Pns. CW Spec. U.S.N.R.
1944

PROJECTILES AND FUZES

1 April, 1943

1. This publication has been compiled by the joint effort and cooperation of the staffs of the U.S. Navy Bomb Disposal School, Navy Yard, Washington, D.C. and the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, Aberdeen, Maryland.

2. Permission has been obtained from the Chief of the Bureau of Ordnance, letter (PLd) A7-3, to reproduce in pamphlet form all pertinent information regarding U.S. Navy projectiles and fuzes now classified as confidential.

3. It is of vital importance to Bomb Disposal personnel that they have the most complete and accurate information on all projectiles and fuzes. Therefore, it is requested that this School be notified immediately of any corrections or additions to this publication.

D. L. KAUFFMAN
Lt. Comdr., U.S.N.R.
Officer-in-Charge

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

# SECTION 1
# PART A

# U.S. NAVY PROJECTILES

SECTION I
PART A

U.S. NAVY
PROJECTILES

| SIZE | MK. OR MOD | TYPE | PAGE NO. |
|---|---|---|---|
| | | Preface | |
| | | Introduction | 13 |
| 3"/23/50; 1, 3 & 6 Pdr. Guns. | Mk. 10 Mod 9 | Primer | 28 |
| 4"/50, 5"/38, 5"/25 Guns | Mk. 13 | Primer | 30 |
| All Bag Guns | Mk. 15 Mod.1 | Primer | 32 |
| 1"1 Guns | Mk. 19 | Primer | 34 |
| 40 mm Guns | Mk. 21; Mk. 22 | Primer | 36 |
| Igniting | Mk.5;Mk.5 Mod 1 | Tracer | 38 |
| 4"/50, 5"/51 | Mk.6 | Tracer | 40 |
| 40 mm A.A. | Mk. 8 | Tracer | 42 |
| 4"/50, 5"/38, 5"/25 Guns. | Mk. 9 | Tracer | 44 |
| 1 Pounder | Mk. 2 | Cartridge Case | 46 |
| 1 Pounder | | Projectile | 48 |
| 3 Pounder | Mk.1;Mk.1 Mod 1 | Cartridge Case | 50 |
| 3 Pounder | | Projectile | 52 |
| 6 Pounder | Mk. 1 | Cartridge Case | 54 |
| 6 Pounder | | Projectile | 56 |
| 20 mm | Mk. 1 | Cartridge Case | 58 |
| 20 mm H.E. | Mk. 3 | Projectile | 60 |
| 20 mm H.E.T. | Mk. 4; Mk. 7 | Projectile | 62 |
| 20 mm A.P. | Mk. 8 | Projectile | 64 |
| 40 mm A.A. | Mk. 1 | Cartridge Case | 66 |
| 40 mm A.A. | Mk. 1 & 2 | Projectile | 68 |
| 1"1 A.A. | Mk. 1 | Cartridge Case | 70 |
| 1"1 A.A. | Mk. 1 | Projectile | 72 |
| 1"1 A.A. | Mk. 2 | Projectile | 74 |
| 3" | Mk. 3 | Cartridge Case | 76 |
| 3" A.A. | Mk. 7 | Cartridge Case | 78 |
| 3" | Mk. 14 | Projectile | 80 |
| 3"/50 A.A. | Mk. 16 | Projectile | 82 |
| 3"/50 Illum. | Mks. 21 & 24 | Projectile | 84 |
| 3"/23 Illum. | Mk. 22 | Projectile | 86 |
| 3"/50 A.A. | Mks. 27 & 23 | Projectile | 88 |
| 3"/50 Illum. | Mk. 25 | Projectile | 90 |
| 3"/23 A.A. | Mk. 26 | Projectile | 92 |
| 3"/23 Illum. | Mk. 28 | Projectile | 94 |
| 3"/50 A.P. | Mk. 29 | Projectile | 96 |
| 3"/23 A.P. | Mk. 30 | Projectile | 98 |
| 4"/50 | Mk.2 Mods 3 & 4 | Cartridge Case | 100 |
| 4"/50 Illum. | Mk. 14 | Projectile | 102 |
| 4"/50 H.C. | Mk. 15 | Projectile | 104 |
| 4" Type EX-1 | | Projectile | 106 |
| 5"/38 | Mk. 5 | Cartridge Case | 108 |
| 5" Illum. | Mk. 25 | Projectile | 110 |
| 5" Illum. | Mk. 27 | Projectile | 112 |
| 5" A.A. Common | Mks.28 & 36 Mod 1 | Projectile | 114 |
| 5" Illum. | Mk. 30 | Projectile | 116 |
| 5" A.A. Common | Mks. 31 & 35 | Projectile | 118 |
| 5" Common | Mk. 32 | Projectile | 120 |
| 5" Common | Mk. 37 | Projectile | 122 |
| 5" H.C. | | Projectile | 124 |
| 6" | Mk. 4 | Cartridge Case | 126 |
| 6"/47 Illum. | Mks. 22 & 32 | Projectile | 128 |
| 6"/47 Illum. | Mk. 23 | Projectile | 130 |


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

| SIZE | MK. OR MOD | TYPE | PAGE NO. |
|---|---|---|---|
| 6"/47 Spec. Common | Mk. 27 | Projectile | 132 |
| 6" H.C. | Mk. 34 | Projectile | 134 |
| 6"/47 A.P. | Mk. 35 | Projectile | 136 |
| 8"/55 Common | Mks.13, 14 & 15 | Projectile | 138 |
| 8"/55 A.P. | Mks. 19 & 21 | Projectile | 140 |
| 8"/55 H.C. | Mk. 24 | Projectile | 142 |
| 12"/50 A.P. | Mks. 15 & 18 | Projectile | 144 |
| 12"/50 H.C. | Mk. 16 | Projectile | 146 |
| 12"/50 H.C. | Mk. 17 | Projectile | 148 |
| 14"/45/50 A.P. | Mk. 8 | Projectile | 150 |
| 14"/45/50 Bbt. | Mk. 9 | Projectile | 152 |
| 14"/45/50 A.P. | Mk. 16 | Projectile | 154 |
| 14"/45 H.C. | Mk. 19 | Projectile | 156 |
| 16" A.P. | Mk. 3 | Projectile | 158 |
| 16" A.P. | Mk. 5 | Projectile | 160 |
| 16" A.P. | Mk. 8 | Projectile | 162 |
| 16" H.C. | | Projectile | 164 |


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

| DESIGNATION | TYPE | PAGE NO. |
|---|---|---|
| | General Information | 163 |
| Mk. 2 Mod 2 | Base Detonating | 178 |
| Mk. 2 Mod 8 | Base Ignition | 182 |
| Mk. 2 Mod 9 | Base Ignition | 184 |
| Mk. 3 Mod 1 | Base Detonating | 186 |
| Mk. 3 Mod 2 | Base Detonating | 190 |
| Mk. 7 Mod 1 | Nose Detonating | 194 |
| Mk. 8 Mod 4 | Base Ignition | 196 |
| Mk. 9; Mk. 11; Mk. 15 | Nose Ignition | 200 |
| Mk. 9 | Base Detonating | 204 |
| Mk. 10 Mods 3, 4, 9 | Base Ignition | 208 |
| Mk. 11 Mods 1-5 | Nose Ignition | 211 |
| Mk. 11; Mk. 11 Mod 8 | Base Detonating | 212 |
| Mk. 12; Mk. 12 Mods 2-3 | Nose Detonating | 216 |
| Mk. 13 Mods 6-7 | Base Detonating | 220 |
| Mk. 15 | Nose Ignition | 223 |
| Mk. 16 Mods 2, 3 & 5 | Nose Ignition | 224 |
| Mk. 17 | Auxiliary Detonating | 228 |
| Mk. 17 Mods 1-6 )<br>Mk. 17 Mod 8 ) | Auxiliary Detonating | 229 |
| Mk. 18; Mk. 22; Mk. 25 | Nose Ignition | 232 |
| Mk. 18 Mods 2, 3, 4 | Nose Ignition | 235 |
| Mk. 19; Mk. 20 | Base Detonating | 237 |
| Mk. 21 | Base Detonating | 238 |
| Mk. 22 | Nose-Mechanical Time | 242 |
| Mk. 23 | Base Detonating | 244 |
| Mk. 25 | Nose-Mechanical Time | 248 |
| Mk. 26; Mk. 26 Mods 1,2 | Point Detonating | 250 |
| Mk. 27 | Point Detonating | 252 |
| Mk. 28 | Base Detonating | 256 |
| Mk. 29 | Point Detonating | 260 |
| Mk. 30 | Point Detonating | 264 |
| Mk. 34 | Point Detonating | 266 |


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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

## INTRODUCTION

Ammunition and types of guns in which it is used is divided into the following three classifications:

FIXED AMMUNITION -

Complete rounds in which the propelling charge is fixed, not adjustable, and which are loaded into the guns as a unit, are known as "fixed" ammunition. The propelling charge is assembled in the cartridge case which is crimped to the projectile. The primer is fitted in the base of the cartridge case.

Guns which come under this classification are:

| | |
|---|---|
| 5"/25 | 3 Pdr. |
| 4"/50 | 6 Pdr. |
| 3"/50 | 40 MM |
| 3"/23 | 20 MM |
| 1 Pdr. | 1"1/75 |

SEMI-FIXED AMMUNITION -

Ammunition of this type is that in which the primer and propelling charge are fixed in the cartridge case, but in which the projectile is separate from the cartridge case. The projectile and case are loaded separately.

The propellants and primers are prepared in the cases. The propellants are usually held firmly in the case by means of wads or distance pieces. As a rule, the cases are not designed to be entirely filled with the powder charge since this would result in too high a density of loading. In this type of ammunition, air-tightness for the powder charge is secured by sealing wads or plugs inserted in the mouths of the cartridge cases.

Guns which come under this classification are:

6"/47 (See Bag Guns)
5"/54
5"/51 (14 semi-fixed wet guns which use the same projectile as 5"/51 bag guns but with a Mk. 3 catapult case.)
5"/38

BAG OR "SEPARATE LOADING" AMMUNITION -

Complete rounds in which the separate components--projectile, propelling charge and primer--are loaded into the gun separately are known as "separate loading" ammunition. Although the propelling charge may be in one section, it is usually divided into parts with each part assembled in a bag.

Guns under this classification are:

| | |
|---|---|
| 16"/45 | 6"/53 |
| 16"/50 | 6"/50 |
| 14"/45 | 6"/47 (Only two guns in fleet under this classification.) |
| 14"/50 | |
| 12"/50 | |
| 8"/55 | 5"/51 |
| 7"/45 | 5"/50 |

| NATIONALITY: U.S.NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION - continued

GENERAL -

Although differing in characteristic details, all artillery projectiles are of the same general shape, that is, they have a cylindrical body and an ogival head. The principal characteristic differences are:

1. Location of fuzes - point and/or base.
2. Radius of ogive - smaller for low, larger for high velocity projectiles.
3. Rotating band - narrow for low, wide for high velocity projectiles.
4. Base - "boat tailed" or "square base".
5. Armor piercing cap - used only with armor piercing projectiles.
6. Windshield, or False Ogive - where required for improved ballistics.

CLASSES OF PROJECTILES -

Projectiles used in the U.S.Navy are divided into eleven (11) classes, as follows:

1. Armor-piercing (A.P.) -
   These projectiles are subjected to a test against face hardened plate one (1) caliber in thickness.

2. Common (Com.) -
   These projectiles are subjected to a test against plates one-third to one-half a caliber in thickness.

3. Class B (Cl B.) -
   A Class B projectile is one that has a minimum wall thickness consistent with the setback in the gun, and which permits a maximum bursting charge. The ogive is in general similar to the ogive of a common projectile. The projectile is not subjected to a plate test.

4. High Capacity (H.C.) -
   These projectiles are very similar to the "Class B" type. However, the H.C. projectile has a higher loading factor.

5. Shrapnel (Shrap.) -
   A modern shrapnel is a projectile containing projectile balls which are expelled from the shrapnel case by means of a small charge of explosive, the case remaining intact.

6. Flat Nose & Cup Nose (F.N. & C.N.) -
   Flat and Cup Nose projectiles are designed with thin walls and maximum bursting charges and are in this respect similar to "Class B" projectiles. The noses of the projectiles are flat or cup shaped which prevent ricochets of the projectiles upon striking water. Both are primarily designed for use against submarines.

7. Illuminating (S.S.) -
   An illuminating projectile is one that discharges an illuminating element.

| NATIONALITY: U.S.NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION - continued

CLASSES OF PROJECTILES, continued -

8. Smoke, gas, etc. -
These are special projectiles containing a smoke, gas, etc. producing element.

9. Tracer (Tr.) -
These projectiles are designed solely to leave visible tracers in the daytime, and do not have bursting charges. They are a separate class from other projectiles which, when required, may be fitted with tracers.

10. Target (T.) -
A target projectile is one that represents ballistically, as far as flight is concerned, another projectile, but which contains no explosive. Target projectiles are used for ranging and target practice.

11. Proof Shot -
Proof shot are slugs, the base and bourrelet dimensions of which are the same as those of projectiles of the same caliber. They give the same interior ballistics as the projectiles they represent, but their exterior ballistics are different. Proof Shot are used for testing guns and powder, and also for spotting practice on board ship.

CAP & WINDSHIELD -

The armor-piercing cap is of forged alloy steel, heat treated to have a hard face and relatively soft core. On impact, the hardened face of the cap destroys the hardened surface of the armor plate while the softer core of the cap protects the hardened point of the projectile by distributing the impact stresses over a large area of the head.

The cap also has the effect of increasing the "biting" angle; that is, a capped projectile will "bite" or fail to glance off at greater angles of obliquity than will the same projectile without a cap. This is due to the greater bluntness of the front end of the cap.

The windshield, made of steel or aluminum, is secured to the cap or head of projectile to give improved ballistics.

Windshields are usually screwed on the cap and frequently the thread is cut on a tapered surface. After screwing home, they are 'set' by a center punch at the joint. If they become loose in handling, they should be tightened and reset.

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

1, 3 and 6 Pound Guns -

The 1, 3 and 6 Pound guns are Coast Guard guns. The projectiles fired from these guns are filled with a black powder bursting charge. Black powder is very sensitive to friction. It may fall down in the threads and ignite the burster charge. Care should be taken when handling, especially if the fuze is unscrewed.

## MARKING AND PAINTING OF PROJECTILES

MARKING OF PROJECTILES -

1. For the purpose of indicating the character of the projectile, the name of its manufacturer, and the specifications under which it is made, each projectile is marked by the manufacturer as follows:

2. The following markings are shown on the base of the projectile:

(3-INCH PROJECTILES AND LARGER)

See Ordnance Drawing No.45880

(a) Caliber, type, mark and mod of projectile.
(b) Name of manufacturer, which may be abbreviated.
(c) Serial number of projectile (omitted in case of target projectiles).
(d) Consecutive lot number, with year of specifications.
(e) Weight as delivered by manufacturer. (empty)

3. The following markings are shown on the rotating band:

(3-INCH PROJECTILES AND LARGER)

See Ordnance Drawing No.45880

(a) Initials of inspector.
(b) Stamp of inspector.
(c) Caliber, type, mark and mod of projectile.
(d) Lot number with year of specification.

4. The following marking is shown on the base plug:

(3-INCH PROJECTILES AND LARGER)

See Ordnance Drawing No.45880

(a) Serial number of projectile.

5. The following markings are shown on the base of the projectile:

(1, 3 and 6 POUNDER PROJECTILES)

See Ordnance Drawing No. 45880

(a) Caliber, type, mark and mod of projectile.
(b) Consecutive lot number with year of specifications.

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

MARKING AND PAINTING OF PROJECTILES, continued -

6. The following markings are shown on the rotating band:

(1, 3, and 6 POUNDER PROJECTILES)

See Ordnance Drawing No. 45880

(a) Initials of inspector.
(b) Stamp of inspector.
(c) Caliber and type of projectile.
(d) Mark and mod. of projectile.

7. For the 9-Pounder projectile the following markings are shown only on the rotating band:

(9-POUNDER PROJECTILE)

See Ordnance Drawing Number 45880

(a) Initials of inspector.
(b) Stamp of inspector.
(c) Caliber, type, mark and mod. of projectile.
(d) Lot number with year of specifications.

8. (20 mm PROJECTILES)

The stenciled markings on a 20 mm. projectile are located on the body of the projectile rather than on the base, which is common practice for marking other projectiles. However, if projectile is painted this marking cannot be seen.

9. INDICATION OF TYPE OF PROJECTILES

The following are the authorized abbreviations for signifying the type of projectiles:

| | |
|---|---|
| A.P. | Armor-piercing |
| Com. | Common |
| Bbt. | Bombardment |
| Fld. | Field. |
| A.A. | Anti-aircraft |
| AA-Com. | Anti-aircraft--Common |
| S.S. | Illuminating |
| Tr. | Tracer |
| Sm. | Smoke |
| Shrap. | Shrapnel |
| F.N. | Flat Nose |
| C.N. | Cup Nose |
| Mkr. | Marker |
| L.C. | Line-carrying |
| T. | Target |
| P.S. | Proof Shot |
| Compl. | Signifies weight complete |

10. INDICATION OF WEIGHT OF PROJECTILE
(See Ordnance Drawing No. 45880)

The manufacturer stamps the weight of the empty projectile on each projectile of 3 inches in caliber or larger. The manufacturer stamps "COMPL." on the bases of all projectiles of 3 inches in caliber and larger. The depot loading the projectiles stamps the completed weights on the bases.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

11. INDICATION OF LOT NUMBER
(See Ordnance Drawing No. 45880)

Each manufacturer designates the first lot of a caliber and type he manufactures under certain specifications as "Lot 1." Lots of this same caliber and type made by the same manufacturer are numbered consecutively from "Lot 1" as long as they are manufactured under the same specifications. A change of specifications is accompanied by assigning new lot numbers, beginning again with "Lot 1."

PAINTING OF PROJECTILES

General -

1. Exteriors and interiors of projectiles are carefully cleaned before paint is applied and all grease or oil removed. Paint in all cases is applied evenly and the thickness of the coat be limited to the least amount required to protect the surface and produce the desired color.

2. BOURRELET -
(See Plates 2 and 3 on following pages)

The bourrelet is not painted. It is covered with a thin coat of vaseline or other heavy grease so as to properly protect the surface from rusting.

3. ROTATING BAND TO POINT -
(See Plates 1, 2 and 3 on following pages)

The exterior of the projectile from the rotating band to point, except bourrelet, is painted with a thin, hard, smooth, lead-free paint of the color as designated below, which matches the shades as given on the following plate (No. 1).

| | |
|---|---|
| Armor-piercing projectiles | BLACK |
| Common projectiles | SLATE |
| Target projectiles, no paint | VASELINE |
| Shrapnel | WHITE |
| Antiaircraft projectiles | GREEN |
| Antiaircraft-common projectiles | GREEN |
| Bombardment Projectiles | GREEN |
| Illuminating projectiles | LIGHT BLUE WITH WHITE STARS. |

4. ILLUMINATING PROJECTILES -
(See Plates 1, 2 and 3 on following pages)

Illuminating projectiles have, in addition to being painted with its designated color, two white 5-pointed stars, with one point directly toward the point of the projectile, and they are painted diametrically opposite to each other on the body of the projectile. These stars are situated equidistant between the point and the rotating band of the projectile. The size of the stars on a projectile are determined by inscribing a star in a circle whose diameter is the same as the diameter of the projectile.

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

PAINTING OF PROJECTILES, continued -

5. ROTATING BAND TO BASE -

(See Plates 1, 2 and 3 on following pages)

The exterior of the projectile from rotating band to base is painted in the same manner as the exterior from rotating band to point, except for projectiles used with cartridge cases. On projectiles used with cartridge cases the exterior, from rotating band to base, is coated with vaseline.

6. BASE -

(See plates 2 and 3 on following pages)

The bases of all projectiles and base plugs are coated with vaseline.

7. 20 MM PROJECTILES -

The 20 MM projectile does not fall into the above category of marking and painting. The 20 MM is painted as follows:

| | |
|---|---|
| White | - H.E. Tetryl |
| Grey | - H.E.T. Tetryl (Tracer) |
| Red | - H.E.I. Tetryl (Incendiary) |
| Dark Green | - Blind Loaded, plugged |
| Dark Green with Yellow line | - Blind loaded with tracer |
| Black | - A.P. |
| Blue | - Penolite -(Tracer) |
| Yellow | - Penolite -(No tracer) |

8. 40 MM PROJECTILES -

The marking and color of the 40 MM projectile is the same as that of larger caliber projectiles except that only the nose of the 40 MM is painted. There is no painting on the body of the 40 MM.

9. 1"1 PROJECTILES -

The 1"1 projectile has two dots on the body of the projectile--one red and one yellow--which indicate that the projectile has a tracer and is filled with Explosive D. There is no other painting on the projectile.

10. INTERIORS OF PROJECTILES -

The cavities of all projectiles are carefully cleaned and smoothed and are painted with an antiacid lacquer or paint approved by the Bureau of Ordnance. An exception to this is projectiles filled with day tracer fluid (anti-aircraft, anti-aircraft common and bombardment projectiles) and target projectiles. The cavities of the projectiles filled with day tracer fluid are coated with a thin, hard, lead-free paint to prevent the cavities from rusting. The cavities of target projectiles are not painted.

11. FUZE HOLES -

Before the fuze-hole plug called for by the projectile drawing is inserted, fuze holes are coated with a thin coating of vaseline to prevent rusting.

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CLASSIFICATION: TYPICAL PROJECTILE | |




TYPICAL PROJECTILE.



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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

ARMOR PIERCING AND COMMON PROJECTILES -

Projectiles having a false ogive (windshield) may carry a spotting dye which colors the water on impact. Each ship of a force will have projectiles with a different color spotting dye. This enables the spotters to determine which projectiles were fired by each ship.

The spotting dye in powder form is placed in the false ogive before it is screwed on to the nose of the projectile. Upon impact, the false ogive breaks loose from the projectile and the dye is free to color the water.

If a spotting dye is used, it will be indicated by a ring painted around the ogive below the tracer and filler indicating rings. The spotter ring will be painted the color of the spotting dye.

TARGET PROJECTILES -

For each projectile used in service, there is also a practice or "target" projectile which is not shown in this book. Ballistically, these target projectiles are identical to the regular service projectiles but they do not carry an explosive and are used exclusively for range finding and target practice.

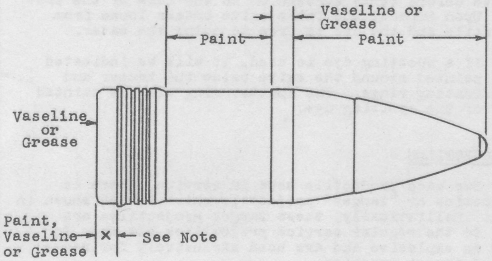
C-O-N-F-I-D-E-N-T-I-A-L

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

DIAGRAM OF
EXTERIOR PAINTING OF PROJECTILES

PLATE 2




COLOR OF PAINTED SURFACES

| | | |
|---|---|---|
| A.P. | (Armor-piercing) | Black |
| Com. | (Common) | Slate |
| T. | (Target) | No Paint (Vaseline) |
| Shrap. | (Shrapnel) | White |
| A.A. | (Antiaircraft) | Green |
| A.A.-Com. | (Antiaircraft-Common) | Green |
| Bbt. | (Bombardment) | Green |
| S.S. | (Illuminating) | Light Blue with White Stars. |

Note - For all projectiles for fixed ammunition (cartridge case) the surface indicated by the dimension "X" is vaselined.

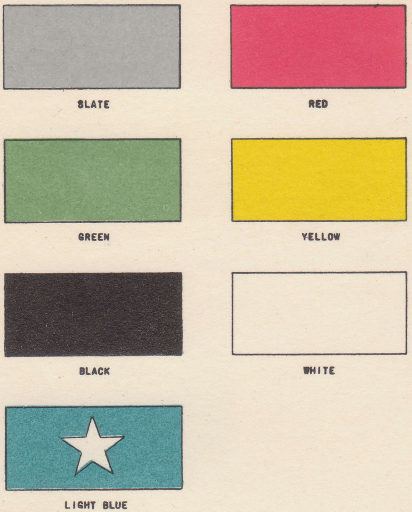
For all projectiles for bag guns, the surface indicated by the dimension "X" is painted the same color as indicated for the body of the projectile.

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

STANDARD COLORS FOR PROJECTILES

PLATE 1

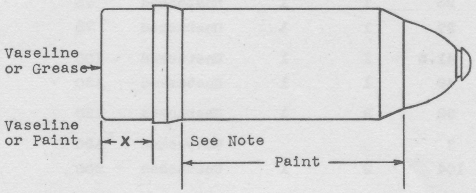


| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

DIAGRAM OF
EXTERIOR PAINTING OF SHRAPNEL AND ILLUMINATING PROJECTILES

PLATE 3




COLOR OF PAINTED SURFACES

| | | |
|---|---|---|
| Shrap. | (Shrapnel) | White |
| S.S. | (Illuminating) | Light Blue with White Stars |

Note - For all projectiles for fixed ammunition (cartridge case), the surface indicated by the dimension "X" is vaselined or greased.

For all projectiles for bag guns, the surface indicated by the dimension "X" is painted the same color as indicated for the body of the projectile.

The white stars for illuminating projectiles are two five-pointed stars, with one point directly toward the point of the projectile, and are painted diametrically opposite to each other on the body of the projectile. These stars are situated equidistant between the point and the rotating band of the projectile. The size of the stars on a projectile is determined by inscribing a star in a circle whose diameter is the same as the diameter of the projectile.

NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943

INTRODUCTION, continued -

GUN CHARGE DATA FOR BAG GUNS

| Gun Caliber | Maximum Weight of Charge Lbs | Number Tanks Per Charge | Number Sections Per Tank | Powder Charge Type | Ignition Per Section Grams |
|---|---|---|---|---|---|
| 5"/50 | 23 | 1 | 1 | Unstacked | 75 |
| 5"/51 | 27 | 1 | 1 | Unstacked | 75 |
| 6"/50 | 41.5 | 1 | 1 | Unstacked | 100 |
| 6"/53 | 48 | 1 | 1 | Unstacked | 150 |
| 7"/45 | 62 | 2 | 1 | Unstacked | 150 |
| 8"/23 | 7 | | | Unstacked | 150 |
| 8"/45 | 104 | 2 | 1 | Unstacked | 200 |
| 8"/55 Large Chamber | 110 | 2 | 1 | Stacked | 200 |
| 8"/55 Small Chamber | 105 | 2 | 1 | Stacked | 200 |
| 10"/40 | 220 | 2 | 1 | Unstacked | 400 |
| 12"/50 | 353 | 2 | 2 | Stacked | 300 |
| 14"/45 Small Chamber | 380 | 2 | 2 | Stacked | 300 |
| 14"/45 Large Chamber | 420 | 2 | 2 | Stacked | 300 |
| 14"/50 Long Chamber | 480 | 2 | 2 | Stacked | 300 |
| 14"/50 Short Chamber | 435 | 2 | 2 | Stacked | 300 |
| 16"/45 | 590 | 2½ | 2 | Stacked | 350 |
| 16"/50 | 700 | 3 | 2 | Stacked | 350 |

NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943

INTRODUCTION, continued -

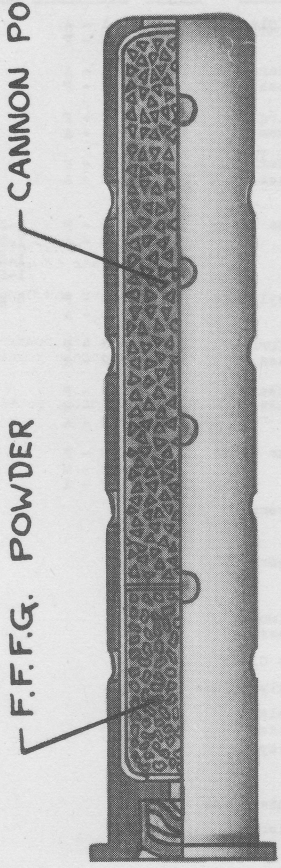
MAJOR GUNS IN THE FLEET -

| Size of Gun | Weight of Projectile | Class or Type of Ship | Number Guns Each | Number of Turrets A-Aft M-Midships F-Forward | Number Guns Each Turret |
|---|---|---|---|---|---|
| 16"/50 | 2700# A.P. | Iowa Class | 9 | 1 - A<br>2 - F | 3 |
| 16"/45 | 2700# A.P. | No. Carolina Class | 9 | 1 - A<br>2 - F | 3 |
| 16"/45 | 2240# A.P. | W. Virginia Class | 8 | 2 - F<br>2 - A | 2 |
| 14"/50 (Small Chamber) | 1500# A.P. | New Mexico Class | 12 | 2 - F<br>2 - A | 3 |
| 14"/45 (Large Chamber) | 1400# A.P. | Nevada Class | 10 | 2 - F<br>2 - A | 1-3 gun)-F.<br>1-2 gun)<br>1-3 gun)-A.<br>1-2 gun) |
| Note: | | Pennsylvania | 12 | 2 - F<br>2 - A | 3 guns ea. |
| 14"/45 | 1400# A.P. | New York Class | 10 | 3 - F<br>2 - A | 2 |
| 12"/50 | 870# A.P. | Arkansas Class | 12 | 2 - F<br>2 - M<br>2 - A | 2 |
| 12"/50 | 1140# A.P. | Alaska Class | 12 | 2 - F<br>2 - M<br>2 - A | 2 |
| 8"/55 (Large Chamber) | 260# A.P. | Cruisers | 9 | | |
| 8"/55 (Small Chamber) | 260# A.P. | Cruisers | 9 | | |
| 8" Hvy. Cruisers | 335# A.P. | Baltimore Class | 9 | | |
| 6"/50 | Bag Guns | Omaho Class | 10 | | |
| 6"/47 | Semi-Fix | Brooklyn Class | 15 | | |
| 6"/47 | Semi-Fix | Cleveland Class | 12 | | |
| 5"/38 (Single Mounts) | | Destroyers | | | |
| 5"/38 | | Atlanta Class | | | |
| 5"/38 | | Carriers | 16 | | |

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 3"/23, 3"/50; 1, 3 & 6 Pdr. |

DESIGNATION: Mk. 10 Mod 9




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

PRIMERS

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 3"/23, 3"/50; 1, 3 & 6 Pdr. |

DESIGNATION: Mk. 10 Mod 9

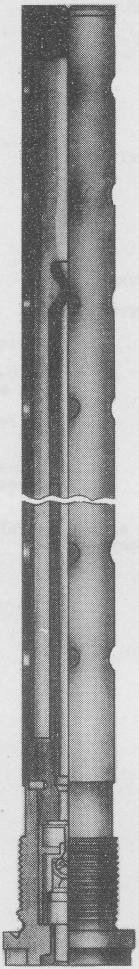
| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 2.21" |
| 2. | DIAMETER OF BODY | .375" |
| 3. | DIAMETER OF LIP | .473" |
| 4. | THICKNESS OF LIP | .025" |
| 5. | DIAMETER OF CAP CONTAINER | .2335" |
| 6. | WALL THICKNESS | .024" |
| 7. | NUMBER OF HOLES | 16 |
| 8. | DIAMETER OF HOLES | .089" |
| 9. | LENGTH OF IGNITION TUBE | None |
| 10. | MATERIAL OF CONSTRUCTION | Brass |
| 11. | HOW SECURED | Push Fit |
| 12. | MARKINGS | "Mk. 10-9", Manufacturer's symbol & year of manufacture. |
| 13. | NATURE OF CHARGE | Black Powder and Cannon Powder |
| 14. | WEIGHT OF CHARGE | 10 grams black powder, 26 grams Cannon powder |
| 15. | COMPOSITION OF CAP: Commercial mixture of mercury fulminate, potassium chlorate and antimony sulfide. | |

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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Combination | GUNS: 4"/50, 5"/38, 5"/25 |

DESIGNATION: Mk. 13



Mk. 13

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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Combination | GUNS: 4"/50, 5"/38, 5"/25 |

DESIGNATION: Mk. 13

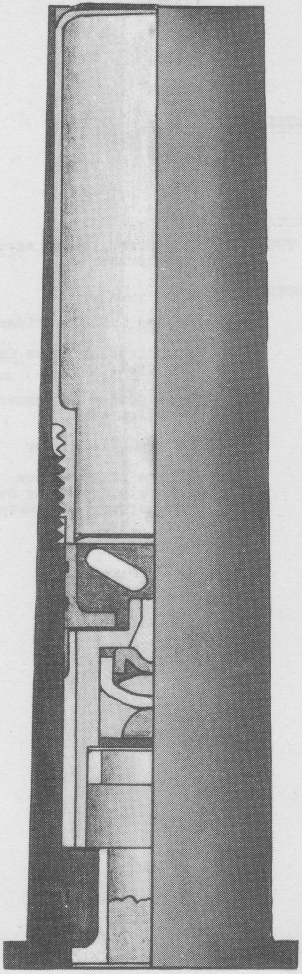
| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 9.745" |
| 2. | DIAMETER OF BODY | .538" |
| 3. | DIAMETER OF LIP | .80" |
| 4. | THICKNESS OF LIP | .098" |
| 5. | DIAMETER OF CAP CONTAINER | .32" |
| 6. | WALL THICKNESS | .036" |
| 7. | NUMBER OF HOLES | 24 |
| 8. | DIAMETER OF HOLES | .141" |
| 9. | LENGTH OF IGNITION TUBE | 7.0" Brass tubing screwed into primer. |
| 10. | MATERIAL OF CONSTRUCTION | Brass |
| 11. | HOW SECURED | Screwed into cartridge case. |
| 12. | MARKINGS | Four circular holes in base for tool. |
| 13. | NATURE OF CHARGE | Black powder in primer and ignition tube. |
| 14. | WEIGHT OF CHARGE | 265 grams in primer |
| 15. | COMPOSITION OF CAP | Mixture of Potassium Chlorate, Antimony Sulfide and Mercury Fulminate. |

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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Lock Combination | GUNS: All Bag Guns |

DESIGNATION: Mk. 15 Mod 1



MK. XV, MOD. 1

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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Lock Combination | GUNS: All Bag Guns |

DESIGNATION: Mk. 15 Mod 1

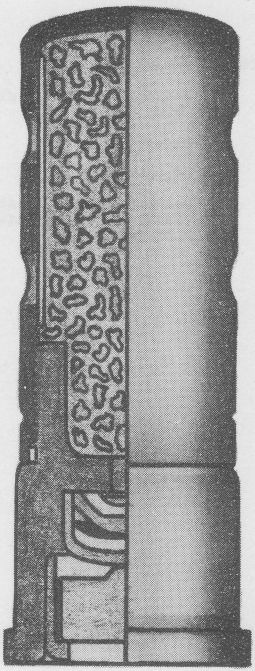
| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 1.985" |
| 2. | DIAMETER OF BODY | .492" |
| 3. | DIAMETER OF LIP | .596" |
| 4. | THICKNESS OF LIP | .050" |
| 5. | DIAMETER OF CAP CONTAINER | .320" |
| 6. | WALL THICKNESS | .022" |
| 7. | NUMBER OF HOLES | None |
| 8. | MATERIAL OF CONSTRUCTION | Bronze |
| 9. | HOW SECURED | Push-fit in breech plug of gun. |
| 10. | NATURE OF CHARGE | Black Powder |
| 11. | WEIGHT OF CHARGE | 30 grams |
| 12. | COMPOSITION OF CAP | Mercury Fulminate, Antimony Sulfide and Potassium Chlorate. |

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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 1"1 |

DESIGNATION: Mk. 19



Mk. XIX, Mod. 1

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 1"1 |

DESIGNATION: Mk. 19

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 1.71" |
| 2. | DIAMETER OF BODY | .54" |
| 3. | DIAMETER OF LIP | .62" |
| 4. | LIP THICKNESS | .079" |
| 5. | DIAMETER OF CAP CONTAINER | .401" |
| 6. | WALL THICKNESS | .035" |
| 7. | NUMBER OF HOLES | 6 |
| 8. | DIAMETER OF HOLES | .140" |
| 9. | LENGTH OF IGNITION TUBE | None |
| 10. | MATERIAL OF CONSTRUCTION | Brass |
| 11. | HOW SECURED | Push-fit |
| 12. | MARKINGS | "Mk. XIX Mod 1", mfg's initials and lot number. |
| 13. | NATURE OF CHARGE | Army black powder |
| 14. | WEIGHT OF CHARGE | 28 grains |
| 15. | COMPOSITION OF CAP | Mixture of T.N.T., Antimony Sulfide and Potassium Chlorate. |

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

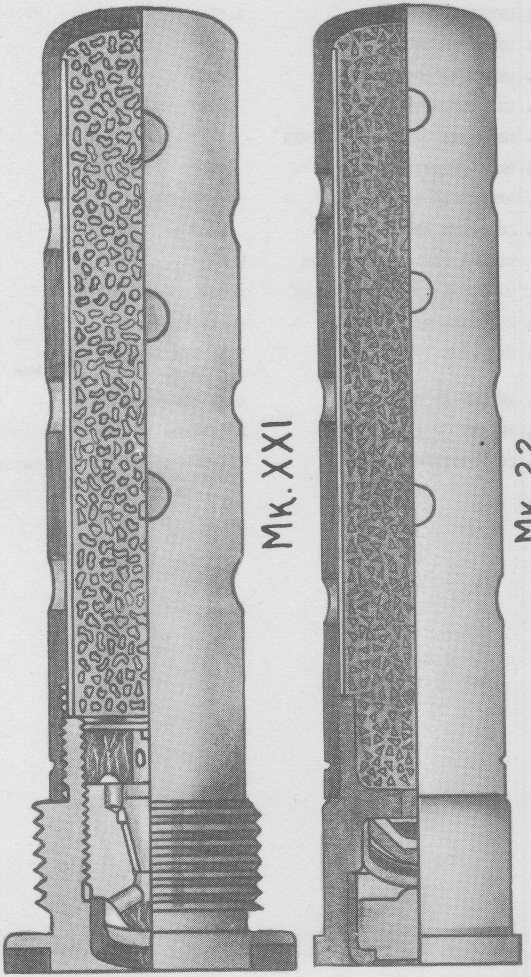


522852 O - 43 - 3

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 40 mm. |

DESIGNATION: Mk. 21; Mk. 22




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

PRIMER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| TYPE: Percussion | GUNS: 40 mm. |

DESIGNATION: Mk. 21; Mk. 22.

| | | Mk. 21 | Mk. 22 |
|---|---|---|---|
| 1. | OVERALL LENGTH | 2.9"(approx) | 2.9"(approx) |
| 2. | DIAMETER OF BODY | .54" | .54" |
| 3. | WALL THICKNESS | | .035" |
| 4. | NUMBER OF HOLES | | 12 |
| 5. | DIAMETER OF HOLES | | .140" |
| 6. | LENGTH OF IGNITION TUBE | None | None |
| 7. | MATERIAL OF CONSTRUCTION | Brass | Brass |
| 8. | HOW SECURED | Screws into Cartridge case. R.H. threads. | Push-fit |
| 9. | MARKINGS | | "Mk.22" Mfg's initials, loading plant, lot number, year |
| 10. | NATURE OF CHARGE | Black Powder | |
| 11. | WEIGHT OF CHARGE | 64 grains | 64 grains |
| 12. | COMPOSITION OF CAP | Mixture of 1.2 grains Fulminate of Mercury, Potassium Chlorate and Antimony Sulfide. | |

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

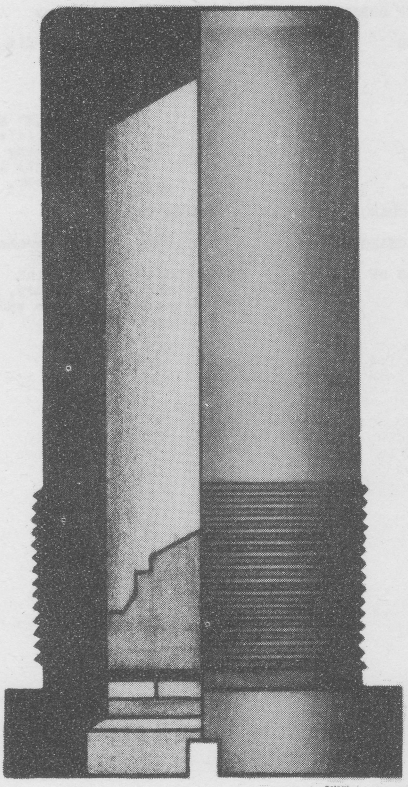
TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 5; Mk. 5 Mod 1 | TYPE: Igniting |

PROJECTILES USED IN:

Mk. 5 - 5"/38 Common
6"/47 Spec. Com., A.P., H.C.
8"/55 A.P., Common
14"/45 & 50 A.P.
16"/45 A.P.

