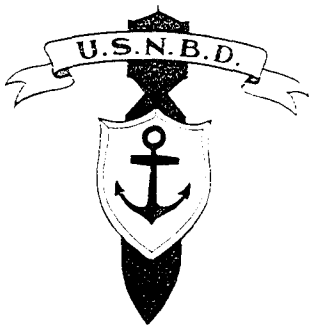
UNITED STATES
BOMBS AND FUZES
PYROTECHNICS
LAND MINES
FIRING DEVICES



1 JUNE, 1944

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J. P. DAVID,
Lieutenant, USNR.
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- -

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INDEX

HIGH EXPLOSIVE BOMBS

(Continued on next page)

I N D E X
(cont'd)

BOMBS — High Explosive

U.S. ARMY-NAVY "AN" SERIES

INCENDIARY BOMBS

CHEMICAL BOMBS

PYROTECHNICS

SMOKE BOMBS

BOMB FUZES

FUZES —

NAVY "MK" AND NAVY DESIGNED "AN" FUZES:

LAND MINES

FIRING DEVICES

MISCELLANEOUS

INTRODUCTION

This publication has been designed to present complete and accurate information on the subjects of bombs, bomb fuzes, pyrotechnics, land mines and firing devices used by the armed services of the United States. In addition to information on currently used ordnance, such obsolete or obsolescent ordnance as might be encountered in bomb disposal activities has been included.

The plan of this publication is as follows:

SECTION I: High Explosive Bombs

Part I: U. S. Army "Modified Mark" Series
II: U. S. Army "M" Series
III: U. S. Navy "Mk" Series
IV: U. S. Army-Navy "AN" Series

SECTION II: Incendiary & Chemical Bombs, Pyrotechnics

SECTION III: Bomb Fuzes

SECTION IV: Land Mines, Firing Devices

Deviation from this plan has been made in the case of the more recently developed bombs which bear the "M" or "Mk" designation, but which possibly will be standardized for both Army and Navy use in the future. When such material is standardized, and as further information concerning the subjects covered in this publication is received, that information will be forwarded to the possessors of the publication in the form of Correction and Addition sheets.

SECTION I

HIGH EXPLOSIVE BOMBS

INTRODUCTION

Prior to 1941 the Army and Navy had separate manufacture and designs for all bombs, and each service had distinctive nomenclature to indicate a particular piece of ordnance. The Navy nomenclature was prefixed by the word "Mark" (abbreviated Mk), the number of the design was given by a Roman Numeral, and modifications to the original design were indicated by the abbreviation "Mod." followed by the number of the change; i.e., Mk XII-Mod 2 500 lb. G.P. bomb). The Army nomenclature prior to July 1, 1925 was similar to this, differing only in method of designating modifications. A modification was designated by the letter M followed by a Roman Numeral; i.e., Mk I-MII 100 lb. G.P. bomb.

In 1925, the Army changed its method of nomenclature to avoid confusion with the Navy, and all items since then have been named "M" (for Model) followed by an Arabic Numeral. Modifications are indicated by adding the letter "A" and the appropriate number (thus, M 38A2 indicates the second modification of the 38th design of the bomb).

Early in 1941, a joint committee for standardization of ordnance known as the Army-Navy Standardization Board was created and since its inception, bomb production, with very few exceptions, has been of the types approved by this Board for joint issue to Army, Navy and British forces. The responsibility of designing bombs for land targets was given the Army, and bombs for Naval objectives or for carrier use were to be developed by the Navy. Designs accepted by this Committee are designated by the prefix "AN" followed by the Army or Navy name of the design. Thus, an Army bomb approved for joint production would be named AN-M 64A1, and a Navy bomb which was accepted would be named AN- Mk 33.

In this book the bombs have been classified according to the series in which they have been developed; hence, the bomb section consists of four parts, each of which has an introduction listing the common characteristics of the bombs within that series:

Part I: U.S. Army "Modified Mark" Series Bombs.

Part II: U.S. Army "M" Series Bombs.

Part III: U.S. Navy "Mk" Series Bombs.

Part IV: U.S. Army-Navy "AN" Series Bombs.

Since the development of the "AN" series there have been two further modifications of the general purpose (G.P.) bombs within the series, successively the "AN-GP" and "AN-GP A1" modifications. The changes characteristic of these two modifications are dealt with in the introduction to Part IV.

In brief, the fundamental characteristics of the bombs in each of the different series are as follows:

U.S. Army "Modified Mark" Series - streamlined and filled with 100% T.N.T.

U.S. Army "M" Series - parallel sides, ogival nose, boat tails; box-type tail fin construction; and filled with 50/50 Amatol sealed at both ends with T.N.T. surrounds.

U.S. Navy "Mk" Series - similar design to Army bombs and filled with 100% T.N.T.; discontinued with some exceptions under the standardization program.

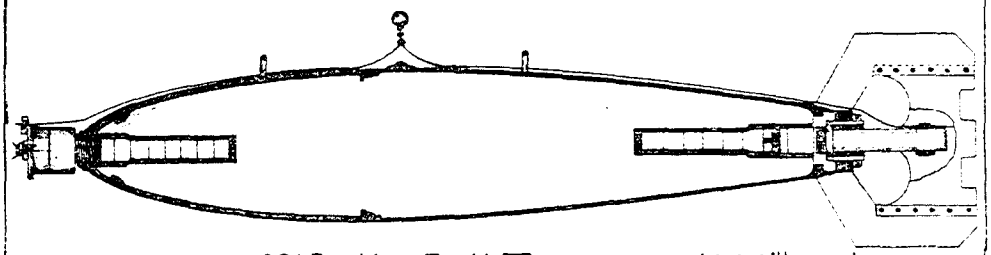
U.S. Army-Navy "AN" Series - similar to "M" series, except (a) third suspension lug added at center of gravity and 180 degrees removed from other two and (b) base plate changed to a male plug.

U.S. ARMY

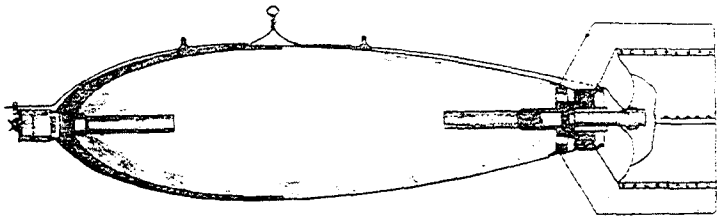
"MODIFIED MARK"

SERIES BOMBS

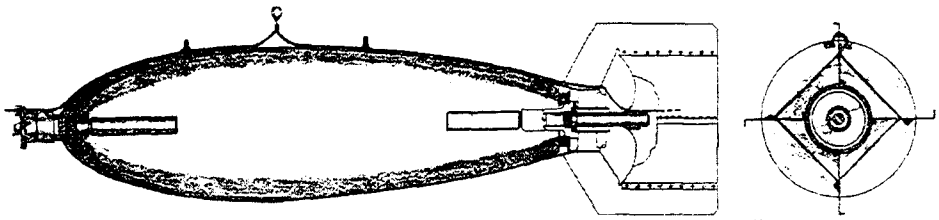
U.S. ARMY "MODIFIED MARK" SERIES (*OBSOLETE*)



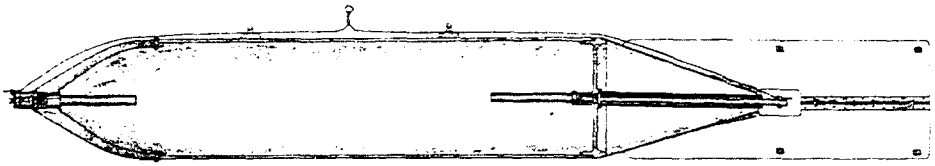
100 LB. MK. I M IV —(47.2" LONG)



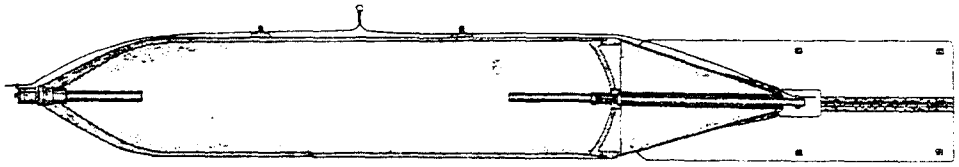
300 LB. MK. I M. II —(51.2" LONG)



600 LB. MK. I M. II —(63.0" LONG)



2000 LB. MK I M. III —(135.8" LONG)



2000 LB. MK. I M. IV & V —(135.8" LONG)

PART I: U. S. ARMY "MODIFIED MARK" SERIES BOMBS

This particular series of bombs was not satisfactory for war use and has been abandoned, except for a few of these bombs which are being used at present for target practice and training purposes. They are all of the same type and intended for the same target use: Army Demolition-H.E. Bombs for General Bombardment. The following chart contains the essential data concerning the bombs of this series:

BOMBS	100 lb. Mk I MIV	300 lb. Mk I MII	600 lb. Mk I MIII	1100 lb. Mk III MI	2000 lb. Mk I M III & M IV	2000 lb. Mk I MV
FUZES	Nose: M103			Tail: M106		
OVERALL LENGTH	47.2"	61.2"	64.0"	68.5"	135.8"	
LENGTH OF BODY	39.5"	40.6"	52.2"	61.6"	97.0"	
BODY DIAMETER	7.9"	12.2"	16.5"	20.5"	18.5"	
WALL THICKNESS	0.16"	0.12"	0.2"	0.15"	0.50"	
WALL MATERIAL	Steel.					
BODY CONSTRUCTION	Streamlined body formed by welding three cast steel sections together.				Cast steel nose riveted to seamless steel tubing; rear not tapered.	Seamless steel tubing.
TYPE OF SUSPENSION	Horizontal.					
CONSTRUCTION OF SUSPENSION	Two U-shaped bar steel eyebolts welded to body along longitudinal axis.				Two U-shaped eyebolts on plates secured to body by cap screws.	
COLOR & MARKINGS	Prior to March 11, 1942, these bombs would have been yellow all over with black manufacturers markings, but since that date will be olive-drab with one inch yellow bands around nose and base and a 1/4 inch band around center of gravity.					
LENGTH OF TAIL	8.5"	12.0"	14.0"	33.5"	49.2"	
WIDTH OF TAIL	11.0"	15.0"	20.5"	25.5"	26.1"	
MATERIAL OF TAIL	Sheet Steel				Sheet steel with cast steel tail cone.	
TAIL CONSTRUCTION	A cast steel sleeve secured to body by a fin locking nut; four fins or vanes; internal box-type struts.			Four vanes with bar struts, attached to body by screws.	Four vanes riveted to tail cone; two sets external bar struts to reinforce vanes. Cone secured to flange on base plate.	
WEIGHT OF TAIL	2.6#	6.1#	5.0#	55.0#	140.0#	
TYPE OF FILLING	Cast TNT					
WEIGHT OF FILLING	65.0#	146.0#	356.0#	650.0#	960.0#	
TOTAL WEIGHT	119.4#	285.9#	611.0#	1175.0#	1920.0#	1830.0#
CHARGE/WEIGHT RATIO	54.5%	52.0%	58.0%	55.3%	50.0%	52.4%

U.S. ARMY

"M" SERIES

BOMBS

PART II: U.S. ARMY "M" SERIES BOMBS

INTRODUCTION

Bombs included in the "M" series are:

M-30	100 lb. Demolition H.E.
M-31	300 lb. Demolition H.E.
M-32	600 lb. Demolition H.E.
M-33	1100 lb. Demolition H.E.
M-34	2000 lb. Demolition H.E.
M-57	250 lb. Demolition H.E.
M-43	500 lb. Demolition H.E.
M-44	1000 lb. Demolition H.E.

(Prior to standardization these bombs were designated as "Demolition H.E." bombs; since standardization the designation has been "G.P.H.E.").

Other bombs that carry an "M" designation, though not actually classified in the "M" series, and are included in this section because they are obsolescent are:

M-62	600 lb. A.P.-H.E.
M-61	800 lb. A.P.-H.E.
M-60	900 lb. A.P.-H.E.
M-52	1000 lb. A.P.-H.E.
M- 5	30 lb. Frag.

COMMON CHARACTERISTICS OF THE "M" SERIES (M-30 THRU M-34); M-43, M-44, M-57:

Targets: Ammunition dumps, railway engines and cars, all types of construction ex- and airplanes on the ground.

Fuzes: For regular missions: (a) Nose- M-103 or AN-M 103.
(b) Tail- M-100 series or AN-M 100 series, including A1 and A2 modifications.

For special missions: (a) Nose- Shipping plug left in nose.
(b) Tail- M-112 series for masthead bombing from land base only.
M 115 series for masthead bombing from land or carrier base.
M-123 series for long delay.

Body Construction: These bombs may be made by any one of the following methods: (a) From seamless steel tubing in which the nose of the bomb is formed by swaging and the tail by drawing to the necessary diameter; (b) or the case may be forged in one piece; (c) or the bomb may be formed from cast sections welded together. These bombs have female base filling plates.

Type of Suspension: Always held horizontally by dual lugs.

Construction of Suspension Lug: Two eyebolts welded to body along longitudinal axis of the bomb. The eyebolts are formed from bar steel, shaped in the form of a U and then welded to the body.

Color & Markings: Prior to March 11, 1942, these bombs would have been painted yellow all over with black manufacturer's markings; since that date they have been painted olive-drab with a one inch yellow band around the nose and base and a 1/4 inch band around the center of gravity.

Material of Tail: Sheet steel.

Tail Construction: This type of tail consists of the following parts: (a) a cast steel sleeve secured to the body of the bomb by a fin locking nut; (b) four fins or vanes; (c) internal box-type struts. One vane and one strut are pressed from one piece of metal and the four pieces are welded together and to the sleeve.

Type of Filling: (a) 50/50 Amatol filling with T.N.T. surrounds around the nose and tail booster sleeve to seal the amatol from moisture since amatol is hygroscopic; or (b) 100% T.N.T., which will be stencilled on the bomb. All of this series except the 100 lb. M-30 contain two built-in M-104 auxiliary boosters, one in the nose and one in the tail, which contain tetryl. The 100 lb. M-30 has the auxiliary booster in the nose only. The M-102 adapter booster (tetryl) is threaded to the base plate of all bombs in the series and receives the tail fuze.

COMMON CHARACTERISTICS OF THE "M" DESIGNATED A.P.-H.E. BOMBS:

Target: Armored naval seacraft, reinforced concrete, heavy steel construction.

Fuzes: M-102 or AN-M102, including A1 and A2 modifications.

Material of Wall: Steel.

Body Construction: These bombs are converted seacoast artillery shells from which the rotating bands may have been removed. The cases are single-piece forgings. M-62 and modifications differ only slightly in external dimensions and are all equipped with a nose cap for streamlining.

Type of Suspension: Horizontal.

Construction of Suspension Lug: Two U-shaped eyebolts welded to plates that are welded or riveted to suspension bands. The bands are secured to the case by tightening bolts on under side of bomb.

Color & Markings: Same as for bombs in "M" series.

Construction of Tail: Truncated tail cone slide fit over bomb base, secured by a locking nut at top of fuze body; four fins or vanes; internal box-type struts.

Date

OVERALL LENGTH	25.5 in.
BODY LENGTH	13.05 in.
BODY DIAMETER	4.2 in.
WALL THICKNESS	0.6 in.
TAIL WIDTH	6.5 in.

U.S. ARMY BOMB

30 LB. FRAG.

M 5

(Obsolescent)

TARGET:

Personnel, motor convoys, airplanes on the ground, etc.

FUZING:

Mk XIV

BODY CONSTRUCTION:

Same as the AN-M 40 and AN-M 41 fragmentation bombs, except that the outside wrapping is replaced by rings cut from cast steel pipe. The tube is steel.

SUSPENSION:

Horizontally, vertically, or in a cluster. U-shaped eyebolts are welded to bomb at center of gravity and to rear of tail. Individual suspension is prohibited, all bombs to be dropped in the M3 cluster of 6 M5 30# frag bombs.

COLOR AND MARKINGS:

Prior to March 31, 1942: yellow with black manufacturer's markings; since that date, olive-drab with 1 inch yellow bands around nose and base, 1/4 inch band around center of gravity.

TAIL CONSTRUCTION:

Four rectangular sheet steel vanes welded to a length of 1 inch cast iron pipe that screws into the base filling plug.

WEIGHTS:

	T.N.T.
Weight of Filling	4.68 lbs.
Total Weight	28.3 lbs.
Charge/Weight Ratio	16.3 %

REMARKS:

Obsolete bomb.

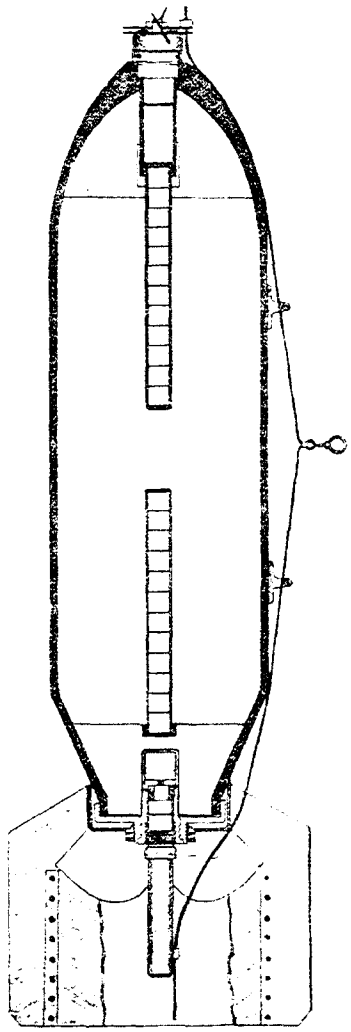
DATA ON "M" SERIES BOMBS*

BOMBS	100 lb. M-30		300 lb. M-31		600 lb. M-32		1100 lb. M-33		2000 lb. M-34	
OVERALL LENGTH	36.0 in.		48.6 in		59.5 in.		68.7 in.		90.4 in.	
LENGTH OF BODY	30.0 in.		40.2 in.		49.5 in.		54.7 in.		70.0 in.	
DIAMETER OF BODY	8.2 in.		10.9 in.		15.2 in.		19.8 in.		23.3 in.	
THICKNESS OF WALL	0.16 in.		0.27 in.		0.35 in.		0.43 in.		0.5 in.	
LENGTH OF TAIL	9.75 in.		12.1 in.		13.9 in.		18.5 in.		25.7 in.	
WIDTH OF TAIL	11.0 in.		14.9 in.		20.4 in.		27.0 in.		31.6 in.	
WEIGHT OF TAIL	3.5 lbs.		6.0 lbs.		12.6 lbs.		22.5 lbs.		38.6 lbs.	
TYPE OF FILLING	Amatol 50/50	TNT	Amatol 50/50	TNT	Amatol 50/50	TNT	Amatol 50/50	TNT	Amatol 50/50	TNT
WEIGHT OF FILLING	53.3 lbs.	54.0 lbs.	135.5 lbs.	137.0 lbs.	319.3 lbs.	336.0 lbs.	588 lbs.	618 lbs.	1061 lbs.	1077 lbs.
TOTAL WEIGHT	106.3 lbs.	107.0 lbs.	272.5 lbs.	274.0 lbs.	586.5 lbs.	621.0 lbs.	1111 lbs.	1141 lbs.	1971 lbs.	1987 lbs.
CHARGE/WEIGHT RATIO	50.1%	50.6%	49.4%	50.0%	54.4%	54.1%	52.9%	54.1%	53.8%	54.7%

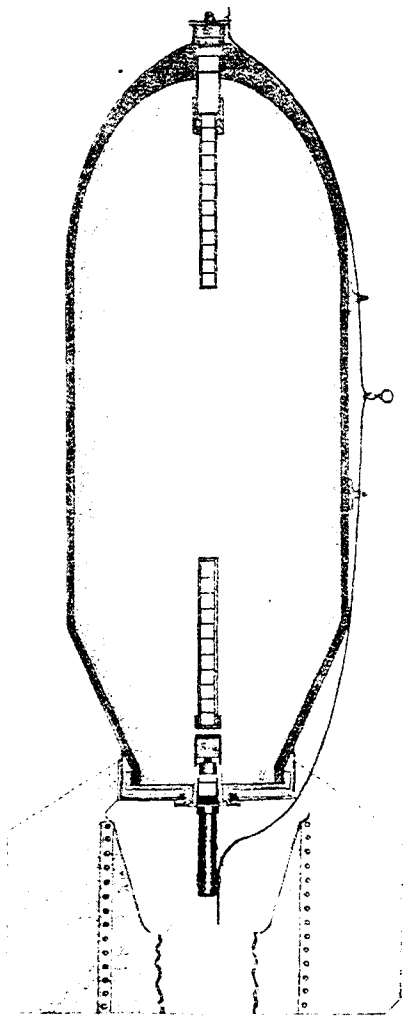
* These bombs are obsolescent.

RESTRICTED

"M" SERIES DEMOLITION BOMBS

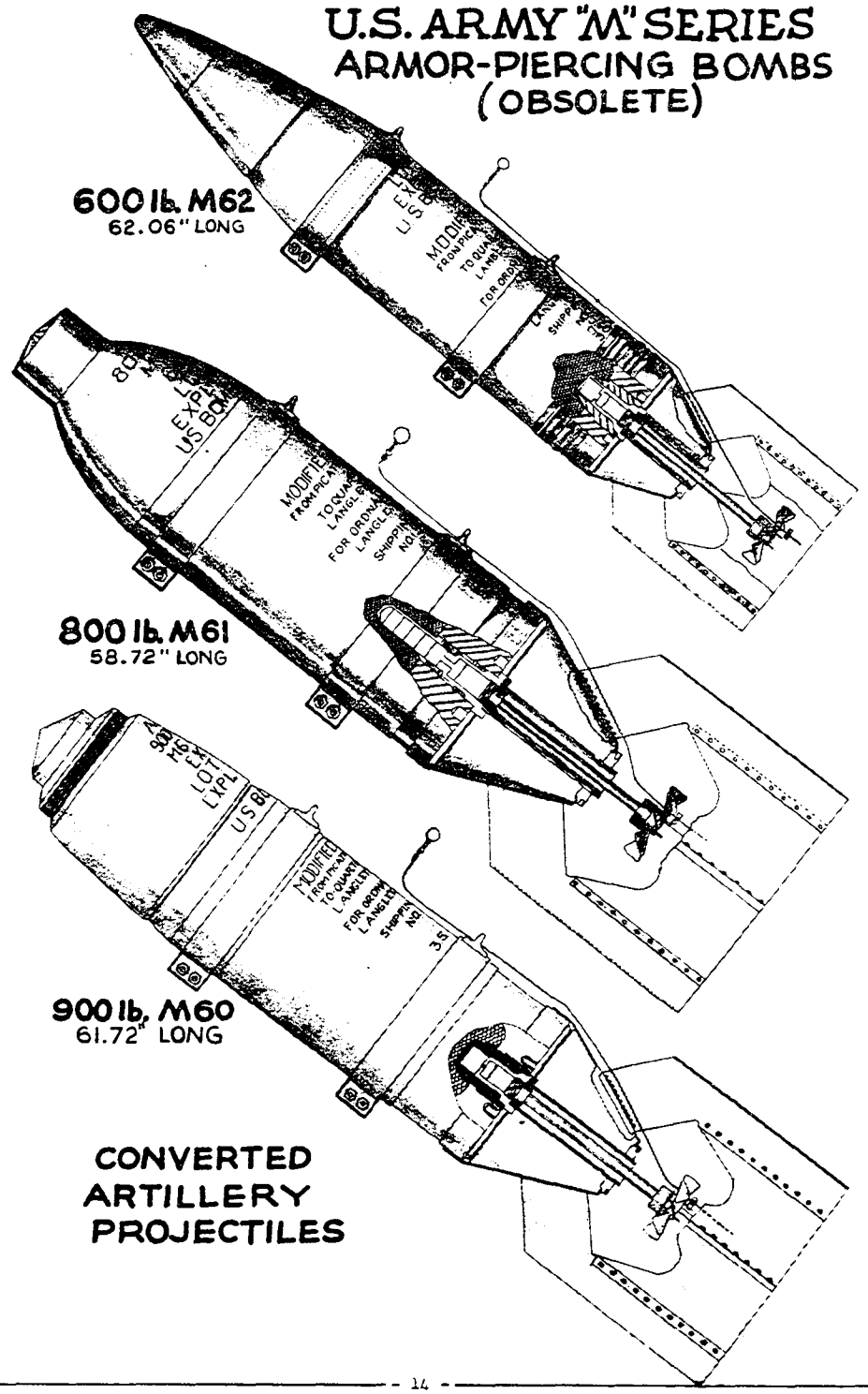


600 LB. M-32



1100 LB. M-33

U.S. ARMY "M" SERIES ARMOR-PIERCING BOMBS (OBSOLETE)



600 lb. M62
62.06" LONG

800 lb. M61
58.72" LONG

900 lb. M60
61.72" LONG

CONVERTED ARTILLERY PROJECTILES

DATA ON "M" DESIGNATED A.P.-H.E. BOMBS

BOMBS	M-62 600 lbs.	M-61 800 lbs.	M-60 900 lbs.	M-52 1000 lbs.
OVERALL LENGTH	62.1 in.	58.7 in.	61.7 in.	70.9 in.
LENGTH OF BODY	46.2 in.	37.7 in.	40.7 in.	50.0 in.
DIAMETER OF BODY	10.1 in.	11.6 in.	11.5 in.	12.2 in.
WALL THICKNESS				2.3 in.
LENGTH OF TAIL	17.8 in.	21.0 in.	24.5 in.	26.0 in.
WIDTH OF TAIL	13.8 in.	18.5 in.		16.6 in.
WEIGHT OF TAIL	15.12 lbs.	22.4 lbs.	22.4 lbs.	21.0 lbs.
TYPE OF FILLING	Explosive D	Explosive D	Explosive D	Explosive D
WEIGHT OF FILLING	33.61 lbs.	32.68 lbs.	43.0 lbs	58.35 lbs.
TOTAL BOMB WEIGHT	576.0 lbs.	787.28 lbs.	890.0 lbs	1077.0 lbs.
CHARGE/WEIGHT RATIO	5.9%	4.2%	4.8 %	5.4%

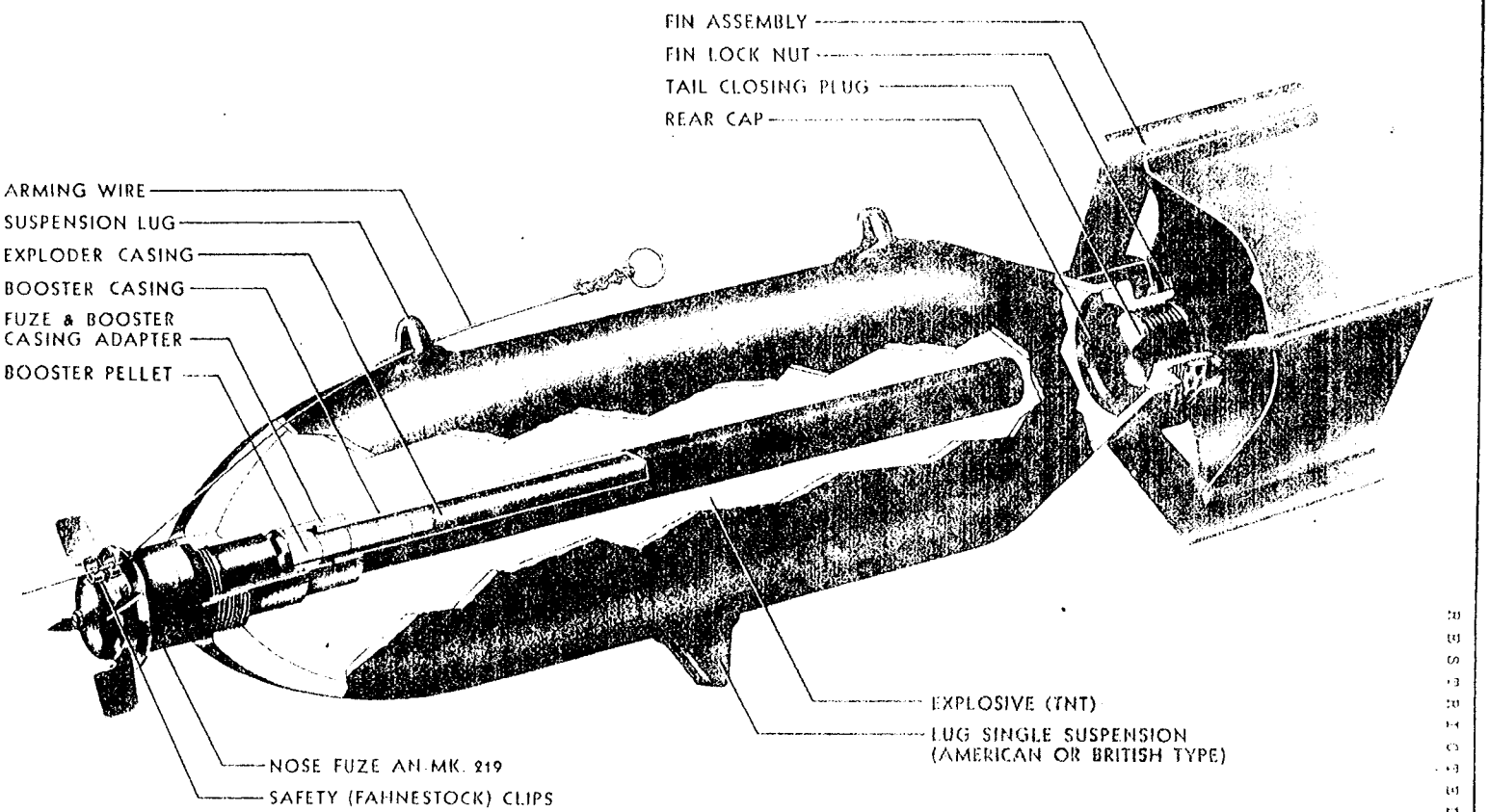
U.S. NAVY

"MK." SERIES

BOMBS

With the exception of Armor Piercing and depth bombs, the U. S. Navy bomb production is very limited, since other types of bombs procured for Navy use are of Army design and joint A-N manufacture. Prior to the standardization program the Navy manufactured many different bombs, and in the following section the bombs which are likely to be found are illustrated.

100 LB. GENERAL PURPOSE BOMB MK. 4 MOD. 4



U. S. NAVY BOMBS

100 LB. G.P.

Mk 1 and Mods
Mk 4 and Mods

(Obsolescent)

Date	Mk I Mods. 2-3	Mk IV Mods. 1-4
OVERALL LENGTH	48.8 in.	36.2 in.
BODY LENGTH		23.0 in.
BODY DIAMETER	7.9 in.	8.0 in.
WALL THICKNESS		0.175 in.
TAIL LENGTH	21.0 in.	9.1 in.
TAIL WIDTH	9.8 in.	11.0 in.

TARGET:

General bombardment except modern seacraft and reinforced fortifications.

FUZING:

AN-Mk 219

BODY CONSTRUCTION:

Mk I, Mods. 2-3: Two sheet steel castings welded together, the bomb having a "Tear drop" shape.

Mk IV, Mods. 1-4: Single piece steel forging; cylindrical with ogival nose.

SUSPENSION:

Mk I, Mods. 2-3: Horizontal suspension by two lugs welded on body; may have single lug or trunnions on band.

Mk IV, Mods. 1-4: Two lugs welded on body 14 inches apart; single lug welded on opposite side.

COLOR AND MARKINGS:

Grey overall with 11 inch yellow disc between two lugs, indicating H.E. May be yellow overall.

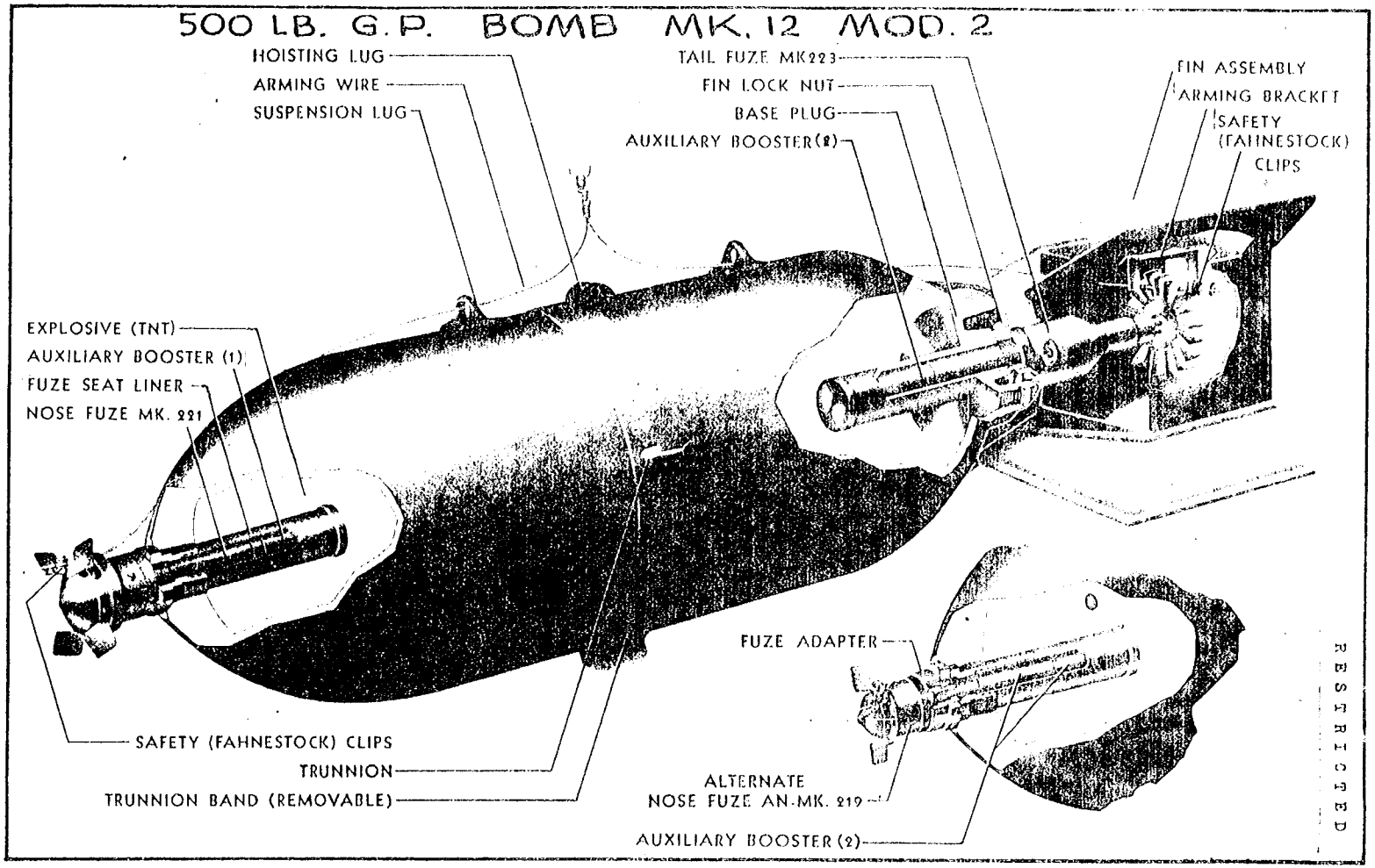
TAIL CONSTRUCTION:

Mk I, Mods. 2-3: Four vanes which pass down over the body are welded to a tail cone. Vanes fastened to body of bomb by screws and are braced by two sets of bar struts riveted to vanes.

Mk IV, Mods. 1-4: Four vanes welded to a sleeve which is secured to bomb body with a locking nut. Box type internal struts are welded to the vanes.

WEIGHTS:

	T.N.T. Mk I	T.N.T. Mk 4
Weight of Filling	65 lbs.	55 lbs.
Total Weight	116 lbs.	120 lbs.- Mod. 1 105 lbs.- Mod. 4
Charge/Weight Ratio	56 %	45.8%, 52.8%


500 LB. G.P. BOMB MK. 12 MOD. 2
HOISTING LUG
ARMING WIRE
SUSPENSION LUG
TAIL FUZE MK223
FIN LOCK NUT
BASE PLUG
AUXILIARY BOOSTER (2)
FIN ASSEMBLY
ARMING BRACKET
SAFETY (FAHNESTOCK) CLIPS
EXPLOSIVE (TNT)
AUXILIARY BOOSTER (1)
FUZE SEAT LINER
NOSE FUZE MK. 221
FUZE ADAPTER
SAFETY (FAHNESTOCK) CLIPS
TRUNNION
TRUNNION BAND (REMOVABLE)
ALTERNATE NOSE FUZE AN-MK. 219
AUXILIARY BOOSTER (2)

U. S. NAVY BOMB

500 LB. G.P.

Mk 12 Mod 2

(Obsolescent)

Data

OVERALL LENGTH	59.5 in.
LENGTH OF BODY	42.6 in.
DIAMETER OF BODY	14.0 in.
THICKNESS OF CASE	0.36 in.
LENGTH OF TAIL	20 in.
WIDTH OF TAIL	19.4 in.

TARGET:

General bombardment except against modern warships and reinforced fortifications.

FUZING:

Nose: AN-Mk 219 (Instantaneous) (Requires Mk 219 adapter ring and one additional Mk I auxiliary booster.)
Mk 221 (.01 second delay)
Tail: Mk 223 (.01 second delay)

BODY CONSTRUCTION:

One piece steel, forged or drawn; cylindrical with ogival nose.

SUSPENSION:

Horizontal suspension by two lugs or suspended from dive-bomber by trunnions on a band.

COLOR AND MARKINGS:

Grey overall with yellow disc between lugs indicating H.E.

TAIL CONSTRUCTION:

Four sheet metal vanes welded to cone which is attached to body by a nut which surrounds the fuze. Box type struts.

WEIGHTS:

	T.N.T.
Weight of Filling	256 lbs.
Total Weight of Bomb	504 lbs.
Charge/Weight Ratio	50 %

REMARKS:

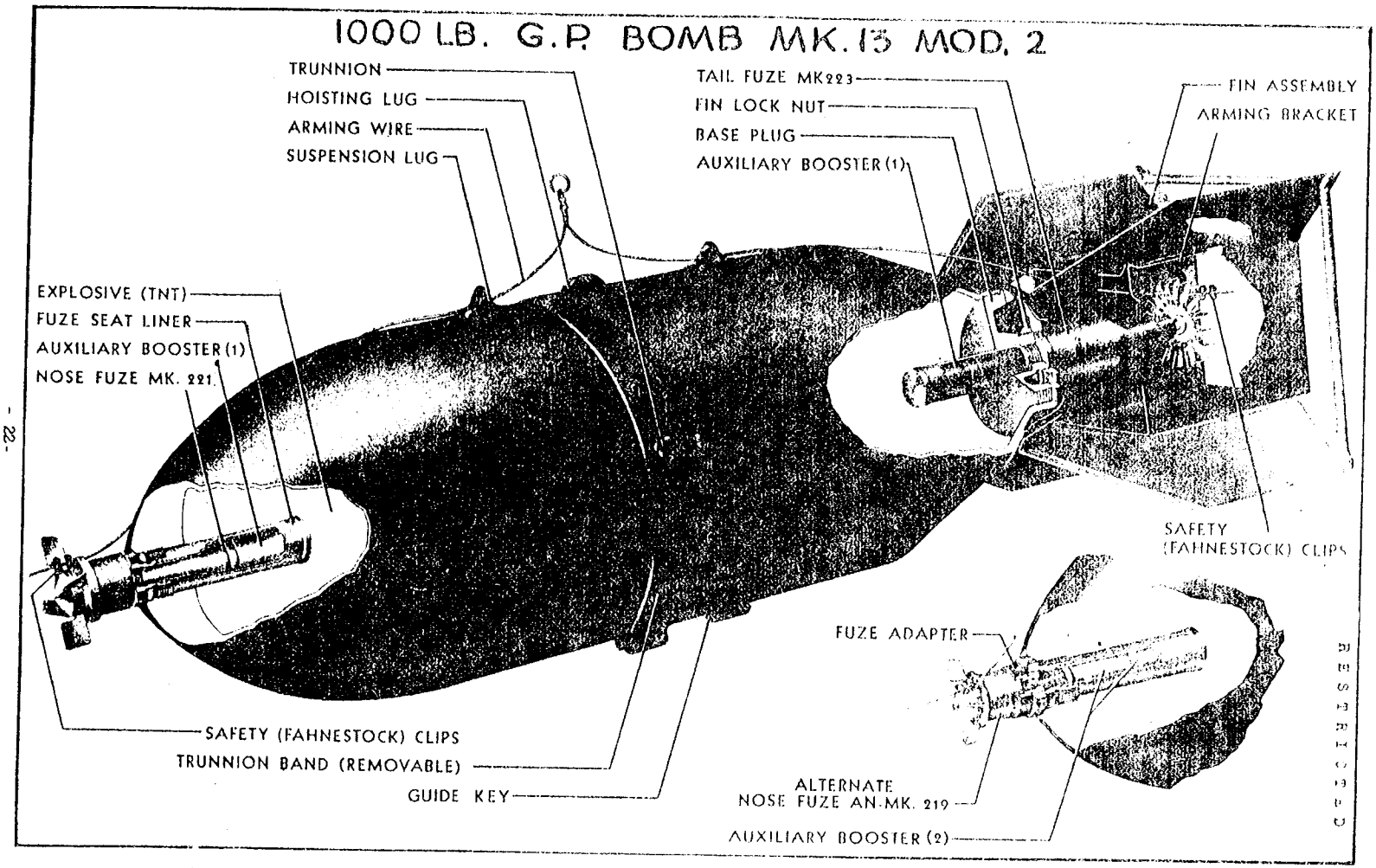
Three other 500 lb. G.P. bombs, now obsolete, are:

500 lb. Mk III, Mod. 1.
500 lb. Mk XII, Mod. 1.
500 lb. Mk IX.

The 500 lb. Mk 12 Mod. 2 is still to be found in the field, but is no longer being manufactured.

In order to get a wider selection of possible tail fuzings, use an M 102 adapter booster with a .47 inch spacer ring, and install any of the following fuzes: AN-M 101A2, M 113 A1 or M 116.

1000 LB. G.P. BOMB MK. 13 MOD. 2



RESTRICTED

Data	U.S. NAVY BOMB
OVERALL LENGTH . . . . . 72.6 in. LENGTH OF BODY . . . . . 53.0 in. DIAMETER OF BODY . . . . . 17.7 in. THICKNESS OF CASE . . . . . 0.45 in. LENGTH OF TAIL . . . . . 22.3 in. WIDTH OF TAIL . . . . . 23.5 in.	**1000 LB. G.P.** Mk 13 Mod 2 (Obsolescent)

TARGET:

General bombardment except against modern warships and reinforced fortifications.

FUZING:

Nose: AN-Mk 219 (Instantaneous).
Mk 221 (.01 second delay).
Tail: Mk 223 (.01 second delay).

BODY CONSTRUCTION:

One piece drawn or forged steel; cylindrical with ogival nose.

SUSPENSION:

Horizontal by two suspension lugs, or suspended by trunnions on band around body for dive-bombing. Torpedo sling guide key welded to bomb for suspension in torpedo slings.

COLOR AND MARKINGS:

Grey overall with 11 inch yellow disc between suspension lugs to indicate H.E.

TAIL CONSTRUCTION:

Four vanes welded to tail cone which is secured to body by a locking nut which screws onto threaded collar of the base plate.

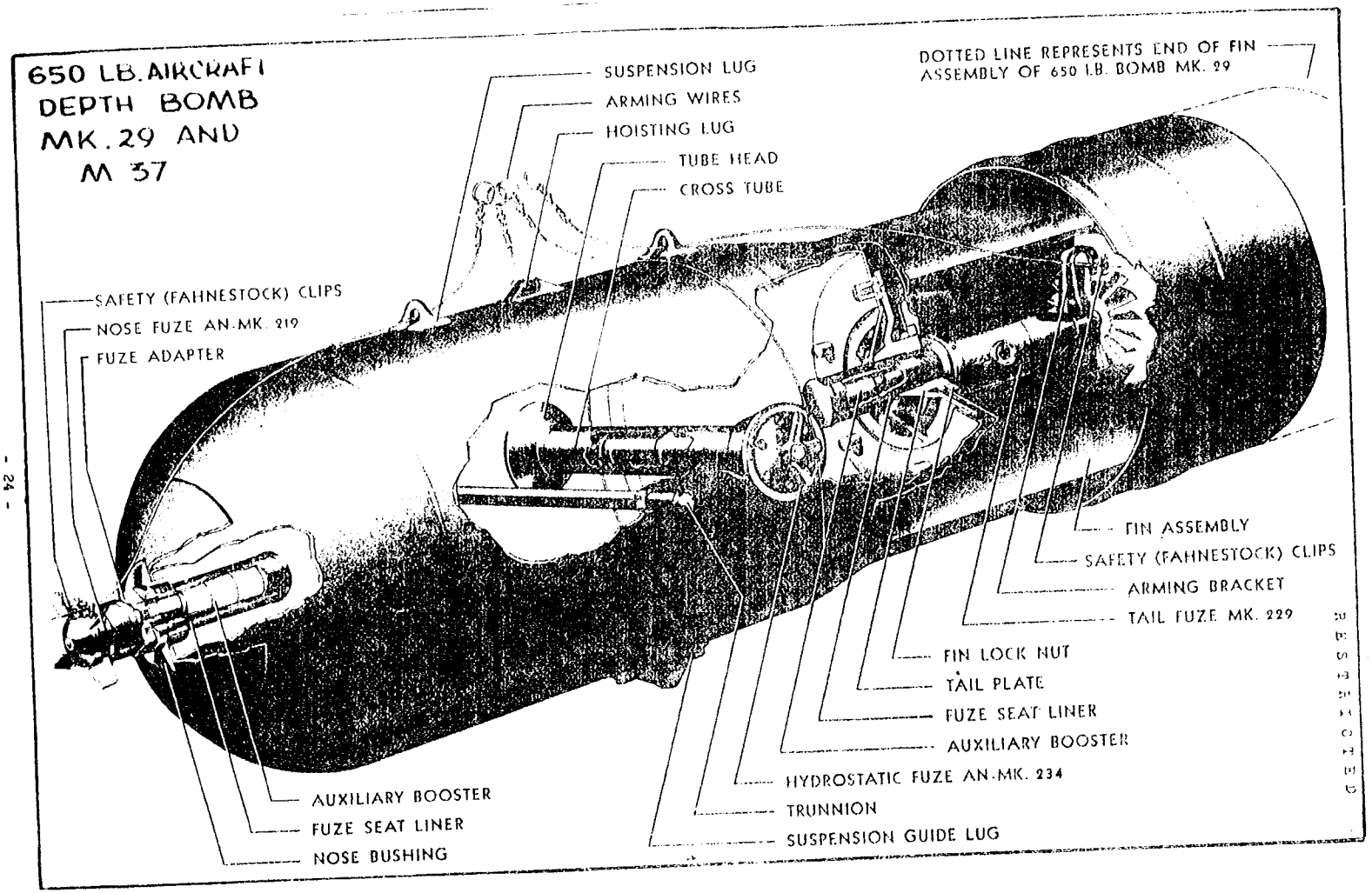
WEIGHTS:

	T.N.T.
Weight of filling	511 lbs.
Total weight	1,005 lbs.
Charge/Weight Ratio	51 %

REMARKS:

Though this bomb may be found in the field, it is no longer being manufactured.

In order to get a wider selection of possible tail fuzings, use an M 102 adapter booster with a .47 inch spacer ring, and install any of the following fuzes: AN-M102A2, M 114A1 or M 117.


650 LB. AIRCRAFT
DEPTH BOMB
MK. 29 AND
M 57
DOTTED LINE REPRESENTS END OF FIN ASSEMBLY OF 650 LB. BOMB MK. 29
SUSPENSION LUG
ARMING WIRES
HOISTING LUG
TUBE HEAD
CROSS TUBE
SAFETY (FAHNESTOCK) CLIPS
NOSE FUZE AN-MK. 219
FUZE ADAPTER
AUXILIARY BOOSTER
FUZE SEAT LINER
NOSE BUSHING
FIN ASSEMBLY
SAFETY (FAHNESTOCK) CLIPS
ARMING BRACKET
TAIL FUZE MK. 229
FIN LOCK NUT
TAIL PLATE
FUZE SEAT LINER
AUXILIARY BOOSTER
HYDROSTATIC FUZE AN-MK. 234
TRUNNION
SUSPENSION GUIDE LUG

U. S. NAVY BOMBS

650 LB. DEPTH

Mk 29 (Obsolete)
Mk 37 (Obsolescent)

Data	Mk 29	Mk 37
OVERALL LENGTH	70.0 in.	63.0 in.
BODY LENGTH	41.0 in.	41.0 in.
BODY DIAMETER	17.7 in.	17.7 in.
WALL THICKNESS	.12 in.	.12 in.
TAIL LENGTH	36 in.	29 in.
TAIL WIDTH	17.7 in.	17.7 in.

TARGET:

Submarine or light surface ships.

FUZING:

Nose: AN-M 103 (Instantaneous)
AN-Mk 219 (Instantaneous)

Athwartship: AN-Mk 224 or AN-Mk 234
Tail: Mk 229

BODY CONSTRUCTION:

Bombs are manufactured with a hemispherical nose reinforced with steel disc. The suspension lugs are reinforced with a steel strip. Flat nose attachment in the shape of a bucket and fitting down under the nose of the bomb, can be used to improve underwater trajectory. The vacant spaces are then filled with plaster of paris. These attachments increase the weight by 72 lbs.

SUSPENSION:

Horizontal suspension by the usual two suspension lugs, with threaded holes on each side 90° removed to receive trunnion lugs for suspension from dive-bombers.

COLOR AND MARKINGS:

Painted olive drab overall with an 11 inch yellow disc between the two suspension lugs. May be light grey overall.

TAIL CONSTRUCTION:

Four sheet steel vanes welded to tail cone which is secured to the body by locking nut screwing onto the rear of the body. Annular strut is used around rear of vanes. The tail of the Mk 37 was shortened by 7 inches so that the Mk 229 tail fuze could arm more readily. Otherwise the tail is similar to that of the Mk 29.

WEIGHTS:

	T.N.T. Mk 29	T.N.T. Mk 37
Weight of Filling	464 lbs.	464 lbs.
Total weight	657 lbs.	659 lbs.
Charge/Weight Ratio	70 %	70 %

REMARKS:

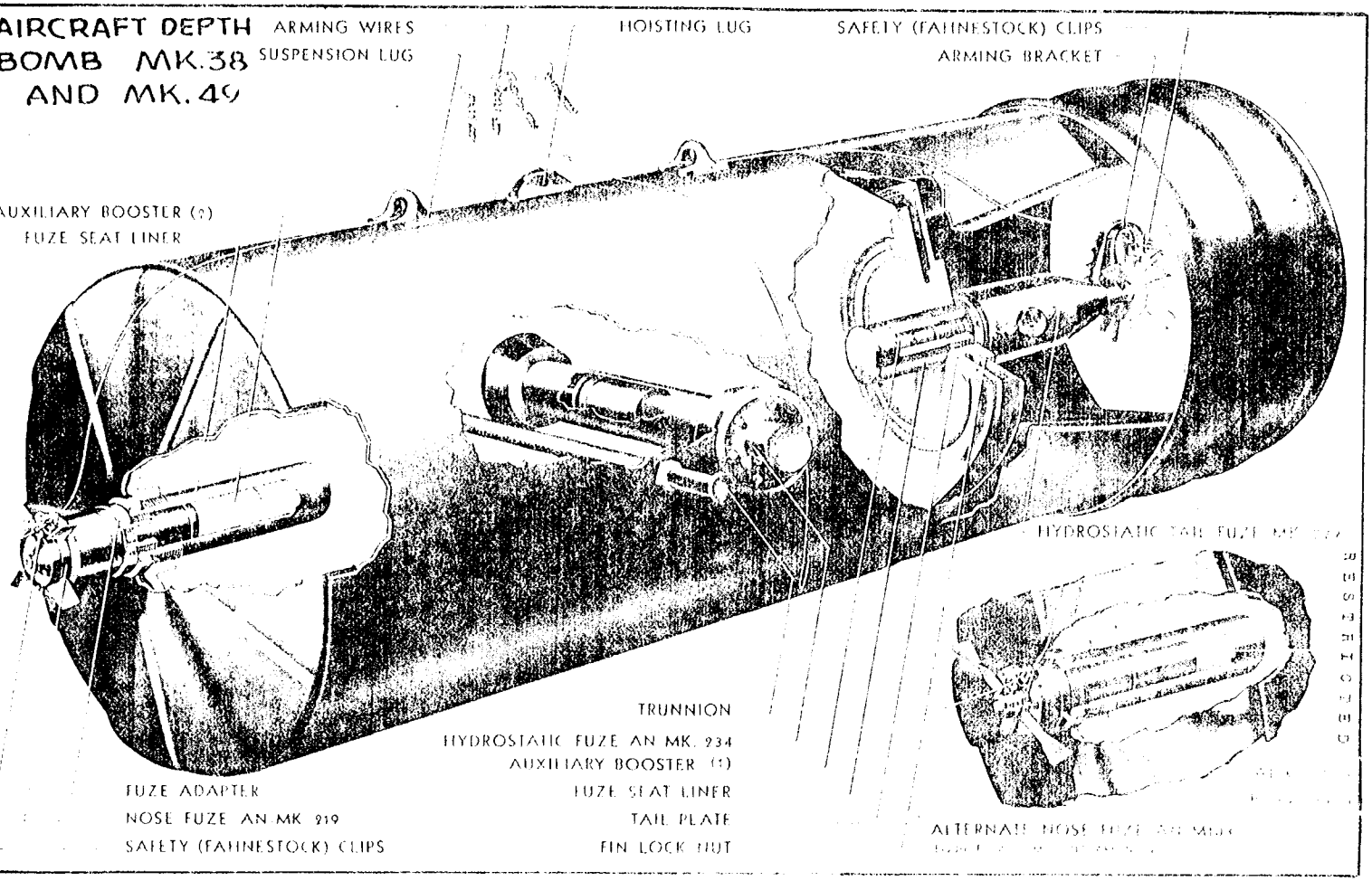
(1) AN-Mk 219 will not arm under 2500 feet altitude if flat-nose attachment is used.

(2) Use Mk219 adapter ring and insert additional auxiliary booster when using AN-Mk 219.

(3) AN-M103 will not arm with flat-nose attachment, unless special arming vanes are used.

(4) An extender is supplied with each bomb to permit installation of the AN-Mk224 or AN-Mk 234 hydrostatic fuze in the longer athwartship tube.

AIRCRAFT DEPTH BOMB MK.38 AND MK.49



SECRET

U. S. NAVY BOMBS

650 LB. DEPTH

Mk 38 (T.N.T.)
Mk 49 (Torpex)

(Obsolescent)

DATA

OVERALL LENGTH	58.6 in.
BODY LENGTH	38.4 in.
BODY DIAMETER	17.7 in.
WALL THICKNESS	.12 in.
TAIL LENGTH	28.0 in.
TAIL WIDTH	17.7 in.

TARGET:

Light surface vessels or submarines.

FUZING:

Nose:	AN-M 103 (Instantaneous setting only) with modified arming vane. AN-Mk 219 (Instantaneous)
Athwartship:	AN-Mk 224 or AN-Mk 234.
Tail:	Mk 229 (See Remarks)

BODY CONSTRUCTION:

The body is constructed in three pieces, the flat nose and tail piece being welded onto the sheet steel center tube. The suspension lugs are reinforced with a strip of sheet steel.

SUSPENSION:

Horizontal suspension by the usual two suspension lugs, with threaded holes on each side 90° removed to receive the trunnion lugs for suspension from dive-bombers.

COLOR AND MARKINGS:

Olive drab with yellow disc between lugs.

TAIL CONSTRUCTION:

Four vanes supported by a circular strut.

WEIGHTS:

	Mk 38 T.N.T.	Mk 49 TORPEX
Weight of Filling	425 lbs.	472 lbs.
Total Weight	634 lbs.	681 lbs.
Charge/Weight Ratio	67 %	69 %.

REMARKS:

(1) AN-Mk 219 will not arm if dropped from under 2500 feet. A Mk219 adapter and an additional Mk 1 auxiliary booster must be used with this fuze.

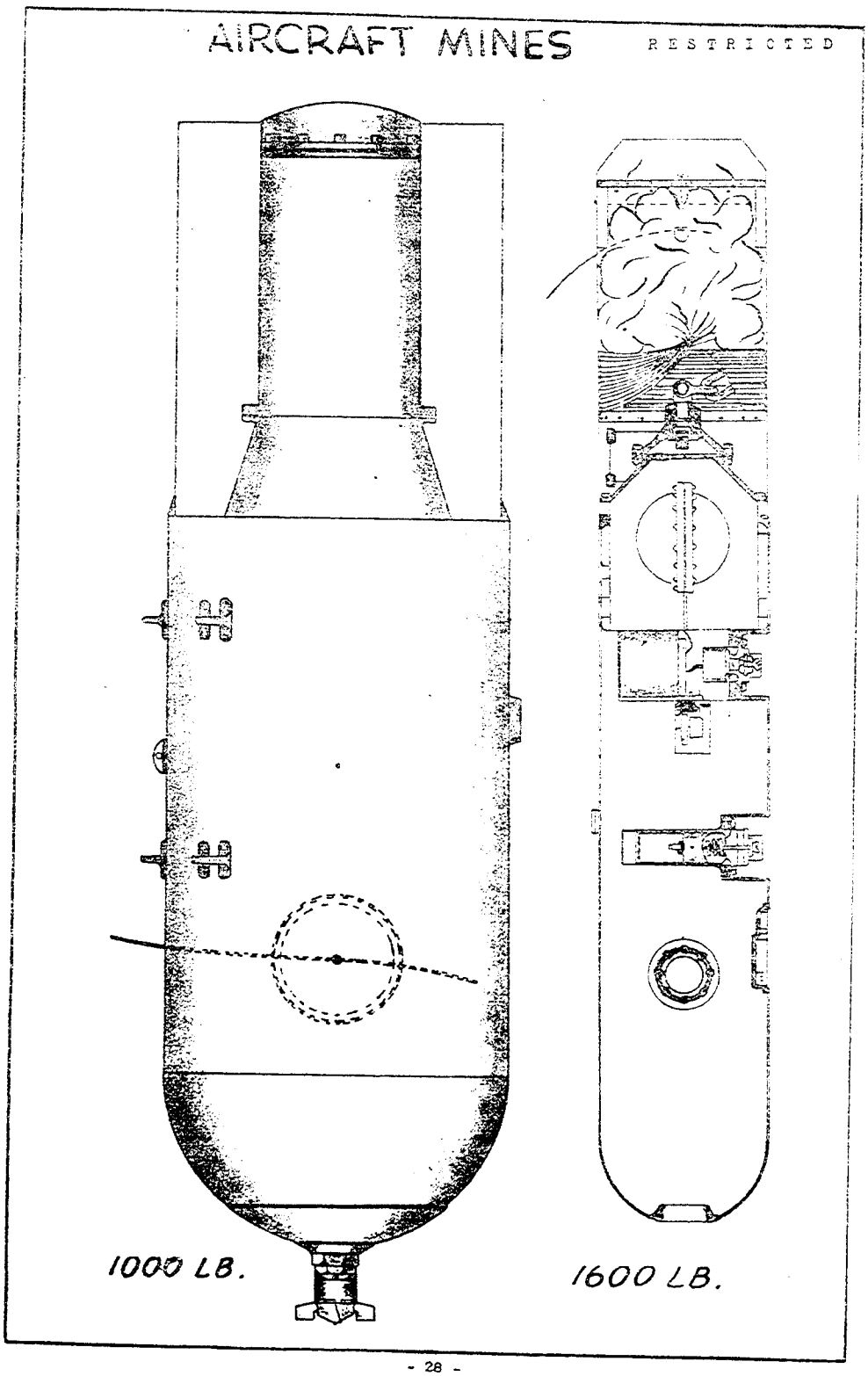
(2) Mk 221 arms with difficulty, and should not be used because of delay.

