

SECRET

TM-E9-1984

WAR DEPARTMENT

TECHNICAL MANUAL

**DISPOSAL METHODS
FOR
ENEMY BOMBS AND FUSES**

November 12, 1942

**ENEMY
BOMBS AND FUZES**

RESTRICTED

SECTION VII

JAPANESE FUZES

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| DESIGNATION | FILE NO. | TYPE |
|-------------|----------|--|
| D-1 (a) | 2522.N10 | Army Electrical Aerial Burst Nose Fuze. |
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| E-1 (a) | 2512.T10 | Mechanical Impact Anti-Withdrawal Tail Fuze. |

NATIONALITY: JAPANESE

INFORMATION DATE: October 1943

INTRODUCTIONI. GENERALA. TYPES OF FUZES:

The Japanese fuzes are of two distinctive types. The Army uses one type while the Navy uses the other type. Army fuzes are found only in Army bombs. Navy fuzes are found only in Navy bombs.

B. NOMENCLATURE:

The designation of Japanese fuzes is by letter and number. These designations are made by Allied Forces in the South-West Pacific. The "A" series of fuzes lists mechanical impact nose fuzes. The "B" series of fuzes lists mechanical impact tail fuzes. The "C" series of fuzes lists chemical fuzes. The "D" series of fuzes lists aerial burst fuzes.

The U.S. system of classification includes the alphabetical-numerical designation and a file number. The system used for deriving these numbers is explained in the preface of TM E9-1983.

1. Army Fuzes.

Army fuzes have the following characteristics:

- a. There are holes in the arming vanes for an arming wire.
- b. Safety pins are never used.
- c. Most fuzes have primer flash cap as part of the fuze.

2. Navy Fuzes.

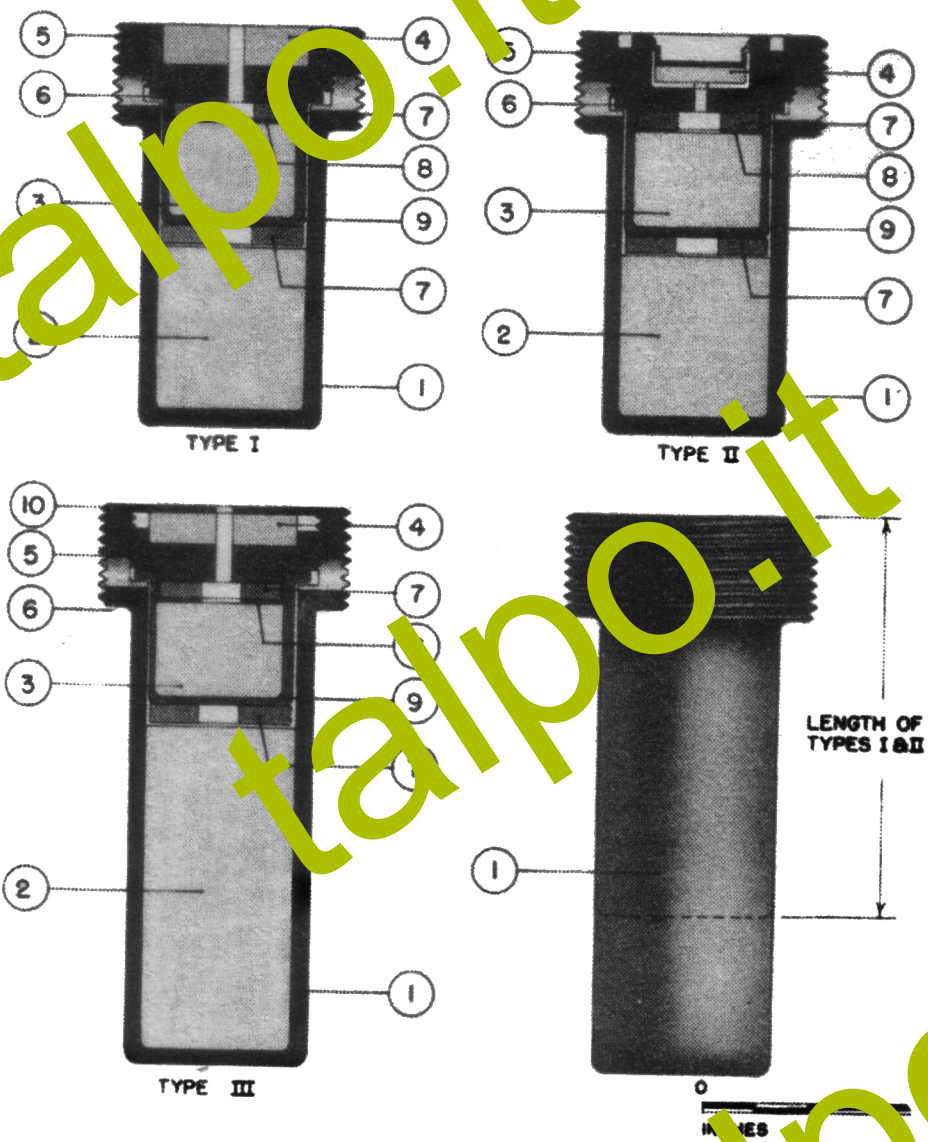
Navy fuzes have the following characteristics:

- a. There are no holes in the arming vanes.
- b. Safety pins are sometimes used.
- c. The fuzes seldom have the primer flash cap as an integral part of the fuze.

