

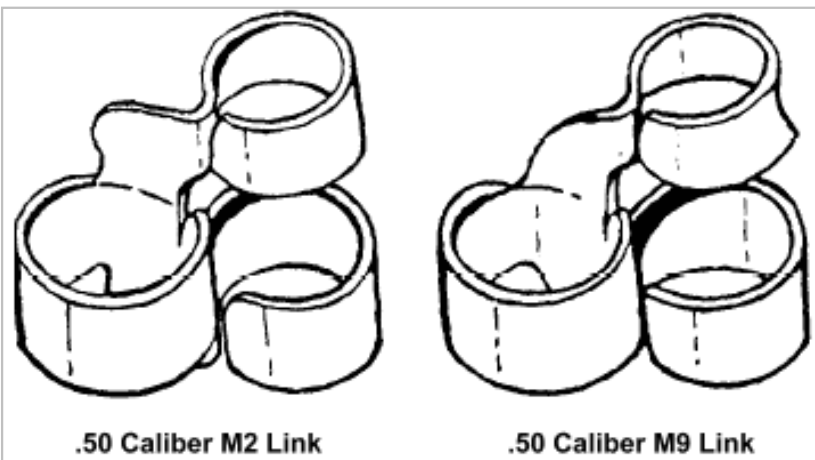
# .50 Caliber Browning (12.7 x 99 mm) Ammunition

## Gary's U.S. Infantry Weapons Reference Guide

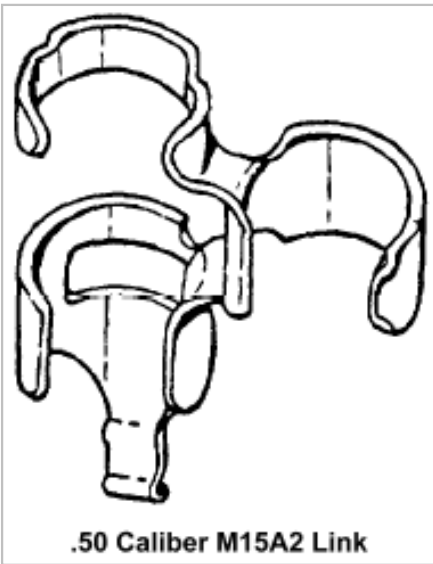
### DESCRIPTION

Ammunition for use in machine guns is issued in metallic link belts. Link belts are made of units of cartridges and links. Each link has two loops fitted around a single cartridge and one loop fitted around an adjacent cartridge. Each cartridge in a metallic link belt has two links attached to it, except the end cartridges.

Cartridge links are made of steel which is processed to prevent rusting. They are manufactured and tested to assure satisfactory ammunition feeding and functioning under all service conditions.



M2 and M9 links are manufactured with closed loops. When assembled with the cartridge in belts, the links fit on the cartridge shoulder. The tapered front loops of the links are positioned firmly on the cartridge shoulder to hold the cartridge in proper alignment for feeding into the weapon. The design required the cartridge to be extracted from the rear and dropped into position for moving into the chamber for firing. Weapons designed for the links require additional space in the rear of the receiver for retraction. M2 and M9 links are used with the M2 machine gun only.



The M15A2 link is manufactured with partially open loops and has a positioning finger on one side which snaps into the extractor grooves of the cartridge to retain the cartridge in proper feed alignment. The link design permits a portion of bolt to ride through link loop openings and push the cartridges forward and out of the link into the chamber for firing. The M15A2 link is used with the M85 machine gun.

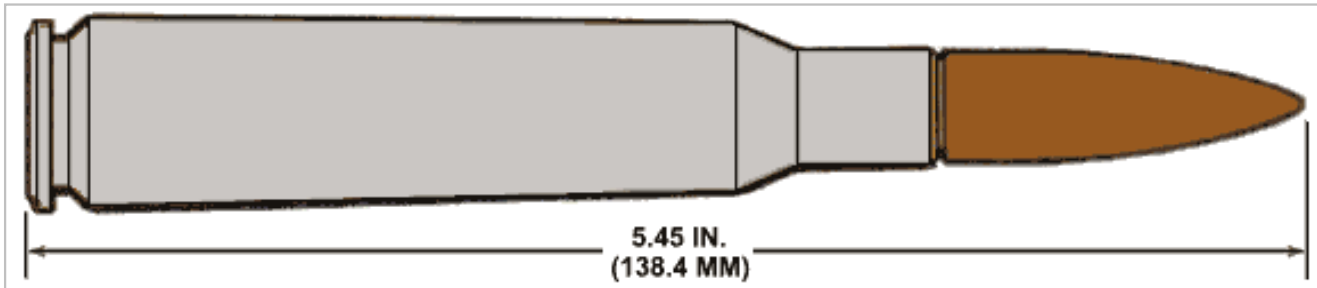
Ballistic data for .50 Browning ammunition.

Model	Cartridge Weight	Cartridge Length	Propellant	Projectile Weight	Chamber Pressure	Muzzle Velocity 78 ft (23.8 m) from muzzle
M1 HPT	2,082 gr (134.91 gm)	5.45 in (138.4 mm)	240 gr (15.55 gm) WC 860	?	65,000 psi (4,570 kg/cm <sup>2</sup> )	N/A
M1 Blank	917 gr (59.42 gm)	3.91 in (99.3 mm)	46 gr (2.98 gm) WC 150	N/A	N/A	N/A
M1 Incendiary	1,744 gr (113.00 gm)	5.45 in (138.4 mm)	240 gr (15.55 gm) WC 860	?	54,000 psi (3,796 kg/cm <sup>2</sup> )	2,950 fps (899 mps)
M1 Tracer	1,785 gr (115.66 gm)	5.45 in (138.4 mm)	240 gr (15.55 gm) IMR 5010	?	52,000 psi (3,656 kg/cm <sup>2</sup> )	2,700 fps (823 mps)
M1A1 Blank	915 to 955 gr (59.29 to 61.88 gm)	3.91 in (99.3 mm)	42 gr (2.72 gm) Dupont Hi Skor 700X	N/A	N/A	N/A
M2 Ball	1,813 gr (117.48 gm)	5.45 in (138.4 mm)	235 gr (15.23 gm) WC 860	?	55,000 psi (3,867 kg/cm <sup>2</sup> )	2,810 fps (856 mps)