(3) An extender is supplied with each bomb to permit installation of the AN-Mk 224 or AN-Mk 234 hydrostatic fuze in the longer athwartship tube.

(4) AN-M 103 must have special flat nose depth bomb vane.

AIRCRAFT MINES

RESTRICTED



Data	Mk 13 1000 lb.	Mk 12 Mod 1 1600 lb.
OVERALL LENGTH	67.6 in.	130.9 in.
BODY DIAMETER	19.9 in.	20.9 in.
WALL THICKNESS	.11 in.	
TAIL LENGTH	24.25 in.	
TAIL WIDTH	25.25 in.	

U. S. NAVY MINES

1000 LB., 1600 LB. AIRCRAFT MINES

Mk 13, 1000 lb.
Mk 12, Mod 1, 1600 lb.

(Service)

TARGET:

Shipping, submarines, etc., or with AN-Mk 219 or AN-M 103, these mines can be used as demolition bombs.

FUZING:

Hydrostatic and AN-Mk 219 or AN-M 103.

BODY CONSTRUCTION:

Hemispherical nose welded to tubular steel body; rear cap screws on the body of the 1,000 lb. mine which is a bomb type mine without a parachute; the 1,600 lb. mine contains a parachute to slow down rate of descent.

SUSPENSION:

1000 lb.: Three sets of double lugs 45° apart.
1600 lb.: Slings.

COLOR AND MARKINGS:

Black.

TAIL CONSTRUCTION:

1000 lb.: 4 sheet metal vanes folded longitudinally in "V" shape and welded to tail piece, which is welded to body.
1600 lb.: Aluminum alloy parachute container.

WEIGHTS:

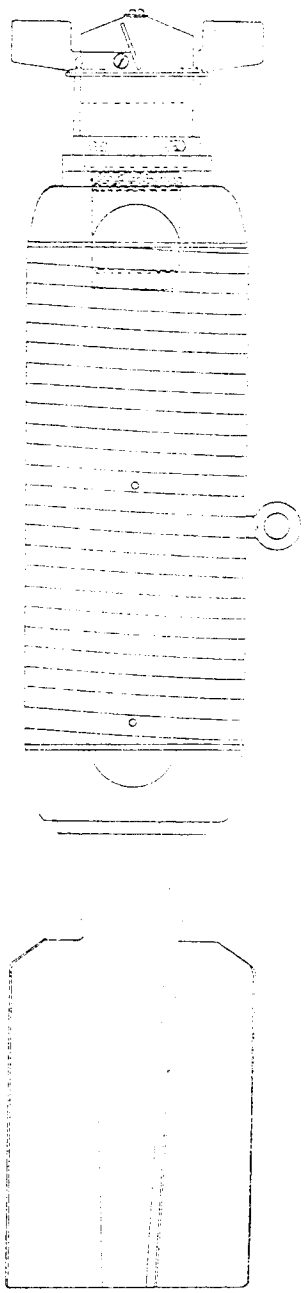
	1000 lb. T.N.T.	1600 lb. T.N.T.
Weight of Filling	675 lbs.	1,100 lbs.
Total weight	1,026 lbs.	1,680 lbs.
Charge/Weight Ratio	65 %	66 %

REMARKS:

These are ground mines and should not be dropped in water over 15 fathoms deep. The clock in these mines is started by a hydrostatic clock-starter after mine has reached a depth of 15 feet in water, arming the magnetic-influenced firing mechanism in about 15 minutes.

RESTRICTED

U.S. NAVY 30 LB. FRAGMENTATION BOMB



U.S. NAVY BOMB

30 LB. FRAG.

Mk 5

(Obsolescent)

Data

OVERALL LENGTH	22.2 in.
LENGTH OF BODY	12.8 in.
DIAMETER OF BODY	4.2 in.
WALL THICKNESS	0.57 in.
LENGTH OF TAIL	7.0 in.
WIDTH OF TAIL	6.5 in.
WEIGHT OF TAIL	2.5 lbs.

TARGETS:

Personnel, motor convoys, airplanes on the ground, etc.

FUZING:

Nose - AN Mk 219. (Mk V and Mod. 1, use Army Mk XIV fuze.)

BODY CONSTRUCTION:

Cast steel nose and tail piece threaded onto tubular steel body. The only difference in construction is that in the Mk.V Mod. 1 and 2, 23 rings cut from seamless tubing are fitted around the tubular body, while on the Mk.V Mod. 3, a steel wire is helically wound left-handed, the adjacent surfaces of wire being parallel.

SUSPENSION:

Horizontal suspension by a single eyebolt which is screwed into a ring at the center of the body.

COLOR & MARKINGS:

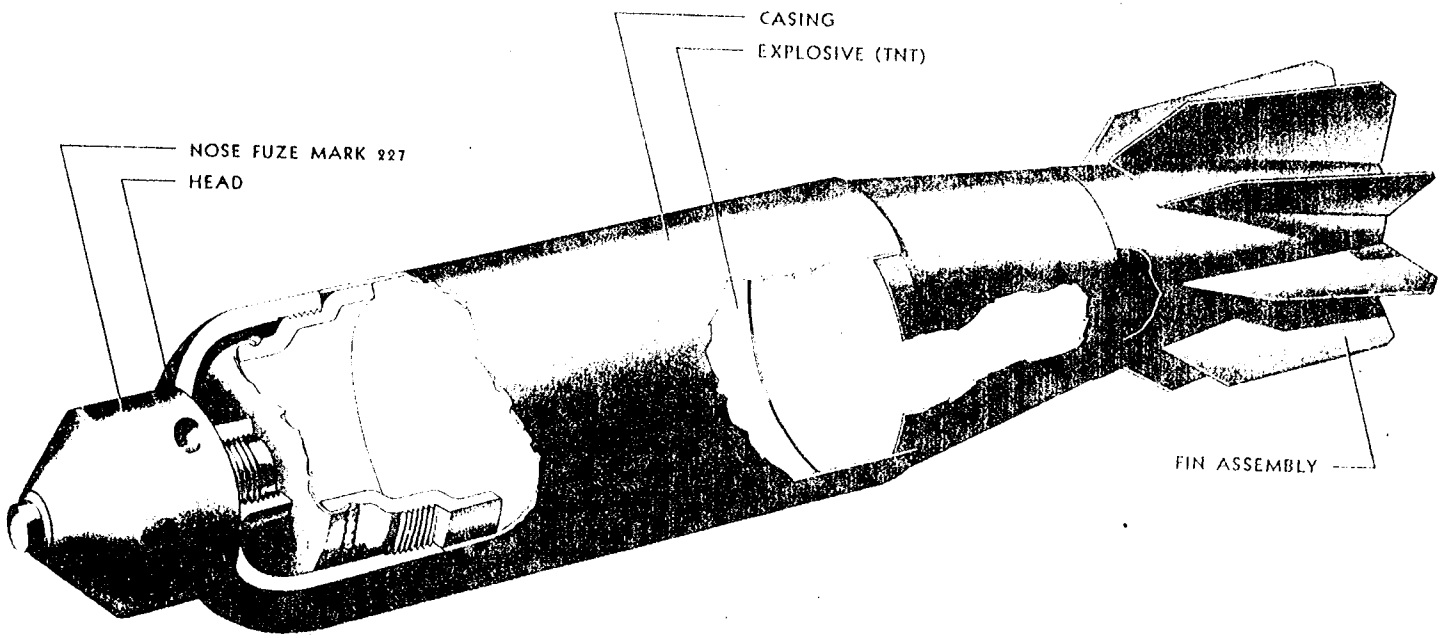
Yellow overall or grey with yellow disc on body.

TAIL CONSTRUCTION:

Four sheet steel vanes welded to tail cone, which is secured to base plug by a single bolt.

WEIGHTS:	CAST T.N.T.
Weight of Filling	4.5 lbs.
Total Weight	33.4 lbs.
Charge/Weight Ratio	13.5 %

5 LB. ANTI-AIRCRAFT BOMB MARK 34



U. S. NAVY BOMB

5 LB. A.A.

Mk 34

(Service)

Data

OVERALL LENGTH	15.0 in.
BODY LENGTH	12.0 in.
BODY DIAMETER	3.0 in.
WALL THICKNESS	.05 in.
TAIL LENGTH	3.0 in.
TAIL WIDTH	3.0 in.

TARGET:

Enemy aircraft in flight or on the ground.

FUZING:

Mk 227 (Nose)

BODY CONSTRUCTION:

Reinforced steel nose and conical tail section welded to cylindrical steel body. Carried in Mk 3 container holding 20 bombs.

SUSPENSION:

Mk 3 container.

COLOR AND MARKINGS:

Grey or olive-drab overall. If grey, will have yellow disc on body; if olive-drab may have yellow nose band.

TAIL CONSTRUCTION:

Eight sheet steel vanes welded to tail cone which, in turn, is welded to body. Vanes are welded on cone at ten degree angle from the longitudinal axis.

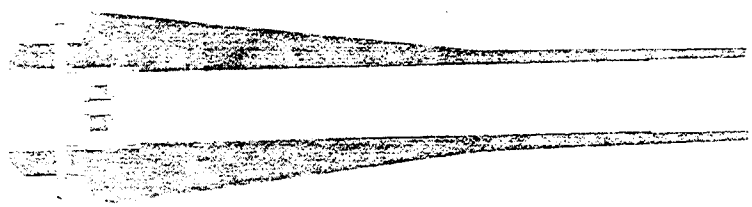
WEIGHTS:

	T.N.T.
Weight of Filling	1.9 lbs.
Total Weight	5.5 lbs.
Charge/Weight Ratio	34.5 %

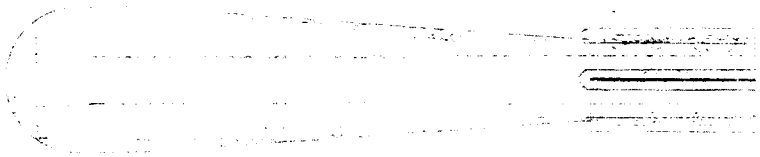
REMARKS:

3 lb. Type C (Mk XXXII) A.A. bomb is a smaller copy of the 5 lb. bomb. It is no longer being used.

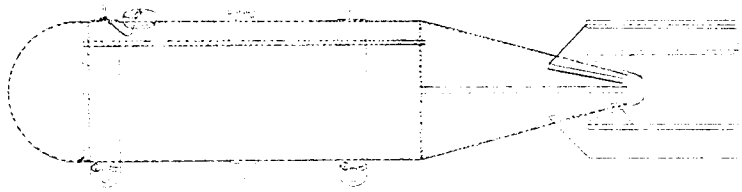
U.S. NAVY PRACTICE BOMBS



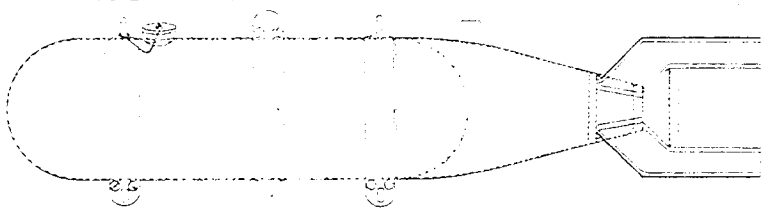
5 LB. MKS. 3,4,5,25 — 8.25" LONG - 2.18" DIA.
4½ LB. MK. A3



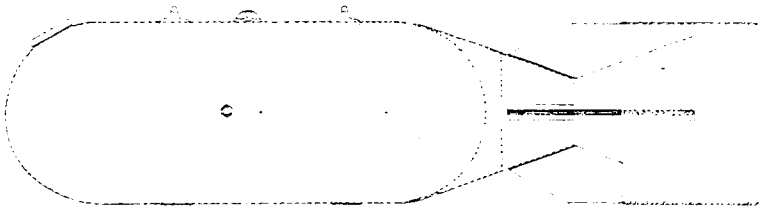
15 LB. MK. 19 — 15.0" LONG - 2.6" DIA.



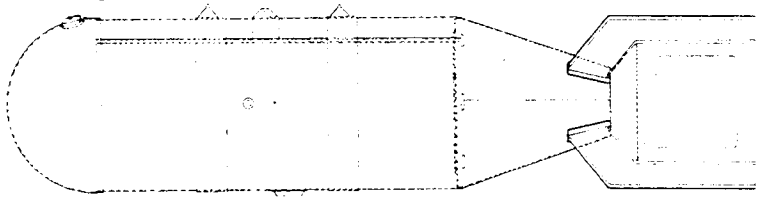
100 LB. MK. 7 — 41.2" LONG - 8.0" DIA.



100 LB. MK. 15 — 41.2" LONG - 8.0" DIA.



500 LB. MK. 21 — 61.8" LONG - 15.0" DIA.



1000 LB. MK. 22 — 79.0" LONG - 19.0" DIA.

U. S. NAVY

PRACTICE BOMBS

The United States Navy uses two types of practice bombs: (a) Miniature practice bombs and (b) regular-sized practice bombs. Since the miniature practice bombs contain only a practice signal cartridge as a spotting charge and the regular-sized practice bombs contain neither a fuze nor a spotting charge, the information on these bombs has been condensed into the tables below.

MINIATURE PRACTICE BOMBS:

	3 lb. Mks. 3, 4: AN Mk 5 and AN-Mk 23, 43	13 lb. Mk 19
OVERALL LENGTH	8.25 in.	13.0 in.
BODY DIAMETER	2.18 in.	2.6 in.
COLOR & MARKINGS	Unpainted	Unpainted or black
BODY CONSTRUCTION	Alloy Casting	
FILLING	These bombs use either the AN-Mk 4 or Mk 5 Signal Cartridge.	
REMARKS	The AN-Mk 4 practice signal cartridge is an extra long 10-gauge shot gun shell which is inserted in the nose of the bomb. On impact the cartridge is fired, expelling a large puff of black smoke from tail of bomb. The firing device consists of two shallow cups separated by a spacer, the firing pin extending through the bottom of one cup. The firing mechanism in the Mk 5 Mod. 1 is more sensitive than in other marks. The Mk 5 signal cartridge is the same size but filled with fluorescein, which stains the water, giving a spot of longer duration than the AN-Mk 4. Difference between bombs is primarily a difference in alloy of casting.	

REGULAR-SIZED PRACTICE BOMBS:

	LENGTH	DIAMETER	COLOR	TOTAL WEIGHT WATER FILLED	TOTAL WEIGHT WET SAND FILLED
100 lb. Mk. 7	41.2 in.	8.0 in.	Black	45.5 lbs.	83.0 lbs.
100 lb. Mk. 15	41.2 in.	8.0 in.	Black	57.0 lbs.	100.0 lbs.
500 lb. Mk. 5	67.3 in.	16.0 in.	Black	360.0 lbs.	500.0 lbs.
500 lb. Mk.11	61.8 in.	16.0 in.	Black	285.0 lbs.	448.0 lbs.
500 lb. Mk 21	61.8 in.	16.0 in.	Black		489.0 lbs.
1000 lb. Mk.7	80.0 in.	19.0 in.	Black	580.0 lbs.	1000.0 lbs.
1000 lb. Mk.22	78.0 in.	19.0 in.	Black		1013.7 lbs.

No fuzes are used in these bombs and they contain no spotting charge, being filled either with water or wet sand. The filling is usually stencilled on the body of the bomb. To prevent freezing and splitting of cases at high altitude, anti-freeze is added. To improve spotting of hits, a spotting dye is also used.

REMARKS:

Mk 15 100# and Mk 21 500# are the only ones being issued now; the others are obsolete.

U. S. ARMY-NAVY

"AN" SERIES

BOMBS

INTRODUCTION

The creation of the Army-Navy Standardization Committee resulted in the standardization of the bombs of these two services into the AN series. This series was very similar to the "M" series except for these modifications:

a. A third suspension lug was added at the center of gravity and diametrically opposite the dual suspension lugs to fit British release devices.

b. The base plate was changed to a male plug to increase the strength on low angle penetration of targets.

c. The bombs were painted an overall olive-drab with 1 inch yellow bands around the nose and base and a 1/4 inch yellow band around the center of gravity.

The bombs in this series included the following weights: 100#, 250#, 500#, 1000#, and 2000#. These bombs are all general purpose high-explosive bombs. Though other types of bombs (i.e. armor-piercing, semi-armor-piercing, fragmentation, incendiary, depth, etc.) have been subsequently standardized and given AN designations, it is with the AN general purpose bombs and their modifications that this introduction shall be concerned.

AN G.P. series:

The AN series was subsequently replaced by the AN G.P. series to make it possible for these bombs to be used in Anti-submarine work as well as for general bombardment. This modification was incorporated into the 500#, 1000#, and 2000# bombs only, their new designations becoming AN-M 64, AN-M 65, and AN-M 66, and consisted of a change from the M102 adapter booster to the M115 adapter booster. With the M115 adapter booster, it became possible to use either standard Army tail fuzes or the AN MK 230 tail hydrostatic fuze. The standard filling of these bombs was 50/50 Amatol until the supply of T.N.T. became ample in 1943, at which time T.N.T. became the standard filler. At the present time, 25% of the production of these bombs is filled with Composition "B".

AN G.P. A1 series:

The A1 modification consists of two steel pins in the base plate which locks the base plate to the main filling, thus preventing removal of the base plate once the bomb is filled. In this series the adapter boosters have also been modified to the M102 A1 and the M115 A1. This modification consists of a hole through the adapter booster and a groove in the threads of the base plate to receive a locking pin which is shipped with all anti-withdrawal tail fuzes. Insertion of the pin which is held in by the fuze body prevents withdrawal of the adapter booster. This series is the current production G.P. bomb series and is used jointly by the Army, Navy, and British.

General Purpose Bomb Designations:

The following table will assist in understanding the development of the designations that have been successively applied to general purpose bombs used by the Army and Navy:

WEIGHT (lb.)	M Series	Navy	AN Series	AN-GP Series	AN-GP A1 Series
100	M30	Mk4-4	AN-M30	AN-M30	AN-M30 A1
250	M57		AN-M57	AN-M57	AN-M57 A1
300	M31				
500	M43	Mk12-2	AN-M43	AN-M64	AN-M64 A1
600	M32				
1000	M44	Mk13-2	AN-M44	AN-M65	AN-M65 A1
1100	M33				
2000	M34		AN-M34	AN-M66	AN-M66 A1

COMMON CHARACTERISTICS OF "AN" DESIGNATED GENERAL PURPOSE BOMBS:

Body Construction:

The body construction of American G.P. bombs may be in one, two, or three pieces. Methods of manufacture include (a) one piece cast or spun, (b) two piece cast and welded or (c) three piece cast and welded. The ogival nose tapers to join the thin parallel side walls which terminate in a boat tailed shape at the after end. The threaded nose opening is closed by the fuze seat liner and the threaded base opening is closed by a male plug, the tail fuze pocket being made by the adapter booster.

INTRODUCTION - cont'd.

Suspension

Dual suspension lugs for horizontal suspension are welded directly to the bomb case, being spaced 14 inches apart on bombs up to 2000 pounds, and 30 inches apart on bombs 2000 pounds and over. A single horizontal suspension lug is also welded to the bomb case at the center of gravity and diametrically opposite the dual lugs. The lugs are eyebolts, shaped from bar steel and formed in the shape of a U. M series bombs could be carried on single suspension racks by using an additional single suspension lug welded on a band fitting around the bomb body at the center of gravity.

For suspension in dive bomb displacement gear, trunnions are provided on a separate band which may be one of two types. The first type provides the trunnion only, and the second, a more common type, provides a single hoisting lug in addition to the trunnions. On some of the newer designs of AN bombs of Navy manufacture, the suspension and hoisting fittings are not attached to the bomb case by welding, but are held to the case by threaded bolts fitting into holes tapped and threaded into the body. For suspension in torpedo slings, the torpedo sling guide key found on Navy bombs can be made on AN bombs by using the base of the single suspension lug with the lug removed by gentle hacksawing.

To hoist bombs into Navy planes, the AN bombs not equipped with hoisting lugs must have a hoisting lug furnished by either an expendable band with single or dual lugs, or by a removable hoisting band. The removable band is preferred, since it does not effect the terminal velocity of the bomb. The newest and best of these bands is the Mark 8 universal hoisting band. For Army planes, bombs are usually hoisted by canvas slings, which also have the advantage of not effecting air trajectory.

Tail Fin Construction

The tail construction is known as the box type tail and consists of the following parts: A cast steel sleeve secured to the body of the bomb by a fin locking nut, four sheet steel fins supported by 4 sheet steel struts in the shape of a box. One fin and one strut are pressed from the single piece of metal and the four pieces are then welded to the sleeve.

Color and Markings

The standard color scheme employed on these bombs since March 11, 1942, has been an olive drab body with yellow bands to indicate the H.E. filler. The banding system for Amatol and T.N.T. fillers is a 1" yellow band at the nose, a 1" yellow band at the tail of the bomb body, and a 1/4" dotted band at the center of gravity. Because Composition "B" is more sensitive and requires more careful handling, it is given an additional marking of a second 1" yellow band at the nose and at the tail. On these bands "Comp.B" is stencilled in black paint. Recent production eliminates the 1/4" band, since the center of gravity is located accurately enough by the single suspension lug.

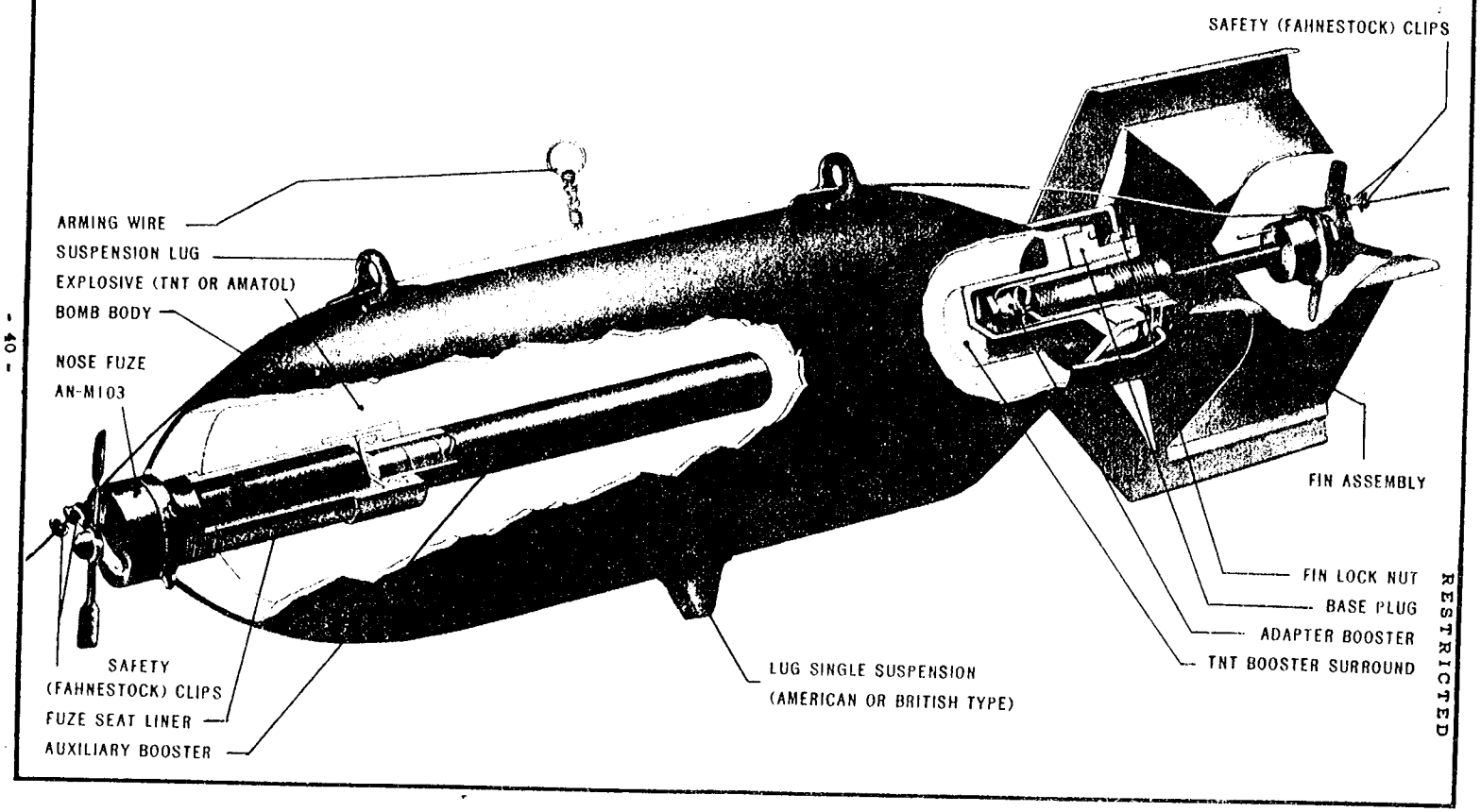
The following standard markings are painted on the bomb body in black paint; type, weight and name of bomb, type of filling, lot number, place of filling and date of filling and inspector's initials.

Additional indestructable marking is stamped into the metal of the bomb case on the rear conical surface of the bomb body; type, size, name, maker's initials, lot number and date (i.e., G.P. 500 lb. AN-M 64 CSCO Lot 57 4/42).

Explosive Filling

The filling of these bombs is accomplished in the following manner. With the nose fuze seat liner in place, the bomb is placed on end nose down and an M 104 auxiliary booster is positioned behind it. The M 104 is a bakelite tube containing tetryl. The initial pour of the explosive is sufficient to secure the auxiliary booster when it cools, then the remainder of the filling, 50/50 Amatol, T.N.T., or Composition "B" is added until approximately 6 inches remains to be filled. A second M 104 auxiliary booster is then inserted in all bombs except the 100# and the tail surround is added to complete the filling. A wooden former is inserted in the tail fuze cavity as the filling cools. After cooling, the former is removed and the appropriate adapter booster is inserted. The adapter booster consists of the fuze seat liner with an additional steel cup containing a tetryl pellet. The M 102 (and M 102A1) adapter booster has an internal thread diameter of 1.50 inches. The M 115 adapter booster has an internal thread diameter of 2.0 inches and an adapter ring to further reduce the diameter to 1.50 inches when smaller fuzes are used. For reference to adapter boosters, see page 122.

100 LB. GENERAL PURPOSE BOMB AN-M30



RESTRICTED

Data:

OVERALL LENGTH.....36.0 in.
LENGTH OF BODY..... 29.0 in.
DIAMETER..... 8.2 in.
WALL THICKNESS..... 0.16 in.
TAIL LENGTH..... 9.75 in.
TAIL WIDTH.....11.0 in.
TAIL WEIGHT..... 3.5 lbs.

ARMY-NAVY BOMB

100 LB. G.P.

AN-M 30A1

TARGETS:

Ammunition dumps, railway engines and cars, airplanes on the ground, andlight types of construction, plus light surface vessels.

FUZING:

Regular Missions—

Nose: AN-M 103, M 103
Tail: AN-M 100A2, AN-M 100A1, M 100

Special Missions—

Tail: M 112 (Masthead bombing from land base only.)
AN-M 115 (Masthead bombing from carrier or land base.)
M 123 (Long Delay Time fuze against land targets.)
Nose: Shipping plug, when above fuzes are used in the tail.

WEIGHT:

	50/50 Amatol	T.N.T.
Weight of Filling	54.0 lbs.	57.0 lbs.
Total Weight	110.0 lbs.	115.0 lbs.
Charge/Weight Ratio	49 %	50 %

REMARKS:

The difference between these two bombs is:
(a) The AN-M 30A1 incorporates two pins fitted into the base plate which extend into the main filling and prevent removal of the base plate.
(b) The AN-M 30A1 uses the M 102A1 adapter booster, which has a 3/8" hole, mating with a groove in the internal threads of the base plate. A locking pin, shipped with anti-withdrawal fuzes only, fits through the hole and into the groove and prevents extraction of the adapter booster. The pin is held in place by the fuze body.

FOR CONSTRUCTION OF BODY, SUSPENSION, COLOR & MARKINGS, TYPE OF FILLING, AND TAIL CONSTRUCTION see -

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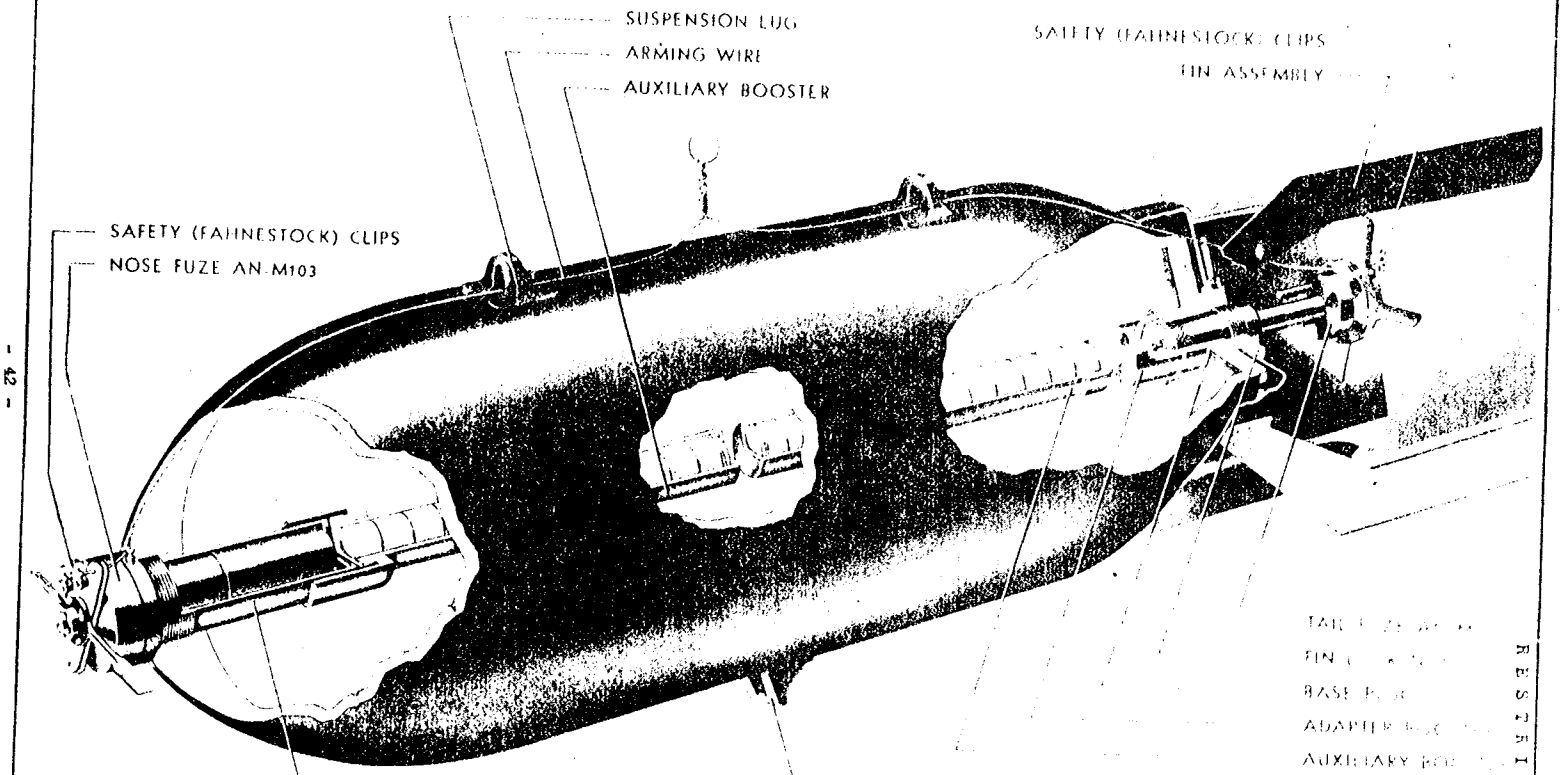
250 LB. GENERAL PURPOSE BOMB AN-M57



ARMY-NAVY BOMB

250 LB. G.P.

AN-M 57A1

Data:

OVERALL LENGTH.....45.1 in.
LENGTH OF BODY.....36.0 in.
DIAMETER.....10.9 in.
WALL THICKNESS..... 0.27 in.
TAIL LENGTH.....12.1 in.
TAIL WIDTH.....14.9 in.
TAIL WEIGHT..... 6.0 lbs.

TARGETS:

Ammunition dumps, railway engines and cars, airplanes on the ground, light types of construction, and light surface vessels.

FUZING:

Regular Missions—

Nose: AN-M 103, M 103
Tail: AN-M 100A2, AN-M 100 A1, M 100

Special Missions—

Tail: M 112 (Masthead bombing from land base only.)
AN-M 115 (Masthead bombing from carrier or land base.)
M 123 (Long Delay Time fuze against land targets.)
Nose: Shipping plug, when above fuzes are used in the tail.

WEIGHT:

	50/50 Amatol	T.N.T.
Weight of Filling	123.7 lbs.	129.0 lbs.
Total Weight	255.9 lbs.	260.0 lbs.
Charge/Weight ratio	48.0%	50.0%

REMARKS:

The difference between these two bombs is:
(a) The AN-M 57A1 incorporates two pins fitted into the base plate which extend into the main filling and prevent removal of the base plate.
(b) The AN-M 57A1 uses the M 102A1 adapter booster, which has a 3/8" hole, mating with a groove in the internal threads of the base plate. A locking pin, shipped with anti-withdrawal fuzes only, fits through the hole and into the groove and prevents extraction of the adapter booster. The pin is held in place by the fuze body.

FOR CONSTRUCTION OF BODY, SUSPENSION, COLOR & MARKINGS, TYPE OF FILLING, AND TAIL CONSTRUCTION see -

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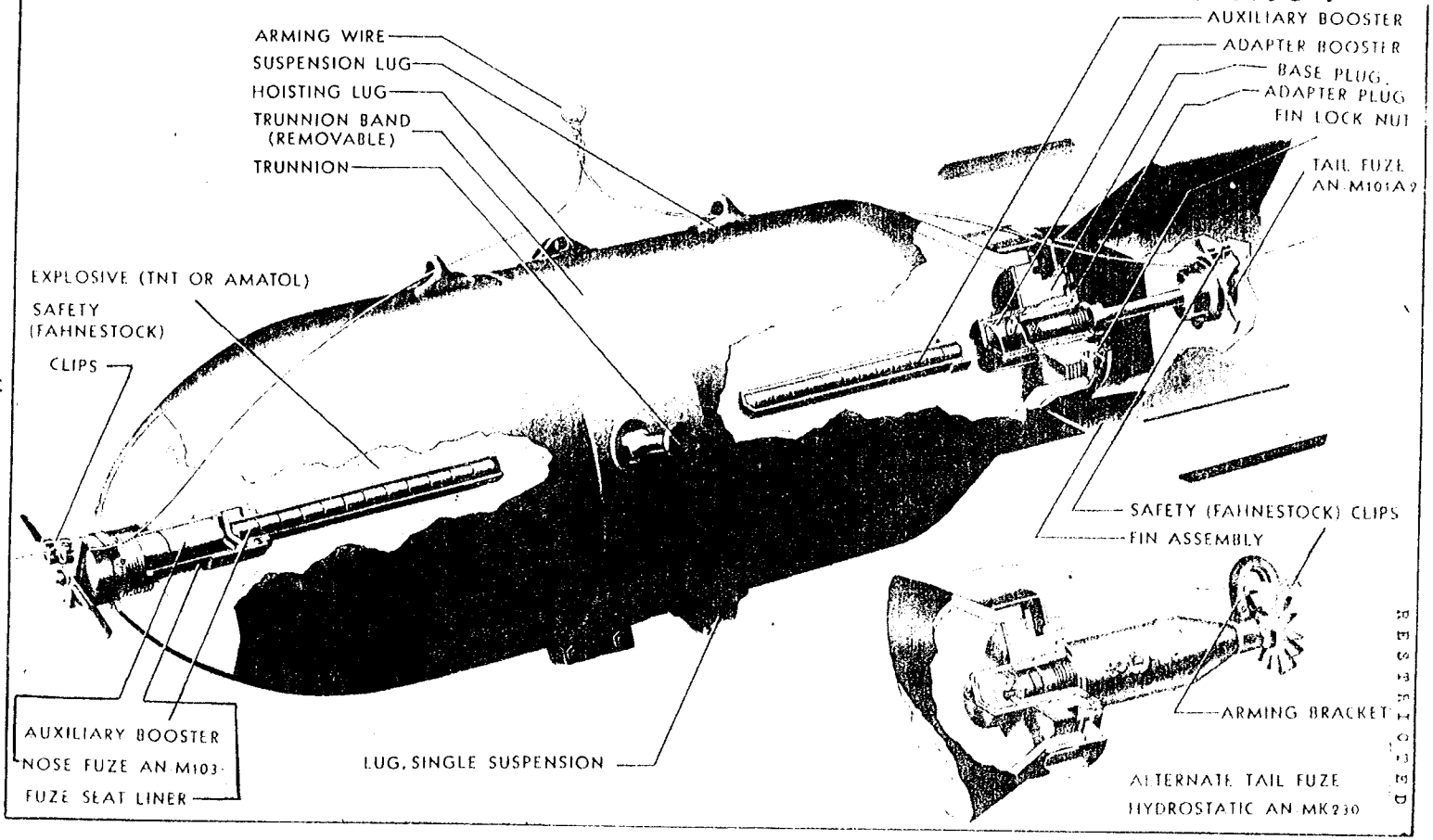
500 LB. GENERAL PURPOSE BOMB AN-M64



RESTRICTED

Data: AN-M 43 , AN-M 64 & AN-M 64A1

OVERALL LENGTH.....56.8 in.
LENGTH OF BODY.....45.0 in.
DIAMETER.....14.2 in.
WALL THICKNESS..... 0.3 in.
TAIL LENGTH.....13.9 in.
TAIL WIDTH .....18.9 in.
TAIL WEIGHT.....12.3 lbs.

ARMY-NAVY BOMBS

500 LB. G.P.

AN-M 64A1
AN-M 43

TARGETS:

Ammunition dumps, railway engines and cars, airplanes on the ground, all types of construction, and light surface vessels. In addition, the AN-M 64 with the AN-Mk 230 hydrostatic tail fuze can be used against more heavily armed surface vessels and submarines. THE AN-M 43 WILL NOT TAKE THE AN-Mk 230 FUZE.

FUZING:

The fuzing of these bombs is the same WITH ONE EXCEPTION: the AN-Mk 230 fuze can be used in the AN-M 64 because this bomb has the M-115 (or M-115 A1--see Introduction) adapter booster. The M-115 adapter booster has a sleeve that can be easily removed making it possible to use a fuze with a larger diameter. With the removable sleeve screwed in the adapter booster any Army tail fuze may be used. The AN-M 43 uses the M 102 adapter booster which has no removable sleeve and a diameter too small to receive the AN-Mk 230 hydrostatic fuze. The possible fuzing of these bombs is as follows:

Regular Missions—

Nose: AN-M 103, M 103
Tail: AN-M 101A2, AN-M 101A1, M 101

Special Missions—

Tail: M 113 (Masthead bombing from land based planes only.)
AN-M 116 (Masthead bombing from carriers and land bases.)
M 124 (Long Delay Time fuze against land targets.)
Nose: Shipping plug, when above tail fuzes are used.

Additional Fuzing (AN-M 64 only)—Coastal patrol missions

Nose: AN-M 103 (selective arming), M 103.
Tail: AN-Mk 230 hydrostatic tail fuze (sleeve in M-115 adapter booster must be removed before this fuze can be used.)

WEIGHTS:

	AN-M43		AN-M 64		AN-M 64A1	
	Amatol	T.N.T.	Amatol	T.N.T.	T.N.T.	Comp. B
Filling Weight	262#	267#	262#	267#	267#	274#
Total Weight	510#	525#	510#	525#	525#	535#
Chg/Wt. Ratio	51.2%	51.0%	51.2%	51.0%	51.0%	51.0%

REMARKS:

The difference between these bombs is in the adapter booster which is employed in the base plate to receive the tail fuze. The AN-M 43 uses the M 102 adapter booster, the AN-M 64 uses the M 115 adapter booster and the AN-M 64A1 uses the M 115A1 adapter booster.

The A1 modification also includes two base plate locking pins fitting into the main filling, preventing removal of the base plate, and a groove in the internal thread of the base plate which mates with the hole of the M 115A1 adapter booster to receive a locking pin, supplied only with anti-withdrawal fuzes. With this pin held in place by the fuze body, the adapter booster cannot be extracted.

FOR CONSTRUCTION OF BODY, SUSPENSION, COLOR & MARKINGS, TYPE OF FILLING, AND TAIL CONSTRUCTION SEE -

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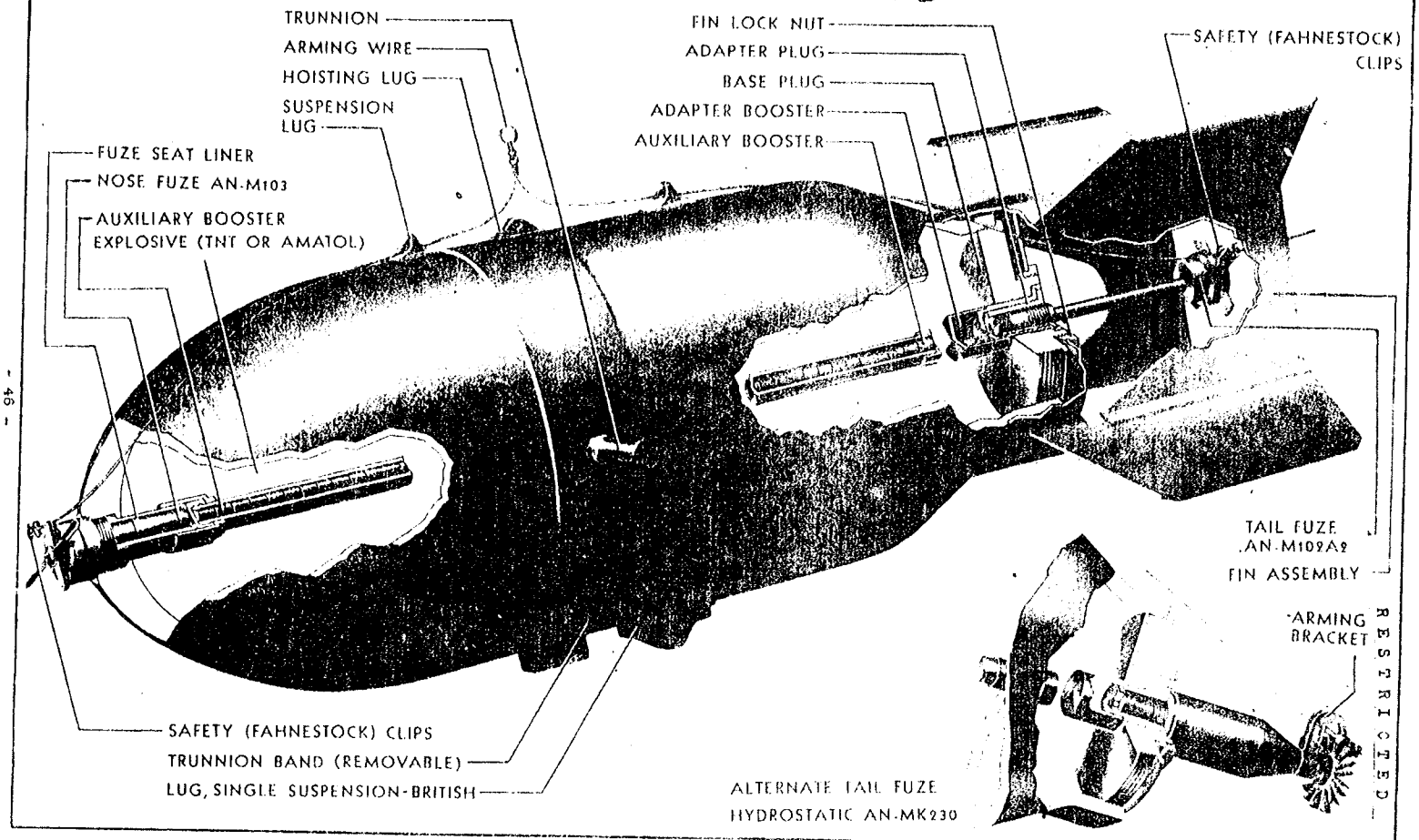
AN-M65 1000 LB. G.P. BOMB



Data: AN-M 44 & AN-M 65 & AN- M65A1

OVERALL LENGTH	67.1 in.
LENGTH OF BODY	53.1 in.
DIAMETER	16.8 in.
WALL THICKNESS	0.5 in.
TAIL LENGTH	18.5 in.
TAIL WIDTH	25.4 in.
TAIL WEIGHT	21.5 lbs.

ARMY-NAVY BOMBS

1000 LB. G.P.

AN-M 65A1
AN-M 44

TARGETS:

Ammunition dumps, railway engines and cars, airplanes on the ground, all types of construction, and light surface vessels. In addition, the AN-M 65 with the AN-Mk 230 hydrostatic tail fuze can be used against more heavily armed surface vessels and submarines. THE AN-M 44 WILL NOT TAKE THE AN-Mk 230 FUZE.

FUZING:

The fuzing of these bombs is the same WITH ONE EXCEPTION: the AN-Mk 230 fuze can be used in the AN-M 65 because this bomb has the M 115 (or M 115A1--see Introduction) adapter booster. The M 115 adapter booster has a sleeve that can be easily removed making it possible to use a fuze with a larger diameter. With the removable sleeve screwed in the adapter booster any Army tail fuze may be used. The AN- M 44 uses the M 102 adapter booster which has no removable sleeve and a diameter too small to receive the AN-Mk 230 hydrostatic fuze. The possible fuzing of these bombs is as follows:

Regular Missions—

Nose: AN-M 103, M 103
Tail: AN-M 102A2, AN-M 102A1, M 102

Special Missions—

Tail: M 114 (Masthead bombing from land based planes only.)
AN-M 117 (Masthead bombing from carriers or land bases.)
M 125 (Long Delay Time fuze against land targets.)
Nose: Shipping plug, when above tail fuzes are used.

Additional Fuzing (AN-M 65 only)—Coastal patrol missions

Nose: AN-M 103 (selective arming, M 103
Tail: AN-Mk 230 hydrostatic tail fuze (sleeve in M 115 adapter booster must be removed before this fuze can be used.)

WEIGHTS:

	AN-M44		AN-M 65		AN-M 65A1	
	Amatol	T.N.T.	Amatol	T.N.T.	T.N.T.	Comp. B
Weight of filling	530#	558#	530#	558#	558#	595#
Total Weight	964#	990#	965#	990#	990#	1040#
Chg/Wt. Ratio	54.9%	56.0%	55.8%	56.0%	56.0%	57.0%

REMARKS:

The difference between these bombs is in the adapter booster which is employed in the base plate to receive the tail fuze. The AN-M 44 uses the M 102 adapter booster, the AN-M 65 uses the M 115 adapter booster, and the AN-M 65A1 uses the M 115A1 adapter booster.

The A1 modification also includes two base plate locking pins fitting into the main filling, preventing removal of the base plate, and a groove in the internal threads of the base plate which mates with the hole of the M 115A1 adapter booster to receive a locking pin, supplied only with anti-withdrawal fuzes. With this pin held in place by the fuze body, the adapter booster cannot be extracted.

FOR CONSTRUCTION OF BODY, SUSPENSION, COLOR & MARKINGS, TYPE OF FILLING, AND TAIL CONSTRUCTION SEE -

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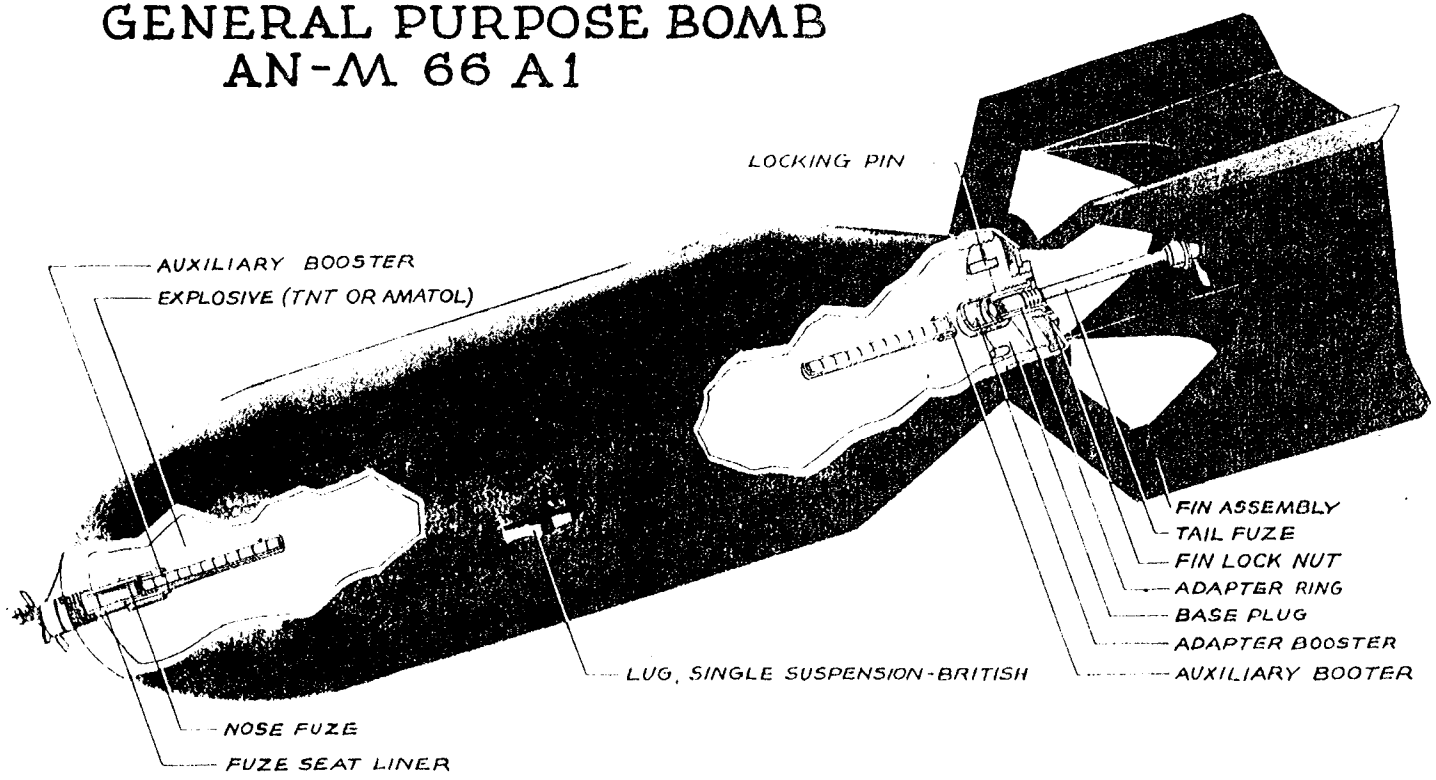
2000 LB.
GENERAL PURPOSE BOMB
AN-M 66 A1



RESTRICTED

Date: AN-M 34 & AN-M 66 & AN-M 66A1

OVERALL LENGTH	90.4 in.
LENGTH OF BODY	70.0 in.
DIAMETER	23.3 in.
WALL THICKNESS	0.5 in.
TAIL LENGTH	25.7 in.
TAIL WIDTH	31.6 in.
TAIL WEIGHT	38.6 lbs.

ARMY-NAVY BOMBS

2000 LB. G.P.

AN-M 66A1
AN-M 34

TARGETS:

Ammunition dumps, railway engines and cars, airplanes on the ground, all types of construction, and light surface vessels. In addition, the AN-M 66 with the AN-Mk 230 hydrostatic tail fuze can be used against more heavily armed surface vessels and submarines. THE AN-M 34 WILL NOT TAKE THE AN-Mk 230 FUZE.

FUZING:

The fuzing of these bombs is the same WITH ONE EXCEPTION: the AN-Mk 230 fuze can be used in the AN-M 66 because this bomb has the M 115 (or M 115A1--see Introduction) adapter booster. The M 115 adapter booster has a sleeve that can be easily removed making it possible to use a fuze with a larger diameter. With the removable sleeve screwed in the adapter booster any Army tail fuze may be used. The AN-M 34 uses the M 102 adapter booster which has no removable sleeve and a diameter too small to receive the AN-Mk 230 hydrostatic fuze. The possible fuzing of these bombs is as follows:

Regular Missions—

Nose: AN-M 103, M 103
Tail: AN-M 102A2, AN-M 102A1, M 102

Special Missions—

Tail: M 114 (Masthead bombing from land based planes only.)
AN-M 117 (Masthead bombing from carriers or land bases.)
M 125 (Long Delay Time fuze against land targets.)
Nose: Shipping plug, when above tail fuzes are used.

Additional Fuzing (AN-M 66 only)—Coastal patrol missions

Nose: AN-M 103 (selective arming), M 103
Tail: AN-Mk 230 hydrostatic tail fuze (sleeve in M 115 adapter booster must be removed before this fuze can be used.)

WEIGHTS:

	AN-M 34		AN-M 66		AN-M 66A1	
	Amatol	T.N.T.	Amatol	T.N.T.	T.N.T.	Comp. B
Weight of filling	1063#	1117#	1063#	1117#	1117#	1142#
Total Weight	2049#	2103#	2052#	2106#	2106#	2140#
Chg/Wt. Ratio	51.9%	53.1%	52.0%	53.0%	53.0%	53.0%

REMARKS:

The difference between these bombs is in the adapter booster which is employed in the base plate to receive the tail fuze. The AN-M 34 uses the M 102 adapter booster, the AN-M 66 uses the M 115 adapter booster, and the AN-M 66A1 uses the M 115A1 adapter booster.

The A1 modification also includes two base plate locking pins fitting into the main filling, preventing removal of the base plate, and a groove in the internal threads of the case plate which mates with the hole of the M 115A1 adapter booster to receive a locking pin, supplied only with anti-withdrawal fuzes. With this pin held in place by the fuze body, the adapter booster cannot be extracted.

FOR CONSTRUCTION OF BODY, SUSPENSION, COLOR & MARKINGS, TYPE OF FILLING, AND TAIL CONSTRUCTION SEE -

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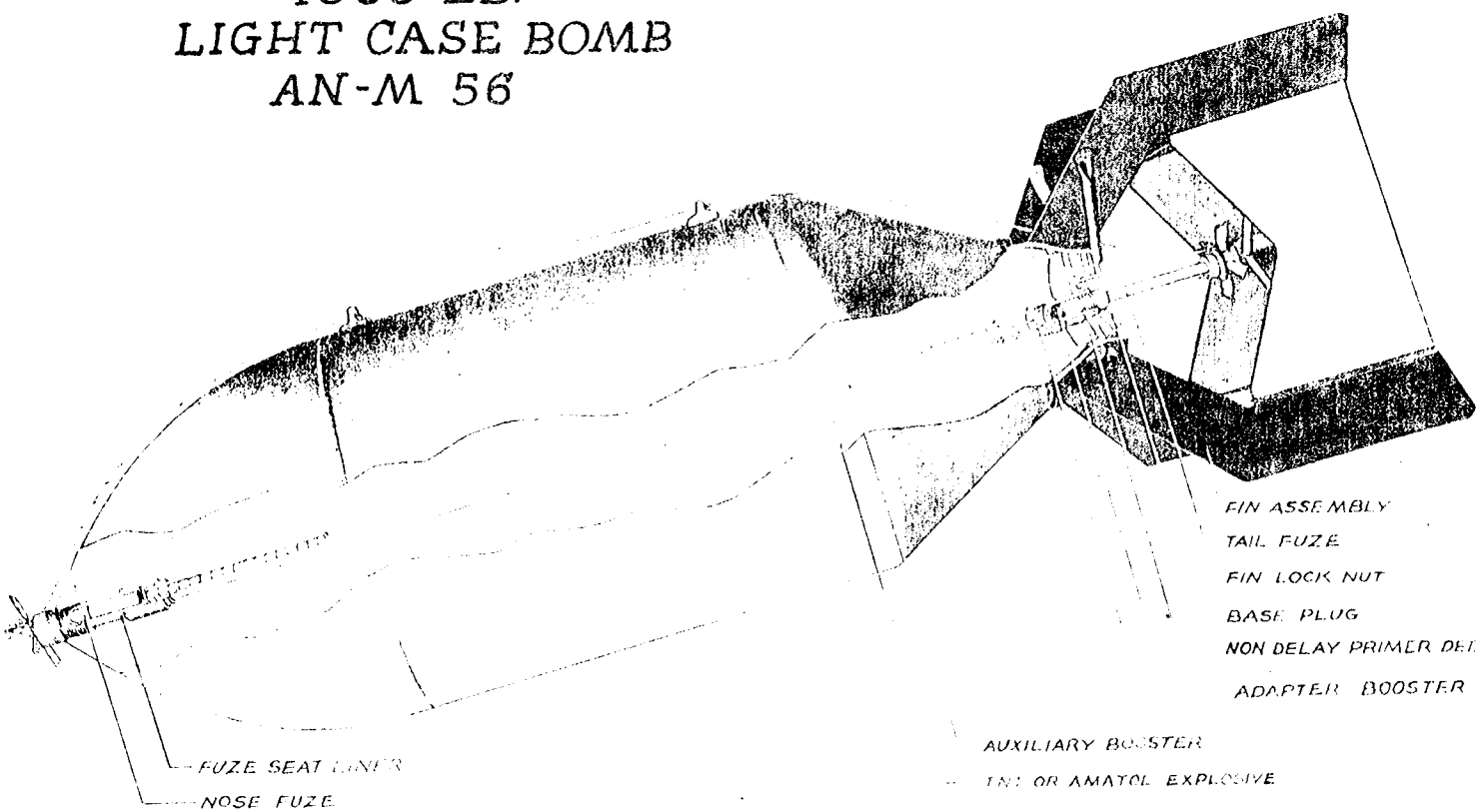
4000 LB.
LIGHT CASE BOMB
AN-M 56



RESTRICTED

Data:

OVERALL LENGTH	117.3 in.
LENGTH OF BODY	94.9 in.
BODY DIAMETER	34.0 in.
WALL THICKNESS	0.37 in.
TAIL LENGTH	28.0 in.
TAIL WIDTH	47.6 in.
TAIL WEIGHT	95.0 lbs.

