cube-----0.07m<sup>3</sup> (2.7 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.3C  
 DOT shipping class-----B  
 DOT designation-----PROPELLANT EXPLOSIVE SOLID - CLASS B  
 DODAC-----Not available  
 Dwg. No. -----Not available

Limitations:

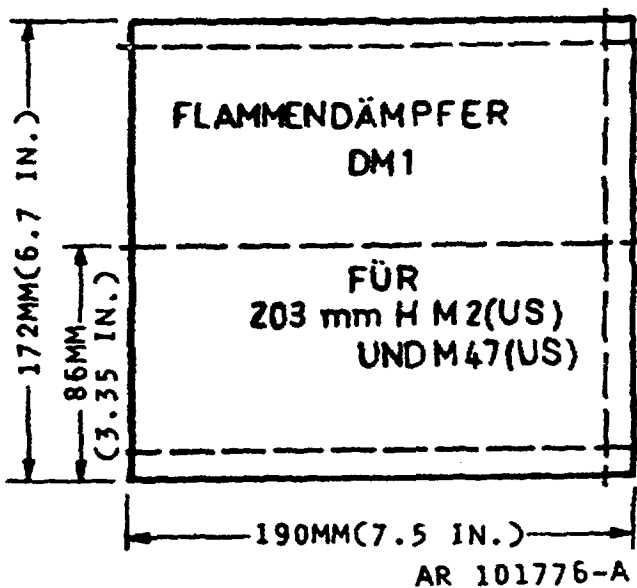
The M2C1 propelling charge must be used with a flash reducer. If flash reducers are not available, occasional blast overpressure and excessive flash may be experienced.

References:

SC 1305/30-IL  
 SB 700-20  
 DARCOM (AMC)-R 700-3-3  
 TM 9-1300-206  
 TM 9-1300-250  
 TM 9-1300-251-20  
 TM 9-1300-251-34  
 TM 9-2300-216-10  
 TM 9-2350-210-12



REDUCER, FLASH: DM1 (GE)



Use:

Flash Reducer DM1 is used when firing 203mm (8 in.) White Bag Propelling Charge DM22 (all zones). It is not used with Green Bag Propelling Charge DM12 which is flashless. The primary purpose is the reduction in muzzle flash to make accurate weapon location more difficult for the enemy. It is used in both night and daylight firings. A secondary effect is reduction of blast pressure at the muzzle.

Description:

The flash reducer is a square light brown cloth pad containing a 460g (1 lb) mixture of black powder and potassium sulphate or potassium nitrate. The assembly is sewn around each edge to prevent leakage of the contents, and through the center to increase tear resistance; the appearance is of two equal increments. The flash reducer is inserted under the tie straps at the forward end of the propelling charge at the time of firing.

Functioning:

The flash reducer is ignited by the burning propellant. The chemical combination of burning potassium and propellant serves to modify the flashing of gases at the muzzle of the weapon. The result is a reduction in brilliance and of blast overpressure at the muzzle.

Tabulated Data:

Type	-----	Chemical modifier
Weight	-----	460 g (1 lb)
Dimensions	-----	172mm x 190mm (6.7 x 7.5 in.)
Color	-----	Light brown w/black markings
Filler	-----	Potassium sulphate and black powder
Weapon	-----	M10, M110A1

Cannon-----M2A1E1, M201  
Charge, propelling-----DM22

Temperature Limits:

Firing:  
Upper limit-----+52°C (+125°F)  
Storage:  
Upper limit-----+63°C (+145°F)  
Packing-----Not available

Packing Box:

Weight -----Not available  
Dimensions -----Not available  
Cube-----Not available

Shipping and Storage Data:

Storage Class/SCG-----1.1 D  
DOT shipping class-----A  
DOT designation-----BLACK POWDER  
DODAC-----Not available  
Drawing No. -----Not available

