TM 9-1980

WAR DEPARTMENT TECHNICAL MANUAL

BOMBS FOR AIRCRAFT

RESTRICTED. *DISSEMINATION OF RESTRICTED MATTER.*—The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 23b, AR 380-5, 15 Mar 1944.)

WAR DEPARTMENT • NOVEMBER 1944

WAR DEPARTMENT TECHNICAL MANUAL

TM 9-1980

This manual supersedes TM 9-1980, 3 June 1942; TM 9-330, 25 March 1942; TB 1980-2, 11 June 1942; TB 1980-4, 13 August 1942; TB 1980-5, 29 August 1942; TB 1980-6, 13 August 1942; TB 1980-7, 15 October 1942; TB 1980-8, 7 November 1942; TB 1980-9, 23 December 1942; TB 1980-10, 28 January 1943; TB 1980-11, 4 February 1943; TB 1980-12, 11 June 1943; TB 1980-13, 14 September 1943; TB 1980-14, 17 September 1943; TB 1980-15, 30 September 1943; TB 1980-16, 8 September 1943; TB 9-1980-17, 4 January 1944; TB 9-1980-18, 1 February 1944; TB 9-1980-19, 2 February 1944; TB 9-1980-20, 15 February 1944; TB 19-1980-21, 22 March 1944; TB 9-1980-22, 5 May 1944; TB 9-1980-23, 8 May 1944, TB 9-1980-24, 6 June 1944; TB 9-1980-25, 15 June 1944; TB 9-1980-26, 20 July 1944; and TB 9-1980-27, 29 June 1944.

BOMBS FOR AIRCRAFT

WAR DEPARTMENT • NOVEMBER 1944

RESTRICTED. *DISSEMINATION OF RESTRICTED MATTER.* The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 23*b*, AR 380-5, 15 Mar 44.)

United States Government Printing Office
Washington : 1944

WAR DEPARTMENT,

WASHINGTON 25, D. C., 15 November 1944.

TM 9–1980, Bombs for Aircraft, is published for the information and guidance of all concerned.

[A.G. 300.7 (21 Jun 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

As prescribed in paragraph 9a, FM 21–6: R & H 1(6); Bn1(4); IBn 9(2); IC 3(5), 9(10); Armies (10); Corps (10); Sv C (10) Depts (10); D (2); Arm & Sv Boards (2); Tech Svs (2); P, C, and Stas (1); ROTC's (1); Gen & Sp Sv Schools (10); Ord Decentralized Sub-Offices (3); Ord Dist Offs (5); H & R Points (5); PE's "Mark for Ord O" (5); Ord Reg Off (3); Ord Dist Br O (3); Ord Establishments (5); Ord Tk Dep (3).

IBn 9: T/O & E 9–15.

IC 3: T/O & E 3–117; 3–457; 3–418; 3–47; 3–417; 3–67; 3–500 Chemical Composite Co; 3–47.

IC 9: T/O & E 9–17, Ord Amm Co: 9–17, Ord Amm Co Avn; 9–57, Ord Dep Co; 9–57, Ord Dep Co, Avn; 9–177; 9–179; 9–187; 9–257; 9–417; 9–417–S–PC.

For explanation of symbols, see FM 21–6.

CONTENTS

WHEN YOU HANDLE BOMBS 100% IS THE ONLY PASSING MARK

In the next few pages are outlined some of the basic precautions you should know if you are going to have anything to do with bombs for aircraft.

These are illustrated by procedures with *typical* bombs and fuzes.

But remember: "typical" does not mean "invariable." There are many kinds of fuzes, many kinds of bombs. They differ—sometimes in small details that are very important to *your* safety.

So: learn these facts—but when you are going to deal with some particular bomb or fuze, *look it up* in Part Three, the main section of this manual, and be *100% right.*

PART ONE

PRECAUTIONS

1. **GENERAL.** Bombs contain explosives of terrific power, set off by fuzes that are sometimes supersensitive when armed. They must be handled with understanding and respect.

A bomb consists of three main parts: (1) the bomb body with its explosive or chemical content, (2) a fin assembly to keep it straight in flight, and (3) a fuze to explode it at the proper moment.

Usually, but not always* these three parts are assembled together into a "complete round" just before hoisting into the bomb bay of an aircraft. Putting on the fins is a relatively simple matter.

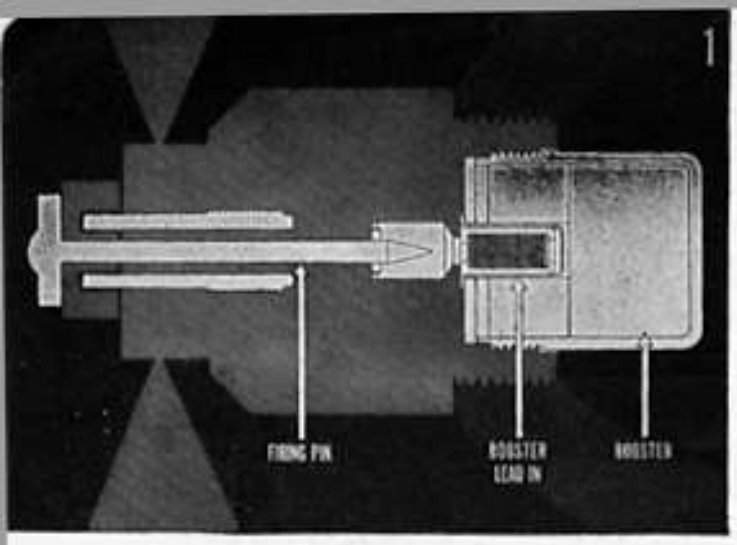
Two other steps require the closest care and attention to avoid possibility of disaster as well as to insure perfect functioning of the bomb:

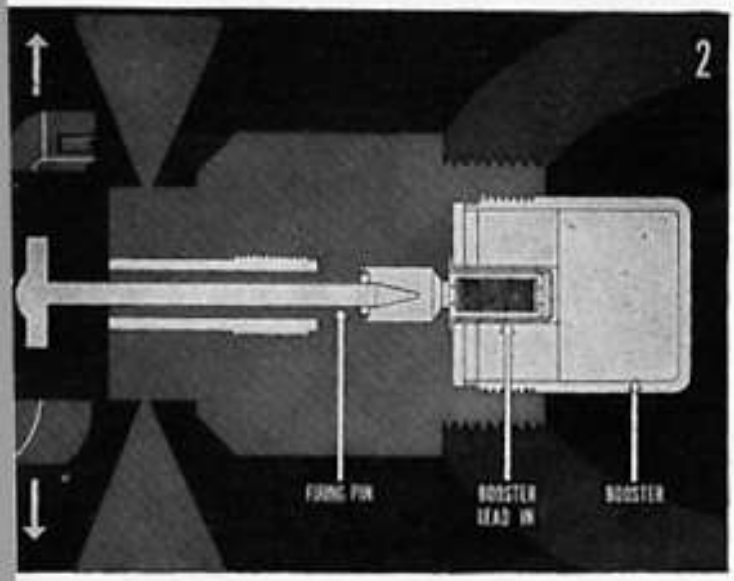
Fuzing: the insertion of fuzes into bomb bodies.

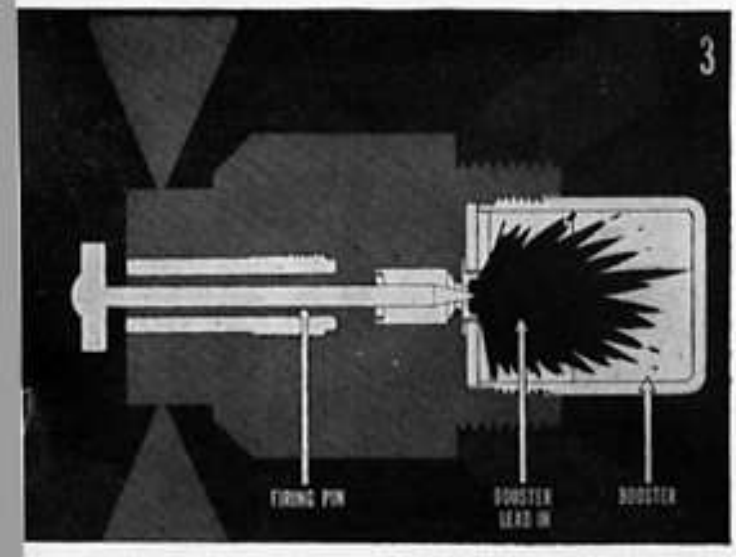
Arming wire assembly: the arrangement of a wire with its accessories to keep a bomb "safe" till it is dropped. Withdrawal of the arming wire at the instant of dropping sets or "arms" the fuze so that it will explode the bomb as planned.

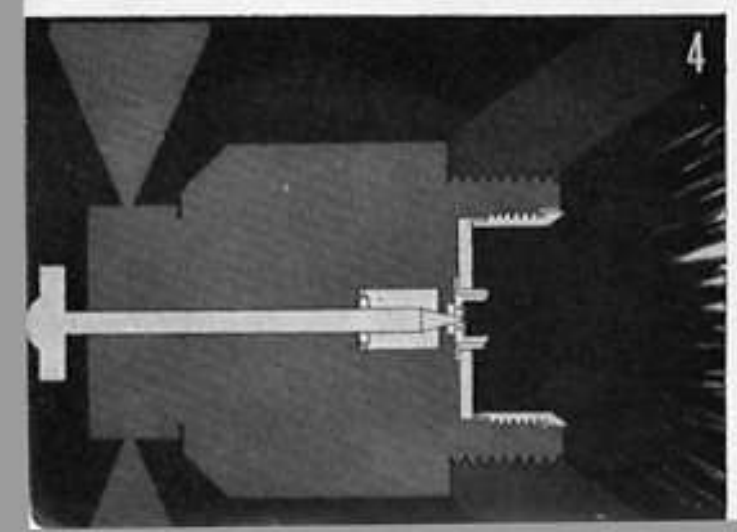
First it is well to know how a bomb functions.

*Remember: in this section, nearly any explanation must be qualified by "usually, but not always." Part Three will show you how many exceptions there are.









HOW A BOMB WORKS

2. THE EXPLOSIVE TRAIN. A bomb body is filled with high explosive, one characteristic of which is that it is insensitive to ordinary shock and heat. To make it detonate, a smaller quantity of more sensitive explosive must be detonated in immediate contact with it.

In a small-arms cartridge, smokeless powder, relatively insensitive, is ignited by the very small but very sensitive *primer*. But with even-more-insensitive explosives like TNT, a small primer is not enough; it has to be *amplified* by a detonator of less sensitivity and larger quantity. In the larger type of bombs, this in turn has to be amplified by a "booster" of medium sensitivity and medium quantity. The booster is often a part of the fuze, as shown in the diagrams at right. In very large bombs there may be a succession of boosters.

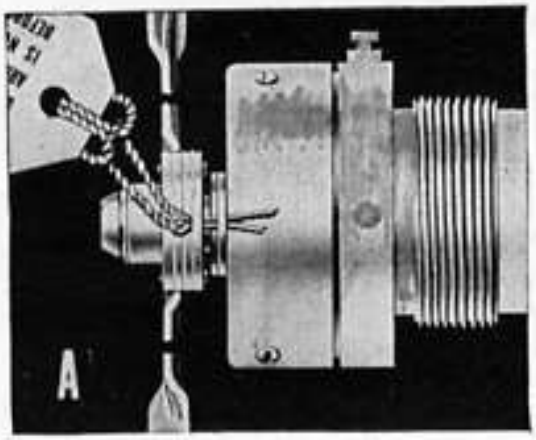
The succession of charges from primer to main explosive charge is called the "explosive train." Its action is diagrammed at left.

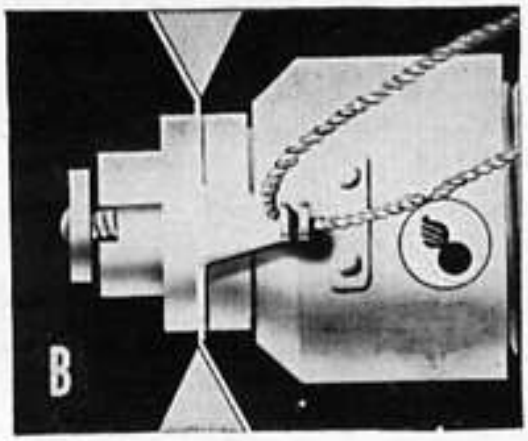
Figure 1 ① The bomb is in flight, but the arming action (in this case a propeller-like vane, spinning in the air stream) still holds a collar between the striker head (with its firing pin) and the primer.

② Now the collar has been released and flies off in three parts.

③ The bomb has struck; the firing pin is forced into the primer, which detonates the booster lead-in. This in turn detonates the booster.

④ The booster's detonation sets off the bomb's main explosive charge.





SAFETY DEVICES

3. HOW A FUZE IS SAFEGUARDED FROM PREMATURE FIRING.

Fuzes must be sensitive at the moment of action—but safe till then. So, like the trigger mechanisms of rifles, they have devices to keep them from premature action.

Figure 2. The *safety cotter pin* (A) or a *car seal* (B) is always kept in place during shipment and storage, and right up to the time of loading the assembled bomb in an aircraft starting on a mission.

The *arming wire* (C) takes the place of the safety pin when the bomb is loaded for a mission. It performs the same function in the same way, but is so rigged (page 8) that the bomb dropping mechanism, if set for the purpose, can automatically pull the end of the arming wire out of the fuze as the bomb is released.

Arming actions (C and D) present in most fuzes, further safeguard the bomb until a predetermined time after it has left the aircraft. These may be mechanical devices (schematically illustrated opposite) or powder trains or other devices described in paragraph 21 of Part Three.

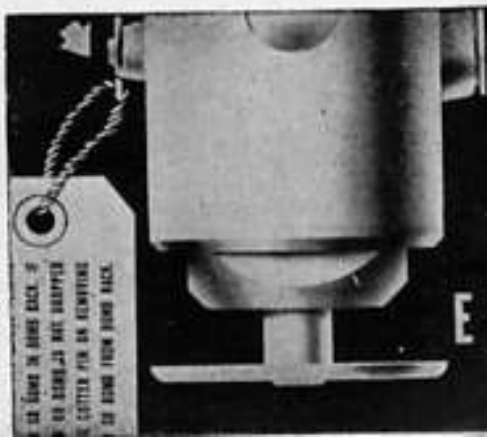
Arming. The successive removal of the blocks interposed by safety pin, arming wire, and delay mechanism are said to *arm* a fuze:

The safety cotter pin is withdrawn by hand, the arming wire being substituted for it.

The arming wire is pulled away as shown on page 8.

Some fuzes are now fully armed, ready to explode on impact. Otherwise, in delayed arming fuzes:

The arming action functions for its assigned interval of time until all obstacles are removed, so that the fuze is fully sensitive, ready to touch off the bomb. There are two principal kinds of arming action: The *arming vane type* (D) by which a small, propeller-like vane, spinning in the air stream, disengages the safety devices of the fuze; and the *arming pin type* (B) by which withdrawal of the arming wire usually sets off a delay element that may be a time mechanism or a burning powder train.

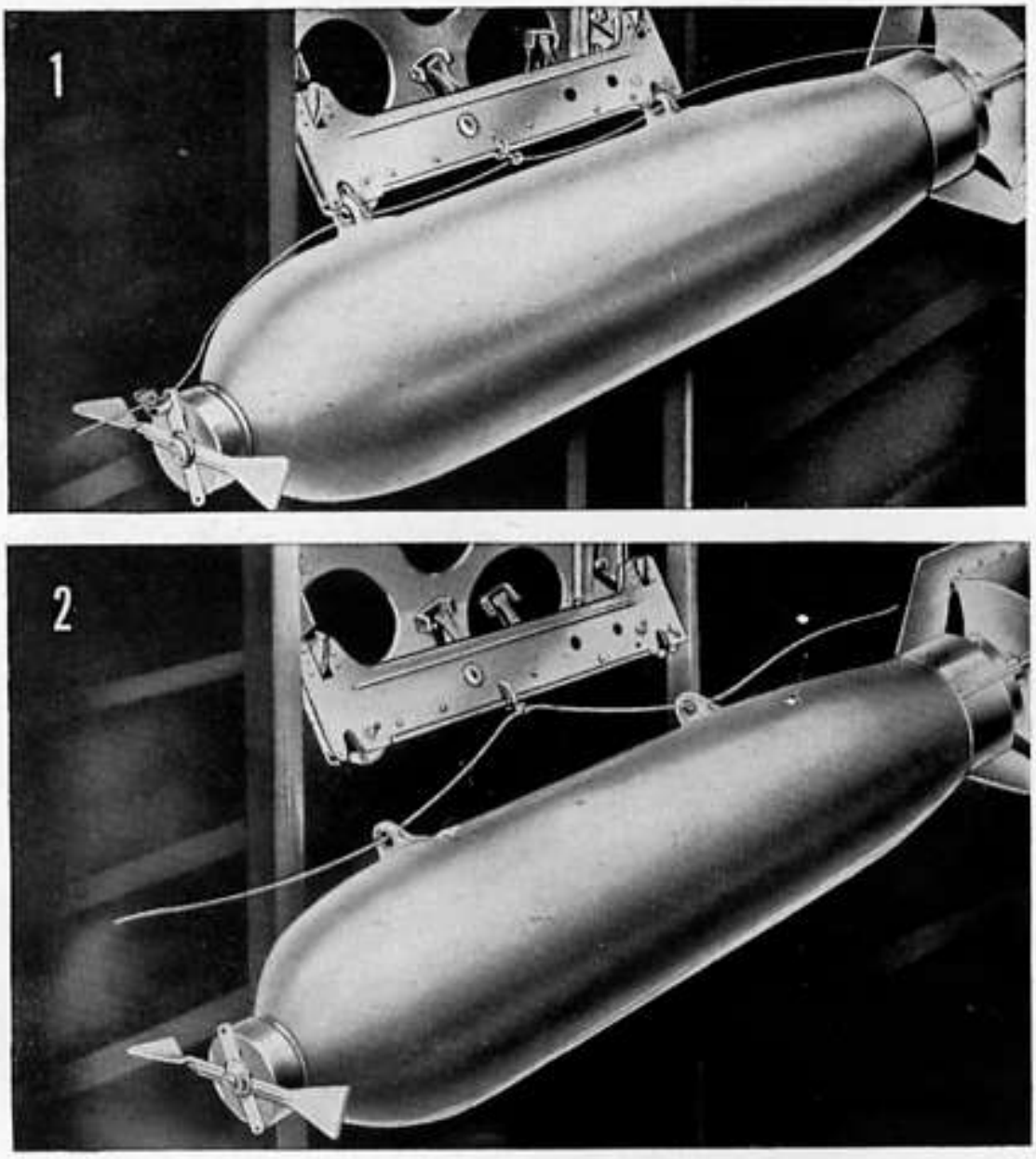


HOW THE ARMING WIRE WORKS

(Shown with an arming-vane type fuze. Principle is the same with arming-pin type fuze.)

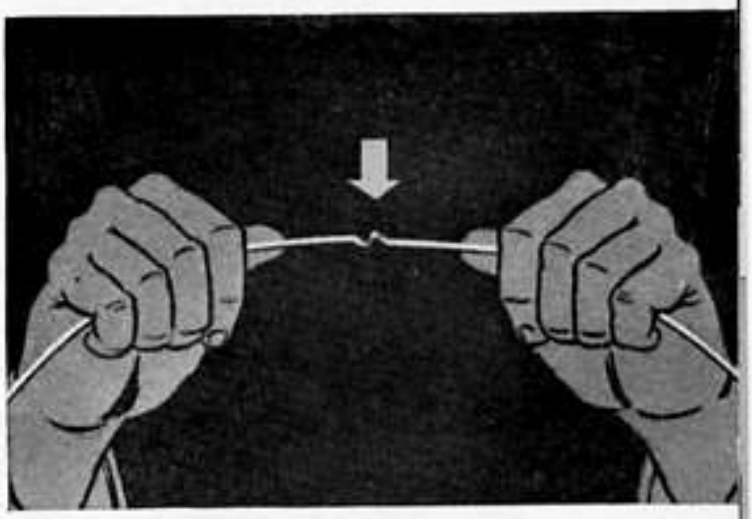
Figure 3 ① Bomb hanging from its shackle in the bomb bay. Fuzes in nose and tail are "safe" until their propeller-like vanes are spun by the air as the bomb falls, disengaging the safety devices of the fuze. Here, they cannot spin because they are kept from turning by ends of the arming wire. Notice that the arming wire is gripped at its mid-point by a pawl in the shackle.

② Now the bomb has been released with controls in the "armed" position. The pawl holds onto the arming wire; jerks it clear of the vanes; the vanes begin to turn; when they have disengaged the safety devices, the fuzes will be armed. If the controls had been at "safe" the pawl would have let go of the arming wire, which would have stayed with its bomb as it fell, kept the vanes from turning and prevented the fuzes from arming.

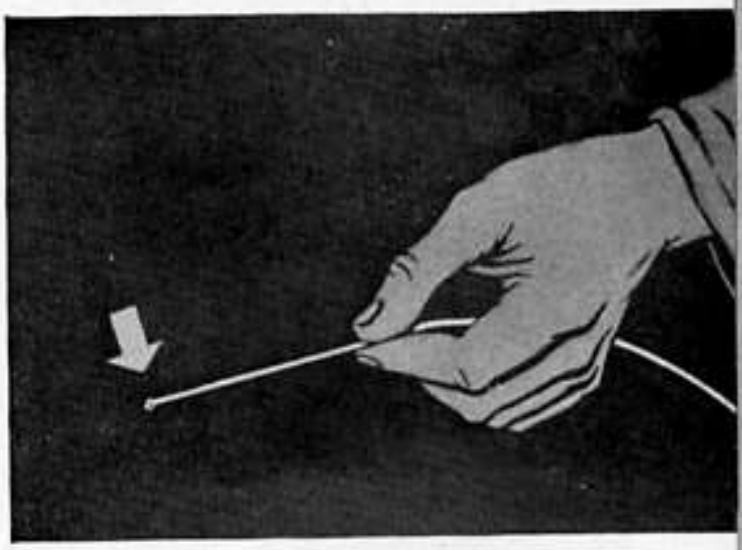


4. BE SURE ARMING WIRES ARE IN PERFECT CONDITION. Success or failure of a bombing mission may literally hang on the condition of the arming wire of one bomb.

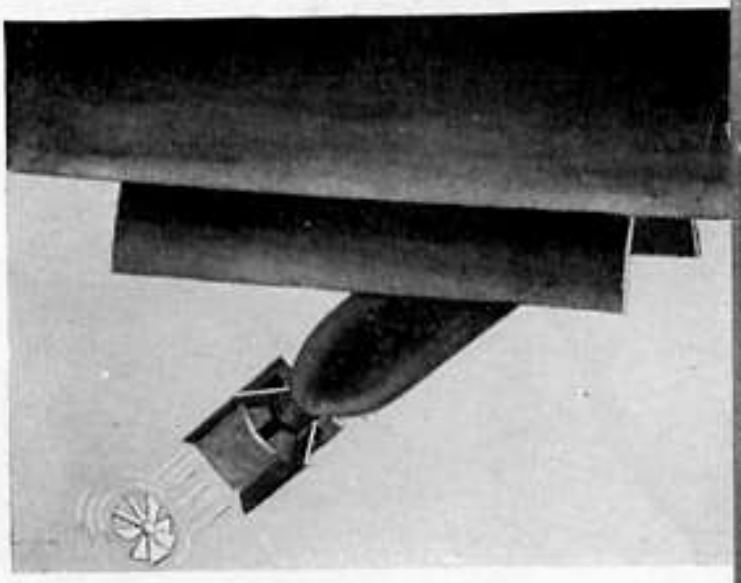
Figure 4 ①. Never, under any circumstances, use an arming wire in which there is any kink or twist.



②. Often, when cutting off the end of an arming wire, a bur is formed. Never use a wire with a bur at the end. Remove bur with a file, or re-cut the end so that there is no bur. Sometimes, damage to the wire forms a bur at another point. *File off all burs.*

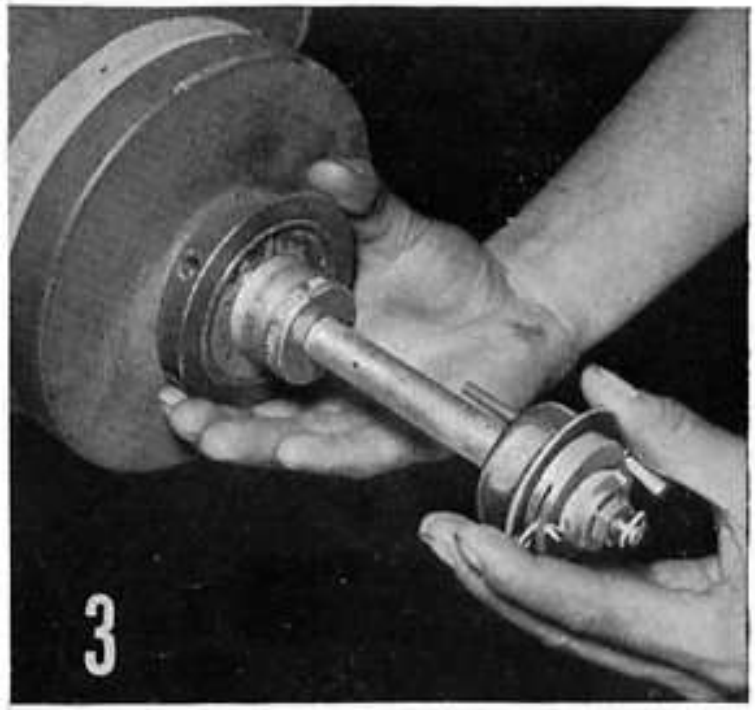


③. One kink, twist or bur, even though seemingly too small to be important, may cause a bomb as heavy as 700 pounds in weight to hang in the bomb bay after release. If this happens, deadly danger may be ahead. When a "hung bomb" is suspended, the slip stream or air current in the bomb bay may spin the arming vane, thus arming the other fuze. Only a slight jar—as in landing — may then cause an explosion destroying crew and plane.

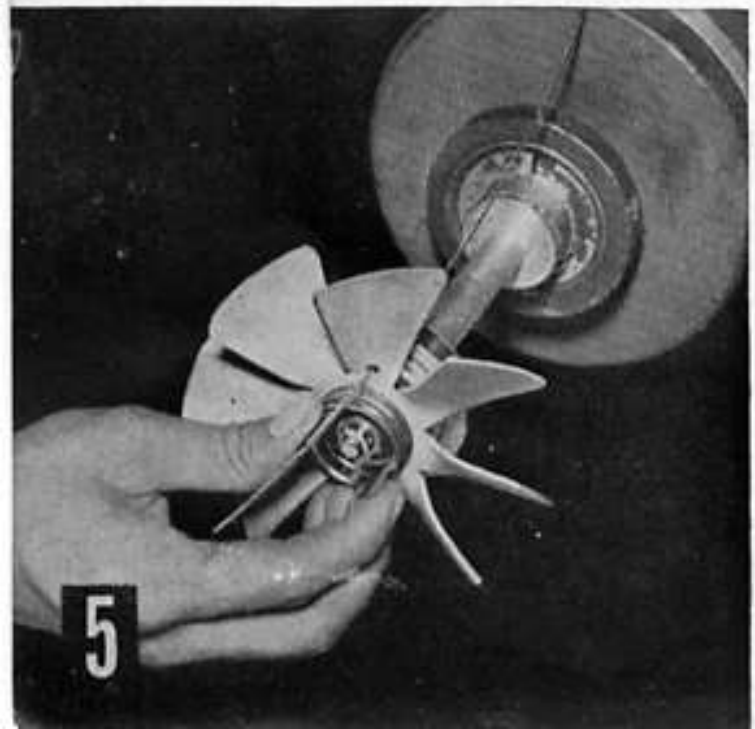


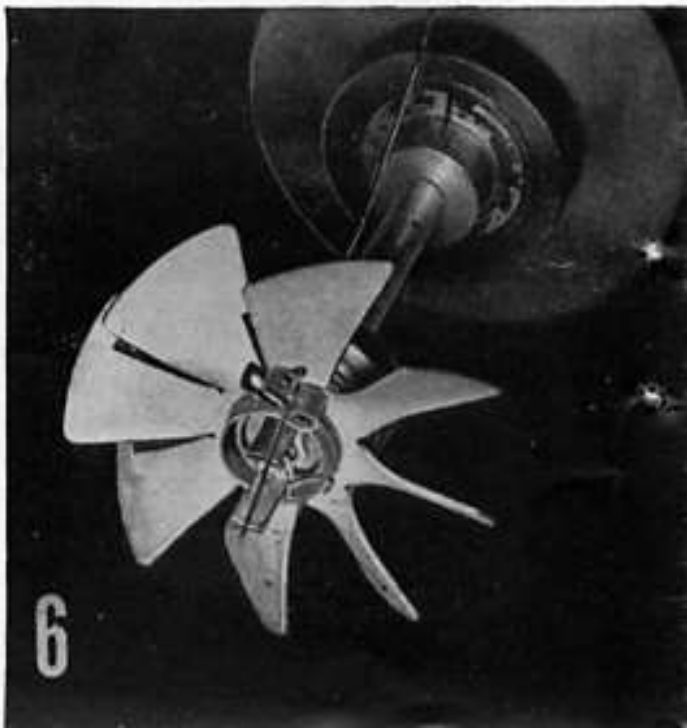

1


2


3


4


5


6

HOW TO INSERT A TAIL FUZE

5. BASIC PROCEDURE. The approved method is demonstrated with fuze AN–M101A1. Some fuzes require additional steps, as described in detail under each fuze in Part Three.

Figure 5. ①. After removing tail plug, wipe threads carefully, and attach fin assembly.

②. Remove cotter pin (A) in the fuze body. (Most fuzes cannot be inserted with this pin in place. Some fuzes have several pins; some none.)

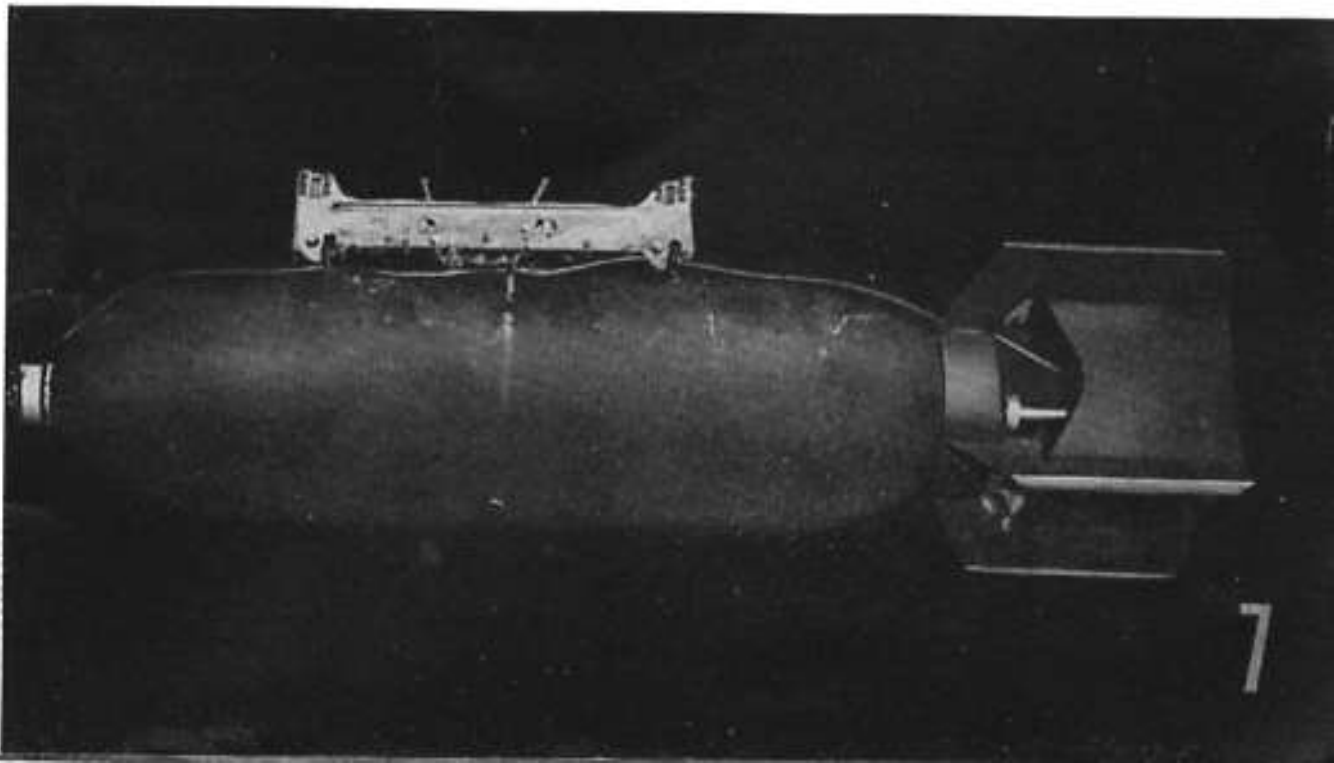
③. Screw fuze into place, holding other hand below to guard against dropping or bumping detonator against bomb body. Screw in handtight. Never tighten with wrench or any other tool unless specifically directed to do so.

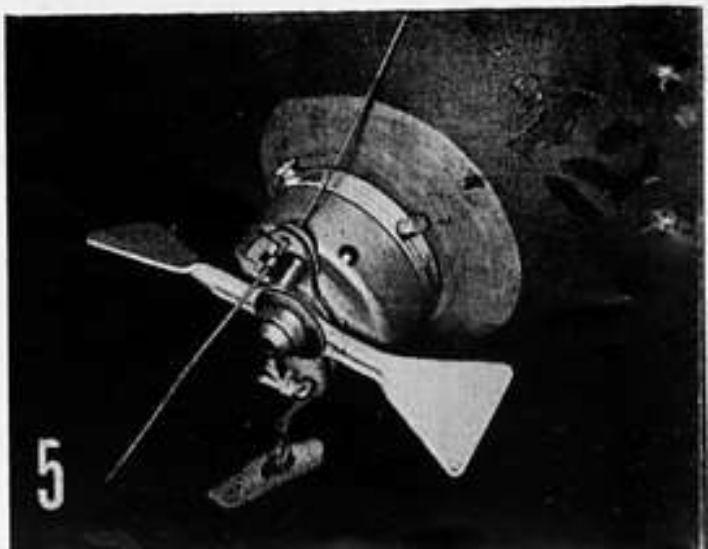
④. Remove car seal from outer end of fuze.

⑤. Thread arming wire into place and put on vane.

⑥. Put safety clip in position just touching vane. Cut off excess arming wire so as to allow only 2½ to 3 inches to extend. It must be free of kinks and burs.

⑦. *The complete round* as it hangs from shackle in bomb bay. Ordinarily fin is attached while nose and tail fuzes are being taken from containers. Nose and tail fuzes are attached simultaneously by different members of the fuzing crew.





HOW TO PUT A NOSE FUZE IN PLACE

6. TYPICAL BASIC PROCEDURE. The approved method is demonstrated with fuze AN–M103. Other fuzes differ in detail. Some require additional steps. These are described for each fuze in Part Three.

Figure 6 ①. After removing nose plug, inspect threads and wipe out any grease and dirt.

②. Remove fuze from sealed container. (*Important*—keep the container in event fuze has to be repacked.)

③. Screw fuze in place handtight. Always cup hand to guide fuze and to guard against dropping. A hard bump can explode detonator. Never tighten with a wrench or other tool unless specifically authorized.

④. Put vane in place by pressing center bushing. This avoids possible distortion of blades.

⑤. Thread arming wire through upper eyelets. Attach safety clip (A). Allow arming wire to extend 2½ to 3 inches. Arming wire must be free of kinks and burs.

EXTRA-IMPORTANT CAUTIONS

7. DON'T FOOL WITH ARMED FUZES. Primer detonators (at right) contain explosive extremely sensitive to shock—and, as a rule, sensitive to heat. They are not a hazard if properly handled—but:

Do not let detonators drop, no matter how small a distance!

Do not strike them, or permit them to strike anything!

Never withdraw an arming wire from a fuze, except when an explosion of the bomb is desired, or when a complete round is to be unfuzed—as on an aircraft's return from mission with bombs not dropped. In this case **NEVER FAIL** to replace safety pin *before* or *immediately after* removing the arming wire.

Any fuze which has become armed, accidentally or otherwise, may be *extremely dangerous!* Some fuzes, when armed, are so sensitive that a jar *in any direction* equivalent to a drop of *one inch* will explode them! The best rule is to *let them alone* for properly qualified Ordnance personnel to deal with. See description of the various fuzes in Part Three.

Figure 7. Short delay primer detonators have a single wide knurled band.

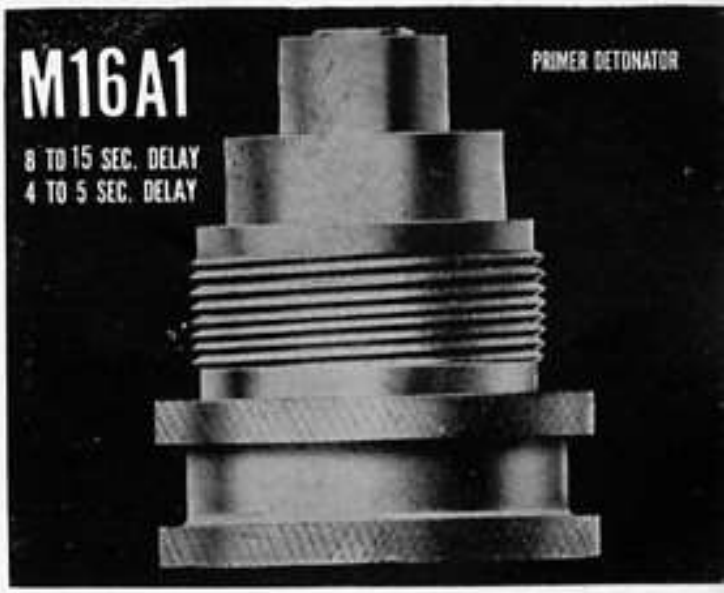


Figure 8. Long delay primer detonators have two narrow knurled bands.

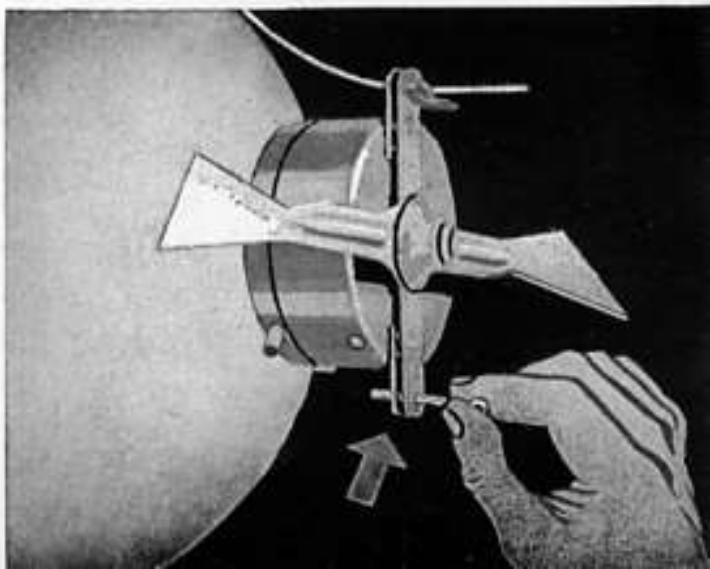
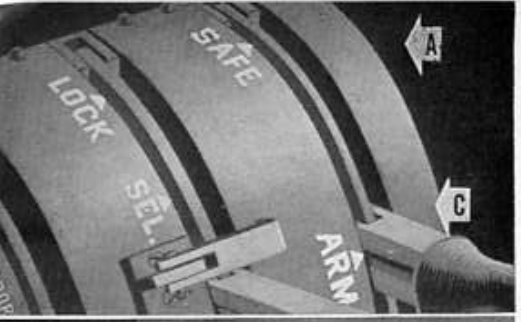


Figure 9. Replace safety pin *before* or *immediately after* removing the arming wire.



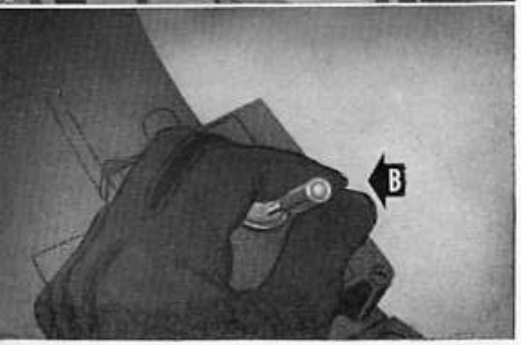
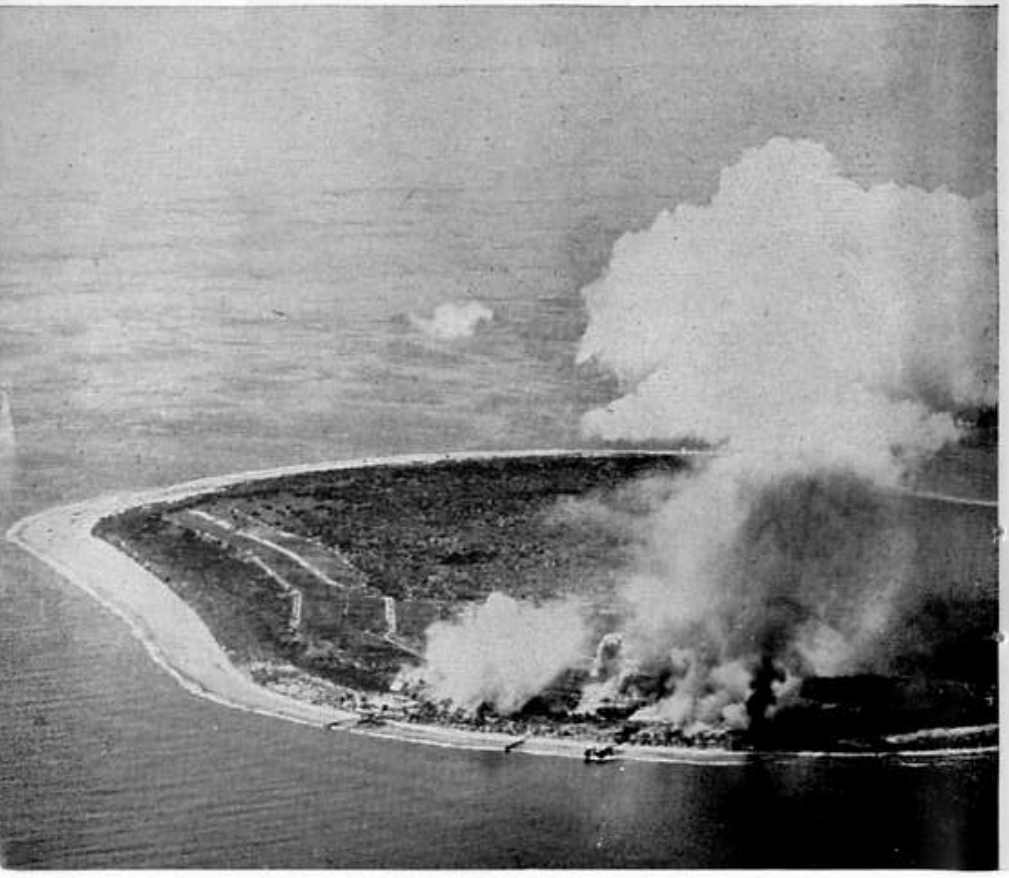


Figure 10. A. It is vitally important that bombardier set arming control to proper "armed" position prior to release of bomb. When bombs are to be dropped on enemy targets, arming control must be set at armed position. B. "Bombs away" C. If it is necessary to jettison bombs over friendly territory control must be set at unarmed or "safe" position. Bombs will then strike without exploding, or at most with a low order detonation.

"MISSION COMPLETED"



YOURS IS A GREAT RESPONSIBILITY!

8. YOU'VE GOT TO BE RIGHT. It is your job to see that the bombardiers have plenty of eggs *ready to hatch out trouble* for the enemy.

Remember: these eggs hatch *only when they are set right.* Every detail of fuzing must be correct.

A one cent cotter pin can make a thousand dollar bomb fail. Worse than that: carelessness exposes men to needless danger, risks lives uselessly, may even cause the loss of a vitally important action.

