75mm Gun M2, M3, & M6 Specification Booklet

Carriage and mount:	M3 series in mount M1, M4 series in Mount M34 and M34A1
Length of Chamber (to Rifling):	14.4 inches
Length of Rifling:	69.6 inches(M2) 96.2 inches (M3 and M6)
Length of Chamber (to projectile base):	12.96 inches (APC M61), 11.5 inches (HE M48)
Travel of Projectile in Bore:	(M2) 71 inches (APC M61), 72.5 inches (HE M48) (M3&M6) 97.67 inches, (APC M61), 99.1(HE M48)
Length of Bore:	84.0 inches, 28.5 calibers (M2); 110.63 inches, 37.5 calibers (M3 and M6)
Depth of Breach Recess:	7.75 inches (M2 and M3 guns); 5.75 inches (M6 gun)
Length of Muzzle to rear face of Breach:	(M2) 91.75 inches, 31.1 calibers (M3) 118.38, 40.1 calibers (M6) 116.38 inches; 39.4 calibers
Additional length, Muzzle Brake, etc.:	none
Overall length:	(M2)91.75 inches; (M3) 118.38 inches; (M6) 116.38 inches
Diameter of Bore:	2.95 inches
Chamber Capacity:	88.05 cubic inches (APC M61), 80.57 cubic inches (HE M48)
Weight Tube:	611 pounds
Total Weight:	783 pounds (M2); 893 pounds (M3); 410 pounds (M6)
Type of Breechblock:	Semiautomatic sliding wedge, Gun mounted so breechblock slides vertically in Mount M1 and horizontally in mounts M34, M34A1 and M64
Rifling:	24 grooves, uniform right-hand twist, one turn in 25.59 calibers (slope in 7 degrees)
Ammunition:	Fixed
Primer:	Percussion
Weight Complete Round:	APC M61 Projectile (APCBC/HE-T) 19.92 pounds HVAP T45 Shot (APCR-T)* 13.60 pounds AP M72 Shot (AP-T) 18.80 pounds HE M48 Shell (HE), Supercharge 19.56 pounds HE M48 Shell (HE) Normal 18.80 pounds HC B1 M89 Shell, Smoke 9.83 pounds
Weight, Projectile	APC M61 Projectile (APCBC/HE-T) 14.96 pounds HVAP T45 Shot (APCR-T)* 8.40 pounds AP M72 Shot (AP-T) 13.94 pounds HE M48 Shell (HE), 14.70 pounds HC B1 M89 Shell, Smoke 6.61 pounds
Maximum Powder Pressure:	38,000 PSI
Maximum Rate of Fire:	20 rounds a minute
Muzzle Velocity:	**M2** Gun / **M3/M6** Guns APC M61 Projectile (APCBC/HE-T) 1930 Ft./second / 2030 Ft./second HVAP T45 Shot (APCR-T)* / 2850 Ft./second AP M72 Shot (AP-T) 1930 Ft./second / 2030 Ft./second HE M48 Shell (HE), Supercharge 1885 Ft./second / 1980 Ft./second HE M48 Shell (HE) Normal 1470 Ft./second / 1520 Ft./second HC B1 M89 Shell, Smoke 820 Ft./second / 850 Ft./second
Muzzle Energy of Projectile: $KE = \frac{1}{2}MV^2$ Rotational energy is neglected and values are based on long tons (2240pounds)	**M2** Gun / **M3/M6** Guns APC M61 Projectile (APCBC/HE-T) 387 Ft-tons / 427 Ft-tons HVAP T45 Shot (APCR-T)* / 473 Ft-tons AP M72 Shot (AP-T) 360 Ft-tons / 398 Ft-tons HE M48 Shell (HE), Supercharge 362 Ft-tons / 400 Ft-tons HE M48 Shell (HE) Normal 220 Ft-tons / 235 Ft-tons
Maximum Range (independent of mount):	**M2** Gun / **M3/M6** Gun APC M61 Projectile (APCBC/HE-T) 13,600 yards / 14,000 yards AP M72 Shot (AP-T) 10,200 yards / 10,650 yards HE M48 Shell (HE), Supercharge 13,300 Yards / 14,000 yards 0HE M48 Shell (HE) Normal 11,000 yards / 11,400 yards HC B1 M89 Shell, Smoke Approximately 1500 yards / 1500 yards

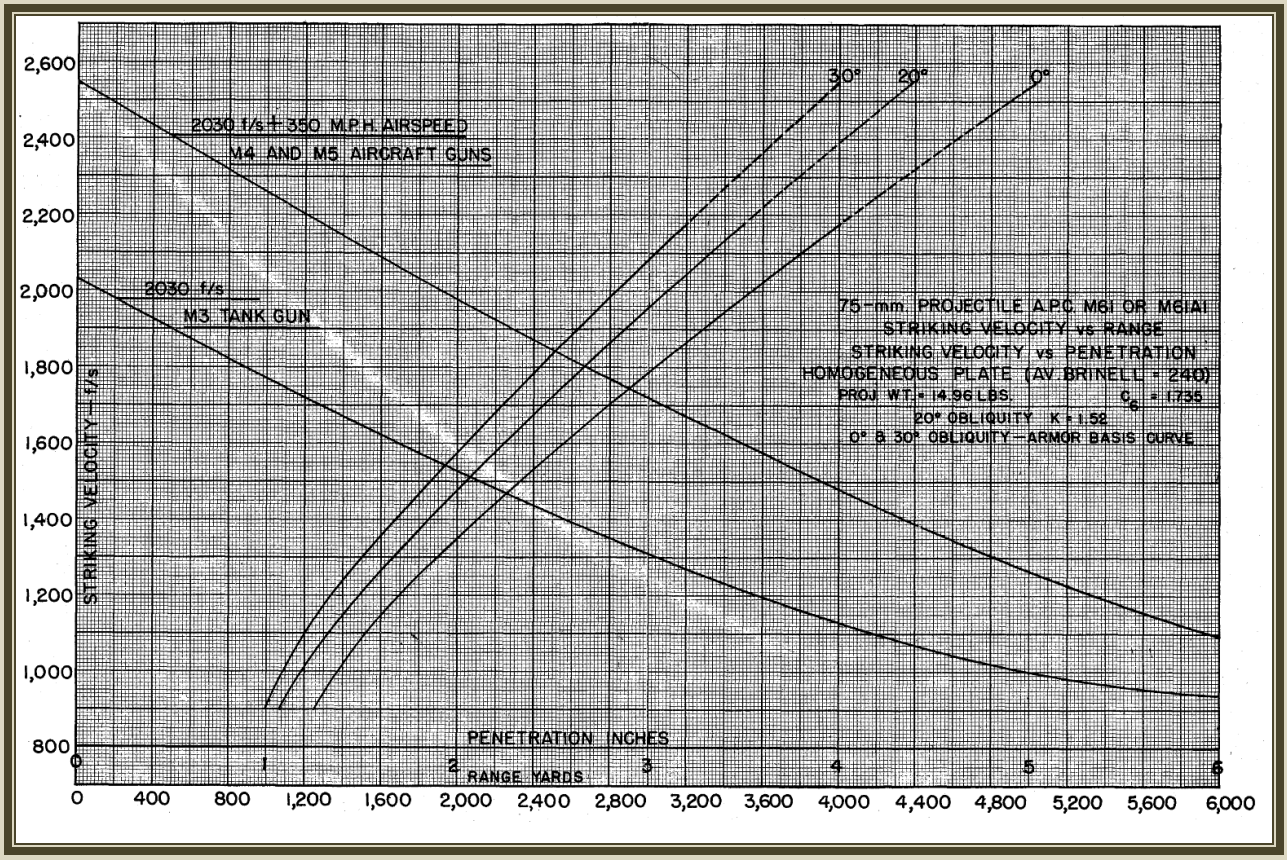
Data below for **M3** gun only. ***Done by the Sherman Tank site with Data from Hunnicutt's Sherman Tank book.***