ARMY-NAVY BOMB

4000 LB. L.C.

AN-M 56

TARGETS:

General bombardment, particularly effective against residential areas, factories, etc., being designed for maximum blast effect.

FUZING:

Nose: AN-M 103, M 103 (Set for instantaneous action always)
Tail: AN-M 102A2, AN-M 102A1 (Non-delay action).

BODY CONSTRUCTION:

The body is made of several cast pieces welded together. The side walls have a minimum thickness of .3 inch and a maximum thickness of .5 inch. Closed at the base by a female cap. It has a rounded nose and parallel side walls.

SUSPENSION:

Suspension is by means of two lugs welded to the case 15 inches on either side of the center of gravity.

TAIL CONSTRUCTION:

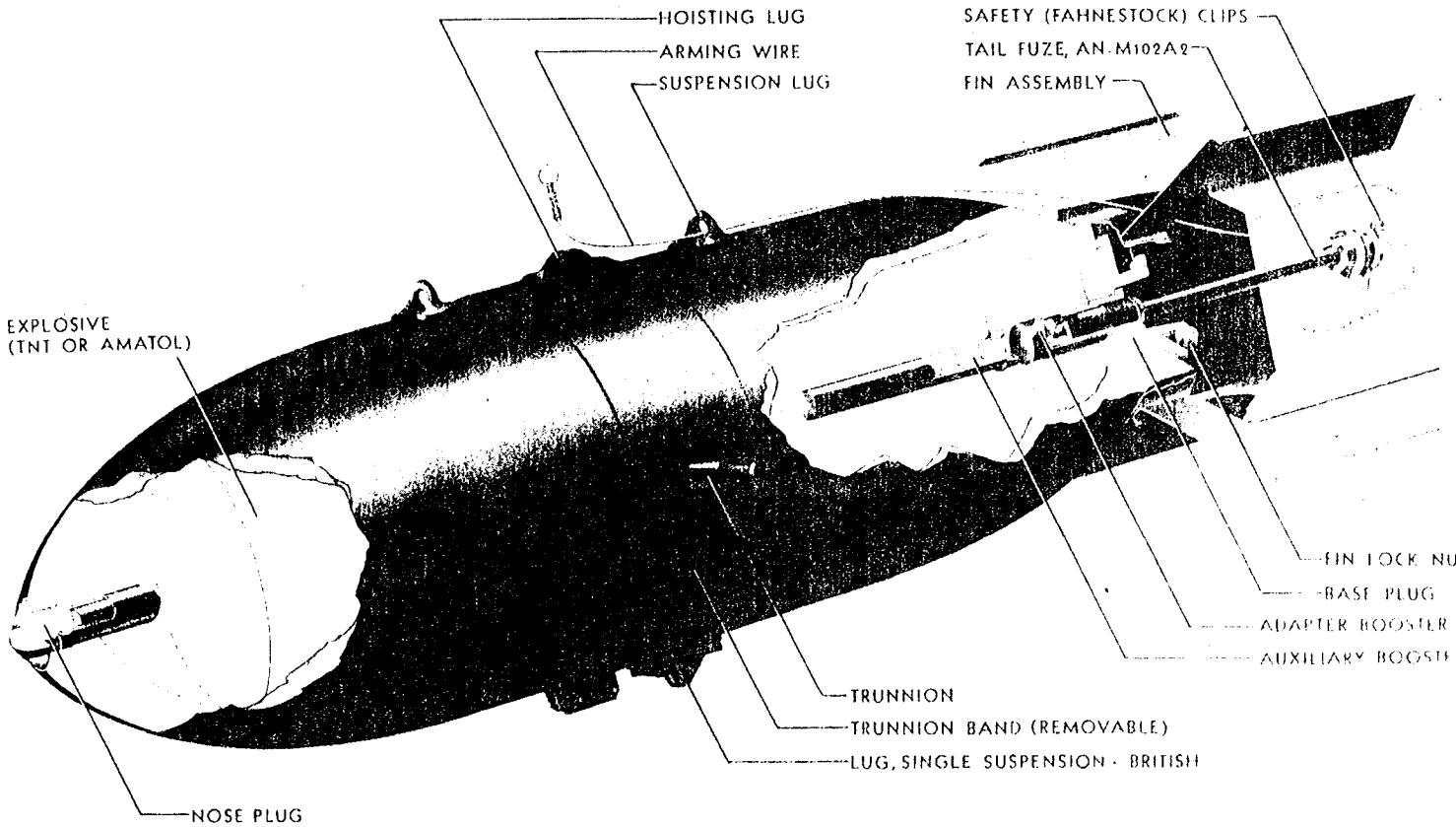
The normal box type tail is modified on this bomb by eight additional strut rods to give increased stability for this large bomb.

FILLING:

The standard filling for this bomb at present is cast T.N.T. A full length M111 auxiliary booster is employed to insure complete detonation.

WEIGHT:	T.N.T.	Amatol
Weight of Filling	3362.0 lbs.	3248 lbs.
Total Weight	4205.0 lbs.	4085 lbs.
Charge/Wt. Ratio	80.0%	79.0%

1000 LB. SEMI-ARMOR PIERCING BOMB AN-M59



Data:	500 lb.	1000 lb.
OVERALL LENGTH. . .	57.8 in.	69.3 in.
LENGTH OF BODY. . .	46.8 in.	57.3 in.
BODY DIAMETER . . .	11.8 in.	15.1 in.
WALL THICKNESS. . .	0.75 in.	1.0 in.
TAIL LENGTH	15.05 in.	16.8 in.
TAIL WIDTH	16.16 in.	20.7 in.
TAIL WEIGHT	11.4 lbs.	17.0 lbs.

ARMY-NAVY BOMBS

500 & 1000 LB. S.A.P.

AN-M 58A2 (500 lb.)
AN-M 59A1 (1000 lb.)

TARGETS:

Moderately armored surface vessels, reinforced concrete or steel construction.

FUZING:

Ordinarily tail fuzes only are employed in the S.A.P. bombs, but in an emergency an instantaneous nose fuze, the AN-M 103, can be used if fragmentation effect is desired. When this is used, a non-delay primer detonator should be used in the tail fuze. Otherwise, in regular missions a short delay primer detonator is used in the tail fuze and no nose fuze is used.

Regular Use - Tail fuzing only
500 lb.: AN-M 101A2, AN-M 101A1 (with short delay primer detonator)
1000 lb.: AN-M 102A2, AN-M 102A1 (with short delay primer detonator)
Special Use - Fragmentation effect
500 lb.: Nose, AN-M 103 (instantaneous setting)
Tail, AN-M 101A2, AN-M 101A1 (non-delay primer detonator)
1000 lb.: Nose, AN-M 103 (instantaneous setting)
Tail, AN-M 102A2, AN-M 102A1 (Non-delay primer detonator)

Special Uses-	Minimum Altitude Bombing	Long Delay
500 lb.:	M 113A1 or M 116	M 124 or M 133
1000 lb.:	M 114A1 or M 117	M 125 or M 134

BODY CONSTRUCTION:

S.A.P. bombs are of single piece construction, either cast or spun, slightly streamlined in shape with semi-pointed noses. The threaded nose opening receives a fuze seat liner and a steel nose plug, which can be removed in order that an instantaneous nose fuze may be inserted when fragmentation effect is desired.

SUSPENSION:

Suspension lugs are welded to the case in a manner similar to the G.P. bombs--see INTRODUCTION, page 38. Trunnions on band (dive-bombing) may be used.

TAIL CONSTRUCTION:

Box type tail is employed as on the G.P. bombs, see INTRODUCTION, page 38 .

AN-M 58A1 MODIFICATION:
To increase the penetration of the 500 lb. AN-M 58, 9.5 pounds of Amatol were removed and replaced by 31.5 lbs. of steel. These bombs are designated 500 lb. AN-M 58A1.
AN-M 58A2 and AN-M 59A1 MODIFICATION:
To enable these bombs to be used with anti-withdrawal fuzes, the base plate locking pins, and M 102A1 adapter booster are employed to prevent removal of base plate and adapter booster.

FILLING:

Cast T.N.T. is currently being used, with a wax pad employed in the nose to cushion the explosive in order to prevent premature detonation on impact with an armored target. One M 104 auxiliary booster is used, positioned just forward of the M 102 adapter booster. Filler was formerly Amatol with T.N.T. surrounds.

COLOR & MARKINGS:
Olive drab overall with one inch yellow band around nose and base and 1/4 inch yellow band around center of gravity. Bombs having wax in the nose can be identified by the marking "with pad".

WEIGHTS: (With T.N.T.)	AN-M 58	AN-M 58A1	AN-M 59
Filling weight	160 lbs.	162 lbs.	320 lbs.
Total weight	472 lbs.	494 lbs.	995 lbs.
Chg/Wt. Ratio	33.9%	31.0%	32.0%

1000 LB. ARMOR PIERCING BOMB, AN-MK. 33

FIN LOCK NUT

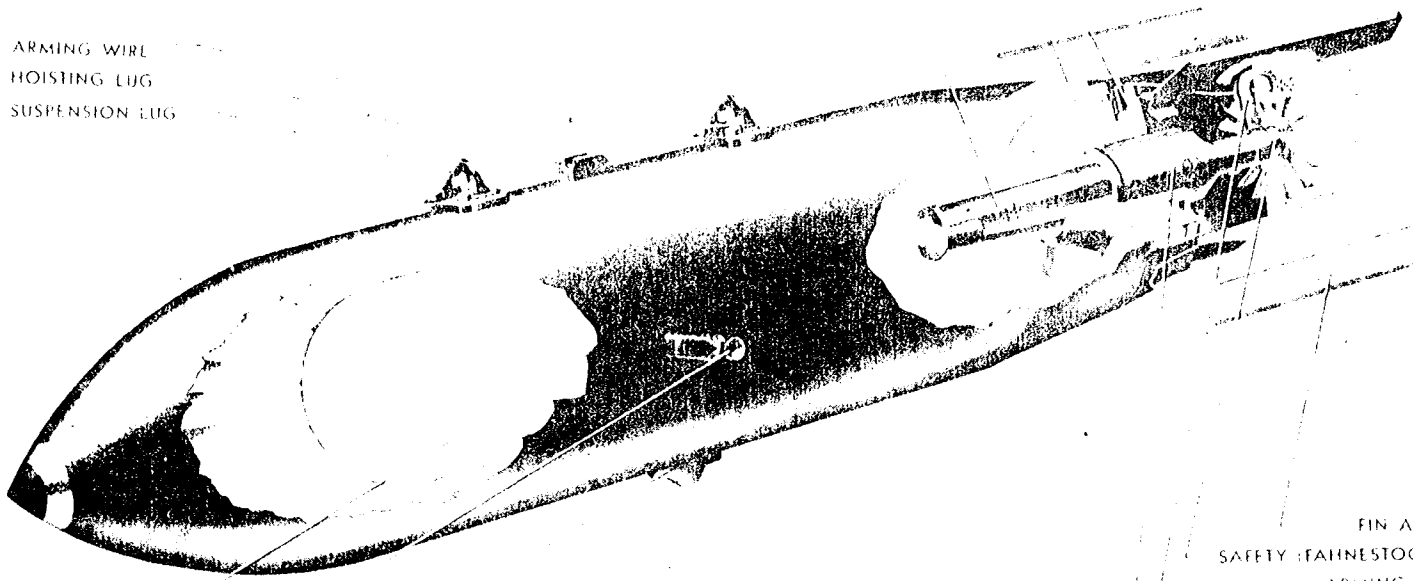
BASE PLUG

AUXILIARY BOOSTER

ARMING WIRE

HOISTING LUG

SUSPENSION LUG



EXPLOSIVE "D"

TRUNNION

LUG SINGLE SUSPENSION - BRITISH

FIN ASSEMBLY

SAFETY (FAHNESTOCK) CLIPS

ARMING BRACKET

TAIL FUZE AN-MK 998

ARMY-NAVY BOMBS

1000 LB., 1600 LB. ARMOR PIERCING

AN-Mk 33 (1000 lb.)
AN-Mk 1 (1600 lbs.)

Data:	1,000# AN-Mk 33	1,600# AN-Mk 1
OVERALL LENGTH....	73.0 in.	83.5 in.
LENGTH OF BODY....	58.0 in.	69.5 in.
BODY DIAMETER.....	12.0 in.	14.0 in.
WALL THICKNESS....		1.3 in.
TAIL LENGTH	17.0 in.	20.5 in.
TAIL WIDTH	16.0 in.	20.6 in.

TARGETS:

Heavily armored ships such as battleships and cruisers, and heavily fortified land targets.

Tail: AN-Mk 228 (.08 sec. delay)

BODY CONSTRUCTION:

Single piece, forged and machined, with pointed noses, parallel sides and slight boat tailing. The base plate is of the male type.

SUSPENSION:

Suspension in the Mk 1-1600 lb. design was by means of lugs welded to bands, the bands being positioned by grooves on the external bomb surface. The newer designs, AN-Mk 1 & Mk 33 are suspended by fittings which screw into holes drilled in the bomb case and secured by bolts.

TAIL CONSTRUCTION:

The normal Box type tail assembly is used on these bombs. (INTRODUCTION, p. 38)

FILLING:

The main filling of these bombs is pressed Explosive "D" or cast T.N.T. The tail fuze pocket requires the use of the Mk 1 granular T.N.T. auxiliary booster.

COLOR & MARKINGS:

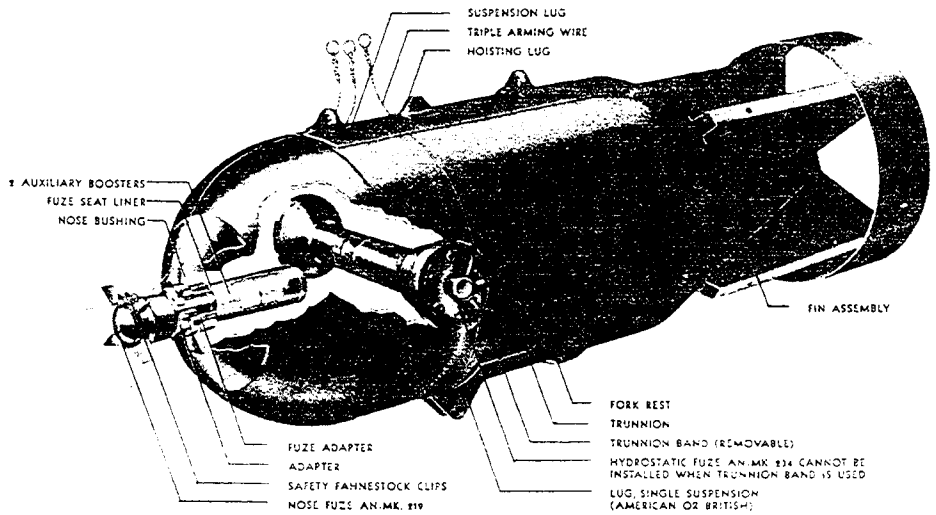
Olive drab overall with one inch yellow bands around nose and base and 1/4 in. yellow band around center of gravity.

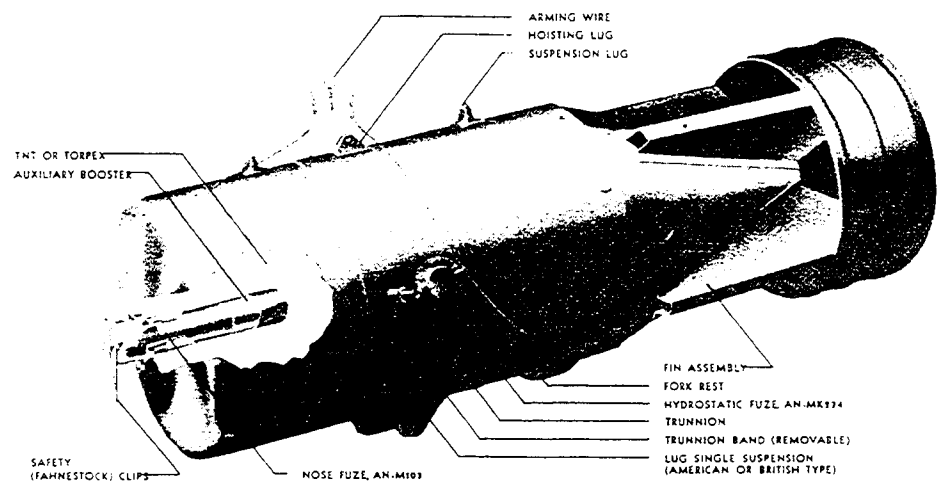
WEIGHTS:	1000# - AN-Mk 33	1600# AN-Mk 1
Weight of filling (Expl.D)	140 lbs.	215 lbs.
Total Weight	1025 lbs.	1590 lbs.
Chg/ Wt. Ratio	14.0%	14.0%

590703 O - 44 - 5

AIRCRAFT DEPTH BOMB MK. 17 MOD. 1, AN-MK. 17 MOD. 2 & AN-MK. 44

MARK 17 MOD 1 OR AN-MARK 17 MOD. 2, TNT LOADED, WEIGHS 325 LBS. AN-MARK 44, TORPEX LOADED, WEIGHS 350 LBS.





AIRCRAFT DEPTH BOMB AN-MARK 41 AND AN-MARK 47

AN-MARK 41, TNT LOADED, WEIGHS APPROXIMATELY 325 LBS. AN-MARK 47, TORPEX LOADED, WEIGHS APPROXIMATELY 350 LBS

Data:	AN-Mk 17-2 AN-Mk 44	AN-Mk 41 AN-Mk 47
OVERALL LENGTH	52.5 in.	49.9 in.
LENGTH OF BODY	31.1 in.	27.8 in.
BODY DIAMETER	15.0 in.	15.0 in.
WALL THICKNESS	0.06 in.	0.06 in.
TAIL LENGTH	20.2 in.	24.6 in.
TAIL WIDTH	20.6 in.	15.4 in.

(Note: AN-Mk 17-2 & AN-Mk 44 have round nose, can use flat nose attachment; AN-Mk 41, AN-Mk 47 are flat nosed; Mks.44, 47 weigh 350#, use TPX.)

ARMY-NAVY BOMBS

325 LB. DEPTH

AN-Mk 17-2 (T.N.T.)
AN-Mk 44 (Torpex)
AN-Mk 41 (T.N.T.)
AN-Mk 47 (Torpex)

(Service)

TARGETS:

Submarines or light surface vessels, or as Light Case bomb for general bombardment when dropped on land.

FUZING:

Nose: AN-Mk 219, Will not arm if dropped from below 2500 ft. when used on bomb with flat nose attachment or flat nose. Requires auxiliary booster and Mk219 adapter ring. Gives instantaneous action.
Mk 221, delay of .01 seconds; will not arm on flat nose if dropped from below 2500 ft.
AN-M 103 (instantaneous only); special vanes for flat nose bombs
Athwartships: AN-Mk 224 & AN-Mk 234 (hydrostatic fuzes, capable of functioning at 25, 50, 75, 100, or 125 ft. depending on setting).

BODY CONSTRUCTION:

AN-Mk 17-2 & AN-Mk 44: These depth bombs are made with round noses welded to a cylindrical steel tube. There is a strengthening disc around the nose and a steel strip along the suspension lugs to reinforce the body. The transverse fuze pocket is 11.9 inches aft of the nose. To prevent ricochet and improve underwater trajectory a flat nose attachment is made for these bombs, the attachments being in the shape of a bucket which fits down over the nose and is filled with plaster of paris, increasing the weight of the bomb by 44 lbs. Bomb case extremely thin.
AN-Mk 41 & AN-Mk 47: These bombs constructed with a flat nose, there being a slight taper from the walls to the nose. The body is in three pieces, the sides being tubular with a transverse fuze pocket tube welded in place 15 inches aft of the nose.

SUSPENSION:

Suspension of these bombs is by the usual dual or single lugs, the lugs being welded to the bomb. The single lug is actually somewhat different than is usually found, being in the form of a bracket rather than a lug. These bombs can be suspended from dive bombers by trunnions on suspension bands.

TAIL CONSTRUCTION:

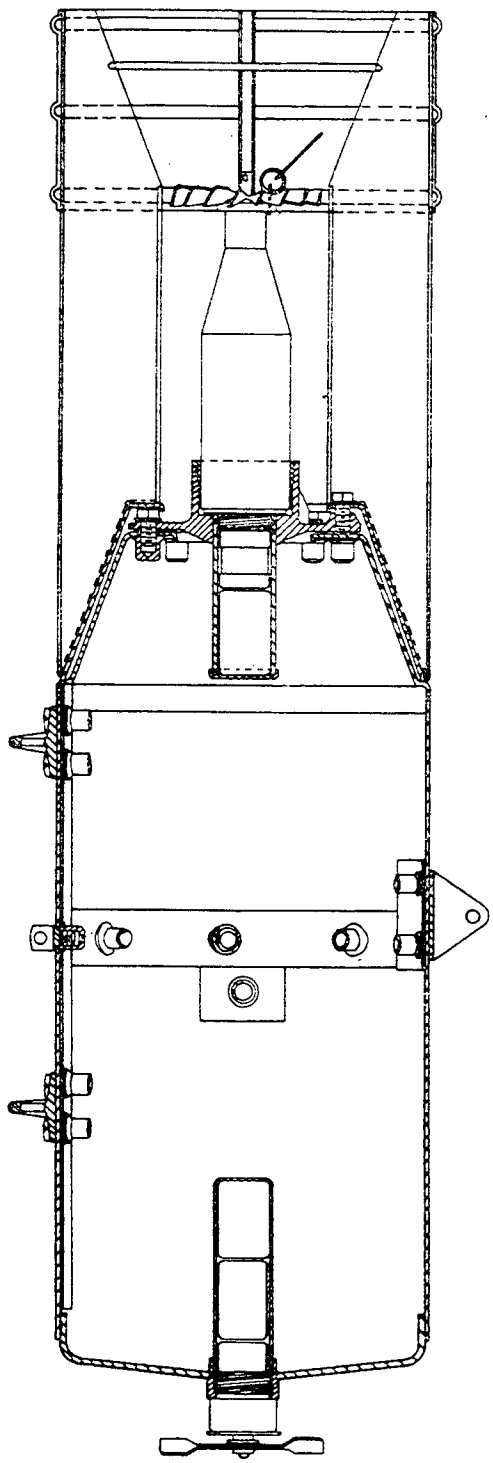
Instead of employing the box type tail these bombs use a drum tail. Looking at it from the after end, it is circular and has four fins extending at right angles to each other. The fins are spot welded to a cone which fits over the after end of the bomb. The fins are also spot welded to the drum shroud. The tail is bolted onto base of bomb.

FILLING AND WEIGHTS:

	AN-Mk 17-2	AN-Mk 44	AN-Mk 41	AN-Mk 47
Filling	T.N.T.	Torpex	T.N.T.	Torpex
Filling Weight	224#	249#	227#	252#
Total Weight	325#	350#	330#	355#

AIRCRAFT DEPTH BOMB

325 LBS. MARK 53
350 LBS. MARK 54



U. S. NAVY BOMBS

325 LB. DEPTH

Mk 53 (T.N.T.)
Mk 54 (Torpex)

(Service)

Data

OVERALL LENGTH (including fuze)	54.6 in.
BODY DIAMETER	13.5 in.
WALL THICKNESS	.06 in.
TAIL LENGTH	24.5 in.
TAIL WIDTH	13.9 in.
TYPES OF FILLER	Mk 53-T.N.T. Mk 54-Torpex
LOADING FACTOR	70% (approx.)

TARGET:

Submarines or light surface vessels, or as light case demolition bombs for general bombardment when dropped on land.

FUZING:

Nose: AN-M 103 (must have modified arming vanes for use with flat nose bomb). AN-Mk 219 (with an adapter ring may be used in the nose if the AN-M 103 with the modified vanes is not available. The AN-Mk 219 requires 2,500 feet of air travel to arm).

Tail: AN-Mk 230 Hydrostatic tail fuze.

BODY CONSTRUCTION:

Cylindrical welded sheet steel body with a flat nose. A base closing plate is secured to the rear of the bomb by four bolts.

SUSPENSION:

These bombs are suspended horizontally by two lugs 7" on each side of the center of gravity, or by a single lug at the center of gravity and 180° removed from the other lugs. There is no external band, the bombs being strengthened internally by a band which is fitted into the bombs at the center of gravity. Trunnions for dive bombing may be threaded to the case and internal strengthening band.

COLOR & MARKINGS:

Olive drab overall. Mk 53 - 325 lb. depth bomb, Mk 54 - 350 lb. depth bomb stencilled on the respective bomb bodies.

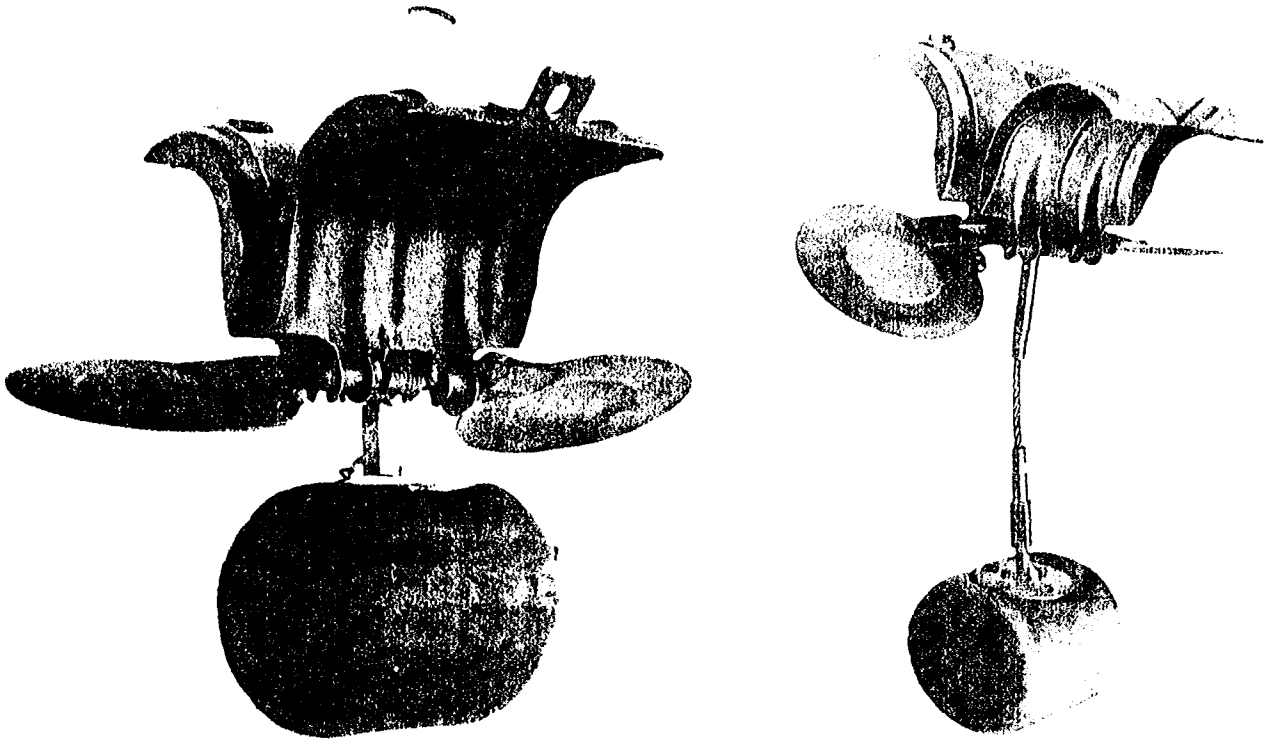
TAIL CONSTRUCTION:

Welded to the tail cone are four vanes which are strengthened by interior box-type struts, and an exterior wide ring strut. The tail cone is secured to the base closing plate by four bolts.

REMARKS:

These two bombs (the same except for filling) have been designed to replace depth bombs using athwartship fuzes, since difficulties have been encountered at times in the past with the AN-Mk 224 and AN-Mk 234. The Mk. 53 and Mk. 54 will use the AN-Mk 230 and a nose fuze, having no athwartship pocket.

U.S. FRAGMENTATION BOMB (BUTTERFLY)
M 83



Data:

OVERALL LENGTH	3.0 in.
BODY DIAMETER	3.0 in.
WALL THICKNESS	0.25 in.
FILLER	T.N.T.
WT. OF FILLER	0.47 lbs.
TOTAL WEIGHT	3.2 lbs.
COLOR	Olive Drab

U. S. ARMY BOMB

4 LB. FRAG (BUTTERFLY)

M 83
(Service)

TARGETS:

Residential areas, airfields, roads and troop movements, industrial districts, etc. This bomb is an adaptation of the German SD-2 "Butterfly" bomb and except for minor details is an exact replica of that bomb.

FUZING:

Three different fuzes will be available which have also been adapted from the German fuzes. At present they have experimental "T" designations. Below are both the "T" and the future "M" designations:

Experimental	U.S.	German	Type
T 47	M 129	Copy of (41)	Air or Ground Burst
T 48	M 130	" " (67)	Time (Maximum: 30 min.)
T 49	M 131	" " (70)B	Anti-Disturbance

All three fuzes have identical measurements: Length of Fuze (incl. Booster), 2 inches; Length of Fuze (Less Booster), 1 1/8 inches; Diameter of fuze, 1 3/4 in.; Length of Arming Spindle, 6 1/2 inches. The T 47 is the only fuze which can be identified, having a setting switch "AIR - GROUND" on top of the fuze.

The fuzes screw into the bombs with a left hand thread and are tightened with a spanner wrench which fits into the two spanner holes in the top of each fuze. Luting on the threads insures a tight, moistureproof fit. Assembly of the fuzes in the bombs is done at the factory so that this work will not be required of service personnel.

BODY CONSTRUCTION:

The bomb body is cylindrical in shape, cast in two halves and welded together. The fuze cavity, 1 3/4 inches in diameter, is threaded with a left hand thread to prevent unscrewing of the fuze while the bomb is in flight and is situated athwartships in the body.

ARMING VANE ASSEMBLY:

The vane assembly consists of four pieces hinged together: two semi-cylindrical surfaces (wings) and two discs (propeller blades) inclined at a slight angle. While the bomb is still in the cluster the vane assembly is folded around the bomb to form a cylindrical casing which can be closed against the pressure of the vane springs by means of a safety clip, the arming spindle projecting through the bomb casing.

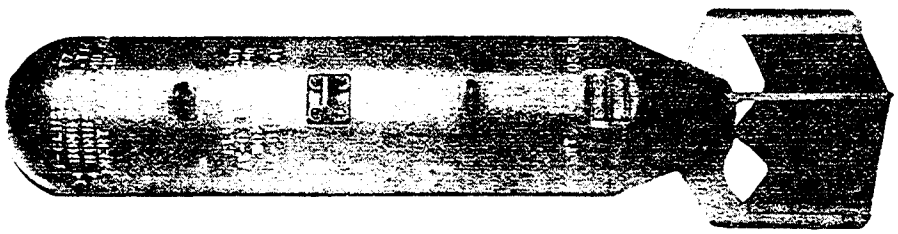
When the bombs are packed in the cluster adapter the safety clips are removed, but the bombs remain in their closed status due to their proximity to each other. When the cluster adapter bursts open, the individual bombs scatter and the vane assembly on each, under the influence of its coil springs, spreads open, air resistance causing it to raise up the arming spindle. The square head on the spindle engages a square hole in the hinge of the vane assembly. The two "wings" reduce the velocity of descent of the bomb, and the two "propellers", being set at angles to each other cause the vane assembly to turn in a counter-clockwise direction, thereby screwing the arming spindle out of the fuze body, permitting the fuze to arm. The arming spindle is not withdrawn completely from the fuze, being retained in the fuze by a collar on the spindle.

CONTAINERS (CLUSTER ADAPTERS):

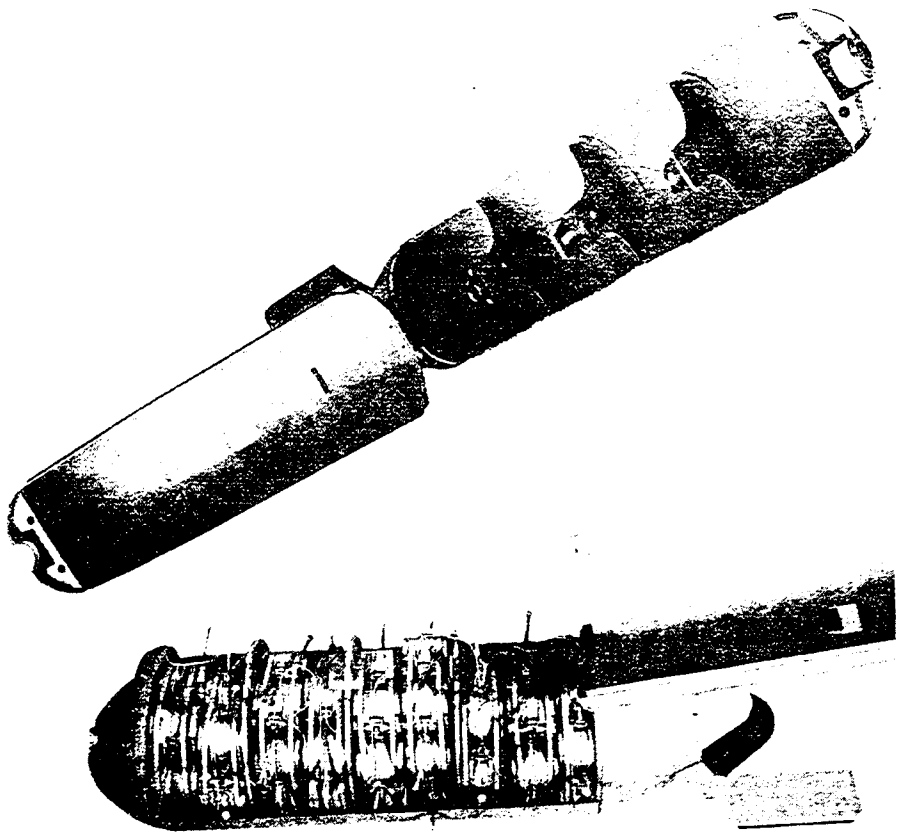
There are two sizes of cluster adapters (containers) for these bombs, the 100 lb. M 15 (T 10) which contains 24 bombs and is then labeled the M 28 cluster, and the 500 lb. M 16 (T 11) holding 90 bombs and when loaded called the M 29 cluster. Both clusters use the M111A2 aerial burst fuze. Clusters should be released from an altitude of 3000 to 5000 feet with the fuze set to function 5 to 8 sec. respectively after release. With such settings the M 83's will scatter to form a pattern of approximately 200 x 300 feet.

BUTTERFLY BOMB CLUSTER ADAPTERS

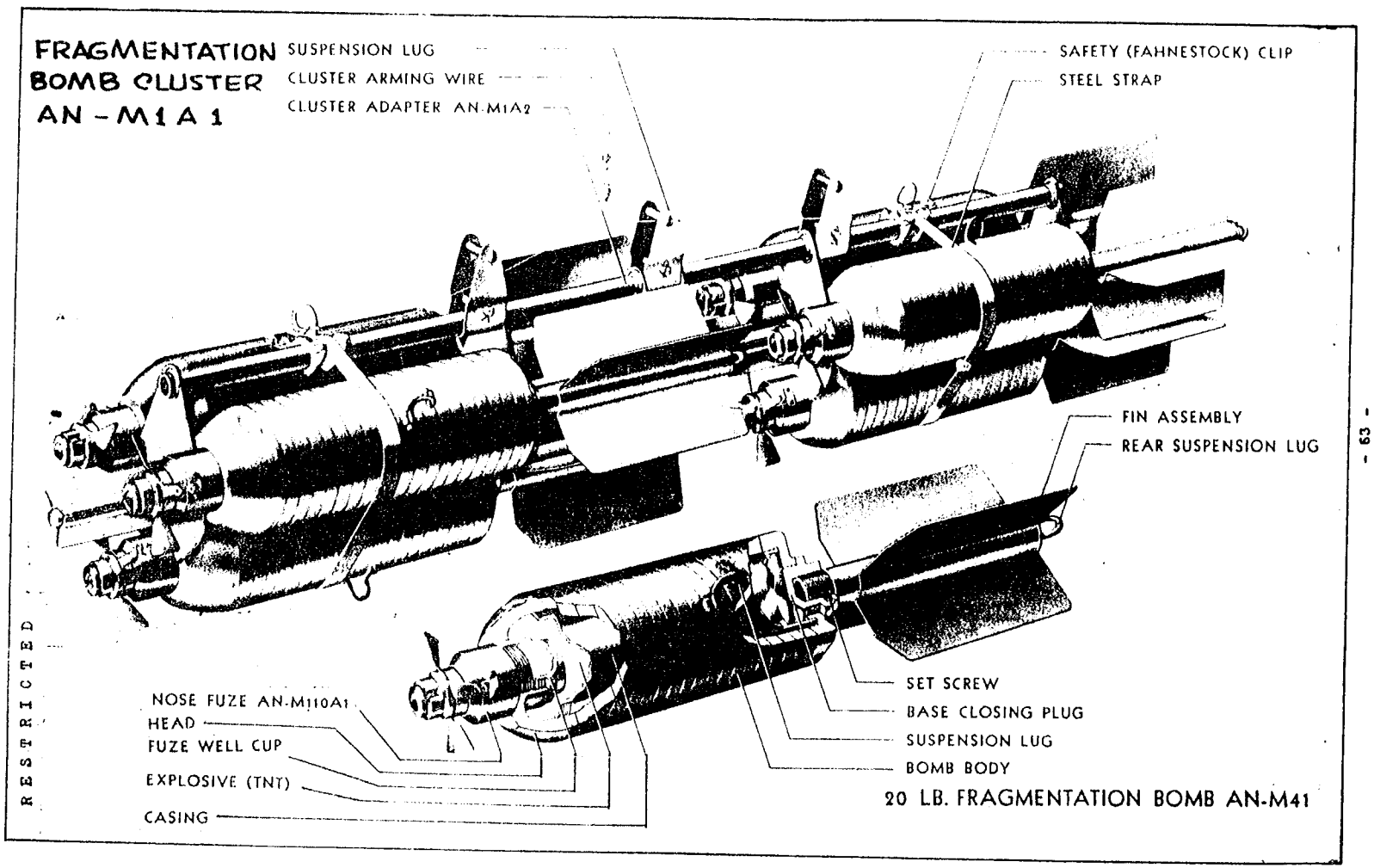
(SEE PREVIOUS PAGE)



MODIFIED T 7 (M15) CLUSTER ADAPTER

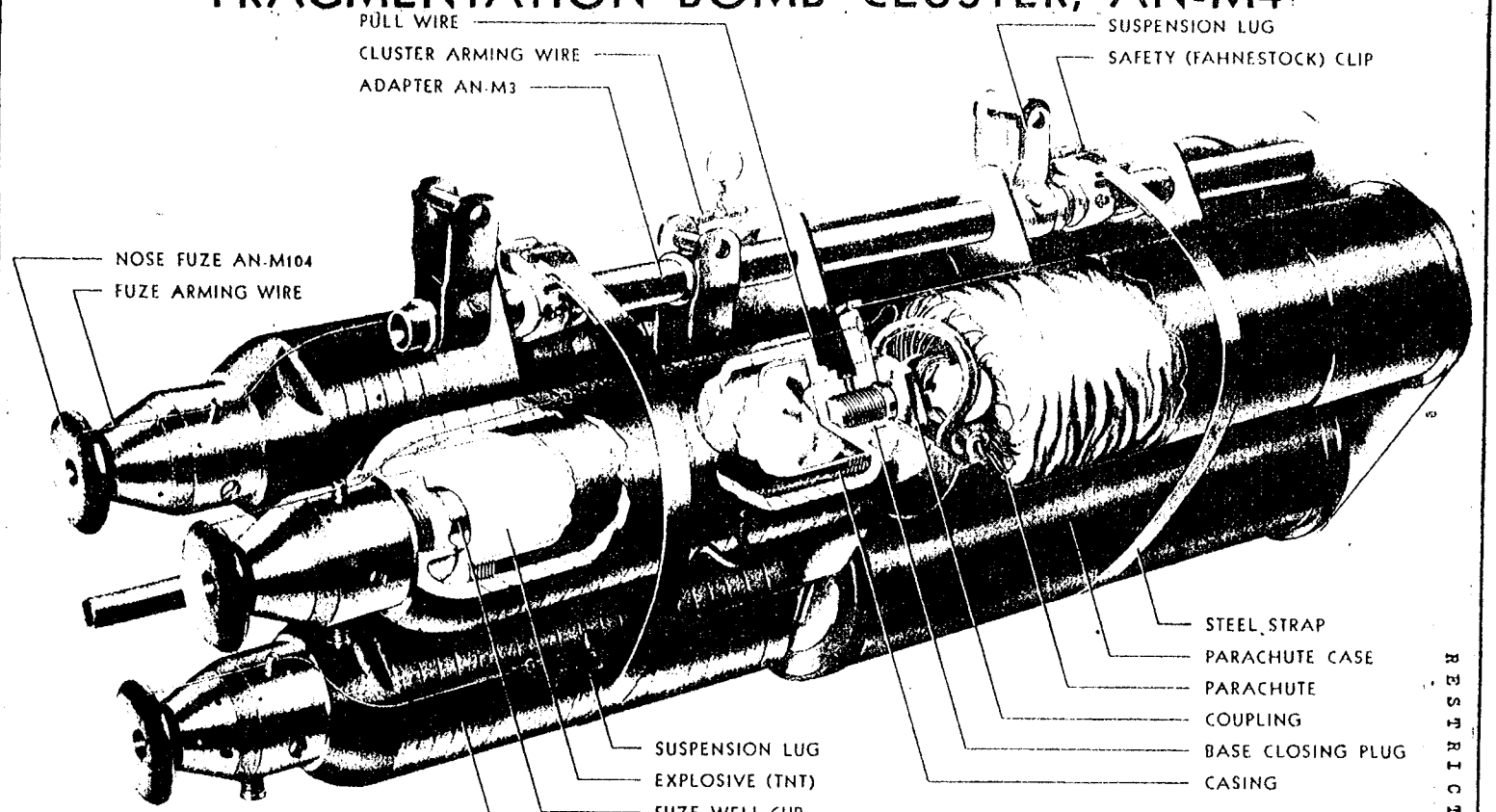


T8 (M16) CLUSTER ADAPTER LOADED WITH NINE WAFERS
T 11 (M83) FRAGMENTATION BOMBS


FRAGMENTATION BOMB CLUSTER AN-M1A1
SUSPENSION LUG
CLUSTER ARMING WIRE
CLUSTER ADAPTER AN-M1A2
SAFETY (FAHNESTOCK) CLIP
STEEL STRAP
FIN ASSEMBLY
REAR SUSPENSION LUG
SET SCREW
BASE CLOSING PLUG
SUSPENSION LUG
BOMB BODY
NOSE FUZE AN-M110A1
HEAD
FUZE WELL CUP
EXPLOSIVE (TNT)
CASING
20 LB. FRAGMENTATION BOMB AN-M41

RESTRICTED

FRAGMENTATION BOMB CLUSTER, AN-M4



FRAGMENTATION (PARACHUTE) BOMB AN-M40

RESTRICTED

ARMY-NAVY BOMBS

20 LB. FRAG.
23 LB. PARA-FRAG.

AN-M 41 20 lb.)
AN-M 40 23 lb.) and Al Mods, See
M 72 23 lb.) Remarks

Data	20 lb. AN-M 41	23 lb. AN-M 40 & M 72
OVERALL LENGTH	19.5 in.	26.7 in.
BODY LENGTH	11.3 in.	11.3 in.
BODY DIAMETER	3.6 in.	3.6 in.
WALL THICKNESS	0.56 in.	0.56 in.
TAIL LENGTH	9.25 in.	13.9.in.
TAIL WIDTH	5.1 in.	4.35 in.
TAIL WEIGHT	1.6 lbs.	5.3 lbs.

TARGET:

Personnel, motor convoys, airplanes on the ground, etc. For AN-M 40 & M 72: used against ground targets by airplanes flying at low altitudes.

FUZING:

AN-M41: AN-M 110 A1; M 110.
AN-M40
& M 72: AN-M 120; AN-M 104.

BODY CONSTRUCTION:

These bombs are constructed of the following: (1) Cast Steel nose and tail pieces; (2) A seamless steel inner tube; (3) helically-wrapped drawn steel wire wrapping around inner tube. The tube is threaded to hold the nose and tail sections.

SUSPENSION:

For individual suspension of these bombs, a U shaped eyebolt of steel is welded to bomb at center of gravity.

The AN-M 40 bombs, however, are always clustered, 3 of them with the AN-M 3 cluster adapter forming the AN-M 4 cluster.

The AN-M 41 has an eyebolt welded to rear of tail for vertical suspension. May be dropped in a cluster of 6 bombs in the AN-M 1A2 or M 1 cluster adapter, forming the AN-M 1A1 or M 1 cluster. The cluster adapter is made of sheet metal and does not use eyebolts of bombs for suspension.

The M 72, slightly modified version of the AN-M 40, is adapted for individual vertical suspension and can be carried in vertical cellular racks by several types of army planes.

COLOR AND MARKINGS:

Olive drab with a 1 inch yellow band around the nose and extreme rear of the bomb and a 1/4 inch band around the center of gravity.

TAIL CONSTRUCTION:

AN-M 41: Four rectangular sheet steel vanes welded to a length of 1 inch cast iron pipe which screws into base filling plug.

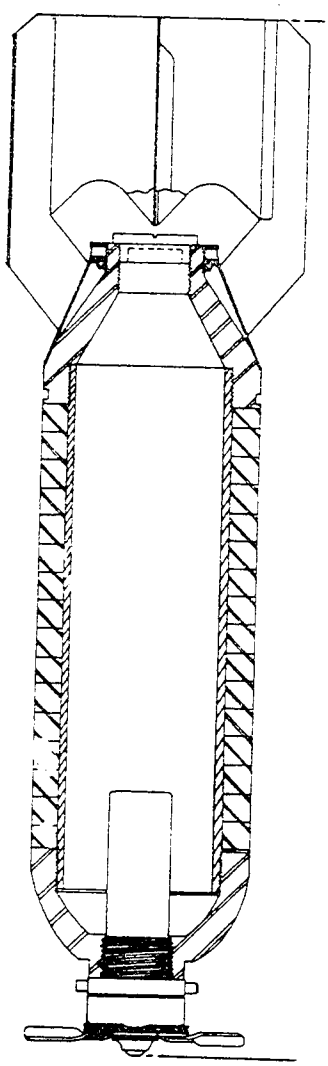
AN-M 40 and M 72 are fitted with cylindrical sheet steel parachute housings which have end caps at the rear and contain a white silk parachute.

WEIGHTS:

	20 lb. AN-M 41 T.N.T.	23 lb. AN-M 40 & M 72 T.N.T.
Weight of Filling	2.7 lbs.	2.7 lbs.
Total Weight	20.3 lbs.	24.5 lbs.
Charge/Weight Ratio	13 %	11.0 %

REMARKS: (1) The AN-M 40 and M 72 are low-level fragmentation bombs and should be dropped from a maximum altitude of 400 ft.
(2) The AN-M 41 is a high-level fragmentation bomb and should be dropped from a minimum of 800 ft.
(3) The A1 modification consists of a shoulder around the nose of the bomb to facilitate clustering with unfuzed bombs. Heretofore the spacers of the cluster adapters have fitted against the fuze; hence, without the shoulder the bombs could not be clustered unfuzed. Fuzes are now being shipped in individual waterproof containers.

M 82, 90 LB. FRAGMENTATION BOMB



Data	U.S. ARMY BOMB 90 LB. FRAG M 82
OVERALL LENGTH . . . . . 28 in. BODY LENGTH . . . . . 19.8 in. BODY DIAMETER . . . . . 6 in. WALL THICKNESS . . . . . .94 in.	

TARGET:

Parked aircraft, vehicles, and personnel.

FUZING:

AN-M103 nose fuze only (instantaneous setting).

BODY CONSTRUCTION:

Nose and tail pieces of cast steel screw on to a central section of seamless steel tubing. A square helical steel spring is wound around the steel tubing. The nose and tail pieces are partially cut through to afford greater fragmentation.

SUSPENSION:

Suspended in a cluster of 6 bombs. No suspension lugs used.

COLOR AND MARKINGS:

Olive drab overall. One inch yellow band around the nose and extreme rear of the bomb, and a 1/4 inch band around the center of gravity.

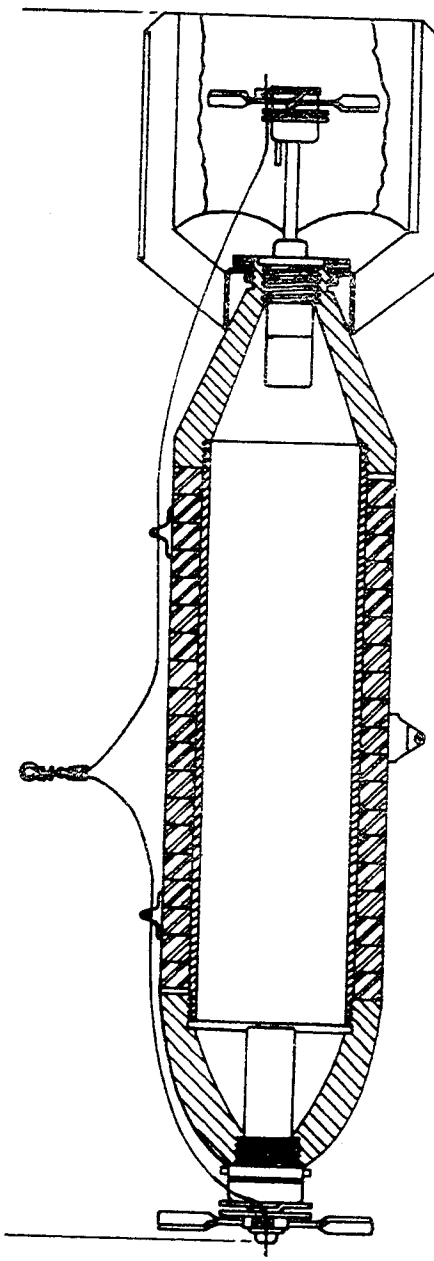
TAIL CONSTRUCTION:

Tail with normal U.S. box construction. Secured to bomb by locking ring.

WEIGHTS:

	Comp.B.
Weight of filling	11.4 lbs.
Total weight	90.0 lbs.
Charge/Weight Ratio	14.0 %.

AN-M-81, 260 LB, FRAGMENTATION BOMB



Data

OVERALL LENGTH	43.6 in.
BODY LENGTH	32.8 in.
BODY DIAMETER	8 in.
WALL THICKNESS	1.25 in.

ARMY-NAVY BOMB

260 LB. FRAG.

AN-M 81

TARGET:

Parked aircraft, vehicles, and personnel.

FUZING:

Nose: AN-M 103 (Instantaneous setting).
Tail: AN-M 100A2 or AN-M 100A1. (A non-delay M 14 primer detonator must be used).

BODY CONSTRUCTION:

Nose and tail pieces of cast steel screw onto a central section of seamless steel tubing. A square helical steel spring is wound around the steel tubing. The nose and tail pieces are partially cut through to afford greater fragmentation.

SUSPENSION:

Horizontal; two eyebolts being welded to body along longitudinal axis of the bomb, 14" apart. A third eyebolt is welded to the body at center of gravity and 180° removed from the other eyebolts.

COLOR AND MARKINGS:

Olive drab overall. One inch yellow band around the nose and extreme rear of the bomb, and a 1/4 inch band around the center of gravity.

TAIL CONSTRUCTION:

Sheet steel tail, normal U.S. box construction. Secured to bomb by locking ring.

WEIGHTS:

	Comp.B
Weight of filling	34.1 lbs.
Total weight	260.0 lbs.
Charge/Weight Ratio	14.0%

SECTION 2

INCENDIARY & CHEMICAL BOMBS

PYROTECHNICS

CHEMICAL, INCENDIARIES AND PYROTECHNICS

These items are grouped together inasmuch as they are designed by the Chemical Warfare Service.

Chemical:

In general the chemical bombs are of two types, classified according to case construction. The light case bombs have the advantage of higher charge weight ratio, whereas the heavy case bombs have better stowage and handling characteristics. Both types have full length burster charges to split the bomb case and disperse the filling over the area to be contaminated. Fuzing must always be instantaneous or serial burst to maintain maximum dispersion of contents. Various fillings can be employed for different effects.

Incendiaries:

Incendiaries in use at the present time are classified by their construction and use into two types. The intensive type burns as a unit, confining its intense heat to a relatively small area. The bombs are small in size and are always dropped in clusters to give area coverage. They are normally employed against targets having a high percentage of roof coverage, such as industrial establishments and crowded residential areas. Since the bombs have heavy nose plugs and substantial case strength, some penetration can be expected, and the high burning temperature of its filling will be effective in industrial areas

The scatter type is usually a larger bomb which disperses small chunks of its burning material over a large area to ignite many small fires. It is normally employed against readily inflammable targets such as frame construction, material storage and grain fields. These bombs explode on impact to throw burning fragments of gasoline gel or other sticky emulsions against its target.

Pyrotechnics:

Military pyrotechnics are used for illumination, signalling, or screening purposes, and are used by all forces on land, at sea, and in the air. The field of pyrotechnics is a broad one, but the major items of aircraft pyrotechnics have been included in this book.

For illumination, aircraft parachute flares are the principle items, with float lights being used to a lesser extent. The parachute flares are employed for emergency night landings on unilluminated fields for night aerial reconnaissance and for night bombardment. Float lights have been employed primarily for marking points of depth bomb attacks on submarines, but can be used as a navigational "fix" and to locate the water surface for night seaplane landings.

Signalling devices are of many and varied types, ranging from Very cartridges to parachute suspended flares. By adding different colors to the signals, several prearranged messages can be sent from aircraft to other planes, to ships or to ground forces.

Screening or smoke producing items are useful in masking ground positions from enemy forces, and for daytime signalling.

Color & Markings:

Chemical bombs have different markings than other types of ordnance. The bomb body is painted light grey, and colored bands indicate the nature of the filling. The bands are located between the dual suspension lugs and forward of the center of gravity. One band indicates a non-persistent filler. Two bands indicate a persistent filler. Green indicates casualty agents; red, harassing agents; yellow, smoke or screening agents; purple, incendiaries.

Incendiary bombs may follow the scheme of chemical bombs, with light grey body color and a purple band, or more recently, an olive drab body color with a purple band has been standardized.

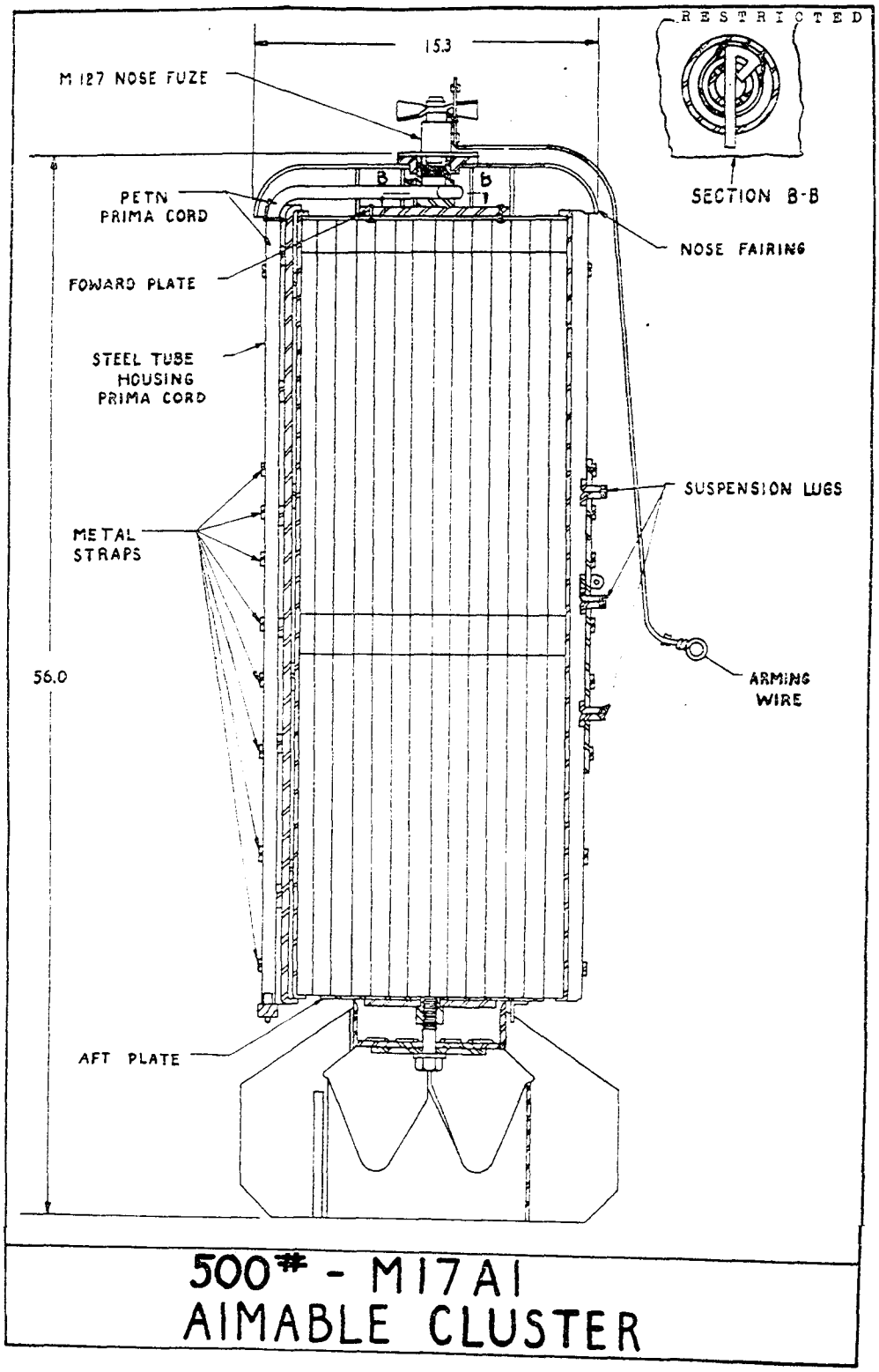
Pyrotechnic devices are usually light grey or unpainted metal, with various colored bands and embossed markings to make identification easy either by day or night. In addition to color coding, each item is labeled completely, giving name, purpose and type of device, and in most items, instructions for use of the particular device. If the piece is too small to permit complete labeling, the shipping container will be marked appropriately.

