

APPENDIX E
ORDNANCE ITEMS DESCRIPTION

Rocket, 2.36 inch HEAT, M6A1

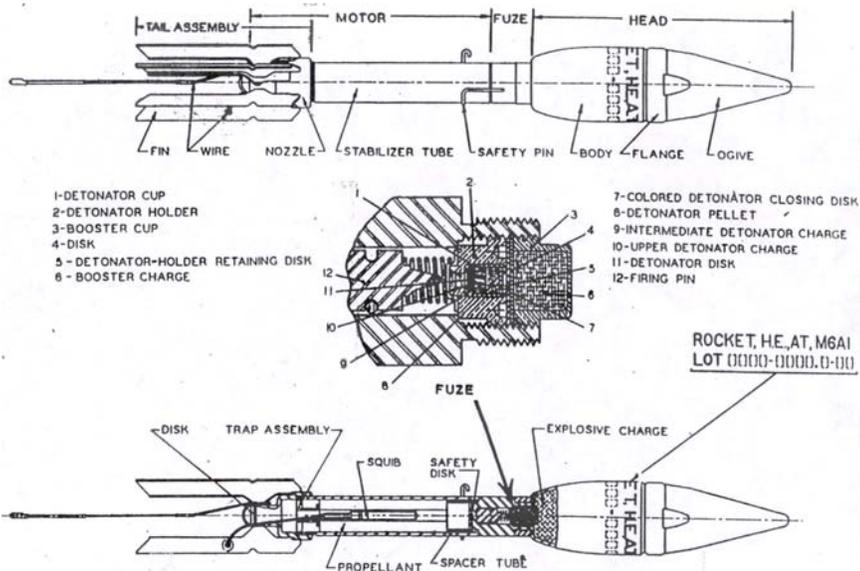
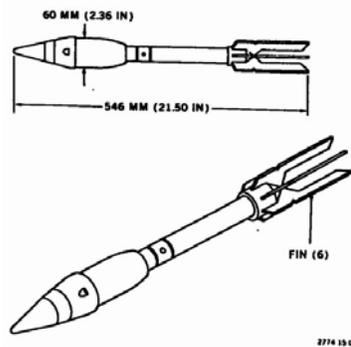


FIGURE 6. - ROCKET, H.E., AT, 2.36", M6A1



Use :

Pill boxes, tanks, and armored vehicles are prime targets. The rocket can also be used in a stationary emplacement for demolition or as an antitank mine or booby trap. The rocket can penetrate three inches of homogeneous steel armor plate at all ranges and at angles of impact as low as 30 degrees, employing the shaped charge explosive.

Rocket, 2.36 inch HEAT, M6A1 (Con't.)

Description :

The M6 rocket consists of three principal parts: the high explosive head, the stabilizer tube, and the fin assembly.

The head consists of metal parts which are similar in function to the parts of the AT grenade head. These parts are the ogive and the body. The bursting charge is similar, both in that it is a "hollow" or a "shaped charge," and also in its composition which is mainly 50/50 pentolite with a 10/90 pentolite booster surround. The stabilizer tube consists of two principal parts: the fuze body, which threads into the union and contains the fuze mechanism, and the powder tube to which the fuze body is permanently joined, and which contains the propellant charge.

The fuze is similar in all its components to that of the AT grenade. It is, however, of heavier construction, as is the entire rocket, and contains heavier booster and detonator charges. The parts of the fuze are a spring restrained striker; a detonator of priming mixture, lead azide, and tetryl; and a booster of tetryl. The striker is held in the unarmed position prior to loading into the launcher, by a safety pin which engages an annular groove in the striker as it passes through opposed holes in the fuze body. The safety pin clips to the stabilizer tube and must be removed prior to firing of the rocket.

The powder tube or remainder of the stabilizer tube in this case serves as a housing for the propellant powder and an electric safety match or squib. The electric safety match with an igniting charge of black powder is located at the upper end of the powder tube. Two contact wires pass down through the powder tube and out through the nozzle portion of the fin assembly. The fin assembly consists of three parts: the nozzle, which is a venturi tube; the trap, which is a spider ring closing the nozzle opening above the venturi and holding the propellant powder in place; and finally, the fins themselves.

- Dimensions
 - Length, complete - 21.5 inches
 - Length, head - 8.6 inches
 - Length, body - 4.11 inches
 - Length, ogive
 - M6A1 (cone shaped) - 4.5 inches
 - M6A3 (hemispherical) - 4.56 inches
 - Length, motor tube - 6.32 inches
 - Diameter, body - 2.23 inches
 - Diameter, ogive - 2.25 inches
- Weights
 - Complete - 3.5 lbs

Rocket, 2.36 inch HEAT, M6A1 (Con't.)

Markings :

Olive drab with yellow markings.

Operation :

The safety pin is removed and the rocket inserted into the rear opening of the launcher. It is held in place by a safety catch. Firing is accomplished by establishing an electric circuit between rocket and launcher. This causes ignition of the electric safety match, the black powder ignites, and the propellant powder gases issue through the nozzle, the venturi serving to increase their velocity. This back blast serves to propel the rocket forward. There is no recoil and back blast should not affect the firer since the powder is designed to be completely burned within the launcher.