NATIONALITY: JAPANESE INFORMATION DATE: October 1943

GAINES FOR ARMY FUZES

ARMY fuzes employ different gaines from those used in NAVY fuzes. All ARMY fuzes use one of the three types shown below. Types I and II are used in nose fuzes only, while type III is used only in the tail fuzes. The latter type is approximately twice as long as types I and II (see scale). Types I and III are ignited by a flash from a primer cap in the fuze, while type II is pierced by the striker. Type I is used in all ARMY nose fuzes except A-2(b). This fuze uses type II, and is used only in bombs which do not have H.E. as the main charge (15 Kg. anti-personnel is an exception, and employs the A-2(b) fuze). Type III only is used in all ARMY tail fuzes. These gaines are usually surrounded by a booster (see A-4(a), 11(a) and C-3(a) as examples).



| LEGEND | | |
|---|--|--|
| TYPE I | TYPE II | TYPE III |
| 1. CONTAINER. 2. TETRYL. 3. FULMINATE OF MERCURY (.6 GR.) 4. BLACK POWDER MIXTURE. 5. COPPER PLUG. 6. COPPER CUP COVER. 7. FELT WASHER. 8. TIN FOIL STRIP. 9. COPPER CUP. | 1. CONTAINER. 2. TETRYL. 3. FULMINATE OF MERCURY (.6 GR.) 4. CAP. 5. COPPER PLUG. 6. COPPER CUP COVER. 7. FELT WASHER. 8. TIN FOIL STRIP. 9. COPPER CUP. | 1. CONTAINER. 2. TETRYL. 3. FULMINATE OF MERCURY (GR.) 4. BLACK POWDER MIXTURE. 5. COPPER PLUG. 6. COPPER CUP COVER. 7. FELT WASHER. 8. TIN FOIL STRIP. 9. COPPER CUP. 10. METAL WASHER COVER. |

NATIONALITY: JAPANESE

INFORMATION DATE: October 1943

COMPONENT PARTS OF NAVY GAINES AND MAGAZINES

The component parts of the standard Japanese NAVY gaines and magazines are as follows:-

a - Primer Plugs.

These primer plugs have been found in four variations:-

- a1 - Used in Type A gaines (may be in two parts) and in magazines.
- a2 - Used in Type B gaines.
- a3 - Used in Type C gaines and magazines.
- a4 - Used in Type D gaines.

The striker of the fuze pierces the primer and sets off the explosive in the next plug.

b - Delay Plugs.

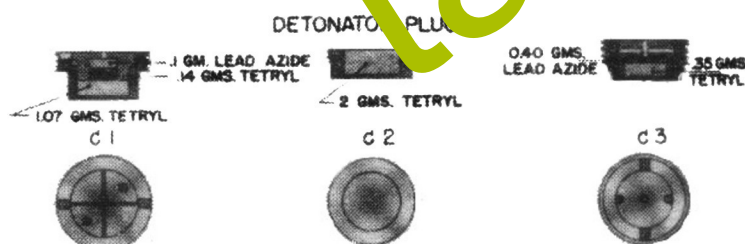
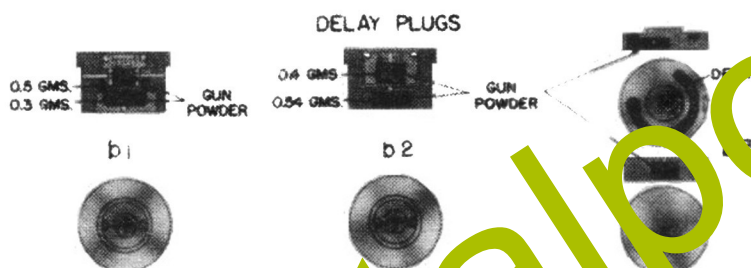
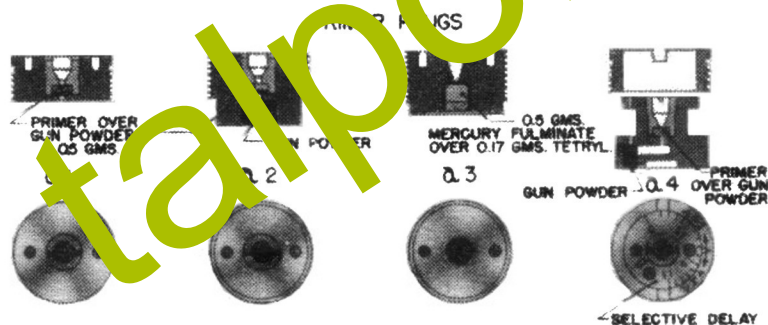
These delay plugs have been found in three variations:-

- b1 - Used in Type A gaines and magazines.
- b2 - Used in Type A gaines.
- b3 - Used in Type D gaines.

- Detonator Plugs.