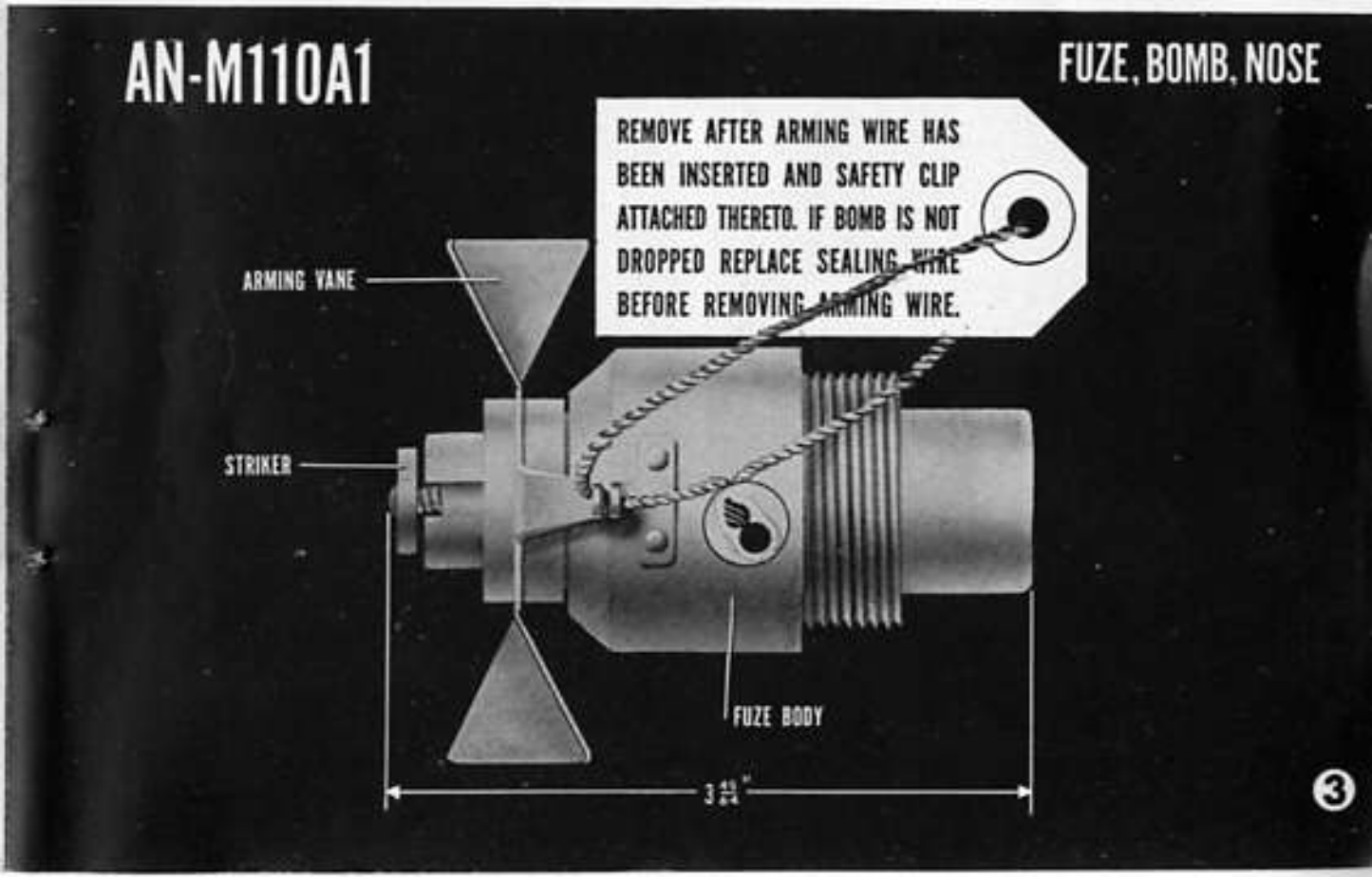
PART TWO
RECOGNITION

---

9. **TYPICAL NOSE FUZES.** General purpose bombs have both nose and tail fuzes. Depth bombs have both nose and transverse fuzes. Small fragmentation and chemical bombs normally have only nose fuzes. Armor-piercing and semi-armor-piercing bombs are usually fuzed at the tail.

Notice that these fuzes, as compared with the tail fuzes shown on pages 15 and 16 are short and thick. A nose fuze which tapers toward an external striker head, like **M104, AN–M120** or **AN–M110A1** is usually meant for a fragmentation bomb and is extremely dangerous if it becomes armed accidentally or otherwise.

Figure 11 ①, ②, and ③. Notice the shape of these three fuzes. They are all for fragmentation bombs. Any fuze shaped like this may be extremely sensitive when armed. Don't fool with one of these babies unless its safety pin or arming wire is in place. A light touch on the striker in *any direction* may result in an explosion that will blow you and everybody else nearby into kingdom come. Send for an Ordnance-trained man.



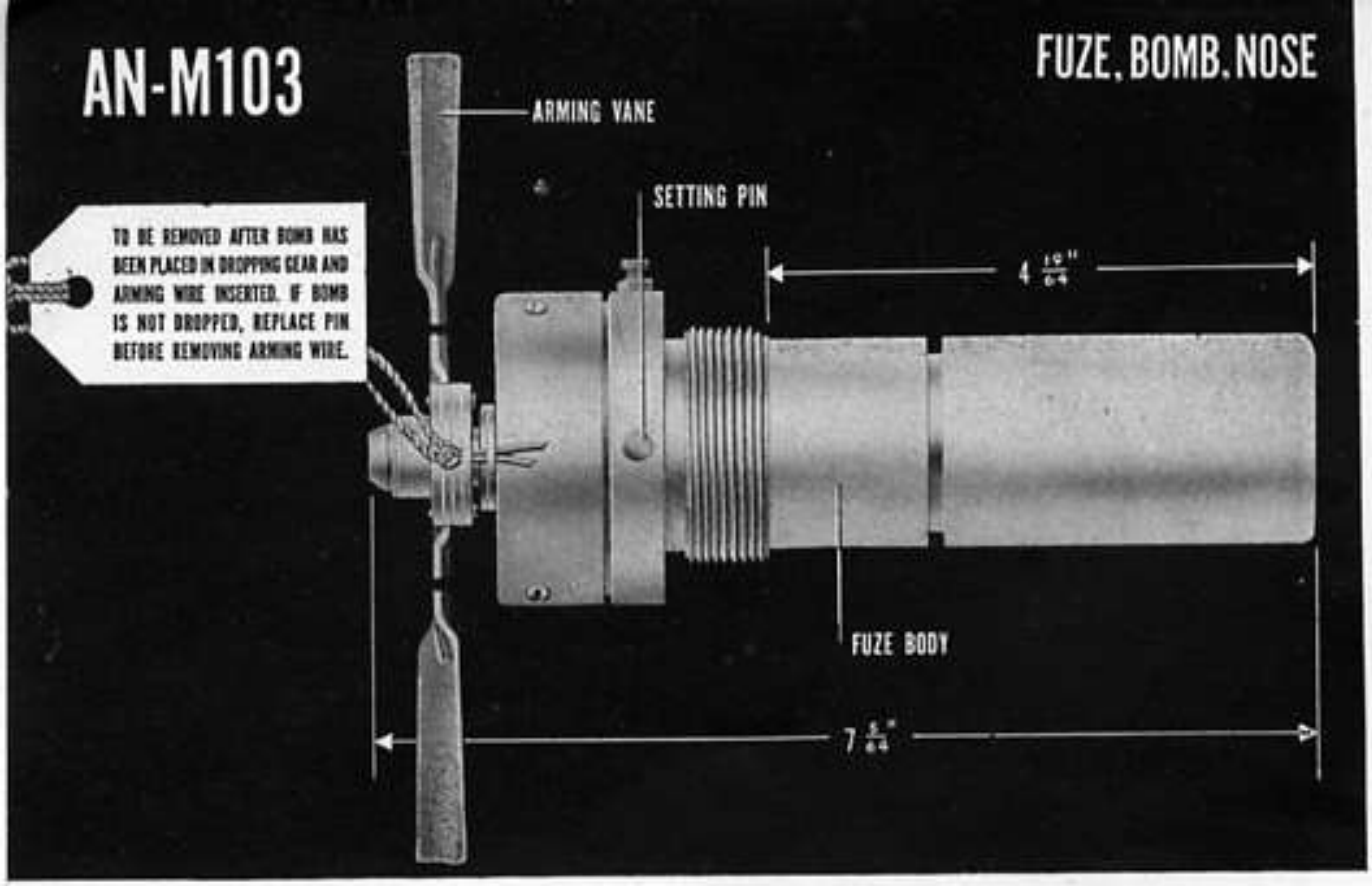


Figure 12. Typical nose fuze for general purpose bomb. Notice its vane-type arming mechanism and the cotter safety pin, plainly shown here.

Figure 13. A small impact nose fuze of the arming pin type for 100-pound chemical bombs and practice bombs, neither of which requires a heavy booster charge.

Figure 14. A combination type fuze: acts on either time mechanism or impact; whichever is set off first; is armed by both vane and pin type *arming* mechanism. Used for igniting parachute flares and opening bomb clusters, *not* high explosive bombs.

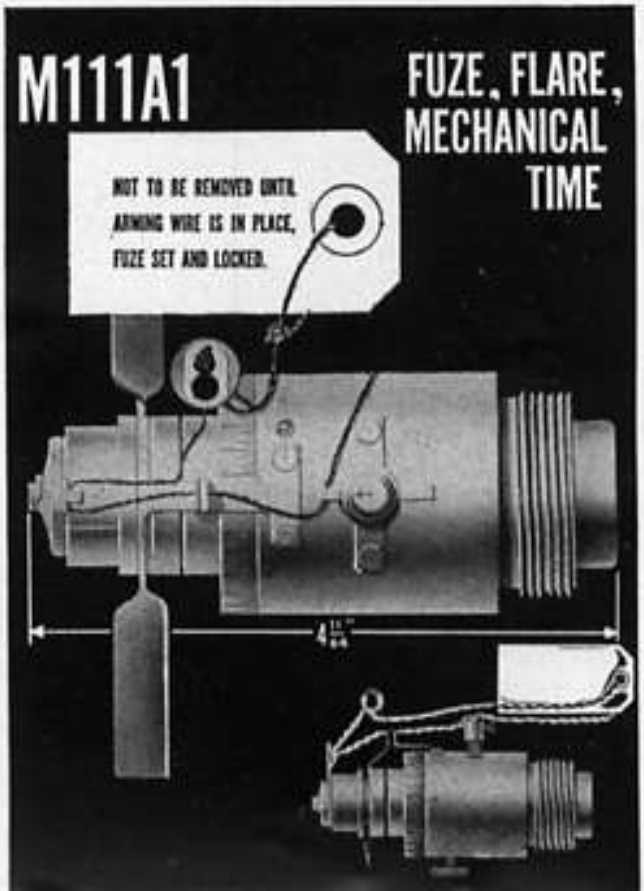


Figure 15. An impact fuze of the arming-vane type, used to fuze the 325 lb. bomb AN-Mk. 17 (See par. 89), when that bomb is used for surface demolition effect.

10. TYPICAL TAIL FUZES. Long and slender, these are threaded for an adapter of 1½" inside diameter. The arming vane is attached at a distance from the fuze body. General purpose bombs have both nose and tail fuzes; semi-armor-piercing and armor-piercing usually have only tail fuzes to distinguish short- from long-delay fuzes and rapid- from slow-arming types, see Part Three, paragraph 33.

Figure 16. An impact tail fuze of the vane type, used with the smaller sizes of general purpose bombs.

Figure 17. Arming vane type detonates bomb 4 to 5 or 8 to 15 seconds after impact. *Extremely sensitive* once armed.

Figure 18 ① and ②. Two Navy tail fuzes, similar in appearance (bottle-shaped) but different in function. AN-Mk. 228 is a vane type, detonator-safe fuze for armor-piercing bombs. It arms after 150 revolutions of the vane, detonates the bomb .08 second after impact.

Figure 19. An arming-pin type tail fuze, armed immediately on withdrawal of arming wire; detonates the bomb 4, 11, or 45 seconds after impact. Can be handled with comparative safety (par. 56).

Figure 20. Transverse depth fuzes are set crosswise of the bomb body, and are actuated by water pressure. AN-Mk. 234 is both armed and fired by hydrostatic pressure — at various depths, which can be pre-selected.

PAINTING AND MARKING

11. STANDARD NOMENCLATURE of bombs is the official designation, as: (BOMB, SAP, 500 lb. AN-M58A1). This information with filler and lot number is stenciled on the bomb.

PAINTING AND MARKING: BOMBS

BOMB	BODY	BANDS	MARKING (letters and figs.)
HIGH EXPLOSIVE: (G.P., Demo., AP., SAP., Frag*)			
Filled with TNT or Amatol	Olive Drab	Nose: One 1″ yellow Tail: One 1″ yellow	Black
Filled with Comp B	Olive Drab	Nose: Two 1″ yellow Tail: Two 1″ yellow	Black "Comp B" stenciled on one nose band and one tail band.
PRACTICE	Light Blue	None	White
DRILL	Olive Drab	Nose: One 1″ black Tail: One 1″ black	Black: Drill (inert)
CHEMICAL			
Nonpersistent gas	Blue-Gray	1 Green, nose, tail, and center	Green
Persistent gas	Blue-Gray	2 Green, nose, tail, and center	Green
Irritant smoke (vomiting gas)	Blue-Gray	1 Red, nose, tail, and center	Red
Screening Smoke	Blue-Gray	1 Yellow, nose, tail and center	Yellow
Incendiary	Olive Drab	1 Purple, nose, tail, and center	Purple

* Small fragmentation bombs: nose and tail painted yellow (no bands), Body—olive drab.

MARKING: FUZES

Fuzes are stenciled or stamped with type and model, lot number, number and length of delay.

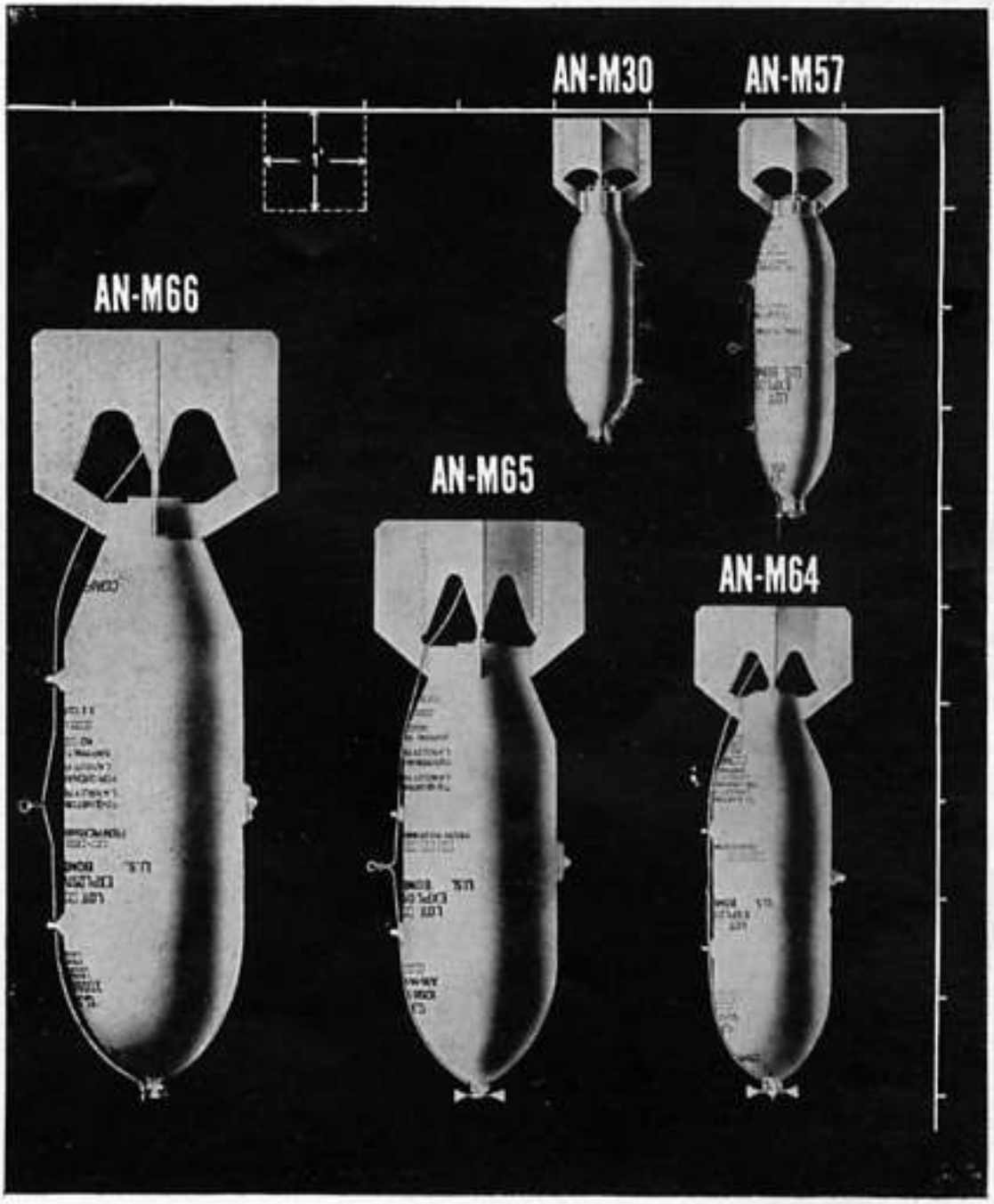
PAINTING AND MARKING: PRIMER DETONATORS
(See fig. 42)

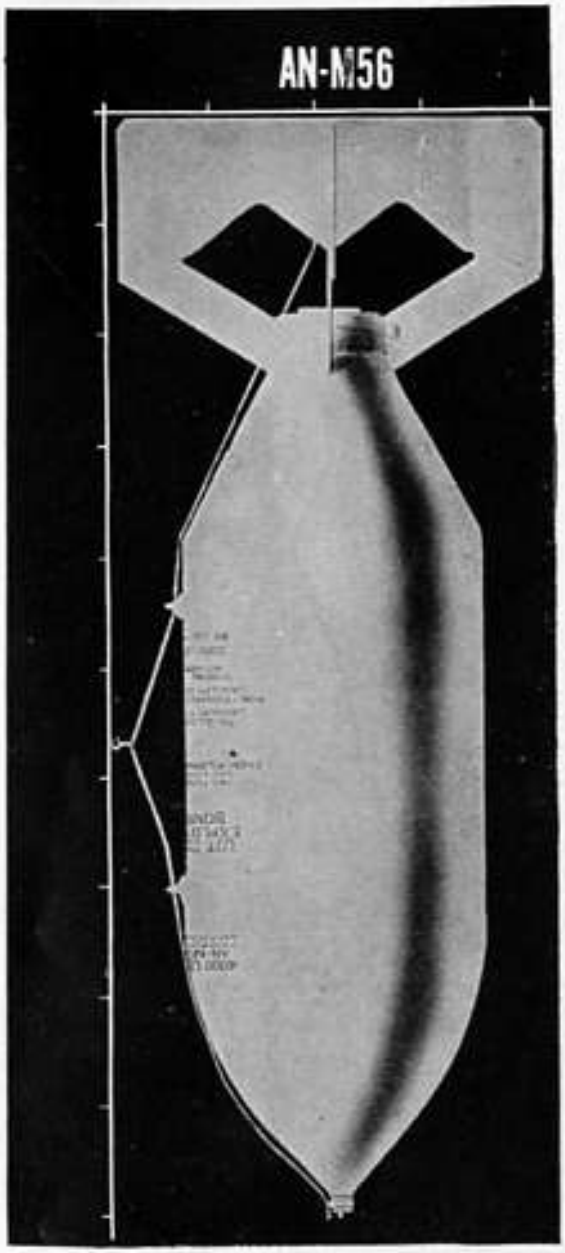
Head painted:
- All black—0.1 Sec. delay
- ½ black—0.05 Sec. delay
- ¼ black—0.025 Sec. delay
- ⅛ black—0.01 Sec. delay
- All white—Nondelay

12. RECOGNITION OF BOMBS BY GENERAL APPEARANCE. The characteristics of all models of each type of bomb are similar. These are described in detail in Part Three.

General Purpose Bombs

Figure 21. General purpose (GP), bombs are "cylindrical" bombs with ogive heads, straight-cone-tapered cases. They are readily distinguishable from the somewhat similar appearing semiarmor-piercing bombs by the fact that they are usually fuzed both nose and tail. They are used for blast, fragmentation or mining purposes, gaining their principal effect from high explosive. In explosive content they average 50% by weight. Normally, they have both two suspension lugs for double hook suspension and a single lug at the center of gravity for single hook suspension.





Light Case Bombs

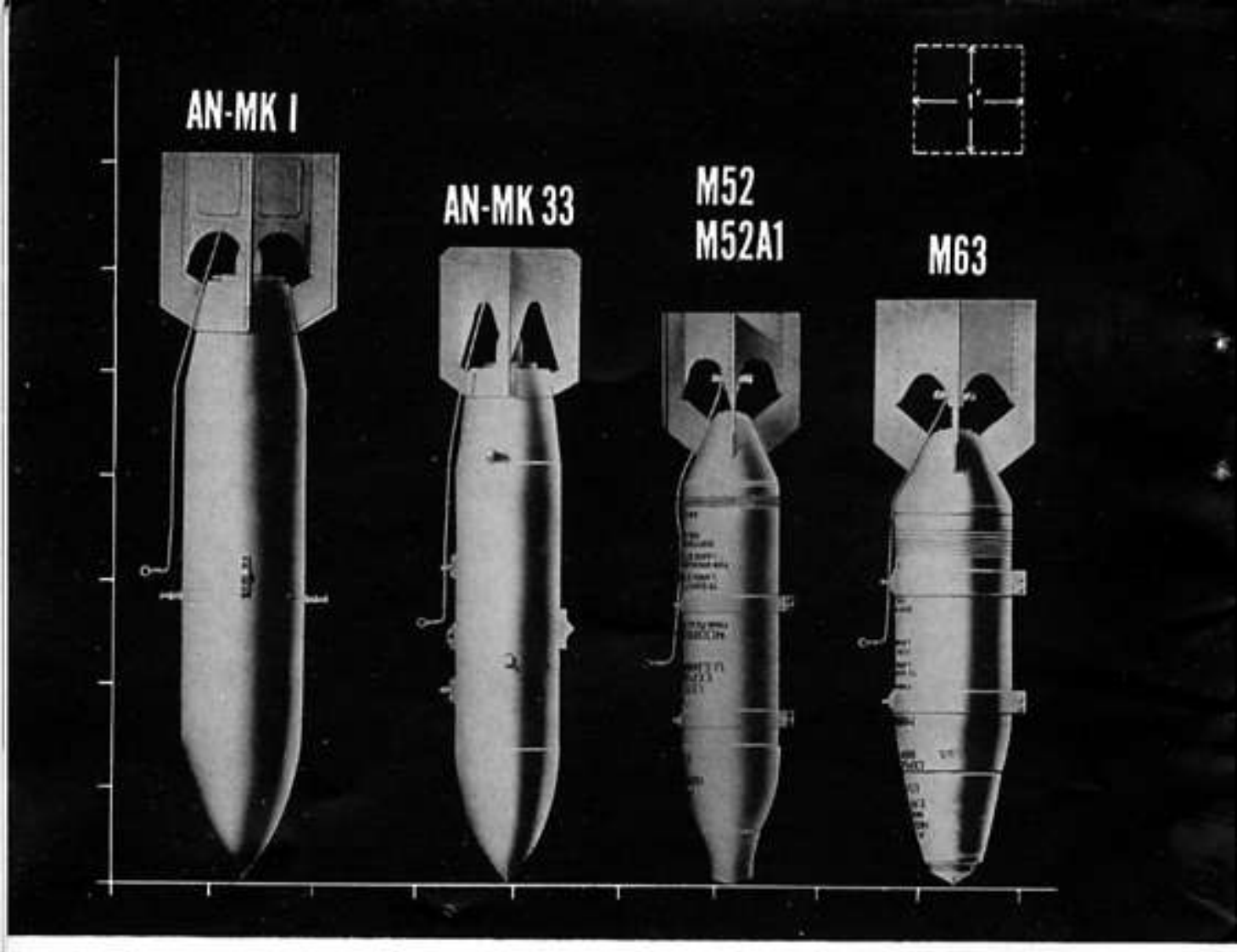
Figure 22. Light case (LC) bombs are similar in size and shape to the larger GP bombs: since they are intended primarily for blast effect, strength of case is sacrificed for maximum explosive charge (70% by weight). Readiest method of distinguishing them from GP bombs is the stenciled marking on the case.

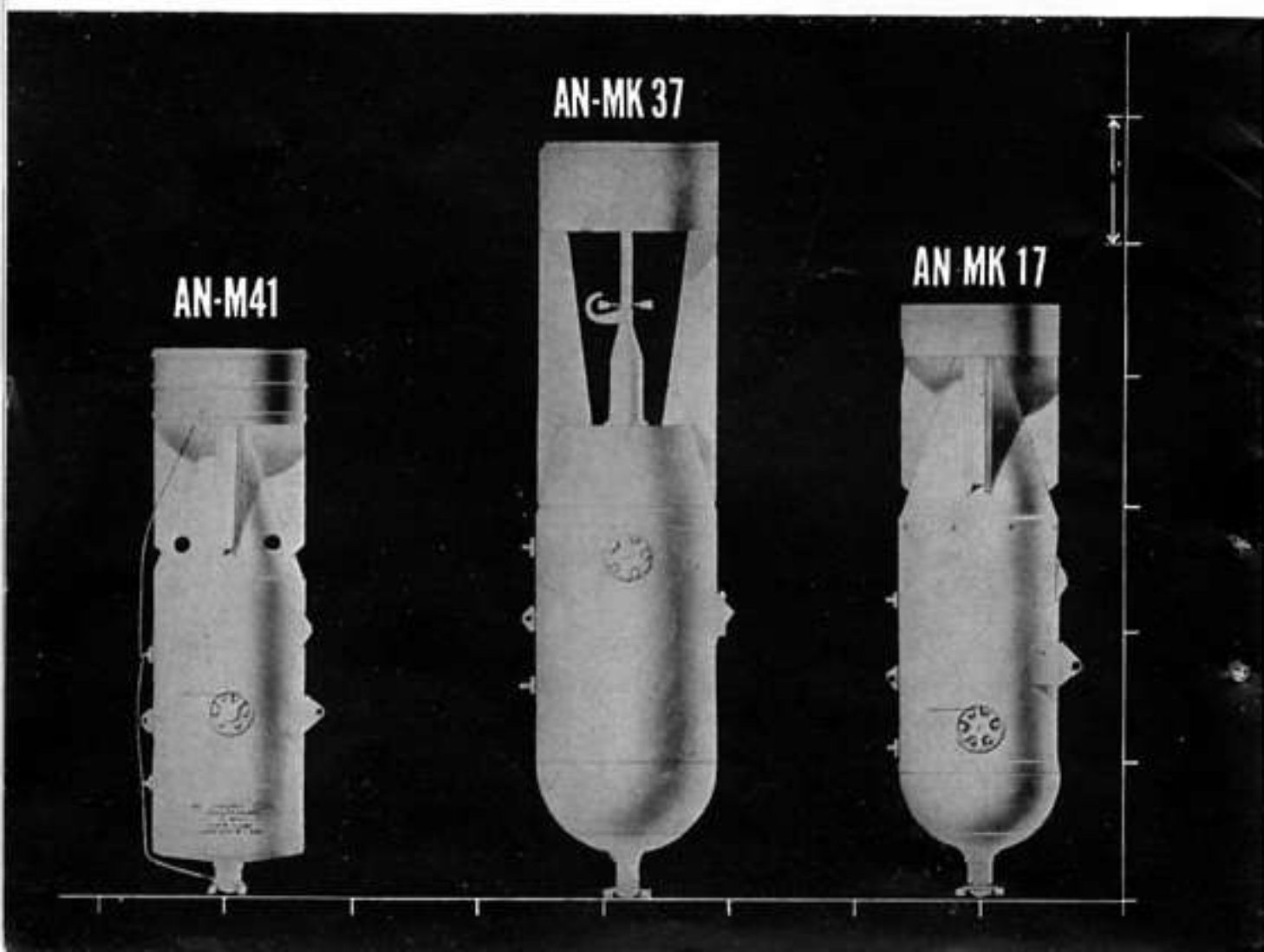
Demolition Bombs

Demolition (Demo) bombs are similar in appearance to GP bombs except that they do not normally have the single suspension lug found at the center of gravity of GP and LC bombs.

Semiarmor-Piercing Bombs

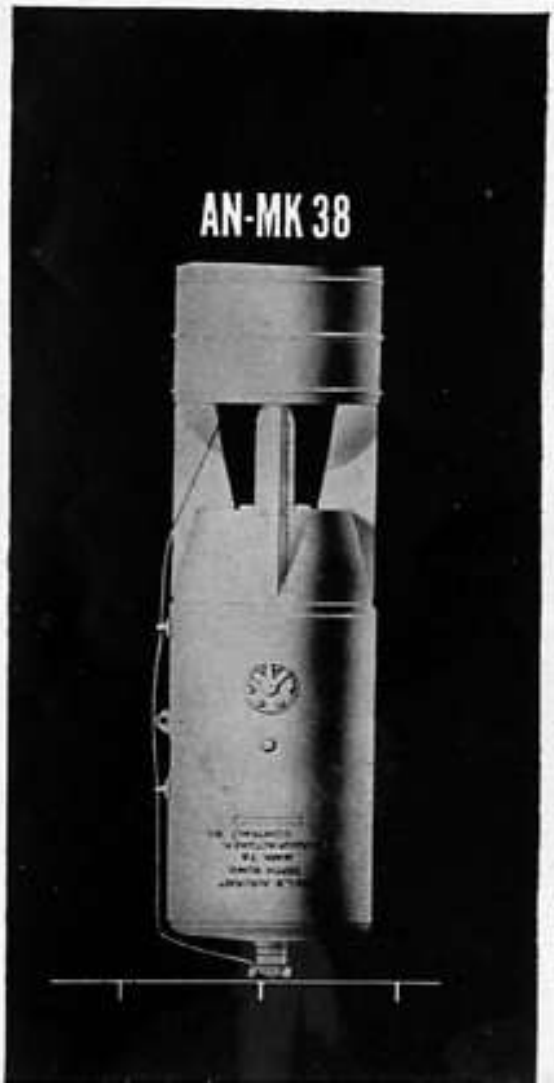
Figure 23. Semiarmor-piercing bombs are more streamlined than the cylindrical bombs. While designed for both nose and tail fuze, the nose is usually filled with a steel plug, only a tail fuze being used. These bombs have heavier cases and carry about 30% explosive.


AN-MK 1
AN-MK 33
M52
M52A1
M63


AN-MK 37
AN-M41
AN MK 17

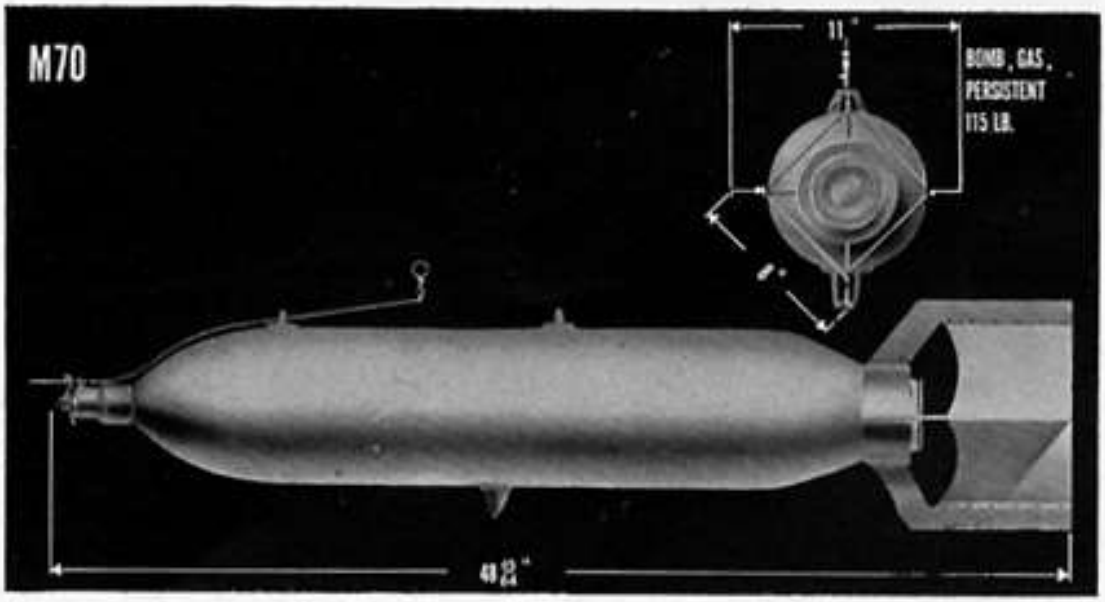
Armor-Piercing Bombs

Figure 24. These are heavy case bombs somewhat more streamlined than the cylindrical (GP) type generally fuzed only in the tail. They contain approximately 5% to 15% explosive, and are intended for use against ships with armored decks or heavy steel or concrete structures. Some armor-piercing bombs are converted heavy-caliber artillery shells, fitted with bomb accessories (fuze, tail fins, etc.). All the M series are of this type. They are tail-fuzed for delay action, to explode after penetrating armor.



Depth Bombs

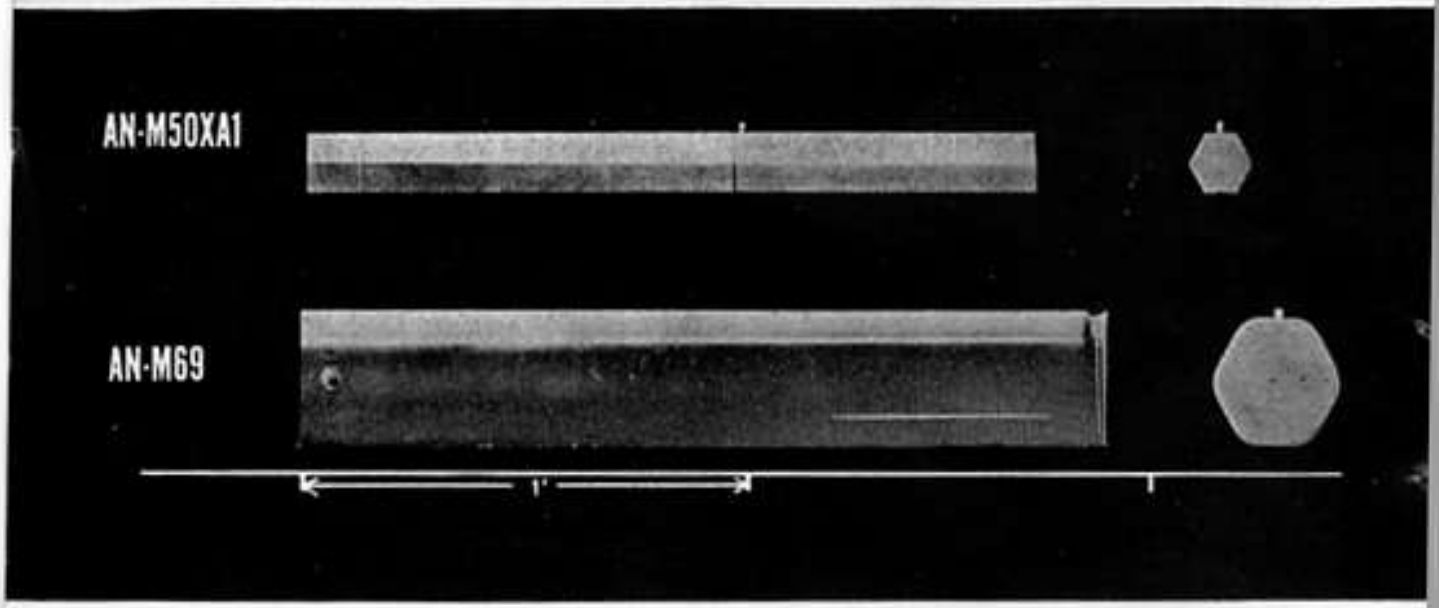
Figure 25. Primarily intended for anti-submarine work, these are light-case bombs with high explosive content. They have nose fuzes for instantaneous effect against targets discovered on the surface, and hydrostatic fuzes (set transversely) for depth effect. Larger sizes also have hydrostatic fuzes in the tail. Newer type depth bombs have flat noses to reduce ricochet. Older types have round noses. They need flat-nose attachments to reduce ricochet.



Chemical Bombs are of two types.

Figure 26. Bombs released individually. 100 lb. size and larger. Similar in appearance to general purpose bombs, but distinguishable by their painting. Medium size and chemical bombs are usually fuzed at nose for impact, since they may contain war gas, white phosphorus (smoke) or incendiary material. (The filler is indicated by the painting — (see par. 16). Large chemical bombs are fuzed nose and tail. While the bursting of such bombs is not destructive in the detonating sense, it may be extremely dangerous in other ways, especially in the case of phosphorus or incendiary-filled bombs. Bombs filled with war gases should be handled with care by personnel properly protected against possibility of chemical leakage.

Figure 27. Bombs released in clusters. Small (4 to 10 lbs.) and usually hexagonal in cross section to allow solid packing in clusters. Accuracy in flight is less important than scatter effect for area bombing.



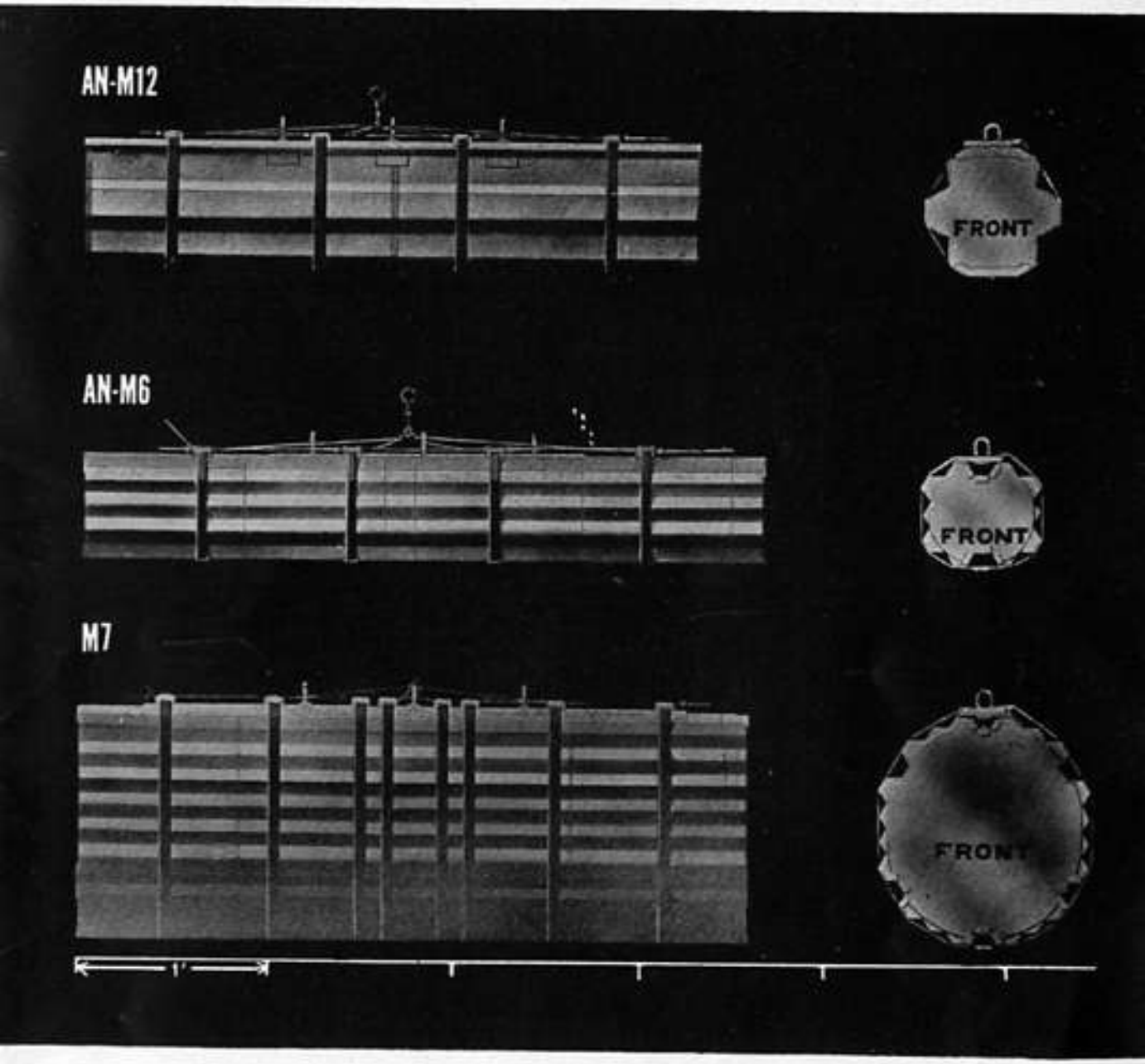
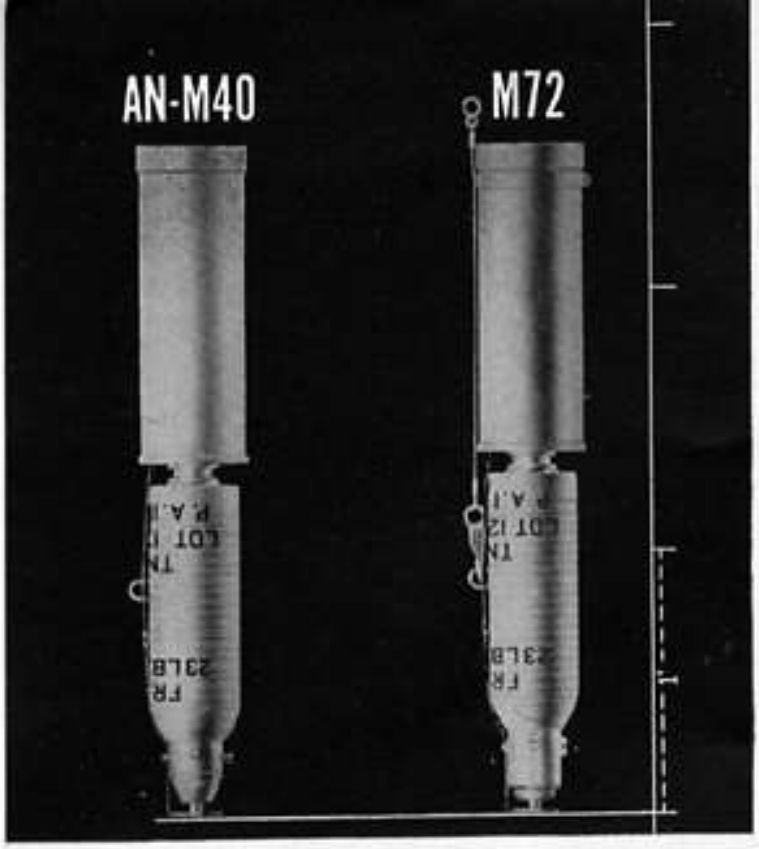


Figure 28. Typical cluster assemblies of incendiary bombs in cluster adapters. Smoke bombs are similarly clustered. When released in "armed" condition, such a cluster falls from the plane as a unit, then comes apart, allowing the bombs to arm and fall separately for coverage of an area target.

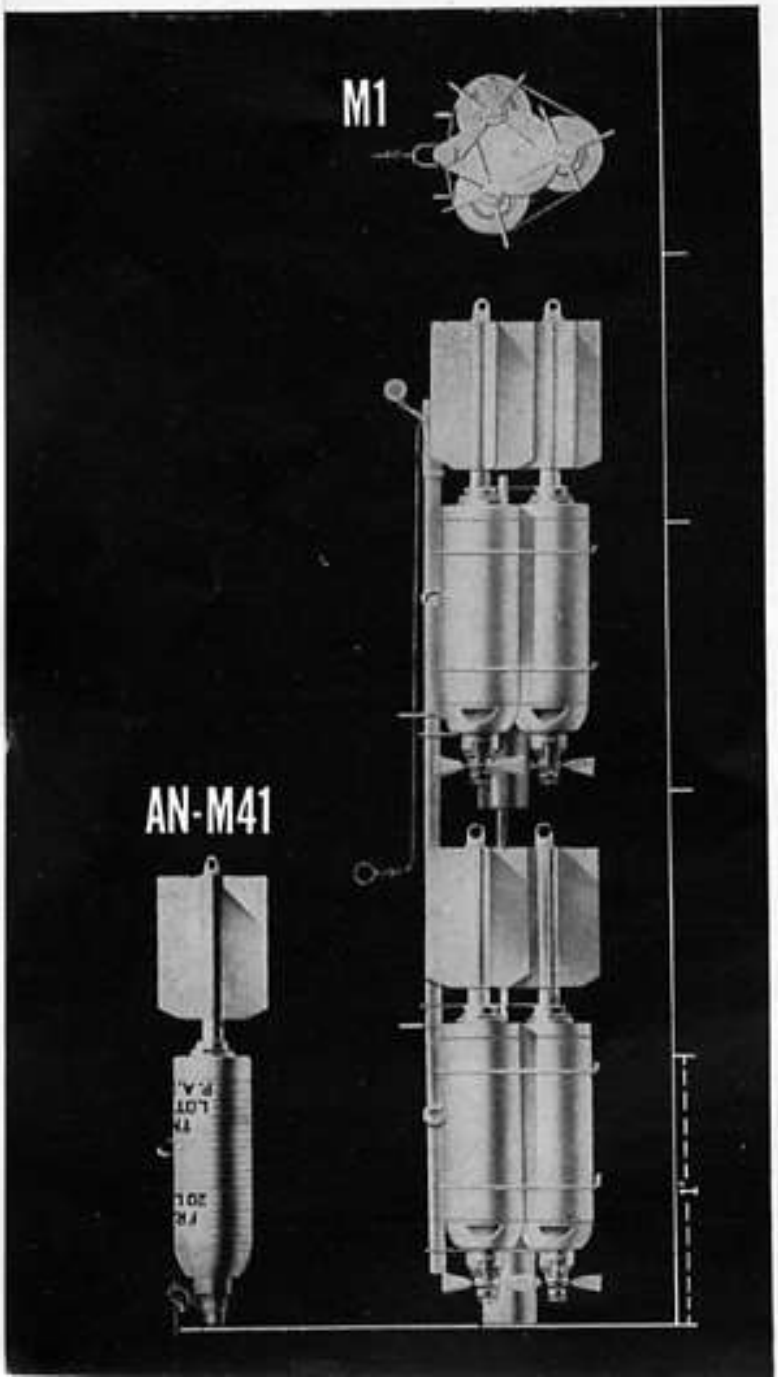
Practice Bombs

Practice bombs are provided for the training of bombing crew in marksmanship. In shape and flight characteristics these resemble the various types of service bombs (G.P., Frag., etc.). They are, however, readily distinguishable by the fact that they are painted with light blue bands at nose or tail.