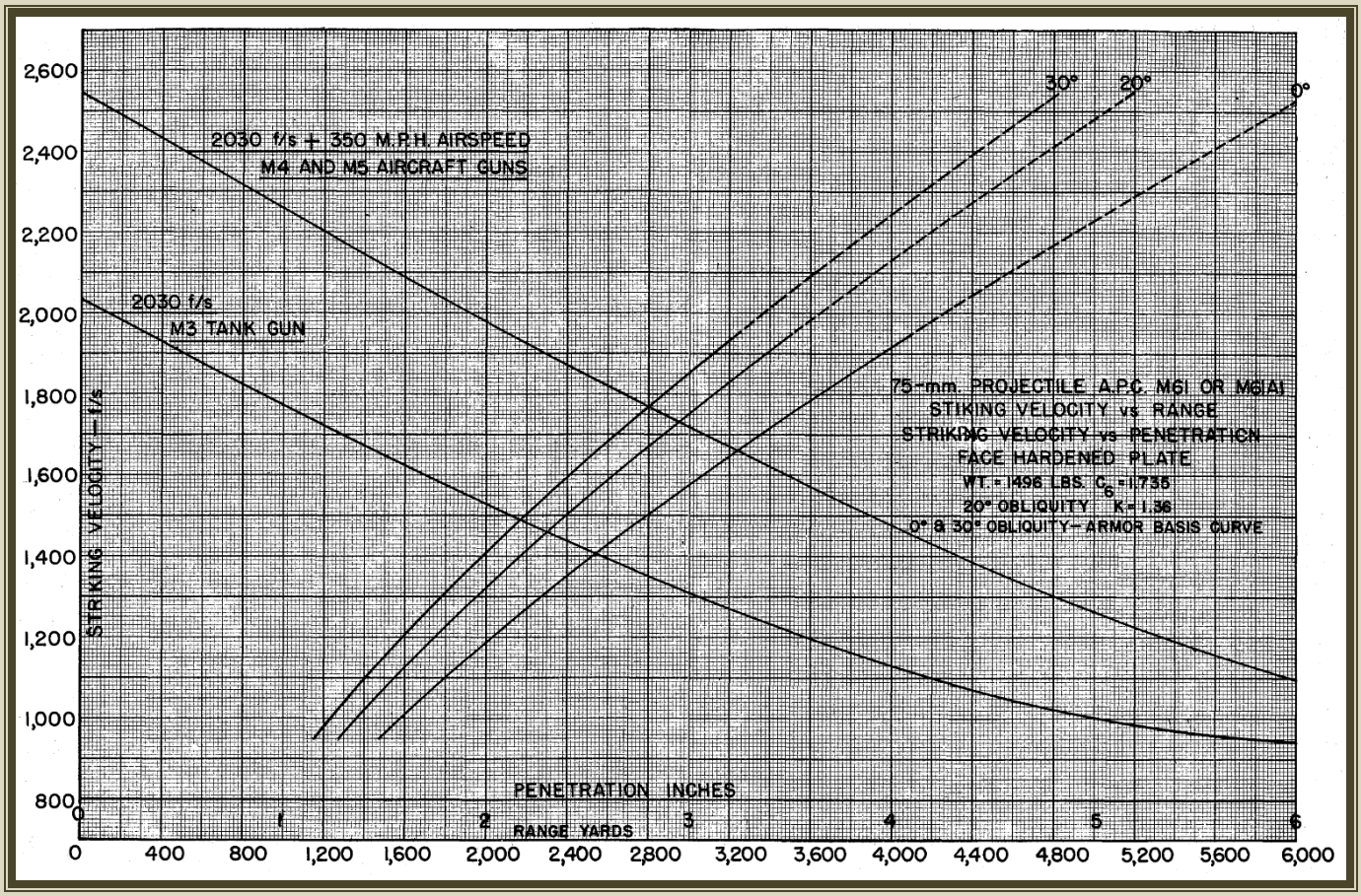
Shell Name		500 yards (457.2 meters)	1000 yards (914.4 meters)	1500Yards (1371.6 meters)	2000 yards (1828.8 meters)
APC M61	Homogeneous armor at 30 degrees	2.4 inches (60.96mm)	2.2 inches (55.88mm)	2.0 inches (50.8mm)	1.8 inches (45.72mm)
AP M72	Homogeneous armor at 30 degrees	2.4 inches (60.96mm)	2.1 inches (53.34mm)	1.8 inches (45.72mm)	1.5 inches(38.1mm)
APC M61	Face-hardened armor at 30 degrees	2.7 inches (68.58mm)	2.4 inches (60.96mm)	2.2 inches (55.88mm)	1.9 inches (48.26mm)
AP M72	Face-hardened armor at 30 degrees	2.3 inches (58.42mm)	1.8 inches (45.72mm)	1.3 inches (33.02mm)	1.0 inches (25.4mm)
APC M61	Homogeneous armor at 30 degrees	2.6 inches (66.04mm)	2.4 inches (60.96mm)	2.2 inches (55.88mm)	2.0 inches (50.8mm)
AP M72	Homogeneous armor at 30 degrees	3.0 inches (76.2mm)	2.5 inches (63.5mm)	2.0 inches (50.8mm)	1.7 inches (43.18mm)
HVAP T45*	Homogeneous armor at 30 degrees	4.6 inches (116.84mm)	3.8 inches (96.52mm)	3.1 inches (78.74mm)	2.5 inches (63.5mm)
APC M61	Face-hardened armor at 30 degrees	2.9 inches (73.66mm)	2.6 inches (66.04mm)	2.4 inches (60.96mm)	2.1 inches (53.34mm)
AP M72	Face-hardened armor at 30 degrees	2.6 inches (66.04mm)	2.1 inches (53.34mm)	1.6 inches (40.64mm)	1.3 inches (33.02mm)
	*Experimental only				

COMPLETE ROUND TABLE FOR AMMUNITION FOR 75-MM GUNS

(This table is not to be confused with official Complete Round Charts, Form No. 5981.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Booster, Adapter-Booster, or Burster	Cartridge Case[1]	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler Kind	Filler Weight (Lb.)	Weight as Fired (Lb.)	Type and Model	Action			Kind	Weight (Lb.)	Model	Type
Service Ammunition															
7, 8	A, B, C	PROJECTILE	A.P.C.	M61A1	Exp. D	0.144	14.96	B.D., M66A1	Delay	None	M18	FNH, M1 (super)	2.00	M31A2	150-gr. perc.
7	B	PROJECTILE	A.P.C.	M61A1	Exp. D	0.144	14.96	B.D., M66A1	Delay	None	M18	FNH[2] (super)	2.00	M31A2	150-gr. perc.
7, 8	A, B, C	PROJECTILE	A.P.C.	M61	Exp. D	0.144	14.96	B.D., M66A1	Delay	None	M18	FNH, M1 (super)	2.00	M31A2	150-gr perc.
8, 9	A, B, C	PROJECTILE	A.P.C.	M61	None	—	14.40	None	—	None	M18	FNH, M1 (super)	2.00	M31A2	150-gr. perc.
7	B	PROJECTILE	A.P.C.	M61	Exp. D	0.144	14.96	B.D., M66A1	Delay	None	M18	FNH[2] (super)	2.00	M31A2	150-gr. perc.
8, 9	B	PROJECTILE	A.P.C.	M61	None	—	14.40	None	—	None	M18	FNH[2] (super)	2.00	M31A2	150-gr. perc.
—	A, C	SHELL	Gas	M64	CNS	1.10	15.01	P.D., M57	SQ	M6	M18	FNH	2.00	M31A2	150-gr. perc.
—	A	SHELL	Gas	Mk. II	NC	—	—	P.D., M46	SQ	Mk. IVM1	M18	FNH, M1 (normal)	1.35	M22A1	75-gr. perc.
—	A	SHELL	Gas	Mk. II	H	1.33	12.33	P.D., M46	SQ	Mk. IVM1	M18	FNH, M1 (normal)	1.35	M22A2	75-gr. perc.
—	A	SHELL	H.E.	M48	TNT	1.47	14.70	P.D., M48A2[3]	SQ & 0.15-sec. Delay	M20A1[4]	M18	FNH, M2 (reduced)	0.59	M22A3	75-gr. perc.
—	A, C	SHELL	H.E.	M48	TNT	1.47	14.70	P.D., M48A2[3]	SQ & 0.15-sec. Delay	M20A1[4]	M18	FNH, M1 (normal)	1.15	M22A3	75-gr. perc.
	A, C	SHELL	H.E.	M48	TNT	1.47	14.70	P.D., M48A2[3]	SQ & 0.05-sec. Delay	M20A1[4]	M18	FNH, M1 (super)	2.00	M31A2	150-gr. perc.
	A	SHELL	H.E.	M48	TNT	1.47	14.70	TSQ, M54	Time & SQ	M20A1[4]	M18	FNH, M2 (reduced)	0.59	M22A3	75-gr. perc.
—	A	SHELL	H.E.	M48	TNT	1.47	14.70	TSQ, M54	Time & SQ	M20A1[4]	M18	FNH, M1 (normal)	1.15	M22A3	75-gr. perc.
—	A	SHELL	H.E.	M48	TNT	1.47	14.70	TSQ, M54	Time & SQ	M20A1[4]	M18	FNH, M1 (super)	2.00	M31A2	150-gr. perc.
8	B	SHELL	H.E.	M48	TNT	1.47	14.70	P.D., M57	SQ	M20A1[4]	M18	FNH (super)	2.00	M31A2	150-gr. perc.
—	B	SHELL	H.E.	M48	TNT	1.47	14.70	P.D., M57	SQ	M20A1[4]	M18	FNH[2] (super)	1.93	M31A2	150-gr. perc.
	A, C	SHELL	H.E.	Mk. I	TNT	1.64	12.44[5]	P.D., M46 or M47[6]	SQ or Delay[6]	Mk. III	M18	FNH, M2 (reduced)	0.56	M22A2	75-gr. perc.
—	A, C	SHELL	H.E.	Mk. I	TNT	1.64	12.44[5]	P.D., M46 or M47[6]	SQ or Delay[6]	Mk. III	M18	FNH, M1 (normal)	1.35	M22A2	75-gr. perc.
—	A, C	SHELL	H.E.	Mk. I	TNT	1.64	12.44[5]	P.D., M46 or M47[6]	SQ or Delay[6]	Mk. III	M18	NC, M2 (reduced)	0.56	M22A2	75-gr. perc.
—	A, C	SHELL	H.E.	Mk. I	TNT	1.64	12.44[5]	P.D., M46 or M47[6]	SQ or Delay[6]	Mk. III	M18	NC, M1 (normal)	1.35	M22A2	75-gr. perc.
—	A	SHELL	Smoke	Mk. II	FM	1.68	12.69	P.D., M46	SQ	Mk. IVM1	M18	FNH, M1 (normal)	1.35	M22A2	75-gr. perc.
—	A	SHELL	Smoke	Mk. II	FS	1.90	12.90	P.D., M46	SQ	Mk. IVM1	M18	FNH, M1 (normal)	1.35	M22A2	75-gr. perc.





