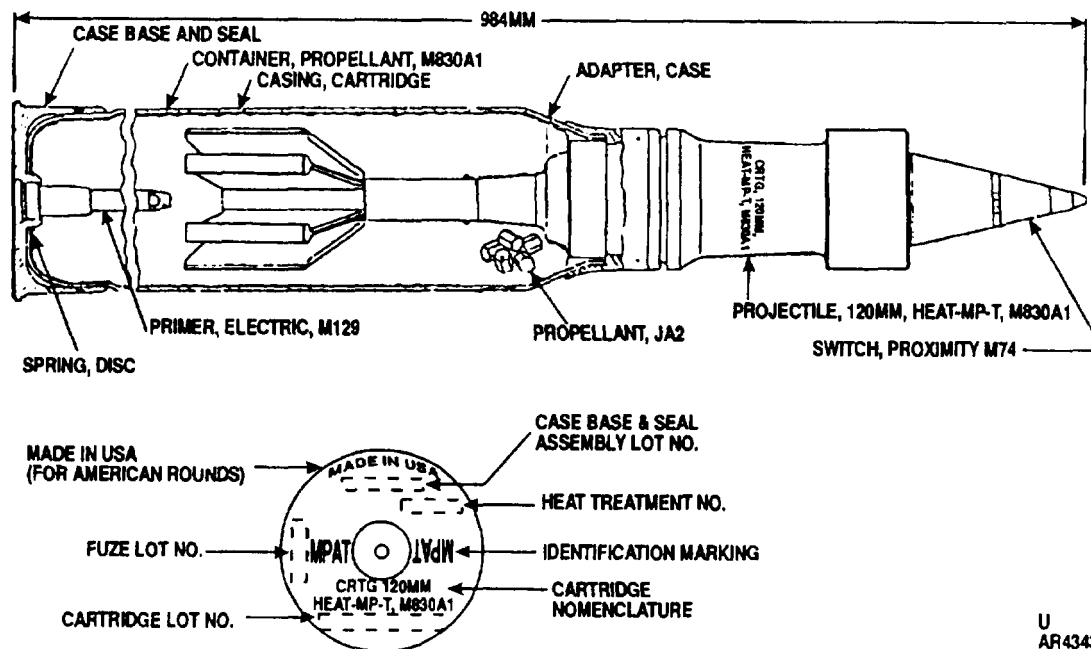


## CARTRIDGE, 120-MILLIMETER: HEAT-MP-T, M830A1



U  
AR4343-A

### Type Classification:

STD -29 Sep 92.

### Used:

This cartridge is a high explosive antitank and air defense multipurpose, tactical service round with tracer. The M830A1 is used in the 120-mm smooth bore M256 cannon.

### Description:

The cartridge; 120-mm, HEAT-MP-T, M830A1 is a high explosive antitank, multi-purpose, tactical service round with tracer. The M830A1 is used in the 120-mm, M256 smooth bore tank cannon and is a fin-stabilized round with a discarding sabot. The baseline design contains a propulsion system consisting of a metal case base, a combustible cartridge case, case adapter, nineteen perforated hexagonal JA-2 propellant, a propellant containment device (cloth bag), and an M129 primer (all are currently used on the M829A1). The projectile consists of a subcaliber projectile and three piece

aluminum sabot. The subcaliber projectile combines a fuzing system and a chemical energy warhead (Composition A3 Type II). The three segment sabot is secured to the warhead body by a nylon obturator and a steel retaining ring. The fuzing system includes: M774 base element, flexible communication circuit, Frontal Impact Switch Assembly (FISA) and M74 Proximity Switch. The conical nose of the projectile consists of the FISA coupled to the warhead body and the M74 Proximity Switch coupled to the FISA. The FISA is a secondary switch which closes upon impact against ground target. The M74 Proximity Switch (primary switch) contains two parallel "switches," either of which, when closed, will complete the M774 firing circuit. One switch closes upon direct impact with a target. The other is an electronic switch (a transistor) which "closes" when the proximity switch senses the presence of an air target. For all modes, a flexible electrical cable provides a path between the switches and M774 base element. In any of the functioning modes of the M830A1 fuzing system, the J1 connector of the M774 fuze is returned to "ground potential" which completes the fuze firing circuit.

The M774 base element is a dual environment safe and arm (S&A) device. The M774 receives an electric firing pulse from either the FISA or the proximity switch which then triggers the base element electronics to fire the M69 electric detonator. The M69 detonator is contained in the rotor which provides a physical separation of the M69 detonator from the fuze electronics until the subprojectile has traveled a safe distance downrange. The first safety feature of the mechanical S&A lock consists of three leaves and a spring, oriented so as to release the rotor upon forward acceleration. The second safety feature is a drag weight which senses the decelerating force/drag of the projectile as it leaves the muzzle. As the drag weight senses drag, it moves out of the way of the rotor allowing the rotor to rotate to the armed position as designed.

