RESTRICTED

OP 1667

VOLUME 1

JAPANESE EXPLOSIVE ORDNANCE

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NAVY DEPARTMENT

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ORDNANCE PAMPHLET 1667

JAPANESE EXPLOSIVE ORDNANCE

1. Ordnance Pamphlet 1667 describes and illustrates Japanese explosive ordnance. It covers bombs, bomb fuzes, land mines, grenades, firing devices, sabotage devices, and ammunition.

2. Ordnance Pamphlet 1667 is intended to provide general descriptions of these fields of ordnance for instructional and informational purposes.

3. This publication supersedes the publications on Japanese explosive ordnance issued by the United States Navy Bomb Disposal School, which should be destroyed.

4. This publication is RESTRICTED and should be handled in accordance with U. S. Navy Regulations, 1920, Article 76.

G. F. HUSSEY, Jr.,
Vice Admiral, U. S. Navy,
Chief of the Bureau of Ordnance.

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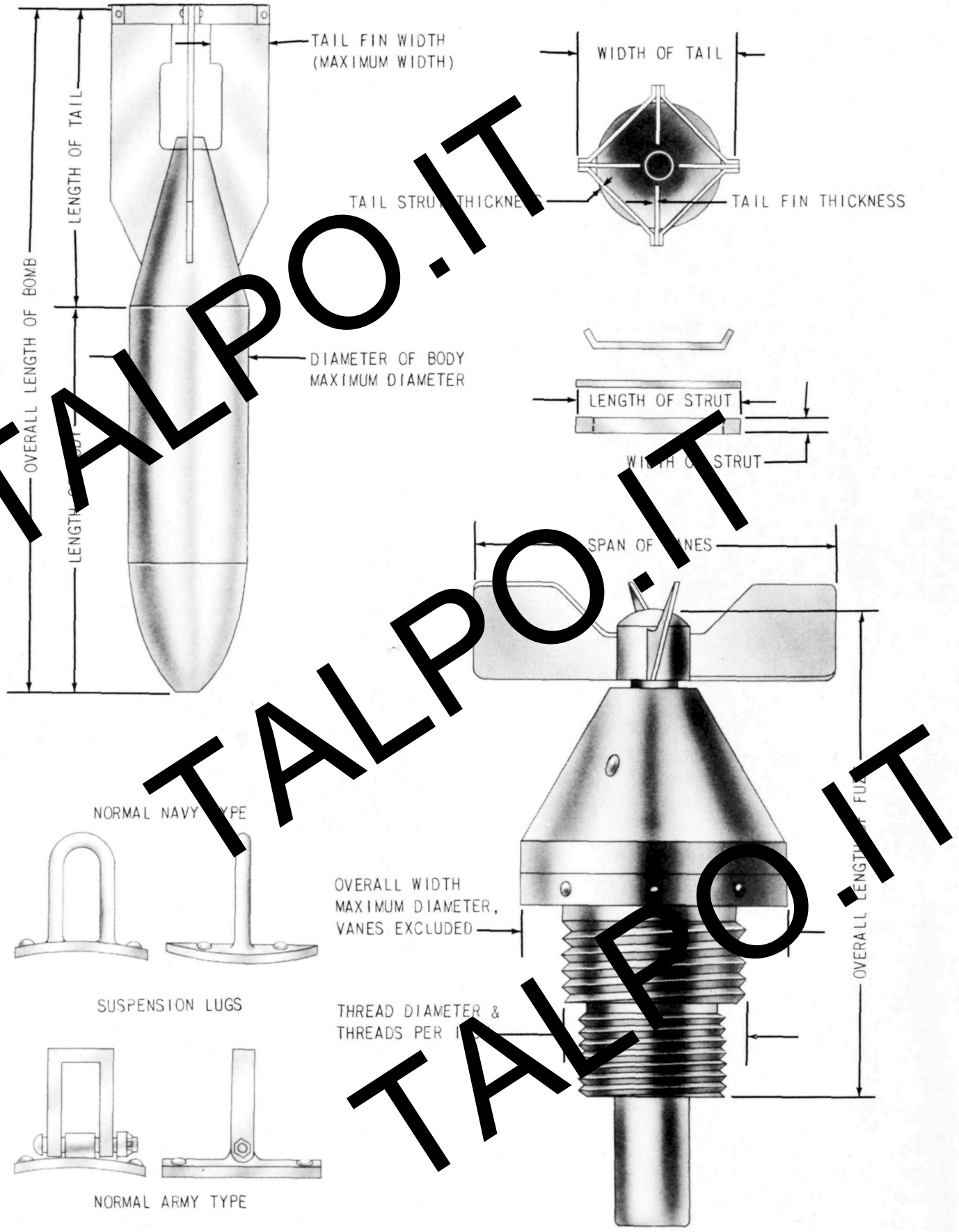


Figure 1—Definitions of Terminology.

Chapter 1

JAPANESE BOMBS

Introduction

The contents of this section are divided into two main parts, Japanese Army bombs and Japanese Navy bombs.

The Japanese Army and Navy have separate air forces each of which employs its own distinct types of bombs and fuzes. These ordnance items are dissimilar in construction and identification features, and each service utilizes its own system of designation.

For the most part the two types of bombs and fuzes may not be used interchangeably. Special adapters have been developed, however, which allow some flexibility of this rule. This has been particularly demonstrated in the use of Navy bombs by the Army in conducting antisubmarine warfare.

The Japanese designations of bombs are used in this book. A general discussion of the system is presented here. A more detailed explanation is given in the introduction to each section.

System of designation:

1. *Type number.*—Items of ordnance as well as most other items of military equipment, are given a type number indicating the year the article was finally adopted for service use. This may occur several years after the ordnance has been in production and actual use.

Until the reign of the present emperor, (Showa era; started in 1926) items were designated by the year of era. Now, however, the year of the Japanese Empire (Japanese year 2600 corresponds to our 1940) may be used. For items introduced up to the year 2600 the last two numbers are used in the designation. Thus type 99 means the item was adopted in 2599 or our 1939.

The year 2600 may be represented as type 100 or type 0, in a designation. The years 2601, 2602, etc., are usually represent by the last digit such as type 1, type 2, etc.

Experimental Ordnance items are assigned experimental type numbers indicating the year of the Showa era during which the experiment was authorized.

Ordnance items standardized in the eras preceding the Showa era; namely, Taisho 1912–1926 and Meiji 1867–1912, will be designated by the era and the year of the era. Type II (Taisho)=1922, type 41 (Meiji)=1908.

2. *Mark number.*—Some ordnance such as Navy bombs developed for a special purpose will be designated by a mark number.

3. *Description of ordnance.*—Some items may have a word or two following the type number which gives a brief description of the particular piece of ordnance.

4. *Model.*—This term has several meanings but generally it indicates a change in basic design.

5. *Modification.*—This is used to represent minor changes in design or a change in explosive filling.

Chapter 1—Section 1

JAPANESE ARMY BOMBS

1. Designation

The Japanese Army designates its bombs according to a type number, weight, and sometimes a descriptive title.

a. The type number indicates the year in which the bomb was adopted for service use.

b. The weight is expressed in kilograms and usually is stenciled on the bomb.

c. The descriptive title is not used on the standard high-explosive bombs but is used on others. The descriptive title such as smoke,

ARMY EXPLOSIVES

Explosive	Use	Japanese Designation	Remarks
Primers (cap composition):			
1. Mercury fulminate, potassium chlorate, antimony trisulfide.	Primer cap composition	Raikufun=exploding powder.	Documents: Mks I and III are ammunition primers, Mk II is a fuze primer.
2. Potassium chlorate, antimony sulfide.	Primer cap composition	----------	Most common mixture for fuze primers.
Initiators (detonators):			
3. Mercury fulminate	Initiator for fuzes and blasting caps.	Raikō=thunder mercury	
4. Lead azide	Initiator for fuzes and detonators.	Chikka Namari	Most common initiator especially where a black powder relay is present.
Boosters:			
5. Picric acid	Main booster charge	Ōshokuyaku=yellow color explosive.	Pressed. Toxic.
6. Tetryl	Subbooster	Meiayaku	Pressed. Toxic.
7. RDX	Subbooster	Shouyaku	Pressed (often with wax).
Main charges:			
8. Picric acid	Bombs, projectiles, land mines, bangalore torpedo.	Yellow color explosive.	Usually cast in preformed paper-wrapped blocks. Toxic.
9. TNT	Bombs (rare) projectiles, hand grenades.	Chatatsuyaku=tea-brown explosive.	Generally cast into case. Granular in grenades. Toxic.
10. TNT, 25 percent, Picric, 75 percent.	Bombs	Chaōyaku=TNT-picric.	Cast—rare. Documents: TNT lowers melting point and facilitates casting. A bit less sensitive than picric. Toxic.
11. Picric, 50 percent, Dinitronaphthalene 50 percent.	Projectiles	Ōnayaku	Cast—rare. Documents: Picric 80 percent, Dinitronaphthalene 20 percent. Dinitronaphthalene aids casting and makes less sensitive. Toxic.
12. Picric, 90 percent; Wax, 10 percent.	Projectiles	Ōshivaku=picric wax	Pressed. Used in nose of A. P. projectile. Documents: low sensitivity. Toxic.
13. TNT, 70 percent; Dinitronaphthalene, 30 percent.	Projectiles	Chanayaku	Cast. Toxic.
14. TNT 70, 60, and 50 percent; RDX 30, 40, and 50 percent.	Bombs, projectiles, land mines, bangalore.	Nigotanōyaku=Mk 2 pale yellow explosive.	Cast. Appears to be the coming Army explosive. Many new types of ordnance have it. Toxic.
15. Ammonium nitrate, 75 percent; RDX, 25 percent.	Bombs	Anyaku	Cast in case. White and very hygroscopic.

incendiary, gas, substitute, practice, and antishipping, indicate the purpose of the bomb.

2. Construction

The standard high-explosive bombs are of three-piece construction. On older bombs the tail cone, which is filled with explosive, is welded to the cylindrical body, and the nose section is threaded to the body. In later models the nose is welded to the body and the tail cone is threaded on.

Some of the antishipping bombs utilize two-piece construction; the nose and body are of one piece, and the tail cone is threaded to the body. The special construction features of the various antishipping bombs are described under the individual bombs.

3. Suspension

All the Army bombs except those carried in containers are suspended by a single hinged rectangular lug located at the center of gravity.

4. Filling

High-explosive bombs are usually filled with precast, paper-wrapped blocks of explosive surrounded by paraffin, or in the latest type by cast TNT. When fillings other than picric acid are used, the nature of the filling may be stenciled on the bomb. Bombs filled with an explosive other than the standard filling for that bomb are marked with the Jap character for special.

Liquid-filled smoke bombs are grey over-all, have a red nose band and no body band. They are marked by the symbol for smoke " ㄒ ."

Gas bombs are painted grey over-all and have a red nose band. It is supposed that color bands around the body indicate the type of gas filling. This system is utilized in marking Army gas projectiles.

Red band	Vomit gas.
Blue band	Lung irritant.
Green band	Tear gas.
Yellow band	Vesicant.
Brown band	Blood and nerve poison.

5. Color and markings

High-explosive bombs are painted black over-all. A red band around the tip of the nose indicates that the explosive is loaded in the bomb case. A white band forward of the suspension lug indicates that the bomb case is made of high-grade steel. A yellow band forward of the white band denotes a high-explosive filling. Recently this system has been modified to the extent that the white band has been omitted. Forward of the yellow band is stenciled the type number, weight, filling, and additional description. Aft of the suspension lug is stenciled the place and the date of manufacture and a "+" or "—" indicating a minor weight discrepancy.

Incendiary bombs with a solid filling are painted black over-all with a white band forward of the suspension lug.

A symbol for incendiary bombs " ㅓ " is stenciled on the bomb.

All liquid-filled bombs are painted grey over-all. A red nose tip indicates that the high explosive burster tube is loaded and a blue band aft of the nose tip indicates that the liquid filling is present.

Liquid-filled incendiary bombs are marked by a single white band just forward of the suspension lug and by the symbol " ㅓ ."

6. Sizes

Although documents refer to 1,000-kg. bombs, none larger than 500-kg. has been recovered.

7. Fuzing

All Army bombs of 30-kg. and above may be fuzed in both the nose and tail. Bombs of 250-and 500-kg. generally use larger weight.

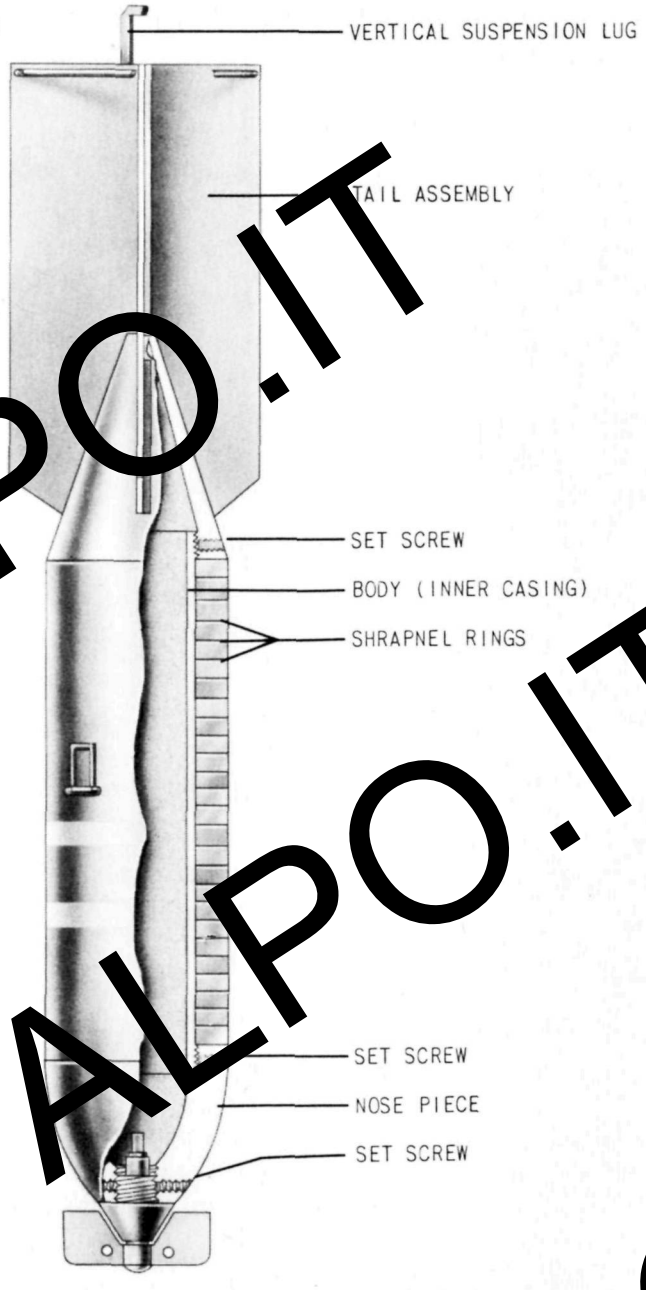


Figure 2—Type 92 15-kg. High-Explosive Bomb.

Type 92 15-kg. High-Explosive Bomb

Fuzes____A–2 (b), A–2 (d)
Over-all length: 25½ inches.
Length of body: 14½ inches.
Diameter of body: 3⅞ inches.
Thickness of wall: ½ inch.
Material of wall: Steel rings (26).
Type of Suspension: Vertical and horizontal.
Suspension lug: Normal Army suspension lug. Rectangular hinged steel lug on a plate riveted to body with four rivets. A similar steel hinged lug is fastened to end of tail fins.
Color and markings: Body over all with a red band around the nose and a white band and yellow band forward of the suspension lug. (White band may be missing.)
Length of tail: 11 inches.
Width of tail: 5½ inches.
Width of tail fins: 2¾ inches.
Dimensions of tail struts: Length, 3¾ inches; width, 5/16 inch; thickness, 1/16 inch.
Material of tail: 1/16-inch sheet steel.
Type of filling: 3 precast blocks of picric acid. An alternative filling is cast TNT.
Weight of filling: 9 pounds 9 ounces.

Total weight of bomb: 33 pounds.
Charge/weight ratio: 30 percent.

Construction of body: A cast-steel nose is threaded onto a tubular steel body. Twenty-six steel rings ⅜ inch wide and ⅜ inch thick are fitted around the body. One ring to which the suspension lug is attached is 1⅜ inch wide and ⅜ inch thick. A tail cone is screwed onto the after end of the tubular body.

Construction of tail: Four angular fins are welded to the tail cone and braced by a single set of box-type struts. A suspension lug is secured to the after end of the fins.

Type 99 30-kg. High-Explosive Bomb

Fuzes: A–2 (a), A–2 (c), B–1 (a), B–1 (b); D–5 (a).
Over-all length: 33 inches.
Length of body: 19¾ inches.
Diameter of body: 5⅞ inches.
Thickness of wall: 9/32 inches.
Material of wall: Tubular steel.
Type of suspension: Horizontal.
Suspension lug: Normal Army suspension lug.
Color and marking: Black over all with a red band around the nose and a yellow band and white band around the body forward of the suspension lug.
Length of tail: 13½ inches.
Width of tail: 8¼ inches.
Width of tail fins: 3¼ inches.
Dimensions of tail struts: Length, 5¾ inches; width, 1 inch; thickness, 1/16 inch.
Material of tail: Sheet steel.
Type of filling: Cyclonite, 48 percent; TNT, 52 percent; in 3 preformed blocks.
Weight of filling: 25 pounds, 12 ounces.
Total weight of bomb: 66 pounds.
Charge/weight ratio: 39 percent.

Construction of body: A cast-steel nosepiece is screwed into a tubular steel body. A tail cone is welded to the after end of the steel body.

Construction of tail: Four tail fins are spot welded to the cone, and are braced by a single set of box-type struts.

Remarks: This bomb has been found with sheet steel plates welded to the outer edges of the fins to form a box-like reinforcement for the tail fins. They cover the area from the after end of the fins to a point just forward of the curve in the fins. This is an antishipping adaptation using the A–8 (a) and B–8 (a) fuzes. Documents report that an antipenetration device is used on the tail of the type 99 30-kg. bomb for minimum altitude bombing.

Type 94 50-kg. Type 94 and Type 3 100-kg. High-Explosive Bombs

Fuzes: A–2 (a), A–2 (b), A–2 (c); B–1 (a), B–1 (b); D–5 (a).

	50 kg.	100 kg.
Over-all length	41 inches	53 inches.
Length of body	24½ inches	31¼ inches.
Diameter of body	7 inches	9½ inches.
Thickness of wall	¼ inch	13/32 inch.

Material of wall: Tubular steel.
Type of suspension: Horizontal.
Suspension lug: Normal Army suspension lug.

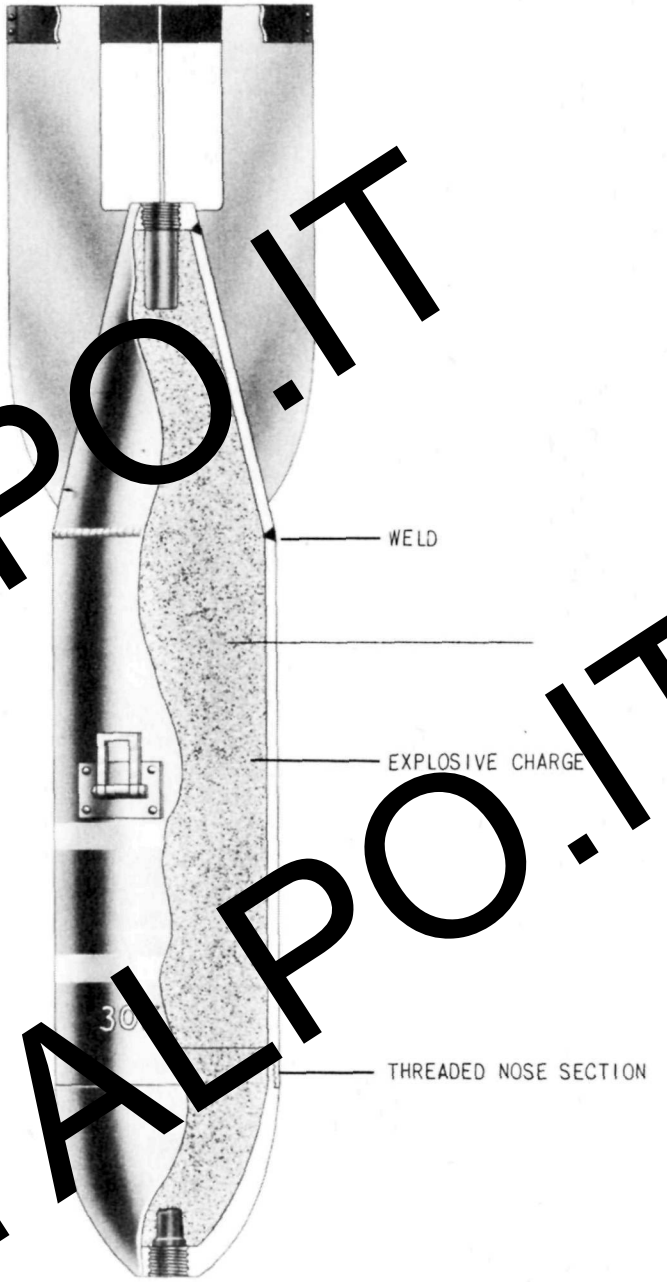


Figure 3—Type 99 30-kg. High-Explosive Bomb.

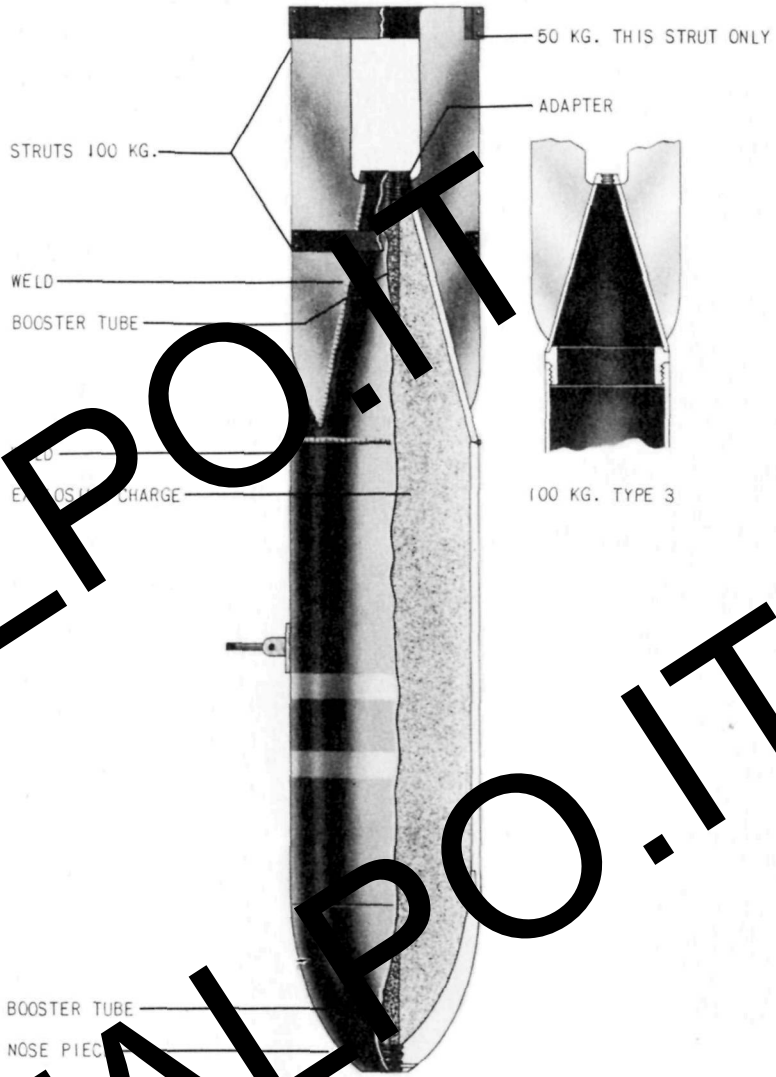


Figure [illegible]—Type 94 50-kg., Type 94 and Type 3 100-kg. High-Explosive Bombs.

Color and markings: Black over-all with a red band around the nose and a white band and yellow band around the body just forward of the suspension lug.

	50 kg.	100 kg.
Length of tail	16⅝ inches	21¾ inches.
Width of tail	9½ inches	13¼ inches.
Width of tail fins	3½ inches	5⅞16 inches.
Dimentions of tail struts.	6⅞ x 1⅞16 x 3⁄32 inches.	Forward struts: 9⅞16 x 1⅞16 x 3⁄32 inches.. After struts: 9⅞16 x 1⅞16 x 3⁄32 inches.
Material of tail	Sheet steel	Sheet steel
Type of filling	3 blocks of picric acid.	Type 94: 4 blocks of picric acid. Type 3: 5 blocks of picric acid.
Weight of filling	44 pounds	97 pounds 12 ounces.
Total weight of bomb	110 pounds	220 pounds.
Charge/weight ratio	40 percent	42.5 percent.

Construction of body: Type 94, 50-kg. and 100-kg.: A cast-steel nose is screwed into a tubular steel body. A tail cone is welded to the after end of the body.

Type 3, 100-kg.: A cast steel nosepiece is welded to a tubular steel body. A tail cone is welded to a collar which is screwed into the after end of the body.

Construction of tail: Four tail fins are spot welded to the tail cone and are braced by box type struts. The 50-kg. bomb has a single set of struts. The 100-kg. bomb has two sets of struts.

Remarks: The type 94, 100-kg. bomb may vary in its explosive filling: Variations include: (1) Picric acid, 78 percent; TNT, 22 percent in 4 preformed blocks. (2) Ammonium nitrate, 78 percent; RDX, 22 percent cast into the bomb.

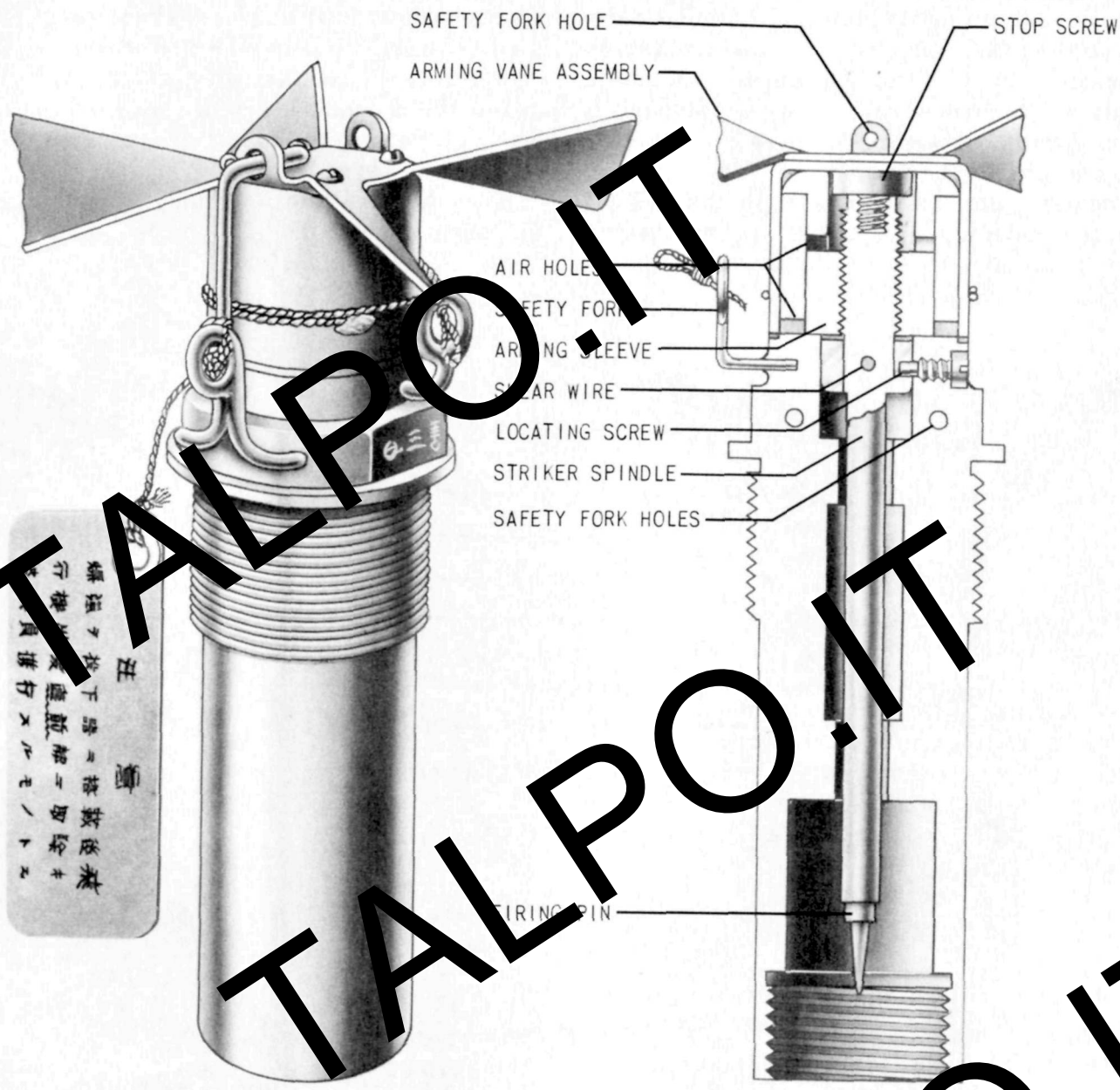


Figure 118—A-3 (d) Bomb Fuze.

screw and a shear wire which prevent the spindle from rotating or moving forward until impact. The upper portion of the spindle is threaded while a steel firing pin is screwed into the lower end. The arming vane assembly consists of a nose cap, arming vanes, and arming sleeve. The arming sleeve internally threaded, screws onto the spindle and its length of travel is limited by a stop screw threaded into the top of the spindle. To this sleeve, the nose cap and arming vanes are attached by four short screws. The lower end of the fuze body is internally threaded to take the standard Japanese gaine or magazine.

A heavy wire eyelet is attached to the side of the fuze body and serves as a guide for the starting wire. The starting wire is soldered to the nose cap in two places and gives an initial turn to the arming assembly when the bomb is dropped. A safety fork fits into the upper portion of the fuze body, one prong of which extends up through eyelets of arming vane assembly to prevent premature vane rotation.

Operation: On release of bomb, the arming wire pulls the starting wire through the eyelet, breaking it loose at the soldered points and simultaneously imparting an initial rotation to the arming vane

assembly. In seven revolutions, the arming sleeve rises up the striker spindle to lock against the stop screw and arm the fuze. On impact, the entire assembly (vanes, nose cap, sleeve and spindle) is driven inward, shearing the shear wire, and the firing pin pierces the primer.

Remarks: This fuze is similar to the A–3 (a) with the following exceptions: (*a*) the maroon lacquered lower fuze body is 1 7/16 inches longer than that of the A–3 (a); (*b*) the striker spindle of the new fuze is longer than that of the A–3 (a) to match the elongated lower fuze body; (*c*) the vanes have a span of 4¾ inches as compared to the 4½ inch vane span of the A–3 (a).

The threads on the arming spindle are 12 threads per inch.