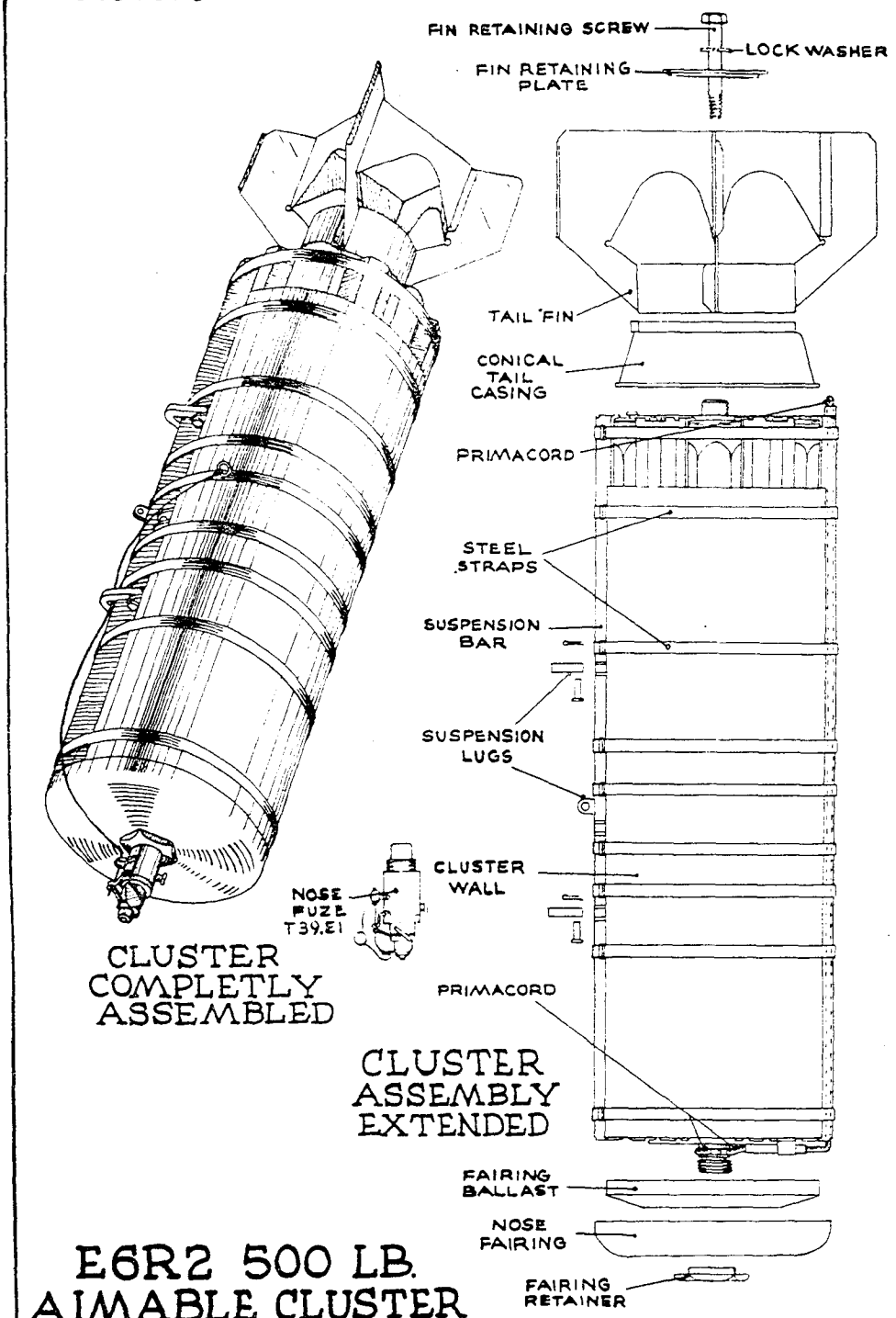
CAUTION: All of these items represent a different type of hazard than high explosive filled bombs. They are particularly susceptible to fire and proper precautions should be observed. In handling several of the pyrotechnics and incendiaries, remember to avoid friction as would be caused by rolling or dragging the missile.

Suspension:

Heavy case chemical bombs are suspended in the same manner as G.P. bombs; that is, by dual lugs or by a single lug welded to the bomb case. The light case chemical bombs are suspended by lugs welded to bands which fit around the bomb body. Incendiary bombs of the large scatter type have the same suspension as the chemical bombs. The smaller incendiary bombs are always clustered, and for maximum packing efficiency are hexagonal in shape. The clusters employed on incendiaries are of two types, the quick opening variety and the aimable type with cluster opening controlled by an aerial burst fuze. The quick opening clusters come in two sizes - 100 lb. and 500 lb. The cluster adapters for 4 lb. intensive incendiaries will carry 34 bombs in the 100 lb. size or 128 bombs in the 500 lb. size. The adapters for 6 lb. scatter incendiaries carry 14 bombs or 60 bombs. The cluster adapters consist of steel tubes supported by plates with the bombs assembled around the tubes. The bombs are held in place by spring steel bands secured by an arming wire running through a buckle at the ends of the band. Removal of the arming wire assembly as the cluster drops releases the buckles and the bands open to release the bombs immediately.

The aimable clusters are relatively new. They fit a 500 lb. bomb station and are designed for precision bombing from high altitudes. To give the cluster the desired ballistic properties, a standard box type tail assembly is attached by a single bolt to the aft plate of the cluster adapter. A strip of primacord (PETN) running full length along the side of the cluster serves to break the spring steel bands and allow the bombs to scatter when the aerial burst nose fuze functions. The M 17A1 500-lb. aimable cluster is filled with 110 AN-M 50A2 and AN-M 50XA3 4-lb. incendiary bombs. The E6R2 500-lb. aimable cluster contains 38 M 74 (E5) 6-lb. incendiary bombs.


RESTRICTED
15.3
M 127 NOSE FUZE
SECTION B-B
PETN
PRIMA CORD
NOSE FAIRING
FOWARD PLATE
STEEL TUBE
HOUSING
PRIMA CORD
SUSPENSION LUGS
METAL
STRAPS
56.0
ARMING
WIRE
AFT PLATE
500# - M17A1
AIMABLE CLUSTER



CLUSTER COMPLETLY ASSEMBLED

CLUSTER ASSEMBLY EXTENDED

E6R2 500 LB. AIMABLE CLUSTER

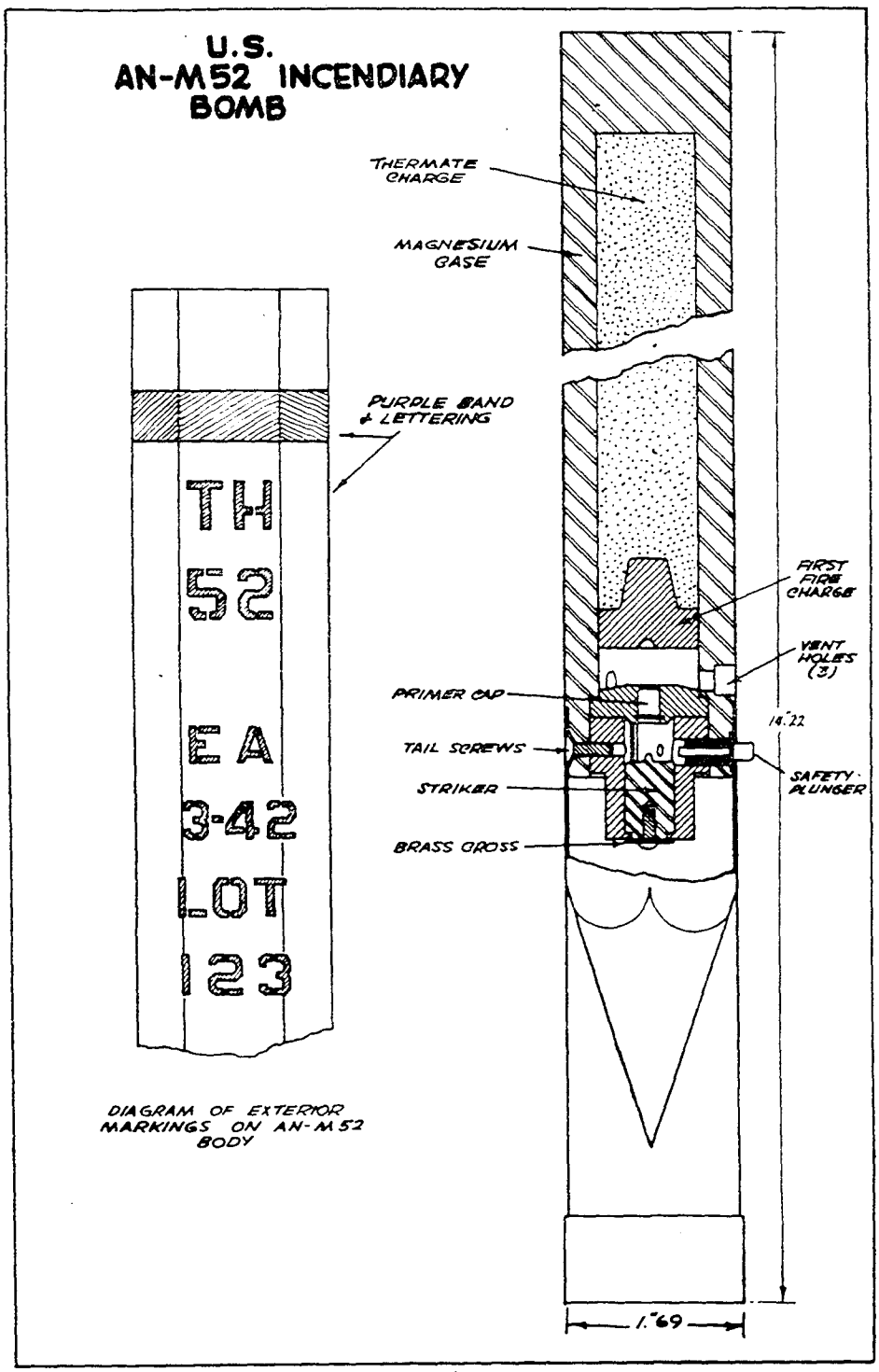


DIAGRAM OF EXTERIOR MARKINGS ON AN-M52 BODY

R E S T R I C T E D

ARMY-NAVY BOMB

2 LB. INCEND.

AN-M 52

Data

OVERALL LENGTH	14.22 in.
WIDTH ACROSS FLATS	1.69 in.
BODY LENGTH	9.13 in.
TAIL LENGTH	5.79 in.
MATERIAL	Magnesium alloy
FILLING	Thermate
WEIGHT OF FILLING	0.4 lb.
TOTAL WEIGHT	2 lbs.

BODY CONSTRUCTION:

Hexagonal cast magnesium alloy body weighing 1.13 lbs, with bore one inch shorter than the body length, thus making a solid nose. There are three vent holes below the primer cap assembly to assist in initial burning.

TAIL CONSTRUCTION:

Hexagonal sheet metal tail, secured to body with three screws.

SUSPENSION:

Carried in clusters. The 100 lb. M 10 cluster consists of 51 bombs secured by the M 5 cluster adapter, and the 500 lb. M 11 cluster consists of 192 bombs and the M 8 cluster adapter.

ACTION:

Spring loaded safety plunger is depressed by adjacent bomb; upon release from cluster it jumps out, leaving a thin brass cross holding striker. On impact, striker breaks free from cross, igniting primer, first fire charge and thermate. The thermate burns, igniting the magnesium alloy case. Total burning time is 8 minutes.

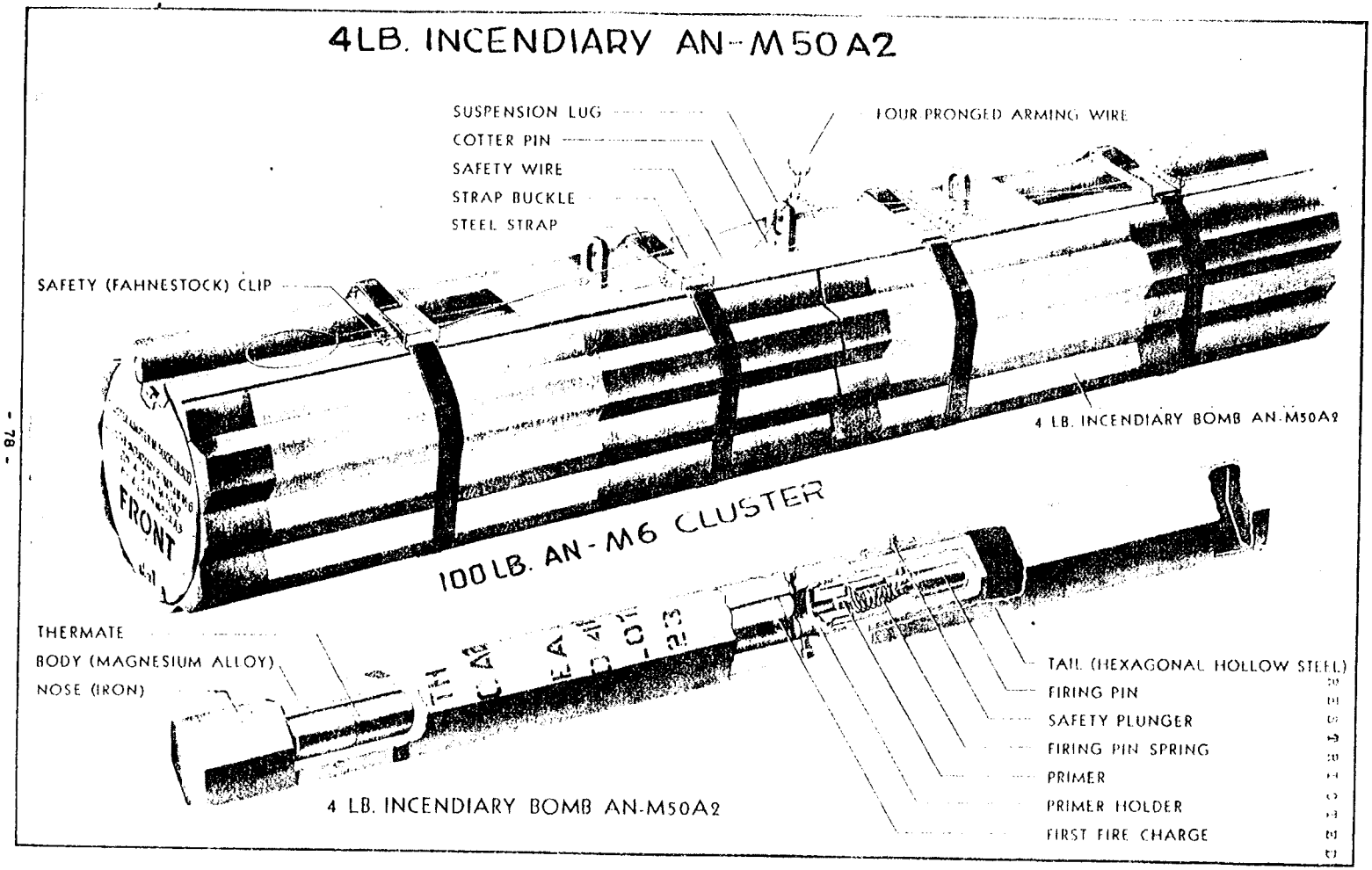
REMARKS:

For COLOR & MARKINGS, see

INTRODUCTION, Page 72

NOTE: Thermate is a composition of 80% Thermite and 20% First fire charge:

Thermite		First Fire Charge		
Iron Oxide	76%	Sodium Nitrate	50%	
Aluminum Powder	24%	Aluminum Powder	45%	75%
		Sulphur	4%	
		Boiled Linseed Oil	1%	
		Black Powder		25%


4LB. INCENDIARY AN-M50A2
SUSPENSION LUG
COTTER PIN
SAFETY WIRE
STRAP BUCKLE
STEEL STRAP
FOUR PRONGED ARMING WIRE
SAFETY (FAHNESTOCK) CLIP
4 LB. INCENDIARY BOMB AN-M50A2
100 LB. AN-M6 CLUSTER
THERMATE
BODY (MAGNESIUM ALLOY)
NOSE (IRON)
TAIL (HEXAGONAL HOLLOW STEEL)
FIRING PIN
SAFETY PLUNGER
FIRING PIN SPRING
PRIMER
PRIMER HOLDER
FIRST FIRE CHARGE
4 LB. INCENDIARY BOMB AN-M50A2

4 LB. INCEND.

AN-M 50A1
(and modifications)

Data	AN-M 50A1
OVERALL LENGTH	21.3 in.
WIDTH ACROSS FLATS	1.69 in.
BODY LENGTH	14.0 in.
TAIL LENGTH	8.7 in.
MATERIAL	Magnesium alloy
FILLING	Thermate
WEIGHT OF FILLING	0.63 lbs.
TOTAL WEIGHT	3.6 lbs.

BODY CONSTRUCTION:

Hexagonal body of magnesium alloy, weighing 1.25 lbs., with an iron nose plug. There are three vent holes below the primer cap assembly to assist in initial burning.

TAIL CONSTRUCTION:

Hexagonal sheet metal secured to body with three screws.

SUSPENSION

Carried in clusters, either AN-M 6, 100 lb. (M 5 cluster adapter) holding 34 bombs, or the M 7, 500 lb. (M 6 cluster adapter) holding 128 bombs.

ACTION:

Spring loaded safety plunger is depressed by adjacent bomb; upon release from cluster it jumps out leaving a thin brass cross holding striker, which breaks free on impact and ignites primer. The thermate burns, igniting the magnesium alloy case. Total burning time is 9.5 to 10.5 minutes.

REMARKS:

AN-M 50XA , contains 170 grains of black powder in a steel capsule at nose, replacing portion of thermate. The bomb burns approximately 1.5 minutes, black powder explodes, scattering burning magnesium over wide radius.

AN-M50A2 is waterproofed around the primer cap and first fire charge.

AN-M50XA2 has an explosive head consisting of a steel nose cap which houses three tetryl pellets, a detonator and a delay fuze. The delay fuze is ignited and sets off the detonator, exploding tetryl pellets, projecting fragments of steel and burning magnesium.

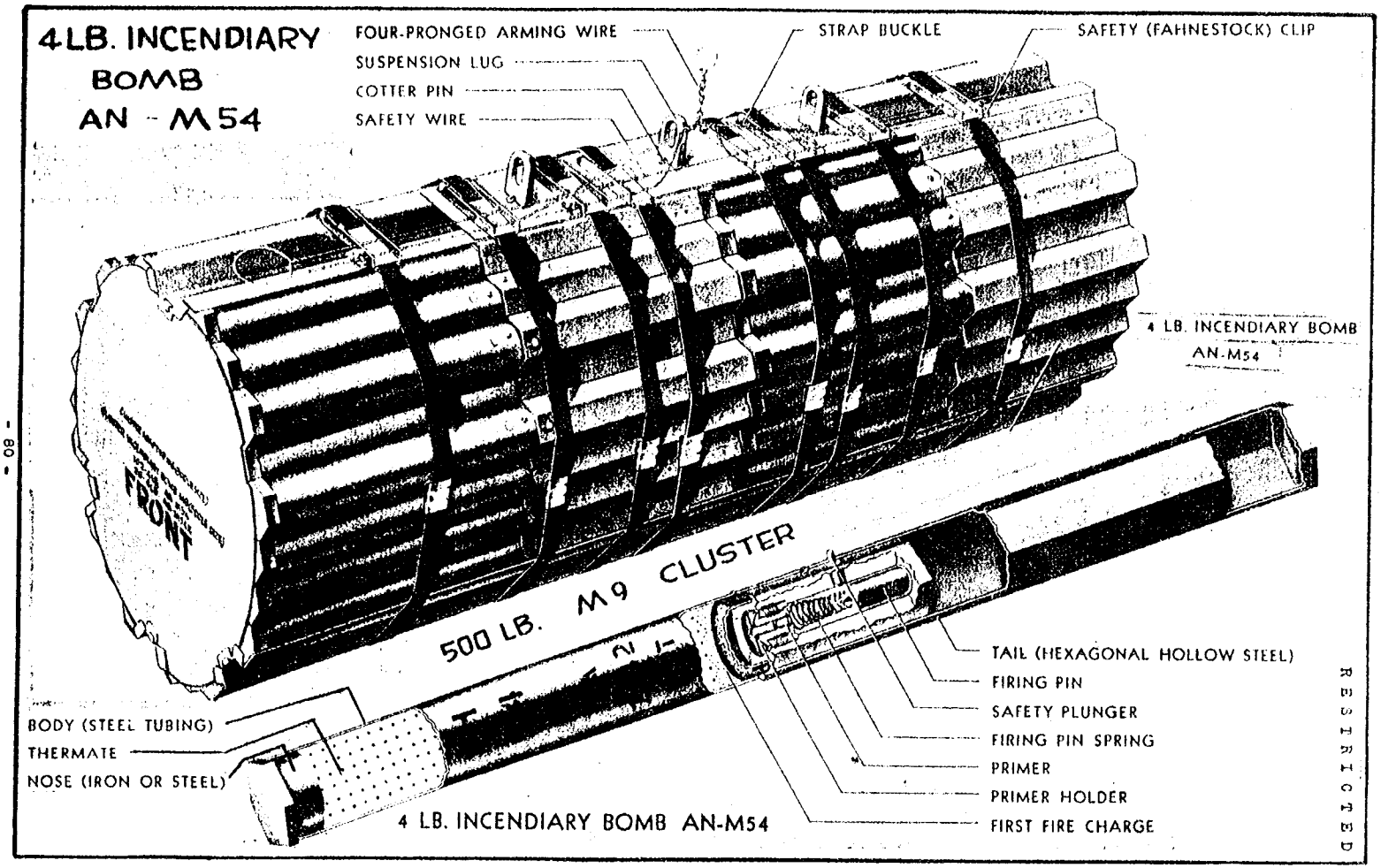
AN-M50XA3 is identical to AN-M50XA2 except the assembly around primer cap and first fire charge is waterproofed.

AN-M50TA2 is identical to AN-M50A2 except it contains a secret toxic agent, which does not effect the burning properties of the incendiary. These bombs are carried in the M 14 cluster, which will be composed of 95% AN-M 50TA2 and 5% AN-M50XA3 bombs. These clusters will have a green and a purple band painted around them.

AN-M 50XA2 and AN-M 50XA3 each have a Type A and Type B. Type A indicates that the delay from impact to explosion is two to four minutes; Type B indicates that the delay from impact to explosion is sixty to seventy seconds.

For COLOR & MARKINGS, see

INTRODUCTION, page 72 .


4 LB. INCENDIARY BOMB AN - M54
FOUR-PRONGED ARMING WIRE
SUSPENSION LUG
COTTER PIN
SAFETY WIRE
STRAP BUCKLE
SAFETY (FAHNESTOCK) CLIP
4 LB. INCENDIARY BOMB AN-M54
500 LB. M9 CLUSTER
BODY (STEEL TUBING)
THERMATE
NOSE (IRON OR STEEL)
TAIL (HEXAGONAL HOLLOW STEEL)
FIRING PIN
SAFETY PLUNGER
FIRING PIN SPRING
PRIMER
PRIMER HOLDER
FIRST FIRE CHARGE
4 LB. INCENDIARY BOMB AN-M54

R E S T R I C T E D

ARMY-NAVY BOMBS

4 LB. INCEND.

AN-M 54
(and modifications)

Data	AN-M 54
OVERALL LENGTH	21.35 in.
WIDTH ACROSS FLATS	1.69 in.
BODY LENGTH	13.6 in.
TAIL LENGTH	10.0 in.
MATERIAL	Steel.
FILLING	Thermate
WEIGHT FILLING	1.6 lbs.
TOTAL WEIGHT	4.0 lbs.

BODY CONSTRUCTION:

Steel cylinder having a hexagonal nose plug. The fuze is installed in the tail plug assembly. There are three vent holes below the primer cap assembly to assist in initial burning.

TAIL CONSTRUCTION:

Hexagonal hollow sheet metal tail.

SUSPENSION:

Carried in clusters, either the AN-M 8 100 lb. cluster (M 5 cluster adapter) carrying 34 bombs, or the M 9 500 lb. cluster (M 6 cluster adapter) carrying 128 bombs.

ACTION:

Spring loaded safety plunger is depressed by adjacent bomb; upon release from cluster it jumps out leaving the firing pin riding on a creep spring. On impact the firing pin overcomes its creep spring and strikes primer, igniting the thermate which melts the steel body and releases molten iron.

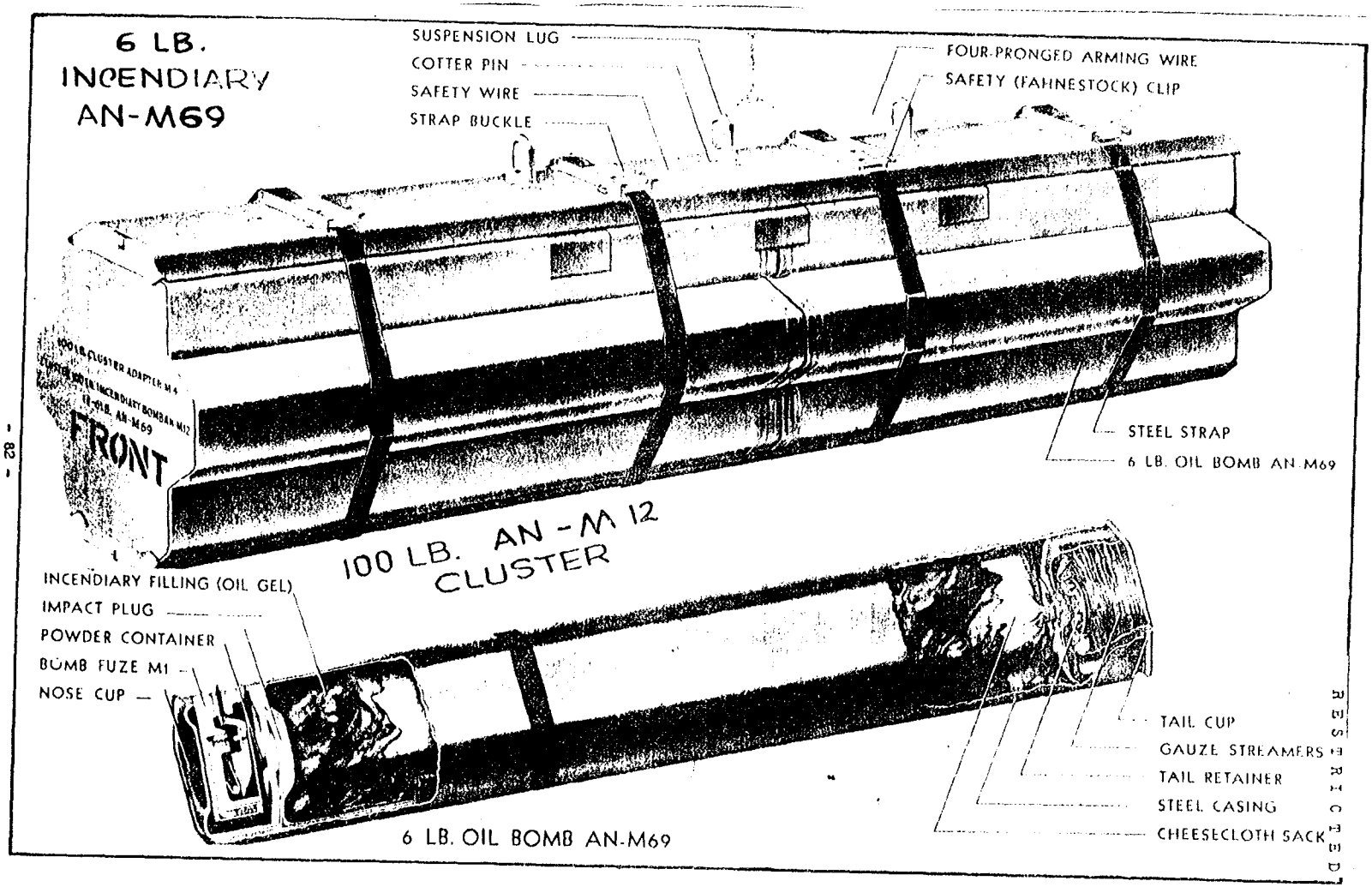
REMARKS:

AN-M 54X is the same as AN-M 54 except that next to the hexagonal nose plug a small portion of the thermate charge is replaced by a steel capsule containing 170 grains of black powder which explodes and scatters the molten iron after bomb has burned about one minute.

AN-M 54XA1 is the same as AN-M 54 except inside the hexagonal nose plug there is a steel cylinder containing a tetryl high explosive charge with a delay fuze and a detonator. A thin spacer of magnesium is between thermate and fuze opening of explosive cylinder. After one minute of burning the fuze is ignited, exploding the tetryl. These bombs are no longer being procured for naval service, and should not be used except when AN-M 50A2 or AN-M 69 bombs are not available.

FOR COLOR & MARKINGS, see

INTRODUCTION, Page 72


6 LB.
INCENDIARY
AN-M69
SUSPENSION LUG
COTTER PIN
SAFETY WIRE
STRAP BUCKLE
FOUR-PRONGED ARMING WIRE
SAFETY (FAHNESTOCK) CLIP
STEEL STRAP
6 LB. OIL BOMB AN-M69
FRONT
100 LB. AN-M 12
CLUSTER
INCENDIARY FILLING (OIL GEL)
IMPACT PLUG
POWDER CONTAINER
BOMB FUZE M1
NOSE CUP
TAIL CUP
GAUZE STREAMERS
TAIL RETAINER
STEEL CASING
CHEESECLOTH SACK
6 LB. OIL BOMB AN-M69

R E S T R I C T E D

ARMY-NAVY BOMB

6 LB. INCEND

AN-M 69

Data

OVERALL LENGTH	19.5 in.
WIDTH ACROSS FLATS	2.87 in.
MATERIAL	Steel.
FILLING	Oil.
FILLING WEIGHT	2.8 lbs.
TOTAL WEIGHT	6.0 lbs.

BODY CONSTRUCTION:

Hexagonal case, nose cup, fuze and powder charges sealed off from rest of case by impact diaphragm and plug.

TAIL CONSTRUCTION:

Tail assembly consists of a tail cup, tail retainer and disc. Four gauze streamers, each 54" long are attached to tail retainer by tail disc to stabilize bomb and reduce terminal velocity.

SUSPENSION:

Carried in clusters, either the AN-M 12 100 lb. cluster (with M 4 cluster adapter) carrying 14 bombs, or the AN-M 13 500 lb. cluster (with M 7 cluster adapter) which carries 60 bombs. Latest cluster arrangement is in the M 17A1 or E6R2 500 lb. aimable clusters. These clusters are streamlined, consisting of two semi-cylindrical metal pieces held together by straps. The M 17A1 uses the M 127 aerial burst fuze, and the E6R2 uses the T 39K1, which is the same as the M 127 except the booster has 7 grams tetryl instead of 18 to prevent injuring the bombs as it sets off the primacord which severs the straps holding the two pieces together.

ACTION:

Spring loaded safety plunger jumps out of M 1 fuze upon release from cluster, arming fuze. On impact the striker overcomes spring, detonates primer cap, which ignites a lead-coated spitter fuze. The spitter fuze burns from 3 - 5 seconds, allowing penetration, and ignites black powder booster charge. This ignites the igniter-ejector charge consisting of 2 bags of black powder and oiled magnesium powder. The combustion blows off tail cup, ignites incendiary filling and ejects it for a maximum of 75 yards.

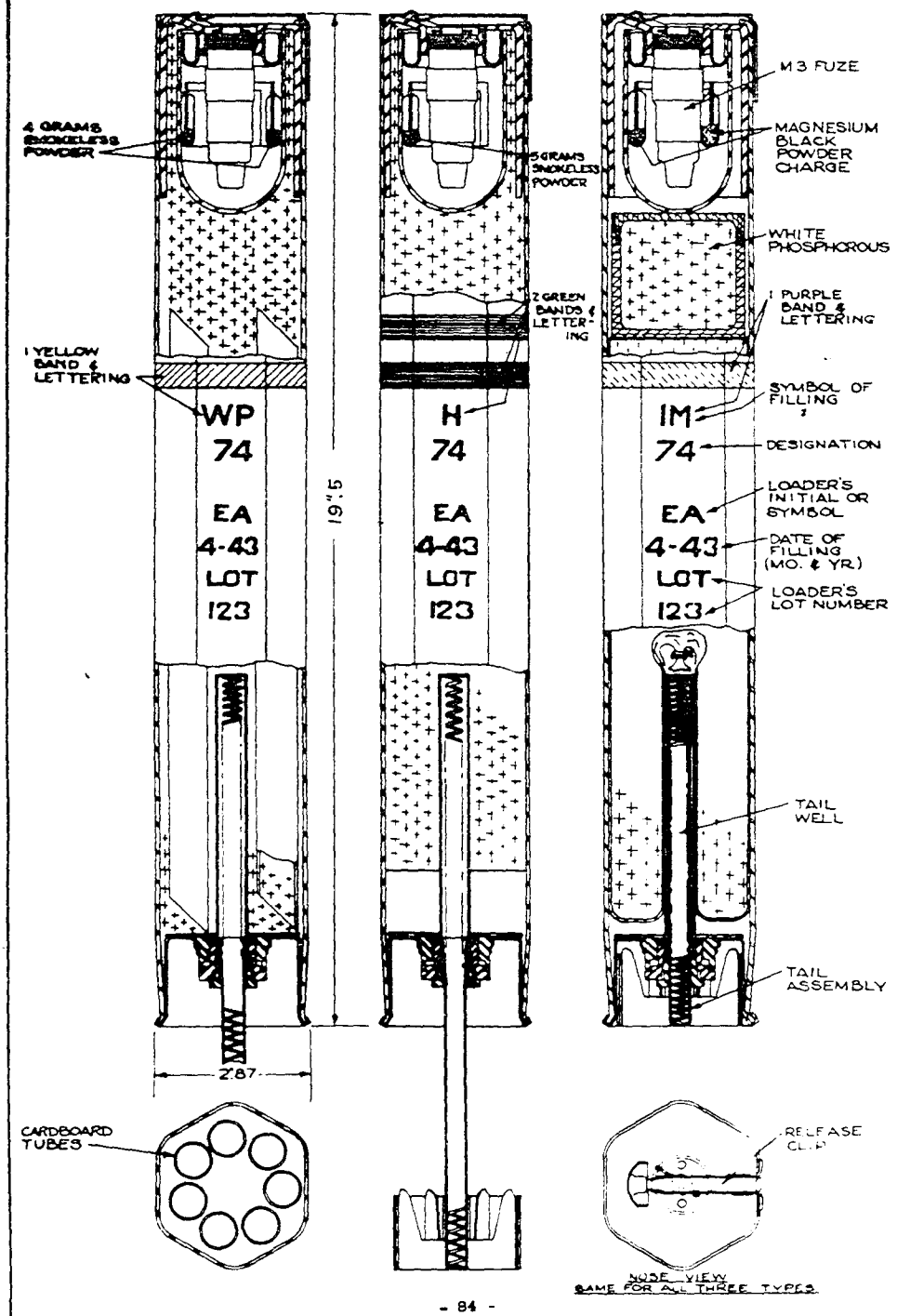
REMARKS:

For COLOR & MARKING, see

INTRODUCTION, Page 72

RESTRICTED

M74 10 LB. CHEMICAL BOMB



R E S T R I C T E D

U.S. ARMY BOMBS

10 LB. INCEND

10 LB. SMOKE

M 74: Incendiary
M 77: Smoke

Data

OVERALL LENGTH	19.5 in.
WIDTH ACROSS FLATS	2.9 in.
MATERIAL	Sheet steel.
FILLING:	
M 74	Oil gel, white phosphorus, or mustard gas.
M 77	H.C. Smoke
FUZES:	
M 74	M 3 Nose
M 77	M 4 Tail (similar acting)

BODY CONSTRUCTION:

Same type construction as AN-M 69 6 lb. oil incendiary, made out of sheet steel leak-proof casing with a nose cup housing the fuze fitting into front of casing. In bombs filled with incendiary composition IM or NP, a small chemical container is located immediately behind the dome of nose cup, filled with white phosphorus, which aids ignition and produces smoke. In bombs with IM or NP, filling is enclosed in cheesecloth sock; if white phosphorus is used, it is enclosed in impregnated paper tubes inside the casing.

TAIL CONSTRUCTION:

The M 74 has a telescope type tail which fits inside the tail cup and is ejected under spring pressure when the bomb is released from the cluster. A well inside the tail cup holds the tail sleeve when the assembly is compressed in the cup. The M 77 does not have the jump out tail.

SUSPENSION:

Carried in AN-M 12 100 lb. or AN-M 13 500 lb. clusters, with M 4 cluster adapter and 14 bombs in the former and M 7 cluster adapter and 60 bombs in the latter. Latest clusters are the M 17A1 and E6R2 500# streamlined aimable clusters, with the M 127 aerial burst fuze in the M 17A1 and the T 39E1 (M 138) in the E6R2.

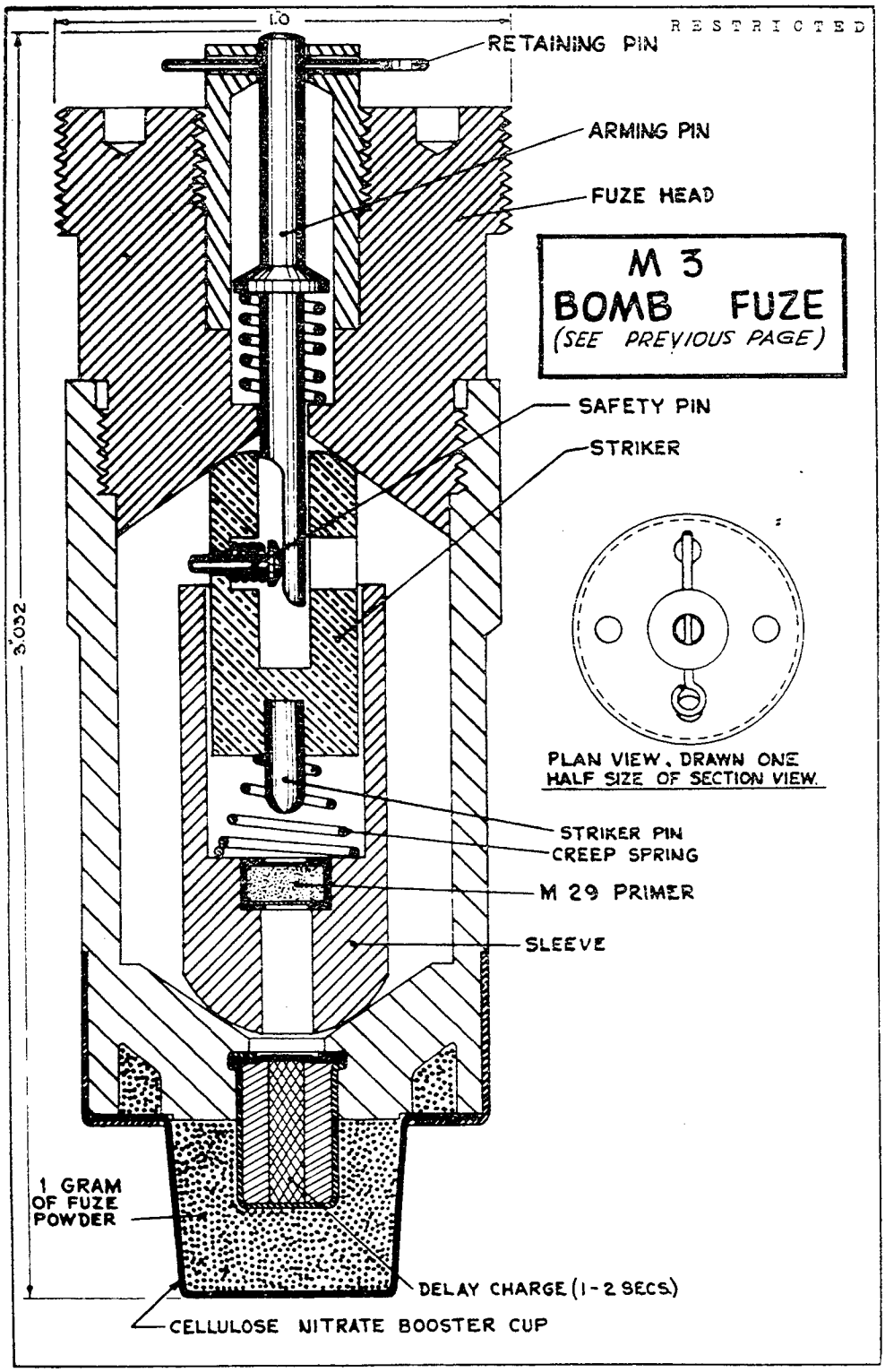
ACTION:

As bombs are released from cluster, the arming pin is forced out by its spring, permitting the safety pin of the fuze to enter the cavity in the striker. Impact forces the striker and sleeve together, igniting the M 29 percussion primer and built-in delay charge of black powder and collodion, giving a 1 to 2 second delay before igniting the booster of fuze powder and filling.

REMARKS:

Do not reinsert arming pin after it has been ejected, as it may cause the fuze to function. FOR COLOR & MARKINGS, see

INTRODUCTION, Page 72


1.0
3.032
RETAINING PIN
ARMING PIN
FUZE HEAD
M 3
BOMB FUZE
(SEE PREVIOUS PAGE)
SAFETY PIN
STRIKER
PLAN VIEW, DRAWN ONE HALF SIZE OF SECTION VIEW.
STRIKER PIN
CREEP SPRING
M 29 PRIMER
SLEEVE
1 GRAM OF FUZE POWDER
DELAY CHARGE (1-2 SECS.)
CELLULOSE NITRATE BOOSTER CUP

R E S T R I C T E D

U.S. ARMY BOMB

30 LB. CHEMICAL

M 46A2

Data

OVERALL LENGTH	31.6 in.
LENGTH OF BODY	29 in.
BODY DIAMETER	5.13 in.
LENGTH OF FINS	11 in.
TAIL WIDTH	6.88 in.
MATERIAL	Sheet steel.
FILLING	Mustard (H) or White Phosphorus (WP)
FILLING WEIGHTS	19.8 lbs.-(H) 28.1 lbs.-(WP)
TOTAL WEIGHTS	31.4 lbs.-(H) 39.7 lbs.-(WP)

FUZING:

AN-M 126A1 (Nose), which has replaced the M 108.

BODY CONSTRUCTION:

Sheet Metal cylindrical type body with hemispherical nose threaded to receive nose fuze. A suitable closing block is fitted to the adapter to keep the fuze and booster cavities free of foreign matter. A male filling plug threads into the base of the bomb.

TAIL CONSTRUCTION:

Four sheet steel fins are welded to the bomb base.

SUSPENSION:

Horizontal or vertical suspension, with a single lug on a band at the center of gravity for horizontal suspension and a lug welded to the tail assembly for vertical suspension.

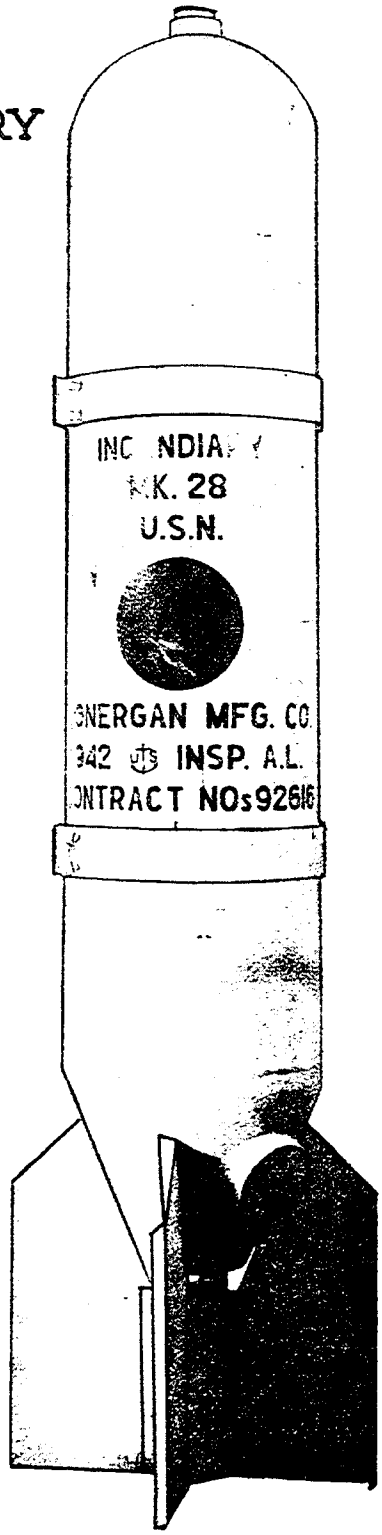
COLOR AND MARKINGS:

Light grey overall with one or two colored bands indicating the type of filling.

REMARKS:

This bomb replaced the 30 lb. M 1 streamlined chemical bomb. The M 46A2 is a modification of the earlier M 46.

100 LB. INCENDIARY MK. 28



R E S T R I C T E D

U.S. NAVY BOMB

100 LB. INCEND.

Mk 28

Data

OVERALL LENGTH	45.4 in.
BODY LENGTH	33.7 in.
BODY DIAMETER	8.0 in.
WALL THICKNESS	.05 in.
TAIL LENGTH	11.75 in.
TAIL WIDTH	11.3 in.

TARGET:

Buildings of frame construction, etc. This bomb is frequently used as a practice bomb without a chemical filling.

FUZING:

M 103 (Army Fuze). When used for practice bomb, it takes AN-M 126A1.

BODY CONSTRUCTION:

Three piece sheet steel construction with hemispherical nose piece and conical tail cone welded to a tubular body.

SUSPENSION:

Two suspension lugs on bands or single lug on band near center of gravity.

COLOR AND MARKINGS:

Grey overall with bright red disc 4 inches in diameter in middle of body.

TAIL CONSTRUCTION:

Four sheet steel vanes welded to tail cone, which is welded to body.

TYPE OF FILLING:

Gasoline, gasoline-gel, gasoline and waste, or rubber. Water or sand for practice.

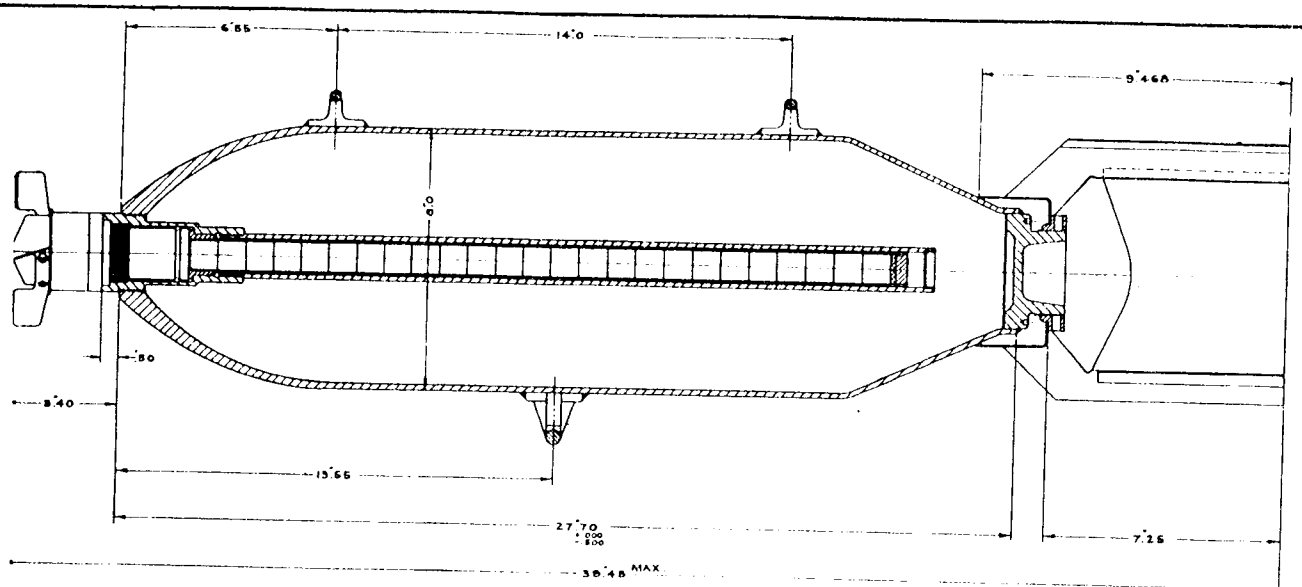
WEIGHTS:

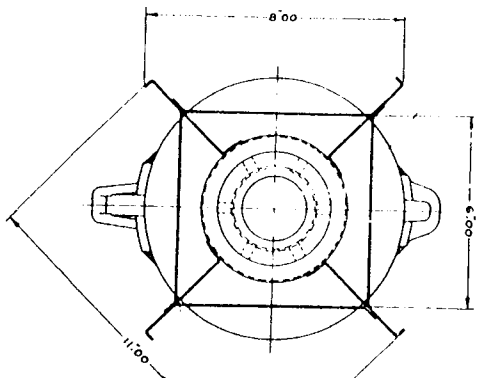
Weight of Fuel	42-45 lbs.
Total Weight	65-68 lbs.
Charge/Weight Ratio	65 % (approx.)

REMARKS:

(1) This bomb is like the AN-M 47A2 bomb, except that it is equipped with a filler cap. Both bombs are prone to leak and should be examined frequently. Refer to page 93 .

(2) There is also a 100 lb. Mk I which is almost identical with the old Army M-47, both of which are obsolete.





U. S. NAVY
100 LB. MK. 42
CHEMICAL BOMB

R E S T R I C T E D

U.S. NAVY BOMB

100 LB. CHEMICAL

Mk 42

Data

OVERALL LENGTH	39.43 in.
BODY LENGTH	27.70 in.
BODY DIAMETER	8.0 in.
THICKNESS OF WALL	0.175 in.
TAIL LENGTH	9.468 in.
TAIL WIDTH	11.0 in.
MATERIAL OF WALL	Steel
MATERIAL OF TAIL	Sheet steel
TYPE OF FILLING	Mustard
WEIGHT OF FILLING	43 lbs.
TOTAL WEIGHT	86.5 lbs.

FUZING:

AN-Mk 219.

TARGET:

Personnel and materiel.

BODY CONSTRUCTION:

Steel tube, swagged aft. An adapter screws into the nose and is threaded to receive the fuze. A burster tube containing T.N.T. running the length of the bomb body screws into the after end of the adapter. The after end of the body is closed by a male base plate, which is threaded for the tail assembly to be fitted. The bomb is filled through the nose.

SUSPENSION:

Horizontal suspension with two lugs 7" on either side of the center of gravity or a single lug 180° removed and at the center of gravity.

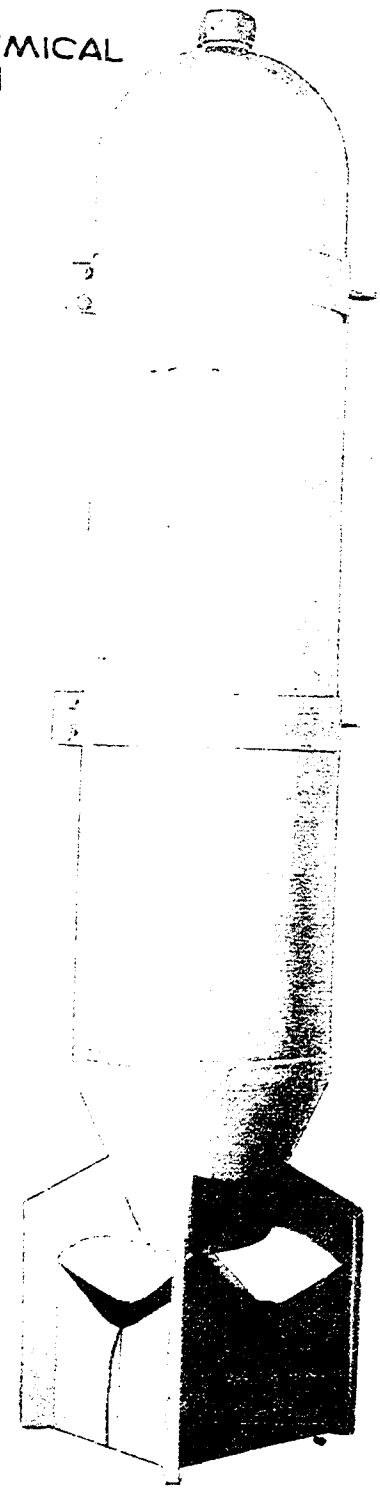
CONSTRUCTION OF TAIL:

Box type, four fin tail, secured by locking nut.

COLOR & MARKINGS:

Olive drab overall with two green bands 1/2 inch wide and 1/2 inch apart aft of the nose.

100 LB. CHEMICAL
MK. 47 A1



RESTRICTED

ARMY-NAVY BOMBS

100 LB. CHEMICAL

AN-M 47A2
(and early mods)
M 75

Data	AN-M 47A2
OVERALL LENGTH	48.9 in.
BODY DIAMETER	8.1 in.
WALL THICKNESS	0.06 in.
WEIGHT OF CASE	26.5 lbs.
MATERIAL	Sheet steel
TAIL LENGTH	12.9 in.
TAIL WIDTH	10.9 in.
FILLING	Mustard Gas, white phosphorus or gasoline gel incendiary IM or NP
FUZING	AN-M 126A1 or M 126

USE:

White phosphorus as smoke screen; incendiary filling against buildings of frame construction and mustard to contaminate enemy personnel.

BODY CONSTRUCTION:

Sheet steel tube with longitudinal seam weld; nose end hemispherical and base plate at rear end welded to the tube. Several bursters may be used interchangeably and run the length of the bomb. The M 12 burster is a tube containing magnesium powder and black powder. M 13 burster is a double walled tube containing T.N.T. in the inner tube and white phosphorus in the outer tube. A special burster consisting of M 13 burster with T.N.T. in inner tube and sodium in outer tube has been developed for use in igniting oil slicks on water as well as against land targets.

TAIL CONSTRUCTION:

Four vanes welded to truncated cone with box-type interior struts.

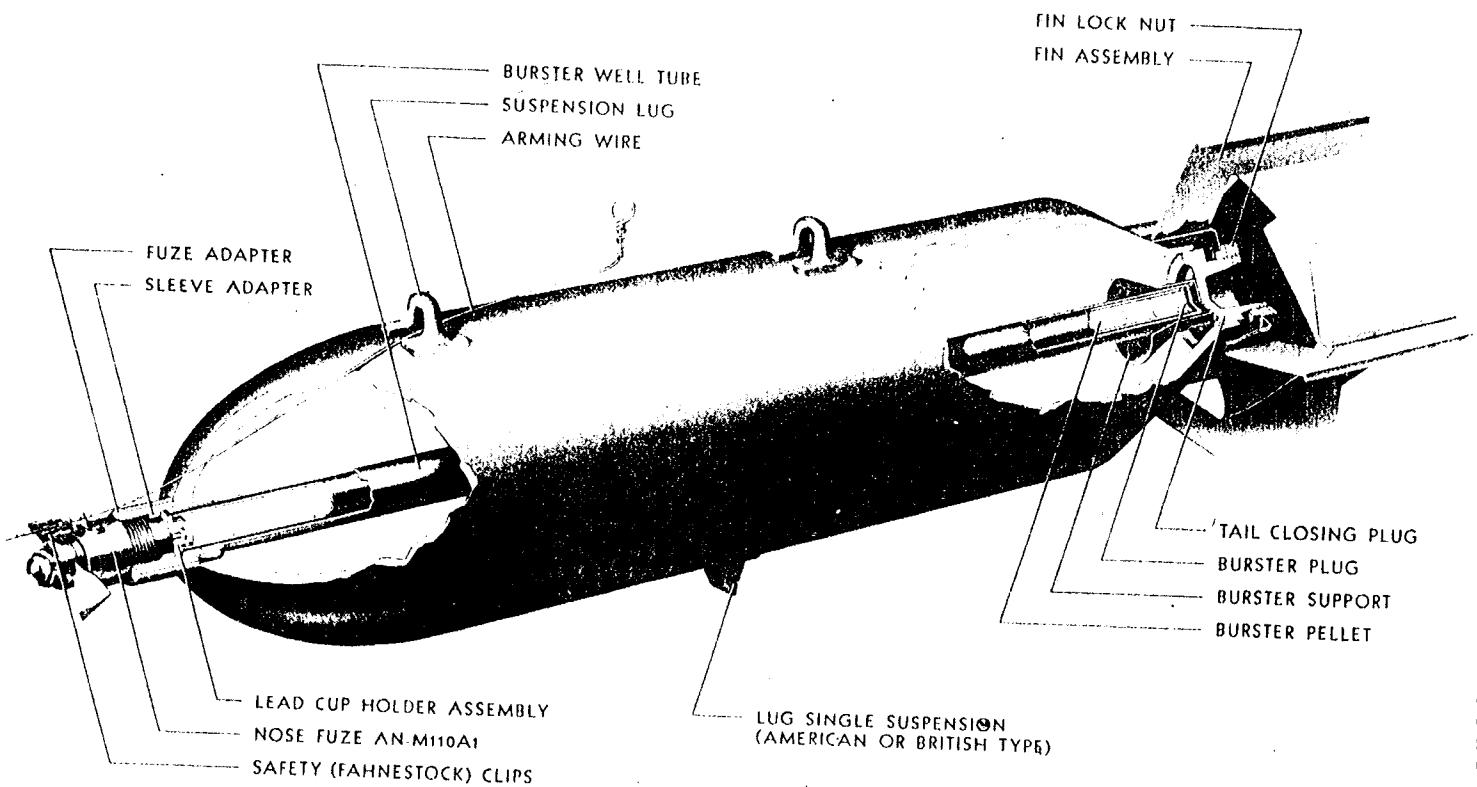
SUSPENSION:

Horizontal suspension by two eyebolts formed by holes in each half of the two suspension bands, the halves then being crimped together to form a complete band. The bands are secured to bomb body by tightening the bolts on the underside of the body. One of the bands can be loosened and slipped to the center of gravity if single suspension is desired.