These detonator plugs have been found in three variations:-

- c1 - Used in Type A and B gaines.
- c2 - Used in Type C gaines.
- c3 - Used in Type D gaines.



COMPONENTS OF NAVY GAINES AND MAGAZINES

GAINES

FILE NO. 2500.12

NATIONALITY: JAPANESE

INFORMATION DATE: OCTOBER 1943

NAVY GAINES AND THEIR USE

There are four types of gaines used by the Japanese Navy. Types A and D are used for delay action while types B and C are used for instantaneous action. The components of each gaine are illustrated. Type A gaine has been found with different delay plugs (b-1 or b-2). The detonator plug a-1 may be found in two pieces or as a single piece.

The most recent detonator plug is the a-3 which has been found in the type C gaine. This is a super-quick gaine used in the 60 Kg. G.P.H.E. Navy bomb Type 97 with the A-3(a) fuze. Type B employs the ordinary instantaneous plug, a-2.

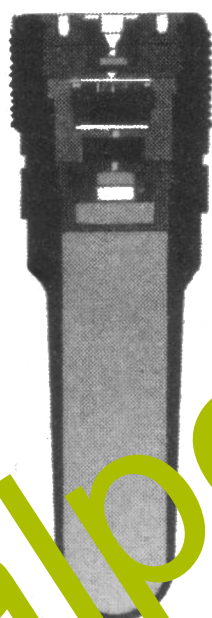
Any gaine will fit any Navy fuze which takes a standard gaine. The markings on the various gaines refer to the type, date of manufacture and use.

Type A has been found with the bottom of the gaine painted red, brown, or green on the outside. These colors have been observed only on type A gaines which always employ a delay. When the b-2 delay plug is used, the tip is red or brown. If a b-1 plug is used, the tip is painted green. The b-2 plug is believed to be of longer delay than the b-1 plug which has a delay of 0.034 seconds. In the b-3 plug, the delay may be set for 0.5 seconds, 1.0 seconds or 1.5 seconds.

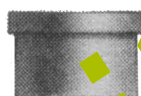
It is of interest to note that the c-2 detonator plug can be initiated by detonation only, since its explosive charge is entirely tetryl. Therefore, only the a-3 primer-detonator plug can be used with the c-2 detonator plug. This may be the reason for the superquick action which gives the "daisy-cutter" effect when used in the 60 Kg. Type '97 Navy bomb.

Navy gaines house all the necessary explosive to initiate a normal H.E. filling. They are made of brass, cadmium plated, and finished with a dull lacquer. Although all are equipped with spanner flats, they have been recovered from bombs in which they were screwed hand tight.

TYPE A



a-1
(MAY BE
ONE PIECE)

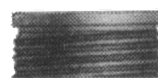
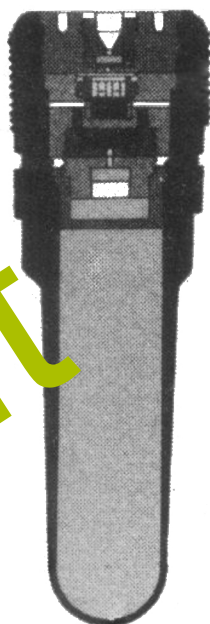


b-2



c-1

TYPE A



a-1

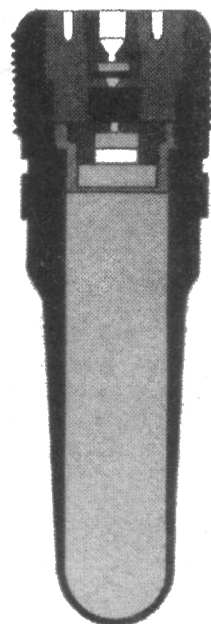


b-1

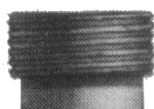


c-1

TYPE B



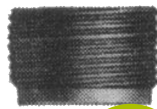
TYPE C



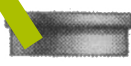
a-2



c-1

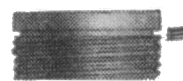
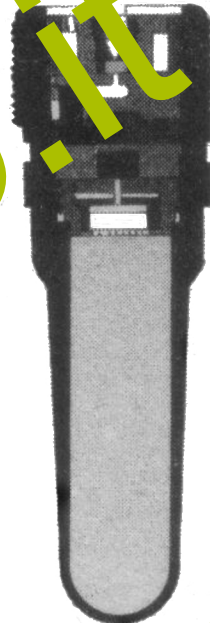


a-3

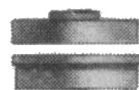


c-2

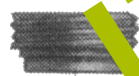
TYPE D



a-4



b-3



c-3

NATIONALITY: JAPANESE

INFORMATION DATE: October 1943

TYPES OF NAVY GAINES

There are four common types of Japanese gaines used in conjunction with NAVAL fuzes. All are interchangeable and differ only in internal construction, as may be required to fit the various components of the exploder assembly. The various gaines are partially filled by a picric acid plug which acts as the booster element, although the larger bombs will have an additional booster charge surrounding these gaines. The weights of these boosters are:-

Booster for Type A gaines - 30 grams.

Booster for Type B & C gaines - 36 grams.