M2 AP	1,812 gr (117.41 gm)	5.45 in (138.4 mm)	235 gr (15.23 gm) WC 860	706.7 gr (45.8 gm)	53,000 psi (3,726 kg/cm <sup>2</sup> )	2,810 fps (856 mps)
M2 Dummy	1,248 gr (80.87 gm)	5.45 in (138.4 mm)	N/A	?	N/A	N/A
M8 API	1,764 gr (114.30 gm)	5.45 in (138.4 mm)	233 gr (15.1 gm) WC 860	622.5 gr (40.34 gm)	59,000 psi (4,148 kg/cm <sup>2</sup> )	2,910 fps (887 mps)
M10 Tracer	1,752 gr (113.53 gm)	5.45 in (138.4 mm)	240 gr (15.55 gm) IMR 5010	?	54,000 psi (3,796 kg/cm <sup>2</sup> )	2,860 fps (872 mps)
M17 Tracer	1,732 gr (112.23 gm)	5.45 in (138.4 mm)	225 gr (14.58 gm) IMR 5010	?	54,000 psi (3,796 kg/cm <sup>2</sup> )	2,860 fps (872 mps)
M20 API-T	1,718 gr (111.32 gm)	5.45 in (138.4 mm)	230 gr (14.9 gm) IMR 5010	619 gr (40.11 gm)	55,000 psi (3,867 kg/cm <sup>2</sup> )	2,910 fps (887 mps)
M23 Incendiary	1,581 gr (102.45 gm)	5.45 in (138.4 mm)	237 gr (15.36 gm) IMR 4831	?	58,000 psi (4,077 kg/cm <sup>2</sup> )	3,400 fps (1,036 mps)
M33 Ball	1,762 gr (114.17 gm)	5.45 in (138.4 mm)	235 gr (15.23 gm) WC 860	706.7 gr (45.8 gm)	55,000 psi (3,867 kg/cm <sup>2</sup> )	2,910 fps (887 mps)
M858 Plastic Practice	460 gr (29.81 gm)	5.2 in (132.1 mm)	49 gr (3.18 gm) 10B101	?	26,100 psi (1,835 kg/cm <sup>2</sup> )	2,790 fps (850 mps)
M860 Plastic Practice-T	460 gr (29.81 gm)	5.2 in (132.1 mm)	49 gr (3.18 gm) 10B101	?	26,100 psi (1,835 kg/cm <sup>2</sup> )	2,790 fps (850 mps)
M903 SLAP	1,466 gr (94.99 gm)	5.45 in (138.4 mm)	275 gr (17.82 gm) WC 856	355 - 360 gr (23.00 - 23.33 gm)	55,000 psi (3,867 kg/cm <sup>2</sup> )	4,000 fps (1,219 mps)
M962 SLAP-T	1,466 gr (94.99 gm)	5.45 in (138.4 mm)	282 gr (18.27 gm) WC 856	350 - 360 gr (22.68 - 23.33 gm)	55,000 psi (3,867 kg/cm <sup>2</sup> )	4,000 fps (1,219 mps)

MK211 Mod 0 API	1,765 gr (114.37 gm)	5.45 in (138.4 mm)	233 gr (15.1 gm) WC 860/MR 5010 or RA- NC-167	671 gr (43.48 gm)	55,000 psi (3,867 kg/ cm <sup>2</sup> )	2,910 +- 30 fps (886 +- 9.1 mps)
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### Cartridge, Caliber .50, Ball, High Pressure Test, M1

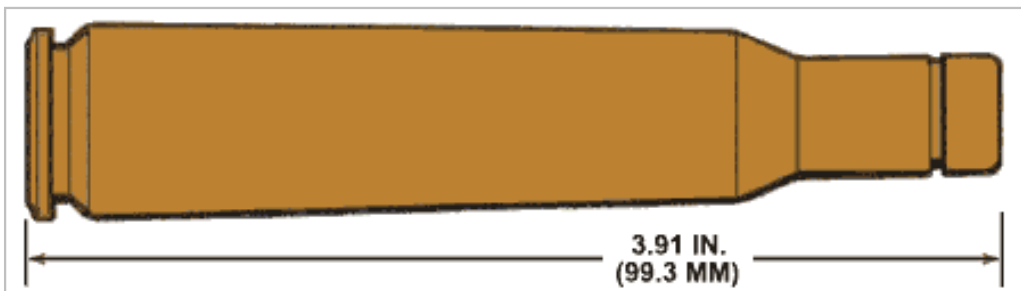


Used by all .50 Browning weapons. The cartridge is intended for use in proof testing weapons during manufacture, test, or repair.

The cartridge is identified by a stannic-stained (silvered) cartridge case.

Type Classification: STD - OTCM 36841

### Cartridge, Caliber .50, Blank, M1

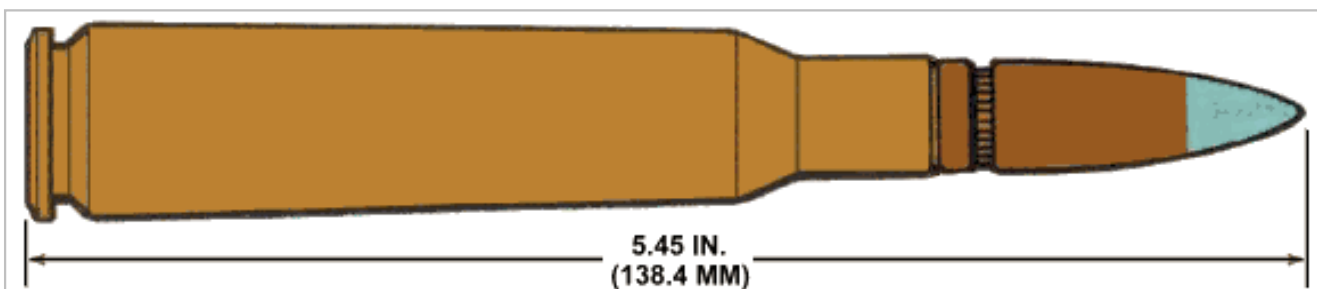


Used by the M2 machine gun (flexible only). The cartridge is used to simulate firing in training exercises.

