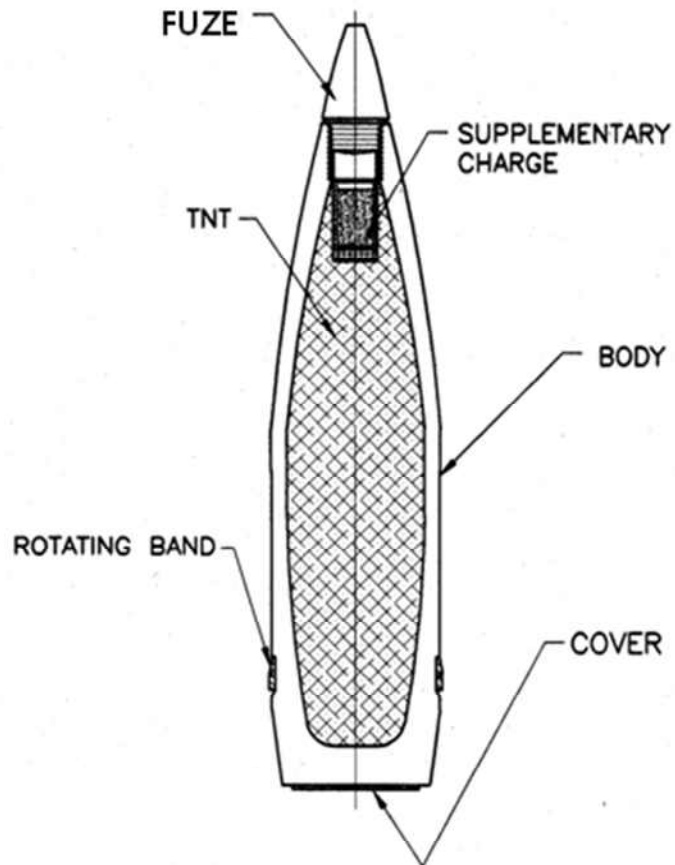


PROJECTILE, 155MM, HE, M107



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 6.62 Kg of TNT. The shape is ogival with a boattail for aerodynamic efficiency. A supplementary charge of 136.0 grams TNT is contained in an aluminum liner in the deep fuze cavity. A threaded lifting plug closes the fuze cavity at the nose of the projectile for handling and storage. Point detonating or time 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 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. If a point detonating fuze or time fuze is employed, the fuze detonates the supplementary charge on impact (PD) or after the preset time (MTSQ), and the supplementary charge detonates the projectile filler.

Tabulated Data

Weight Zones of Loaded Projectile (w/o fuze, w/o plug)

Zone	Over (kg)	Up to & Incl (kg)	Marking
2	40.82	41.41	■ ■
3	41.32	41.91	■ ■ ■
4	41.73	42.50	■ ■ ■ ■
5	42.32	42.91	■ ■ ■ ■ ■

Complete round:

Type ----- HE
 Length w/lifting plug ----- 68.40cm. max
 Length w/o lifting plug ----- 60.68cm.
 Cannon used with ----- M1, M1A1. M1A2, M45, M126, M126A1, M185, M199

Projectile:

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

Filler and weight:

TNT ----- 6.62 kg

Primers:

For cannon:

M45, M126, M126A1, M199, and M185 ----- M82
 Propelling charges ----- M3, M3A1, M4A1, M4A2, M119/M119A1
 Fuzes ----- PD:M557, M78 series, M739 series, MK399 MOD 1
 MTSQ:M564, M582 series;

Temperature Limits:

Firing:
 Lower limit ----- -54°C
 Upper limit ----- +63°C

Storage:



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

*Packing ----- 8 projectiles / 1 pallet

*Pallet:

Weight ----- 361.5 kg
 Dimensions ----- 68.9 × 34.6 × 81.3 cm
 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 PROJECTILES
 DODAC:
 Deep cavity ----- 1320-D544
 Normal cavity ----- 1320-D571
 Assembly Dwg No.
 Deep cavity ----- 9216352
 UNO serial number ----- 0168
 UNO proper shipping name -- Projectiles

Ballistics:

Cannon M1, M1A1, M45:

Charge	Muzzle Velocity (m/s)	Max. Range (m)	Elevation (mil)
1, M3, green bag	207.3	3,900	774.4
2, M3, green bag	234.7	4,800	698.6
3, M3, green bag	268.2	6,100	729.2
4, M3, green bag	310.9	7,800	749.6
5, M3, green bag	371.9	9,700	760.7
3, M4A1, white bag	274.3	6,300	702.7
4, M4A1, white bag	316.4	8,000	729.9
5, M4A1, white bag	374.6	9,700	720.6
6, M4A1, white bag	463.3	12,000	759.8
7, M4A1, white bag	563.9	14,600	740.8

Cannon M126/M126A1:

Charge	Muzzle Velocity (m/s)	Max. Range (m)	Elevation (mil)
1, M3A1, green bag	207.3	3,900	729.2

2, M3A1, green bag	236.2	4,900	710.1
3, M3A1, green bag	275.8	6,500	739.3
4, M3A1, green bag	317.0	8,200	744.1
5, M3A1, green bag	374.9	9,800	743.2
3, M4A2, white bag	269.7	6,200	700.7
4, M4A2, white bag	313.9	8,000	700.8
5, M4A2, white bag	373.4	9,800	778.8
6, M4A2, white bag	461.8	12,000	746.2
7, M4A2, white bag	562.4	14,600	772.5

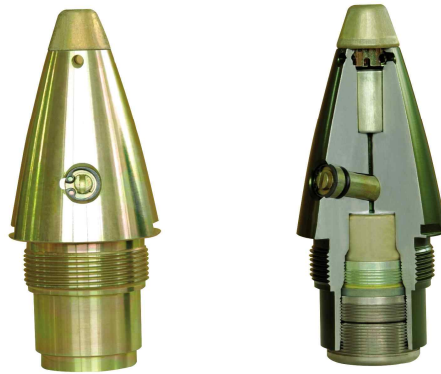
Cannon M185:

Charge	Muzzle Velocity (m/s)	Max. Range (m)	Elevation (mil)
1, M3A1, green bag	211.8	4,000	673.6
2, M3A1, green bag	237.7	5,000	722.4
3, M3A1, green bag	277.4	6,500	690.4
4, M3A1, green bag	318.5	8,300	760.9
5, M3A1, green bag	374.9	9,800	717.2
3, M4A2, white bag	292.6	7,200	734.9
4, M4A2, white bag	336.8	8,900	736.8
5, M4A2, white bag	393.2	10,300	756.1
6, M4A2, white bag	475.5	12,400	758.4
7, M4A2, white bag	565.4	14,800	760.3
8, M119/M119A1	684.3	18,100	781.5

Cannon M199:

Charge	Muzzle Velocity (m/s)	Max. Range (m)	Elevation (mil)
1, M3A1, green bag	212.8	4,000	673.6
2, M3A1, green bag	239.8	5,000	722.4
3, M3A1, green bag	280.8	6,500	690.4
4, M3A1, green bag	322.9	8,300	760.9
5, M3A1, green bag	380.1	9,800	717.2
3, M4A2, white bag	296.5	7,200	734.9
4, M4A2, white bag	340.9	8,900	736.8
5, M4A2, white bag	398.0	10,300	756.1
6, M4A2, white bag	482.0	12,400	758.4
7, M4A2, white bag	574.3	14,800	760.3
8, M119/M119A1	684.3	18,100	781.5

Fuze, Point Detonating, HW594(M739A1)



Use

Point Detonating Fuzes HW594(M739A1) are selective superquick and 0.05 second delay impact fuzes designed for use in all standard HE artillery, 4.2 inch Mortar, 105mm through 8-inch Howitzers and 175mm Guns.