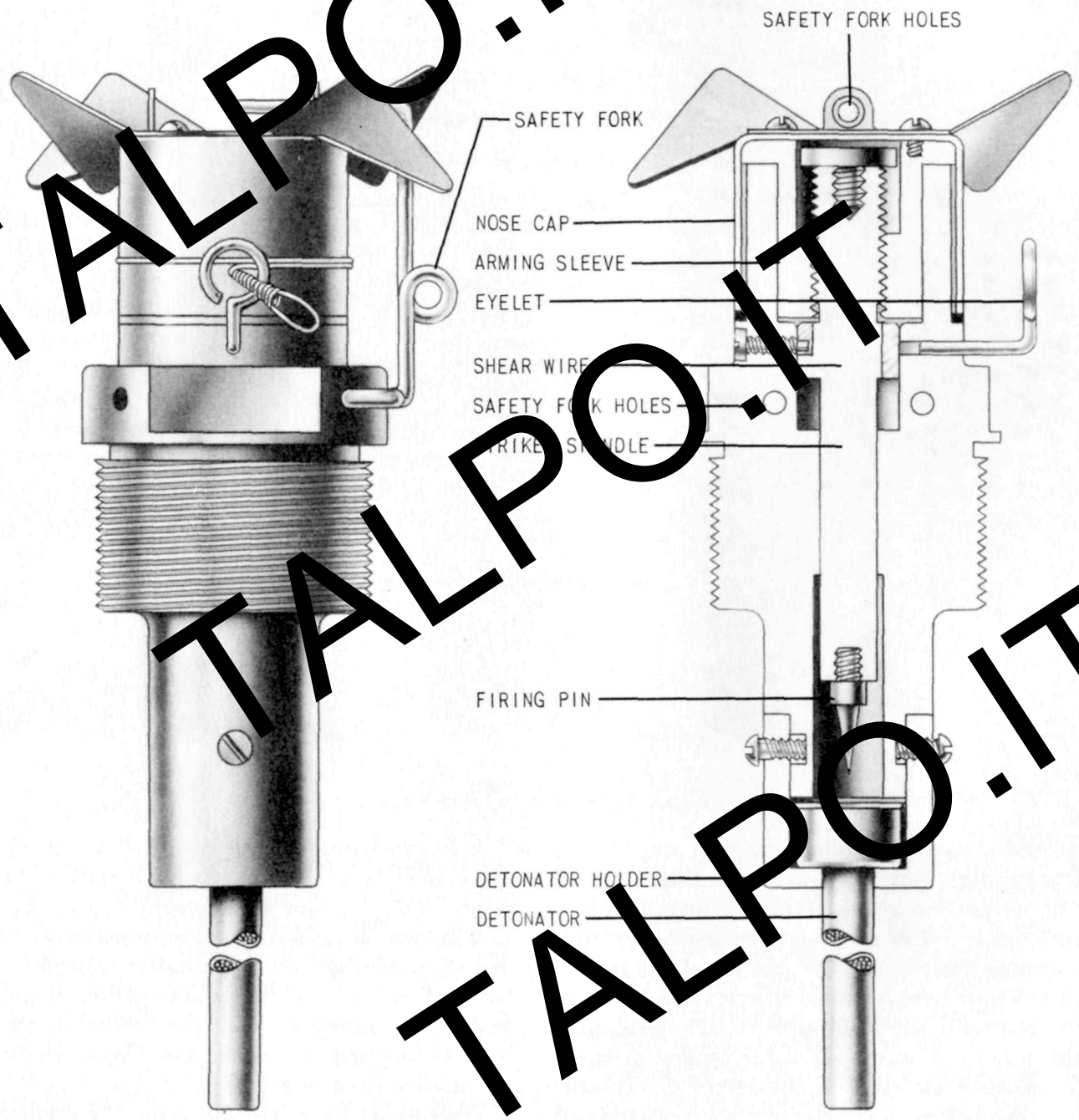


Figure 119—A–3 (e) Bomb Fuze.

Type 3 Nose Initiator A–3 (e)

Bombs in which used: Temporarily designated type 99 No. 6 smoke.
Color: Steel, except for brass nose cap.
Over-all length: 5⅜ inches (less detonator).
Over-all width: 2⅛ inches; vane span, 3⅝ inches.
Material of construction: Steel except for brass nose cap, arming sleeve, and striker spindle.
Position and method of fixing in bomb: Screwed into nose fuze pocket and tightened with a wrench.
Components of explosive train: Detonator.
Delay times: None.
Threads: 10 threads per inch, RH, 1⅞ inches in diameter.

Description: The fuze consists of the fuze body, arming vane assembly, striker spindle and detonator holder.

The fuze body is of one-piece construction. It houses the striker spindle which is held in position by a locating screw and a brass shear wire. The upper portion of the spindle is threaded and a steel firing pin is screwed into the lower end. The arming vane assembly consists of a nose cap, arming vanes and arming sleeve. The arming sleeve is internally threaded and screws onto the spindle. Its length of travel is limited by a stop screw threaded into the top of the spindle. The nose cap and four arming vanes are attached to this sleeve by four short screws.

The lower end of the fuze body is grooved circumferentially. The cup-like detonator holder is secured to the fuze body by two screws which fit into the groove.

A heavy wire eyelet is attached to the side of the fuze body and serves as a guide for the starting wire. The starting wire is soldered to the nose cap in two places and gives an initial turn to the arming assembly when the bomb is dropped. A safety fork fits into the upper portion of the fuze body, one prong of which extends up through eyelets of arming vane assembly to prevent premature vane rotation.

Operation: On release of bomb, the arming wire pulls the starting wire through the eyelet, breaking it loose at the soldered points and simultaneously imparting an initial rotation to the arming vane assembly. In seven revolutions, the arming sleeve rises up the striker spindle to lock against the stop screw and arm the fuze. On impact, the vane assembly (vanes, nose cap, sleeve, and spindle) is driven inward, shearing the shear wire and the firing pin pierces the detonator.

Type 2 No. 50 Ordinary Bomb Model 1 Fuze A–3 (f)

Bombs in which used: Type 2 No. 50 ordinary bomb, Model 1.
Color: Natural steel except for brass nose cap.
Over-all length: 10 inches.
Over-all width: 2 inches; vane span, 3½ inches.
Material of construction: Steel except for brass nose cap and arming sleeve.
Position and method of fixing in bomb: The fuze is screwed into the nose of the bomb and tightened with a spanner wrench.
Components of explosive train: Incorporated in Navy gaine.
Fuzes likely to be found with: B–2 (a), slightly modified.
Delay times: Incorporated in Navy gaine.
Threads: 10 threads per inch; RH; diameter, 1⅞ inches.

Description: The fuze consists of three main parts: the body, striker spindle and arming vane assembly.

The striker spindle is housed in the fuze body and is held in position by a locating screw and a shear wire. The spindle is made in three sections. The upper section, which is externally threaded to take the arming sleeve, is internally threaded in the top to take the stop screw and internally threaded in the bottom to take the middle section of the spindle. The lower section of the striker spindle is internally threaded to take the middle

Figure 110—A-3 Bomb Fuze.

section. The arming vanes and nose cap are attached to the arming sleeve by four screws.

A heavy wire eyelet is attached to the side of the fuze body and serves as a guide for the starting wire. The starting wire is soldered to the nose cap in two places and gives an initial turn to the arming assembly when the bomb is dropped. A safety fork fits into the upper portion of the fuze body, one prong of which extends up through eyelets of arming vane assembly to prevent premature vane rotation.

Operation: On release of bomb, the arming wire pulls the starting wire through the eyelet, breaking it loose at the soldered points and simultaneously imparting an initial rotation to the arming vane assembly. In seven revolutions, the arming sleeve rises up the striker spindle to lock against the stop screw and arm the fuze. On impact, the entire assembly (vanes, nose cap, sleeve, and spindle) is driven inward, shearing the shear wire, and the firing pin pierces the primer.

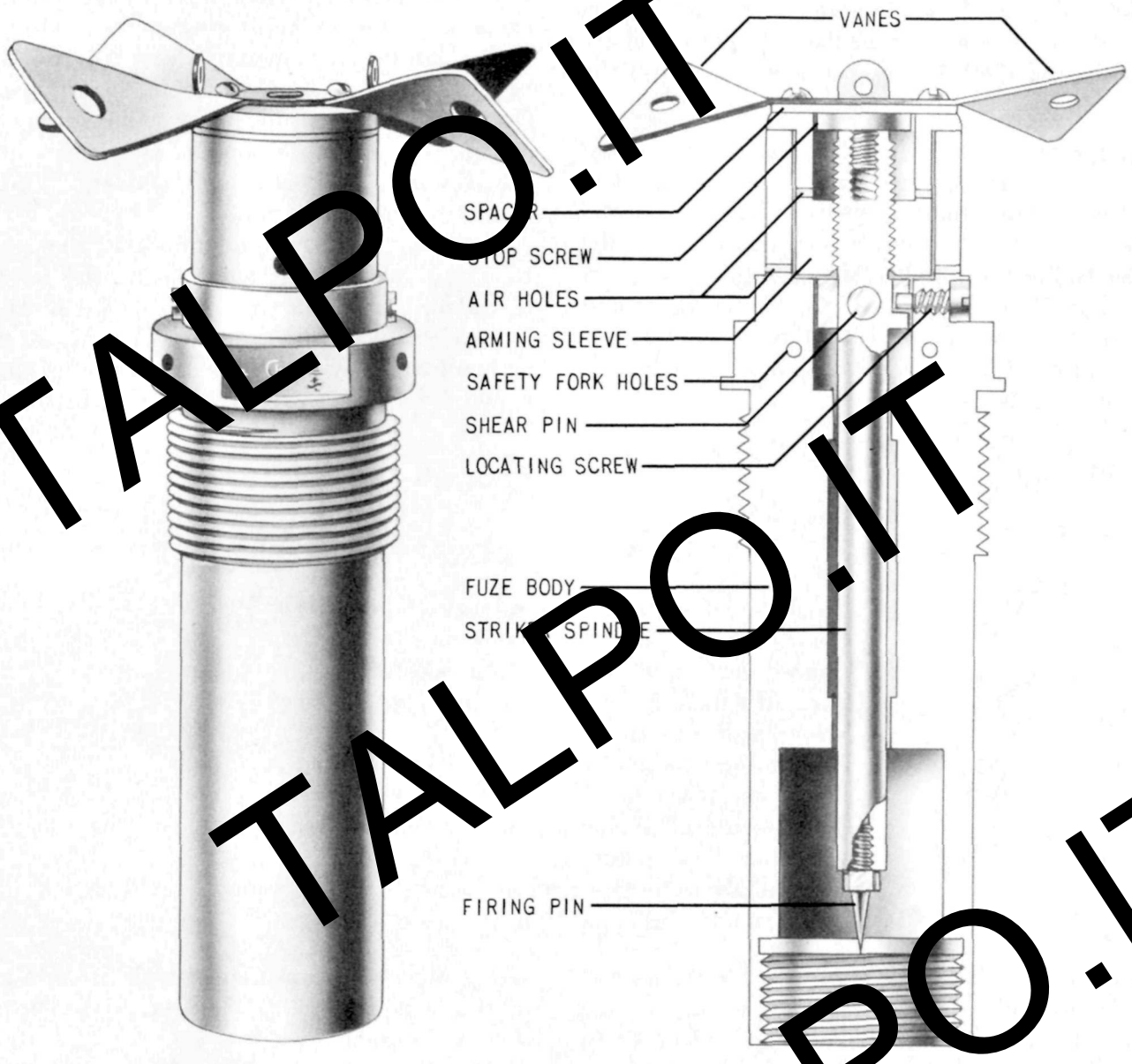


Figure 121—A–3 (g) Bomb Fuze.

A–3 (g) Nose Fuze

Bombs in which used: Baka bomb.
Color: Natural steel.
Over-all length: 7⅛ inches.
Over-all width: 2^{3}⁄$_{64}$ inches.
Material of construction: All steel except for the brass arming sleeve, striker spindle and locating screw.
Position and method of fixing in bomb: Screwed clockwise into the nose. No antiwithdrawal or locking device used.
Components of explosive train: Incorporated in Navy gaine.
Fuzes likely to be found with: B–9 (a), B–10 (a).
Delay times: Incorporated in Navy gaine.
Threads: 10 threads per inch, RH, 1⅞ inches diameter.

Description: The fuze consists of three main parts: the body, the striker spindle and the arming vane assembly.

The striker spindle is positioned in the one piece fuze body by a locating screw and steel shear pin 15/64 inch in diameter. The upper portion of the spindle is threaded externally and internally and a steel firing pin is screwed into the lower end.

The arming vane assembly consists of vanes, spacer disc, arming sleeve and stop screw. The internally threaded arming sleeve screws onto the striker spindle. A stop screw threaded into the upper end of the spindle prohibits the sleeve from screwing off the spindle. The arming vanes and spacer disc are attached to the sleeve by four shear screws. There is a 1/4 inch hole in each vane 1 inch from its edge.

A safety fork fits into the upper portion of the fuze body, one prong of which extends through the eyelets of the arming vane assembly thereby holding it stationary.

Operation: When the Baka bomb is released from the plane, an arming wire is withdrawn from the holes in the arming vanes. The vanes rotate causing the arming sleeve to rise up on the striker spindle and lock against the stop screw. On impact with a solid object the arming vane assembly and striker spindle are driven inward shearing the steel shear pin and the firing pin pierces the primer.

Remarks: This fuze is similar to the A–3 (d) with the following exceptions: (a) the nose cap is replaced by a spacer disc; (b) the shear wire is replaced by a shear pin; (c) there is no flange on the fuze body above the threads; (d) there is no starting wire eyelet on the fuze body.

A–5 (a) Nose Fuze

Bombs in which used: 1-kg. practice bomb.
Color: Black, may have brass band.
Over-all length: 2 1/2 inches (less booster).
Over-all width: 3 inches (including fuze housing).
Material of construction: Cast iron.
Position and method of fixing in bomb: Fixed in the nose of the bomb.
Components of explosive train: A primer and a booster are present.
Fuzes likely to be found with: None.
Delay times: None.

Description: The fuze body is inside the nose of the bomb and cannot be seen; it is part of the nose of the bomb. The striker head is attached to the spindle which has an integral firing pin. In the unarmed position the striker is held away from the detonator by a safety screw pin and a shear wire. When the bomb is attached to the bomb rack a small arm depresses a spring loaded safety plunger, the shaft of which fits into a hole in the striker spindle. The safety screw pin is then withdrawn.

Operation: On release from the plane the spring-loaded safety plunger is forced out of the striker spindle and the fuze is armed. On impact the striker assembly is driven inward shearing the shear wire and the firing pin pierces the primer.

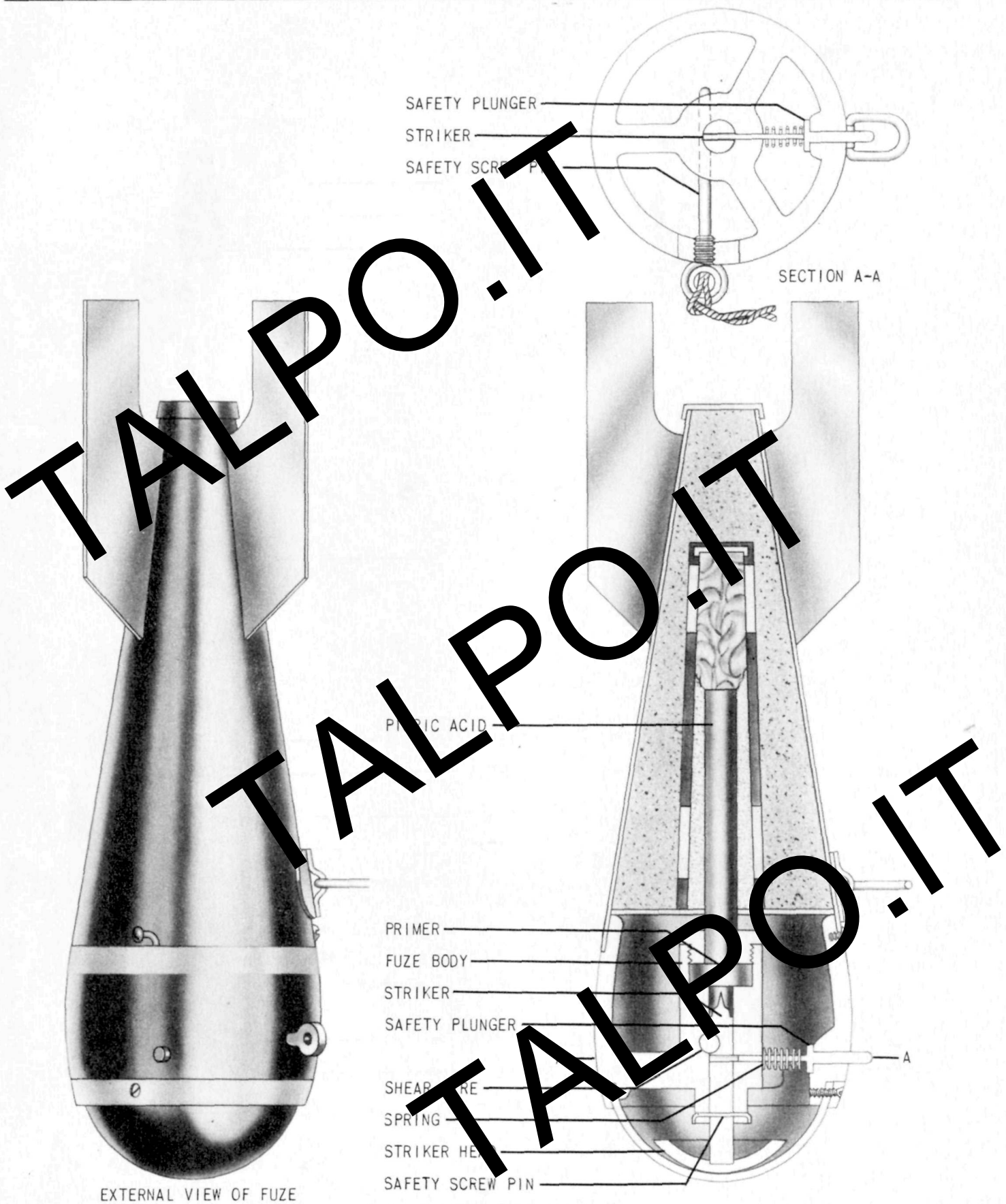


Figure 122—A-5 (a) Bomb Fuze.

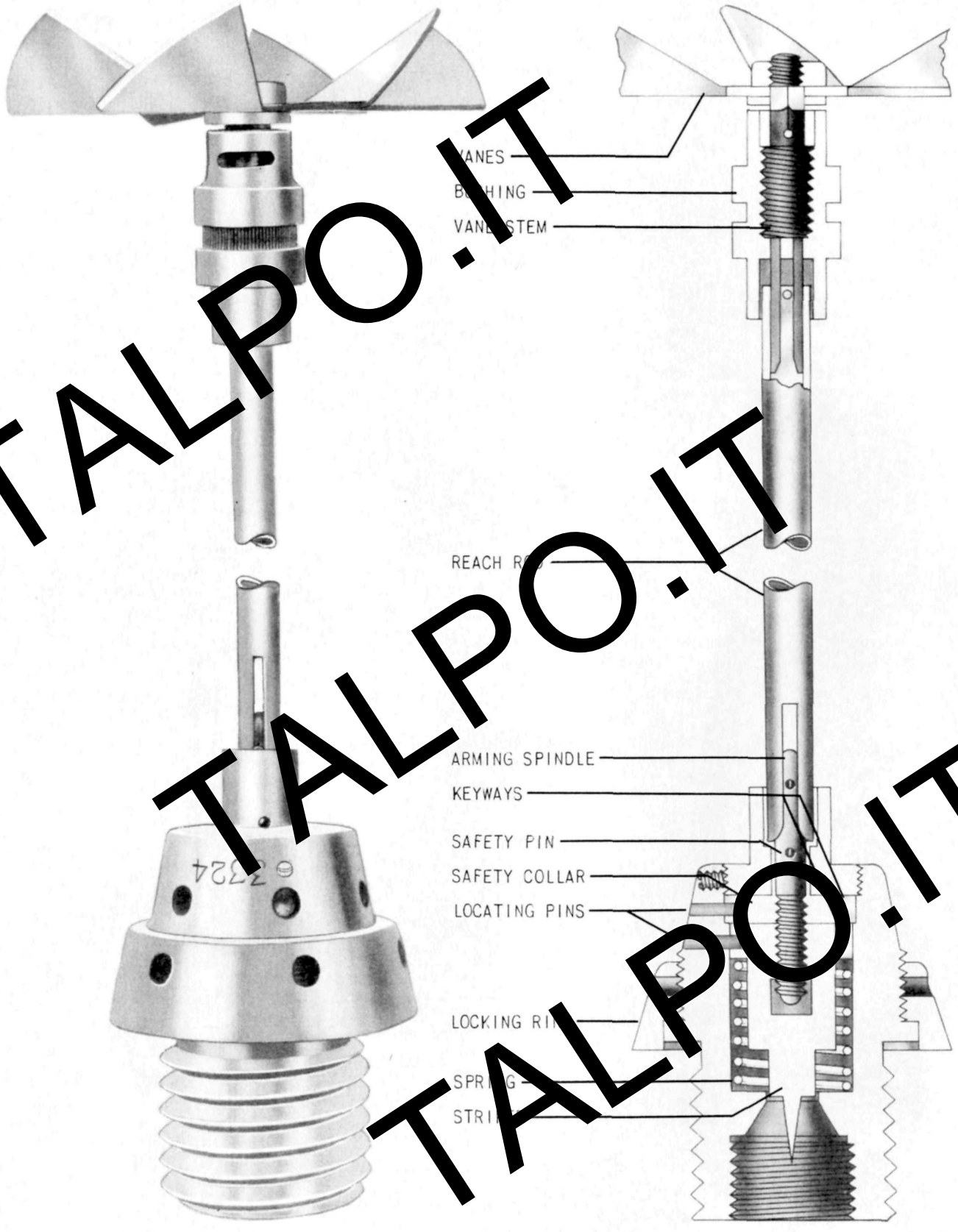


Figure 123—B-2 (a) Bomb Fuze.

Type 99 No. 25 Ordinary Bomb Fuze B–2 (a)

Bombs in which used: Type 99 No. 25 ordinary.
Markings:

Color: Chromium plated

Over-all length: 4½ inches (without the arming spindle extension).
Over-all width: 2$^{9}/_{16}$ inches.
Material of construction: St[illegible] except locking ring, safety collar, and [illegible]ndle.
Position and method of fixing in bomb: The fuze is screwed into the tail of the bomb and tightened with a spanner wrench. A locking ring is then screwed down to secure the fuze.
Components of explosive train: The standard Japanese gaine is employed.
Fuzes likely to be found with: Navy nose fuze A–3 (a).
Delay times: Incorporated in the Navy gaines.
Threads: 2$^{9}/_{64}$ inches in diameter, 4 threads per inch.

Description: The fuze body houses the safety collar, the striker, the arming spindle and the spring. Six spanner holes are found in both the body and the locking ring. The arming assembly consists of a long reach rod connecting the arming spindle and the vanes. The lower end of the spindle screws through the top of the fuze body and the safety collar into the striker.

Operation: On release from the plane, the vanes rotate, unscrewing the arming spindle from the striker. On impact, the striker moves against the action of the spring and pierces the primer in the gaine to set off the exploder system.

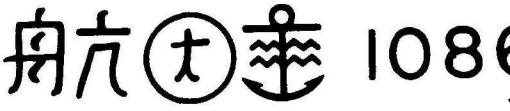
Remarks: This fuze has been recovered only in the bomb listed above.

Variations of B–2 (a) have been found with:

1. Chromium plated body, brass locking ring, locating pins on same side;
2. Chromium plated body, chromium plated steel alloy locking ring, locating pins on same side;
3. Body and locking ring made of zinc plated steel alloy, locating pins on same side;
4. Body shoulders straight rather than sloping. Distance from top of shoulder to locking ring threads is 1 inch; two locating screw pins 180° apart; brass locking ring; body of unplated steel.

Type 99 No. 80 Mk 5 Bomb Fuze B–2 (b)

Bombs in which used: Type 99 No. 80 Mk. 5.
Markings:



Color: Unpainted steel.
Over-all length: 5$^{9}/_{16}$ inches.
Over-all width: 3$^{5}/_{32}$ inches (including locking ring).
Material of construction: Steel except for brass arming spindle and brass safety collar.
Position and method of fixing in bomb: Two fuzes are screwed into the base plate of the bomb and secured by the locking ring.
Components of explosive train: Incorporated in a large Navy gaine.
Fuzes likely to be found with: One other B–2 (b).
Delay times: 0.1 second delay incorporated in [illegible] gaine.
Threads: 2$^{17}/_{32}$ inches in diameter; 4 threads per inch.

Description: The fuze body houses the striker, the spring, the safety collar, and the arming spindle. The upper end of the body is internally threaded, right-hand, to receive the bushing which

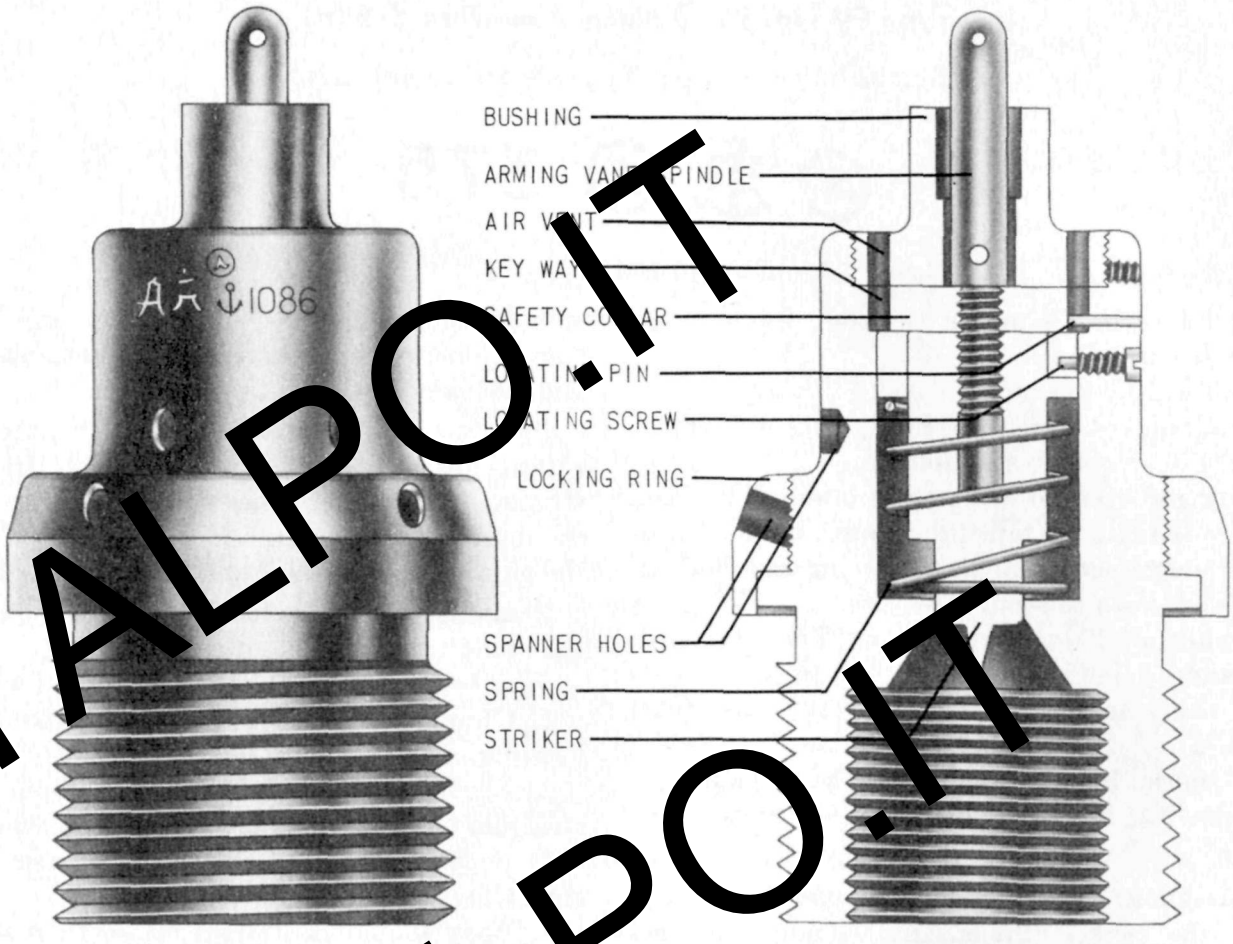


Figure 124—B-2 (b) Bomb Fuze.

secures the safety collar in position. The arming assembly consists of the vanes and a long reach rod which slide-fits over the arming spindle. A locking ring screws down over a shoulder of the body to secure the fuze in the bomb.

The safety collar and the top of the striker are internally threaded, left-hand, to receive the arming spindle. The collar rests on a shoulder of the fuze body and prevents the striker from moving downward when fuze is unarmed. The striker and safety collar are prevented from rotating by the locating screw and locating pin respectively.

Operation: On release from the plane, the arming vanes rotate, unscrewing the arming spindle from the striker. On impact the striker moves against the spring and pierces the primer in the gaine.

Remarks: The fuze uses an oversize Japanese Navy gaine in which is incorporated the primer, slight delay, detonator and booster.

The arming assembly is similar to the B-2 (a) except that the arming vane span of the B-2 (b) is only $3\frac{15}{16}$ inches as compared to the $4\frac{11}{16}$ inches span of the vanes used with the B–2 (a).

A small model of the B-2 (b) has been discovered in a 250-kg. Ordinary bomb, having a thread diameter of $2\frac{7}{64}$ inches.

Type 15 Tail Fuze Model 2 and Model 1 B-3 (a) and B-3 (b)

Bombs in which used:
B-3 (a) No. 25 Model 2 ordinary.
B-3 (b) No. 50 Model 2 ordinary.
No. 30 Model 1 ordinary.

Markings:

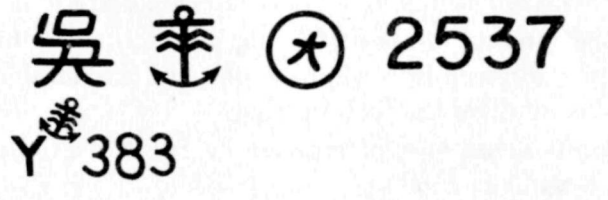


Figure 125—B–3 (a) and B–3 (b) Bomb Fuzes.

	B–3 (a)	B–3 (b)
Color	Brass	Brass.
Over-all length	5⅝ inches	7 3/16 inches.
Over-all width	2⅜ inches	3½ inches.

Material of construction: Brass except for steel sleeve, steel pivot for arms, and steel firing pin.
Position and method of fixing in bomb: Threaded into tail cone. Tightened with spanner wrench.
Components of explosive train: Employs standard Navy gaine.

	B–3 (a)	B–3 (b)
Fuzes likely to be found with:	A–3 (a) in nose.	Probably A–1 (c) in nose.
Delay times: Incorporated in the gaine.		
Threads	1 31/32 inches in diameter, 12 threads per inch.	3 inches in diameter, 8 thread per inch.

Description: Principal parts are the body, the bushing which threads into the upper end of the body, the sleeve housed within the bushing, the striker which is threaded to take the vanes, and the arms which pivot on a steel pin extending through the body. When unarmed, the striker is prevented from moving down by the safety pin, the safety fork, the shear wire, and the arming vanes. The arms are prevented from moving by the sleeve which in turn is held in place by the arming vanes. The fuze body is internally threaded for the standard Navy gaine. Six spanner holes are drilled in the body.

Operation: On loading in the plane, the safety pin and the safety fork are removed. The vanes are prevented from rotating by an arm on the bomb rack. On release, the vanes rotate up and out, leaving the sleeve free to rise. The striker is held up by only a shear wire. On impact, inertia forces the arms down against the shoulder of the striker, the shear wire is sheared, and the firing pin pierces the primer. Because both arms pivot about the stationary pin and extend through the body, pressure upward against the arms would force the short ends of the arms down against the striker and thereby shear the shear wire. Two-way action is thus achieved.

Remarks: After impact, a slight movement of the arms is liable to force the firing pin into the primer. The B–3(b) is similar to the B–3(a) except that all parts are larger and it lacks one minor safety pin hole at the top of the striker spindle. The diameter of the threads for the fuze pocket is larger than that of any other Japanese Navy fuze, but the fuze is internally threaded to take the standard Navy gaine. The fuze appears to be designed for use in large bombs—probably 500 kg. and over. Increased size of the fuze may provide greater certainty of arming and of firing despite the greater disruptive force of impact of the larger bomb.

B–5 (b) Tail Fuze

Bombs in which used: 1 kg. hollow-charge bomb.
Color: Aluminum.
Over-all length: 2 5/16 inches (less booster).
Over-all width: 1¾ inches.
Material of construction: Steel.
Position and method of fixing in bomb: Screwed into base of bomb body.
Components of explosive train: Gaine containing detonator and booster.
Fuzes likely to be found with: None.
Delay times: Instantaneous.