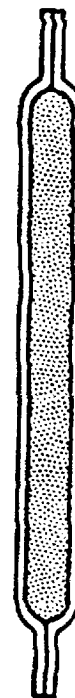
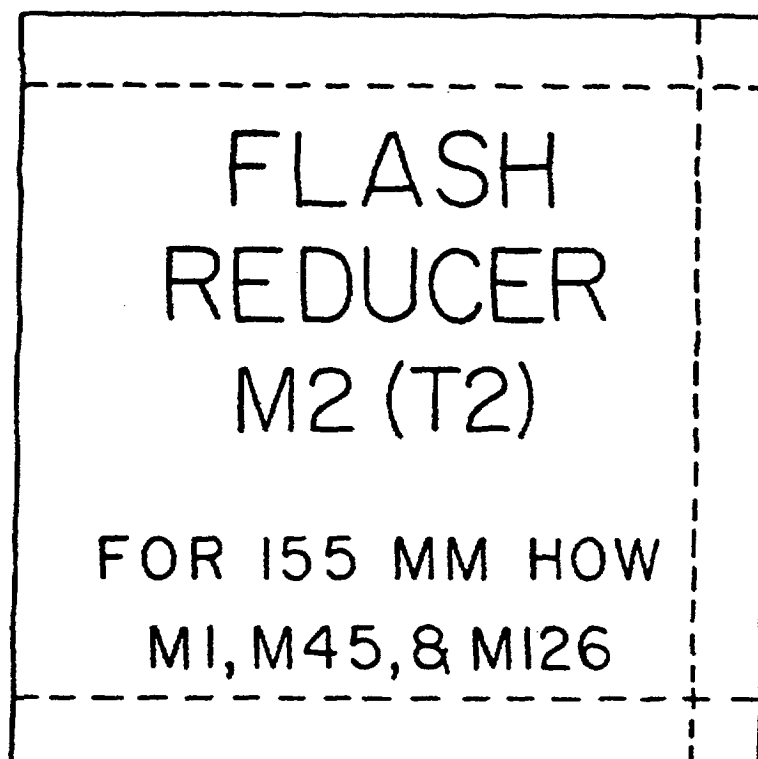
Limitations:

Not available

References:

Not available

## REDUCER, FLASH: M2 (2) (BE)



AR 199645A

Type Classification:

STD OTCM 31154 dtd 1946

Use:

Flash Reducer M2 (T2) is used with White Bag Propelling Charge M4 and M4A1 in 155mm howitzer cannons, ordinarily on an optional basis. However, TB 9-1300-385 requires use of this flash reducer with certain specific lots of Propelling Charge M4. The primary purpose is the reduction of muzzle flash to make accurate weapon location more difficult for the enemy. A secondary effect is reduction of blast pressure at the muzzle. When used, one flash reducer is inserted at the

forward end of each increment used, including the base charge. Even though Propelling Charge M4A2 has an integral flash reducer assembled at Increment No. 3, the M2 (T2) may be used as a supplement with that charge also, if additional flash reduction is desired. No flash reducers are required when using Green Bag Propelling Charge M3.

Description:

Flash Reducer M2 (T2) consists of 1-1/2 ounces of black powder and potassium sulphate or potassium nitrate mixture in a 4-inch square bag of red cotton cloth. The edges are sewn together to prevent leakage of the chemical mixture.

Functioning:

The flash reducer is ignited by the burning propellant. When the black powder and potassium nitrate or potassium sulphate mixture burns in combination with the propelling charge, the chemical reaction causes a reduction in muzzle flash of the weapon. The likelihood of blast overpressure from the muzzle is also reduced. There is some increase in smoke at the weapon muzzle when the M2 (T2) is used.

Tabulated Data:

Weight -----0.06 lb  
 Dimensions -----4 x 4 in.  
 Cannon (Weapons)  
 used with-----M1, M1A1 (M114, M114A1);  
   M45 (M44, M44A1);  
   M126, M126A1 (M109);  
   M185 (M109A1); M199  
   (M198)  
 Propelling charges  
 used with-----M4, M4A1, M4A2

Temperature Limits:

Firing:  
 Lower limit-----40°F (-40°C)  
 Upper limit-----+125°F (+52°C)  
 Storage:  
 Lower limit-----80°F for periods not more  
   than 3 days  
 Upper limit-----+160°F for periods not more  
   than 4 hr/day

\*Packing-----200 flash reducers in metal  
   container 4 containers in  
   wooden box