REMARKS:

AN-M 47A2 Incendiary:	40 lbs. gelled gasoline, either IM or NP, with total weight of 66 lbs.
M 47A1 Incendiary:	Like AN-M 47A2, with interior coating of acid-proof paint instead of oil.
AN-M 47A2 Smoke:	Main filling is 100 lbs. white phosphorus, with M 7 burster containing black powder and total weight 126.5 lbs.
M 47A1 Smoke:	Like AN-M 47A2 Smoke, with charge of 103 lbs. WP and total weight 129.5 lbs.
AN-M 47A2 Gas:	68 lbs. of H (Mustard), equipped with M 4 T.N.T. burster. Inside of body is coated with oil. Total weight, 94.5 lbs.
M 47A1 Gas:	Interior coated with acid-proof black paint instead of oil.
M 47 Chemical:	Original design with wall thickness of only 1/32 inches.
M 75 Target Identification:	Hematite (red iron ore) filling for marking targets on snow covered bombing ranges, using the M 108 fuze.

115 LB. CHEMICAL BOMB M70



RESTRICTED

R E S T R I C T E D

ARMY-NAVY BOMB

115 LB. CHEMICAL

M 70

Data

OVERALL LENGTH	48.7 in.
LENGTH OF BODY	36.95 in.
DIAMETER OF BODY	8.1 in.
WALL THICKNESS	0.224 in.
TAIL LENGTH	12.9 in.
TAIL WIDTH	10.9 in.
FILLING	Mustard (H), White Phosphorus (WP), IM or NP incendiary mixture.
FILLING WEIGHT	Mustard - 58.3 lbs.
TOTAL WEIGHT	115.9 lbs.
FUZING	AN-M 110A1 (Nose)

BODY CONSTRUCTION:

The bomb is made from seamless steel tubing, with an ogival nose threaded to receive the nose fuze. A burster well tube runs the length of the body, fitting into a positioning cup at the rear.

TAIL CONSTRUCTION:

Four fins welded to a sleeve, which is secured by a locking nut threading into the tail closing block. The fins are supported by box-type struts.

SUSPENSION:

The bomb is carried horizontally by dual lugs 7 inches on either side of the center of gravity, or a single lug 180° removed at the center of gravity.

COLOR & MARKINGS:

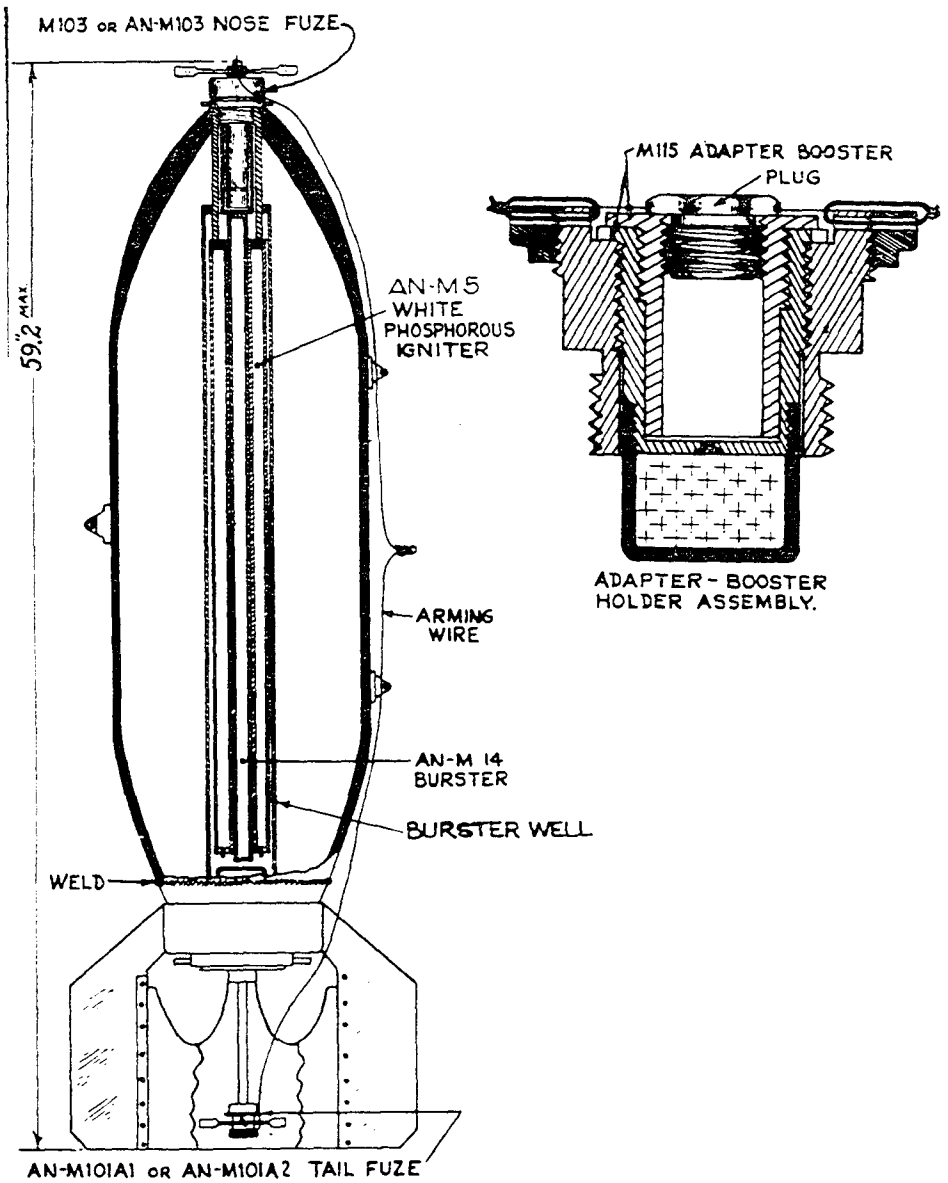
Light grey overall with one or two colored bands indicating the type of filling. Two green bands indicate Mustard.

ACTION:

On impact the fuze functions instantaneously, setting off the burster charge which explodes the bomb and scatters the main filling.

RESTRICTED

U.S. 500 LB., AN-M 76 INCENDIARY BOMB



R E S T R I C T E D

ARMY-NAVY BOMB

500 LB. INCEND.

AN-M 76

Data

OVERALL LENGTH	59.2 in.
BODY LENGTH	45.3 in.
BODY DIAMETER	14.2 in.
WALL THICKNESS	0.3 in.
TAIL LENGTH	13.9 in.
TAIL WIDTH	14.8 in.
FILLING	Oil gel PT1
FILLING WEIGHT	180 lbs.
TOTAL WEIGHT	473 lbs.
MATERIAL	Steel
COLOR & MARKINGS	Olive drab with purple band between suspension lugs.

FUZING:

Nose: AN-M 103 (Instantaneous setting)
Tail: AN- M 101A2 or AN-M 101A1 (Non-delay M14 primer detonator)

BODY CONSTRUCTION:

One piece cast steel with base plate welded to body, and a burster tube 3.5 inches in diameter, 35.75 inches long running through center of bomb welded to nose and base plate. M 115 adapter booster screws into base plate.

TAIL CONSTRUCTION:

Cast steel sleeve with 4 sheet steel fins and internal box-type struts.

SUSPENSION:

Dual suspension lugs welded on body 7 inches on each side of center of gravity and single lug, 180° removed, and at center of gravity.

ACTION:

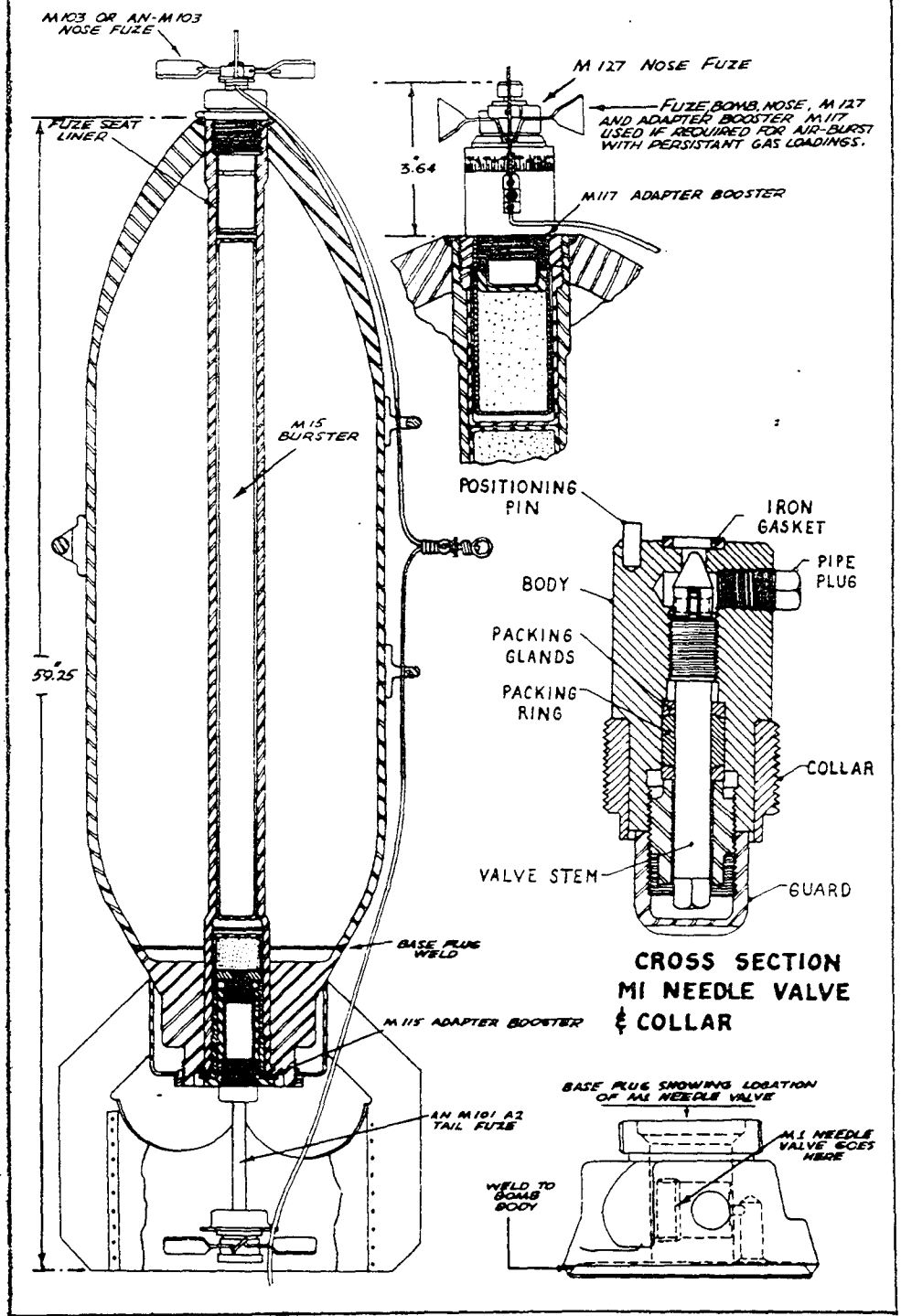
On impact, fuzes function and detonate the 1.25 lb. tetrytol burster in the burster tube and initiate the 9 lb. white phosphorus igniter which, in turn, ignites the main filling. The bomb has a dispersal area of about 300 x 600 feet.

REMARKS:

Attention is drawn to the fact that white phosphorus is present in the igniter, and proper precautions should be taken in disposing of these bombs. The incendiary mixture, PT1, consisting essentially of paste of magnesium, gasoline, and a thickener, liberates heat at about 4 times that given off by the usual incendiary mixture IM.

RESTRICTED

M78 500 LB. CHEMICAL BOMB



R E S T R I C T E D

U. S. ARMY BOMB

500 LB. CHEMICAL

M 78

Data

OVERALL LENGTH	59.25 in.
BODY LENGTH	46.7 in.
BODY DIAMETER	14.18 in.
WALL THICKNESS	0.3 in.
TAIL LENGTH	13.9 in.
TAIL WIDTH	18.9 in.
MATERIAL	Steel
FILLING	Hydrocyanic Acid (AC) mustard or phosgene.
FILLING WEIGHTS	100 lbs. - (AC) 205 lbs. - (CG)
TOTAL WEIGHTS	359 lbs. - (AC) 464 lbs. - (CG)

FUZING:

Nose: M 103 or AN-M 103, M 127 (with M 117 adapter booster)

Tail: AN-M 101A2, with M 14 non-delay primer detonator.

BODY CONSTRUCTION:

Resembles the 500 lb. G.P. AN-M 64. Body is one piece cast steel with an M 15 burster well running the entire length. The burster is threaded internally at the nose to receive the nose fuze and at the rear to receive the M 115 adapter booster. The base plug consists of a special forging welded to the case containing the M 1 needle valve.

TAIL CONSTRUCTION:

A standard box type fin assembly is secured to the bomb by a locking nut which threads on to the base plug.

SUSPENSION:

Horizontal suspension by dual lugs 7" on either side of the center of gravity or by a single suspension lug 180° removed at the center of gravity.

COLOR & MARKINGS:

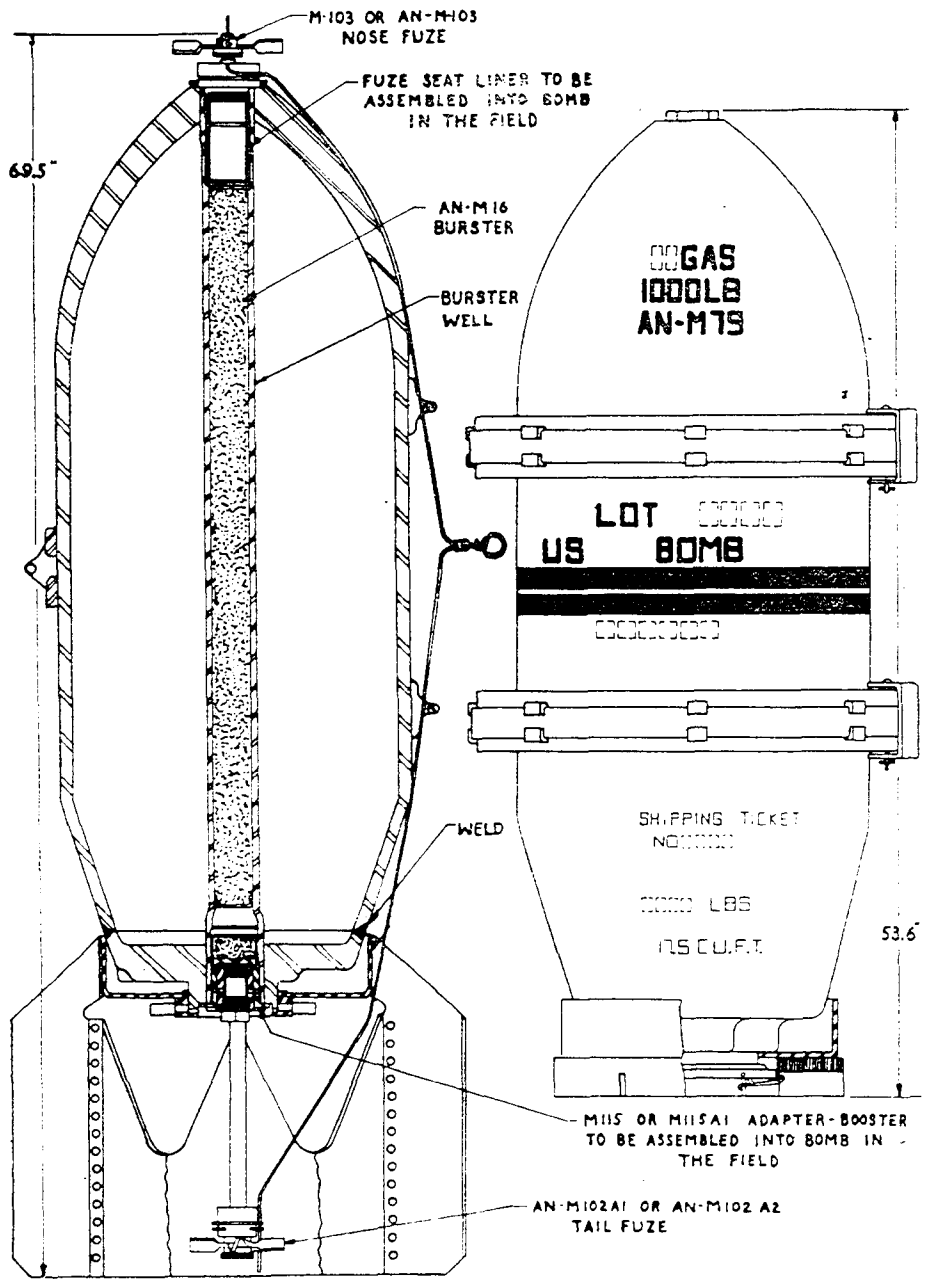
Blue-grey overall with stencilled green lettering and one or two colored bands painted around the body to indicate the type of filler.

REMARKS:

The M 117 adapter booster is used in conjunction with the M 127 nose fuze. This nose fuze is required for aerial bursts with persistent gas agents.

RESTRICTED

US 1000 LB CHEMICAL BOMB
AN - M79



R E S T R I C T E D

ARMY-NAVY BOMB

1000 LB. CHEMICAL

AN-M 79

Data

OVERALL LENGTH	69.5 in.
BODY LENGTH	53.6 in.
BODY DIAMETER	18.6 in.
WALL THICKNESS	.38 in.
TAIL LENGTH	18.5 in.
TAIL WIDTH	25.4 in.
FILLING	Hydrocyanic acid (AC) mustard or phosgene
FILLING WEIGHT	200 lbs. - (AC) 417 lbs. - (CG)
TOTAL WEIGHT	722 lbs. - (AC) 939 lbs. - (CG)

FUZING:

Nose: AN-M 103 or M 127 with M 117 adapter booster.

Tail: AN-M 102A2 with non-delay M 14 primer detonator, and M 115 adapter booster

BODY CONSTRUCTION:

Resembles the AN-M 65 1000 lb. G.P. bomb, taking the same tail assembly, arming wires and fuzes. The body is one piece cast steel and has a steel burster well 2.5" in diameter axially through it and expanded in both the nose and base plate before welding; eliminating any possibility of decomposition of chemical fillers due to the presence of crevices. The base plate differs from that of the standard G.P. bomb in that it is a special forging welded to the case and containing the M 1 needle valve. It also has a 1.25" filling hole closed by a soft iron gasket, a hard steel gasket plug and a threaded closing plug. The M 16 booster is used in the burster well and consists of a water-proof fiber tube filled with 4.45 lbs. tetrytol.

TAIL CONSTRUCTION:

Standard 1000 lb. G.P. tail assembly consisting of 4 fins welded to a sleeve which is held on to the base plate by a locking nut.

SUSPENSION:

Horizontal suspension by dual lugs 7" on either side of the center of gravity or by a single lug 180° removed at the center of gravity.

COLOR & MARKINGS:

Blue-grey overall with one or two colored bands around the body to indicate the type of filler used.

ACTION:

On impact with the ground the tetrytol booster breaks the bomb case into a few large pieces without causing the chemical agent to "flash". The initial cloud formed by the burst of this bomb when filled with (CG) covers an area of 100 yards in diameter within approximately 8 to 10 seconds.

REMARKS:

Attempts to disassemble the bomb or any of its components are to be avoided except for the fuzes which may be removed provided it is necessary to return the bomb to storage. Release of the filler is dangerous should not be undertaken except under exceptional circumstances. In handling any damaged chemical bombs or when conducting surveillance tests by means of the M 1 needle valve, personnel should be equipped with rubber gloves and a gas mask.

M 115A1 adapter booster can also be used in place of M 115.

U.S. NAVY BOMB RESTRICTED

50 LB. FLOATING SMOKE

Mk 1, Mod 1

Data

OVERALL LENGTH	38.29 in.
BODY DIAMETER	8.85 in.
TAIL LENGTH	9.4 in.
TAIL WIDTH	12.5 in.
FILLING	(HC) mixture
FILLING WEIGHT	28 lbs.
TOTAL WEIGHT	54 lbs.

FUZING:

Mk 3 Mod 1. Special nose fuze actuated upon water impact.

BODY CONSTRUCTION:

Aluminum nose casing attached to a hollow wood float which provides buoyancy. The nose carries a water impact fuze and at the tail of the float is a valve cap with a valve to prevent water from leaking into the interior of the bomb. The rear of the bomb is conical and the nose is hemispherical.

TAIL CONSTRUCTION:

The tail consists of four fins bolted to the rear of the bomb with 4 tubular struts bolted to the fins. The fins do not extend after the rear of the bomb.

SUSPENSION:

One movable suspension band.

ACTION:

Impact operates the firing mechanism in the nose, detonating the primer which in turn ignites a length of time fuze giving a delay of 18 seconds, during which time the smoke bomb is returning to and becoming stable on the surface of the water. The time fuze ignites the quickmatch which in turn ignites the starting mixture and this initiates the action of the smoke mixture. Gas pressure formed by the burning smoke mixture breaks the vent discs and opens the valve cap at the tail end of the wooden float. The bomb then evolves a dense white smoke for about 3 minutes.

REMARKS:

This bomb should be dropped from an altitude of over 500 feet and should not be dropped in less than 40 feet of water where the bottom is soft enough to cause the bomb to stick and fail to return to the surface. While designed for use over water, the bomb may also be effective if dropped over ordinary loam soil if dropped from an altitude under 2000 feet. If dropped from over 2000 feet or if dropped from any altitude onto very hard rocky ground the bomb will usually deflagrate. The HC mixture is a pressed powder safe under any normal storage or handling conditions. The smoke, while harmless in the concentrations found in smoke screens in the open, is toxic in more concentrated form.

R E S T R I C T E D

U. S. NAVY BOMB

100 LB. FLOATING SMOKE

Mk. 3

Data

OVERALL LENGTH	48.5 in.
BODY DIAMETER	10.25 in.
TAIL LENGTH	13 in.
TAIL WIDTH	14.25 in.
FILLING	HC mixture
FILLING WEIGHT	59 lbs.
TOTAL WEIGHT	102 lbs.

FUZING:

Mk 3 Mod 1. Special nose fuze actusted on water impact.

BODY CONSTRUCTION:

Aluminum nose casting carrying a pyrotechnic charge, attached to a hollow wood float which provides buuyancy. The nose carries a water impact fuze, and at the tail of the float is a valve cap with the valve to prevent water from leaking into the interior of the bomb. The rear of the bomb is conical in shape and the aluminum nose is hemispherical.

TAIL CONSTRUCTION:

The tail consists of four fins bolted to the rear of the bomb with four tubular struts bolted to the fins. The fins do not extend upon the rear end of the bomb.

SUSPENSION:

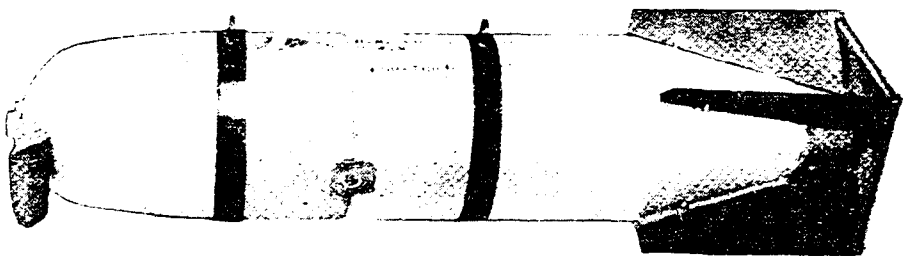
Two movable suspension bands.

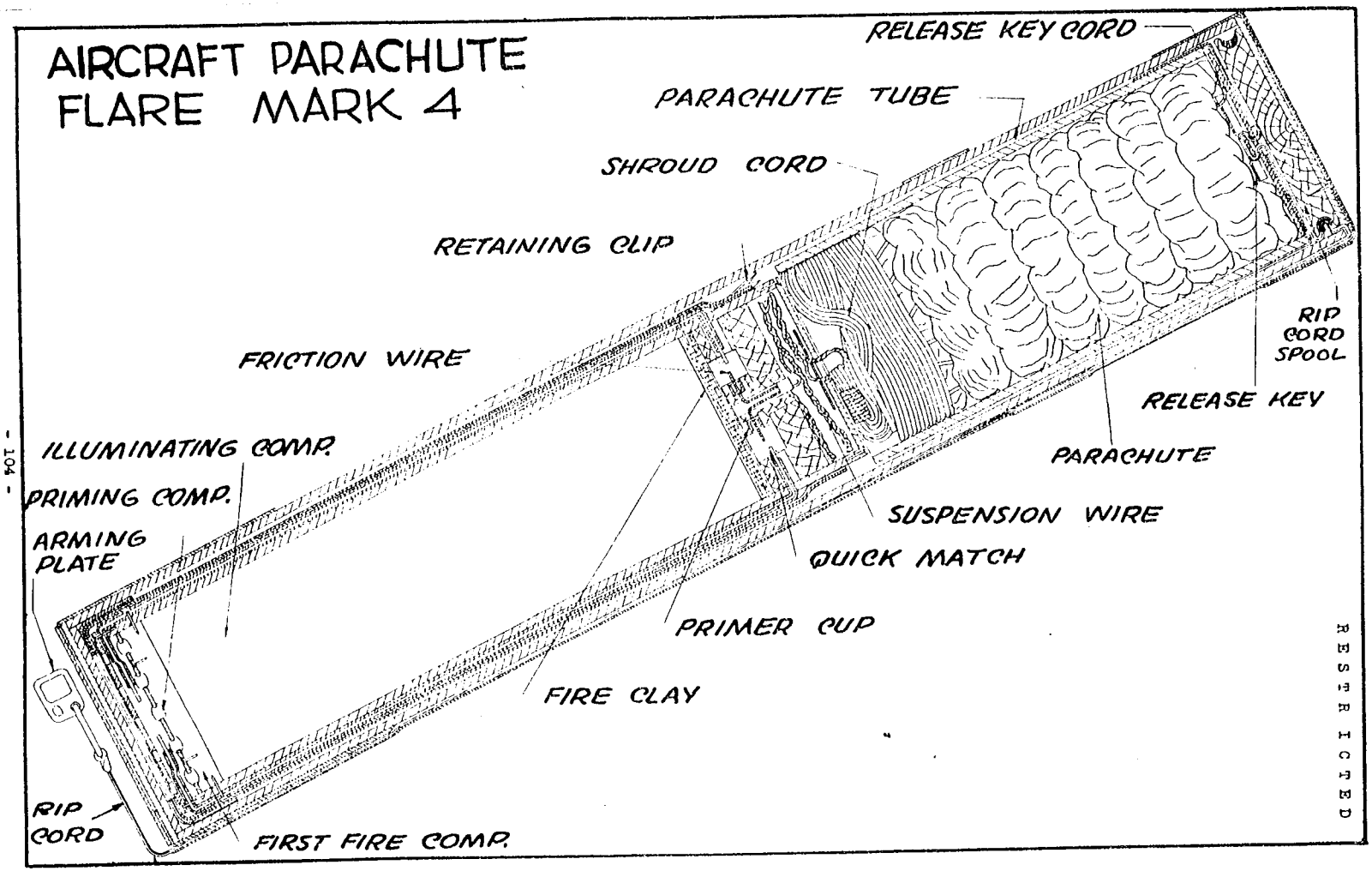
ACTION:

Impact operates the firing mechanism in the nose, detonating the primer which in turn ignites a length of time fuze giving a delay of 18 seconds, during which time the smoke bomb is returning to and becoming stable on the surface of the water. The time fuze ignites the quickmatch which in turn ignites the starting mixture and this initiates the action of the smoke mixture. Gas pressure formed by the burning smoke mixture breaks the vent discs and opens the valve cap at the tail end of the wooden float. The bomb then evolves a dense white smoke for about 7½ minutes.

REMARKS:

This bomb should be dropped from an altitude of over 500 feet and should not be dropped in less than 40 feet of water where the bottom is soft enough to cause the bomb to stick and fail to return to the surface. While designed for use over water, the bomb may also be effective if dropped over ordinary loam soil if dropped from an altitude under 2000 feet. If dropped from over 2000 feet or if dropped from any altitude onto very hard rocky ground the bomb will usually deflagrate. The HC mixture is a pressed powder safe under any normal storage or handling conditions. The smoke, while harmless in the concentrations found in smoke screens in the open, is toxic in more concentrated form.




AIRCRAFT PARACHUTE
FLARE MARK 4
RELEASE KEY CORD
PARACHUTE TUBE
SHROUD CORD
RETAINING CLIP
FRICTION WIRE
RIP CORD SPOOL
RELEASE KEY
PARACHUTE
ILLUMINATING COMP.
PRIMING COMP.
ARMING PLATE
SUSPENSION WIRE
QUICK MATCH
PRIMER CUP
FIRE CLAY
RIP CORD
FIRST FIRE COMP.
RESTRICTED

RESTRICTED

U. S. NAVY

MK. 4 FLARE

(AND MODS)

Data

OVERALL LENGTH	27 in.
DIAMETER OF CASE	4.75 in.
WEIGHT	18 lb.
BURNING TIME	3 min.
INTENSITY	300,000 candle-power.
COLOR	White.
EFFECTIVE RELEASING ALTITUDE	1200 - 5000 ft.
RATE OF FALL AFTER IGNITION	350 ft/min.

USE:

1. Primarily, it is used to illuminate an area to permit the landing of aircraft.
2. Occasionally, it is used for reconnoitering, bombing, and blinding anti-aircraft defenses.

DESCRIPTION:

The complete flare consists of a parachute and illuminant contained in a shellac-impregnated chip board tube closed at the ends by chip board discs which are held in place by gummed cloth and sealed with paraffin. There are two metal steadying bands fastened around the case against which the steadying forks of the bomb rack rests. The complete flare is issued in a water-proof metal container.

RELEASING METHODS:

1. Bomb rack or shackle release: Mk 50 and Mk 51 racks; Mk 3 (and Mods.) shackles; Mk 4, Mod. 2 and above shackles; Mk 5 and Mods. shackles.

   For this type of release support bands are required, being shipped with the flare and attached in positions indicated on the flare. The Mk 35 and Mk 41 racks are not designed to operate with less than 100 lb. load and should not be used with this flare.

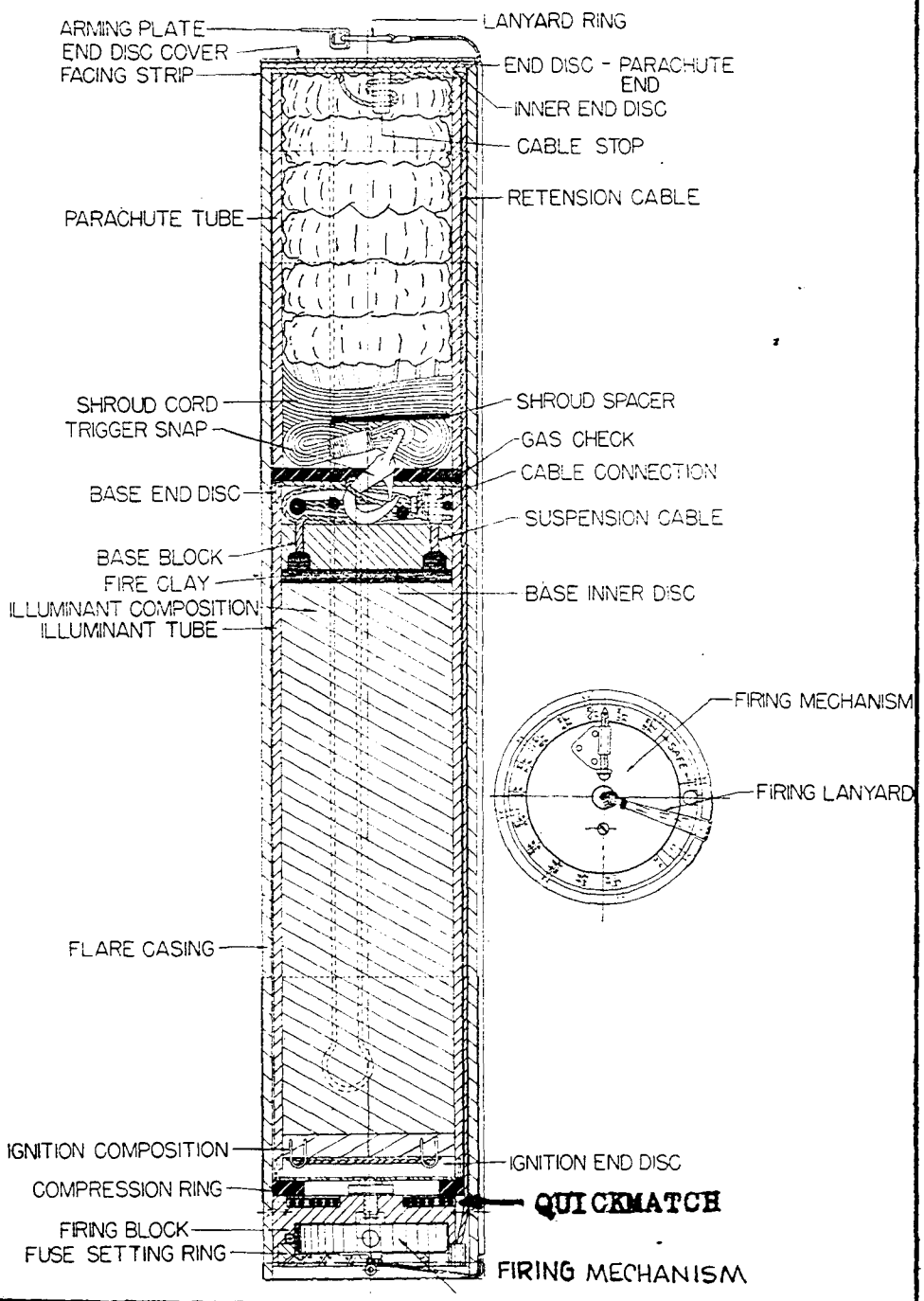
2. Adapter Release (chute or holder): The flare is inserted into the adapter with the heavy end down and the rip cord is secured on a hook in the plane. The flare is released by a switch from the cockpit.
3. Cockpit Release (Not recommended except in emergency): An additional 10 feet of rip cord is attached to the arming plate of rip cord and the other end is secured to some substantial part in the plane. The flare is released in a vertical position, heavy end down, with as much downward velocity as possible so that it will be well clear of the plane when rip cord is taut.

OPERATION:

As the flare is dropped from the plane, the arming plate of the rip cord is retained by the plane and the rip cord is pulled from the side of the flare case to which it is fastened by gummed cloth tape. As the flare continues to fall, the rip cord, which is wound around a wooden spool inside the end of the flare case, is unwound tearing away the end of the flare case. The end disc and spool fall away as the parachute tube is pulled from the flare case and retained by the rip cord. The parachute is pulled out of its tube by the weight of the illuminant and flare case and causes the parachute and parachute shrouds to straighten out. When the parachute and parachute shrouds are fully extended, a small cord attached to the release key pulls the release key down allowing the rip cord to slip through the key and the flare falls free.

An ignition wire is attached to the suspension cable in such a manner that it is pulled before the cable is fully extended. Four friction wires are attached to the ignition wire and run through primer cups of match compound. This ignites a double quickmatch train which burns down the outside of the illuminant case and ignites the primer composition which in turn ignites the first fire and illuminant. When the parachute opens, the illuminant is pulled out of the flare case, and flare case falls clear. Full suspension and ignition occur about 30 - 50 feet below the plane.

AIRCRAFT PARACHUTE FLARE MK.5, MOD. 2 & 3



R E S T R I C T E D

U. S. NAVY

MK. 5 FLARE (AND MODS.)

Data

OVERALL LENGTH	27 in.
DIAMETER OF FLARE CASE	4.75 in.
WEIGHT	18 lb.
BURNING TIME	3 min.
INTENSITY	750,000 candle-power.
COLOR	Mk 5 and Mk 5 Mods 1 & 2 are white; Mk 5 Mods 3-7, yellow.
EFFECTIVE RELEASE ALTITUDE	3500 - 15000 ft.
TERMINAL VELOCITY (Before ignition)	225 ft/sec.
RATE OF FALL (After ignition)	450 ft/ min.

USE:

To illuminate an area for reconnoitering, bombing, or landing.

DESCRIPTION:

The complete flare consists of a parachute and illuminant and impregnated chip board case. It is closed on the parachute end by several layers of chipboard discs held in place by gummed cloth tape and sealed with paraffin, and on the fuze end, which contains the Ensign Bickford fuze, by a metal cover. There are two metal steadying bands fastened around the case against which the steadying forks of the bomb rack rests. The complete flare in its case is issued in a water-proof metal container.

OPERATION:

The setting of the Ensign Bickford time delay fuze is made by turning the lock screw on the metal firing mechanism housing to the desired delay, which is indicated on the bevel of the fuze setting ring. The numbers indicates the vertical distance the fuze will drop before igniting. When the correct setting is obtained, the firing mechanism is secured by screwing the lock screw until its point is buried in the flare case.

When the flare is released from the plane, the arming plate is retained on the plane, the rip cord is torn from the side of the flare case and the cover on the fuze end is flipped off. The rip cord is attached to the snap cord that passes around a lug on the firing lever and is secured to the fuze block. As the flare continues to fall, the snap cord is pulled, overcoming the lever spring and cocking the firing lever. When a tension of approximately 38 pounds is reached in the snap cord, it breaks releasing the firing lever and the lever spring then drives the firing lever back against the fulminate of mercury primer. The flare now falls free.

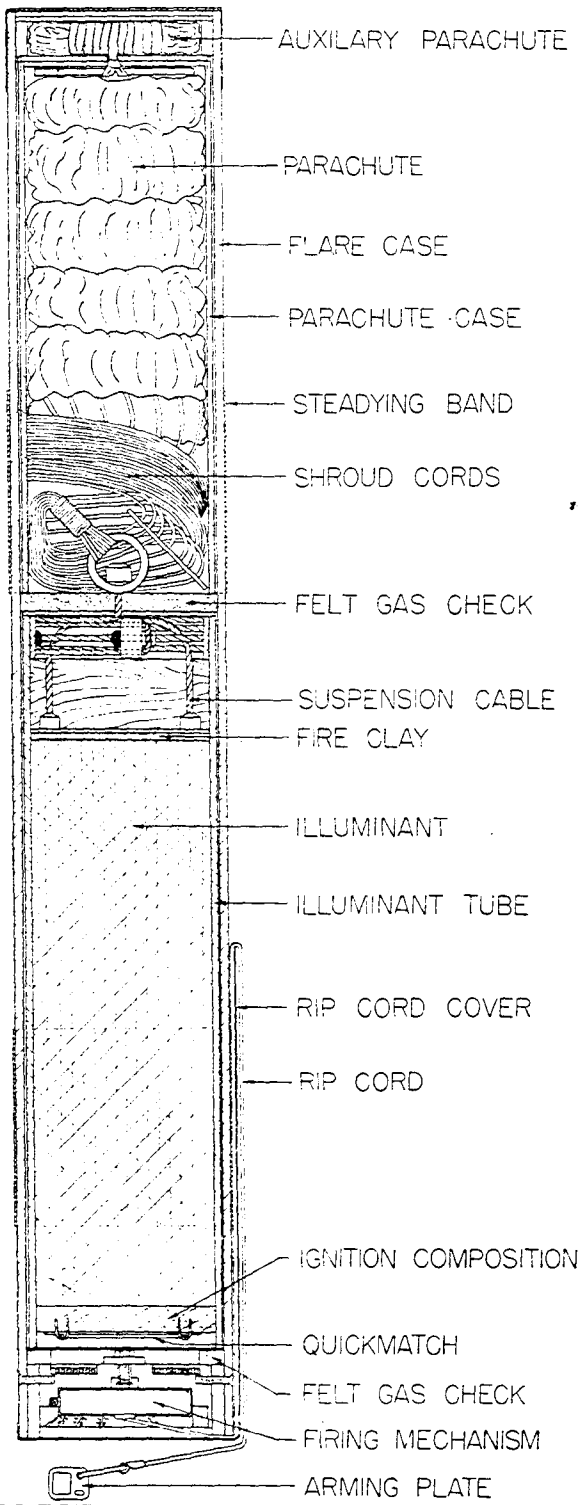
The primer ignites the black powder pellets in the fuze plunger and the expanding gases from the burning black powder propells the sharp point of the plunger radially outward into the Ensign Bickford time fuze. There are three small holes near the point of the plunger which allow some of the flame to escape from the inside of the plunger into the powder of the Engisn Bickford fuze that causes its ignition. The time fuses burns its predetermined length at the rate of approximately 12 inches per 60 seconds, and ignites the quickmatch under the firing block.

The flash produced by the quickmatch, ignites the fire cracker fuse stapled to the ignition composition. The gases evolved when the ignition composition begins to burn force the end discs out at the parachute end then the parachute and illuminant. The parachute tube which is of split construction falls away, the parachute opens and the retention cable slides through trigger snap on the end of the shroud lines until it reaches the cable stop. A short length of cable on one side of the cable stop suspends the flare case, and a longer length on the other side suspends the illuminant. This keeps the case from dropping as a missile hazard. The sudden shock caused by the cable stop making contact with the trigger snap is taken up by a shock absorber. This is done by pulling a cable contain lead balls called snubbers through a hole which is of smaller diameter than the diameter of the snubbers, and as each snubber passes through the hole, part of it is sheared off, thus absorbing part of the shock. The last ball is of much greater diameter and acts as a stop.

REMARKS:

In later models a new type of shock absorber eliminates the use of lead snubbers. The cable pulls through a connection in which friction absorbs the shock of the parachute opening.

AIRCRAFT PARACHUTE FLARE MK.6 MOD. 1



R E S T R I C T E D

U. S. NAVY

MK. 6 FLARE
(AND MODS.)

Data

OVERALL LENGTH	37.75 in.
DIAMETER OF CASE	5.4 in.
WEIGHT	30 lbs.
BURNING TIME	3 - 3.5 min.
INTENSITY	1,000,000 candlepower.
COLOR	Yellow
EFFECTIVE RELEASE ALTITUDE	3500 - 15000 ft.
TERMINAL VELOCITY (Before ignition)	225 ft/sec.
RATE OF FALL (After Ignition)	450 ft/min.

USE:

To illuminate a large area for reconnoitering and bombing, and also as a blinding effect on the operators of anti-aircraft weapons.

DESCRIPTION:

The complete flare consists of the illuminant, a parachute, and an auxiliary parachute contained in a shellac impregnated chipboard case. The case is closed on the parachute end by several layers of chipboard discs held in place by gummed cloth tape and sealed with paraffin and on the illuminant end by an Ensign Bickford time fuze and a metal cover. To the snap cord of the Ensign Bickford fuze is attached the rip cord which is taped down along the side of the flare case. There are two metal steadying bands around the case against which the steadying forks or sway braces of the bomb racks rest. The flare is issued in a water-proof metal container and should be kept there at all times when not installed in an aircraft.

RELEASING METHODS:

1. Bomb Rack or Schackles - Mk 50 and Mods Racks
   Mk 51 Mods Racks
   Mk 3 and Mods shackles
   Mk 4 and Mods shackles
   Mk 5 and Mods shackles

For this type of release, support bands are required, which are shipped with the flare and attached in positions indicated on the flare. The flare is suspended on the racks and shackles with the fuze end forward. The Mk 35 and Mk 41 racks are not designed to operate with a load less than 100 lbs., and should not be used with this flare.

2. Adapter Release - Due to the size of this flare, it cannot be installed in the flare adapter used for the Mk 5 flare.

3. Cockpit Release - (Not Recommended except in emergency) - An additional 10 feet of rip cord is attached to the arming plate on the rip cord and the other end is secured to some substantial part in the plane. The flare is launched by throwing it over the side in a vertical position with the fuze end up.

OPERATION:

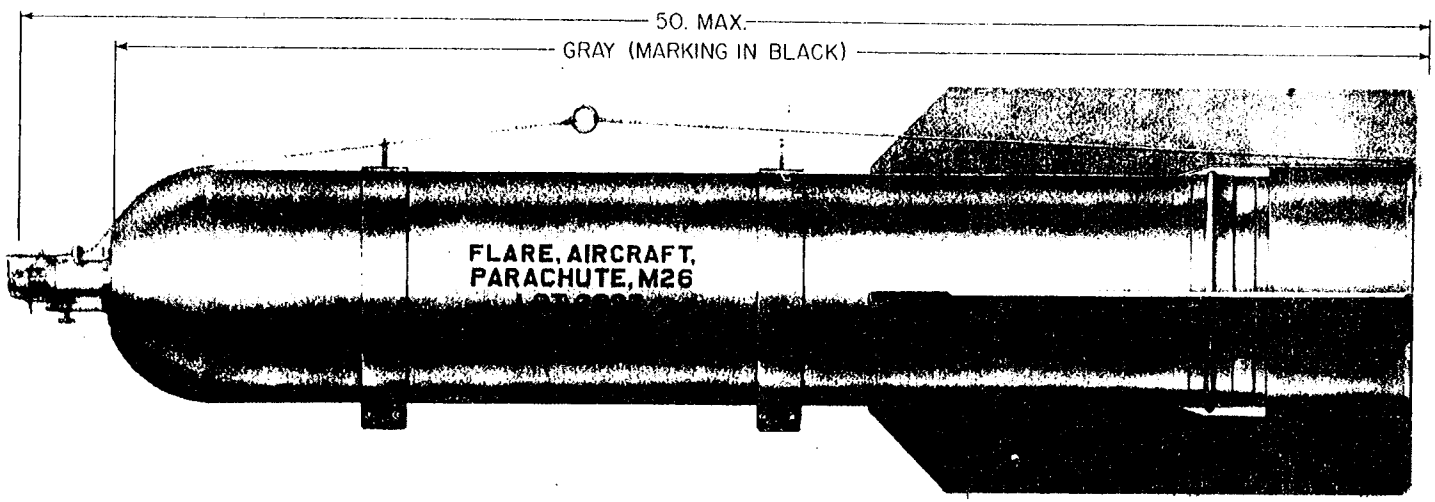
When the flare is released, the arming plate is retained by the plane and the rip cord is torn from the side of the case, flipping the metal cover off of the Ensign Bickford fuze. (The operation of the fuze is the same as given in the Mk 5 flare).

The gases evolved when the ignition composition begins to burn, forces the end out of the flare case, followed by the auxiliary parachute, the parachute in its case and the illuminant. The flare case falls clear. The auxiliary parachute opens and retards the parachute in its case to which it is attached, and the illuminate pulls the parachute out of its case. The auxiliary parachute and parachute case fall away and the parachute opens.

REMARKS:

This flare also incorporates a shock absorber as used in the Mk 5 with either lead balls passing through a hole of smaller diameter than the lead balls, or a special connection utilizing friction to absorb shock of the parachute opening.

AIRCRAFT PARACHUTE FLARE M26



RESTRICTED

ARMY-NAVY

AN-M26 FLARE

Data

OVERALL LENGTH	50 in.
DIAMETER OF CASE	8 in.
WEIGHT	53 lbs.
BURNING TIME	3 - 3.5 mins.
INTENSITY	800,000 candle-power.
COLOR	White light.
EFFECTIVE RELEASING ALTITUDE	4000 - 25000 ft.
RATE OF FALL (after ignition)	700 ft/min.

USE:

To provide illumination for night bombardment; also may be used to blind anti-aircraft defenses.

FUZING:

M 111A2; M 111 A1; M 111.

DESCRIPTION:

The flare is enclosed in a metal cylindrical case with a rounded nose and tail fins. In the nose a M 111A2 fuze can be inserted and the tail end is closed with a shipping cover that has a handle attached and sealed by a strip of tape. The case is equipped with two suspension lugs 14 inches apart.

RELEASING METHOD:

This flare may be dropped from any bomb rack or shackle in general service except the Mk 35. For single suspension racks and shackles the aft suspension lug is used, being located at the center of gravity.

OPERATION:

When the flare is dropped, the arming wire is pulled allowing the vanes of the M 111A2 fuze to rotate. The hangwire is retained and pulls off the cover of the stabilizing sleeve compartment. As the flare continues to drop, the tear wire and tear wire cord pull out the stabilizing sleeve, and the cover lock cord attached to the shrouds of the stabilizing sleeve unlocks and pulls out the cover lock. When the sleeve is fully extended, the tear wire breaks allowing the flare to fall free stabilized in flight by its fins and stabilizing sleeve.

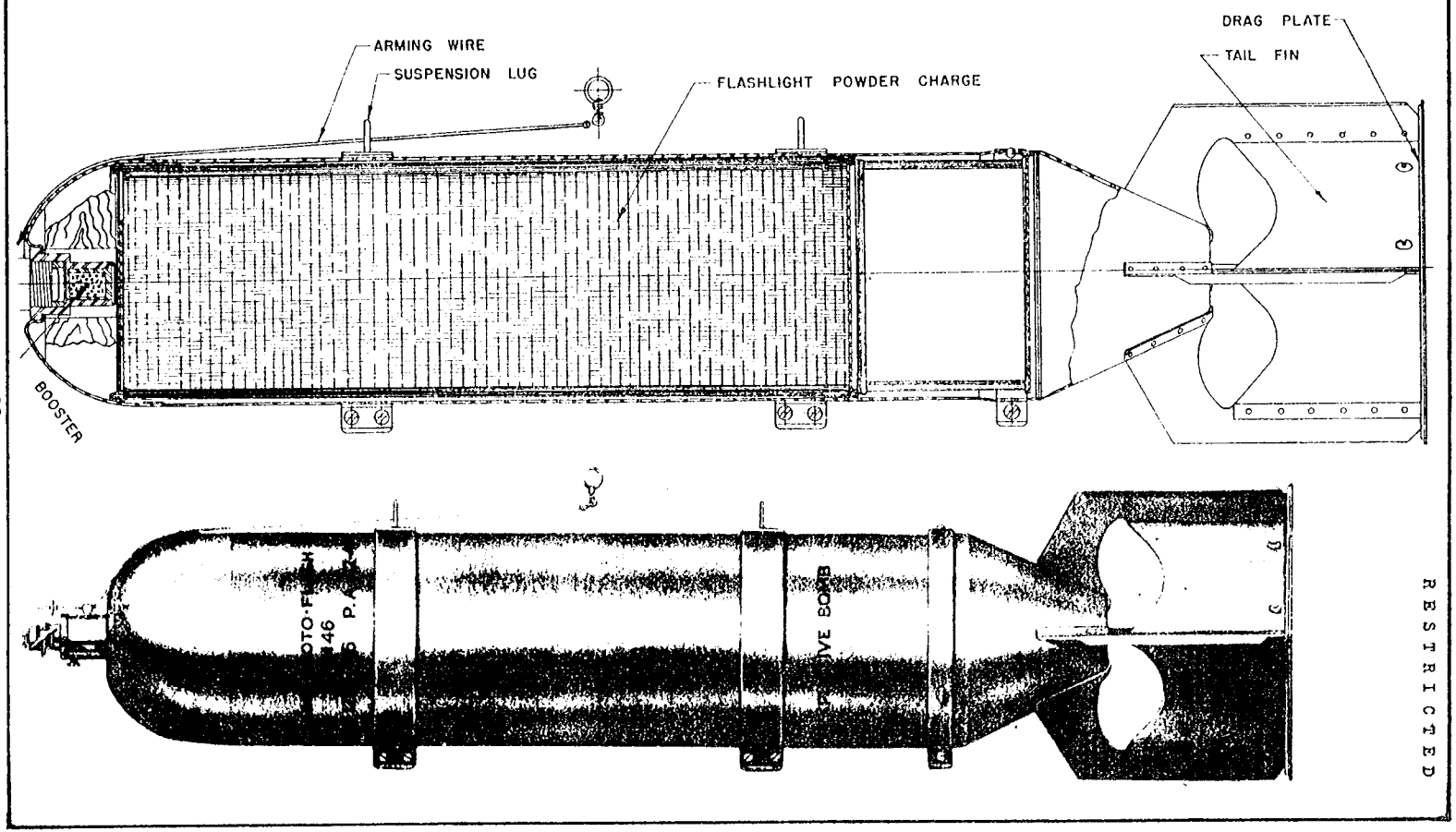
When the nose fuze functions, the gases of the black powder booster forces the releasing cup cover out of the detachable cover, releasing the retaining pins from the groove in the flare case and freeing the detachable cover. As the detachable cover is pulled out by the stabilizing sleeve, a pull out cord pulls out the parachute. When the parachute opens, the flare stops with a jerk breaking the pull out cord which allows the stabilizing sleeve assembly to fall free and pulling the entire flare assembly out of the flare case which then falls away. The sudden stop also pulls the friction wires through the igniters, starting the 6 second delay through the center of the candle which allows full opening of the parachute.

The shock caused by the opening of the parachute is taken by the shock absorbers, made of copper tubing in a spiral or coiled shape, and straightens out in absorbing the shock. After the parachute is opened, the delay ignites the first fire which ignites the candle. When the first fire is ignited, the gases formed by burning forces the rib retainer down and the spring loaded ribs jump out opening the glass cloth spade.

REMARKS:

The An-M 26 flare can be dropped at air speeds up to 240 knots, but above that the stabilizing sleeve is apt to tear away. The M 26 flare cannot be dropped at air speeds greater than 130 knots for the same reason.

PHOTOFLASH BOMB M46



R E S T R I C T E D

U. S. ARMY BOMB

M 46 PHOTOFLASH

Data

OVERALL LENGTH	48.4 in.
DIAMETER OF BODY	8 in.
WEIGHT	51.9 lbs.
WEIGHT FLASH POWDER	25 lbs.
BURNING TIME	1/5 sec.
PEAK INTENSITY	500,000,000 candlepower.

USE:

For night photography. (Developed so that planes engaged in night photography reconnaissance need not be limited to low altitudes.)

FUZING:

M 111A2; M 111A1; M 111.

DESCRIPTION:

In appearance it resembles a conventional light case bomb. Uses an M 111A2 fuze in the nose, but it is issued unfuzed. It also has two suspension bands for rack and shackle suspension. Has box type tail with square drag plate closing off the tail vane assembly.

RELEASING METHODS:

This bomb can be dropped from any bomb rack or shackle except the Mk 35 rack.

OPERATION:

When the bomb is dropped the arming wire is pulled, starting the mechanical time fuze. When the time set on the fuze has elapsed, the flashlight powder is ignited by the fuze booster. The resulting flash of light lasts for about 1/5 sec. and has a peak intensity of approximately 500,000,000 candle-power.

REMARKS:

1. Because of the brilliance of the flash it is detrimental to the vision to watch the explosion of photoflash bombs.
2. Extreme care should be exercised in handling these bombs, because the charge is very sensitive to friction, shock, and temperature.
3. Bomb should not be jettisoned over friendly territory, as it may function on impact.

U. S. NAVY

RESTRICTED

MK. 8 FLARE
MOD. 1
VERY SIGNALS

Data

OVERALL LENGTH	25 in.
DIAMETER OF CASE	4.75 in.
WEIGHT AS DROPPED	16 lbs.
BURNING TIME	3 - 3.5 min.
INTENSITY	600,000 candlepower.
COLOR	Yellow (pale).
EFFECTIVE RELEASE ALTITUDE	
RATE OF FALL (After ignition)	500 ft/ min.

USE:

For night anti-submarine warfare.

DESCRIPTION

This flare is the same as the Mk 4 flare (see page 105) except that the external length is 2 inches shorter and the illuminant has a 90-second delay fuze through its center.

RELEASING METHODS

Same as for Mk 4 Flare, see page 105.

OPERATION:

Similar to Mk 4 flare, except when the ignition wire attached to the suspension cable is pulled it pulls the friction wires in the Ensign Bickford fuze igniter, ignited the 90-second delay fuse running through the center of the illuminant. When the parachute opens, the illuminant is pulled out of the flare case, and the flare case falls away. The sudden shock caused by the opening of the parachute is taken up by a shock absorber. This is done by pulling a cable containing lead balls, called snubbers, through a hole which is of smaller diameter than the diameter of the snubbers. As each snubber passes through the hole, part of it is sheared off, thus absorbing part of the shock. The last ball is of much greater diameter and acts as a stop. Full suspension of the flare occurs 30 - 50 feet below the plane, and approximately 90 seconds later the first fire of the illuminant is ignited by the delay.

REMARKS:

The Mk 8 Mod 1 flare can be launched at speeds up to 220 knots, but the Mk 8 flare which does not have the snubbers for the shock absorber effect should not be launched at speeds over 150 knots.

VERY SIGNAL CARTRIDGES, MARK 2 (Single Stars)

Very's Signal cartridges are used primarily as distress signals. They resemble 10 gage shotgun shells in appearance and are designed to be fired from a Very's signal pistol or a hand projector. It will reach a height of approximately 200 feet and has a maximum visibility of approximately one mile.