On impact with the target the striker, due to inertia, drives forward overcoming its restraining spring. It strikes and causes detonation of a detonator of priming mixture, lead azide, and tetryl, which in turn carries detonation of a tetryl booster, a 10/90 pentolite booster surround, and a 50/50 pentolite bursting charge.

Hazardous Components :

- Igniter - Black powder
- Propellant - Ballistite, 5 sticks (61.5 grams)
- Filler - 50/50 Pentolite with 10/90 Pentolite surround, 0.5 lbs

Possible Fuzes :

Fuze, Rocket, BD, M400

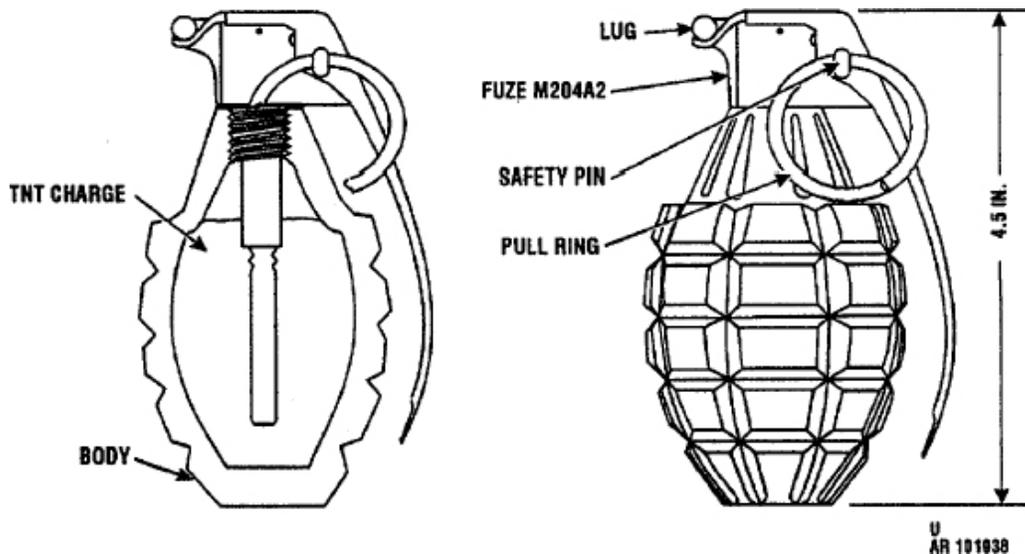
Fuze, Rocket, BD, M401

Differences Between Models :

The 2.36 inch A/T Rockets M6A1 and M6A3 are identical except for difference in the ogive and the tail assembly. In other respects the two rockets are similar, consisting of a hollow ogive crimped onto the body, a body union fitting into the base of the body with internal threads to receive the motor, and a fuze which is located in the forward end of the motor tube. The M6A1 has a conical ogive, whereas the M6A3 has a hemispherical ogive which gives better penetration by forming a stronger stand-off piece for the shaped-charge effect of the explosive. M6A4 is like the M6A3, except that it is lighter -- being made of high-strength alloys -- and also uses the Bore Safe Fuze M400. The M6A5 uses the Bore Safe Fuze M401 and has a larger propellant grain, which eliminates the safety disk.

**Source: ORDATA Online (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
NAVEODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD, USA,
20640-5070**

Grenade, Hand, Fragmentation, Mk 2



Use :

The Mk 2 fragmentation hand grenade is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projections of fragments.

Description :

The Mk 2 grenade is pineapple shaped with deep serrations of its body. These serrations delineate fragmentation of the body when the grenade explodes. No safety clip is authorized for use with this grenade. The grenade body is of cast iron and contains a high-explosive filler.



Grenade fuzes M204A1 and M204A2 are pyrotechnic delay-detonating fuzes. They differ only in body construction. The body contains a primer and a pyrotechnic delay column. Assembled to the body are a striker, striker spring, safety lever, safety pin with pull ring, and detonator assembly. The split end of the safety pin has an angular spread or diamond crimp.

- Dimensions
 - Length, with fuze - 4.5 inches
 - Diameter - 2.25 inches
- Weights
 - Complete - 1.31 lbs

Grenade, Hand, Fragmentation, Mk 2 (Con't.)

Markings :

Olive drab, or olive drab with yellow band around top of fuze well. World War I era grenades were painted battleship gray.

Operation :

Removal of the safety pin permits release of the safety lever. When the safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its axis and strikes the percussion primer. The primer emits a small, intense spit of flame, igniting the delay element. The delay element burns for 4 to 5 seconds, then sets off the detonator. The detonator explodes, thus initiating the explosive charge. The explosive charge explodes, rupturing the body and projecting fragments.