See the end of this booklet for instructions on how to read these tables. It really makes these tables much more understandable.

75 mm HE SHELL, M48

INITIAL FRAGMENT VELOCITY 3,120 F/S

TABLE 38
CASUALTIES

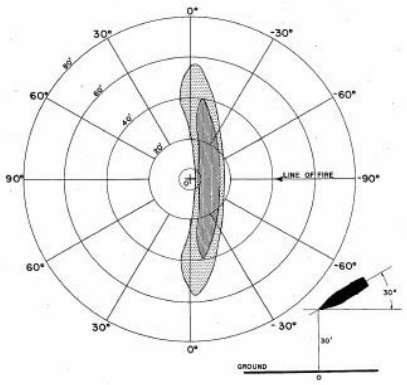
Distance from burst (ft)	Total number of effective fragments	Average number of effective fragments per sq ft	For the lightest effective fragment	
			Weight (oz)	Velocity (f/s)
r	N	B	m	v
20	1,070	0.213	0.014	2,060
30	920	0.0809	0.018	1,820
40	750	0.0375	0.024	1,570
60	640	0.0141	0.037	1,270
80	510	0.0064	0.051	1,080
100	450	0.0036	0.063	972
150	370	0.0013	0.090	813
200	320	0.0006	0.116	716
300	250	0.0002	0.173	587
400	200	0.0001	0.244	494

TABLE 39
PERFORATION OF ⅛ IN. MILD STEEL

Distance from burst (ft)	Total number of effective fragments	Average number of effective fragments per sq ft	For the lightest effective fragment	
			Weight (oz)	Velocity (f/s)
r	N	B	m	v
20	534	0.106	0.049	2,390
30	442	0.0391	0.065	2,180
40	386	0.0192	0.082	2,010
60	300	0.0066	0.127	1,790
80	242	0.0030	0.185	1,580
100	197	0.0016	0.253	1,430
130	132	0.0006	0.375	1,270
160	86	0.0003	0.508	1,160
190	57	0.0001	0.655	1,080
225	39	0.0001	0.820	1,020

75-MM SHELL, H.E., M48

PERFORATION OF 1/8-IN. MILD STEEL



At least 1 hit per 10 sq. ft.

At least 1 hit per 25 sq. ft.

FIGURE 73

Height of Burst 30 ft.
Remaining Velocity 800 f/s
Range 8,500 yd. (normal charge)—75-mm Gun, M3

75-MM SHELL, H.E., M48

PERFORATION OF 1/8-IN. MILD STEEL

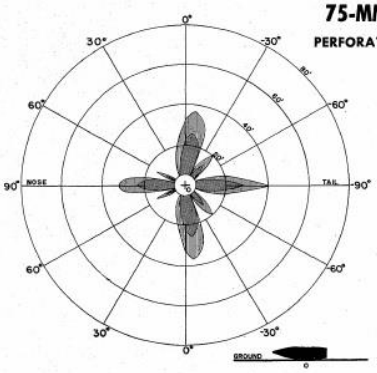


FIGURE 71

Ground Burst
Shell Horizontal at rest

At least 1 hit per 4 sq. ft.

At least 1 hit per 10 sq. ft.

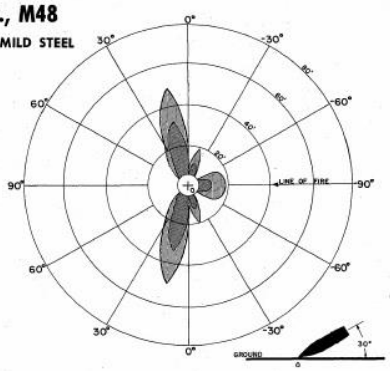


FIGURE 72

Ground Burst
Remaining Velocity 800 f/s
Range 8,500 yd. (normal charge)—75-mm Gun, M3

75-MM SHELL, H.E., M48

CASUALTIES

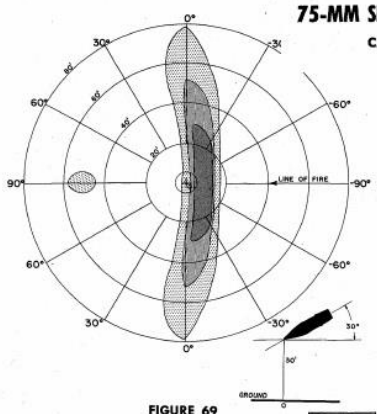


FIGURE 69

Height of Burst 30 ft.
Remaining Velocity 800 f/s
Range 8,500 yd. (normal charge)—75-mm Gun, M3

At least 1 hit per 4 sq. ft.

At least 1 hit per 10 sq. ft.

At least 1 hit per 25 sq. ft.

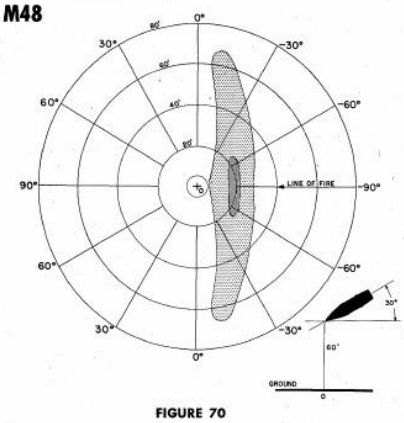


FIGURE 70

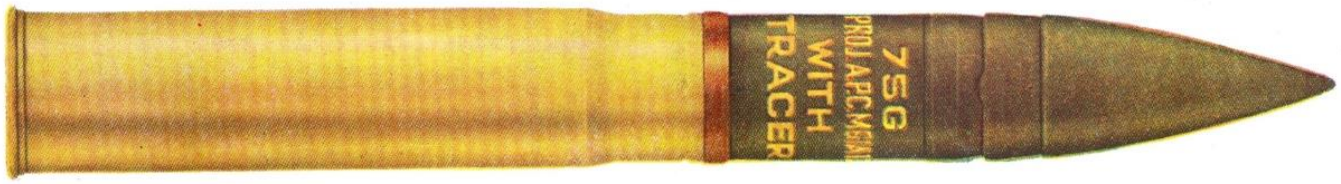
Height of Burst 60 ft.
Remaining Velocity 800 f/s
Range 8,500 yd. (normal charge)—75-mm Gun, M3

DATA

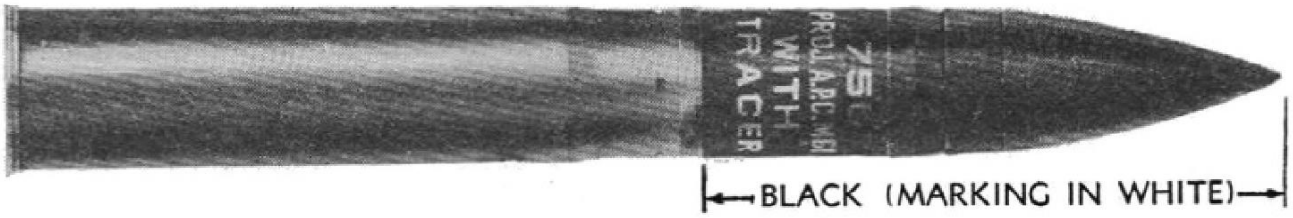
Weight of complete round	19.92 lb	Radius of ogive (false ogive)	7.17 cal.
Length of complete round	26.29 in.	Muzzle velocity	2,030 ft per sec*
Length of projectile	13.22 in.	Maximum range	13,870 yd*
Length of cartridge case	13.82 in.	Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)	3.4†
Width of rotating band	0.49 in.		
Type of base	Square		

Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd)....2.8‡

*—In M3 Guns; muzzle velocity in M1916, M1917 and M2 Guns, 1,930 feet per second, in M1897A4 Guns, 2,000 feet per second.
†—In M3 Guns; in M2, M1916, and M1917 Guns, 3.1 inches; in M1897A4 Guns, 3.3 inches.
‡—In M3 Guns; in M2, M1916, and M1917 Guns, 2.6 inches; in M1897A4 Guns, 2.7 inches.