Color of Star	Burning Time	Candlepower	Identification of Color of Signal
Red	7 sec.	300	Paper case is painted red. The closing wad is corrugated.
White	6 sec.	250	Paper case is natural color (white). The closing wad has a small cone in the center.
Green	5 sec.	600	Paper case is painted green. The closing wad is smooth.

R E S T R I C T E D

ARMY-NAVY

NIGHT DRIFT SIGNAL

Data

	AN-Mk4	AN-Mk5-Mod 1
OVERALL LENGTH	13 in.	19 in.
DIAMETER OF BODY	3 in.	3 in.
WEIGHT	2 lbs.	4 lbs.
BURNING TIME	3-3.5 min.	15-17 min.
TIME OF IMPACT TO IGNITION	8-12 sec.	9 sec.
EFFECTIVE RELEASING ALTITUDE	Under 500 ft.	
VISIBILITY	Nite - 6-7 miles.	

USE:

To obtain the drift of the plane from which it was dropped.
To mark the initial point of contact with submarine.
To mark an object to which an aircraft desires to call the attention of a surface vessel.
To determine the wind direction before landing.
To mark landing deck on aircraft carriers for night landings.
To mark location of surface of water for emergency night landings.

DESCRIPTION:

The appearance of these signals differs in that the AN-Mk 4 has an ogival shaped, die cast nose with a lug on one side to turn the signal so it will not strike the bottom in shallow water, while the AN-Mk 5 Mod 1 has a flat die cast nose and its overall length is 6 inches longer. In both cases the die cast nose contains a water impact fuse. The bodies of both signals are made of hollow wooden cylinders three inches in diameter, with one end tapered to a one inch diameter on which the tail assembly is mounted.

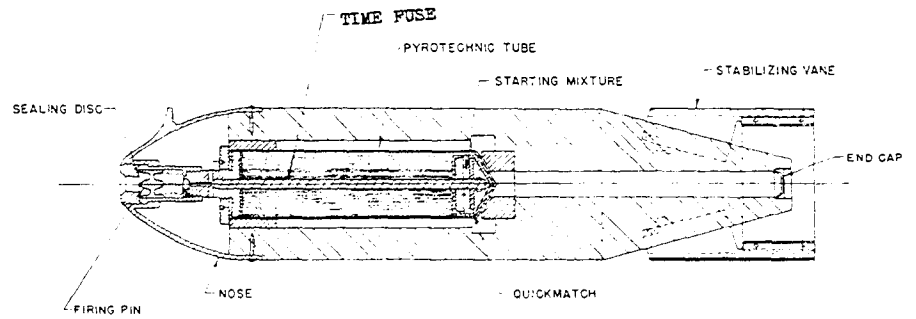
The pyrotechnic mixture is formed into pellets approximately 4 inches long and 1.25 inches in diameter with a .022 inch hole down the center through which the delay fuse passes. One pellet is used in the AN-Mk 4 and three pellets are used in the AN-Mk 5 Mod 1. The pellets are enclosed in a pyrotechnic tube to keep the hydroscopic material from absorbing moisture through the wooden body. Originally pure tin was used for this purpose, but in recent lots lead and zinc have been substituted. The nose end of the signal is closed with a paraffin treated sealing disc, while the tail is sealed by a metal cap.

OPERATION:

When launched from aircraft, the drift signal falls nose down. On impact with the surface of the water, the water breaks the paraffined paper sealing disc, and drives the firing pin up against the primer. The flame from the primer ignites the time fuse which runs the length of the hole in the center of the pyrotechnic pellets and give the drift signal enough time to return to the surface and right itself. The time fuse ignites a length of quickmatch which in turn ignites the starting mixture and then the pyrotechnic pellet. The gases evolved break open the pyrotechnic tube and force out the cap which seals the discharge tube in the tail. A bright flame 12 - 15 inches high and a white smoke are produced, which is visible for 6 - 7 miles on a clear night.

REMARKS:

This signal may be used for day signal, but under certain conditions daylight observation is difficult.



NIGHT DRIFT SIGNAL AN-MK 5 MOD. 1

SUBMARINE EMERGENCY IDENTIFICATION FLARE, MK 10, MK 11, MK 12.

Use: Identification of surfaced submarines.

The flare case consists of a seamless steel tube, closed at one end by a steel cup and at the other by a casting which carries a steel closure disc, primer, and the firing mechanism. The firing mechanism extends along the side of the flare body. When the firing pin is cocked and released, it strikes the primer which ignites a black powder charge which in turn ignites the pyrotechnic candle. The pressure built up within the flare case blows the closure disc off and a flame about 9 in. high becomes visible.

Weight . . . . . 3.2 lbs.
Dimensions . . . . . 9-3/4" x 2" dia.
Total Burning Time . . . . 55 sec. (Mk 11 and Mk 12 - Duration of lights are 10 seconds and duration of blackouts are 5 seconds).

Colors:

Mk 10	- Red	
Mk 10 Mod 1	- Green	
Mk 10 Mod 2	- Yellow	
Mk 11	- R-BO-R-BO-R-BO-R	
Mk 11 Mod 1	- G-BO-G-BO-G-BO-G	BO - Blackout (5 sec.)
Mk 11 Mod 2	- Y-BO-Y-BO-Y-BO-Y	R - Red (10 sec.)
Mk 12	- R-BO-G-BO-R-BO-G	G - Green (10 sec.)
Mk 12 Mod 1	- R-BO-Y-BO-R-BO-Y	Y - Yellow (10 sec.)
Mk 12 Mod 2	- G-BO-Y-BO-G-BO-Y	

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AIRCRAFT EMERGENCY IDENTIFICATION SIGNALS, MARK 6 and MARK 7

	Mark 6 (Star)	Mark 7 (Smoke)
Dimensions	6" x 2.5" dia.	10" x 2.5" dia.
Weight of signal	1.4 lbs.	2.5 lbs.
Burning Time	25 sec.	25 sec.
Color of Signal	Red, White, Green	Red, Yellow, Green, Black
Visibility	8 - 10 miles	5000 - 6000 yards

Use: For identification of aircraft - Mk 6 star signal is used at night and Mk 7 smoke signal during the day.

The signals are contained in aluminum cylinders about 2½" in diameter with a grenade firing mechanism screwed on one end and closed by a metal cap on the other. An ejection charge, a pyrotechnic candle, and a parachute made of silk, rayon or peper are contained in the signal.

Before the signal is launched over the side, the safety pin is removed. Upon release, the release lever is thrown off as the striker rotates about the hinge pin and the striker point impinges on the primer which ignites the 2.75 second delay. The delay ignites the ejection charge which forces the parachute and pyrotechnic candle out of the signal case and also ignites the starting mixture of the candle that burns for about 25 seconds.

The cylindrical surface of the signal is suitably marked with ink to indicate the type and color of the signal. The closing cap of the Mk 7 day signal is painted the color of the smoke, while the closing cap of the Mk 6 night signal is embossed to serve as identification in the dark. The red star signal has a dot in the center of the closing cap, the white star a short straight line, and the green star a wide "V". In addition to the center marking, there is an arc of a circle, one inch in length, embossed near the edge of the cap to indicate it is a star signal.

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R E S T R I C T E D

U. S. NAVY

DEPTH CHGE. MARKER

Night - Mark 2

Data

OVERALL LENGTH	7 in.
DIAMETER OF CASE	5 in.
WEIGHT	2.5 lbs.
EFFECTIVE RELEASING ALTITUDE	Up to 3000 ft.
VISIBILITY	4 miles from deck of ship. 10 miles from aircraft.
BURNING TIME	55 min.
IGNITION TIME (after impact)	70 - 90 sec.

USE:

To indicate the initial point of contact with submarines and provide a reference point for further search and attack during night operations.

DESCRIPTION:

The marker is a sealed, cylindrical, metal container that has a centrally located tube which is sealed on both ends by tear strips with a pull ring attached and contains calcium phosphide. The main charge is calcium carbide that surrounds the central tube and is held in one end by a screen. This produces a concentration of weight at one end and allows the marker to float in an upright position.

OPERATION:

After the two tear strips are pulled off, the marker is launched by throwing it overboard. Water enters through the small holes in the bottom and reacts with both the calcium carbide producing an inflammable gas, acetylene, and calcium phosphide producing a spontaneously ignited gas, phosphine. Both gases escape from the small holes in the top and ignite within 70 - 90 seconds after impact with the water. In extremely cold weather, the ignition delay may be somewhat longer. The resulting flame is about 9 inches high and if it should be put out by rough water, the gases will ignite again.

C O N F I D E N T I A L

U. S. NAVY

DEPTH CHGE. MARKER

Day - Mark 1, Mod 1

Data

OVERALL LENGTH	11.88 in.
DIAMETER OF CASE	3.46 in.
WEIGHT	3.5 lbs.
WEIGHT OF DYE	2.75 lbs.
WEIGHT OF BURSTING CHARGE	30 grams.
EFFECTIVE RELEASING ALTITUDE	Up to 1000 ft.
VISIBILITY	3000 yds from deck of ship; 5 mi. from aircraft.

USE:

To indicate the initial point of contact with submarines and provide a reference point for further search and attack during day operation.

DESCRIPTION:

The marker consists of a circular wooden block on which is mounted a grenade - firing mechanism with a 15 second delay. Fluorescein dye is contained in two cylindrical paper cans, one attached to each flat side of the wooden block, and a celluloid tube containing the black powder bursting charge is attached to the delay element and extends through the wooden block into the paper cans. The dye is rusty red in color when dry, but a water solution of the dye is yellow-green.

OPERATION:

The marker is clasped firmly in one hand being sure that the release lever is held against the body of the marker. With the other hand, the safety ring which is attached to the safety cotter pin is pulled and the marker is launched by throwing it over the side. When the marker is released, the spring loaded striker forces the release lever off and the striker rotating about a hinge pin hits the primer that ignites the 15 second delay fuze. The delay gives the marker sufficient time to reach the water and float on the surface, and then ignites the bursting charge. The gases evolved burst the dye containers and spread the dye on the water forming a yellow-green slick about 40 feet in diameter that lasts for 45 to 60 minutes.

SIGNALS, CARTRIDGES

AIRCRAFT SIGNALS, DOUBLE STAR (ARMY) SIGNAL CARTRIDGES, TWO STAR (NAVY)

Double star aircraft signals are used as a method of emergency identification of aircraft. They can be seen at any time during the day or night, but should not be fired when it is possible to use the radio or electric signal light.

These signals project two separate freely falling stars of the same or different colors which burn for 7 seconds and reach a height of approximately 250 feet. The stars can be distinguished at distances up to 5 miles at night and for 2 or 3 miles in the daytime. All the signals can be fired from the AN-M 8 pyrotechnic pistol, and the AN-M 28-33 series can be used in the M2 pistol.

Designation	Color of Tracer	Color of Stars	Remarks
AN-M 28	None	RR	(1) Dimensions of this series -3"02 x 1"58 dia.
29	None	YY	
30	None	GG	(2) Cartridges are made of aluminum or steel and plastic.
31	None	RY	
32	None	RG	(3) Embossed letters on closing wad and colored bands on the cylindrical part indicate the colors of stars.
33	None	GY	
AN-M 37	None	RR	(1) Dimensions of this series- 3"85 x 1"54 dia.
38	None	YY	
39	None	GG	(2) Cartridges are constructed like shotgun shells.
40	None	RY	
41	None	RG	(3) Colors of stars are printed on paper closing wad and colored bands are painted around the paper end of the cartridge case.
42	None	GY	
AN-M 53	Y	RY	(1) Dimensions - 3"85 x 1"54 dia.
54	G	RR	(2) Cartridges are constructed like shotgun shells.
55	G	GR	
56	R	GG	(3) Colors of stars and tracers are printed on closing wad and colored bands are painted around the paper end of the cartridge case. Heavy bands indicate color of stars, and thin band the color of tracer.
57	R	RR	
58	R	GR	
Mk 3 Mod 3	Same as AN-M 37-42	None	(1) Same as AN-M 37-42 series. (2) No markings indicated on outside of case.
Mk 4	Same as AN-M 53-58	Same as AN-M 53-58	(1) Same as AN-M 53-58 series.

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PISTOL ROCKET SIGNAL, MARK 1, COMET.

The Comet Rocket Signal is used for emergency identification by a surfaced submarines. The signal consists of an aluminum body approximately 14 inches long in two sections. The bottom section or rocket chamber is 8" long x 1¼" in diameter and houses a primer which ignites a 1 gram black powder charge. This charge serves both as an auxiliary propelling charge and as the rocket ignition charge. The upper section, or rocket tube, contains 58 grams B.P. rocket charge, expelling charge, and the signal. The after end has four folding tail vanes, which spring open as soon as the rocket tube leaves the rocket chamber. The signal is fired from the Submarine Rocket Pistol or the pyrotechnic pistol AN-M 8.

When the signal is fired, the one gram black powder propelling charge sends the signal to a height of 30 feet before the rocket charge takes over and sends the signal a height of about 650 feet. The rocket charge serves as a delay, and when the signal reaches its maximum height, the expelling charge is ignited which ejects the star signal and ignites it at the same time. Star signal falls under its own weight.

Burning time . . . . . 11 seconds.
Candlepower 60000
Visibility (night) . . . 9 - 10 miles.
Colors . . . . . Red, green, and yellow (single star)

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SECTION 3

BOMB FUZES

FUZES

Bomb fuzes designed by the U. S. forces can be classified in three ways - by their position in a bomb, by their method of arming and by their firing action.

In current production the primary fuzes are of AN standardized types, the fuzes used against land targets being of Army design, and fuzes used against naval targets being of Navy design. In addition to the AN types, both the Army and the Navy have their own fuzes designed prior to standardization. Most of these are obsolescent, but may still be found in the field. Between the two services the following types of fuzes can be found; nose, athwartships and tail fuzes using one of the following six methods of arming,

(1) arming vane
(2) arming vane with reduction gear
(3) arming pin
(4) arming pin with pyrotechnic delay
(5) arming pin with mechanical delay
(6) a combination of any two of the above.

and functioning in one of the following ways: instantaneous, selective instantaneous or short delay, short delay, long delay, hydrostatically, or with aerial burst.

Nomenclature:

Army fuzes use M (for Model) designation followed by a three digit Arabic numeral, beginning with 1 (i.e., M 105). Modifications are indicated by the letter A and the proper Arabic numeral.

Navy fuzes are prefixed by the letters Mk (for Mark) followed by a three digit Arabic numerals beginning with 2 (i.e., Mk 233). Modifications are indicated by the abbreviation Mod. followed by the proper Arabic numeral. (Fuzes made before Spring of 1943 were numbered by Roman numerals and used only a two digit number. To avoid confusion with Navy projectile fuzes and Army bomb fuzes, 200 was added to the number of each bomb fuze, and Arabic numbers were adopted for convenience). Fuzes accepted by the Joint Army-Navy Standardization Board are prefixed with the letters AN followed by their Army or Navy design number.

Explosive Train:

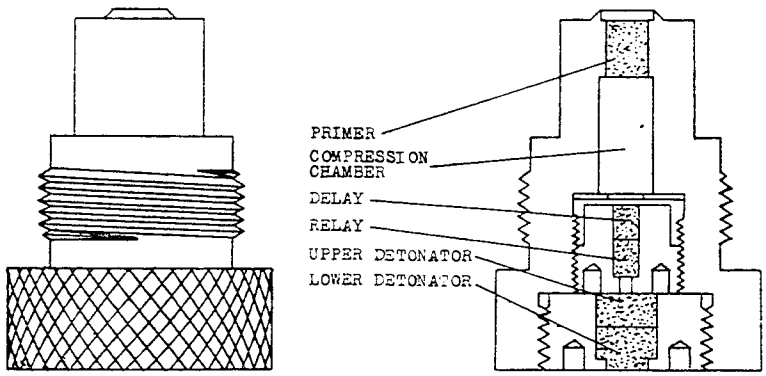
Typical firing trains employed in both Army and Navy fuzes use pointed strikers with sensitive primers for instantaneous action and blunt firing pins and percussion primers for delay action. The simple instantaneous explosive train in nose fuzes consists of a sensitive primer mixture of lead azide and lead styphnate, and upper detonator of lead azide, and a lower detonator of tetryl.

For a short delay, the blunt firing pin initiates a mercury fulminate percussion primer, which sends a flash through a chamber of compression to ignite a pressed black powder delay. This on completion of burning flashes a relay pellet of lead azide which boosts the flame sufficiently to ignite an upper detonator of lead azide, and lead styphnate which detonates the lower detonator of tetryl.

The explosive train including the booster is usually incorporated in all Navy fuzes and Army nose fuzes, but in Army tail fuzes, the explosive train does not include the booster, and may have the remainder of its explosives contained in an interchangeable primer detonator to allow optional selection of short delays. Three such primer detonator assemblies are now in use - The M 14 (see fig. 1) used in AN-M 100A1 and A2 series fuzes; the M 16 (see fig. 1) used in M 112 and M 115 series fuzes; and the M 16A1 (see fig. 1) used in M 112A1 and M 115 series fuzes. Another primer detonator assembly, the M 19, is used in the chemical long delay fuzes for safety in shipment since it is not assembled to the fuze until shortly before the fuze is assembled to the bomb.

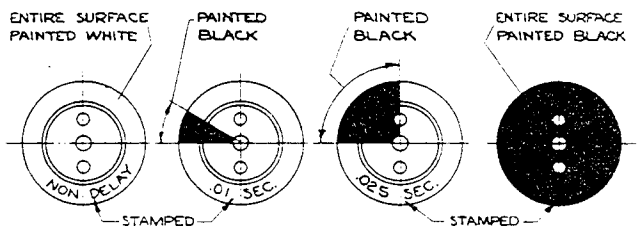
Since the Army-designed tail fuzes do not have an integral booster, this part of the explosive train is furnished by a device known as the adapter booster, which serves to seat the fuze as well as act as the booster. There are four adapter boosters in current use - the M 102, M 102A1, M115 and M 115A1 (see fig. 2). The first two have an internal thread diameter of 1"50 and the second pair have an internal thread diameter of 2"0, which is further reduced to 1"50 by a removable adapter ring. The Army tail fuzes all have a thread diameter of 1"50 while the AN-Mk 230 tail hydrostatic fuze has a diameter of 2"0. To enable the smaller Army nose fuzes (primarily M 127) to be used in the large fuze pockets, another adapter booster, the M 117, has been designed. This adapter booster converts the nose fuze pocket of G.P., S.A.P., L.C., 260# and 90# frag., 500# incendiary, and 500#, 1000#, and 2000# chemical bombs from 2"0 threads to 1"50 threads.

FIG. 1 PRIMER DETONATORS

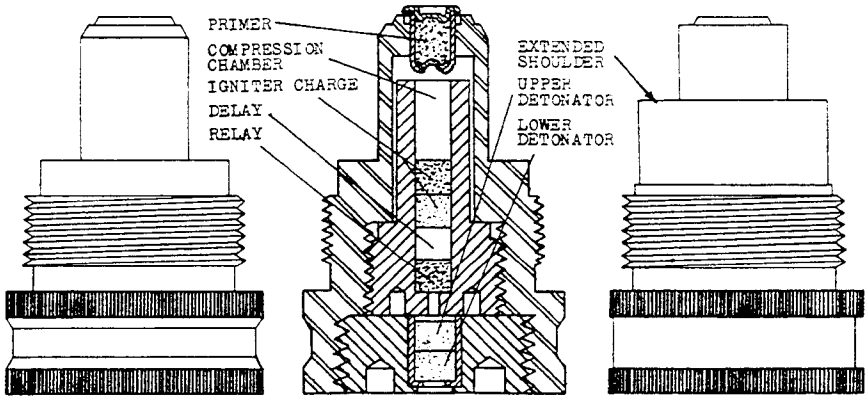


M 14 PRIMER DETONATOR

METHOD OF MARKING FOR VARIOUS DELAYS



NON DELAY | 0.01 SEC DELAY | 0.025 SEC DELAY | 0.10 SEC DELAY



M 16
PRIMER DETONATOR

M 16 and M 16A1 Primer Detonators have the same internal construction.

M16-A1
PRIMER DETONATOR

FUZE EXTENSION, M1

The following reprint of instructions which accompany the fuze extension M1 is published for the information of Bomb Disposal Personnel who may encounter this device in the field.

GENERAL

The fuze extension M1 fits the fuze cavity of any standard aircraft bomb and is used to secure bursts of the bomb at a distance above ground equal to the length of the extension used. Two sizes 9 and 18 inches are issued at present, but extensions can be obtained in any length up to 36 inches. An AN-M 103 nose fuze usually is used with the extension.

Description

a. The extension consists of the following parts:

1 pipe containing outside threads at one end and a collar with inside threads at the other.
1 lock washer.
1 burster charge in a waterproof fiber tube.

b. The extension is 2-3/8 inches in diameter and is similar to a common steel pipe with the exception of the collar. A lock washer is provided to secure the extension to the bomb and make certain that it does not become detached in flight. The burster charge, consisting of cast tetrytol, fits into the pipe and carries the detonation from the fuze to the bomb.

Assembly

a. When this extension is used, the following procedure will be followed:

(1) Place the lock washer on the collar end of the extension.
(2) Assemble the extension to the bomb, making certain that it is screwed up tight.
(3) Place the burster charge in the extension.
(4) Screw the fuze into the extension.
(5) Prepare the fuze for functioning in the normal manner.
(6) If the bomb is not dropped, the above steps, in reverse order, will be followed to return the bomb and fuze to storage.

Precautions

a. Make certain that the lock washer is placed on the extension before it is assembled to the bomb, otherwise, the extension and fuze may become detached during flight.

b. The burster charge should be handled with reasonable care at all times.

c. Precautions pertaining to the handling of bombs and bomb fuzes should be observed.

R E S T R I C T E D

ARMY-NAVY TAIL FUZES

AN-M100A2, AN-M101A2 AN-M 102 A2

MECHANICAL IMPACT

Obsolete	Obsolescent
M 100	AN-M 100A1
M 101	AN-M 101A1
M 102	AN-M 102A1

Data

BOMBS USED IN:
- AN-M 100A2 . . . . . 100,250 lb. G.P., 260 lb. frag.
- AN-M 101A2 . . . . . 500 lb. G.P., S.A.P. Chem. Incendiary, 600 lb. G.P.
- AN-M 102A2 . . . . . 1000 lb. G.P., S.A.P.Chem. 1100 lb. G.P. 2000 lb. G.P., Chem., 4000 lb.

FUNCTIONING . . . . . M 14 interchangeable primer detonator with delays of .01, .025, or .1 second or non-delay.

ARMED CONDITION . . . When gear carrier stop protrudes less than 1" below vane cup.

FUZES USED WITH . . . AN M 103 Normally.

ARMING TIME . . . . . 150-170 vane revolutions

VANE SPAN . . . . . 5" (4 vanes)

MAX. BODY DIAMETER . . 1.5"

OVERALL LENGTH . . . . AN M 100A2 9.6"; AN-M 101A2, 12.6"; AN-M 102A2, 16.6".

MATERIAL . . . . . Cadmium plated steel with brass striker block, primer detonator holder and other small parts.

GENERAL: These three fuzes are identical except for length of arming stem. Larger bombs require a longer arming stem so that vanes can catch the air slip from the bomb.

OPERATION: As the vanes rotate, the pinion gear which is attached to the vane assembly revolves around the stationary gear. Since the movable gear has 30 teeth and stationary gear 29 teeth, the movable gear is rotated clockwise one tooth per revolution of the pinion gear. The arming stem is secured by a cotter pin to the movable gear sleeve and hence unthreads from the firing plunger as the movable gear is rotated. In unthreading, the arming stem lifts the movable gear, and since the stationary gear is held by a collar threading into the lower extension of the movable gear sleeve, the stationary gear is lifted also. After 150-170 revolutions of the vanes, the double-threaded arming stem will have unthreaded from the firing plunger and the fuze will be armed. Further air travel will unthread the arming stem from the fuze body and the entire assembly will fly off. On impact, the firing plunger will overcome the creep spring and the striker will function the primer detonator.

EARLY DESIGNS: The M 100, M 101, and M 102 fuzes had a fixed delay of .1 sec., and had 24 single threads on the arming stem. Had eight broad vanes with less pitch and required approximately 720 vane revolutions to arm. AN-M 100A1, AN-M 101A1 and AN-M 102A1 incorporated interchangeable M 14 primer detonator. The A2 modification then reduced the number of vanes to four, and the number of threads to 16 double threads, thus decreasing the arming time to 150-170 vane revolutions.

REMARKS: When these fuzes are used in the 260 lb. Frag. 500 lb. Incendiary, 500 lb., 1000 lb., 2000 lb. chem. and 4000 lb. L.C. the M 14 primer detonator should have non-delay functioning. On G.P. and S.A.P. bombs the length of the short delay will be governed by the tactical use.

R E S T R I C T E D

ARMY-NAVY NOSE FUZE

AN-M 103

MECHANICAL IMPACT

(M 103 is Obsolete fuze)

Data

BOMBS USED IN . . . . . All G.P. bombs or in depth bombs for land targets, chemical, frag. and incendiary bombs. May be used in S.A.P. for frag. effect, but results not too consistent.

FUNCTIONING . . . . . Instantaneous or .1 sec. delay alternative settings.

ARMED CONDITION . . . . When safety discs are out.

FUZES USED WITH . . . . AN-M 100 Series normally

ARMING TIME . . . . . Instantaneous setting, 330 vane revolutions
.1 sec. delay setting, 220 vane revolutions

VANE SPAN . . . . . 6" (2 vanes)

MAX. BODY DIAMETER . . 2.7"

OVERALL LENGTH . . . . 7" (with booster)

MATERIAL . . . . . Cadmium plated steel with some brass parts.

GENERAL: The AN-M 103 is the standard nose fuze in service. When shipped the fuze is set for delay action. One auxiliary booster is required when this fuze is used in Navy bombs. When used in light case frag., chem., and incendiary bombs and aircraft depth bombs, the fuze should be set for instantaneous action to prevent breaking up of the bomb case before detonation occurs.

OPERATION: When bomb is dropped, arming wire is pulled and vanes rotate. The two pinion gears are rotated counter-clockwise, their off-center hubs walking the external tooth gear backwards around the teeth of the internal tooth gear, which is thus cranked in a counter-clockwise direction. The outboard edge of the internal tooth gear is grooved and rides screws projecting through from the vane cup, maintaining an even position. The arming screw, being positively attached to the base of the internal tooth gear, is gradually unthreaded from the striker. As it unthreads it lifts the entire vane assembly, including the vane cup. After 220 revolutions of the vanes, the vane cup will clear the safety discs, which spring free, leaving the striker secured only by the shear wire and setting pin. The spring-loaded arming stem will rise as the vane assembly rises, being retained only by the base of the internal tooth gear. If the setting is for delay action, however, the setting pin will be depressed into the deep slot and will protrude into the channel of the arming stem to engage the collar on the arming stem after it has risen only sufficiently to clear the step in the detonator slider, lining the detonator up with the delay firing train. On impact the force of inertia will cause the striker body to shear the shear pin and setting pin and the delay firing pin will impinge on the delay primer, setting off the flash which ignites the delay pellet, relay, primer, detonator, booster lead-in, and booster in succession. The instantaneous firing pin will merely protrude into the empty channel positioned to receive it. If set for instantaneous action, the setting pin will be in the shallow slot and will not protrude into the arming stem channel. After an additional 110 revolutions of the vanes (330 total), the vane cup will have been lifted high enough to have the arming stem moved out of the slider cavity, allowing the slider to line the primer detonator beneath the instantaneous firing pin. The slider is motivated by two springs and is locked in the armed position by a spring loaded detent. On impact the firing pin will impinge directly on the primer, setting off the detonator, booster lead-in, and booster in succession. Even though an instantaneous setting is used, the delay striker will impinge on the delay primer, setting off the delay pellet. It is thus possible that the fuze would function on delay, even though set for instantaneous set action, if it failed to function instantaneously.

EARLY DESIGN: The early M 103 fuze had 15 single threads on the arming stem instead of 6½ double threads, with an arming time of 850 vane revolutions for instantaneous firing and 525 vane revolutions when set for delay action, and had larger and weaker vane construction.

REMARKS: (1) Especially large vanes have been designed for the AN-M 103 for use with flat nosed depth bombs, as the regular vanes have difficulty in arming.
(2) The AN-M 103 can be used for dive bombing, but not for masthead bombing.

R E S T R I C T E D

U. S. ARMY NOSE FUZES

AN-M 104, M 109

MECHANICAL IMPACT

(AN-M 104 replaced by AN-M 120A1)
(M 109 replaced by AN-M 110A1)

Data

BOMBS USED IN . . . . AN-M 104: 23 Lb. AN-M 40 Frag.
M 109: 20 Lb. AN-M 41 Frag.

FUNCTIONING . . . . . Instantaneous

ARMED CONDITION . . . . When delayed arming disc is out.

FUZES USED WITH . . . . None

ARMING TIME . . . . . 2.5 (0.25) seconds (pyrotechnic)

MAX. BODY DIAMETER . . 2.2"

OVERALL LENGTH . . . . 4.4" (with booster)

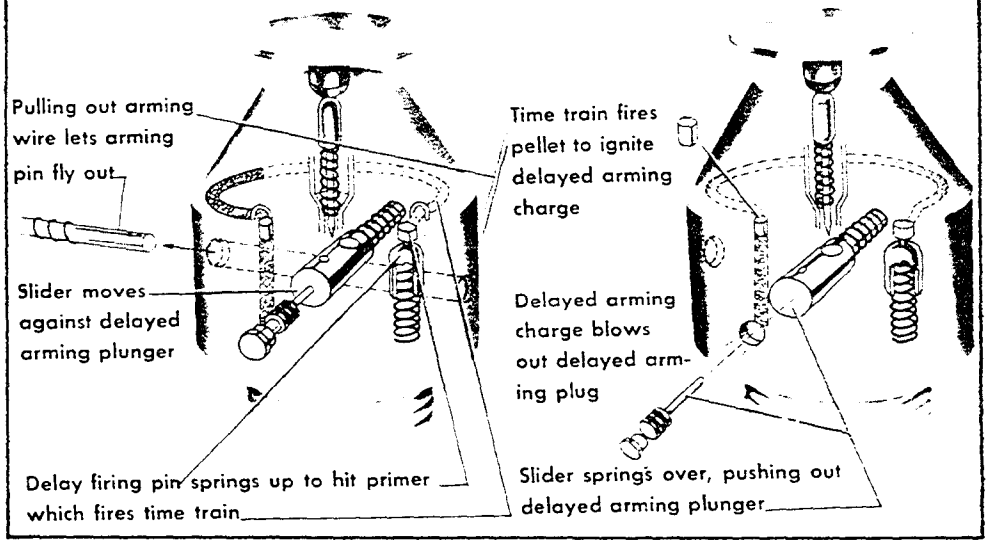
MATERIAL . . . . . Aluminum alloy body, cadmium plated firing pin and striker, brass delay train cup.

GENERAL: These fuzes are identical except for three minor differences: The M 109 has an additional spring beneath the striker head, a smaller striker disc, and the arming wire is removed from the arming pin when it is released from the plane (AN-M 104)arming wire removed when parachute opens).

OPERATION: When bomb is dropped and parachute opens(AN-M 104),the arming wire is pulled from the arming pin and the spring-loaded arming pin flies free. Ejection of the arming pin allows the spring-loaded delay firing pin to spring up against the delay primer, starting the pyrotechnic delay train, and permits the spring-loaded slider to move against the delayed arming plunger. In 2.5 seconds the 326° pyrotechnic delay train has been burned and the body pellet of black powder is ignited, setting off the delayed arming charge and blowing out the delayed arming plunger, which is no longer retained by the plug, and lines up the primer detonator with the firing pin. The firing pin is retained only by the weak firing pin spring and on impact the firing pin impinges on the primer in the slider.

REMARKS: Since the fuze has a mushroom striker head and a sensitive firing pin, it is a semi-always acting fuze and very sensitive if touched at any angle. If the mushroom head is flush with the fuze body and the delayed arming disc is out, then it is assumed that the fuze is in a fired condition and care should be taken not to lift the mushroom striker head away from the fuze body.

AN-M 104 has been replaced by the AN-M 120A1, and the M 109 has been replaced by the AN-M 110A1.



R E S T R I C T E D

U. S. ARMY NOSE FUZE

M 105

MECHANICAL IMPACT

(Obsolete)

Data

BOMBS USED IN	Modified Mark H.E. bombs
FUNCTIONING	Instantaneous or .1 sec. delay alternative settings.
ARMED CONDITION	When safety discs are out.
FUZES USED WITH	M 106
ARMING TIME	720 vane revolutions
VANE SPAN	6"
MAX. BODY DIAMETER	2.7"
OVERALL LENGTH	4.3"
MATERIAL	Body, striker assembly, and safety discs are of cadmium plated steel. Gear train and arming vane hub is of brass. Detonator cup may be of brass or plated steel.

OPERATION: Upon release from the plane an arming wire is pulled to allow the vanes to rotate in the air stream. The reduction gear carries this rotation to the arming screw, which unthreads from the striker to lift the vane cap. After 450 rotations of the vanes, the cap will be lifted high enough to allow the spring loaded safety discs to be expelled from beneath the striker head. Additional rotation will cause the arming screw to thread out of the striker, allowing the arming mechanism to pull away from the bomb. Upon impact, the striker block is forced down, cutting the shear wire and forcing the two strikers against the firing assembly. If the setting pin is in the deep slot, the fuze is set for delay action and the striker point over the instantaneous channel merely protrudes into the empty recess with no effect; the delay cap being fired, setting off the delay and relay element, detonator, and bomb filler. If setting pin is in shallow slot, fuze is set for instantaneous action, and the instantaneous firing pin sets off the primer cap, detonator, and main filler, before the delay can function.

REMARKS: No. 4 primer caps are used to initiate both trains of explosive. The delay channel and detonator assembly are as follows: delay train of 0.32 grains of black powder, the relay charge of 1.47 grains of lead azide.

R E S T R I C T E D

U. S. ARMY TAIL FUZE

M 106 A2

MECHANICAL IMPACT
PYROTECHNIC DELAY

Early Designs:
M 106
M 106A1
M 106 Long

Data

BOMBS USED IN . . . . . G.P.H.E. bombs

FUNCTIONING . . . . . 3-5 sec. (pyrotechnic)

ARMED CONDITION . . . . When arming pin is out.

FUZES USED WITH . . . . AN-M 103 or M 105, as an insurance fuze.

ARMING TIME . . . . . Instantaneous

MAX. BODY DIAMETER . . 1.5"

OVERALL LENGTH . . . . 9.4"

MATERIAL . . . . . Cadmium-plated steel except percussion cap housing, which is brass.

GENERAL: This fuze is dangerous to handle if the arming pin is out because it has a heavy striker and a weak creep spring. This fuze should never be used for horizontal, glide or dive bombing if there are any fuzes of the AN-M 100 series available. It should never be used for skip or masthead bombing if there are any fuzes of the M 112A1 or M 115 series available.

OPERATION: Upon withdrawal of the arming wire from the arming pin, the arming pin is ejected by its spring. The only thing preventing the heavy striker from impinging on the primer at this point is the weak creep spring. Upon impact, the striker block overcomes the creep spring, the firing pin impinging on the primer. The flame from the primer ignites the primer pellet, which in turn ignites the short length of safety fuze which is coiled in the fuze body. The opposite end of the safety fuze is primed with the detonator pellet of black powder which insures the functioning of the upper detonator and lower detonator when the safety fuze has burned its entire length.

EARLY DESIGNS: (1) The original M 106 had a longer coil of safety fuze, with a functioning time of 45-60 seconds.
(2) The M 106A1 had a reduced funtioning time of 8-11 seconds, for masthead bombing.
(3) M 106 long was used in the Modified Mark series 2000 lb. G.P. bomb, having an overall length of 31.3 inches.

REMARKS: If any of these fuzes are found in storage or elsewhere in an unarmed condition, they should be carefully checked to ascertain that the wire clip preventing the arming pin from being ejected by its spring is in good condition and not rusted or weak. Should this clip or wire rust through and give way, the arming pin would pop out, leaving the fuze in a dangerous armed condition.

BUREAU OF ORDNANCE HAS DECREED THAT ALL OF THESE FUZES ENCOUNTERED IN NAVAL ACTIVITIES BE DISPOSED OF BY DUMPING IN DEEP WATER.

RESTRICTED

U. S. ARMY NOSE FUZE

M 108

MECHANICAL IMPACT

Data

BOMBS USED IN: . . . . . M 75 Target Identification.

FUNCTIONING . . . . . Instantaneous

ARMED CONDITION . . . . When safety block is gone.

FUZES USED WITH . . . . None

ARMING TIME . . . . . Instantaneous

MAX. BODY DIAMETER . . 1.3"

OVERALL LENGTH . . . . . 2.6"

MATERIAL . . . . . Brass fuze body with cadmium or zinc plated steel striker.

GENERAL: This fuze is not threaded into the bomb nose, but is pushed down and held there by two spring loaded retaining balls which protrude from the side of the fuze. The fuze requires an adapter ring having an annular groove to receive the retaining balls.

OPERATION: When the arming wire is withdrawn from the arming pin as the bomb is dropped, the arming pin is ejected from the fuze by the action of the arming pin spring. The safety block holder then falls free of the fuze, and the safety block is ejected clear of the fuze and striker by its spring. On impact, the striker is driven into the fuze body, cutting the shear wire and impinging on the primer, setting off the upper detonator, and lower detonator successively.

EARLY DESIGN: The early M 108 did not have a safety block inserted between the striker head and fuze body, and was quite dangerous as a drop of only a few inches on a hard surface was enough to function the fuze. The M 108 Modified is shipped with the safety block as shown in drawing.

REMARKS: This fuze was designed for use in the M 47 100 lb. Incendiary. It is being replaced by the AN-M 126A1 in all bombs except the M 75 Target Identification bomb.

590703 O - 44 - 10

R E S T R I C T E D

ARMY-NAVY NOSE FUZES

AN-M 110 A1

AN-M 126 A1

MECHANICAL IMPACT

Data

BOMBS USED IN:
AN-M 110A1 . . . . . 20 lb. AN-M 41A1 Hi-Level Frag.
115 lb. M 70 Chemical bomb

AN-M 126A1 . . . . . 100 lb. AN-M 47A2 Chemical bomb.

FUNCTIONING . . . . . Instantaneous

ARMED CONDITION . . . When safety block is gone.

FUZES USED WITH . . . None

ARMING TIME . . . . . 340 vane revolutions

VANE SPAN . . . . . 3.6"

MAX. BODY DIAMETER . . 1.7"

OVERALL LENGTH . . . . AN-M 110A1, 3-5/8" with booster.
AN-M 126A1, 3-1/16" with booster housing.

MATERIAL . . . . . Aluminum body with steel safety blocks and striker.

GENERAL: These two fuzes are identical in both construction and operation. The only difference is that the booster is eliminated from the AN-M 126A1. Instead of the booster, a steel cylinder, the same dimensions as the booster, is screwed into the base of the fuze body. This steel cylinder contains an enlarged firing train consisting of primer, upper detonator and lower detonator, which is seated against the tetryl burster of the chemical bombs.

OPERATION: When the bomb is dropped and arming wire pulled, vanes rotate. The vanes are positively attached to the upper part of the stationary gear, which can rotate but can not move in a vertical plane because of a collar which rides in a groove in the fuze body. As the vanes and stationary gear rotate about the ball race, the movable gear, which is threaded up inside the stationary gear also rotates. Both gears mesh with an idler gear, and since the movable gear has one more tooth than the stationary gear, for each rotation the movable gear lags one tooth, thus unscrewing downward from the stationary gear. As the sleeve of the movable gear moves down, it releases the safety block, allowing the block to be expelled by centrifugal force. The sleeve is moved down far enough in 340 rotation of the vanes to arm the fuze. On impact the striker is driven down, overcoming the resistance of the firing pin spring and the firing pin initiates the explosive action instantaneously.

EARLY DESIGNS: The original designs, M 110 and M 126, had more teeth on the gears, and consequently required 570 vane revolutions to arm. They also had three safety blocks, each 120°segments, and the arming sleeve fitted in a groove in the blocks in the unarmed position, preventing them from falling out. The original designs also had larger vanes.

REMARKS: If the striker head is flush with the fuze body, the fuze is in a fired condition. In such condition, the striker should not be pulled away from the fuze, as the firing pin is sensitive and withdrawal might create sufficient friction to ignite the primer.

U. S. ARMY NOSE FUZES

M 111 A2
M 127

CLOCKWORK AERIAL BURST

R E S T R I C T E D

BOMBS USED IN:
M 111A2 . . . . . Flares & photoflash and butterfly bomb clusters, M 28, M 29.
M 127 . . . . . Aimable clusters of incen.

FUNCTIONING . . . . . Aerial Burst, 5-92 sec., or impact instantaneous.

ARMED CONDITION . . . When safety block and arming pin are both out.

FUZES USED WITH . . . None

ARMING TIME . . . . . 340 vane revolutions

VANE SPAN . . . . . 3.6"

MAX. BODY DIAMETER . . 1.63"

OVERALL LENGTH . . . . 4.2"

MATERIAL . . . . . Aluminum alloy body with zinc or cadmium plated steelstriker.

GENERAL: The M 127 fuze is made by assembling the booster and detonator assembly from an AN-M 110A1 fuze to a M 111A2 fuze body. The result is a mechanical time fuze with a tetryl booster instead of a black powder booster such as in the M 111A2.

OPERATION: The time interval is set by turning the upper part of the fuze to the desired setting on the graduated scale and tightening the lock screw. Upon being released from the plane the arming wire is withdrawn releasing the vane and the arming pin. The vanes are positively attached to the upper part of the stationary gear, which can rotate but can not move in a vertical plane because of a collar which rides in a groove in the fuze body. As the vanes and stationary gear rotate on the ball race, the pinion is rotated, thus rotating the movable gear, which is threaded up inside the stationary gear and extends inside the safety block. Since the movable gear has one more tooth than the stationary gear, it lags one tooth on every rotation and gradually unscrews downward. After 340 vane revolutions the movable gear has unthreaded far enough for its sleeve extension to be withdrawn free of the horseshoe safety block, which can now fall free. The timing disc, meanwhile, has been rotated by the spring-driven clockwork. After the predetermined set time has elapsed, the slot in the timing disc will be positioned opposite the timing disc lever. Through a series of levers, pressure forces this timing disc lever into the slot, freeing the firing lever. Since the half round pin is no longer retained by the firing lever it is free to rotate under the pressure of the spring-loaded firing pin, a collar on the firing pin bearing on one side of the notch in the half round pin. As the half round pin rotates, the firing pin is released and impinges on the primer, firing the booster.

If the timing mechanism should fail, the fuze would still detonate on impact, because the striker would be forced down and would shear any obstruction between it and the primer.

EARLY DESIGNS: (1) Original M 111 had setting time range of from 15-93 sec., and because of greater number of teeth on gears required 570 vane revolutions to arm.
(2) M 111A1 reduced minimum setting time from 15 to 5 seconds. Both of these early designs had three 120° section safety blocks with a groove which received the arming sleeve of the movable gear. They also had weaker gears with more teeth and larger, weaker vanes.

REMARKS: (1) M 111A2 booster contains 70 grains of black powder.
(2) The M 127 should not be assembled to a cluster until the cluster has been locked in place in the bomb rack.

R E S T R I C T E D

U. S. ARMY TAIL FUZES

M 112 Al, M 113 Al
M 114 Al

MECHANICAL IMPACT
PYROTECHNIC DELAY
(For Skip or Masthead bombing from land-based planes only)

Data

BOMBS USED IN:	
M 112A1	100, 250,300 lb. G.P.
M 113A1	500 lb. G.P., S.A.P., 600 lb. G.P.
M 114A1	1000, 1100, 2000 lb. G.P. 1000 lb. S.A.P.
FUNCTIONING	M 16A1 primer detonators with 4-5 or 8-15 seconds delay are interchangeable. (Masthead, skip bombing).
ARMED CONDITION	When vane assembly has risen 3/4"
FUZES USED WITH	None
ARMING TIME	15-20 vane revolutions
VANE SPAN	5"
MAX. BODY DIAMETER . . .	1.5"
OVERALL LENGTH	M 112A1, 9.6" M 113A1, 12.6" M 114A1, 16.6"
MATERIAL	Cadmium plated steel

GENERAL: The only difference in these three fuzes is in the length of the arming stem. Larger bombs require a longer arming stem so that the vanes can catch the air slip from the bomb.

OPERATION: As the vanes rotate, the arming stem is unthreaded from the plunger. There are no reduction gears in the vane assembly, the arming stem being secured to the vane nut by a cotter pin, and 15 to 20 revolutions of the vanes will free the plunger. A key pin riding in a groove in the plunger prevents it from rotating as the arming stem is withdrawn. On impact, the plunger compresses its creep spring and the spring-loaded firing pin forces the locking balls out into the enlarged part of the fuze cavity, freeing the firing pin. The cocked firing pin spring forces the firing pin against the primer, initiating the delay in the primer detonator.

EARLY DESIGNS: The original M 112, M 113, and M 114 used the M 16 primer detonator, which is the same as the M 16A1 except that the shoulder is lower. Hence, when the M 16A1 was designed it was necessary to alter the base of the fuze slightly to permit use of this primer detonator with the higher shoulder on its external surface. The alternative M 16 primer detonators had delays of 4-5 or 8-11 seconds, whereas the longer delay M 16A1 has a range of from 8-15 seconds. This delay consists of a barium chromate silicon powder in place of the lead chromate silicon mixture used in the M 16 primer detonator. The M 16, though no longer being manufactured, can still be used in the M 112A1, M 113A1, and M 114A1 fuzes.

REMARKS: This fuze will function on impact angle of 3°, and gives positive action because of its cocked firing pin. This fuze is unsafe for carrier landings. Delay of 4-5 seconds should be used against sea targets, and delay of 8-15 seconds against land targets.

NEVER TURN THE VANES COUNTER-CLOCKWISE TO RENDER FUZE SAFE, AS THE ARMING STEM MAY DEPRESS PLUNGER INSTEAD OF ENGAGING IT.

R E S T R I C T E D

U. S. ARMY TAIL FUZES

M 115, M 116

M 117

MECHANICAL IMPACT
PYROTECHNIC DELAY

(For Skip or Masthead bombing from land or carrier bases.)

Data

BOMBS USED IN:	
M 115	100, 250,300 lb. G.P.
M 116	500 lb. G.P., S.A.P., 600 lb. G.P.
M 117	1000, 1100, 2000 lb. G.P. 1000 lb. S.A.P.
FUNCTIONING	M 16A1 primer detonators: 4-5, 8-15 sec. delay. M 16 primer detonators: 4-5, 8-11 sec. delay. (Masthead, skip bombing)
ARMED CONDITION	When gear carrier stop protrudes less than 1" below vane cup.
FUZES USED WITH	None
ARMING TIME	150-170 vane revolutions
VANE SPAN	5"
MAX. BODY DIAMETER	1.5"
OVERALL LENGTH	M 115, 9.6" M 116, 12.6" M 117, 16.6"
MATERIAL	Cadmium plated steel

GENERAL: The only differences between these fuzes is in the length of the arming stem. Larger bombs require a longer arming stem so that the vanes can catch the air slip from the bomb. The only difference between these three fuzes and the M 112A1 series is that this series employs the reduction gears as used in the AN-M 100A2 series, consequently having a longer arming time. Actually, the M 115 series is a composite of the M 112 series body with the AN-M 100A2 series vane and reduction gear assembly.

OPERATION: As the vanes rotate, the pinion gear which is attached to the vane assembly revolves around the stationary gear. Since the movable gear has 30 teeth and the stationary gear 29 teeth, the movable gear is rotated clockwise one tooth per revolution of the pinion gear. The arming stem is secured by a cotter pin to the movable gear sleeve and hence unthreads from the firing plunger as the movable gear is rotated. In unthreading, the arming stem lifts the movable gear, and since the stationary gear is held by a collar tnreading into the lower extension of the movable gear sleeve, the stationary gear is lifted also. After 150-170 revolutions of the vanes, the arming stem will have unthreaded from the firing plunger and the fuze will be armed. Further air travel will unthread the arming stem from the fuze body and the entire arming assembly will fly off. On impact, the plunger compresses its creep spring and the spring-loaded firing pin forces the locking balls out into the enlarged part of the fuze cavity, freeing the firing pin. The cocked firing pin spring forces the firing pin against the primer, initiating the delay in the primer detonator.

REMARKS: These fuzes will take either the M 16 primer detonators with delays of 4-5 or 8-11 seconds, or the M 16A1 primer detonators with delays of 4-5 or 8-15 seconds. Actually the M 16 are no longer being manufactured, though they are still to be found in the field. These fuzes can be used for skip or masthead bombing from land or carrier bases.

NEVER TURN THE VANES COUNTER-CLOCKWISE TO RENDER FUZE SAFE, AS THE ARMING STEM MAY DEPRESS PLUNGER INSTEAD OF ENGAGING IT.

R E S T R I C T E D

ARMY-NAVY NOSE FUZE

AN-M 120 A1

MECHANICAL IMPACT
with
MECHANICAL ARMING DELAY

BOMBS USED IN . . . . . AN-M 40A1 and M 72A1 23 lb. para-frag. M 71A1 & M 73A1 practice.

FUNCTIONING . . . . . Instantaneous

ARMED CONDITION . . . When arming pin is out.

FUZES USED WITH . . . None

ARMING TIME . . . . . 1.9 (±.15) seconds mechanical delay.

MAX. BODY DIAMETER . . 2.2"

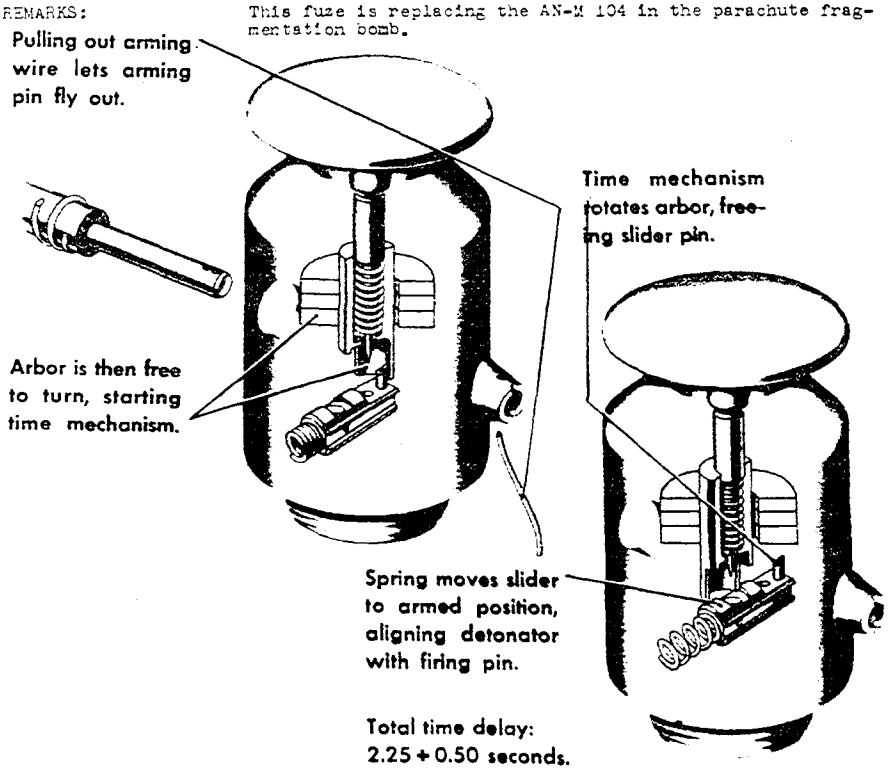
OVERALL LENGTH . . . 4.4"

MATERIAL . . . . . Aluminum alloy body, cadmium plated striker & striker head.

OPERATION: As the parachute opens, the arming wire is withdrawn from the arming pin, which is then ejected by the arming pin spring. Ejection of the arming pin frees the arbor, a semi-circular projection on the timing shaft, to be rotated by the clockwork mechanism. A regulator controls the oscillation of the clockwork governor, and is properly adjusted at the factory. The slider pin rides against the inside of the arbor under pressure of the slider spring. After the arbor has been rotated a full 160°, it clears the slider pin, allowing the slider to be forced across the fuze by the slider spring, lining up the detonator with the firing pin. A spring-loaded detent locks the slider in position. On impact, the striker head is forced in, driving the firing pin into the primer detonator and detonating the bomb.

EARLY DESIGN: The M 120 and AN-M 120 did not have the clockwork regulator, and had an arming time of 2.5 (±.25) seconds; hence attacks had to be made at higher levels. External appearance of all designs is the same.

REMARKS: This fuze is replacing the AN-M 104 in the parachute fragmentation bomb.



R E S T R I C T E D

U. S. ARMY TAIL FUZES

M 123, M 124

M 125

CHEMICAL TIME
ANTI-WITHDRAWAL

BOMBS USED IN:

M 123	AN-M 30A1 100# G.P. AN-M 57A1 250# G.P.
M 124	AN-M 64A1 500# G.P. AN-M 58A2 500# S.A.P.
M 125	AN-M 65A1 1000# G.P. AN-M 66A1 2000# G.P. AN-M 89A1 1000# S.A.P.

FUNCTIONING . . . . . Chemical long delay fuze: delays of 1, 2, 6, 12, 24, 36, 72 and 144 hours.

ARMED CONDITION . . . Considered armed if dropped, because of glass ampoule, or after 150-170 revolutions of vanes.

FUZES USED WITH . . . None, though a nose anti-disturbance fuze is being developed to be used with it.

ARMING TIME . . . . . 150-170 vane revolutions

VANE SPAN . . . . . 5"

MAX. BODY DIAMETER. . 1.5"

OVERALL LENGTH . . . M 123, 9.6"
M 124, 12.6"
M 125, 16.6"

MATERIAL . . . . . Zinc plated and dichromate coated steel.

GENERAL: The only difference in these three fuzes is in the length of the arming stem. Larger bombs require longer arming stem so that vanes can catch the air slip from the bomb. Functioning time of these fuzes is determined by the concentration of the acetone solution and the use of extra celluloid discs. The primer is lead azide, and the detonator, tetryl.

OPERATION: The stem case and gear system of these fuzes are identical with the fuzes in the AN-M 100A2 series, except that the threads on the arming stem are right hand threads and thread downward instead of out. The pinion gear revolves around the stationary gear and in so doing rotates the movable gear, which has one more tooth than the stationary gear, one tooth per revolution. Since the arming stem is secured to the movable gear sleeve, it also rotates counter-clockwise, threading down toward the glass ampoule. The arming stem exerts pressure on the pressure cap causing the glass ampoule to break where it rests on the knife edge. Attached to the arming stem is a stop nut, which compresses a rubber washer to seal the upper part of the fuze from leakage. The acetone is thus freed to act on the celluloid disc retaining the locking balls. As the acetone acts on the celluloid ring, the locking balls are forced out by the head of the screw which is threaded into the spring-loaded firing pin. After the predetermined delay, as effected by varying the concentration of acetone and adding celluloid plugs between the celluloid ring and ampoule, the balls will be forced clear of the screw head and the firing pin will strike the primer detonator.

If an attempt is made to withdraw the fuze once it has been installed, the anti-withdrawal locking ball will ride into the shallow part of its groove, and lock the lower fuze body to the adapter booster. Further turning of the fuze will merely unthread the upper fuze body from the lower part, allowing the spring-loaded firing pin sleeve to force the sleeve balls into the separation, driving both the sleeve and the firing pin toward the primer detonator. A separation of 3/64 of an inch activates the fuze, regardless of the length of time the acetone has been acting, or if the fuze is in an unarmed condition.

REMARKS: (a) Never attempt to withdraw the fuze during or after installation in the bomb.

(b) If the bombs with this fuze are not dropped, they must be jettisoned over enemy territory or in the sea. They cannot be considered safe even if dropped unarmed.

(c) The fuzes should not be subjected to temperatures exceeding 120°F. In each shipping box there are 2 vials containing powder which solidify at higher temperatures. Follow directions in the shipping box in regard to the use and disposition of these fuzes if higher temperatures are experienced.

(d) In assembling the primer detonator, care should be taken to avoid damage to the anti-withdrawal locking ball and its groove.

RESTRICTED

U. S. ARMY "BUTTERFLY" FUZE

M 129

IMPACT or AERIAL BURST

(Experimental—T 47)

Data

BOMB USED IN . . . . . M 83 4 lb. Frag. (Butterfly)

FUNCTIONING . . . . . Aerial Burst or Impact (with slight inherent delay).

ARMED CONDITION . . . . When arming spindle has been unthreaded 3½ turns, must be assumed to be armed.

FUZES USED WITH . . . . None

ARMING TIME . . . . . 2.5 seconds

DIAMETER OF FUZE . . . 1-3/4"

LENGTH (w/booster) . . . 2"

SPINDLE LENGTH . . . . 6½"

MATERIAL . . . . . Three zinc alloy castings, top, middle, and base, held together by three long screws.

GENERAL: The top section of the fuze is centrally threaded for the arming spindle, the middle section houses the clockwork and firing mechanism, and the base section is a simple flat casting added only to afford a means of screwing the plastic booster cup to the fuze. The fuze screws into the bomb with a left hand thread and is tightened with a spanner wrench which fits into the two spanner holes in the top of each fuze. Luting on the threads insures a tight, moisture-proof fit. Assembly of the fuzes in the bombs is done at the factory.

OPERATION:

"GROUND" Burst:

The release arm is prevented from moving in the unarmed position by the presence of the arming spindle. The release arm is attached to the release rod, which has a cutaway section against which the spring-loaded striker bears. When the arming spindle unthreads about 3½ turns, the pressure of the striker against the release rod causes it to rotate and move the release arm in a clockwise direction. A gear train, through which the external teeth of the release arm pass, controls the speed of the release arm and in 2½ seconds the release arm engages the stop arm. Both the stop arm and release arm are prevented from further rotation by a projection on the impact detent. The fuze is now fully armed. On impact, the impact detent overcomes its light coil spring due to inertia, and as it is forced down, permits both the stop arm and the release arm to be rotated further under influence of the striker spring against the cutaway release rod. The release rod thus rotates until the striker is no longer retained by the cutaway section, and the striker fires the detonator cap.