Hazardous Components :

- Filler - Flaked or granular TNT, 2 ounces
- Primer - M42
- Detonator - Lead azide, lead styphnate, and RDX

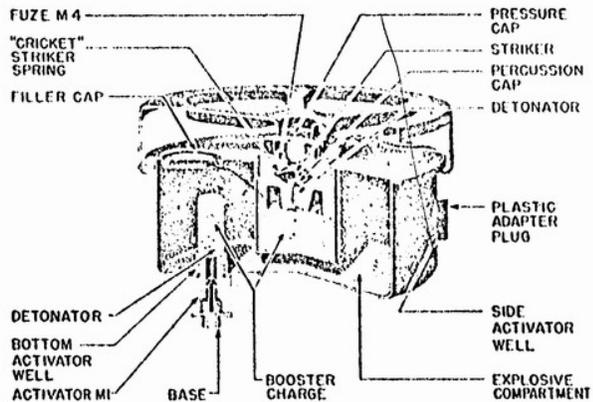
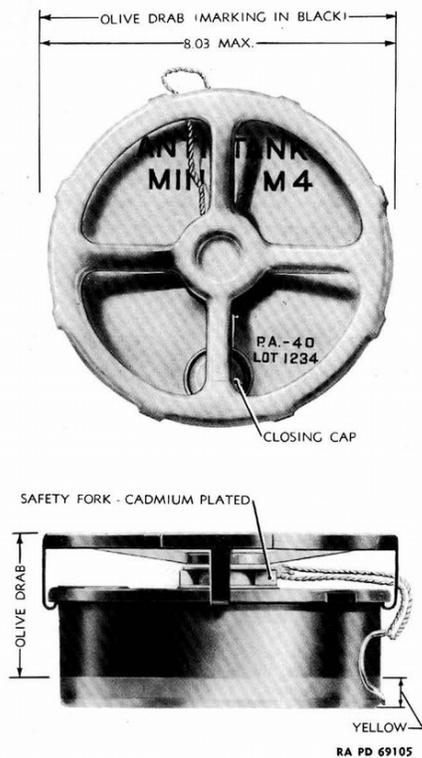
Possible Fuzes :

Fuze, Grenade, M204A1

Fuze, Grenade, M204A2

Source: **dudbusters.com** (<http://www.dudbusters.com/library/online.htm>)

LandMine, AT, M4



Use :

These are pressure-actuated, high-explosive (blast), antitank (AT) mines.

Description :

The metallic Anti Tank Mine M4 is identical to the M1A1 type except for the booster, the fuze, and the activator wells.

- Dimensions
 - Length – Not available
- Weights
 - Complete – Not available

Markings :

H.E. types are painted a lusterless olive drab with yellow base and black stencil. The H.E. fuze has a yellow striker head.

Operation :

No information on functioning available.

Possible Fuzes :

No information on fuzing.

- Sources: (1) [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)
 (2) [ORDATA Online \(http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1\)](http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1)
 NAVODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD,
 USA, 20640-5070

Grenade, Rifle, M9/M9A1

Use :

The M9 is an earlier model of the M9A1 HEAT rifle grenade designed primarily for use against tanks and other armored or resistant targets.

Description :

The M9 weighed about 1.3 pounds, contained a shaped charge similar to the bazooka AT rocket, could penetrate 3 to 4 inches of armor, and had a maximum effective range of 250 yards (probable effectiveness about 100 yards).

- Dimensions
 - Length – 11.24 inches
 - Diameter – 2.25 inches
- Weights
 - Complete - 1.3 lbs

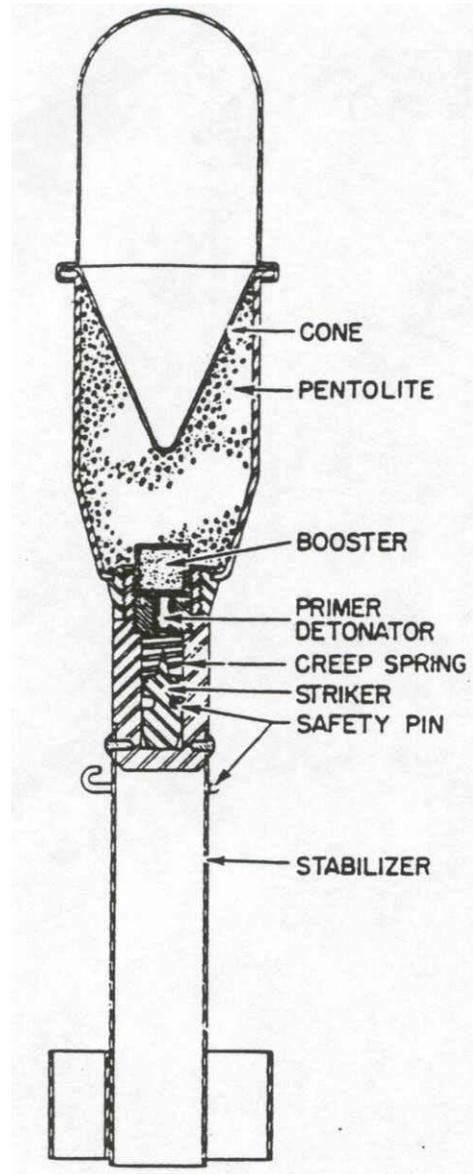
Markings :

The M9 has the same tail assembly as the M9A1, but the head is acorn shaped and is equipped with a point detonating fuze. It is slightly less sensitive than the M9A1. The safety pin of the M9 is located in the base of the grenade body instead of in the stabilizer tube. Its pull ring is secured to the body with adhesive tape. Olive drab in color.

Operation :

The grenade is fired from a rifle by means of a special launcher attachment. A special cartridge is used for propulsion. The grenade must be placed on the launcher before the safety pin is withdrawn. The safety pin is removed before firing. When the grenade is fired, set-back holds the striker away from the detonator. On impact, the striker overcomes the creep spring and hits the detonator.