Fragmentation Bombs

Figure 29. These are small, heavy-cased bombs, their body walls reinforced with heavy steel rings or a spiral steel bar. Fragments of this reinforcement are extremely destructive to personnel and light matériel such as aircraft on the ground. They may be either finned (as AN-M41) for release at ordinary levels or provided with parachutes for low-level release.

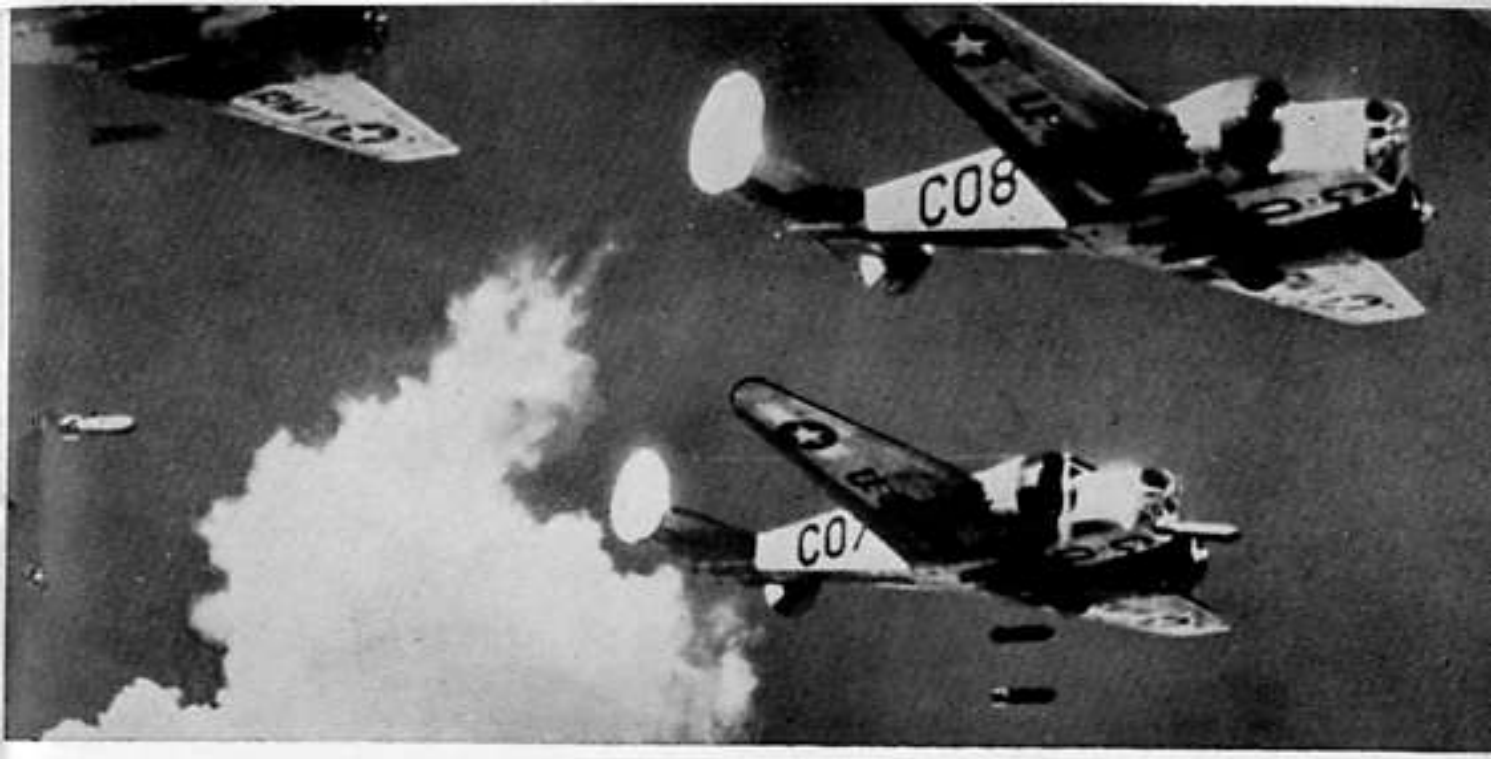


Drill Bombs

Drill bombs are completely inert bombs provided for training ground crews in the techniques of assembling, fuzing, unfuzing and bomb-handling. Each service bomb is represented by a corresponding drill bomb, distinguishable from its service counterpart by its *bands* (one black at nose and at tail) and by the fact that they are plainly marked in black, "Drill (Inert)".

Clusters

Figure 30. Fragmentation bombs are sometimes released in clusters for area bombing. Shown at left is a cluster of 6 finned bombs fuzed with arming vane fuzes. The cluster falls from the plane as a unit, then opens, so that the bombs fall separately. A similar cluster adapter can be used for 3 parachute type bombs with pin type fuzes.

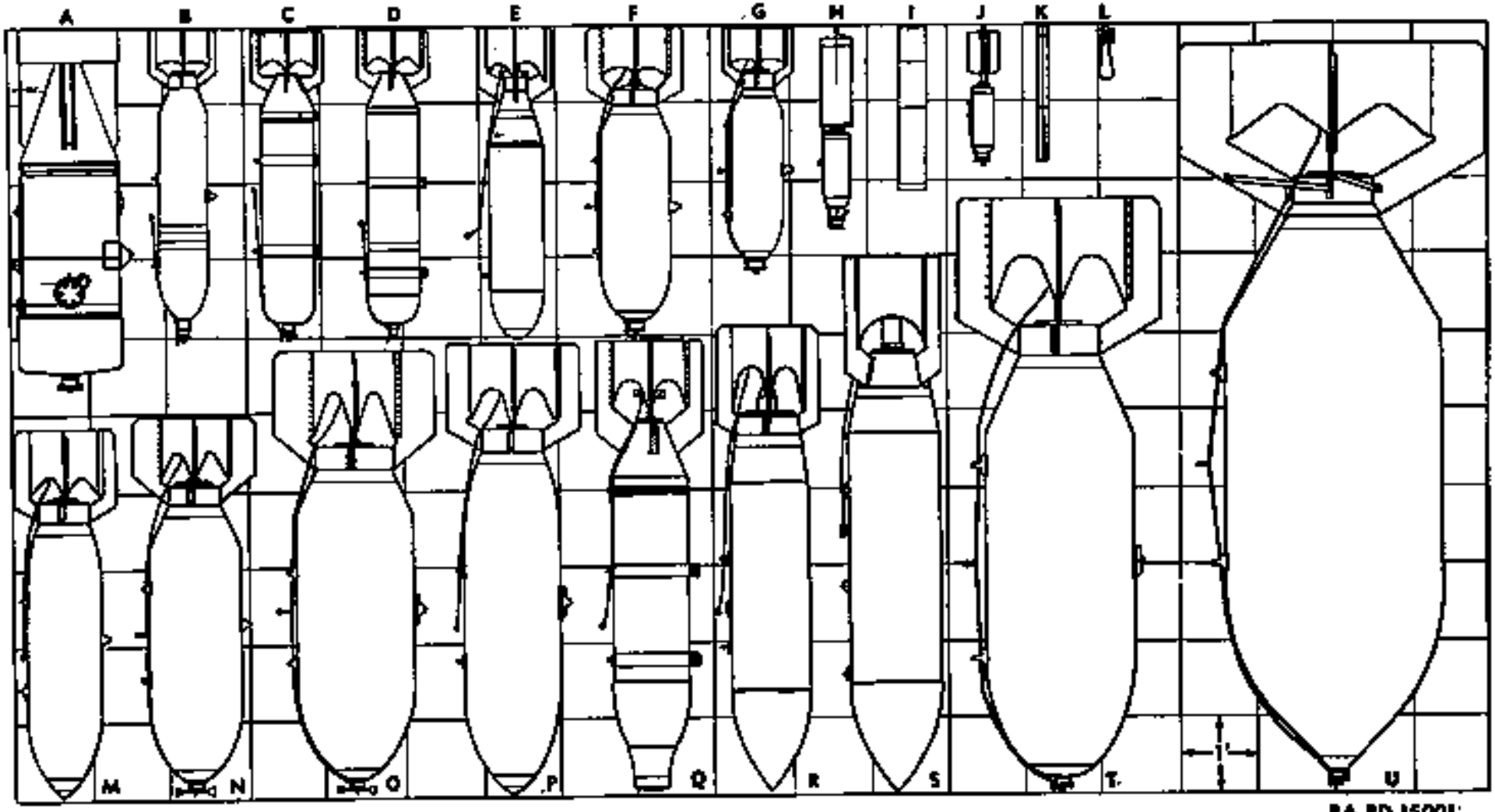


PART THREE

SECTION I. INTRODUCTION

13. **SCOPE.** a. The following sections supply information of a technical nature concerning the care, assembly, use, and means of identification of bombs stored and issued by the Ordnance Department and Chemical Warfare Service.

b. A bomb is defined as an item of ammunition dropped from aircraft, which consists of a case filled with explosive or chemical agents, and a means of exploding or scattering the charge at the target. Current models of bombs, grouped for comparison, are illustrated in figure 31. Aircraft torpedoes, submarine mines planted by aircraft, rockets, pyrotechnics, and mortar bombs, although they are somewhat similar in nature, are not classified as bombs. Such items are described in other technical publications.



RA PD 15001

Figure 31. Aircraft bombs, all types.

A. .....BOMB, depth, 325-lb., AN-Mk. 17, w/flat nose
B. .....BOMB, gas, persistent, H, 115-lb., M70
C. .....BOMB, photoflash, M46
D. .....BOMB, chemical, 100-lb., M47-A2
E. .....BOMB, practice, 100-lb. M38A2
F. .....BOMB, G. P., 250-lb., AN-M57
G. .....BOMB, G. P., 100-lb., AN-M30
H. .....BOMB, fragmentation, 23-lb., AN-M72
I. .....BOMB, photoflash, M23A1
J. .....BOMB, fragmentation, 20-lb., M41 (for cluster)
K. .....BOMB, incendiary, 4-lb., AN-M50A2 (C.W.S. item)
L. .....BOMB, practice, miniature, 3-lb., AN-Mk. 23
M. .....BOMB, S.A.P., 500-lb., AN-M-58A1
N. .....BOMB, G. P. 500-lb., AN-M64
O. .....BOMB, G.P., 1000-lb., AN-M65
P. .....BOMB, S.A.P., 1000-lb., AN-M59
Q. .....BOMB, A. P., 1000-lb., M52A1
R. .....BOMB, A.P., 1000-lb., AN-Mk. 33
S. .....BOMB, A.P., 1600-lb., AN-Mk. 1
T. .....BOMB., G. P., 2000-lb., AN-M66
U. .....BOMB, light case, 4000-lb., AN-M56

---

14. **CLASSIFICATION.** In common with other types of ammunition, bombs are classified according to filler as explosive, chemical and inert. Explosive bombs are classified according to use as armor-piercing (A.P.), semiarmor-piercing (S.A.P.), general purpose (G.P.), depth, fragmentation, and practice. Chemical bombs are classified according to type of filler as gas, smoke, and incendiary. Inert bombs are used for practice and drill. Each of these types is described in detail in the following sections.

15. **IDENTIFICATION.** a. **General.** Bombs are completely identified by the standard nomenclature and the ammunition lot number which are stenciled on all packings and, where the size of the item permits, on the item itself.

b. **Standard nomenclature.** Standard nomenclature is established in order that each item stored and issued by the Ordnance Department may be specifically identified by name. It consists of the name, type, and weight of the item and the model designation. The standard nomenclature lists for bombs and components are SNL's, S–1, S–2, and S–3. The use of standard nomenclature is mandatory for all purposes of record, except as described in e below.

c. **Model.** In order to distinguish between different designs of the same type, a model number is assigned at the time a design is adopted as standard. The model designation consists of the letter M followed by an arabic numeral. Modifications of the original design are indicated by the addition of the letter A and the appropriate arabic numeral to the model designation. For example, M38A2 designates the second modification of the item originally adopted as M38. Cer-

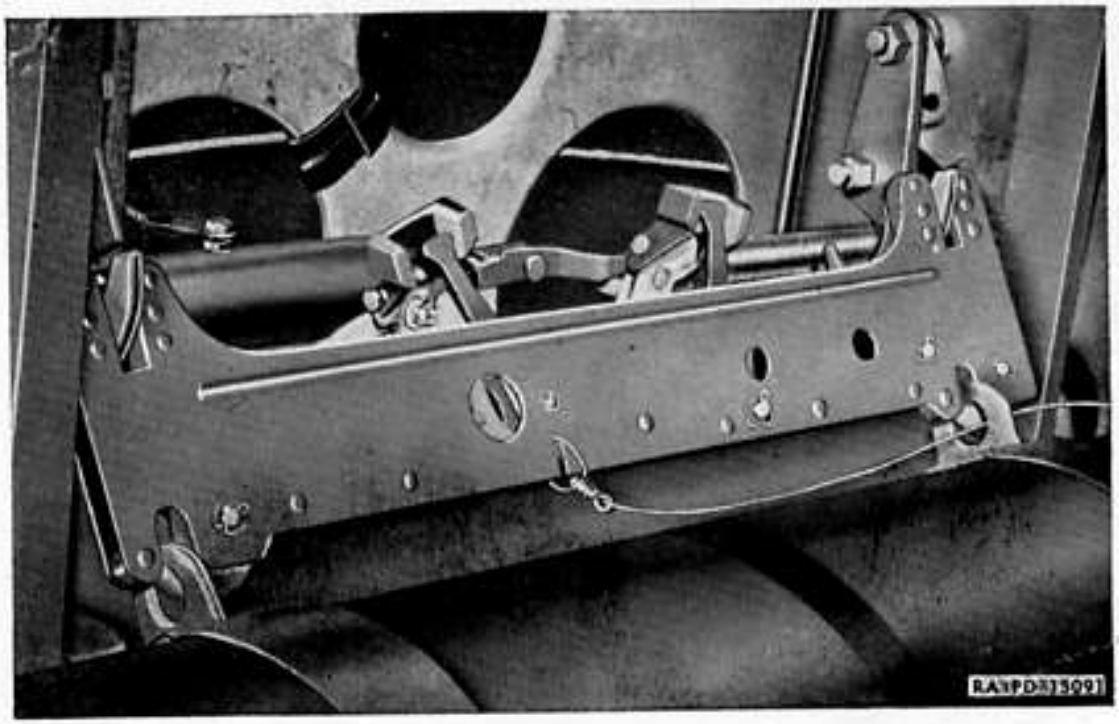


Figure 32. Suspension of bomb in plane.

tain items have been standardized for use by both Army and Navy. This is indicated by prefixing the letters AN– to the model. Items of Navy designed are designated by Mark (Mk.) instead of model and modifications by Mod. (for example, AN–Mk. 24–Mod. 2).

d. Ammunition lot number. When ammunition is manufactured a lot number is assigned in accordance with pertinent specifications. The lot number represents a quantity of ammunition items, or ammunition components, which have been manufactured under conditions as nearly identical as possible, and which may, therefore, be expected to function uniformly. It consists of a series of letters and numerals representing the loader's lot number, the loader's symbol or initials, and the date loaded. The ammunition lot number is required for purposes of record involving the particular ammunition, especially reports on condition, functioning, or accidents.

e. Ammunition identification code. In order to facilitate requisitions and records in the field, a five-character code symbol is assigned each item of ammunition issued. These code symbols are listed in ammunition SNL's.

f. Data card. The ammunition data card is a 5- by 8-inch card prepared for each lot of ammunition and forwarded with each shipment of ammunition. In addition to the ammunition lot number, it gives the lot numbers of the components and other pertinent information concerning the lot of ammunition. When required, instructions for assembly are printed on the reverse of the card.

g. Shipping name. Interstate Commerce Commission regulations

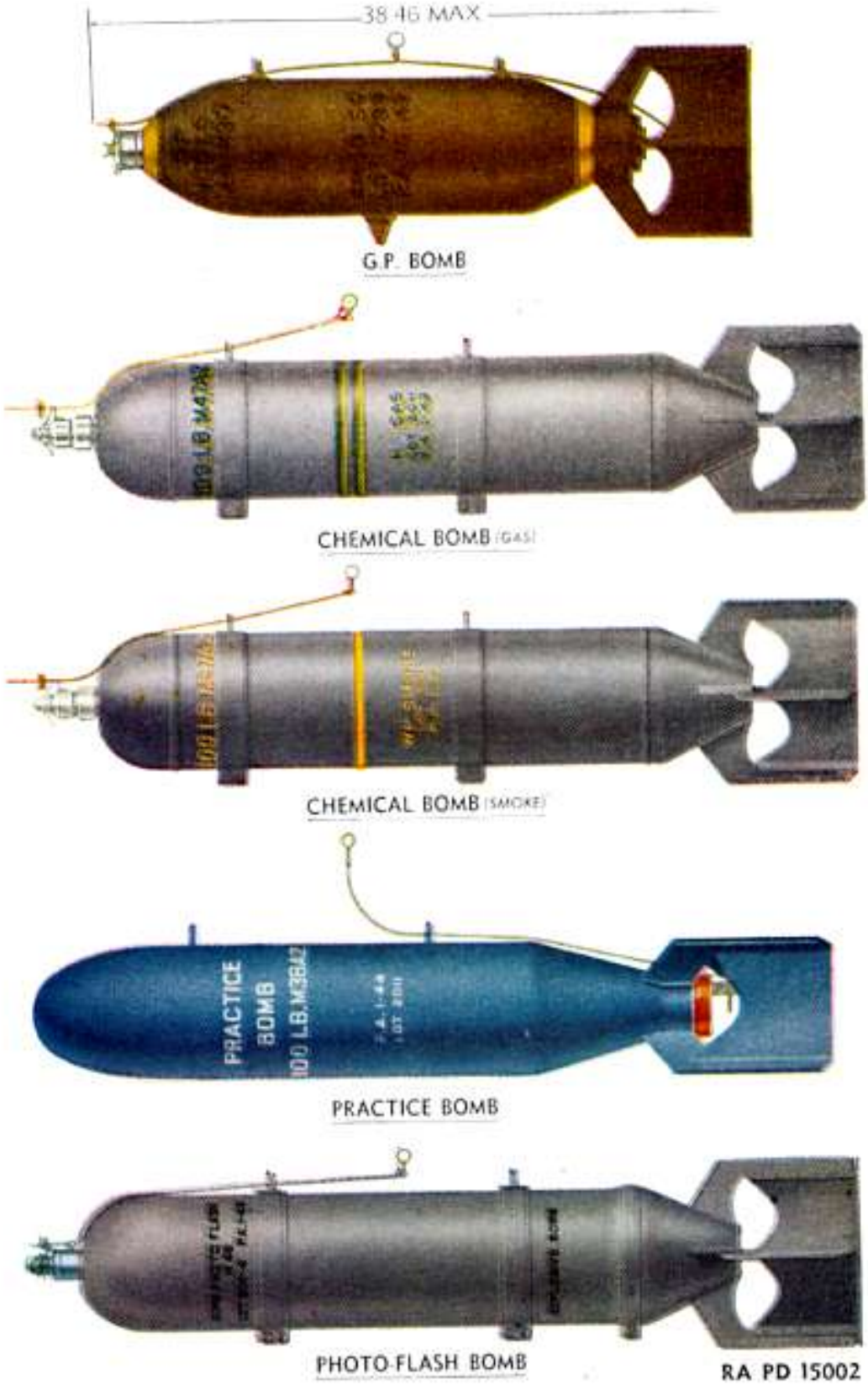


Figure 33. Painting and marking of bombs.

require that each explosive item offered for shipment by common carrier be marked with the shipping name or dangerous commodity designation assigned by the Bureau of Explosives. (See AR 55–155.)

16. PAINTING AND MARKING. a. Painting. Ammunition is painted to prevent rust and to furnish, by the colors a ready means of identification as to type. In addition, bombs stored in the open are painted to prevent their ready detection from the air. High explosive incendiary, and drill bombs are painted lusterless olive-drab with bands to indicate the type. The colors used for these bands are, yellow for high explosive, black for drill, and purple for incendiary bombs. Fragmentation type bombs are painted on the head and base instead of with colored bands. Chemical and photoflash bombs are painted gray. (See fig. 33.)

b. Marking. (1) Bombs are marked with the following information: Type, weight, model, filler, and lot number. High explosive and drill bombs are marked in black. Chemical bombs are marked in color as follows: Persistent gas marked in green, with two green bands; nonpersistent gas, marked in green with one green band; irritant gas, marked in red with one red band; smoke, marked in yellow, with one yellow band. Incendiary bombs are marked in purple, with one purple ban on olive-drab body. Bomb bodies intended to be stored before loading are marked longitudinally with the word EMPTY in four equally spaced locations. When the bomb is filled, the word empty is painted over with the color of the bomb body.

(2) Fuzes are marked either by stenciling or stamping, with the type and model, lot number, and length of delay.

(3) Primer detonators are marked with type and model, and length of delay. In addition the head of Primer Detonator, M14, is painted (fig. 42) to indicate the delay.

(4) Packings which are intended to contain components of a complete round have the type and model of each component stenciled on the packing. The word WITHOUT is stenciled above this list until the components are packed, at which time the word OUT is painted over.

17. PACKING FOR SHIPMENT. In general, bombs are shipped unfuzed with the fuze holes closed with metal closing plugs. These plugs will not be removed except for inspection and for assembly of the complete round. Large bombs are shipped with two paper or metal shipping bands to protect the suspension lugs. The fin assemblies of such bombs are shipped separately in metal crates. (See fig. 35.) Smaller bombs are shipped, finned, in metal crates. Small chemical and fragmentation bombs are packed in wooden boxes.

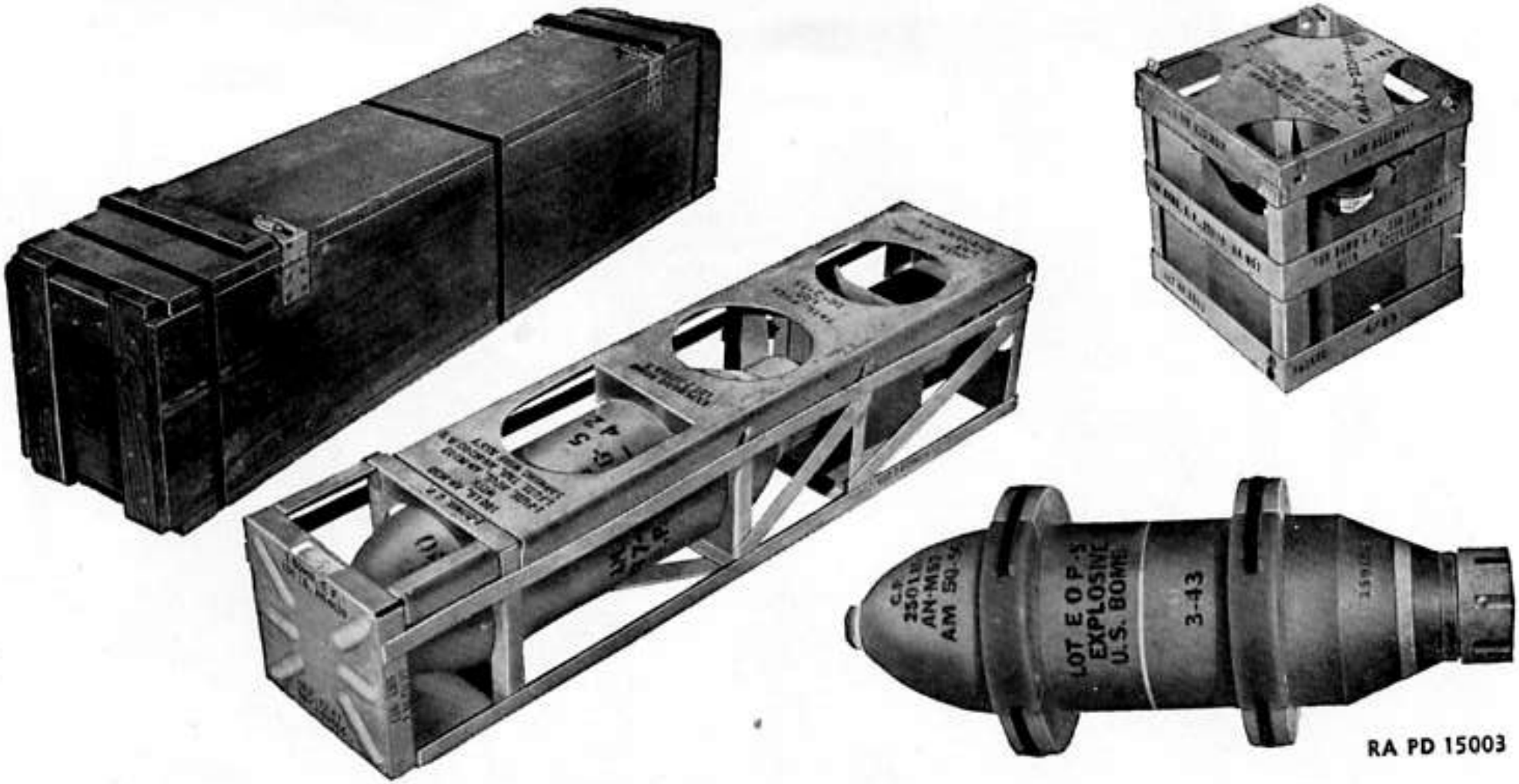


Figure 34. Packing of bombs.

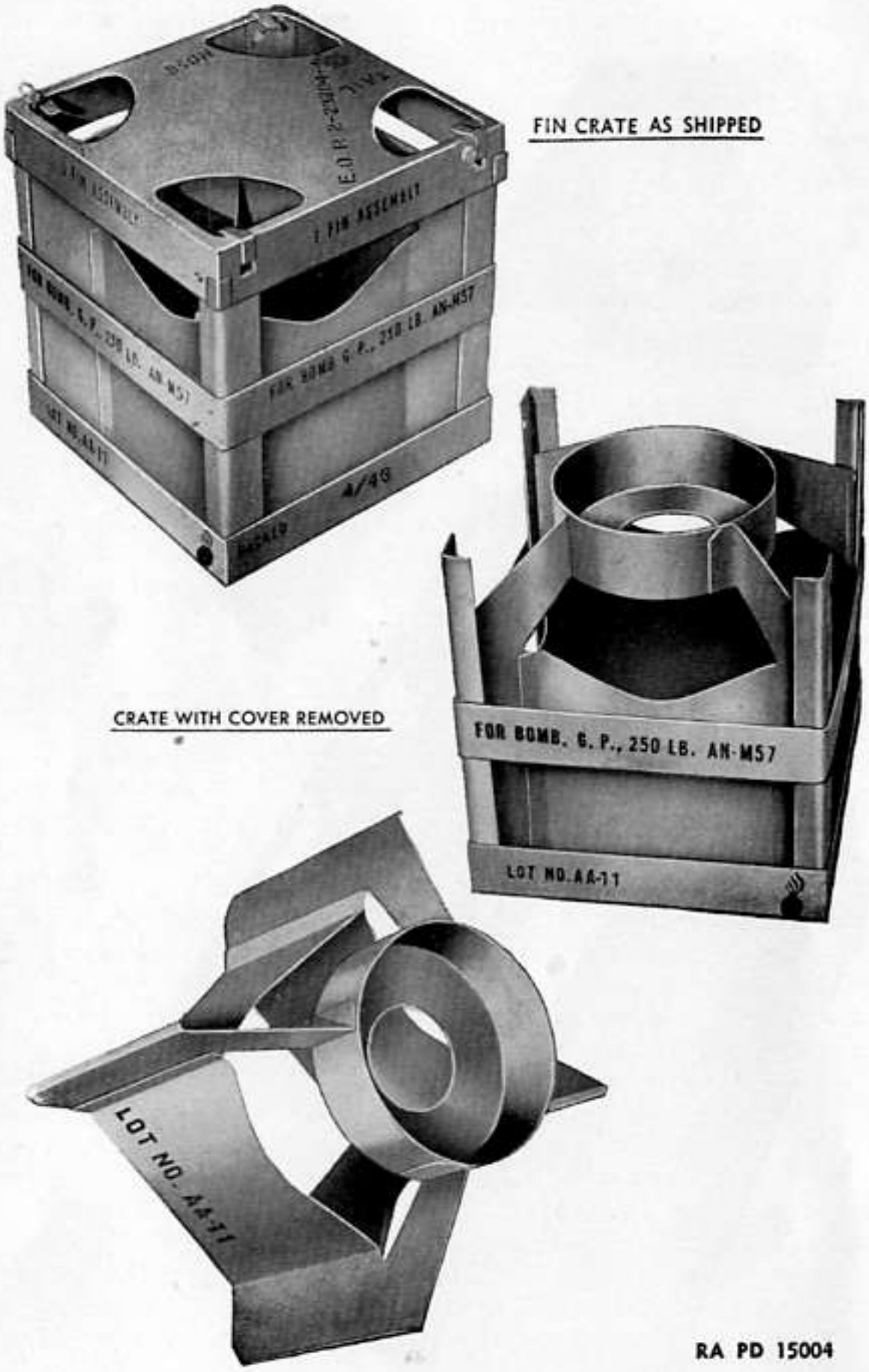


Figure 35. Packing of components.

SECTION II. TYPES AND COMPONENTS

18. COMPLETE ROUND. **a. Definition.** A complete round consists of all the components and accessories necessary for the ammunition to function in the manner intended. Strictly speaking, complete round includes no more than the necessary number of each component. However, for purposes of supply, a complete round as issued may include both of the alternative components to allow for flexibility. For example, a complete round of issue may include both a delay and a nondelay primer detonator, although only one will be used.

b. Components of complete round as issued. In practice, it is necessary to separate various components of the complete round so that the careful handling required by one sensitive or frail component, will not be necessary with an item as large and heavy as the assembled bomb. In general, the bomb is shipped in the following assemblies:

(1) Bomb body containing explosive charge and auxiliary booster, with suspension lugs attached and protected by shipping bands; and fuze cavities protected by plugs.

(2) Fin assembly. The fin, being light sheet metal, is shipped separately protected by a metal crate.

(3) Fuzes. Fuzes contain the sensitive explosives and are given more careful handling. They are shipped separately so that if a fuze should accidentally explode, it cannot cause the explosion of the bomb.

(4) Arming wire assembly is shipped separately because it is small and is more easily packed separately or with smaller components than with the bomb body.

(5) Exceptions to the general practice, above, will be given under the specific items as they are described in the following sections.

c. Percentage of explosive. The relative amounts of explosive and metal in a bomb are dependent upon the use for which the bomb is designed. The percentage of explosive is often used as a description of the type of a bomb; for example, a semiarmor-piercing bomb, which contains 30 percent of explosive by weight, may be described as a "30-percent bomb," or a general-purpose bomb, as a "50-percent bomb."

19. TYPES. **a. General Purpose.** This type of bomb (fig. 36) is designed to meet the requirements of the great majority of bombing situations. The various models range in weight from 100 to 2,000 pounds and the percentage of explosive in this type averages 50 percent. General-purpose bombs may be used for blast, fragmentation, or mining effect. They are adapted for (designed for use with) both nose and tail fuzes. Nose fuzes produce more efficient surface effect and tail fuzes produce more efficient deep (mining) effect. Both fuzes are generally used; the secondary fuze is used as insurance

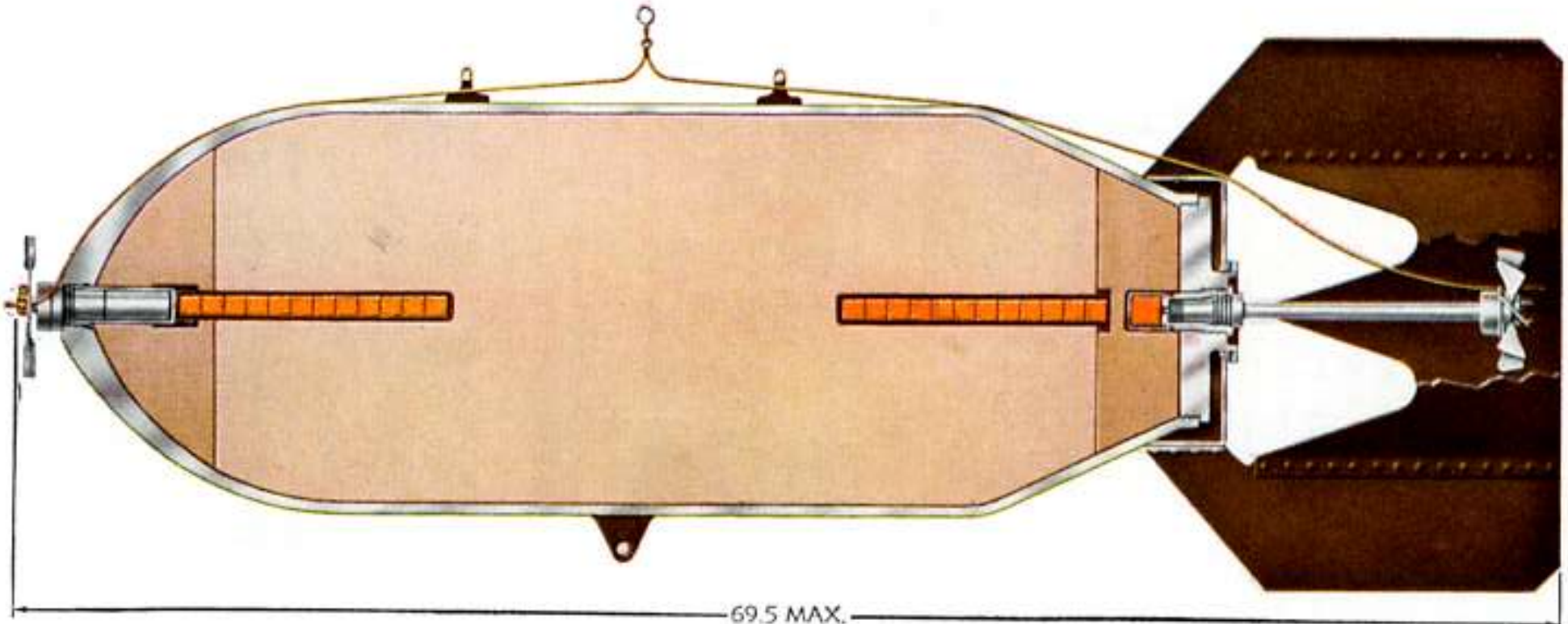


Figure 36. ① G.P. bomb.

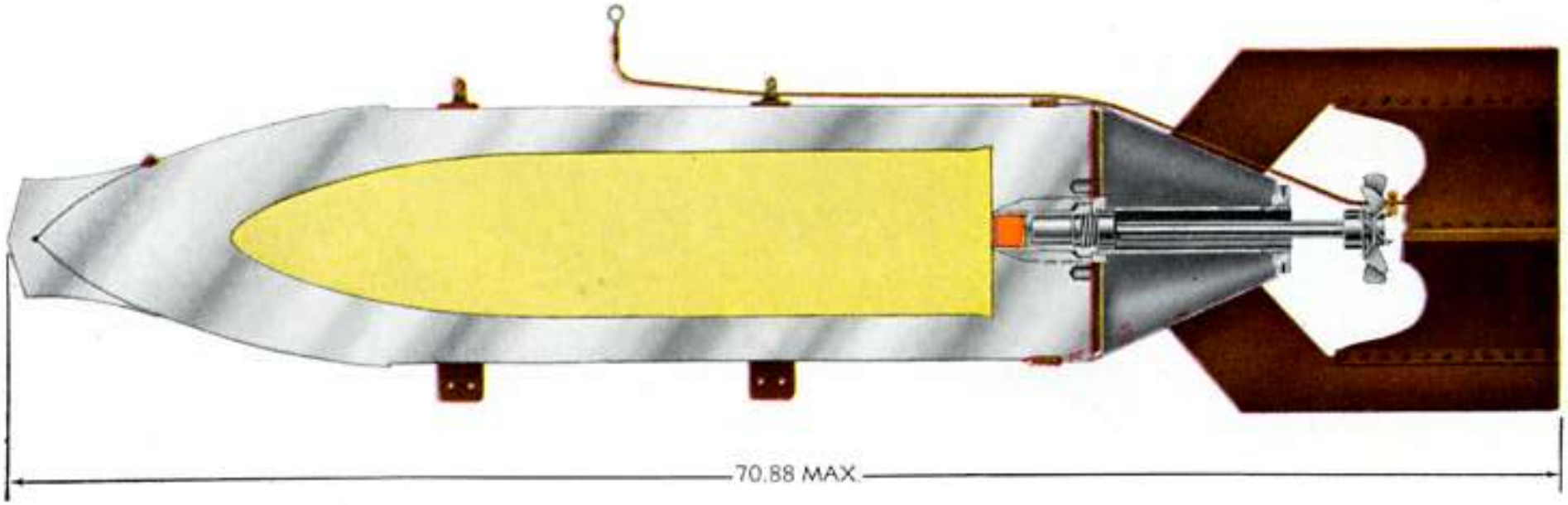


Figure 36. ① A.P. bomb.

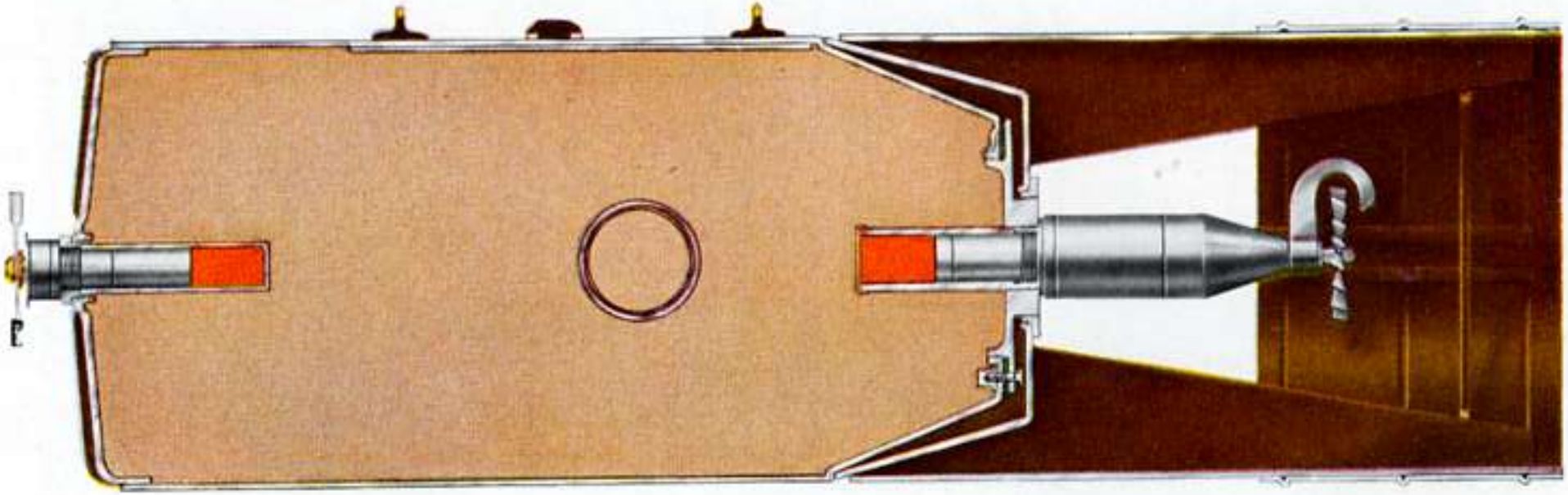
against malfunction. The general-purpose bomb has a cylindrical body which tapers in an ogive to the nose and in a straight cone to the base plug closing the tail end. It has two suspension lugs for double-hook suspension, welded to the case on one side and, diametrically opposite, one lug for single suspension. Double suspension lugs are spaced 14 inches apart on bombs weighing 1,000 pounds and less; they are spaced 30 inches apart on bombs weighing 2,000 pounds and more. The metal case is strong enough not to rupture on impact with normal soil when released from high altitude, but it may fail on impact with heavy armor or high-strength reinforced concrete structures. General-purpose bombs are generally loaded with TNT or Comp B.

b. Light case. This type of bomb is designed to carry a maximum charge. The percentage of explosive is 70 percent or more. Since strength of case has been sacrificed to maximum charge, this type bomb cannot be used for penetration and must be fuzed to explode before the case breaks up on impact. In other respects this type resembles the general purpose described above.

c. Armor-piercing. This type of bomb (fig. 36Ⓔ) is designed to pierce the heavy deck armor of modern battleships. The case is extremely heavy and as a consequence the percentage of explosive is about 15 percent. In order to be effective, armor-piercing bombs must score direct hits. The effect of a near miss is small, due to the comparatively small amount of explosive. This type should not be used against unarmored or lightly armored ships because, being fuzed with delay fuze to permit penetration of armor, the bomb would pass entirely through a light target before exploding. Armor-piercing bombs are streamlined in shape and adapted for tail fuze only. Suspension lugs are bolted to the body when the round is assembled for use. Earlier models used suspension bands with the lugs attached to the bands. Some armor-piercing bombs were made by converting armor-piercing shell, and average 5 percent explosive. Armor-piercing bombs are usually loaded with explosive D.

d. Semiarmor-piercing. This type resembles general-purpose bombs except that the bomb body is heavier and the explosive charge is approximately 30 percent. It may be used against lightly armored targets or, because of the heavy case providing better fragmentation, against concentrations of personnel and matériel.

e. Depth. The depth bomb is a light case type of bomb designed for use against submarines. It averages 70 percent explosive. The case is cylindrical and has a flat nose to reduce or prevent ricochet when dropped from planes flying at low altitudes. The depth bomb is fuzed with a hydrostatic fuze which functions at a pre-determined depth rather than on impact. While a hydrostatic fuze may be of the nose or tail type, it is often designed for installation in a cavity running



RA PD 15010

Figure 36. ① Depth bomb.

transversely through the body of the bomb. Depth bombs are generally loaded with Comp B, TNT, or Torpex.

f. Fragmentation. Fragmentation bombs (fig. 37) are designed to produce their effect through projection of the fragments of the body. They are intended for use against personnel and light matériel. The explosive charge of this type averages 14 percent. The body walls are of uniform thickness and may be made up of steel coils, while the armor-piercing bomb which also may be a 14-percent bomb, has the weight and thickness of metal concentrated toward the nose. One type of fragmentation bomb is stabilized by fins. The other, designed for low-altitude bombing, is equipped with a parachute to delay the impact of the bomb until the airplane has cleared the danger area. Fuzes for fragmentation bombs are designed to function on or above the surface of the ground. Fragmentation bombs are usually loaded with TNT or Comp B.

g. Chemical bombs. Gas and smoke bombs (fig. 33) have a light metal case which acts only as a container for the chemical agent up to the time the bomb strikes the ground. These bombs are equipped with superquick fuzes because any penetration of the bomb would carry the chemical agent under ground, thus wasting the charge. The bomb case is opened and the charge scattered by a burster which is an explosive element resembling the booster and auxiliary booster of explosive bombs. Some bursters are long tubes of explosive which are located along the axis of the bomb. Incendiary bombs are of two types; one has a case similar to the gas and smoke bombs and is loaded with a charge of inflammable material such as oil; the other type has a heavy magnesium alloy case containing an igniting charge and the case itself acts as the main charge of the bomb.

h. Photoflash bombs. This type (fig. 33) is a pyrotechnic item but is classed with bombs because of its explosive effect. It is a light case bomb with a charge of flashlight powder instead of high explosive.

i. Practice. This type of bomb is provided for target practice. There is a wide range of types and weights in order to represent all types of service bombs. Some practice bombs have a fuze and a spotting charge; others are completely inert. Some are sand loaded to weight at point of use, others are constructed to weight. Each model is described in the following sections.

j. Drill bombs. Completely inert bombs and components are supplied for the training and practice of ground crews. Each type and weight of service bomb is represented by a corresponding drill bomb. Drill bombs are made up from the metal parts of service bombs, inert loaded when necessary. They are used for practice fuzing, unfuzing, and handling. Drill bombs, unlike inert practice bombs, are not expendable; they are not to be used for bombing practice.

k. Gauge bombs. Completely inert bombs are furnished to the

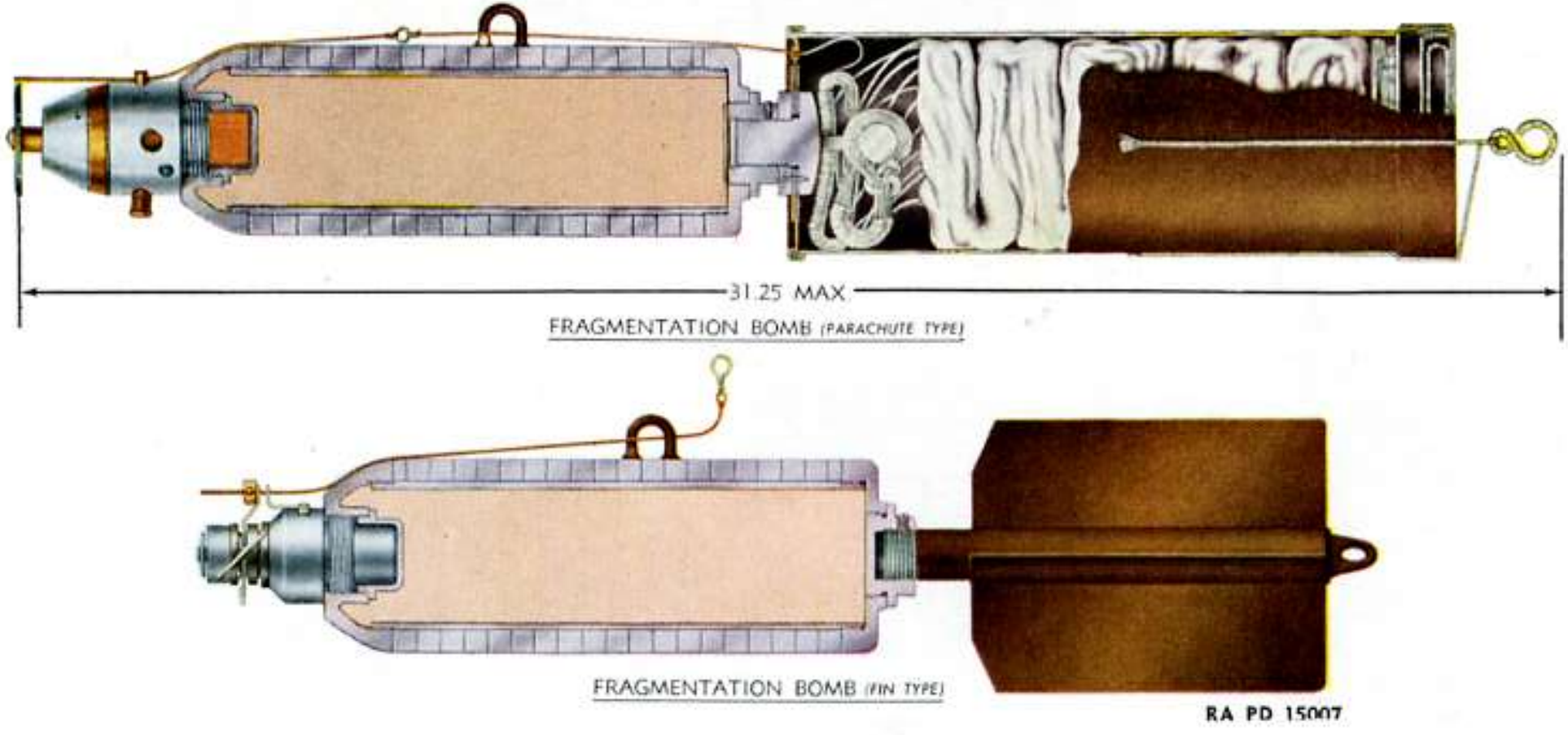


Figure 37. Fragmentation bombs.