Mk.5 Mod 1- 5"/51 H.C.
6"/47 H.C.
8"/55 H.C.
12"/50 H.C.
14"/45 & 50 H.C.
16"/45 H.C.



MK. 5 AND MK. 5, MOD. 1

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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk.5; Mk.5 Mod 1 | TYPE: Igniting |

PROJECTILES USED IN:

Mk. 5 - 5"/38 Common
6"/47 Spec. Com., A.P., H.C.
8"/55 A.P., Common
14"/45 & 50 A.P.
16"/45 A.P.

Mk. 5 Mod 1 - 5"/51 H.C.
6"/47 H.C.
8"/55 H.C.
12"/45 H.C.
14"/45 & 50 H.C.
16"/45 H.C.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 2.48" |
| 2. | DIAMETER OF HEAD | 1.248" |
| 3. | DIAMETER OF THREADS (MAJOR) | 1.0625" |
| 4. | DIAMETER OF ILLUMINANT CAVITY | .625" |
| 5. | METHOD OF SECURING | Screws into base of projectile by 15 L.H. threads. |
| 6. | COMPOSITION OF STARTER PYROTECHNIC | Barium Peroxide & Magnesium Powder. |
| 7. | COMPOSITION OF ILLUMINANT | Sodium Nitrate, Calcium Silicide, Charcoal, and Linseed oil. |
| 8. | COLORS USED | Orange |

9. MARKINGS;
End of tracer painted orange to indicate color. "Tr. Mk. 5 (or 5-1) Lot ____," together with mfg's initials, loading date and initial of color; ("O" for orange)

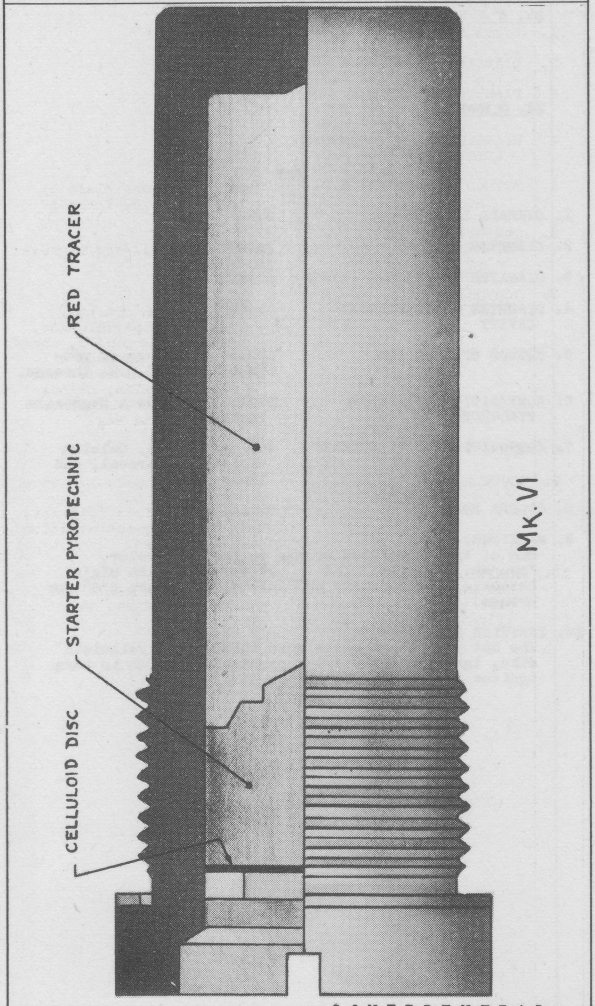
10. IGNITION METHOD:
The hot propellant gases burn through the celluloid disc, igniting the starter pyrotechnic which in turn ignites the orange illuminant.

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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 6 | |

PROJECTILES USED IN: 4"/50 and 5"/51




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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 6 | |

PROJECTILES USED IN: 4"/50 and 5"/51

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 2.45" |
| 2. | DIAMETER OF HEAD | .939" |
| 3. | DIAMETER OF THREADS (MAJOR) | 13/16" |
| 4. | DIAMETER OF ILLUMINATING CAVITY | .500" |
| 5. | METHOD OF SECURING | Screws into base plate by means of 10 L.H. threads. |
| 6. | COMPOSITION OF STARTER PYROTECHNIC | Barium peroxide and magnesium powder. |
| 7. | COMPOSITION OF ILLUMINANT | RED: Strontium nitrate, ammonium perchlorate, magnesium powder, charcoal and linseed oil.<br>WHITE: Barium nitrate, barium peroxide, magnesium powder, aluminum powder and wax. |
| 8. | COLORS USED | Red and White |
| 9. | MARKINGS | End of tracer painted red or white. "MK VI LOT ___" together with Mfr's initials, year and color abbreviation stamped on head. |

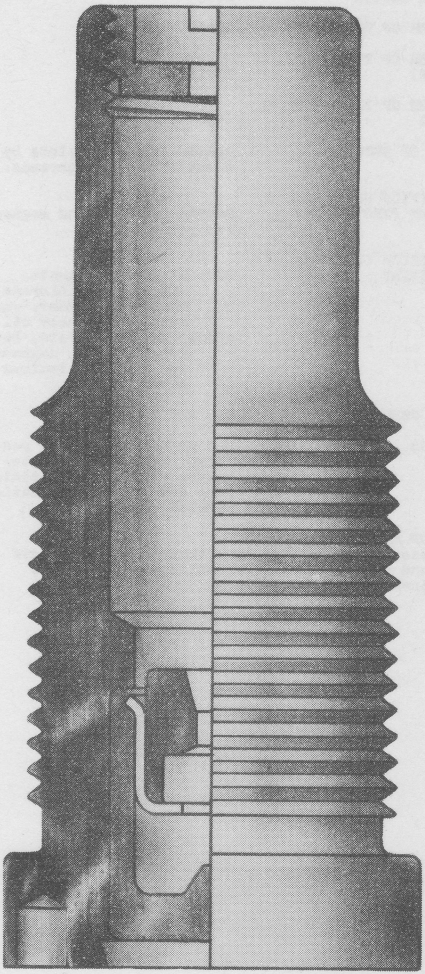
10. IGNITION METHOD:
Hot gases of propellant burn through the celluloid disc and ignite the starter which then fires the illuminant.

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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 8 | |

PROJECTILES USED IN: 40mm A.A.




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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 8 | |

PROJECTILES USED IN: 40 mm. A.A.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 2.12" |
| 2. | DIAMETER OF HEAD | .925" |
| 3. | DIAMETER OF THREADS (MAJOR) | .830" |
| 4. | DIAMETER OF ILLUMINANT CAVITY | .475" |
| 5. | METHOD OF SECURING | Screws into shell base by 17 L.H. threads. |
| 6. | COMPOSITION OF STARTER PYROTECHNIC | Barium peroxide and magnesium powder. |
| 7. | MARKING | "MK. 8 MOD__ LOT__" stamped on head. |

8. IGNITION METHOD:
The cap holder, when the shell is fired, sets back, thus overcoming the stirrup spring and forces itself against the anvil, igniting and initiating the action of the tracer and blowing out the sealing disc aft of the anvil.

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9 | |
| PROJECTILES USED IN: 4"/50, 5"/38 & 5"/25 | |




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

TRACER DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9 | |

PROJECTILES USED IN: 4"/50, 5"/38 & 5"/25

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 2.48" |
| 2. | DIAMETER OF HEAD | 1.248" |
| 3. | DIAMETER OF THREADS (MAJOR) | 1-1/16" |
| 4. | DIAMETER OF ILLUMINANT CAVITY | .500" |
| 5. | METHOD OF SECURING | Screws into base by means of 15 L.H. threads. |
| 6. | COMPOSITION OF STARTER PYROTECHNIC | Barium peroxide, Magnesium powder, Barium nitrate. |
| 7. | COMPOSITION OF ILLUMINANT | White: Aluminum powder and wax.<br>Red: Strontium nitrate, ammonium perchlorate, magnesium powder and charcoal and linseed oil. |
| 8. | COLORS USED | Red and White |
| 9. | MARKINGS | End of tracer painted to indicate color. "Mk 9", lot, mfg's initials, year and color initial stamped on head. |

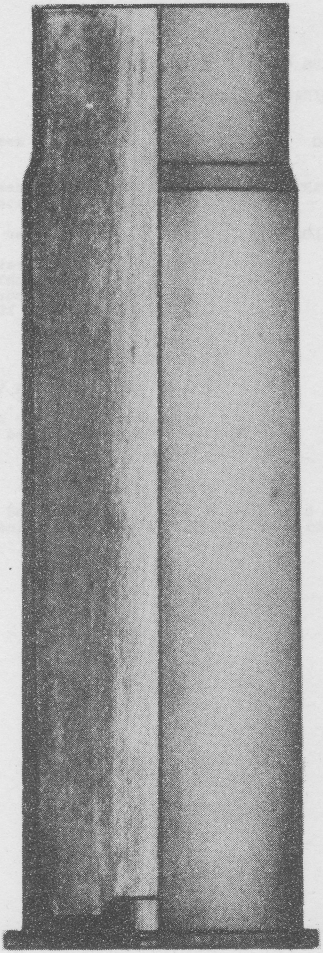
10. IGNITION METHOD:

Propellant gases burn through a celluloid disc and ignite starter which in turn initiates the illuminant.

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

CARTRIDGE CASE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| DESIGNATION: 1 Pdr. Cartridge Case Mk. II | GUN: 1 Pdr. / 20, 40, 42.5, 50 cal. |



Mk. 2

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

CARTRIDGE CASE DATA

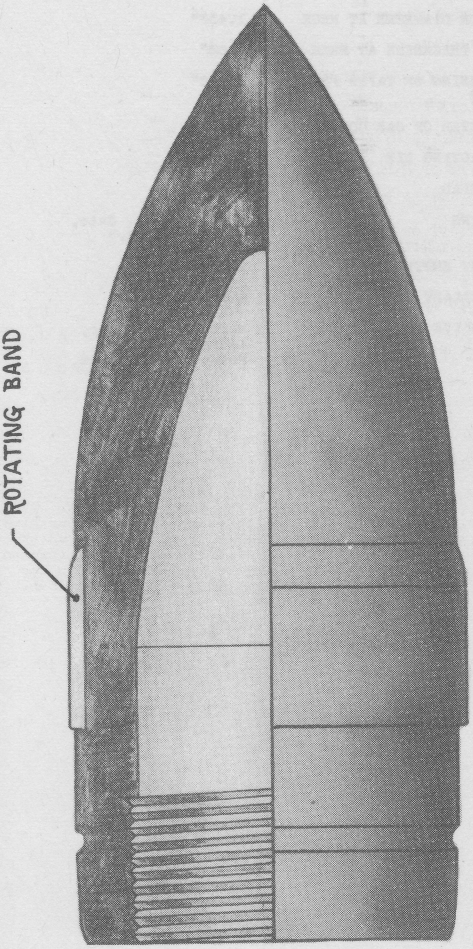
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 1 Pdr Cartridge Case Mk. II | GUN: 1 Pdr / 20, 40, 42.5, 50 cal. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 5.389" |
| 2. | MAXIMUM DIAMETER | 1.600" |
| 3. | INSIDE DIAMETER AT NECK | 1.433" |
| 4. | CASE THICKNESS AT NECK | .02" |
| 5. | BEGINNING OF TAPER FROM BASE | 4.248" |
| 6. | DIAMETER OF CAP CONTAINER | .473" |
| 7. | EXTRACTING LIP | .087" |
| 8. | MATERIAL | Brass |
| 9. | MARKING | Mfg's symbol, date, "Mk II - 1 pdr" |
| 10. | WEIGHT EMPTY | 6.502 oz. |
| 11. | PROPELLANT | Black Powder |
| 12. | EXPLOSIVE IN CAP | Mercury Fulminate, Antimony Sulfide, Potassium Chlorate. |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 1 Pdr. | CLASSIFICATION: Common |
| TARGET: Used in coast guard guns, landing forces, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 1 Pdr. | CLASSIFICATION: Common |
| TARGET: Used in coast guard guns, landing forces, etc. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 3.56" |
| 2. | DIAMETER OF BASE | 1.441" |
| 3. | DISTANCE FROM BASE TO BAND | .829" |
| 4. | WIDTH OF BAND | .731" |
| 5. | DIAMETER OF BOURRELET | 1.445" |
| 6. | TYPE OF FILLER | Black Powder |
| 7. | WEIGHT OF FILLER | 180 grains |
| 8. | WEIGHT OF LOADED PROJECTILE | 8670 grains |
| 9. | CHARGE-WEIGHT RATIO | 2.07% |
| 10. | TYPE OF GUN USED IN | 1 Pdr. |
| 11. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 8; Mk. 8 Mods 1, 2, 3, 4 & 5; Mk. 2 Mods 8 & 9. |
| 12. | TRACER | In Fuze |
| 13. | CARTRIDGE CASE | Mk. 1 & Mk. 2 |
| 14. | PRIMER | Mk. 10 Mod 8; Mk. 10 Mod 9 |

15. REMARKS:
This ammunition is used in coast guard guns. Their bursting charge is Black Powder and T.N.T. or Black Powder alone. Black Powder is very sensitive and this should be kept in mind when unscrewing the fuze as some of the powder may have fallen down into the threads and the friction would cause detonation.

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

CARTRIDGE CASE DATA

| NATIONALITY: U. S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 3 Pdr. Mk I<br>3 Pdr. Mk I Mod I | GUN: 3 Pdr - 40, 45 and 50 cal. |




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

CARTRIDGE CASE DATA

| NATIONALITY: U. S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 3 Pdr. Mk I | GUN: 3 Pdr - 40, 45 and 50 cal. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 14.843" |
| 2. | MAXIMUM DIAMETER | 2.272" |
| 3. | INSIDE DIAMETER AT NECK | 1.826" |
| 4. | CASE THICKNESS AT NECK | .04" |
| 5. | BEGINNING OF TAPER FROM BASE | 12.44" |
| 6. | DIAMETER OF CAP CONTAINER | .473" |
| 7. | EXTRACTING LIP | .12" |
| 8. | MATERIAL | Brass |
| 9. | MARKING | Mfg's Symbol, date, "3 Pdr. Mk I" |
| 10. | WEIGHT EMPTY | 1.6 lb. (approximate) |
| 11. | PROPELLANT | Black Powder |
| 12. | EXPLOSIVE IN CAP | Mixture of Mercury Fulminate, Antimony Sulfide, Potassium Chlorate. |

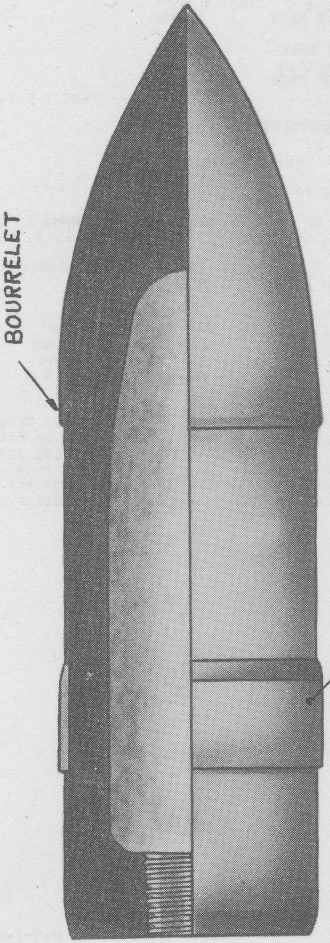
C-O-N-F-I-D-E-N-T-I-A-L



522853 O - 43 - 4

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3 Pdr. | CLASSIFICATION: Common |
| TARGET: Used in coast defense guns, landing forces, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3 Pdr. | CLASSIFICATION: Common |
| TARGET: Used in coast defense guns, landing forces, etc. | |

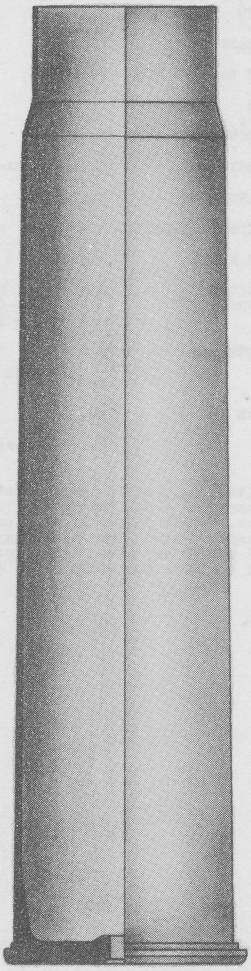
| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 6.681" |
| 2. | DIAMETER OF BASE | 1.75" |
| 3. | DISTANCE FROM BASE TO BAND | 1.185" |
| 4. | WIDTH OF BAND | .787" |
| 5. | DIAMETER OF BOURRELET | 1.845" |
| 6. | TYPE OF EXPLOSIVE | Black Powder and T.N.T. |
| 7. | WEIGHT OF CHARGE | .13 lbs. |
| 8. | WEIGHT OF LOADED PROJECTILE | 3.30 lbs. |
| 9. | CHARGE-WEIGHT RATIO | 3.93% |
| 10. | FUZES WHICH MAY BE USED IN PROJECTILE | BASE: Mk. 8, Mods 1, 2, 3, 4 & 5; Mk. 2, Mods 8 & 9. |
| 11. | TYPE OF GUN USED IN | 3 Pdr. |
| 12. | TRACER | In Fuze |
| 13. | CARTRIDGE CASE | Mk. 1 |
| 14. | PRIMER | Mk. 10, Mods 8 & 9 |

15. REMARKS:
This ammunition is used in coast guard guns. The bursting charge is Black Powder and T.N.T. or Black Powder alone. Black Powder is very sensitive and this should be kept in mind when unscrewing the fuze as some of the powder may have fallen down into the threads and the friction would cause detonation.

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 6 Pdr. Mk I | GUN: 6 Pdr. - 40, 45 and 50 cal. |



Mk. I

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

CARTRIDGE CASE DATA

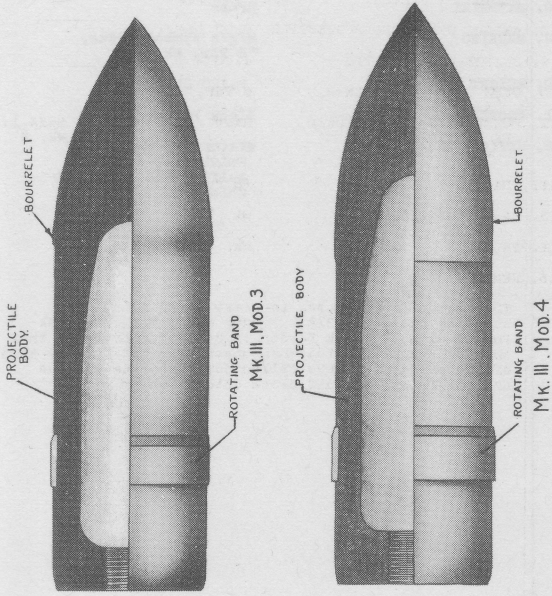
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 6 Pdr. Mk I | GUN: 6 Pdr. - 40, 45 and 50 cal. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 12.09" |
| 2. | MAXIMUM DIAMETER | 2.705" |
| 3. | INSIDE DIAMETER AT NECK | 2.209" |
| 4. | CASE THICKNESS AT NECK | .045" |
| 5. | BEGINNING OF TAPER AT BASE | 10.04" |
| 6. | DIAMETER OF CAP CONTAINER | .473" |
| 7. | EXTRACTING LIP | .15" |
| 8. | MATERIAL | Brass |
| 9. | MARKING | Mfg's symbol, date, "6 Pdr. Mk I" |
| 10. | WEIGHT EMPTY | 2.125 lbs |
| 11. | PROPELLANT | Black Powder |
| 12. | EXPLOSIVE IN CAP | Mixture of Mercury Fulminate, Antimony Sulfide and Potassium Chlorate. |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 6 Pounder | CLASSIFICATION: Common |
| TARGET: Used in Coast Guard guns, landing forces, etc. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6 Pounder | CLASSIFICATION: Common |
| TARGET: Used in Coast Guard guns, landing forces, etc. | |

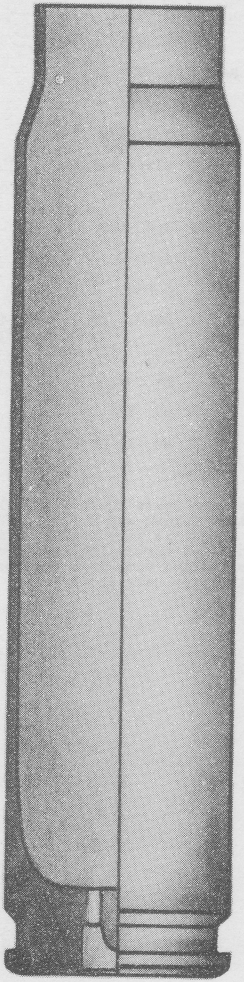
| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | 8.45" |
| 2. | DIAMETER OF BASE | 2.224" |
| 3. | DISTANCE FROM BASE TO BAND | 1.493" |
| 4. | WIDTH OF BAND | .787" |
| 5. | DIAMETER OF BOURRELET | 2.239" |
| 6. | TYPE OF FILLER | Black Powder |
| 7. | WEIGHT OF FILLER | .24 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 6.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 4.00 % |
| 10. | TYPE OF GUN USED IN | 6 Pdr. |
| 11. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 8; Mk. 8 Mods 1, 2, 3, 4 & 5; Mk. 2 Mods 8 & 9. |
| 12. | TRACER | In fuze |
| 13. | CARTRIDGE CASE | Mk. 1 |
| 14. | PRIMER | Mk. 10 Mods 8 & 9 |
| 15. | REMARKS: | |

This ammunition is used in Coast Guard guns. The bursting charge is Black Powder and T.N.T. or Black Powder alone. Black Powder is very sensitive and this should be kept in mind when unscrewing the fuze as some of the powder may have fallen down into the threads and the friction would cause detonation.

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

CARTRIDGE CASE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| DESIGNATION: 20 mm. Mk I | GUN: Hispano Suiza Type |



MK. I

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

CARTRIDGE CASE DATA

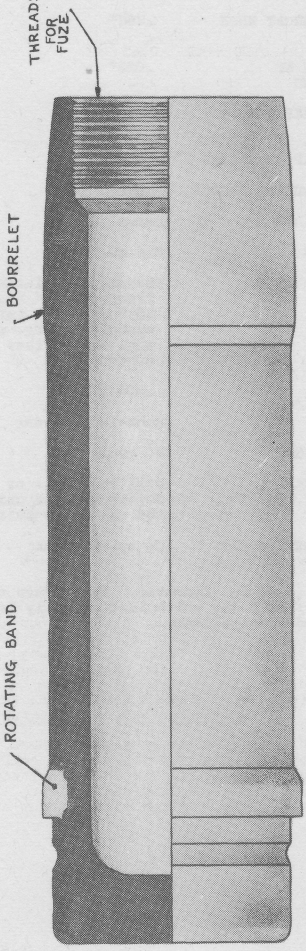
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 20 mm. Mk I | GUN: Hispano Suiza Type |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 4.342" |
| 2. | MAXIMUM OUTSIDE DIAMETER (Base) | .976" |
| 3. | INSIDE DIAMETER AT NECK (Proj. end) | .766" |
| 4. | THICKNESS CASE AT PROJECTILE END | .023" |
| 5. | BEGINNING OF TAPER FROM BASE | .610" |
| 6. | DIAMETER OF CAP CONTAINER | .388" |
| 7. | DEPTH OF EXTRACTING GROOVE | .055" |
| 8. | MATERIAL | Brass |
| 9. | VOLUME OF CASE | 2.4 cu.in. |
| 10. | MARKINGS | Stamped with letters and figures 1/16" high and .01" deep the initials or symbols of mfg, year of mfg. and caliber and mark of case. |
| 11. | WEIGHT EMPTY | .205 lbs |
| 12. | PROPELLANT | Smokeless Powder |
| 13. | PROPELLANT WEIGHT | 30 grams |
| 14. | EXPLOSIVE IN CAP | 37½% Fulminate of Mercury<br>37½% Potassium Chloride<br>25% Antimony Sulfide |
| 15. | EXPLOSIVE WEIGHT IN CAP | 2¼ to 2½ grams |
| 16. | REMARKS:<br>The anvil is .3102 in. diameter. The primer cap chamber contains two fire holes which lead directly to the smokeless powder propellant. | |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 20 MM. H.E. Mk 3 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 20 MM. H.E. Mk. 3 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze | 3.2" |
| | Without Fuze | 2.6" |
| 2. | DIAMETER OF BASE | 0.74" |
| 3. | DISTANCE FROM BASE TO BAND | 0.4" |
| 4. | WIDTH OF BAND | 0.2" |
| 5. | DIAMETER OF BOURRELET | 0.78" |
| 6. | TYPE OF FILLING | Tetryl or a derivative of Penthrite |
| 7. | WEIGHT OF FILLING | .02 lbs |
| 8. | WEIGHT OF PROJECTILE | .27 lbs |
| 9. | CHARGE-WEIGHT RATIO | 7.0 % |
| 10. | TYPE OF GUN USED IN | 20 MM. A.A. Mk. 4 |
| 11. | TRACER | This particular 20 MM. does not have a tracer. |
| 12. | FUZE WHICH MAY BE USED WITH PROJECTILE | Nose Fuze Mk. 26 |
| 13. | CARTRIDGE CASE | Mk. 3; Mk. 1. |
| 14. | PRIMER | Cap |
| 15. | REMARKS: | |

Markings - The markings appear on the body and run fore and aft. Sample markings: "Mk. 3-6 D 6-42"

Color - The projectile is painted all over to indicate the explosive which it contains, as follows:

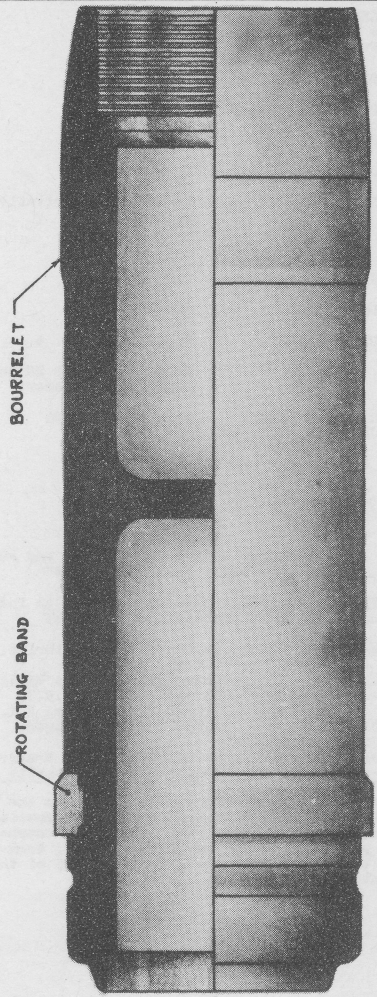
| | |
|---|---|
| Yellow - | Derivative of Penthrite. |
| White - | Tetryl, H.E. |
| Black - | Armor piercing (no explosive) |
| Gray - | Tetryl (tracer) H.E.T. |
| Red - | Tetryl (Incendiary) H.E.I. |
| Dark Green - | Blind Loaded, plugged. |
| Dark Green with Yellow line - | Blind Loaded with tracer |
| Blue - | Derivative of Penthrite (tracer) |

Note: It is possible that in the very near future the 20 MM Mk. 3 will be filled with an incendiary composition and referred to as H.E.I. The incendiary composition will be pressed into the projectile first, then the burster (tetryl) will be pressed in on top of this increment.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 20 MM. Mk 4 & Mk 7; HET | CLASSIFICATION: A.A. |
| TARGET: These projectiles are used against aircraft. | |




MK. 4 AND MK. 7

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 20 MM. Mk 4 & Mk 7; HET | CLASSIFICATION: A.A. |

TARGET: These projectiles are used against aircraft.

| | | Mark 4 | Mark 7 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Fuze<br>Without Fuze - | 3.2"<br>2.5" | 3.2"<br>2.5" |
| 2. | DIAMETER OF BASE | 0.74" | 0.74" |
| 3. | DISTANCE FROM BASE TO BAND | 0.4" | 0.4" |
| 4. | WIDTH OF BAND | 0.2" | 0.2" |
| 5. | DIAMETER OF BOURRELET | 0.78" | 0.78" |
| 6. | TYPE OF FILLING | The main filling or burster charge may be a derivative of penthrite or tetryl. | |
| 7. | WEIGHT OF FILLING | .01 lbs | .01 lbs |
| 8. | WEIGHT OF PROJECTILE | .26 lbs | .27 lbs |
| 9. | CHARGE-WEIGHT RATIO | 3.84 % | 3.70 % |
| 10. | TYPE OF GUN USED IN | 20 MM. A.A. Gun Mk. 4 | |

11. TRACER:
These two marks of the 20 MM. have the tracer arrangement as illustrated on the opposite page.

The projectiles are divided into two compartments--the forward compartment contains the burster charge, the after compartment contains the tracer element. The tracer element is divided into two increments: (1) First increment is the tracer composition which is pressed in the after compartment by hydraulic pressure; (2) The second increment is the "starter" which is pressed in on top of the tracer composition. The starter composition is more sensitive than the tracer composition. When either of these projectiles is fired, the heat from the propellant charge ignites the starter which, in turn, sets off the tracer composition.

| | | |
|---|---|---|
| 12. | FUZE WHICH MAY BE USED IN PROJECTILE | Nose Fuze Mk. 26 |
| 13. | CARTRIDGE CASE | Mk. 3; Mk. 1; Mk. 2. |
| 14. | PRIMER | Cap |

15. REMARKS:

Color - The 20 MM. is not painted in accordance with the standard markings of other projectiles. The 20 MM. is painted all over in one color to indicate the nature of the burster filling, (see Introduction). The Mk. 4 and Mk. 7 are H.E.T. and painted Gray.

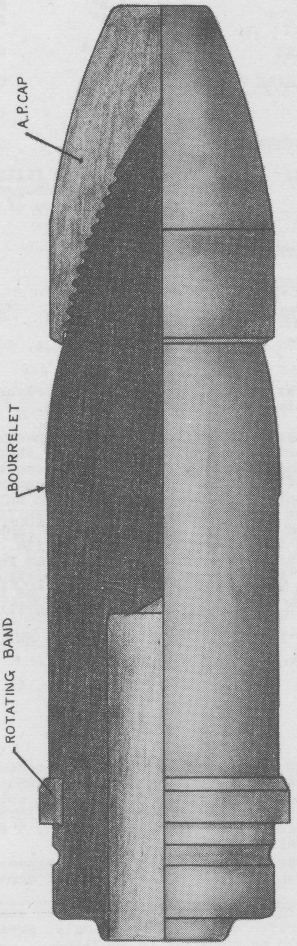
Markings - The markings on the 20 MM. appear on the body and run fore and aft. Sample of markings:
"Mk. 4 - 6 D 6-42"

Note: The burster charge of the 20 MM. is more sensitive than the usual burster charge. Accordingly, greater caution should be observed in handling.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 20 MM A.P. Mk. 8 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |




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

PROJECTILE DATA

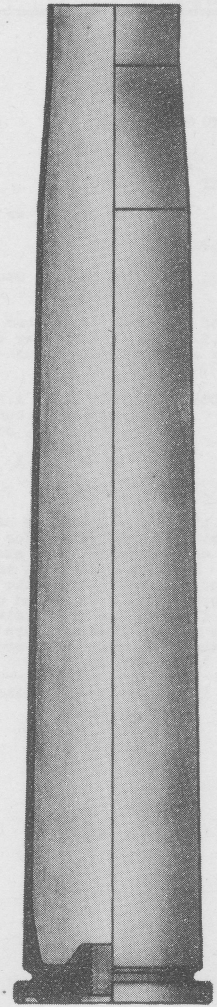
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 20 MM A.P. Mk. 8 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Plastic Cap<br>Without Plastic Cap | <br>3.1"<br>2.6" |
| 2. | DIAMETER OF BASE | 0.74" |
| 3. | DISTANCE FROM BASE TO BAND | 0.3" |
| 4. | WIDTH OF BAND | 0.2" |
| 5. | DIAMETER OF BOURRELET | 0.78" |
| 6. | TYPE OF FILLING | No filling or burster charge. |
| 7. | WEIGHT OF LOADED PROJECTILE | .27 lbs |
| 8. | TYPE OF GUN USED IN | 20 MM A.A. Gun Mk. 4 |
| 9. | TRACER:<br>The tracer cavity of this fuze is neither as deep nor as wide as the H.E.T. 20 MM. The tracer composition is in the form of a capsule and is a push-fit in the cavity. | |
| 10. | FUZES WHICH MAY BE USED WITH PROJECTILE | This is an A.P. projectile without a burster charge, therefore, no fuze is used. |
| 11. | CARTRIDGE CASE | Mk. 3; Mk. 1 |
| 12. | REMARKS:<br><br>Description: - The projectile itself is of the same shape and size as other 20 MM. except for the pointed nose. Also, it is made of solid steel except for the tracer cavity. As illustrated, the nose of the projectile is fitted with a solid plastic cap which is moulded to the body. The extreme end of the plastic nose has a flat surface with a diameter of 0.3". An alternate method of manufacture permits annular grooves around the nose of the projectile before the plastic is moulded on. | |

Note: - The A.P. 20 MM. is painted a solid black color.

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 40 MM. Mk. 1 | GUN: 40 MM. Mk. 1 A.A. |



Mk.1

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 40 MM. Mk. 1 | GUN: 40 MM. Mk. 1, A.A. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 12.24" |
| 2. | MAXIMUM DIAMETER | 2.441" |
| 3. | INSIDE DIAMETER AT NECK | 1.537" |
| 4. | CASE THICKNESS AT NECK | .037" |
| 5. | BEGINNING OF TAPER | 9.740" |
| 6. | DIAMETER OF CAP CONTAINER | .802" |
| 7. | EXTRACTING LIP | .433" |
| 8. | MATERIAL | Brass |
| 9. | VOLUME | Approx. 31.65 cu.in. |
| 10. | MARKING: Stamped with letters and figures 1/8" high and .01" deep, initials or symbol of manufacturer and year of manufacture in full and 40 MM Mk. 1 around cap on base. | |
| 11. | WEIGHT EMPTY | 1.93 lbs |
| 12. | PROPELLANT | Smokeless powder |
| 13. | PROPELLANT WEIGHT | 300 grams |
| 14. | EXPLOSIVE IN CAP | 37.5% Fulminate of Mercury<br>37.5% Potassium Chlorate<br>25.0% Antimony Sulfide |
| 15. | PRIMER | Mk. 21 and 22. |
| 16. | REMARKS: The cap is screwed into the base by eighteen (18) left hand threads. | |

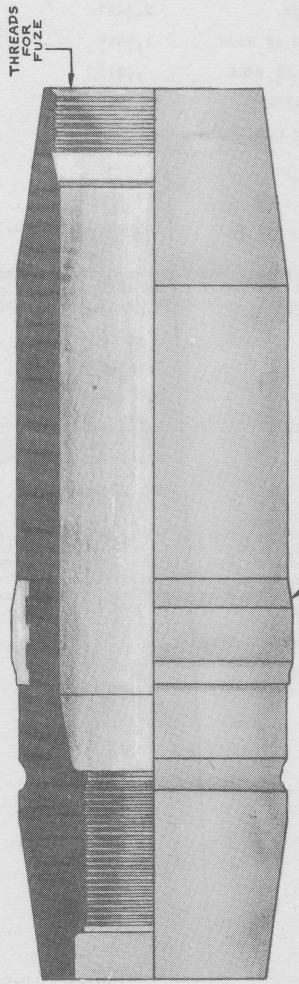
C-O-N-F-I-D-E-N-T-I-A-L



522852 O - 43 - 5

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 40 MM Mk. 1 & 2 | CLASSIFICATION: A.A. |
| TARGET: Used primarily against aircraft. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 40 MM Mk. 1 & 2 | CLASSIFICATION: A.A. |
| TARGET: Used primarily against aircraft. | |

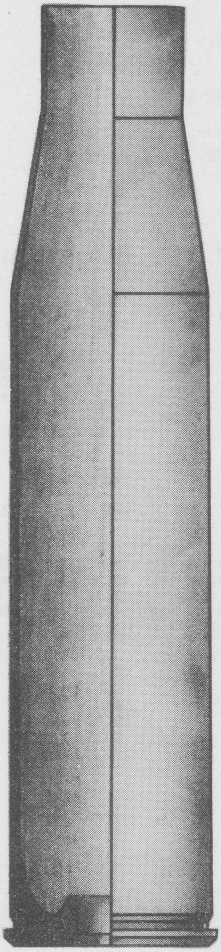
| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Fuze<br>Without Fuze | <br>7.1"<br>5.2" |
| 2. | DIAMETER OF BASE | 1.3" |
| 3. | DISTANCE FROM BASE TO BAND | 1.7" |
| 4. | WIDTH OF BAND | 0.6" |
| 5. | DIAMETER OF BOURRELET | 1.57" |
| 6. | TYPE OF FILLING | Cast T.N.T. |
| 7. | WEIGHT OF FILLING | 0.1 lbs |
| 8. | WEIGHT OF PROJECTILE (COMPLETE) | 2.0 lbs |
| 9. | CHARGE-WEIGHT RATIO | 5.0 % |
| 10. | TYPE OF GUN USED IN | 40 MM A.A. gun |
| 11. | TRACER | Either Mk. 1 or Mk. 2 may be fitted with the 40 MM tracer igniter Mk. 8 or Mk. 10. |
| 12. | FUZE WHICH MAY BE USED IN PROJECTILE | Nose Fuze - Mk. 27 |
| 13. | CARTRIDGE CASE | Mk. 2; Mk. 1. |
| 14. | PRIMER | Mk. 21; Mk. 22. |
| 15. | REMARKS:<br>The 40 MM Mk. 1 was manufactured first. The Mk. 2 was then produced with only minor manufacturing differences. Both marks are in production now, but they are gauged the same as described above. Therefore, the external recognition is the same. | |

NOTE: ALL 40 MMs HAVE TRACERS.