Gases produced when the hand-loaded grenade cartridge is fired launch the grenade. For most of the designed rifle grenades, however, the thrust was not great enough to lift them to the desired altitude or propel them with enough force. Therefore, a propelling charge, ignited by flame from the fired cartridge, was assembled in the base of some of the rifle grenades to provide the additional boost. At the same time, the flame from the propelling charge would ignite the black powder of any time train for a time delay fuze, if needed. Fuzes were standard in signal and illumination pyrotechnic rifle grenades.



Grenade, Rifle, M9/M9A1 (Con't.)

Because of the heavy recoil generated by the grenade cartridge, the rifle (or carbine) was fired by firmly planting the butt on the ground, turned sideways to avoid damaging the stock.

Possible Fuzes :

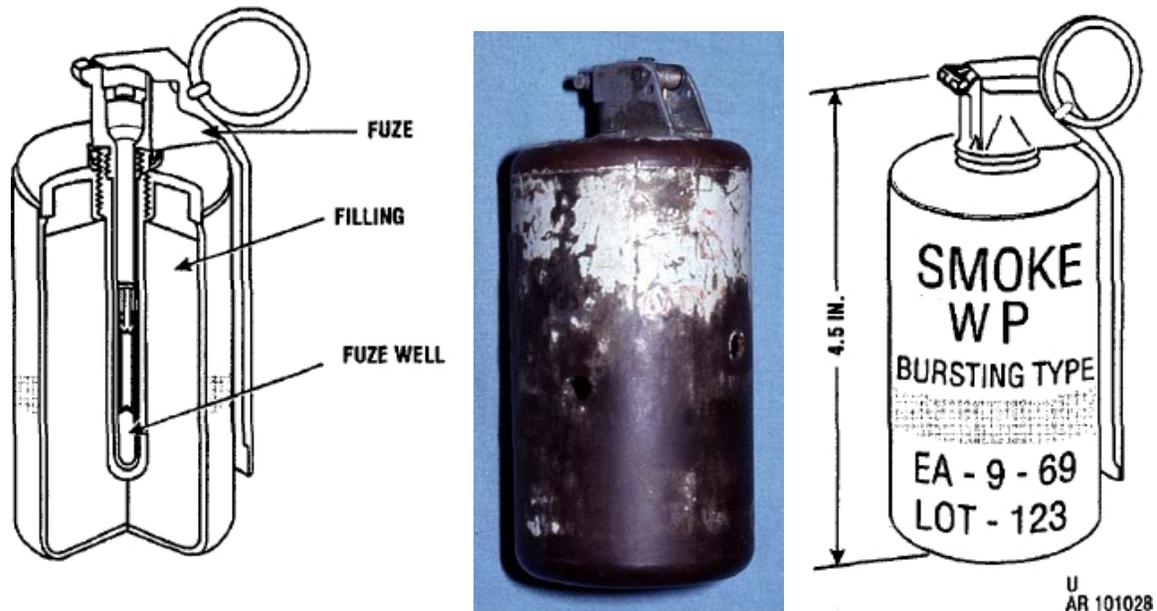
Impact fuzing

Hazardous Components :

- Filler – TNT 4 ounces

Source: U.S. Army Technical Publications OP 1664

Grenade, Hand, Smoke, WP, M15



Use :

WP smoke hand grenade M15 is a bursting type grenade used for signaling, screening and incendiary purposes.

Description :

The grenade body is of sheet steel and is cylindrical in shape. The body has a fuze well liner and is filled with WP.

The screening effect of the smoke is limited because WP burns with such intense heat, the smoke tends to rise rapidly. Pieces of WP will burn for about 60 seconds, igniting any flammable substance contacted. The hand grenade M206A1 and M206A2 pyrotechnic delay-detonating fuzes. They differ only body construction. The body contains a primer and pyrotechnic delay column. Assembled to the body are striker, striker spring, safety lever, safety pin with pull ring, and a detonator assembly. The split end of safety pin has an angular spread or a diamond crimp.

Safety clips are not required with these grenades.

- Dimensions
 - Length - 4.5 inches
 - Diameter - 2.37 inches
- Weights
 - Complete - 1.94 lbs

Grenade, Hand, Smoke, WP, M15 (Con't.)

Markings :

Gray with yellow band and yellow markings. The fuze is olive drab with black markings.

Operation :

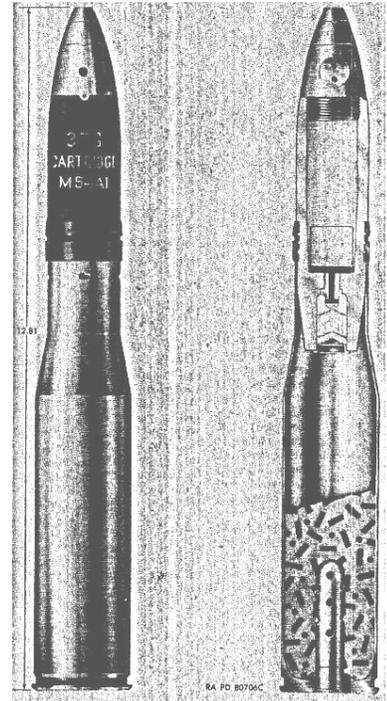
Removal of the safety pin permits release of the safety lever. When safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its axis and strikes the percussion primer. The primer emits small, intense spit of flame, igniting the delay element. The delay element burns for 4 to 5 seconds, then sets off the detonator. The detonator explodes rupturing the body and exposing the WP filler to air. The WP will burn approximately 60 seconds.