\*Packing Box:  
 Weight -----68.2 lb  
 Dimensions -----26-7/16 x 13 x 11-15/16 in.  
 Cube-----2.37 cu ft

**\*NOTE: See SC for complete packing data including NSN's.**

Shipping and Storage Data:

Quantity-distance class -----1.1  
 Storage compatibility  
     group -----D  
 DOT shipping class-----A  
 DOT designation-----BLACK POWDER  
 DODAC-----1320-D552  
 Assembly Dwg. No.-----9229177

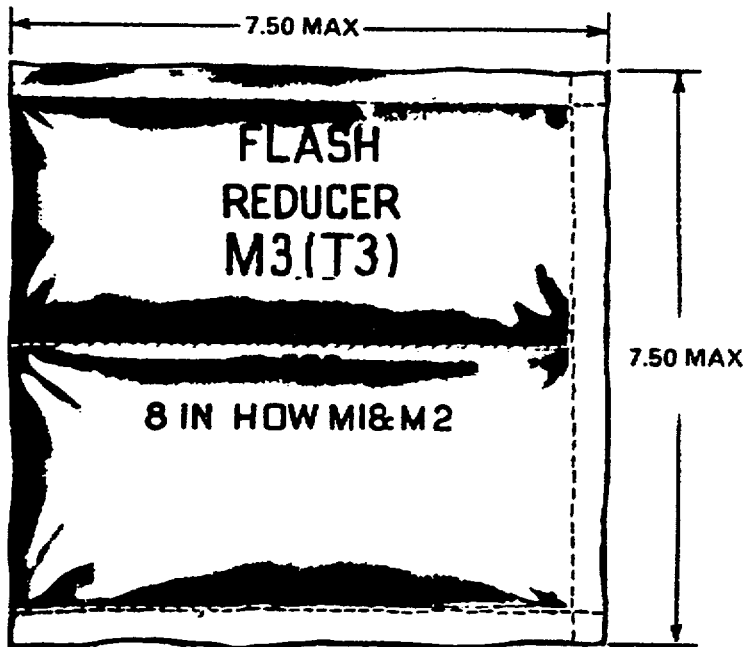
Preparation for Firing:

None.

References:

TM 9-1300-251-20  
 SC 1305/30-IL  
 SB 700-20  
 AMCP 700-3-3

REDUCER, FLASH: M3 (NL AND BE)\*



AR 199693-A

\*US manufacture

Use:

Flash Reducer M3 is used when firing 8 inch (203mm) White Bag Propelling Charge M2 (all zones). It is not used with Green Bag Propelling Charge M1 which is flashless. The primary purpose is the reduction in muzzle flash to make accurate weapon location more difficult for the enemy. It is used in both night and daylight firings. A secondary effect is reduction of blast pressure at the muzzle.

Description:

The flash reducer is a square red cloth pad containing a one pound (454 g) mixture of black powder and potassium sulphate or potassium nitrate. The assembly is sewn around each edge to prevent leakage of the contents, and through the center to increase tear

resistance. Thus, the appearance is of two equal increments. The flash reducer is inserted under the tie straps at the forward end of the propelling charge at the time of firing.

Functioning:

The flash reducer is ignited by the burning propellant. The chemical combination of burning potassium and propellant serves to modify the flashing of gases at the muzzle of the weapon. The result is a reduction in brilliance and of the blast overpressure at the muzzle.

Tabulated Data:

Type -----	Chemical modifier
Weight -----	1 lb (454 gm)
Dimensions -----	190.5 x 190.5mm (7-1/2 x 7-1/2 in.)