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S.NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 1.10 Mk. I | GUN: 1.10" A.A. |



Mk. I

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

CARTRIDGE CASE DATA

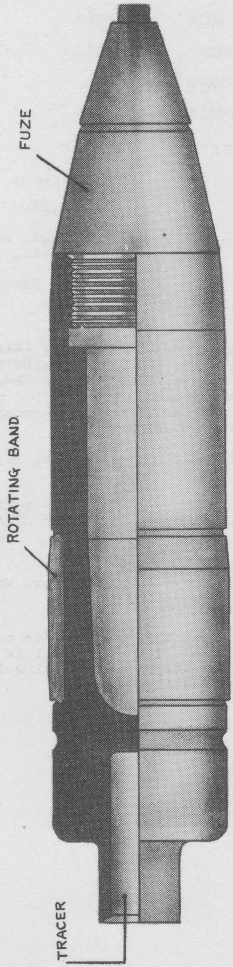
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 1.10 Mk. I | GUN: 1.10" A.A. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 7.83" |
| 2. | MAXIMUM DIAMETER | 1.625" |
| 3. | INSIDE DIAMETER AT NECK | 1.077" |
| 4. | CASE THICKNESS AT NECK | .03" |
| 5. | BEGINNING OF TAPER FROM BASE | 5.21" |
| 6. | DIAMETER OF CAP CONTAINER | .630" |
| 7. | EXTRACTING LIP | .03" |
| 8. | MATERIAL | Brass |
| 9. | VOLUME | 10.84 cu.in. |
| 10. | MARKING | Mfg. symbol, date, mark and mod on base. |
| 11. | PROPELLANT | Smokeless Powder |
| 12. | PROPELLANT WEIGHT | 120 grams |
| 13. | EXPLOSIVE IN CAP | Mixture of Potassium Chlorate, Mercury Fulminate and Antimony Sulfide. |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 1"10 Mk. I | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |




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

PROJECTILE DATA

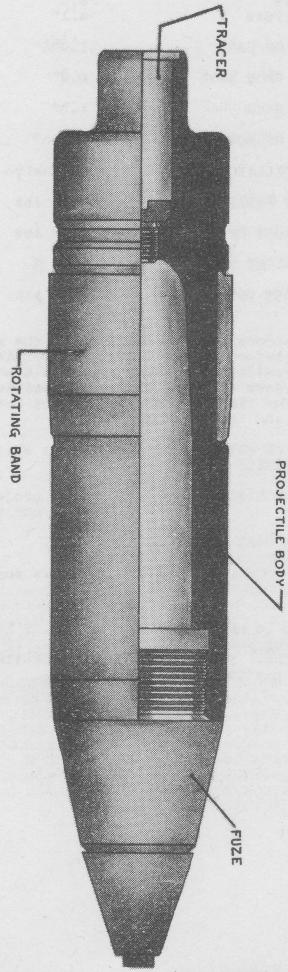
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 1".10 Mk. I | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Fuze<br>Without Fuze | <br>5.8"<br>4.1" |
| 2. | DIAMETER OF BASE | 1.085" |
| 3. | DISTANCE FROM BASE TO BAND | 0.9" |
| 4. | WIDTH OF BAND | 1.0" |
| 5. | DIAMETER OF BOURRELET | 1.095" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | .04 lbs |
| 8. | TOTAL WEIGHT OF PROJECTILE | .92 lbs |
| 9. | CHARGE-WEIGHT RATIO | 4.0 % |
| 10. | TYPE OF GUN USED IN | 1".10 A.A. |
| 11. | TRACER:<br>Tracer composition is retained in the recess at the base of the projectile. All 1".10 projectiles have tracers. The composition and arrangement is the same as the 20 MM tracer with the tracer composition pressed in the base. The fire from the propellant powder initiates the starter and tracer composition. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 12, Mods 1, 2 & 3. |
| 13. | CAP & WINDSHIELD | This projectile has neither cap nor windshield. |
| 14. | CARTRIDGE CASE | Mk. I |
| 15. | PRIMER | Mk. 19 and Mods. |
| 16. | REMARKS:<br>It is to be noted that the 1".1 Mk. I is not the self-destroying projectile. The 1".1 Mk. II is self-destroying. This is the primary distinguishing feature between the two projectiles | |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 1"10 Mk. 2 | CLASSIFICATION: A.A. |
| TARGET: Aircraft. | |




Mk. 2

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

PROJECTILE DATA

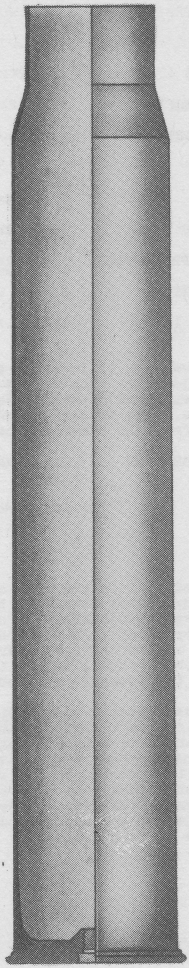
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 1"10 Mk. 2 | CLASSIFICATION A.A. |
| TARGET: Aircraft. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Fuze<br>Without Fuze | <br>5.7"<br>4.1" |
| 2. | DIAMETER OF BASE | 1.085" |
| 3. | DISTANCE FROM BASE TO BAND | 1.30" |
| 4. | DIAMETER OF BOURRELET | 1.095" |
| 5. | WIDTH OF BAND | 1.0" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | .034 lbs |
| 8. | TOTAL WEIGHT OF PROJECTILE | .917 lbs |
| 9. | CHARGE-WEIGHT RATIO | 3.7 % |
| 10. | TYPE OF GUN USED IN | 1"10 A.A. |
| 11. | TRACER:<br>The tracer composition is inserted in the recess at the base of the projectile. The tracer element is divided into two increments and pressed into the recess by hydraulic pressure. The tracer is ignited by the propellant charge from the cartridge case. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 12 Mods 1, 2 & 3. |
| 13. | CARTRIDGE CASE | 1"1 Cartridge Case Mk. 1 |
| 14. | PRIMER | Cap |
| 15. | REMARKS:<br>It is to be noted that in the case of the 1"10 Mk. 2, the projectile detonates itself at the end of its aerial flight even though there is no contact with the target. The purpose of this feature is to prevent the projectile from returning to the earth and detonating on impact when the aircraft target is missed. Obviously, this projectile is desirable at land bases.<br><br>The feature of self-destruction is incorporated in the projectile itself. As illustrated by the drawing on opposite page, there is a hollow shaft connecting the tracer cavity and burster charge cavity. A small cap of black powder is inserted in the shaft. When the tracer burns down to the bottom of the tracer cavity, the heat will ignite the black powder cap which in turn sets off the burster charge and destroys the projectile while in flight. | |

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

CARTRIDGE CASE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| DESIGNATION: 3" Mk. III | GUN: 3"/50 |



Mk. 3

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 3" Mk. III | GUN: 3"/50 |

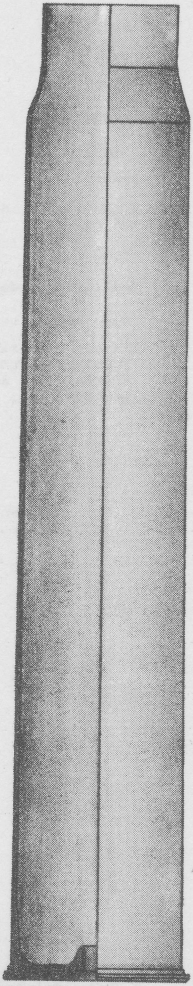
| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 23.44" |
| 2. | MAXIMUM DIAMETER | 3.90" |
| 3. | INSIDE DIAMETER AT NECK | 2.975" |
| 4. | CASE THICKNESS AT NECK | .05" |
| 5. | BEGINNING OF TAPER | 19.82" |
| 6. | DIAMETER OF CAP CONTAINER | .806" |
| 7. | EXTRACTING LIP | .20" |
| 8. | MATERIAL | Brass |
| 9. | MARKING | Mfg's symbol, date and '3" Mk. III". |
| 10. | WEIGHT EMPTY | 7.88 lbs |
| 11. | PROPELLANT | Smokeless Powder |
| 12. | PROPELLANT WEIGHT | 4.0 lbs |
| 13. | EXPLOSIVE IN CAP | Mixture of Mercury Fulminate, Potassium Chlorate and Antimony Sulfide. |

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 3" A.A. Mk. 7 | GUN: 3"/50 |

FOR USE WITH THE FOLLOWING PROJECTILES: 3" Mk. 25 and Mk. 27 having 1.0" rotating bands.



Mk. 7

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

CARTRIDGE CASE DATA

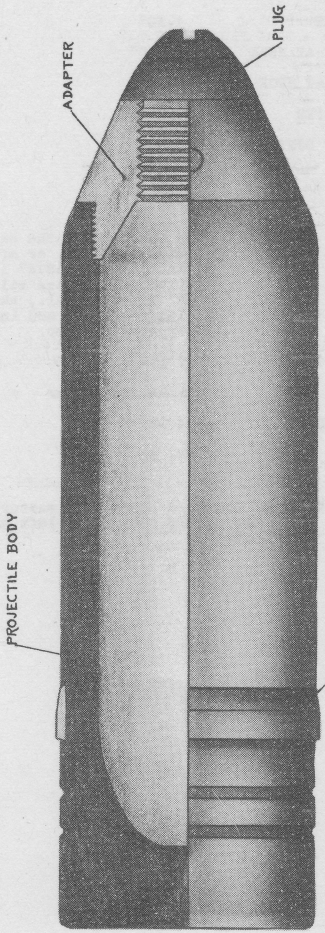
| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| DESIGNATION: 3" A.A. Mk. 7 | GUN: 3"/50 |
| FOR USE WITH THE FOLLOWING PROJECTILES | 3" Mk. 25 and Mk. 27 having 1.0" rotating bands. |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 22.99" |
| 2. | MAXIMUM DIAMETER | 4.30" |
| 3. | INSIDE DIAMETER AT NECK | 2.975" |
| 4. | CASE THICKNESS AT NECK | .045" |
| 5. | BEGINNING OF TAPER | 20.12" |
| 6. | DIAMETER OF CAP CONTAINER | .806" |
| 7. | EXTRACTING LIP | .20" |
| 8. | MATERIAL | Brass |
| 9. | MARKING | On the base of the case will be N.G.F. or mfg's initials in .1875" letters. Also on the base will be 3" Mk. 7/50 cal., anchor, lot no., date and inspector's stamp. |
| 10. | WEIGHT EMPTY | 7 lbs |
| 11. | PROPELLANT | Smokeless Powder |
| 12. | PROPELLANT WEIGHT | 4 lbs |
| 13. | PRIMER | Mk. 14 |
| 14. | REMARKS: The primer seat is .8" long and .806" in diameter at the base end. There are twenty (20) .619" left hand threads in the primer seat. | |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3" - Mk. 14 | CLASSIFICATION: Field Common |
| TARGET: Bombardment purposes. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3" - Mk. 14 | CLASSIFICATION: Field Common |
| TARGET: Bombardment purposes. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Fuze & Base Plug<br>Without Fuze & Base Plug | 10.545"<br>7.55" |
| 2. | DIAMETER OF BASE | 2.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.50" |
| 4. | WIDTH OF BAND | .60" |
| 5. | DIAMETER OF BOURRELET | 2.97" |
| 6. | TYPE OF FILLING | T.N.T. |
| 7. | WEIGHT OF FILLING | 1.06 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 13.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 8.15 % |
| 10. | TYPE OF GUN USED IN | 3"/50 |
| 11. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 8 Mods 4 & 5;<br>Mk. 2 Mod 9. |
| 12. | CARTRIDGE CASE | Mk. 1 |
| 13. | PRIMER | Mk. 14 |

14. REMARKS:

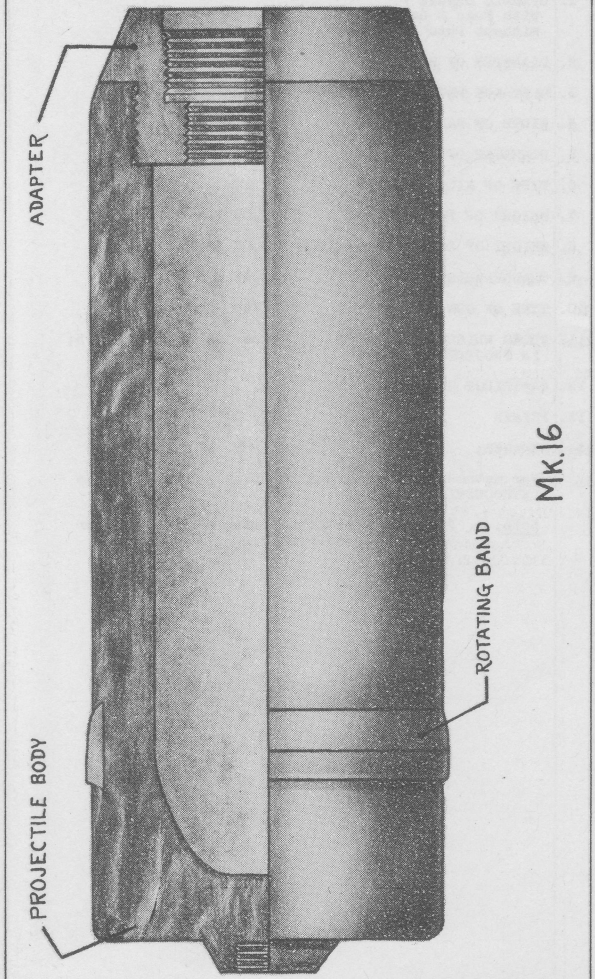
For method of marking and painting projectile, see INTRODUCTION.

Note: - Projectile is fitted with a nose plug for testing purposes only.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 Mk. 16 | CLASSIFICATION: A.A. |
| TARGET: Used against aerial targets. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 Mk. 16 | CLASSIFICATION: A.A. |
| TARGET: Used against aerial targets. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Cover | 11.925" |
| | Without Fuze & Cover | 8.175" |
| 2. | DIAMETER OF BASE | 2.980" |
| 3. | DISTANCE FROM BASE TO BAND | 1.350" |
| 4. | WIDTH OF BAND | .70" |
| 5. | DIAMETER OF BOURRELET | 2.98" |
| 6. | TYPE OF FILLING | Cast T.N.T. |
| 7. | WEIGHT OF FILLING | .75 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 12.60 lbs |
| 9. | CHARGE-WEIGHT RATIO | 5.95 % |
| 10. | TYPE OF GUN USED IN | 3"/50 |
| 11. | TRACER | Mk. 4 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 22; Mk. 22-1, 22-2, 22-3 & 22-4; Auxiliary Detonator Fuze Mk. 17 and Mods. |
| 13. | CARTRIDGE CASE | Mk. 1 |
| 14. | PRIMER | Mk. 14 |
| 15. | REMARKS: | |

For method of marking and painting projectile, see INTRODUCTION.

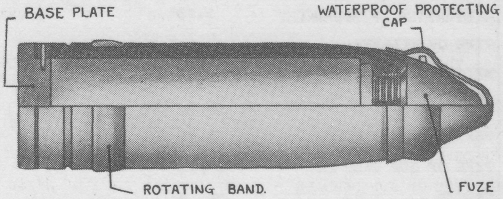
C-O-N-F-I-D-E-N-T-I-A-L



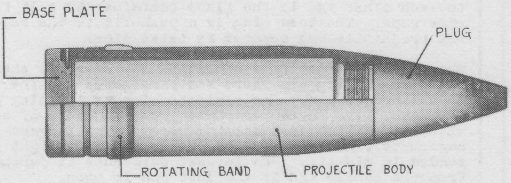
522853 O - 43 - 6

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 - Mks. 21 & 24 | CLASSIFICATION: Illuminating |
| TARGET: Used for lighting up target area for night engagements. | |




Mk. XXI




Mk. XXIV

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/50 - Mks. 21 & 24 | CLASSIFICATION: Illuminating |
| TARGET: Used for lighting up target area for night engagements. | |

| | | Mark 21 | Mark 24 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Fuze & Base Plug<br>Without Fuze & Base Plug | 9.51"<br>7.77" | 13.07"<br>8.97" |
| 2. | DIAMETER OF BASE | 2.97" | 2.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.32" | 1.32" |
| 4. | WIDTH OF BAND | .70" | .70" |
| 5. | DIAMETER OF BOURRELET | 2.98" | 2.98" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expelling charge. The flare composition is magnesium. | | |
| 7. | WEIGHT OF LOADED PROJECTILE | 12.88 lbs | 13.04 lbs |
| 8. | TRACER | None | None |
| 9. | TYPE OF GUN USED IN | 3"/50 | 3"/50 |
| 10. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mks. 22; 22-1, 22-2, 22-3, 22-4. | |
| 11. | CARTRIDGE CASE | Mk. 1; Mk. 7. | |
| 12. | PRIMER | Mk. 7; Mk. 14 | |

13. REMARKS:

The illuminating projectile is made of a thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with three parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The three parachutes of varying sizes are connected to each other and to the flare container by a 15 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

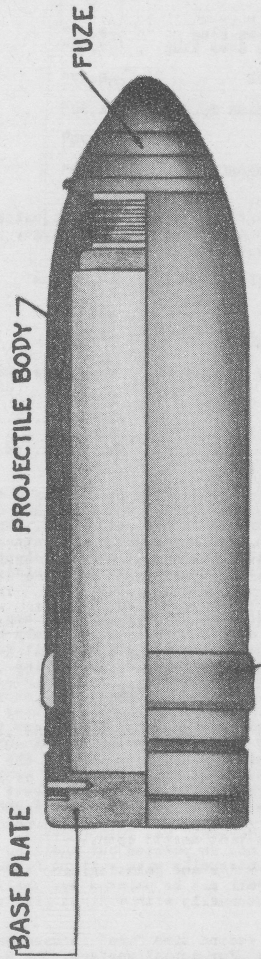
When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the plug off the base. The three parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/23 - Mk. 22 | CLASSIFICATION: Illuminating |
| TARGET: Used for lighting up target area for night engagements. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/23 - Mk. 22 | CLASSIFICATION: Illuminating |

TARGET: Used for lighting up target area for night engagements.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Base Plug & Fuze Mk.11 | 11.41" |
| | With Base Plug & Fuze Mk.22 | 12.73" |
| | Without Base Plug & Fuze | 8.87" |
| 2. | DIAMETER OF BASE | 2.965" |
| 3. | DISTANCE FROM BASE TO BAND | 1.32" |
| 4. | WIDTH OF BAND | .70" |
| 5. | DIAMETER OF BOURRELET | 2.98" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expelling charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF PROJECTILE (Complete with Mk. 11 fuze) | 12.88 lbs |
| 8. | (a) FUZES WHICH MAY BE USED IN PROJECTILE | (a) Mks. 22; 22-1, 22-2, 22-3, 22-4. |
| | (b) FUZE USED FOR TESTING PURPOSES ONLY | (b) Mk. 11 (21 second time fuze) |
| 9. | CARTRIDGE CASE | Mk. 2 |
| 10. | PRIMER | Mk. 10-Mod 7 and 9 |
| 11. | TYPE OF GUN USED IN | 3"/23 |
| 12. | TRACER | None |

13. REMARKS:

The illuminating projectile is made of a thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with three parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The three parachutes of varying sizes are connected to each other and to the flare container by a 15 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The three parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of markings and painting, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

NOTE: Mk. 11 (21 second time fuze) is used only for testing purposes. For actual warfare, the Mk. 22 and Mods Fuze is used in the nose. Also there is soldered to the nose a waterproof fuze cover. CONFIDENTIAL

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 - Mks. 23 & 27 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft targets. | |




Mk. 27




Mk. XXIII



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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/50 - Mks. 23 & 27 | CLASSIFICATION: A.A. |
| TARGET: Used against aircraft targets. | |

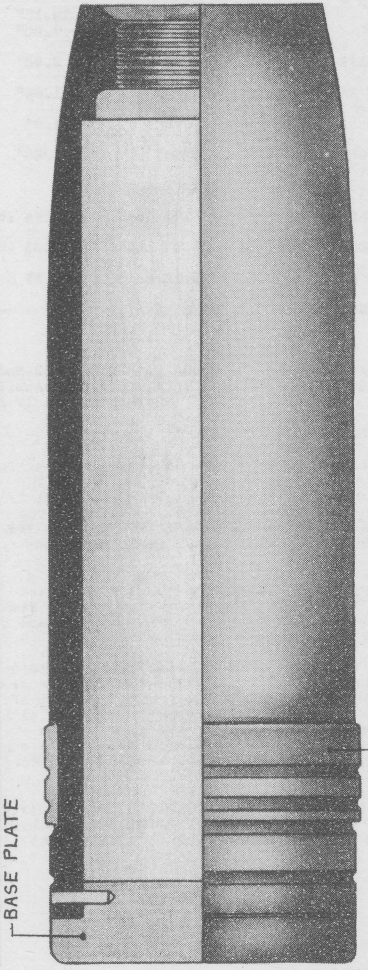
| | | Mark 23 | Mark 27 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Fuze | 12.13" | 12.13" |
| | Without Fuze | 7.80" | 7.80" |
| 2. | DIAMETER OF BASE | 2.98" | 2.98" |
| 3. | DISTANCE FROM BASE TO BAND | 1.80" | 1.35" |
| 4. | WIDTH OF BAND | .70" | 1.0" |
| 5. | DIAMETER OF BOURRELET | 2.98" | 2.98" |
| 6. | TYPE OF FILLING | Cast T.N.T. | |
| 7. | WEIGHT OF FILLING | .74 lbs | .74 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 13.00 lbs | 13.05 lbs |
| 9. | CHARGE-WEIGHT RATIO | 5.67 % | 5.67 % |
| 10. | TYPE OF GUN USED IN | 3"/50 A.A. | |
| 11. | TRACER | Mk. 4 | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 22; Mk. 22-Mods 1, 2, 3 & 4; Auxiliary Detonator Mk. 17 & Mods | |
| 13. | CARTRIDGE CASE | Mk. 1 | |
| 14. | PRIMER | Mk. 14 | |
| 15. | REMARKS: | | |

For method of marking and painting projectiles, see INTRODUCTION.

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/50 - Mk. 25 | CLASSIFICATION: Illuminating |
| TARGET: Used for illuminating target area in night engagements. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 Mk. 25 | CLASSIFICATION: Illuminating |
| TARGET: Used for illuminating target area in night engagements. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 13.07" |
| | Without Fuze & Base Plug | 9.35" |
| 2. | DIAMETER OF BASE | 2.96" |
| 3. | DISTANCE FROM BASE TO BAND | .87" |
| 4. | WIDTH OF BAND | 1.00" |
| 5. | DIAMETER OF BOURRELET | 2.98" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expeller charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF LOADED PROJECTILE | 13.07 lbs |
| 8. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 22; Mk. 22 Mods 1, 2, 3 and 4. |
| 9. | CARTRIDGE CASE | Mk. 1; Mk. 7. |
| 10. | PRIMER | Mk. 7; Mk. 14. |
| 11. | TRACER | None |

12. REMARKS:

The illuminating projectile is made of a thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with three parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The three parachutes of varying sizes are connected to each other and to the flare container by a 15 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the plug off the base. The three parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/23 - Mk. 26 | CLASSIFICATION: A.A. |
| TARGET: Used against aerial targets. | |




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

PROJECTILE DATA

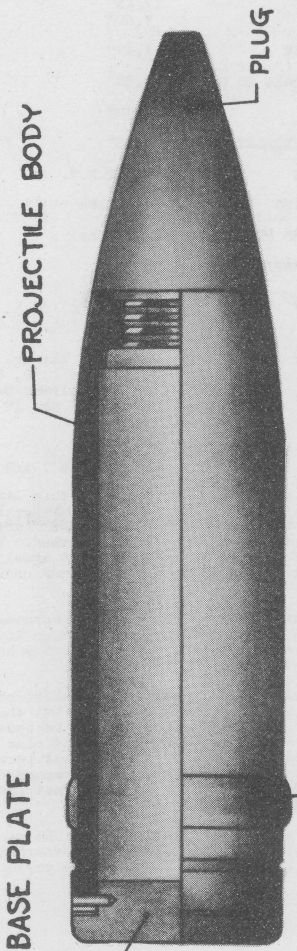
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/23 - Mk. 26 | CLASSIFICATION: A.A. |
| TARGET: Used against aerial targets. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH:<br>With Fuze<br>Without Fuze | <br>12.13"<br>7.80" |
| 2. | DIAMETER OF BASE | 2.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.80" |
| 4. | WIDTH OF BAND | .70" |
| 5. | DIAMETER OF BOURRELET | 2.98" |
| 6. | TYPE OF FILLING | Cast T.N.T. |
| 7. | WEIGHT OF FILLING | .74 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 12.95 lbs |
| 9. | CHARGE-WEIGHT RATIO | 5.71 % |
| 10. | TYPE OF GUN USED IN | 3"/23 A.A. |
| 11. | TRACER | Mk. 4 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 22; Mk. 22 and Mods 1, 2, 3 & 4; Auxiliary Detonator Fuze Mk. 17 & Mods. |
| 13. | CARTRIDGE CASE | Mk. 2 |
| 14. | PRIMER | Mk. 10-Mods 7 and 9 |
| 15. | REMARKS:<br>For method of marking and painting projectile, see INTRODUCTION. | |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/23 - Mk. 28 | CLASSIFICATION: Illuminating |
| TARGET: Used to illuminate target area during night engagements. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/23 - Mk. 28 | CLASSIFICATION: Illuminating |
| TARGET: Used to illuminate target area during night engagements. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 13.07" |
| | Without Fuze & Base Plug | 8.87" |
| 2. | DIAMETER OF BASE | 2.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.32" |
| 4. | WIDTH OF BAND | .70" |
| 5. | DIAMETER OF BOURRELET | 2.98" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expelling charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF PROJECTILE (Complete) | 13.00 lbs |
| 8. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mks. 22; 22-1, 22-2, 22-3, 22-4. |
| 9. | CARTRIDGE CASE | Mk. 2 |
| 10. | PRIMER | Mk. 10-Mods 9 and 10 |
| 11. | TRACER | None |
| 12. | TYPE OF GUN USED IN | 3"/23 |

13. REMARKS:

The illuminating projectile is made of a thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with three parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The three parachutes of varying sizes are connected to each other and to the flare container by a 15 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

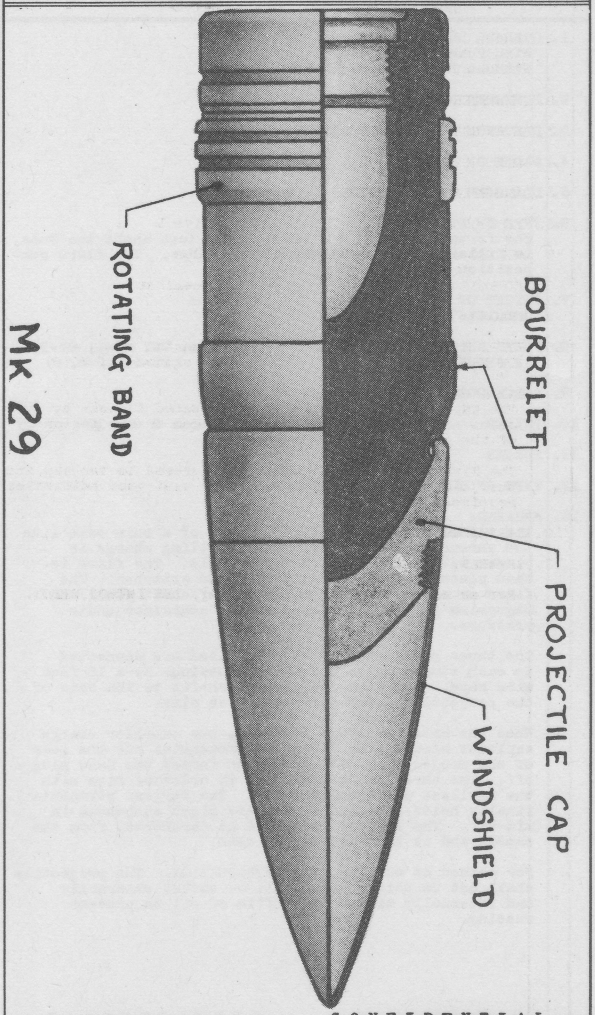
When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The three parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/50 - Mk. 29 | CLASSIFICATION: A.P. |
| TARGET: Used against heavy armor targets. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/50 - Mk. 29 | CLASSIFICATION: A.P. |
| TARGET: Used against heavy armor targets. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH:<br>With Cap & Windshield<br>Without Cap & Windshield | <br>12.16"<br>6.91" |
| 2. | DIAMETER OF BASE | 2.98" |
| 3. | DISTANCE FROM BASE TO BAND | 1.35" |
| 4. | WIDTH OF BAND | 1.0" |
| 5. | DIAMETER OF BOURRELET | 2.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF LOADED PROJECTILE | 13.07 lbs |
| 8. | TYPE OF GUN USED IN | 3"/50 caliber |
| 9. | TRACER | Mk. 4 |
| 10. | FUZES WHICH MAY BE USED IN PROJECTILE | Experimental stage - N.G.F. sketch No. 70787 |
| 11. | CAP & WINDSHIELD:<br>The Cap weighs 2.09 lbs and is fastened to nose by means of three notches equally spaced on the periphery of the crimp cap.<br><br>The Windshield, .0239" thick, is screwed to the cap and the joint is brazed with solder to meet good ballistics requirements. | |
| 12. | CARTRIDGE CASE | Mk. 1 |
| 13. | REMARKS:<br><br>For method of marking and painting, SEE INTRODUCTION. | |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 3"/23 - Mk. 30 | CLASSIFICATION: A.P. |
| TARGET: Used against any heavy armored targets. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 3"/23 - Mk. 30 | CLASSIFICATION: A.P. |
| TARGET: Used against any heavy armored targets. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Cap & Windshield<br>Without Cap & Windshield | <br>12.16"<br>6.91" |
| 2. | DIAMETER OF BASE | 2.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.80" |
| 4. | WIDTH OF BAND | .70" |
| 5. | DIAMETER OF BOURRELET | 2.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF LOADED PROJECTILE | 12.95 lbs |
| 8. | TRACER | Mk. 4 |
| 9. | CAP & WINDSHIELD:<br>The Cap weighs 2.09 lbs and is fastened to the nose by means of three notches equally spaced on the periphery to crimp cap. The cap has two "V" notches 180° apart, approximately .07" deep and .15" wide for staking windshield.<br><br>The Windshield .0239" thick is screwed to the cap and the joint is brazed with solder to meet good ballistics requirements. | |
| 10. | TYPE OF GUN USED IN | 3"/23 |
| 11. | CARTRIDGE CASE | Mk. 2 |
| 12. | REMARKS:<br>For method of marking and painting projectile, see INTRODUCTION. | |

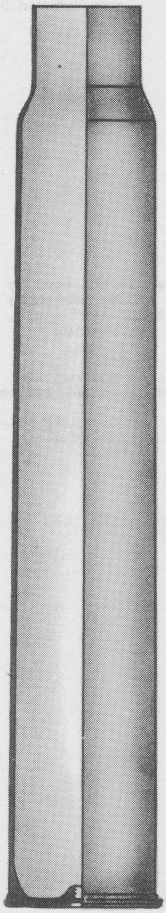
C-O-N-F-I-D-E-N-T-I-A-L



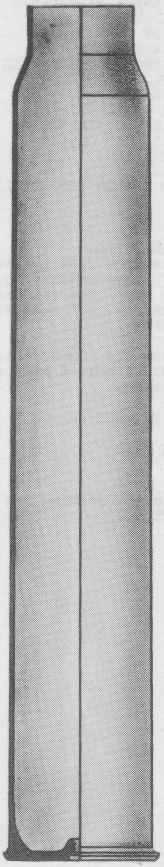
522853 O - 43 - 7

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 4" Mk. 2-Mods 3 & 4 | GUN: 4"/50 cal. |



MK. 2, MOD. 3



MK. 2, MOD. 4

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 4" Mk. 2 and Mk. 2-Mods 3 & 4. | GUN: 4"/50 cal. |

| | | Mk. 2 | Mk. 2 Mods 3 & 4 |
|---|---|---|---|
| 1. | OVERALL LENGTH | 34.84" | 33.74" Mod 4<br>33.84" Mod 3 |
| 2. | MAXIMUM DIAMETER | 5.61" | 5.545" |
| 3. | INSIDE DIAMETER AT NECK | 3.95" | 3.95" |
| 4. | CASE THICKNESS AT NECK | .05" | .045" |
| 5. | BEGINNING OF TAPER AT BASE | 29.84" | 29.865" |
| 6. | DIAMETER OF CAP CONTAINER | .806" | .806" |
| 7. | EXTRACTING LIP | .15" | .29" |
| 8. | MATERIAL | Brass | Brass |
| 9. | VOLUME | 644 cu.in. | 651 cu.in. |
| 10. | MARKING | Mfg's Symbol, date, and "4" Mk. 2 and Mod (if any)". | |
| 11. | WEIGHT EMPTY | 17.25 lbs | 14.90 lbs |
| 12. | PROPELLANT | Smokeless Powder | |
| 13. | PROPELLANT WEIGHT | 15.00 lbs | 15.00 lbs |
| 14. | EXPLOSIVE IN CAP | Mixture of Antimony Sulfide, Potassium Chlorate and Mercury Fulminate. | |

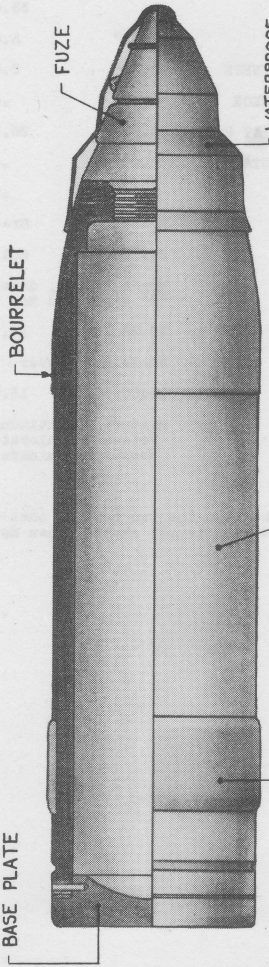
15. REMARKS:

Sole distinction between the two mods is that the neck of the Mod. 4 case is .1" shorter than Mod. 3.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 4"/50 Mk. 14 | CLASSIFICATION: Illuminating |
| TARGET: Used to illuminate target area during night engagements. | |




MK. 14

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 4"/50 Mk. 14 | CLASSIFICATION: Illuminating |
| TARGET: Used to illuminate target area during night engagements. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 18.40" |
| | Without Fuze & Base Plug | 14.32" |
| 2. | DIAMETER OF BASE | 3.93" |
| 3. | DISTANCE FROM BASE TO BAND | 2.25" |
| 4. | WIDTH OF BAND | 1.85" |
| 5. | DIAMETER OF BOURRELET | 3.99" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expelling charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF LOADED PROJECTILE | 34.67 lbs |
| 8. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 18 Mods 2, 3 & 4. |
| | Note: For test purposes, the projectile is fitted with a fuze hole plug. | |
| 9. | CARTRIDGE CASE | Mk. 1; Mk. 2 and Mods |
| 10. | TRACER | None |
| 11. | PRIMER | Mk. 13 |

12. REMARKS:

The illuminating projectile is made of thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with three parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

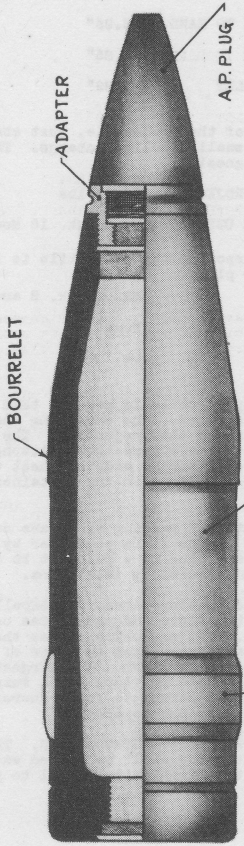
The three parachutes of varying sizes are connected to each other and to the flare container by a 15 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The three parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 4"/50 Mk. 15 | CLASSIFICATION: High Capacity (HC) |
| TARGET: Used for bombarding shore establishments and lightly armored craft such as destroyers, submarines, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 4"/50 Mk. 15 | CLASSIFICATION: High Capacity (HC) |

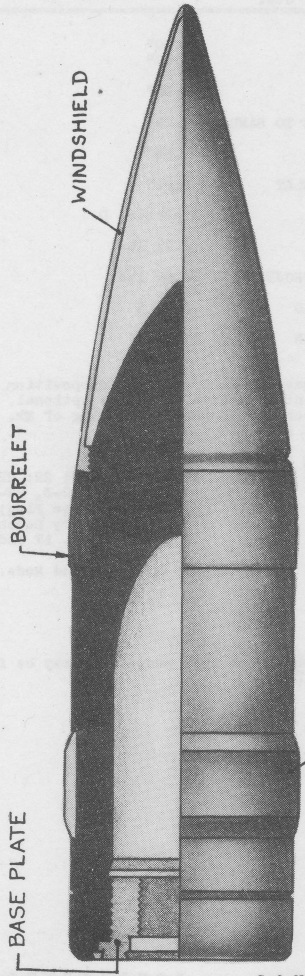
TARGET: Used for bombarding shore establishments and lightly armored craft such as destroyers, submarines, etc.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze | 18.00" |
| | Without Fuze | 14.67" |
| 2. | DIAMETER OF BASE | 3.96" |
| 3. | DISTANCE FROM BASE TO BAND | 2.25" |
| 4. | WIDTH OF BAND | 1.85" |
| 5. | DIAMETER OF BOURRELET | 3.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 2.71 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 33.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 8.21 % |
| 10. | TYPE OF GUN USED IN | 4"/50 |
| 11. | TRACER: With the Mk. 28 Base Fuze, the tracer composition can be incorporated into the fuze. This is optional. If used, tracer is screwed in under base plug of Mk. 28 fuze. Tracer Mk. 9. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28<br>Nose: Mks. 30; 22; 22-1, 22-2, 22-3, 22-4; A.P. Nose Plug; Auxiliary Detonator Fuze Mk. 17 and Mods. |
| 13. | CARTRIDGE CASE | Mk. 1; Mk. 2 and Mods. |
| 14. | PRIMER | Mk. 13 |
| 15. | REMARKS: The color and markings of this projectile may be found in the INTRODUCTION. | |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 4"/50 Type EX-1 | CLASSIFICATION: Common |
| TARGET: Used against lightly armored craft such as destroyers and submarines. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 4"/50 Type EX-1 | CLASSIFICATION: Common |
| TARGET: Used against lightly armored craft such as destroyers and submarines. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Windshield | 17.50" |
| | Without Windshield | 12.42" |
| 2. | DIAMETER OF BASE | 3.96" |
| 3. | DISTANCE FROM BASE TO BAND | 2.25" |
| 4. | WIDTH OF BAND | 1.85" |
| 5. | DIAMETER OF BOURRELET | 3.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 1.00 lb |
| 8. | WEIGHT OF LOADED PROJECTILE | 33.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 3.03 % |
| 10. | TYPE OF GUN USED IN | 4"/50 |
| 11. | TRACER | None |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 10 Mod 4. |

13. CAP & WINDSHIELD:
This projectile is not fitted with a cap. However, the windshield, 3/32" thick, is fastened to the nose of the projectile by means of five notches which are staked equally spaced on the periphery.