Hazardous Components :

- Filler - White Phosphorous, 15 oz.

Source: [dudbusters.com](http://www.dudbusters.com) (<http://www.dudbusters.com/library/online.htm>)

Projectile, 37 mm, HE, M54



Use :

Used in 37 mm Antiaircraft Automatic Gun M1A2. This cartridge is used for firing against aircraft, hence is fitted with a supersensitive type of superquick fuze.

Description :

The M54 is assembled with the cartridge case M17 which is stab crimped to the projectile. The projectile consists of a relatively thin-walled body, a tetryl or composition A-3 bursting charge, PD fuze M56, and a shell-destroying tracer. The nose is threaded to receive the fuze. The "boattailed" base is bored (and counterbored) and threaded to receive the relay igniting charge assembly. The tracer assembly, consisting of an igniter charge and a tracer charge, is pressed into the counterbore.



- Dimensions
 - Length, complete - 12.81 inches, 325.4 mm
 - Length, fuzed projectile - 5.89 inches
 - Length, cartridge case - 8.75 inches
 - Width, rotating band - 0.74 inches
- Weights
 - Complete - 2.62 lbs, 1.2 kg

Projectile, 37 mm, HE, M54 (Con't.)

Markings :

Olive drab with yellow markings. Older projectiles had yellow bodies.

Operation :

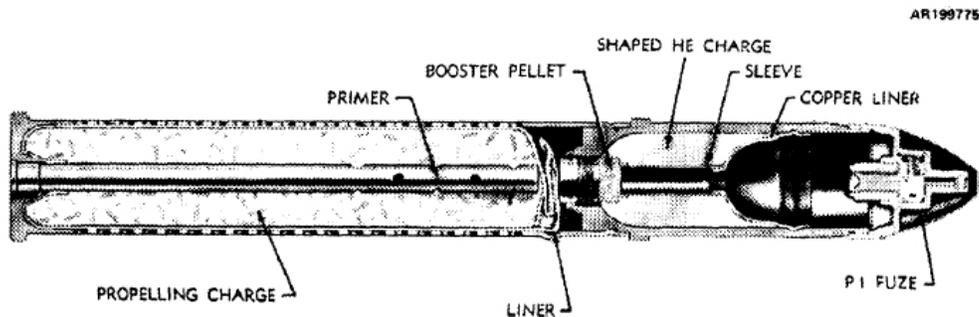
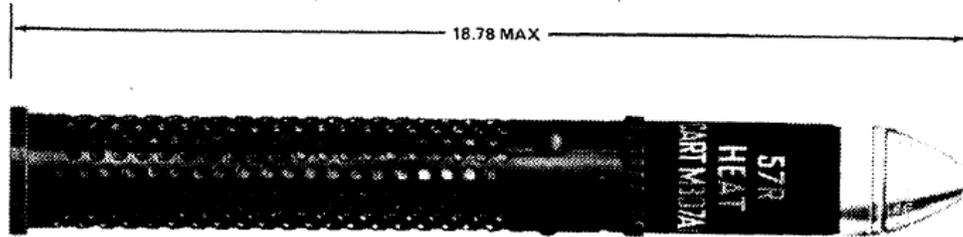
When the cartridge is fired, the burning propellant initiates the igniter charge which, in turn, ignites the tracer charge. The tracer burns with a visible trace for about 8 seconds, equivalent to a range of about 3,500 yards. As the tracer burns out, the relay igniting charge is ignited and causes the bursting charge to detonate if prior functioning has not been caused by fuze impact.

Hazardous Components :

- Propellant - FNH, 0.38 lbs
- Primer - M23A2
- Tracer - Self destroying
- Filler
 - Tetryl, 0.1 lbs
 - Composition A-3, 0.1 lbs

Source: dudbusters.com (<http://www.dudbusters.com/library/online.htm>)

Projectile, 57 mm, HEAT, M307A1 and M307



Use :

This cartridge is employed against armored targets and used with 57 mm Rifles M18 and M18A1.

Description :

HEAT Cartridge M307A1 includes a perforated metal cartridge case containing a plastic liner and a percussion primer and is crimped to the projectile just behind the pre-engraved rotating band of the projectile. The projectile forward cap is threaded to receive a point detonating fuze. A hemispherical copper liner crimped to the interior of the projectile forms a shaped charge to the rear and space forward to provide the standoff necessary for penetration. A steel sleeve brazed to the neck of the copper liner provides a passage from the fuze to a booster pellet in the base of the projectile. The booster pellet extends into the high explosive charge.



Projectile, 57 mm, HEAT, M307A1 and M307 (Con't.)

- Dimensions
 - Length - 18.78 inches
- Weights
 - Complete - 5.43 lbs

Markings :

Olive drab with yellow markings.