PROJECTILE, Fixed, A.P.C., M61A1, w/FUZE, B.D., M66A1, and TRACER, 75-mm Gun

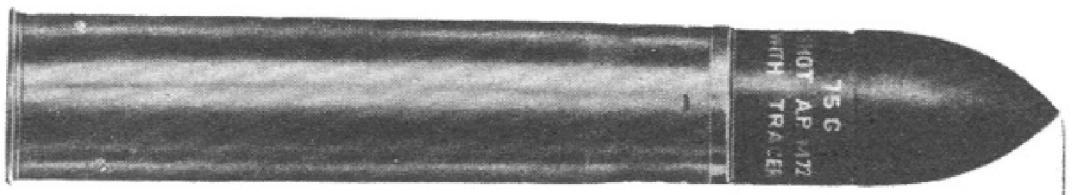


Weight of complete round	19.36 lb	Radius of ogive (false ogive)	7.17 cal.
Length of complete round	26.29 in.	Muzzle velocity	2,030 ft per sec*
Length of projectile	13.22 in.	Maximum range	13,870 yd*
Length of cartridge case	13.82 in.	Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)	3.4†
Width of rotating band	0.49 in.		
Type of base	Square		

Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd).... 2.8‡

*—In M3 Guns; muzzle velocity in M1916, M1917 and M2 Guns, 1,930 feet per second, in M1897A4 Guns, 2,000 feet per second.
†—In M3 Guns; in M2, M1916, and M1917 Guns, 3.1 inches; in M1897A4 Guns, 3.3 inches.
‡—In M3 Guns; in M2, M1916, and M1917 Guns, 2.6 inches; in M1897A4 Guns, 2.7 inches.

PROJECTILE, Fixed, A.P.C., M61, w/TRACER, 75-mm Gun

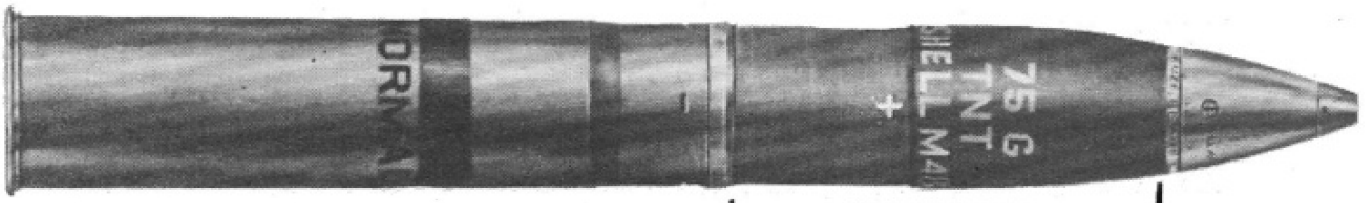


RA PD 80739

Weight of complete round	18.80 lb	Muzzle velocity	2,030 ft per sec*
Length of complete round	20.81 in.	Maximum range	10,650 yd*
Length of projectile	9.21 in.	Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)	2.6†
Length of cartridge case	13.82 in.		
Width of rotating band	0.49 in.	Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd)	3.1‡
Type of base	Boat-tailed		
Degree of taper	9 deg 15 min		
Radius of ogive	1.64 cal.		

*—In M3 Guns; in M2, M1916, and M1917 Guns, 1,930 feet per second; in M1897A4 Guns, 2,000 feet per second.
†—In M3 Guns; in M2, M1916, and M1917 Guns, 2.3 inches; in M1897A4 Guns, 2.5 inches.
‡—In M3 Guns; in M2, M1916, and M1917 Guns, 2.9 inches; in M1897A4 Guns, 3.0 inches.

SHOT, Fixed, A.P., M72, w/TRACER, 75-mm Gun

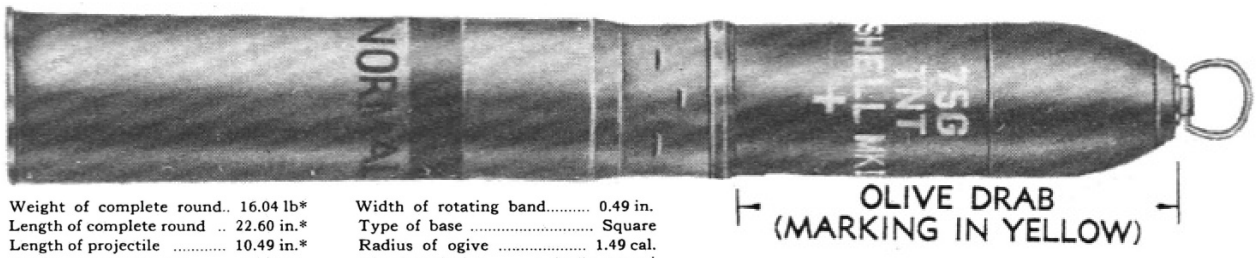


Weight of complete round .... 18.80 lb
Length of complete round ..... 26.6 in.
Length of fuzed projectile .... 15.00 in.
Length of cartridge case ..... 13.82 in.
Width of rotating band..... 0.49 in.
Type of base ..... Boat-tailed
Degree of taper ..... 9 deg 15 min
Radius of ogive ..... 7.51 cal.
Muzzle velocity ..... 1,515 ft per sec*
Maximum range (at 44 deg)..... 11,195 yd*

*—In M3 Guns; in M1916-17 and M2 Guns, 1,470 feet per second; in M1897A4 Guns, 1,500 feet per second.

RA PD 80733

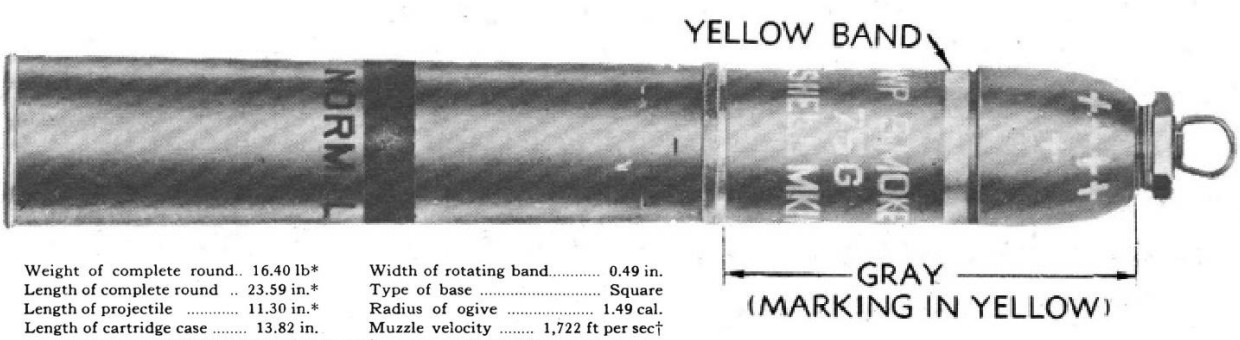
SHELL, Fixed, H.E., M48, Normal Charge, w/FUZE, P.D., M48A2, SQ & 0.15-sec. Delay, 75-mm Gun



Weight of complete round.. 16.04 lb*
Length of complete round .. 22.60 in.*
Length of projectile ..... 10.49 in.*
Length of cartridge case ..... 13.82 in.
Width of rotating band..... 0.49 in.
Type of base ..... Square
Radius of ogive ..... 1.49 cal.
Muzzle velocity .....1,722 ft per sec†
Maximum range (at 42 deg)..... 8,865 yd†

*—For unfuzed rounds; fuze weights are: M47, 0.74 pound; M46, 0.77 pound.
†—For M2, M1916, and M1917 Guns; muzzle velocity in M1897A4 Guns is 1,784 feet per second; in M3 Guns, 1,814 feet per second.

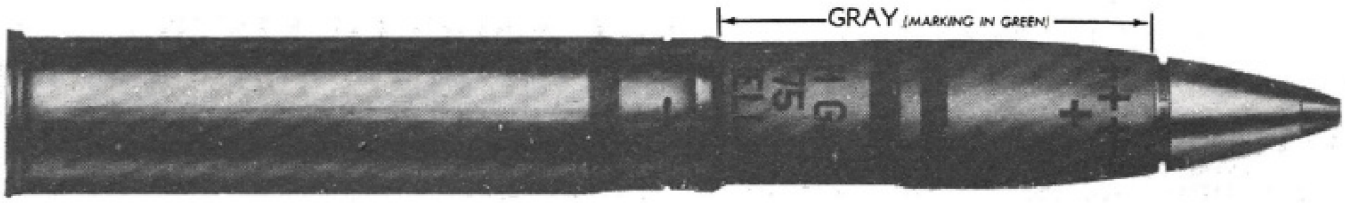
SHELL, Fixed, H.E., Mk. I, Flashless, Unfuzed, 75-mm Gun (Adapted for FUZE, P.D., M46 or M47)



Weight of complete round.. 16.40 lb*
Length of complete round .. 23.59 in.*
Length of projectile ..... 11.30 in.*
Length of cartridge case ..... 13.82 in.
Width of rotating band..... 0.49 in.
Type of base ..... Square
Radius of ogive ..... 1.49 cal.
Muzzle velocity ..... 1,722 ft per sec†
Maximum range (at 42 deg)..... 8,600 yd†

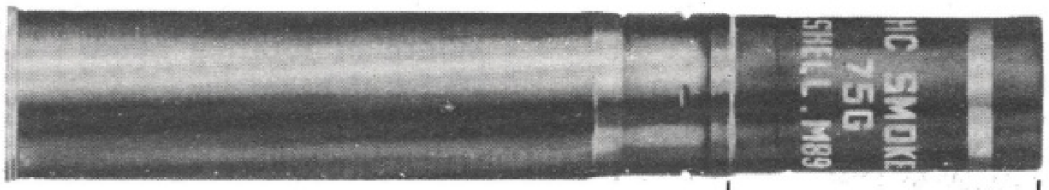
*—Data for unfuzed rounds; fuze weight for M46 is 0.77 pound.
†—In M2, M1916, and M1917 Guns; muzzle velocity in M1897A4 Guns, 1,784 feet per second; in M3 Guns, 1,815 feet per second.