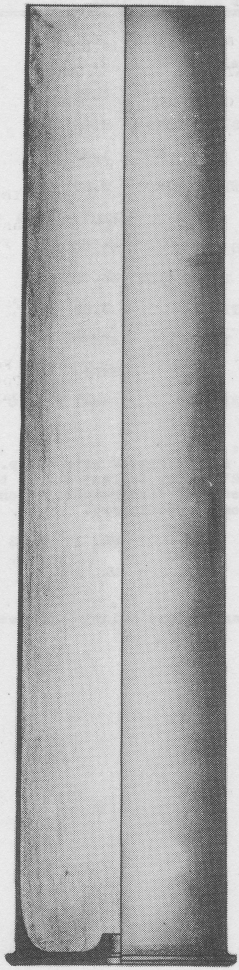
| | | |
|---|---|---|
| 14. | CARTRIDGE CASE | Mk. 1; Mk. 2 and Mods. |
| 15. | PRIMER | Mk. 13 |

16. REMARKS:
For method of marking and painting projectile, see INTRODUCTION.

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 5" Mk. V | GUN: 5"/38 Mk. XII |



Mk.V

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

CARTRIDGE CASE DATA

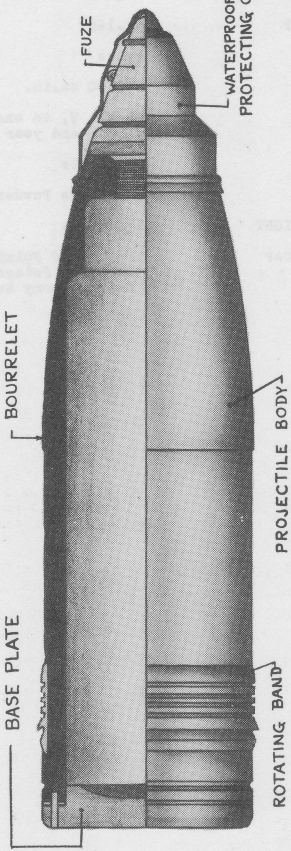
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 5" Mk. V | GUN: 5"/38 Mk. XII |

| | |
|---|---|
| 1. OVERALL LENGTH | 26.75" |
| 2. MAXIMUM DIAMETER | 5.69" |
| 3. INSIDE DIAMETER AT NECK | 5.31" |
| 4. CASE THICKNESS AT NECK | .045" |
| 5. DIAMETER OF CAP CONTAINER | .806" |
| 6. EXTRACTING LIP | .145" |
| 7. MATERIAL | Brass |
| 8. VOLUME | 608.90 cu.in. |
| 9. MARKING | 5" Mk. V, an anchor, mfg's symbol and year of mfg. |
| 10. WEIGHT EMPTY | 12.31 lbs |
| 11. PROPELLANT | Smokeless Powder |
| 12. PROPELLANT WEIGHT | 15.00 lbs |
| 13. EXPLOSIVE IN CAP | Mixture of Fulminate of Mercury, Potassium Chlorate and Antimony Sulfide. |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 25 | CLASSIFICATION: Illuminating |
| TARGET: The purpose of the illuminating projectile is to illuminate the area around the target during night engagements. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mk. 25 | CLASSIFICATION: Illuminating |

TARGET: The purpose of the illuminating projectile is to illuminate the area around the target during night engagements.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 20.0" |
| | Without Fuze & Base Plug | 15.8" |
| 2. | DIAMETER OF BASE | 4.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.90" |
| 4. | WIDTH OF BAND | 2.00" |
| 5. | DIAMETER OF BOURRELET | 4.95" |
| 6. | TYPE OF FILLING: The nose of the projectile is filled with an expelling charge, and the flare or candle is a magnesium composition. | |
| 7. | WEIGHT OF PROJECTILE CASE | 34.70 lbs |
| 8. | WEIGHT OF PROJECTILE WITH FUZE AND LOADED | 54.00 lbs |
| 9. | TYPE OF GUN USED IN | 5"/51 |
| 10. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 18 Mods 2, 3 & 4. |
| 11. | TRACER | None |
| 12. | CARTRIDGE CASE | Mk. 3 |
| 13. | PRIMER | Mk. 15 Mod 1 |

14. REMARKS:

The Mk. 25 is filled in the same manner as the Mk. 27, having seven parachutes of varying sizes attached to the candle or flare. The expelling charge blows the base plug off and throws the parachutes and flare free of the projectile case.

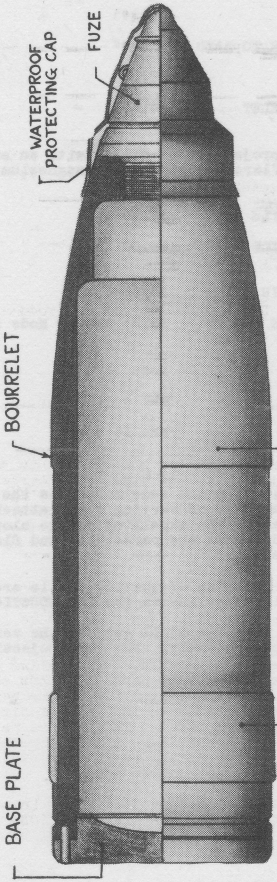
The markings and painting of the projectile are in accordance with instructions in the INTRODUCTION.

There are only a very few 5"/51 guns in the service at present and, consequently, very few projectiles.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 27 | CLASSIFICATION: Illuminating |
| TARGET: The purpose of the illuminating or "Star" projectile is to illuminate the area around the target in night engagements. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 27 | CLASSIFICATION: Illuminating |

TARGET: The purpose of the illuminating or "Star" projectile is to illuminate the area around the target in night engagements.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 20.0" |
| | Without Fuze & Base Plug | 15.8" |
| 2. | DIAMETER OF BASE | 4.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.90" |
| 4. | WIDTH OF BAND | 2.00" |
| 5. | DIAMETER OF BOURRELET | 4.95" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expelling charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF PROJECTILE LESS FUZE AND FILLER | 34.9 lbs |
| 8. | WEIGHT OF PROJECTILE COMPLETE | 54.0 lbs |
| 9. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 18-Mods 2, 3 & 4. |
| 10. | CARTRIDGE CASE | Mk. 4 |
| 11. | PRIMER | Mk. 13 |
| 12. | TRACER | None |

13. REMARKS:

The illuminating projectile is made of a thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with seven parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The seven parachutes of varying sizes are connected to each other and to the flare container by a wire rope 40 feet long. The base plug is a push-fit to the base of the projectile and secured by twist pins.

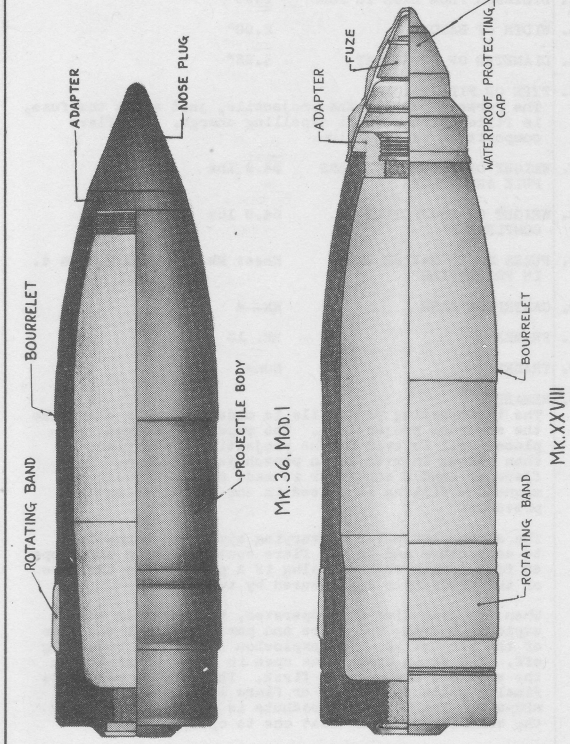
When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The seven parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

Markings and painting of the projectile is in accordance with instructions set out in the INTRODUCTION.

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5"/25 Mks. 28 and 36, Mod. 1 | CLASSIFICATION: A.A. Common (For 5"/25 gun) |
| TARGET: Used against aircraft; also, may be used against small lightly armored surface craft. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5"/25 Mks. 28 and 36, Mod. 1 | CLASSIFICATION: A.A. Common (For 5"/25 gun) |
| TARGET: Used against aircraft; also, may be used against small lightly armored surface craft. | |

| | | Mark 28 | Mark 36-Mod 1 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Fuze<br>Without Fuze | 20.7"<br>16.6" | 20.7"<br>16.6" |
| 2. | DIAMETER OF BASE | 4.97" | 4.97" |
| 3. | DISTANCE FROM BASE TO BAND | 2.4" | 2.4" |
| 4. | WIDTH OF BAND | 2.0" | 2.0" |
| 5. | DIAMETER OF BOURRELET | 4.98" | 4.98" |
| 6. | TYPE OF FILLING | Explosive D | |
| 7. | WEIGHT OF FILLING | 7.3 lbs | 7.3 lbs |
| 8. | WEIGHT OF PROJECTILE | 51.7 lbs | 53.9 lbs |
| 9. | CHARGE-WEIGHT RATIO | 14.0 % | 13.0 % |
| 10. | TYPE OF GUN USED IN | 5"/25 | 5"/25 |
| 11. | TRACER | Mk. 9; If no fuze, Mk. 6 | Mk. 9; If no fuze, Mk. 6 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28. Mk. 13 & Mods not to be used.<br>Nose: Mk. 29; Mk. 18-Mod 2, Mod 3 and Mod 4.<br>Steel nose plug may be used when base detonation desired. | |
| 13. | CAP AND WINDSHIELD | Since these projectiles are used primarily against aircraft instead of armor plate, it has neither cap nor windshield. | |
| 14. | CARTRIDGE CASE | Mk. 4 | |
| 15. | PRIMER | Mk. 13 | |

16. REMARKS:

These projectiles may be fitted with a base and nose fuze. When it is desirable to use only the base fuze, a steel plug is screwed into the nose. The steel plug is the same shape as the fuze and may be distinguished from the fuze by virtue of the fact that the plug has no external markings.

Marking for Mk. 36 - This projectile may be identified by the stamping on the base and rotating band as follows: "5 in. A.A. Com - Mk. 36 Mod 1". Also, weight in pounds, lot number, year and manufacturer's mark appears.

NOTE: In the illustrations on the opposite page, the greatest variation between these two projectiles is the shape of the ogives. The Mk. 28 tapers to a sharper point than the Mk. 36-Mod 1.

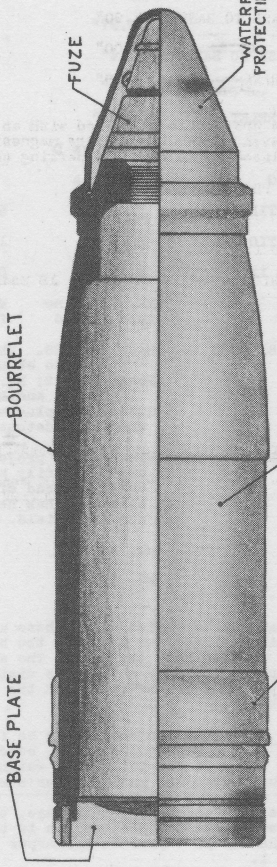
C-O-N-F-I-D-E-N-T-I-A-L



522853 O - 43 - 8

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mk. 30 | CLASSIFICATION: Illuminating |
| TARGET: Purpose is to illuminate the area around the target in night engagements. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mk. 30 | CLASSIFICATION: Illuminating |

TARGET: Purpose is to illuminate the area around the target in night engagements.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Base Plug | 20.0" |
| | Without Fuze & Base Plug | 15.8" |
| 2. | DIAMETER OF BASE | 4.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.90" |
| 4. | WIDTH OF BAND | 2.00" |
| 5. | DIAMETER OF BOURRELET | 4.95" |
| 6. | TYPE OF FILLING: The nose of the projectile is filled with an expelling charge. The seven parachutes and the magnesium candle or flare are placed in on top of expelling charge. | |
| 7. | WEIGHT OF EMPTY PROJECTILE | 34.0 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 54.0 lbs |
| 9. | TYPE OF GUN USED IN | 5"/38 |
| 10. | FUZES USED IN THIS PROJECTILE | Nose: Mk. 18 Mods 2, 3 & 4. |
| 11. | CARTRIDGE CASE | Mk. 5 |
| 12. | TRACER | None |
| 13. | PRIMER | Mk. 13 |
| 14. | REMARKS: | |

Refer to Mk. 27 for the operation and loading.

This projectile is marked and painted in accordance with information set out in the INTRODUCTION.

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mks. 31 and 35 | CLASSIFICATION: A.A. Common |

TARGET: This projectile is effective against lightly armored surface vessels, merchant shipping and submarines.




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mks. 31 and 35 | CLASSIFICATION: A.A. Common |

TARGET: This projectile is effective against lightly armored surface vessels, merchant shipping and submarines.

| | | Mark 31 | Mark 35 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Fuze | 20.7" | 20.7" |
| | Without Fuze | 17.2" | 17.2" |
| 2. | DIAMETER OF BASE | 4.97" | 4.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.90" | 1.90" |
| 4. | WIDTH OF BAND | 2.20" | 2.20" |
| 5. | DIAMETER OF BOURRELET | 4.98" | 4.98" |
| 6. | TYPE OF FILLING | Explosive D | |
| 7. | WEIGHT OF FILLING | 7.20 lbs | 7.20 lbs |
| 8. | WEIGHT OF PROJECTILE | 54.00 lbs | 55.20 lbs |
| 9. | CHARGE-WEIGHT RATIO | 13.33 % | 13.04 % |
| 10. | TYPE OF GUN USED IN | 5"/38 | |
| 11. | TRACER | Mk. 9; Mk. 6 | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28; Mk. 13-Mod 6 and Mod 7 may be used with special permission. Use no other Mods of Mk. 13.<br>Nose: Mk. 29; Mk. 18-Mod 2, 3 and 4. Auxiliary Detonator Mk. 17 and Mods used with nose fuze.<br>The nose of either projectile may be fitted with a steel plug if desirable. | |
| 13. | CARTRIDGE CASE | Mk. 5 | |
| 14. | PRIMER | Mk. 13 | |

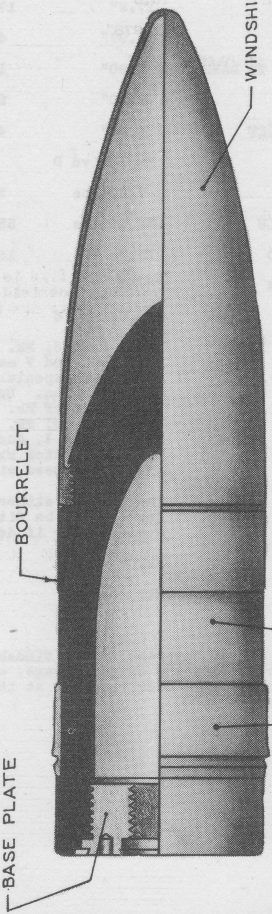
15. REMARKS:

These projectiles do not have the cap or windshield, however, as illustrated on the opposite page, a waterproof protecting cap screws over the fuze at the nose of the projectile.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 32 | CLASSIFICATION: Common |
| TARGET: This projectile is effective against light armored surface vessels, merchant shipping and submarines. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Mk. 32 | CLASSIFICATION: Common |

TARGET: This projectile is effective against light armored surface vessels, merchant shipping and submarines.

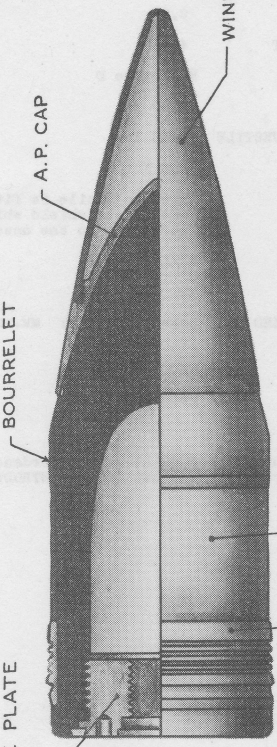
| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Windshield<br>Without Windshield | <br>20.7"<br>13.6" |
| 2. | DIAMETER OF BASE | 4.978" |
| 3. | DISTANCE FROM BASE TO BAND | 1.9" |
| 4. | WIDTH OF BAND | 2.2" |
| 5. | DIAMETER OF BOURRELET | 4.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 2.60 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 54.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 5.0 % |
| 10. | WINDSHIELD | This projectile is fitted with a windshield which screws on to the nose. |
| 11. | TYPE OF GUN USED IN | 5"/38 |
| 12. | TRACER | Mk. 5 |
| 13. | FUZES WHICH MAY BE USED IN PROJECTILE | Base fuze only: Mk. 20 |
| 14. | CARTRIDGE CASE | Mk. 5 |
| 15. | PRIMER | Mk. 13 |
| 16. | REMARKS: | |

This projectile is marked and painted in accordance with the standard procedure set out in the INTRODUCTION.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 37 | CLASSIFICATION: Common |
| TARGET: This projectile is effective against lightly armored surface vessels such as destroyers, cruisers and merchant ships. Also used against submarines. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Mk. 37 | CLASSIFICATION: Common |

TARGET: This projectile is effective against lightly armored surface vessels such as destroyers, cruisers, and merchant ships. Also used against submarines.

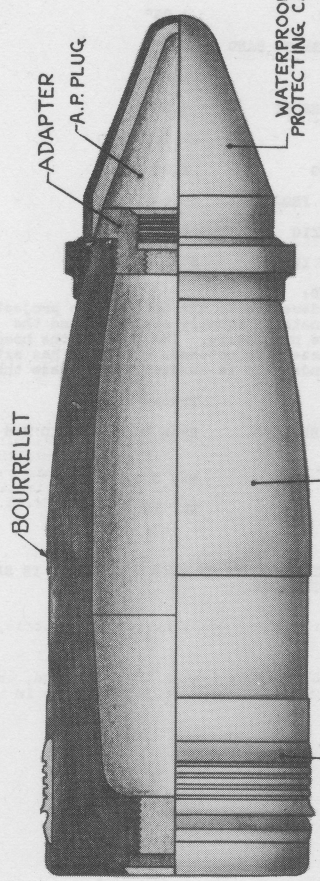
| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Hood & Windshield<br>Without Hood & Windshield | <br>17.0"<br>13.5" |
| 2. | DIAMETER OF BASE | 4.98" |
| 3. | DISTANCE FROM BASE TO BAND | 0.7" |
| 4. | WIDTH OF BAND | 2.0" |
| 5. | DIAMETER OF BOURRELET | 4.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 1.80 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 50.00 lbs |
| 9. | CHARGE-WEIGHT RATIO | 4.0 % |
| 10. | TYPE OF GUN USED IN | 5"/51 |
| 11. | WINDSHIELD & HOOD:<br>The hood is soldered on to the nose of the projectile. There are five notches equally spaced around the periphery of the projectile. The edge of the hood is crimped into these five notches. The hood has external threads; the windshield is screwed on to these threads. | |
| 12. | TRACER | Tracer in fuze. |
| 13. | FUZES WHICH MAY BE USED IN PROJECTILE | Base Fuze: Mk. 10 Mod 4 |
| 14. | CARTRIDGE CASE | Mk. 3 |
| 15. | PRIMER | Mk. 15 Mod 1. |
| 16. | REMARKS:<br>THE MARKINGS AND PAINTING OF THIS PROJECTILE IS SET UP IN THE INTRODUCTION. | |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 5" Type EX-1 | CLASSIFICATION: High Capacity (HC) |

TARGET: This projectile is somewhat similar to the Common projectile in its use. It is effective in bombardment raids on shore installations, lightly armored surface craft, and submarines.




TYPE EX-1

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 5" Type EX-1 | CLASSIFICATION: High Capacity (HC) |

TARGET: This projectile is somewhat similar to the Common projectile.in its use. It is effective in bombardment raids on shore installations, lightly armored surface craft, and submarines.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Nose Fuze<br>Body without Nose Fuze | 17.0"<br>13.0" |
| 2. | DIAMETER OF BODY | 4.98" |
| 3. | DISTANCE FROM BASE TO BAND | 0.6" |
| 4. | WIDTH OF BAND | 2.0" |
| 5. | DIAMETER OF BOURRELET | 4.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 3.60 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 50.00 lbs |
| 9. | CHARGE- WEIGHT RATIO | 7.0 % |
| 10. | TYPE OF GUN USED IN | 5"/51 |
| 11. | TRACER | Mk. 5 Mod 1. |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28.<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 and 4. Auxiliary Detonator Mk. 17 and Mods.<br><br>When base detonation only is desirable, a steel plug may be screwed into the nose instead of the regular fuze. This adds to the armor piercing effect. |
| 13. | CARTRIDGE CASE | Mk. 3 |
| 14. | PRIMER | Mk. 15 Mod 1. |
| 15. | REMARKS: | |

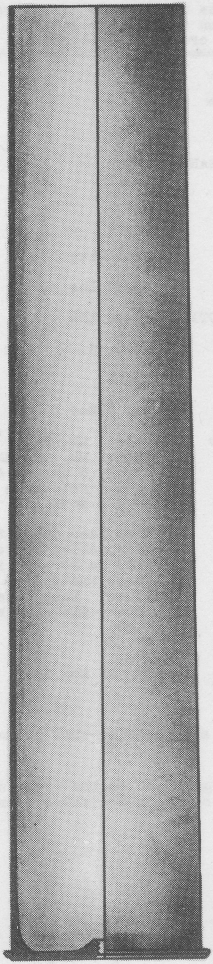
For method of marking and painting this projectile, see INTRODUCTION.

Only a very few 5"/51 guns are in the fleet and, consequently, a very few of these projectiles are in use.

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 6" Mk. IV | GUN: 6"/47 Mk. XVI |



Mk. 4

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

CARTRIDGE CASE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: 6" Mk. IV | GUN: 6"/47 Mk. XVI |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH | 38.20" |
| 2. | MAXIMUM DIAMETER | 7.22" |
| 3. | INSIDE DIAMETER AT NECK | 6.63" |
| 4. | CASE THICKNESS AT NECK | .055" |
| 5. | BEGINNING OF TAPER | 34.90" |
| 6. | DIAMETER OF CAP CONTAINER | .806" |
| 7. | EXTRACTING LIP | .22" |
| 8. | MATERIAL | Brass |
| 9. | VOLUME | 1383 cu.in. |
| 10. | MARKING | 6" Mk. IV, an anchor, Mfg's symbol and year of manufacture. |
| 11. | WEIGHT EMPTY | 28.20 lbs |
| 12. | PROPELLANT | Smokeless Powder |
| 13. | PROPELLANT WEIGHT | 33.00 lbs |
| 14. | EXPLOSIVE IN CAP | Mixture of Fulminate of Mercury, Potassium Chlorate and Antimony Sulfide. |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 6"/47 Mks. 22 & 32 | CLASSIFICATION: Illuminating |
| TARGET: Used for illuminating the target area during night engagements. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 6"/47 Mks. 22 & 32 | CLASSIFICATION: Illuminating |

TARGET: Used for illuminating the target area during night engagements.

| | | Mk. 22 | Mk. 32 |
|---|---|---|---|
| 1. | OVERALL LENGTH - | | |
| | With Fuze & Base Plug | 23.027" | 22.77" |
| | Without Fuze & Base Plug | 18.697" | 18.70" |
| 2. | DIAMETER OF BASE | 5.94" | 5.94" |
| 3. | DISTANCE FROM BASE TO BAND | .95" | .65" |
| 4. | WIDTH OF BAND | 2.50" | 2.50" |
| 5. | DIAMETER OF BOURRELET | 5.94" | 5.99" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expeller charge. The flare composition is magnesium. | | |
| 7. | WEIGHT OF PROJECTILE (LESS FUZE & FILLER) | | 60.56 lbs |
| 8. | WEIGHT OF PROJECTILE (COMPLETE) | 95.40 lbs | 96.00 lbs |
| 9. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 18 | |
| 10. | TRACER | None | |
| 11. | CARTRIDGE CASE | Mk. 4 | |
| 12. | PRIMER | Mk. 13 | |

13. REMARKS:

The illuminating projectile is made of thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with seven parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

The seven parachutes of varying sizes are connected to each other and to the flare container by a 40 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

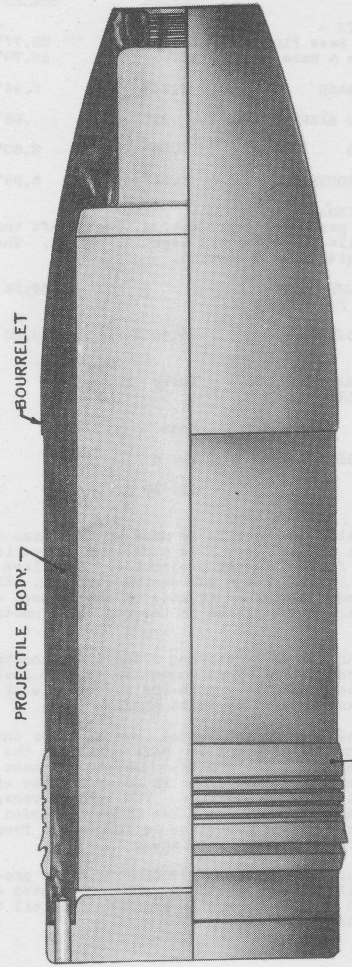
When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The seven parachutes opn in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 Mk. 23 | CLASSIFICATION: Illuminating |
| TARGET: Used to illuminate target area during night engagements. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 Mk. 23 | CLASSIFICATION: Illuminating |

TARGET: Used to illuminate target area during night engagements.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Fuze & Base Plug<br>Without Fuze & Base Plug | 23.07"<br>18.697" |
| 2. | DIAMETER OF BASE | 5.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.80" |
| 4. | WIDTH OF BAND | 2.50" |
| 5. | DIAMETER OF BOURRELET | 5.985" |
| 6. | TYPE OF FILLING: The forward part of the projectile, just abaft the fuze, is filled with a small expeller charge. The flare composition is magnesium. | |
| 7. | WEIGHT OF LOADED PROJECTILE | 96.00 lbs |
| 8. | FUZES WHICH MAY BE USED IN PROJECTILE | Nose: Mk. 18 |
| 9. | CARTRIDGE CASE | Mk. 4 |
| 10. | TRACER | None |
| 11. | TYPE GUN USED IN | 6"/47 |
| 12. | PRIMER | Mk. 13 |

13. REMARKS:

The illuminating projectile is made of thin case like the shrapnel projectiles. The expelling charge is placed well forward in the projectile. The flare is then placed in with seven parachutes attached. The flare or candle container is made of sheet steel and magnesium filling is placed in the container under pressure.

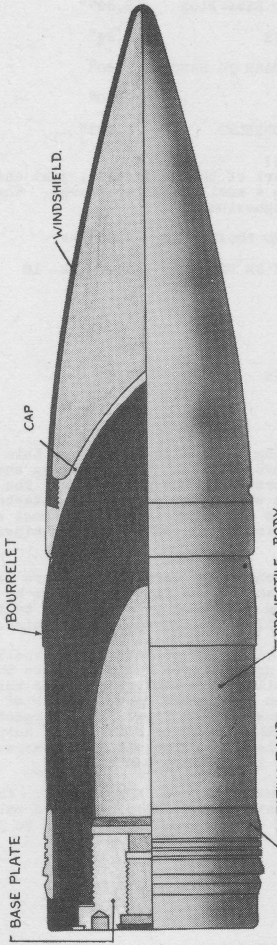
The seven parachutes of varying sizes are connected to each other and to the flare container by a 40 foot wire rope. The base plug is a push-fit to the base of the projectile and secured by twist pins.

When the nose time fuze operates, the expeller charge explodes blowing the flare and parachutes out the rear of the projectile. The explosion forces the base plug off. The seven parachutes open in order of size with the smallest one opening first. The largest parachute finally holds the candle or flare light suspended in mid-air. The largest parachute is fartherest from the candle and is the last one to open.

For method of marking, see INTRODUCTION. The projectile shall not be painted but shall be coated externally and internally with a light film of oil to prevent rusting.

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 - Mk. 27 | CLASSIFICATION: Special / Common |
| TARGET: Used against lightly armored surface craft such as cruisers, destroyers and also submarines. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 6"/47 - Mk. 27 | CLASSIFICATION: Special Common |

TARGET: Used against lightly armored surface craft such as cruisers, destroyers and also submarines.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Cap & Windshield<br>Without Cap & Windshield | 27.0"<br>15.95" |
| 2. | DIAMETER OF BASE | 5.99" |
| 3. | DISTANCE FROM BASE TO BAND | 1.0" |
| 4. | WIDTH OF BAND | 2.50" |
| 5. | DIAMETER OF BOURRELET | 5.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 2.20 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 105 lbs |
| 9. | CHARGE-WEIGHT RATIO | 2.1 % |
| 10. | TYPE OF GUN USED IN | 6"/47 |
| 11. | TRACER | Mk. 5 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 19 |

13. CAP & WINDSHIELD:
The Cap is soldered to the nose of the projectile. Also it is held secure by five crimp caps equally spaced around the periphery of the nose.

The Windshield is fastened to the cap by means of five notches which are equally spaced on the periphery and staked.

| | | |
|---|---|---|
| 14. | CARTRIDGE CASE | Mk. 4 |
| 15. | PRIMER | Mk. 13 |

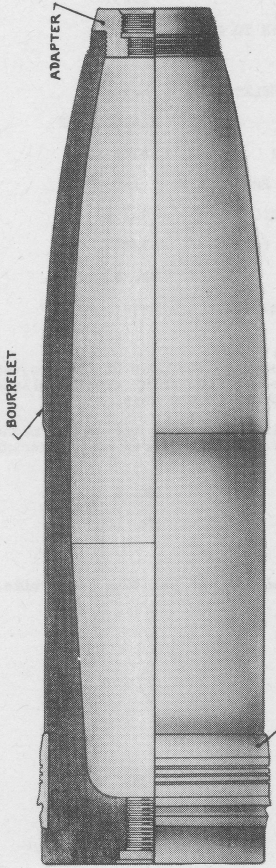
16. REMARKS:

For method of marking and painting projectile, see INTRODUCTION.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 and 6"/53 Mk. 34 | CLASSIFICATION: High Capacity (H.C.) |
| TARGET: Used effectively in bombarding shore installations because of the high loading factor. Also, used against lightly armored vessels such as cruisers, aircraft carriers, etc. | |




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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 and 6"/53 Mk. 34 | CLASSIFICATION: High Capacity (H.C.) |

TARGET: Used effectively in bombarding shore installations because of high loading factor. Also, used against lightly armored vessels such as cruisers, aircraft carriers, etc.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Fuze<br>Without Fuze | 27.05"<br>22.625" |
| 2. | DIAMETER OF BASE | 5.99" |
| 3. | DISTANCE FROM BASE TO BAND | 1.00" |
| 4. | WIDTH OF BAND | 2.50" |
| 5. | DIAMETER OF BOURRELET | 5.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 13.22 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 105 lbs |
| 9. | CHARGE-WEIGHT RATIO | 12.60 % |
| 10. | TYPE OF GUN USED IN | 6"/47 and 6"/53 |
| 11. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 & 4; A.P. Nose Plug; Auxiliary Detonator Fuze Mk. 17 and Mods. |
| 12. | TRACER | Mk. 5; Mk. 5 Mod 1 |
| 13. | PRIMER | Mk. 13 |

14. REMARKS:

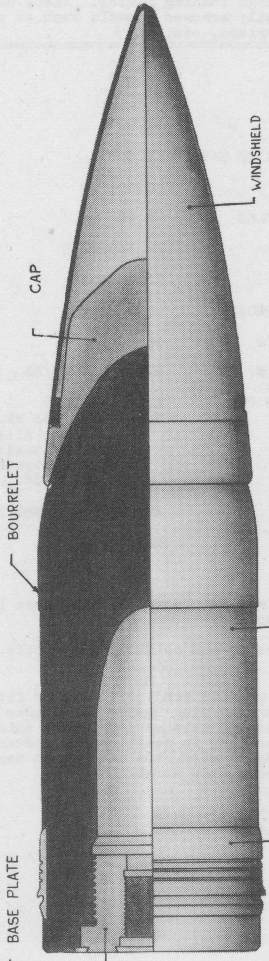
A waterproof cap may be placed over the nose fuze for protection from moisture.

For method of marking and painting projectile, see INTRODUCTION.

Note: - The nose of this projectile may be fitted with a steel armor piercing plug instead of a nose fuze. The steel plug has two notches 180° apart which may be staked to hold the plug in position and prevent turning. When the A.P. plug is used, the detonation depends entirely on the base fuze alone.

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 6"/47 - Mk. 35 | CLASSIFICATION: A.P. |
| TARGET: Used against heavily armored targets. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 6"/47 - Mk. 35 | CLASSIFICATION: A.P. |
| TARGET: Used against heavily armored targets. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH -<br>With Cap & Windshield<br>Without Cap & Windshield | <br>27.9"<br>17.19" |
| 2. | DIAMETER OF BASE | 5.99" |
| 3. | DISTANCE FROM BASE TO BAND | 1.00" |
| 4. | WIDTH OF BAND | 2.50" |
| 5. | DIAMETER OF BOURRELET | 5.99" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 1.95 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 130 lbs |
| 9. | CHARGE-WEIGHT RATIO | 1.5 % |
| 10. | TYPE OF GUN USED IN | 6"/47 |
| 11. | TRACER | Mk. 5 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 21; Mk. 19. |
| 13. | CAP & WINDSHIELD:<br>The Cap weighs 15.82 lbs and is soldered on to the nose of the projectile, In addition to the solder, it is secured by five crimp caps equally spaced around the periphery of the nose.<br><br>The Windshield, 3/32" thick, is fastened to the cap by means of three equi-distanced notches which are staked. | |
| 14. | CARTRIDGE CASE | Mk. 4 |
| 15. | PRIMER | Mk. 13 |
| 16. | REMARKS:<br><br>For method of marking and painting projectile, see INTRODUCTION. | |

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 8"/55 260 lb. Mks. 13, 14 & 15 | CLASSIFICATION: Common |
| TARGET: Effective against lightly armored surface vessels, such as cruisers, destroyers and also against submarines. | |




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

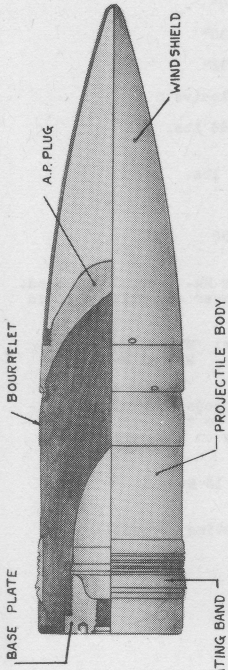
PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 8"/55 260 lb. Mks 13, 14 & 15 | CLASSIFICATION: Common |
| TARGET: Effective against lightly armored surface vessels, such as cruisers, destroyers and also against submarines. | |

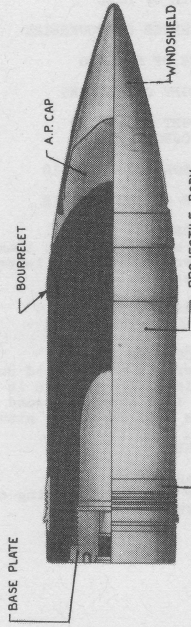
| | | |
|---|---|---|
| 1. | OVERALL LENGTH: With Windshield | 36.0" |
| | Without Windshield | 26.19" |
| 2. | DIAMETER OF BASE | 7.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.0" |
| 4. | WIDTH OF BAND | 3.30" |
| 5. | DIAMETER OF BOURRELET | 7.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 11.46 lbs. |
| 8. | WEIGHT OF LOADED PROJECTILE | 260 lbs. |
| 9. | CHARGE-WEIGHT RATIO | 44% |
| 10. | TYPE OF GUN USED IN | 8"/55 |
| 11. | TRACER: If Mk. 11 is used, then tracer Mk. 5 should be used. However, if Mk. 9 is used, tracer composition is in fuze itself. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 9; Mk. 11; Mk. 11 Mod.8 |
| 13. | WINDSHIELD & CAP: There is no cap used on this projectile. The windshield, 1/8 " thick is fitted to the nose by means of five equally spaced notches on the periphery of the nose which are staked. | |
| 14. | PRIMER | Mk. 15 Mod. 1 |
| 15. | REMARKS: For method of marking and painting projectile, see INTRODUCTION. | |

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 8"/55 - Mks. 19 & 21 | CLASSIFICATION: A.P. |
| TARGET: Used against heavily armored vessels and fortifications. | |




Mk. XIX




Mk. 21

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 8"/55 - Mks. 19 & 21 | CLASSIFICATION: A.P. |
| TARGET: Used against heavily armored vessels and fortifications. | |

| | | Mk. 19 | Mk. 21 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Cap & Windshield | 36.0" | 36.0" |
| | Without Cap & Windshield | 19.4" | 24.5" |
| 2. | DIAMETER OF BASE | 7.98" | 7.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.00" | 2.00" |
| 4. | WIDTH OF BAND | 3.30" | 3.30" |
| 5. | DIAMETER OF BOURRELET | 7.98" | 7.98" |
| 6. | TYPE OF FILLING | Explosive D | |
| 7. | WEIGHT OF FILLING | 3.64 lbs | 5.03 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 260 lbs | 335 lbs |
| 9. | CHARGE-WEIGHT RATIO | 1.4 % | 1.5 % |
| 10. | TYPE OF GUN USED IN | 8"/55 | |
| 11. | TRACER | Mk. 5 | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 21; Mk. 23; Mk. 11; Mk. 11-8. | Base: Mk. 21; Mk. 23. |

13. CAP & WINDSHIELD:
The Cap is soldered on to the nose. In addition to the solder, the cap is also secured by five crimp caps equally spaced around the periphery of the nose. The Windshield, .125" thick, is then attached to the cap and held in place by five equally spaced notches which are staked. Method of attaching windshield may be varied if approved by BuOrd.

14. PRIMER — Mk. 15 Mod 1

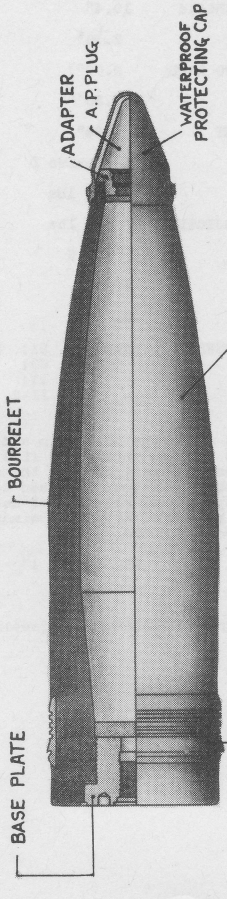
15. REMARKS:

For method of marking and painting projectiles, see INTRODUCTION.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 8"/55 Mk. 24 | CLASSIFICATION: H.C. |
| TARGET: Due to high loading factor, this projectile is effective in bombardment against lightly armored vessels. | |




Mk. 24

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 8"/55 Mk. 24 | CLASSIFICATION: H.C. |
| TARGET: Due to high loading factor, this projectile is effective in bombardment against lightly armored vessels. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Cap | 34.56" |
| | Without Fuze & Cap | 30.48" |
| 2. | DIAMETER OF BASE | 7.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.0" |
| 4. | WIDTH OF BAND | 3.30" |
| 5. | DIAMETER OF BOURRELET | 7.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 21.34 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 260 lbs |
| 9. | CHARGE-WEIGHT RATIO | 8.21 % |
| 10. | TYPE OF GUN USED IN | 8"/55 |
| 11. | TRACER | Mk. 5 Mod 1 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28.<br>Nose: Mk. 29; Mk. 18-2, 18-3, 18-4.<br>Auxiliary Detonating Fuze Mk. 17 & Mods. Nose Plug. |
| 13. | PRIMER | Mk. 15 Mod 1 |

14. REMARKS:

A waterproof cover may be placed over the nose fuze for protection from moisture.

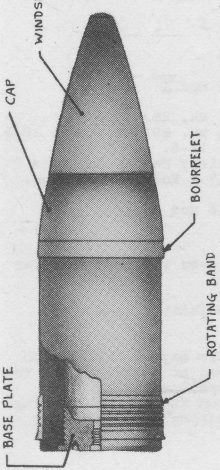
For color and markings of this projectile, see the INTRODUCTION.

NOTE: - The nose of this projectile may be fitted with a steel armor piercing plug instead of a nose fuze. The steel plug has two notches 180° apart which may be staked to hold the plug in position and prevent turning. When the A.P. plug is used, detonating depends on the base fuze alone.

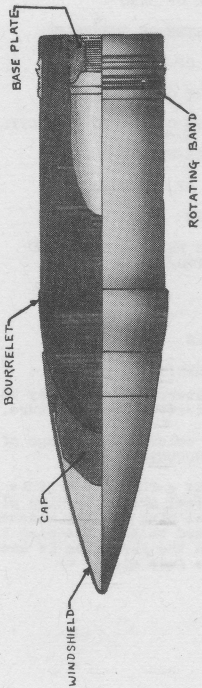
C-O-N-F-I-D-E-N-T-I-A-L

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 12"/50; Mk. 15 - 870# Mk. 18 -1140# | CLASSIFICATION: A.P. |
| TARGET: Used against heavy armor such as battleships, etc. | |




Mk. XV




Mk. 18

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 12"/50; Mk. 15 - 870# Mk. 18 - 1140# | CLASSIFICATION: A.P. |

TARGET: Used against heavy armor such as battleships, etc.

| | | Mk. 15 | Mk. 18 |
|---|---|---|---|
| 1. | OVERALL LENGTH - With Cap & Windshield | 42.10" | 54.00" |
| | Without Cap & Windshield | | 38.59" |
| 2. | DIAMETER OF BASE | 11.94" | 11.98" |
| 3. | DISTANCE FROM BASE TO BAND | 1.00" | 2.00" |
| 4. | WIDTH OF BAND | 4.00" | 4.00" |
| 5. | DIAMETER OF BOURRELET | 11.97" | 11.98" |
| 6. | TYPE OF FILLING | Explosive D | |
| 7. | WEIGHT OF FILLING | 22.50 lbs | 17.10 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 870 lbs | 1140 lbs |
| 9. | CHARGE-WEIGHT RATIO | 2.59 % | 1.50 % |
| 10. | TYPE OF GUN USED IN | 12"/50 | |
| 11. | TRACER | In fuze | Mk. 5 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 2 Mod 2; Mk.11 | Base: Mk.21; Mk.23. |

13. CAP & WINDSHIELD:
There is no windshield on the Mk. 15. However, on the Mk. 18 the windshield is attached to the cap and held in place by five equally spaced notches which are staked. Cap weighs 110.98 lbs and is soldered to the nose. In addition to the solder, the cap is also secured by seven crimp caps equally spaced on the periphery of the nose.