Operation :

The primer ignites the propellant when struck by the weapon firing pin, and the burning propellant generates gases to propel the projectile through the barrel. Recoil is eliminated because the design of the cartridge case permits controlled release of some gas pressure through apertures in the rifle breech block. The rotating band engages the barrel rifling to spin the projectile. The fuze functions upon impact and fires through the steel sleeve to the booster pellet. Detonation of the explosive charge collapses the copper liner and creates a focused, high velocity shock wave containing a jet of metal particles that penetrates the interior of the target.

Hazardous Components :

- Cartridge case - M30A1, M30A1B1
- Propellant - M10
- Primer - M60, M60A1
- Booster - Integral (Tetryl)
- Filler - Composition B or 50/50 Pentolite, 0.4 lb

Possible Fuzes :

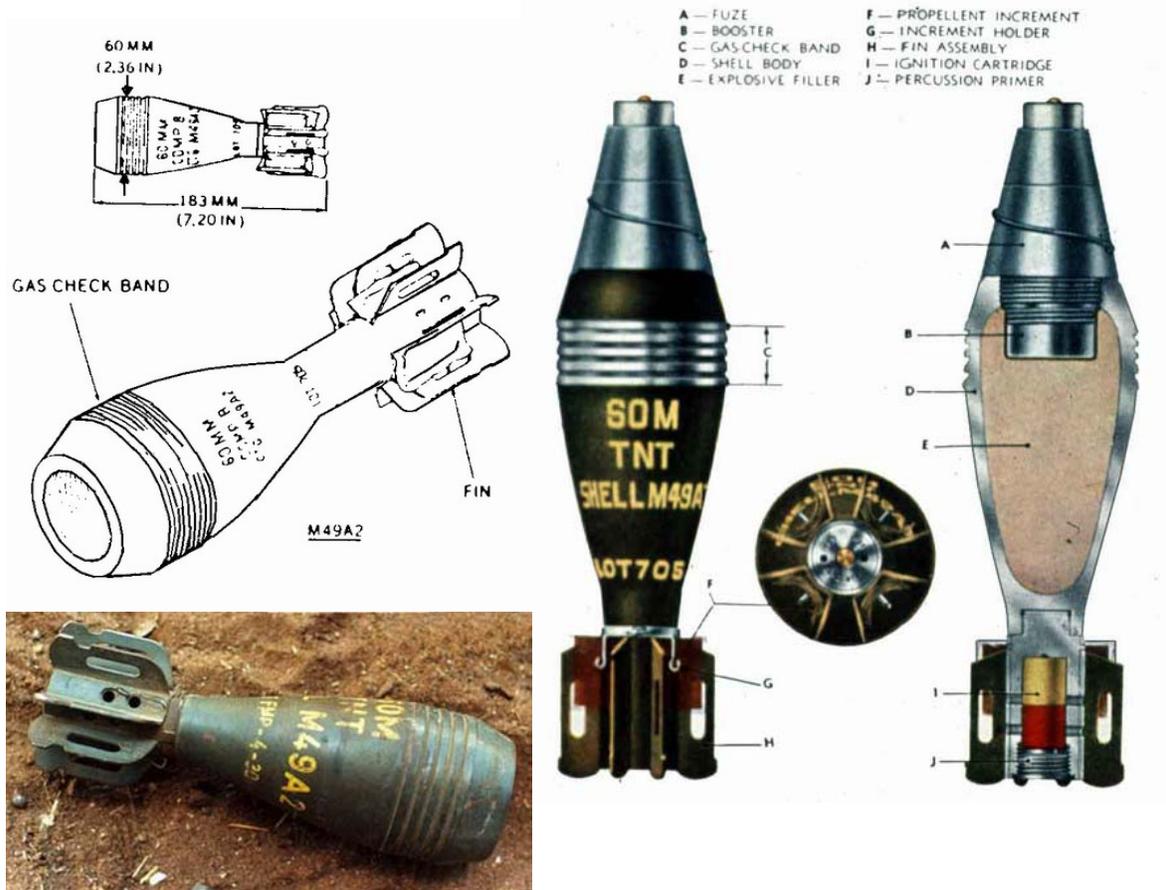
Fuze, Projectile, Point Initiating, M90

Differences Between Models :

M307 uses a paper lined Cartridge M30 and Percussion Primer M46.

Source: [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)

Mortar, 60 mm, HE, M49A2



Description :

These are fin stabilized, mortar fired, high explosive projectiles. The projectiles are painted olive drab with yellow identification markings.

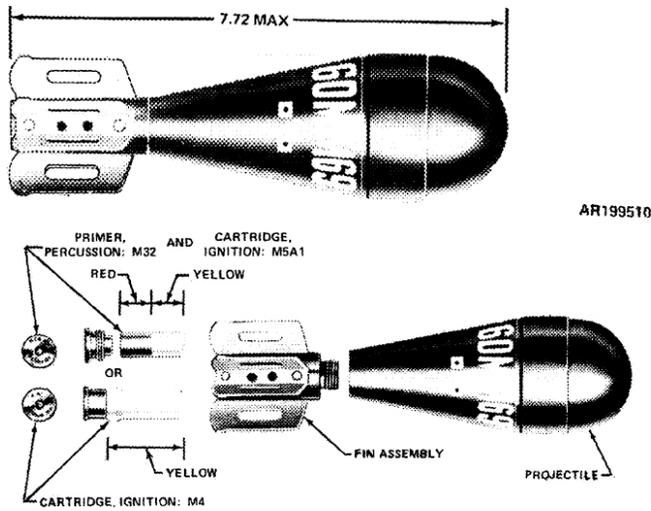
- Dimensions
 - Length – 183.00 mm
 - Diameter – 60.00 mm
 - Weight – 1.41 kg

Hazardous Components :

- Explosive Filler – Composition B, 190.00 g

Source: **ORDATA Online** (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
NAVEODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD, USA, 20640-5070

Mortar, 60 mm, Training, M69



Use :

This cartridge is used for training in the loading and firing of 60mm mortars M2 and M19.