Booster for Type D gaines - 27 grams.

Type A gaines is used only for delay action while Type B gaines is for ordinary instantaneous action. Type C is used to give the so-called "daisy-cutter" effect and Type D is used for a slightly longer delay than is given by Type A. These gaines are used with the following fuzes:-

| | | | |
|--------|--------|--------|--------|
| A-1(a) | B-2(a) | C-1(a) | D-2(a) |
| A-3(a) | B-3(a) | C-2(a) | D-2(b) |
| A-3(b) | | | |

White or red squares of silk are found in the bottom of each gaines. Their meanings are not known.

TYPE A.



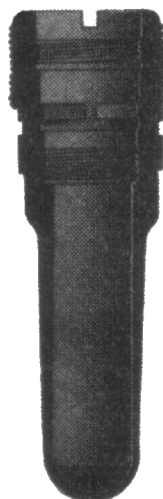
TYPE B.



TYPE C.



TYPE D.

PICRIC BOOSTERS
FOR JAPANESE GAINES.

TYPE D. TYPE A. TYPE B&C.

GAINES FOR JAPANESE NAVY FUZES.

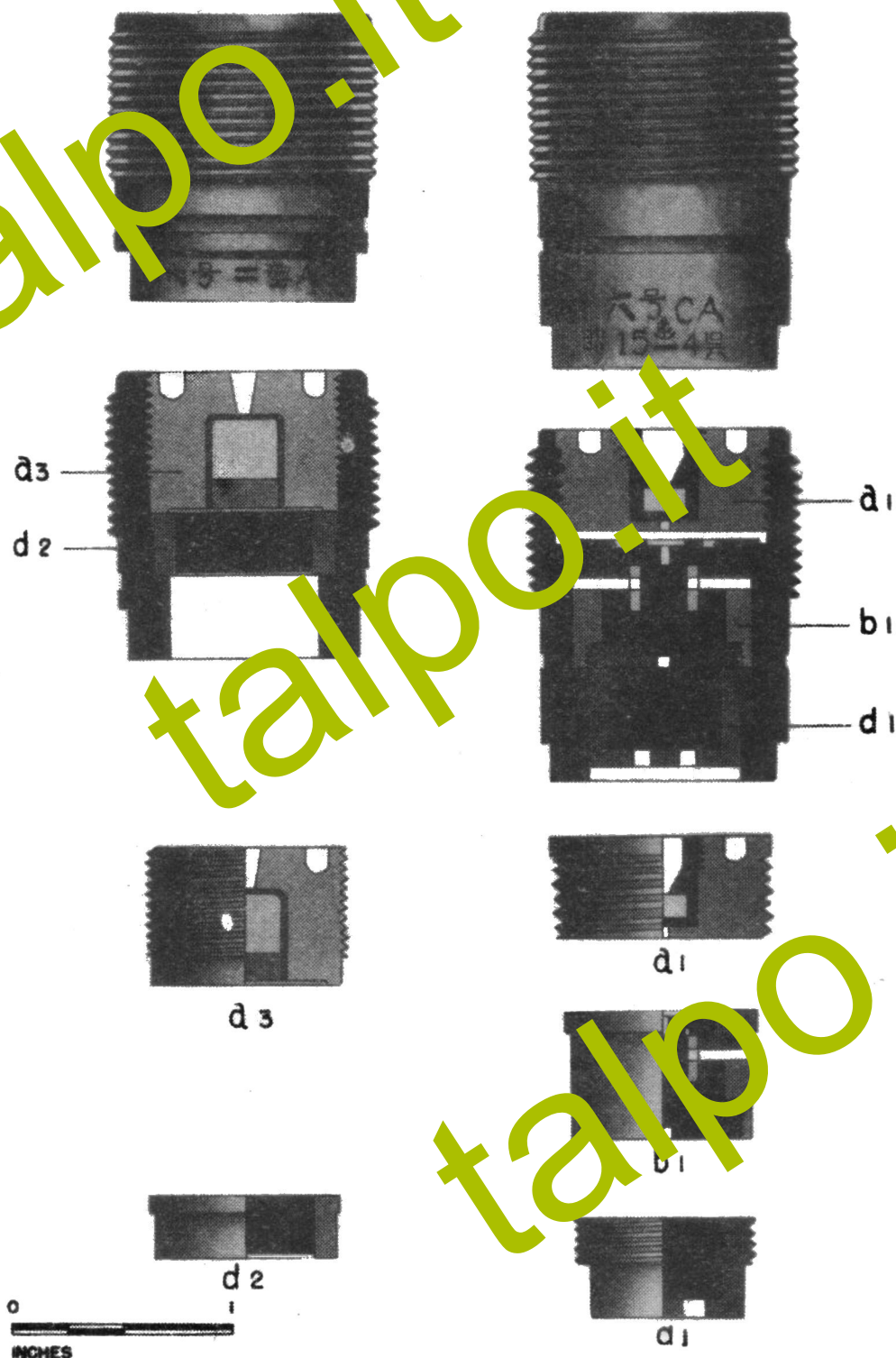


NATIONALITY: JAPANESE

INFORMATION DATE: October 1943

MAGAZINES FOR NAVY FUZES

Magazines are used only in NAVY fuzes, used to initiate Low Explosives such as black powder. They are never used with H.E.-filled bombs. Magazines can be fitted to any fuze which takes a standard NAVY gaine. Up till now, however, only A-3(a) and A-3(b) have been used with magazines. Only an instantaneous magazine with two plugs and a slight delay magazine with three plugs have been found to date. The "d" type plugs contain a large amount of gun powder and are not used in gaines. Plugs "a" and "b" are used in gaines as well as magazines. The magazine explosive is initiated by the fuze striker piercing plug "a 1" or "a 3". Magazines are generally used in incendiary bombs.