Color-----Red w/black markings  
 Filler-----Black powder and  
                   potassium sulphate or  
                   potassium nitrate  
 Weapon -----M10, M110A1  
 Cannon-----M2A2, M201  
 Charges used with -----203mm (8 in.) Charge  
   Propelling: M2

Temperature Limits:

Firing:

Lower limit-----40°C (-40°F)  
 Upper limit-----+70°C (+125°F)

Storage:

Lower limit-----62°C (-80°F) (for period not  
   more than 3 days)  
 Upper limit-----+70°C (+160°F) (for not  
   more than 4 hr/day)

Packing-----10 flash reducers in carton;  
   1 carton in barrier bag; 4  
   bags in wooden box

Packing Box:

Weight -----36.3 kg (80 lb)  
 Dimensions -----435 x 365 x 241mm (17-1/8  
   x 14-3/8 x 9-1/2 in.)  
 Cube-----0.04m<sup>3</sup> (1.35 ft<sup>3</sup>)

Shipping and Storage Data:

Storage Class/SCG-----1.1 D  
 DOT shipping class-----A  
 DOT designation-----BLACK POWDER  
 DODAC-----Not available

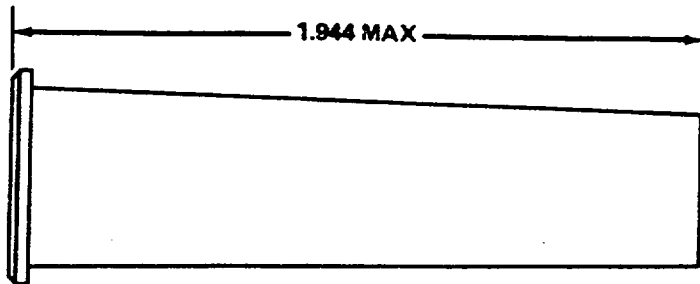
Limitations:

Not available

References:

TM 9-1300-251-20  
 TM 9-2300-216-10

**PRIMER, PERCUSSION: M82 (NL, BE\*, DE, GR, SP, UK)**



AR199651

\*US manufacture

Use:

This primer is used to initiate burning of propellant charges in separate loading weapon systems.

Description:

The primer consists of a cylindrical brass case with an extraction flange which contains a plunger in the base, an ignition element, and a container loaded with 22 grains of black powder. The plunger has an integral striker and is activated by the breech mechanism firing pin. The ignition element is threaded into the primer case forward of the striker and contains a percussion primer. The primer contains primer mixture and an anvil, and is sensitive to impact from the plunger. The black powder container is also threaded into the case with the open end toward the ignition element. This end is sealed with a paper disc to prevent seepage of black powder granules.

Functioning:

The primer is inserted into the firing lock of the weapon. When struck in the base by the firing pin, the plunger is driven forward and initiates the primer in the ignition element. The primer flash ignites the black powder charge in the container assembly which flashes through the vent tube to ignite the black powder igniter at the base of the propelling charge.

Tabulated Data:

Type -----	Percussion
Weight -----	0.063 kg (0.14 lb)
Length -----	49.3mm (1.94 in.) (max)
Weapon -----	155mm: M109, M109A1
	175mm: M107
	8-in. (203mm) M110, M110A1
Filler and weight -----	Black powder, 22 grains (1.42 g)

Temperature Limits:

<u>Firing:</u>	
Lower limit -----	-40°C (-40°F)
Upper limit -----	+52°C (+125°F)
<u>Storage:</u>	
Lower limit -----	62°C (-80°F) (for period of not more than 3 days)
Upper limit -----	70°C (+160°F) (for not more than 4 hr/day)
Packing -----	20 primers in fiberboard container; 25 containers in wooden box

Packing Box:

Weight -----	22.2 kg (49 lb)
Dimensions -----	24-1/8 x 12 x 11-13/16 (613 x 305 x 289mm)

Packing Box - continued:

Cube-----0.05m<sup>3</sup> (1.8 ft<sup>3</sup>)

Shipping and Storage Data:

Storage class/SCG -----(04) 1.2 G  
DOT shipping class-----C  
DOT designation-----CANNON           PRIMERS  
  HANDLE CAREFULLY  
DODAC-----Not available  
Drawing No. -----Not available

Preparation for Firing:

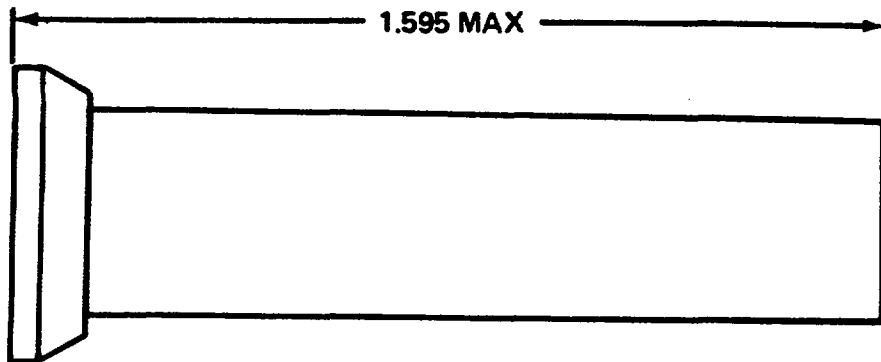
No preparation is required.