14. PRIMER — Mk. 15 Mod 1

15. REMARKS:

Method of attached windshield may be varied if approved by the Bureau of Ordnance.

For method of marking and painting projectile, see INTRODUCTION.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1945 |
| CALIBER: 12"/50 Mk. 16 - 740 lbs. | CLASSIFICATION: High Capacity |
| TARGET: Bombardment of shore establishments and light armored vessels. | |




Mk. 16



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

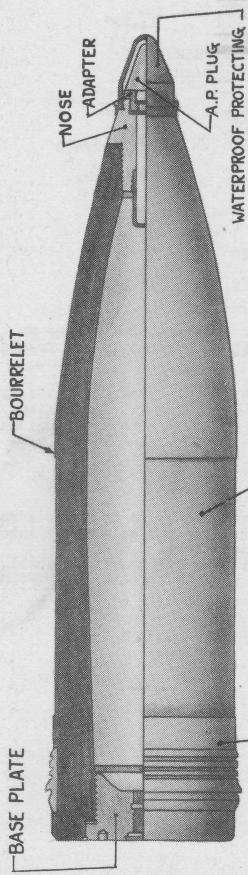
PROJECTILE DATA

| | | | |
|---|---|---|---|
| NATIONALITY: | U.S. NAVY | INFORMATION DATE: | April, 1943 |
| CALIBER: | 12"/50<br>Mk. 16 - 740 lbs. | CLASSIFICATION: | High Capacity |
| TARGET: | Bombardment of shore establishments and light armored vessels. | | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH<br>With Fuze<br>Without Fuze | <br>42.10"<br>36.16" |
| 2. | DIAMETER OF BASE | 11.98" |
| 3. | DISTANCE FROM BASE TO BAND | 1.0" |
| 4. | WIDTH OF BAND | 4.0" |
| 5. | DIAMETER OF BOURRELET | 11.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 58.20 lbs. |
| 8. | WEIGHT OF LOADED PROJECTILE | 740 lbs. |
| 9. | CHARGE-WEIGHT RATIO | 7.86% |
| 10. | TYPE OF GUN USED IN | 12"/50 |
| 11. | TRACER:<br>Tracer Mk. 5 Mod. 1 is optional in the Mk. 28 base fuze. If used, it is screwed in the fuze underneath the base plug. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28; Mk. 17 & Mods Auxiliary Det. Fuze.<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 & 4. |
| 13. | PRIMER | Mk. 15 Mod. 1 |
| 14. | REMARKS:<br>When base detonation only is desired, a forged or rolled steel A.P. plug can be screwed into the nose to replace the nose fuze.<br>Markings and painting of projectile shall be in accordance with facts set forth in INTRODUCTION. | |

PROJECTILE DATA

| | | | |
|---|---|---|---|
| NATIONALITY: | U.S. NAVY | INFORMATION DATE: | April, 1943 |
| CALIBER: | 12"/50 - Mk. 17 940 lbs. | CLASSIFICATION: | High Capacity |
| TARGET: | Used in bombarding shore establishments and against lightly armored vessels, such as cruisers. | | |




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

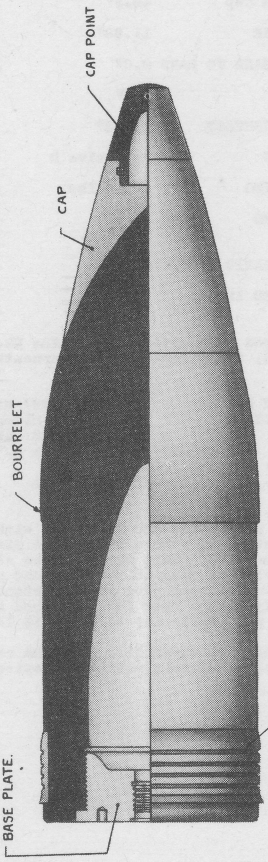
PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 12"/50 - Mk. 17 940 lbs. | CLASSIFICATION: High Capacity |
| TARGET: Used in bombarding shore establishments and against lightly armored vessels, such as cruisers. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH:<br>With Fuze & Cap<br>Without Fuze & Cap | <br>54.0"<br>46.3" |
| 2. | DIAMETER OF BASE | 11.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.0" |
| 4. | WIDTH OF BAND | 4.0" |
| 5. | DIAMETER OF BOURRELET | 11.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 79.44 lbs. |
| 8. | WEIGHT OF LOADED PROJECTILE | 940 lbs. |
| 9. | CHARGE-WEIGHT RATIO | 8.45% |
| 10. | TYPE OF GUN USED IN | 12"/50 |
| 11. | TRACER:<br>Tracer Mk. 5 Mod 1 is optional with the Mk. 28 base fuze. If used, it is screwed in underneath the base plug. | |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28; Mk. 17 & Mods Aux. Detonating fuze.<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 & 4. |
| 13. | PRIMER | Mk. 15 Mod. 1 |
| 14. | REMARKS:<br>Nose of this projectile may be fitted with a steel A.P. plug instead of a nose fuze. The steel plug has two notches 180° apart which may be staked in notches to hold the plug in position and prevent turning. When the nose plug is in, detonation depends entirely on the base fuze. Method of marking and painting projectile may be found in INTRODUCTION.<br><br>Water-proofing cap, which fits over the nose fuze, is provided as a moisture resistant device. | |

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 14"/45 and 14"/50 1400 lbs - Mk. 8 | CLASSIFICATION: A.P. |
| TARGET: Used against heavy armor such as battleships, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 14"/45 and 14"/50 1400 lbs - Mk. 8 | CLASSIFICATION: A.P. |

TARGET: Used against heavy armor such as battleships, etc.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | 49.39" |
| 2. | DIAMETER OF BASE | 14.56" |
| 3. | DISTANCE FROM BASE TO BAND | 1.00" |
| 4. | WIDTH OF BAND | 4.66" |
| 5. | DIAMETER OF BOURRELET | 13.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 29.50 lbs |
| 8. | TOTAL WEIGHT OF PROJECTILE | 1400 lbs |
| 9. | CHARGE-WEIGHT RATIO | 2.10 % |
| 10. | TYPE OF GUN USED IN | 14"/45 & 14"/50 |
| 11. | TRACER | Mk. 5 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 11; Mk. 11 Mod 8 |
| 13. | PRIMER | Mk. 15 Mod 1 |
| 14. | REMARKS: | |

Subject projectile does not have a cap or windshield. A waterproof cover may be placed over the nose fuze for protection from moisture.

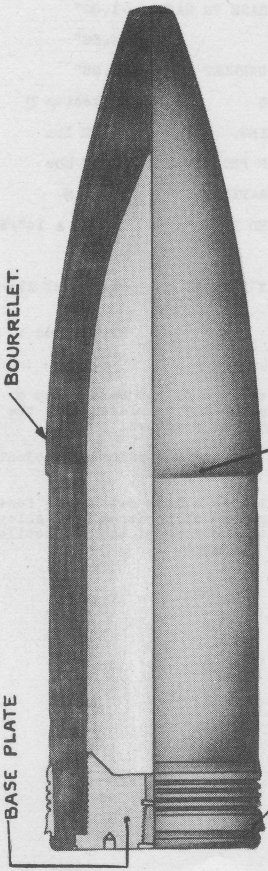
For method of marking and painting projectile, see INTRODUCTION.

This projectile has a base detonating fuze only. A fuze hole plug made of Hardened Lead Alloy or Hardwood is screwed into the nose of the projectile when delivered for shipment.

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | | INFORMATION DATE: April, 1943 |
|---|---|---|
| CALIBER: | 14"/45 & 14"/50 Mk. 9 - 1410 lbs. | CLASSIFICATION: Bombardment |
| TARGET: | This projectile is used for bombarding shore establishments, etc. | |




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

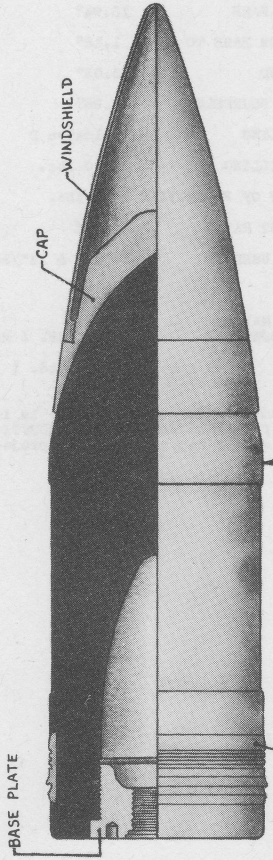
PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 14"/45 & 14"/50 Mk. 9 - 1410 lbs. | CLASSIFICATION: Bombardment |
| TARGET: This projectile is used for bombarding shore establishments, etc. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH<br>With Tip<br>Without Tip | <br>59.51"<br>56.0" |
| 2. | DIAMETER OF BASE | 13.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.13" |
| 4. | WIDTH OF BAND | 3.53" |
| 5. | DIAMETER OF BOURRELET | 13.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 105.0 lbs. |
| 8. | TOTAL WEIGHT OF PROJECTILE | 1410 lbs. |
| 9. | CHARGE-WEIGHT RATIO | 7.45% |
| 10. | TYPE OF GUN USED IN | 14"/45 & 14"/50 |
| 11. | TRACER | Mk. 5 |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 3 Mod. 2 |
| 13. | PRIMER | Mk. 15 Mod. 1 |
| 14. | REMARKS:<br>Painting and marking of projectile is in accordance with facts set forth in INTRODUCTION.<br>No windshield or cap used on this projectile. | |

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 14"/45 & 14"/50 Mk. 16 - 1500 lbs. | CLASSIFICATION: A.P. |
| TARGET: Used against heavy armor, such as, battleships, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 14"/45 & 14"/50 Mk. 16 - 1500 lbs. | CLASSIFICATION: A.P. |

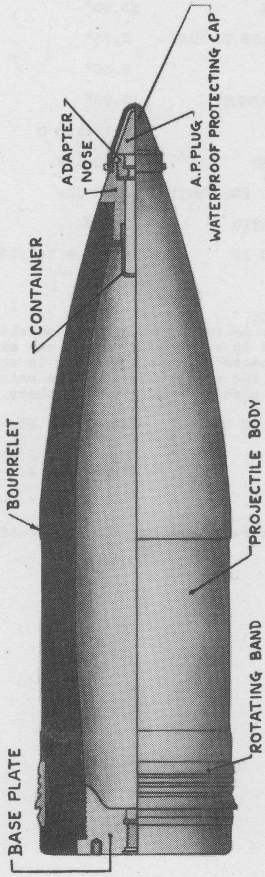
TARGET: Used against heavy armor such as, battleships, etc.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Cap & Windshield<br>Without Cap & Windshield | 56.00"<br>37.27" |
| 2. | DIAMETER OF BASE | 13.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.25" |
| 4. | WIDTH OF BAND | 4.66" |
| 5. | DIAMETER OF BOURRELET | 13.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 22.50 lbs. |
| 8. | WEIGHT OF LOADED PROJECTILE | 1500 lbs |
| 9. | CHARGE-WEIGHT RATIO | 1.5 % |
| 10. | TYPE OF GUN USED IN | 14"/45 & 14"/50 |
| 11. | TRACER | Mk. 5 |
| 12. | CAP & WINDSHIELD: This projectile is fitted with a windshield 3/16" thick, 24.09" long and is screwed on to the cap and staked at five equally spaced notches. The cap is soldered on to the nose of the projectile and then crimped in seven equally spaced places around the periphery. | |
| 13. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 21; Mk. 23. |
| 14. | PRIMER | Mk. 15 Mod 1. |
| 15. | REMARKS: For method of marking and painting projectile, see INTRODUCTION. | |

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 14"/45 Type EX-1 Mk. 19 - 1275 lbs. | CLASSIFICATION: High Capacity |
| TARGET: Used in bombardment and against lightly armored vessels such as cruisers, carriers, etc. | |




MK. 19

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 14"/45 Type EX-1 Mk. 19 - 1275 lbs. | CLASSIFICATION: High Capacity |
| TARGET: Used in bombardment and against lightly armored vessels such as cruisers, carriers, etc. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Fuze & Cap | 56.0" |
| | Without Fuze & Cap | 48.3" |
| 2. | DIAMETER OF BASE | 13.98" |
| 3. | DISTANCE FROM BASE TO BAND | 2.25" |
| 4. | WIDTH OF BAND | 4.66" |
| 5. | DIAMETER OF BOURRELET | 13.98" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 104.21 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 1275 lbs |
| 9. | CHARGE-WEIGHT RATIO | 8.01 % |
| 10. | TYPE OF GUN USED IN | 14"/45 & 14"/50 |
| 11. | TRACER | Mk. 5 Mod 1. |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28.<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 and 4. |
| 13. | PRIMER | Mk. 15 Mod 1 |

14. REMARKS:

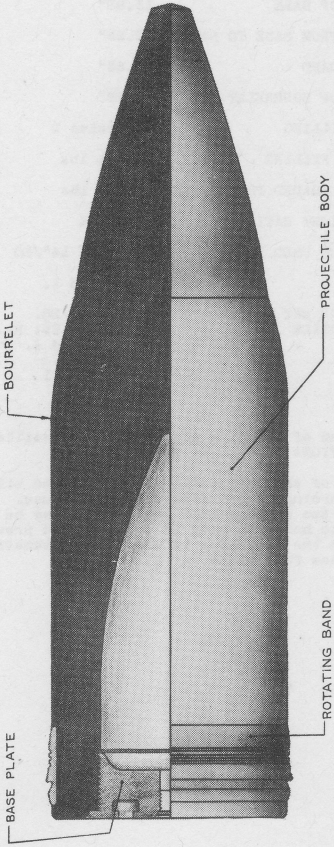
For method of painting and marking projectile, see INTRODUCTION.

The nose of this projectile may be fitted with a steel armor piercing plug instead of a nose fuze. The steel plug has two notches 180° apart which may be staked in notches to hold the plug in position and prevent turning; when the A.P. plug is used, the detonation depends on the base fuze alone.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 16" - Mk. 3 | CLASSIFICATION: A.P. |
| TARGET: This projectile is one of the older ones which are not very commonly used now. Used against heavy armor plate. | |




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

PROJECTILE DATA

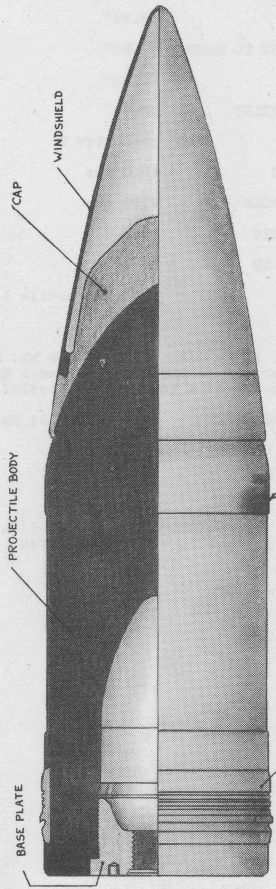
| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 16" - Mk. 3 | CLASSIFICATION: A.P. |
| TARGET: This projectile is one of the older ones which are not very commonly used now. Used against heavy armor plate. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Cap | 56.5" |
| 2. | DIAMETER OF BASE | 15.94" |
| 3. | DISTANCE FROM BASE TO BAND | 1.50" |
| 4. | WIDTH OF BAND | 5.30" |
| 5. | DIAMETER OF BOURRELET | 15.94" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 50.0 lbs |
| 8. | WEIGHT OF PROJECTILE | 2100 lbs |
| 9. | CHARGE-WEIGHT RATIO | 2.3 % |
| 10. | TYPE OF GUN USED IN | 16"/45 |
| 11. | CAP & WINDSHIELD | This projectile is fitted with both. |
| 12. | TRACER: If base Fuze Mk. 11 is used, then tracer Mk. 5 should be used. However, if Base Fuze Mk. 2-Mod 2 is used, the tracer composition is in the fuze itself. | |
| 13. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 11; Mk. 2 Mod 2. |
| 14. | PRIMER | Mk. 15 Mod 1. |
| 15. | REMARKS: This projectile will be painted and marked in accordance with facts set out in the INTRODUCTION. | |

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 16" Mk. 5 - 2240 lbs | CLASSIFICATION: A.P. |
| TARGET: This projectile to be used against heavy armor plate. | |




Mk. V

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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 16" Mk. 5 - 2240 lbs | CLASSIFICATION: A.P. |
| TARGET: This projectile to be used against heavy armor plate. | |

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - | |
| | With Cap & Windshield | 64.0" |
| | Without Cap & Windshield | 43.4" |
| 2. | DIAMETER OF BASE | 15.97" |
| 3. | DISTANCE FROM BASE TO BAND | 2.5" |
| 4. | WIDTH OF BAND | 5.3" |
| 5. | DIAMETER OF BOURRELET | 15.97" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 33.6 lbs |
| 8. | WEIGHT OF PROJECTILE LOADED | 2240 lbs |
| 9. | CHARGE-WEIGHT RATIO | 1.5 % |
| 10. | TYPE OF GUN USED IN | 16"/45 |
| 11. | CAP & WINDSHIELD: The cap weighs 219 lbs and is soldered on to the nose of the projectile. In addition to the solder, the cap is also secured by seven crimp caps equally spaced around the periphery of the nose. The Windshield is then attached to the cap and held in place by five equally spaced notches which are staked. | |
| 12. | TRACER | Mk. 5 |
| 13. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 21; Mk. 23. |
| 14. | PRIMER | Mk. 15 Mod 1 |
| 15. | REMARKS: | |

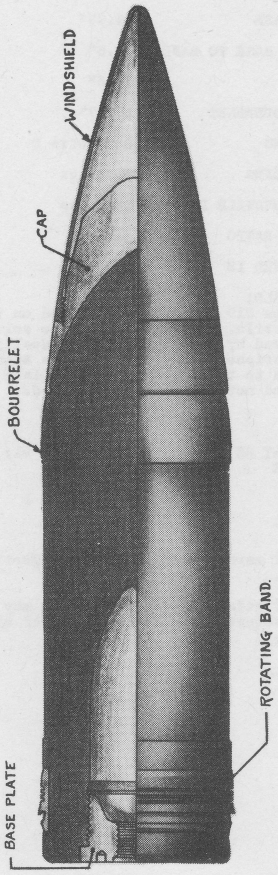
For method of marking and painting projectile, see INTRODUCTION.

The method of attaching the windshield may be varied by the manufacturer with the approval of the Bureau of Ordnance.

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

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 16" - Mk. 8; 2700# | CLASSIFICATION: A.P. |
| TARGET: Used against heavily armored ships such as battleships and some cruisers. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 16" - Mk. 8; 2700# | CLASSIFICATION: A.P. |

TARGET: Used against heavily armored ships such as battleships and some cruisers.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Cap & Windshield<br>Without Cap & Windshield | 71.8"<br>51.6" |
| 2. | DIAMETER OF BASE | 15.97" |
| 3. | DISTANCE FROM BASE TO BAND | 2.50" |
| 4. | WIDTH OF BAND | 5.30" |
| 5. | DIAMETER OF BOURRELET | 15.95" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 40.50 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 2700 lbs |
| 9. | CHARGE-WEIGHT RATIO | 2.0 % |
| 10. | TYPE OF GUN USED IN | 16"/45 |
| 11. | TRACER | Mk. 5 |

12. CAP & WINDSHIELD:
The cap is soldered on to the nose of the projectile and then crimped in seven equally spaced places around the periphery. The crimp cap is the circular type made of brass.

The windshield is 7/32" thick and 26.4" long. The windshield is screwed on to the cap and staked at five equally spaced notches. However, the windshield may be secured by alternate methods with the approval of the Bureau of Ordnance.

13. FUZES WHICH MAY BE USED IN PROJECTILE: Base: Mk. 21; Mk. 23

14. PRIMER: Mk. 15 Mod 1

15. REMARKS:

As this projectile is designed, the fuze hole adapter has stamped on its base the actual weight of the adapter in pounds and also the words "Mk.XI Fuze". Some Mk. XI fuzes are still used and may be found in this projectile.

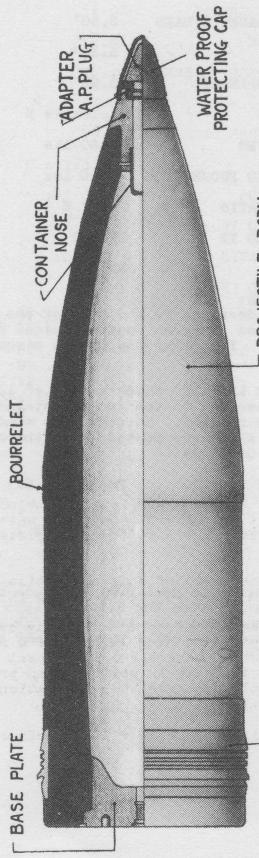
C-O-N-F-I-D-E-N-T-I-A-L



522853 O - 43 - 11

PROJECTILE DATA

| | |
|---|---|
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
| CALIBER: 16" - Type EX-1 1900 lbs. | CLASSIFICATION: High Capacity |
| TARGET: This projectile, having a high loading factory, is effective in bombardment raids on all types of shore installations and against lightly armored vessels such as cruisers, aircraft carriers, etc. | |




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

PROJECTILE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| CALIBER: 16" - Type EX-1 1900 lbs. | CLASSIFICATION: High Capacity |

TARGET: This projectile, having a high loading factor, is effective in bombardment raids on all types of shore installations and against lightly armored vessels such as cruisers, aircraft carriers, etc.

| | | |
|---|---|---|
| 1. | OVERALL LENGTH - With Fuze & Cover<br>Without Fuze & Cover | 64.0"<br>56.5" |
| 2. | DIAMETER OF BASE | 15.97" |
| 3. | DISTANCE FROM BASE TO BAND | 1.30" |
| 4. | WIDTH OF BAND | 5.30" |
| 5. | DIAMETER OF BOURRELET | 15.97" |
| 6. | TYPE OF FILLING | Explosive D |
| 7. | WEIGHT OF FILLING | 153.5 lbs |
| 8. | WEIGHT OF LOADED PROJECTILE | 1900 lbs |
| 9. | CHARGE-WEIGHT RATIO | 9.0 % |
| 10. | TYPE OF GUN USED IN | 16"/45 |
| 11. | TRACER | Mk. 5 Mod 1; Mk. 9. |
| 12. | FUZES WHICH MAY BE USED IN PROJECTILE | Base: Mk. 28<br>Nose: Mk. 29; Mk. 18 Mods 2, 3 & 4; A.P. Nose Plug; Auxiliary Detonator Fuze Mk. 17 & Mods. |
| 13. | PRIMER | Mk. 15 Mod 1 |

14. REMARKS:

Unlike the 16" A.P. projectile, the subject projectile does not have a cap or windshield. A waterproof cover may be placed over the nose fuze for protection from moisture.

The color and markings of this projectile are in accordance with facts set forth in the INTRODUCTION.

Note: - The nose of this projectile may be fitted with a steel armor piercing plug instead of a nose fuze. The steel plug has two notches 180° apart which may be staked to hold the plug in position and prevent turning. When the A.P. plug is used, the detonation depends on the base fuze alone.

In service, this projectile will be referred to as Mk. 13.

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

# SECTION 1
# PART B

# U.S. NAVY PROJECTILE FUZES

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

## INTRODUCTION

### GENERAL

A fuze is a mechanism for igniting or detonating the bursting charge of a projectile at some time during flight or on impact. The impact action may be either instantaneous or short delay.

### AERIAL BURST

The aerial burst fuze is essentially a device which controls the time of flight of a projectile either through the burning of a predetermined (variable) length of powder train, (Mk. 16, etc.) or by the action of a mechanical clock (Mk. 18, etc.)

### POINT AND BASE

When classified according to assembled position in the projectile, fuzes are either Point fuzes, which are assembled into the nose of the projectile, or Base fuzes.

### IGNITION AND DETONATING FUZES

The differentiation between fuzes as to whether Ignition (Mks. 16, 18, 22, etc.) or Detonating fuzes (Mks. 17, 28, etc.) is based on the method of firing the burster charge. The operating mechanism of the ignition fuze types acts to fire a black powder magazine which may ignite the bursting charge of the projectile directly or function through an auxiliary fuze (Mk. 17, etc.), containing a detonating element. A detonating fuze contains a high explosive directly within its own body, (Mks. 23, 26, 27, 28, etc.)

### DELAY

The delay elements within the impact fuzes consist of either slow burning powder pellets of fixed size (Mk. 21) or pellets in which varying lengths burn before the action takes place, (see Mk. 11). The delay element is designed to allow penetration of material targets before bursting the shell. They are always used in armor piercing projectiles to obtain complete penetration before the shell bursts. Instantaneous impact fuzes are used against light armor or material targets for burst before penetration.

### ARMING

The principal forces used in arming or preparing fuzes for action are (1) Setback, the force of inertia or resistance to linear acceleration of projectiles, and (2) Centrifugal Force, due to the rotation of the projectile. Many of the Navy fuzes use a combination of both of these forces in arming the fuze. The force of setback is one which exists only during the time that the projectile is in the bore, while centrifugal force exists from the instant that the projectile begins its movement until detonation occurs. Setback is in general used to shear safety pins, fire percussion elements and to initiate operation of mechanical clocks. Centrifugal force serves to release detents (or locking pins), fire the operating mechanism of mechanical clocks, revolve rotor blocks, clear interrupter blocks and align half-block units, as is explained in detail in the individual fuze explanation.

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

NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1945

PROJECTILE FUZE LOCATIONS




U.S.N.
PROJECTILE
FUZE LOCATIONS



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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

SAFETY FEATURE

The Navy system of using a rotor-interrupter (Mks. 12, 17, 27, 34, etc.) in the explosive train is designed primarily as a bore safety feature. The rotor is unlocked (detents cleared) and revolved into alignment only under the action of centrifugal force. If the operation is as designed, though the limiting rotative speed at which the detents will unlock the mechanism may be reached, the rotor interrupter unit will be subjected to the high forward linear acceleration which effect will temporarily oppose and prevent the action of centrifugal force in causing re-alignment of the train. The detonator plunger type of fuzes (Mks. 23, 28, etc.) are made bore-safe by keeping the detonator leads out of alignment with the booster lead-ins until impact occurs.

Due to the shape of the firing pin in the Semple centrifugal plunger type of fuze, the force of initial acceleration prevents centrifugal force from causing alignment (arming). When the acceleration has ceased, (the propellant gases no longer act on the projectile) centrifugal force is able to revolve the firing pin into its aligned position. Thus, bore safety is provided. (Mks. 2 Mod 2, Mk. 3 Mod 1, Mk. 3 Mod 2, Mks. 9, 10, 11 & 15).

FUZING

The fuzing of the projectiles for all guns is covered in the general chart in the introduction to the Projectile Section of this handbook. Many of the projectiles are used with one fuze, either nose or base--depending on the intended use; however, very often a combination of nose, base and auxiliary fuzes is desirable.

The Nose Ignition Type Fuzes (Powder Magazine) which are used with the Mk. 17 auxiliary detonating fuzes are:

Mks. 18, 22, 24, 25, 29 & 30.

The Nose Ignition Fuzes used alone are:

Mks. 12, 26, 27 & 34.

The Base fuzes used alone are:

Mks. 2, 3, 8, 9, 11, 19, 20, 21 & 23.

The Mk. 28 is the fuze most generally used in combination with Nose and Auxiliary detonating fuzes. The Mk. 28 is most commonly used with Nose fuzes Mks. 18, 22, 25, 29 and 30.

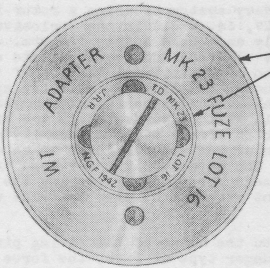
The combination of fuzes used depends upon the use desired, for example:

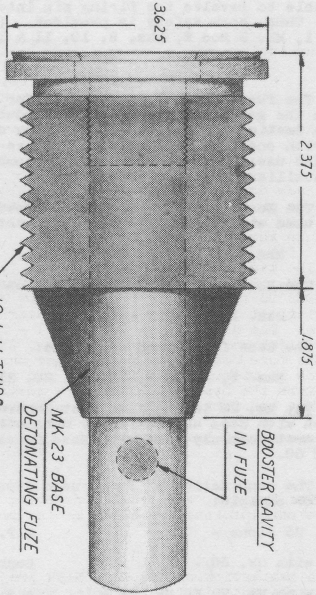
| | |
|---|---|
| Mk. 21, 23 alone - | A.P. Projectile |
| Mk. 28 with Mk. 30 - | Bombardment H.C. Proj. |
| Mk. 28 with Mk. 29 or Mk. 18 - | A.A. Projectile |

The Nose fuzes are combined with the Auxiliary Detonating fuze through the use of an adapter ring. This

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

Mks. 23 & 28
BASE FUZE ADAPTER




U.S.N.
PROJECTILE
BASE FUZE ADAPTER

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

INTRODUCTION, continued -

ring (see Fuzed projectile drawing) is a steel collar or bushing with external threads by which it screws into the projectile nose and has internal upper and lower threads. The Nose fuze is screwed into the upper internal threads and the auxiliary detonator into the lower internal threads.

MARKINGS

Identification markings on base fuzes are generally stamped on the head circumferentially so that they are externally visible when the fuze is assembled into the projectile. Nose fuzes are stamped circumferentially on the large diameter rim of the ogive. Base fuzes are commonly marked:

TDF Mk. _____
Lot
Inspectors Marks
Date

Nose fuzes are marked with at least -

Mk. _____
Lot _____

and also may include -

Type (Detonating or Ignition)
Mfg., Inspectors Mark, date.

Adapter head markings are as shown in the drawing.

ASSEMBLY

Base detonating fuzes are assembled into projectiles in either one of two ways--either by threading directly into the projectile base or into a fuze adapter, which in turn is threaded into the base plug.

The two base fuze adapter types (see drawing of adapter for Mk. 23) are the same, except for their length. Since the Mk. 23 is a longer fuze than the Mks. 19, 20, 21 and 28 series, it requires a longer adapter for proper support of the fuze. The adapter for the Mk. 21 - 28 series does not have the conical portion shown on the Mk. 23 adapter since it supports the fuze body up to the booster cavity and must of necessity be shorter. After the fuze and adapter have been assembled into the base plug, both are sealed in with a gas seal ring consisting of a copper sheathed lead ring . This is set into the ring groove with an arbor press but is readily removable by hand methods.

TRACERS

For Tracers, see section covering this subject. Tracer-fuze combinations are shown on the projectile chart.

CHART

A tabulation of the U.S. NAVY projectile fuzes and salient characteristics including mark and mod; location, whether ignition or detonating, type of action and explosive used is shown below.

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

# U.S. NAVY PROJECTILE FUSES

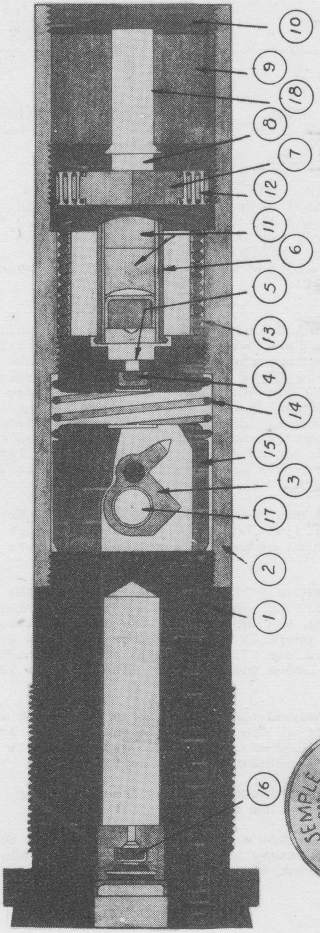
UNOFFICIAL — FILE NUMBER 04100.A — CONFIDENTIAL

| MARK | MODIFICATION | WHERE LOCATED | IGNITION OR DETONATING | ACTION TYPE | EXPLOSIVE IN FUSE |
|---|---|---|---|---|---|
| 2 | 2 | BASE | DETONATING | SEMPLE PLUNGER – PROPELLED DETONATOR<br>MAJOR CALIBER<br>DELAY TRACER | PRIMER – CAP COMPOSITION<br>MAGAZINE – FUZE POWDER<br>DETONATOR – MERCURY FULMINATE<br>BOOSTER – TETRYL OR PICRIC |
| 2 | 8<br>—<br>9 | BASE | IGNITION | GATE LOCKED – FIRING PIN<br>SETBACK SHEAR LOCK FIRING PIN | PRIMER – MERCURY FULMINATE<br>MAGAZINE – BLACK POWDER |
| 3 | —<br>1<br>2 | BASE | DETONATING | SEMPLE PLUNGER<br>INSTANTANEOUS – TRACER<br>MAJOR CALIBER | DETONATOR – MERCURY FULMINATE<br>BOOSTER – TNT |
| 7 | 1 | NOSE | DETONATING | MEDIUM CALIBER<br>SLIDING DETONATOR CARRIER | DETONATOR – MERCURY FULMINATE<br>BOOSTER – TETRYL |
| 8 | 4<br>5<br>6 | BASE | IGNITION | SEMPLE<br>HINGED STRIKER<br>MINOR CALIBER | CAP – MERCURY FULMINATE<br>MAGAZINE – BLACK POWDER |
| 9 | 1<br>2<br>3 | NOSE | IGNITION | 21 SECOND COMBINATION FRANKFORT ARSENAL<br>POWDER TRAIN with SEMPLE PLUNGER | CONCUSSION PRIMER – FULMINATE COMPOSITION<br>TRAINS AND MAGAZINE – BLACK POWDER |
| 9 | — | BASE | DETONATING | SEMPLE PLUNGER<br>DELAY ACTION | DELAY – BLACK POWDER<br>DETONATOR – MERCURY FULMINATE<br>BOOSTER – TNT |
| 10 | 3<br>4<br>9 | BASE | IGNITION | SEMPLE<br>SEMPLE<br>GRAY & DAVIS } SEMPLE PLUNGER MEDIUM CALIBER | CAP – MERCURY FULMINATE<br>MAGAZINE – BLACK POWDER |
| 11 | —<br>1<br>2<br>3<br>4<br>5<br>— | NOSE | IGNITION | COMBINATION<br>COMBINATION<br>TIME<br>TIME<br>COMBINATION<br>COMBINATION } SCOVILL 21 SECOND FUSE POWDER TRAIN and SEMPLE PLUNGER | CONCUSSION PRIMER – FULMINATE COMPOSITION<br>TRAINS and MAGAZINE – BLACK POWDER |
| 11 | —<br>8 | BASE | DETONATING | BALL LOCK FIRING PIN<br>SPRING ACTUATED PLUNGER<br>MAJOR CALIBER --- REPLACED BY MK 23<br>* VARIABLE DELAY ELEMENT | PRIMER – UMC PRIMER COMPOSITION<br>DELAY PELLET – BLACK POWDER<br>LEAD CHANNEL – LOOSE BLACK POWDER<br>BOOSTER – (LEAD IN and LEAD OUT) TETRYL<br>DETONATOR – MERCURY FULMINATE |
| 12 | 1<br>2<br>3 | NOSE | DETONATING | EXTERNAL STRIKER HEAD<br>ROTOR INTERRUPTER – 1".1 GUN<br>VERY SENSITIVE | DETONATOR – MERCURY FULMINATE<br>BOOSTER – TETRYL and No. 74 POM POM MIX |
| 13 | ALL MODIFICATIONS | BASE | DETONATING | REPLACED BY MK 28<br>BALL LOCK FIRING PIN<br>ROTOR – DETONATOR UNIT | DETONATOR – MERCURY FULMINATE and NO. 74 POM POM MIX<br>LEAD IN and BOOSTER – TETRYL |
| 15 | — | NOSE | IGNITION | 45 SECOND COMBINATION<br>POWDER TRAIN with SEMPLE PLUNGER | CONCUSSION PRIMER – FULMINATE COMPOSITION<br>TRAINS and MAGAZINE – BLACK POWDER |
| 16 | —<br>2<br>3<br>5 | NOSE | IGNITION | COMBINATION<br>TIME<br>TIME<br>TIME 45 SECOND POWDER TRAIN and SEMPLE PLUNGER | CONCUSSION PRIMER – MERCURY FULMINATE<br>MAGAZINE and TRAIN – BLACK POWDER |
| 17 | 1—6<br>8 | UNDER NOSE FUZE | DETONATING | AUXILIARY DETONATING FUSE GAS FIRED BY NOSE FUSE ACTION<br>ROTOR ARMING (MOD. 8) ROTOR FITTED WITH PIN STOPS | DETONATOR – MERCURY FULMINATE and TETRYL<br>LEAD IN and BOOSTER – TETRYL |
| 18 | 1<br>2<br>3<br>4 | NOSE | IGNITION | 45 SECOND CLOCK<br>MECHANICAL TIME FUSE | PRIMER – NON FULMINATE MIX<br>MAGAZINE – BLACK POWDER IN MOISTURE PROOF PLASTIC DONUT MAGAZINE |
| 19 | — | BASE | DETONATING | DELAY ACTION FIXED STRIKER<br>GAS LOCKING – IMPACT PLUNGER | DELAY PELLET – BLACK POWDER<br>PRIMER – UMC NO. 7 ( DELAY ELEMENT ) |
| 20 | — | BASE | DETONATING | DELAY ACTION – FIXED STRIKER<br>GAS LOCKING – IMPACT PLUNGER | SENSITIVE PRIMER – POM POM MIX NO. 74<br>DETONATOR – AZIDE<br>LEAD IN and OUT – TETRYL<br>BOOSTER – TETRYL |
| 21 | — | BASE | DETONATING | DELAY ACTION – FIXED STRIKER<br>BALL AND GAS LOCKING – IMPACT PLUNGER | DELAY ELEMENT – BLACK POWDER<br>PRIMER – UMC NO. 7<br>SENSITIVE PRIMER – POM POM MIX NO. 74<br>DETONATOR – MERCURY FULMINATE and TETRYL<br>LEAD IN and OUT; BOOSTER – TETRYL |
| 22 | — | NOSE | IGNITION | 30 SECOND CLOCK MECHANICAL TIME FUZE | PRIMER – NON FULMINATE MIX<br>MAGAZINE – BLACK POWDER IN MOISTURE PROOF PLASTIC DONUT MAGAZINE |
| 23 | — | BASE | DETONATING | MAJOR CALIBER FUZE – DELAY (FIXED) ACTION –<br>BALL LOCKED STRIKER – SPRING ACTUATED PLUNGER<br>– HEAVY IMPACT FUZE | SENSITIVE PRIMER – POM POM MIX NO. 74<br>DELAY ELEMENT – BLACK FUZE POWDER<br>DETONATOR – LEAD AZIDE<br>LEAD OUT and IN; BOOSTER – TETRYL |
| 25 | — | NOSE | IGNITION | 45 SECOND MECHANICAL TIME (SAME CLOCK AS IN MK 18, –<br>BUT IN MK 22 SHAPED BODY) | PRIMER – NON FULMINATE MIX<br>MAGAZINE – BLACK POWDER IN MOISTURE PROOF<br>PLASTIC DONUT MAGAZINE |
| 26 | —<br>1<br>2<br>3 | NOSE | DETONATING | SHOCK ACTION ON DETONATOR, USE 20 MM PROJECTILE ONLY<br>MODS. 1 and 2 HAVE EXTRA BOOSTER MAGAZINE | DETONATOR – TETRYL and LEAD AZIDE<br>EXTRA BOOSTER – LEAD AZIDE |
| 27 | — | NOSE | DETONATING | ROTOR ARMED – IMPACT STRIKER USED IN 40 MM PROJECTILE | DETONATOR – LEAD AZIDE and PRIMER MIX<br>LEAD IN and BOOSTER – TETRYL |
| 28 | 1—12 | BASE | DETONATING | INSTANTANEOUS ACTION – FIXED STRIKER – GAS LOCKING – IMPACT PLUNGER<br>MK SERIES : 19, 20, 21, 28, and 31 ALL BASICALLY ALIKE | SENSITIVE PRIMER – POM POM MIX NO. 74<br>SECONDARY PRIMER – UMC NO. 7<br>DETONATOR – LEAD AZIDE<br>LEAD OUT and IN; BOOSTER – TETRYL |
| | SPECIAL | BASE | GREEN BAND | WEAK DETENT SPRINGS FROM MK 21 ADAPT THE MK 28 FOR MAJOR CALIBER USE | |
| 29 | —<br>1 | NOSE | DETONATING | IMPACT STRIKER – INTERRUPTED TRAIN FUZE<br>IT IS U.S. ARMY M-48 ADAPTED FOR USN USE, PLASTIC OGIVE – TAPED | RELAY DETONATOR – LEAD AZIDE |
| 30 | —<br>1 | NOSE | DETONATING | SAME AS MK 29 – OGIVE TAPED TO PREVENT CRACKING, UNTIL REPLACED | INITIAL DETONATOR – LEAD AZIDE and PRIMER MIX |
| 31 | EXPERIMENTAL | BASE | DETONATING | DELAY ACTION – SAME FUZE AS MK 28 SERIES, –<br>BUT WITH EXTERNAL TRACER UNIT WHICH IS THREADED INTO HEAD | DELAY PRIMER – UMC NO. 7<br>DELAY PELLET – BLACK POWDER<br>SENSITIVE PRIMER – POM POM MIX NO. 74<br>DETONATOR – TETRYL and MERCURY FULMINATE<br>LEAD IN and OUT; BOOSTER – TETRYL |
| 34 | — | NOSE | DETONATING | IMPACT ACTION – FIRING PIN – SHEAR BLOCK – ROTOR ARMING UNIT<br>NEW 1.1" FUZE | DETONATOR – LEAD AZIDE, TETRYL and PRIMER MIX<br>LEAD IN and BOOSTER – TETRYL |
| 35 | — | UNDER NOSE FUZE | DETONATING | AUXILIARY DETONATING FUZE SAME AS MK 17 (MOD. 8) –<br>PINNED ROTOR BUT WITH WEAKER DETENT SPRINGS FOR USE IN 12, 14, and 16, INCH HIGH CALIBER PROJECTILES | DETONATOR – MERCURY FULMINATE<br>LEAD IN and BOOSTER – TETRYL |

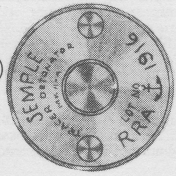
*POM POM MIX NO. 74 is composed of MERCURY FULMINATE, ANTIMONOUS SULPHIDE, and POTASSIUM CHLORATE*
*Blank space in the column "MODIFICATION" indicates UNMODIFIED FUZE.*

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 2 - Mod 2 | |
| CLASSIFICATION: Base Detonating Fuze | |




MK. 2-MOD. 2




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 2 - Mod 2 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br>12" & 14" A.P. | MARKINGS<br>Semple Tracer Detonator<br>Mk. II-A<br>Lot No.<br>RRA 1916 |

1. MATERIAL OF CONSTRUCTION: Steel Body

2. OVERALL LENGTH 7.25 — THREADED LENGTH 1.25 — THREADS 13 L.H.

3. DIAMETERS: Body - 1.38 — Head - 1.80

4. DESCRIPTION:
The fuze is composed primarily of two major parts--(A), the Tracer Head (1) threaded for the base of the projectile and (B), the Detonator Stock (2) which houses the Semple Plunger Unit(3), Primer Detonator Tube (6), Safety Coil (13) and the Gate Assembly (7) and Magazine (9).

5. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in the unarmed position during transportation, storage and until after the fuzed projectile is fired from the gun. The Semple plunger bolts (17) (detents) and the gates (7) are forced outward by centrifugal force against their spring(12) pressure and friction. The eccentrically weighted firing pin(3), when released from the unarmed position by the outward motion of the plunger locking bolts, is permitted to revolve to a position in which it is aligned with the cap.

The gate sections are brass cylinders which are thrown outward by centrifugal force against their springs, clearing the channel between the detonator and the booster.

On impact the inertia of the lead body (15) of the Semple Plunger Unit drives it down against the creep spring (14) firing the cap (4) and the small powder charge (5) which propells the detonator tube (6) down beyond the half blocks (7) into the explosion chamber (18) where it explodes and detonates the booster (9).

6. SAFETY FEATURES:
Should any unwarranted conditions cause alignment of the plunger and firing of the cap and detonator, the steel wire safety coil (13) around the detonator capsule (6) will confine the explosion within the fuze body.

The safety lock-detent mechanism is armed only by centrifugal force of the moving projectile.

The gate blocks provide a safety interruption in the explosive train because, until they are opened, the detonator tube cannot align with the booster.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 2 - Mod 2

CLASSIFICATION: Base Detonating Fuze

6. SAFETY FEATURES, continued -

Due to the shape of the firing pin, the force of initial acceleration prevents centrifugal force from producing alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin to the armed position.

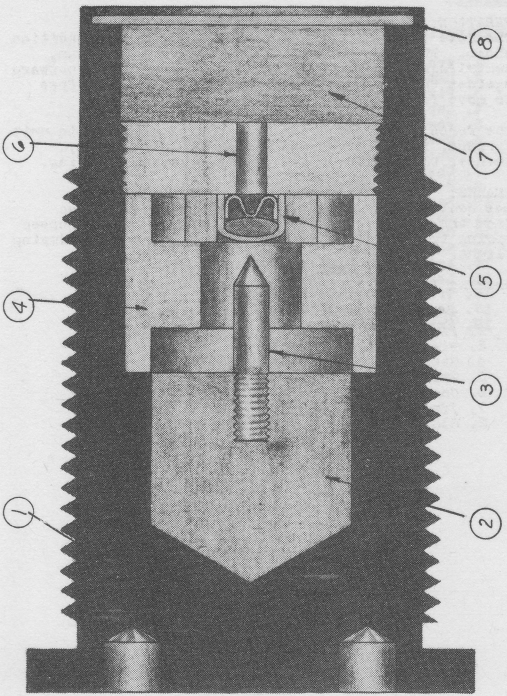
7. REMARKS:

Drawing Identification Numbers -

1. Tracer Head.
2. Detonator Stock.
3. Firing Pin.
4. Cap.
5. Powder Charge.
6. Detonator Tube.
7. Gate Blocks.
8. Channel.
9. Booster Charge.
10. Base Plug.
11. Detonator Capsule.
12. Gate Spring.
13. Safety Coil.
14. Anti-creep Spring.
15. Lead-Inertia Block.
16. Tracer (percussion).
17. Semple Plunger Detent.
18. Explosion Chamber.

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 2 - Mod 8 | |
| CLASSIFICATION: Minor Caliber - Base Ignition Fuze | |




Mk. 2 - Mod. 8

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 2 - Mod 8

CLASSIFICATION: Minor Caliber - Base Ignition Fuze

PROJECTILES USED IN

1, 3 and 6 Pounders

1. DESCRIPTION:
The fuze consists of a stock (1) containing a plunger-(2) firing pin unit (3), centrifugal locking gates (4), a primer unit (5) and a magazine (7).

2. OPERATION:
The fuze is assembled and transported in the condition shown. When the projectile is fired from the gun, centrifugal force drives the two locking gates outward against their spring; thus leaving the plunger free to move forward on impact.

The force of impact drives the plunger-firing pin unit forward, impinging on and firing the primer and, thence, through the channel to the powder magazine.

3. REMARKS:
Once centrifugal force has removed the guard gates from the plunger-striker path, there is no anti-creep spring to prevent forward motion of the striker during flight.

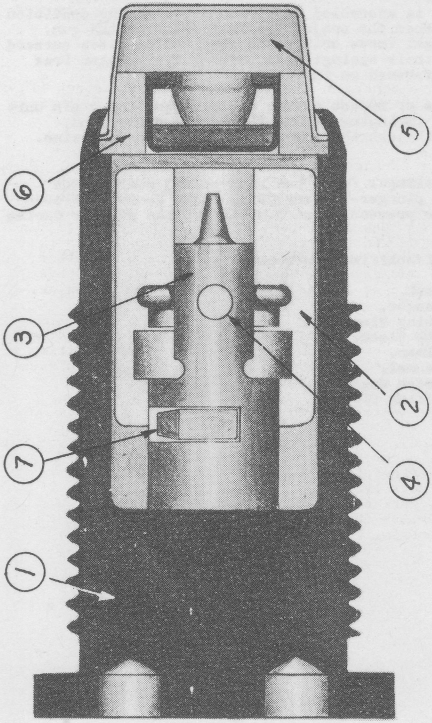
Drawing Identification Numbers -

1. Stock.
2. Plunger.
3. Firing Pin.
4. Gate Block.
5. Primer.
6. Channel.
7. Powder Magazine.
8. Closing Disc.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 2 - Mod 9 | |
| CLASSIFICATION: Minor Caliber - Base Ignition Fuze | |




ASSEMBLED POSITION

MK. 2-MOD. 9

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 2 - Mod 9

CLASSIFICATION: Minor Caliber - Base Ignition Fuze

PROJECTILES USED IN

3"/23/50 Common
1, 3 & 6 Pounders

1. MATERIAL OF CONSTRUCTION — Body - Brass; Plunger - Brass; Firing Pin - Steel

2. OVERALL LENGTH 1"75 — THREAD LENGTH 0"80; THREADS 16 L.H.

3. DIAMETERS: Head - "875 — Body - 0"63

4. DESCRIPTION:
This fuze consists essentially of a brass stock (1) or body which houses a steel firing pin (3), an inertia plunger (2) and a primer-magazine unit (5-6).

5. OPERATION:
The fuze is assembled and transported as shown. When the projectile is fired from the gun, the force of setback drives the plunger (2) back towards the head of the fuze shearing the copper pin (4). When the plunger has moved back sufficiently, the locking Pin (7) in the firing pin (3) is moved into the groove in the plunger body, thus locking the two units together. On impact, the plunger and firing pin unit are driven forward firing the primer and the powder magazine.

6. REMARKS:
Note that there is no anti-creep spring and that once the setback has taken place and the plunger-firing pin unit is locked together, there is nothing to prevent their movement down towards the primer.

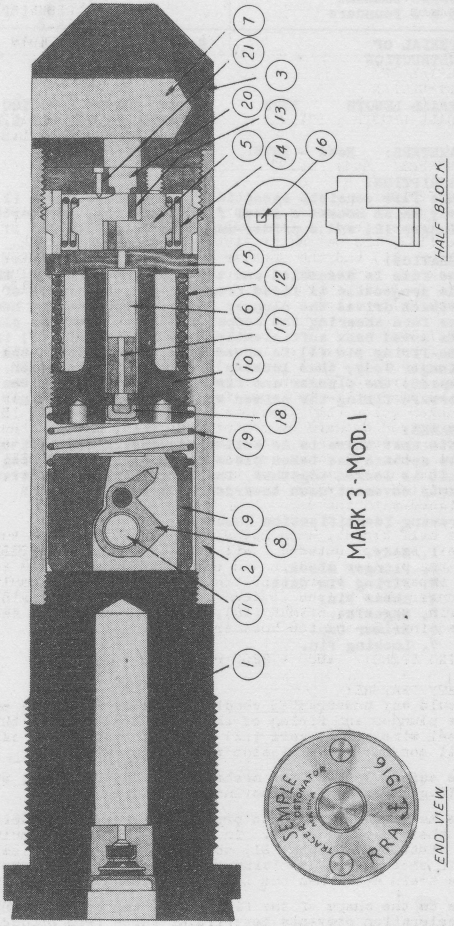
Drawing Identification Numbers -

1. Body.
2. Plunger Block.
3. Firing Pin Unit.
4. Shear Pin.
5. Magazine.
6. Primer Cup.
7. Locking Pin.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3A, Service Mk. 3 - Mod 1 | |
| CLASSIFICATION: Base Detonating Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3A, Service Mk. 3 - Mod 1 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br>6" Armor Piercing<br>6" Common | MARKINGS<br>Semple<br>Tracer Detonator<br>Mk. III-A<br>RRA 1916 |

1. MATERIAL OF CONSTRUCTION: Steel Body

2. OVERALL LENGTH 7".62 THREADED LENGTH 1".25 THREADS 13 L.H.

3. DIAMETERS: Body 1.38" Head 1".80

4. DESCRIPTION:
The fuze is composed primarily of four major parts--the Tracer Head (1)(threaded for the base of the projectile), the Detonator Stock (2), the Half Block Holder (15) and the Booster Head(3). The Detonator Stock (2) serves as the housing for the Semple Plunger Unit (8-9-11), Detonator Housing (10) and the Half Block Holder (15).

5. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in the unarmed position during transportation, storage and until after the fuzed projectile is fired from the gun. The Semple plunger bolts (11) (detents) and the half blocks (5) are forced outward by centrifugal force against their spring pressure and friction. The eccentrically weighted firing pin (8), when released from the unarmed position by the outward motion of the plunger locking bolts, is permitted to revolve to a position in which it is aligned with the cap.

The half blocks, when moved by centrifugal force to their extreme outward position, align the two segments of the booster lead-in and complete the explosive train. On impact the inertia of the lead body of the Semple Plunger Unit drives it down against the creep spring (9) firing the cap, primer (18), detonator unit (6), booster lead-in (13) and the booster (7).

6. ARMING SPEED: 1850 - 2200 r.p.m.

7. SAFETY FEATURE:
Should any unwarranted conditions cause alignment of the plunger and firing of the cap and detonator, the steel wire safety coil (12) around the detonator capsule will confine the explosion within the fuze body.

The safety lock-detent mechanism is armed only by centrifugal force of the moving projectile.

The half blocks (5) also provide a safety interruption in the explosive train. In addition, the block holder is fitted with a pin (21) to prevent the cylindrical half blocks from revolving within the holder interrupting the train even when the lead-in segments are in alignment.

Due to the shape of the firing pin, the force of initial acceleration prevents centrifugal force from producing

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3A, Service Mk. 3 - Mod 1 | |
| CLASSIFICATION: Base Detonating Fuze | |

7. SAFETY FEATURES, continued -

alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin into the armed position.

8. CAUSES OF FAILURES WHICH HAVE EXISTED IN Mk. 3A FUZES:

1. Deterioration of primer-mix.
2. Locking detent-latch for holding alignment lead in segments in half blocks may be omitted in assembly of fuze.
3. Springs behind locking detent are not of sufficient strength.

9. REMARKS:

Tracer integral with fuze head.

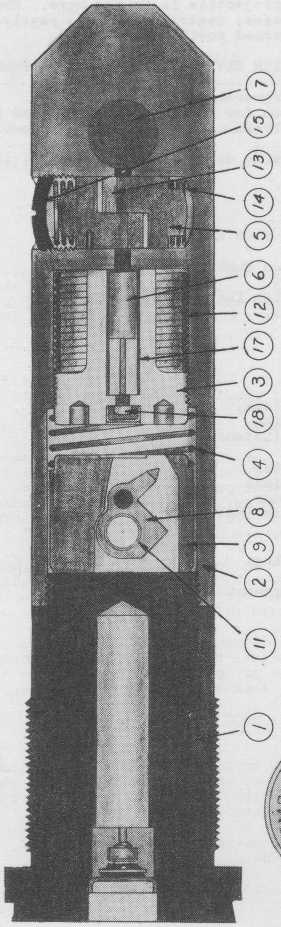
Drawing Identification Numbers:

1. Tracer Head (with integral tracer unit).
2. Detonator Stock.
3. Booster Head.
5. Half Blocks.
6. Detonator.
7. Booster.
8. Firing Pin.
9. Lead Inertia Block.
10. Detonator Housing.
11. Plunger Bolts (Detents).
12. Safety Coil.
13. Lead-in Segments.
14. Half Block Springs.
15. Half Block Holder.
16. Half Block Latch (Detent).
17. Cork Cushion.
18. Primer-Cap.
19. Anti-creep Spring.
20. Channel.
21. Half Block Alignment Pin.

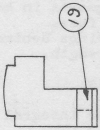
C-O-N-F-I-D-E-N-T-I-A-L

PROJECTILE FUZE DATA

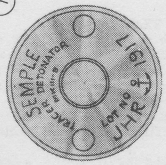
| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3B, Service Mk. 3 - Mod 2 | |
| CLASSIFICATION: Base Detonating Fuze | |




Mk. 3 - Mod. 2




HALF BLOCK




END VIEW

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3B, Service Mk. 3 - Mod 2 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br>6" Common<br>14" Bombardment | MARKINGS<br>Semple<br>Tracer Detonator<br>MK III-B<br>Lot<br>JHR 1916 |

1. MATERIAL OF CONSTRUCTION: Steel Body

2. OVERALL LENGTH 6.85 — THREAD LENGTH 1.25, THREADS 13 L.H.

3. WEIGHT 2.58 lbs

4. DIAMETERS: Body - 1.375 Head - 1.80

5. DESCRIPTION:
The fuze is composed primarily of two major parts--(A) the Tracer Head (1) threaded for the base of the projectile, and (B) the Detonator Stock (2) which houses the Semple Plunger Unit (8-9), Detonator Housing (3), Safety Coil (12) and Half Block Assembly (5).

6. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in the unarmed position during transportation, storage and until after the fuzed projectile is fired from the gun. The Semple plunger bolts (11)(Detents) and the half blocks (5) are forced outward by centrifugal force against their spring (14) pressure and friction. The eccentrically weighted firing pin, when released from the unarmed position by the outward motion of the plunger locking bolts, is permitted to revolve to a position in which it is aligned with the cap.

The Half blocks (5), when once moved by centrifugal force to their extreme outward position, (which aligns the two segments of the booster lead-in) (13) are held there by a spring loaded latch-detent (19).

On impact the inertia of the lead body (9) of the Semple plunger unit drives it down against the creep spring (4), firing the primer-cap (18), detonator unit (6), the booster lead-in (13) and the booster (7).

7. ARMING SPEED: 1850 - 2200 r.p.m.

8. SAFETY FEATURES:
Should any unwarranted conditions cause alignment of the plunger and firing of the cap and detonator, the steel wire safety coil (12) around the detonator capsule will confine the explosion within the fuze body.

The safety lock-detent mechanism is armed only by centrifugal force of the moving projectile.

The half blocks (5) also provide a safety interruption in the explosive train.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 3B, Service Mk. 3 - Mod 2 | |
| CLASSIFICATION: Base Detonating Fuze | |

8. SAFETY FEATURES, continued -

Due to the shape of the firing pin, the force of initial acceleration prevents centrifugal force from producing alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin into the armed position.

9. REMARKS:

The cap over hole into which half-blocks are set is staked into position. Screw slot in cap requires concave blade screwdriver for disassembly.

Tracer integral with fuze head.

CAUSES OF FAILURES WHICH HAVE EXISTED IN MK. 3B FUZES:

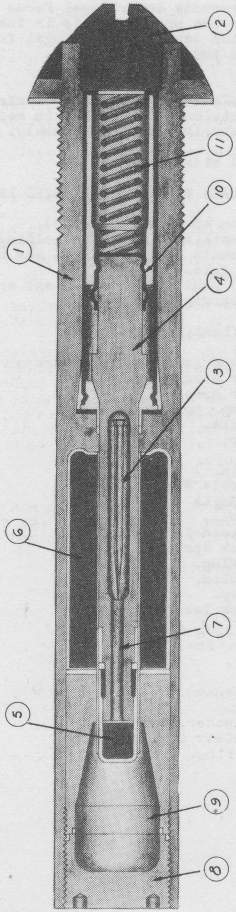
1. Deterioration of primer-mix (18).
2. Locking detent-latch (19) for holding alignment lead-in segments in half blocks may be omitted in assembly of fuze.
3. Springs (14) behind locking detent are not of sufficient strength.

Drawing Identification Numbers:

1. Tracer Head (with integral tracer unit).
2. Detonator Stock.
3. Detonator Housing.
4. Anti-creep spring.
5. Half Blocks.
6. Detonator.
7. Booster.
8. Firing Pin.
9. Lead Inertia Block.
11. Plunger Bolts (detents).
12. Safety Coil.
13. Booster Lead-in segments.
14. Half Block Springs.
15. Closing Plug.
17. Cork Cushion.
18. Primer-Cap.
19. Half Block Latch (detent).

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 7 Mod 1 | |
| CLASSIFICATION: Nose Detonating Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 7 Mod 1

CLASSIFICATION: Nose Detonating Fuze

PROJECTILES USED IN

7" Field - Marine Shore Batteries

1. OVERALL LENGTH 7".81 THREADED LENGTH 1".27
THREADS 13 R.H.

2. DIAMETERS Body - 1".12 Base of Head - 1".62

3. DESCRIPTION:
The fuze consists of a single piece steel stock (1) which houses a detonator (5) and booster (6) firing pin and booster carrier unit. The internal units are held in by a threaded base and nose plugs.

4. OPERATION:
The fuze is assembled and transported in the unarmed position shown. The detonator (5) in this position is not in the core of the booster but is in a safety chamber (9). If an explosion were to take place here, the booster (6) would not fire. The fuze remains in this position when fired and until impact.

On impact the percussion rod (4) drives forward, forcing the safety cap (10) past the construction in the upper tube, against the safety spring (11). Both the safety spring (11) and Cap (10) serve to prevent any accidental forward motion of the percussion rod which would fire the fuze. This forward motion (on impact) of the percussion rod aligns the detonator and at the same time fires it since the needle firing pin (3) is held in its position and the motion of the detonator toward the aligned position (within the booster) drives it onto the striker needle.

5. REMARKS:
The conical shape of the percussion rod at (4) prevents any setback action. The cone plus the springs (11) and the cap (10) fix the percussion rod until impact.

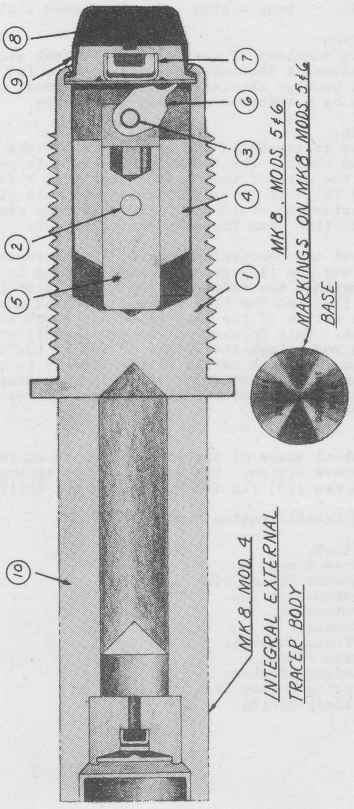
Drawing Identification Numbers:

1. Stock.
2. Nose Plug.
3. Needle Firing Pin.
4. Percussion Rod.
5. Detonator.
6. Booster.
7. Firing Channel.
8. Base Plug.
9. Safety Chamber.
10. Spring Safety Cap.
11. Safety Spring.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 8 Mod 4 | |
| CLASSIFICATION: Minor Caliber - Base Ignition Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 8 Mods 4, 5, 6.

CLASSIFICATION: Minor Caliber - Base Ignition Fuze

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 1, 3 & 6 Pounders<br>3" Common | Mod 4 Semple Tracer Fuze<br>MK III |
| | Mod 5 -7<br>NMC<br>MK XII<br>F.L.X. |
| | Mod 6 A.M. Co. Mk. XII Mod 1<br>J.B.S.<br>7-17 |

1. MATERIAL OF CONSTRUCTION: Body - Brass or Bronze.
Plunger Post & Plunger- Brass.
Striker - Cold Rolled Steel

2. WEIGHT: Mk. 8 Mod 4 129.7 grams
Mk. 8 Mods 5 & 6 2.40 ozs

3. OVERALL LENGTH: Mk. 8 Mod 4 3".61
Mk. 8 Mods 5 & 6 1".675
Length of External Tracer Housing
Mk. 8 Mod 4 1".84

4. THREADED LENGTH: 1".0 THREADS: 18 L.H.

5. DIAMETERS: Head - 0".875 Body - 0".625

6. DESCRIPTION:
The body of the fuze contains the plunger (4) and the plunger post (5) which is fitted to the plunger by a shear pin (2). The Striker (6) is attached by a hinge pin (3) to the plunger. The primer-magazine unit (7-8) is held to the body by upsetting the end inward.

7. OPERATION:
The fuze is assembled and transported in the position shown with the plunger (4) in the forward position and the striker (6) rotated on the hinge pin (3), which fastens the striker to plunger (4) so that it is not aligned with the primer (7). The force of setback cuts the shear pin (2) allowing the plunger to ride back on the plunger post (5). This motion carries the striker, which straightens out as it enters the recess in the end of the plunger post and then points at the primer-cap.

On impact the plunger and plunger post go forward together and fire the primer, which ignites the magazine.

8. REMARKS:
While this is not a centrifugally actuated fuze, it is to be noted that the firing pin is not aligned with the primer until after setback and cannot be so aligned until the plunger has moved relative to the plunger post.

Mk. 8 Mod 4 differs from Mods 5 & 6 only in that it has the longer body with the integral external tracer assembly.

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



522853 O - 43 - 13

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 8 Mods 4, 5, 6. | |
| CLASSIFICATION: Minor Caliber - Base Ignition Fuze | |

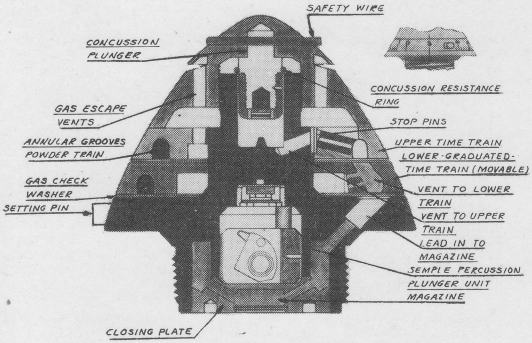
8. REMARKS, continued -

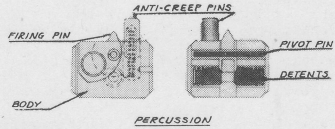
Drawing Identification Numbers:

1. Fuze Body
2. Shear Pin.
3. Hinge Pin.
4. Plunger.
5. Plunger Post.
6. Striker.
7. Primer-Cap.
8. Magazine.
9. Cup.
10. Tracer Body (integral) - on Mk. 8 Mod 4 only.

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9, Mk. 11, Mk. 15 | |
| CLASSIFICATION: Nose Ignition Fuze - Powder Train | |




Mk. 9 & Mk. 11 & Mk. 15

PERCUSSION PLUNGER ASSEMBLY (ARMED)

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 9 Mods 1, 2 & 3.

CLASSIFICATION: 21 Second Frankford Arsenal Combination Fuze. (Ignition)- Nose

PROJECTILES USED IN

3" A.A.

1. MATERIAL OF CONSTRUCTION Brass

2. OVERALL LENGTH 2".54 THREADED LENGTH 0".65
THREADS 7 R.H.

3. DIAMETERS: At Base of Ogive - 2".38

4. DESCRIPTION & OPERATION:
The time element of this fuze is composed of the following principal parts: The time or concussion plunger, the concussion resistance ring, the firing pin, the vent, leading to the upper time train, the compressed powder pellet, the upper time train, the vent, the lower time train, the compressed powder pellet in the vent leading to the powder magazine. The plunger is cylindrical in shape and contains the percussion composition in a recess at its base. The weight of the plunger rests upon the concussion resistance ring, which keeps the primer from contact with the firing pin. At discharge of the gun, the resistance of the ring is overcome and the primers explode by contact with the firing pin.

As stated above, the annular grooves into which the meal powder of the time train is pressed are in the shape of a horseshoe, a solid portion being left between the ends of the groove in each ring or disc. The upper time train ring is prevented from rotating by pins which are halved into the fuze body and the inner circumference of the ring.

The vent to the upper train is drilled through the walls of the concussion plunger chamber, and is exactly opposite a hole in the inner surface of the upper time train leading to the end of the train from which the direction of burning is anti-clockwise.

The hole to the lower train is drilled through the upper face of the lower time train ring to the end of the lower time train groove, from which the direction of burning is clockwise. The lower time train ring is movable and is graduated on its outer edge in a clockwise direction from 0 - 21 sections.

A radial pin is provided in the lower ring for engagement with a notch in the fuze setter for setting the fuze. A line on the lower flange of the fuze stock is the datum line for fuze settings.

A down vent is drilled through the flange of the fuze stock to the powder magazine and leads to the same end of the lower time train as the vent (that end from which the direction of burning is clockwise) when the fuze is at its "zero" setting.

The action of the fuze as a time fuze is as follows: At 12 Seconds:- The lower train vent has now changed its position with respect to the vent leading to the beginning of the upper time train and the vent leading

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9 Mods 1, 2 & 3 | |
| CLASSIFICATION: 21 Second Frankford Arsenal Combination Fuze. (Ignition) | |

4. DESCRIPTION & OPERATION, continued -
to the powder magazine, both of which points are fixed by the angle subtended between the 0 and 12 second settings. The flame now passes out through the vent and burns along the upper time train in an anti-clockwise direction until the vent is reached, where it passes down to the beginning of the lower time train and burns back in a clockwise direction to the position of the vent, whence it is transmitted by the pellet of compressed powder to the powder magazine.

As already stated, the annular grooves in the lower face of each ring for the powder trains do not form complete circles, a solid portion being left between the ends of the grooves in each. This solid portion is utilized to obtain a setting at which the fuze can not be exploded by the time train and is known as the "Safety Point".

5. SAFETY FEATURES:
This point is marked by a line on the outer edge of the movable time train, surmounted by an S, and is located about halfway between the zero mark and the 21 second graduation. When this point is brought opposite the line on the lower flange of the fuze body, the vent is covered by the solid metal between the ends of the upper train and the vent leading to the powder magazine is covered by the solid metal between the ends of the lower or movable time train. At the safety setting it will be seen that the upper train may burn entirely out in case of accidental firing of the time plunger, or in case it may be desired to burst the shrapnel by impact or percussion, without the flame being able to reach the magazine.

SEMPLE CENTRIFUGAL PLUNGER SAFETY: - Due to the shape of the firing pin, the force of intital acceleration prevents centrifugal force from producing alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin into the armed position.

6. REMARKS:
Mk. 9 Mods 1 & 2 have standard Semple centrifugal plunger units for impact detonation with a separate powder train to the magazine. The Mk. 9 Mod 3 has a revised form of impact unit, which consists of a U-shaped firing pin body against which the detonator block is driven by the force of impact. A yoke piece, extending down to the detonator from the base of the upper or time train striker, serves instead of the usual anti-creep spring.

DETERIORATION OF BLACK POWDER - As black powder ages it becomes less sensitive, due to minor chemical changes, so that the powder train of an old fuze may be expected to burn more slowly than that of a new one. Black powder, the major component of a time-train composition, is hydroscopic. It readily absorbs moisture and this absorption will cause the train to burn slower and slower as the moisture content increases, until it fails to function when the composition becomes wet. When the

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 9 Mods 1, 2 & 3

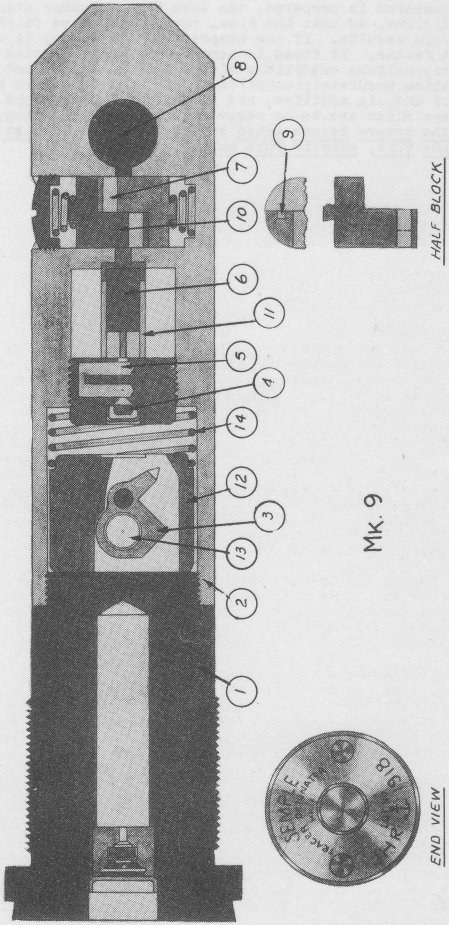
CLASSIFICATION: 21 Second Frankford Arsenal Combination Fuze. (Ignition)

6. REMARKS: continued -
composition is prepared, the work is done under standard conditions, so that the final result will give fairly uniform results. If the composition dries out, it will burn faster. If fuzes in service are not subjected to fairly uniform conditions of storage, they will not function accurately on firing. All time fuzes are waterproof and, in addition, are fitted with water-tight covers which are to be removed just prior to firing. If the covers become loose so that they admit moist air to the fuze, erratic fuze action may be expected.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9; Service Mk. 9 | |
| CLASSIFICATION: Base Detonating Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9; Service Mk. 9 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br>7" Armor Piercing<br>8" Common | MARKINGS<br>Tracer Detonator<br>Mk. IX<br>Lot<br>JHR 1918 |

1. MATERIAL OF CONSTRUCTION — Tracer Head - Steel; Detonator Head - Brass; Plunger Body - Composition

2. OVERALL LENGTH — 6".62

3. THREAD LENGTH 1".25 — THREADS 13 L.H.

4. DIAMETERS Body - 1".38 — Head - 1".80

5. DESCRIPTION:
The fuze is composed primarily of two major parts--the Tracer Head (1) (threaded for the base of the projectile) and the Detonator Stock (2), which houses the Semple Plunger Unit (3, 12), Detonator Housing (11), and Half Block Assembly (10).

6. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in the unarmed position during transportation, storage and until after the fuzed projectile is fired from the gun. The Semple plunger bolts (detents) (13) and the half blocks (10) are forced outward by centrifugal force against their spring pressure and friction. The eccentrically weighted firing pin (3), when released from the unarmed position by the outward motion of the plunger locking bolts, is permitted to revolve to a position in which it is aligned with the primer-cap (4). The half blocks (10), when once moved by centrifugal force to their extreme outward position, (which aligns the two segments(7) of the booster lead-in) are held there by a spring loaded latch-detent (9).

On impact the inertia of the lead body (12) of the Semple Unit drives it down against the creep spring firing the primer-cap. This ignites the powder delay train (5) which, when burned through, fires the detonator (6), booster lead-in (7) and booster (8).

7. SAFETY FEATURES:
Due to the shape of the firing pin, the force of initial acceleration prevents centrifugal force from producing alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin into the armed position.

The safety lock-detent mechanism is armed only by centrifugal force of the moving projectile.

The half blocks also provide a safety interruption in the explosive train.

8. REMARKS:
The cap over the hole into which half-blocks are set is staked into position. Screw slot in the cap requires concave blade screwdriver for disassembly.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 9; Service Mk. 9 | |
| CLASSIFICATION: Base Detonating Fuze | |

8. REMARKS, continued -

CAUSES OF FAILURES WHICH HAVE EXISTED IN MK. 3B FUZES:

1. Deterioration of primer-mix.
2. Locking detent latch for holding alignment lead in segments in half blocks may be omitted in assembly of fuze.
3. Springs behind locking detent are not of sufficient strength.

Tracer integral with fuze head.

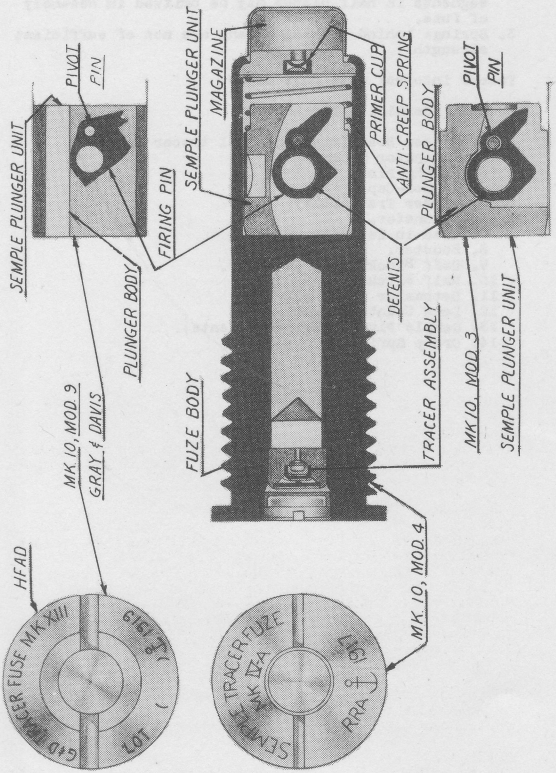
Drawing Identification Number:

1. Tracer Head (with integral tracer unit).
2. Detonator Stock.
3. Firing Pin.
4. Primer-Cap.
5. Powder Train Delay.
6. Detonator.
7. Lead-in Segments.
8. Booster.
9. Half Block Latch (detent).
10. Half Blocks.
11. Detonator Housing.
12. Lead Counterweight.
13. Sample Plunger Bolts (detents).
14. Creep Spring.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 10 Mods 3, 4, 9 | |
| CLASSIFICATION: Semple Medium Caliber Ignition Fuze - With Tracer. (Base) | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 10 Mods 3, 4, 9

CLASSIFICATION: Semple Medium Caliber Ignition Fuze - With Tracer. (Base)

| PROJECTILES USED IN | MARKINGS |
|---|---|
| Mk.10 Mod 4 - 4" Common<br>5" Common | Mk.10 Mod 3 — Semple Tracer Fuze Mk. IV PRA 1916 |
| | Mk.10 Mod 4 — Semple Tracer Fuze Mk. IVA Lot No. PRA 1917 |
| | Mk.10 Mod 9 — G & D Tracer Fuze Mk. XIII Lot ( ) 1919 |

1. MATERIAL OF CONSTRUCTION — Stock - Cold Rolled Steel; Plunger - Brass; Firing Pin - Sheet Brass

2. OVERALL LENGTH — Mk. 10 Mod 3 - 4.10"; Mk. 10 Mod 4 - 4.12"; Mk. 10 Mod 9 - 4.29"

3. THREADED LENGTH — Mk. 10 Mod 3), Mk. 10 Mod 4) - 1.40"; Mk. 10 Mod 9)

4. THREADS — 9 L.H.

5. WEIGHT — Mk. 10 Mod 3 - 407 grams; Mk. 10 Mod 4 - 398 grams

6. DIAMETERS: — Body - 1.05" Head - 1.40"

7. DESCRIPTION:
The fuze consists of a single body unit which contains the Semple Plunger Unit, Anti-creep Spring and Primer-Magazine Head.

8. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in this position during transportation, storage and until after the fuzed projectile is fired from the gun. The Semple Plunger bolts (detents) are forced outward by centrifugal force against their spring pressure and friction. The eccentrically weighted firing pin, when released from the unarmed position by the outward motion of the plunger locking bolts, is permitted to revolve to a position in which it is aligned with the cap.

On impact the inertia of the lead body of the Semple Plunger Unit drives it down against the creep spring, firing the cap, primer and magazine.

9. REMARKS:
The Mk. 10 Mods 3, 4 and 9 differ only slightly. The Mod 9 is of Gray & Davis manufacture and has a slightly different shape to the firing piece--as shown--but is essentially the same.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 10 Mods 3, 4, 9

CLASSIFICATION: Semple Medium Caliber Ignition Fuze - With Tracer. (Base)

9. REMARKS, continued -

The Mk. 10 Mod 4 is the most widely used and important modification.