The cartridge is identified by the absence of a bullet and has crimped cartridge case mouth.

Type Classification: CONT - OTCM 36841

### Cartridge, Caliber .50, Incendiary, M1



Used by M2 and M85 machine guns. For incendiary effect, especially against aircraft.

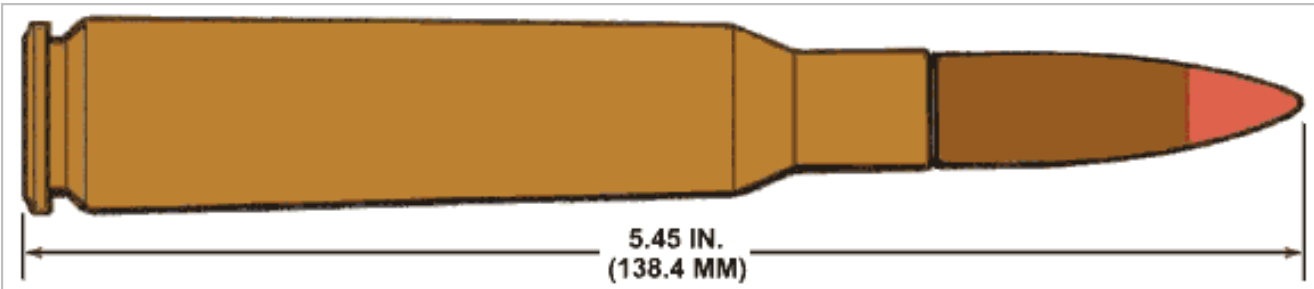
Upon impact with a hardened or armored target, the incendiary composition bursts into flame and will ignite any flammable material.

Incendiary composition: 34 grains (2.2 gm) IM 11

The cartridge is identified by a blue bullet tip.

Type Classification: OBS - MSR 11756003

### Cartridge, Caliber .50, Tracer, M1



Used by M2 and M85 machine guns. The tracer is intended to permit visible observation of the bullet's in-flight path or trajectory to the point of impact. Limited to continental US for training purposes only.

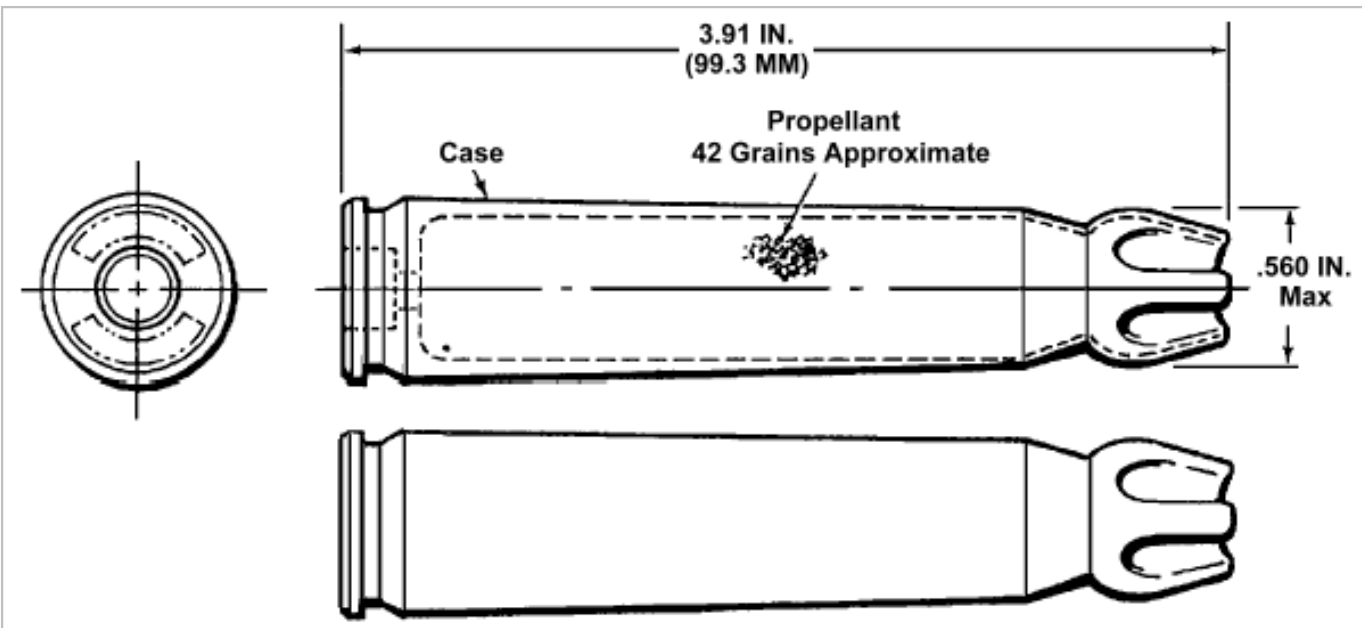
Trace range: 1,969 yards (1,800 m)

Tracer: R256

The cartridge is identified by a red bullet tip.