Army Air Forces by the Ordnance Department for use in gauging and testing aircraft. Such bombs are not issued to the field.

20. **COMPONENTS.** a. Complete round. The components (fig. 38) of a complete round are, in general, as follows:

(1) *Bomb, unfuzed, w/o fin.* This is composed of: Bomb body with explosive charge and auxiliary booster, fuze seat liner, base plug with fin lock nut and adapter-booster, suspension bands (when lugs are not attached directly to bomb body), shipping bands or packing crate, and nose and tail closing.

(2) Nose fuze (not included in A.P. or S.A.P. bombs).

(3) Tail fuze (not included in chemical or small fragmentation bombs).

(4) Fin assembly (attached to bomb in smaller sizes).

(5) Arming wire assembly.

(6) Trunnion band (for dive bombing only).

b. Bomb body. (1) The bomb body is described in paragraph 19.

(2) *Fuze seat liner.* The fuze seat liner is a metal cup which is assembled inside the nose of the bomb to keep a cavity clear for assembling the nose fuze.

(3) *Base plug.* The base plug closes the filling hole and forms the base of the bomb. The tail fuze adapter-booster is screwed into the base plug. An extension of the plug to the rear is threaded to provide for attachment of the fin assembly by means of the fin lock nut. For shipping, the fin lock nut is covered by a fiber protector and is wired in place. In bombs of current manufacture the base plug has studs extending into the explosion charge to prevent removal of the plug.

(4) *Adapter-booster.* An adapter is a bushing threaded on the outside for assembly to the bomb body and on the inside for assembly of the fuze. When the booster (par. 18) is assembled to the adapter, the assembly is known as an adapter-booster. Tail adapter boosters of high explosion and chemical bombs are drilled for the insertion of lock pins to prevent their removal.

(5) *Suspension bands.* When, for any reason, it is inadvisable to weld or bolt suspension lugs to the bomb body, the lugs are attached to metal bands which are bolted around the bomb body. When suspension bands are to be installed, their postion is indicated by a band painted on the bomb.

(6) *Shipping bands.* Shipping bands are attached to the bomb to protect the suspension lugs. They may be of compressed paper with a recess for the lug or may be of metal in the form of a U-shaped channel. They are not removed until the bomb is prepared for use.

(7) *Closing plugs.* The openings to the fuze cavities are closed during shipping and storage by metal plugs. Those plugs serve to protect the fuze seat cavity and threads. They may be removed only for

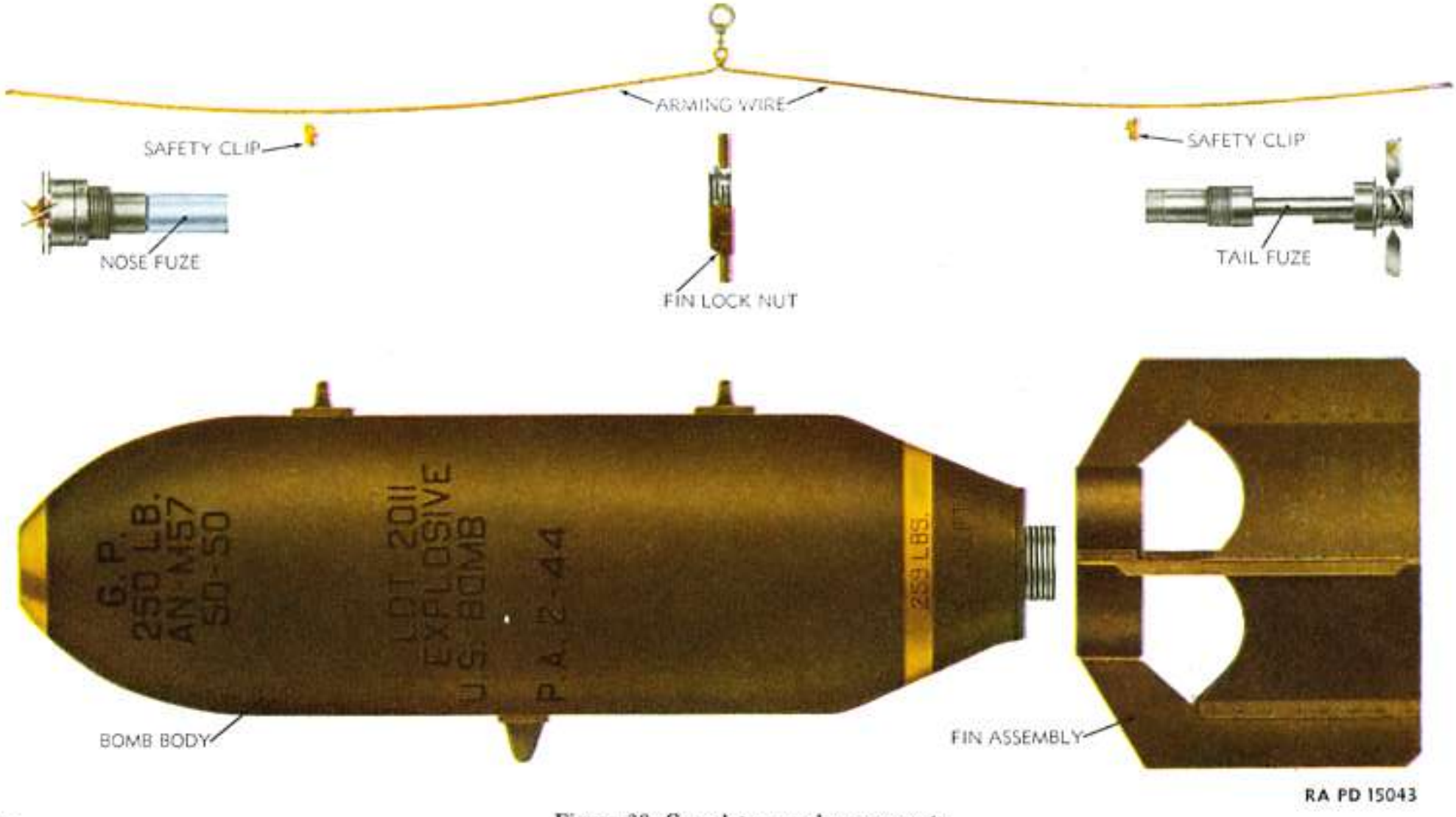


Figure 38. Complete round components.

inspection or for fuzing the bomb. If a bomb is returned to storage after being prepared for use, the fuzes are removed and the fuze hole plugs replaced.

c. Fuzes. See paragraph 20 for a description of fuzes.

d. Fin assembly. The fin assembly provides for stability of the bomb in flight. Bombs of 100-pound and smaller size have the fin assembled to the bomb body before shipment. Larger bombs are shipped with fin unassembled. In such cases the fin assembly is packed in a metal crate. The fin assembly consists of a fin sleeve which fits over the tail of the bomb and is held in place by the fin lock nut. The sheet metal fin blades are riveted or spot welded to the fin sleeve and, with the supporting members, form a square box. Fins should be protected against bending or other distortion because such distortion materially alters the flight of the bomb.

e. Arming wire assemblies are described in paragraph 22, below.

f. Trunnion bands. When trunnion mounting is desired for dive bombing, the trunnions are mounted on a steel band which is bolted to the bomb body in the same manner as suspension bands. The center of gravity band or the single suspension lug serves to indicate the proper location of the trunnion band. A.P. bombs are drilled and threaded so that the trunnions may be screwed into the bomb body.

21. FUZES. a. General. A fuze is a mechanical device designed to initiate a detonation under the circumstances desired. Fuzes are classified according to position as nose, tail, and transverse, and according to function as time, impact, and hydrostatic. Time fuzes function a predetermined number of seconds after the arming pin is released; impact fuzes function when the bomb strikes a resistant material; and hydrostatic fuzes function by water pressure. Impact fuzes are classified as delay when they are designed to have a definite time between impact and explosion of the bomb, and as superquick (nose) or nondelay (tail) when there is no delay element incorporated.

b. Arming. Bomb fuzes are shipped in a safe condition. They are so constructed that, while they are unarmed, they cannot function. A detonator safe fuze is one in which the detonator is out of line with the firing pin until the fuze arms.

c. Nose fuzes. Nose fuzes, in general, are held unarmed by the presence of safety blocks between the striker and the fuze body thus preventing the firing pin from being driven into the primer.

d. Tail fuzes. Tail fuzes, in general, are held unarmed by an arming stem being screwed into the inertia type firing pin. The booster is not assembled to the fuze in this case; it is located in the adapter-booster assembled to the bomb.

e. Fuzes are described in detail in the following sections.

22. ARMING WIRE ASSEMBLY. a. Description. The arming wire assembly (fig. 39) consists of a length of brass wire attached to a swivel loop and one or more safety clips. Each combination of bomb and fuzes has a particular arming wire assembly specified. When one fuze is used, the swivel loop is attached at one end of the wire; when two fuzes are used the loop is attached toward the middle of the wire in such position that the two branches of wire are of the proper length.

b. Components. Components of arming wire assemblies are also supplied in bulk. They are—

WIRE, arming, low brass, 0.064-in. diameter (for some fuzes 0.036-in. diam.)
LOOP, swivel, assembly
CLIP, safety, Fahnestock type
FERRULE, arming wire, pc. mk. 82–3–234 PA

c. Assembly. The data necessary for the preparation of arming wire assemblies are provided in figure 39 and table I, section XX. Arming wire assemblies should be free of twists, kinks, and burs and the wire should protrude approximately 2½ inches (not less than 2 inches nor more than 3 inches) beyond the fuze or fuzes when the bomb is installed in the rack or shackle. The dimensions indicated in table I are the minimum dimensions to be used when preparing arming wire assemblies. Excess wire can be cut off when the arming wire is installed. To prepare the assembly, proceed as follows:

(1) Cut the length of wire (dimension f) from the coil.

(2) With round-nose pliers or some equivalent tool, form a ⅜-inch open loop in the wire, the necessary distance from the end (dimension e).

(3) Pass the wire through the smaller eye of the swivel loop assembly.

(4) Pass both branches of the wire through the ferrule. Slide the ferrule up until it closes the loop formed in (2) above, but does not cause the swivel loop to bind.

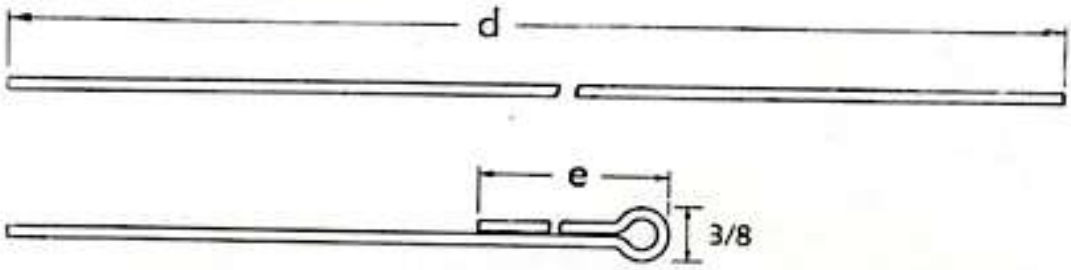
(5) Bend the arming wire as shown in the figure.

(6) Remove all kinks and burs.

(7) If the arming wire is not for immediate use, place a safety clip on each end and coil the assembly into a 5-inch coil, fasten, and tag for identification.

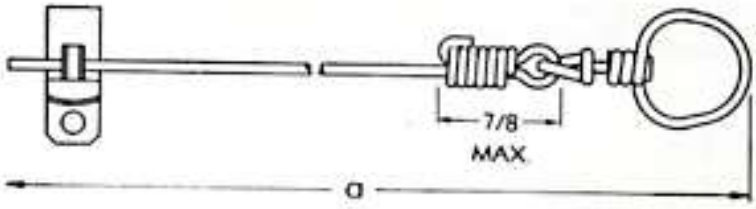
RA PD 49610

Figure 39 ①. Arming wire components.

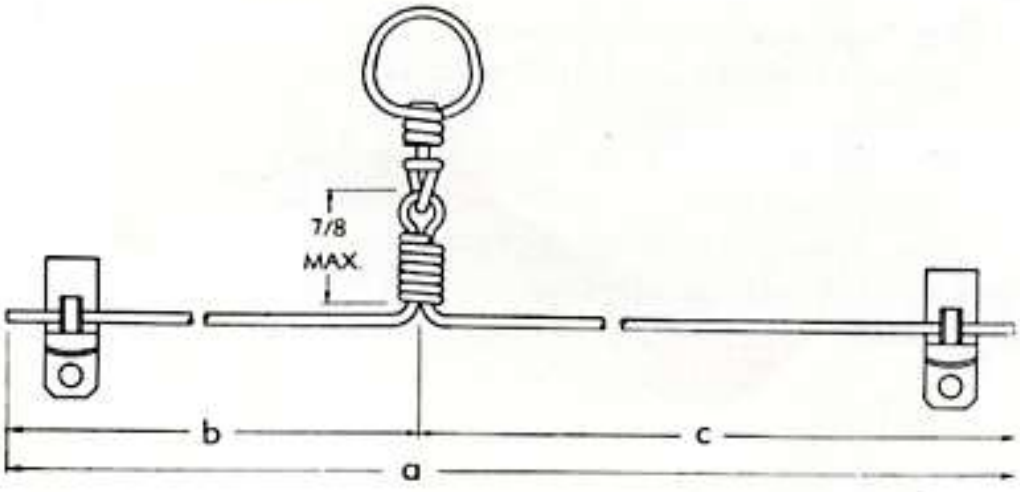


RA PD 49611

Figure 39 ②. Arming wire dimensions.



TYPE "A"



TYPE "B"

RA PD 49614

Figure 39 ③. Wire, arming, assembly.
(Dimension letters refer to Table I section XX)

SECTION III. HANDLING

23. CARE AND PRECAUTIONS IN HANDLING. a. General. Ammunition is packed to withstand all conditions ordinarily encountered. However, to insure that items of ammunition will be in serviceable condition when required for use, the precautions, applying to bombs in general, which are given below, and the specific precautions set forth with the description of each item in the following sections, will be observed.

(1) Bombs and bomb components will be stored as shipped. Those items shipped separately will be stored separately.

(2) Complete rounds will not be assembled in advance of anticipated requirements, and these rounds prepared for use but not used will be disassembled and returned to storage. Exceptions for alerted ammunition and special fuzing will be noted under the appropriate items in the following sections.

(3) Assembled rounds will be carried with arming wire, safety pins, or both, in place at all times up to the time of installation in the plane. The arming wire will remain in place until the bomb is released.

(4) Ground crews will be trained with drill bombs and inert components before attempting to handle service ammunition.

(5) In shipping and storage, applicable ordnance drawings will be followed.

(6) Packings will not be opened until the items are required for use or for inspection. Partly used boxes will be resealed, marked, and kept on top or in front of the pile. Damaged containers will be repaired or replaced with care given to transferring the markings to the new parts of the container. Packings will not be opened, repaired, or replaced within 100 feet of a magazine or other store of explosives.

(7) Items removed from their packings and not used will be returned to their packings and resealed as effectively as originally.

b. Fuzes. (1) Fuzes are packed in sealed moistureproof containers which will not be opened until the material is required for use. Fuzes unpacked and not used will be repacked and resealed.

(2) Fuzes should be protected against shock and high temperature. Boxes should not be dropped, slid, rolled, "walked" on the corners, or struck, as in lining up a stack. They should be shaded from the direct rays of the sun and protected from other sources of high temperature.

(3) Fuzes will not be disassembled except as specifically authorized.

(4) If a fuze should become armed accidentally, it will be treated with the utmost caution. *No attempt will be made to restore the fuze to its original unarmed condition.* Specific precautions for each type fuze will be found in sections V, VI, and VII.

c. Fin assemblies. (1) Fins will be protected against bending, warping, denting, and other damage.

(2) Care will be exercised to assembling fins in such position as to insure that they will not be damaged when the bomb is installed in, or released from the plane.

d. Bomb bodies. (1) Bomb bodies are designed with such strength that they are comparatively proof against ordinary damage. However, insecure blocking in shipping may permit shifting that will damage cases and plugs.

(2) Suspension lugs should be protected by the shipping bands until the bomb is ready for use.

(3) Fuze hole plugs should not be removed before the bomb is to be used except for inspection of cavities and threads.

(4) Sand for loading practice bombs should be of uniform texture and of the proper density to fill the bomb completely in reaching the desired weight. If the sand available is too heavy, sifted ashes, soot, or some similar light material should be thoroughly mixed with the sand before loading. If the bomb is not completely filled, the load will shift, thus altering the position of the center of gravity and, consequently, the ballistic properties of the bomb.

e. Photoflash bombs. The flashlight powder, with which photoflash bombs are loaded, is extremely sensitive to friction, heat, or shock. The bomb should be handled with great care. If any flashlight powder should be spilled, all work in the vicinity will be stopped until the powder is taken up and any possible residue neutralized with water. Damaged bomb bodies and loose powder will be placed in a tight container for taking to the disposal area. (See TM 9–1981.)

f. Chemical bombs. In handling chemical bombs, the protective devices appropriate to the type will always be on hand. These include mask and full protective clothing for blister gases, appropriate mask for poison gases, asbestos gloves and submergence tanks for phosphorus, and dry granular inert material such as coal-tar pitch, graphite, or fine soft coal for magnesium incendiaries.

24. STORAGE AND MAINTENANCE. a. General. Explosives and ammunition will be stored in an area set aside for the purpose. Such an area will be removed from operating areas, inhabited areas, public roads and public railroads by distances laid down in pertinent regulations such as TM 9–1900 or the Ordnance Safety Manual. Each type of ammunition will be stored separately and in quantities small enough to prevent sympathetic detonation of surrounding stores if one stack or magazine should explode. Such quantities and distances are given in TM 9–1900. In storage areas, smoking, carrying of matches or other flame-producing devices, use of lights other than an approved

type, accumulation of inflammable trash or dead vegetation, and hunting are forbidden. Ammunition and explosives of any one size and type will be stored in as many separate storage units as storage facilities permit; in no case will the entire supply of any one size and type be concentrated in one place.

b. **Bombs.** (1) General-purpose, armor-piercing, semiarmor-piercing, light case, depth, and fragmentation bombs may be stored together provided quantity-distance regulations are observed and all requirements for each type are met by all types combined. For example, fragmentation bomb clusters which are shipped and stored fuzed, may not be stored with general-purpose bombs, which may not be stored with fuzes.

(2) General-purpose, semiarmor-piercing, depth, light case, or photoflash bombs will not be stored with any other type of explosives or ammunition.

(3) Bombs shipped with fuzes in the same container will ordinarily be stored as shipped. However, for long-term depot storage, fuzes will be removed from bomb containers and stored separately.

(4) In the case of depth bombs fuzed with transverse hydrostatic fuzes, an exception is made for alerted ammunition. (See par. 90.)

(5) Bomb storage areas should be located at greater than missile distances from artillery ammunition storage, if practicable.

(6) Bombs should be stored on steel dunnage which should be electrically connected and grounded. The use of inflammable dunnage for bombs should be avoided.

(7) Bombs containing phosphorus may not be stored with any other type of ammunition. If temperatures in storage exceed 105° F, WP bombs should be stored upright, preferably nose down.

(8) Other types of chemical bombs may be stored together but not with any other type of ammunition.

(9) Photoflash bombs may not be stored with any other type of ammunition, except, when the total amount of explosive is less than 1,000 pounds, photoflash bombs and small arms ammunition may be stored together.

c. **Fuzes.** (1) Fuzes will be stored in dry, well-ventilated places and will be protected against sun, excess moisture, and heat.

(2) Fuzes may be stored with primers, primer-detonators, detonators, boosters, bursters, and small-arms ammunition. Under conditions of limited storage, if the total amount of explosive in one location is less than 1,000 pounds, fuzes may be stored with fixed ammunition.

d. **Inert components.** Fin assemblies, empty bomb bodies, arming wires, and similar inert components may be stored in any place which provides protection against damage by the weather.

25. **INSPECTION BEFORE USE.** When components are unpacked for assembly into complete rounds, they will be inspected to insure that they are in serviceable condition. Bombs will be inspected to insure that exposed surfaces are free of foreign material, particularly particles of explosive. Fuze cavities and threads will be inspected to insure that they are clean and clear and not so distorted so as to interfere with the assembling or function of the fuze. Suspension lugs should be examined for damage which might weaken the lug or its attachment to the bomb. Lugs should be gauged for distance and alignment. Fin assemblies should be examined for straightness, alignment, and security of attachment. Fuzes should be inspected for evidence of deterioration such as heavy rust or corrosion, evidence of improper handling, and should be examined to see that the proper primer-detonator is assembled.

26. **ASSEMBLY (FUZING AND FINNING).** Assembly of complete rounds will be done at a point located at a safe distance from explosives and operations areas. At the distributing point, all of the necessary components are loaded on the bomb service truck and bomb trailer and transported to the bomb fuzing point. At this point components are removed from the packings and inspected as described above. Nose and tail fuze hole plugs are removed and the cavities and threads inspected. The shipping wire of the fin lock nut is cut and the nut removed from the bomb tail and the fin is assembled with one vane of the fins in line with the suspension lug, and the fin lock nut is replaced and tightened by hand or with the wrench supplied. Bombs are installed in the plane and then the fuzes are assembled to the bomb as described under the particular fuze in section IV. When space in the bomb bay is limited, fuzes are assembled to the bomb before the bomb is delivered to the plane.

27. **HANDLING IN FIELD.** Bombs are handled and transported from distributing points to airplanes by means of the following equipment:

Truck, bomb service, M6 (TM 9–765)
Truck, bomb lift, M22 (TM 9–762)
Trailer, bomb, M5 (TM 9–760)

These items and the tools and accessories supplied therewith are described in the Technical Manuals noted above.

28. **DESTRUCTION OF UNSERVICEABLE MATERIAL.** Unserviceable material will be destroyed by authorized and experienced personnel in accordance with the provisions of TM 9–1900 or the Ordnance Safety Manual. Duds will be destroyed by Ordnance bomb disposal troops.

29. **SAFE ALTITUDES AND DISTANCES.** Altitudes and distances safe from fragmentation and blast effect will be specified by the Commanding General, Army Air Forces (par. 21, AR 750–10, 22 January 44).

30. **FIELD REPORT OF ACCIDENTS.** When an accident involving the use of ammunition occurs during training practice, the procedure prescribed in AR 750–10 will be observed by the Ordnance officer under whose supervision the ammunition is maintained or issued. Where practicable, reports covering malfunctions of ammunitions in combat will be made to the Chief of Ordnance, giving the type of malfunction, type of ammunition, the lot number of the complete rounds or separate-loading components, and condition under which fired.

SECTION IV. FUZES, GENERAL

31. **CLASSIFICATION.** a. **Position.** Fuzes are classified according to the position in which they are assembled to the bomb as nose, tail, and transverse.

b. **Arming.** Fuzes are classified according to method of arming as arming pin type and arming vane type. These are further classified as—

(1) Direct arming, when the fuze becomes armed immediately on ejection of the arming pin or by direct unscrewing of the arming stem by the vane.

(2) Delayed arming, when the ejection of the arming pin initiates a powder train or clockwise mechanism which arms the fuze after a predetermined time or when the arming vane is connected to the arming stem by a reduction gear assembly.

c. **Action.** Fuzes are classified according to action as time, impact, and hydrostatic.

(1) Time fuzes fuction to explode the bomb a certain number of seconds after release. Time fuzes act in a manner similar to an ordinary alarm clock. A notched disk is rotated by the clockwork under a trigger. When the time set has elapsed, the notch has turned so as to be under the trigger which drops into the notch and releases a spring-loaded firing pin. Although the fuze is generally set for the time desired when the complete round is assembled, the time setting may be changed at any time up to release, provided the fuze is accessible.

(2) Impact fuzes begin their function when the bomb strikes a resistant material. Fuzes classed superquick (instantaneous) or nondelay act to explode the bomb immediately; those classed as delay have an incorporated element which delays the explosion of the bomb

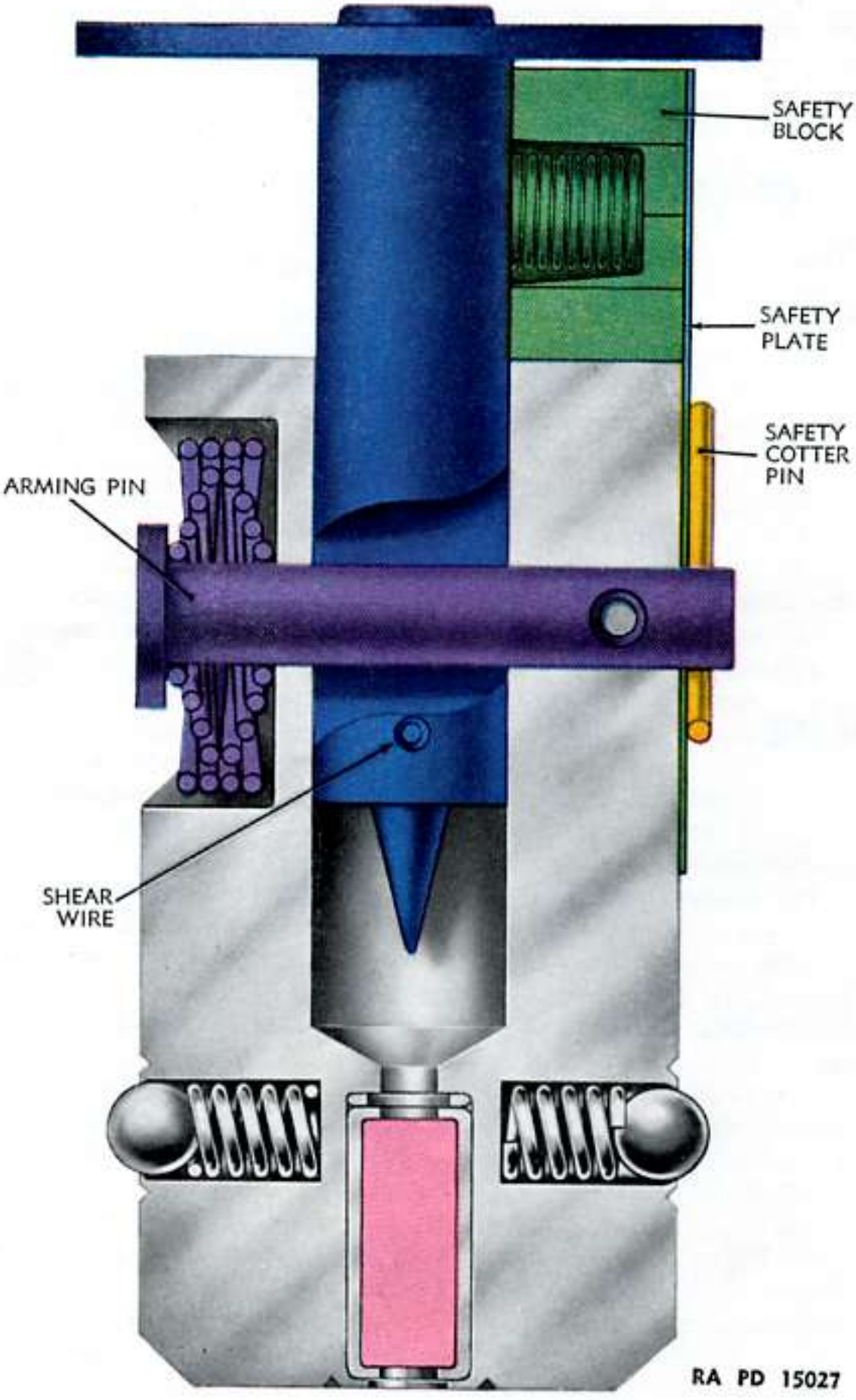


Figure 40. Nose fuze pin type.

until a definite time has elapsed, and allows the bomb time to penetrate the target or gives a low altitude bomber time to clear the danger area before the bomb explodes.

(3) Hydrostatic fuzes act under the influence of water pressure to explode the bomb a predetermined depth below the surface.

32. COMPONENTS. **a. Nose fuzes.** The essential parts of a nose fuze are a striker head, a firing pin, safety block, arming mechanism, primer, detonator, and usually delay element and booster, all assembled in a fuze body. In the arming pin type (fig. 40) a spring-loaded arming pin, which passes through the fuze body and firing pin, is held in place by the arming wire. The wire also restrains a plate which holds the safety blocks in place. In the arming vane type (fig. 41) the striker is restrained by a safety block or a ring of safety disks which are released by the action of the arming vane. The arming vane is kept from rotating prematurely by the arming wire. In both types the striker is held in place after arming by a shear wire.

b. Tail fuzes. The essential parts of a tail fuze are the primer detonator, an inertia type firing pin, and arming mechanism, all assembled in the fuze body. In the arming pin type (fig. 42) the arming pin passes through the fuze body and the firing pin. In the vane type (fig. 43), an arming stem is screwed into the firing pin to keep it from striking the primer until the action of the vane unscrews the arming pin. In both types, the firing pin is held in place while the bomb is in flight by a light creep spring. Dependent upon the degree of sensitivity to impact required, the firing pin may be of the simple inertia type or of the cocked type.

c. Hydrostatic fuzes. This type works on the principle of a bellows or diaphragm working against a spring of fixed strength. When the external pressure overcomes the resistance of the spring the firing pin is released and driven against the primer by spring action. In some fuzes provision is made for adjustment by a mechanism controlling the compression of the diaphragm spring. This is set by an external lever. In other fuzes, adjustment is obtained by interchanging the springs.

d. Primer detonators. In order to allow variation of the delay action of tail fuzes, primer, delay element, and detonator are assembled in one interchangeable unit. Primer detonators (fig. 44) of various delay times are supplied. Primer detonator, M14 is supplied with 0.1 second delay, 0.025 second delay, 0.01 second delay and nondelay. Primer detonator, M16, and M16A1, are supplied with 8 to 15 seconds delay and 4 to 5 seconds delay.

e. Arming vane. In general, vane type fuzes are packed and shipped with the arming vane disassembled. The vane assembly is shipped separately in the same box.

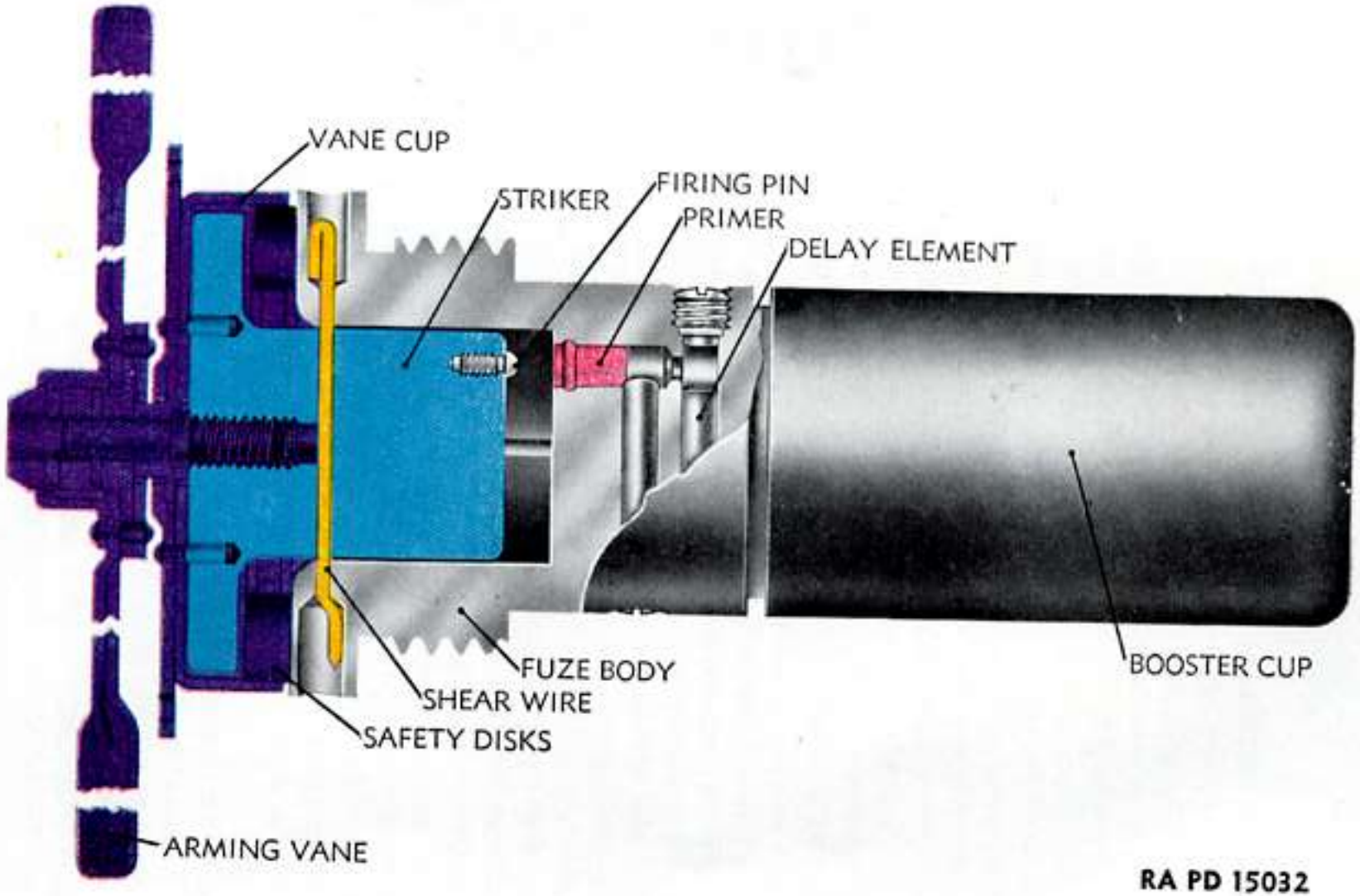


Figure 41. Nose fuze, vane type.

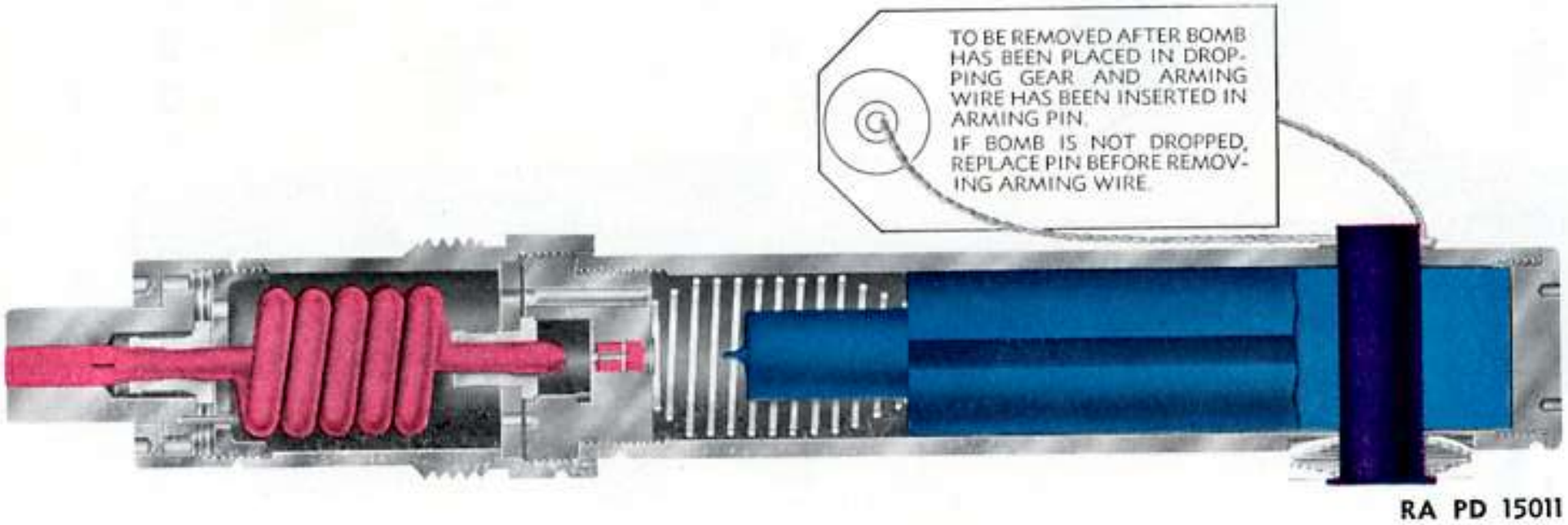


Figure 42. Tail fuze, pin type.

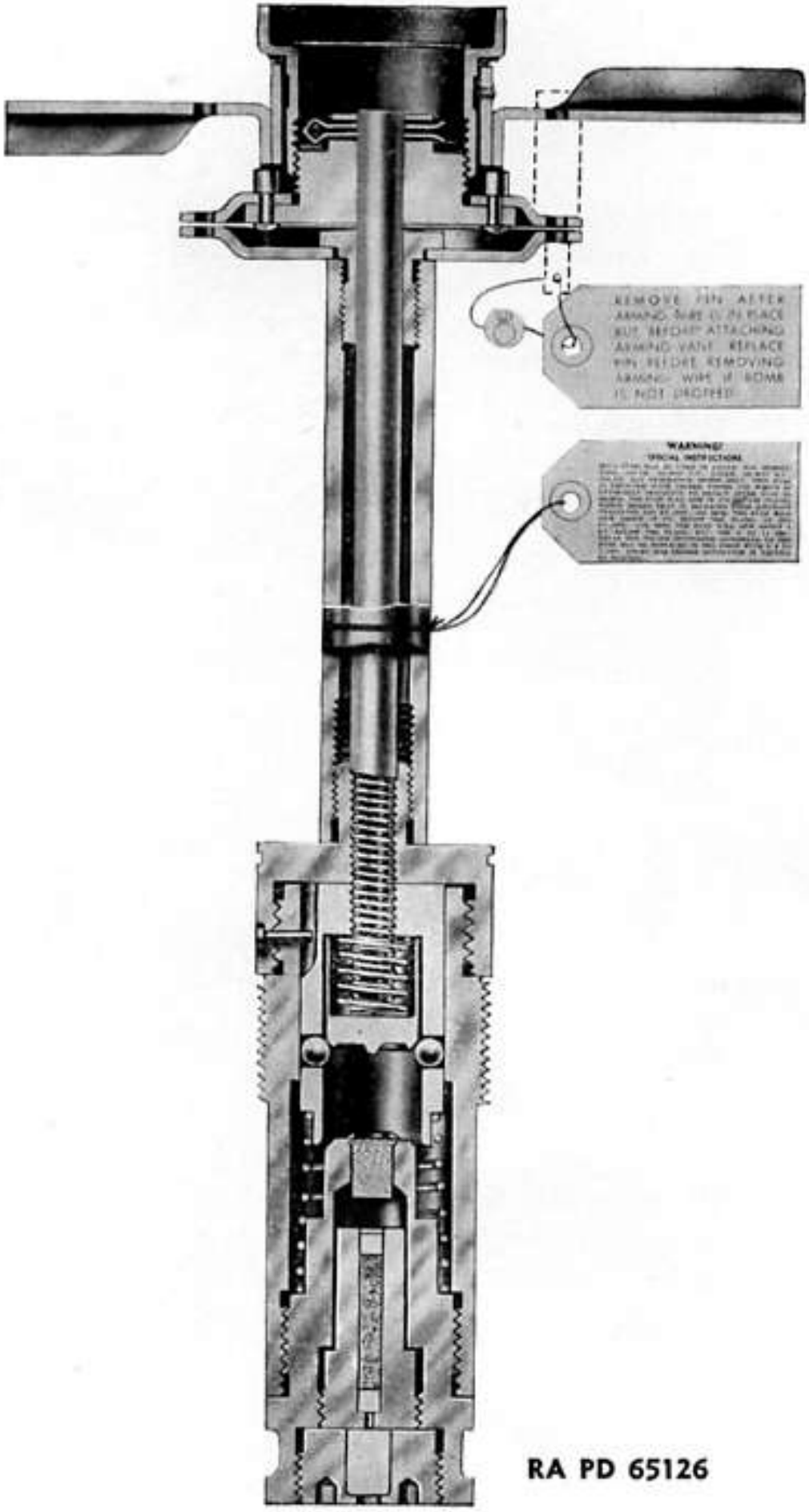
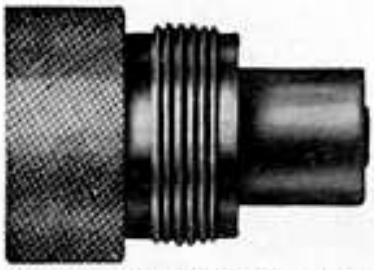
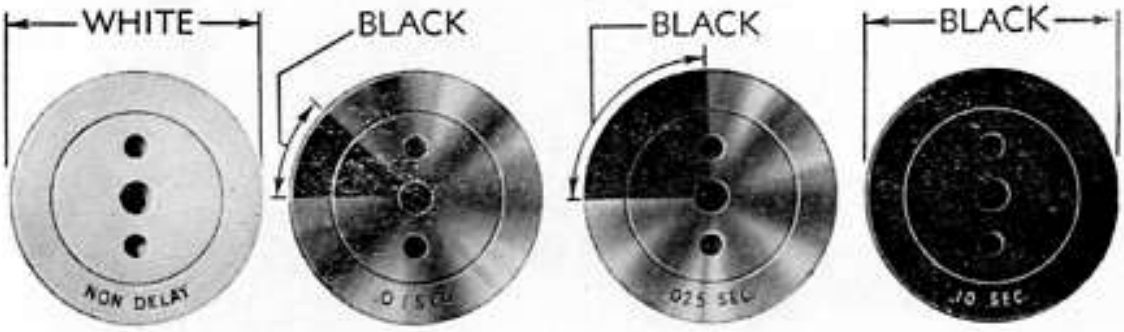


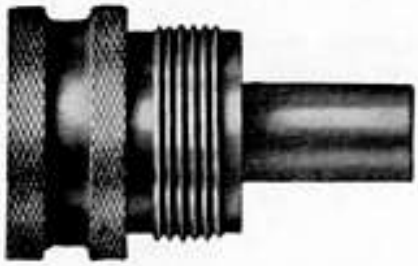
Figure 43. Tail fuze, vane type.



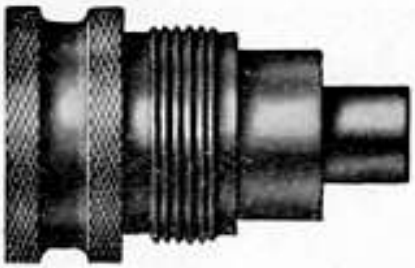
PRIMER DETONATOR, M14



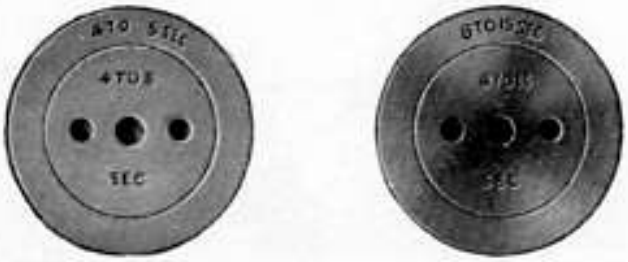
VARIOUS DELAYS OF PRIMER DETONATOR, M14



PRIMER DETONATOR, M16



PRIMER DETONATOR, M16A1



VARIOUS DELAYS OF PRIMER DETONATOR, M16

RA PD 15012

Figure 44. Primer detonators.