SHELL, Fixed, Smoke, Phosphorus, WP, Mk. II, Normal Charge, Unfuzed, 75-mm Gun (Adapted for FUZE, P.D., M46)



Weight of complete round	20.26 lb	Type of base	Boat-tailed
Length of complete round	26.6 in.	Degree of taper	9 deg 15 min
Length of fuzed projectile	15.00 in.	Radius of ogive	7.51 cal.
Length of cartridge case	13.82 in.	Muzzle velocity	1,980 ft per sec
Width of rotating band	0.49 in.	Maximum range	13,860 yd

SHELL, Fixed, Smoke, Phosphorus, WP, M64, w/FUZE, P.D., M57, 75-mm Gun



Weight of complete round	9.83 lb	Type of base	Square
Length of complete round	20.26 in.	Muzzle velocity (approx)	850 ft per sec
Length of projectile	7.49 in.	Maximum range (at 12 deg) (approx)	1,500 yd
Length of cartridge case	13.82 in.		
Width of rotating band	0.49 in.		

SHELL, Fixed, Smoke, HC, B.I., M89, 75-mm Guns, M2 and M3

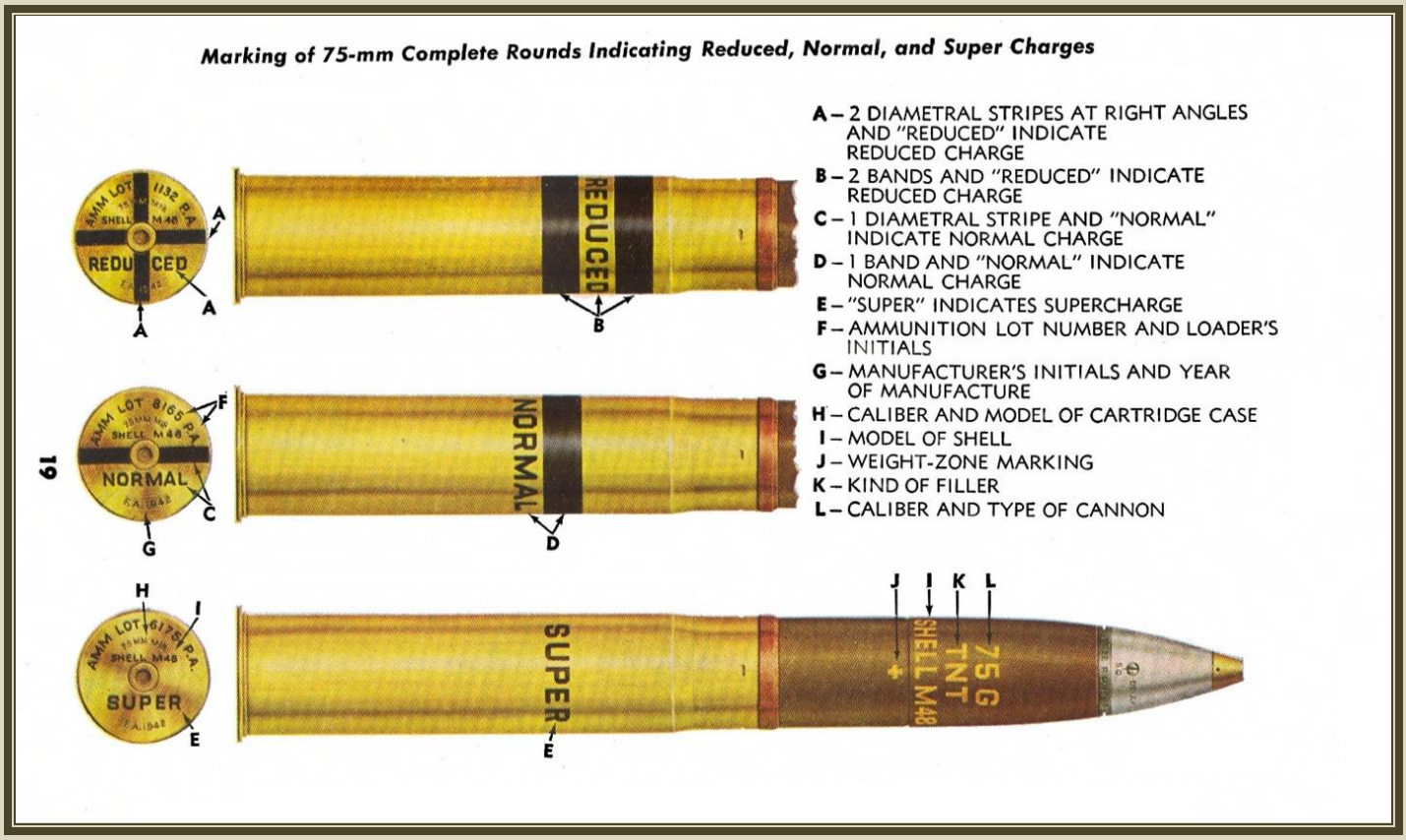
The preceding listing of rounds is not complete. I do not have any images of the experimental **T45 HVAP**, or the **T30** Canister rounds. I also did not include the, **Shell Fixed, Gas, Persistent, H, Mk. II,** in its various charge configuration, since it was not used in WWII. Also not included was **Shell, Fixed, Gas, Persistent, CNS, M64** for the same reason. **Shrapnel, Fixed, MK. I, 75mm gun** was not included because I don't think it saw combat use in WWII. I didn't include the various blank, practice, and dummy rounds for space reasons.

♠♠♠

The **M3** Gun was a natural choice for the main gun on the Sherman. The guns long lineage as an infantry gun goes back to the **French Canon De 75 modele 1897 field gun**. This gun saw wide use by the French Army and US Army in WWI. Updated version of the field gun were still in use with the French and US Army, and since the Germans captured large stocks of this weapon when they took French, they used them too, as AT guns against the T-34 in some cases!

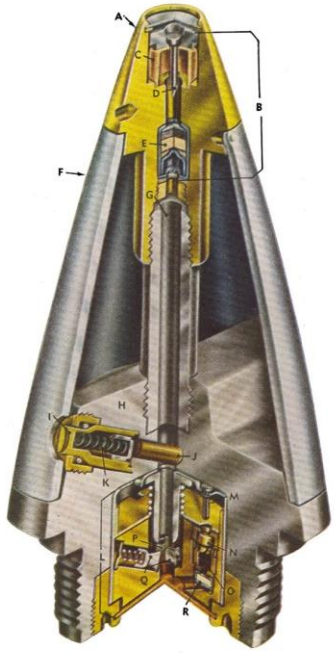
As the previous section illustrated, there were a large number of readily available ammunition choices, coupled with the improved breach used on the tank guns. The **M34** and **M34A1** gun mounts the **M3** fit in were well designed and durable. The gun could be fired almost as fast as it could be fed, and the limitation on that was how easy to reach the ammo was. The AP performance of the gun was not great, but it was more than enough to handle Panzer III and IV tanks on an even basis. It also proved effective against tanks like then Panther and Tiger in real world conditions.

Real world conditions take into account more than just raw gun performance. The Sherman could spin its turret around and do a full rotation in 15 seconds. The turret drive system was very precise as well, and the turret could rotate much slower when the gunner needed to be precise. The gunner had good elevation and depression, -12 to +25 degrees. The stabilizer helped keep the tanks sights on the target, and was really useful shooting the co-ax machine gun while moving. This coupled with the Commanders override, gave the Sherman an advantage in getting the first shot off once an enemy was spotted. This was a big advantage, and was one of the reasons the well trained crews in Northern Europe had little trouble handling heavier German armor. It helped the German Armor was crew by crews it would be charitable to call green, were saddled with tanks that needed an experts hand minimize all Panther or Tigers disadvantages and maximize their few true advantages, and these crews were like mythical beasts in how rare they were.



This is the fuze used on the **M48** 75mm high explosive round. The early version of this fuze had some issues with the fuze failing when used in direct fire roles do to the angle of the shell being too shallow to reliable trigger the round. This problem was solved before the US Army used the M3 and M4 Mediums in North Africa.