References:

- TM 9-1300-206
- TM 9-1300-251-20
- TM 9-1300-251-34
- TM 9-2300-216-10
- TM 9-2350-217-10
- TM 9-2350-217-10N



PRIMER, PERCUSSION: MK2A4 (NL, BE\*, NO\*, IT, DE, GR, UK, SP)



**AR199649**

\*US manufacture

Use:

This primer is used with a variety of separate loading ammunition rounds to initiate burning of the propelling charge.

Description:

Percussion Primer MK2A4 is a brass cylinder with an extraction flange base, containing a charge of 19 grains of black powder. A primer cup in the center of the base contains a small quantity of sensitive primer composition. An anvil, gas check cone, and plug are installed between the primer cup and the black powder charge. The black powder is sealed in the primer case by a closing disc at the rear and a cork washer at the front end.

Functioning:

The primer is inserted in the firing lock of the weapon. When struck by the firing pin, the primer cup is indented, compressing the sensitive primer composition against the anvil. The primer composition detonates from the impact shock and flashes through a port in the

plug to ignite the black powder charge in the primer case. The gas check cone prevents blowback in the event the primer cup is ruptured. The burning black powder charge initiates burning of the propelling charge.

Tabulated Data:

Type -----Percussion  
 Weight -----0.027 kg (0.06 lb)  
 Length-----40.5mm (1.595 in.)  
 Diameter -----8.8mm (0.348 in.)  
 Filler and weight-----Black powder 19 grains  
 (1.23 g)

Temperature Limits:

Firing:  
 Lower limit-----40°C (-40°F)  
 Upper limit-----52°C (+125°F)  
 Storage:  
 Lower limit-----62°C (-80°F) (for periods  
 not more than 3 days)  
 Upper limit-----+70°C (+160°F) (for periods  
 not more than 4 hr/day)

Packing-----250 primers in shipping  
 container; 2 containers in  
 wirebound box

Packing Box:

Weight -----16.8 kg (37 lb)  
Dimensions -----371 x 325 x 232mm  
                                  14-5/8 x 12-13/16 x 9-1/8  
                                  in.  
Cube-----0.028m3 (1 ft3)

Limitations:

None

Shipping and Storage Data:

Storage Class/SCG----- (04) 1.2 G  
DOT shipping class-----C  
DOT designation-----CANNON PRIMERS -  
                                  HANDLE CAREFULLY  
DODAC-----Not available

References:

TM 9-1300-251-20  
SC 1305/30-IL  
SB 700-20  
DARCOM (AMC)-R 700-3-3  
TM 9-1025-200-12

Order of the Secretary of the Army:

Official:

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*General, United States Army*  
*Chief of Staff*

**R. L. DILWORTH**  
*Brigadier General, United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-34B-R, Organizational Maintenance requirements for Artillery Ammunition.

\*U.S. GOVERNMENT PRINTING OFFICE : 1997 0 - 418-292 (66113)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS



**SOMETHING WRONG WITH THIS MANUAL?**

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CUT IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

Your mailing address

DATE Date you filled out form.

PUBLICATION NUMBER

TM 9-XXXX-XXX-XX

DATE

Date of TM

Title of TM

BE EXACT. . . PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
400		183	
512		191	

Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Figure 191, item 3 has the wrong NSN. Supply rejects orders for this item. The NSN shown here is not listed in the AMDF or the MCRL.

Please give us the correct NSN and P/N.

**SAMPLE**

CUT ALONG A

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

John Smity, S. SGT. 793/XXXX

SIGN HERE:

*John Smity*

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