Type Classification: OBS - MSR 11756003

### Cartridge, Caliber .50, Blank, M1A1

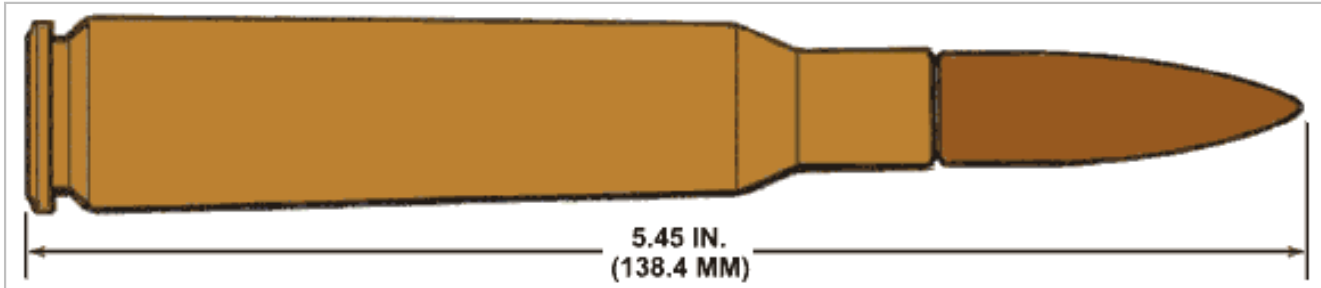


Used by the M2 machine gun with the M19 Blank Ammunition Firing Attachment, the M85 machine gun with the M20 Blank Firing Attachment, and the M107 Long Range Sniper Rifle. The cartridge is used to simulate firing in training exercises.

The cartridge is identified by the absence of a bullet. The M1A1 differs from the M1 in that the M1A1 has a rosette crimp at the mouth.

Type Classification: STD - MSR 02806015

### Cartridge, Caliber .50, Ball, M2

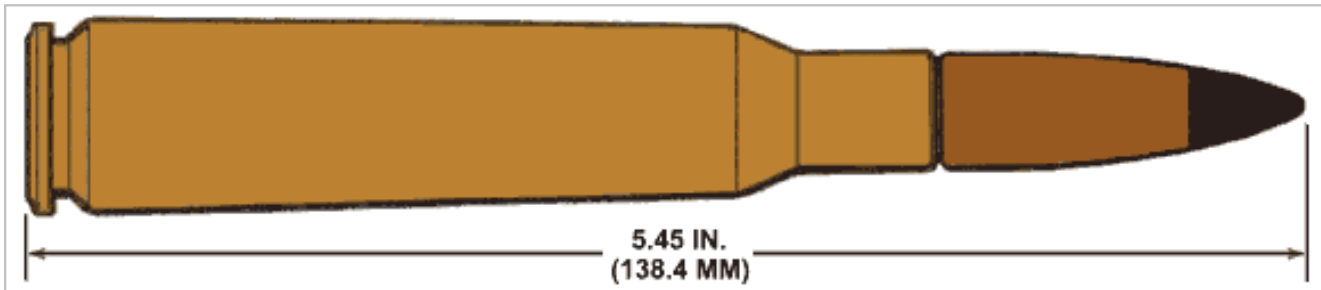


Used by M2 and M85 machine guns. The cartridge is intended for use against personnel or unarmored targets.

The cartridge is identified by a plain bullet.

Type Classification: STD - OTCM 36841

### Cartridge, Caliber .50, Ball, Armor Piercing, M2



Used by M2 and M85 machine guns. The cartridge is for use against light-armored or unarmored targets, concrete shelters, and similar bullet-resisting targets.

Armor Penetration.

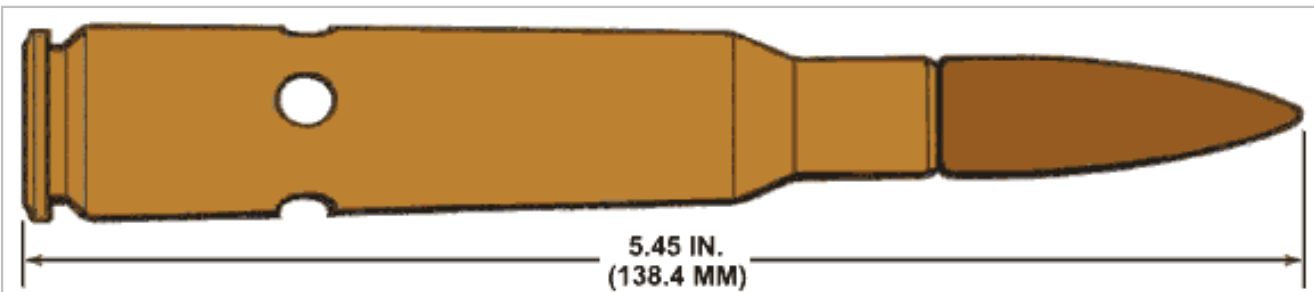
500 meters: 0.75 in (19 mm)

1,200 meters: 0.39 in (10 mm)

The cartridge is identified by a black bullet tip.

Type Classification: OBS - MSR 11756003

### Cartridge, Caliber .50, Dummy, M2

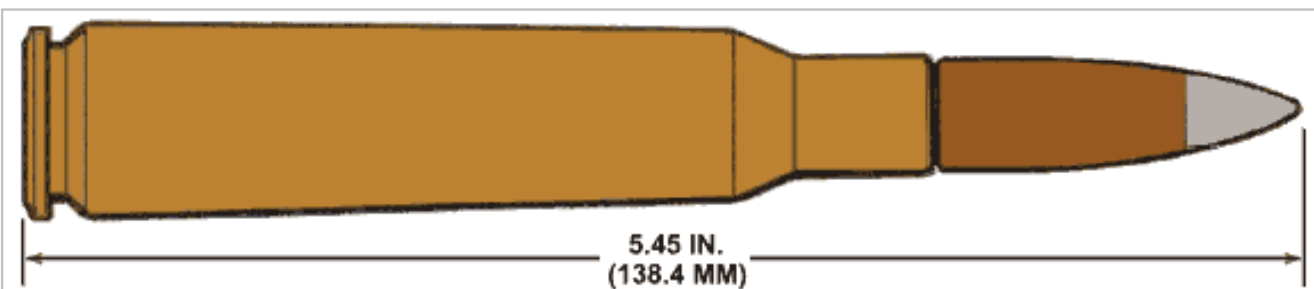


Used by all .50 Browning weapons. The cartridge is used for practice in loading for simulated firing and for inspecting and testing the mechanism of the weapon.

The cartridge is identified by three drilled holes in the cartridge case and the absence of a primer.