Due to the peculiar shape of the firing pin, the affect of acceleration in the gun causes it to lag. This force is greater than the centrifugal force and consequently during acceleration it does not align itself with the primer. When the acceleration has ceased (when the powder gases cease to act on the projectile after projectile has left the bore), the centrifugal force takes charge and completes the movement of rotation of the pin.

Tracer is integral with fuze head.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 11 Mods 1 - 5

CLASSIFICATION: 21 Second Frankford Arsenal Combination Fuze (Ignition). (Nose)

1. OVERALL LENGTH 2".54

2. THREADED LENGTH 0".80 THREADS 7 R.H.

3. DIAMETER At Base of Ogive - 2".38

4. REMARKS:
Fuze exactly the same as described under Mk. 9 Mods 1, 2 and 3--difference being only in manufacture.

| | | |
|---|---|---|
| Mk. 11 - | Combination | |
| Mk. 11 Mod 1 - | Combination | Scovill |
| Mk. 11 Mod 2 - | Time | " |
| Mk. 11 Mod 3 - | Time | " |
| Mk. 11 Mod 4 - | Combination | " |
| Mk. 11 Mod 5 - | Combination | " |

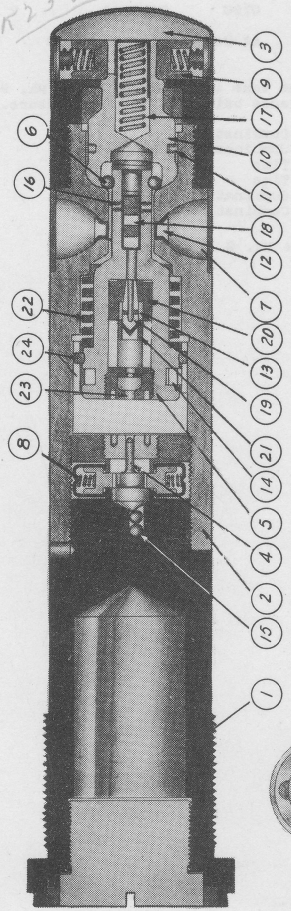
For drawing, see Mk. 9

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 11 and Mk. 11 Mod 8 | |
| CLASSIFICATION: Base Detonating Fuze | |

made MK 23 out of lot.




Mk. 11

END VIEW



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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 11 and Mk. 11 Mod 8

CLASSIFICATION: Base Detonating Fuze

PROJECTILES USED IN

8" Armor Piercing
8" Common
14" Armor Piercing

1. FUZES FOUND WITH — None. Used in AP projectiles.

2. MATERIAL OF CONSTRUCTION — Cadmium Plated Steel

3. OVERALL LENGTH 7.80 — THREADED LENGTH 1.25; THREADS 13 L.H.

4. WEIGHT 2 lbs 7 oz.

5. DIAMETERS: Head - 1.80 — Body - 1.38

6. DESCRIPTION:
The fuze is composed of three major parts, namely, the Fuze Head (1), the Fuze Body (2) and the Nose Cap (3).

The fuze head assembly contains the firing pin (4) and detents (8). The fuze body contains the plunger (5), firing spring (22) and the delay element (13, 19). The nose cap, which is threaded to the forward end of the body, contains the ball retainer units (10).

7. OPERATION:
The operation of the fuze is as follows: The fuze is assembled in the unarmed position and remains in this position during transportation, storage and until after the fuzed projectile is fired from the gun. After the projectile leaves the muzzle of the gun, the firing pin detents (8) and the ball retainer detents (9) are forced outward due to centrifugal force. The firing pin (4) creeps forward during flight and is locked in the armed position by two steel balls (15) which drop into the space left by the forward movement of the firing pin. Should the firing pin fail to creep forward during flight, it is projected forward and locked on impact. The ball retainer (10) is lightly gripped by the ring of plunger locking balls (6) which tend to spread radially as long as the firing pin exerts its force to pull the plunger to the rear; therefore, it does not creep forward during flight but remains in the assembled position until impact. To further insure that the ball retainer will not creep forward, an anti-creep spring (17) is interposed between the ball retainer and the nose cap.

On impact all parts tend to move forward with a force determined by the nature of the impact. The plunger (5) compresses the firing spring (22) and moves forward until stopped by the shoulder in the fuze body. The force of impact also drives the tapered detonator lead-in cone (19) down into its base black (20). Impact force determines how far in it is driven, and thereby controls the amount of black powder pellet (13) which must be burned (after ignition by primer) before the flash carries into the lead-in hole and down to the detonator (18). At the same time the ball retainer moves forward until stopped by the nose cap and is locked in this position by three ring segments (11)

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



522853 O - 43 - 14

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 11 and Mk. 11 Mod 8 | |
| CLASSIFICATION: Base Detonating Fuze | |

7. OPERATION, continued -
engaging a shoulder at the end of the body. The plunger locking balls (6) are released by this forward movement of the ball retainer and are projected forward into the cavity around and inside of the ball retainer. The plunger (5) remains in the forward position until the force of impact diminishes sufficiently to permit the firing spring to propel the plunger to the rear allowing the firing pin (4) to fire the primer, thus initiating the explosive action. With the plunger in the rear position, the plunger lead-out holes (16) and the booster lead-in holes (12) are brought into alignment and the fuze is completely armed. The plunger is locked in the rear position by three ring segments (14) in a manner similar to the ball retainer. On very light impact, when the force is insufficient to compress the comparatively strong plunger firing spring, the ball retainer acts as a trigger by slipping forward out of the grip of the locking balls and releases the plunger.

The firing spring then forces the plunger to the rear driving the primer (23) against the firing pin (4). The flash passes through a cylindrical channel to the black powder pellet (18) surrounding the detonator lead-in cone (19). When the black powder delay pellet has been burned down to the lead-in hole in the cone, the flash carries through and to the detonator which fires the plunger lead-out,(16), booster lead-in (12), and the fuze booster (7).

8. ARMING SPEED 1200 - 1400 r.p.m.

9. SAFETY FEATURES:
The safety detent mechanism is armed only by centrifugal force--one set of detents for the firing pin and one for the ball retainer unit.

10. REMARKS:
The plunger is kep in proper alignment by a key and keyway (24).

The Mk. 23 fuze is very similar to the Mk. 11. The Mk. 23 is a revision of the Mk. 11 Mod 8 only so far as the internal variable delay system is concerned, with the exception of a few slight structural changes.

The Mk. 11 Mod 8 has the variable delay unit (described above) while the Mk. 23 has a fixed delay. The structural differences consist primarily of a thicker plunger head on the Mk. 23 and in the use of a sharp firing pin and a more sensitive primer in the Mk. 23.

The Mk. 11 No Mod differs from the Mk. 11 Mod 8 in that an anti-creep spring is added behind the ball retainer in the Mk. 11 Mod. The Mk. 11 No Mod has a one piece crimped sleeve which extends entirely up and over the nose cap, nose threads and booster cavity, while the Mk. 11-Mod 8 has but a short sleeve over the booster cavity and another over the ball retainer detent holes in the nose cap.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 11 and Mk. 11 Mod 8 | |
| CLASSIFICATION: Base Detonating Fuze | |

10. REMARKS, continued -

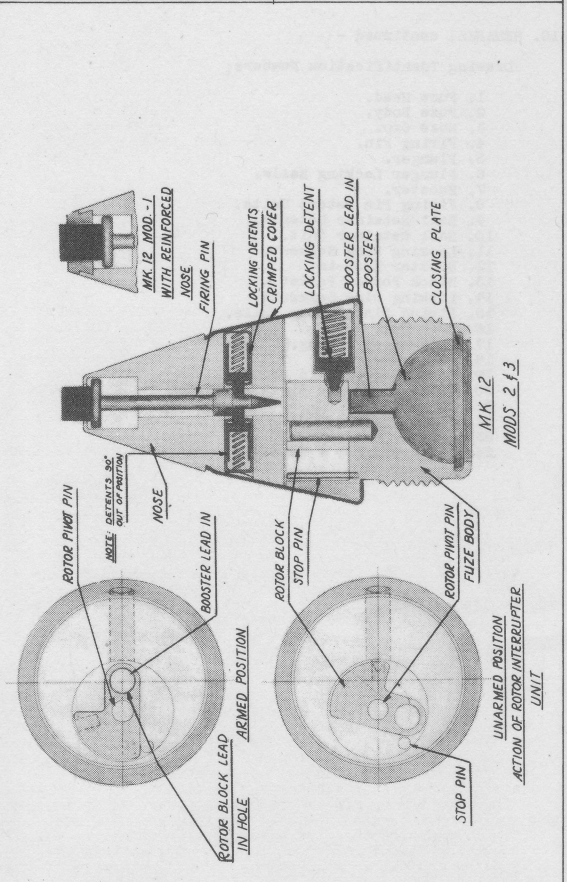
Drawing Identification Numbers:

1. Fuze Head.
2. Fuze Body.
3. Nose Cap.
4. Firing Pin.
5. Plunger.
6. Plunger Locking Balls.
7. Booster.
8. Firing Pin Detent Units.
9. Ball Retainer Detents.
10. Ball Retainer Unit.
11. Locking Ring Segment.
12. Booster Lead-in.
13. Black Powder Pellet.
14. Locking Ring Segments.
15. Firing Pin Locking Balls.
16. Lead Out.
17. Anti-creep Spring.
18. Detonator.
19. Detonator Lead-in Cone.
20. Delay Unit Base Black.
21. Channel.
22. Firing Spring.
23. Primer.
24. Alignment Key & Keyway.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 12; Mk. 12 Mod 2; Mk. 12 Mod 3. | |
| CLASSIFICATION: Nose Detonating Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 12 Mods 1, 2 & 3 | |
| CLASSIFICATION: Nose Detonating Fuze | |
| PROJECTILES USED IN<br>1"1 A.A. | MARKINGS<br>D.F. Mk. 12-2 Lot<br>P M C H.D.B. |

1. MATERIAL OF CONSTRUCTION — Nose - Aluminum; Base - Commerical Brass; Booster Cover - Sheet Steel

2. WEIGHT — 85.3 grams

3. OVERALL LENGTH 2"3 — THREADED LENGTH 0"62; THREADS 7 R.H.

4. DIAMETERS: Firing Pin Head- 0"18; Base of Ogive- 1"08

5. DESCRIPTION:
This fuze is for use in small caliber anti-aircraft projectiles. It is a sensitive fuze and is designed to burst the projectile with high order detonation on impact with materials offering appreciable resistance to penetration, such as the wings or fuselage of airplanes, etc. The fuze arms by centrifugal force. At impact, it acts through a detonator and a booster to detonate the burster charge in the projectile. The principal parts of the fuze are the Nose and the Base secured together by a jacket which is crimped over at both ends. A disc is interposed between the nose and base. The nose contains the assembly of the firing pin detents and the firing pin. The base contains the assembly of the rotor, rotor detent, detonator and booster.

6. OPERATION:
The operation of the fuze is as follows: The fuze is assembled in the unarmed position and remains in this condition during transportation, storage and until the projectile in which it is assembled is fired from the gun. The fuze becomes fully armed by the centrifugal force set up by the rotation of the projectile. The firing pin detents are thrown outward and clear of the firing pin at from 5000 r.p.m. to 7500 r.p.m., while the rotor detent is moved outboard and clear of the rotor at from 10,000 to 16,000 r.p.m. The rotor thus released rotates about the rotor pivot until stopped by the rotor stop. The rotation of the rotor brings the detonator in the rotor in line with the firing pin and the booster lead. When the projecting head of the firing pin comes in contact with any object having an appreciable resistance to impact such as the surface of an airplane wing, the firing pin is momentarily retarded or stopped, while the fuze continuing in its flight causes the firing pin to puncture the disc and stab the detonator, thus exploding the detonator which in turn detonates the booster and the burster charge of the projectile.

7. DETONATION:
Instantaneous on light duralumin sheets. Will detonate on water impact.

8. SAFETY FEATURE:
Safety detent mechanism arms only by centrifugal force. One set for the firing pin and one for the rotor.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 12 Mods 1, 2 & 3 | |
| CLASSIFICATION: Nose Detonating Fuze | |

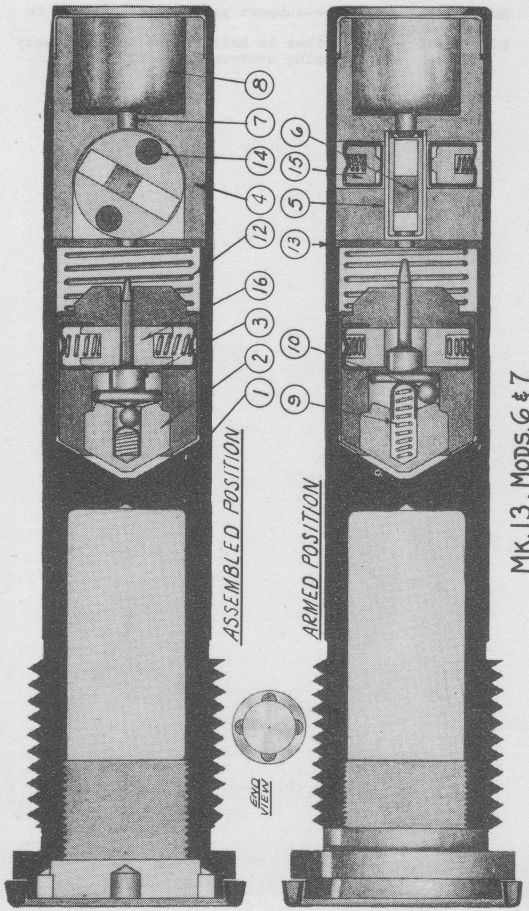
9. REMARKS:
Differences between modifications -

Mod 1 - Extra striker-support piece set in groove in nose.
Mods 2 & 3 - The striker is held in the nose assembly by crimping over on the end.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 13 Mods 6 & 7 | |
| CLASSIFICATION: Base Detonating Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 13 Mods 6 & 7 | |
| CLASSIFICATION: Base Detonating Fuze. | |
| PROJECTILES USED IN<br>5"/25 AA Common<br>5"/38 AA Common | FUZES FOUND WITH<br>Mks. 29, 18 Mods 2, 3 & 4 |

1. MATERIAL OF CONSTRUCTION — Body - Steel; Striker & Housing - Steel; Rotor Block & Rotor - Aluminum

2. OVERALL LENGTH 5.80 — THREADED LENGTH 1.22; THREADS 7 L.H.

3. DIAMETERS: Body - 1.04 Head - 1.26

4. DESCRIPTION:
This medium caliber base detonating fuze is designed--

(a) To detonate the projectile explosive charge and thereby burst the projectile with high order detonation instantaneously after impact.
(b) To insure safety and to prevent detonation of the projectile when fired in a gun and in normal flight.

It is composed of a fuze body (1) which houses a firing pin (3), detents (16), lock assembly, firing pin spring (9), rotor block-closing plate (13), rotor block (4), rotor assembly (5) and booster unit (8).

5. OPERATION:
(A)The fuze, assembled in the unarmed condition, remains so during transportation and stowage. After assembly in a projectile and fired from a gun, centrifugal force moves all detents (15, 16) outward against their spring pressure (and friction), releasing the rotor (5) and firing pin (3).

(B) The firing pin (3) is then pushed to the armed position by the firing pin spring (9) and is secured in this position by the locking ball (10) which, in addition is held out by centrifugal force.

(C) The rotor (5), complete with lead counterweights (14) and detonator (6), is assembled in the rotor block (4) with the axis of the detonator at an angle of about 55° from the axis of the fuze. The line of centers of the lead counterweights, being perpendicular to the axis of the detonator, is at an angle of about 35° from the axis of the fuze. The rotor is held in this (unarmed) position by the two rotor detents (15), the tapered ends of which engage in holes in the side of the rotor. In this position the detonating element is safe and if the detonator were to be exploded in this position it would not detonate the booster. The rotor detents on being moved outward by centrifugal force, withdraw from the holes in the rotor permitting the counterweights to rotate until the detonator is in line with the booster lead-in (7) and firing pin (3) respectively. In this position the rotor is dynamically balanced, centrifugal force holding the two lead filled holes at a maximum radius from the axis of rotation of the fuze. The rotor is now fully armed.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 13 Mods 6 & 7

CLASSIFICATION: Base Detonating Fuze.

5. OPERATION, continued -

(D) Upon impact of the fuzed projectile with anything which will cause rapid deceleration (such as armor plate, water, etc.), the projectile and fuze body tend to stop. The armed fuze plunger however, being free to move, tends to continue at the speed it had just prior to the impact and, hence, rides forward against the comparatively weak anti-creep spring causing the firing pin (3) to stab and fire the detonator (6). This initiates detonation of the explosive train of booster lead-in (7), booster (8), and projectile explosive filler, which bursts the the projectile.

6. ARMING SPEED 3000 - 4000 Revolutions

7. SAFETY FEATURE:
The Safety Detent system is on the firing pin and rotor-detonator unit. It is armed and aligned only by centrifugal force.

8. REMARKS:
Due to the fact that the medium caliber base detonating fuze Mk. 13 and Mods has given an unacceptable percentage of premature fuze functionings when assembled in 5"/25 and 5"/38 caliber anti-aircraft ammunition, particularly in the 5"/25 caliber, the Bureau of Ordnance has been replacing them with medium caliber base detonating fuzes Mk. 28 as they become available. 5"/38 AA Common projectiles assembled with fuzes Mk. 13 and Mods shall not be issued to shore stations or prepared as part of the shipment to advanced bases.

ATLANTIC FLEET-
(A) No 5"/38 caliber AA Common projectiles, fuzed with fuzes Mk. 13 Mods 6 or 7 shall be issued to any ship of the Atlantic Fleet except upon the specific request of the Commander in Chief, Atlantic Fleet.

PACIFIC FLEET -
(A) Destroyers, aircraft carriers, and large fleet auxiliaries whose main batteries comprise 5"/38 caliber guns shall be issued 5"/38 AA Common projectiles assembled with the Mk. 13 Mod 6 or Mod 7 base fuze.

(B) Ships in which the 5"/38 caliber gun does not comprise the main battery shall not be issued ammunition assembled with the fuze Mk. 13 and Mods.

Drawing Identification Numbers:

1. Body.
2. Plunger Body.
3. Firing Pin.
4. Rotor Block.
5. Rotor.
6. Detonator.
7. Booster Lead-in.
8. Booster.
9. Firing Pin Spring.
10. Locking Ball.
12. Anti-creep Spring.
13. Rotor Block Closing Plate.
14. Lead Counterweights.
15. Rotor Detents.
16. Firing Pin Detents.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 15 IGNITION

CLASSIFICATION: 45 Second Combination Fuze - Powder Train and Semple Plunger Unit. (Nose Fuze)

PROJECTILES USED IN

Illuminating only.

1. MATERIAL OF CONSTRUCTION Body - Brass

2. OVERALL LENGTH 2".80 THREADED LENGTH 0".80
THREADS 7 R.H.

3. DIAMETER At Base of Ogive - 2".98

4. REMARKS:
Fuze is standard powder train fuze with Semple Plunger Unit. Operation is the same as Mk. 9 and Mk. 11 except that total burning time of powder train is 45 seconds.

For drawing, see Mk. 9

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 16 & Mods 2, 3 & 5 | |
| CLASSIFICATION: Nose Ignition Fuze | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 16 and Mods 2, 3 & 5

CLASSIFICATION: 45 Second Time Fuze Powder Train or Combination Powder Train and Centrifugal Plunger. (Nose)

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 5", 14" and 16" | U.S.N. Fuze Mk. XVI Mod |

1. MATERIAL OF CONSTRUCTION — Brass

2. OVERALL LENGTH — 4".30

3. THREADED LENGTH 0".80 — THREADS 7 R.H.

4. DIAMETER AT BASE OF OGIVE 3".0

5. DESCRIPTION AND OPERATION:

The time element of this fuze is composed of the following principal parts: The time or concussion plunger, the concussion resistance ring, the firing pin, the vent leading to the upper time train, the compressed powder pellet, the upper time train, the vent, the lower time train, the compressed powder pellet in the vent leading to the powder magazine. The plunger is cylindrical in shape and contains the percussion composition in a recess at its base. The weight of the plunger rests upon the concussion resistance ring, which keeps the primer from contact with the firing pin. At discharge of the gun, the resistance of the ring is overcome and the primers are exploded by contact the firing pin.

As stated above, the annular grooves into which the meal powder of the time train is pressed are in the shape of a horseshoe, a solid portion being left between the ends of the groove in each ring or disc. The upper time train ring is prevented from rotating by pins which are halved into the fuze body and the inner circumference of the ring.

The vent to the upper train is drilled through the walls of the concussion plunger chamber and it is exactly opposite a hole in the inner surface of the upper time train leading to the end of the train from which the direction of burning is anti-clockwise.

The hole to the lower train is drilled through the upper face of the lower time train ring to the end of the lower time train groove, from which the direction of burning is clockwise. The lower time trainring is movable and is graduated on its outer edge in a clockwise direction from 0 to 45.

A radial pin is provided in the lower ring for engagement with a notch in the fuze setter for setting the fuze. A line on the lower flange of the fuze stock is the datum line for fuze settings.

The down vent is drilled through the flange of the fuze stock to the powder magazine and leads to the same end of the lower time train as the vent (that end from which the direction of burning is clockwise) when the fuze is at its "zero" setting.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 16 and Mods 2, 3 & 5 | |
| CLASSIFICATION: 45 Second Time Fuze Powder Train or Combination Powder Train and Centrifugal Plunger. | |

5. DESCRIPTION AND OPERATION, continued -

The action of the fuze as a time fuze is as follows:

(A) At "zero" setting. At discharge of the gun the time plunger arms and fires its primer. The flame from the primer passes out through the vent, igniting the pellet, the end of the upper time train, down through the vent to the end of the lower time train and thence through the vent to the magazine, the flame from which is transmitted to the base charge in the shrapnel. It will be seen that for the "zero" setting of the fuze the origin of both upper and lower time trains are in juxtaposition.

(B) At 12 seconds: The vent has now changed its position with respect to the vent leading to the beginning of the upper time train and the vent leading to the powder magazine, both of which points are fixed by the angle subtended between the 0 and 12 second settings. The flame now passes out through the vent and burns along the upper time train in an anti-clockwise direction until the vent is reached, where it passes down to the beginning of the lower time train and burns back in a clockwise direction to the position of the vent, whence it is transmitted by the pellet of compressed powder to the powder magazine.

(C) For the 21.2 second setting, the vent leading to the beginning of the lower time train is opposite the end of the upper time train and the end of the lower time train is opposite the vent leading to the powder magazine. It will be seen now that to reach the magazine and burst the shrapnel, the entire length of time train in both rings must be burned.

As already stated, the annular grooves in the lower face of each ring for the powder trains do not form complete circles, a solid portion being left between the ends of the grooves in each. This solid portion is utilized to obtain a setting at which the fuze cannot be exploded by the time train and is known as the "safety point".

6. SAFETY FEATURES:

This point is marked by a line on the outer edge of the movable time train, surmounted by an "S", and is located about halfway between the zero mark and the 45 second graduation. When this point is brought opposite the line on the lower flange of the fuze body, the vent is covered by the solid metal between the ends of the upper train and the vent leading to the powder magazine is covered by the solid metal between the ends of the lower or movable time train. At the safety setting it will be seen that the upper train may burn entirely out in case of accidental firing of the time plunger. The cloth washers are glued to the upper face of the graduated time train ring and to the upper face of the flange on the fuze stock. These surfaces are corrugated, as shown, to make the washers adhere more strongly. The function of the washers is to make a gas check and prevent premature action of the fuzes. The compressed pellet in the vent leading from the outside to the beginning of the lower time train is to release the

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 16 and Mods 2, 3 & 5 | |
| CLASSIFICATION: 45 Second Time Fuze Powder Train or Combination Powder Train and Centrifugal Plunger. | |

6. SAFETY FEATURES, continued -
pressure of the gases due to the burning train. The gases from both time trains escape into the outer air through the annular spaces shown in the illustration and the vents in the closing cap. The percussion element of this fuze consists of a percussion plunger and an ordinary percussion primer. The system of vents through the walls of the fuze conduct the flame from the percussion primer to the magazine.

BORE SAFETY - SEMPLE PLUNGER UNIT: Due to the shape of the firing pin, the force of initial acceleration prevents centrifugal force from producing alignment while the projectile is in the bore. When this acceleration ceases, centrifugal force revolves the firing pin into the armed position.

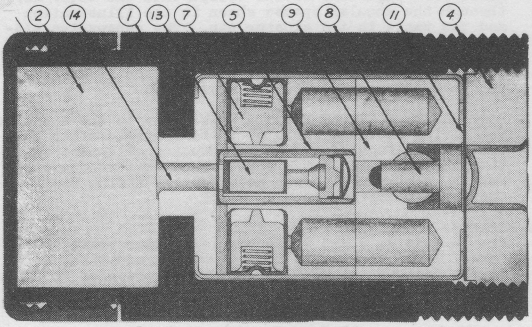
7. REMARKS:
Mk. 16 Mods 2, 3 and 5 are regular powder train time fuzes, while the Mk. 16 No Mod has, in addition, a Semple Centrifugal Plunger Unit in the base of the fuze. This unit produces detonation on impact regardless of the time setting.

DETERIORATION OF BLACK POWDER - As black powder ages it becomes less sensitive, due to minor chemical changes, so that the powder train of an old fuze may be expected to burn more slowly than that of a new one. Black powder, the major component of a time-train composition, is hydroscopic. It readily absorbs moisture and this absorption will cause the train to burn slower and slower as the moisture content increases, until it fails to function when the composition becomes wet. When the composition is prepared, the work is done under standard conditions, so that the final result will give fairly uniform results. If the composition dries out, it will burn faster. If fuzes in service are not subjected to fairly uniform conditions of storage, they will not function accurately on firing. All time fuzes are waterproof and, in addition, are fitted with water-tight covers which are to be removed just prior to firing. If the covers become loose so that they admit moist air to the fuze, erratic fuze action may be expected.

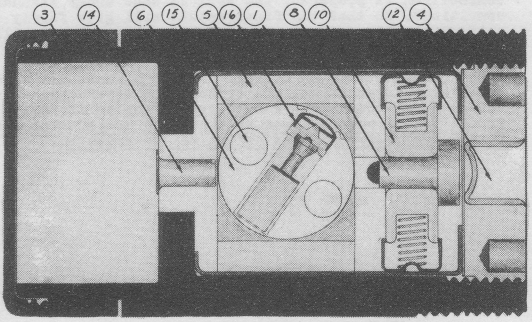
C-O-N-F-I-D-E-N-T-I-A-L

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 17 | |
| CLASSIFICATION: Auxiliary Detonating Fuze | |




MK 17 BASE DETONATING FUZE
ARMED POSITION
(REVOLVED 90° FROM ASSEMBLED VIEW)




MK 17 BASE DETONATING FUZE
ASSEMBLED POSITION

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 17 Mods 1 - 6; Mk. 17 Mod 8

CLASSIFICATION: Auxiliary Detonating Fuze

| PROJECTILES USED IN | | MARKINGS (On Head of Fuze) |
|---|---|---|
| 3"/23 AA | 6"/53 HC | AUX |
| 3"/50 AA & HC | 8"/55 HC | Det. Fuze |
| 4"/50 HC | 12"/50 HC | Mk. 17 - 2 |
| 5"/38 AA Common | 14"/45) HC | |
| 5"/51 HC | 14"/50) | Lot No. |
| 5"/54 AA Common | 16"/45 HC | PMC 1942 |
| 6"/47 HC | 16"/50 HC | HDB |

1. FUZES FOUND WITH — Behind Nose Fuzes Mks. 22 Mods 1, 2, 3 & 4; Mks. 30, 29, 16, 18; Mk. 18 Mods 2, 3 & 4

2. MATERIAL OF CONSTRUCTION — Steel body - not painted

3. OVERALL LENGTH 2.5" — THREADED LENGTH 0.96 — THREADS 10 L.H.

4. WEIGHT — 348 grams

5. DIAMETER — Body - 1.38

6. DESCRIPTION:
The fuze is composed of a one piece body (1) with a booster cap (3) and plug closing (4) the respective ends. The body assembly contains the firing pin assembly (8, 9, 10) and the rotor block assembly (5, 6, 7). The fuze is designed:
   (a) To detonate the projectile explosive charge and thereby burst the projectile with high order detonation instantaneously after the time fuze functions.
   (b) To insure safety and to prevent detonation of the projectile should the time fuze function prematurely, at rest or in the bore of the gun.

7. OPERATION:
(a) The fuze is assembled in the unarmed position and remains in this condition during transportation and storage and until the projectile in which it is assembled is fired from a gun. When the projectile is fired from a gun, centrifugal force moves the firing pin detents (10) and rotor detents (7) outward overcoming the holding forces and thereby releasing the firing pin (8) and rotor (6).

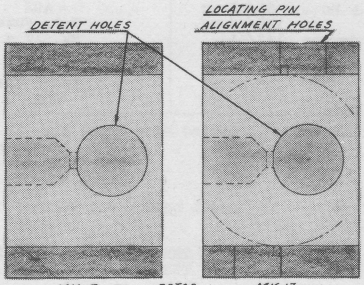
(b) The rotor (6) which contains two lead counterweights (15), the primer (16) and the detonator (13) is assembled in the rotor block (5) with the axis of the detonator at an angle of about 55° from the axis of the fuze. The line of centers of the lead counterweights, being perpendicular to the axis of the detonator, is at an angle of about 35° from the axis of the fuze. The rotor is held in this (unarmed) position by the two rotor detents (7), the tapered ends of which engage in holes in the side of the rotor. In this position the detonating element is safe and if the detonator (16) were to be exploded in this position it would not detonate the booster (2) or ignite the magazine charge in

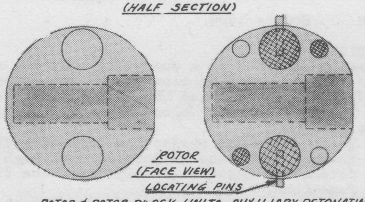
PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

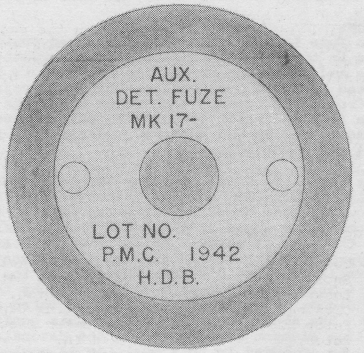
DESIGNATION: Mk. 17 Mods 1 - 6; Mk. 17 Mod 8

CLASSIFICATION: Auxiliary Detonating Fuze




ROTOR & ROTOR BLOCK UNITS AUXILIARY DETONATING FUZE MK 17




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 17 Mods 1 - 6; Mk. 17 Mod 8

CLASSIFICATION: Auxiliary Detonating Fuze

7. OPERATION, continued -
the time fuze. The rotor detents on being moved outward by centrifugal force withdraw from the holes in the rotor permitting the counterweights to rotate until the detonator and primer are in line with the booster lead-in and firing pin respectively. In this position the rotor is dynamically balanced, centrifugal force holding the two lead filled holes at a maximum radius from the axis of rotation of the fuze. The rotor is now fully armed, the firing pin is released and the fuze functions as follows:

(c) The gas pressure from the time fuze magazine charge forces the obturating cup (12) down, shearing the firing pin sealing disc (11) adjacent to the firing pin. Continuation of the gas pressure forces the obturating cup and the firing pin down which engages and fires the primer (16).

8. EXPLOSIVE TRAIN:
The firing pin engages and fires the primer which functions detonator, booster lead-in and the booster.

9. ARMING SPEED: 3000 - 4000 r.p.m.

10. REMARKS:
Safety detent mechanisms hold the rotor assembly and the firing pin in an unarmed position. The fuze is armed only by centrifugal force. One set of detents holds the firing pin, and one set holds the rotor unit in the unarmed position. In addition, centrifugal force is necessary to cause rotation of the counter-weights which carry the rotor to its armed position.

If the projectile is found unexploded, the rotor may or may not be in the armed (aligned) position--depending upon the condition of impact.

MK. 17 MOD 8 - SEE SKETCH.
To aid in holding rotor alignment in the Mod 8, the rotor body is drilled as shown in drawing and locating pins set into holes in periphery of rotor. When rotor is in alignment, pins strike the sides of hole preventing further revolution.

MK. 35 FUZE -
This fuze will be a revised Mk. 17 Mod 8 (pinned rotor) with weaker detent springs on both rotor and firing pin so that the fuze can be used in major caliber (12", 14" & 16") HC projectiles. Mk. 35 is identified by a green band around midsection.

Drawing Identification Numbers:

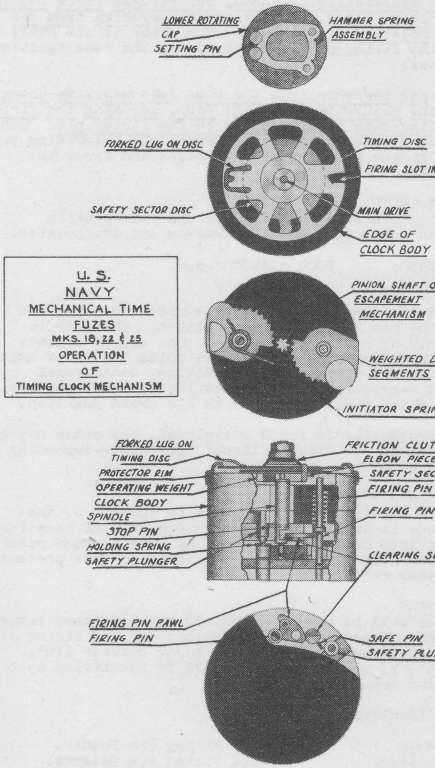
1. Body.
2. Booster.
3. Booster Cap.
4. Closing Plug.
5. Rotor Block.
6. Rotor.
7. Rotor Detents.
8. Firing Pin.
9. Firing Pin Holder.
10. Firing Pin Detents.
11. Sealing Disc.
12. Obturating Cup.
13. Detonator Assembly.
14. Lead In.
15. Lead Counterweight.
16. Primer

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mks. 18, 22 and 25

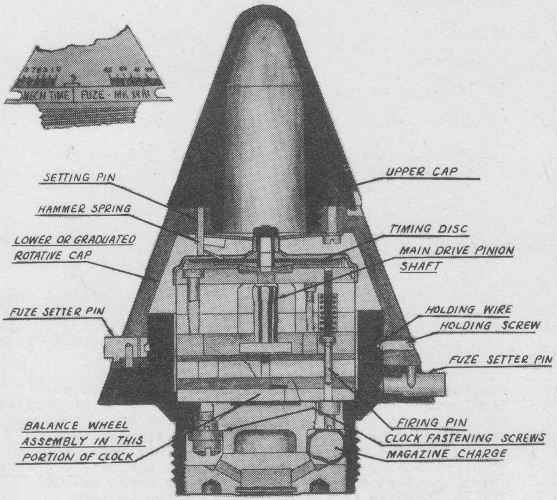
CLASSIFICATION: Mechanical Time Fuzes, Clock.- Nose




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 18 | |
| CLASSIFICATION: Mechanical Clock Time Fuze - Nose | |




Mk. XVIII

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 18 Mods 2, 3, 4

CLASSIFICATION: Nose-Mechanical Time, 45 Second Setting (Ignition)

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 4"/50 Illuminating<br>5"/25 AA Common<br>5"/25 Illuminating<br>5"/38 AA Common & Illuminating<br>5"/51 HC & Illuminating<br>6"/47 HC & Illuminating<br>6"/53 HC<br>8"/55 HC | Mech. Time Fuze<br>MK. XVIII<br>F.A. EDB<br>Lot ____ |

1. FUZES FOUND WITH — Mk. 28; Mk. 13 Mods 6-7; Mk. 17 & Mods.

2. MATERIAL OF CONSTRUCTION — Brass

3. WEIGHT — 2.52 lbs.

4. DIMENSIONS:

| | |
|---|---|
| Diameter at Base of Ogive - | 3.05" |
| Threaded Length - | 0.81" |
| Overall Length - | 3.54" |
| Threads - | 7 RH |

5. DESCRIPTION:
The 45 second Mk. 18 Mechanical Time Fuze is designed:

(A) To effect functioning of a projectile after a predetermined lapse of time.
(B) To insure safety and to prevent functioning of the projectile when fired in a gun and in normal flight prior to the time set.

In its assembled form, the fuze has a contour which conforms with that of the U.S. Navy long point projectile and consists of four main units as follows: Movement Assembly - The movement assembly is attached to the inside of the body of three holding screwss. Body - The brass body contains the magazine charge (30 grains black powder) and the bottom closing screw assembly. It is threaded to fit an adapter which in turn is threaded to fit into the nose of the projectile. Lower Cap Assembly - The brass lower cap (or graduated rotative cap) is attached to the body by means of a joint consisting of a steel wire leading through grooves in the cap and body. This allows freedom of rotative relative motion between lower cap and body. It prevents axial relative motion between lower cap and body. It has a tensioning feature wherein the torsional resistance which restrains rotative relative movement between lower cap and body is adjusted by four screws at assembly. Upper Cap - The brass upper cap screws into the lower cap and functions to complete the nose contour of the assembled fuze.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 18 Mods 2, 3, 4

CLASSIFICATION: Nose-Mechanical Time, 45 Second Setting (Ignition)

6. OPERATION:

The fuze is assembled in an unarmed condition and remains in this condition during transportation and storage. It is armed by setback force, driven by centrifugal force governed by an escapement mechanism, and fired by a spring driven firing pin which is released at the correct instant by a centrifugally controlled mechanism. The timing element which receives the selective setting, termed timing disc, is connected to the main drive pinion shaft by a friction clutch which permits the timing disc to turn relative to the main drive pinion shaft during the setting operation. The entire gear train, including the main drive pinion shaft, is locked until released by another centrifugally controlled mechanism, the safety lever assembly. In order to run the timing disc relative to the main drive pinion shaft, a setting pin is provided. This setting pin is fixed at one end to the top inside shoulder of the lower (rotative) cap and in such a position as to be parallel to the longitudinal axis of the fuze. The free end of the setting pin engages the forked lug of the timing disc. Disengagement of the setting pin and the forked lug of the timing disc is effected under the force of setback by two small weights (of the hammer spring assembly) which depress the forked lug. As soon as the force of setback decreases from its maximum value, the spring holder of the disengaging weights begings to return the weights to a forward position, clear of the timing disc. The forked lug remains bent down. Thus, the timing disc is unlocked by the force of setback. The gear train, including the escapement mechanism, is unlocked almost simultaneously by centrifugal force. In turn, centrifugal force acts to start and to sustain the movement of the timing disc in its measurement of the predetermined interval of time for which the fuze has been set.

When the slot in the timing disc comes opposite the elbow piece, the centrifugal force of the operating weight on the elbow piece moves it outward turning the elbow into the slot and revolving the spindle. (Note that the safety plunger, which is kept in position by a holding spring, is driven down by the force of setback--so that the stop pin on the spindle is free to move past it once the projectile has been fired from the gun.) The revolving slotted spindle clears the pawl which moves outward allowing the striker to be driven down by its spring.

The firing pin impinges on a non-fulminate type of percussion primer (a modified .45 caliber Frankford Arsenal primer). In turn, flame from the primer impinges on the magazine charge which consists of 30 grains of black powder in a silk bag located in the base of the fuze body.

7. REMARKS:

Mks. 18 and 18 Mod 1 used only in illuminating projectile.

The brass protector rim on the upper edge of the clock body (which extends over the edge of the timing disc) protects the forked lug on the timing disc from being driven down too far against the top of the body and hindering action. The powder in the magazine is now enclosed in a plastic donut or ring which prevents entrance of moisture.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mks. 19 and 20 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br><br>Mk. 19 - 5"/51 Spec. Common<br>6"/47 Spec. Common and A.P.<br>6"/53 Spec. Common<br>Mk. 20 - 5"/38 Common | |

1. DESCRIPTION AND OPERATION:

Mk. 19 - Same fuze as Mk. 28 except that it has a 0.01 second delay time element in the detonator plunger. Body is chrome moly steel with duralumin nose cap.

Functions: Delay on Thin or 4" plate; Water impact.

Mk. 20 - Same fuze as Mk. 28. Has a 0.01 second delay element in detonator plunger assembly. Manganese steel body.