Description: The fuze body which houses the striker is externally threaded at the base to screw into the bomb body and at the top for the body cap. The cap screws onto the body and is

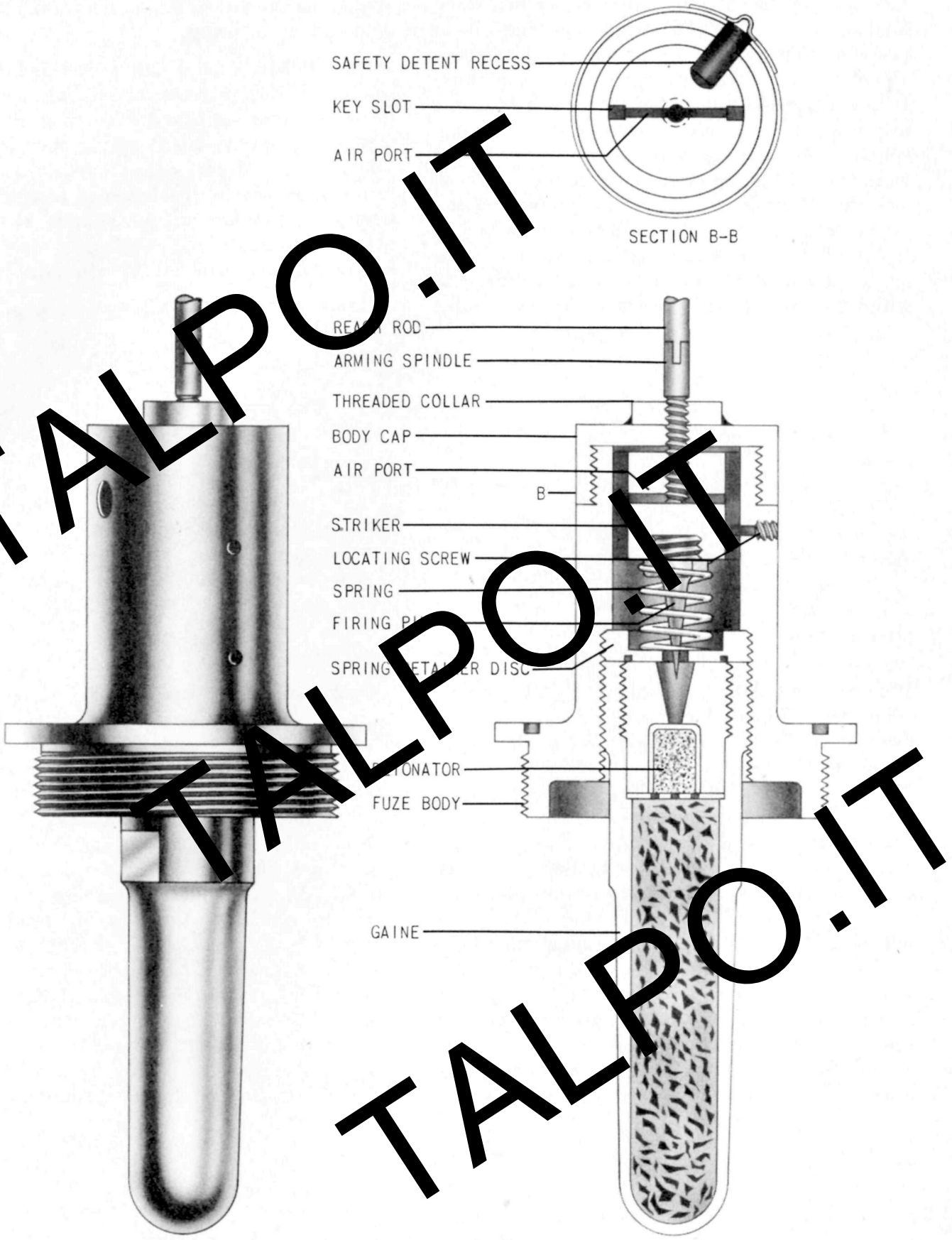


Figure 126—B–5 (b) Bomb Fuze.

threaded to receive the arming spindle which further screws into the striker, holding it in position. There are three grooves in the striker, two of which act as air vents, and one as a keyway. In the unarmed position the striker is held in the safe position by a safety detent and the arming spindle. An arming wire passes through the vanes preventing rotation and extends down to lock the safety detent against the pressure of the safety detent spring. A thin metal disc attached to the arming wire and lying just over the vanes inside the circular tail brace acts as a drogue to withdraw the arming wire when the bomb falls. When armed, the striker is held away from the detonator by a spring.

Operation: When bomb is released from the container, the pressure of air against drogue forces it from bomb and withdraws the arming wire. The safety detent spring then ejects the safety detent from side of fuze. The vanes rotate and unscrew the threaded arming spindle, freeing the striker. (This spindle is threaded with a left-hand thread.) On impact, striker carries forward and drives the firing pin into the detonator.

Remarks: Refer to drawing 1 kg. bomb.

B–5 (c) Tail Fuze

Bombs in which used: Navy 1-kg. A/P bomb.
Color: Aluminum.
Over-all length: 2¼ inches (less gaine and arming stem).
Over-all width: 2¼ inches.
Material of construction: Aluminum alloy.
Position and method of fixing in bomb: Screwed into base of bomb body.
Components of explosive train: Same gaine as is used with the B–5 (b).
Fuzes likely to be found with: None.
Delay times: Instantaneous.

Description: The fuze is integral with the tail section, and is very similar to the B–5 (b) except for a reduction gear system used to slow down the arming process. The fuze is composed of the following parts: (1) Two small arming vanes held in the safe position by a drogue; (2) an arming stem; (3) gear frame containing the arming stem gear; intermediate gear, pinion gear and arming spindle gear; (4) detent retaining pin; (5) spring-loaded safety detent; (6) arming spindle; (7) heavy inertia striker; (8) spring; and (9) fuze body.

Operation: When the bomb falls free from the container, the drogue retaining the vanes is carried away by the wind, allowing the vanes to rotate. The motion of the vanes is transmitted through the reduction gear system to the spindle which is threaded out of the striker. To prevent rotation of the striker, a locating pin and keyway system are incorporated in the fuze body and striker. As the spindle rises, it also lifts the gear frame to which is secured a pin retaining the safety detent. The safety detent, which fits through the fuze body into the striker and holds it in position, is spring-loaded outward, and removal of the safety detent pin permits it to fly out. With the spindle and detent removed, the heavy striker is held up only by a weak spring, which is overcomes on impact, initiating the gaine.

Figure 127—FZ 5 (c) Bomb Fuze

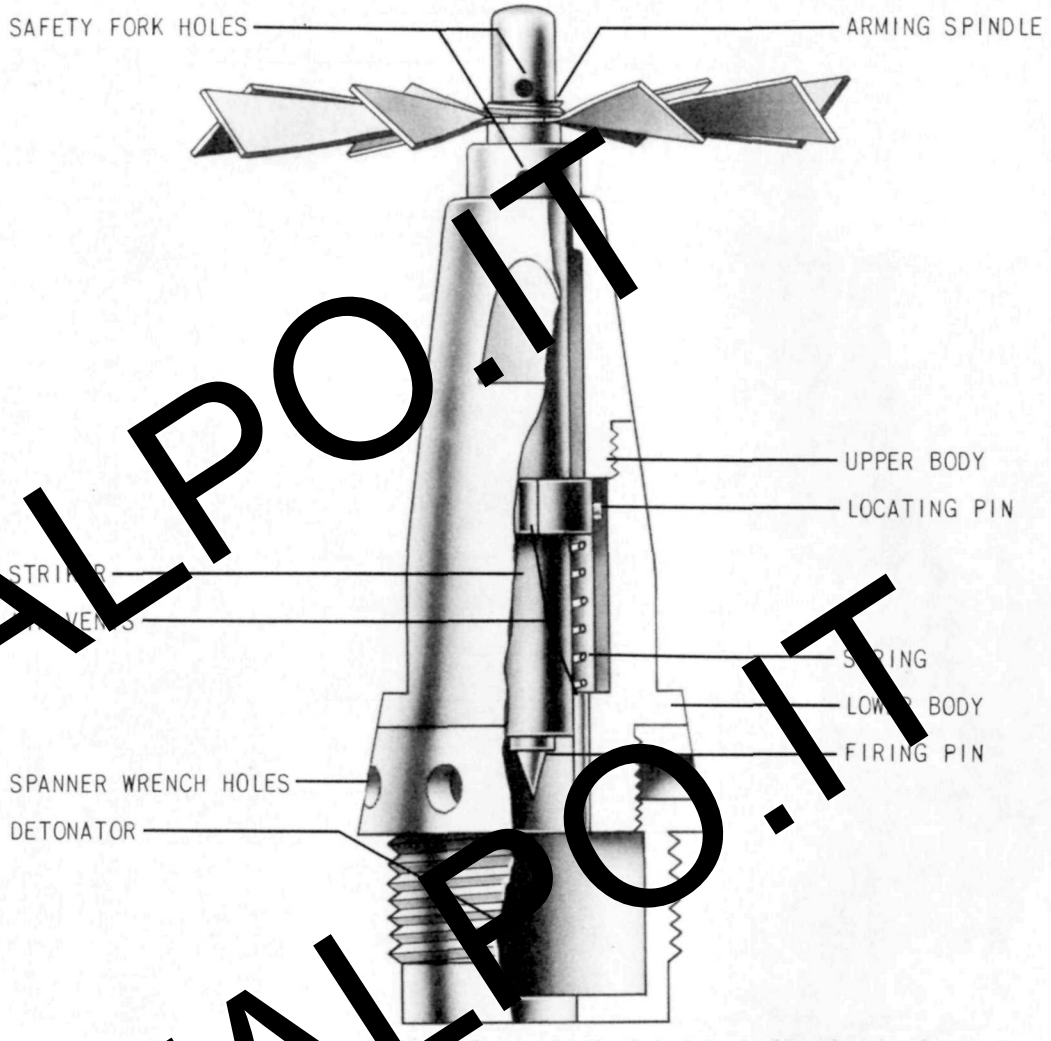
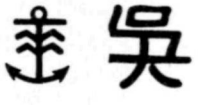


Figure 128—B–6 (a) Bomb Fuze.

Type 97 Rail Initiator B–6 (a)

Bombs in which used: 31-kg. practice bomb.

Markings:



Color: Brass.

Over-all length: 3⅝ inches.

Over-all width: 1¼ inches, vane width, 2$^{5}/_{16}$ inches.

Material of construction: Brass except steel firing pin and spring.

Position and method of fixing in bomb: Screwed into tail fuze pocket and tightened with spanner wrench.

Components of explosive train: Not known.

Fuzes likely to be found with: None.

Threads: 1$^{3}/_{64}$ inches in diameter, 20 threads per inch.

Description: The upper portion of the body acts as a guide for the arming spindle. The lower portion of the body contains the light spring. The firing pin is screwed into the end of the striker. The lower portion of the fuze has a combination spanner ring and detonator cup screwed to it. Around the striker, four air vents are drilled. Two vents are also located on the striker collar. These vents allow the striker to move against the primer on impact without any cushion effect caused by the air in the striker channel. The arming vane assembly has eight vanes.

Operation: On release from the aircraft, a U-shaped safety fork is withdrawn from the two holes in the arming spindle. The vanes rotate twelve times and fall free, leaving the striker held back by the light spring. The arming spindle is prevented from rotating by a small locating pin which fits in a keyway in the lower portion of the fuze body. On impact, inertia causes the striker to move against the spring and to pierce the primer.

Figure 129—B–9 (a) Bomb Fuze.

B–9 (a) Tail Fuze

Bombs in which used: Baka bomb.
Color: Brass.
Over-all length: 4½ inches.
Over-all width: 2¾ inches.
Material of construction: Brass except for an aluminum striker body and steel firing pin and spring.
Position and method of fixing in bonb: The fuze is screwed into the tail fuze pocket and tightened with a spanner wrench.
Components of explosive train: Incorporated in the Navy gaine.
Fuzes likely to be found with: A-3 (g), B-10 (a).
Delay times: Incorporated in the Navy gaine.
Threads: 12 threads per inch, RH, $1\frac{15}{16}$ inches in diameter.

Description: The fuze body has at its upper end a dome-shaped cap which has a curved inner surface. The cap is pierced by a central hole through which a stud on the arming fork fits to engage a recess in the top of the striker extension. The cap is held in place by a grub screw. Two holes 180° apart are drilled longitudinally in the fuze body to accommodate an arming fork. Two holes are drilled through the body wall along the axis of one of the longitudinal holes. The upper hole appears to be for inspection purposes. The lower hole contains a spring-loaded arming detent. A screw threads into the body just below this hole and prevents the detent from flying out of the body after it has been released by the arming fork. Two air vents 180° apart pierce the lower portion of the fuze body. A groove in the bottom of the

fuze body contains a locking spring which serves to secure the fuze firmly in its pocket.

The striker assembly consists of a striker extension, striker, and a spring. The striker extension is an egg-shaped brass knob having a cylindrical lower shaft, at the end of which is machined a small ball. The striker has a wide head which is recessed in its center to take the ball of the striker extension. There is a deep annular groove in the side of the striker into which is fitted a spring-loaded arming detent held in position by the arming fork. A spring holds the striker away from the primer after the detent has been released.

Operation: When the pilot of the bomb pulls the handle of the tail fuze arming mechanism, the arming fork is withdrawn far enough to allow the spring-loaded detent to move outward, disengaging the groove in the striker. The fuze is now armed. The striker is held away from the primer by the spring. On direct impact the weight of the striker extension forces the striker down, compressing the spring and hitting the primer.

If the impact is not direct, the striker extension is cammed to the side against the curved dome of the closing cap. This action forces the striker down against the spring, thereby firing the primer.

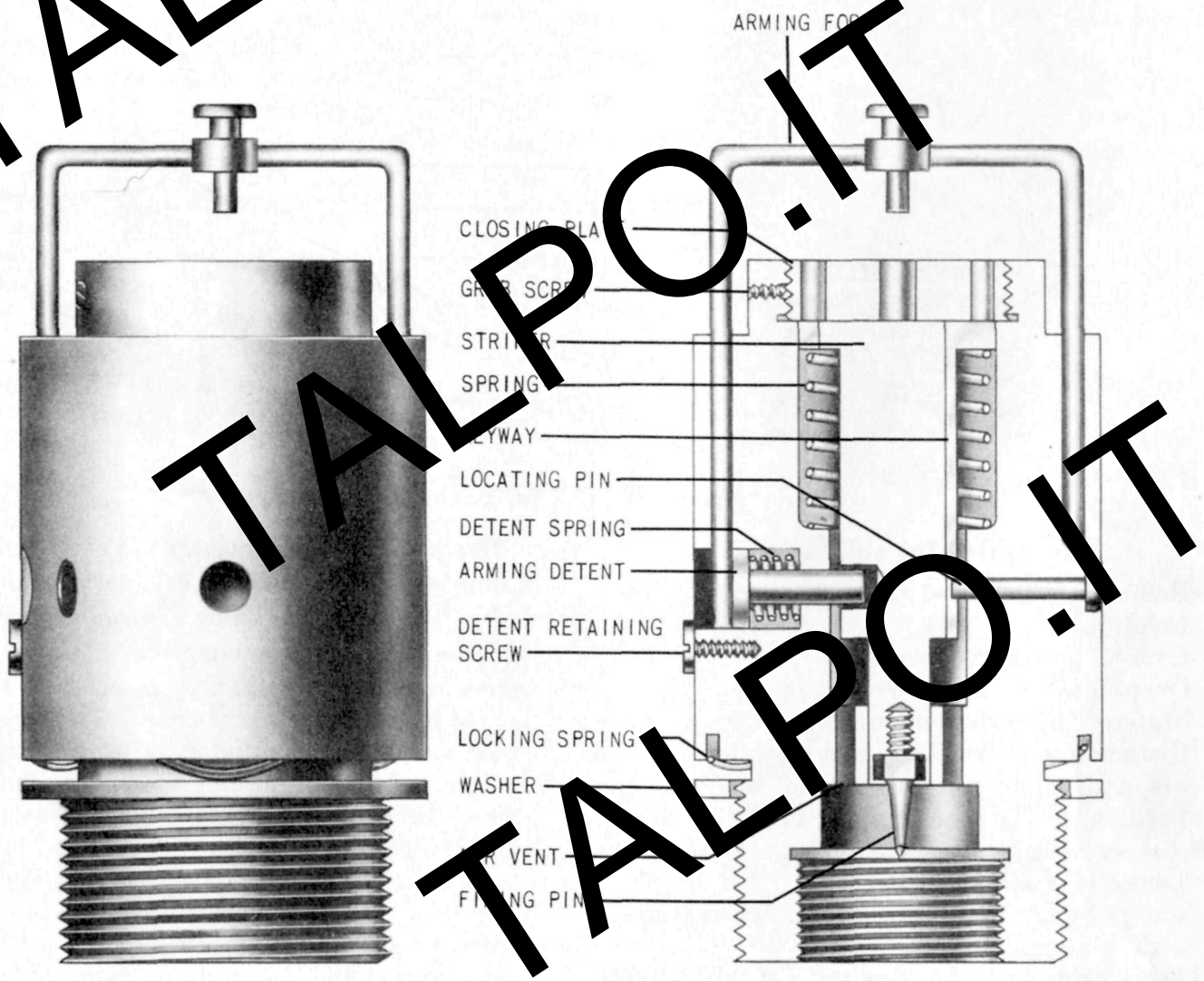


Figure 130—B–10 (a) Bomb Fuze.

B–10 (a) Tail Fuze

Bombs in which used: Baka bomb.
Color: Brass.
Over-all length: $4\frac{3}{32}$ inches.
Over-all width: $2\frac{3}{8}$ inches.

Material of construction: Brass except for the steel firing pin threaded into the lower end of the striker.

Position and method of fixing in bomb: The fuze is screwed into the tail fuze pocket and tightened with a spanner wrench.

Components of explosive train: Incorporated in the Navy gaine.

Fuzes likely to be found with: B–3(g), B–9(a).

Delay times: Incorporated in the Navy gaine.

Threads: 12 threads per inch, RH, $1\frac{15}{16}$ inches in diameter.

Description: The body is of one piece brass construction. It is threaded at the top to receive a brass closing plate. This plate is pierced by two spanner holes and a central hole. A grub screw holds the closing plate in place.

There are six spanner holes in the outer circumference of the fuze body, slightly below the central portion. In the same plane as the spanner holes is a locating pin, staked in place, which extends through the body and engages a keyway in the striker body. There is an arming detent 180° removed and limited in its outward movement by the head of a screw threaded into the fuze body directly below the detent cavity.

The body is pierced longitudinally by two holes 180 degrees apart, one of which terminated in the outer end of the detent cavity. A U-shaped arming fork fits in these holes and holds the spring-loaded arming detent inward so that it engages a hole in the striker body.

The heavy brass striker has a wide head which is cut by four vents. There is also a longitudinal keyway which runs the entire length of the striker and accommodates the locating pin. At a 180° interval there is a hole for the arming detent. The striker rests on a spring which is in the central channel of the fuze body. The bottom shoulder of the striker channel is pierced by four vents. A groove cut in the bottom of the fuze body contains a steel locking spring which serves to hold the fuze firmly in the fuze pocket.

Operation: After the bomb has been released from the plane the fuze is armed by the pilot of the bomb. He operates a tail fuze arming mechanism which withdraws the arming fork far enough to allow the spring-loaded arming detent to move outward, disengaging the hole in the striker. The fuze is now armed. The striker is held away from the primer by the spring. On impact the striker compresses the spring and hits the primer.

Type 99 Special Bomb Tail Fuze C–1 (a)

Bombs in which used:
Type 97 No. 6 land.
Type 98 No. 25 land Model 1.
Color: Steel.
Over-all length: $6\frac{3}{32}$ inches.
Over-all width: $2\frac{15}{32}$ inches.

Material of construction: Steel throughout except copper chemical tank.

Position and method of fixing in bomb: The fuze is screwed into the tail of the bomb. A steel locking ball prevents removal.

Components of explosive train: Standard Navy gaine.

Fuzes likely to be found with: None. A plug is placed in the nose fuze pocket.

Delay times: Varies from ½ to 125 hours.

Threads: $1\frac{61}{64}$ inches in diameter, 12 threads per inch.

Description: The fuze body is constructed in two parts—the lower body housing the firing

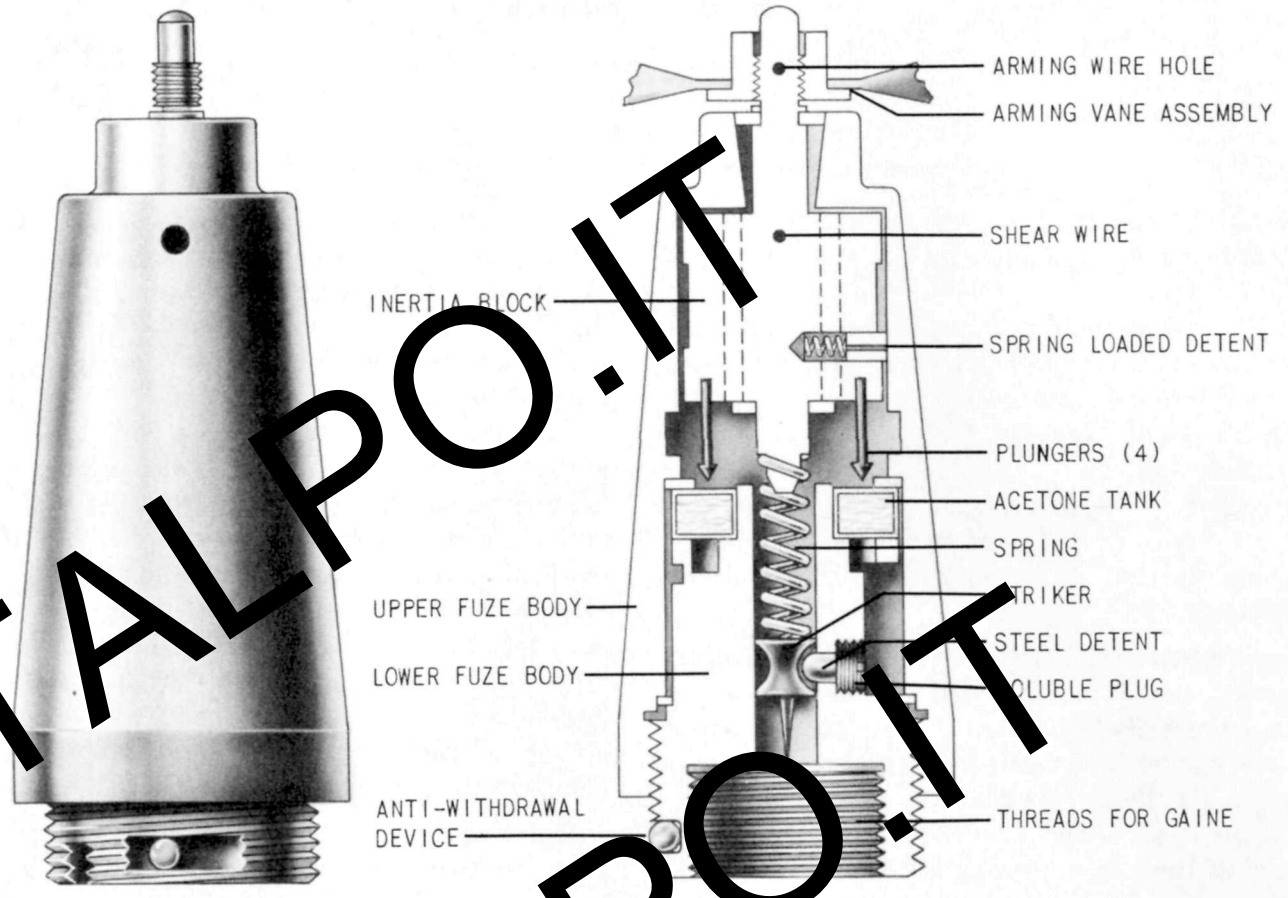


Figure 131—[illegible]1 (a) Bomb Fuze.

components, and the upper body forming a cup extending well above the lower body and housing the arming components. In the upper body is a large inertia block having an arming spindle extending out of the fuze body. The vanes are screwed on this spindle and hold the block in position. A shear wire prevents rotation of the inertia block. On the lower surface of the block are four plungers located around a central extension which rests against a spring. This spring, when compressed by the downward movement of the inertia block, puts pressure on the striker located in the lower body. Bearing against a concave portion on the side of the striker is a steel detent held in place by a soluble plug. Also located in the lower body, and directly under the inertia block plungers is a copper tank containing acetone. A channel leads from the tank to the soluble plug.

Operation: On release from the plane, the arming wire is withdrawn and the vanes unscrew and fall free, leaving the inertia block to be held back by the shear wire which is sheared on impact. The inertia block, moving down after impact, is locked in the down position by the spring-loaded detent. At the moment that the inertia block moved down and the plungers pierced the acetone tank, the spring was compressed; the striker was then under pressure. The acetone from the tank contacts the soluble plug. When the plug dissolves, the striker moves forward under spring pressure and pierces the gaine. A steel ball locks the fuze in the pocket to prevent withdrawal.

Remarks: Anti-withdrawal. A steel ball in the threads of the fuze locks the fuze when an attempt is made to withdraw it.

Column 1 below lists delays for three models of this fuze as stated in captured documents. Column 2 lists delays obtained from actual tests.

	No. 1 (hours)	No. 2 (hours)
Model 1	2–12	
Model 2	12–72	17¼
Model 3	72–120	24½

Type 99 Special Bomb Nose Fuze C–2 (a)

Bombs in which used:
Type 3 No. 6 land.
Type 97 No. 6 land.
Type 98 No. 25 land Model 1.

Color: Cadmium plated.

Over-all length: 5⅞ inches.

Over-all width: 2⁵⁄₁₆ inches.

Material of construction: Steel except brass locking piece.

Position and method of fixing in bomb: The fuze is screwed into the nose of the bomb. A steel locking ball prevents removal.

Components of explosive train: A standard Japanese Navy gaine is screwed into the base of the fuze.

Fuzes likely to be found with: C–1 (a) Navy chemical long delay tail fuze.

Delay times: Up to 125 hours.

Threads: $^{61}⁄_{64}$ inches in diameter, 12 threads per inch.

Description: The fuze consists of a steel body in which are housed the arming assembly and the delay assembly. The arming assembly, which is housed in the upper end of the body, consists of the arming vanes which are attached to the arming vane boss by three small screws. The arming

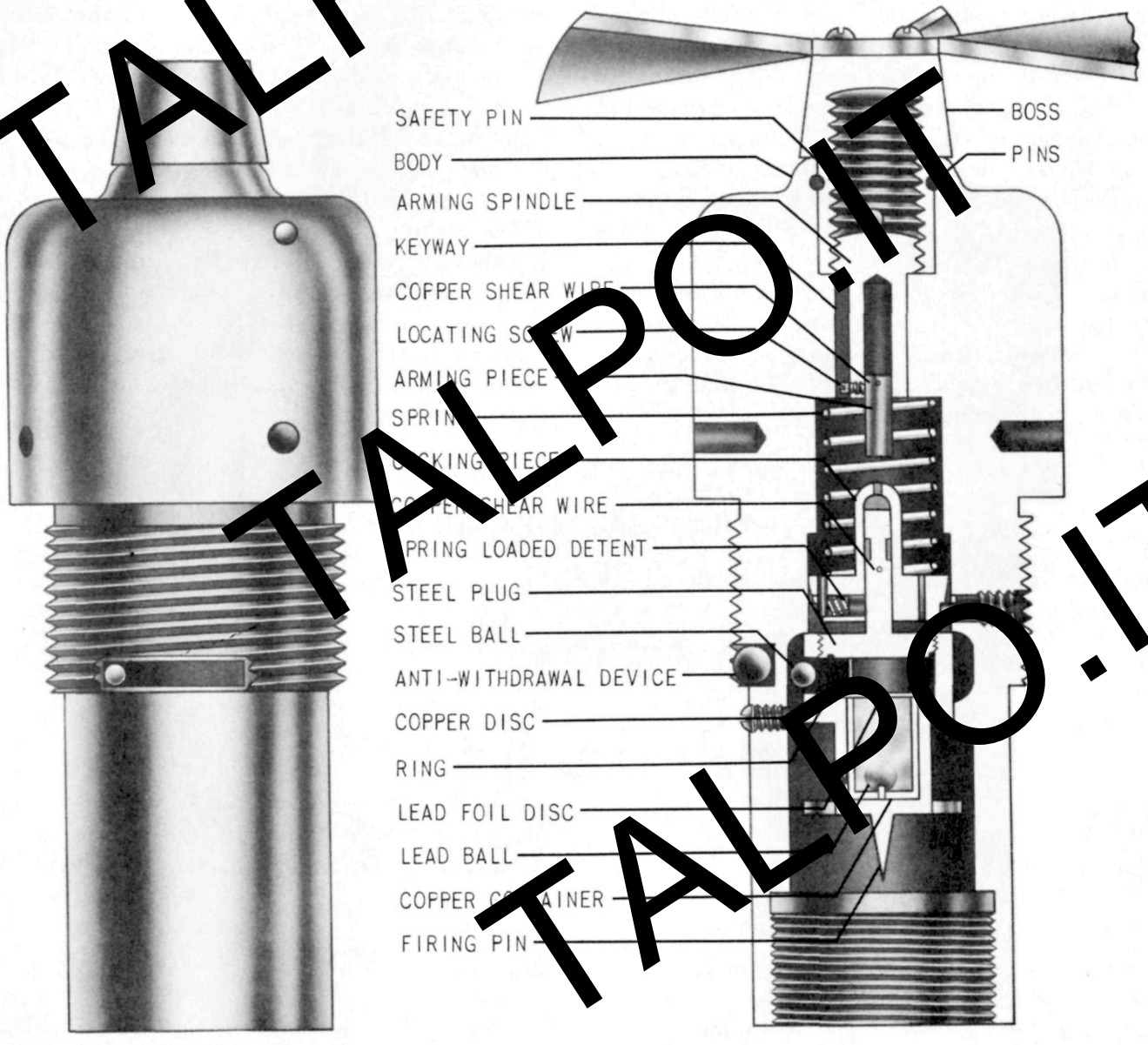


Figure 132—C–2 (a) Bomb Fuze.

vane boss is internally threaded at the lower end to receive a short, hollow arming spindle and an arming piece which is held in the base of the spindle by a copper shear wire. A small locating screw inserted in the spindle engages in the keyway of the fuze body and prevents the spindle from rotating but permits upward or downward movement. The boss is retained in the fuze body by two pins which permit it to rotate. A safety pin engages in the fuze body and the boss. The delay assembly, which is housed toward the lower end of the body, is actuated by a spring after the delay period has expired. Screwed into the top of the striker assembly is a steel plug with a cutaway striker assembly stem on which a brass cocking piece rides. On one side of this cocking piece is a small brass spring-loaded detent; on the opposite side is an assembly screw. The cocking piece and striker assembly stem are held in position by a copper shear wire. Under the steel plug is a soluble celluloid ring outside of which is a copper disc and a steel ball set into a drilled hole. This ball prevents the downward movement of the striker assembly as the ball rests on a shoulder of the fuze body. A lead foil disc is fitted over a copper container which is filled with acetone. A solid lead ball with a small copper stud on its side is placed in the container.

Operation: When the bomb is released, the safety pin is withdrawn allowing the arming vanes and boss to rotate. This action screws the arming spindle and the arming piece into the arming vane boss clear of the cocking piece. On impact, the cocking piece shears the shear wire and moves forward, compressing the striker spring. It is locked in the forward position by the detent, thus holding the striker unit under spring compression. Simultaneously, the solid ball in the acetone container breaks the lead foil disc, allowing the solvent to escape into the space above and dissolve the celluloid ring. After a period of time, in which the soluble ring has become softened, the steel ball, due to the pressure of the striker spring, is forced away from the shoulder of the fuze body. The striker assembly, under compression of the spring is forced downward and the firing pin hits the detonator.

Remarks: If dropped from a sufficient altitude, the fuze may be armed despite the presence of the safety pin. If the vanes fail to rotate, the inertia of the cocking piece may be great enough to shear the shear wire and to drive the arming piece into the provided recess in the spindle and thus permit the firing arm.

Antiwithdrawal: A steel ball in a groove in the threads of the fuze locks the fuze when an attempt is made to withdraw it.

D–2 (a), D–2 (b), and D–2 (c) Aerial Burst Tail Fuzes

Bombs in which used: No. 3 Mk 3 or No. 25 Mk 3.

Markings:

D–2 (a)—

	D–2 (a)	D–2 (b)	D–2 (c)
Color	Brass	Cadmium plated	Cadmium plated.
Over-all length	5¾ inches	5¾ inches	5¾ inches.
Over-all width	2 7/16 inches	2½ inches	2½ inches.

Material of construction: Brass except for a few internal parts of steel.

Position and method of fixing in bomb: Screwed into adapter ring at apex of tail.

Components of explosive train: A primer is fitted in the fuze. The flash from it sets off a standard Japanese gaine.

Fuzes likely to be found with: Probably A–3 (a) nose fuze.