Type Classification: STD - OTCM 36841

### Cartridge, Caliber .50, Ball, Armor Piercing Incendiary, M8



Used by M2 and M85 machine guns, and the M107 Long Range Sniper Rifle. The cartridge combines the functions of the M2 armor piercing bullet and the incendiary bullet, and is used against flammable targets and light-armored or unarmored targets, concrete shelters, and similar bullet-resisting targets.

Armor Penetration.

500 meters: 0.63 in (16 mm)

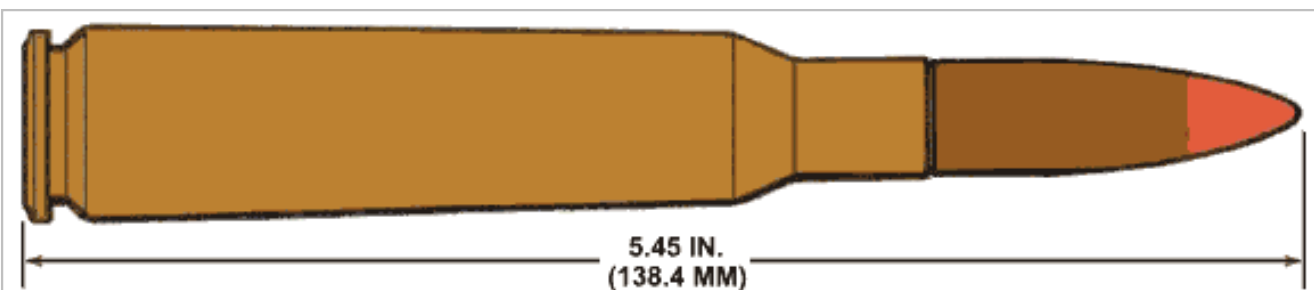
1,200 meters: 0.32 in (8 mm)

Incendiary composition: 15 grains (0.97 gm) IM 11

The cartridge is identified by an aluminum bullet tip.

Type Classification: OBS - MSR 11756003

### Cartridge, Caliber .50, Tracer, M10



Used by M2 and M85 machine guns. The tracer cartridge exhibits a visible trace from a point not greater than 100 yards (91 m) from the muzzle of the weapon to a point not less than

1,600 yards (1,463 m) from the muzzle.

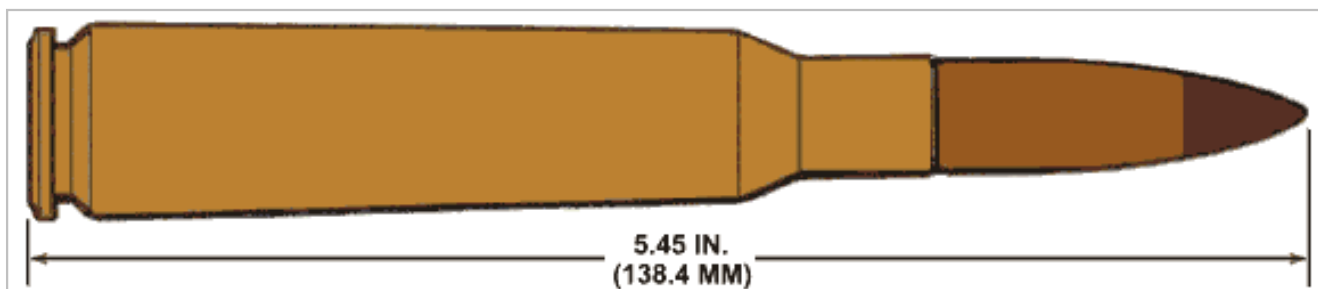
Tracer: R256

The cartridge is identified by an orange bullet tip.

Type Classification: STD - OTCM 37107

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### Cartridge, Caliber .50, Tracer, M17



Used by M2 and M85 machine guns, and the M107 Long Range Sniper Rifle. The cartridge tracer is intended to permit visible observation of the bullets in-flight path or trajectory to the point of impact.

Trace range: 2,679 yards (2,450 m)

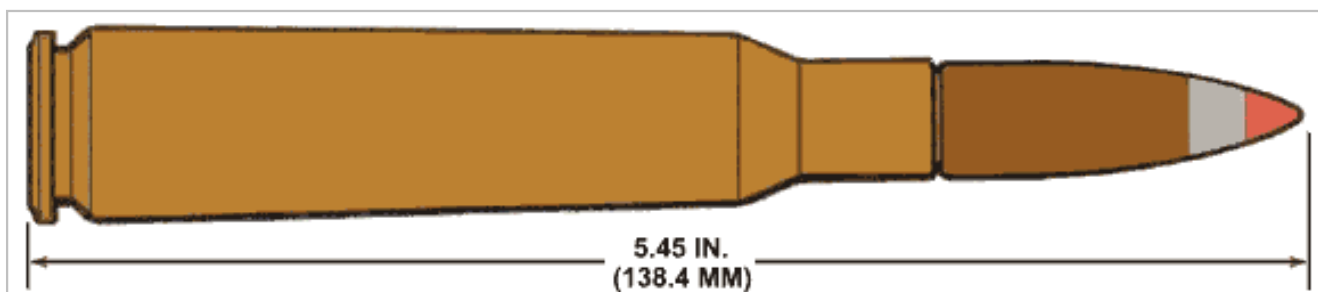
Tracer: R256

The cartridge is identified by a brown bullet tip.

Type Classification: CON - MSR 11756003

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### Cartridge, Caliber .50, Armor Piercing Incendiary-Tracer, M20



Used by M2 and M85 machine guns, and the M107 Long Range Sniper Rifle. The cartridge combines the functions of the armor piercing and the incendiary bullet, and is used against flammable targets and light-armored or unarmored targets, concrete shelters, and similar bullet-resisting targets. This tracer is dim at near ranges, but increases to bright as it moves further from the gun.

Armor Penetration.