Fuze P.D M48A2



FUZE, P.D., M48A2

FUZES, PROPELLING CHARGES, PRIMERS, AND OTHER COMPONENTS

319. FUZE, P.D., M48A2, M48A1, AND M48.

a. General. The M48A2 (fig. 163) is a selective superquick or delay fuze. Either action can be obtained, prior to firing, by turning a setting screw in the side of the fuze. The M48A2 Fuze has two models, one having a delay of 0.05 second, the other a delay of 0.15 second; the time of delay is stamped on the fuze body. The M48A1 Fuze was originally fitted with the 0.15-second delay, whereas the M48 Fuze has the 0.05-second delay. The M48A1 Fuze differs from the M48A2 in that the firing pin in the delay-action assembly is not secured against movement to the rear. This is also true of the M48 Fuze, which differs, in addition, in not having a centrifugal lock (P) to hold the centrifugal delay plungers (Q) apart at low velocities. The fuzes are adapted for use in conjunction with the M20 Booster (or modification) which is made a manufacturing component of the shell. Some M48A1 Fuzes modified to have 0.05-second delay elements are in existence.

b. Data. Length, visible, 3.74 inches, over-all, 4.55 inches; weight, 1.41 pounds; thread size, 1.7-14NS-1.

c. Description. The fuze consists of a head (A) which holds a superquick action (B), and a body (H) which houses a delay assembly (L) and a selective setting device. These main assemblies are connected by a tube (G) which holds the parts firmly in position, and are further supported by a thin-walled ogive (F) shaped to continue the sweep of the ogive of the shell. The superquick action comprises a firing pin (D) supported by a gilding metal cup (C), and a detonator (E). The firing pin support is strong enough to withstand ordinary blows on the firing pin as well as set-back forces upon firing, but collapses under the force of impact at the target. The delay assembly is an inertia plunger type and includes a firing pin (M), primer (N), black powder delay pellet (O), and a detonating relay charge (R).

d. Setting. The setting device is an eccentrically positioned plunger (J) and plunger spring (K), the functioning of which is regulated by a setting sleeve (I). The head of the sleeve is slotted to facilitate turning when adjusting the setting. To enable exact alinement, two register lines and the marking "S.Q." and "DELAY" are stamped on the ogive of the fuze. When the slot in the sleeve head is alined with the "S.Q." line (parallel to the fuze axis), or within 15 degrees either side, the sleeve, which is thicker on one side than on the other, is turned so that it does not interfere with movement of the plunger. The plunger is free, therefore, to move outward under centrifugal force, and thereby open the passage for superquick action. When the slot is alined with the "DELAY" line (at right angles to the fuze axis) or within 15 degrees either side, a section on the setting sleeve rests against the plunger, securing it in the lower extremity of the recess, across the superquick passage.

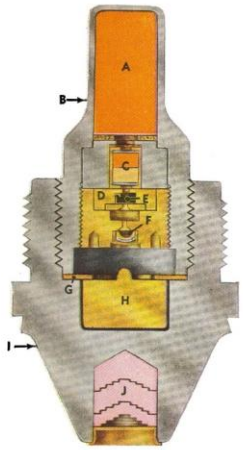
e. Safety Devices. Boresafe superquick action is provided by the plunger (J). Boresafe delay action is provided by the M20 type booster.

f. Functioning. No action takes place upon firing until sufficient rotational speed has been established to overcome the resistance of springs and set-back force on the several safety devices. When set for superquick action, after projectile leaves the muzzle of the weapon, centrifugal force causes the plunger (J) to move outward opening the passage. At the same time, the plunger pins (Q) locking the delay assembly in unarmed position also move outward, releasing that assembly in preparation for impact. In the M48A1 and M48A2 Fuzes, the plunger-pin lock (P) then swings on its pivot under centrifugal force, placing an arm against the inner end of each plunger pin and thereby preventing the return of the pins to the unarmed position. In the M48, rotational force is relied on to hold the pins in the armed position. Upon impact, the firing pin of the superquick action is driven against the detonator, initiating the superquick action. Inertia causes the delay action plunger to move forward, driving the primer against the delay action firing pin and initiating the delay action. In normal functioning with superquick action, the delay action has no effect since the superquick train will have caused the shell to explode before the delay train can burn for its prescribed time. However, should the superquick action fail, the shell will function with delay action rather than become a dud. When set for delay action, the plunger which interrupts the superquick passage is restrained from moving. Upon impact, the superquick firing pin and detonator function but the effect is prevented from being transmitted to the shell.

g. Preparation for Firing. The fuze need only be adjusted for the desired action, as described above. The setting can be adjusted at will, prior to firing, with a screwdriver or similar instrument. The adjustment can be made in the dark by noting the position of the slot, parallel to the fuze axis (or within 15 deg either side) for superquick ("S.Q.") action, and at right angles thereto (or within 15 deg either side) for delay ("DELAY") action.

This is the base detonating fuze used on AP rounds for the 75mm rounds later in the war.

FUZE, B.D., M66A1



FUZES, PROPELLING CHARGES, PRIMERS, AND OTHER COMPONENTS

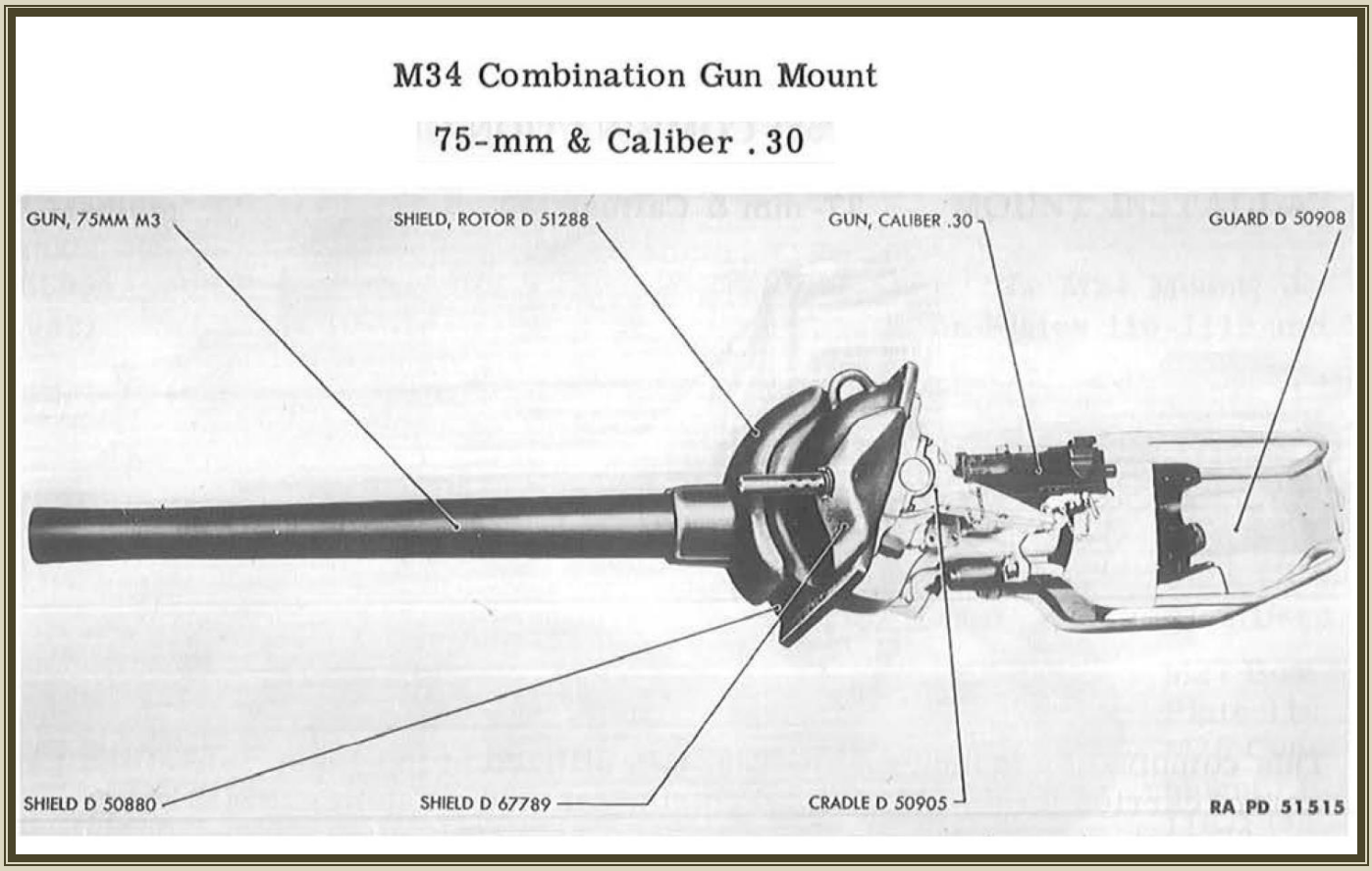
311. FUZE, B.D., M66A1.

a. General. The M66A1 (fig. 155) is a delay-action base-detonating fuze which is provided for use with the M61 and M61A1 (75-mm) and M62 and M62A1 (3-in.) Armor-piercing-capped Projectiles. It is a simple inertia-type fuze, without boresafety provision, in which the firing pin (H) is held at rest by a soft steel washer (G) prior to impact at the target. Upon impact, the weight of the firing pin forces it past the washer.

b. Data. Over-all length, 3.458 inches; weight 1 pound; thread size, 1.65-10NS-1 LH.

c. Description. The fuze is made up of three parts: A body assembly (I), a detonator-booster assembly (B), and a primer holder assembly (D). The body assembly contains the firing pin and, in a cavity in the boat-tailed rear portion, a red tracer composition (J) which operates independent of the fuze mechanism. The detonator-booster assembly holds a tetryl booster pellet (A) and the intermediate detonating charges of lead azide and tetryl (C). The primer holder assembly contains the primer, PRIMER, No. 26 (F), and a black powder delay pellet (E).

d. Functioning. The tracer composition is ignited by the flash of the propelling charge, and burns thereafter for a prescribed time (about 3 sec), providing a visible trace. The firing pin remains at rest upon firing and during the flight of the projectile. Upon impact, the forward force of the firing pin breaks the soft brass washer, and the point of the pin strikes the primer. Action of the primer ignites the delay pellet. After burning a prescribed time (0.01 sec), the black powder pellet initiates detonation of the detonating elements in the explosive train. The final charge (the booster pellet) in turn causes the filler of the projectile to explode.