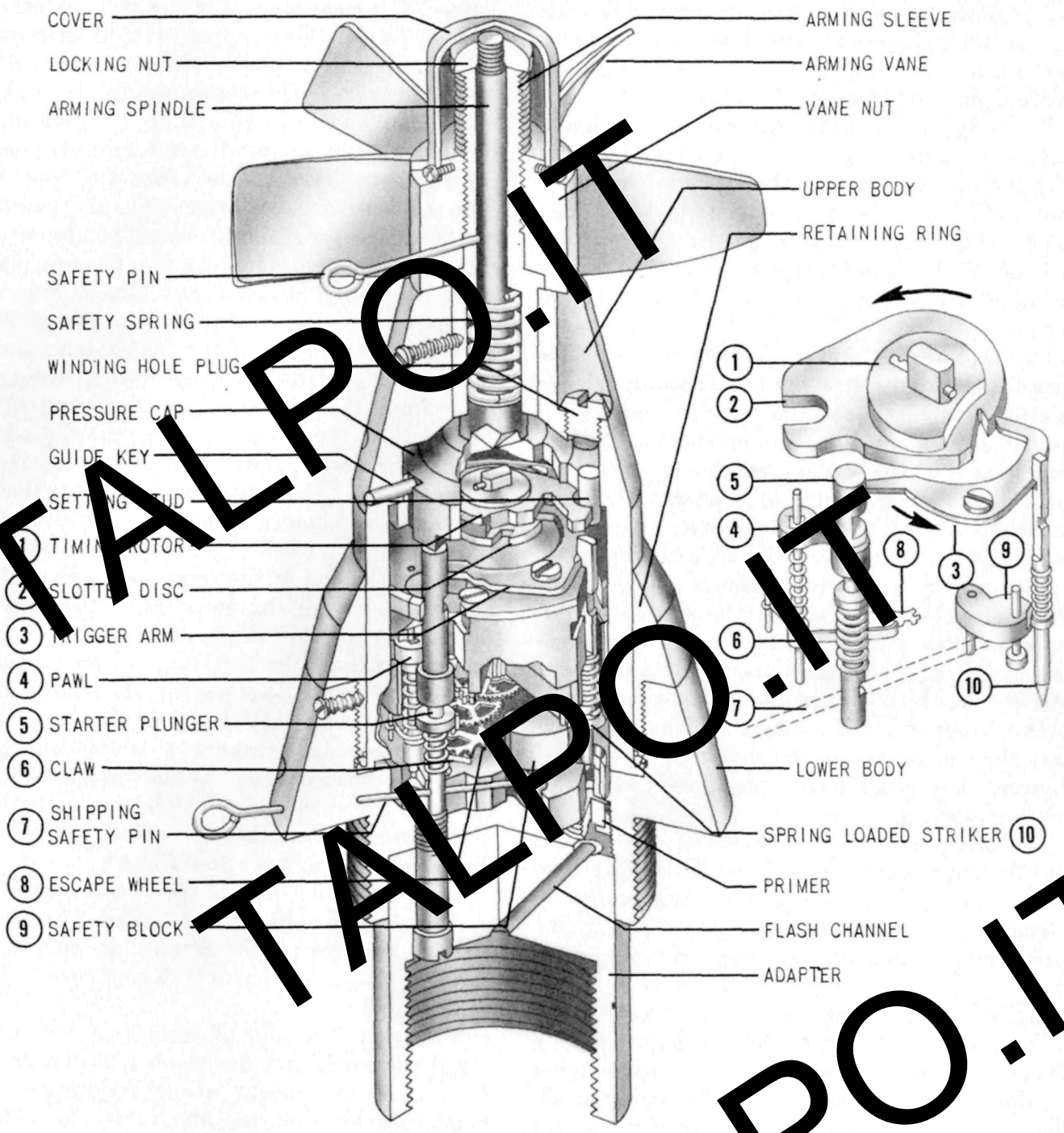


Figure 133—D–2 (a), D–2 (b), and D–2 (c) Bomb Fuzes

	D–2 (a)	D–2 (b)	D–2 (c)
Delay times	0–50 seconds	5–25 seconds	0–20 seconds.
Threads	$1\frac{15}{16}$ inches diameter, 12 threads per inch.	$1\frac{15}{16}$ inches diameter, 12 threads per inch.	$1\frac{15}{16}$ inches diameter, 12 threads per inch.

Description: These fuzes are all similar in design, construction and operation. The clockworks in all three fuzes is almost exactly identical with the clock in a Japanese artillery projectile and with the fuze in a German artillery projectile for the 88-mm gun. All of the fuzes require a rotation of 1,000 revolutions per minute before they can function. The parts of the fuze can be

broken down into five principal categories according to their function: the body, the arming mechanism, the timing mechanism, the firing mechanism, and the safety features.

The body consists of an upper part and a lower part held together by a retaining ring which fits over the upper body and threads into the lower body. The upper body has a lip on its lower edge which is held under the retaining ring, permitting rotation of the upper body for setting the time. An adapter fits into the lower body, secured by two screws.

The arming mechanism consists of six vanes press fitted into the vane nut and an arming sleeve externally threaded to take the vane nut. The arming sleeve houses the arming spindle which is secured at the base to the pressure cap. The top end of the arming spindle is externally threaded (left-hand) to take the locking nut. A cover is secured to the vane nut with three grub screws.

The timing mechanism consists of a spring-driven clockwork which turns a timing rotor and slotted disc at a predetermined rate. The pressure cap is keyed to the upper body and has a setting stud which engages the notch in the timing rotor. The parts of the timing mechanism which start the clockwork are the spring-loaded starter plunger, the spring-loaded pawl, the claw, and the escape wheel.

The firing mechanism consists of the spring-loaded striker which has a beveled shoulder that bears against a beveled edge on the trigger arm.

The five safety features are: safety pin, safety spring, safety block which overcomes the pressure of its spring (not shown in the drawing) and swings out from under the striker by centrifugal force, shipping safety pin which locks the starter plunger, prevents the safety block from swinging out during shipping, and locks the trigger arm by the starter plunger until it rises during flight and presents a notch through which the end of the trigger arm can pass.

Operation: The fuze is set by rotating the upper body, which is calibrated up to 50 seconds, and matching the desired setting with a line on the retaining ring. The setting stud in the pressure cap—which is keyed to the upper body—is thus rotated, turning the timing rotor—in which it is engaged—and the slotted disk so that the slot of the disc is positioned with respect to the trigger arm. At the expiration of the set time, after the bomb has been dropped, the disk will have rotated so that the slot will be opposite the trigger arm.

Shipping safety pin is pulled when bomb is loaded in plane. On release, safety pin is pulled, vanes and vane nut rotate up. Initial impact of the vane nut against the locking nut, plus the continued rotation of the vanes and vane nut, lifts the pressure cap, overcoming the resistance of the safety spring and freeing the setting stud from the timing rotor. As the pressure cap is lifted, the spring-loaded starter plunger rises until the spring-loaded pawl slips into the groove in the plunger. This action of the pawl rotates the rod to which it and the claw are keyed, freeing the claw from the escape wheel and starting the clockwork. The clockwork turns the slotted disk so that the slot is rotated toward the trigger arm. The pawl locks the starter plunger up so that the notch in the plunger is opposite the end of the the trigger arm. The starter plunger no longer obstructs the end of the trigger arm, since it can now pass through the notch when the trigger is forced into the slot of the disk.

Angled fins on the bomb cause rotation which, when 1,000 revolutions per minute is attained, is sufficient to swing the safety block out from under the spring-loaded striker by centrifugal force. The spring-loaded striker is now held by the edge of the trigger arm only. After the set time has elapsed the slot in the disk comes opposite the trigger which is forced into the slot by the pressure of the beveled shoulder of the striker on the beveled edge of the trigger arm. The spring-loaded striker impinges on the primer, sending a flash through the flash channel which sets off the gaine.

Remarks: The time of delay is set before leaving the ground, and the bomb must be dropped from a specific height above the target. The bomb usually explodes about 100 to 175 feet above ground.

The fuzes D–2 (b) and D–2 (c) were not recovered from UX-2's but were found in ammunition dumps. The D–2 (c) is the earliest model of the clockwork fuzes as indicated by the early date of manufacture and the lack of an external means of winding the clock.

There may be a type 3 Mk 3 tail fuze (without centrifugal safety block) as the fuzing for a Mk 3 bomb. This fuze is used with a standard time setting of 3 seconds.

Type 97 Land Bomb Gaine "B" and Type 99 Ordinary Bomb Gaine "C"

Japanese designation	Type 99 ordinary bomb gaine "C."	Type 97 land bomb gaine "B."
Delay	0.2 second	0.1 second.
Color	Brown tipped	Red tipped.

Dimensions: Over-all length 4½ inches; diameter 1⅜ inches.

Explosive train: Primer composition in upper plug. Black powder delay over flask powder relay in middle plug. Lead azide detonator over tetryl in lower plug. Picric acid booster.

Remarks: In the type 97 land bomb gaine the primer plug is of one piece construction. In the type 99 ordinary bomb gaine it is of two-piece construction.

Figure 141—Type 97 Land Bomb Gaine "B" and Type 99 Ordinary Bomb Gaine "C".

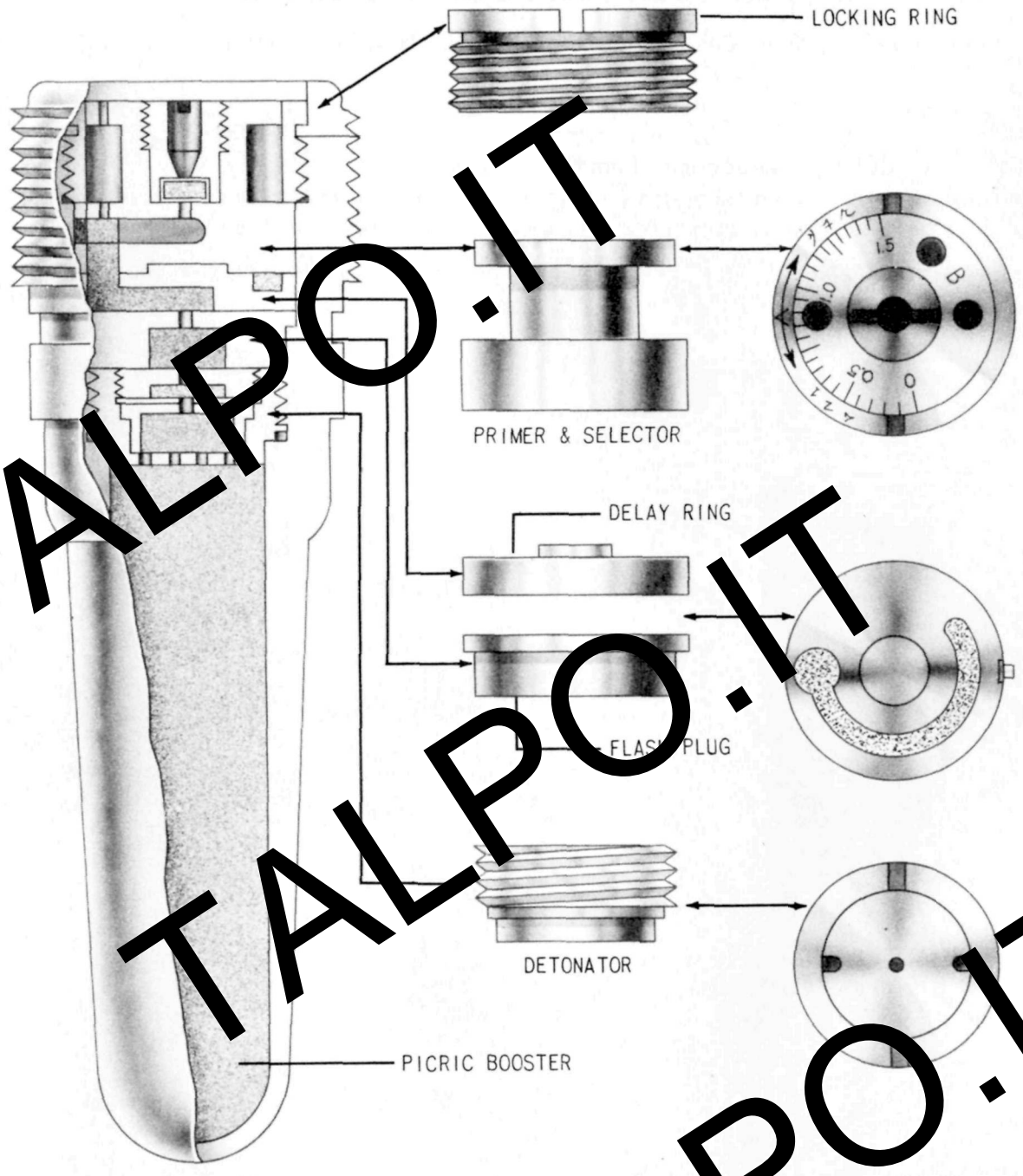


Figure 142—Type 15 Ordinary Bomb Gaine.

Type 15 Ordinary Bomb Gaine

Japanese designation: Type 15 ordinary bomb gaine.

Delay: Selective delay from fractional to 1.5-seconds.

Color: Tip not colored.

Dimensions: Length, 4½ inches; Depth, 1⅜ inches.

Explosive train: Primer composition in upper cap. Pressed black powder in semicircular channel above flask powder relay. Lead azide detonator over tetryl in lower plug. Picric acid booster.

Type 92 Land Bomb Gaine Modification 2

Japanese designation: Type 92 land bomb gaine Modification 2.
Delay: Instantaneous.
Color: Tip not colored.
Dimensions: Length 4½ inches, Depth, 1⅜ inches.
Explosive train: Mercury fulminate over tetryl in an inverted copper cup in upper plug. No delay plug present. Tetryl pellet in lower plug. Picric acid booster.

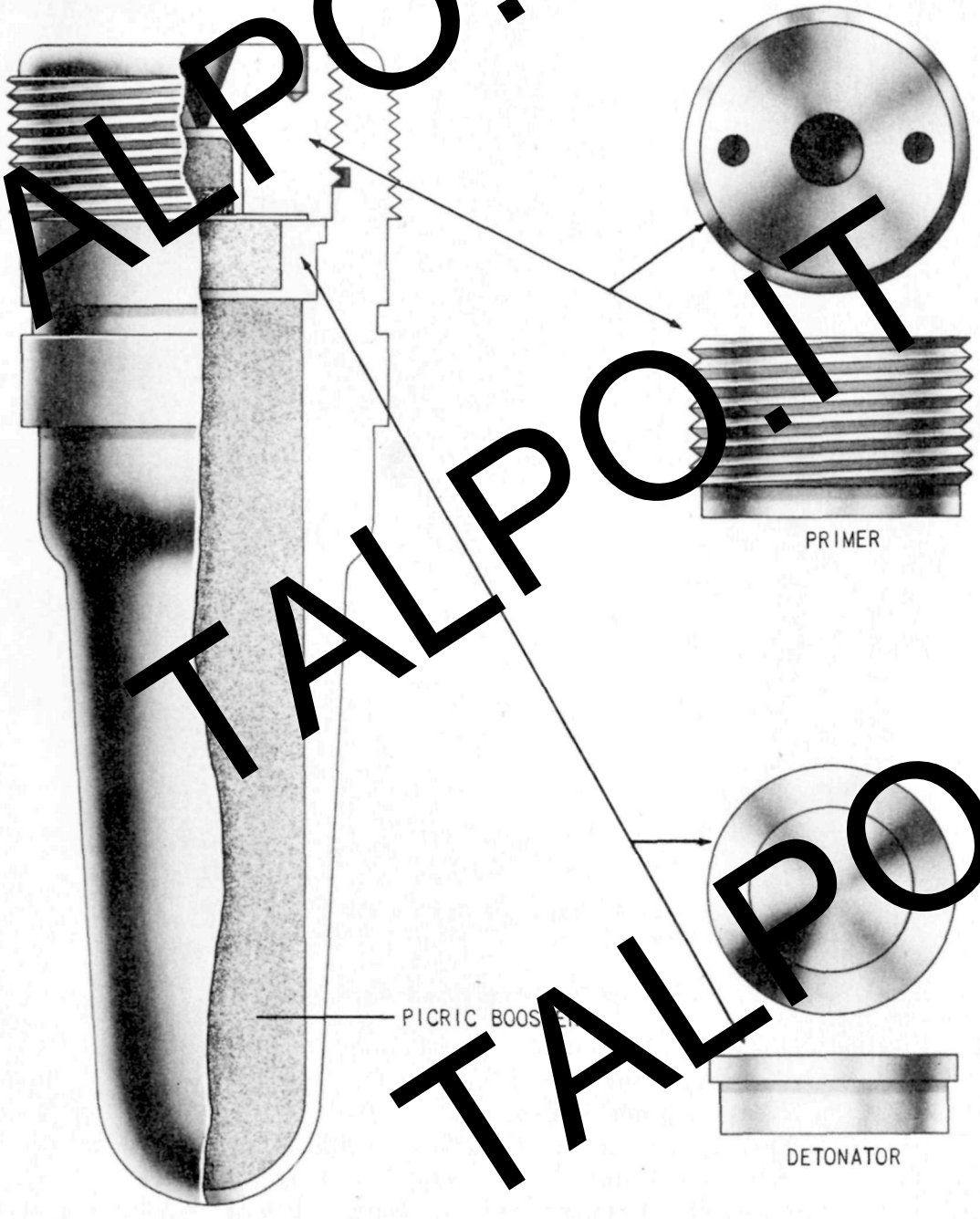


Figure 143—Type 92 Land Bomb Gaine Modification 2.

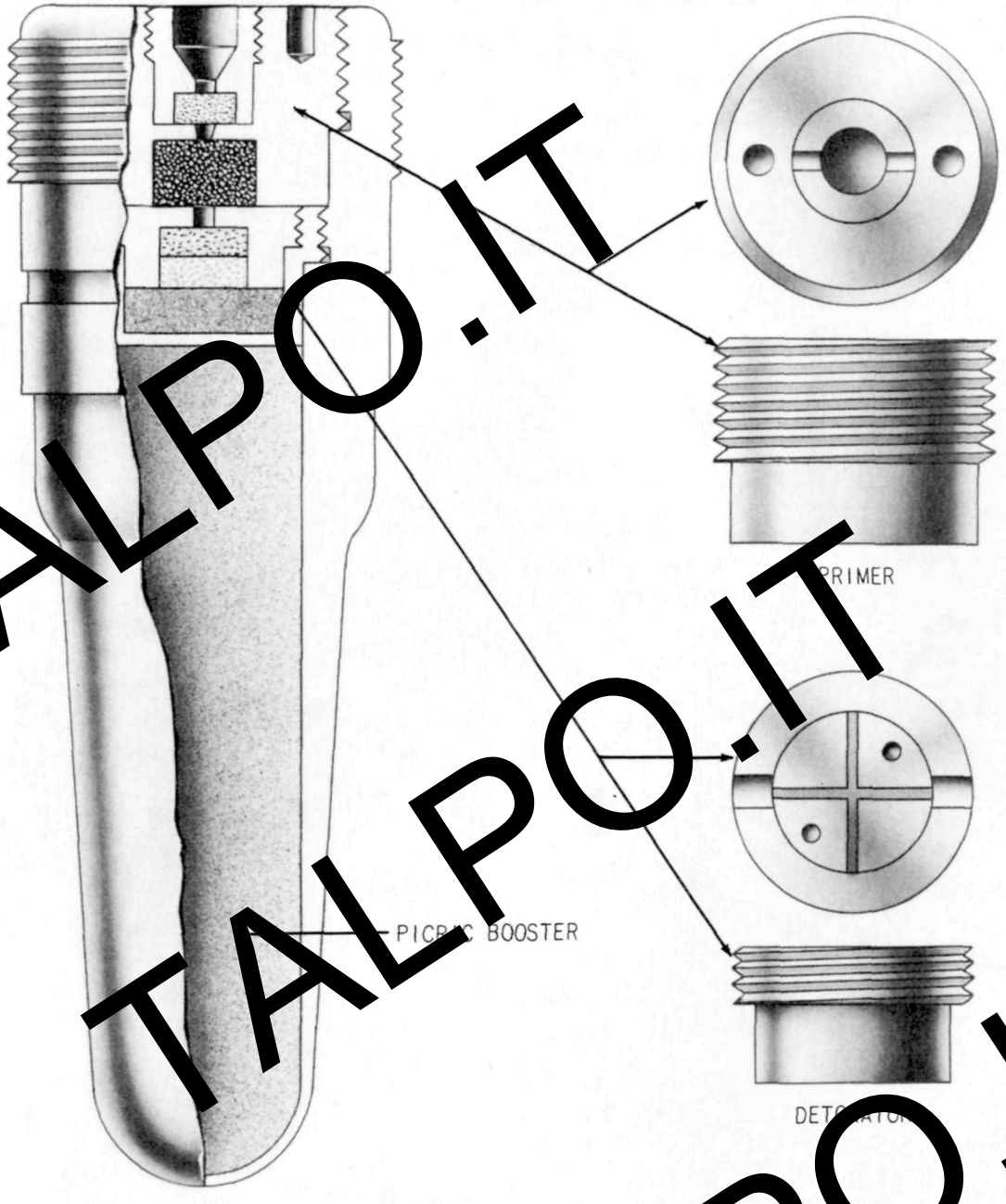


Figure 144—Type 96 Land Bomb Gai

Type 96 Land Bomb Gaine

Japanese designation: Type 96 land bomb gaine.
Delay: Instantaneous.
Color: Tip not colored.
Dimensions: Length, 1½ inches; Depth, 1⅜ inches.
Explosive train: Primer composition over flask powder in upper plug. No delay plug present. Lead azide detonator over tetryl in lower plug. Picric acid booster.

Type 4 Gaine for Skipping Bomb

Japanese designation: Type 4 gaine for skipping bomb.
Delay: 10 to 11 seconds.
Color: Tip not colored.
Dimensions: Length 4½ inch[illegible] Depth 1⅜ inches.
Explosive train: Primer com[illegible]sition in upper plug. Circular black [illegible]owder [illegible]elay train and relay in middle plug. P[illegible]imer co[illegible]position over lead azide [illegible]tor over [illegible]etryl pellet in lower plug. P[illegible]cric acid booster.

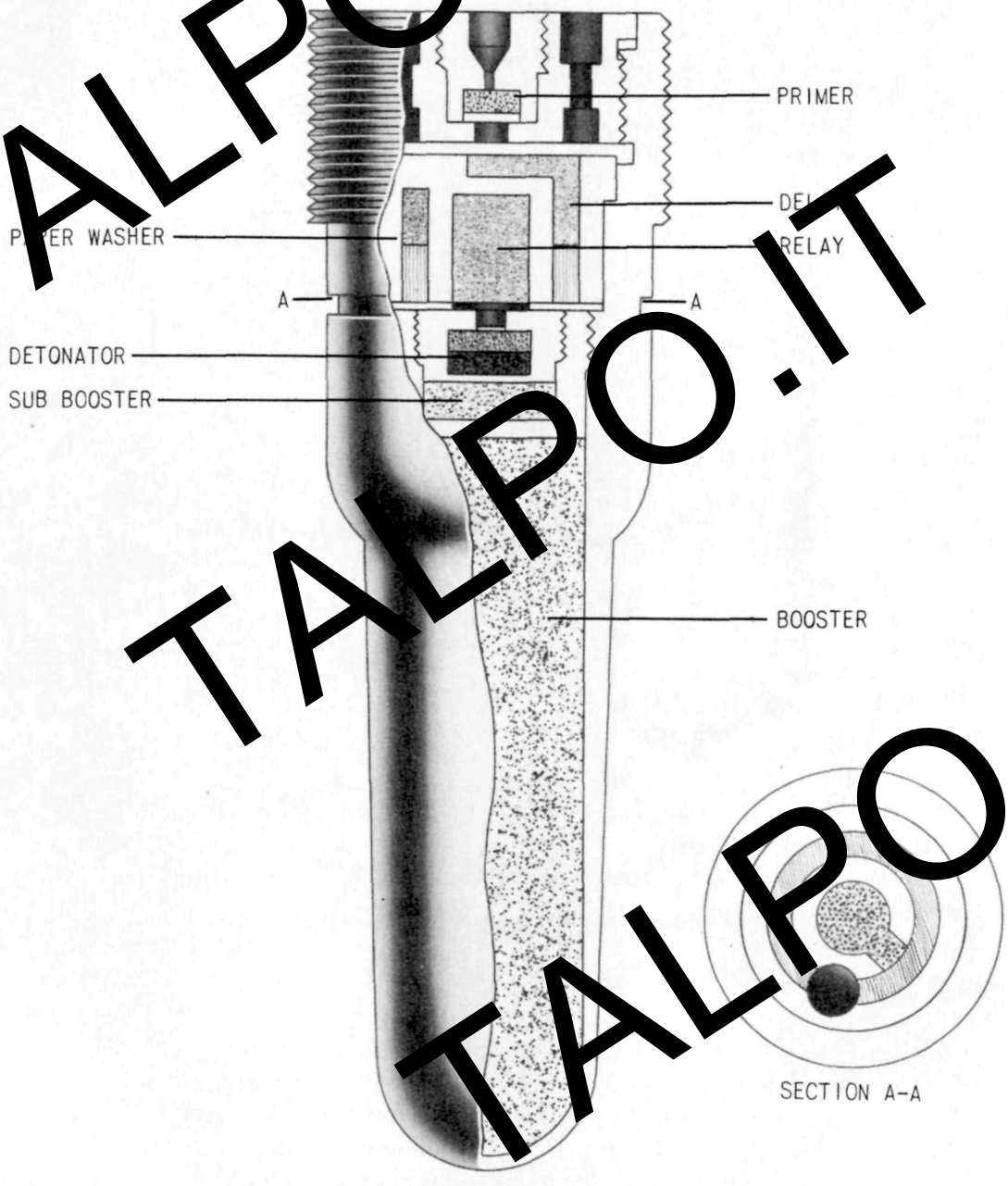


Figure 145—Type 4 Gaine for Skipping Bomb.

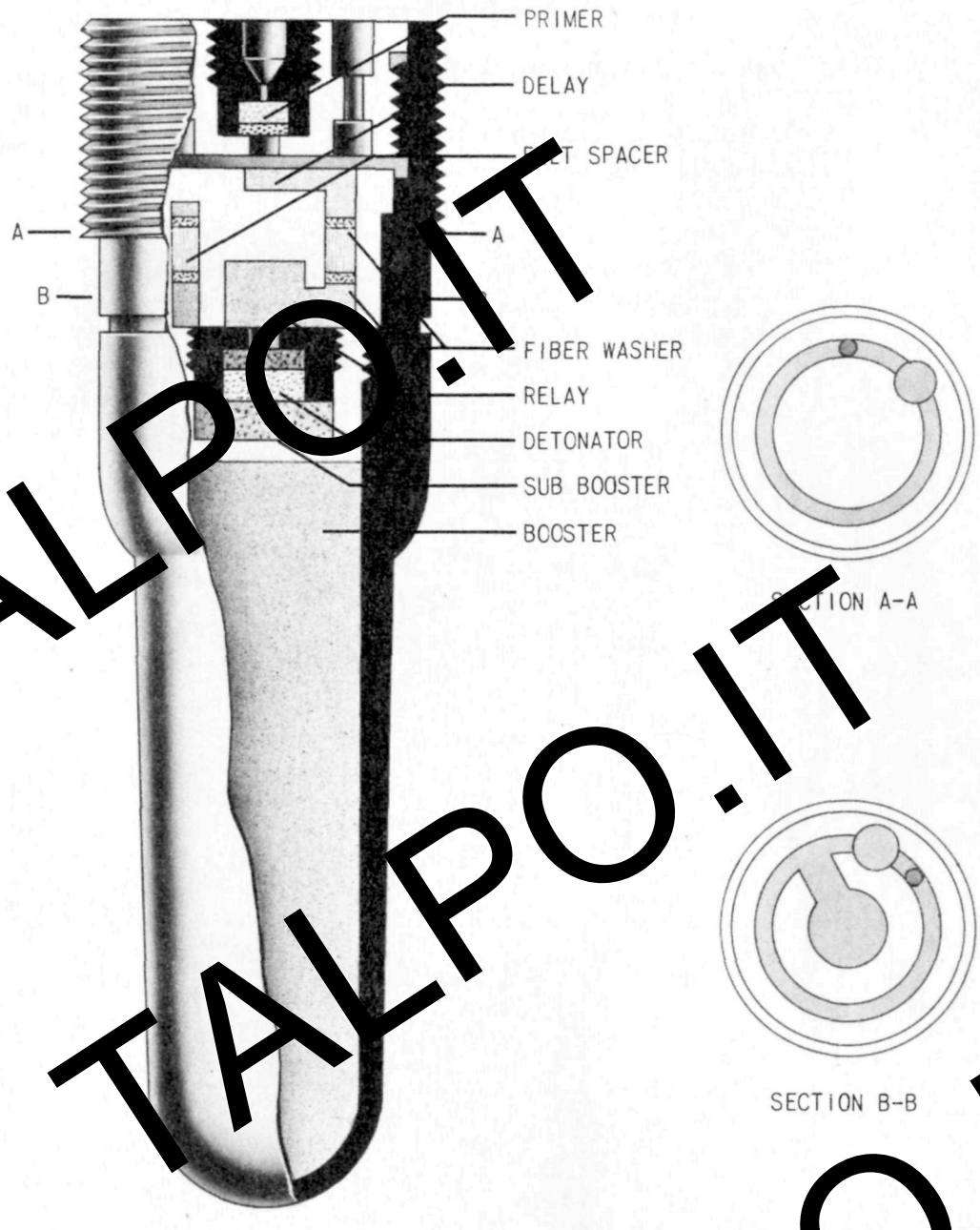


Figure 146—Type 1 Mk 2 Gaine "A"

Type 1 Mk 2 Gaine "A"

Japanese designation: Type 1 Mk 2 bomb gaine "A."

Delay: 3.5 ± 1.0 seconds.

Color: Tip not colored.

Dimensions: Length 4½ inch; depth 1⅜ inches.

Explosive train: Primer composition in upper plug. Black powder delay train pressed into upper and lower rings and relay middle plug. Primer composition over lead azide detonator over tetryl pellet in lower plug. Picric acid booster.

Figure 147—Type 0 Mk 5 Bomb Gaine

Type 0 Mk 5 Bomb Gaine

Japanese designation: Type 0 Mk 5 bomb gaine.
Delay: 0.2 second.
Color: Tip not colored.
Dimensions: Length 6½ inches; depth 1¾ inches.
Explosive train: Primer composition in upper plug. Black powder delay over flash powder relay in middle of plug. Lead azide detonator over tetryl pellet in lower plug. Picric acid sub-booster in cup. Picric acid booster.

Type 3 Electric Gaine

Japanese Designation: Type 3 electric gaine.
Delay: Instantaneous.
Color: Tip not colored.
Dimensions: Length, 5⅜ inches; depth, 1⅜ inches.
Explosive train: Electric blasting cap. Picric acid booster.

Remarks: The electric blasting cap fits into a specially hollowed-out cavity in the picric booster. Leads from the cap run up to a female plug which is attached by a special adapter to the standard gaine body.

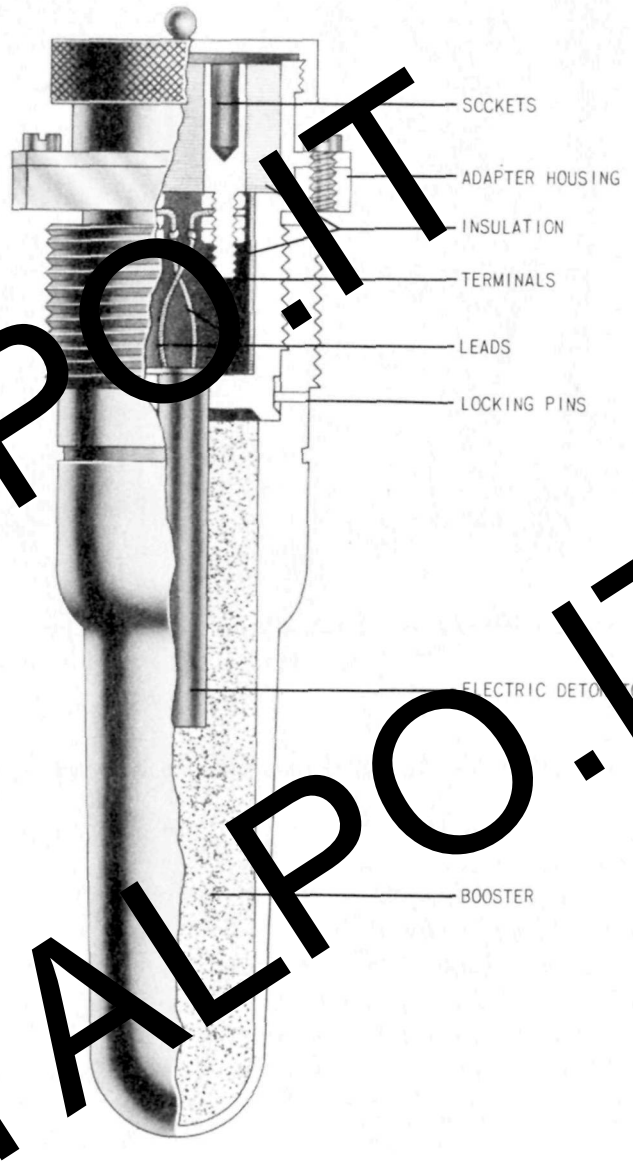


Figure 148—Type 3 Electric Gaine.