"AIR" Burst:

When the setting switch is set for "AIR" burst, the fuze operates exactly as above except that the impact detent has already been depressed by means of the spring-loaded plunger under the setting switch. In this condition, the projection on top of the impact detent does not offer any resistance to the release arm and stop arm during their travel across the face of the mechanism. Hence, the striker is free to fire the detonator as soon as the release arm and stop arm have by-passed the impact detent and the release rod has rotated sufficiently to free the striker.

REMARKS: This fuze is the only one of the three fuzes for the M 83 4 lb. Frag. (Butterfly) bomb which can be identified after it has been inserted in the bomb. Its setting switch, marked "AIR-GROUND" on top of the fuze, identifies it. This fuze is a copy of the German (41) Butterfly fuze.

R E S T R I C T E D

U. S. ARMY "BUTTERFLY" FUZE

M 130

Mechanical Time

(Experimental - T48)

Data

BOMB USED IN . . . . . M 83 4 lb. Frag. (Butterfly).

FUNCTIONING . . . . . Mechanical time fuze, max. setting of 30 minutes.

ARMED CONDITION . . . . Assumed armed when arming spindle is out 1/4", as there is no external indication of the time setting.

FUZES USED WITH . . . . None

ARMING TIME . . . . . 3½ rotations of arming spindle.

DIAMETER OF FUZE . . . . 1-3/4"

LENGTH (w/booster) . . . 2"

SPINDLE LENGTH . . . . 6½"

MATERIAL . . . . . Three zinc alloy castings, top, middle, and base, held together by three long screws.

GENERAL: The top section of the fuze is centrally threaded for the arming spindle, the middle section houses the clockwork and firing mechanism, and the base section is a simple flat casting added only to afford a means of screwing the plastic booster cup to the fuze. The fuze screws into the bomb with a left hand thread and is tightened with a spanner wrench which fits into the two spanner holes in the top of each fuze. Luting on the threads insures a tight, moisture-proof fit. Assembly of the fuzes in the bombs is done at the factory.

OPERATION: The clockwork mechanism in the unarmed position is seen in Fig. 1. When the arming spindle has been withdrawn approximately 1/4 inch, the balance wheel release arm, pivoted on the release arm cam, moves a limited distance until it is centered over the hole previously occupied by the arming spindle, Fig. 2. This action prevents the reinsertion of the arming spindle and starts the mechanism in operation as the projection on the balance wheel release arm frees the balance wheel. With a maximum setting time of 30 minutes, the functioning is as follows:

1. The timing gear, under the influence of its clock spring, rotates in a counter-clockwise direction. Near the end of its first revolution, the stud on the timing gear engages the first slot of the setting plate and pulls the latter around with it a limited distance in a clockwise direction.

2. Near the end of the timing gear's second revolution, the stud engages the second slot in the setting plate, once again moving it a limited distance.

3. Near the end of the third revolution, the stud on the timing gear engages the heel of the setting plate to move the latter clear of the timing gear. With the setting plate in this position, the setting plate cam presents its cutaway section to the release arm, thereby freeing the release arm. The release arm is forced past the setting plate by the spring-loaded striker bearing against the release arm cam. As the pivoted striker clears the release arm cam it is free to strike in a counter-clockwise direction and fire the detonator, Fig. 3.

REMARKS: Each complete rotation of the timing gear takes approximately 9 to 10 minutes and with the maximum setting of the setting plate a delay of 27 to 30 minutes will result. By varying the initial position of the setting plate and/or timing gear at the factory, the fuze can be set to function for any desired time up to 30 minutes. This fuze is a copy of the German (67) Butterfly fuze.

R E S T R I C T E D

U.S. ARMY "BUTTERFLY" FUZE

M 131

ANTI-DISTURBANCE

(Experimental - T49)

Data

BOMB USED IN	M 83 4 lb. Frag. (Butterfly).
FUNCTIONING	Anti-disturbance.
ARMED CONDITION	No external indication
FUZED USED WITH	None
ARMING TIME	Approximately 5 seconds after impact.
DIAMETER OF FUZE	1-3/4"
LENGTH (w/booster)	2"
SPINDLE LENGTH	6¼"
MATERIAL	Two zinc castings.

GENERAL: The fuze consists of two castings, the top one having a center hole threaded for the arming spindle and the outer threads to screw the fuze into the bomb; the lower casting containing the timing, anti-disturbance and firing mechanisms, with its base internally threaded for the tetryl booster cup. Assembly is held together by three long screws. On one side of the lower casting is a large hollow screw which holds the firing pin and the firing pin spring under compression. Diametrically opposite is another smaller screw retaining the primer detonator.

OPERATION: When the arming spindle is withdrawn approximately 1/4 inch, the escape wheel spring and the timing gear are freed, and the fuze commences to arm. During the complete operational circle, the fuze acts in three successive steps as follows:

(1) After about 1/2 second, during which time the timing gear rotates in a clockwise direction under the influence of the coiled drive spring, the entire mechanism is brought to a halt as the stud on the impact spring engages the stud under the timing gear and the fuze remains in this condition until impact.

(2) On impact, the force of inertia on the flat impact spring is sufficient to disengage the studs on the impact spring and the timing gear. The timing gear now continues its rotation for a period of approximately 5 seconds until the stud, seated in place above the timing gear, engages a small projection on the end of the anti-disturbance block. Here the timing gear is once again brought to a halt with the fuze in a fully armed position, as in Fig. 2. The fuze is now in an extremely sensitive condition, since the anti-disturbance block is supported only by the delicate anti-disturbance block spring.

(3) Should the fuze now be subjected to handling, shock, or vibration, the projection on the anti-disturbance block and the stud above the timing gear would become disengaged. The timing gear can thus make its final run, this time until its blank segment permits it to slip by the small gear (with which it was previously engaged) with increased momentum. During this last swift movement, the stud under the timing gear strikes the release arm stop, moving it away from the release arm, and the spring-loaded striker can now rotate the release arm cam as the release arm is freed. The cam is forced around in a clockwise direction, permitting the striker to slip by and fire the detonator cap, initiating the booster, as in Fig. 3.

REMARKS: There are no markings on the fuze to identify it, and when fitted into the bomb, it can not be distinguished from the M 130 fuze. This fuze is so sensitive that the vibration caused by an aircraft propeller nearby may be sufficient to release the anti-disturbance block and fire the fuze. This fuze is copied from the German (70)B, Butterfly fuze.

R E S T R I C T E D

U.S. ARMY TAIL FUZES

M 132, M 133
M 134

CHEMICAL TIME
ANTI-WITHDRAWAL

BOMBS USED IN:
M 132 . . . . . AN-M 30A1 100# G.P.
AN-M 57A1 250# G.P.
M 133 . . . . . AN-M 64A1 500# G.P.
AN-M 58A2 500# S.A.P.
M 134 . . . . . AN-M 65A1 1000# G.P.
AN-M 66A1 2000# G.P.
AN-M 59A1 1000# S.A.P.

FUNCTIONING . . . . . 10 minutes average chemical delay with range of 6-80 minute delays possible, due to temperature variations.

ARMED CONDITION . . . No external indication, assumed to be armed if dropped.

FUZES USED WITH . . . None

ARMING TIME . . . . . 84 vane revolutions (maximum)

VANE SPAN . . . . . 5"

MAX. BODY DIAMETER. . 1.5"

OVERALL LENGTH . . . M 132, 9.6"
M 133, 12.6"
M 134, 16.6"

MATERIAL . . . . . .

GENERAL: The only differences in these three fuzes is in the length of the arming stem. Larger bombs require longer arming stems so that the vanes can catch the air slip from the bomb. These fuzes are dependent upon chemical action for normal functioning, and atmospheric temperatures will have a direct bearing on the length of the delay. The fuzes are similar in principle to the M 123 series, but are safer in that the solvent is contained in a flexible copper bellows rather than a glass ampoule. The fuze body does not project far beyond the adapter booster; hence, there is less chance of breakage upon severe multiple impacts. THIS FUZE, AS IN THE M 123 SERIES, HAS A BALL LOCKING DEVICE AND ANY ATTEMPT TO REMOVE THE FUZE WILL RESULT IN DETONATION OF THE BOMB.

OPERATION: When the bomb is dropped, the arming wire is withdrawn, and the vanes rotate. The vane assembly is the same as in the M 123 series, and the vanes act through reduction gears like those in the AN-M 100A2 series fuzes, to turn the arming stem, which is threaded to the knife edge piece. As the arming stem turns, the knife edge piece threads down, compressing the sylphon bellows and piercing the guilding metal closure disc. The T-slot channel in the knife edge allows the acetone to drain out of the sylphon tank and act on the celluloid plug. The three felt washers absorb excess acetone and concentrate it on the plug. As the celluloid plug is dissolved after a minimum of five minutes, the compressed firing pin spring thrusts the aluminum ball retainer upwards, freeing the balls holding the firing pin in place. The firing pin spring then forces the firing pin down onto the M 19 primer detonator.

If an attempt is made to withdraw the fuze once it has been installed, the anti-withdrawal locking ball will ride into the shallow part of its groove and lock the lower part of the fuze body to the adapter booster. Further turning of the fuze will unthread the upper part of the fuze and permit the ball retainer to be forced up by the cocked firing pin spring, allowing the balls to be forced out and the firing pin to strike the M 19 primer detonator.

REMARKS: The concentration of acetone is not varied in these fuzes as in the M 123 series, nor are additional celluloid plugs added to prolong the delay. Variable delays result only from temperature variations, as is indicated in the following table:

Temperature	Length of Delay
122° F	6 min.
110° F	7.5 min.
85° F	15 min.
70° F	21 min.
55° F	30 min.
40° F	40 min.
32° F	45 min.
10° F	80 min.

R E S T R I C T E D

U.S. ARMY NOSE FUZE

M 135

CLOCKWORK AERIAL BURST

Data

BOMBS USED IN	All G.P. bombs and AN-M56 4000# L.C. May be found in 90#, 260# frag., 500# and 1000# chemical.
FUNCTIONING	Aerial burst, with time range of 5-92 seconds. Will function on impact.
ARMED CONDITION	When safety block and lower arming pin are out.
FUZED USED WITH	None normally, unless AN-M 100A2 series is used (with non-delay M 14 primer detonator) for insurance purposes.
ARMING TIME	340 vane revolutions
VANE SPAN	3.6"
MAX. BODY DIAMETER . . .	2.7"
MATERIAL	Upper part of body is aluminum alloy, lower part cadmium plated steel.

GENERAL: This fuze is a combination of the M 111A2 mechanical time fuze and the AN-M 103 nose fuze, in which the former fuze has been assembled to a modified body and booster portion of the AN-M 103 fuze. The time setting can be adjusted to the nearest .1 second, and the fuze will fire accurately within .4 second; time calibrations are made for every 1/2 second, with a 10 division vernier scale located on the non-rotating part of the fuze so as to be used for setting the time for the nearest .1 of a second.

The setting pin of the AN-M 103 has been removed and in its place the spring-loaded lower arming pin has been inserted. The lower arming pin holds the detonator carrier out of line with the firing train until the arming wire is pulled.

OPERATION: Prior to loading the fuzed bomb into the plane, the time setting is made and the time set screw tightened. The arming wire is withdrawn as the bomb is dropped and the vanes start to rotate. The arming pin is ejected and the time mechanism starts to operate, the lower arming pin being simultaneously ejected, allowing the spring-loaded detonator carrier to move over into the armed position. After approximately 750 feet of air travel the safety block is released from the fuze (see Operation of M 111A2, page139, for details on functioning). After the set time has expired, the firing pin will be freed and its spring will force it into the primer and detonate the bomb.

The bomb may detonate if it strikes a target prior to complete functioning of the time mechanism, provided the arming wire has been withdrawn, in which case the firing pin would shear the rather delicate levers obstructing it.

REMARKS: Effective use of this fuze in G.P. bombs presupposes that a method can be devised for accurately measuring the altitude of release.

R E S T R I C T E D

ARMY-NAVY NOSE FUZE

AN-MK. 219

MECHANICAL IMPACT

(Rotor System Arming)

Data

BOMBS USED IN:
- Mk 4 and Mods . . . . 100 lb. G.P.
- Mk 5 . . . . . 30 lb. Frag.
- Mk 12 & Mods . . . . 500 lb. G.P.
- Mk 13 & Mods . . . . 1000 lb. G.P.
- Mk 9 . . . . . 500 lb. L.C. Demolition
- Mk 9 . . . . . 1000 lb. L.C. Demolition
- Mk 42 . . . . . 100 lb. bomb Chemical
- All Types of Depth Bombs.

FUNCTIONING . . . . . Instantaneous
ARMED CONDITION . . . . When striker flange has risen more than 5/16" from outer sleeve, and arming wire is gone.

FUZES USED WITH . . . . Mk 223 (Tail)fuze in G.P. bombs, or Mk 224, 234, 229 or AN-Mk 230 in depth bombs.

ARMING TIME . . . . . 170 vane revolutions

VANE SPAN . . . . . 4.75" (4 vanes)

MAX. BODY DIAMETER . . . 2.75"

OVERALL LENGTH . . . . 5.5" (w/booster)

MATERIAL . . . . . Steel, aluminum alloy, and brass parts.

GENERAL: This fuze uses the "rotor system" of arming, and the operation of this system is the same in all the fuzes that use it: AN-Mk 219, Mk 221, Mk 223, and AN-Mk 228. This fuze will function on impact with water or denser medium, providing it has been dropped from sufficient altitude to arm.

OPERATION: There are two stages of arming. During the first stage, the upper gear is free to rotate and the lower gear is held stationary. During the second stage, the lower gear is free to rotate and the upper gear is held stationary.

1st Stage: As the bomb is dropped the arming wire is withdrawn and the vanes begin to rotate in a clockwise direction. Since the idler gear is attached to the vane carrier and is in mesh with the upper and lower gears, when the vanes rotate the idler gear is caused to move about the upper and lower gears. The lower gear is attached to the hammer carrier and is locked because the hammer carrier is resting down in the inner sleeve. Since the upper gear has one more tooth than the lower gear, the upper gear will rotate in a clockwise direction one tooth for every complete revolution of the idler gear. The upper gear is positively attached to the arming shaft, and in rotating threads the arming shaft up until the head of the screw on the end of the shaft locks against the shaft extension nut. A collar on the shaft lifts the hammer carrier and the entire arming assembly. Simultaneously with the locking of the arming shaft and the upper gear, the hammer carrier clears the inner sleeve, freeing the lower gear.

2nd Stage: The lower gear has one less tooth than the upper gear, hence as the pinion continues to revolve (now meshing with the teeth of the stationary upper gear) the lower gear and hammer carrier are rotated in a counter-clockwise direction. The aligning lug on the hammer carrier engages the firing pin carrier, lining up the firing pin extension with the firing pin. Further rotation causes the firing pin carrier to engage the detonator carrier, lining the firing pin up with the detonator. The hammer carrier, firing pin carrier, and detonator carrier continue to rotate through 180 degrees, until the lip on the detonator carrier engages the inner sleeve. Simultaneously, the spring-loaded detent in the striker snaps into a recess in the hammer carrier, thus locking the firing train components in an armed position. Since the upper and lower gears are now both locked, the two copper pins securing the lower gear to the hammer carrier are sheared and the vanes rotate freely. (If the air speed is less than 300 m.p.h., the air pressure will not be sufficient to shear the pins, and the vanes will merely cease rotating.)

The fuze is now fully armed. On impact, the entire upper assembly of the fuze is forced inward. The shear wire in the arming shaft is cut as the upper part of the shaft telescopes into the lower part and the shear wire through the firing pin is cut as the firing pin extension forces the firing pin into the detonator. The detonator sets off the auxiliary booster lead-in, booster-lead-in, booster, and main charge successively.

REMARKS: The early Mark 219, Mods 2, 3, and 4 are identical to the AN-Mk 219. The different mods merely indicated the manufacturer of the fuze. This was important only in that slight differences in the manufacture prevented the interchange of parts made by different manufacturers.

The internal parts are held in the fuze by a single master locking screw.

R E S T R I C T E D

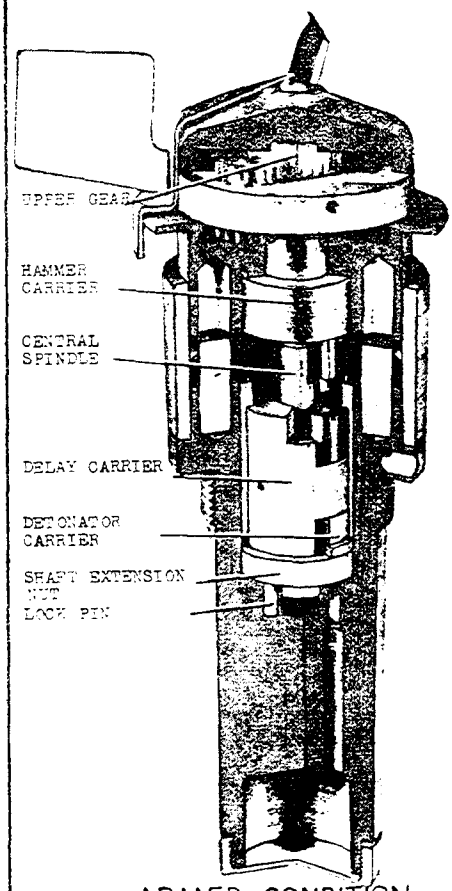
U. S. NAVY NOSE FUZE

MK 221

MECHANICAL IMPACT
(Rotor System Arming)

Data

BOMBS USED IN	500 lb. G.P. Mk 12 1000 lb. G.P. Mks. 13
FUNCTIONING	0.01 seconds delay
ARMED CONDITION	When striker flange has risen more than 5/16" from outer sleeve, and arming wire is gone.
FUZES USED WITH	Mk 223
ARMING TIME	165 vane revolutions
VANE SPAN	5.3" (four vanes)
MAX. BODY DIAMETER . .	2.75"
OVERALL LENGTH	8.5" (w/booster)
MATERIAL	Steel, aluminum alloy, and brass.



ARMED CONDITION

GENERAL: The Mk 221 is essentially the same as the Mk 219, but it incorporates the following differences:
(1) The body is longer and larger.
(2) It incorporates a delay of .01 seconds. The delay element and percussion type firing pin are housed in the delay carrier. The delay carrier corresponds to the firing pin carrier in the Mk 219.
(3) A protecting cap is over the head. The vanes are screwed to the vane carrier by four screws which pass through the protecting cap to the vane carrier.
(4) There are three lock screws instead of one.
(5) When the fuze is armed, a lock pin in the floor of the fuze body falls through an opening in the shaft extension nut, locking the rotor and delay carrier to the shaft extension nut, and thus preventing the parts from getting out of line before impact.
(6).The central spindle has a shear collar and a guide pin which permit the central spindle to telescope.

OPERATION: The operation of the Mk 221 is the same as the operation of the AN-Mk 219 on page .

REMARKS: The delay element consists of a primer, delay pellet of black powder and a special detonator of fulminate of mercury; the detonator consists of fulminate of mercury mixture; and the auxiliary booster lead-in, booster lead-in, and booster consist of tetryl.

The Mk 221 will fit into the nose of the depth bomb, but the .01 second delay may allow the case of the bomb to be so damaged that a low order detonation may result. Therefore, it is not recommended that the Mk 221 be used with the depth bomb.

R E S T R I C T E D

U. S. NAVY TAIL FUZE

MK. 223

MECHANICAL IMPACT

(Rotor System Arming)

see pages 159, 160

Data

BOMBS USED IN	500 lb. G.P. Mk 12 & Mods 1000 lb. G.P. Mks 13
FUNCTIONING	0.01 sec. delay
ARMED CONDITION	When striker has risen over 5/16" above outer sleeve, as seen through window in aluminum casing.
FUZES USED WITH	AN-Mk 219 or Mk 221
ARMING TIME	165 vane revolutions
VANE SPAN	5.25" (16 vanes unpainted).
MAX. BODY DIAMETER	3.25"
OVERALL LENGTH	16.36"
MATERIAL	Bottle shaped external case is cast aluminum; fuze parts are steel, aluminum alloy, and brass.

GENERAL: The fuze is essentially a Mk 221 fuze with an external protective bottle shaped casing of aluminum, a vane extension shaft, and 16 vanes instead of four. This casing screws onto the fuze body and is secured by two lock screws. The lower end of the vane shaft has a flattened surface and fits into a slot in the top of the fuze cap, which is attached by screws to the pinion carrier. The fuze has a delay element in the delay carrier similar to the Mk 221, and a celluloid window in the protective casing permits inspection of the fuze to determine whether or not it is in the armed condition.

OPERATION: When the arming wire is withdrawn, the arming vanes and the vane shaft rotate. The lower end of the vane shaft engages the cap, which rotates and revolves the pinion around the inner gears, operating the reduction gearing. The alignment of the firing pin extension, delay carrier (firing pin carrier in AN-Mk 219), and detonator is similar to that of the AN-Mk 219, see page 159

REMARKS: The central spindle in this fuze does not telescope, but the collar on the central spindle which supports the hammer carrier is held by a shear wire which breaks on impact as the cap, vane carrier, and striker move forward due to inertia.

Delay element consists of a primer, delay pellet of meal "D" black powder, and special detonator of Fulminate of Mercury mixture; and the auxiliary booster lead in, booster lead-in, and booster consist of tetryl.

The moving parts housing the firing train are held in the fuze by three locking screws.

RESTRICTED

ARMY-NAVY ATHWARTSHIP FUZE

AN-MK. 224

(HYDROSTATIC)

Data

BOMBS USED IN . . . . Depth bombs, Mks. 17, 29, 37, 38; AN-Mks. 17,Mod.2, 41, 44, and 47.

ARMED CONDITION . . . When jump-out pins are out, fuze is partially armed. Arming completed at 12-15' depth of water when primer and detonator are aligned with firing pin.

FUNCTIONING . . . . Water pressure at depth set for, 25, 50, 75, 100, or 125 feet of water.

FUZES USED WITH . . . AN-M 103, AN-Mk 219, or Mk 221 in nose, and Mk 229 in tail in 650 lb. depth bombs.

ARMING TIME . . . . Partially armed when dropped and arming wire is pulled, complete arming time depending on travel through water until depth at which it is set to function is reached.

OVERALL LENGTH . . . Pistol assembly - 6.9"
Booster extender assemblies - 9.9"

MAX. BODY DIAMETER. . 3.6"

MATERIAL . . . . . Bronze, brass, steel, and aluminum.

GENERAL: This is an athwartships fuze, and is assembled in three sub-assemblies: pistol, booster, and booster extender. The pistol is marked for the depth at which it is set, and contains the firing mechanism and the detonator sliders. Desired depth setting is made by inserting in the proper firing pin spring and auxiliary spring if necessary, with settings of 25, 50, 75, 100, or 125 feet possible. The following table shows the springs to use for the various depth settings:

Depth	Spring Color
25 feet	Yellow
50 feet	Black
75 feet	Black & green
100 feet	Yellow and red
125 feet	Black and red

The yellow and black springs as selected actuate the firing pin and in addition serve a depth controlling purpose. Green and red springs are auxiliary depth control springs and do not actuate the firing pin. The booster extender fits into the opposite end of the transverse tube in the depth bomb.

OPERATION: (1) Action in Booster extender: As the arming wire is pulled, the jump-out pin is forced out by its spring, and water enters the assembly as the bomb becomes immersed. The water expands the bellows until it overcomes the pressure of the spring acting against the locking slide. The booster spindle and the locking slide are held together by the locking balls between them. When the water pressure has forced the piston, locking slide, and spindle inward sufficiently for the locking balls to slip into the enlarged groove in the fuze body, the entire booster extension is then free to move the remaining inch toward the pistol. The hollow-cone shaped slider aligner, bearing inward against the L-shaped primer and detonator sliders, forces them inboard against their springs, thus lining up the explosive train.

(2) Action in Pistol: As the water pressure increases and overcomes the tension of the firing and auxiliary depth springs in the piston, the bellows extend and the base of the hydrostatic piston moves down over the firing pin guide piece. This action compresses the firing and auxiliary depth springs, and when the enlarged part of the hydrostatic piston comes opposite the locking balls they are forced out by the spring pressure, freeing the firing pin to be forced against the primer. The L-shaped primer and detonator sliders will have been lined up with the firing pin by the action of the slider aligner as described in (1).

REMARKS: If the booster extender fails to function properly and force the slider aligner over the primer and detonator sliders, the fuze cannot function. The slider aligner which holds them in the armed position is prevented from returning to the unarmed position by the locking slide, which locks after the locking balls are forced out from the spindle in the extender.

RESTRICTED

U. S. NAVY NOSE FUZE

MK. 227

MECHANICAL IMPACT

(Centrifugal Force Arming)

Data

BOMB USED IN	Mk 34 5 lb. A.A. bomb.
FUNCTIONING	Instantaneous impact
ARMED CONDITION	No external indication
FUZES USED WITH	None
ARMING TIME	1500 ft. air travel at sea level; 3000' at 20,000' altitude.
OVERALL LENGTH	2.35"
BODY DIAMETER	2.0"
MATERIAL	Tin plated brass and alloy castings.

GENERAL: This fuze is unique in American aviation ordnance in using centrifugal force as its arming device. The rotational velocity required to arm the fuze is acquired by the offset tail fins on this small bomb.

OPERATION: Two pairs of centrifugal detents are employed, one pair supporting the striker, and the second pair positioning the slider with primer detonator out of line with the firing pin. At a rotational velocity of 1500 r.p.m.'s the detents move out of the way, compressing their springs and allowing the slider freedom of movement. The slider is mounted with its center of gravity away from the axis of rotation, so when the detents move out of the slider, centrifugal force carries the slider into line with the firing pin. Upon impact the firing pin is driven into the primer detonator, initiating the explosive action.

REMARKS: The Mk 34 bomb and Mk 227 fuze were designed for air-to-air bombing, but have not proven successful in this use. However, it has had limited use against parked aircraft and has been dropped for its nuisance value on night raids during the early stages of the war in the Pacific.

R E S T R I C T E D

U.S. NAVY TAIL FUZE

AN-MK. 228

MECHANICAL IMPACT

(Rotor System Arming)
see pages 159, 160

Data

BOMBS USED IN . . . . . 1000, 1600 lb. A.P. bombs.

FUNCTIONING . . . . . 0.08 second delay

ARMED CONDITION . . . . When striker flange has risen more than 5/16" above outer collar, as seen thru celluloid window.

FUZES USED WITH . . . . None

ARMING TIME . . . . . 140-160 vane revolutions

VANE SPAN . . . . . 5.25" (16 vanes, painted red)

MAX. BODY DIAMETER . . 3.15"

OVERALL LENGTH . . . . 16.36" (w/booster)

MATERIAL . . . . . Steel, aluminum alloy, and brass; the brass parts are tin plated and some steel parts are cadmium plated. The bottle shaped tail support is cast aluminum alloy.

GENERAL: This fuze is similar in design and operation to the Mk 223, and is almost identical in external appearance. It is distinguished from the Mk 223 in that it has red vanes. The AN-Mk 228 has the following distinctive internal features: It has two separate explosive trains and a delay of .08 second; two firing pin extensions are fitted on the lower end of the hammer carrier. Two delay elements and two delay firing pins are housed in the delay carrier. The detonator carrier has two detonators, and the shaft extension nuts contain two auxiliary booster lead-ins which are aligned with two booster lead-ins in the fuze body. One firing pin is slightly longer than the other, so the two firing trains are not initiated simultaneously.

OPERATION: As the arming wire is pulled, the vanes rotate and turn the arming vane shaft, rotating the cap and revolving the pinion around the inner gears. Arming of the fuze then continues as in the AN-Mk 219, see page 159 The AN-Mk 228 has an added detent in the delay carrier which locks when the firing train is lined up. On impact, a shear wire through the supporting collar and spindle is cut, as the firing pin extensions force the firing pins into the primers.

REMARKS: Delay elements consist of a primer, delay charge of black powder, and special detonator of lead azide; detonator consists of lead azide; auxiliary booster lead-ins, booster lead-ins, and booster consist of tetryl.

R E S T R I C T E D

ARMY-NAVY TAIL FUZES

AN-MK. 230
MK. 229

MECHANICAL ARMING
HYDROSTATIC FIRING

Data

BOMBS USED IN:	
Mk 229	650 lb. depth bombs 500 lb. Mks 9 & 12 (LC,GP) 1000 lb. Mks 9 & 13 (LC,GP)
AN-Mk 230	500 lb. G.P. AN-M 64 1000 lb. G.P. AN-M 65 2000 lb. G.P. AN-M 66 325 lb. depth bomb Mk 53 350 lb. depth bomb Mk 54
FUNCTIONING	Hydrostatic pressure with settings for 25, 50, 75, 100, or 125 feet of water.
ARMED CONDITION . . .	No external indication.
FUZES USED WITH . . .	With Mk 229: AN-Mk 219, AN-M 103, or Mk 243, nose. With AN-Mk 230: AN-M 103, Mk 243, nose.
ARMING TIME	110 vane revolutions
OVERALL LENGTH	Mk 229, 16.365"; AN-Mk 230, 15.395"
MAX. BODY DIAMETER . .	Mk 229, 3.4"; AN-Mk 230, 3.375"
VANE SPAN	5.25" (16 vanes)
MATERIAL	Steel, aluminum alloy, and brass

GENERAL: These two fuzes are identical in construction and operation, except that the part of the Mk 229 that fits into the bomb body is 1.3" longer than the corresponding part of the AN-Mk 230; hence, the AN-Mk 230 cannot be used in bombs that take the Mk 229 fuze. The AN-Mk 230 fits into the M 115 or M 115A1 adapter booster, and can be used in the general purpose bombs that take that adapter booster for use against marine targets.

OPERATION: The desired depth setting is accomplished by turning the depth setting knob and thereby compressing the depth spring the proper amount. If a functioning at 125 feet is desired, the spring would be compressed the maximum amount, consequently causing the water pressure to overcome the greater resistance of more tightly coiled springs. If a shallow water functioning is desired, the springs would be only partially compressed and the water pressure necessary to overcome the more loosely coiled springs would be considerably less. In setting, the depth adjusting sleeve is raised to the desired spring compression by means of a five-sided cam secured to the external depth setting knob, and resting under a projection of the depth adjusting sleeve.

On release from the plane, the arming wire is withdrawn and the vanes are free to rotate. This rotation is transmitted by the vane shaft thru a series of reduction gears to the arming shaft. The upper gear has one more tooth than the lower gear, and as the pinion gear rotates around the lower stationary gear, the upper gear is pushed around clockwise one tooth per revolution of the vanes. This rotation of the upper gear causes the arming screw to rotate clockwise, since the upper gear and arming screw are positively secured, and because of the right-handed threads on the screw the detent retaining cup threads up on it. As the cup clears the two arming detents locking the setting spindle, their springs force the detents out, freeing the setting spindle. The fuze is then armed. On impact with the water the inertia counterbalances prevent the firing assembly from moving down and prematurely firing the fuze because of the deceleration caused by impact. As the bomb submerges, water enters two ports in the outer body and through holes in the depth setting mechanism housing. Hydrostatic pressure acting on the sylphon bellows forces the hydrostatic piston downward, compressing the firing spring, until the retaining balls fall out into the widened portion of the piston. The detonator carrier is then forced downward by the pressure of the compressed firing spring onto the fixed firing point, setting off the explosive train.

REMARKS: The detonator consists of fulminate of mercury and tetryl pellets, and the booster lead-in, auxiliary lead-in, and booster are tetryl.

DO NOT DISASSEMBLE THIS FUZE WITHOUT REINSERTING THE SAFETY PIN THROUGH THE LOWER FUZE BODY AND MOVABLE DETONATOR CARRIER.

~~CONFIDENTIAL~~

U.S. NAVY NOSE FUZE

MK. 232

MOD. 2

IMPACT OR ELECTRICAL FIRING

Data

BOMBS USED IN	All G.P. & depth bombs, and old type demolition and L.C. bombs.
FUNCTIONING	Impact instantaneous or electrical impulse.
ARMED CONDITION	When vanes are 3/8 inch away from striker housing. NO ATTEMPT SHOULD BE MADE TO UNARM THIS FUZE BY ROTATING THE VANES BACKWARD.
FUZES USED WITH	Usually none
ARMING TIME	8 vane revolutions
OVERALL LENGTH	7"
MAX. BODY DIAMETER	2.5"
VANE SPAN	5.125" (16 vanes)
MATERIAL	Steel and brass.

GENERAL: The Mark 232, Mod 1 is a bomb nose fuze of the arming vane type, requiring little air travel to arm. It may be initiated by an electrical impulse or impact on a hard surface, detonating instantaneously. The fuze has an electric semi-cap which, when fired by an impulse, blows through a hole leading to the detonator and sets it off. For electrical firing as well as impact, the fuze must first be armed, allowing the detonator slider to move over into a position where the detonator can be initiated by either the firing pin or explosion of the semi-cap.

OPERATION: (1) As an Impact Fuze: A cotter pin, which is wired in place with a small fuze wire, prevents the arming vanes from rotating. The arming wire is attached to this cotter pin and withdrawal of the arming wire breaks the light fuze wire. The vanes are then rotated by action of the wind stream, and this rotation is transmitted to the striker which advances on the threads in the striker housing. It advances until stopped by the striker stop coming up against the bottom of the striker housing. As the striker advances on its threads it withdrews the firing pin from the slider, which is then forced over by its springs lining the detonator up with the firing pin and booster lead-in. A detent locks the detonator slider in the armed position. Upon impact, the brass collar threads are sheared by the firing pin block and the firing pin is forced into the detonator.

(2) Electrical Firing: Detonation is initiated by means of the squib being directly fired by an electric current through the igniter bridge.

REMARKS: The fuze will not function on impact with water, but must strike a hard surface in order to strip the striker housing thresds.

~~C O N F I D E N T I A L~~

U.S. NAVY NOSE FUZE

MK. 233

ELECTRICAL FIRING

Data

BOMBS USED IN	100 lb. G.P. Mk 4, Mod 4
FUNCTIONING	Electrical impulse
ARMED CONDITION	When cable is pulled free from rotor cap, and cap is in a locked condition.
FUZES USED WITH	Used in conjunction with bombs which are fuzed with U.S.N. Mk 232 Mod 1
ARMING TIME	Rotation of the rotor cap 180 degrees, when pulled by the cable attached to it.
OVERALL LENGTH	4.51"
MAX. BODY DIAMETER . .	2.375"
MATERIAL	Steel

GENERAL: The fuze will function instantly upon explosion of the electric semi-cap. It is mechanically armed by means of a motor in the plane. The body is that of an AN-Mk 219, in which the vanes, cap, and rotors have been removed, and a hole has been drilled in the shoulder for the accomodation of electric wiring. A rotor block has been inserted in the rotor cavity in the fuze body. The rotor block contains an electric semi-cap with lead-in wires and a detonator. These units are assembled, unarmed, 180 degrees from the booster lead-in in the fuze body.

OPERATION: In the unarmed position the detonator in the rotor is offset 180 degrees from the booster lead-in. To arm the fuze, the rotor is rotated 180 degrees at which point the detonator and booster lead-in are aligned. This is accomplished by means of a motor in the airplane, exerting a pull on one end of the arming cable. This pull rotates the pulley to which the other end of the cable is secured, and thereby rotates the rotor to the armed position. There it is locked by the lock detent. Continuing force of the motor's pull on the arming cable shears the 0.055" copper shear wire which secures the cable to the pulley.

The protective shipping cap covering the connector plug is removed when the fuze is assembled to the bomb and connection is made with the source of electrical current in the airplane. Closing the electrical circuit after the fuze is armed successively initiates the semi-cap, detonator, booster charges and explosive charge in the bomb.

REMARKS: The detonator consists of lead azide, and the booster lead-in and booster consist of tetryl.

R E S T R I C T E D

ARMY-NAVY ATHWARTSHIP FUZE

AN-MK. 234

HYDROSTATIC

Data

BOMBS USED IN	Depth bombs, MKs 17, 29, 37, 38; AN-MKs 17, Mod 2, 41, 44, and 47.
FUNCTIONING	Water pressure at depth set for, 25, 50, 75, 100, or 125 feet of water.
ARMED CONDITION	Partially armed when arming wire is pulled and jump-out pins are ejected. Arming completed at 12-15' of water when primer & detonator are aligned with firing pin.
FUZES USED WITH	AN-M 103, AN-Mk 219, or Mk 221 in nose; Mk 229 in tail in 650 lb. depth bombs.
ARMING TIME	Partially armed immediately after arming wire is pulled when jump-out pins are ejected, complete arming time dependent on travel through water until depth of 12-15' is reached.
OVERALL LENGTH	Firing assembly (Pistol) - 6.9" Extender assembly - 9.9"
MAX. BODY DIAMETER . .	3.6"
MATERIAL	Bronze, brass, steel, and aluminum.

GENERAL: The fuze is essentially the same as the AN-Mk 224, being an athwartship fuze consisting of the pistol, booster, and booster extender. The firing assembly and booster extender are inserted in the athwartships tube of the depth bombs from opposite sides. The AN-Mk 234 differs from the AN-Mk 224 in that it has an external setting device and does not require disassembly to effect depth variations in functioning.

The depth setting is accomplished by varying the amount the adjustable spring must be compressed by the hydrostatic piston as the bellows expand. If a deep setting is desired, the depth setting collar is rotated so that a shallow step on the collar would be positioned under the spring housing depth lug. Thus, the depth lug would engage the collar shortly after entering the water, and the bomb would have to sink farther before the water pressure could overcome the spring resistance. If a deep step were positioned under the lug, the hydrostatic piston could move farther before encountering resistance from the spring. Until the lug is engaged, the spring housing rides inward with the hydrostatic piston, but as soon as the lug is engaged the spring housing no longer moves with the piston and the spring resistance must be overcome.

OPERATION: (1) Action in Booster extender: When the bomb is dropped from the plane, the arming wire to the booster extender is withdrawn from the jump-out pin. The jump-out pin is thrown out by its spring; the booster spindle is freed, and water is permitted to enter the hole created by the jump-out pin. The water expands the bellows until it overcomes the pressure of the spring acting against the locking slide and booster spindle. The locking balls are forced into an enlarged groove in the fuze and the booster and slider aligner move inward, aligning the primer and detonator sliders, as described in the operation of the AN-Mk 224 (see page 165 for diagram and explanation.)

(2) Action in the Pistol: As the arming wire pulls free, it extracts the plug and neoprene connector, permitting water to enter the fuze when bomb immerses in water. The water acts against the flanged base of the hydrostatic piston and as the pressure increases expands the bellows. The hydrostatic piston, adjustable spring, and spring housing all move inward until the depth lug engages the step on the depth setting collar which has been positioned opposite it. At this point the spring housing no longer moves inward. The hydrostatic piston continues to move inward under pressure of the water, but its movement is restricted by the resistance of the adjustable spring. Meanwhile, the movement of the hydrostatic piston compresses the firing spring, and when the enlarged groove in the piston comes opposite the locking balls the firing spring forces the balls out, forcing the firing pin against the primer. The primer fires the detonator, which sets off the sub-booster of tetryl, the booster and the main charge.

REMARKS: For a diagram of the extender and booster assembly, and for a more complete explanation of this assembly, turn to pages 164 and 165.

~~C O N F I D E N T I A L~~

U.S. NAVY NOSE FUZE

MK. 243

MECHANICAL IMPACT

Data

BOMBS USED IN . . . . . 500 lb. AN-M 64 G.P.
500 lb. Mk 12, Mod 2 G.P.
1000 lb. AN-M 65 G.P.
1000 lb. Mk 13, Mod 2 G.P.
2000 lb. AN-M 66 G.P.

FUNCTIONING . . . . . Delay of .015 second.

ARMED CONDITION . . . . When space between vane cup and vane cup support is 5/16 inch.

FUZES USED WITH . . . . AN-Mk 230 tail hydrostatic

ARMING TIME . . . . . 130 vane revolutions

GENERAL: The fuze resembles the AN-M 103 in appearance, and has been designed specifically to be used against submarines or ships since it will not function on water, or at an impact angle of less than 45 degrees. The blunt firing pin merely sets loosely over the primer in the cavity cup, and when struck by the striker shoulder is driven against the primer, initiating the delay.

OPERATION: As the vanes rotate, the pinion gear revolves around the upper movable gear and lower stationary gear. Since the upper gear has 23 teeth and the lower gear has 22 teeth, the upper gear is pushed around clockwise with the pinion by the amount of one tooth per revolution of the vanes. The lower gear is prevented from rotating by the lower gear stop arm protruding into the striker. As the upper gear rotates, the arming screw unthreads from the striker, allowing the arming stem spring to lift the arming stem free of the detonator slider. After 130 vane revolutions the vanes fall away and the arming stem clears the detonator slider, which is moved across the fuze body by its spring and locked under the delay element by a detent and the slider locking pin. On impact with a hard surface, the striker body is forced inward, shearing both the locating pin and the shear threads and forcing the shoulder of the striker against the blunt firing pin. The firing pin sets off the primer delay of .015 second, detonator, booster lead-in, and the booster in succession.

REMARKS: When using this fuze the vanes should be checked by simply turning back and forth a few times in order to determine that the arming mechanism operates easily. The fuze will not function on water impact from altitudes of release up to 10,000 feet.

SECTION 4

LAND MINES AND FIRING DEVICES

INTRODUCTION

The following section illustrates and describes the antitank and antipersonnel land mines and firing devices that have been standardized by the U. S. Army and issued to personnel in the field.

There are many types of improvised mines and firing devices being used in all theatres of the war, but these have not been included in this book because of their number and localized character. Such of these as prove particularly successful and can be accepted for general usage will be described in future amendments to this publication.

R E S T R I C T E D

U. S. ARMY

M 1A1 MINE (ANTITANK)

Data:

DIAMETER	8 in.
HEIGHT	4 in.
TOTAL WEIGHT	10.6 lbs.
EXPLOSIVE WEIGHT (Cast TNT)	6 lbs.
MATERIAL	Steel

USE:

Defense against armored cars, tanks, or other vehicles.

COMPONENTS:

The metallic Antitank mine M1A1 has three main components: loaded body, fuze, and spider. The spider fits over the fuze to increase the effective size of its head.

a. Mine Body: The steel body is cylindrical, and is about 2-3/4 inches high and 8 inches in diameter. A carrying ring is attached to its side. The flanged rim around the top is notched for attaching the spider. In the center of the top is the fuze and booster cavity; the booster fits into the cavity and locks into place. The spider is a ring with two cross members pressed from a single sheet of metal. Hooks on the spider engage the flange on the mine body, and the center of the spider rests on the striker head of the fuze. When the mine is packed, the spider is placed over the bottom of the steel body to save space.

b. Fuze M1A1: This fuze consists essentially of a striker assembly and a body with a primer. The striker assembly protrudes 3/8 of an inch beyond the body of the fuze. Pressure of 500 lbs. directly on the fuze head, or 250 lbs. on edge of spider depresses outer sleeve, cutting shear pins and aligning holes in outer sleeve with steel balls lodged in inner sleeve. The steel balls are forced into holes in the outer sleeve, releasing the striker. The striker thus freed, driven by striker spring, sets off percussion cap detonator--booster--main charge. For safety of shipping and handling, a safety fork is fitted over the collar between the striker head and the top of the fuze body.

ASSEMBLY:

The following steps are required to assemble the complete mine: Remove spider from bottom of mine body. Check fuze cavity to see that it is clear of foreign matter and booster locked in place. If booster is received separately, push it down into cavity until it latches. Thereafter it is not removable. Insert fuze. Upper surface of fuze body should be flush with upper surface of mine. Attach spider. To attach spider, align but do not engage two adjacent hooks with two notches in flange of mine body. Engage other two hooks under flange on body, next press first two through notches, then rotate spider approximately one eighth turn in either direction, securing it to mine body.

ARMING:

The safety fork is removed from the fuze by pressure of the thumbs on the prongs. The fork is not removed until after the mine is laid and is left beside the mine attached to its cord, never between the body and the spider. Before the mine is taken up, the safety fork is replaced.

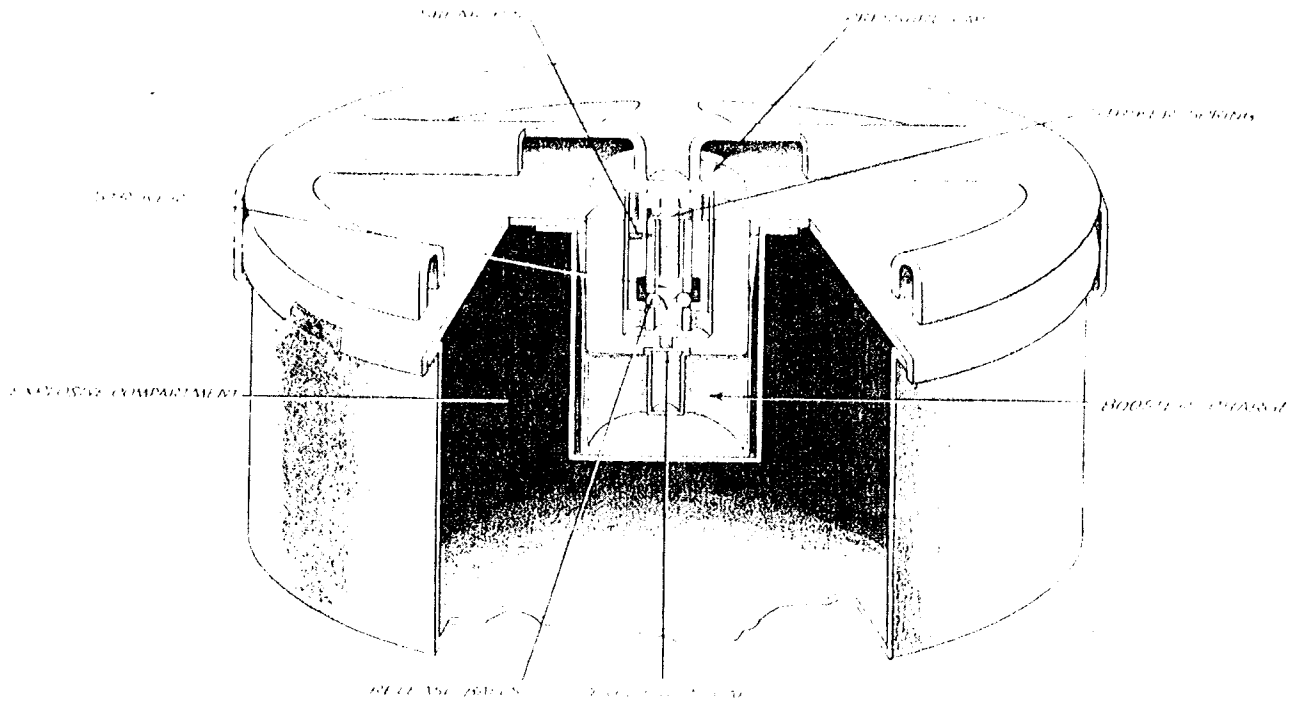
COLOR AND MARKING:

The Antitank mine M1A1 is painted olive drab except for the base, which is yellow, and a narrow yellow stripe encircling the body at the base. Type, model, lot number, manufacturer's initials or symbol, and date of loading are printed on the head.

REMARKS:

1. Care must be taken not to bury the mine too deeply as it may fail to detonate when run over by a vehicle. The mine may be buried with the top of the spider protruding approximately 1/4 of an inch above the surface of the ground and adequately camouflaged, or it may be buried spider down with the top surface of the mine not more than an inch below the ground surface.
2. The antitank mine M., the original model, is no longer being manufactured or issued. The principal difference is that in the mine M1, the booster is an integral part of the fuze; in the mine M1A1 the booster is a separate part.

U.S. ANTITANK MINE M 1A1



RESTRICTED

U. S. ARMY

M5 MINE (ANTITANK)

Data:

DIAMETER	10 in.
HEIGHT	8.5 in.
TOTAL WEIGHT	14.5 lbs.
FILLER WEIGHT	5.6 lbs.
MATERIAL	Pottery
COLOR	Olive-drab

USE:

Defense against armored cars, tanks, or other vehicles.

BODY:

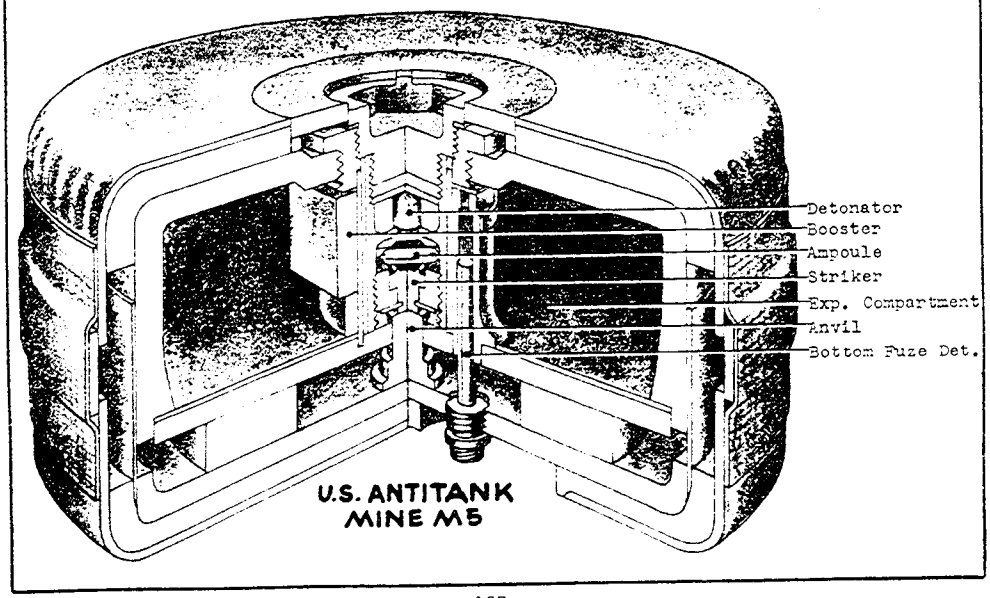
The mine body is cylindrical, consisting of a pottery container with an asphalt impregnated felt and tarred paper outer protective lining. It is heavier and larger than the M1A1 mine and contains about the same amount of explosive. Its main combat advantage is that it cannot be detected by the electric mine detector. In the center of the top is the fuze cavity around which is a combination synthetic rubber shock ring and sealing strip. The mine is suspended in a cloth carrying strap.

FUZE:

The fuze consists of a plug, fuze container with mechanism, and a safety ring, which fits around the container and up against the plug. The plug is screwed into the body of the mine when issued. The fuze is a chemical one, with no metal parts. A force of 350 lbs. (approx.)causes the striker, bearing on the wooden anvil, to break the glass vial containing the chemical. Mixture of the chemical in glass vial with chemical substance surrounding the vial causes a flash which sets off the detonator--booster--main charge.

ARMING:

The safety ring is removed from the fuze by pulling it outward and upward, over the plug. It is not removed until after the mine has been laid or planted. After the ring has been removed, the plug is screwed down firmly into place. This safety ring is the only metal on this mine, and until the mine is issued with a non-metallic safety ring, the ring should not be left beside the mine as it will disclose the location to an electric mine detector.



U. S. ARMY

RESTRICTED

M 4 MINE
(ANTITANK)

Data:

DIAMETER	8 in.
HEIGHT	4 in.
TOTAL WEIGHT	10.6 lbs.
EXPLOSIVE WEIGHT (Cast TNT)	6 lbs.
MATERIAL	Steel

USE:

Defense against armored cars, tanks, or other vehicles.

COMPONENTS:

The metallic Antitank mine M4 is identical with the M1A1 type (see page 185) except for the booster and the fuze. Since the booster, after loading, becomes an integral part of the mine, and since the M1A1 and M4 boosters and fuzes are not interchangeable, it is especially important that the M1A1 and M4 mines and their respective fuzes be kept separated. However, the two mines are assembled, armed, and employed in the same manner. The advantage of the M4 mine is that the internal construction of the M4 fuze makes it safe to reuse, because it is not made more sensitive by repeated light blows.

a. Fuze: The M4 fuze functions on the "cricket" or "oilcan" principle, while the M1A1 fuze uses a cocked firing pin spring and shear pins. In appearance, the only difference is that the primer and the detonator of the M4 fuze are contained within the fuze body instead of sticking out from the bottom and the bottom edge is sharp rather than beveled.

b. Booster: The M4 booster is identical with M1A1 booster except that it has a flat top with a crossed scar to insure rupture of the booster shell by the detonator, while the M1A1 booster has a cavity in the top into which fit the protruding primer and detonator of the M1A1 fuze.

ASSEMBLY:

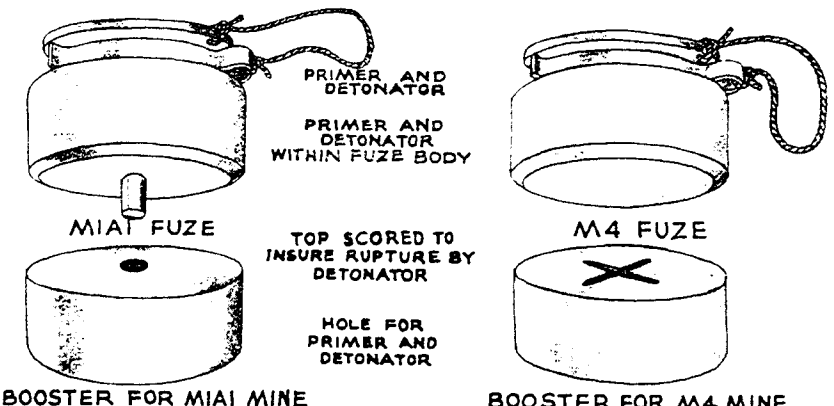
The mine is assembled in the same manner as the M1A1 mine. (See page 185).

ARMING:

The safety fork is removed from the fuze by pressure of the thumbs on the prongs. The fork is not removed until after the mine is laid, and is left beside the mine attached to its cord, never between the body and the spider. Before the mine is taken up, the safety fork is replaced.

REMARKS:

Care must be taken not to bury the mine too deeply as it may fail to detonate when run over by a vehicle. The mine may be buried with the top of the spider protruding approximately 1/4 inch above the surface of the ground and adequately camouflaged, or it may be buried spider down with the top surface of the mine not more than an inch below the ground surface.



R E S T R I C T E D

U. S. ARMY

M 2AI MINE (ANTIPERSONNEL)

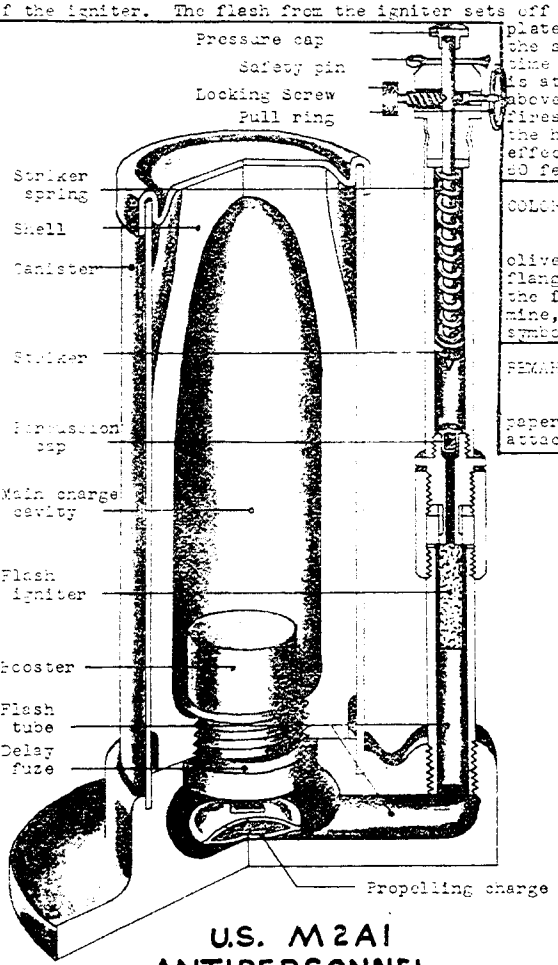
CASE DIAMETER	2½ in.
BASE DIAMETER	9¼ in.
WEIGHT OF SHELL	3 lbs.
WEIGHT OF EXPLOSIVE	0.4lbs.
MATERIAL	Steel
LETHAL RANGE	60 feet

GENERAL:

The Antipersonnel Mine M2A1 is a standard mine, usually activated by the combination firing device M1 (see page 199). The mine consists of an explosive shell contained in an upright thin-walled steel tube welded to a base plate. A 1/4-inch pipe nipple threaded to the base plate connects the firing mechanism to the mine. The propelling charge, 20 grains of blackpowder in a small bag, is located beneath the shell in a cavity at the bottom of the tube; the tube is sealed at the top with a cap. The primer and igniter assembly are fitted onto the pipe nipple; a cap screwed over the primer protects it until the mine is assembled and placed.

OPERATION:

The mine is similar to a small mortar. When the fuze is actuated, the primer sets off the igniter. The flash from the igniter sets off the propelling charge in the baseplate. The propelling charge projects the shell into the air and at the same time ignites delay fuze. When the shell is at a height of approximately 6 feet above the base plate, the delay fuze fires a tetryl booster which detonates the high explosive in the shell. The effective lethal range of the shell is 60 feet.



U.S. M2A1 ANTIPERSONNEL MINE

COLOR & MARKINGS:

The mine and firing device are dull olive drab in color except for the base flange, which is yellow. Stenciled on the flange is the type and model of the mine, the lot number, manufacturer's symbol, and date of loading.

REMARKS:

Each mine is packed in a corrugated paper carton with firing device and attached igniter. Trip wire is included.

U. S. ARMY

IMPROVISED MINES (ANTITANK)

RESTRICTED

The Bangalore torpedo and the 2.36" anti tank rocket can both be used as anti-tank mines, with slight improvisations, as is explained below.