Description :

Unlike other mortar ammunition, the components of this round are issued separately. This facilitates replacement of damaged, worn, or expended parts. The complete round consists of an inert projectile, a fin assembly, an ignition cartridge, and a percussion primer. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly.

- Dimensions
 - Length, complete - 7.72 inches
- Weights
 - Complete - 4.43 lbs

Markings :

Black or blue with white markings.

Operation :

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 detonates the ignition cartridge. Since this round is fired only at Charge 0, the gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. Since the cartridge is inert, there is no detonation upon impact and the cartridge may be recovered for reuse.

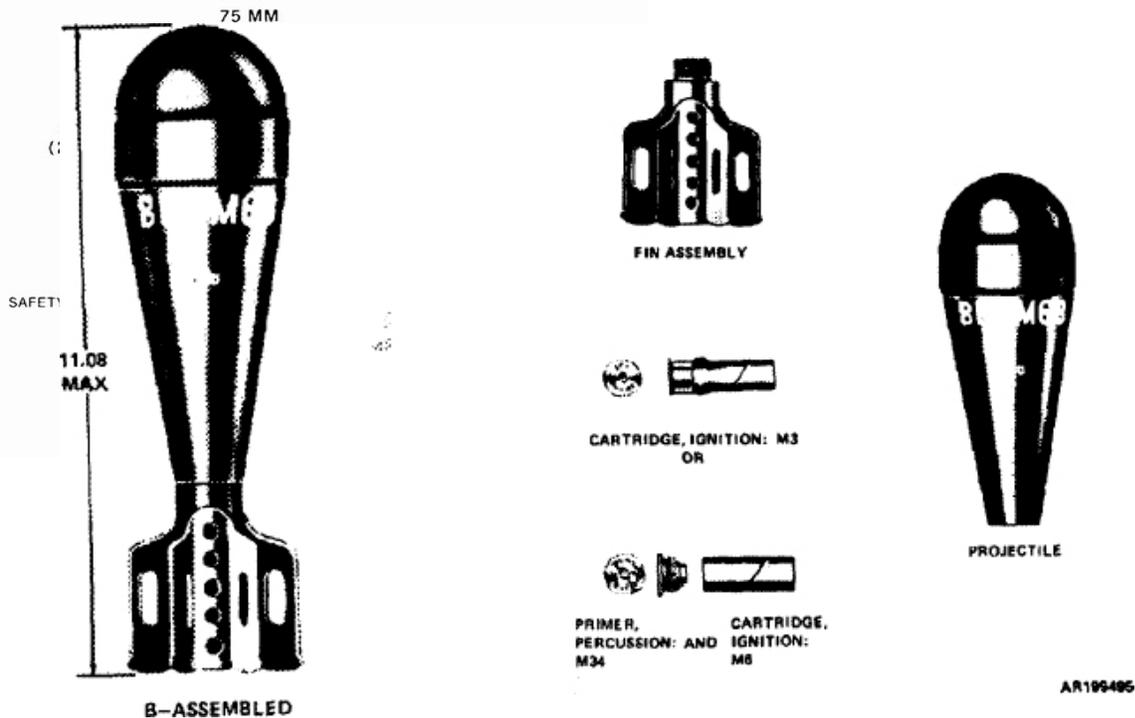
Mortar, 60 mm Training, M69 (Con't.)

Hazardous Components :

- Ignition cartridge - M4, M5A1
- Propellant - None
- Primer - M32

Sources: ⁽¹⁾ **dudbusters.com** (<http://www.dudbusters.com/library/online.htm>)
⁽²⁾ **ORDATA Online** (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
**NAVEODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD,
USA, 20640-5070**

Mortar, 81 mm, Training, M68



Use :

This cartridge is used for training in the loading and firing of the 81mm mortar.

Description :

Unlike other mortar ammunition, the components of this round are issued separately to facilitate replacement of damaged, worn, or expended parts. The complete round consists of an inert projectile, a fin assembly, and an ignition cartridge. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly.



- Dimensions
 - Length, complete - 11.08 inches
- Weights
 - Complete - 10.79 lbs

Mortar, 81 mm, Training, M68 (Con't.)

Markings :

Black with white markings. Items of later manufacture are bronze, or not painted.

Operation :

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. Since this round is fired only at Charge 0, the gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. Since the projectile is inert, there is no detonation upon impact, and the cartridge may be recovered for reuse.

Hazardous Components :

- Ignition cartridge - M3, M6
- Propellant charge - None
- Primer - M34 percussion
- Filler - Inert

Possible Fuzes :

No information on fuzing.