MAGAZINES FOR JAPANESE NAVY FUZES.

JAPANESE NAVY NOSE FUZE A-1(a)



FILE NO.: 2512.N40 JAPANESE NAVY AERIAL BURST NOSE FUZE D-4(a)
2512.N41 D-4(b)

(D-4(a) - Type 3 Bomb Nose Igniting Mechanism
D-4(b) - Fuze for Type O, Model 1, Parachute
Flare)

DESCRIPTION:

| | |
|--------------------|--|
| Classification | - Mechanical aerial burst nose fuze. |
| Bombs used in | - D-4(a) - Type 2 No. 6 Mk. 21 Container. D-4(b) - Type O Parachute Flare, Model 1. |
| Companion fuzes | - None. |
| Overall length | - D-4(a) - 5.75 inches. D-4(b) - 4.75 inches. |
| Overall width | - 1.406 inches. |
| Vane span | - 4.12 inches. |
| Material of body | - Steel or brass. |
| Arming time | - 26 revolutions, fires in 27 revolutions. |
| Delay setting | - May be varied by changing type of delay container. |
| Explosive train | - Primer flash cap and delay train incorporated in delay container. |
| Color and markings | - Natural brass, steel or yellow lacquer; vanes are natural steel color. One fuze "404" Other fuze "213" "4" "" stamped on body. |

CONSTRUCTION:

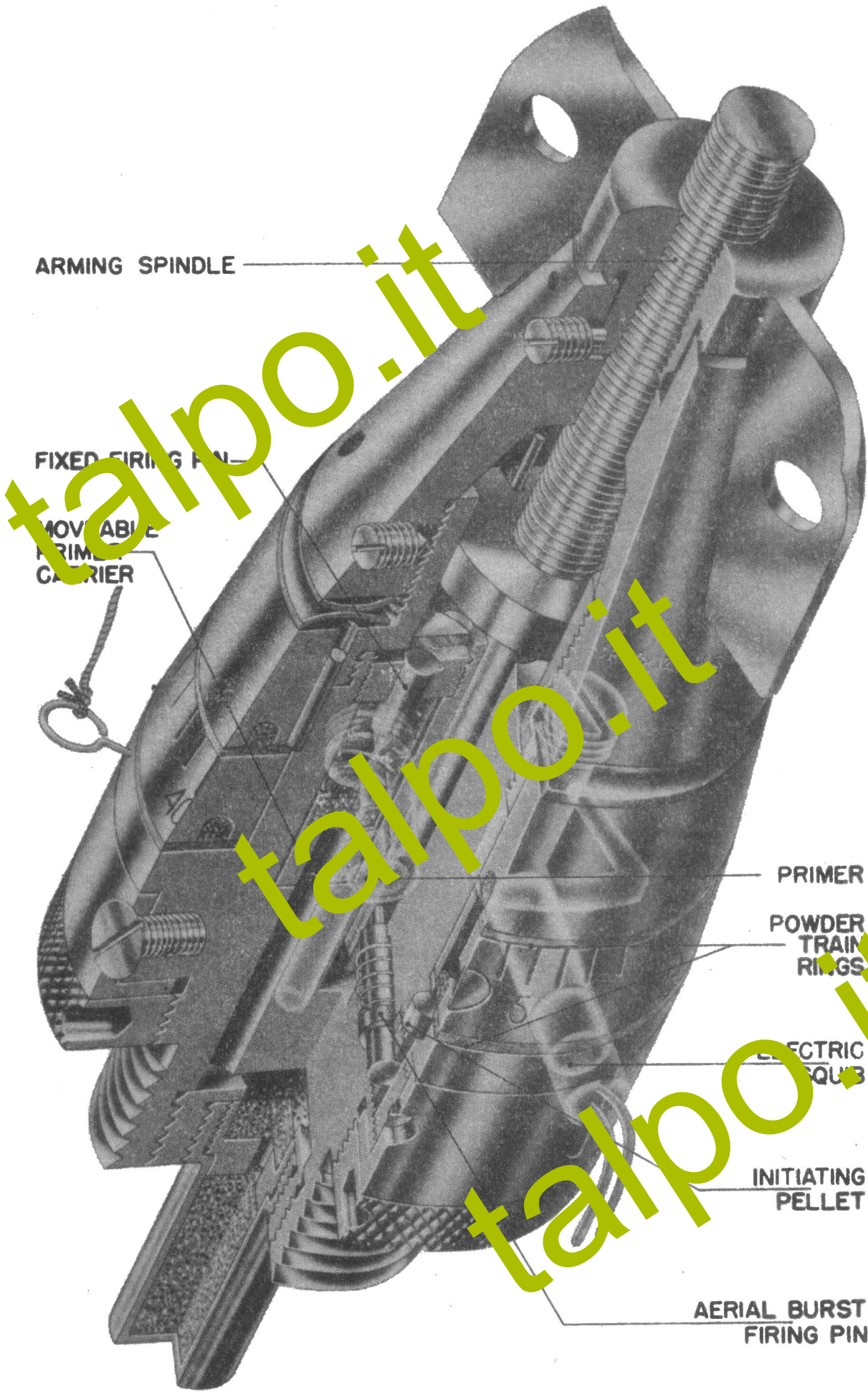
The fuze consists of three parts: The upper fuze body contains the arming spindle; the lower body housing the striker, striker retaining ball, and striker spring; and the powder delay container. The upper body is threaded internally at the base to receive the lower fuze body and threaded internally at the top to take the arming spindle. A safety screw pin threads into the upper body and extends into a hole in the arming spindle, thus preventing rotation. The lower body is threaded externally at its upper end to screw into the upper body and threaded internally at its lower end to receive the primer flash cap holder and powder delay container. The central channel of the lower body flares out at its upper end to allow the striker retaining ball to move outward during the operation of the fuze. The powder delay container is threaded externally at its upper end to screw into the lower fuze body. A six-bladed arming vane is attached to the top of the arming spindle.