500 meters: 0.83 in (21 mm)

1,200 meters: 0.43 in (11 mm)

Incendiary composition: 27 grains (1.74 gm) IM 161

Trace range: 328 - 1,914 yards (300 - 1,750 m)

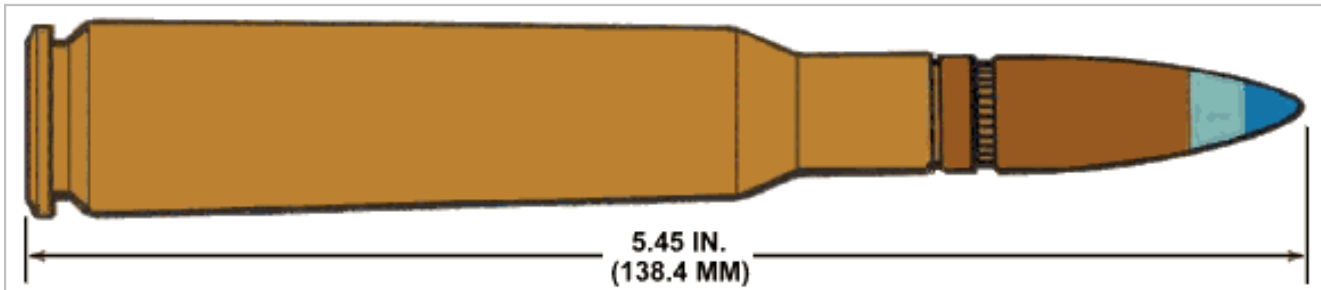
Tracer: R256



The cartridge is identified by a red bullet tip with an aluminum colored ring to the rear of the red tip.

Type Classification: OBS - MSR 04776009

### Cartridge, Caliber .50, Incendiary, M23



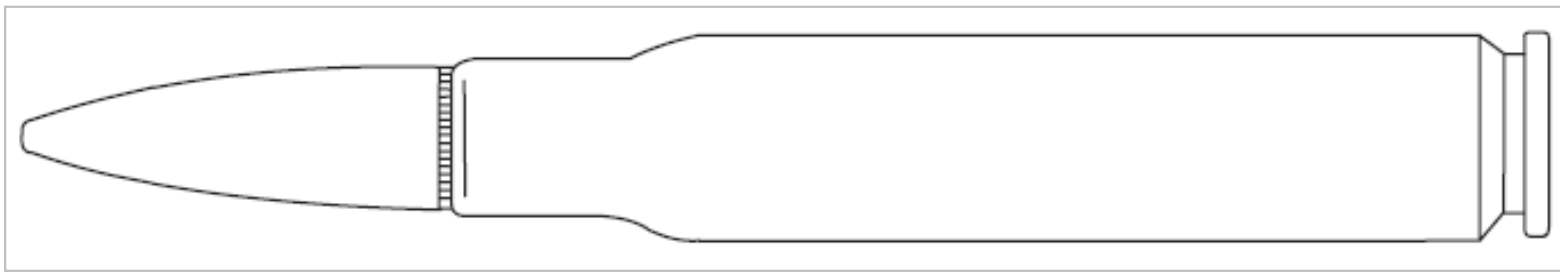
Used by M2 and M85 machine guns. The cartridge is used against flammable targets. The cartridge is capable of initiating combustion of flammable materials upon target impact at 175 yards (160 m).

Incendiary composition: 90 grains (5.83 gm) IM 28

The cartridge is identified by a blue bullet tip with a light blue ring to the rear of the blue tip.

Type Classification: STD - OTCM 36841

### Cartridge, Caliber .50, Ball, M33



Used by M2 and M85 machine guns, and the M107 Long Range Sniper Rifle. The cartridge is intended for use against personnel or unarmored targets.

Armor Penetration.

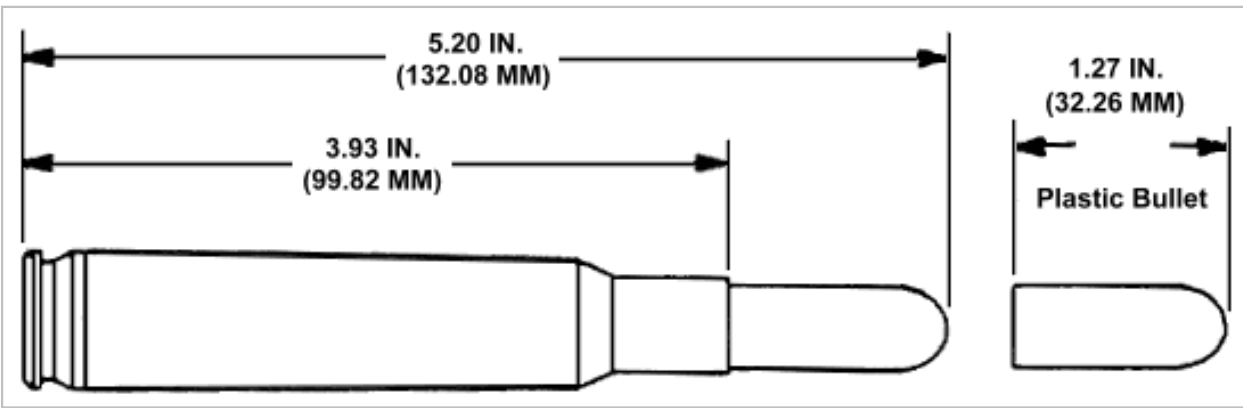
500 meters: 0.32 in (8 mm)

1,200 meters: 0.16 in (4 mm)

The cartridge is identified by a plain bullet tip.