Description

The HW594(M739A1) fuzes are the latest improved version of the selective impact fuzes. The fuze body is one-piece design of solid aluminum and has a standard 2-inch threaded base to match projectile nose and fuze cavity. The fuze consists primarily of five (5) modular subassemblies: (1) crossbar and holder assembly, (2) firing pin and detonator assembly, (3) setting sleeve assembly, (4) Impact Delay Module Assembly, and (5) the safe and arming assembly. The crossbar and holder assembly is a rain insensitive sleeve that allows firing in heavy rain with reduced probability of down-range premature functioning. The assembly is in the nose section of the fuze and consists of five(5) crossbars which break up raindrops and foliage and thus reduce fuze initiation sensitivity without affecting ground or target impact sensitivity. The firing pin and detonator assembly is located below the rain insensitive sleeve and provides the superquick action on impact. The firing pin is held in position by a firing pin support which prevents initiation of the M99 stab Detonator until impact. The setting sleeve assembly (interrupter) is located in the side of the fuze body extending through the flash path of the M99 Detonator and thus provides selection of a PD mode which does not interrupt the flash from the detonator; or a delay mode which prevents the detonation flash from initiating the explosive train. The HW594 fuze contains an Impact Delay Module (IDM) assembly instead of the M1 Delay Plunger Assembly. The IDM provides fuze initiation delay based upon the completion of mechanical actions caused by projectile deceleration and will function immediately after passing through the target. Function occurs when a spring loaded firing pin is

release. There are no explosive components contained within the IDM. The safe and arming (S&A) module is below the delay assembly. It contains a rotor with a M55 detonator, an escapement to prevent the detonator from aligning with the explosive firing train until safe arming distance is achieved, both setback and spin locks to prevent accidental arming prior to firing. The explosive lead when initiated will detonate the booster pellet made of 22 grams of Composition A5 which is held by an aluminum booster cup assembled into the base of the fuze.

Functioning :

In the firing pin and detonator assembly, the firing pin is held over the SQ detonator by a collapsible support. The setting sleeve assembly interrupter blocks the flashhole between detonator and S&A assembly. The S&A assembly is not armed since the M55 detonator which is contained in the S&A rotor is held out of axial alignment by a setback pin and spinlock detents. The delay assembly is not armed because the detents hold the plunger from moving forward and beginning the sequence of events required for function.

Tabulated Data

Type PD

Length:

- Visible 3,76 in (Ref)
- Intrusion into projectile... 2.21 in (max)
- Overall 5.97 in (Ref)
- Weight 1.5 lb
- Thread 2.00-12UNS-1A

	<u>SQ</u>	<u>Delay</u>
Maximum rotation		
where fuze unit will not arm (RPM)	1050	1075
Minimum rotation		
where fuze unit will arm (RPM)	1800	2025

Minimum distance where
All fuze units will arm:

	<u>Feet</u>	<u>Meters</u>
105mm Howitzer M103	223	68
105mm Howitzer M2	248	76
4.2-Inch Mortar M30	252	77
155mm Howitzer M126	366	112
175mm Gun M113	413	126
155mm Howitzer M1	439	134
8-Inch Howitzer M2	600	183



Explosive Components:

SQ element:

- Detonator Stab M99
- S&A Assembly;
- Detonator M55;
- Lead Explosive PA508
- Booster Pellet, Comp A5,

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 hr/day)

Shipping and Storage Data:

- UNO serial number 0409
- Quantity-distance class (04)1.2
- Storage compatibility group D
- DOT shipping class C

*Packing8 fuzes in metal container;2 containers in a wire bound box.

*Packing Box:

- Weight 55.8lb
- Dimensions 14-5/8 x 12-12/16 x 9-1/8 in.
- Cube 1.04 cu ft

Fuze, Electronic Time, K560



Use

This electronic time fuze is designed for use with the High Explosive, ILL, DP-ICM, FASCAM, WP ammunitions for 105mm, 155mm, 8" Howitzer.

Description

The fuze contains an electronic timing mechanism that can be set to function at any time from 0.5 to 199.9 seconds. The fuze is set inductive or manually. The button type three setting rings are at the head of the fuze, and the time to be set is shown on rings. Setting of the time is accomplished by rotating three(3) rings located on the fuze head on depressing the zero(0) button to unlock the ring. The fuze consists of the electronics ass'y, the power supply and the plastic ogive. The fuze base contains the safety and arming assembly(S&A).