OPERATION:

The safety screw pin is removed when bomb is loaded in the plane. On release from the aircraft, the arming vanes rotate and thus thread the arming spindle upward. The spindle is locked to the striker by the striker retaining ball and, moving up, pulls the striker with it, compressing the striker spring. After 26 revolutions of the arming vanes, the striker retaining ball is opposite the flared portion of the channel in which the striker rides. The retaining ball moves outward and the spindle, no longer held to the striker, threads out of the fuze body and falls away. Removal of the spindle from the striker permits the retaining ball to move inward under pressure of the cocked striker. This releases the striker which is driven into the flash cap by its spring. The flash cap sets off the powder delay container.

JAPANESE ARMY NOSE FUZE

D-5 (A)
D-5 (B)



JAPANESE ARMY AERIAL BURST NOSE FUZE D-5(a) & D-5(b)

(D-5(a) - Type I Aerial Burst Nose Fuze;

D-5(b) - Type I Combination Nose Fuze

for Black Powder Bursting Charge.)

DESCRIPTION:

| | | |
|--------------------|---|---|
| Classification | - | Electrical Aerial Burst (or impact) nose fuze. |
| Bombs used in | - | D-5(a): 15 Kg., 30 Kg., 50 Kg., 100 Kg., H.E. Bombs. 50 KG Incendiary Bombs D-5(b) 12 Kg. Army Parachute Flare. |
| Companion fuzes | - | D-5(a): B-1(a), B-1(b) D-5(b): None. |
| Overall length | - | 10 inches. |
| Overall width | - | 2. inches. |
| Material of body | - | Brass. |
| Arming time | - | 13 Revolutions of arming vanes. |
| Delay setting | - | 3 to 40 seconds. |
| Explosion train | - | D-5(a): Army H.E. gaine. D-5(b): Black powder filled magazine. |
| Color and markings | - | Brass. 昭十八七 東 ☆ Bomb Fuze 昭十八 阪 ⅈ Flare Fuze |

CONSTRUCTION:

The vane hub is secured to the upper fuze body by two grub screws. This allows the vanes to rotate; yet prevents the vanes from falling away. The upper fuze body threads onto an internal adapter ring which in turn screws around the lower fuze body. Two powder train rings slip down over the lower fuze body. The upper ring is fixed, being locked to the upper fuze body by a key pin. The lower ring is moveable and graduated for 3 to 40 seconds delay. The squib retaining collar is an "L" shaped ring fitting around the lower fuze body. A knurled arming ring threads onto the lower fuze body and serves to lock the fuze in the bomb. The arming spindle is threaded at the upper end to turn through the vane hub and is slotted at the lower end to prevent the aerial burst firing pin access to the primer. In the unarmed position the arming spindle flange holds the moveable primer carrier down and away from its fixed firing pin by bearing against the safety arm of the carrier. An electric squib, with two insulated copper wires terminating in a wipe contact rod, fits into the lower fuze body.

OPERATION:

On release, the wipe contact rod is pulled through the plane's contact points, firing the squib and thus initiating the powder train rings. Rotation of the arming vanes causes the arming spindle to move up, freeing the aerial burst striker and moveable primer carrier. When the powder train has burned its course, the explosion of the initiating pellet drives the firing pin against the creep spring and into the primer. A delay pellet transmits the flash to the black powder magazine or H.E. gaine. If aerial burst fails or impact occurs between the arming time and before the aerial burst feature operates, the moveable primer carrier will move forward against its creep spring and impinge on the fixed firing pin upon impact.