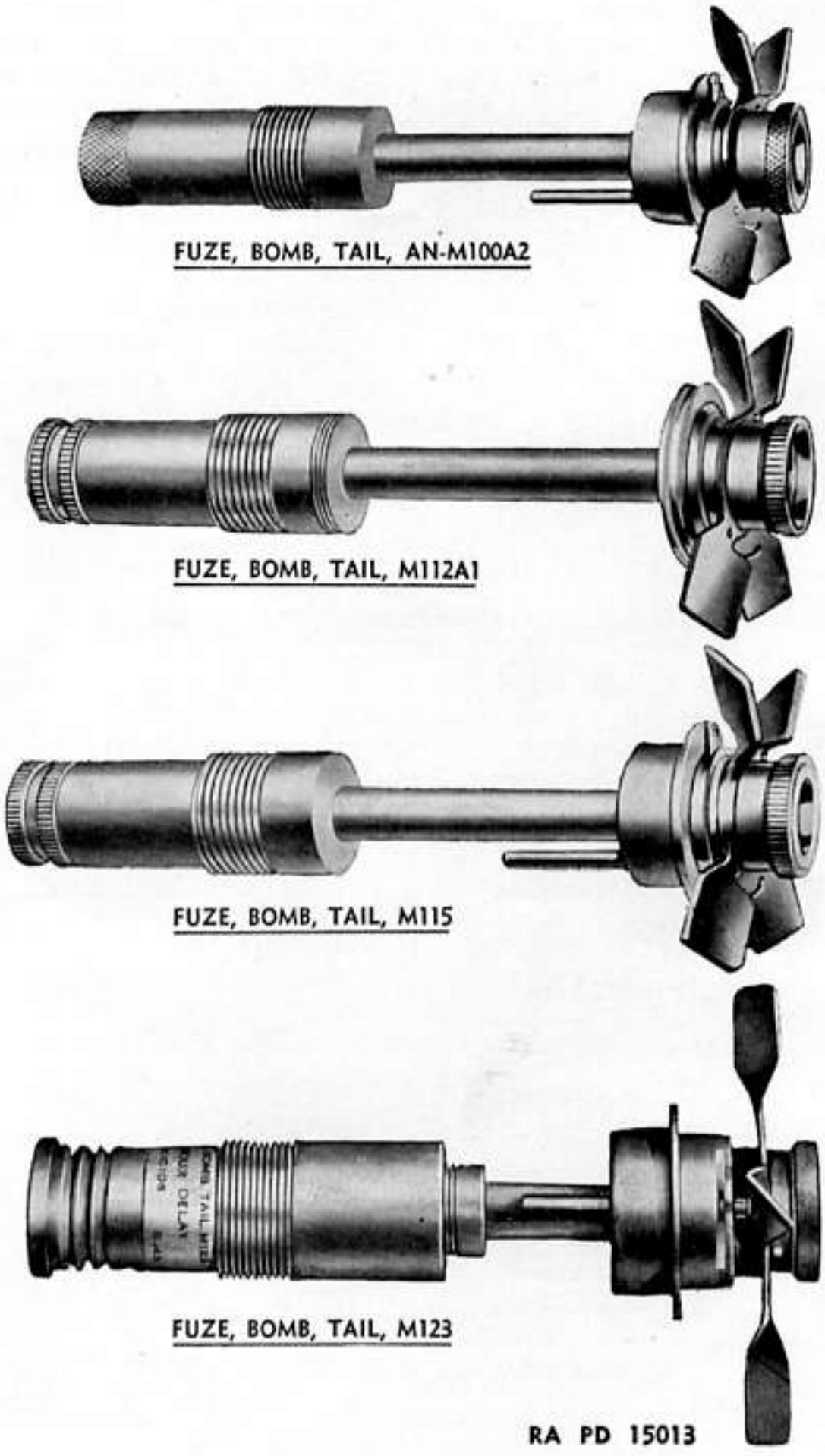


Figure 45. Tail fuzes.

33. IDENTIFICATION. Fuzes are identified by the information marked on the containers and stamped on the fuze body. They may be identified by inspection as herein described. Detailed differences are as follows: Rapid arming fuzes are distinguished from slow arming types by the rod which extends from the arming head forward along the arming stem for approximately 1.5 inches. This rod is present on the slower arming types and absent from the rapid type. (See fig. 45.) Fuzes of one series (that is, fuzes with the same mechanism and action, but designed for bombs of different sizes) are distinguished among themselves by the length of the arming stem. (See fig. 46.) Special-purpose fuzes such as hydrostatic, have a distinctive appearance and method of operation. They are described in the following sections.

34. FUZE EXTENSION. The most efficient use of fragmentation and chemical bombs requires that they detonate at or slightly above the surface of the ground. The nose fuze extension consists of a steel tube, filled with tetrytol, adapted to receive the fuze and screw into the fuze seat of the bomb. (See par. 26.)

35. NOSE ADAPTER BOOSTER. Large bombs are adapted for large diameter nose fuzes. An adapter booster which is threaded externally to fit the large fuze seat and internally to receive the smaller fuze is necessary in order to use smaller special-purpose fuzes with these bombs.

36. PRECAUTIONS. *a.* Fuzes are packed in sealed moistureproof containers. They will not be unsealed until required for use; fuzes un-

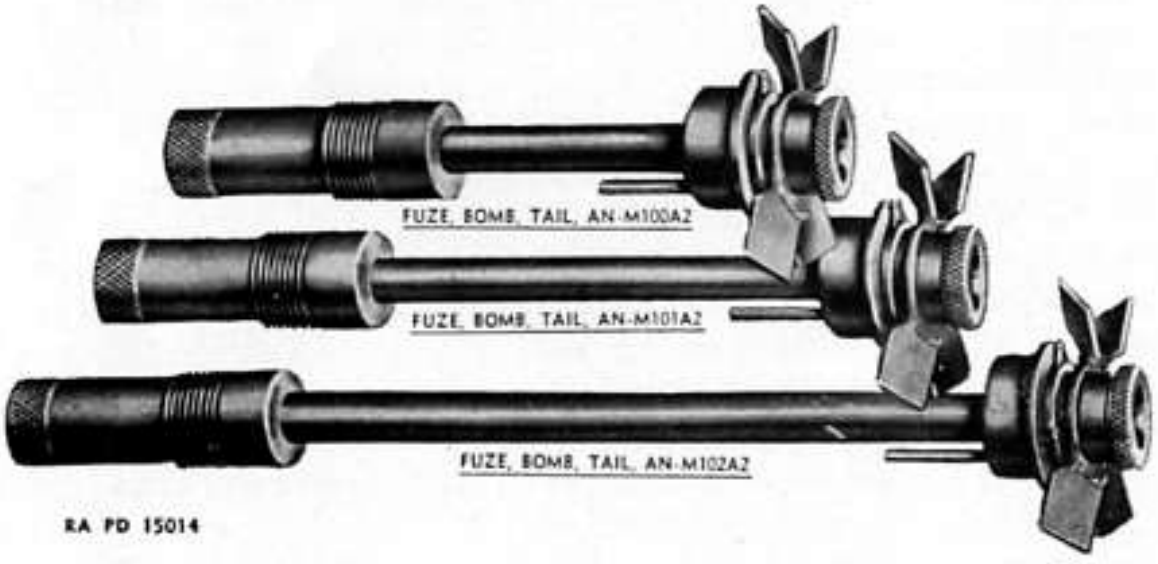


Figure 46. Tail fuze series.

packed for use and not used will be resealed and returned to their original packings which will be effectively sealed with tape.

b. Fuzes will be protected against excessive heat.

c. Fuzes will be handled with care at all times. Boxes will not be dropped, tumbled, dragged, or thrown; nor will they be struck with a hammer or similar tool either to open the box or align in a stack.

d. Fuzes will not be unpacked—or packed within 100 feet of—a magazine containing explosives.

e. When the fuze is unpacked, it should be examined to insure that shipping seals are intact, that safety blocks or arming pin are in place, or that the arming stem is not unscrewed.

f. Safety cotter pins, shipping wires, and seals will be left in place until the arming wire is assembled to the fuze.

g. Care will be exercised not to bend or distort vane assemblies.

h. Only primer detonators authorized for use with the particular fuze will be used.

i. When an authorized alteration is made to a fuze, the fuze will be so marked as to indicate clearly the nature of the modification. (For example, when the depth setting of a hydrostatic fuze is changed, the new depth setting will be stenciled on the pistol head.) If the fuze is repacked after alteration, the container will also be so marked.

j. Fuzes will not be disassembled further than authorized without prior approval of the Chief of Ordnance.

SECTION V. NOSE FUZES

37. FUZE, BOMB, AN–M103 (NOSE). a. Data. FUZE, bomb, AN–M103 (nose), drawing 73–8–14, is a detonator-safe, arming-vane type nose fuze which requires 230 revolutions of the vane to arm for delay action and 345 revolutions to arm for instantaneous action. It is designed to detonate the bomb on impact, either instantaneously, or with 0.1 second delay, dependent upon the setting of a delay pin. The fuze is 7.1 inches, overall, in length and weighs 3.7 pounds. FUZE, bomb, AN–M103 (nose), is authorized for use in all G.P., demolition, and S.A.P. bombs when the tail fuze used has a delay of 0.1 second or less. It may also be used in depth bombs (except AN–Mk. 17) and G.P. bombs with hydrostatic fuzes, but only if selective arming racks are available. FUZE, bomb, M103 (nose) is an earlier model which differs from the AN–M103 in requiring 785 revolutions of the vane to arm the fuze. In other respects, information given herein concerning the AN–M103 applies equally to the M103.

b. Description. FUZE, bomb, AN–M103 (nose), is cylindrical in shape. (See fig. 47.) The inner portion—which assembles inside the

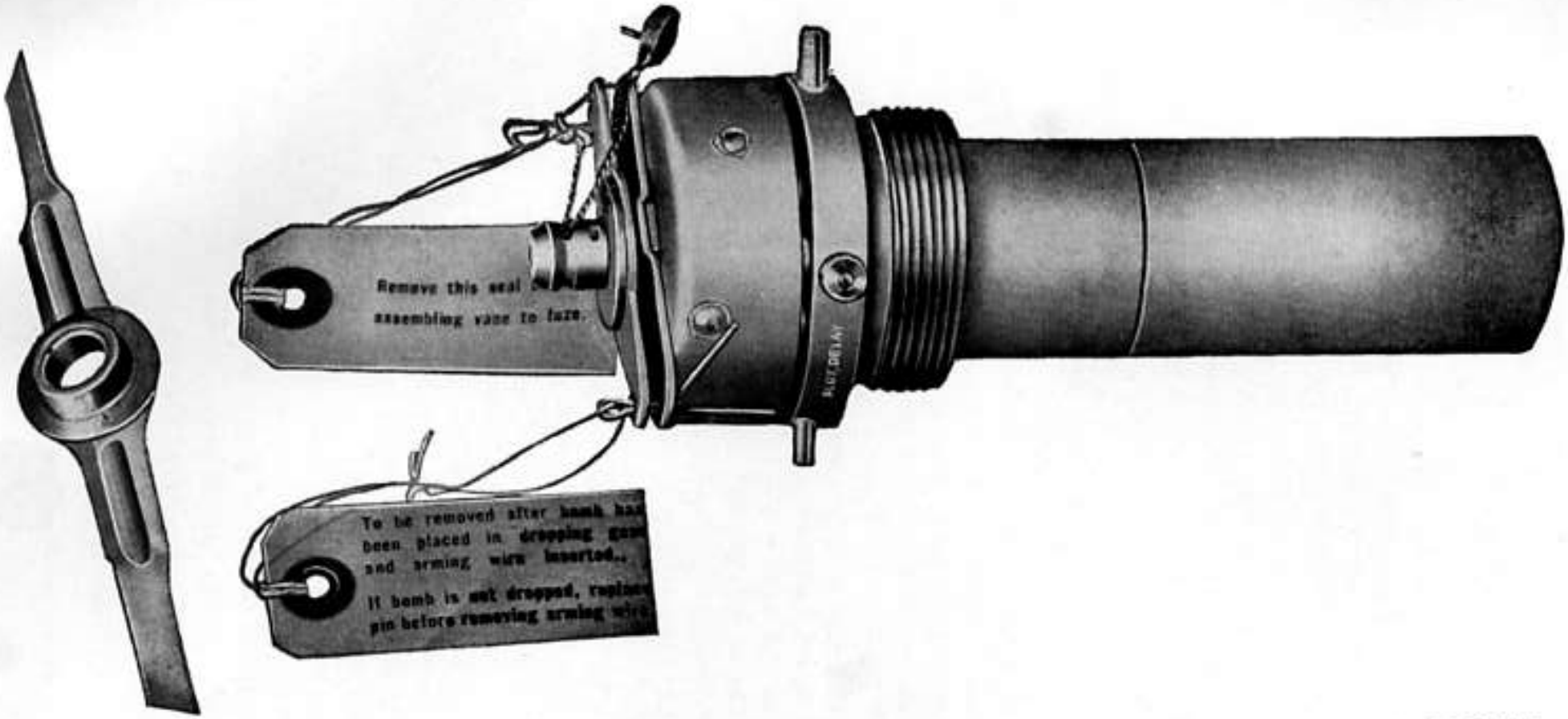


Figure 47. FUZE, bomb, AN–M103 (nose).

fuze seat in the bomb—is 5 inches in length and 1¾ inches in diameter. The outer portion is 1¼ inches long and 2½ inches in diameter. The arming vane hub projects ¾ of an inch from the outer end. The two-blade arming vane is shipped separately. A vane stop which consists of two straps attached to the vane hub and fuze top respectively, is fastened during shipping and handling by a safety cotter pin and a sealed shipping wire. On the side of the fuze there are two diametrically opposed lugs which serve to prevent the hand slippng when fuzing or unfuzing the bomb. The setting pin is located on the circumference midway between the lugs. On the setting pin there is a cross member which forms a key and rests in one of two slots in the pin seat; when the key is in the *deep* slot the fuze is set for delay and when key is in the *shallow* slot, the fuze is set for *superquick* action.

c. **Function.** The fuze contains four interrelated systems (figs. 48, 49, and 50), arming (purple), delay selecting (green), firing (blue), and the explosive train (red).

(1) The arming system consists of the arming vane ① (90° out of position in illustration), vane cup ②, reduction gears ③, arming screw ④, and safety blocks ⑤. The arming vane, reduction gears, and arming screw are assembled in one unit with the vane cup; the safety blocks are held between the flange of the striker ⑪ and the fuze body by the vane cup. When the arming vane is rotated by the air stream, the arming screw unscrews from the striker body carrying the vane, gears, and vane cup with it. When the vane cup has progressed ¼ inch the safety blocks are released. Positive ejection is insured by a flat spring assembled within the circle of blocks. The arming vane continues to rotate until the arming screw has progressed ½ inch. Then the entire assembly becomes disengaged from the fuze and falls free.

(2) The delay selecting system consists of the detonator slider ⑦ which is held in place against spring action by the arming stem ⑧ which in turn is held in place by the arming assembly. As the arming screw advances, the arming stem follows, driven by its spring ⑨. When the stem has progressed ¼ inch, it clears the first step of the detonator slider which moves to line up the detonator ⑩, with the delay element ⑪ and booster lead ⑫ of the explosive train. If the setting pin ⑬ is in the delay position, it restrains the arming stem from moving further (fig. 49) and, on impact, the fuze functions with 0.1 second delay. If the pin is set for superquick action, the arming stem continues to progress until the end of the stem clears the second step of the detonator slider and the slider moves to line up the detonator with the superquick firing pin ⑭ and booster lead ⑫. (See fig. 50.) Upon impact, the fuze will function immediately. The detonator is out of line with the other explosive elements until the fuze arms: the fuze is detonator safe.

Note. Once the fuze arms, detonator slider cannot return to its original position.

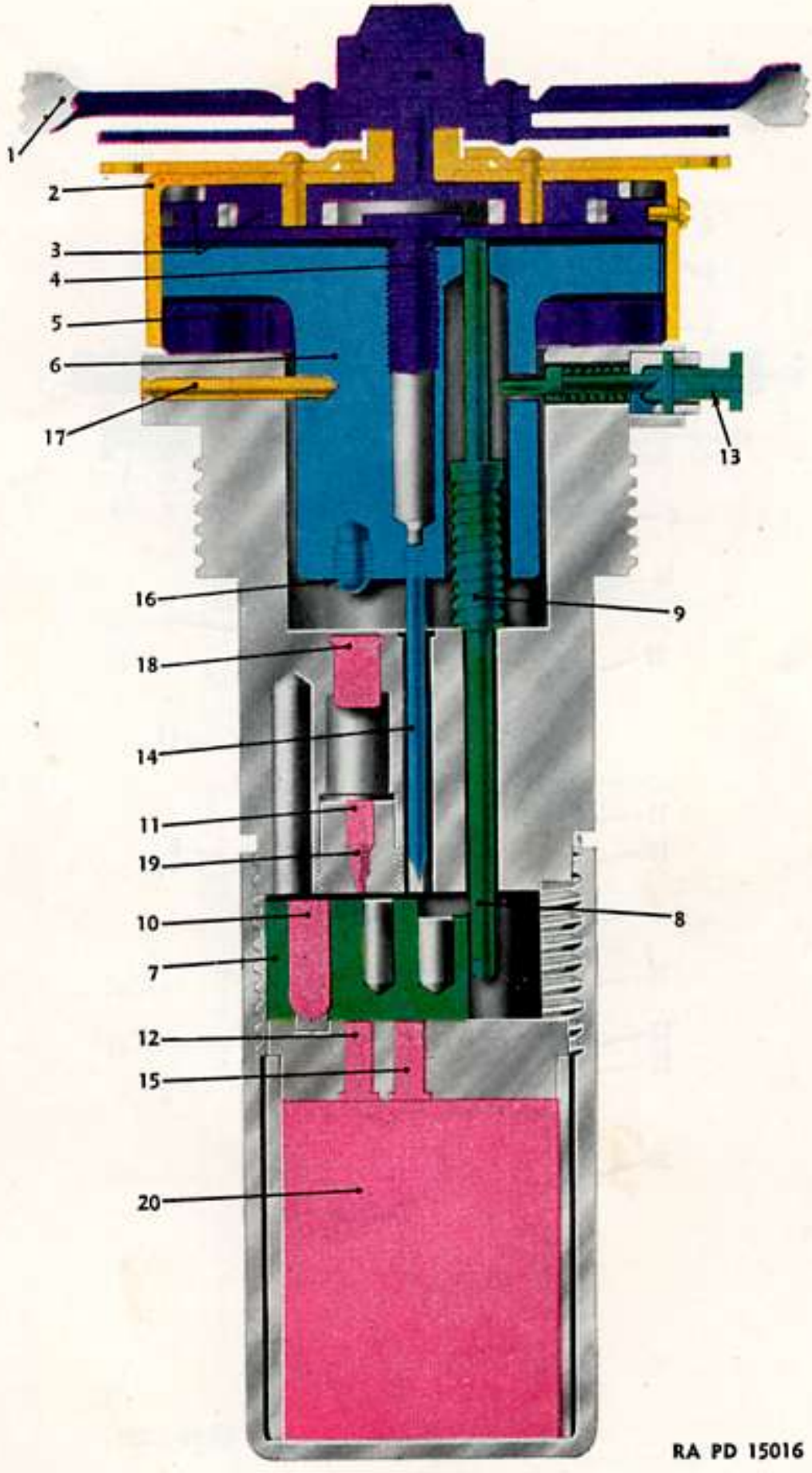


Figure 48. FUZE, bomb, AN–M103 (nose) unarmed.

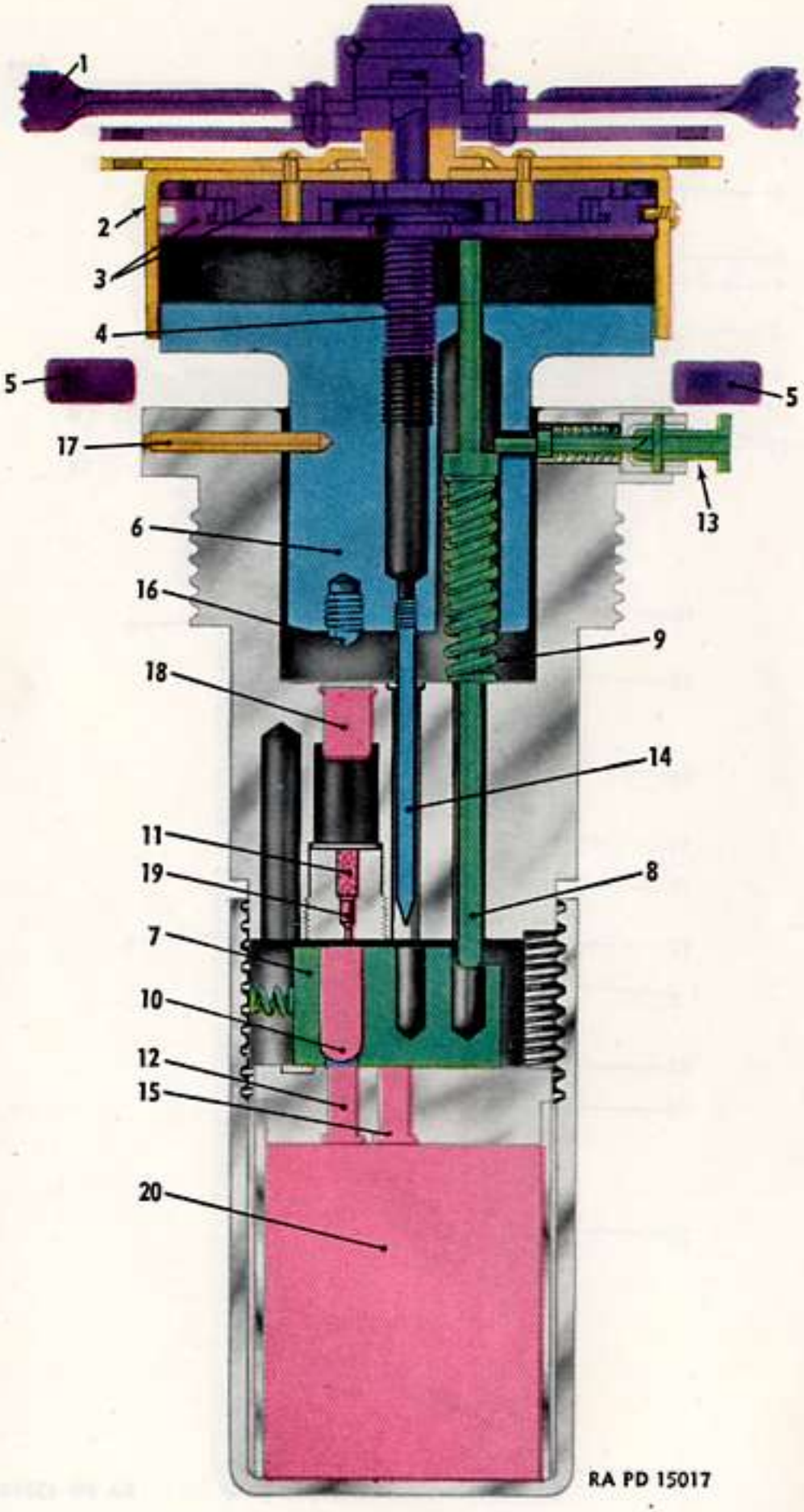


Figure 49. FUZE, bomb, AN–M103 (nose), armed for delay action.

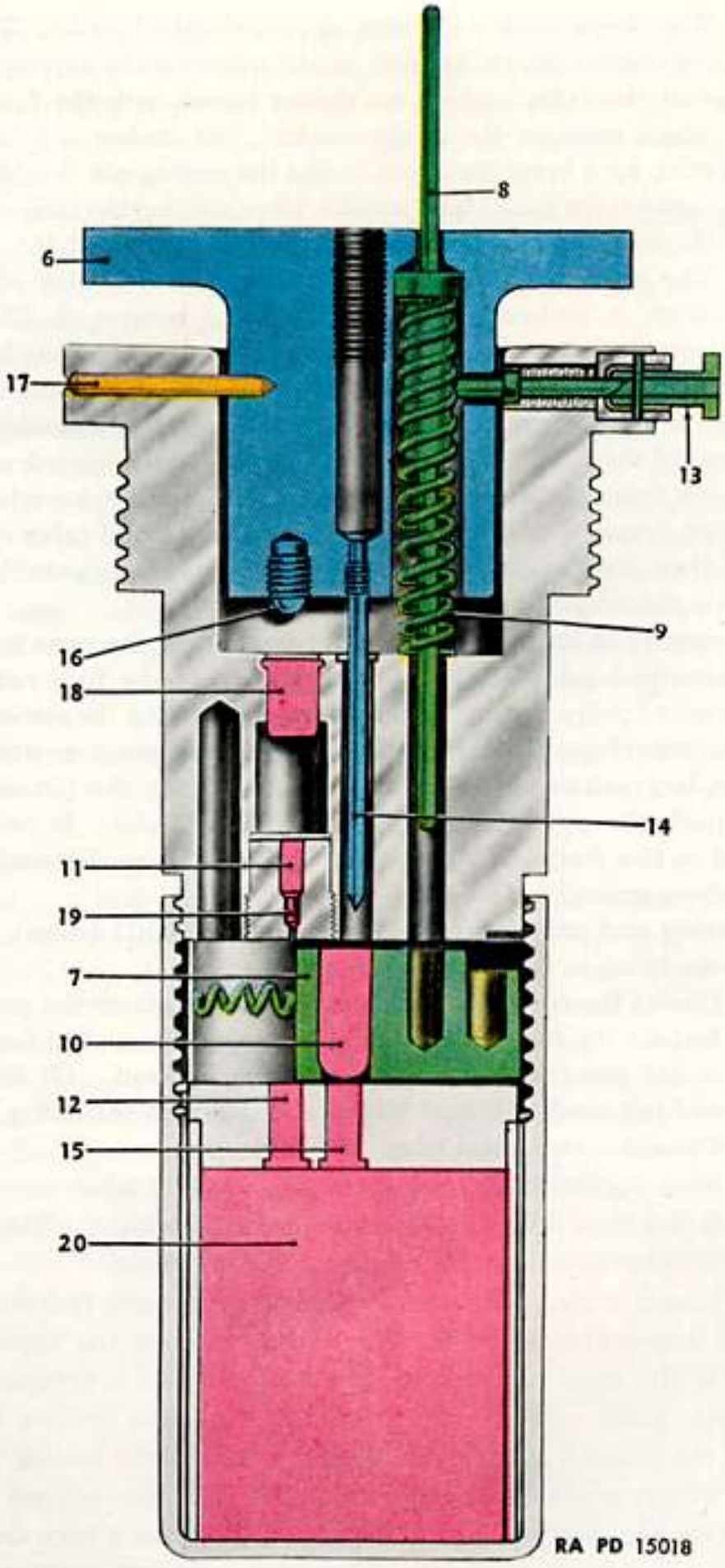


Figure 50. FUZE, bomb, AN–M103 (nose), armed for superquick action.

(3) The firing system consists of a cylindrical striker ⑥ and two firing pins, one for the delay train ⑯, the other for the superquick train. A flange at the outer end of the striker forms, with the fuze body, a groove which contains the safety blocks. The striker is held in place after arming by a brass shear pin ⑰ and the setting pin ⑱ which acts as an additional shear pin. Upon impact, after arming, the striker is driven inward shearing the pins and driving both firing pins with it.

(4) The explosive train consists of a primer ⑬, delay element ⑪, relay charge ⑨, detonator, booster leads and booster ⑳. The primer, delay element, and relay charge are housed in the fuze body in position to be initiated by impact of the delay firing pin. The detonator is assembled in the detonator slider and the booster is assembled to the inner end of the fuze. When the slider is set for superquick action, the superquick firing pin is driven directly into the detonator—which serves as its own primer—and the primer, delay charge, and relay charge, although they are fired by the delay firing pin, are bypassed, and the booster is detonated immediately.

d. Preparation for use. Aside from assembling the vane to the vane hub (described below) the only preparation of the fuze necessary is the change of delay setting. This is done by pulling the setting pin out until the key clears the setting slots, turning the pin a quarter turn so that the key will enter the other slot, and letting the pin drop back. As shipped, the pin is set in the *d*eep (*d*elay) slot. It needs to be changed to the *s*hallow (*s*uperquick) slot only when detonation of the bomb above ground is desired.

e. Fuzing and unfuzing. FUZE, bomb, AN–M103 (nose), is assembled to the bomb in the steps detailed below:

(1) Unseal the container and remove the fuze from the packing.

(2) Inspect the fuze to see that it is serviceable and to see that the setting is for superquick or delay action as desired. (If the fuze is set SQ and not used, it should be reset to delay on repacking.)

(3) Cut and remove seal wire.

Note. When EXTENSION, fuze, M1 is used, see also j below.

(4) Screw fuze, less vane, into the bomb handtight. The use of a wrench or other tool is neither necessary nor permitted.

(5) Uncoil arming wire, and thread shorter branch, first through the forward suspension lug of the bomb, then through the upper pair of eyelets in the vane stop straps. If the nearer pair is occupied by the cotter pin, place another cotter pin in the opposite eyelets, and then remove the original cotter pin and replace it with the arming wire.

(6) Adjust arming wire to protrude 2 to 3 inches beyond the vane stop. Slip one safety clip over the end of the arming wire and slide it up until it just touches the face of the strap. Be sure that the protruding section of wire is neither kinked nor burred.

(7) Slip arming vane assembly over vane hub so that the locating pins on the vane enter the corresponding holes in the vane hub and the vane holder spring snaps into the groove in the hub.

Note. The assembly of tail fuze and fin assembly may precede or follow the installation of nose fuze described in e above.

(8) Upon completion of assembly of the round, the cotter pin and tag are removed from the vane stop.

(9) If a bomb is not dropped it will be unfuzed and returned to storage reversing the steps specified above.

f. Accidental arming. If a fuze should be found with the vane cup advanced enough to have released the safety disks, it is armed and will function on receiving a blow or pressure on the striker. In such a case the first action taken will be to place improvised safety blocks between the flange of the striker and the fuze body and taping or otherwise fastening them in place. The improvised blocks should be of a material thick enough to take up all available space between the flange and fuze body. After the blocks are in place the fuze may be handled in comparative safety. No further attempt will be made to disarm such a fuze. It should be destroyed as unserviceable ammunition in a dangerous condition.

g. Partial arming. The earlier model of this fuze, **FUZE, bomb, M103 (nose)**, may not arm before impact when released from minimum altitudes for over-water bombing. When such use is contemplated, the older type fuze may be partially armed by removing the safety pin and seal wire and turning the vane hub counterclockwise for approximately 250 revolutions, until exactly ⅛ inch of the thickness of the safety disks is uncovered by the vane cup. Note that no more than ⅛ inch of the disks should be exposed and not more than 250 turns of the vane hub should be made. The seal wire and safety pin will be replaced and the tags attached to both will be marked to show that the fuze is partially armed. If partial arming is done in advance of requirements, fuze containers will be so marked. **FUZE, bomb, M103 (nose)**, partially armed, as described above, may be employed on any mission without restoration to its original condition. **FUZE, bomb, AN–M103 (nose)**, normally arms within minimum combat altitudes; it will not be partially armed.

h. Marking. The container in which the fuze is packed is marked with the nomenclature of the fuze, the ammunition lot number, the fuze assembly drawing number, and the date of its revision. The fuze has stamped in the metal of the body the type, model, and lot number. Two instruction tags are attached to the fuze as shipped. One, attached to the seal wire, reads: "Remove this seal before assembling vane to fuze"; the other, attached to the safety pin, reads: "To be removed after bomb has been placed in dropping gear, arming wiring inserted. If bomb is not dropped, replace pin before removing arming wire."

i. Packing. The fuze, less vane, is packed in an individual, sealed metal container. When shipped in bulk, 25 such containers and 25 vanes, mounted on spindles, are packed in a wooden box.

j. EXTENSION, fuze, M1,— inch. (1) EXTENSION, fuze, M1,— inch may be used in any bomb adapted for the AN–M103 nose fuze. It consists of a burster support and a burster assembly. The burster support is a steel tube 2.375 inches outside diameter which has a male thread at one end and a female thread at the other. The former screws into the adapter in the nose of the bomb; the latter receives the AN–M103 nose fuze. The burster assembly consists of an asphalt-impregnated, chipboard tube which has a recessed metal cap crimped to one end and a plain metal cap cemented to the other. The tube is filled with cast tetrytol. A shakeproof lock washer is supplied with each assembly. The various sizes of the components are as follows:

Nomenclature	Length, overall (inches)	
	Burster support	Burster assembly
EXTENTION, fuze, M1, 6-inch	6.72	5.92
EXTENTION, fuze, M1, 9-inch	9.72	8.92
EXTENTION, fuze, M1, 12-inch	12.72	11.92
EXTENTION, fuze, M1, 18-inch	18.72	17.92
EXTENTION, fuze, M1, 24-inch	24.72	23.92
EXTENTION, fuze, M1, 30-inch	30.72	29.92
EXTENTION, fuze, M1, 36-inch	36.72	35.92

(2) To assemble the extension proceed as follows:

(*a*) To insure that the arming wire is of adequate length to reach the increased distance to the fuze.

(*b*) Remove components from their packing and inspect them to be sure they are in good condition and match in size. (See table above.)

(*c*) Remove fuze hole plug of the bomb and inspect.

(*d*) Place the lock washer on the booster support and screw the support into the nose fuze adapter. Be sure it is tight enough for the lock washer to take hold.

(*e*) Insert the burster, crimped end first, into the support and push it in as far as possible. Do not use force. If the burster binds, inspect to see whether the support or the burster is at fault and discard the faulty item.

(*f*) Assemble the fuze in the outer end of the extension as described above.

(*g*) If not used, return to original condition and packing.

(3) EXTENSION, fuze, M1, painted olive drab, marked in black.

38. FUZE, BOMB, AN–M104 (NOSE). a. Data. FUZE, bomb, AN–M104 (nose), is a detonator safe, arming pin type, nose fuze which arms through the action of a powder train delay element 2.5 seconds after the bomb parachute opens. It acts to detonate the bomb immediately on impact. This fuze is authorized for use with parachute type fragmentation bombs. It is extremely sensitive and, once armed, a slight blow to the striker *in any direction* will operate the fuze. The fuze is 4.4 inches in length and 2.25 in diameter and weighs 1.15 pounds. It is threaded for a 1.5 inch adapter.

Note. FUZE, bomb, AN–M104 (nose), practice, differs from the service type in that the booster cup is absent. It was designed for use in practice bombs but, since the parachute of the bomb is ample for spotting purposes, this fuze with spotting charge is no longer used.

b. Description. FUZE, bomb, AN–M104 (fig. 51), is in the shape of a cylinder which tapers to a narrow end. A mushroom-shaped striker protrudes from the narrow head, the arming pin projects from both sides of the cylinder, and the booster cup is attached to the base. Three plugs also appear in the side of the fuze: one, near the arming pin, a small slotted screw plug which covers the detonator slide lock; two, a large slotted screw plug covers the detonator slider assembly; and three, a small smooth delayed arming plug, opposite the detonator slider plug.

c. Function. (See fig. 52.) When the arming wire is withdrawn from its position the arming pin is ejected by its spring. This releases the delayed arming firing pin which is driven by its spring into the delayed arming primer. The primer explodes, igniting the delayed arming time train which burns for 2.5 seconds and then ignites the delayed arming charge which explodes, expelling the delayed arming plug. This allows the detonator slider driven by its spring to push the delayed arming plunger after the plug, and to line up the detonator with the firing pin. On impact, the striker forces the firing pin into the detonator which explodes, detonating the booster load and booster.

d. Preparation for use. After removing the fuze from its packing materials it is ready for use.

e. Fuzing and unfuzing. When FUZE, bomb, AN–M104 (nose), is used with bombs assembled in clusters, the bombs may be fuzed when issued and the only necessary action is that of removing the safety cotter pin and tag from the arming pin when the cluster is placed in the bomb rack. When such bombs are issued unfuzed, the fuze is assembled to the bomb in the following steps:

(1) Unseal fuze can and remove fuze from packings.

(2) Inspect for serviceability, clear threads, absence of corrosion, presence of arming pin, and delayed arming plug.

(3) Screw the fuze into the bomb handtight. (If the end of the arming pin containing the cotter pin is not within a quarter turn of

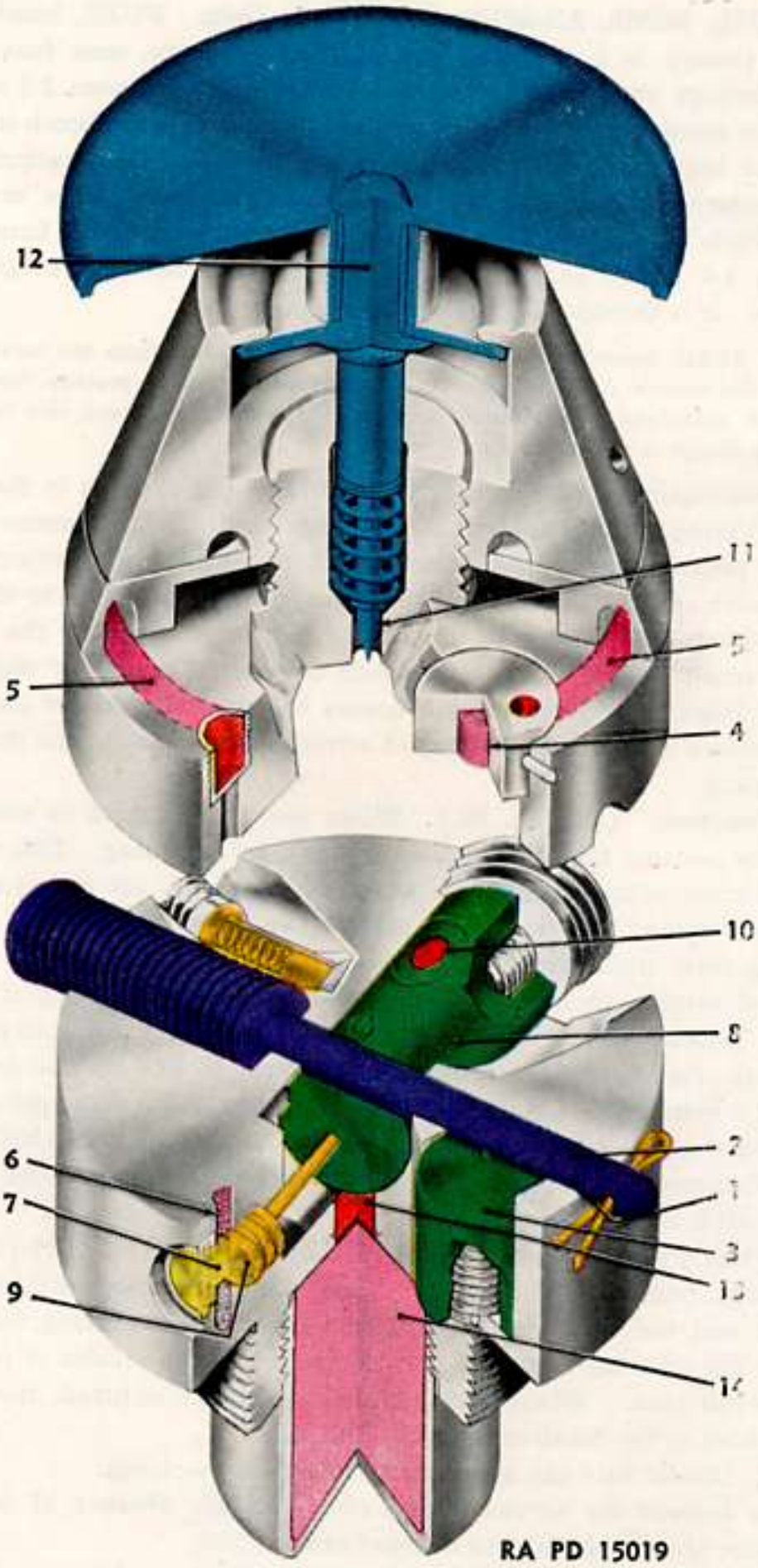


Figure 51. FUZE, bomb, AN–M104 (nose).

Figure 52. **FUZE, bomb, AN–M104 (nose), method of arming.**

the arming cord hole in the parachute case, unscrew the fuze and insert an improvised paper gasket between fuze and bomb so that when screwed handtight the arming pin and arming cord hole are within a quarter turn.)

(4) Remove the tape which tolds the arming wire to the parachute case and unwind the wire and cord from the bomb.

(5) Press on the head of the arming pin so that the inner eyelet in the opposite end of the pin is exposed. Thread the arming wire through the inner eyelet far enough to take up the slack of the cord.

(6) Insure that there are no kinks or burs in the arming wire.

(7) Remove the safety cotter pin and tag.

(8) If the bomb is not used it will be unfuzed by reversing the steps.

f. **Accidental arming.** If the arming pin of the FUZE, bomb, AN–M104 (nose), is released, the spring will normally throw the pin clear of the fuze body and the arming cycle will run its course as described in c above. If the arming pin is allowed to emerge ¾ inch, the delay train will function and the delayed-arming plug will be blown from the fuze with considerable violence. However, if the arming pin is restrained from moving further, it will prevent the detonator slider from moving into the armed position. Another ¾-inch emergence of the arming pin, 1.5 inches in all, will permit the detonator to move into position in line with the firing pin.

Note. When the fuze is completely armed it is extremely dangerous. A blow on the striker plate *from any direction*, equivalent to dropping the fuze from a height of 1 *inch*, will cause detonation of the fuze. If this fuze should become armed accidentally, it should, if at all practicable, be destroyed in place.

g. **Marking.** The type, model, lot loader's initials, and date loaded are stamped on the striker plate of the fuze. An instruction tag is attached to the cotter pin placed in the arming pin. This tag reads: "CAUTION! Remove cotter pin before placing bomb or cluster in bomb rack. If bomb or cluster is not dropped, replace cotter pin on removing from bomb rack."

h. **Packing.** FUZE, bomb, AN–M104 (nose), is packed one per sheet metal can which is placed in a compartment in the bomb packing box. For bulk packing see table IV, section XX.

38. FUZE, BOMB, M108 (NOSE). *a.* **Data.** FUZE, bomb, M108 (nose) is an arming pin type nose fuze which arms immediately on withdrawal of the arming wire. It acts to detonate the bomb immediately on impact. The fuze is 2.66 inches in length, 1 inch in diameter, and weighs 0.54 pound. FUZE, bomb, M108 (nose), is authorized for use in the 100-pound practice target bomb. It may also be used in 100-pound smoke bombs provided the bombs are not released in salvo.

b. **Description.** The fuze body (fig. 40) is an unthreaded cylinder

with a striker assembly which protrudes ¾ inch from the head. Near the base there are two ball latches which engage a groove in the fuze seat when the fuze is assembled to the bomb. Near the head end, a spring loaded arming pin passes through the fuze body and striker. The arming pin is held in place in transit and storage by a safety cotter pin and, when the fuze is assembled to the bomb, by the arming wire. A fine shear wire also passes through the fuze body and striker. A spring loaded safety block is held in position between the striker head and the fuze body by a thin metal plate which is held in place by the safety cotter pin or arming wire.

c. Function. When the arming wire is withdrawn (fig. 53) the arming pin and the safety block are thrown clear by the action of their respective springs. The striker assembly is then held in place only by the shear wire. Upon impact the wire is sheared and the firing pin is driven into the primer detonator.

d. Fuzing and unfuzing. (1) Unseal fuze can, remove fuze from packing, and inspect.

(2) Turn safety cotter pin so that it is across the axis of the fuze.

(3) Insert fuze into fuze seat (previously removed from bomb) until the ball latches engage the groove.

(4) Screw fuze seat into adapter handtight.

(5) Thread arming wire through forward suspension lug of bomb.

(6) With the thumb on the head of the arming pin and a finger on the safety block plate, press on the head of the arming pin until the inner eyelet in the arming pin is exposed above the safety block plate. Pass 2 to 3 inches of the arming wire through the inner eyelet. Remove all kinks or burs. No safety clip is necessary.

(7) Remove safety cotter pin.

(8) If bomb is not dropped, reverse the above steps and return all components to their original condition and packing.

e. Accidental arming. If this fuze should become armed accidentally, the arming pin should be replaced or an improvised pin substituted. If the shear wire is unbroken and all components—safety block with spring and plate, arming pin and spring—are available they may be reassembled and the fuze used. Otherwise destroy the fuze.

f. Marking. The head of the fuze is stamped with the type and model, lot number, manufacturer's initials, and date loaded. A tag attached to the safety cotter pin reads: "To be removed after arming wire is inserted. If bomb is not dropped, replace pin before removing arming wire."

g. Packing. FUZE, bomb, M108 (nose), is packed, one per sealed container. In general, the fuze container is packed in the box with the bomb. When issued in bulk, the fuze is packed 200, in individual containers, per box.

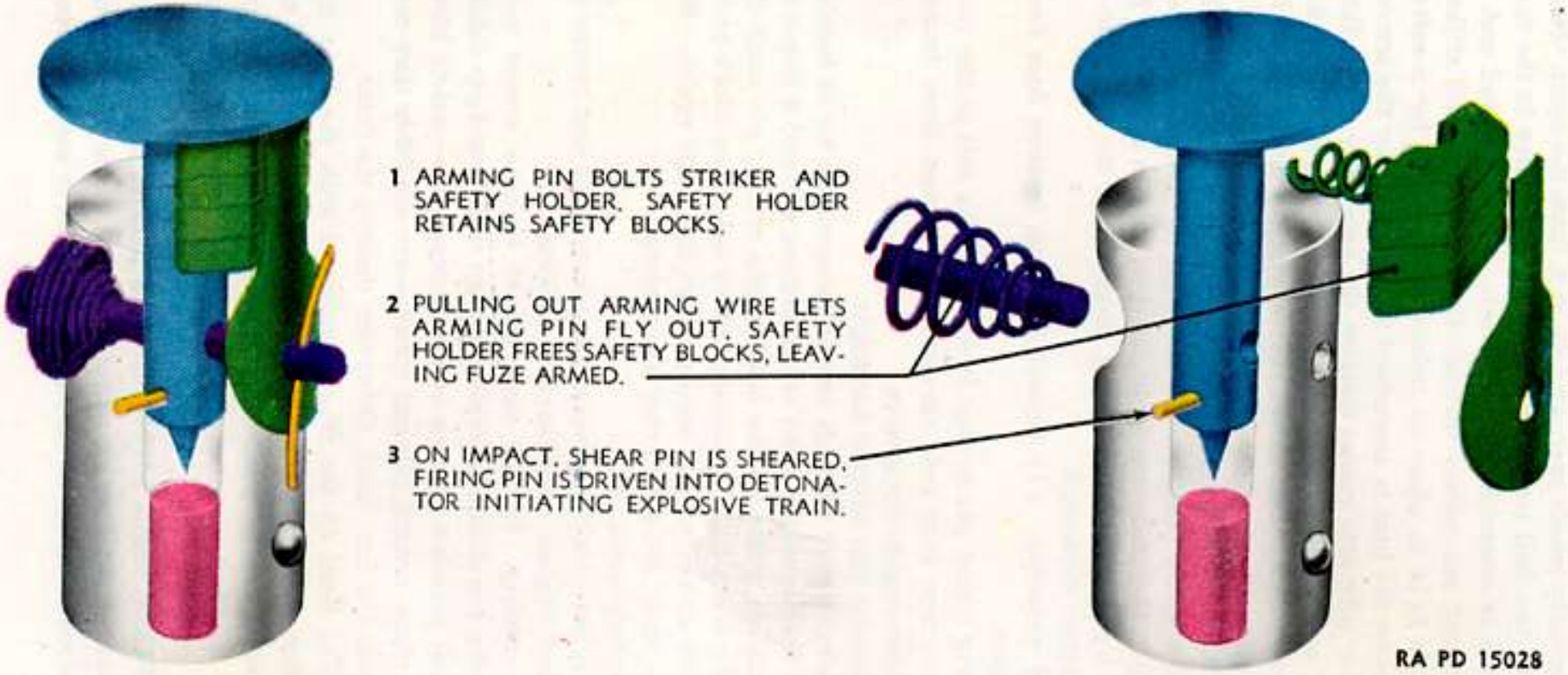


Figure 53. FUZE, bomb, M108 (nose) — method of arming.