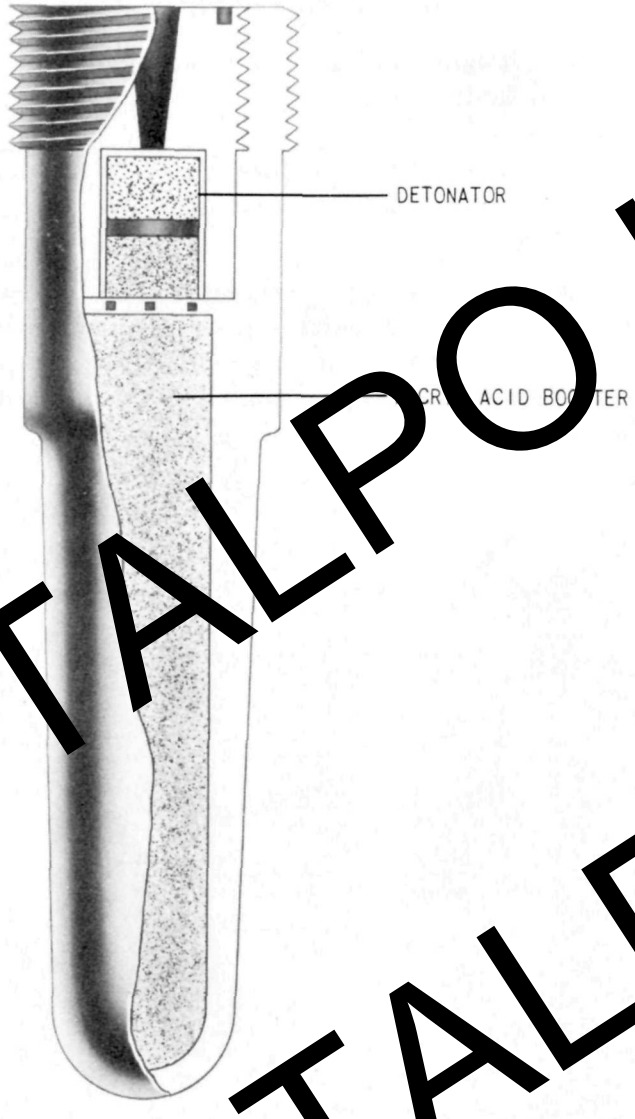


Figure 149—Type 2 Small Model Bomb Gaine Model 1

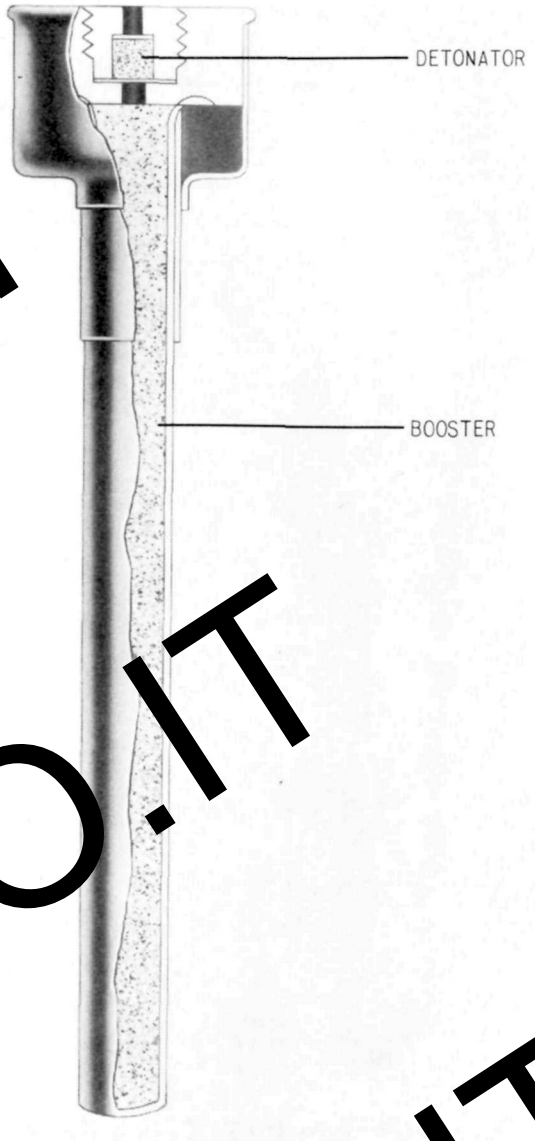


Figure 150—Practice Bomb Gaine.

Type 2 Small Model Bomb Gaine Model 1

Japanese designation: Type 2 small model. Bomb gaine Model 1.
Delay: Instantaneous.
Color: Tip not colored.
Dimensions: Length, 3 inches; depth, 13/16 inch.
Explosive train: Mercury fulminate cap over tetryl in upper plug. Picric acid booster.

Practice Bomb Gaine

Japanese designation: Practice bomb gaine.
Delay: Instantaneous.
Color: Tip not colored.
Dimensions: Over-all length, 3⅜ inches; depth, inch.
Explosive train: Mercury fulminate in upper plug. Tetryl booster.

Navy Magazines

Japanese Navy magazines can be fitted to any fuze that takes a standard Navy gaine. Magazines are used to initiate low explosives such as black powder and are never used in a high explosive filled bomb.

There are two types of magazines. The type 98 Mk 6 bomb magazine Model 2 is instantaneous. The type 98 Mk 6 bomb magazine Model 1 incorporates a 0.03-second delay. The "a" and "b" plugs are similar to those used in standard gaines. The "d" plugs contain a large amount of gunpowder.

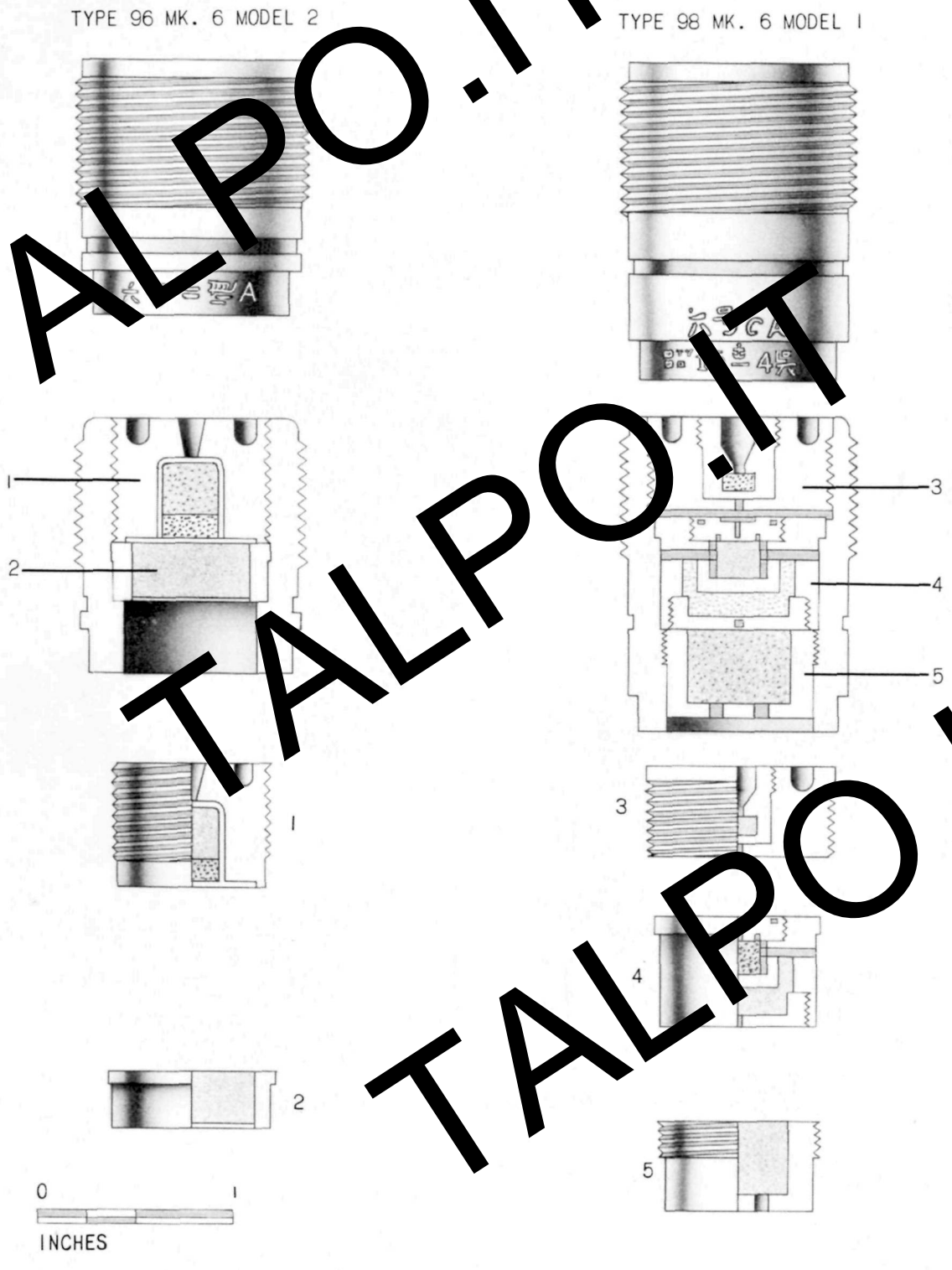


Figure 151—Navy Magazines.

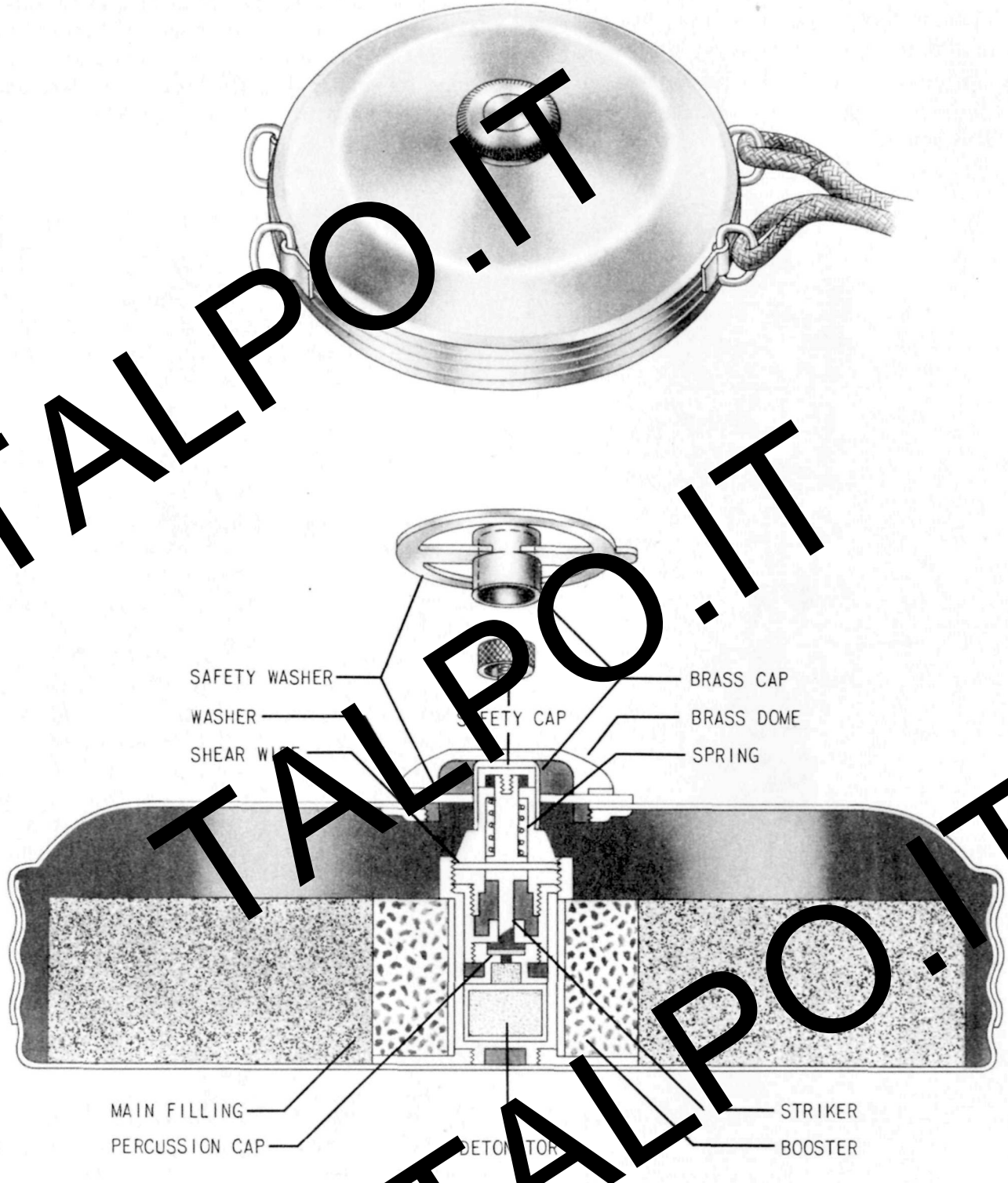


Figure 152—Type 93 Anti-Tank and Anti-Personnel Land Mine.

Chapter 3

LAND MINES, GRENADES, FIRING DEVICES, AND SABOTAGE DEVICES

Introduction

Although the use of land mines by the Japanese forces was not as extensive as it was in Europe, land mines were important defensive weapons in the Pacific war. Also, because of the Japanese lack of effective anti-tank artillery and the inequality of armored forces which was everywhere existent, mining and similar tactics became a mainstay of defense against mechanized equipment. This was most apparent as Allied forces approached the Japanese homeland, and the defense forces were better equipped than those in the outlying islands had been.

Three features of the Japanese land mining methods were especially important. The first was the relatively small number of standard, mass-produced mines and firing devices. This lack of variety in standard mines led to a large amount of field improvisation of land mines and other defense devices, using ordnance and other types of explosives originally designed and manufactured for other purposes.

The second outstanding feature of Japanese land mining was the prevalent use of extremely large charges for all types of land mines. Bombs, sea mines, depth charges, and even torpedo war heads were used extensively with all types of detonating equipment. The use of these large charges, although it was wasteful, was the result of inability to use heavy explosive ordnance for its intended purpose, and rendered the potential danger area of land mines very great.

The third was the emphasis which was placed on various types of controlled mines. This tendency was in keeping with the use of improvised mines, controlled mines being much easier to improvise than enemy activated mines. Controls ranged all the way from elaborate electrical systems to crude, hand operated, suicide devices. Firing devices operated by simple lanyards or poles were very common.

Japanese mining techniques were characterized by an almost complete lack of uniformity. Land mining policies seemed to have been formulated by local authorities and indicated that little or no information was available, and that training was inadequate. Thus, the Japanese land-mining program was far from being as effective as it should have been tactically and did not often cause serious difficulty to advancing Allied forces.

Section 1

LAND MINES

Type 93 Antitank and Antipersonnel Land Mine

Diameter: 6¾ inches.
Over-all height: 1¾ inches.
Weight: 3 pounds.
Weight of explosive: 2 pounds.
Type of explosive: Solid ring main charge of cast picric acid with inner ring booster of pressed powdered picric acid containing a central hole ⅝ inch diameter for house fuze. Explosive completely covered by layer of paper, shellacked to the explosive and waxed externally.
Color and markings: Olive-drab with narrow red ring around brass plug. Mine may have numerals (such as 16.9) in white on top indicating date.  meaning safe inscribed on top of safety cap and on lug of safety washer.

Description: The mine is circular with a slightly domed top and flat bottom. It is constructed of an upper and lower section of sheet metal secured together by four heavy corrugations in the walls which serve as threads. The overlap of the walls of the two sections is sealed with a bituminous paint. The interior of the container is painted with a black enamel. Soldered on the inside of the bottom of the lower section is a brass disc 1 9/16 inches in diameter, having a threaded collar for the insertion of the fuze.

The central hole in the upper section is reinforced with a brass collar threaded to receive the brass plug. A thin leather washer fits between the brass plug and the collar to seal the mine.

Two brass rings are fastened to two opposite sides of the upper section by means of a soldered metal strap. Drag ropes may be fastened to the rings.

The fuze assembly consists of a striker held under spring pressure by a shear wire, a percussion cap, a primary detonator, and a larger secondary detonator all incorporated in the fuze body which is threaded on the lower end to screw into the collar in the bottom of the mine. A safety cap is screwed into the upper end of the striker until the mine is laid. An additional safety feature is a brass cylinder with attached washer which fits over the brass safety cap and rests on top of the fuze body, the washer fitting under the leather washer of the brass plug.

Employment: Antipersonnel and antitank. The Japanese have two sizes of shear wire for this mine. One for antipersonnel use shears at 70 pounds, the other, for antitank use shears at 250 pounds. These mines have been found buried upside down with additional explosives placed beneath them to increase their effect. The A/P fuze has a black upper body.

Operation: With the safety devices removed, any load on the cover of the mine causes the brass plug to press down on the striker. If the pressure is sufficient, the shear pin is sheared. This frees the striker which, under pressure of the spring, strikes the percussion cap initiating the detonating system.

Anti-Vehicular "Yagistick" Land Mine

Over-all length: 36 inches.
Diameter: 2.35 inches by 1.8 inches (oval).
Total weight: 10½ pounds.
Weight of filling: 6 pounds.
Weight of each explosive block: ¾ pound.
Type of explosive: Eight identical blocks of picric acid cast in paper container, coated with paraffin. Each block molded on one end to take fuze so that two blocks placed with molded ends together completely enclose fuze.
Color and markings: Mine case painted olive drab over undercoat of black. Interior painted with black lacquer. Designation,

信管頂部側

(fuze top portion) stenciled vertically in red characters approximately ⅞-inch tall on one side, and the corresponding marking

信管底部側

(fuze bottom portion) in smaller characters about ½-inch tall stenciled on reverse side.

the increased power of penetration of this hollow charge. A well in the apex of the charge contains the detonator.

The wooden handle has a steel striker fitted in one end. This end is encased in a metal cylinder and is held there by a safetypin and a copper shear wire. The cylinder is attached to the neck of the charge container by a threaded connecting ring.

Three metal legs 6 inches long are welded to the base of the charge container at 120° intervals. They guarantee the proper stand-off to obtain the maximum effect from the hollow charge.

Employment: Used as an antitank weapon. Capable of penetrating 6 inches of steel plating.

Operation: The operator pulls out the safetypin, then uses bayonet tactics, the left hand at the front of the handle, the right hand at the after end, as he lunges forward. When the legs of the mine strike the target, the handle is driven forward breaking the shear wire, and the striker is driven into the detonator initiating the explosion of the mine.

Suction Cup Mine

Overall length: 59⅝ inches (including handle and cup).
Total weight: 7 pound 8 ounces (mine body and handle).
Length of body: 5⁵⁄₁₆ inches (including cups and handle holder).
Diameter of body: 4⅜ inches.
Weight of body: 5 pounds 8 ounces filled (including suction cups).
Total length of handle: 59⅝ inches (2 pieces).
Diameter of handle: 1⁷⁄₁₆ inches.
Explosive filling: RDX 53; percent TNT, 47 percent.
Weight of filling: 4 pounds 7½ ounces.

Description: The mine body is made of a black, sheet metal, longitudinally welded, cylinder, having a flanged metal cap spot-soldered over each end. Soldered to the circumference of the forward end, 180° apart, are two metal loops. Into each loop is fitted a solid rubber plug, the forward end of which is made into a shallow suction cup. These suction cups are held in place by metal pins and extend just forward of the leading edge of the mine body.

A wooden handle, consisting of two pieces held together by a metal sleeve, fits into a hollow extension welded to the top of the mine body.

The initiating element, consisting of pull igniters, safety fuse, prima cord and blasting caps, is rigged in duplicate and extends the length of the handle into a well in the top of the mine body. Four blasting caps are used,

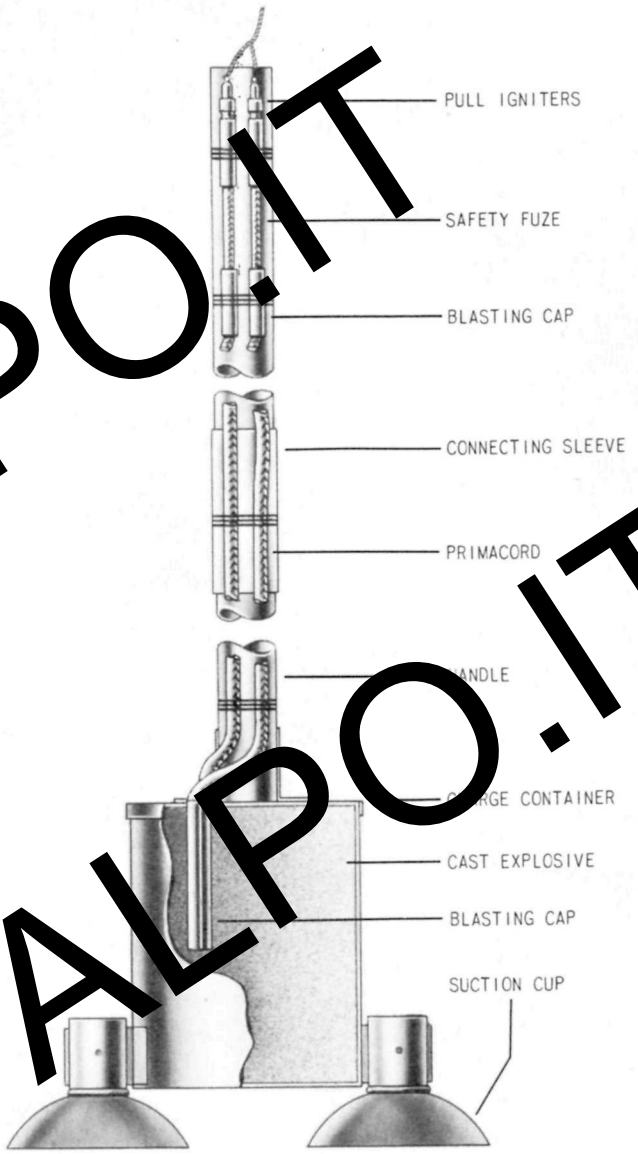


Figure 156—Suction Cup Mine.

two being crimped to forward end of the safety fuse and two being crimped to forward end of the prima cord. If only one section of the handle is used the prima cord may be omitted; in which case the blasting caps of the safety fuse are placed directly into the well of the mine. The initiating element is lashed to the handle of the mine with light line.

Employment: These mines are known to have been successfully used against parked aircraft.

Operation: The suction cups hold the mine in position when it is placed against a smooth surface. The friction igniters are pulled simultaneously, starting the safety fuse burning. This gives an estimated delay of 10–15 seconds, after which the upper blasting caps, the primacord, the blasting caps in the charge, and the main charge are initiated in sequence.

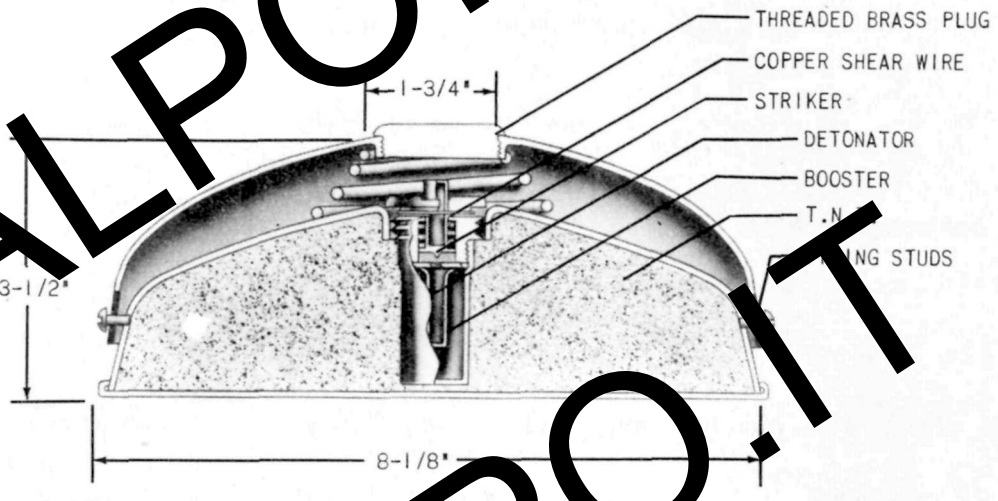


Figure 157—Dutch Antitank and Antipersonnel Land Mine.

Dutch Antitank and Antipersonnel Land Mine

Over-all height: 3½ inches.
Height of body: 2⅞ inches.
Diameter of body: 8⅛ inches.
Diameter of cover: 8¼ inches.
Wall thickness: 5/32 inch.
Weight of filling: 5¼ pounds.
Total weight: 9½ pounds.
Type of filling: TNT.
Color and markings: Olive drab over all with "P. W. 2-41" inscribed across top of both cover and mine body. "P.W.2-41" inscribed on fuze head.

Description: The body is of pressed steel construction with a crimped-on base. The cover is also pressed steel with four side slots corresponding with screw holes in the body which take the small locking studs.

In the center of the cover is a brass plug. A helical spring holds the cover away from the body. The igniter and detonator assembly screws into the top of the body of the mine. The striker is spring-loaded and is held off the cap by the 1/16 inch diameter, soft copper shear wire. There is no safety pin.

The detonator assembly consists of a detonator tube enclosed by an outer tube, and a primer.

Employment: The Japanese use the mine mainly against personnel, laying them in narrow trails, on beaches, and at entrances to bivouac areas. Normally they lay it on top of the ground.

Operation: The movement of the cover is regulated by the size and position of the slots. Pressure on the cover is transferred from the brass plug on to the striker head, thus shearing the shear wire and allowing the spring to drive the striker into the cap thereby detonating the mine. A load of 10 pounds is sufficient to shear the copper shear wire.

Type 3 (a) Antivehicular and Antipersonnel Land Mine

Diameter: 8.6 inches.
Height: 4.13 inches (without fuze).
Height: 6.2 inches (fuzed).
Length of fuze: 2.5 inches.
Material of mine wall: Terra cotta.
Thickness of wall: 7/16 inch.
Explosive filling: Type 88. Captured document states bursting charge might also be either ammonium nitrate, 50 percent, TNT, 50 percent; or ammonium nitrate, 90 percent; dinitronaphthalene 10 percent.
Weight of explosive: 4 pounds 8 ounces.
Total weight of mine: 11 pounds 6 ounces.
Color: Brown.

Description: The mine is circular with a slightly concave top and a moderately convex base. The mine case is made of earth-colored terra cotta. The outer surface has a thin dull glaze while the inner surface is covered with a thin coat of lacquer.

A rubber fuze seal is sealed in place in a hole in the center of the top of the mine.

The explosive filler is contained in a light rubber bag inside the mine.

The fuze body, cover, plunger, and striker support are made of bakelite. The springs, percussion hammer, striker, and the release fork are the only metal parts in the mine and with the exception of the release fork, all are contained inside the fuze.

box and is secured to a tree or other suitable object. A safety device, the exact nature of which is unknown but reported to consist of a bottle cap, is incorporated on the outside of the box at a point of egress of the trip wire. The antilifting device consists of a wire attachment which passes through the base of the box and is secured to a peg driven in the ground.

Employment: The mine is buried 1 to 2 inches below the surface and used as either an antitank or antipersonnel mine.

Operation: The mine can function by either a tension exerted on the trip wire or by lifting the mine to operate the antilifting device. In both instances the pull igniter is fired which in turn detonates the explosive charge.

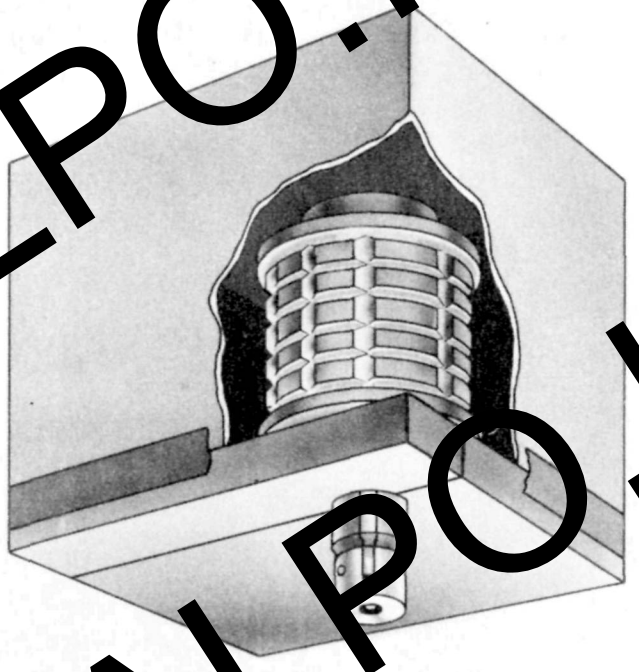


Figure 103.—Improvised Land Mine.

Improvised Land Mine

Dimensions: A box 5⅝ by 4¼ by 3¼ inches.
Material: Tin.
Color: Silver.

Description: The mine consists of a rectangular box with a cover securely fastened by friction tape. Two holes are roughly punched in the cover through which a grenade fuze or detonator projects. The grenade fuze projects approximately ¾ inch, projection of detonator is unknown.

Contained in the box are one Japanese type (91) hand grenade and twelve blocks of ⅓ aluminum powder and ⅔ RDX. Each block is 1½ by ¾ inches wrapped in waxed paper. Color is black. The grenade and blocks, ⅓ aluminum powder and ⅔ RDX, are firmly held in place by waxed paper.

Employment: Can be used as an antitank mine when fuzed with the armed grenade. With a pull or tension detonator it can be used as an antipersonnel mine or booby trap.

Operation: As an antitank mine: Safety pin on fuze is removed. When it is hit by a sharp blow the striker breaks a shear wire and penetrates the primer. After a delay of 4 to 5 seconds the bursting charge explodes setting off the charge.

As an antipersonnel mine or booby trap: A pull igniter with detonator is inserted into the charge. When the trip wire is pulled, the flash will fire the detonator which in turn sets off the explosive and hand grenade.