Type Classification: STD - OTCM 36841

### Cartridge, Caliber .50, Ball, Plastic Practice, M858



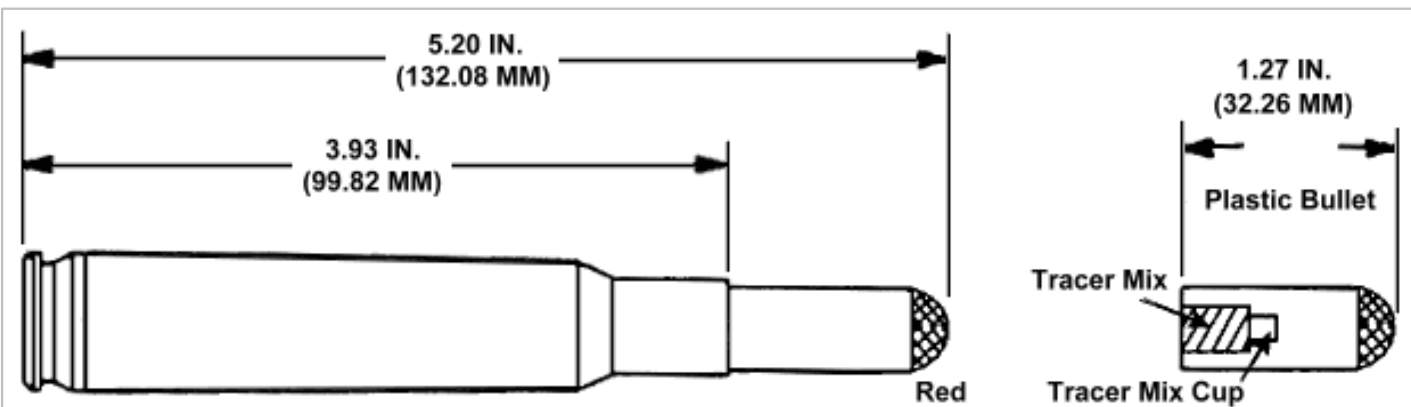
Used by M2 machine gun with the M3 Recoil Amplifier. The cartridge is intended for scaled range training purposes, where range restrictions limit or prohibit the use of one of the other types of live ammunition.

Maximum range: 765 yards (700 m)

The cartridge is identified by the blue bullet and case which are molded into one piece with high density polyethylene plastic.

Type Classification: STD. Type Classification Date: 24-MAY-1983

### Cartridge, Caliber .50, Tracer, Plastic Practice M860



Used by M2 machine gun with the M3 Recoil Amplifier. The cartridge tracer is intended for scaled range training to permit visible observation of the bullet's in-flight path or trajectory to the point of impact. The cartridge is intended for use with the M858 Plastic Practice Ball Cartridge.

Maximum range: 765 yards (700 m)

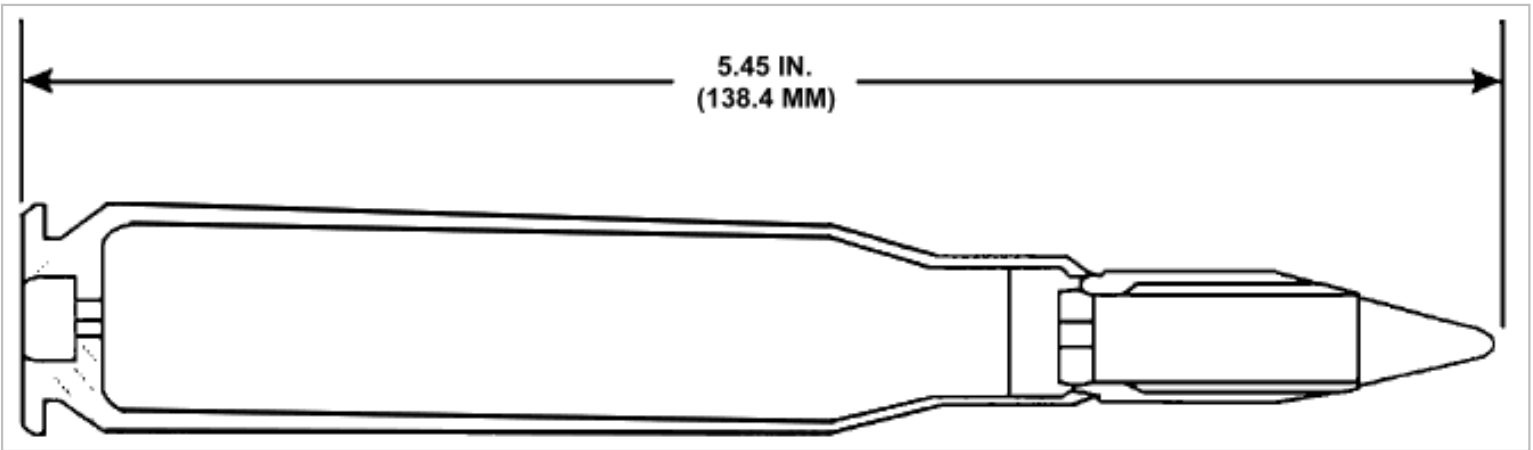
Trace range: 22 - 164 yards (20 - 150 m)

Tracer: DAG9591254/4

The cartridge is identified by a red bullet tip and the blue bullet and case which are molded into one piece with high density polyethylene plastic.

Type Classification: STD. Type Classification Date: 24-MAY-1983

### Cartridge, Caliber .50, Saboted Light Armor Penetrator (SLAP), M903



Used by M2HB machine gun. The SLAP is used in combat against current and future light armored targets and Armored Attack Helicopters (AAHs). The M903 offers the capability to defeat these targets at ranges two to three times that of currently available ammunition.

**Armor Penetration.**

500 meters: 1.34 in (34 mm)

1,200 meters: 0.91 in (23 mm)

Projectile diameter: 0.30 inches (7.7 mm)

The cartridge consists of a heavy metal (tungsten) penetrator that is sabot-launched at a much higher velocity than standard rounds. The sabot, which is designed to break up at the muzzle to release the penetrator, must also survive the gun environment until launch. It is injection molded of special high strength plastic and is reinforced with an aluminum insert in the base section. The cartridge is identified by an amber sabot (Ultem 1000).

Type Classification: STD. Type Classification Date: 31-MAR-1993. Unit cost: \$8.87 (Fiscal Year 2005).

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**Cartridge, Caliber .50, Saboted Light Armor Penetrator-Tracer (SLAP-T), M962**

Used by M2HB machine gun. For use against light armor vehicles and aircraft with the additional tracer feature. This round is also for use in M1-series Abrams Tank gunnery training using a subcaliber insert.