Functioning

Fuzes are set to the calculated time of flight of the projectile to target unless point detonation is desired. Two distinct gun firing signals are required to arm the fuze: (1) Setback and (2) Centrifugal forces. The S&A will be armed at 400 calibers of travel, depending upon weapon and zone of fire. Setback and Centrifugal forces from weapon firing initiates the power supply. The electronics assembly is operated by the initiating power. The electronics assembly sends the fire pulse through the firing circuit after reading the setting time from the Micro-

process and detonates the explosive train on time. If the time mode does not function, the projectile will be detonated on impact by the PD element.



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Tabulated Data

Weight : 1.68lb (760g)
Length : 5.92 in (150.34mm)
Body Material : Plastic, Steel(Cadmium), Al(Chromate)
Thread Size : 2-12UNS-1A
Arming : Setback - 1,300G (min.) ~ 30,000G
Spin - 2,500rpm (min.) ~ 30,000rpm
Non-arming : Setback - 1,000G, Spin - 1,000rpm
Safety distance : 400 Calibers
Operational Temperature : -43° C ~ +63° C
Transportation and Storage : -43° C ~ +63° C
Function Mode : Time, PD
Time Range : 0.5 ~ 199.9 sec.(increasing 0.1sec)
Accuracy : ± 0.1 sec.
Time Setting : Manual, Inductive
Environmental Requirements : MIL-STD-331B, MIL-STD-333B, MIL-STD-1316D
Hazardous Class ----- 1.4B
UN No. ----- 0367

Fuze, Proximity, M732



Use

Proximity Fuze M732 is designed for use on conventional, high-explosive ammunition: specifically, 105mm, 155mm, 175mm, and 8inch artillery ammunition, and 4.2inch mortar ammunition, with a standard 2inch thread. Action may be either proximity air burst or impact, Arming is initiated by setback and completed by the spinning of the projectile. Fuze M732 has the same intrusion(2.2inches as standard point detonating and mechanical time fuzes, and unlike other proximity fuzes, it does not require a deep-intrusion shell cavity.

Description

Fuze M732 has a plastic nose cone fitted to a movable steel ring which rotates on a steel sleeve, The movable ring has an index mark for setting time. The fuze is shipped with the index mark alined with the PD line on the sleeve. The sleeve also has graduations from 5 to 150 which represent seconds of flight time to target.

Functioning

Fuzes are set for anticipated time of flight(in seconds) to the target. When set at any value between 5 seconds and 150 seconds, proximity arming occurs approximately 3 seconds prior to the set time. If the fuze fails to function in the proximity mode, it will function of ground impact. The impact element becomes armed after 400 calibers of air travel and remains armed throughout flight. The burst height is essentially optimum, regardless of projectile size or angle of fall.



NOTE

Do not assemble Desensitizing Cap XM5 to this fuze. This cap was authorized for Proximity Fuzes M513 Series only.

Tabulated Data

length:

Visible ----- 3.76in. max
Intrusion ----- 2.21in.
Overall ----- 5.97in.

Weight ----- 1.75+- .05lb

Body material ----- Steel

Thread size ----- 2-12UNS-1A

Arming:

Setting time ----- 5sec(Min.), 150sec(Max.)

Spin ----- 2,700rpm(Min), 18,000rpm(Max)

Setback ----- 1,100g(Min), 18,000g(Max)

Distance(400calibers minimum):

105mm howitzer ----- 42.6m

4.2inch mortar ----- 42.7m

155mm howitzer ----- 62.0m

175mm gun ----- 70.0m

8inch howitzer ----- 81.3m

Temperature Limits:

Operational ----- -35° to +145°F

Transportation and storage ----- -50° to +160°F

Shipping and Storage Data:

Quantity-distance Class ----- 1.1

Storage Compatibility Group ----- D

DOT Shipping Class ----- C

DOT Decimation ----- DETONATING FUZES, CLASS C EXPLOSIVES HANDLE CAREFULLY

UNO serial number ----- 0408

Packing ----- one fuze per barrier bag 8 barrier bags per metal container;
two containers per wirebound box

CHARGE, PROPELLING, 155MM : M203



Use :

The M203 is a Zone 8 S charge designed to supplement the standard M3, M4 , and M119 series charges and to provide extended range for the 155mm Howitzer M198.