Functions: Delay on thin plate.

2. REMARKS:

For description of Delay Element, see "Operation" for the Mk. 21.

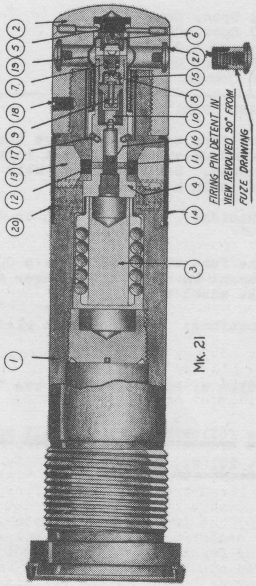
Fuzes of the following marks are all basically alike:

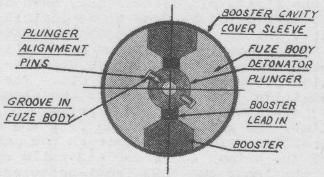
Mks. 19, 20, 21, 28, etc.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 21 | |
| CLASSIFICATION: Base Detonating Fuze | |




CROSS SECTION OF BODY SHOWING METHOD OF PREVENTING MISALIGNMENT OF DETONATOR PLUNGER LEAD OUT & BOOSTER LEAD IN

Mks. 19, 20, 21, & 28

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 21 | |
| CLASSIFICATION: Base Detonating Fuze | |

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 6"/47 A.P.<br>8"/55 A.P.<br>12"/50 A.P.<br>14"/45/50 A.P.<br>16"/45/50 A.P. | T.D.F. Mk. 21<br>Lot ____ |

1. MATERIAL OF CONSTRUCTION — Body - Manganese Steel; Nose Cap - Duralumin

2. OVERALL LENGTH 6".68 — THREADED LENGTH 0".96; THREADS 11 L.H.

3. DIAMETER Body - 1".37 — Head - 1".80

4. DESCRIPTION:
The fuze is composed of two major parts; namely, the fuze body (1) and nose cap (2). The fuze body assembly contains the auxiliary plunger assembly (3), the detonator plunger assembly (4), detents (20, 21), anti-creep spring assembly (15) and two radial boosters (13).

The nose cap (2), which is secured to the forward end of the fuze body by a threaded joint, houses the sensitive firing pin (5) and detents (21). A locking pin (18) is provided to lock the nose cap in position after final assembly at the loading plant.

5. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in this position during transportation, storage and until after the fuzed projectile is fired from the gun. After the projectile leaves the muzzle of the gun, the detonator plunger detents (20) and the firing pin detents (21) are forced outward by centrifugal force against their spring pressure and friction. The detonator plunger (4) is now unlocked but is retained in the assembled (safe) position during flight by the resistance of the anti-creep spring (15) which acts against the forward part of the detonator plunger.

Since the firing pin detents (21) have been forced out, the firing pin (5) is free to be impinged upon by the sensitive primer (6) held in the detonator plunger (4) immediately upon impact of the projectile. Upon impact the detonator plunger continues forward impinging the sensitive primer on the firing pin. The explosion of the sensitive primer (6) drives the plunger firing pin (7) against the secondary primer (8), while at the same time, the gases resulting from the explosion of the sensitive primer pass through the port holes on the side of the primer container and build up a high pressure within the inner cup (19) (anti-creep spring container), expanding that part of the cup which is adjacent to the drilled holes in the nose cap. The bulging of the inner cup locks the detonator plunger in a firing position. In the firing position the lead-out holes (11) in the plunger are in alignment with the booster lead-in holes (12).

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 21 | |
| CLASSIFICATION: Base Detonating Fuze | |

6. EXPLOSIVE TRAIN:
The path of the explosive train carries from the detonator plunger primer and around the baffle unit (9) functioning the 0.035 second delay pellet (10) and then the detonator (16), lead-outs (11), booster lead-in (11) and boosters (13).

7. DETONATION:
0.035 seconds delay on thin plate or heaviest armor.

8. SAFETY FEATURES:
Safety detent mechanism armed only by centrifugal force-one set for the detonator plunger, and another set to protect the sensitive primer from contact with the sensitive firing pin assembled in the nose cap.

Detonator Safety Feature--When the fuze is assembled in the safe or unarmed position and also when traveling through the bore of the gun and while in flight, the detonator may be exploded without affecting the boosters or the bursting charge of the projectile.

9. REMARKS:
If this fuze is found in an unexploded projectile, it will probably be in an armed position.

If a detonation of the sensitive primer has taken place, cup and plunger will be locked in position(by expansion).

This fuze is designed with an additional plunger locking unit (17). The plunger body is drilled, as shown, and balls set into the drilled holes. On forward motion of the plunger and under the action of centrifugal force, the locking balls fly out of their recesses into the forward or larger diameter portion of the body cavity, locking the plunger (4) in the forward position.

See Body cross section for plunger alignment method.

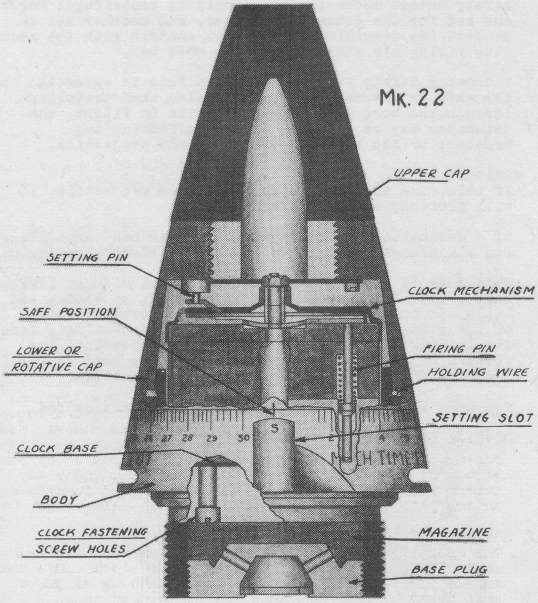
Drawing Identification Numbers:

1. Fuze Body.
2. Nose Cap.
3. Auxiliary Plunger.
4. Detonator Plunger.
5. Sensitive Firing Pin.
6. Sensitive Primer.
7. Plunger Firing Pin.
8. Secondary Primer.
9. Baffle Unit.
10. Delay Pellet.
11. Booster Lead-out.
12. Booster Lead-in.
13. Booster.
14. Cover Sleeve.
15. Anti-creep Spring.
16. Detonator.
17. Locking Balls & Recess.
18. Locking Pin.
19. Inner Cup.
20. Detonator Plunger Detent.
21. Firing Pin Detents.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 22 | |
| CLASSIFICATION: Nose - Mechanical Time- 30 Second Setting | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 22

CLASSIFICATION: Nose - Mechanical Time - 30 Second Setting

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 3"/23/50 AA & Illuminating<br>4"/50 HC & Illuminating | Mechanical Time Fuze<br>Mk. 22 Mod<br>E.M. _____<br>Lot _____ |

1. FUZES USED WITH — Base: Mk. 28 and Mk. 17 Aux. Det.

2. MATERIAL OF CONSTRUCTION — Upper Body - Zinc Lead Alloy; Center Body - Brass; Base - Aluminum

3. OVERALL LENGTH: 4".55 — THREADED LENGTH 0".81; THREADS 7 R.H.

4. DIAMETER — At Base of Ogive- 2".4

5. DESCRIPTION: The 30 Second Mk. 22 Mechanical Time Fuze is designed:
   (a) To effect functioning of a projectile after a predetermined lapse of time.
   (b) To insure safety and to prevent functioning of the projectile when fired in a gun and in normal flight prior to the time set.

   In its assembled form, the fuze has a contour which conforms with that of the U.S. Navy long point projectile and consists of four main units, as follows: Movement Assembly - The movement assembly is attached to the inside of the body by three holding screws. Body - The brass body contains the magazine charge and the bottom closing screw assembly. It is threaded to fit into the nose of the projectile. Lower Cap Assembly - The brass lower cap (or graduated rotative cap) is attached to the body means of a joint consisting of a steel wire leading through grooves in the cap and body. This allows freedom of rotative relative motion between lower cap and body. It prevents axial relative motion between lower cap and body. It has a tensioning feature wherein the torsional resistance which restrains rotative relative movement between lower cap and body is adjusted by four screws at assembly. Upper Cap - The brass upper cap screws and is staked into the lower cap and functions to complete the nose contour of the assembled fuze.

6. OPERATION:
   The operation of this clock is the same as described under "Operation" for the Mk. 18. The clock units used in Mks. 18, 22 & 25 are the same. The body of Mk. 22 has, however, fuze setter slots instead of pins.

7. REMARKS:
   The brass protector rim on the upper edge of the clock body, which extends over the edge of the timing disc, protects the forked lug on the timing disc from being driven down too far against the top of the body and hindering action.

   The powder in the magazine is now enclosed in a plastic donut or ring which prevents entrance of moisture.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 23 | |
| CLASSIFICATION: Base Detonating Fuze | |




Mk. 23






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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 23 | |
| CLASSIFICATION: Base Detonating Fuze | |
| PROJECTILES USED IN<br>8"/55 A.P. 260# and 335#<br>12"/50 A.P.<br>14"/45-50 A.P. 1500#<br>16"/45 A.P. 2240# and 2700# | MARKINGS<br>T.D. Mk. 23<br>Lot<br>JRR<br>NGF 1942 |

1. FUZES FOUND WITH — None - used in A.P. projectiles.

2. MATERIAL OF CONSTRUCTION — Cadmium Plated Steel

3. OVERALL LENGTH 7.80 — THREADED LENGTH 1.25; THREADS 13 L.H.

4. WEIGHT — 2 lbs 7 oz. without tracer.

5. DIAMETERS — Head - 1.8 Body - 1.38

6. DESCRIPTION:
The fuze is composed of three major parts; namely, the fuze head, fuze body and the nose cap.

The fuze head assembly contains the firing pin and detents. The body contains the plunger and firing spring. The nose cap, which is threaded to the forward end of the body, contains the ball retainer unit and its detents.

7. OPERATION: The operation of the fuze is as follows: The fuze is assembled in the unarmed position as shown on the general arrangement drawing and remains in this position during transportation, storage and until after the fuzed projectile is fired from the gun. After the projectile leaves the muzzle of the gun the firing pin detents and ball retainer detents are forced outward due to centrifugal force. The firing pin creeps forward during flight and is locked in the armed position by two steel balls which drop into the space left by the forward movement of the firing pin. Should the firing pin fail to creep forward during flight, it is projected forward and locked on impact. The ball retainer is lightly gripped by the ring of plunger locking balls which tend to spread radially as long as the firing spring exerts its force to pull the plunger to the rear. Therefore, it does not creep forward during flight but remains in the assembled position until impact. To further insure that the ball retainer will not creep forward, an anti-creep spring is interposed between the ball retainer and nose cap.

On impact all parts tend to move forward with a force determined by the nature of the impact. Theplunger compresses the firing spring and moves forward until stopped by the shoulder in the fuze body. At the same time the ball retainer moves forward until stopped by the nose cap and is locked in this position by three ring segments engaging a shoulder at the end of the body. The plunger locking balls are released by this forward movement of the ball retainer and are projected forward into the cavity around and inside the ball retainer. The plunger remains in the forward position until the

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



522853 O - 43 - 16

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 23 | |
| CLASSIFICATION: Base Detonating Fuze | |

7. OPERATION, continued -
force of impact diminishes sufficiently to permit the firing spring to propel the plunger to the rear allowing the firing pin to stab and fire the primer, thus initiating the explosive action. With the plunger in the rear position, the plunger lead-out holes and the booster lead-in holes are brought into alignment and the fuze is completely armed. The plunger is locked in the rear position by three ring segments in a manner similar to the ball retainer. On very light impact, when the force acting on the plunger is insufficient to compress the comparatively strong firing spring, the ball retainer acts as a trigger by slipping forward out of the grip of the locking balls and releases the plunger. The firing spring then forces the plunger to the rear allowing the firing pin to stab and fire the primer. When the sensitive primer is fired, the gas from it fires the percussion primer. The flash from the percussion primer passes through and around the baffle and ignites the delay pellet which defers ignition of the detonator for .020 seconds. This detonator fires the plunger lead which in turn fires the plunger lead-outs, booster lead-ins and fuze booster.

8. ARMING TIME - SPEED 1200 - 1400 r.p.m.

9. DETONATION:
Delay on thin plate or heaviest armor.
Water Impact after slight delay.

10. SAFETY FEATURES:
Safety Detent mechanism armed only by centrifugal force- one set of detents for the firing pin and one set for the ball retainer unit.

11. REMARKS:

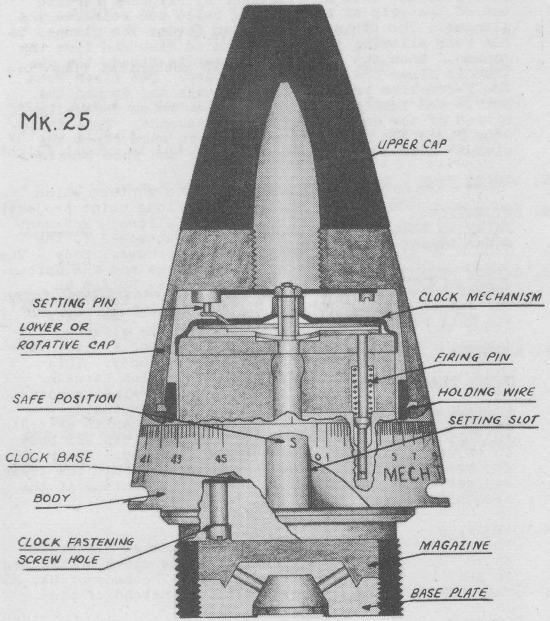
Delay Time- .02 seconds.

Plunger alignment is maintained by pins in plunger stock, as shown. This holds the plunger lead-out and booster lead-in in axial alignment.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 25 | |
| CLASSIFICATION: Nose Mechanical Time - 45 second setting. | |




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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 25 | |
| CLASSIFICATION: Nose Mechanical Time - 45 second setting. | |
| PROJECTILES USED IN<br>5"/54 AA Common | MARKINGS<br>Mechanical Time Fuze<br>Mk. 25 Mod<br>EM<br>Lot ____ |

1. MATERIAL OF CONSTRUCTION: Nose - Die Cast Lead-Zinc Alloy; Body - Brass Center; Base - Aluminum

2. OVERALL LENGTH 4.55" THREADED LENGTH 0.81"; THREADS 7 R.H.

3. DIAMETER At Base of Ogive - 2.40"

4. DESCRIPTION: The 45 second Mk. 25 Mechanical Time Fuze is designed:
   (a) To effect functioning of a projectile after a predetermined lapse of time.
   (b) To insure safety and to prevent functioning of the projectile when fired in a gun and in normal flight prior to the time set.

   In its assembled form, the fuze has a contour which conforms with that of the U.S. Navy long point projectile and consists of four main units as follows: Movement Assembly - The movement assembly is attached to the inside of the body by three holding screws. Body - The brass body contains the magazine charge and the bottom closing screw assembly. It is threaded to fit an adapter which in turn is threaded to fit into the nose of the projectile. Lower Cap Assembly - The brass lower cap (or graduated rotative cap) is attached to the body by means of a joint consisting of a steel wire leading through grooves in the cap and body. This allows freedom of rotative relative motion between lower cap and body. It prevents axial relative motion between lower cap and body. It has a tensioning feature wherein the torsional resistance which restrains rotative relative movement between lower cap and body is adjusted by four screws at the assembly. Upper Cap - The brass upper cap screws and is staked into the lower cap and functions to complete the nose contour of the assembled fuze.

5. OPERATION:
   The operation of this clock is the same as described under "Operation" for the Mk. 18. The clock units used in Mks. 18, 22 and 25 are the same. The body of Mk. 25 has, however, the fuze setter slots instead of pins.

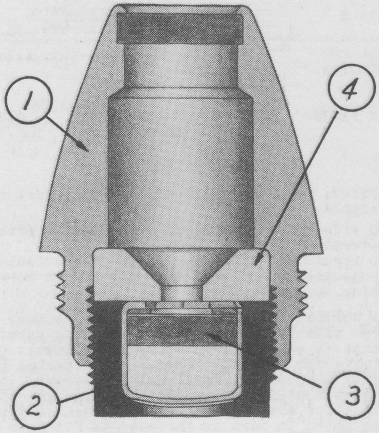
6. REMARKS:
   The brass protector rim on the upper edge of the clock body, which extends over the edge of the timing disc, protects the forked lug on the timing disc from being driven down too far against the top of the body and hindering action.

   The powder in the magazine is now enclosed in a plastic donut or ring which prevents entrance of moisture.

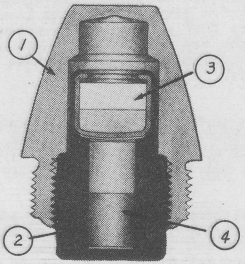
C-O-N-F-I-D-E-N-T-I-A-L

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 26 and Mk. 26 - Mods 1 & 2 & 3 | |
| CLASSIFICATION: Nose Detonating Fuze | |




Mk. 26




Mk 26, Mods. 1&2

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 26 and Mk. 26 - Mods 1 & 2 & 3 | |
| CLASSIFICATION: Nose Detonating Fuze | |
| PROJECTILES USED IN<br>20 mm H.E. and H.E. Tracer Projectile | MARKINGS<br>Mk. 26 Mod<br>MB Co Lot |

1. MATERIAL OF CONSTRUCTION
   Mk. 26: All Brass. One piece nose or with nose plate crimped in.
   Mk. 26: Mod 1 Zinc body. Solid nose with brass magazine.
   Mk. 26: Mod 2 All brass body. Approximately five grams heavier than Mk. 26 Mod 1

2. OVERALL LENGTH 1".016 THREADED LENGTH Mk.26 .0".18
   Mk.26 Mod 1 0".26
   THREADS Mk. 26 4 RH
   Mk.26 Mod 1 7 RH

3. WEIGHTS Mk. 26 24.67 grams
   Mk. 26 Mod 1 23.37 grams

4. DIAMETERS Nose - 0".35 At Base of Ogive - 0".90

5. DESCRIPTION:
   The Mk. 26 concists essentially of four parts--the nose (1) or body unit into which are fitted the Rear Disc or Air Channel (4) and the Closing Unit (2) which contains the Detonator (3).

   The Mk. 26 Mods 1 and 2, which differ only as to metal used for the nose, consist essentially of two pieces: the Nose or Main Body (1) and the Magazine (2) which contains the same detonator (3) used in Mk. 26 No Mod and an additional booster of lead azide (4) below the tetryl detonator.

6. OPERATION:
   The fuze has no safety features in its design as such; however, it will withstand a 40 foot drop on to armor plate without detonation.

   The action of the fuze on impact is primarily a plunger or compression action. The forcing down of the nose (1) on impact compresses the air column and fires the detonator. The detonator in the Mk. 26 No Mod fires directly down into the projectile charge, while in the Mk. 26 Mod 1 and 2 the detonator pellet fires the additional booster.

7. DETONATION:
   Will not detonate on water impact.
   Will detonate instantaneously on 1/8" mild steel.
   Mk. 26 Mods 1 and 2 are more sensitive. At 100 yards it will detonate 100% on 1/8" plate at any oblique up to 70°.

8. REMARKS:
   Mk. 26 Mods 1 & 2 fuzes are quite heat sensitive due to the lead azide booster unit.

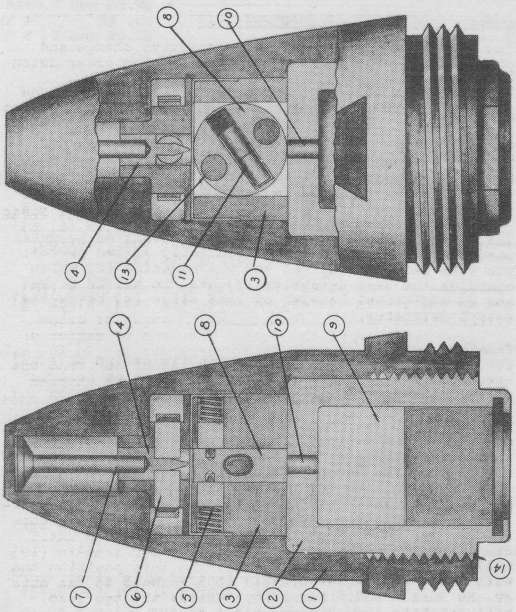
   Drawing Identification Numbers:

| Mk. 26 | Mk. 26 Mods 1 & 2 |
|---|---|
| 1. Nose or Body. | 1. Nose or Body. |
| 2. Magazine & Closing Unit | 2. Magazine. |
| 3. Detonator. | 3. Detonator (tetryl). |
| 4. Air Channel. | 4. Lead Azide Pellets. |

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 27 | |
| CLASSIFICATION: Point Detonating Fuze | |




Mk. 27

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 27

CLASSIFICATION: Point Detonating Fuze

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 40 mm A.A. | Mk. 27 - Lot |
| 1. MATERIAL OF CONSTRUCTION | Die cast aluminum body<br>Plastic hammer piece |
| 2. OVERALL LENGTH 2".445 | THREADED LENGTH 0".307<br>THREADS 4 R H |
| 3. WEIGHT | 106.14 grams |
| 4. DIAMETERS: Nose- 0".344 | At Base of Ogive- 1".28 |

5. DESCRIPTION: This fuze is designed -

(a) To detonate the projectile explosive charge and thereby burst the projectile with high order detonation immediately upon impact.

(b) To insure safety and to prevent detonation of the projectile when fired in a gun and in normal flight until detonated by impact or by action of the self-destruction element.

6. OPERATION:

The fuze is assembled in an unarmed condition and remains so during transportation and storage. After assembly in a projectile and fired from a gun, centrifugal force moves the detents of both firing pin and rotor (5, 6) outward against their spring pressures and friction, releasing the rotor (8) and firing pin (4).

The rotor (8), complete with lead counterweights (13), and detonator (11) is assembled in the rotor block (3) with the axis of the detonator at an angle of about 55° from the axis of the fuze. The line of center of the lead counterweights, being perpendicular to the axis of the detonator, is at an angle of about 35° from the axis of the fuze. The rotor is held in this unarmed position by the two rotor detents (5), the tapered ends of which engage in the holes in the side of the rotor.

In this position the detonating element (11) is safe and if the detonator were to be exploded in this position, it would not detonate the booster (9).

The rotor detents (5) on being moved outward by centrifugal force withdraw from the holes in the rotor, permitting the counterweights to rotate the rotor until the detonator is in line with the booster lead-in (10) and firing pin (4) respectively. In this position the rotor is dynamically balanced with respect to the axis of the fuze. Centrifugal force holds the two lead filled holes at a maximum radius from the axis of rotation of the fuze. The rotor is now fully armed. Since the firing pin detents are also released, arming is complete.

Upon impact of the fuzed projectile with any object offering material resistance to penetration, such as wings or the fuselage of airplanes, etc., the nose of the fuze being pushed in causes the firing pin to stab and fire the detonator, thereby, initiating the detonation of the explosive train of the booster lead-in (10), booster (9) and projectile explosive filler which bursts the projectile.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 27

CLASSIFICATION: Point Detonating Fuze

7. ARMING SPEED:
   Firing Pin 7,000 - 14,000 r.p.m.
   Rotor 10,000 - 14,000 r.p.m.

8. DETONATION:
   Instantaneous on Duralumin Sheet.
   Not on Water Impact.

9. REMARKS:
   All 40 mm projectiles have tracers with self-destroying element which is at end of tracer and ignites when tracer burns out if impact has not fired the projectile.

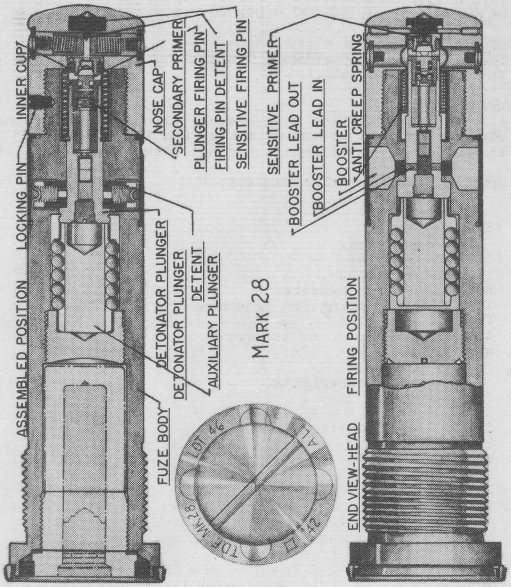
   Drawing Identification Numbers:

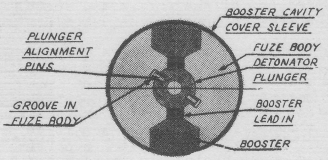
   1. Body.
   2. Magazine.
   3. Rotor Block.
   4. Firing Pin.
   5. Rotor Detents.
   6. Firing Pin Detents.
   7. Plastic Firing Pin Extension.
   8. Rotor.
   9. Booster.
   10. Lead-in.
   11. Detonator.
   13. Lead Counterweights.
   14. Staking.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 28 | |
| CLASSIFICATION: Base Detonating Fuze | |




CROSS SECTION OF BODY SHOWING METHOD OF PREVENTING MISALIGNMENT OF DETONATOR PLUNGER LEAD OUT & BOOSTER LEAD IN

Mks. 19, 20, 21, & 28

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 28

CLASSIFICATION: Base Detonating Fuze

| PROJECTILES USED IN | | MARKINGS |
|---|---|---|
| 4"/50 HC | 6"/47/53 HC | TDF Mk. 28 |
| 5"/25 AA Common | 8"/55 HC | Lot |
| 5"/38 AA Common | 12"/50 HC | B '42 |
| 5"/51 HC | 14"/45/50 HC | |
| 5"/54 AA Common | 16"/45 HC | |

1. FUZES FOUND WITH — Mks. 29, 18 Mods 2, 3 & 4.

2. MATERIAL OF CONSTRUCTION — Manganese Steel Body with Duralumin Nose Cap - not painted.

3. OVERALL LENGTH 6.68 — THREADED LENGTH 0.96; THREADS 11 L.H.

4. WEIGHT — 2 lbs 6 oz.

5. DIAMETERS: Body-1.37 Head - 1.80

6. DESCRIPTION:
The fuze is composed of two major parts; namely, the fuze body and nose cap. The fuze body assembly contains the auxiliary plunger assembly, the detonator plunger assembly, detents, anti-creep spring assembly and two radial boosters.

The nose cap, which is secured to the forward end of the fuze body by a threaded joint, houses the sensitive firing pin and detents. A locking pin is provided to lock the nose cap in position after final assembly at the loading plant.

7. OPERATION:
The fuze is assembled in the unarmed position. All components of the fuze remain in this position during transportation, storage and until after the fuzed projectile is fired from the gun. After the projectile leaves the muzzle of the gun, the detonator plunger detents and the firing pin detents are forced outward by centrifugal force against their spring pressure and friction. The detonator plunger is now unlocked but is retained in the assembled (safe) position during flight by the resistance of the anti-creep spring which acts against the forward part of the detonator plunger.

Since the firing pin detents have been forced out, the firing pin is free to be impinged upon by the sensitive primer held in the detonator plunger immediately upon impact of the projectile. Upon impact the detonator plunger aided by the momentum of the auxiliary plunger continues forward impinging the sensitive primer on the firing pin. The explosion of the sensitive primer drives the plunger firing pin against the delay element primer, while at the same time, the gases resulting from the explosion of the sensitive primer pass through the port holes on the side of the primer container and build up a high pressure within the inner cup (anti-creep spring container), expanding that part of the cup which is adjacent to the drilled holes in the nose cap. The bulging of the inner cup locks the detonator plunger in a firing position. In the firing position the lead-out holes in the plunger are in alignment with the booster lead-in holes.

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

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 28

CLASSIFICATION: Base Detonating Fuze

8. EXPLOSIVE TRAIN:
The firing of the detonator plunger primer in turn functions the detonator, lead-outs, booster lead-ins, boosters and the projectile bursting charge.

9. ARMING TIME - SPEED
Fuze is armed after leaving the gun.
Limiting rotational speeds - 3000 to 4000 r.p.m.

10. DETONATION:
Instantaneous on plate (1/4" - 1/2" steel)
Water Impact

11. SAFETY FEATURES:
The safety detent mechanism is armed only by centrifugal force--one set for the detonator plunger, and another set to protect the sensitive primer from contact with the sensitive firing pin assembled in the nose cap.

Detonator Safety Feature--When the fuze is assembled in the safe or unarmed position and also when traveling through the bore of the gun and while in flight, the detonator may be exploded without affecting the boosters or the bursting charge of the projectile.

12. REMARKS:
The Mk. 28 is a modified and altered Mk. 20, and will replace all Mk. 13 fuzes.

When assembled into a projectile, case is shellac coated.

Note: If this fuze is found in an unexploded projectile, it will be in an armed position.

If detonation of the sensitive primer has taken place, cup and plunger will be locked in position (by expansion).

Mod numbers refer only to different manufacturers.

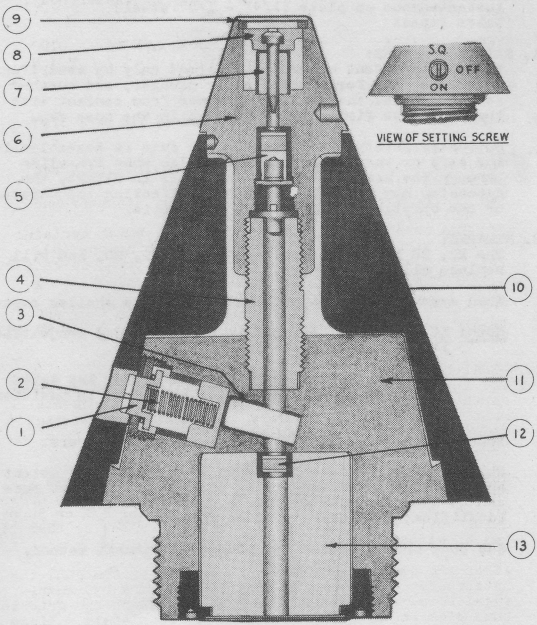
Mk. 28 Special - Same fuze with weaker (Mk. 21) detent springs on plunger and firing pin detents so that fuze can be used in major caliber H.C. projectiles.
Identification - Green band on midsection.

See Body Cross Section for plunger alignment method.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 29 | |
| CLASSIFICATION: Point Detonating Fuze | |




Mk. 29

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 29

CLASSIFICATION: Point Detonating Fuze

| PROJECTILES USED IN | | | MARKINGS | |
|---|---|---|---|---|
| 5"/25 AA Common | 8"/55 HC | | Mk. 29 | NBF |
| 5"/51 HC | 12"/50 HC | | Lot | |
| 6"/47 HC | 14"/45-50 HC | | N.G.F. | J.J-O'D |
| 6"/53 HC | 16"/45 HC | | 1942 | |

1. FUZES USED WITH — Mk. 28; Mk. 17 & Mods; Mk. 13 Mod 6-7.

2. MATERIAL OF CONSTRUCTION — Steel Base; Brass Detonator Body; Plastic Ogive.

3. OVERALL LENGTH — 4".15 — THREADED LENGTH 0".80 — THREADS 7 R.H.

4. WEIGHT — 1.49 lbs

5. DIAMETERS — Nose - 0".55 — At Base of Ogive - 3".0

6. DESCRIPTION:
The fuze (revised U.S. Army M-48) consists of three principal parts:
(a) The Base which contains the Relay Detonator and Holder, and the Interrupter Unit.
(b) The nose or detonator assembly (6) which contains the striker assembly (8) and the detonator (5).
(c) The plastic ogive. (Flash tube is fitted in center of ogive and holds nose and base together).

The ogive has a drilled hole in the side giving access to the setting screw in the interrupter. The ogive may be marked S/O - Delay or S/O, OFF, ON.

7. OPERATION:
The fuze is assembled in the unarmed position as shown on the general arrangement drawing. All components remain in this position during transportation, storage and until after the fuzed projectile is fired from the gun.

When the fuzed projectile is to be loaded into the gun, the set screw (1) in the ogive is turned from the OFF-- or the Delay (depending on marking) to the S/Q or Super-Quick position which unlocks the interrupter so that it can be acted upon by centrifugal force.

After the projectile leaves the muzzle of the gun, the interrupter cylinder (3) is forced outward by centrifugal force against the spring (2) pressure and friction, thus clearing the flash channel (4) completely. Since the striker (8) is held in position only by a support cup (7), the fuze is armed as soon as the channel is clear.

On impact the closing disc (9) is forced down, the support cup is crushed and the striker (8) is driven into the detonator (5). The flash from the detonator passes down through the flash tube channel. The flash ignites the relay detonator (12) in the bakelite detonator holder (13).

8. ARMING SPEED: Limiting Rotation Speeds 1500 - 2000 RPM

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



522853 O - 43 - 17

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 29 | |
| CLASSIFICATION: Point Detonating Fuze | |

9. DETONATION:
Instantaneous super-quick on very thin plate.
Water Impact on ricochet angles above 6°.

10. SAFETY FEATURES:
When the Interrupter setting screw slot is in the horizontal, (the delay or the OFF position depending on the markings on the ogive) the Interrupter is locked in position and is across the channel, thereby, preventing fuze action.

11. REMARKS:

Fuze has Army M-48 base.

Note: Due to chipping of the plastic ogive in the process of loading the fuzed projectile into the gun, orders have been sent out to cover all of these ogives with cloth base adhesive tape. This measure is to be effective until the present plastic composition ogives can be replaced by stronger cheese cloth base plastic.

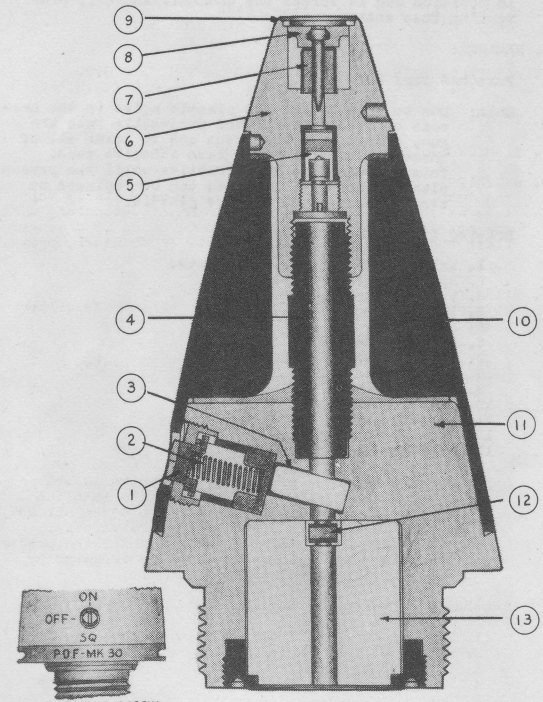
Drawing Identification Numbers:

1. Interrupter Unit Setting Screw.
2. Spring on Interrupter Unit.
3. Interrupter Block.
4. Flash Tube.
5. Detonator.
6. Nose, or Detonator Assembly.
7. Striker Support Cup.
8. Striker Assembly.
9. Closing Disc.
10. Plastic Ogive.
11. Base.
12. Relay Detonator.
13. Bakelite Detonator Holder.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 30 | |
| CLASSIFICATION: Point Detonating Fuze | |




Mk. 30

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|

DESIGNATION: Mk. 30

CLASSIFICATION: Point Detonating Fuze

| PROJECTILES USED IN | MARKINGS |
|---|---|
| 3"/50 HC<br>4"/50 HC<br>5"/54 AA Common | Delay, SO Settings<br>Mk. 30 N.B.F.<br>NGF JJO'D<br>1942 |

1. FUZES USED WITH — Mk. 28; Mk. 17 and Mods

2. MATERIAL OF CONSTRUCTION — Steel Base
Brass Detonator Body
Plastic Ogive

3. OVERALL LENGTH 4"55 — THREADED LENGTH 0"80
THREADS 7 R.H.

4. WEIGHT — 1.51 lbs

5. DIAMETERS: Nose-0"55 At Base of Ogive- 2"4

6. DESCRIPTION:
The fuze (revised U.S. Army M-48) is essentially the same as the Mk. 29. The base and nose (detonator) units are nearly the same--only difference being in a longer flash tube piece and a longer, smaller diameter, ogive.

Ogive markings are S/O or delay.

7. OPERATION:
The operation of the fuze is the same as is described under Mk. 29.

8. DETONATION:
Instantaneous (super-quick) on very thin plate.
Water Impact on ricochet angles above 6°.

9. SAFETY FEATURES:
Same as listed under Mk. 29.

10. REMARKS:

Note: Due to chipping of the plastic ogive in the processof loading the fuzed projectile into the gun, orders have been sent out to cover all of these ogives with cloth base adhesive tape. This measure is to be effective until the present plastic composition ogives can be replaced by stronger cheese cloth base plastic.

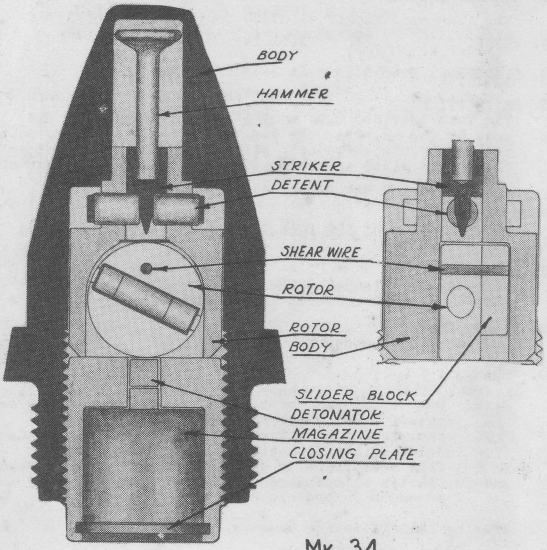
Drawing Identification Numbers:

1. Interrupter Unit Setting Screw.
2. Spring on Interrupter Unit.
3. Interrupter Block.
4. Flash Tube.
5. Detonator.
6. Nose, or Detonator Assembly.
7. Striker Support Cup.
8. Striker Assembly.
9. Closing Disc.
10. Plastic Ogive.
11. Base.
12. Relay Detonator.
13. Bakelite Detonator Holder.

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 34 | |
| CLASSIFICATION: Point Detonating Fuze | |




Mk. 34

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

PROJECTILE FUZE DATA

| NATIONALITY: U.S. NAVY | INFORMATION DATE: April, 1943 |
|---|---|
| DESIGNATION: Mk. 34 | |
| CLASSIFICATION: Point Detonating Fuze | |
| PROJECTILES USED IN<br>1"1 A.A. | MARKINGS<br>None |

1. MATERIAL OF CONSTRUCTION — Body - Die Cast Alloy (Zinc Base); Magazine - Brass; Hammer Rod - Plastic

2. OVERALL LENGTH 2"08 — THREADED LENGTH 0"46; THREADS 7 R.H.

3. DIAMETERS: Nose- 0"300 — At Base of Ogive - 1"06

4. DESCRIPTION:
The fuze consists of an alloy body housing which encloses a brass magazine, rotor-interrupter unit and striker assembly.

5. OPERATION:
The fuze is assembled in the unarmed position and remains so during transportation and storage.

On firing the fuzed projectile from the gun, both centrifugal force and the force of setback act to free the firing pin and to permit rotor alignment. The rotor with the detonator is assembled in the rotor block with the axis of the detonator at an angle of about 55° from the axis of the fuze. The rotor is held in the unarmed position by means of slider-block which is pinned to it with a copper shear wire. In this position the detonating element is safe and if the detonator were to be exploded in this position, it would not detonate the booster.

The force of setback drives the slider--block down in its slot, cutting the copper shear wire, which leaves the rotor free to revolve to its armed position. Since the centrifugal force of the rotating projectile has released the firing pin detents, arming is now complete.

Upon impact of the fuzed projectile, the nose of the fuze being pushed in causes the firing pin to stab and fire the detonator thereby initiating the detonation of the explosive train of the booster lead-in, booster and the filler of the projectile.

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



U.S. GOVERNMENT PRINTING OFFICE : 1943