Projectile diameter: 0.30 inches (7.7 mm)

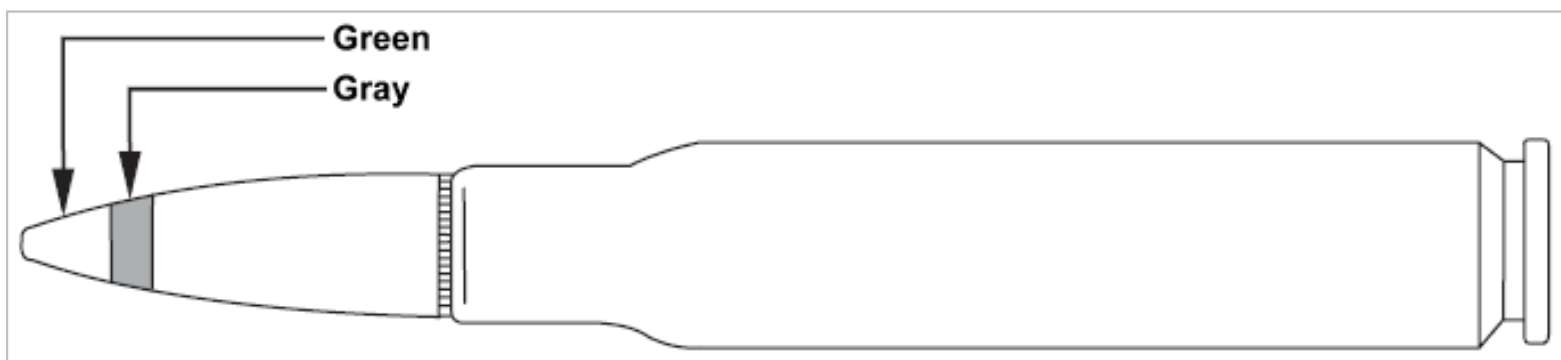
Tracer: R543

The Saboted Light Armor Penetrator with Tracer (SLAP-T), M962 cartridge consists of a tungsten alloy penetrator of the same mass as the Saboted Light Armor Penetrator (SLAP), M903. The sabot, which is designed to break up at the muzzle to release the penetrator, must also survive the gun environment until launch. It is injection molded of special high strength plastic and is reinforced with an aluminum insert in the base section. The tungsten alloy penetrator has a slot in the base to insure full spin-up before separation from the sabot at the muzzle. The penetrator base is cored out to accommodate a trace mix composition.

The cartridge is identified by a red sabot (Ultem 1000).

Type Classification: STD. Type Classification Date: 31-MAR-1993. Unit cost: \$12.85 (Fiscal Year 2005).

## Cartridge, Caliber .50, Armor Piercing Incendiary (API), MK 211 Mod 0



Used by M2 machine gun and the M107 Long Range Sniper Rifle. For use against light armored vehicles and aircraft. This cartridge provides improved penetration performance against enemy personnel and light armor vehicles.

Explosive: 13 grains (0.84 gm) Comp A-4  
Incendiary composition: 13.1 grains (0.85 gm) #136

This cartridge is identified by green bullet tip identification paint. The projectile consists of a brass jacket surrounding a steel body and tungsten core with incendiary and high explosive charges.

Type Classification: STD. Type Classification Date: FEB-1996 (for U.S. Army)

## AMMUNITION EFFECTS

The .50 caliber round is optimized for penetration at long ranges (about 875 yards, or 800 meters). For hard targets, .50 caliber penetration is affected by obliquity and range.

The .50 caliber round can penetrate all of the commonly found urban barriers except a sand-filled 55-gallon drum.

Continued and concentrated machine gun fire can breach most typical urban walls. Such fire cannot breach thick reinforced concrete structures or dense natural stone walls. Internal walls, partitions, plaster, floors, ceilings, common office furniture, home appliances, and bedding can be easily penetrated by .50 caliber rounds.

Number of rounds needed to penetrate a reinforced concrete wall at 25° obliquity.

Wall Thickness	109 yd (100 m) Range	219 yd (200 m) Range
2 ft (0.6 m)	300 rounds	1,200 rounds
3 ft (0.9 m)	450 rounds	1,800 rounds
4 ft (1.2 m)	600 rounds	2,400 rounds

Penetration capabilities of a single .50 caliber M2 AP round fired from a 45-inch barrel.

Range	Armor Plate (homogeneous)	Armor Plate (face-hardened)	Sand	Clay
<b>219 yd (200 m)</b>	1.0 in (25.4 mm)	0.9 in (22.9 mm)	14 in (355.6 mm)	28 in (711.2 mm)
<b>656 yd (600 m)</b>	0.7 in (17.8 mm)	0.5 in (12.7 mm)	12 in (304.8 mm)	27 in (685.8 mm)
<b>1,640 yd (1,500 m)</b>	0.3 in (7.6 mm)	0.2 in (5.1 mm)	16 in (406.4 mm)	21 in (533.4 mm)

Penetration capabilities of a single .50 caliber M2 Ball round fired from a 45-inch barrel.

Range	Sand	Clay	Concrete
<b>219 yd (200 m)</b>	14 in (355.6 mm)	28 in (711.2 mm)	2 in (50.8 mm)
<b>656 yd (600 m)</b>	12 in (304.8 mm)	26 in (660.4 mm)	1 in (25.4 mm)
<b>1,640 yd (1,500 m)</b>	6 in (152.4 mm)	21 in (533.4 mm)	1 in (25.4 mm)

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To the best of my knowledge all military data and images presented in these pages are UNCLASSIFIED, NON-SENSITIVE, and approved for public release.

Sources:

FM 3-06.11 Combined Arms Operations in Urban Terrain.

FM 23-65 Browning Machine Gun Caliber .50 HB, M2.

TM 9-1005-239-10 Operator's Manual M107 Long Range Sniper Rifle.

TM 43-0001-27 Army Ammunition Data Sheets For Small Caliber Ammunition.

MCWP 3-15.1 Machine Guns and Machine Gun Gunnery.

2005 ARMY PROCUREMENT OF AMMUNITION Budget Estimate.