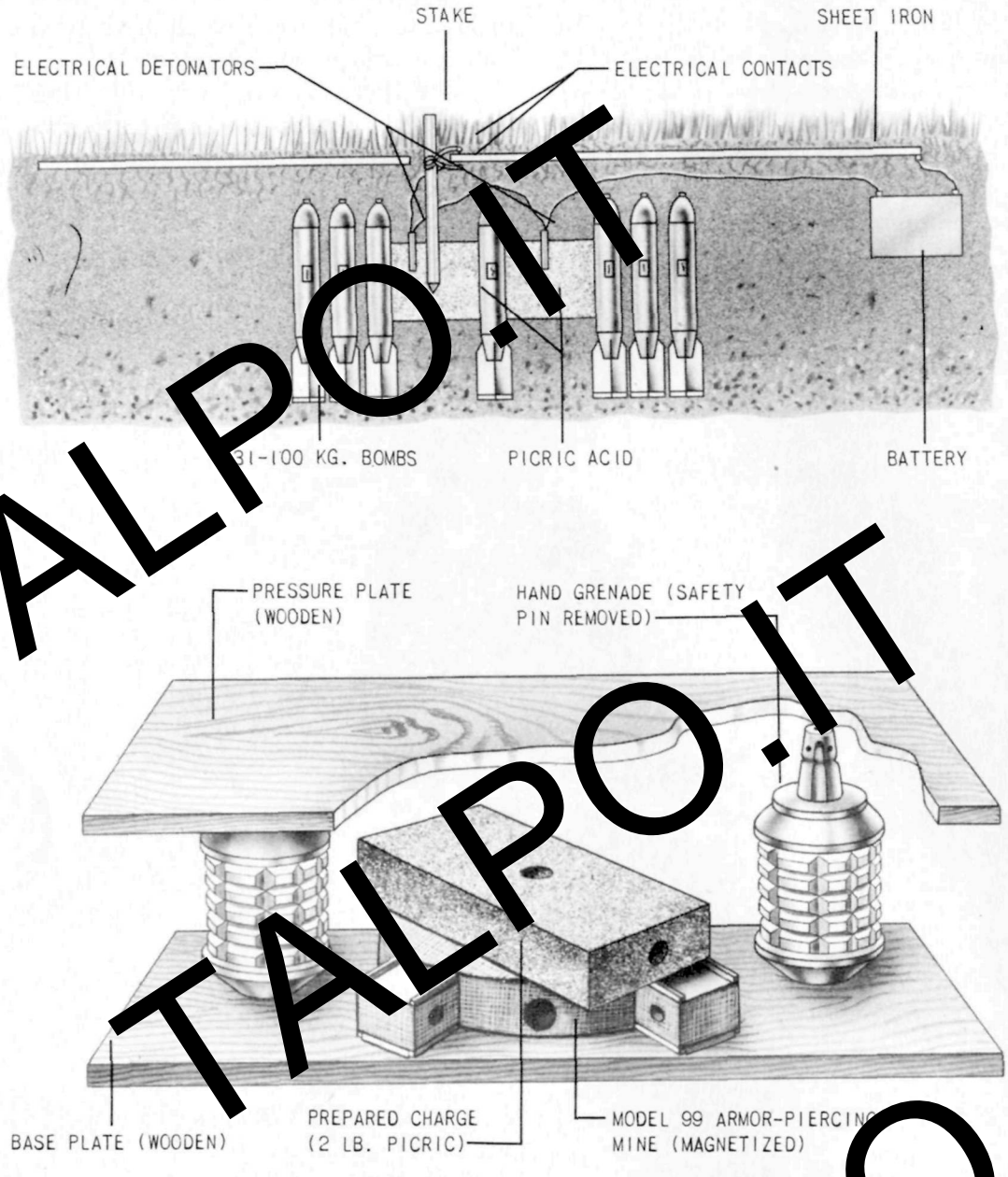


Figure 166—Improvised Antitank Land Mine and Air-Strip Mine.

Air-Strip Mine (Upper Half, Figure 166)

Type of explosive: 31 100-kg. bombs and picric acid.

Method of detonation: Closing electrical circuit or by use of demolition clock.

Description: The bombs were stacked around picric acid blocks in which electrical detonators were inserted. The entire mine was under a turf covered piece of sheet iron that would close the circuit and fire the charge if the iron were lifted or depressed. A clockwork was also inserted to fire charge if iron was not disturbed.

Antitank Mine (Lower Half, Figure 166)

Type of explosive: 2 hand grenades, a 2 pound prepared charge picric acid, and a Mod 99 armor-piercing mine.

Method of detonation: Pressure on board to fire fuzes in grenades. Sympathetic detonation relied upon for explosion of main charge.

Description: A prepared picric charge was laid on top of an armor-piercing mine and a hand grenade was set on the two sides. A board was laid over the top so that pressure would be transmitted to the fuzes of the grenades.

Type JE Antiboat Mine

Diameter: 20¼ inches.
Height: 10.62 inches.
Thickness of wall: 3/16 inch.
Material of wall: Steel.
Weight: 106.5 pounds (not including horns detonator, booster, and wiring).
Weight of filling: 46.5 pounds.
Type of filling: Type 98 explosive (HND/TNT N 40/60) with picric acid booster and tetryl detonator.

Figure 167—Type JE Antiboat Mine.

Description: This is a hemispherical, chemical-horned, all-welded mine. The outer body forms a hemisphere and has two handles on its upper portion, a central opening on top to take the booster and safety switch, and two horn openings 180° apart. The mine is divided internally into an explosive chamber and a chamber containing booster, wiring, safety switch, and horn electrodes. The division is made by a shallow, saucer-shaped steel section, which forms less than a hemisphere which is pressed into the outer body from the bottom and welded in place. A plate is then fitted into the bottom of the mine and is also welded in place. This last-mentioned plate carries a filling plug in its center and is offset $^{13}/_{16}$ of an inch to allow clearance for the plug. The horns, two in number, appear to be standard lead-acid mine horns. They are set at an angle of about 65° and project above the level of the mine top; the threads are left hand. In the firing circuit is a spring-loaded plunger whose upper end projects through the safety-switch cover. A rubber diaphragm in the top of the cover insures watertightness but allows the plunger to move. There is a tapered, threaded hole in the center of the top of the plunger and a groove around the plunger near the top. Until the mine is in position a safety fork engages this groove and holds the plunger up against its spring. The inner end of the plunger is thus withdrawn from between two contacts in the electrical firing circuit and the circuit is incomplete.

Employment: Used on beaches as an antiboat mine. It can also be used on land as an antitank mine by burying or otherwise concealing it.

Operation: After the mine is laid the safety fork is removed. The contact plunger moves down under spring pressure and closes the electrical contacts, thus completing the electrical circuit and the mine is armed. When a horn is crushed an acid vial inside is broken, allowing the acid to drain down into two plates of a small battery which generates sufficient amperage to fire the detonator. As the wiring is series-parallel, either horn on being bent will act independently to fire the mine.

Remarks: The Japanese designation is: Small type land mine.

Type JG Antiboat Mine

Method of actuation: Chemical horn.
Weight of explosive: 22 pounds.
Type of explosive: HND/TNT 40/60 (type 98).
Diameter of top opening: 5.1 inches.
Diameter of top: 7 inches.

Mine No.	Diameter of base (inches)	Height (inches)	Total weight (pounds)
1	$14^{5}/_{16}$	$10^{1}/_{4}$	57
2	$14^{9}/_{16}$	$10^{5}/_{16}$	5
3	$14^{9}/_{16}$	$10^{5}/_{16}$	62.5
4	$14^{5}/_{16}$	$10^{1}/_{4}$	57
5	$14^{5}/_{16}$	$10^{1}/_{4}$	52.5

Description: These are five modifications of the subject mine, each of the 5 being actuated by a single chemical horn screwed into the top. The mines are either bell-shaped or of a truncated cone shape with an additional distinguishing factor being the location of the welds. The firing mechanism is similar to the J-XIII; however, a very small detonator is used to initiate the explosive train.

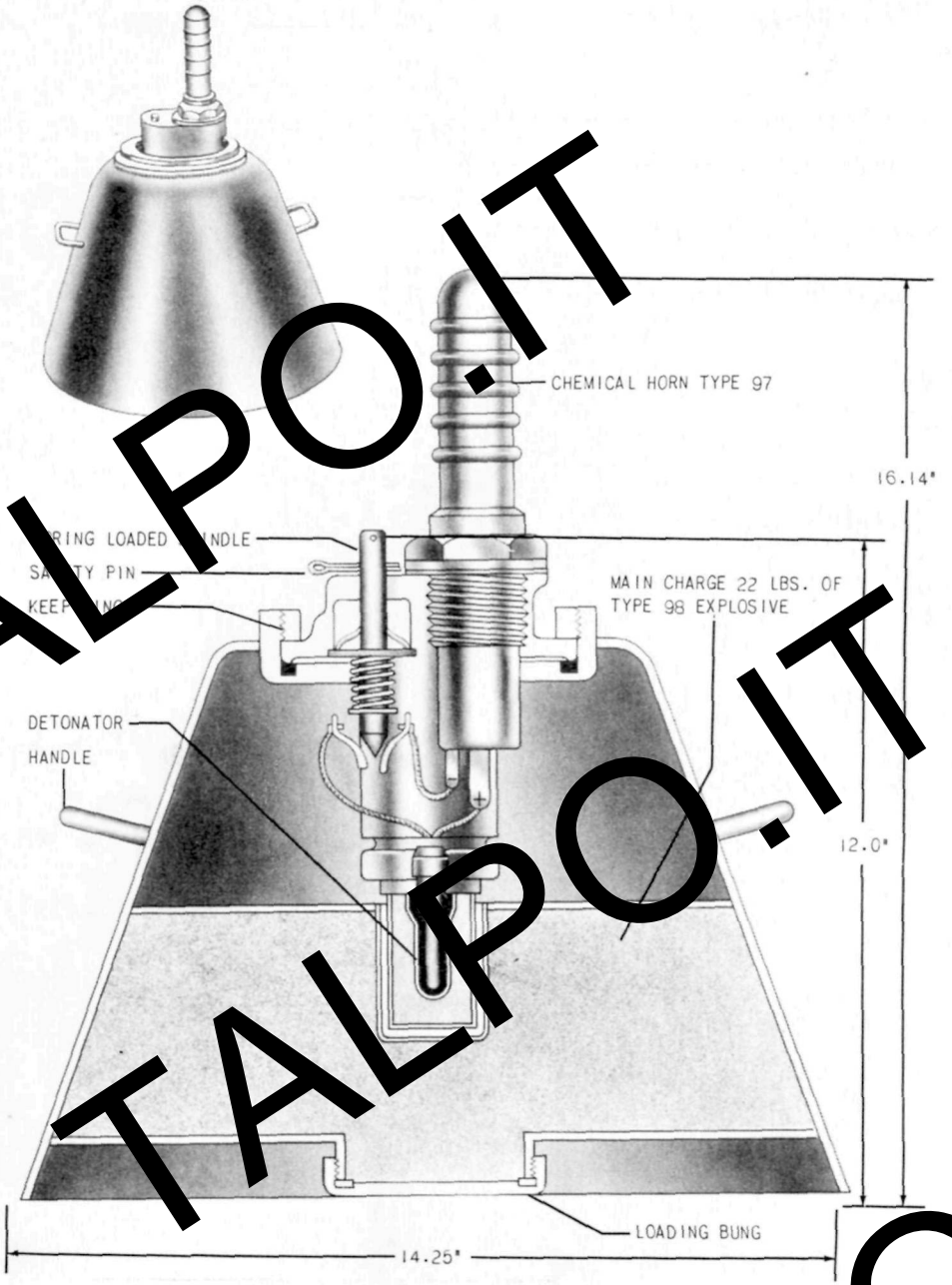


Figure 168—Type JG Antiboat Mine.

Employment: Used as an antiboat mine for the protection of beaches and reefs; also on land as A/T mine by camouflaging.

Operation: The mine is loaded with the chemical horn installed and a safety pin through the spring-loaded arming spindle. When positioned properly, the safety pin is removed allowing the spindle to move down and bridge the contacts of the safety switch.

The mine is fired when the chemical horn is crushed or broken.

Remarks: The Japanese designation for this mine is: Small type mine Model 2.

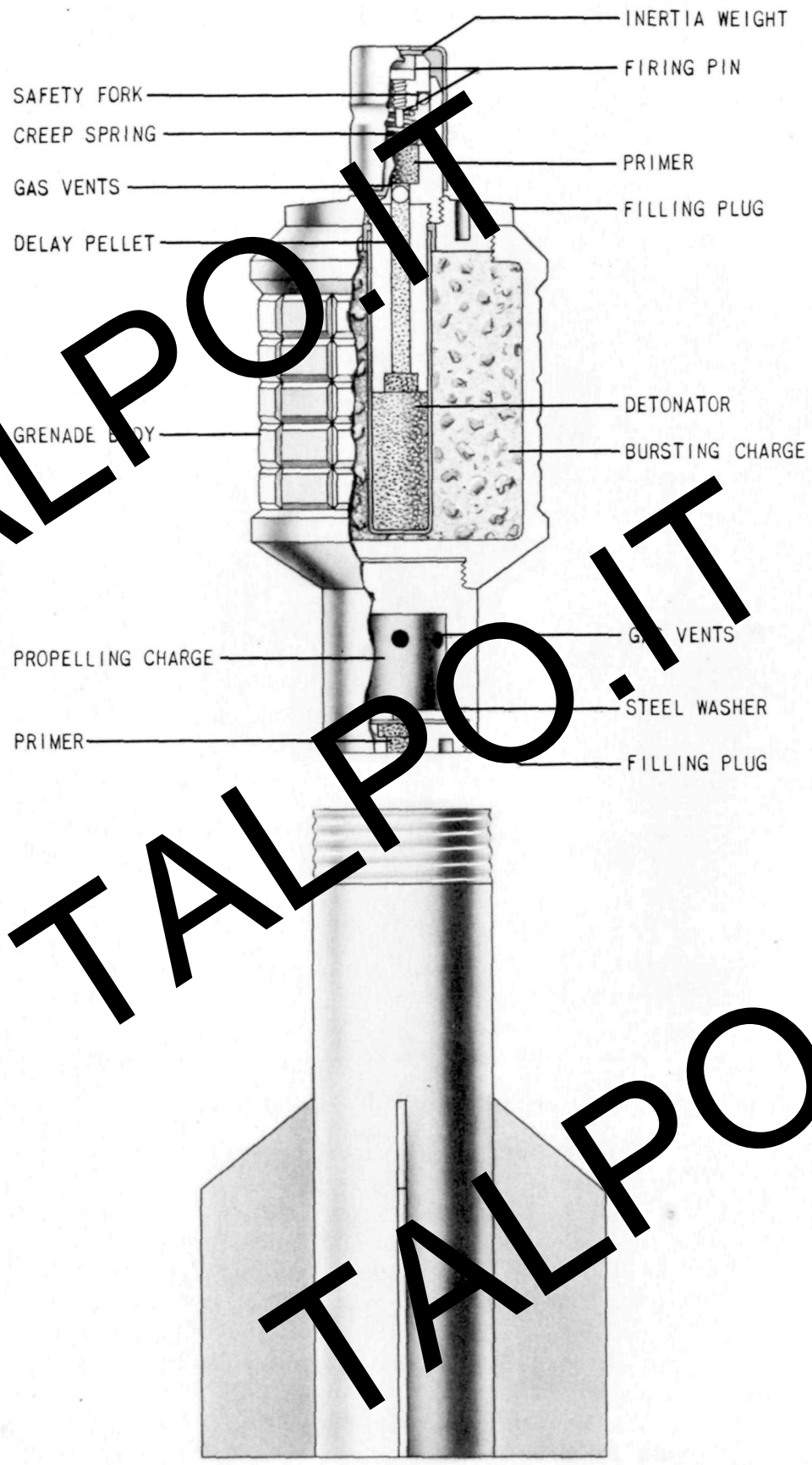


Figure 169—Type 91 Hand, Mortar, or Rifle Grenade.

Chapter 3—Section 2

HAND, RIFLE, AND MORTAR GRENADES

Introduction

The Japanese armed forces developed, both before and during the war, a fairly extensive line of hand and rifle grenades. This type of ordnance, primarily used by ground forces, was developed by the Army, but in the peculiar Japanese military organization, was also used by the Navy ground defense units.

The hand and rifle grenades used by the Japanese, although designed for a large variety of purposes, are similar in a number of respects. Generally, they are smaller than would be considered adequate by American standards. Also, observation of them in use has shown that, although explosive charges are usually large enough, effective fragmentation is often not achieved. In the main, the missiles are lacking in safety factors, and in reliability, the principles used in the igniters being of such character that they may be initiated accidentally and are subject to deterioration because of exposure to moisture. In the case of grenades of glass construction, the danger of initiation is great.

Rifle grenades are often standard hand grenades, adapted for use as rifle grenades by the addition of a tail portion. Hand grenade igniters are retained, with delay trains removed in some cases.

A large variety of improvised grenades has been found in all Pacific areas. These grenades have been adapted from such items as small ammunition, small bombs, pipe, paper, and wood. In general, improvisations were the result of shortage of the manufactured item, and were prepared by inexperienced personnel. Consequently, they were, in almost all cases, very ineffective and extremely dangerous to use.

Type 91 Hand, Mortar, or Rifle Grenade

Over-all length: 3¾ inches.
Maximum diameter: 2 inches.
Color: Body, black; fuze cover, red; and fuze, brass.
Total weight: 18.8 ounces.
Filling: Powdered TNT.
Weight of filling: 65 grams.
Delay: 5 seconds.

Description: The cast iron body is cylindrical and has 50 serrated segments. A filling plug screws into the upper end of the body, and a brass fuze screws through this plug. The base of the grenade is threaded, but not entirely through to the charge. Into these threads fits the propellant container.

The fuze consists of a brass inertia pellet with a steel firing pin separated from the primer by a creep spring. The inertia weight is held in the fuze by a light brass cap which is crimped into a cannelure in the fuze body so as to prevent the firing pin from reaching the primer. The firing pin is threaded into the inertia weight. In addition, a round brass safety pin fits through the fuze, preventing the firing pin from reaching the percussion cap.

The delay pellet screws into the base of the fuze and contains a small quantity of granular black powder and a pellet of black powder. A hole drilled in the side of the fuze contains a fusible plug which melts when the black powder burns, allowing the escape of the gases formed on combustion of the delay train. The tetryl detonator is contained in a brass tube extending from the base of the fuze to the bottom of the bursting charge.

The steel propellant container is screwed into the base of the body. A perforated plug screws into the base of this container and in a cavity in this is a percussion cap. Two flash holes lead to a small quantity of black powder. Inside the propellant container proper is a copper cup containing flakes of nitrocellulose propellant powder. When this grenade is used as a rifle grenade, a finned tail stabilizer is screwed into the base of the grenade instead of the propellant container.

Operation: The firing pin must first be threaded down into the inertia weight. The safety pin must then be withdrawn. If the grenade is to be thrown by hand, it is necessary to strike the inertia weight on some hard object to drive the firing pin into the primer to ignite the delay train.

If the grenade is to be fired from the grenade discharger, the grenade with propellant container is dropped base first into the discharger. When the trigger mechanism of the discharger is operated, its firing pin strikes the percussion cap, igniting the propelling charge which propels the grenade. Force of setback causes the firing pin in the grenade fuze to compress the creep spring and hit the primer to ignite the delay train.

To fire the grenade from a rifle, the stabilizer is placed over the launcher and the rifle is fired using the special cartridge. The shock of discharge forces the striker into the primer igniting the delay.

Type 97 Hand Grenade

Over-all length: 3 inches.
Maximum diameter: 2 inches.
Color: Body, black; fuze cover, red; fuze, brass.
Total weight: 1 pound 3 ounces.
Filling: Powdered TNT.
Delay: 4–5 seconds.

Description: The body is cylindrical with serrations to give uniform fragmentation. This grenade is identical to the type 91 grenade except that the base of this grenade is solid and therefore cannot take a propelling charge. It can only be used as a hand grenade.

Operation: The firing pin must first be threaded down into the inertia weight. The safety pin must then be withdrawn. As the grenade is to be thrown by hand, it is necessary to strike the inertia weight on some hard object thus driving the firing pin into the primer to ignite the delay train.

Remarks: A type 97 grenade with an aluminum body has been recovered.

A gray or black grenade, which strongly resembles and appears to be a forerunner of the type 97 grenade, has also been found. This grenade employs a fuze of black powder rolled in

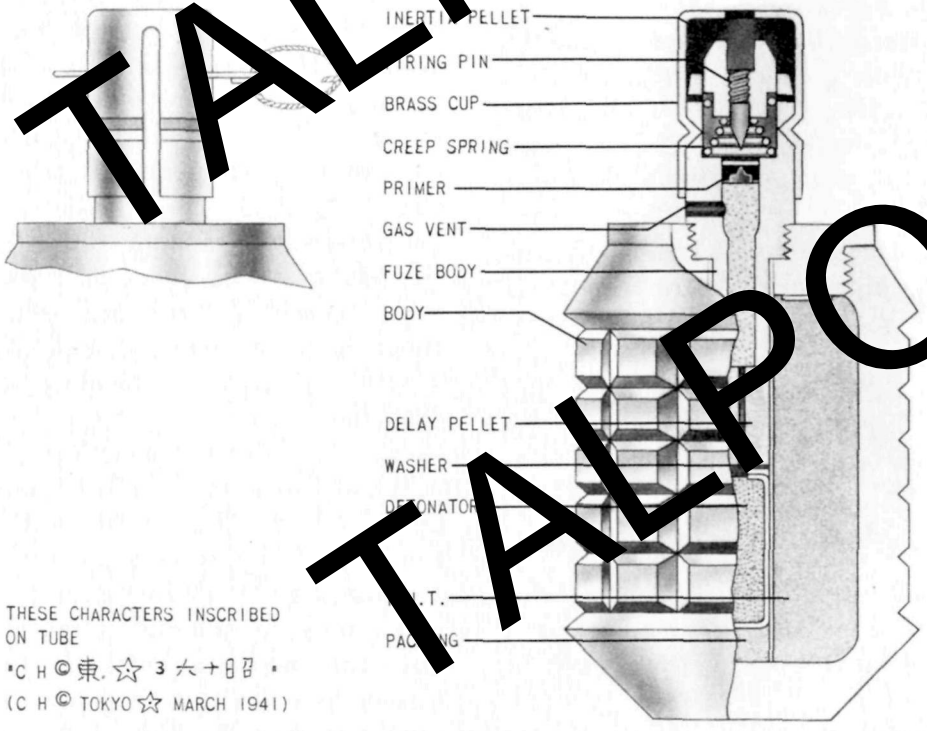


Figure 170—Type 97 Hand Grenade.

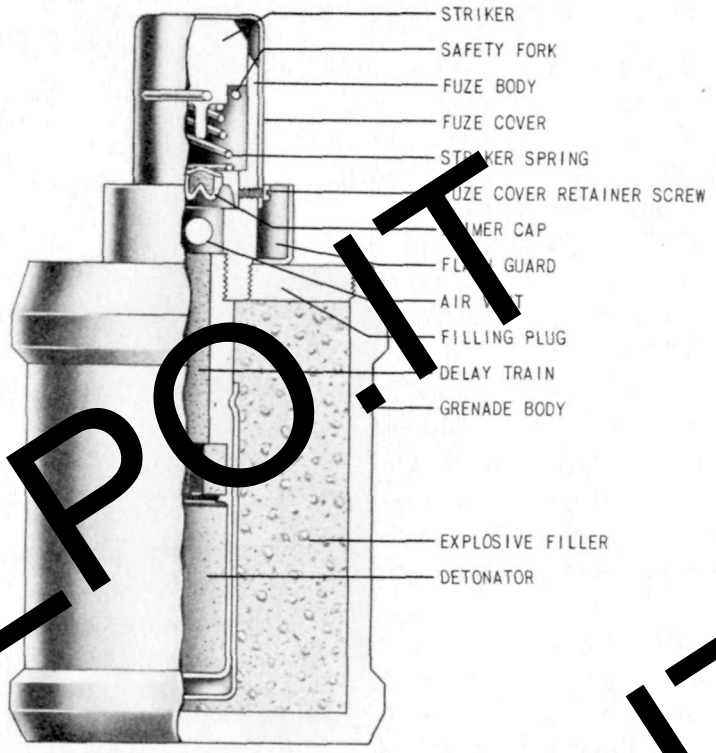


Figure 171—Type 99 Hand Grenade

paper leading directly to the black powder bursting charge. No detonator is used in the firing train. The fuze pocket is threaded to take a mechanical fuze of the same size as the fuze used in the standard type 97 grenade.

Type 99 Hand Grenade

Over-all length: 3½ inches.
Maximum diameter: 2⅜ inches.
Color: Body, black with white label pasted around it. The top of the grenade is painted red; fuze cover, red; fuze, brass.
Total weight: 0.8 pound.
Filling: Cast picric acid.
Delay: 4–5 seconds.

Description: The cast steel body has smooth surfaces. There is a shoulder projecting 1/16 inch from each end of the body. The inside of the body is finished with lacquer to keep the filler from reacting with the steel case. The filler is also wrapped in heavy paper.

A light metal flash deflector is fitted in the top of the grenade. This deflector is ⅜ inch wide and ⅞ inch in diameter. Two ⅛-inch holes are punched in the outer periphery and match the spanner holes in the fuze body. This positions the gas vents in the fuze 90° from the holes in the flash deflector. The flash deflector reduces the possibility of the flash from the cap burning the hand of the thrower and the possibility of the flash being seen by the enemy at night.

The fuze is similar to that used in the type 91 and 97 grenades with a few improvements. On the old type the striker may turn or spring clear of the grenade when the safety wire is pulled. In this fuze, a screw in the fuze body projects through a slot in the striker cover and keeps the cover in place. The slot allows the cover to move down when the striker is struck on a hard object. Also the striker and inertia weight are machined together and the striker protrudes so that it does not have to be threaded down to arm the grenade. In other respects, the fuzes are identical.

Operation: The safetypin is withdrawn and the head of the fuze is struck on some hard object. This forces the striker down into the primer igniting the delay.

Remarks: A type 99 grenade has been encountered with a machined, waterproof, metal fuze cover. The only difference between this variation and the standard grenade is the fact that the flash guard is externally threaded to receive the waterproof fuze cover.

Type 4 Pottery Hand Grenade

Height (base to top of neck): 4 inches.
Diameter: 3 inches.
Body (Material): Terra cotta.
Thickness of case: 7/16 inch.
Color: Light brown.
Filling: Type 88 explosive.
Weight of filling: 3.5 ounces.
Total weight of grenade: 16 ounces.
Delay: 4-5 seconds.

Description: Except for the neck at the top, the grenade is spherical, consisting of two hemispheres baked together. The pottery body is light brown in color, lightly glazed inside and out. The grenade is encased in a straw colored rubber sack which serves as waterproofing and permits the thrower to take a better grip.

The ignition system consists of a match composition, a 4 or 5 second delay element, a lead azide initiator, and a tetryl booster. All but the match composition are encased in a rubber tube which is lacquered into the neck of the grenade. The upper portion of the delay element is surrounded by a wooden collar, the top of which is covered with the match composition.

A wooden scratch block is seated on top of the neck of the grenade. It is held in place by a small rubber sack which snaps around the neck of the grenade. This sack serves a second purpose in waterproofing the ignition system.

A cloth band tied around the neck is probably used for carrying.

Operation: The small rubber sack is removed from the top and the scratch block is struck on the protruding match composition, igniting the delay element. The grenade is thrown and explodes after a 4 or 5 second delay.

Remarks: This grenade appears to be made of the same type pottery as the type 3 pottery land mine, and like the land mine, uses Type 88 explosive. For these reasons it may be assumed to be Navy weapon.

The color of the grenade may vary from white to dark brown, and the exterior may be glazed or unglazed.

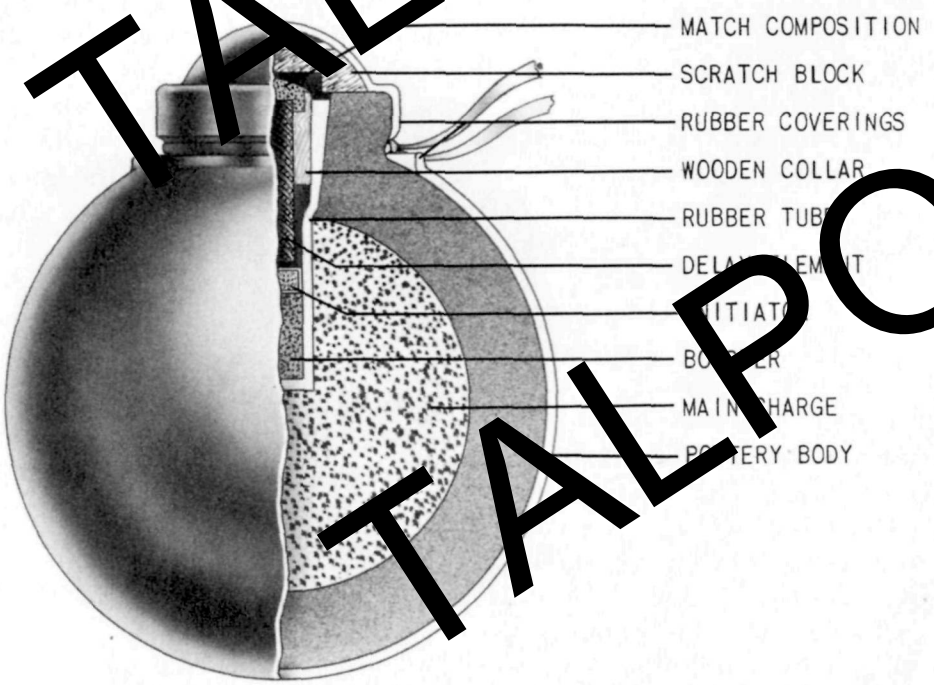


Figure 172—Type 4 Pottery Hand Grenade.

Figure 173—Type 93 Hand Grenade.

Type 93 Hand Grenade

Over-all length: 3¾ inches.
Maximum diameter: 2 inches.
Color: Black.
Total weight: 1 pound.
Filling: Granular TNT.
Weight of filling: 39.5 grams.
Delay: 5½ seconds.

Description: The body, unlike the type 91 or 97, has no longitudinal serrations, but does have five transverse depressions. On one side, fitted top and bottom, are two rings which could be used for carrying or for anchoring. The lead cover is screwed on to the top of the grenade and grooved to provide a grip for easy removal. The thumb cover release holds the cover on and must be depressed before the cover can be removed. When this is depressed, the cover can be unscrewed one and one-half turns, thus exposing the firing string which is attached to a friction igniter.

Operation: The thumb cover release must be depressed, and then the cover must be removed. When the firing string is pulled, it draws a sanded string through a match composition. The ignition of the match composition will ignite the black powder delay train.

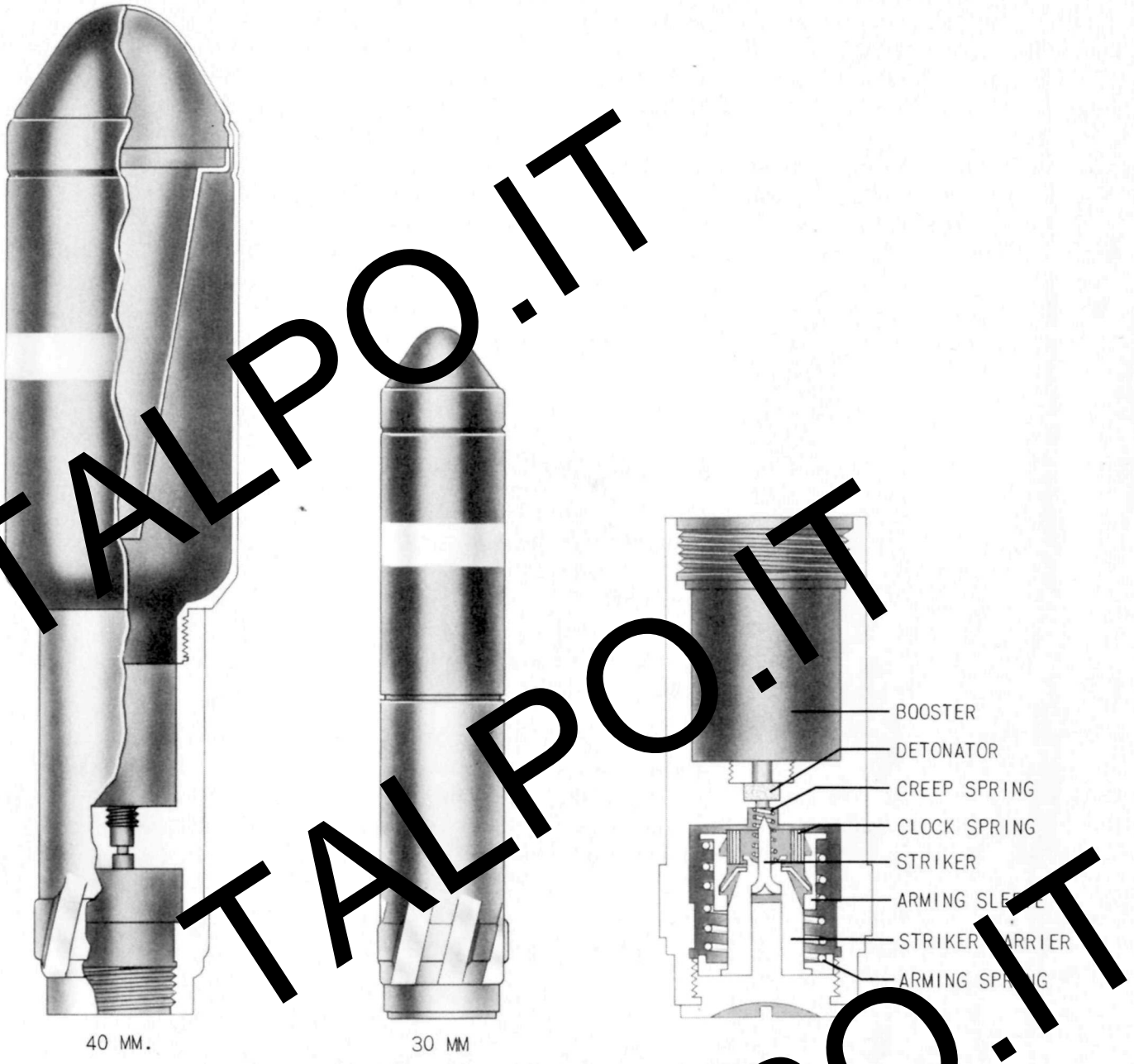


Figure 182—Hollow-Charge Rifle Grenades.