40. **FUZE, BOMB, AN–M110A1 (NOSE).** a. **Data.** FUZE, bomb, AN–M110A1 (nose), drawing 73–8–77, is an arming vane type nose fuze which arms after 325 revolutions of the arming vane. It acts to detonate the bomb on impact. It is 3.7 inches long, 1.75 diameter, and weighs 1.04 pounds. It is authorized for use with the 115-pound, M70 gas bomb, with fin stabilized fragmentation bombs, and the corresponding practice type. This fuze differs from FUZE, bomb, M110 (nose), in that the latter requires 455 revolutions of the vane to arm and in that the AN–M110A1 has a C-shaped safety block between the striker and fuze body, while the M110 has a 3-segment safety block. The AN–M110A1 is shipped with vane assembled; the M110 is shipped with vane separate.

Note. FUZE, bomb, M110, will not be used unless it has been renovated. This will be indicated on a tag attached to the fuze.

b. **Description.** FUZE, bomb, AN–M110A1 (nose), is cylindrical in shape with the arming vane hub and firing pin protruding from the head and the booster cup protruding from the base. The vane hub assembly consists of an arming sleeve, hub sleeve, upper ball race, vane, and vane nut. A gear with 33 teeth is staked to the inner end of the hub sleeve; a gear with 34 teeth is staked to the inner end of the arming sleeve which is screwed inside the hub sleeve. A pinion mounted inside the fuze body meshes with both these gears. The upper ball race, arming vane, and vane nut are assembled on the outer end of the hub sleeve in that order. The arming sleeve extends beyond the hub sleeve for 5/16 inch and holds the C-shaped safety block between the striker disk of the firing pin and the vane nut. A vane strap, stamped in one piece with the arming vane, forms the vane stop with a bracket attached to the fuze body. A shipping wire is sealed in the outer pair of holes in the vane stop.

c. **Function.** When arming wire is withdrawn, the arming vane is rotated by the air stream, rotating the vane hub assembly with it. (See fig. 54.) The vane hub gear and arming sleeve gear are both in mesh with the pinion, but the arming sleeve gear has one more tooth than the vane hub gear. Consequently, only the teeth engaged in the pinion are actually in line and the next pair of teeth are slightly out of line. As the next pair engage the pinion it lines them up causing, as the gears rotate, a slow progression of the arming vane gear with respect to the vane hub gear. This causes the arming sleeve to unscrew from the hub and gradually withdraw into the body of the fuze. When the arming sleeve withdraws enough to clear the safety block, the block is thrown clear since the slot in the block is wide enough to clear the firing pin and spring. The sleeve continues to progress until the gear disengages from the pinion and the vane and hub continue to rotate idly. Upon impact, the firing pin is driven into the primer which explodes causing the detonation of the booster.

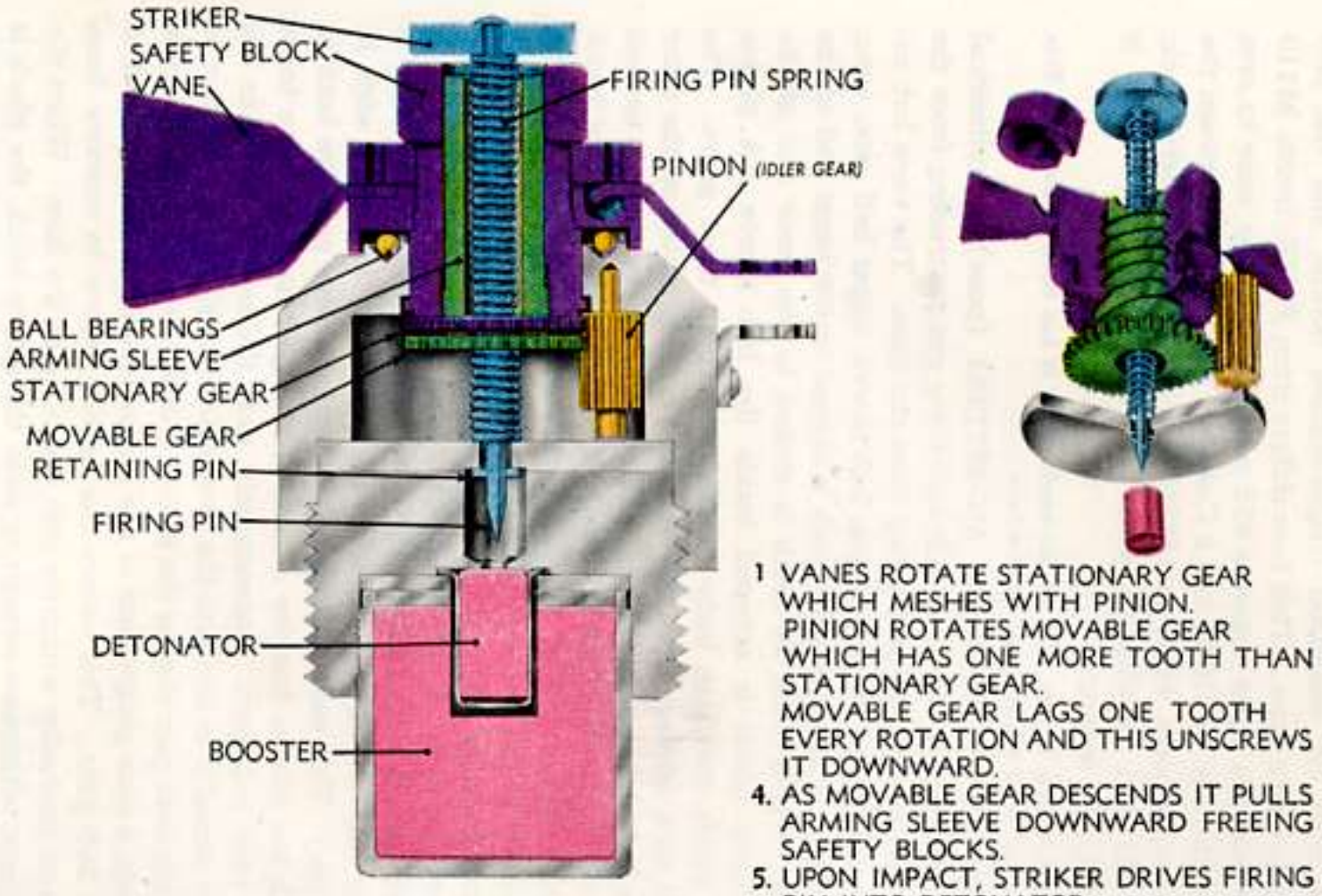


Figure 54. FUZE, bomb, AN–M110A1 (nose).

d. Preparation for use. When FUZE, bomb, AN–M110A1 (nose), is issued it is assembled to bombs only when the bombs are assembled in clusters. When so shipped, the fuze contains a shipping wire sealed in the vane stop and the safety blocks are fastened in place with adhesive tape. It is necessary to remove these restraints to fuze arming before the cluster is installed in the plane. If the safety block should fall out when the tape is removed, the block will be replaced and retaped and the bomb removed and unfuzed. The fuze will be destroyed as unserviceable ammunition in dangerous condition. When issued separately, the fuze is ready to be assembled to the bomb when unpacked.

e. Fuzing. When FUZE, bomb, AN–M110A1 (nose), is assembled to the bomb the following sequence of operations will be observed.

(1) Unseal and open the fuze carton and remove fuze.

(2) Remove shipping supports from fuze and insure that safety block is in place.

(3) Inspect fuze to insure that it is serviceable.

(4) Screw fuze into bomb, handtight.

(5) If bomb is to be clustered, assemble the bomb to the cluster adapter taking care that vane stop of the adapter will prevent the fuze from arming, then remove shipping wire and seal.

(6) If the bomb is intended for individual suspension, insert the end of the arming wire through the forward suspension lug of the bomb and then through the inner eyelets of the fuze vane stop. Place a safety clip on the wire and slide it up until it just touches the face of the vane strap. Adjust the arming wire to protrude 2½ inches beyond the clip, taking care that the wire is neither kinked nor burred.

Note. When used for the chemical bomb, the burster is assembled before the fuze. (See par. 102.)

(7) Remove the shipping wire and seal.

(8) If the bomb is not used, unfuze and return the fuze to storage by reversing the steps listed above.

f. Accidental arming. This fuze is armed when the safety block is displaced from its position between the striker and the vane hub *whether the arming vane has turned or not.* If a fuze should become armed accidentally, carefully replace the safety block, using improvised shims if necessary to take up all play between the striker and vane hub. Tape the blocks in place. The fuze may then be handled with comparative safety. No other attempt should be made to restore the fuze to its original unarmed condition; it should be destroyed.

g. Marking. FUZE, bomb, AN–M110A1 (nose), is marked by stamping in the body with the type, model, lot, loader, and date loaded. Attached to the shipping wire is a tag which reads: "Remove after arming wire is inserted and safety clip attached thereto. If bomb is not dropped, replace sealing wire before removing arming wire."

41. **FUZE, FLARE, MECHANICAL TIME, M111A2 (NOSE).** a. Data. FUZE, flare, mechanical time, M111A2 (nose), drawing 73–8–121, is a combination type. It is both time and impact with respect to function and both vane and pin type with respect to arming. The time function starts upon ejection of the arming pin; the safety block is ejected, arming the fuze, after approximately 325 revolutions of the arming vane. The fuze functions a predetermined number of seconds, from 5 to 93, after the arming wire is withdrawn, provided that the fuze has armed and also that it had not previously functioned on impact. The fuze (fig. 55) is 4½ inches in length, 1¾ inches in diameter, and weighs 1.4 pounds. It is authorized for use with BOMB, photoflash, M46, and FLARE, aircraft, parachute, AN–M26 (all modifications), and delayed opening clusters. The booster element of this fuze is loaded with black powder; it may not, therefore, be used to detonate a high-explosive bomb. (See pars. 44 and 45 for FUZE, bomb, M127 and M138.) Earlier models of this fuze differ as follows: The M111A1 has a 3-segment safety block instead of the C-shaped block and required 455 revolutions of the arming vane to arm. The M111 differs from the M111A1 only in that the minimum time setting is 15-seconds.

b. Description. The FUZE, flare, mechanical time, M111A2 (nose), is cylindrical in shape with the arming vane hub and striker protruding from the front end, and the booster cap protruding from the base. Near the forward end, the circumference of the body is graduated in seconds from 5 to 92. At one side of the body diametrically opposite the vane stop and arming pin there is a thumb screw to lock the fuze after the time is set. Two pins set into the body provide limits to prevent excess rotation in setting the fuze. A shipping wire is sealed in the vane stop. This wire is also attached to a safety cotter pin in the outer eyelets of the arming pin and to a forked striker stop which is inserted between the striker and the safety block.

c. Function. (1) *Arming.* The arming mechanism (fig. 56) is the same as that in the FUZE, bomb, AN–M110A1 (nose), described in paragraph 40. Neither the time action nor impact can cause the fuze to function until it has armed. However, since this fuze is designed for use with light items, it will crush on severe impact and may function whether armed or not.

(2) *Impact.* After the fuze has armed, impact on the striker will shear the trigger mechanism and drive the firing pin into the primer.

(3) *Time.* The fuze is assembled in two parts: The head, which contains the arming mechanism, the spring loaded firing pin, and the trigger mechanism; and the body which contains the clockwork mechanism and the timing disk. (See fig. 57.) The head is assembled so that it may rotate within the body except when clamped in place by the thumb screw. An arm of the trigger mechanism projects from the

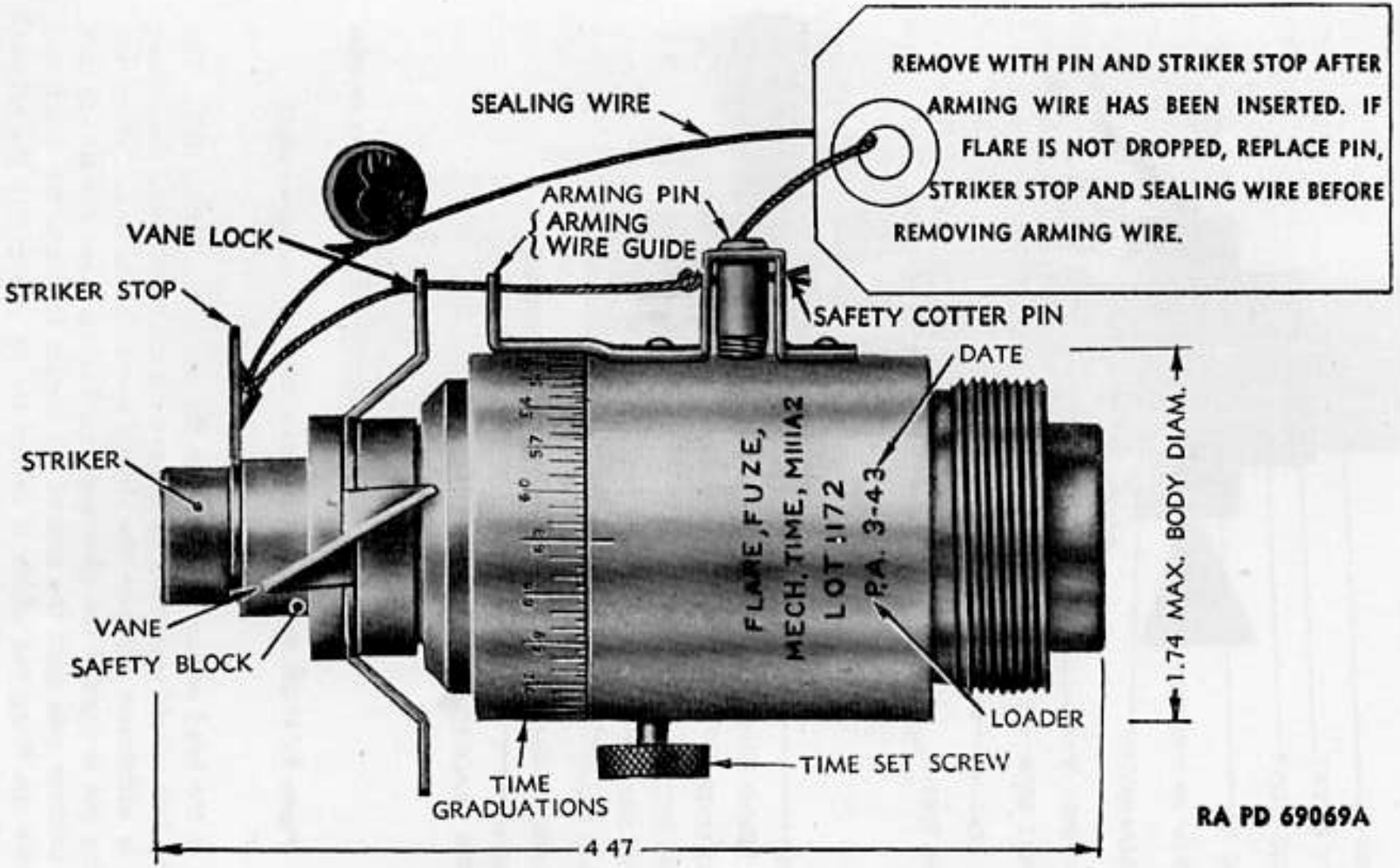


Figure 55. FUZE, flare, mechanical time, M111A2.

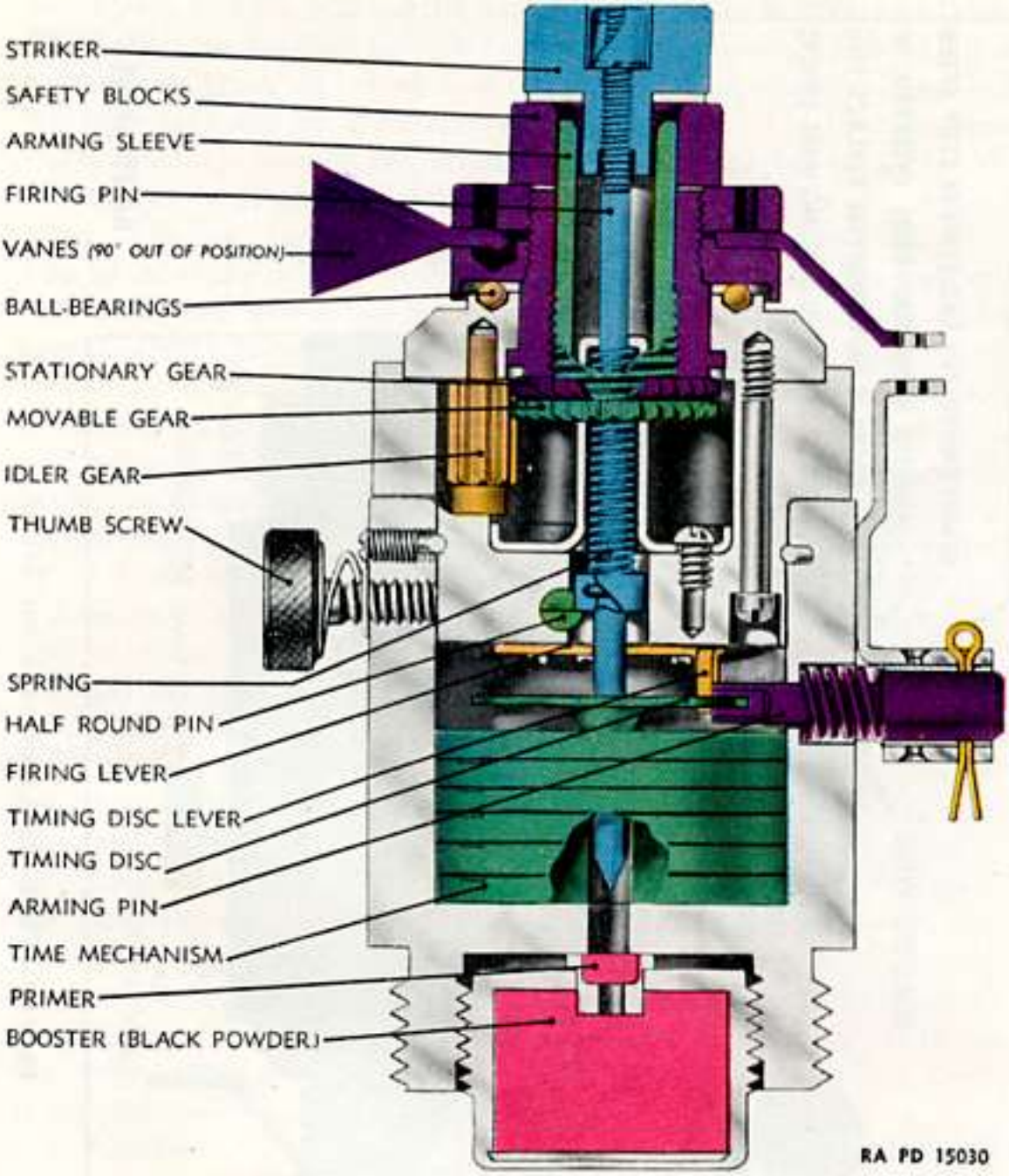


Figure 56. FUZE, flare, mechanical time, M111A2 — cross-sectioned.

base of the head section and rides on the rim of the timing disk. The timing disk is held stationary by the arming pin which, until the arming wire is withdrawn occupies the timing notch in the disk. When the arming pin is ejected the clockwork mechanism turns the timing disk at a uniform rate until the arm of the trigger falls into the notch and releases the firing pin which is driven by its spring into the primer. When the fuze is set, the head assembly is rotated, carrying the trigger arm with it. In this way, adjustment is made of the distance the timing disk must turn to bring the timing notch under the trigger arm. The amount of rotation required is graduated on the head of the fuze.

Once set to the desired time, the head is clamped in position by tightening the thumbscrew provided. The time may be set or reset any time up to release of the bomb or flare.

d. Preparation for use. To be ready for use the fuze requires only that the time be set and, after the arming wire is installed, that the shipping wire, cotter pin, and striker stop be removed.

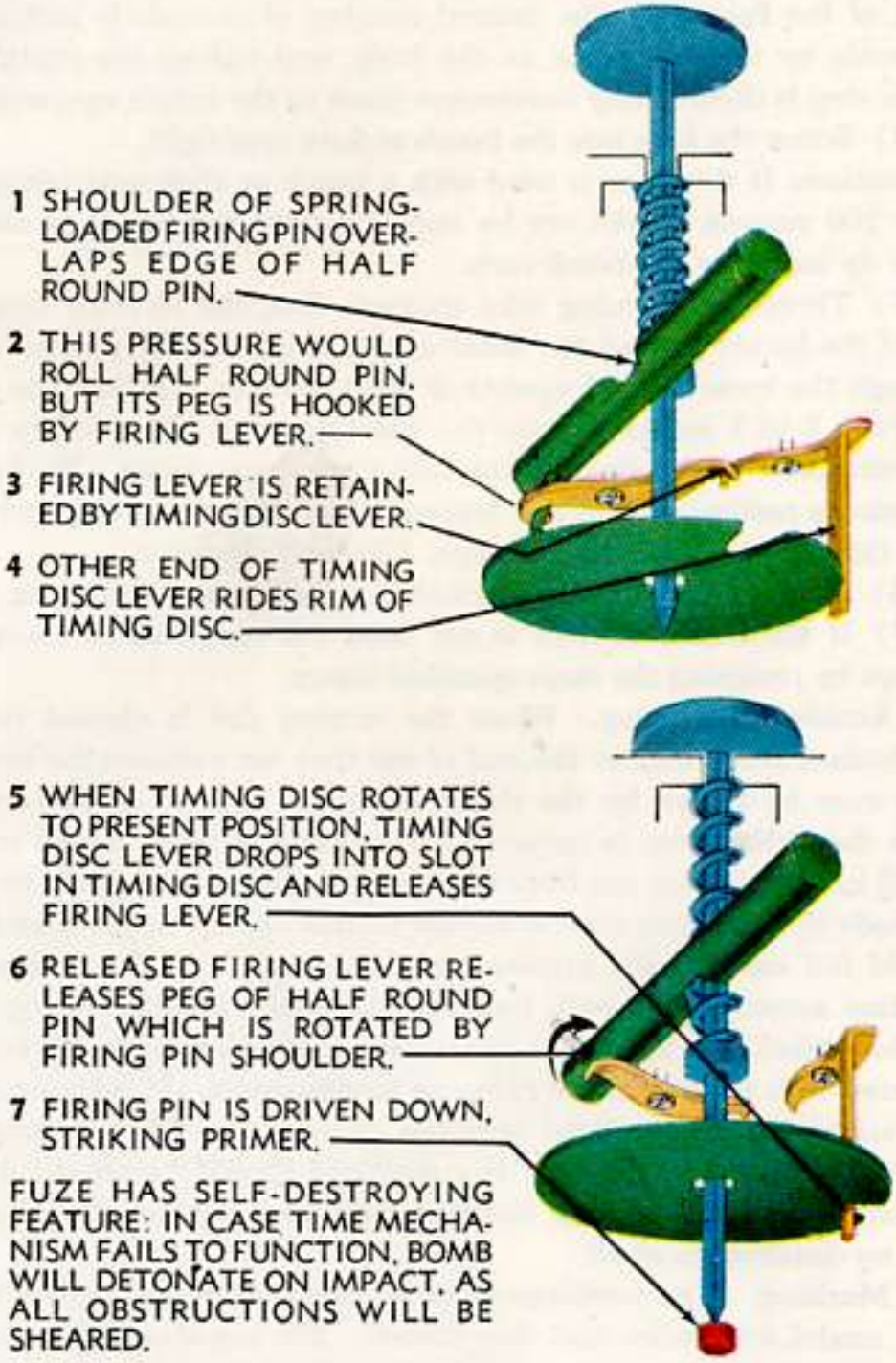


Figure 57. FUZE, flare, mechanical time, M111A2 — method of arming.

e. Fuzing. The fuze is assembled to the bomb or flare in the following sequence.

(1) Unseal packings and remove fuze.

(2) Inspect for presence of safety block, remove the striker stop to insure that the trigger is properly set and that the safety block will not fall out. Replace the striker stop and inspect the fuze to see that it is otherwise serviceable; that is, free of rust, corrosion, and evidence of mistreatment.

(3) Set the fuze as follows: Loosen the thumbscrew and rotate the head of the fuze until the desired number of seconds is indicated on the scale by the index line on the body, and tighten the thumbscrew. (This step is done at any convenient point in the fuzing operation.)

(4) Screw the fuze into the bomb or flare handtight.

Caution: If this fuze is used with a bomb or cluster weighing more than 200 pounds, it will not be installed until the bomb or cluster is securely locked in the bomb rack.

(5) Thread the arming wire through, first, the forward suspension lug of the bomb; second, the inner eyelet in the arming pin; and finally through the inner pair of eyelets in the vane stop. Adjust the wire to protrude 2 to 3 inches beyond the vane stop and slip a safety clip up the wire until it just touches the face of the vane strap. Be sure that the wire is neither kinked nor burred. Note that the arming wire used with this fuze must be the fine type, .036-inch diameter.

(6) Remove car seal wire, striker stop, and safety cotter pin.

(7) If the bomb or flare is not used the fuze will be returned to storage by reversing the steps specified above.

f. Accidental arming. When the arming pin is ejected the time mechanism starts and, at the end of the time set, releases the firing pin. This may be shown by the striker snapping against the safety block when the striker stop is removed. If the safety block is still in place, it will keep the firing pin from striking the primer. No attempt should be made to reset such fuze; it should be destroyed. If the safety block should fall out and the arming pin remain in place, the fuze will not function automatically with time but will function on receiving a blow on the striker. In such case, the safety block should be replaced and fastened with tape until the fuze can be destroyed. If both arming pin and safety block have been removed and the fuze has not functioned within the time set, the fuze is a dud and should be regarded as extremely dangerous; it may function with the slightest disturbance or with no disturbance at all.

g. Marking. The markings stamped on the body of the fuze include type, model, lot, loader, and date loaded. The tag attached to the shipping wire reads: "Remove with pin and striker stop after arming wire has been inserted. If flare is not dropped, replace pin, striker stop, and sealing wire before removing arming wire."

42. FUZE, BOMB, AN–M120 (NOSE). **a. Data.** **FUZE, bomb, AN–M120 (nose),** is detonator safe, arming pin type nose fuze which arms, by mechanical time action, 2.5 seconds after ejection of the arming pin. It acts to detonate the bomb instantaneously on impact. This fuze is authorized for use with parachute type fragmentation bomb. The fuze is 4.6 inches in length and 2.3 inches in diameter. **FUZE, bomb, AN–M120A1** is a modification which arms in 1.9 seconds. It is otherwise the same as the **AN–M120.**

b. Description. **FUZE, bomb, AN–M120 (nose),** is roughly cylindrical in shape with a mushroom-shaped striker protruding from the head and the booster cup assembled to the base. (See fig. 58.) The arming pin housing protrudes from both sides of the fuze body.

Figure 58. FUZE, bomb, AN–M120 (nose).

c. **Function.** The clockwork mechanism of this fuze drives a hollow cylinder which contains the firing pin and is concentric with the fuze axis. (See figs. 59 and 60.) A peg on the detonator slider bears on a cut away section of this cylinder and holds the detonator slider in the safe position. A shoulder on the arming pin also bears on the section, preventing movement of the clockwork until the arming wire is with-

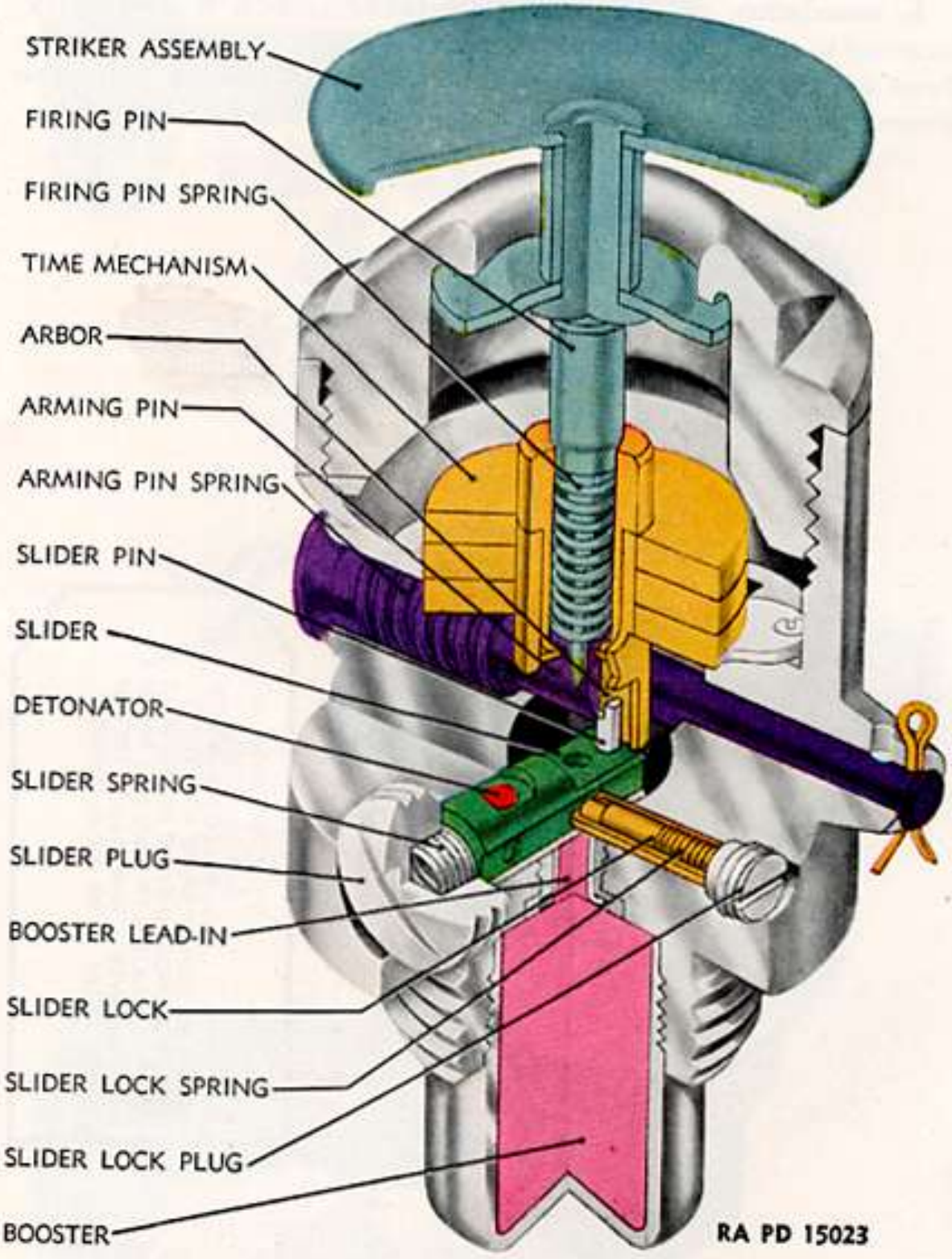


Figure 59. FUZE, bomb, AN-M120 (nose) — sectioned.

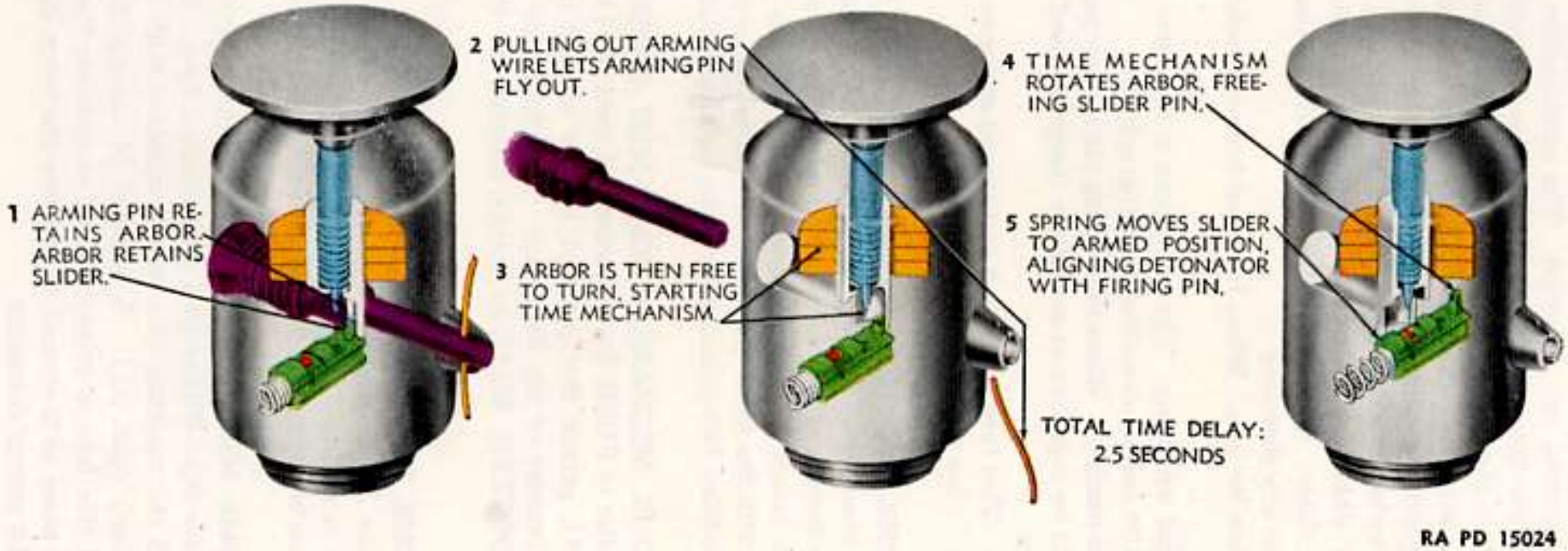


Figure 60. FUZE, bomb, AN–M120 (nose) — method of arming.

drawn and the arming pin is ejected. The continuation of the arming pin also blocks the detonator slider so that the fuze cannot arm until more than half of the arming pin is expelled. When the arming pin is ejected, the clockwork starts and rotates the cylinder section. After 2.5 seconds the cylinder section clears the peg and the detonator slider is moved by its spring so that the detonator lines up with the firing pin. The detonator slide lock (not shown in figure) prevents any further motion of the slider. Once armed, the fuze will function from a blow on the striker *in any direction.*

d. Preparation for use. When removed from its packing, the fuze is ready for use.

e. Fuzing and unfuzing. The procedure is the same as for **FUZE,** bomb, AN–M104 (nose) described in paragraph 38.

f. Accidental arming. When the arming pin is even partially ejected this fuze should be regarded as extremely dangerous and should be destroyed in place.

g. Marking. This fuze is marked and tagged in the same manner as the AN–M104. (See par. 38.)

43. FUZE, BOMB, AN–M126A1 (NOSE). FUZE, bomb, AN–M126A1 (nose) is the same as FUZE, bomb, AN–M110A1 (nose) (par. 40) except that the booster element has been replaced by a metal detonator holder. FUZE, bomb, AN–M126 (nose) is the same as FUZE, bomb, M110 (nose) with the same modification. These fuzes are authorized for use with modified 100-pound gas, smoke, and incendiary bombs.

44. FUZE, BOMB, MECHANICAL TIME, M127 (NOSE). This fuze (fig. 61) is similar to FUZE, flare, mechanical time, M111A2, described in paragraph 41, except that a tetryl booster is used instead of the black powder booster of the flare fuze. This fuze may be used with ADAPTER-BOOSTER, M117, in bombs adapted for the AN–M103 nose fuze.

45. FUZE, BOMB, MECHANICAL TIME, M138 (NOSE). This fuze is the same as the M127 described in paragraph 44, except that the booster charge is reduced by replacing half of the tetryl with a clay pellet. This fuze is authorized for use with aimable clusters.

46. FUZE, BOMB, M139 (NOSE). FUZE, bomb, M139 (nose) (fig. 62), is a selective SQ—0.01-second delay impact fuze. Except for the delay time and the marking, this fuze is identical with FUZE, bomb, AN–M103 (nose) (par. 37). A segment of one-eighth of the head (vane cup) of this fuze is painted black to indicate the delay. The marking is the same as that used to indicate the same delay, 0.01 second, on the M14 primer detonator.

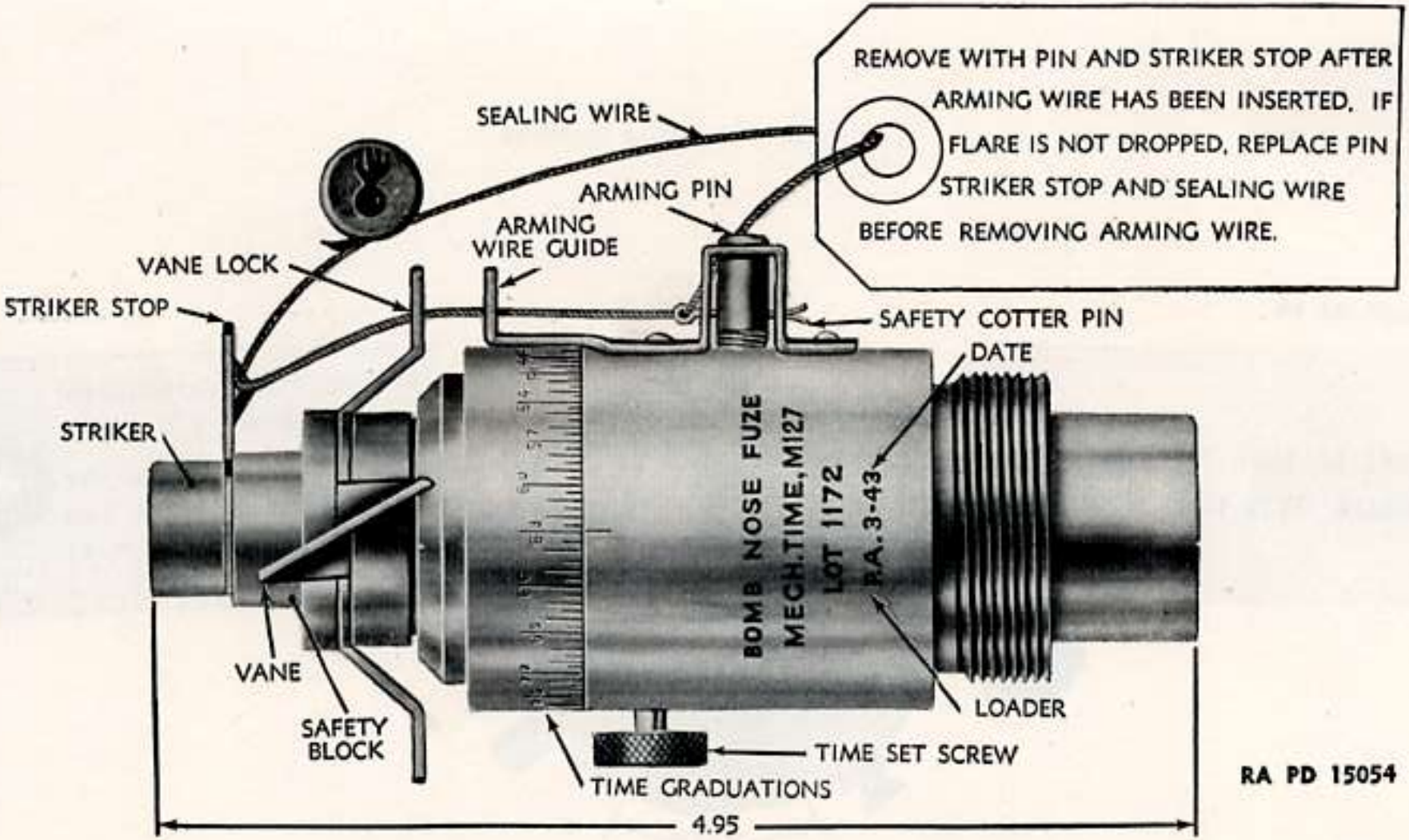


Figure 61. FUZE, bomb, mechanical time, M127 (nose).

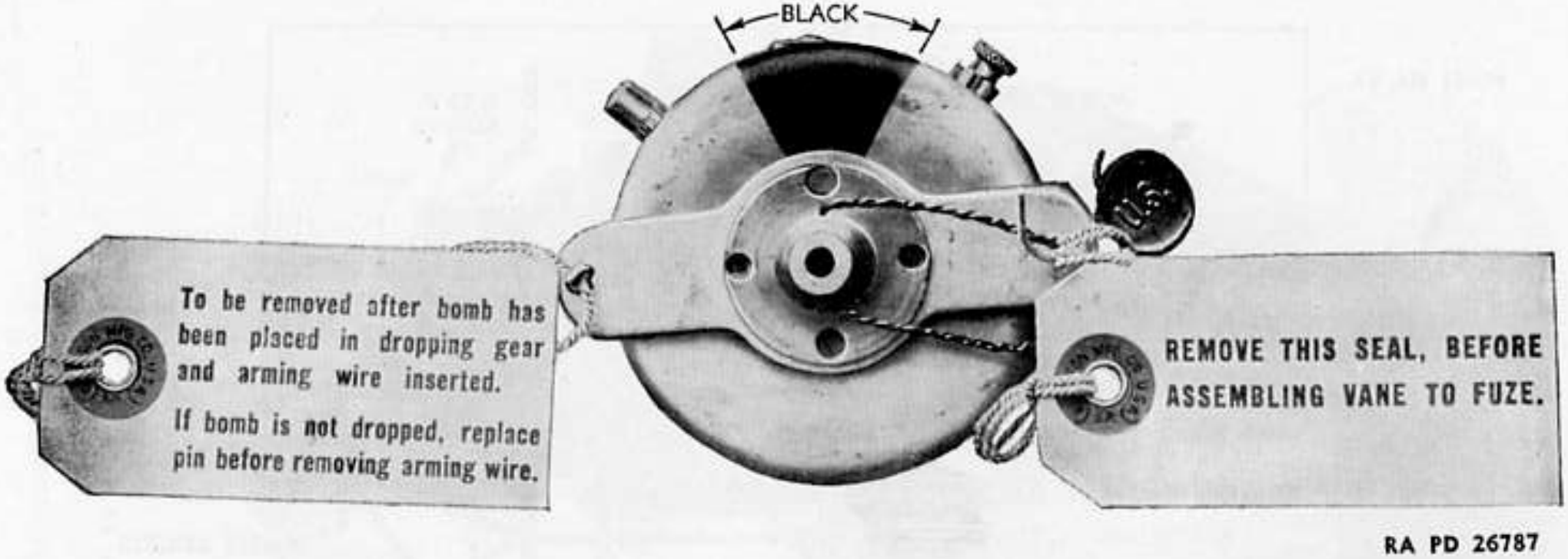


Figure 62. FUZE, bomb, M139.

47. FUZE, BOMB, M140 (NOSE). FUZE, bomb, M140 (nose) (fig. 63), is a selective SQ—0.025-second delay impact fuze. Except for the delay time and the marking, this fuze is identical with FUZE, bomb, AN–M103 (nose). (See fig. 47.) A segment of one-fourth of the head (vane cup) of this fuze is painted black to indicate the delay. The marking is the same as that used to indicate the same delay, 0.025 second, on the M14 primer detonator.

48. FUZE, BOMB, AN–MK. 219 (NOSE). a. Data. FUZE, bomb, AN–Mk. 219 (nose) is a detonator-safe arming vane type nose fuze which requires 175 revolutions of the vane to arm. Upon impact it acts to detonate the bomb immediately. This fuze is authorized for use with depth bombs, but only when it is intended to use the bomb for surface demolition effect. The fuze is 5.5 inches in length, 2.3 inches in diameter and weighs 4 pounds.

b. Description. FUZE, bomb, AN–Mk. 219 (nose) is cylindrical with a flat conical head. (See fig. 64.) Aft of the head, which does not rotate, are the ring-shaped vane carrier, the flange of the striker, the outer sleeve, and the fuze body. Eyelets in lugs on the vane carrier and in the striker flange form the vane stop. The outer sleeve contains a lock screw which holds the arming and firing assembly in the fuze body. (See fig. 65.) The fuze body is a cylindrical cup containing the booster and booster lead. The rest of the fuze mechanism assembled on a central shaft, consists of arming nut, detonator holder, firing pin holder, striker, vane carrier with reduction gears, and head. As shipped, the detonator carrier, the firing pin holder, and striker are out of line with the booster lead and each other and the firing pin is nested in a recess in the striker.

c. Function. As the arming vane is rotated by the air stream, it acts through the reduction gears to turn the central shaft which screws forward in the arming nut, advancing the striker vane carrier and head. (See fig. 66.) When the firing pin is clear of the recess in the striker, the forward motion stops and the striker is turned about the central shaft. As it turns, a lug on the striker body picks up the firing pin holder and the detonator carrier in turn, lining up the striker firing pin, detonator, and booster lead. When proper alignment is reached a spring loaded plunger drives into a recess in the striker preventing further rotation.

d. Preparation for use. Once removed from its packing, the fuze is ready for use.

e. Fuzing. The fuze is assembled to the bomb in the following sequence:

(1) Remove fuze from sealed container and inspect for defects in threads, bent vanes, and other evidence of unserviceability.