Once the M774 base element is armed and receives an electrical firing pulse to trigger the detonator, the detonator, lead, booster, and warhead explosives initiate in sequence destroying the target. The explosive train located in front of the base element consists of the lead cup, booster, and Comp A3 explosive. The warhead explosive is contained in the body with a shaped copper liner, in front of the booster. The liner provides the penetration capability for the system.

An aluminum fin assembly with tracer is attached to the aft end of the subprojectile by way of an aluminum fin adapter. The fin has beveled leading edges and T-tabs on the outside diameter to increase the effective fin area. Spin, which is induced by a twist in the fin blade, provides the subcaliber projectile with greater in-flight stability and accuracy.

**Functioning:**

The operational characteristics of the M830A1 test cartridges is basically the same as that which is utilized for all HEAT-T tank ammunition. After setting the proximity sensor to the designated target and cambering the cartridge, a voltage is applied to the primer. As current flows through the primer, the igniter charge is initiated which, in turn, initiates the benite strands. The burning benite, which is evenly distributed within the primer body initiates the propellant charge. The expanding gases generated by the burning propellant expel the projectile into the gun barrel leaving only the metal case base and primer body behind. During the propellant burn, the tracer element in the fin assembly is ignited which provides the projectile with tracking visibility. The silicone rubber seal and obturator band at the base of the projectile prevent blow-by of propellant gas during travel in the barrel. The obturating band and retaining ring also

function to maintain projectile inbore centering and integrity.

Upon muzzle exit, the air resistance against the front of the sabot breaks the retaining ring and when the obturating band around the sabot breaks, the sabot falls away in three pieces leaving only the subprojectile to travel to the target. The fin assembly with six equally spaced fins, imparts spin to the subprojectile, thereby stabilizing its flight aerodynamics.

The acceleration of the projectile in the gun tube allows the release mechanism to release the rotor from the first safe position. As the projectile travels downbore, the acceleration forces decrease until the rotor can overcome the forces and start its rotation to the armed position. The inbore acceleration of the fuze allows the setback voltage generator to charge up the firing capacitor. As the projectile leaves the gun muzzle, the drag weight senses the increased drag forces and moves out of the rotor's way, allowing it to arm.

Upon direct impact with a target or when the proximity switch senses the presence of an air target, a firing signal is sent to the M774 base element. The base element's firing capacitor provides the necessary current to initiate the M69 detonator, which initiates the lead, booster, and warhead explosives in sequence. A copper jet is formed by the detonation of the warhead. This copper jet provides the capacity to defeat the ground target.

**Tabulated Data:**

Complete round:  
 Type ----- Fixed, High Explosive Antitank Antihelicopter multipurpose w/ tracer  
 Weight ----- 50.1 lb (22.7 kg)  
 Length ----- 38.74 in. (984 mm)  
 Assembly drawing ----- 12912208

**Temperature Limits:**

Firing:  
 Lower limit ----- -25°F (-32°C)  
 Upper limit ----- +125°F (+52°C)  
 Storage:  
 Lower limit ----- -50°F (-46.0°C)  
 Upper limit ----- +145°F (+63.0°C)

**Performance:**

Chamber pressure (peak) ----- (66620 psi @ 49°C; 6700 bars @ 125°F)  
 Velocity (nominal) ----- 4626 ft/sec (1410 m/sec)

**Packing (Metal Container):**

Packing and marking  
drawing ----- 12912370  
Dimensions ----- 44.5 in. x 7.75  
in. x 7.75 in.  
Cube ----- 1.5 cu ft  
Total weight (with cartridge) - 72.1 lb  
Total explosive weight ----- 18.69 lb  
\*Packing ----- 1 round per  
metal container,  
30 metal con-  
tainers per  
pallet

\*NOTE: See DOD Consolidated Ammunition Catalog for complete packing data including NSN's.

**Shipping and Storage Data:**

UNO serial number ----- 0321  
DOD hazard class ----- (08)1.2  
Storage compatibility group -- E  
Field storage category ----- A  
DOT shipping class ----- A  
DOT Designation ----- AMMUNITION  
FOR CANNON  
WITH  
EXPLOSIVE  
PROJECTILES  
DODAC ----- 1315-C791

**Limitations:**

The M830A1 is a full-service round which may only be fired during war emergency.