This is the original **M34** Combination mount. This mount could fit the **M2** and **M3** 75mm guns, and the **M1** series of 76mm guns. This version of the combo mount had several flaws. The main being the lack of direct telescopic sight, this mount was aimed through the gunner's **M4** periscope, with linkage connecting it to the gun mounts. This linkage was not strong enough at first and would vibrate loose. Another problem with this combination mount was the rotor shield, the one pictured is early but not the first model, the original model didn't even have the sleeves that partially cover the sides of the gun. They were added when it was found that area of the gun could be damaged and then the gun would malfunction. The small shield shown on the **M1919A4** machine gun was rarely seen on combat vehicles, but I do not know why. The coaxial machine gun mount seems to be a part of one of the trunnion caps and not an individual bracket like on the later combo mounts. This mount was fully stabilized right from the start. There were some depot modified M34 mounts that added a telescopic sight, and a welded on wider rotor shield to protect the new sight.

This is the later **M34A1** combination gun mount, had all the features of the M34 but it had a full size mantlet/shield rotor. The shield covered the coax mount and the new sight. Not visible in this image is the telescopic sight mounted on the other side of the gun, which was also new with this improved mount. There was a larger weight on the recoil guard to counter the new full size rotor shield. This version of the combo mount had significantly better frontal armor because of the full length rotor shield. This gun mount would stay on the Sherman largely unchanged until 75mm armed Sherman production stopped in late in 45.

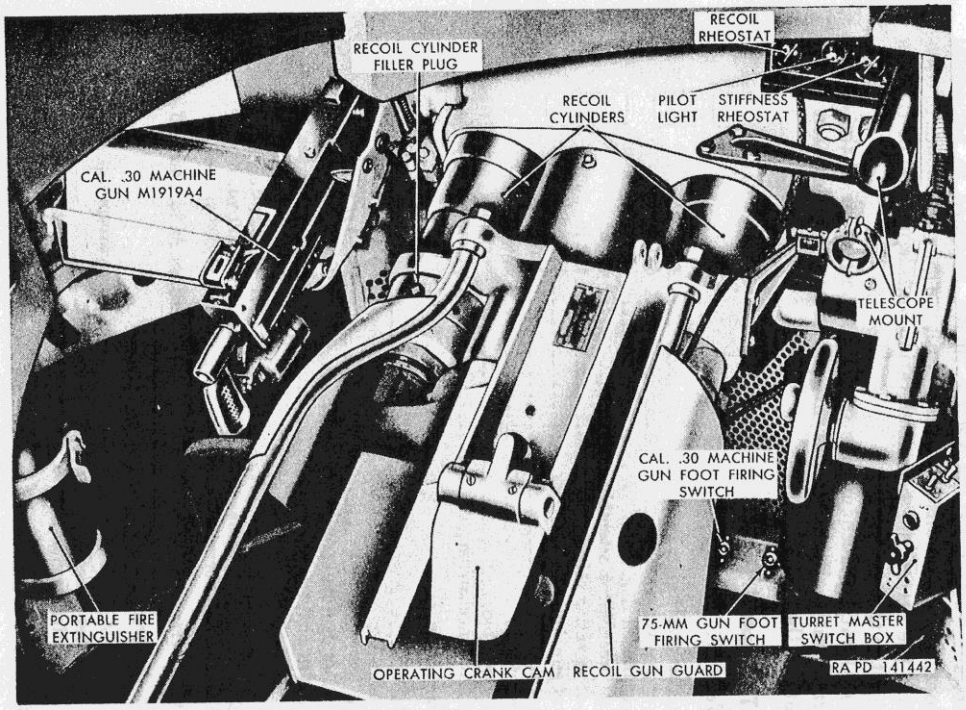


Figure 376. 75-mm gun M3 and combination gun mounts M34 and M34A1 mounted on medium tank M4A3.

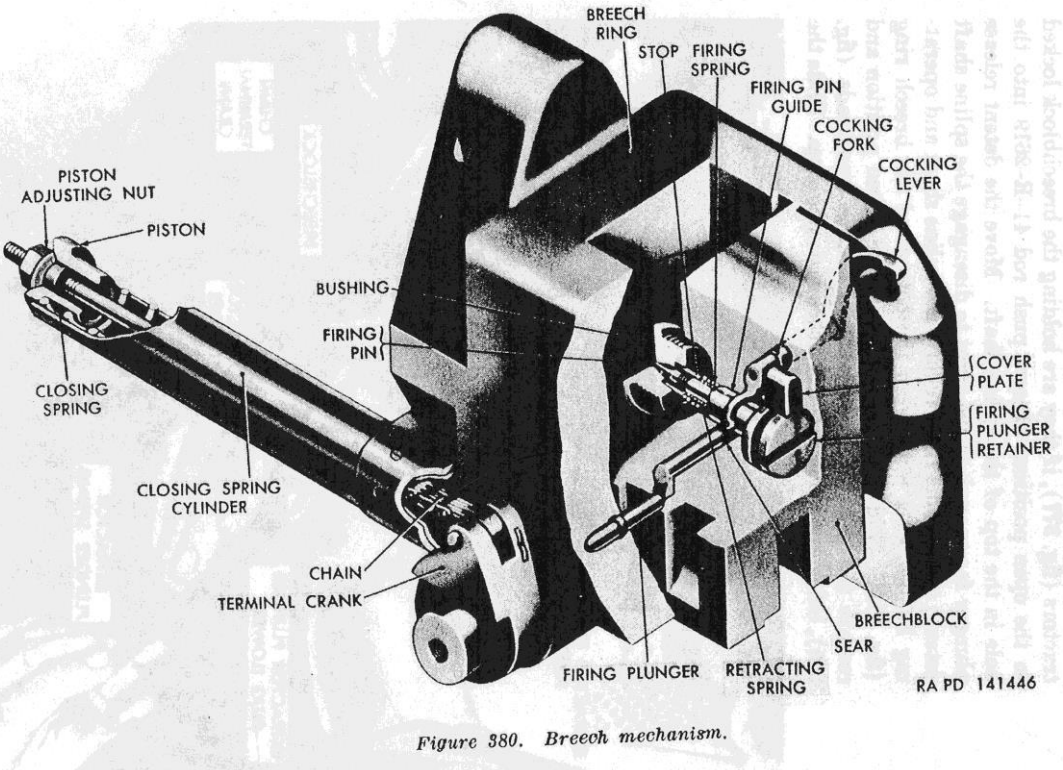


Figure 380. Breech mechanism.

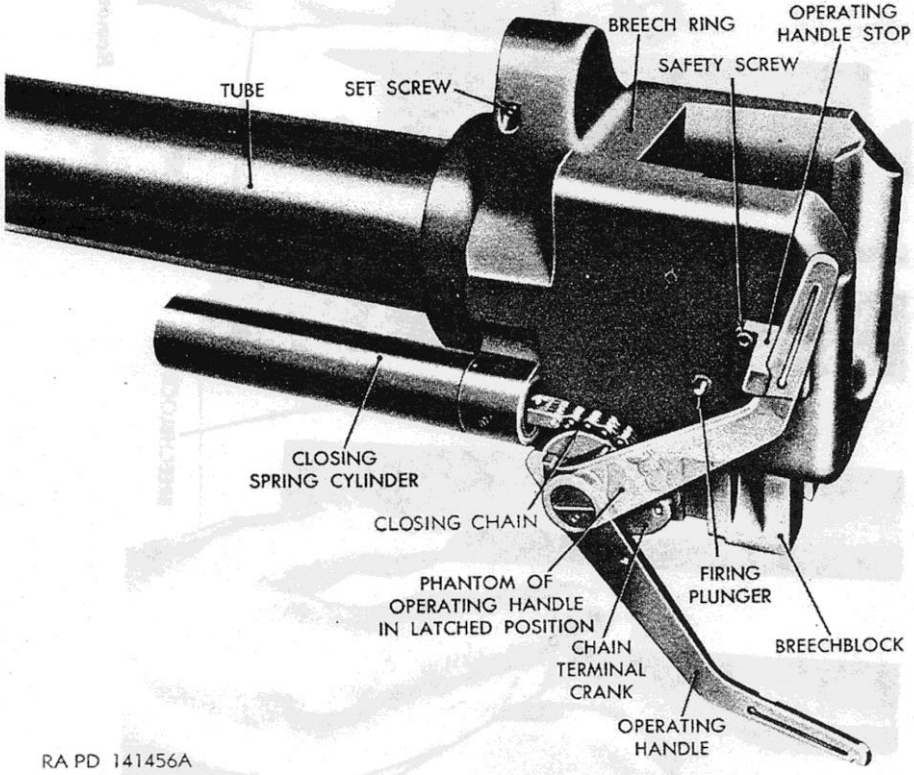


Figure 390. Breech mechanism—bottom view.