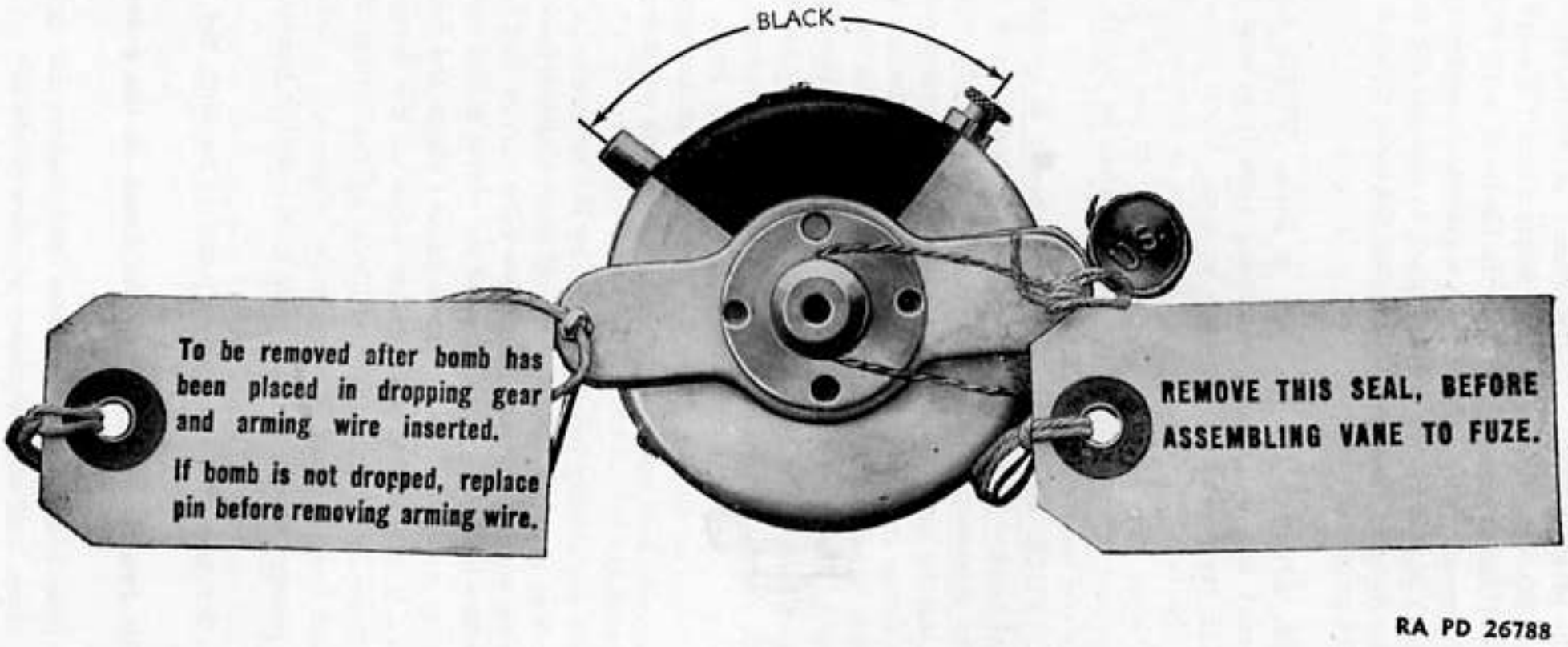


Figure 63. FUZE, bomb, M140.

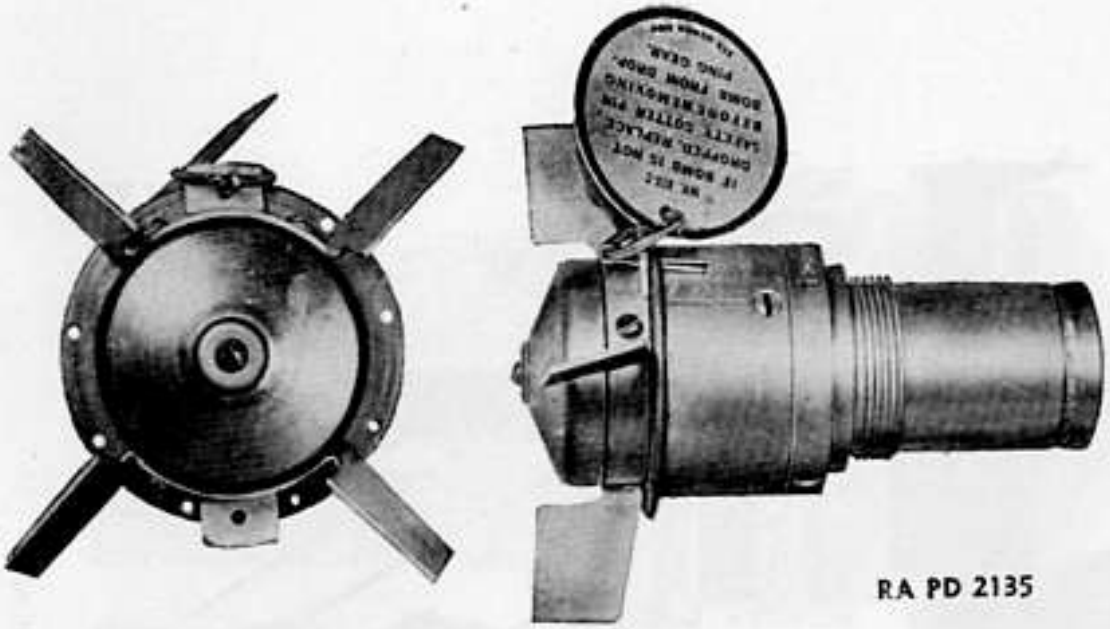


Figure 64. FUZE, bomb, AN–Mk. 219 (nose).

(2) Screw the fuze into the bomb and tighten with a wrench.

(3) Thread one end of the arming wire through the forward suspension lug of the bomb.

(4) Remove the safety cotter pin from the vane stop and rotate the vane carrier slightly in each direction to insure that the vanes rotate freely. Thread the end of the arming wire through the uppermost eyelet in the striker flange and in the nearer lug of the vane carrier. In this step, the vane carrier must not be rotated more than a quarter turn in either direction.

(5) Slip two safety clips over the wire so that they are snug against the vane stop, and adjust the arming wire so that about 3 inches will protrude beyond the vane carrier lug when the bomb and arming wire are installed in the rack. Cut off the excess wire and remove all kinks and burs.

(6) If the bomb is not dropped, the fuze will be removed and returned to storage by reversing the above steps.

f. Precautions. In addition to the general precautions for handling fuzes, the following will be observed:

If a fuze is dropped from a height less than 5 feet, the fuze will be examined for superficial damage to threads, vanes, booster cup, etc., and if none is apparent, the fuze will be considered serviceable. If the fuze is dropped 5 feet or more, it will be considered unserviceable and turned in for disposal.

g. Accidental arming. If the flange of the striker has moved ¼ inch or more away from the edge of the outer sleeve, the fuze will be regarded as armed. In such cases the lock screw should be removed

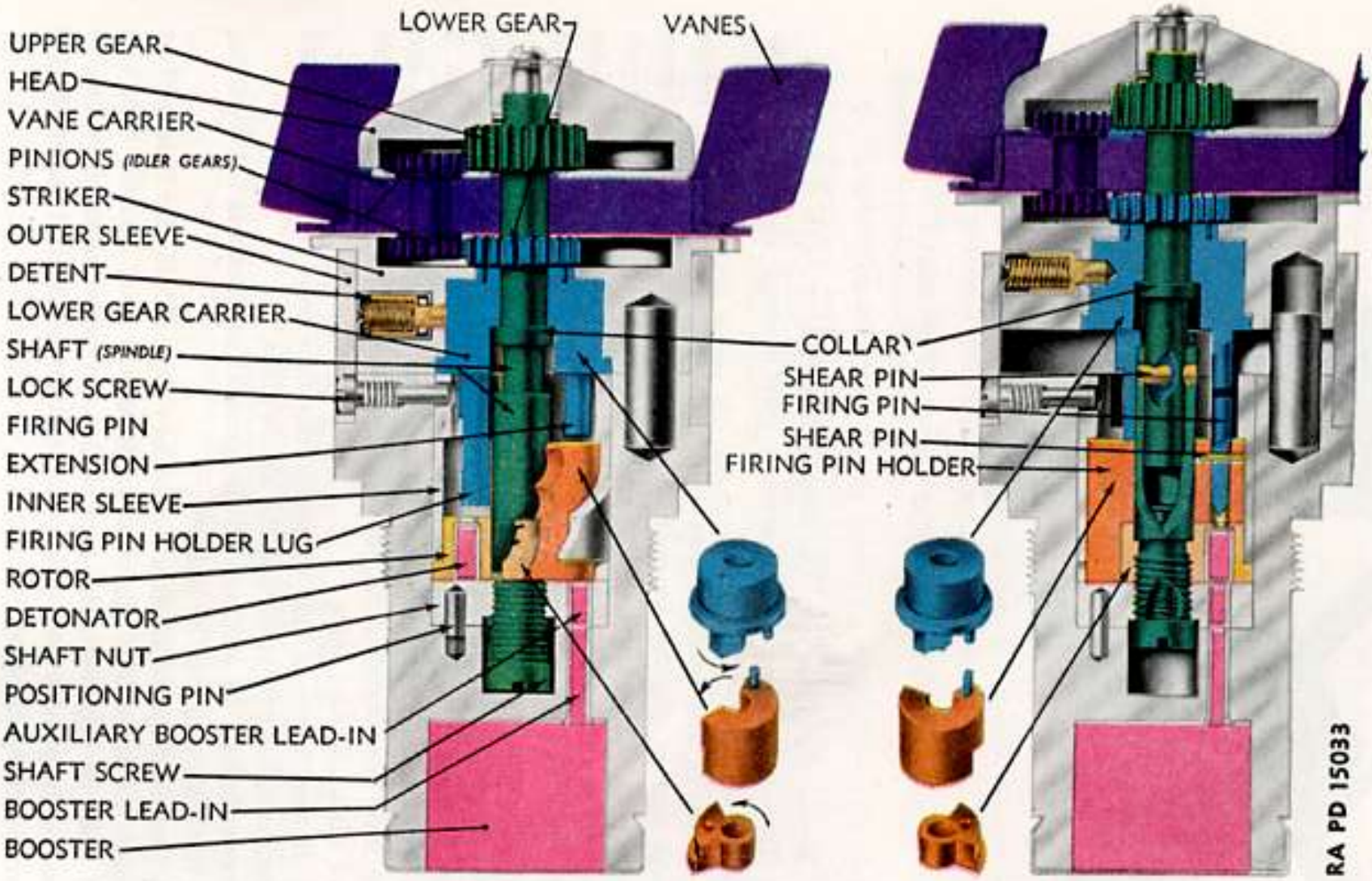


Figure 65. FUZE, bomb, AN–Mk. 219 (nose) — cross-sectioned.

1 PINIONS TURN WITH VANES. LOWER GEAR IS LOCKED. UPPER GEAR IS FORCED IN CLOCKWISE DIRECTION, ONE TOOTH FOR EVERY COMPLETE ROTATION OF VANE.

2 SPINDLE IS SCREWED UPWARD UNTIL IT JAMS, THUS STOPPING UPPER GEAR.

3 LOWER GEAR IS FREE TO ROTATE, AS LOWER GEAR CARRIER HAS BEEN LIFTED OUT OF LOCK.

4 PINION NOW FORCES LOWER GEAR COUNTERCLOCKWISE.

5 THE EXPLOSIVE TRAIN IS ALIGNED AS FOLLOWS:

(A) FIRING PIN EXTENSION MOVES FROM POSITION **a** TO POSITION **d.**

(B) FIRING PIN MOVES FROM POSITION **b** TO POSITION **d.**

(C) DETONATOR MOVES FROM POSITION **c** TO POSITION **d.**

Figure 66. FUZE, bomb, AN–Mk. 219 (nose) — method of arming.

from the side of the fuze and the arming and firing mechanism should be withdrawn from the fuze body by carefully pulling the striker flange forward along the axis of the fuze until the entire assembly is clear. This assembly will be treated with extreme care until it can be disposed of safely.

b. Marking. The fuze has stamped on the body, the type, model, lot, loader's and inspector's initials, and date loaded. A tag attached to the safety cotter pin in the vane stop reads on one side: "Remove safety cotter pin after bomb is placed in dropping gear and prior to assembling arming wire." The other side reads: "If bomb is not dropped, replace safety cotter pin before removing bomb from dropping gear." Fuzes may be marked AN–Mk. 19-Mod. 2 or Mk. XIX-2, earlier designations for this fuze.

SECTION VI. HYDROSTATIC FUZES

49. FUZE, BOMB, HYDROSTATIC, AN–MK. 224 (TRANSVERSE). a. Data. FUZE, bomb, hydrostatic, AN–Mk. 224 (transverse) is an arming pin type, double-headed fuze which is assembled in a transverse tube in the bomb body. Upon withdrawal of the arming wire, the arming pins (jump-out pins) are ejected, leaving the fuze free to arm and fire by hydrostatic pressure at a depth determined by the springs assembled in the fuze. This fuze is designed for use with 325- and 350-pound depth bombs, and may also be used in the 650-pound depth bombs by adding a spacer which is issued with the bomb. As issued, the fuze is set to function at a depth of 25 feet. This may be changed, as described below, for 50, 75, 100, or 125 feet. The fuze weighs approximately 14 pounds.

b. Description. FUZE, bomb, hydrostatic, AN–Mk. 224 (transverse is issued in three parts, a pistol, a booster, and a booster extender. (See fig. 67.)

(1) The pistol consists of a head, a body, and a primer and detonator holder.

(a) The head is dome-shaped and is bolted to the mouth of the transverse tube; it contains the arming pin and water ports.

(b) The body is cylindrical and contains the firing pin and guide piece, hydrostatic piston and bushing, and a firing pin spring. The firing pin is held in place against the firing pin spring by two balls which bear on a groove in the firing pin, and are held by the hydrostatic piston bushing. The end of the guide piece extends through the end of the body and is threaded for the attachment of the primer and detonator holder.

(c) The primer and detonator holder is in the shape of a flattened cone and is assembled to the end of the firing pin guide piece. It contains two L-shaped slides held apart by the action of two springs. One slider contains the primer, the other contains the detonator. In the unarmed position, the firing pin, primer, and detonator are out of line with each other. When the fuze arms, these elements are brought into line with each other and with the booster lead which is assembled in the outer end.

(2) The booster is assembled in a cylindrical metal container which has on one end a slip joint for attachment to the booster extender and, on the other, a funnel-shaped metal skirt for engaging the sliders in the primer and detonator holder.

(3) The booster extender consists of a head and body. The head is similar to that of the pistol. The body contains a hydrostatic bellows, an extender rod, and a release mechanism similar to that of the firing pin in the pistol.

(4) When assembled to the bomb, the heads of the pistol and booster extender protrude slightly. A branch of the arming wire is required for each head and both branches must be withdrawn to permit the fuze to function.

c. Function. When the arming wires are withdrawn, the arming pins in the pistol and booster extender are ejected by their springs. This action releases the hydrostatic piston in the pistol and the extender rod in the booster extender. As the bomb sinks, the water enters the ports in the heads and hydrostatic pressure builds up. When the depth for which the fuze is set is reached the pressure causes the following action:

(1) In the pistol, the hydrostatic piston advances to the end of the body carrying with it the bushing which holds the firing pin locking balls in place.

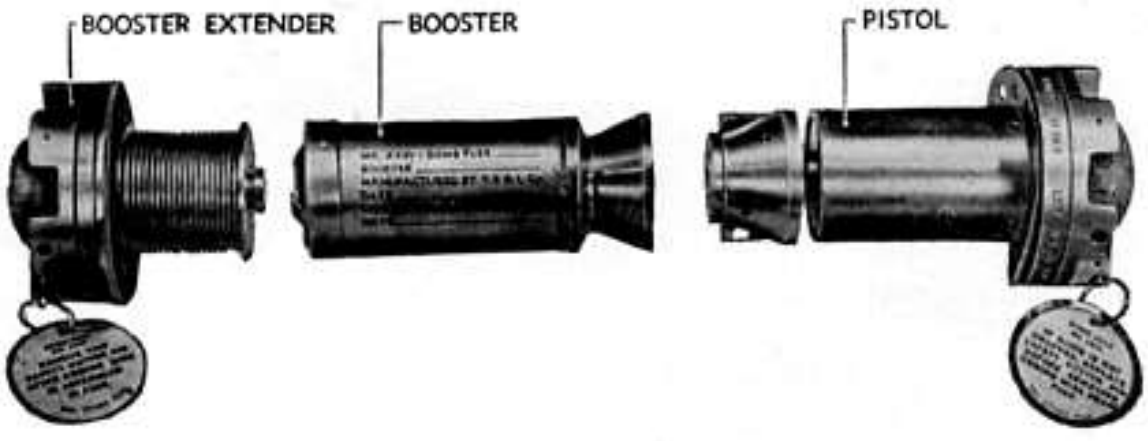
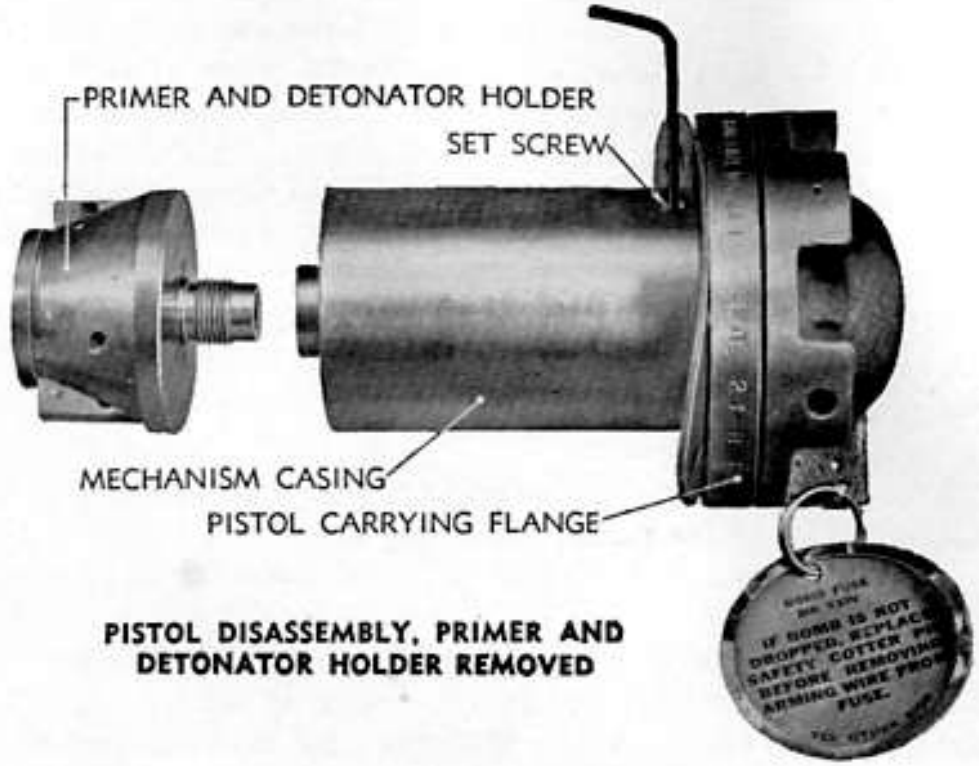
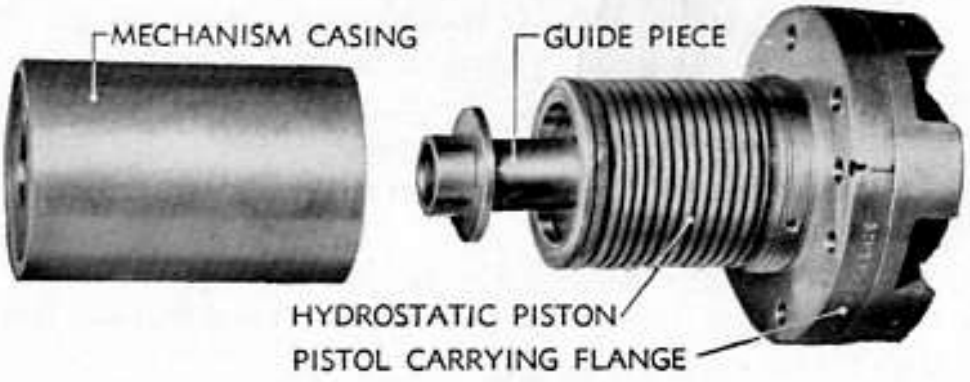


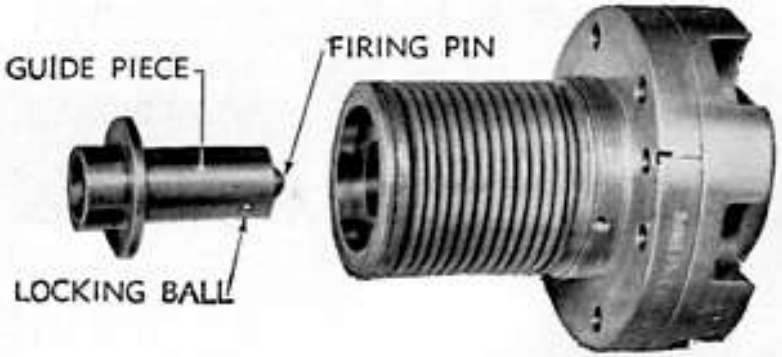
Figure 67. FUZE, bomb, hydrostatic, AN–Mk. 224.



PISTOL DISASSEMBLY, PRIMER AND DETONATOR HOLDER REMOVED



MECHANISM CASING REMOVED



GUIDE PIECE AND FIRING PIN ASSEMBLY REMOVED

RA PD 2137

Figure 68. FUZE, bomb, hydrostatic, AN–Mk. 224 — pistol disassembly.

(2) In the booster extender, the extender rod advances against a spring, compressing it. When the rod has advanced about 0.6 inch, the balls which lock the rod to the spring are released and the rod snaps forward, pushing the booster ahead of it. The skirt on the booster engages the sliding blocks in the pistol extender, moving them to line up the primer and detonator with the firing pin and booster lead. The booster continues to advance, forcing the primer and detonator holder and the firing pin guide piece toward the pistol head. This action is opposed by the firing pin spring. When the proper depth is reached, the firing pin guide piece is pushed through the piston bushing sufficiently to clear the locking balls which fly out releasing the firing pin. The firing pin is driven by its spring into the primer initiating the explosive train.

d. Fuzing. The fuze may be assembled to the bomb in the following sequence:

(1) Unseal the container and inspect the fuze and the gaskets.

(2) Remove the pistol with its gasket from the container and apply a thin coat of GREASE, water pump, to both sides of the gasket. Insert the pistol in either end of the tube, with the gasket in place between the pistol flange and the head of the tube. Take care that the assembly enters freely and is located properly upon the locating dowel pin so that the arming pin points toward the tail of the bomb. Insert the holding screws and draw them up evenly. They should be checked two or three times, in rotation, after the initial tightening. Stencil a P or otherwise mark the bomb body to indicate the pistol end of the fuze.

Note. It is extremely important that a watertight seal be obtained between the flange of the fuze and the head of the tube, otherwise a deeper functioning or a dud will result.

(3) Remove the booster and the booster extender from the container. Apply a thin coat of grease to the extender gasket, as in (2) above. Attach the booster to the extender by means of a slip joint provided. (When fuzing a 650-pound depth bomb, attach the spacer to the extender and the booster to the spacer.) Insert the assembly into the end of the tube opposite the pistol and bolt in place observing all the precautions specified in (2) above. This step may conveniently precede (2) above.

(4) Thread a branch of the arming wire through each head of the fuze. Cut off the excess wire so that no more than 6 or 7 inches protrudes. Remove all kinks and burs. Slip two safety clips up each wire until they touch the head of the fuze.

(5) If it is necessary, weatherproof the fuze against icing as described in h below.

(6) Remove the safety cotter pins. (In fuzes of later manufacture there is only one hole through the pin and housing. In this case, be

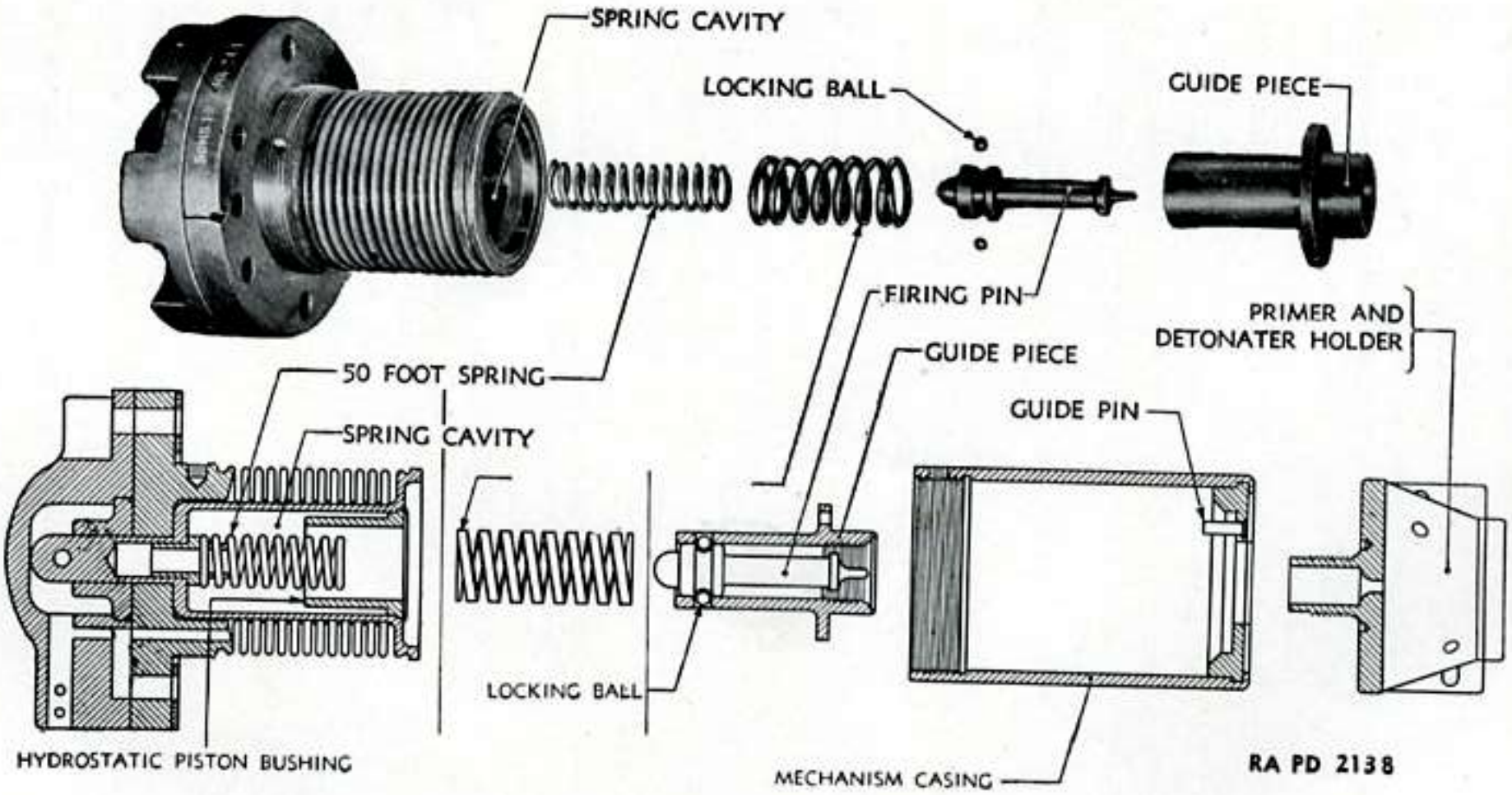


Figure 69. FUZE, bomb, hydrostatic, AN–MK. 224—diagram of assembly of pistol.

sure to hold the arming pin in place while removing the cotter pin and replacing it with the arming wire.)

(7) Reverse the above steps when it is necessary to unfuze the bomb to return it to regular storage.

Note. Depth bombs which are in the category of alerted ammunition may be stored overnight in the open without removing the hydrostatic fuze. (See paragraph 87 for detailed instructions and conditions.)

e. **Preparation for use.** If the depth of functioning desired is that marked on the fuze or its container, the fuze is ready for use when removed from its packings. If another depth is desired, the depth setting is changed as described in f below.

f. **Depth setting.** (1) Five depth settings are possible with this fuze. Unless otherwise marked, the fuze, as issued, will function at 25 feet. This may be changed to 50, 75, 100, or 125 feet by the insertion of the appropriate springs which are supplied to the can in which the fuze is packed. The 50-foot spring is approximately 0.50 inch outside diameter, and is painted black. The 25-foot spring is of the same size and is painted yellow. The 75-foot spring is *added* to the 50-foot spring to obtain function at 75-foot depth. This spring is approximately 0.75 inch outside diameter and is painted green. The 125-foot spring is added to the 50-foot spring to obtain function at 125-foot depth. This spring is approximately 0.75 inch outside diameter, and is painted red. The yellow 25-foot spring and the red 125-foot spring are used together to obtain functioning at 100-foot depths. The 50-foot setting will be used for all ordinary antisubmarine operations. Other settings will not be used except on instructions from the Chief of Ordnance or on direction of the officer in charge of operations.

(2) *To change depth setting.* To change depth setting of this fuze proceed as follows (figs. 68 and 69):

(*a*) Unscrew primer and detonator holder after forcing counterclockwise by hand to break the staking. (See fig. 68.)

(*b*) Remove set screw in mechanism casing and unscrew casing from pistol-carrying flange.

(c) Remove guide piece, firing pin, and locking balls as a unit from hydrostatic piston bushing, exposing the spring cavity.

(*d*) Insert appropriate spring as follows (fig. 69):

1. For function at 25-foot depth: yellow spring.
2. For function at 50-foot depth: black spring.
3. For function at 75-foot depth: black spring in place and insert the larger green spring over it.
4. For function at 100-foot depth: small yellow spring and over it the larger red spring.
5. For function at 125-foot depth: black spring and over it the larger red spring.

(*e*) Assemble firing pin and locking balls in guide piece and insert

as a unit into the hydrostatic piston bushing, resting the firing pin on the 0.5-inch spring.

(*f*) Assemble the mechanism casing to the pistol carrying flange, taking care that the guide pin enters the hole in the guide piece. Screw mechanism casing home and replace the set screw.

(*g*) Reassemble primer and detonator holder to guide piece taking care that the end of the firing pin is centered. Screw tightly home and stake by means of a suitable tool.

(*h*) Mark pistol head to indicate depth setting. If fuze is repacked, also mark the packing can and data card.

g. Precautions. In addition to the general precautions, the following will be observed:

(1) If a fuze or any part is dropped on a hard surface from a height of less than 5 feet, the fuze will be examined for superficial damage and, if none is evident, it will be considered serviceable.

(2) If a fuze is dropped from a height greater than 5 feet, the fuze will be tagged and turned in as unserviceable.

(3) If the arming pins are accidentally ejected, they will be replaced, but the fuze will be inspected by the Ordnance officer before it is replaced in service.

(4) When a fuze is removed from an unused bomb, notes will be kept on its complete history, recording all actions and installations from its first assembly to a bomb up to the time it is turned in or expended.

h. Weatherproofing against ice. (1) When a fuze of earlier manufacture is exposed to icing conditions the water ports in the heads may become blocked with ice. Consequently when icing conditions are anticipated, such fuzes assembled to bombs carried on external racks will be weatherproofed as described below. (See figs. 70 and 71.)

(2) There are nine openings in the lateral surface of each head which require treatment. (In some fuzes there are seven.) These are (fig. 71)—

(*a*) The arming pin hole.

(b) Two ¼-inch holes 60° each side of the arming pin hole.

(*c*) Two small holes (0.086-inch diameter) diametrically opposite (*b*) above (not present in fuzes of later manufacture).

(*d*) Two arming wire holes and two safety-cotter-pin holes in the sides of the arming pin housing.

Note. Those fuzes which have only one opening, the one occupied by the arming pin and its rubber gasket, are weatherproof as manufactured, and need not be given this special treatment.

(3) The openings described above are weatherproofed as follows:

(*a*) After the bomb is installed in the rack, the arming wires inserted, and the safety cotter pins removed, carefully clean exposed

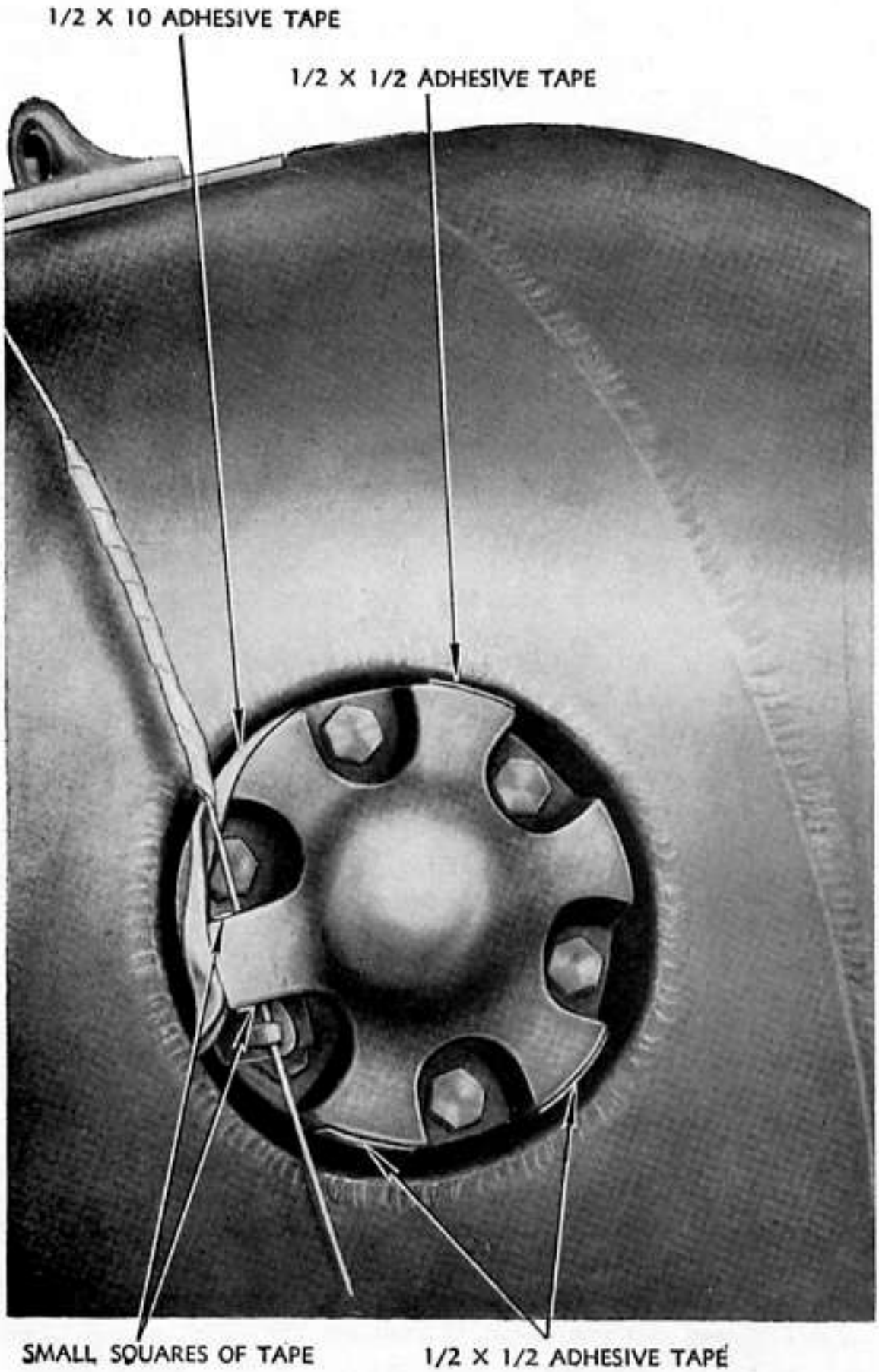


Figure 70. Weatherproofing of hydrostatic fuze.

surfaces of the fuze heads, especially around the openings described.

(*b*) Carefully apply ½-inch squares of fresh, winter grade, adhesive tape to the two small holes ((2)(c) above) and to the ¼-inch hole facing away from the bomb lug; that is, toward the bottom of the bomb.

(c) With a strip of fresh, winter grade, adhesive tape, 10 inches by ½ inch, cover first the ¼-inch hole which faces upward, then carry the tape around the head of the fuze toward the arming pin. Cover the arming pin hole and twist the tape on itself once and stick it to the first layer as far back as the arming wire and, working toward the bomb rack, wrap the balance of the strip securely around the arming wire, so that it will be withdrawn with the wire when the bomb is dropped.

(*d*) Cover the safety-cotter-pin holes with small squares of adhesive tape in the same manner.

(*e*) Apply a little GREASE, O.D., No. 0 or No. 00, around the arming wire where it enters and emerges from the arming pin housing. Take particular care that no grease gets on the adhesive tape.

(4) Treat the opposite head of the fuze in the same manner.

i. **Marking.** Both heads of the fuze are stamped on the flange with the type, model, lot number, loader's symbol, and date loaded. Similar information is printed on the booster. The depth setting is marked on the head of the pistol. The safety cotter pin in each head has attached to it a tag which reads "Bomb, fuze, AN–Mk. 224. Remove this safety cotter pin after arming wire is assembled in fuze. See other side." On the reverse it reads "Bomb, fuze, AN–Mk. 224. If bomb is not dropped replace safety cotter pin before removing arming wire from fuze. See other side."

j. **Packing.** One each, pistol, booster, and booster extender are packed with 2 gaskets, 12 bolts, and a set of auxiliary depth springs in a metal container. Four such containers are packed per metal crate or box.

50. **FUZE, BOMB, HYDROSTATIC, AN–MK. 229 (TAIL).** a. **Data.** FUZE, bomb, hydrostatic, AN–Mk. 229 (tail) is a vane type tail fuze which arms after 110 revolutions of the arming vane. It acts in response to hydrostatic pressure to detonate the bomb at a depth set by means of a handle or disk on the fuze body. This fuze is authorized for use with the 650-pound depth bomb, AN–Mk. 37. It is 16.37 inches in length and 2.36 inches in diameter. It weighs 14.5 pounds.

b. **Description.** This fuze is in the shape of a bottle with a booster cup assembled to the base and a 16-blade arming vane assembled to the outer end. (See fig. 72.) The depth-setting control is attached at the side of the body. The fuze body is marked with depth graduations around the hub of the depth setting handle on earlier models;

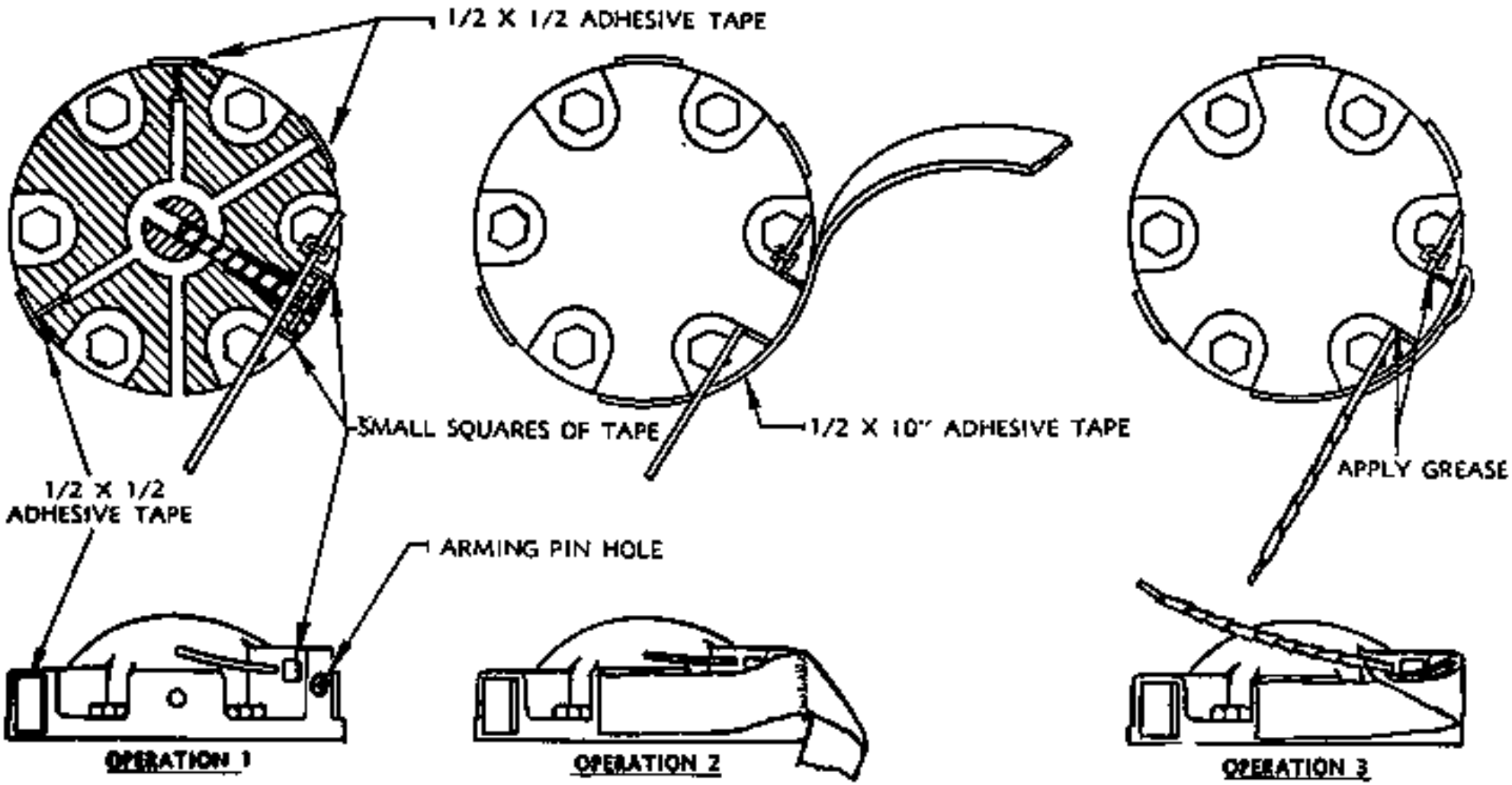


Figure 71. Method of weatherproofing hydrostatic fuze.

the lock screw does not have such marking. On later models, the depth setting is indicated on the disk. A safety cotter pin, which has a ring and tag attached, passes through the neck of the fuze body and the arming vane shaft preventing rotation of the vane and consequent arming of the fuze. (This pin should not be confused with the cotter pin which passes through the arming vane hub and holds the vane on the shaft.) A safety bar, which is held in place by a cotter pin, passes through the booster cup and keeps the detonator carrier from moving toward the firing pin. A J-shaped arming bracket, furnished separately, clamps around the neck of the fuze to provide for installation of the arming wire.

c. **Function.** (See fig. 73.) When the arming wire is withdrawn the air stream rotates the arming vane ①. The rotation is transmitted through a reduction gear train ② to the arming shaft ③ which is threaded into the arming cup ④. The arming cup progresses upward and, after 110 revolutions of the vane, clears the arming pins ⑤ which are ejected by their springs from the groove in the head of the firing spindle ⑥. Upon impact with the water, the inertia counterbalance weights ⑦ prevent function by set-forward. As the bomb sinks, the water enters the ports ⑧ in the body of the fuze and builds up hydrostatic pressure in the bellows ⑨. When sufficient pressure is built up to compress the firing spring ⑩ and auxiliary depth spring ⑫, the firing spindle is forced downward so that the locking balls ⑭ fly into a recess and the firing spring forces the detonator carrier ⑪ against the fixed firing pin ⑮. The resultant explosion is transmitted through the booster leads ⑱ to the booster ⑰. Variation in depth setting is obtained by varying the compression of the auxiliary depth spring by means of a cam on the inner end of the depth setting control ⑬.

d. **Preparation for use.** The fuze is ready for use when removed from its metal container except for removal of safety devices as described in e below.

e. **Fuzing.** The following sequence will be followed in installing this fuze in the bomb.

(1) Remove fuze from sealed container and inspect.

(2) Set to desired depth by turning the depth-setting control to the desired depth and locking in place.

(3) Attach the arming bracket loosely to the neck of the fuze body.

(4) Remove the cotter pin from the safety rod and withdraw the safety rod.

(5) Screw the fuze into the fuze seat, making certain that a serviceable gasket is in place. Tighten the fuze in place with a fuze wrench and align the arming bracket with the suspension lugs and tighten it in place.