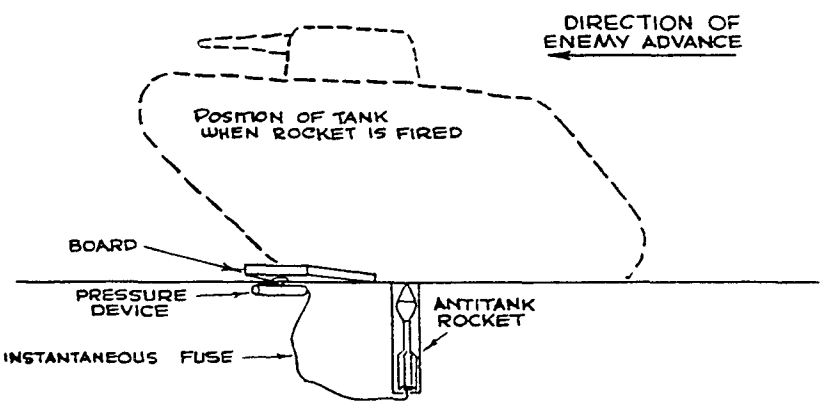
BANGALORE TORPEDO AS ANTITANK MINE:

Special torpedo caps are furnished with each box of 10 bangalores to adapt the bangalore torpedo for use on an antitank mine. Pull-firing detonators are furnished separately. To assemble the bangalore for use as an antitank mine, insert detonators in two torpedo caps, place a safety pin through the torpedo cap ears and the detonator loop of each as shown, and snap a torpedo cap onto each end of torpedo allowing detonator to slip into cap well. Lay torpedo on ground across a wooden block as shown in opposite figure, and drive 8-inch spikes on driftpins into the ground as close to the ends as possible. Pass the detonator wire through each detonator loop and attach the wire to the spike. Make sure there is no tension on the detonator wire. Withdraw safety pin. The mine is now armed, ready for use, and dangerous.

USE OF ANTITANK ROCKET AS ANTITANK MINE:

The antitank rocket M6 may be employed as an improvised antitank mine as follows: Place the rocket, nose up in its container, in a hole about 2 feet deep, either in a roadbed or horizontally on the side of a cut or bank. It can be set to fire electrically by arranging a circuit containing the rocket, a battery, and an improvised circuit closer. Connections to the rocket are made on the ignition wires, one from the brass ring on the nose, the other from the fins. Ordinary twisted-pair field telephone wire will serve; the battery and connections should be protected from water if necessary.

The container cap is removed and the other end knocked out. The container is thus used as a guide for the rocket. A hole is punched in the container cap through which the electric firing device wires (or trip wire) are run. When connections have been made, the container cap is slid in place over the fins to protect the contacts from fouling. The rocket safety pin is removed, the container tube is slid over the rocket and joined to the cap, and the assembly is placed in the hole. Loose dirt and leaves are then placed over all of the rocket except the nose; the nose is concealed by covering with leaves or light bunches of grass. Care must be taken not to bump the nose; as the rocket is completely armed when the safety pin is removed.



R E S T R I C T E D

U. S. ARMY

PULL FIRING DEVICE, MI

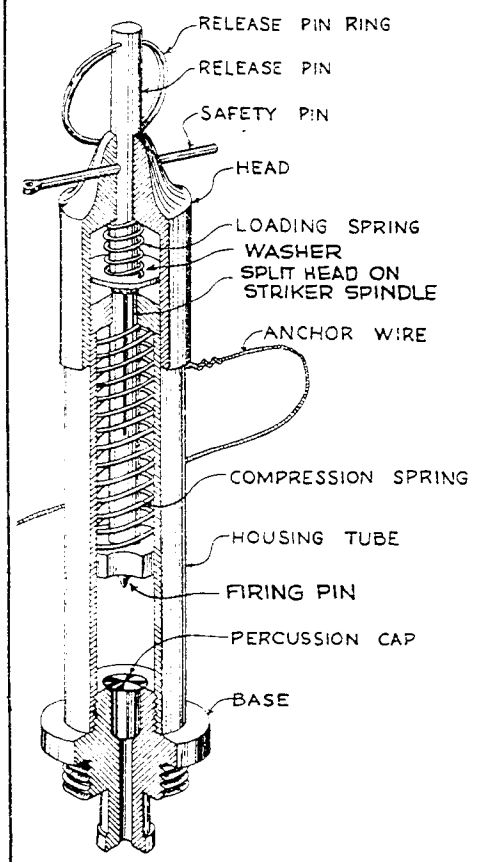
The Pull firing device M 1 is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to the bangalore torpedo.

GENERAL:

This is a mechanical device designed for firing explosive charges by means of a trip wire. A direct pull of 3 to 5 pounds applied to the ring actuates the device. A spring-driven firing pin sets off the percussion cap, which in turn sets off the non-electric cap crimped to the base. This cap detonates the explosive charge. There are two safety pins as shown on the drawing.

DESCRIPTION:

The M1 Pull firing device is composed of the following principal parts: The body, release pin, washer, firing pin, and standard nipple. The release pin has a nib on the internal end which fits into the split head of the striker spindle. The four segments of the split head are held tightly against the nib by the constriction of the internal shoulder of the body into which the split head fits. The release pin is held down by a washer and a spring.



OPERATION:

When the device is set, the blasting cap crimped on and inserted in an explosive charge such as a block of TNT, the safety pin through the release pin is pulled. After checking the device to make sure it has not fired when this safety pin is pulled, the other safety pin in the lower part of the body is pulled free, and the device is in a firing condition. When the trip wire attached to the release ring is tripped, the release pin is pulled outward, overcoming the pressure of the spring against the washer, and the tight-fitting nib pulls the split head of the striker spindle through the internal shoulder of the device. When the split head is far enough through the shoulder to permit the segments of the head to spread, the nib on the release pin pulls free. Once this nib is free of the split head, nothing remains to hold the striker spindle back, and the cocked compression spring forces the firing pin into the percussion cap, which in turn detonates the blasting cap and the explosive charge.

USES:

To activate antitank mines or anti-personnel mines, to supplement warning measures and to impede advance of enemy troops by running out trip wires connected to antipersonnel mines along a route of probable enemy movement, to set off booby traps, to set off explosive charges instantaneously when electric means are not available, to prevent removal by enemy of prepared demolition charges or delayed-action mines.

U. S. ARMY

RESTRICTED

M3 MINE
(ANTIPERSONNEL)

BODY LENGTH	5 3/8 in.
BODY HEIGHT	3.5 in.
BODY WIDTH	3.5 in.
WEIGHT	9.6 lbs.
EXPLOSIVE (Flaked TNT)	0.9 lbs.
MATERIAL	Cast Iron
LETHAL RANGE	30 feet.

GENERAL:

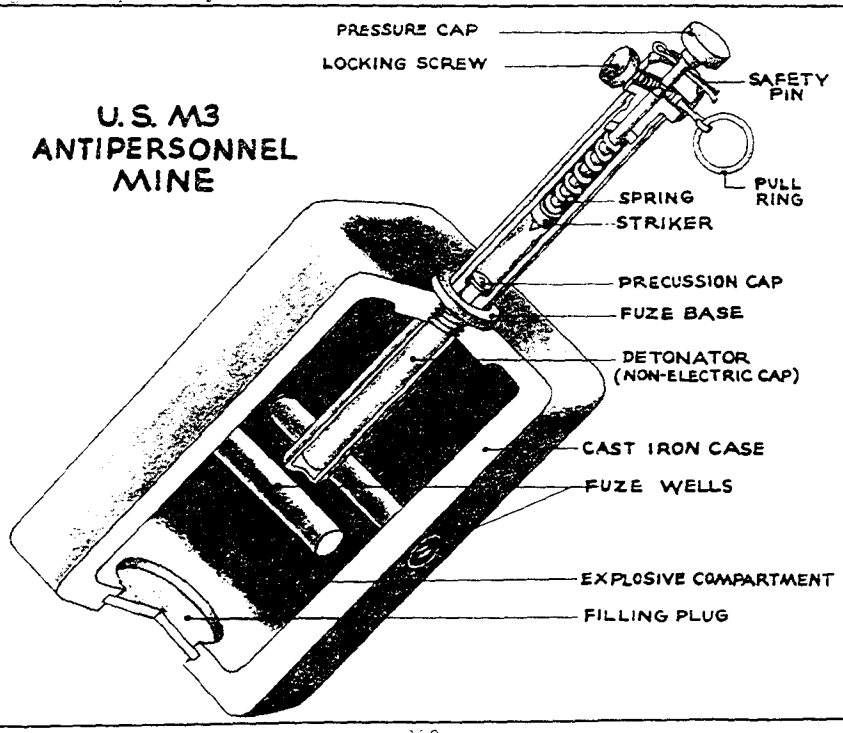
The Antipersonnel Mine M3 is a standard mine; usually activated by the Combination Firing device M1 (see page 199) which is issued with it. The mine is a fragmentation type for use against personnel. It weighs approximately 9.6 lbs. It consists of a hollow cast-iron block, 5 3/8 by 3 1/2 inches containing approximately 0.90 lbs. of high explosive. In two opposite sides and one end there are cap wells threaded to receive any standard firing device. In the end opposite the cap well end is a filling hole closed with a disk.

OPERATION:

The mine can be activated by any standard firing device, though it is issued with the combination firing device M1. It has an effective radius of 30 feet when it is fired on the surface of the ground. The effective radius when buried is decreased to about 10 feet providing the mine is buried only deep enough to camouflage it.

COLOR & MARKING:

The mine body and the firing device are painted olive drab with markings in black indicating the type, model, date of manufacture, lot number, and date of loading. The closing disk is painted yellow.



R E S T R I C T E D

U. S. ARMY

PRESSURE FIRING DEVICE, M1A1

The Pressure firing device M1 is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to the bangalore torpedo.

GENERAL:

This is a mechanical device designed for firing explosive charges by means of pressure. A pressure of 20 pounds or more applied to the trigger pin actuates the device. The pressure releases a striker head to set off a percussion cap, which in turn sets off the non-electric cap crimped to the base. This cap detonates the explosive charge. There is a safety clip and a safety pin.

DESCRIPTION:

The principal parts of the pressure-firing device M1 are the body, trigger pin, striker spindle, and standard nipple base. The projection on the trigger pin which extends down into the device body has two holes next to each other so that an opening is present between them, the hole toward the head of the trigger pin being the largest. The striker spindle has a circumferential groove around the part that extends through the trigger pin. When the device is set, the trigger pin is held up either by a clip or just its spring so that the grooved part of the striker spindle is engaged in the smaller hole on the trigger pin. In this position the striker spindle is locked and cannot fire.

OPERATION:

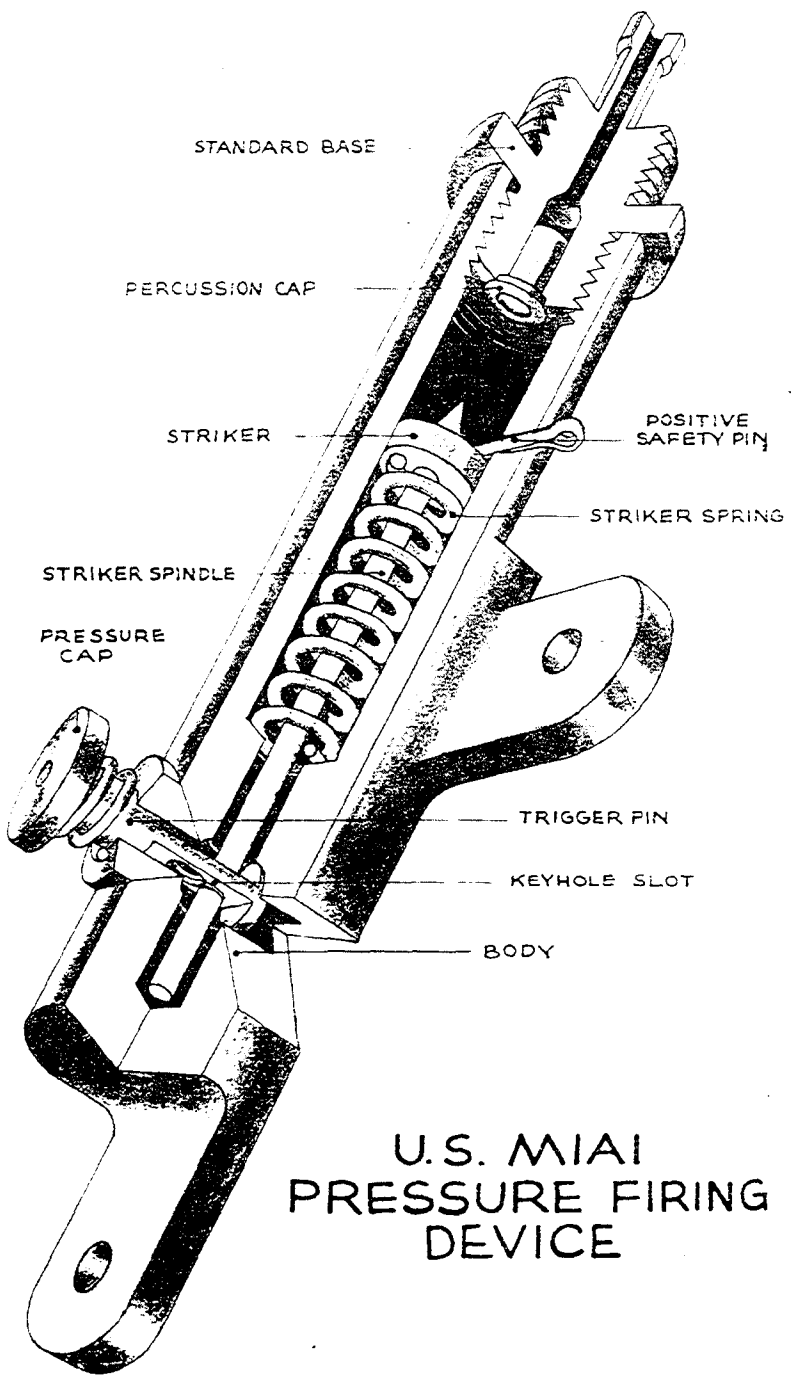
When the device is set, the blasting cap crimped on and inserted in an explosive charge such as a block of TNT, the safety clip is removed. The trigger pin is now held up by the trigger pin spring so that the striker spindle is engaged in the lower hole in the trigger pin. When pressure 20 pounds or more is applied to the head of the trigger pin it is forced inward, the larger hole in the projection on the pin being presented to the striker spindle. Since the spindle is large enough to pass through the larger hole, it is now free to be forced toward the percussion cap by its spring, firing the percussion cap and detonating the charge.

INSTALLATION:

Keeping safety clip and pin in position, remove base containing percussion cap. Remove cardboard protector tube from base. Place firing device in position at location where it is to be used. Slide open end of non-electric cap over projection on base and crimp, using cap crimper. This should be done carefully in order to insure a watertight joint. Screw base, with non-electric cap attached, to device. Prime charge. When primacord is used, tape looped end of primacord to non-electric cap and run the other end to charge. If primacord is not used, insert non-electric cap into block of explosive. Remove safety clip. It should pull off very easily. A sudden jerk may cause the striker head to spring forward. If safety clip does not pull off easily, check installations to make sure that there is not already enough weight on trigger pin head to cause device to function immediately when safety clip is removed. Remove safety pin from housing adjacent to cap base. This pin must be removed last. As long as it remains in place the device cannot possibly fire.

REMARKS:

With the trigger spring removed, a pressure of only 5 pounds will actuate the device. The number of ways that this device can be used is limited only by the ingenuity of the users. Among its many uses are to fire booby traps and other type trap mines, to set off an anti-personnel mine, to make removal of anti-personnel or vehicle mines in the vicinity more difficult, or to activate anti-tank mines, so they will detonate when stepped on.



U.S. MIAI
PRESSURE FIRING
DEVICE

R E S T R I C T E D

U. S. ARMY

RELEASE FIRING DEVICE, M1

The Release firing device is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to the bangalore torpedo.

GENERAL:

The release-firing device M1 is a mechanical device designed for firing explosive charges by means of the removal of a restraining load from the device. A restraining load of at least 2 pounds is required. When the load is removed, a spring lever strikes a firing pin, which detonates a percussion cap. This in turn sets off a non-electric cap crimped to the base. This cap detonates the explosive charge. There is a safety pin, and a lever interceptor which is a positive safety.

DESCRIPTION:

The principal parts of this device are the body, which is a square metal container with a protruding nub threaded to receive the standard firing nipple, the latch, the spring lever, and the firing pin. The latch, when held down against the body by the safety pin or pressure on the box, engages the spring lever and prevents it from firing. The firing pin is held rather loosely in place, having leeway for slight horizontal motion. When the nipple is threaded on it forces the firing pin back as far as it can go, the firing pin point resting squarely against the surface of the percussion cap.

OPERATION:

When the device is set, a weight is placed on top and the safety pin through the body bracket and the latch is removed carefully. If the spring lever does not snap downward, the safety pin in the interceptor hole is then withdrawn. If the spring lever has snapped down it will tend to bind the safety pin interceptor, and if this happens, the nipple should be removed and the device cocked before setting again. After both safety pins are removed, any releasing of the pressure on the latch will permit the spring loaded lever to pull inward on the end of the latch until it is no longer retained by the latch. The spring lever will then snap against the firing pin and drive it into the percussion cap on the nipple, setting off the charge.

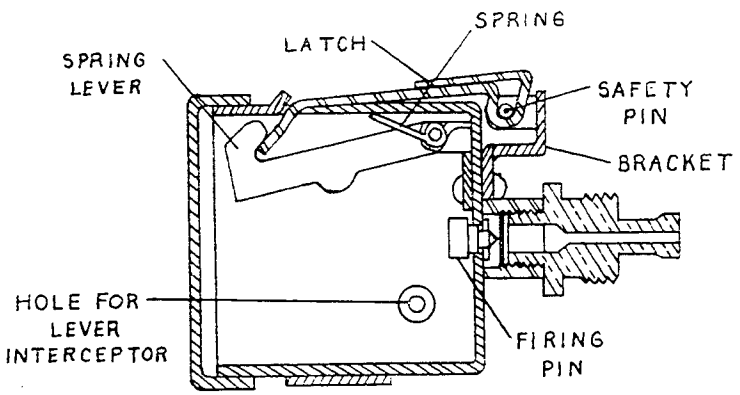
INSTALLATION:

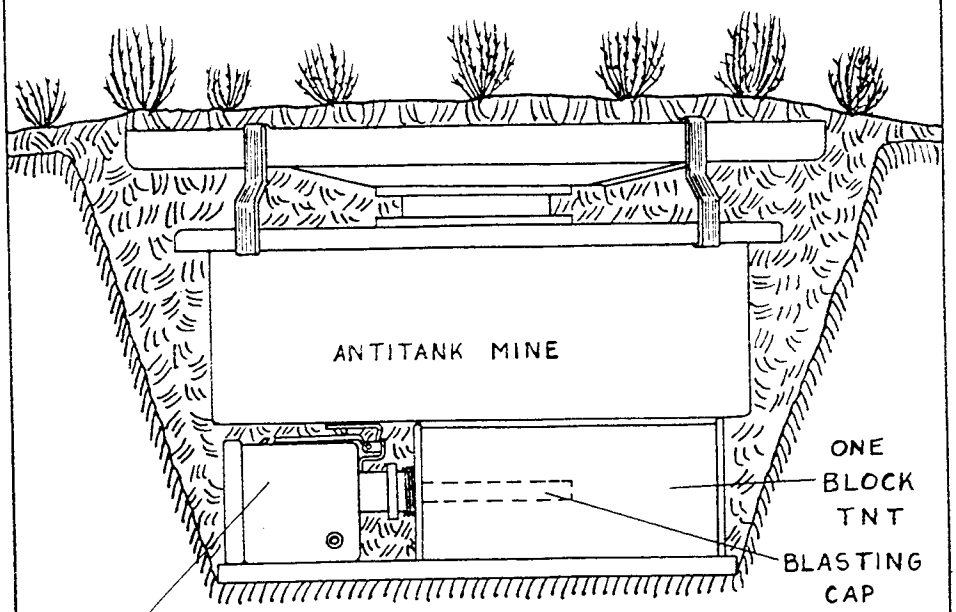
Place nail in safety pin holes and without removing them remove the base(or nipple) containing the percussion cap. Remove cardboard protector tube from base. Slide open end of non-electric cap over projection on base and crimp with cap crimper. This should be done carefully to insure a tight crimp and a waterproof joint between the base and the non-electric cap. Screw base, with non-electric cap attached, to device. Insert non-electric cap in charge or when primacord is used tape the looped end of the primacord to the non-electric cap and run the other end to the charge. Provide a level, solid foundation for the device to rest upon. A board is the best foundation. Place a restraining load such as antitank mine or box of ammunition on exposed surface of latch. Gently remove safety pin by pulling attached string in prolongation of the pin. Do not force pin or attempt to pull it out at right angles. If no clicking sound has been heard, pull nail used as interceptor out in same manner as safety pin. If it does not come out easily the spring lever probably has fallen and is pressing against it. If so, remove the charge; unscrew the base; remove the restraining load, and check the mechanism.

REMARKS:

This device can be used to detonate antitank mines when an attempt is made to remove them, and can also be used effectively as a booby trap by placing it under some heavy object, such as a book, the rocker of a rocking chair, etc.

RELEASE FIRING DEVICE M 1





RELEASE FIRING DEVICE (MOUNTED ON WOOD BLOCK) TO PREVENT REMOVAL OF MINE

R E S T R I C T E D

U. S. ARMY

TENSION & RELEASE FIRING DEVICE, MI

The Tension & Tension Release firing device is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to bangalore torpedo.

GENERAL:

This device is specially designed to be used with a trip wire, and unlike the standard Pull firing device the trip wire must be tightly stretched so as to exert considerable tension on the retaining rod. The device can be activated by tripping, or by cutting the trip wire.

DESCRIPTION:

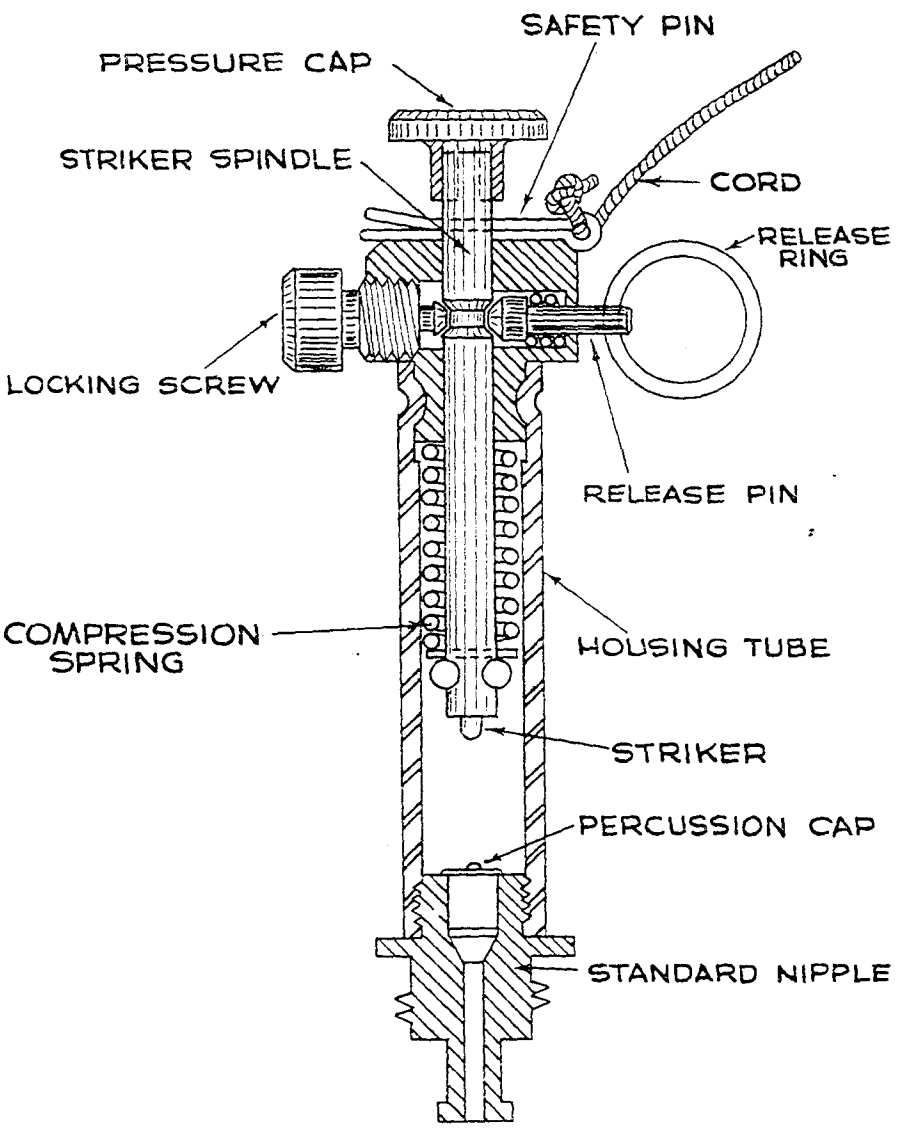
The principal parts of this device are the body, striker spindle, retaining rod, ratchet wheel, the two safety pins, and the standard nipple base. The striker has a split head which engages the nib on the end of the retaining rod when the nib is positioned inside the opening through the internal shoulder of the device body. The ratchet provides a convenient method for tightening and creating tension on the trip wire. Safety pin No. 1 cannot be removed until enough tension has been created to draw the retaining pin out sufficiently for the large end of the safety pin to clear the elongated safety pin hole.

OPERATION:

When the device has been properly installed with the explosive charge the trip wire is attached and tightened by means of the ratchet reel. After the retaining rod has been withdrawn slightly the safety pin can be removed. At the only position where the safety pin can be removed, the proper tension will have been placed on the trip wire. If the trip wire is tripped, the retaining rod will be drawn farther out until the split head of the striker spindle is sufficiently past the shoulder to enable it to spread free of the nib on the retaining rod. If the trip wire should be cut the split head and retaining nib will be forced past the shoulder in the direction toward the percussion cap, and once free of the shoulder in that direction the split head can spread past the nib on the retaining rod. In either case, the pressure exerted by the compression spring pulls the split head free of the retaining nib and forces the striker against the percussion cap, setting off the percussion cap and firing the charge.

REMARKS:

The device must be securely anchored to enable tension to be placed on the trip wire without dislodging the device or explosive charge.



COMBINATION FIRING DEVICE M1

R E S T R I C T E D

U. S. ARMY

COMBINATION FIRING DEVICE, M1

The Combination (Pull or Pressure) firing device M1 is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to the bangalore torpedo.

GENERAL:

The Combination firing device M1 is a mechanical device designed for firing explosive charges either by means of a trip wire or by pressure. When the safety pin and locking screw are removed, the device may be fired either by a pull of 3 to 6 lbs. on the pull ring, or by pressure of 20 lbs. or more on the pressure cap. The pull (or pressure) releases the striker spindle; the compression spring forces the striker against the percussion cap, setting off the charge. The principal use of this device is with standard Antipersonnel mines M2 and M3.

DESCRIPTION:

The principal parts of this device are the body, the striker spindle, the pressure cap, locking screw, release pin, and standard nipple base. The pressure cap is press-fitted onto the end of the striker spindle. The striker spindle has a circumferential groove into which the locking screw and end of the release pin protrude when the device is in the unarmed condition.

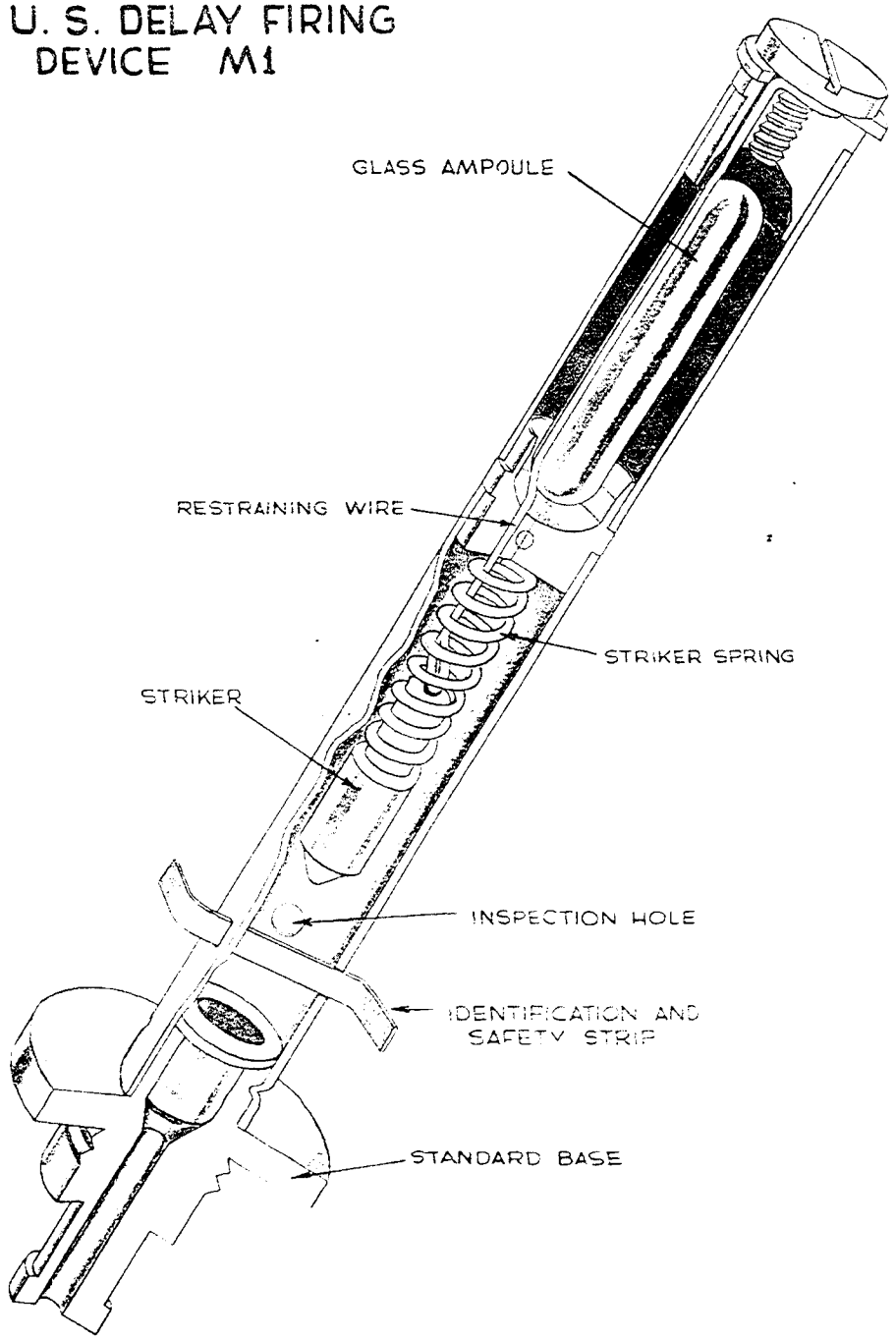
OPERATION:

When the device is set and the blasting cap has been crimped in place and inserted in the charge, the locking screw is backed off so that it is no longer engaged in the groove in the striker spindle. The safety pin is then removed. If the safety pin binds, it is quite possible that the release pin is not properly engaged in the groove in the arming spindle, so the device must be checked carefully. When the safety pin has been removed, the only thing preventing the striker spindle from being forced toward the percussion cap by its spring is the release pin, which is spring-loaded inward. The device is now armed and can be fired either by pressure on the pressure cap or pull on the release ring. If over 20 lbs. pressure is exerted on the cap it will be sufficient to force the release pin out against its spring. If the trip wire is tripped, the release pin will be pulled free of the groove in the arming spindle and the striker will be forced against the percussion cap by its spring.

REMARKS:

This firing device is used almost exclusively with the M2 and M3 antipersonnel mines. For installation of this device with those mines, refer to page 189).

U. S. DELAY FIRING DEVICE M1



R E S T R I C T E D

U. S. ARMY

CHEMICAL DELAY FIRING DEVICE, M1

The Chemical Delay firing device M1 is a standard device and may be threaded to any hand grenade, antipersonnel mine, or to the bangalore torpedo.

GENERAL:

The Chemical Delay firing device does not require the use of trip wires or of external pressure or pressure release to actuate it. These devices are issued in boxes of ten with different delays. The delay depends on the concentration of the corrosive liquid in the glass ampoule, the color of the tap on each device indicating the delay of that device. In addition, the delay varies with the temperature; a chart with the temperature correction for each device will be found in each box. Following is a temperature correction table for the different delays:

TEMPERATURE CORRECTION TABLE

Degrees F.	Black	Red	White	Green	Yellow	Blue
150	5 min.	4 min.	25 min.	3/4 hr.	3/4 hr.	1 1/2 hrs.
130	7 min.	6 min.	37 min.	1 hr.	1 hr.	2 3/4 hrs.
110	8 min.	7 min.	50 min.	1 ¾ hr.	2 hrs.	5 hrs.
90	10 min.	10 min.	1 hr.	2 ¾ hr.	4 hrs.	9 1/2 hrs.
70	12 min.	14 min.	1 3/4 hr.	4 hrs.	6 ¾ hrs.	17 1/2 hrs.
50	14 min.	21 min.	3 3/4 hr.	8 ¾ hrs.	8 ¾ hrs.	45 hrs.
30	1 hr.	¾ hr.	7 1/2 hr.	18 hrs.	16 ¾ hrs.	5 days.
10	5 hrs.	1 hr.	11 hours	38 hrs.	4 days.	9 days.

DESCRIPTION:

The principal parts of the device are the glass ampoule containing the corrosive liquid, the spring-loaded striker, the restraining wire preventing the striker from impinging on the percussion cap, the standard nipple base, and the identification and safety strip. The restraining wire runs along the side of the ampoule and is securely attached to the end of the device. The safety strip runs through the device between the striker and base and would prevent the device from firing should the glass ampoule be broken in handling or shipping.

OPERATION:

After the device has been installed with non-electric blasting cap and the desired explosive charge, the safety strip is removed. Before removing the safety strip, however, the person setting the device should look through the inspection hole to make sure the striker has not been freed and is not resting against the safety strip. After the safety strip has been removed, the device must be actuated by the person setting it by squeezing on the copper tube which houses the glass ampoule. This will break the ampoule and permit the corrosive liquid to act upon the restraining wire. After the preestablished delay the liquid will eat through the restraining wire, freeing the striker to be forced toward the percussion cap by the cocked striker spring and setting off the charge.

REMARKS:

1. There is no safe way of disarming this device. If absolutely necessary to disarm, insert safety pin through inspection holes.

2. Troops must not approach an installed charge employing this delay fuze. Areas where they have been installed should be marked. Time delay starts when tube is squeezed not when safety tab is withdrawn.

U. S. ARMY

R E S T R I C T E D

15- SEC. DELAY FIRING DEVICE, MI

The 15-Sec. Delay firing device M1 does not use the standard nipple, nor is it used with a blasting cap.

GENERAL:

The 15-Sec. Delay firing device M1 is used to obtain delay in firing demolition charges, particularly during assault demolitions. It can be used to fire charges underwater since the case is waterproof.

DESCRIPTION:

This firing device consists of an olive drab plastic case, a pull ring attached to a coated pull wire, flash compound, and a 15-second powder-train delay tube with a detonator at the end.

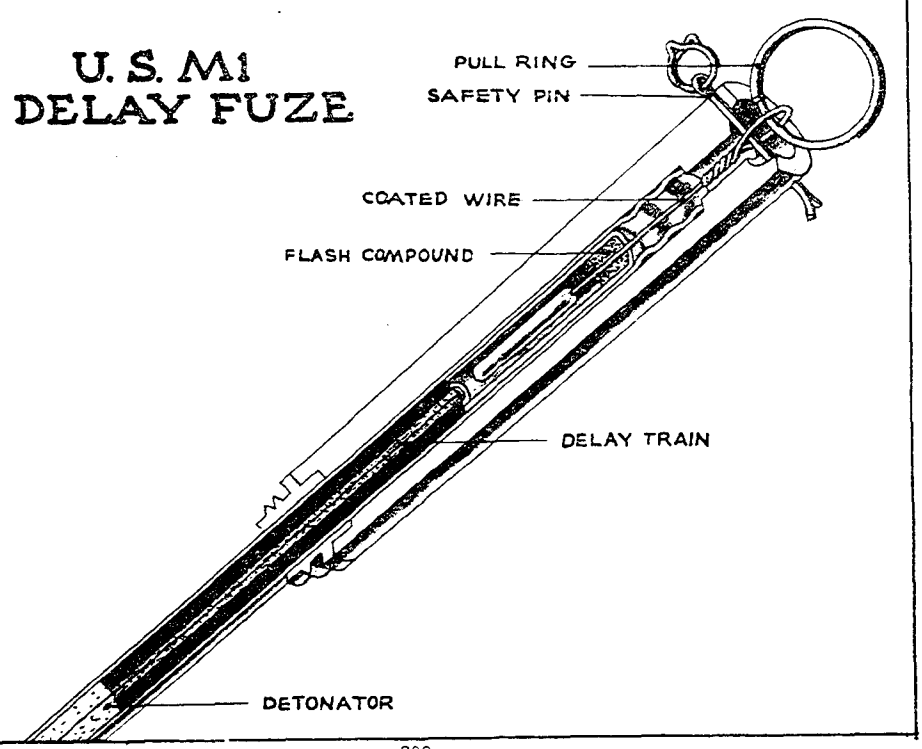
OPERATION:

When the safety pin is removed, a pull on the pull ring draws the coated wire through the flash compound. The resultant flash ignites the powder-train delay which sets off the detonator fifteen seconds later.

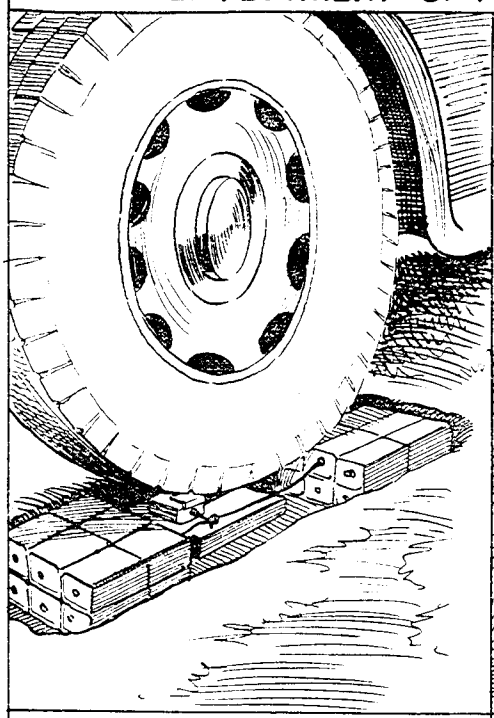
REMARKS:

1. The pull ring should be jerked sharply.

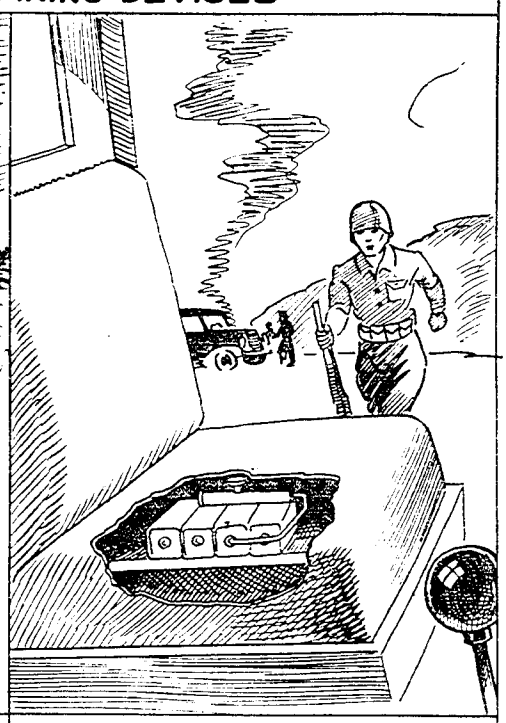
2. Once the pull ring has been jerked there is no way to stop detonator from exploding. Once exploded, the fuze cannot be reused.



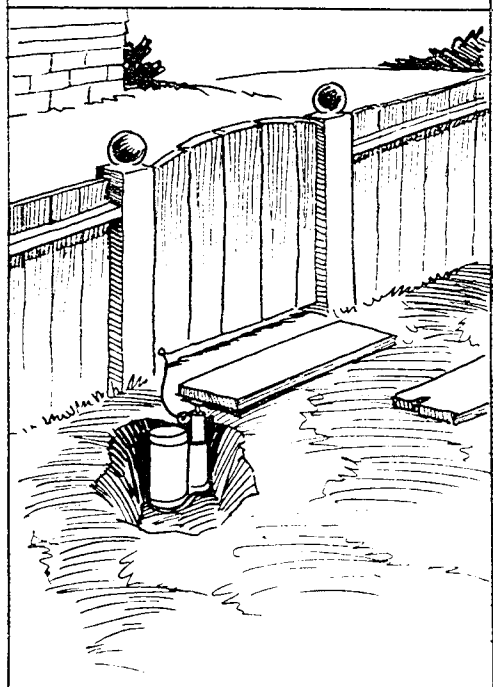
EMPLOYMENT OF FIRING DEVICES



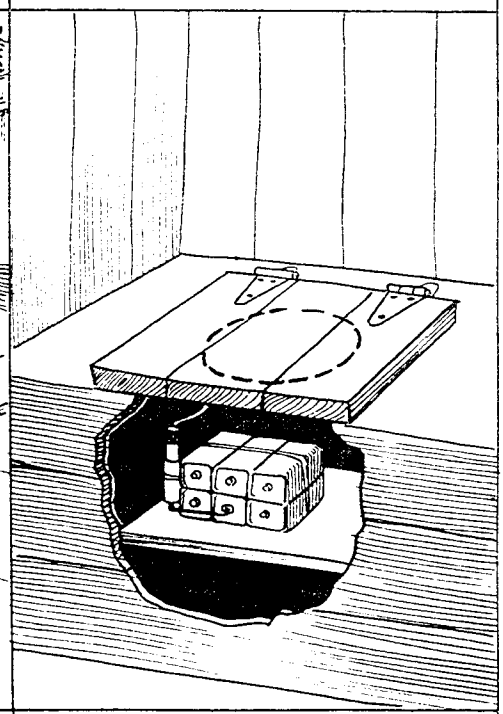
RELEASE FIRING DEVICE



PRESSURE FIRING DEVICE



COMBINATION DEVICE W/ M 2A1 A/P MINE



PULL FIRING DEVICE

U. S. GOVERNMENT PRINTING OFFICE - 0 - 1944

R E S T R I C T E D

U. S. ARMY

COMBINATION FIRING DEVICE, MI

The Combination (Pull or Pressure) firing device M1 is a standard firing device which can be threaded to all of the standard anti-personnel mines, hand grenades, and to the bangalore torpedo.

GENERAL:

The Combination firing device M1 is a mechanical device designed for firing explosive charges either by means of a trip wire or by pressure. When the safety pin and locking screw are removed, the device may be fired either by a pull of 3 to 6 lbs. on the pull ring, or by pressure of 20 lbs. or more on the pressure cap. The pull (or pressure) releases the striker spindle; the compression spring forces the striker against the percussion cap, setting off the charge. The principal use of this device is with standard Antipersonnel mines M2 and M3.

DESCRIPTION:

The principal parts of this device are the body, the striker spindle, the pressure cap, locking screw, release pin, and standard nipple base. The pressure cap is press-fitted onto the end of the striker spindle. The striker spindle has a circumferential groove into which the locking screw and end of the release pin protrude when the device is in the unarmed condition.

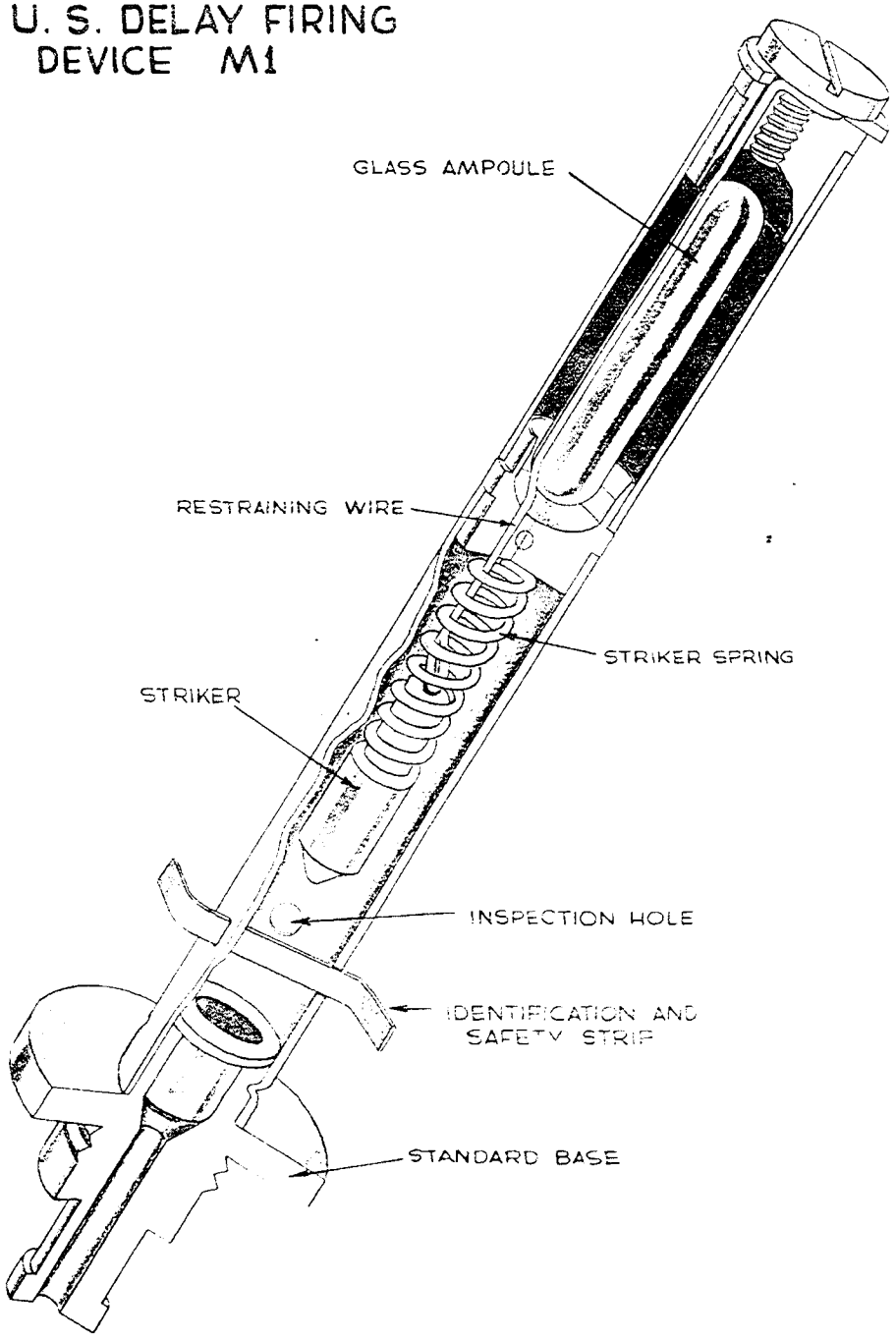
OPERATION:

When the device is set and the blasting cap has been crimped in place and inserted in the charge, the locking screw is backed off so that it is no longer engaged in the groove in the striker spindle. The safety pin is then removed. If the safety pin binds, it is quite possible that the release pin is not properly engaged in the groove in the arming spindle, so the device must be checked carefully. When the safety pin has been removed, the only thing preventing the striker spindle from being forced toward the percussion cap by its spring is the release pin, which is spring-loaded inward. The device is now armed and can be fired either by pressure on the pressure cap or pull on the release ring. If over 20 lbs. pressure is exerted on the cap it will be sufficient to force the release pin out against its spring. If the trip wire is tripped, the release pin will be pulled free of the groove in the arming spindle and the striker will be forced against the percussion cap by its spring.

REMARKS:

This firing device is used almost exclusively with the M2 and M3 antipersonnel mines. For installation of this device with those mines, refer to page 169).

U. S. DELAY FIRING DEVICE M1



R E S T R I C T E D

U. S. ARMY

CHEMICAL DELAY FIRING DEVICE, MI

The Chemical Delay firing device M1 is a standard device and may be threaded to any hand grenade, antipersonnel mine, or to the bangalore torpedo.

GENERAL:

The Chemical Delay firing device does not require the use of trip wires or of external pressure or pressure release to actuate it. These devices are issued in boxes of ten with different delays. The delay depends on the concentration of the corrosive liquid in the glass ampoule, the color of the tap on each device indicating the delay of that device. In addition, the delay varies with the temperature; a chart with the temperature correction for each device will be found in each box. Following is a temperature correction table for the different delays:

TEMPERATURE CORRECTION TABLE

Degrees F.	Black	Red	White	Green	Yellow	Blue
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110	8 min.	7 min.	50 min.	1 ½ hr.	2 hrs.	5 hrs.
90	10 min.	10 min.	1 hr.	2 ½ hr.	4 hrs.	9 1/2 hrs.
70	12 min.	14 min.	1 3/4 hr.	4 hrs.	6 ½ hrs.	17 1/2 hrs.
50	14 min.	21 min.	3 3/4 hr.	8 ½ hrs.	8 ½ hrs.	45 hrs.
30	1 hr.	½ hr.	7 1/2 hr.	18 hrs.	16 ½ hrs.	5 days.
10	5 hrs.	1 hr.	11 hours	38 hrs.	4 days.	9 days.

DESCRIPTION:

The principal parts of the device are the glass ampoule containing the corrosive liquid, the spring-loaded striker, the restraining wire preventing the striker from impinging on the percussion cap, the standard nipple base, and the identification and safety strip. The restraining wire runs along the side of the ampoule and is securely attached to the end of the device. The safety strip runs through the device between the striker and base and would prevent the device from firing should the glass ampoule be broken in handling or shipping.

OPERATION:

After the device has been installed with non-electric blasting cap and the desired explosive charge, the safety strip is removed. Before removing the safety strip, however, the person setting the device should look through the inspection hole to make sure the striker has not been freed and is not resting against the safety strip. After the safety strip has been removed, the device must be actuated by the person setting it by squeezing on the copper tube which houses the glass ampoule. This will break the ampoule and permit the corrosive liquid to act upon the restraining wire. After the preestablished delay the liquid will eat through the restraining wire, freeing the striker to be forced toward the percussion cap by the cocked striker spring and setting off the charge.

REMARKS:

1. There is no safe way of disarming this device. If absolutely necessary to disarm, insert safety pin through inspection holes.

2. Troops must not approach an installed charge employing this delay fuze. Areas where they have been installed should be marked. Time delay starts when tube is squeezed not when safety tab is withdrawn.

U. S. ARMY

15- SEC. DELAY FIRING DEVICE, MI

RESTRICTED

The 15-Sec. Delay firing device M1 does not use the standard nipple, nor is it used with a blasting cap.

GENERAL:

The 15-Sec. Delay firing device M1 is used to obtain delay in firing demolition charges, particularly during assault demolitions. It can be used to fire charges underwater since the case is waterproof.

DESCRIPTION:

This firing device consists of an olive drab plastic case, a pull ring attached to a coated pull wire, flash compound, and a 15-second powder-train delay tube with a detonator at the end.

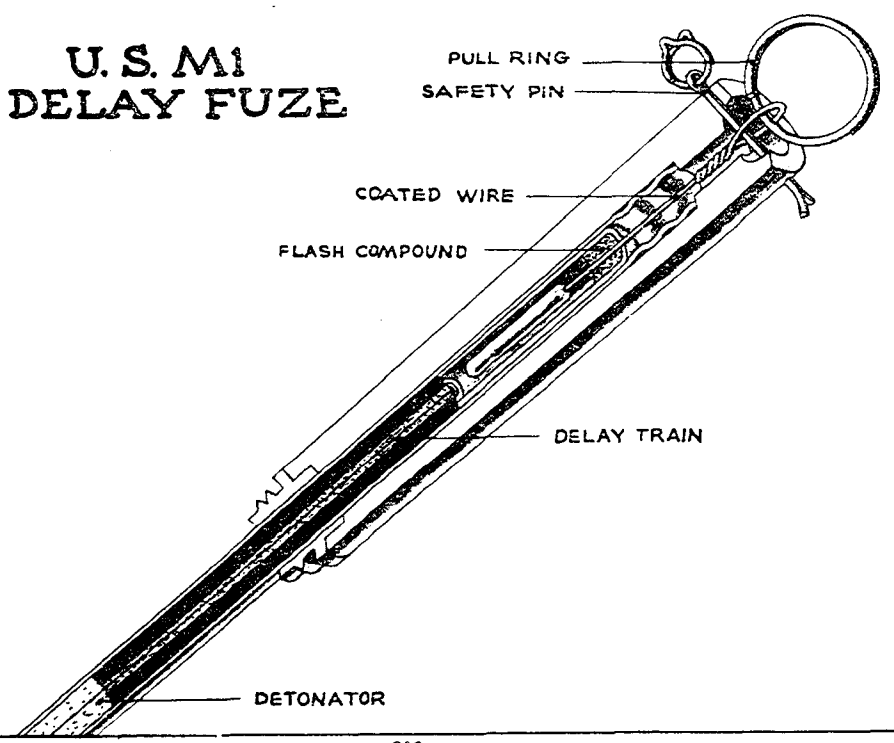
OPERATION:

When the safety pin is removed, a pull on the pull ring draws the coated wire through the flash compound. The resultant flash ignites the powder-train delay which sets off the detonator fifteen seconds later.

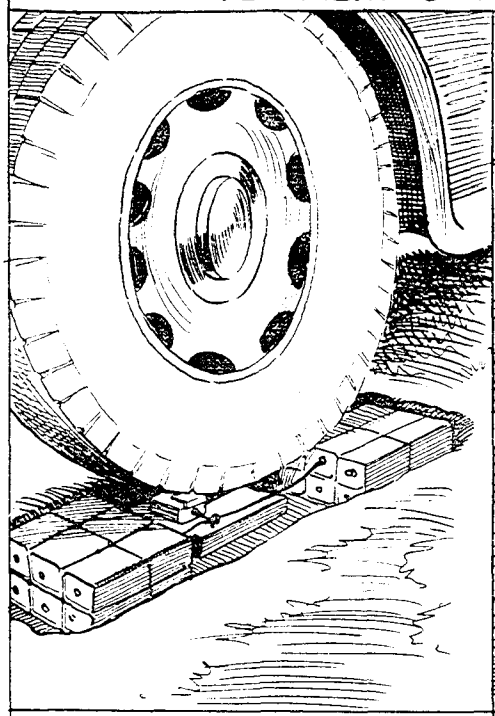
REMARKS:

1. The pull ring should be jerked sharply.

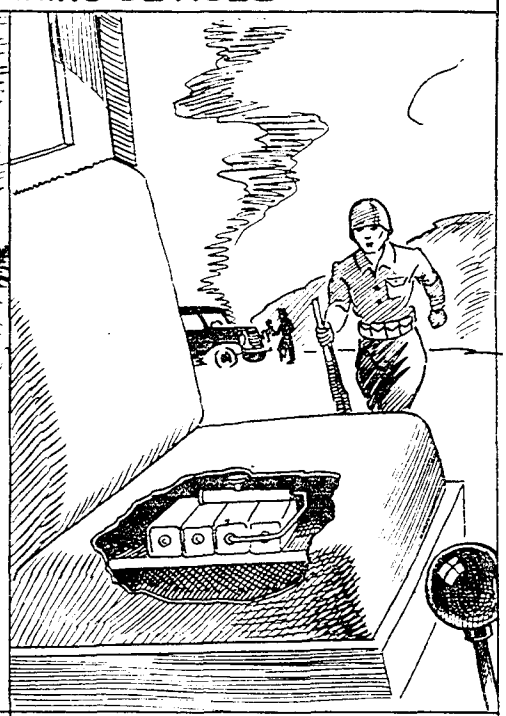
2. Once the pull ring has been jerked there is no way to stop detonator from exploding. Once exploded, the fuze cannot be reused.



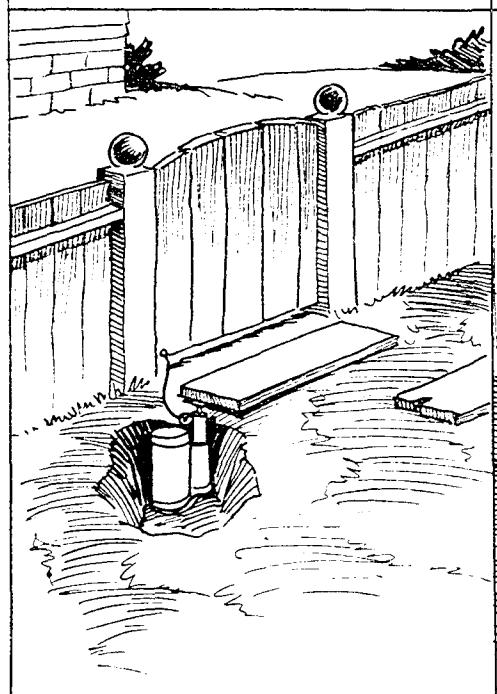
EMPLOYMENT OF FIRING DEVICES



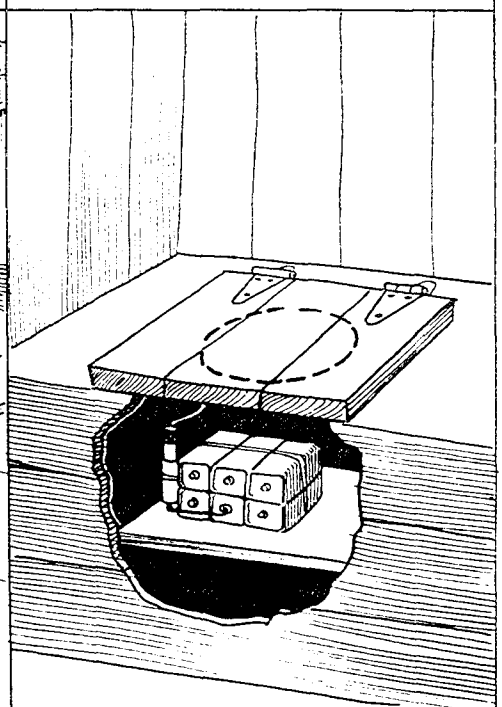
RELEASE FIRING DEVICE



PRESSURE FIRING DEVICE



COMBINATION DEVICE W/ M 2A1 A/P MINE



PULL FIRING DEVICE

U. S. GOVERNMENT PRINTING OFFICE - O - 1944