Source: [dudbusters.com](http://www.dudbusters.com) (<http://www.dudbusters.com/library/online.htm>)

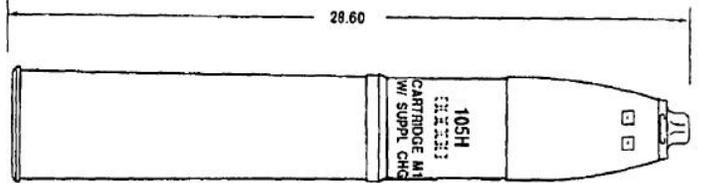
Projectile, 105 mm HE, M1

Use :

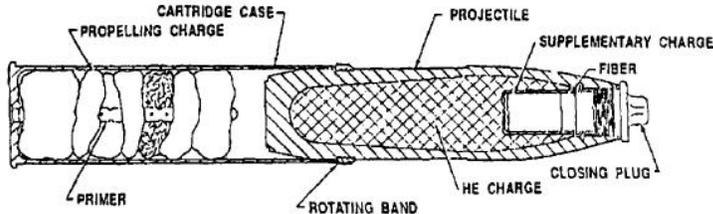
The projectile contains high explosive and is used for fragmentation, blast, and mining in support of ground troops and armored columns.

Description :

The projectile consists of a hollow steel forging with a boat tail 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 con-



U
AR 199735-A



taining 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.



Projectile, 105 mm HE, M1 (Con't.)

- Dimensions
 - Length, with closing plug - 28.6 inches, 726.44 mm
- Weights
 - Complete - 39.92 lbs, 18.15 kg

Markings :

Olive drab with yellow markings.

Operation :

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.

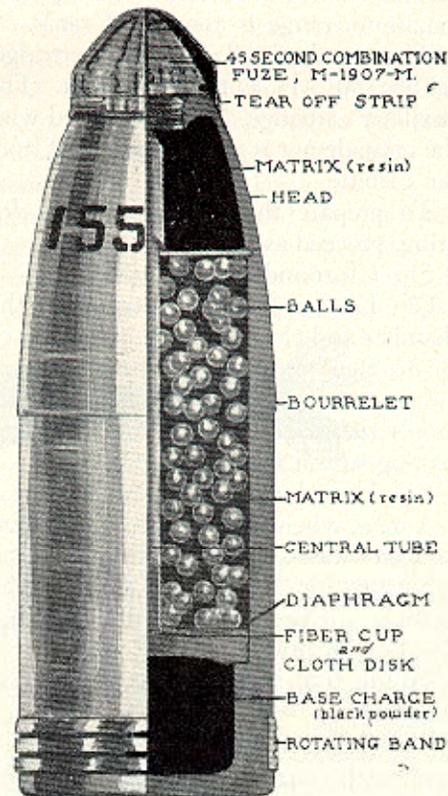
Hazardous Components :

- Fillers
 - Composition B
 - Deep cavity - 5.08 lbs, 2.31 kg
 - Normal cavity - 4.60 lbs, 2.09 kg
 - TNT
 - Deep cavity - 4.80 lbs, 2.18 kg
 - Normal cavity - 4.25 lbs, 1.93 kg
- Cartridge case - M14 Brass, M14B1, M14B3, M14B4 Steel
- Propellant - M1, 2.83 lbs, 1.29 kg
- Primer - M28A2, M28B2

Sources: ⁽¹⁾ **dudbusters.com** (<http://www.dudbusters.com/library/online.htm>)

⁽²⁾ **ORDATA Online** (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
**NAVEODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD,
USA, 20640-5070**

Projectile, 155 mm, Shrapnel, Mk 1



Shrapnel, Mk. 1 for 155mm gun.

Use :

The 155mm shrapnel projectile was used in pre-World War II and was regarded as the most efficient type of ammunition against troops in the open. The 155mm shrapnel packed a lethal load of 800 lead balls each about a half inch in diameter in addition to an explosive charge to scatter the shot as well as fragments of the shell casing.

Description :

Each projectile was practically a shotgun which was fired, by means of the time fuze, ideally at the height which would produce the maximum effect on the enemy. At the moment of burst, the bullets shot forward with increased velocity, normally without fracturing the case. The result was a cone of bullets which swept an area generally much larger than the area made dangerous by the burst of a high explosive shell of the same caliber. The effective area at a range of 4,000 yards was about 35 yards wide and 50 yards long. In addition, some balls with equally effective velocity were scattered less densely over a zone roughly twice as wide and several times as long. The height of burst had to be adjusted by observation of the smoke puff produced at the moment of explosion, and by proper changes in the setting of the time fuze.

- Dimensions
 - Length, with fuze – 18.82 inches
 - Diameter – 5.95 inches
- Weights
 - Complete – 95 lbs

Projectile, 155 mm, Shrapnel, Mk 1 (Con't.)

Markings :

Projectile, except rotating bands, painted red with black stenciling: "155 G (or H)."

Operation :

The height of burst had to be adjusted by observation of the smoke puff produced at the moment of explosion, and by proper changes in the setting of the time fuze.

Hazardous Components :

- Filler – 800 lead spheres
- Propellant – 26.2 lbs. of non-hygroscopic powder
- Igniter – 9 ounces of black powder sewed to bottom of base charge (propellant)

Source: U.S. Army Center of Military History Online (<http://www.army.mil/cmh-pg/faq/shrapnel.htm>)