Description:

The M203 Propelling Charge is a single increment, red bag charge, approximately 30-1/4 inches long. The charge contains approximately 26 pounds of the high energy, M30A1 propellant in a cloth bag. A red cloth igniter pad containing 1 ounce of black powder is sewn to the base of the charge. A central ignition core extends through the center of the charge for almost its entire length. This ignition core consists of a nitrocellulose paper tube containing a bag of black powder which is sewn to the base igniter. A liner consisting of a cloth side impregnated with titanium dioxide and wax, and a lead side lines the forward end of the charge. Four tie straps sewn to the base of the charge run the length of the charge and are tied to the forward end of the charge, A donut shaped flash reducer is inserted under the tie straps at the forward end of the charge. A cylindrical jacket is placed over the charge length and tightly laced. This lacing jacket serves to provide necessary rigidity and structural stability of the assembled charge, and serves to differentiate the 8S from the M119/M119A1 Zone 8 charge.



Functioning:

The flash from the black powder in percussion primer M82 ignites the igniter pad at the base of the charge. The burning igniter pad in turn ignites the black powder in the igniter core to spread ignition to the propelling charge. Rapidly expanding gases from the burning charge propel the projectile through the barrel of the weapon with enough velocity to reach the target, The flash reducer functions to reduce blast overpressure and flash at muzzle of the weapon.

Tabulated Data:

M203 Charge:

Type	Red bag, separate loading
Weight	26 1b (11.8 kg)
Length	30-1/4 in. (76.84 cm)
Color	Red w/black Markings
Cannon used with	M199 (M198) System

Propellant:

M30A1	26 Lb (11.8 kg)
Primer	M82 (only)
Performance	Zone 8 S

Temperature Limits:

Firing:

Lower limit	-50°F (-46 °C)
Upper limit	+125°F (+52 °C)

Storage:

Lower limit	-80°F (-62 °C)(for periods not more than 3 days)
Upper limit	+160°F (+71 °C)(for periods not more that 4 hr/day)
Packing	1 propelling charge in metal container PA68

Propelling charge containers:

Weight	46 1b (21 kg)
Dimensions	38x8-13/32x8-13/32 in.(96.52x21.35x21.35 cm)



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Cube 1.55 cu ft (0.04 cu m)

Shipping and Storage Data:

Quantity-distance class.....	1.3
Storage compatibility group.....	C
DOT shipping class	B
DOT designation.....	PROPELLANT EXPLOSIVE SOLID CLASS B
DODAC	1320-D532
Assembly Dwg. No.....	9281897 (M203)
Container Dwg. No.....	9293303 (M203)

Limitations:

The M203 propelling charge must not be stored or shipped in the vertical position due to damage that could be caused to the igniter core.

CHARGE, PROPELLING, 155MM : M119A1



Use:

This propelling charge is designated Zone 8 and extends the range of 155mm Howitzer M109A1, M109A2/A3, and M198.

Description:

Propelling Charge M119/M119A1 is a single-increment white bag charge. A perforated igniter core tube extends through the center of the propellant. The 26-inch length of the charge precludes use in any other weapon than the long tube howitzer. The forward end is sheathed in lead foil and also carries a one pound flash reducer pad of potassium sulfate. A circular igniter pad of red cloth containing two ounces of clean burning igniter (CBI) is sewn to the bases of the rayon propellant bag.

Functioning:

When the weapon is fired, primer ignites the CBI in the igniter pad at the base of the propelling charge, The igniter flashes through the perforations in the igniter core tube to ignite the propellant. The burning propellant generates rapidly expanding gases to propel the projectile through the barrel and to the velocity required to reach the target. Blast over-



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pressure and muzzle flash of the firing are reduced by the flash reducer included in the charge. The lead foil sheath serves to prevent copper build-up (coppering) in the weapon.

Difference Between Models:

The basic difference between the M119 and M119A1 models is that the M119A1 has a donut shaped flash reducer that precludes non-ignition of the rocket motor of the M549/M549A1 Projectile, The M119A1 has a new folded center core igniter tube ; a 360 degree basic igniter seam lacing jacket. A pull strap has also been added to the M119A1 charge that provides easier removal from the metal container. This pull strap must be removed from the charge before loading into the weapon tube.