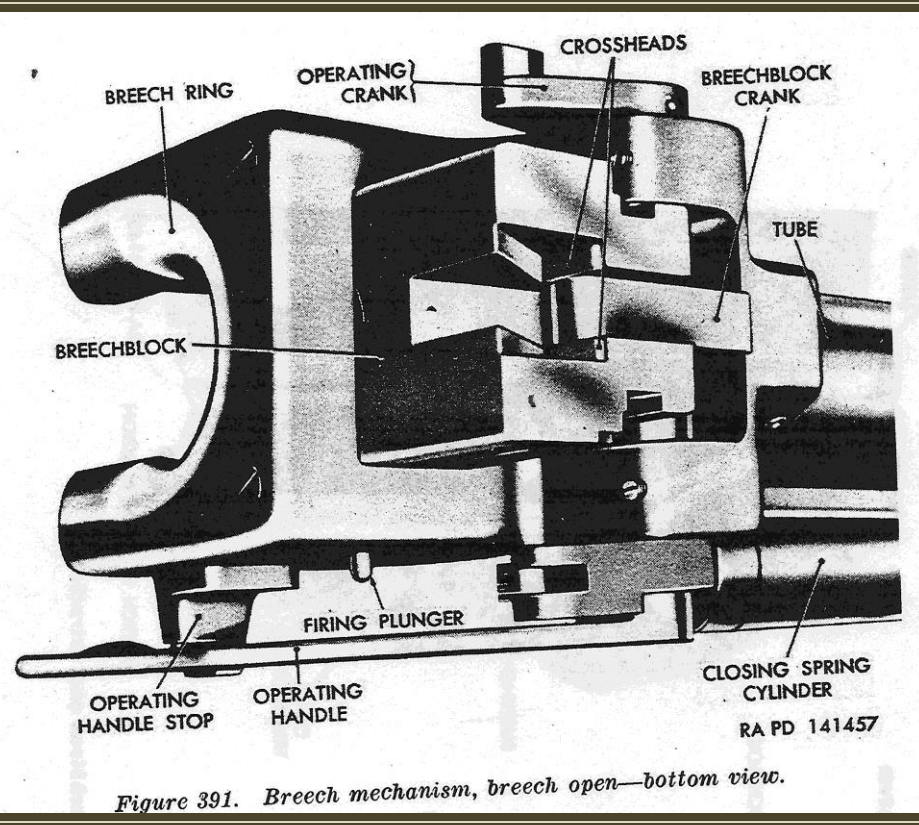


Figure 391. Breech mechanism, breech open—bottom view.

Volume III Part 11
ARMOR PENETRATION

(THIS PART SUPERSEDES VOLUME II PART 1, PAGES 1 TO 29. PAGES 31 TO 52 ARE NOT SUPERSEDED.)

1. GENERAL.

This section provides information pertaining to the performance of armor-piercing projectiles against homogeneous and face-hardened armor plate. The various theories and analyses of the mechanics of armor penetration will not be dealt with in this discussion, although such knowledge is necessary for better evaluation of results obtained from test firings of projectiles against armor plate. It also allows these findings to be interpreted more easily and accurately. It is from the test firings that data are obtained and compiled as a basis for determining penetrations.

2. ARMOR PENETRATION AND STRIKING VELOCITY CURVES.

Armor penetration data are graphically presented for standard and limited procurement projectiles when fired against armor plate at various angles of impact and plate obliquities. These data are shown for both rolled homogeneous armor and face-hardened plates. From the charts, the thickness of armor plate which can be penetrated, at a given range or striking velocity, can be determined. It will be noted that certain portions of the penetration curve are shown as broken lines. This represents an estimated performance for which actual firing data have not been obtained. **The penetration curves are compiled for intact or shattered projectile, with the greater portion of the fragments, completely penetrating the plate.**

3. CHARTS.

The chart shown in Figure 57 is for use in conjunction with the examples given below to illustrate the use of the striking velocity and armor penetration curves.

4. ILLUSTRATIVE EXAMPLES.

The following examples and the chart shown in Figure 57 illustrate the use of the striking velocity and armor penetration curves. The range scale in yards and the penetration scale in inches are shown along the bottom of the chart, the striking velocity in feet per second is shown along the left-hand border. The striking velocity curve is designated by showing the muzzle velocity upon which it is based. The penetration curves are designated to indicate the obliquity upon which they are based.

(1) Example I.

Given—3-inch plate thickness.

Required—The striking velocity and maximum range at which penetration at 20-degree obliquity can be achieved.

Solution—(1) Enter the penetration scale at point "A" which represents 3-inch plate thickness. (2) Proceed upward along the vertical line until the intersection with the 20-degree obliquity penetration curve is reached at "B". (3) From "B" proceed left along a line until the intersection with the striking velocity curve at "C" is reached. (4) From "C" continue left along the horizontal line to "E" where the striking velocity of 2,160 feet per second can be read; then proceed downward from "C" along the vertical line to "D" where the range of 1,430 yards is found. Thus, a striking velocity of 2,160 feet per second is needed to penetrate 3 inches of plate, and the maximum range at which the projectile will penetrate the plate is 1,430 yards.

(2) Example 2.

Given—1,430-yard range.

Required—The maximum thickness of armor plate which can be penetrated at 20-degree obliquity and the corresponding striking velocity required.

Solution—(1) Enter the range scale at 1,430 yards on "D" and proceed upward on a vertical line to point "C" where the striking velocity curve is intersected. (2) Proceed right from "C" along a horizontal line to "B" where the penetration curve for 20-degree obliquity is intersected. (3) Then proceed downward along a vertical line to "A" where a thickness of 3 inches is read. (4) From point "C" proceed left along horizontal line to "E" where a striking velocity of 2,160 feet per second is read.

(3) Example 3.

Given—2,160 feet per second striking velocity.

Required—The range and thickness of 20-degree obliquity armor plate which can be penetrated.

Solution—(1) Enter the striking velocity scale at point "E" which represents 2,160 feet per second. (2) Proceed right to point "C" and then downward along the vertical line to "D" where the range of 1,430 yards can be read. (3) From point "C" proceed right to "B" on the 20-degree obliquity curve and then downward along the vertical line to "A" where the thickness of 3 inches can be read.

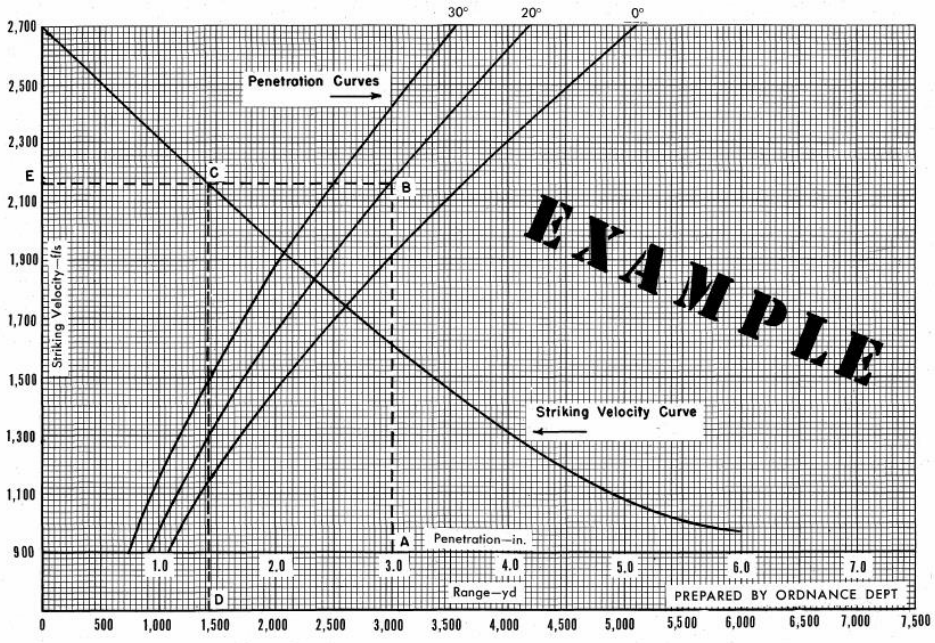


FIGURE 57

Sources: ***The ballistic charts are from Office of the Chief of Ordnance- Terminal Ballistic Data III. Ammunition data from TM9-1901 Artillery Ammunition, Mount on gun info from TM9-7018***
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