The fuze is held in by a base plate with a protruding spigot which is screwed into the base of the grenade. The fuze is held in position by the spigot. The needle firing pin is secured in a housing that has four stirrup-like springs protruding from the side. Around the housing is a setback spring held in by an arming sleeve which has two sets of grooves notched on the inner side. Holding the firing pin stationary is a coil clock spring which is held in by the arming sleeve. There is also a creep spring between the firing pin and detonator.

The propelling charge consists of a special cartridge with a wooden bullet.

Operation: On firing, setback causes the arming sleeve to move down and it is held down by the stirrup springs which engage in the groove in the arming sleeve. Centrifugal force then causes the clock spring to expand and the fuze is armed. On impact the firing pin housing overcomes the creep spring and moves onto the flash cap setting off the detonator and booster.

30-mm Hollow-Charge Rifle Grenade

Over-all length 6.25 inches.
Maximum diameter: 1.18 inches.
Color: Black and gray.
Total weight: 8.25 ounces.
Filling: 50/50 RDX and TNT.
Weight of filling: 1.75 ounces.

Description: The explosive head of the 30-mm grenade is of the same type construction as that of the 40-mm, but on a smaller scale. The spigots of the 30- and 40-mm grenades are identical with the exception of the threads on their forward ends. Both grenades use the same fuze.

Operation: The operation of the 30-mm hollow-charge rifle grenade is identical to that of the 40-mm size.

Model 3 Modification 1 Rifle Grenade

Over-all length: 8 inches.
Maximum diameter: $1\frac{5}{8}$ inches.
Thickness of body wall: $\frac{1}{8}$ inch.
Length of body: $2\frac{13}{16}$ inches.
Length of tail: $4\frac{5}{16}$ inches.
Length of fuze: $1\frac{3}{16}$ inches.
Color: Black.
Filling (main charge): TNT.
Weight of filling: 3 ounces.

Description: This grenade is similar to the type 99 Kiska grenade with a tail assembly added. It is designed to be fired from the spigot type rifle grenade launcher. The body and tail are painted black.

The grenade body is a smooth-surfaced, cylindrical cast steel tube. It is threaded internally at the forward end to receive the cover plate. There is a bored opening in the base of the grenade body. A cylindrical solid steel plug, threaded on its after end to receive the tail assembly, is pressed into this hole.

The tail assembly consists of a stabilizer tube to which four fins are welded. The tube is constructed of rolled sheet steel with a smooth weld down the joining seam. Threads are pressed into the forward end to correspond with those on the base plug. The four fins are of light metal. The outer end of each fin is doubled back to provide a smooth exposed surface. The inner edge is bent 90 degrees and provides a surface for spot welding the fin to the tube. The fins are positioned at 90-degree intervals around the circumference of the tube.

The fuze body differs from the Type 91 and 97 hand grenade fuzes only in having an aluminum striker block into which is screwed a steel striker. A brass shear wire through the block holds the striker away from the percussion cap.

The explosive train of the grenade consists of a percussion cap, black powder relay, cyclonite primer, tetryl booster and a main charge of cast TNT. The cyclonite is enclosed in a brass container, the tetryl in a cardboard cylinder. Directly under the tetryl booster there is a setback buffer consisting of a felt washer and a jelly-like pellet.

Operation: Prior to firing the grenade from the rifle the safety fork is withdrawn. The fuze is fully armed. On impact the brass wire through the striker block is sheared and the steel striker is driven into the percussion cap. The resultant flash ignites the black powder relay.

The fuze is instantaneous and cannot be substituted as a fuze for hand grenades.

Remarks: A translation of the labels attached to the stabilizer tube gives the following information: "This grenade can be used on rifles type 38 and type 99. The wooden bullet for type 38 and type 99 is to be used." These two rifles are the standard combat weapons for Japanese troops.

A translation of the tag attached to the safety fork gives the following precautionary measures: "Do not remove fork until ready to fire." and "Do not drop or otherwise strike on the nose."

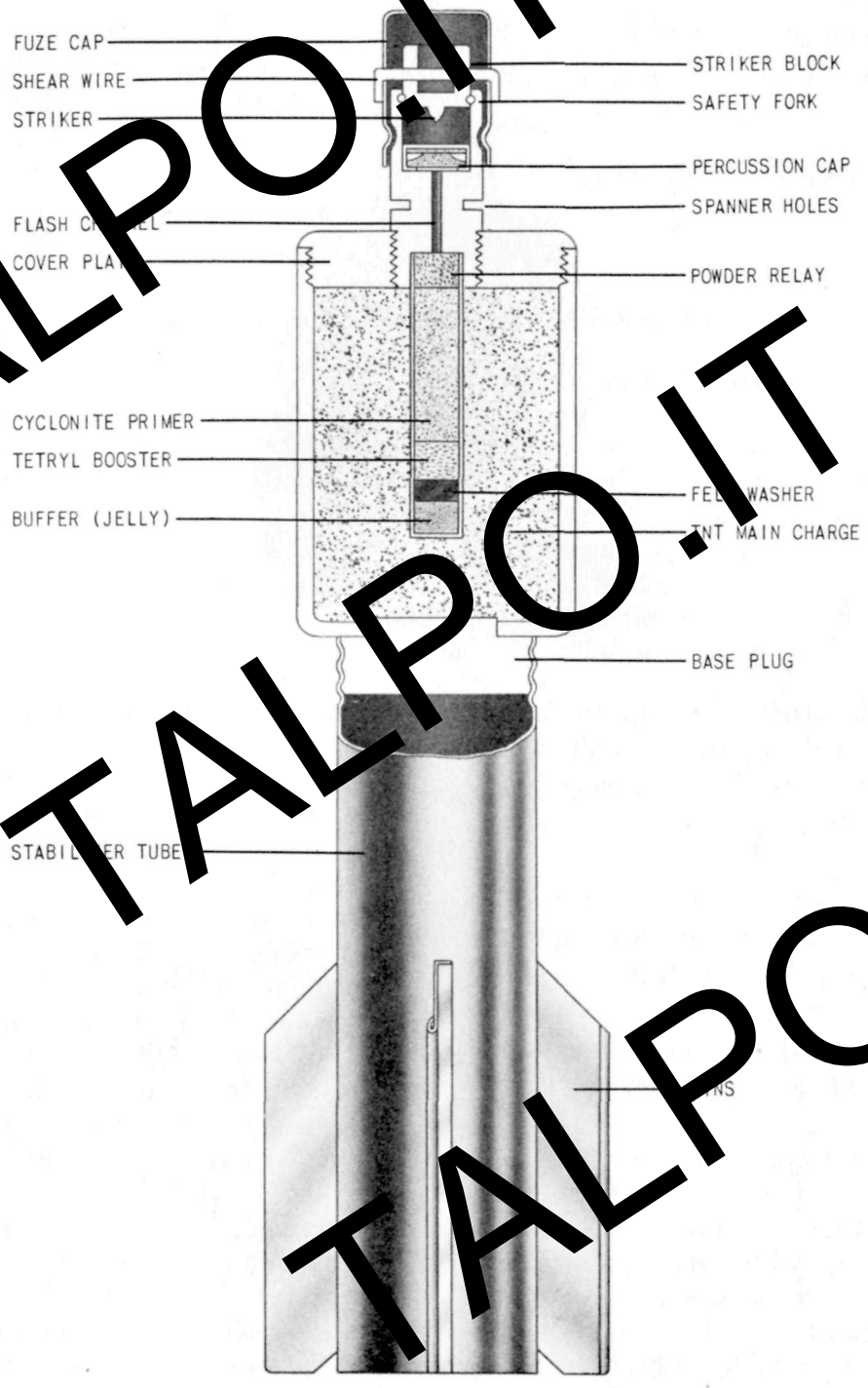


Figure 183—Model 3 Modification 1 Rifle Grenade.

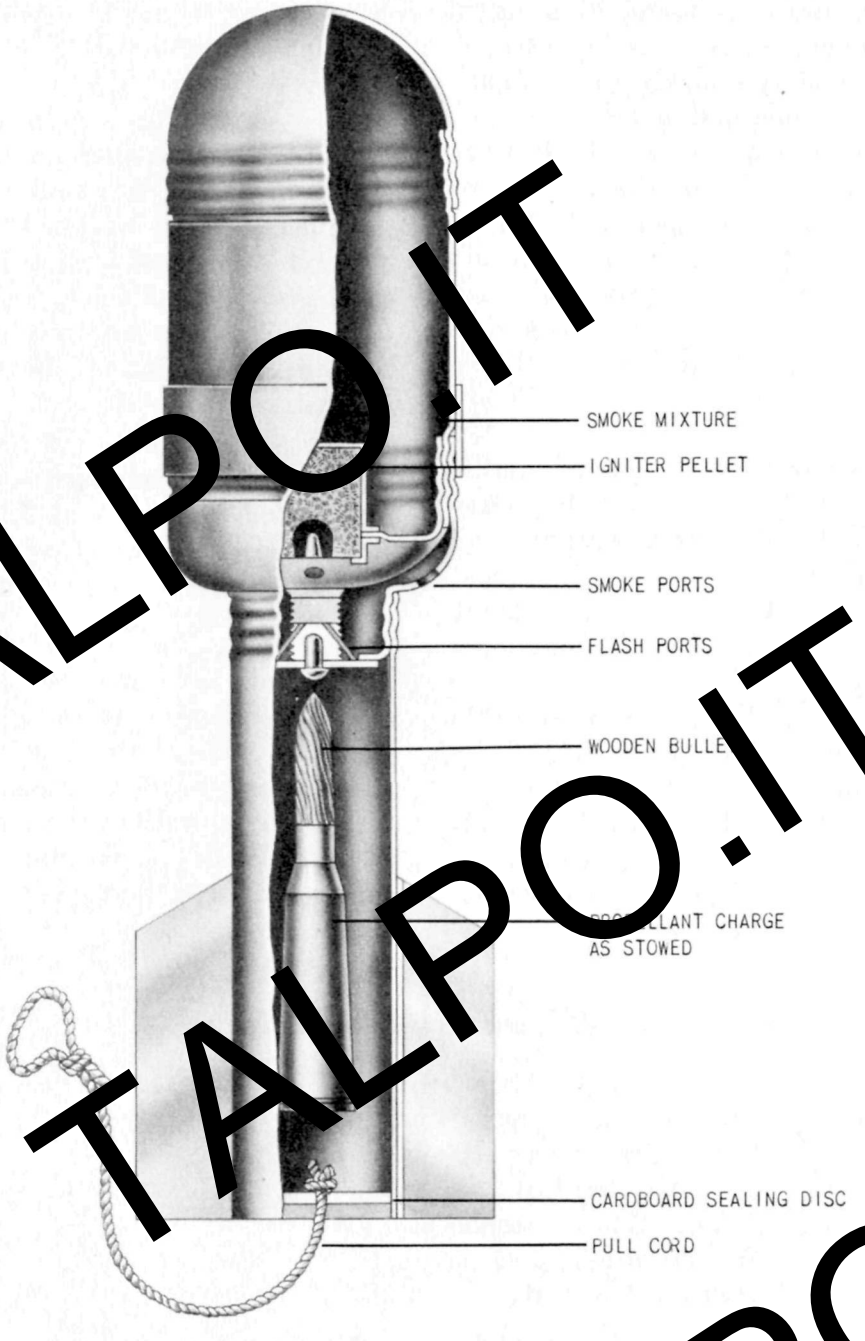


Figure 184—Smoke Rifle Grenade.

Smoke Rifle Grenade

Over-all length: 8½ inches.
Maximum diameter: Body, inches; fins, 2 9/16 inches.
Color: Silver.
Total weight: 1.29 pounds.
Filling: Hexachlorethane, 56.2 percent; zinc, metallic, 27.6 percent; zinc chloride, 2.9 percent; zinc oxide, 13.4 percent.

Description: This grenade is used with a special adapter which fits over the end of the rifle barrel. It is painted silver and thoroughly waterproofed with coats of heavy lacquer and paraffin.

The nose is of No. 23 gage B. and X. tin plate with rolled threads to fit those on the body of the grenade. Soft iron wire is wrapped in the thread groove and soldered in place, presumably to aid in sealing the joint. The body proper is rolled from No. 23 gage B. and X. tin plate and is soldered along one longitudinal seam. Rolled threads are provided at each end to fit the threads on the nose and base.

The base is stamped from No. 18 gage B. and S. sheet steel and is screwed onto the body by means of rolled threads. Soft iron wire is wrapped and soldered into these thread grooves. The base is partially filled with plastic which has a threaded hole half filled with solder. The bottom plate is held in place by a small screw imbedded in the solder. The igniter pellet is encased in a thin walled brass container which is supported by tin plate screwed and soldered onto the body.

The four smoke ports are placed at 90° intervals around the base and are covered with light sheet metal discs which are held in place by waterproof cement covered with paraffin. There are three flash ports, spaced at 120° intervals, in the bottom of the base.

The grenade tube is made of No. 18 gage B. and S. seamless steel tubing and the upper end is threaded to fit the small end of the base. The threaded joint is wrapped with adhesive tape. The tube is sealed with a paraffin impregnated cardboard disc attached to 9 inches of heavy twine. The four fins are soldered to, and are equally spaced around, the tube and are of No. 24 B. and X. tin plate.

The motive force and primary ignition are furnished by a standard .256 caliber Japanese rifle cartridge loaded with 1.927 grams of powder and fitted with a wood pellet. This cartridge is wrapped in paper and stored in the grenade tube.

Operation: The rifle cartridge is removed from the grenade tube and inserted in the rifle. The grenade is placed over the spigot adapter. When the rifle is fired, the gases from the cartridge propel the grenade and also pass through the flash ports to initiate the igniter pellet which in turn ignites the smoke mixture. Smoke is then emitted through the emission holes.

Small Incendiary Rifle Grenade

Overall length: 10 inches.
Maximum diameter: 1⅞ inches.
Color: Gray with purple body band.
Total weight: 1.01 pounds.
Filling: White phosphorus.
Weight of filling: 42 pounds.
Delay 4–5 seconds.

Description: This grenade is designed to be launched from a spigot type rifle grenade launcher on the type 38 or type 99 Japanese rifle, using a cartridge having a wooden bullet.

The grenade is of light, seamless, steel construction and has an incendiary filling of white phosphorus. The nose piece is threaded at its forward end to receive the fuze. A thin, metal well extends into the filler and is soldered around the fuze pocket to give an air tight seal. This well contains the detonator and auxiliary detonator of the fuze, which serve as the bursting charge for the grenade.

The barrel of the grenade is threaded at its forward end to take the nose piece, and at its after end to receive the hemispherical end plate internally and the base piece externally. The end plate has a small hole in its center. The base piece is threaded at one end to screw onto the barrel and at the other end to screw into the stabilizer tube. A bakelite cushion is cast into the base piece to fit the hemispherical end plate.

The stabilizer consists of a cylindrical tube which threads onto the base piece. Four fins are welded to the after section of this tube at 90° intervals.

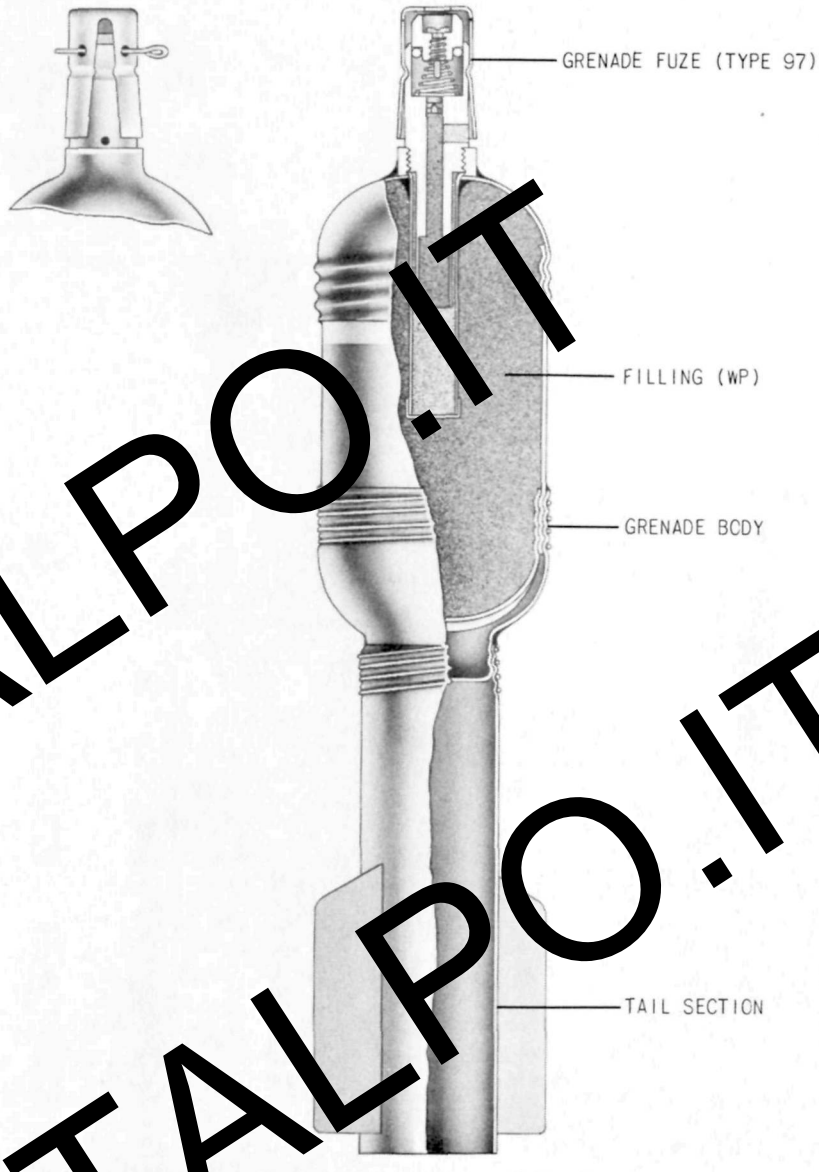


Figure 185—Small Incendiary Rifle Grenade.

The rolled threads, joining the barrel and base piece and base piece and stabilizer, are reinforced by wrapping and soldering soft iron wire into the thread grooves.

The fuze used in this grenade is the same as that used in the type 97 hand grenade.

Operation: After the grenade has been placed over the spigot adapter of a rifle grenade with a cartridge having a wooden bullet, the safety pin is removed from the grenade. When the rifle is fired, the gases from the cartridge propel the grenade, and the force of setback initiates the grenade fuze. After a short delay, the fuze detonates, rupturing the case of the grenade.

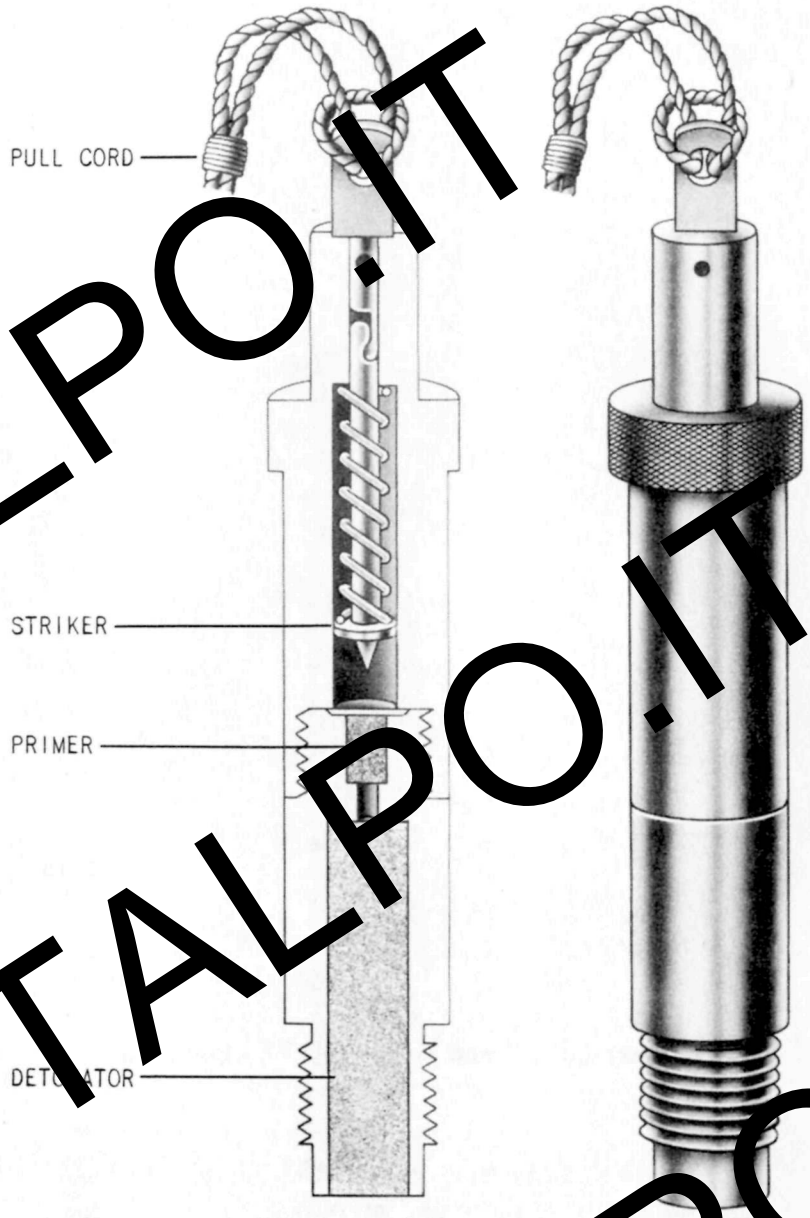


Figure 186—Mechanical Pull Igniter.

Chapter 3—Section 3

FIRING DEVICES AND SABOTAGE DEVICES

Introduction

Japanese demolition equipment is similar in appearance, construction, and function, to that used by the Allies, and can be considered completely adequate for its intended use. The devices covered in this section are standard types and were in widespread use throughout the war.

Several long delay demolition devices were devised by both the Japanese Army and Navy, but were used only in very rare instances. These devices employed chemical delays and mechanical clockwork delays. They were of sound design and construction. Had these devices been mass produced, they could have been put to very good use by the retreating Japanese forces.

Some representative sabotage devices and materials are discussed in this section as illustrations of the types of materials used by the Japanese for this purpose.

As in the case of land mines, the Japanese did a great deal of improvising with demolition material in order that it might be put to special uses. Consequently, a very great variety of combinations and uses of materials was found. In general, Japanese materials of this type were good, but their employment was often faulty and inefficient.

Mechanical Pull Igniter

Over-all length: $3\frac{1}{16}$ inches.
Maximum diameter: $\frac{17}{32}$ inch.
Color: Dark gray.
Material of construction: Steel.

Description: The igniter body is made in two sections. The forward section, which contains the primer cap and a black powder relay, threads into the after section and is staked in place. The after section houses the firing assembly whose components are a two-piece striker, striker spring, safety pin, and lanyard. The juncture of the two striker sections is effected by a notched joint. The striker spring bears against the igniter body and the striker flange. The safety pin is inserted through holes in the igniter body and the after section of the striker to which the lanyard is attached.

Employment: Not known. Could be used as a pull firing device for booby traps.

Operation: Before firing, remove the safety pin. A pull on the lanyard draws the striker to the rear compressing the striker spring. When the notched joint of the striker is drawn past the end of the igniter body, the forward section of the striker is disengaged and driven forward by the compressed striker spring. The striker impinges upon the primer cap which ignites the black powder relay.

To render safe: Insert safety pin and cut trip wire if present.

Figure 187—Friction Pull Igniters.

Friction Pull Igniters

	Red type (Inches)	Black type (Inches)
Igniter length	[illegible]	3 1/16
Igniter diameter	5/16	[illegible]
Sleeve length	[illegible]	1 29/32
Sleeve diameter	[illegible]	7/16

Construction: Red Type: This igniter is composed of a brass body with a red plastic outer sleeve. At one end a screw cap is fitted with an eye for attaching a pull or trip cord. Attached to the inside of this cover is a short pull string which projects through a small pellet of friction ignition composition. The end of the igniter into which a safety fuze is crimped is covered with a piece of tinfoil to keep out moisture. The ignition pellet is contained in a brass tube crimped into the brass outer case.

Black Type: This igniter differs only slightly from the red igniter. The brass case is slightly longer and the black plastic sleeve slightly larger. The sleeve over the case has fourteen depressions or rings around it to give the hand a firm grip. The red igniter has only one ring. As in the red igniters, the ignition pellet is contained in a brass tube crimped into the brass outer case. Tied through the eye on the cap is a heavy cotton cord to assist in pulling. The cap is not threaded but slides off.

Employment: These igniters are designed to ignite safety fuze but can be used with a detonator to ignite trip wire booby traps.

Operation: When the sanded end of the pull string is drawn through the igniter composition, it ignites and flashes through the igniter body.

Waterproof Safety-Fuze Igniter

Igniter length: 4½ inch.
Igniter diameter: ⅜ inch.

Description: This igniter has a brass case with a percussion cap and a nipple to which safety fuze or a nonelectric blasting cap can be attached

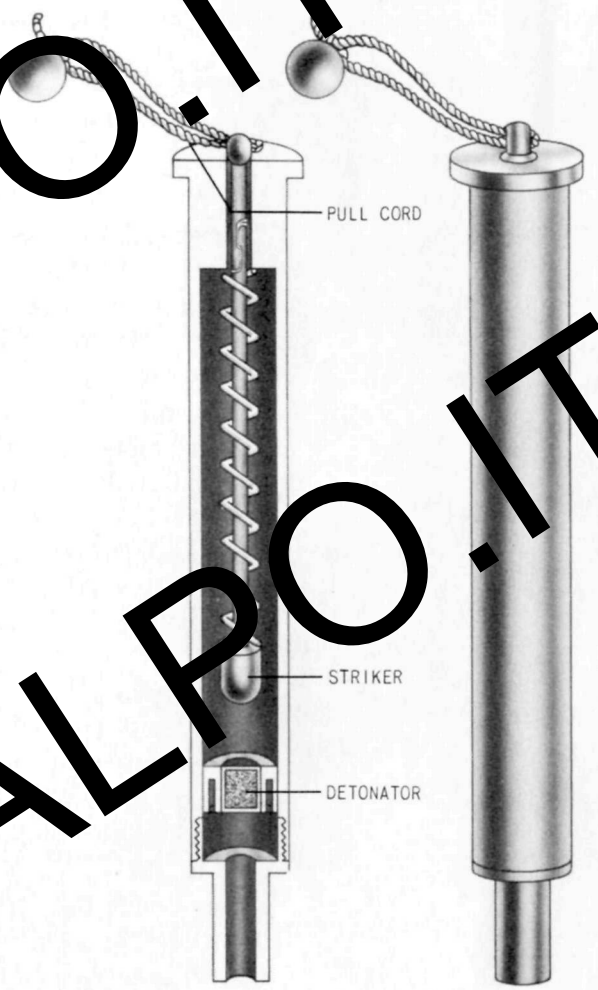


Figure 188—Waterproof Safety-Fuse Igniter.

at one end, and a small hole at the opposite end through which the knobbed head of the release pin protrudes. The firing assembly consists of a release pin and striker connected by a notched joint and surrounded by the firing spring. This igniter has no safety pin, but depends for its safety factor upon the fact that the firing spring is not compressed until a pull is exerted on the release pin.

Employment: This igniter is used in smoke signal bombs and as an igniter for booby traps.

Operation: A pull on the cord attached to the release pin draws the release pin and a portion of the striker through the release-pin hole, compressing the striker spring. The release pin is disengaged from the striker when the notched joint connecting the two parts clears the release pin hole. The striker is then driven forward by the compressed striker spring and impinges on the primer cap.

Trigger-Type Safety-Fuse Igniter

Description: The igniter consists of the housing, firing assembly, and sear lever. The housing is a brass body into one end of which is screwed and soldered a steel base having a bayonet joint for locking a primer cap and fuze to the assembly. The opposite end of the body is internally threaded to take the hollow closing plug. This closing plug fits over and secures the knurled safety ring and a spring washer which prevents the safety ring from slipping. The safety ring has an internal and external cut-away section. The internal section engages a grub screw on the closing plug, and so limits the distance through which the safety ring can be turned. The external section is beneath the trigger of the sear when it is properly positioned for cocking or firing.

The firing assembly consists of a striker and striker spring within the housing, and a lanyard eye which is threaded onto the after end of the striker. A lanyard is attached to the lanyard eye.

The sear lever is a steel bar which is pivoted on a double supporting lug attached to the igniter body. One end of the lever bears the sear which passes through a rectangular hole in the igniter body to engage the striker flange when the striker is retracted. The opposite end of the lever is flattened to form a trigger. A spring-loaded plunger is set into a round hole in the body and closing plug. This plunger bears against the trigger keeping the sear depressed. The plunger and spring also lock the closing plug and the body together.

Employment: This device is used to ignite safety fuse and could possibly be used as a pressure igniter for booby traps.

Operation: To cock the device, rotate the safety ring until the external cut-away portion is opposite the trigger. A pull on the lanyard will then retract the striker and striker spring. The sear rides over the flange on the striker and is forced to drop in front of the flange by the plunger and spring. The sear then holds the striker and spring in the cocked position. By rotating the safety ring so that its solid portion is beneath the trigger, the firing device is on "Safe" and the trigger cannot be depressed. The device is connected to the primer cap and fuze by means of the bayonet joint in the base.

To fire the device, turn the safety ring so that the cut-away section is beneath the trigger. Depressing the trigger disengages the sear from the striker flange allowing the cocked striker to move forward and impinge upon the primer.

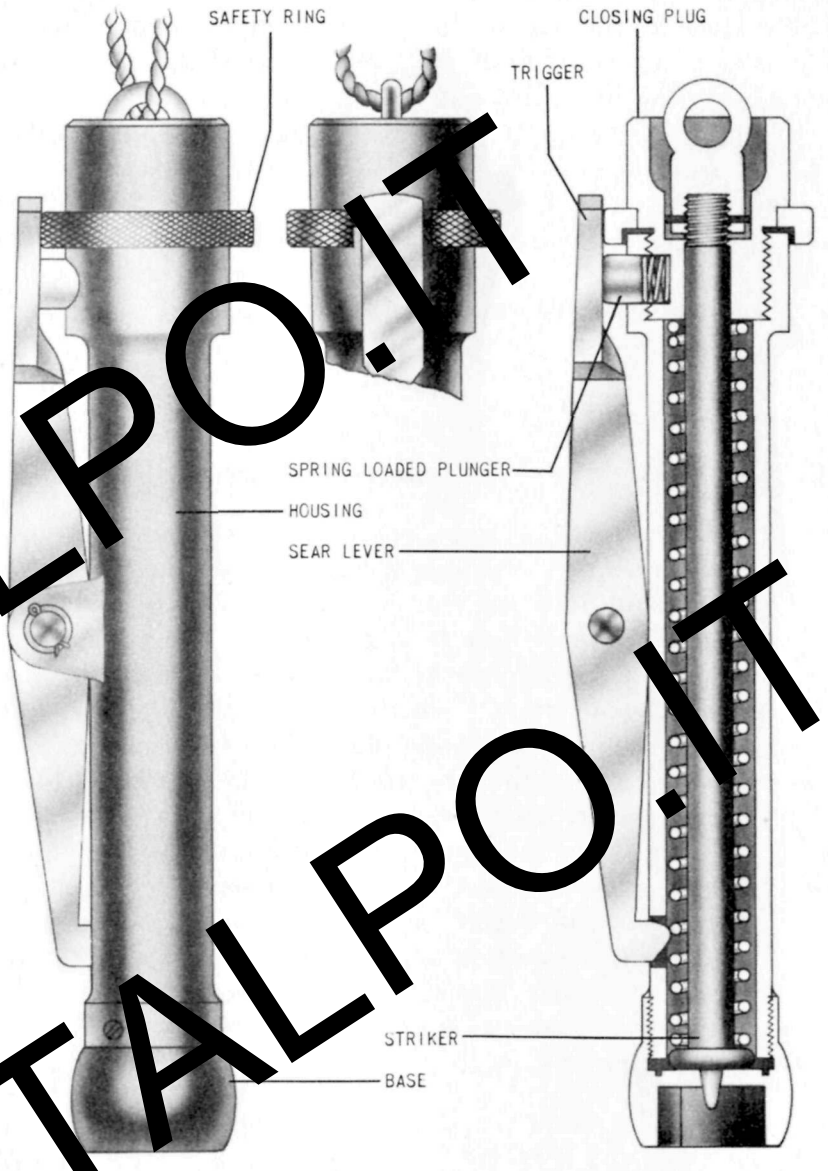


Figure 189—Trigger-Type Safety Fuse Igniter.