Tabulated Data:

M119 (M119A1) charge:

Type	White bag, separate loading
Weight	23 lb (10 kg)
Length	26 in (66 cm)
Color	White w/black Markings
Cannon used with	M185(M109A1/A2/A3;M199(M198)
Propellant	M6, 20.5 lb (9.3 kg)
Primer	M82
Performance (complete round):	
Maximum range	17,092m(18,692 yd)
Muzzle velocity	2245 fps(684 mps)

Temperature Limits:

Firing:

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

Storage:

Lower limit	-65°F (-54°C)(for periods not more than 3 days)
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Upper limit +160°F (+71 °C)(for periods not more that 4 hr/day)
* Packing 1 propelling charge in metal container PA37A1

***Propelling charge containers:**

Weight 70 lb (32 °C)
Dimensions 29-1/4x8-1/4x8-1/4 in.(74.30x21.00x21.00 cm)
Cube 1.2 cu ft (0.03 cu m)

NOTE: See DOD Consolidated Ammunition Catalog 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
DODAC 1320-D533
Assembly Dwg. No 9226436 (M119); 9325852 (M119A1)
Container Dwg. No 9234357

Limitations:

The M119 not to be fired with M549/M549A1 Projectile.
Use Only the M119A1 with the M549/M549A1 Projectile.
The M119 (M119) propelling charge must not be stored or shipped in the vertical position due to damage that could be caused to the igniter core.

CHARGE, PROPELLING, 155MM : M4A2



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 (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 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 14.0lb

Length 21.0 in. max



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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
Upper limit +125°F

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 30.5lb
Dimensions 27-3/4 x 7-3/8 x 7-3/8 in
Cube 0.87 cu ft
Explosive per container .. 13.7 lb

Shipping and Storage Data:

Quantity-distance class 2
Storage compatibility group .. J
DOT shipping class B
DODAC 1320-D541

Preparation For Firing:

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

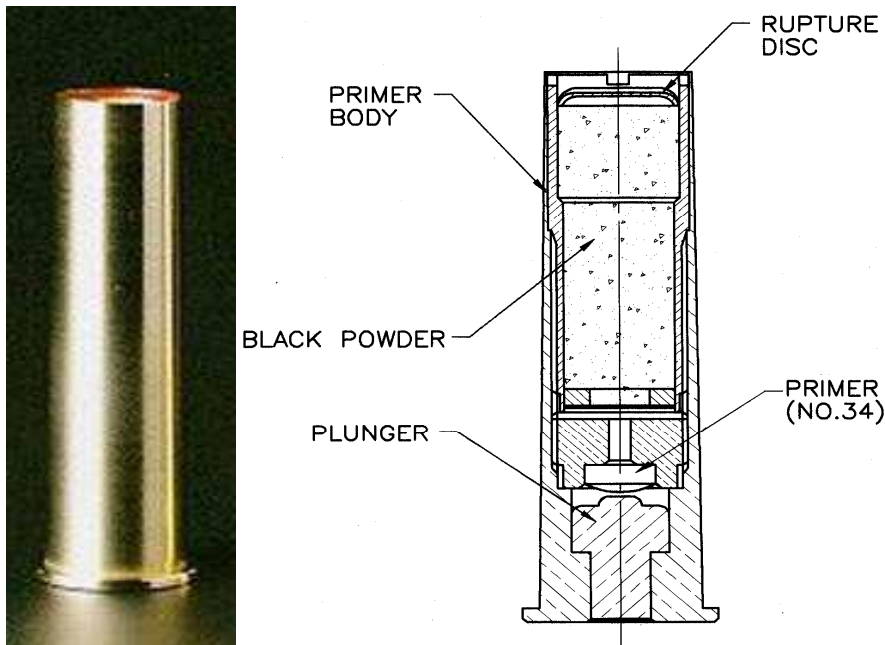
Limitations:

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.

Applicable Specification

MIL - C - 60395C,
Charge, Propelling, 155mm, M4A2, Loading, Assembling and Packing

Primer, Percussion, M82



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 disk to prevent seepage of black powder granules.

Functioning

The primer is inserted into the firing lock of the weapon. When struck by the firing pin, the plunger is driven forward and initiates the primer in the ignition element. The primer flash