REMARKS:

The D-5(a) fuze differs from the D-5(b) in: (1) An H.E. gaine and adapter ring instead of a black powder magazine, (2) No impact firing feature is present.

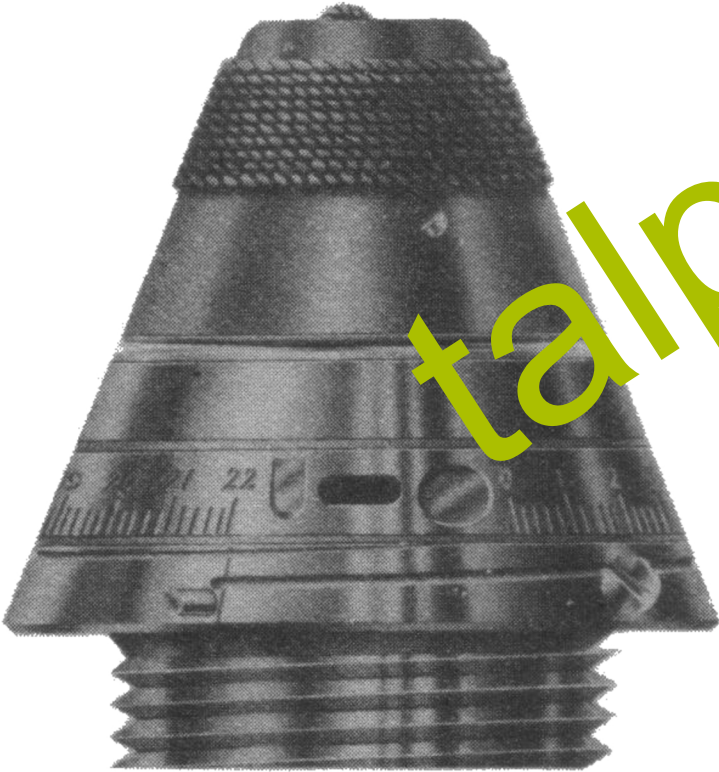
JAPANESE ARMY NOSE FUZE

IGNITER STRING

DETONATOR

GARDBOARD

TIME
RINGS



DESCRIPTION:

| | |
|--------------------------|---|
| Classification | - Mechanical aerial burst nose fuze. |
| Bombs used in | - Propaganda bombs. |
| Companion fuzes | - None. |
| Overall length | - 2.875 inches. |
| Overall width | - 2.875 inches. |
| Material of construction | - Brass except for plastic composition nose piece. |
| Threads | 10 threads per inch. 1.85 inches diameter. |
| Delay | - Setting scale graduated 0-22 seconds. |
| Explosive train | - Match composition igniter, black powder delay, black powder magazine. |
| Color and markings | - Natural brass lower body, mottled brown plastic-fiber composition nose piece. |

CONSTRUCTION:

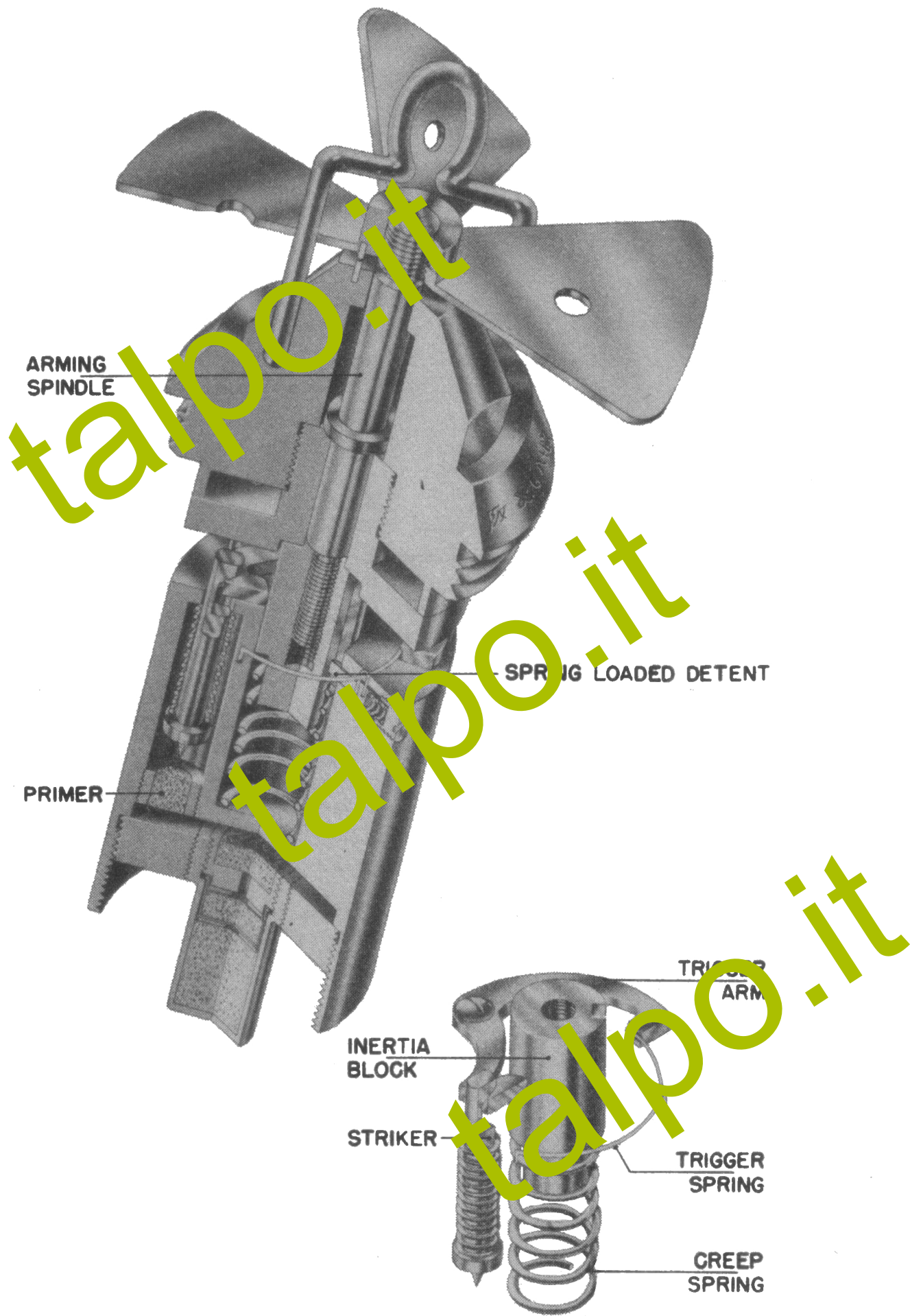
This fuze is a modified form of the 3rd year time-impact projectile fuze modified in the following details:

The moveable primer carrier and creep spring are removed and replaced with a cardboard cylinder to act as a spacer; the upper fuze body above the time rings has been replaced by a mottled brown plastic-fiber composition nose containing the pull igniter; the time firing pin has been filed flat. A grub screw secures the nose piece to the fuze body. There are two time rings; the upper one fixed, and the lower one moveable. The setting dial is graduated from 0 to 22 seconds in increments of 1/5 of a second. Through the center and top of the nose piece is an igniter string, the fuze end of which is attached to a pull igniter leading to a detonator. The detonator occupies the space formerly occupied by the setback primer.

OPERATION:

The time rings are set and the free end of the igniter string is attached to the plane prior to release of the bomb. When the bomb falls, the string is pulled and the match composition ignites the detonator which flashes into the powder rings. After the powder rings burn for the pre-set time, they ignite the black powder charge which in turn explodes the bursting charge of the bomb.

JAPANESE ARMY TAIL FUZE E-1 (A)



JAPANESE ARMY ANTI-WITHDRAWAL TAIL FUZE E-1(a)
(Type 1 Anti-Withdrawal Fuze)

DESCRIPTION:

| | |
|--------------------|--|
| Classification | - Anti-withdrawal Tail Fuze. |
| Bombs used in | - Army 30 Kg., 50 Kg., 100 Kg., 250 Kg., 500 Kg. Type I Time Bombs. |
| Companion fuzes | - C-3(a) |
| Overall length | - 4.625 inches (with gaine) |
| Overall width | - 2.0 inches. |
| Material of body | - Brass and steel. |
| Threads | - 1-15/16 inches diameter, 8 threads per inch. |
| Arming time | - 15 Revolutions of the vanes. |
| Delay setting | - No delay. |
| Explosive train | Primer and standard Army type gaine. |
| Color and markings | Brass. 反 7 八 + 83 |

(Osaka Army Arsenal, July 1943)

CONSTRUCTION:

The vanes, similar to those of the B-1(a), are locked to the arming spindle by a set screw. The arming spindle, housed in the upper fuze body, is attached to the arming vanes at the top by right hand threads and threads to the inertia block at the lower end with left hand threads. The spacing ring is secured by screws to the lower fuze body and screws into the upper fuze body. This serves to hold the inertia block part way down against the creep spring, reducing the distance the block has to move on impact. The lower fuze body contains the inertia block and creep spring, the spring-loaded detent, the spring-loaded striker, the primer, and gaine. The trigger arm is pivoted on a screw threaded into the top of the lower fuze body. One end bears against the trigger spring; the other in the cocked position engages the striker notch, preventing the spring-loaded striker from firing. With the fuze in the unarmed position, the trigger is prevented from pivoting by the inertia block against which it bears.

OPERATION:

On release from the plane, the vanes rotate the arming spindle clockwise, unscrewing it from the inertia block, which is keyed to prevent rotation. The flange of the arming spindle prevents the spindle and vanes from falling completely off the fuze body. On impact the inertia block moves down against the creep spring and is retained below the surface of the lower fuze body by the spring-loaded detent. The spring-loaded trigger arm is released and pivots out beyond the fuze body approximately 1/64 inch until it bears against the wall of the fuze pocket. This movement is not sufficient to release the striker and the fuze will not fire as long as it remains in the bomb.

If withdrawal is attempted, the trigger arm will move into the annular groove of the fuze pocket as the last thread of the fuze pocket is disengaged. This movement of the trigger arm releases the spring-loaded striker, firing the primer.

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