To render safe: Turn the safety ring to the "Safe" position and detach the primer and fuze from the bayonet joint in the base of the igniter. Very little pressure is required to depress the trigger.

Booby-Trap Firing Device

Over-all length: 8¾ inches.
Diameter: 1½ inch.
Weight: 2 pounds 6 ounces.
Color: Black.
Material of construction: Cast iron.

Description: The body is turned out of a solid 1½-inch, cast-iron bar. It houses a spring-loaded striker which is held in position by a safety pin and a release pin. The safety pin fits through the

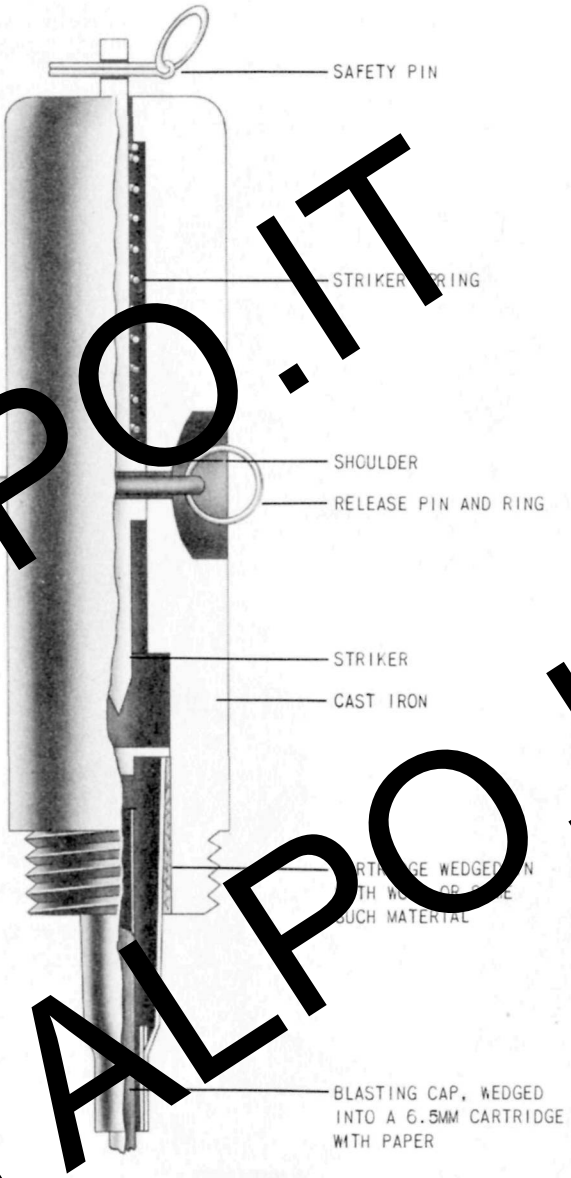


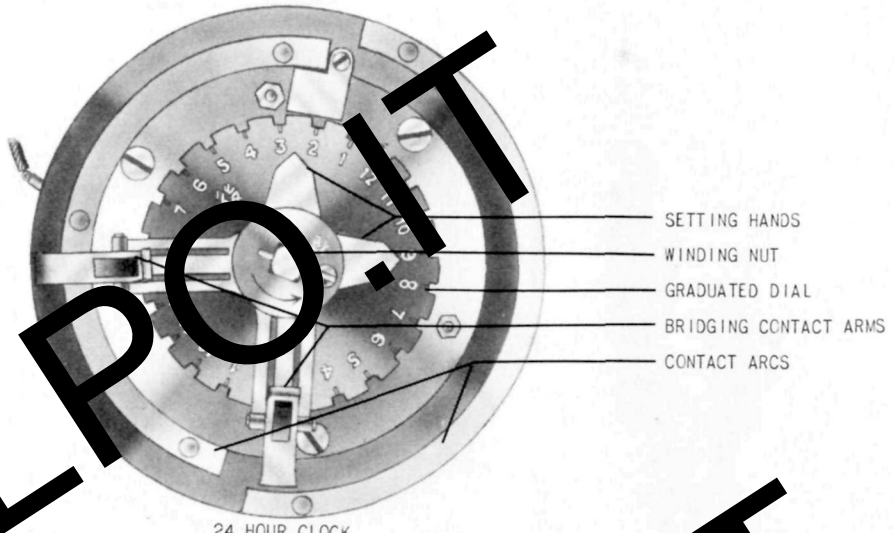
Figure 190—Booby-Trap Firing Device.

aft end of the striker projecting out of the upper part of the body. The release pin extends through the body and the shoulder of the striker. The explosive train consists of a 6.5-mm cartridge case into which is wedged a blasting cap with the open end facing the cartridge cap. The cartridge case is wedged into the base of the firing device.

Employment: The threaded base fits the fuze cavity of a 20-pound British bomb. This device is very easily adapted for booby traps.

Operation: Device screwed into bomb, pull wire attached to release pin, and safety pin removed. Pull on the wire removes release pin which frees the striker.

To render safe: If the release pin is still in position with a trip wire attached, insert a pin through the safety pin hole, cut the trip wire and unscrew the device from the bomb.



24 HOUR CLOCK

TYPE 99 LONG DELAY CLOCK

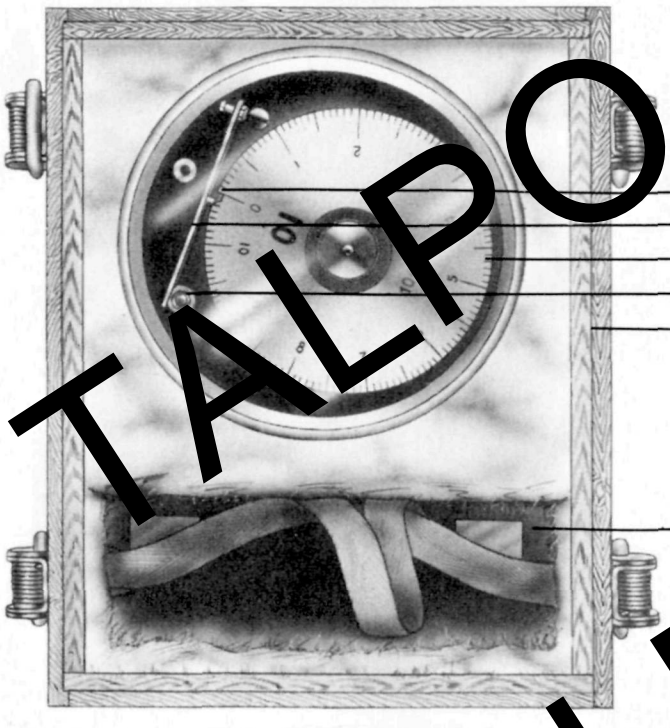


Figure 191—Detonation Clocks.

Twenty-Four-Hour Demolition Clock

This clock will fire a charge electrically after a delay of up to 24 hours. It has two bridging contact arms which ride on two semicircular electrical contacts connected by leads through a battery to the charge. The relation of the two arms to each other governs the amount of delay. They may be set only in one hour increments.

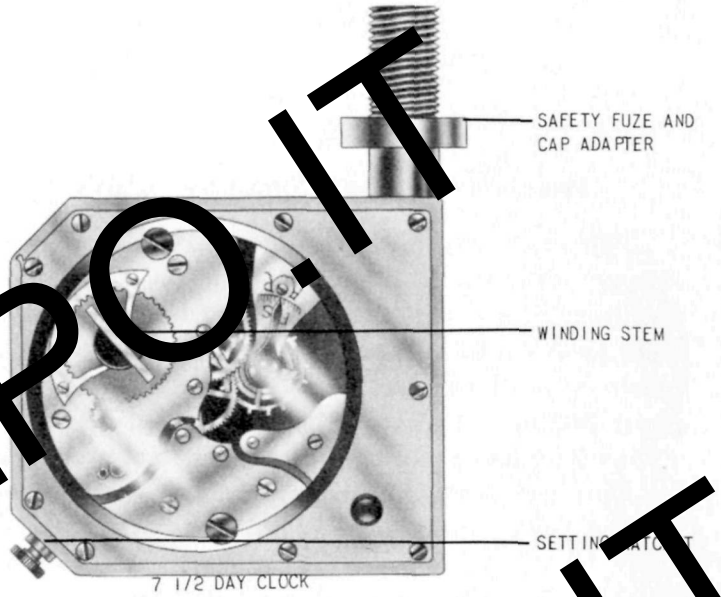
No outer protective case for the working parts of the clock is provided.

Type 99 Long-Delay Demolition Clock

This clock is electrically wound and fires its charge electrically. It has a maximum delay time of 10½ days, and winds itself every 4¾ minutes. Setting is accomplished by rotating the graduated dial to the desired delay time. At completion of the delay time a spring-loaded contact arm drops into an aperture on the outer rim of the dial, and closes the firing circuit.

Additional gear trains and setting dials may be provided in some cases to extend delay time to 30 or 60 days.

Power for the operation of the clock and firing of the charge is provided by a battery contained in the clock's wooden protective case.



TYPE 92 7 DAY CLOCK

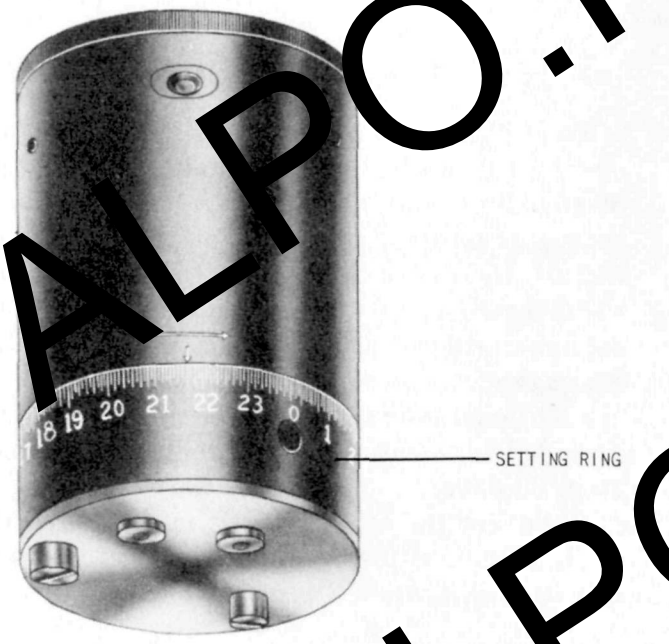


Figure 192—Demolition Clocks.

Seven-and-One-Half-Day Demolition Clock

Apparently of European design, this clock is smaller and more finely made than any of the others. It is hand wound by means of an attached key, and is set by means of a ratchet bearing against the outer edge of the dial. The dial is graduated in one hour intervals to 7½ days. The clock fires when a trigger arm falls into an aperture on the circumference of the dial, releasing the spring-loaded striker. The striker aperture is threaded on the inside to take a blasting cap, and on the outside to take a demolition block.

Type 92 Seven-Day Demolition Clock

This is a spring-driven clock with settings up to 7 days. It is capable of firing a charge either electrically or mechanically. Electric leads connect the contacts on the clock through a battery to the charge. At the base of the clock is a receptacle for safety fuze which is used if the clock is to fire its charge mechanically. A graduated ring is provided at the base of the clock for the purpose of setting delay time.

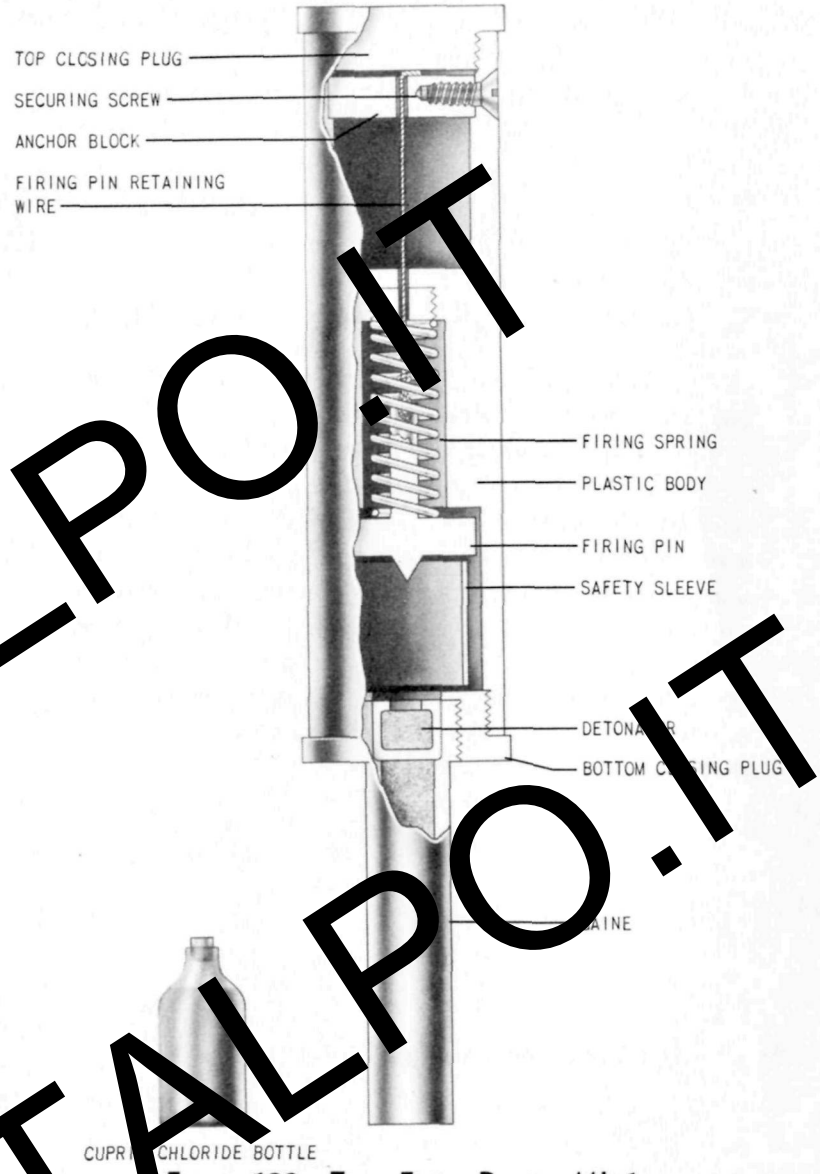


Figure 193—Time Firing Device Mk 1.

Time Firing Device Mk 1

Length (without gaine): 3¾ inches.
Maximum diameter: 1 inch.
Length of gaine: 2⅛ inches.
Diameter of gaine: ⅜ inch.
Color: Brown or transparent.
Material of construction: Plastic.

Description: Two variations of this device have been found that differ only in the color of their plastic cases and the diameter of their firing pin retaining wire. One model has a brown, opaque plastic body and a retaining wire 0.035 inch in diameter, while the other has a transparent plastic body and a retaining wire 0.042 inch in diameter. The body of the device is internally partitioned into three sections, and is closed at each end by a threaded plastic closing plug. The upper section, a chemical tank, is empty except for a small anchor block to which the firing pin retaining wire is secured. A small screw holds the anchor block in position. A compressed firing

spring is contained in the center section and continues into the lower section where it is seated against the firing pin. The firing pin is held in position by the firing pin retaining wire. A gum-like substance which covers the top of the firing pin spring seals the upper section against possible leakage of the chemical that activates the device. The only safety device used is a light metal sleeve inserted in the lower section between the firing pin and the detonator. The gaine is threaded into the bottom closing plug.

A small bottle of the activating chemical, cupric chloride, is carried in a separate cardboard container.

Employment: Not known. Recovery of a hand auger of approximately the same diameter as the gaine with the device strongly suggests that it can be used in preparing wells in almost any explosive charge to receive the detonator.

Operation: Remove the safety sleeve and replace the bottom closing plug. Pour the cupric chloride into the top of the device and replace the top closing plug. The resulting chemical reaction between the cupric chloride and the firing pin retaining wire weakens the wire, which finally snaps allowing the spring-loaded firing pin to impinge upon the detonator.

Firing tests conducted with the transparent firing devices using varying amounts of chemical gave the following results:

Tank one-fourth full	63 minutes.
Tank one-half full	Tank leaked.
Tank three-fourths full	53 minutes.
Tank full	45 minutes.

Corresponding tests with the brown device should give a shorter delay due to the smaller sized firing pin retaining wire which it uses.

To render safe: Destroy in situ if possible or remove the device from the charge and dispose of it immediately.

Chemical Delay Firing Device

Over-all length: 10 inches.
Maximum diameter: 2.5 inches.
Color: Black.
Material of construction: Bakelite.
Length of black powder delay: 6 seconds.

Description: The internal design of this device closely resembles that of the Japanese Navy C–1 (a) tail fuze. The bakelite outer casing houses the mechanical parts of the internal assembly. This internal assembly can be divided into three primary sections. The top section is the plunger, which has a locking detent in its side and is fitted on the bottom with two spikes for piercing the solvent tank. A safety fork, which is inserted through the outer casing and the plunger, prevents accidental depression of the plunger and the consequent starting of the delay action.

The central section contains the solvent tank, striker spring, striker, striker detent, and soluble plug. The upper end of the striker spring bears against a stud on the plunger while the lower end bears against the striker. The striker is held in the unfired position by the striker detent which is in turn held in contact with the grooved striker body by a soluble plug.

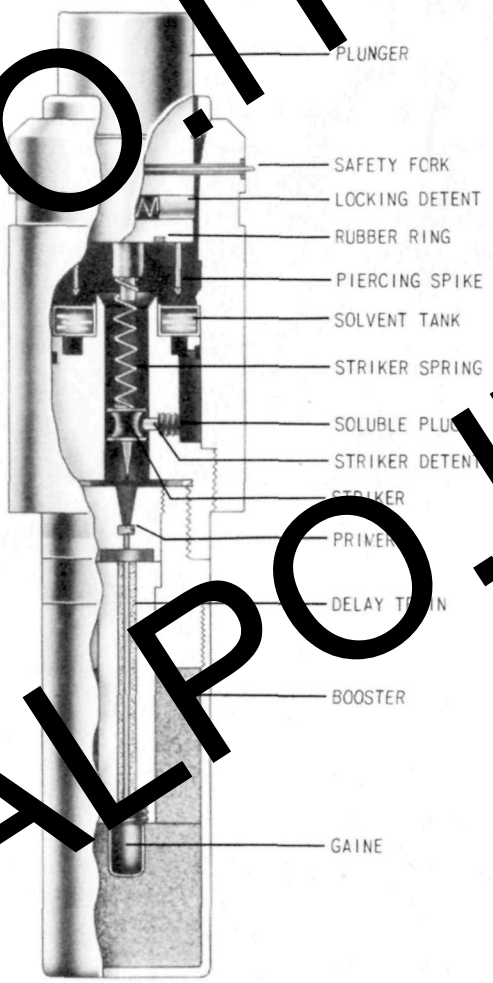


Figure 194—Chemical Delay Firing Device.

The lower section houses the firing train whose components are a primer, a pressed black powder delay train, a gaine from a 25-mm projectile fuze, and a tetryl booster.

The delay time of this device is not known as the solvent ampoule was not recovered. The purpose of the black powder delay train is also not definitely known.

Employment: Not known.

Operation: To fire, remove the safety fork and depress the plunger. This action causes the spikes on the plunger to pierce the solvent tank and release the solvent. The depression of the plunger also compresses the striker spring. The plunger is locked in the depressed position by the detent in its side which engages a notch in the outer casing. The solvent softens the soluble plug allowing the striker detent to be cammed outward to free the striker. The compressed striker spring forces the striker into the primer initiating the firing train.

To render safe: Destroy in situ if possible, otherwise remove device from charge and dispose of it immediately.

Explosive Toothpaste Tube

Length: 6.87 inches.
Width: 2 inches (approximately).
Explosive: RDX, 80.2 percent; mineral oil and wax, 19.8 percent.
Weight of explosive: 4.23 ounces.

Description: The "Tube of Toothpaste" is an unpainted, tin tube which contains an explosive filling and takes a separately packed ignition device. The tube is closed by a screwed cap.

The ignition device consists primarily of a brass plug which contains a match composition, a brass tube housing the black powder delay train, and a brass detonator tube filled with mercury fulminate over tetryl. The brass plug is threaded externally to receive a safety cap, and internally at the opposite end to take the delay tube. The detonator is crimped into the delay tube.

Operation: Remove the screw cap from the tube, insert the igniting device, remove the safety cap, and strike the match composition against a rough surface.

Figure 195—Explosive Toothpaste Tube.

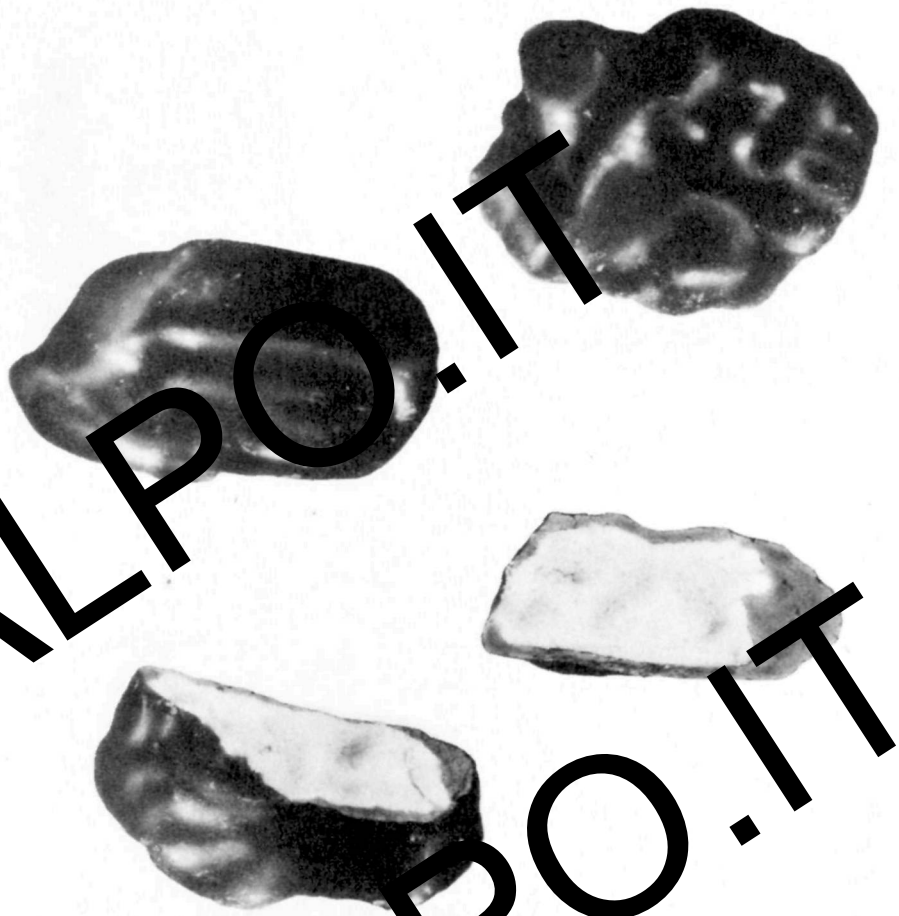


Figure 196—Explosive Coal.

Explosive Coal

Length: 3 inches (approximately).
Width: 2 inches (approximately).
Color: Black.
Explosive: RDX.

Description: These devices consist of thin earthenware containers of irregular sizes and shapes coated with a bitumin type of paint to give them the appearance of anthracite coal. Each container is filled with explosive and contains an igniter. The igniter is a copper tube with a detonator at one end and a small black powder charge at the other end placed next to the container wall.

Close examination of a single piece of explosive coal will allow identification but it is virtually impossible to detect when mixed with real coal.

Operation: When exposed to fire, the heat eventually ignites the black powder which in turn sets off the detonator and main charge.

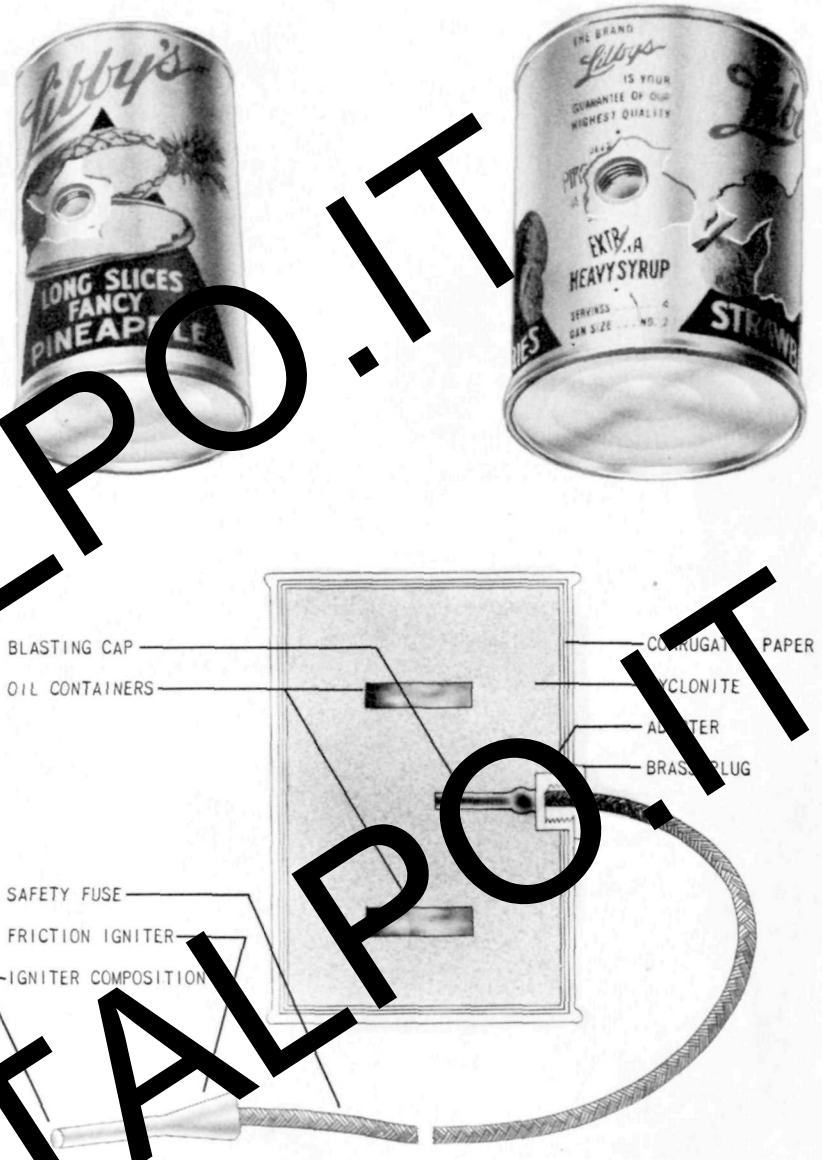


Figure 197—Explosive Food Cans.

Explosive Food Cans

Length: 4½ inches.
Diameter: 3⅜ inches.
Explosive: RDX, 78.3 percent; mineral oil, 21.7 percent.
Weight of explosive: 1.3 pounds.

Description: Three types of explosive food cans have been recovered, whose main difference lies in the spurious food labels which conceal the true nature of the can. The "tin of strawberries" is typical and consists of a standard No. 2 can filled with high explosive. The tin bears a cleverly counterfeited "Libby's Strawberries" label, which covers and conceals the threaded igniter pocket in the side of the can. This label gives the weight of the can as 1 pound 4 ounces. The interior of the can is lined with thick brown paper. Two rectangular metal containers filled with heavy mineral oil are placed in the main filling on either side of the igniter pocket.

Two smaller 14-ounce cans labeled "Libby's Long Slices Fancy Pineapple" and "Del Monte

Mixed Salad Vegetables," which are similar to the "Strawberry" can in all respects except size and label, have been recovered.

All the types of charges can be used either as sabotage devices or booby traps depending on the type of initiating system used. One common initiator has a scratch type igniter, a safety fuse delay (about 1 minute), and a detonator. Another consists of a brass sleeve containing a scratch type igniter, an integral short delay train, and a detonator. The third type of igniter consists of a brass sleeve containing a friction pull igniter, and a detonator. This last igniter has no delay and can be used only if the charge is placed as a booby trap.

Operation: The label of the can is removed or perforated to expose the igniter pocket into which the igniter is threaded. The activation of the igniter sets off the delay, if present, which fires the detonator and the main charge.

Metal Incendiary Cylinders

Length: 6¾ inches.
Diameter: 2¾ inches.
Incendiary mixture: Thermite.

Figure 198—Metal Incendiary Cylinders.

Description: These cylinders are constructed of a light unidentified metal. They are filled with thermite and have an igniter located in the center of the top section.

Four types of cylinders have been recovered which differ as to type of casings and igniters. One casing is a plain cylinder, while the other type has vents around the top to allow more rapid escape of the thermite. Both casings can be fitted with either a friction pull igniter or a scratch type igniter.

Both igniters are of conventional design and both employ a delay element and a 5-gram first fire charge of antimony sulphide, aluminum, and potassium chlorate. A circular piece of wood with rough sides is provided as a scratch block for the scratch type igniter. The block is wrapped in waxed paper and taped to the top of the cylinder on which it is used.

Operation: Place the charge and initiate the igniter. After the delay time has expired, the first fire charge and then the main incendiary charge are ignited in turn.

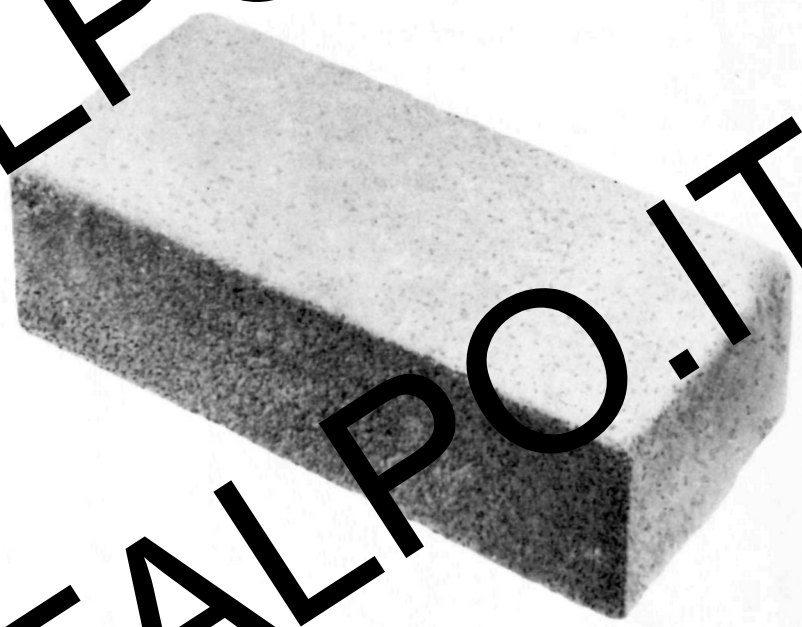


Figure 199—Incendiary Brick.

Incendiary Brick

Size: Same as standard building brick.

Incendiary mixture: Potassium chlorate, sulphur, ground coal or sugar, iron filings and wax.

Description: This device is a skillful imitation of a standard, glazed building brick to which it is comparable in size, weight, and appearance. The brick is wax coated with paint to give it a realistic finish and also allow it to be carried about without detection. There is no pocket for insertion of an igniter.

Operation: The incendiary brick is ignited in various ways, all of which are alike in principle. One method is to pour sulphuric acid and glycerine into a thin rubber tube which is weakened at one point to allow the acid to burn through quickly. When the acid burns through the tube, it drips onto a small amount of potassium permangenate which ignites the brick.

Incendiary Soap

Length: 4.17 inches.
Width: 2.67 inches.
Thickness: 1.45 inches.
Weight: 14 ounces.
Incendiary mixture: Barium nitrate, 30.4 percent; paraffin, 19.4 percent; magnesium, 11.3 percent; aluminum, 11.1 percent; rosin, 10.9 percent; ferrosoferric oxide, 9.1 percent; nitrocellulose, 4.4 percent; gritty siliceous material, 2.6 percent.

Figure 200—Incendiary Soap

Description: This incendiary bar is specifically designed to resemble a bar of "Ivory" soap. The word "Ivory" is stamped on one side and "Proctor and Gamble" on the other. The bar burns with an intense flame, but is easily extinguished by water. It is difficult to ignite.

No method of ignition has been found, but it is probable that some type of ignition device is inserted into the recess in the side of the bar.