(6) Thread the end of the arming wire through the arming bracket and adjust so that 3 to 4 inches protrude. Slip two safety clips up

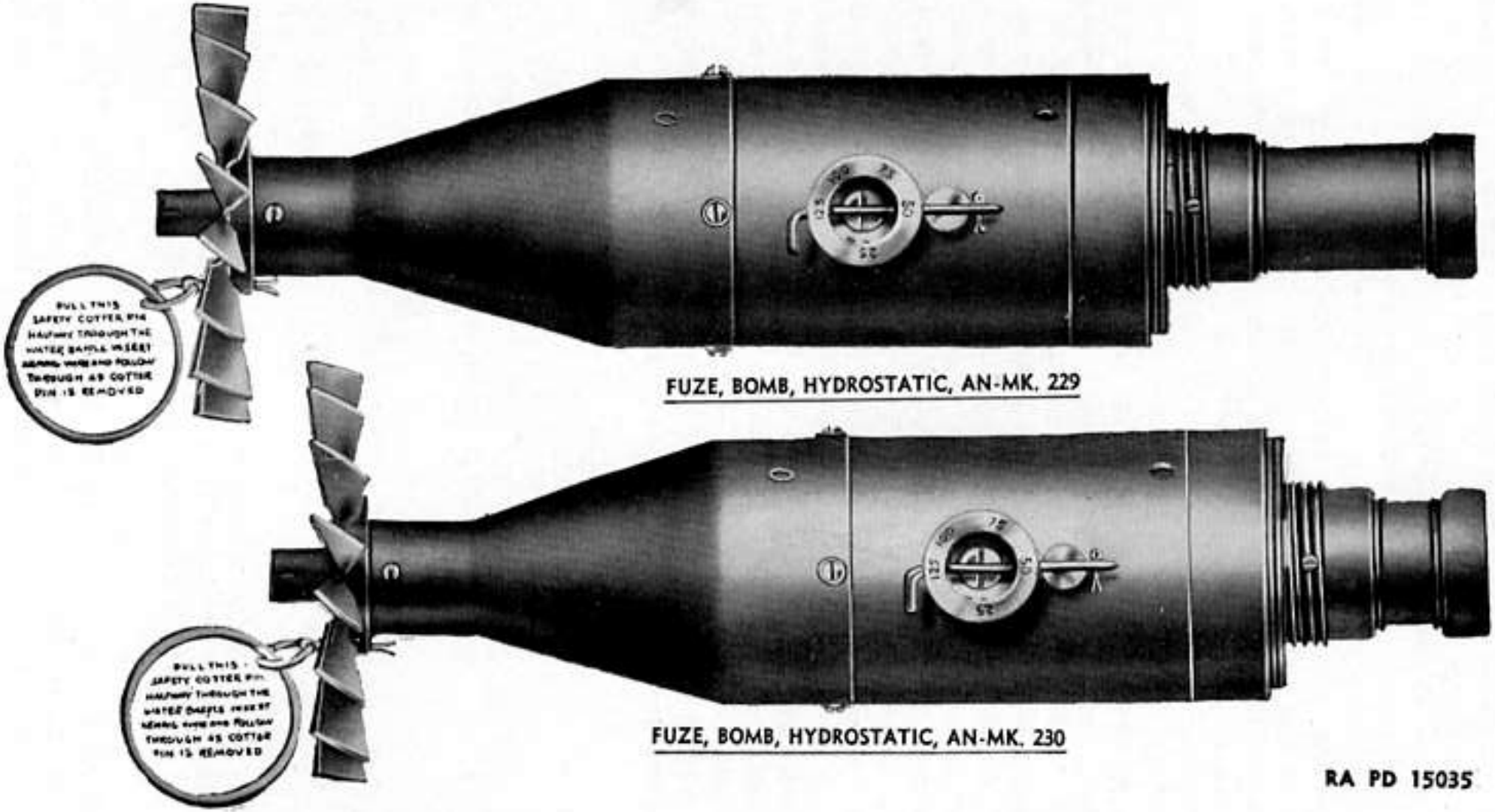


Figure 72. FUZE, bomb, hydrostatic, AN–Mk. 229 and FUZE, bomb, hydrostatic, AN–Mk. 230.

the wire until the inner touches the bracket. Remove all kinks and burs.

(7) Remove the safety cotter pin.

(8) The fuze may be removed and returned to storage by reversing the above steps.

Caution: The fuze must be tightened securely in place because water leakage under the fuze seat will render the fuze a dud. Grease should not be used on the gasket or fuze seat because excess grease might reach the detonator and cause a dud.

f. Accidental arming. If this fuze should become armed accidentally, it may be restored to its unarmed condition by authorized and experienced personnel only. This may be done by first removing the screws in the body, removing the cone from the fuze body, and separating the arming train assembly from the cone. The arming cup is then backed off the arming shaft screw replaced over the arming pins. The arming shaft is then reengaged in the vane cup and screwed down until the housing seats firmly on the fuze body. The vane shaft is inserted into the slot in the reduction gear bracket and the cone reassembled. After the body screws are replaced the vane is turned backward until it begins to bind and is then turned five revolutions forward. The safety cotter pin is then inserted and the fuze repacked.

g. Marking. The fuze is marked with type, model, lot number, and inspector's initials. It is also marked to indicate the depth for each position of the depth-setting handle.

h. Packing. One fuze is packed in a sealed metal container, four such containers are packed in a metal crate.

51. FUZE, BOMB, HYDROSTATIC, AN–MK. 230 (TAIL). a. This fuze is designed for use in general-purpose bombs, 500-pound, AN–M64, 1,000-pound, AN–M65, and 2,000-pound, AN–M66 and their modifications. This fuze differs from the AN–Mk. 229, described in paragraph 50, in the following details.

(1) Instead of the arming bracket, this fuze has a flange on the neck which contains eyelets for the arming wire and shipping safety pin.

(2) The booster cup is approximately 1 inch shorter and the booster charge smaller.

(3) The fuze is 15.4 inches long.

b. Except as specified in (1), (2), and (3) above, this fuze is identical with the AN–Mk. 229. (See par. 50 and fig. 72.)

52. FUZE, BOMB, HYDROSTATIC, AN–MK. 234 (TRANSVERSE). a. Data. FUZE, bomb, hydrostatic, AN–Mk. 234 (transverse) is a double headed fuze similar to the AN–Mk. 224 (par. 49) and, except

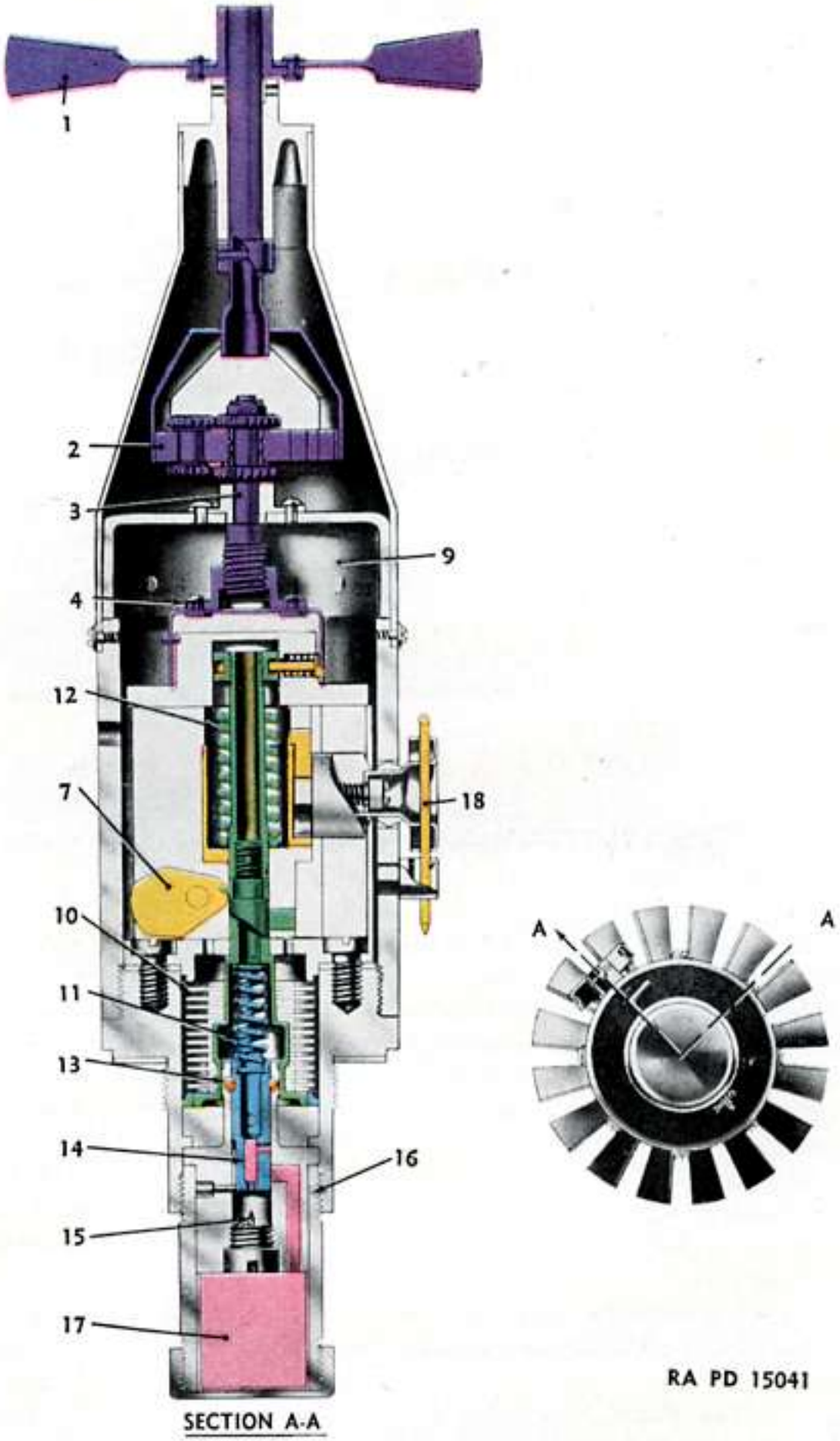


Figure 73. FUZE, bomb, hydrostatic, AN–Mk. 229.

as noted in this paragraph, the descriptions and procedure apply equally to this fuze. This fuze differs in that it may be set for the depth desired, from 25 to 125 feet in steps of 25 feet, without disassembly of the fuze. It is issued in three parts, pistol, booster, and booster extender. The booster and booster extender are similar to those of the AN–Mk. 224, and are assembled to the bomb in the same manner. The pistol (fig. 74) differs in the shape of the head, and the method of arming, but is assembled in the same manner as that of the AN–Mk. 224 except for manner of attaching the arming wire.

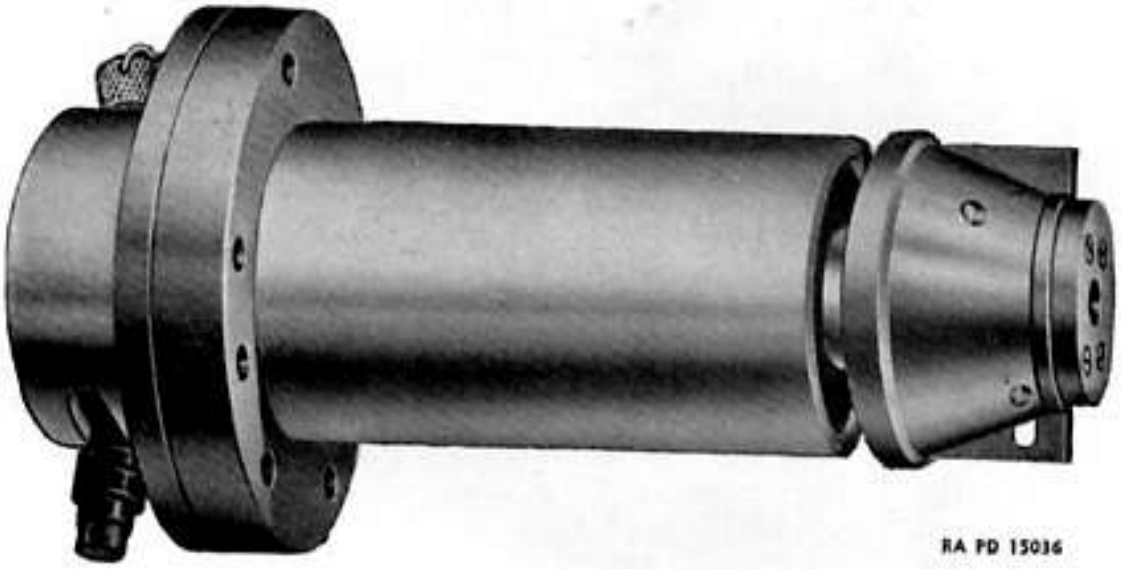


Figure 74. FUZE, bomb, hydrostatic, AN–Mk. 234, pistol.

b. Description. The head of the pistol is cylindrical. Projecting through a slot in one side of the head, there is a lock screw with a safety clip. Projecting through a slot in the other side is the depth-setting knob which also serves as a water port to the firing mechanism of the pistol. When the pistol is unarmed, this port is closed by a small plug and a neoprene tubing connector. Depth settings are graduated on the head.

c. Assembly. The booster and booster extender are assembled in the same manner as those of the AN–Mk. 224. The pistol is assembled in the same manner as the pistol of the AN–Mk. 224, except as follows:

(1) It may be necessary to set the depth-setting knob in the center of the slot in order to assemble the pistol and tighten the screws (see **d** below).

(2) The arming wire to the pistol is *attached* to the plug by passing the wire through the hole in the plug so that approximately 6 inches protrude, cutting off the excess, and forming a loop in the end

of the wire or bending about ¾ inch of the end of the wire back on itself. When the arming wire is withdrawn it must pull the plug from the depth setting knob.

Caution: This applies to the pistol end of the arming wire *only*. The booster extender end of the arming wire must pass through the head and arming pin without kinks or burs, in the usual manner.

d. Depth setting. The depth may be set at any time up to release of the bomb as follows:

(1) Remove the safety clip from the lock screw and unscrew two full turns.

(2) Move the depth setting knob to the desired depth as indicated on the scale.

(3) Tighten the lock screw securely and replace the safety clip so that the screw cannot come loose.

e. Precautions. (1) Care should be exercised in handling the fuzed bomb to insure that the plug or connector are not pulled from the depth setting knob.

(2) Since this fuze is of weatherproof construction, weatherproofing as described for earlier models of the AN–Mk. 224 is unnecessary.

SECTION VII. TAIL FUZES

53. FUZE, BOMB, AN–M100A2 (TAIL). a. Data. FUZE, bomb, AN–M100A2 (tail) is a vane type tail fuze which arms after 175 revolutions of the arming vane and acts to detonate the bomb on impact with a delay determined by the primer detonator used. As issued, PRIMER DETONATOR, M14, 0.025 second delay is assembled to the fuze. This may be replaced in the field by PRIMER DETONATOR, M14 of 0.1 second delay, 0.01 second delay, or nondelay. The fuze is approximately 9 inches long and weighs 2.7 pounds. It is authorized for use in general-purpose and fragmentation bombs of 100 to 300 pounds. Earlier models differ as follows: FUZE, bomb, M100A1 and AN–M100A1 required 675 revolutions of the arming vane to arm the fuze. FUZE, bomb, M100 had a 0.1 second delay primer detonator permanently assembled to the fuze as well as the longer arming. All earlier types had an 8-blade vane. If earlier models are used in low altitude over water bombing, they should be partially armed as described below.

b. Description. FUZE, bomb, AN–M100A2 (tail) consists of body, stem, and arming head. (See fig. 75.)

(1) The body is cylindrical and is threaded to screw into the adapter of the bomb. A PRIMER DETONATOR, M14, is screwed into the inner end; the stem is assembled to the outer end. The body

contains an inertia type firing pin and its restraining spring. A cotter pin is placed through the body and firing pin for shipping.

(2) The stem tube connects the body and the arming head cup. The inner end of the arming stem is screwed through the body and into the firing pin plunger; the arming mechanism is attached to the outer end by means of a cotter pin.

(3) The arming head contains the arming vane assembly and reduction gear train. A stop rod passes through the cup and extends toward the body parallel to the stem. The arming vane is a 4-blade type and is packed separately. A safety pin is sealed into a vane stop for safety in handling.

c. Function. When the arming wire is withdrawn the air stream turns the arming vane which turns the bearing cup assembly. (See fig. 76.) A pinion, mounted on the bearing cup, is in mesh with a 29-tooth fixed gear and a 30-tooth movable gear. The fixed gear is prevented from rotating by the stop rod passing through the stem cup. Each revolution of the pinion with the vane forces the movable gear one tooth 1/30 revolution ahead of the fixed gear. The fixed gear is connected to the arming stem by a cotter pin passing through the gear carrier and the arming stem. As the arming stem rotates, it unscrews from the firing pin plunger. After 5.7 revolutions of the arming stem (approximately 175 revolutions of the vane) the stem clears the plunger and the fuze is armed.

Note. There is no external evidence that the fuze is armed other than the progress of the arming head out of the cup, shortening the amount of stop rod exposed by .6 inch. The vane assembly is still attached to the fuze. After about 200 more revolutions of the vane, the stem unscrews from the fuze body and vane; arming head and stem assembly are carried clear of the fuze by the air stream. Upon impact the plunger is driven forward and the firing pin strikes the primer. The flame from the exploding primer ignites the delay charge which burns the required time and ignites the relay charge. This explodes the detonator.

d. Preparation for Use. When removed from the packing, the fuze is ready for use, except for assembly of the arming vane, described in e below, and for possible change of the primer detonator. When a delay other than 0.025 second is required, unscrew the primer detonator by hand. The use of tools is neither necessary nor permitted. Remove a PRIMER DETONATOR, M14 of the desired delay from its packing, inspect it, and screw it handtight into the base of the fuze. Seal the primer detonator removed from the fuze in the packings of the substitute, and mark to indicate the delay. If the plunger spring or spring washer fall out of the fuze when the primer detonator is removed, they should be replaced before the new primer detonator is assembled.

Caution: PRIMER DETONATOR, M14, used in this fuze and PRIMER DETONATOR, M16, used in other fuzes are not interchangeable. An attempt to assemble a primer detonator to a fuze

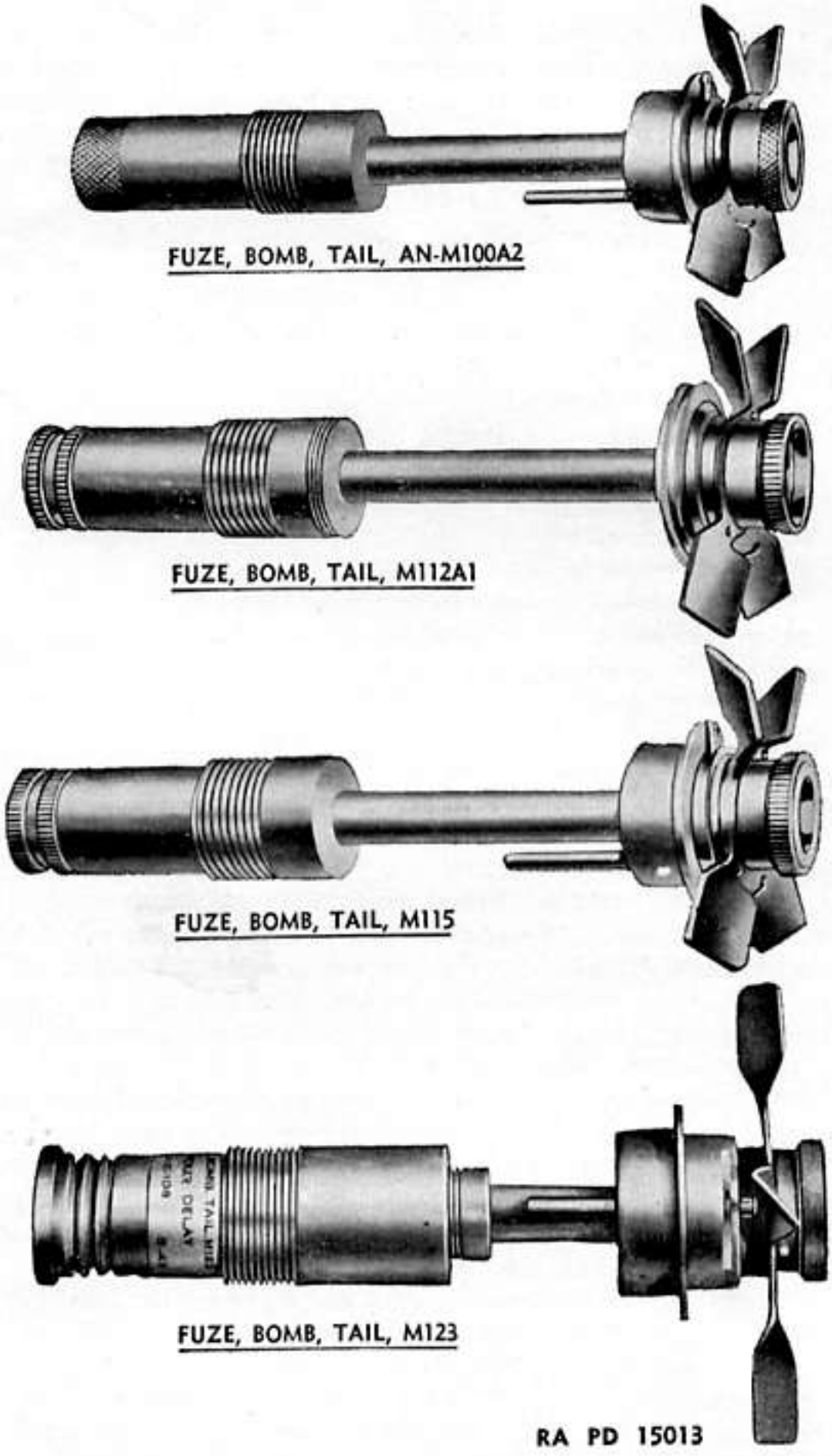


Figure 75. FUZE, bomb, AN–M100A2, AN–M100A1, M112A1, M115, and M123.

for which it is not designed will ruin both fuze and primer detonator. Primer detonators may be distinguished by the knurling around the base: The M14 having a single wide band, the M16 having two narrow bands.

e. Fuzing. In fuzing the bomb with FUZE, bomb, AN–M100A2 (tail), the following sequence will be observed.

(1) Unseal the can and remove fuze from its packings.

(2) Inspect fuze for serviceability and for presence of primer detonator of desired delay.

(3) Remove cotter pin which passes through body of fuze.

(4) Screw fuze into adapter-booster handtight.

(5) Thread long branch of arming wire through rear suspension lug of bomb, then through eyelets of vane stop. If nearer eyelets of the vane stop are occupied by the safety pin, place the safety pin from the fuze body in opposite vane stop, then cut seal wire, remove pin, and insert arming wire.

(6) Remove safety pin.

(7) Thread wire through hole in arming vane and assemble vane to arming head and screw vane nut down handtight. Be sure that slots in vane hub are properly located over studs.

(8) Adjust arming wire to protrdue 2 to 3 inches. Remove all kinks and burs.

(9) Place the safety clip on the wire and slide it up until it just touches the face of the vane.

(10) If the bomb is not used, unfuze and return to storage reversing the steps listed above.

f. Accidental arming. Should this fuze become armed accidentally, as shown by the progression of the arming head and shortening of the stop rod as described above, the fuze will have first the vane assembly and then the primer detonator removed. The fuze may then be disarmed by authorized and experienced personnel as follows:

(1) Place cotter pin through body of fuze.

(2) Remove the cotter pin, at the outer end of the arming stem, which holds arming head on stem. Remove arming assembly.

(3) If there is a register hole through the stem tube and stem, screw arming stem into plunger until holes in the stem and stem tube are in register. Place a cotter pin through these holes. If there is no register hole, screw stem down tight then back off one turn.

(4) Replace arming head on stem and replace cotter pin.

(5) If used, remove cotter pin in stem.

(6) Replace primer detonator.

g. Partial arming. (1) FUZE, bomb, AN–M100A2 (tail) will arm within the minimum combat altitudes; hence, partial arming is neither required nor permitted.

(2) FUZE, bomb, AN–M100A1 or M100 may be partially armed

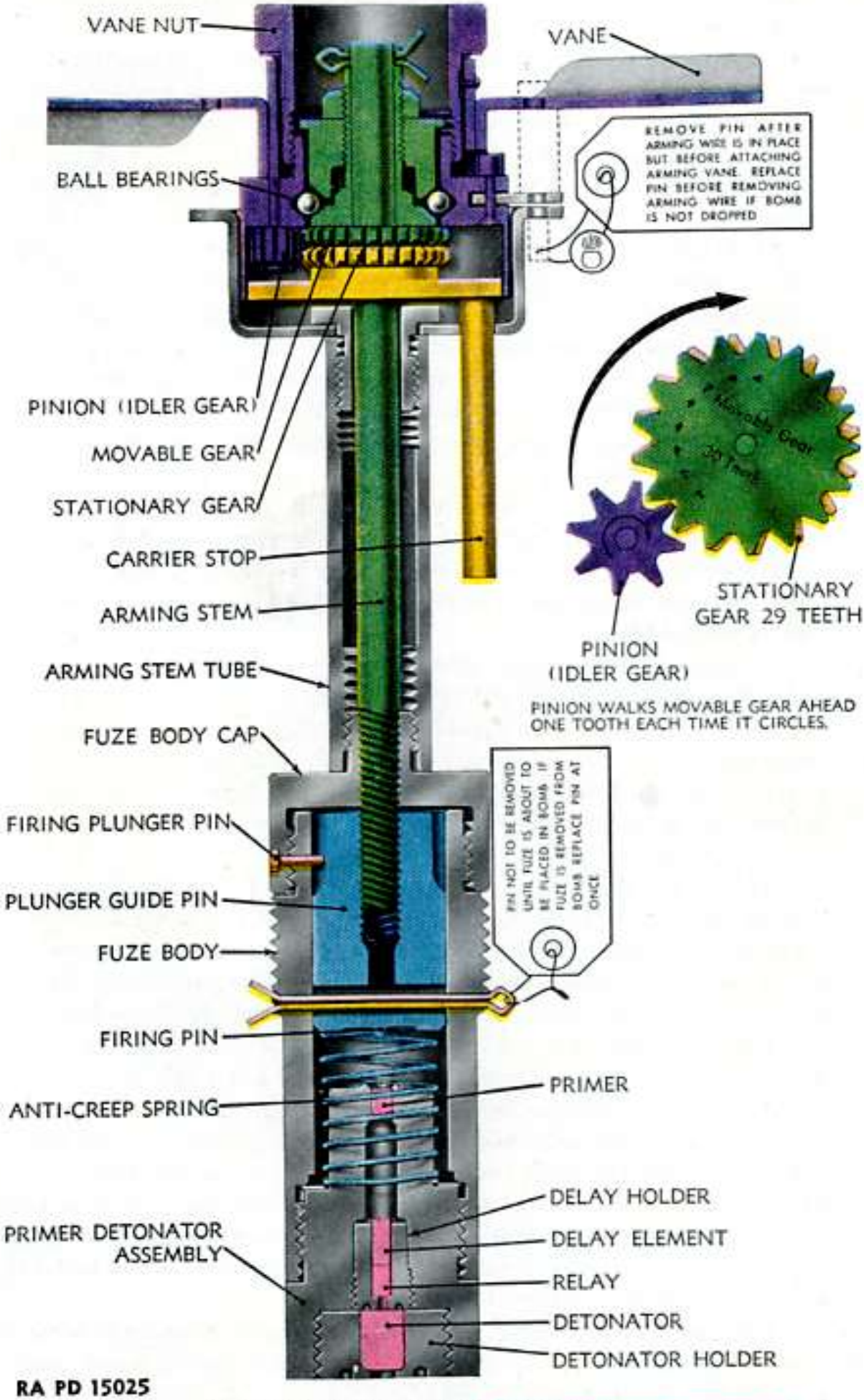


Figure 76. FUZE, bomb, ~~AN-M100A2.~~

as follows if the bomb is to be carried on *internal* racks:

(*a*) Measure the length of the stop rod accurately.

(*b*) Remove safety pin and rotate vane carrier clockwise until the stop rod measures 0.4 inch less than the original measurement. (See (*a*) above.) This should require approximately 350 turns.

(*c*) Replace and rewire safety pin.

(*d*) Attach to seal wire a tag indicating that the fuze is partially armed.

(3) **FUZE**, bomb, AN–M100A1, or M100, when intended for bombs carried on external racks, will be partially armed as follows:

(*a*) Remove the seal wire and safety pin. Leave the cotter pin, through the body of the fuze, in place.

(*b*) Remove the cotter pin through the outer end of the arming stem and remove arming head from the stem.

(*c*) Unscrew (clockwise) the arming stem from the plunger and remove it from the fuze.

(*d*) Cut 0.4 inch from the threaded end of the arming stem, taking care that all burs are removed from threads after the cut is made.

(*e*) Screw stem back into plunger until the holes in the stem and stem tube are in register. Place a pin through the holes until the fuze is assembled.

(*f*) Replace arming head on stem and replace cotter pin.

(*g*) Replace the safety pin and seal wire.

(*h*) Attach a tag to the seal wire indicating that the fuze is partially armed.

(*i*) Fuzes partially armed by this method may also be used in bombs carried on internal racks and for purposes where partial arming is not required.

h. Marking. The fuze is stamped in the metal of the body with the type model and lot number. The sealing wire of the safety pin carries a tag which reads: "Remove pin after arming wire is in place but before attaching arming vane. Replace pin before removing arming wire if bomb is not dropped." In addition to the markings, this fuze is distinguished from the M112, M115, and M123, as follows (fig. 75): The AN–M100A2 has a large arming head and the primer detonator has a single, wide knurled band. The M112 has a small arming head and the primer detonator has two narrow knurled bands. The M115 has a large arming head and the primer detonator has two narrow knurled bands. The M123 has a large head with the reduction gear assembly extending out of the stem cup, and the body of the fuze has a groove which contains a ball. The primer detonator is marked (fig. 44) to indicate the amount of delay.

i. Packing. FUZE, bomb, AN–M100A2 (tail) is packed, without vane assembly, one per container, 25 containers and 25 vane assemblies, on spindles in a wooden box.

54. **FUZE, BOMB, AN–M101A2 (TAIL).** a. Data. FUZE, bomb, AN–M101A2 (tail) is an arming vane type tail fuze which arms after 175 revolutions of the arming vane and acts to detonate the bomb upon impact with a delay determined by the primer detonator assembled. As issued PRIMER DETONATOR, M14, 0.025 second delay, is assembled to the fuze. This may be replaced in the field by PRIMER DETONATOR, M14, 0.1 second delay, 0.01 second delay, or nondelay. This fuze is 12 inches long and weighs 2.9 pounds. It is authorized for use in G.P., S.A.P., and chemical bombs of 500–600 pounds.

b. Description. Except for the length of the stem and the corresponding differences in over-all length, weight, and bombs authorized, this fuze is identical with the FUZE, bomb, AN–M100A2 (tail) described in paragraph 53. (See fig. 77.) With the exceptions noted, all statements made above concerning FUZE, bomb, AN–M100A2 (tail) apply equally to the AN–M101A2, and all statements concerning the AN–M100A1 apply equally to the AN–M101A1.

55. **FUZE, BOMB, AN–M102A2 (TAIL).** a. Data. FUZE, bomb, AN–M102A2 (tail) is an arming vane type tail fuze which arms with 175 revolutions of the arming vane and acts to detonate the bomb upon impact with a delay determined by the primer detonator assembled. As issued for general use PRIMER DETONATOR, M14, 0.025 second delay is assembled to the fuze. This may be replaced in the field by PRIMER DETONATOR, M14, 0.1 second delay, 0.01 second delay, or nondelay. The fuze is 16 inches long and weighs 3.2 pounds. It is authorized for use with all G.P. and S.A.P. bombs of 1,000 pounds and over, with all M series A.P. bombs (0.1 second delay), and with the 4,000-pound L.C. bomb and 1,000-pound chemical bombs (nondelay only).

b. Description. Except for the length of the stem and the corresponding differences in over-all length, weight, and bombs authorized, this fuze is identical with FUZE, bomb, AN–M100A2 (tail) described in paragraph 53. (See fig. 77.) With the exceptions noted, all statements made above concerning FUZE, bomb, AN–M100A2 (tail) apply equally to the AN–M102A2, and all statements concerning the AN–M100A1 apply equally to the AN–M102A1. The same differences as noted above apply between FUZE, bomb, M102A1 and M100A1 and between M102 and M100.

56. **FUZE, BOMB, M106, M106A1, AND M106A2 (TAIL).** a. Data. FUZE, bomb, M106 (tail) is an arming pin type tail fuze which arms immediately on withdrawal of the arming wire and acts to detonate the bomb 45 seconds after impact. The fuze is 9.4 inches in length and weighs 2.4 pounds. It is adapted for use with all general-purpose

bombs. FUZE, bomb, M106A1 (tail) is identical with the M106 except that the delay time is 8 to 11 seconds. FUZE, bomb, M106A2 (tail) is identical with the M106 except that the delay time is 4 to 5 seconds.

b. Description. This fuze consists of a cylindrical housing which contains a weighted plunger carrying the firing pin, a primer, a length of delay fuze and a detonator. (See fig. 78.) The plunger is restrained by a spring loaded arming pin which passes through the plunger and housing near the outer end. The arming pin has two holes drilled through it; one for the safety pin, the other for the arming wire.

c. Function. When the arming wire is withdrawn, the spring ejects the arming pin. Upon impact, the plunger is driven forward by inertia, and overcoming a restraining spring, it strikes the primer. The flame from the primer ignites the delay fuze which burns 45 seconds and ignites the detonator which explodes the booster and bomb. In the M106A1, the delay fuze burns 8 to 11 seconds; in the M106A2 the delay is 4 to 5 seconds.

d. Preparation for use. When the fuze is unpacked it is ready for use.

e. Fuzing. The fuze is assembled to the bomb as follows:

(1) Remove the fuze from its sealed container.

(2) Inspect to see that it is serviceable and of the desired delay.

(3) If necessary, turn the arming pin so that the split end of the safety cotter pin points toward the threaded end; that is, toward the bomb.

(4) Screw the fuze into the bomb handtight.

(5) Press on the head of the arming pin to expose the inner hole in the other end. Thread the arming wire through this inner hole. Adjust the wire to protrude 2 to 3 inches and remove all kinks and burs. No safety clip is necessary.

(6) Remove the safety cotter pin.

(7) If the bomb is not dropped, unfuze by reversing the steps above.

f. Accidental arming. If the fuze should become armed accidentally, the arming pin may be replaced if the pin and spring are available. If the arming pin is lost an improvised pin should be put in its place so that the fuze may be handled with comparative safety and removed for disposition.

g. Marking. (1) All modifications of this fuze have stamped on the head the type, model, lot number, and date loaded. The various modifications are distinguished as follows:

(*a*) FUZE, bomb, M106 (tail), 45 second delay: Body is metal plated.

(*b*) FUZE, bomb, M106A1 (tail), 8–11 second delay: Body painted white, outer end painted green. Body marked with "FUZE, bomb, tail, M106A1, 8–11 seconds delay."

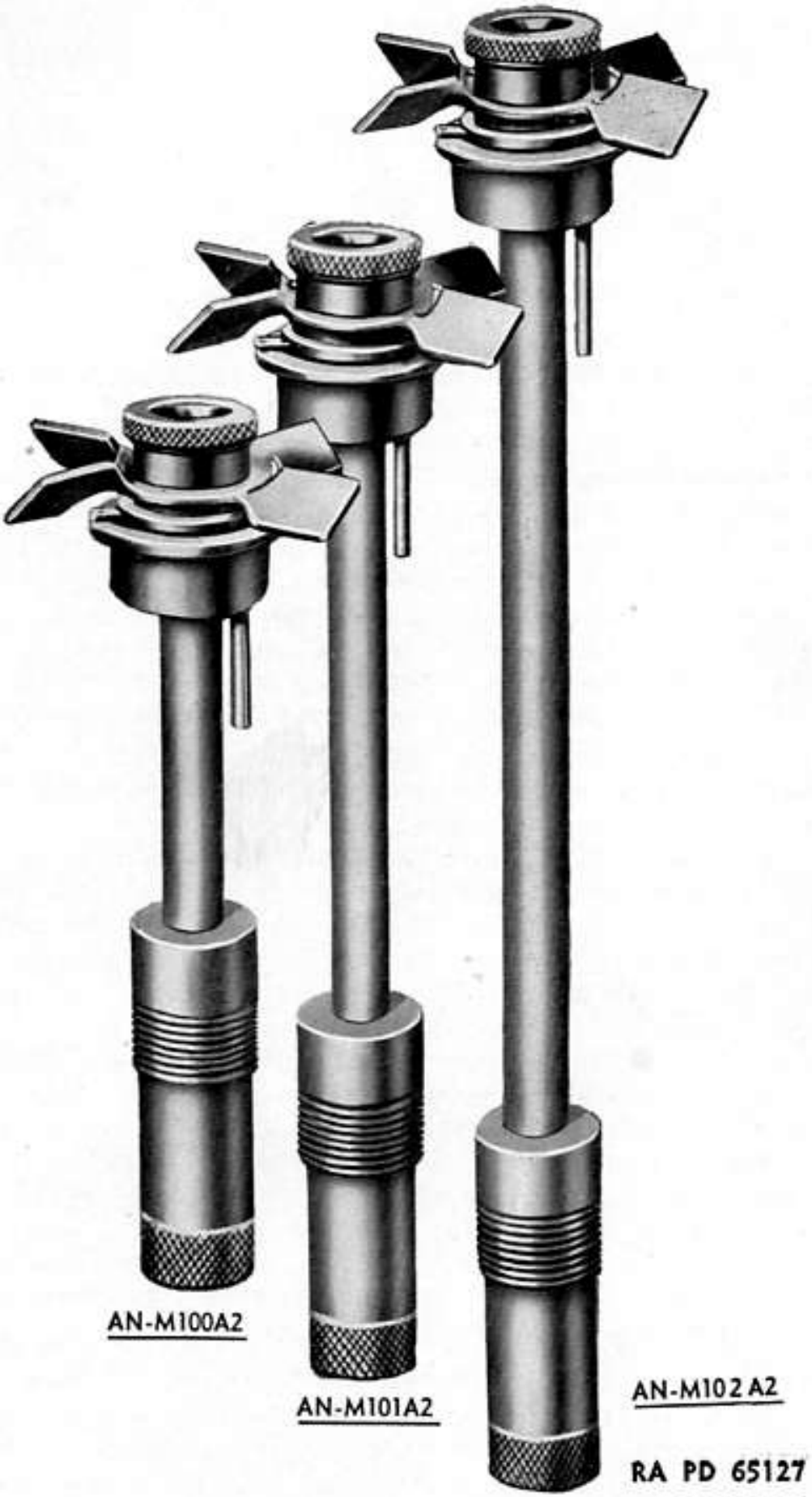


Figure 77. FUZE, bomb, AN–M100A2, AN–M101A2, and AN–M102A2.

(c) FUZE, bomb, M106A2 (tail), 4–5 second delay: Body painted white, outer end painted yellow. Body marked with "FUZE, bomb, tail, M106A2, 4–5 seconds delay."

(2) All modifications have, attached to the safety cotter pin, a tag which reads: "To be removed after bomb has been placed in dropping gear and arming wire has been inserted in arming pin. If bomb is not dropped, replace pin before removing arming wire."

h. Packing. FUZE, bomb, M106 (tail) (all modifications) is packed one per sealed container, 50 per wooden box.

57. FUZE, BOMB, M112A1 (TAIL). a. Data. FUZE, bomb, M112A1 (tail), is an arming vane type tail fuze which arms after 18 revolutions of the arming vane. It acts to detonate the bomb 8 to 15 seconds or 4 to 5 seconds after impact, dependent upon the primer detonator used. As issued, PRIMER DETONATOR, M16A1, 8–15 second delay, is assembled to the fuze; may be replaced in the field by PRIMER DETONATOR, M16A1, 4–5 second delay. The fuze is equipped with a cocked type firing pin which, once the fuze is armed, is extremely sensitive. FUZE, bomb, M112A1 (tail) is authorized for use with G.P. bombs of 100 to 300 pounds. FUZE, bomb, M112 (tail), differs only in that it is issued with PRIMER DETONATOR, M16 which does not have a shoulder to act as plunger stop. FUZE, bomb, M112 (tail) may be substituted when any but the most severe impact is anticipated. The fuze is 9.6 inches long and weighs 2.7 pounds.

b. Description. FUZE, bomb, M112A1 (tail) consists of a body which contains the replaceable primer detonator and a cocked firing pin, the stem and the vane assembly. (See fig. 79.) PRIMER DETONATOR, M16 or M16A1 may be used with this fuze (M16 is used with FUZE, bomb, M112). The firing pin is assembled in a cup-shaped plunger and is held, with its spring compressed, by two balls assembled in holes in the side of the plunger. The balls are held in place against the firing pin by the wall of the fuze body. When the plunger advances upon impact or other shock, the holes containing the balls are brought opposite a groove machined in the body; the balls are forced outward, and the firing pin is released. When the fuze is armed, the plunger is restrained only by a light spring to prevent it creeping forward. The arming stem is threaded at the inner end. When the fuze is in the SAFE condition, the stem is screwed through the cup of the fuze body and into the plunger. The vane assembly is attached, without reduction gearing, to the outer end of the arming stem. The stem tube forms a housing for the stem and carries on its outer end a shallow cup which, with a similar cup on the vane hub, contains eyelets for insertion of the arming wire. The arming vane is shipped separately.

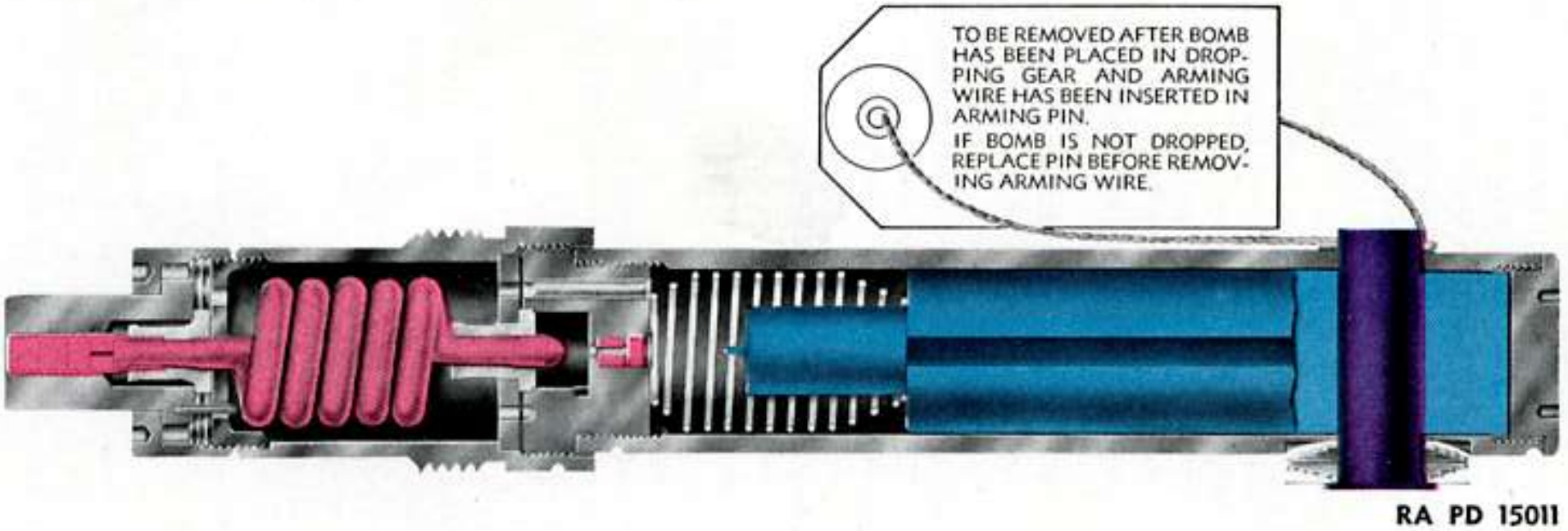


Figure 78. FUZE, bomb, M106.

c. Function. When the arming wire is withdrawn the air stream rotates the arming vane. The rotation is transmitted directly to the arming stem, unscrewing it from the firing pin plunger and body. After approximately 18 revolutions, the stem is unscrewed from the plunger and the fuze is armed. After 18 more revolutions of the vane, the arming stem unscrews from the fuze body and the vane and stem assembly is carried free of the fuze. Upon impact, even a graze impact, the plunger is carried forward by its inertia, the locking balls are released and the firing pin is driven by its spring into the primer. The flame from the primer ignites the delay element which burns 8 to 15 seconds (or 4 to 5 seconds) before igniting the relay which explodes the detonator. Upon severe impact the plunger is arrested by the shoulder on the primer detonator so that the blow on the primer has only the force of the firing pin spring, thus avoiding malfunction due to pierced primer.

d. Preparation for use. The fuze is ready to assemble to the bomb when removed from its packings, except when 4 to 5 seconds delay action is desired. In this case, the 8–15 second primer detonator is unscrewed from the fuze and a 4–5 second delay primer detonator is screwed in its place. The use of tools is neither necessary nor permitted. If hand force is insufficient, the fuze should be turned in as unserviceable.

e. Fuzing. In fuzing a bomb with FUZE, bomb, M112A1 (tail), the following sequence will be observed:

(1) Unseal the can and remove the fuze from its packings.

(2) Inspect the fuze for serviceability and for presence of primer detonator of desired delay.

(3) Screw fuze into adapter-booster handtight.

(4) Thread a long branch of arming wire through rear suspension lug of bomb, then through eyelets of vane stop.

(5) Remove safety pin.

(6) Thread wire through hole in arming vane and assemble vane assembly to hub. Screw vane nut down handtight. Be sure that slots in vane hub are properly located over studs.

(7) Adjust arming wire to protrude 2 to 3 inches.

(8) Place a safety clip on the wire and slide it up until it just touches the face of the vane.

(9) If the bomb is not used, unfuze reversing the above steps.

f. Accidental arming. When the arming stem has progressed enough so that the two cups forming the vane stop are separated by 0.5 inch or more, the fuze is armed. If this fuze should become armed accidentally it should be destroyed. No attempt should be made to reengage the threads of the arming stem in the plunger because if the threads fail to catch, the plunger will be pushed forward enough to

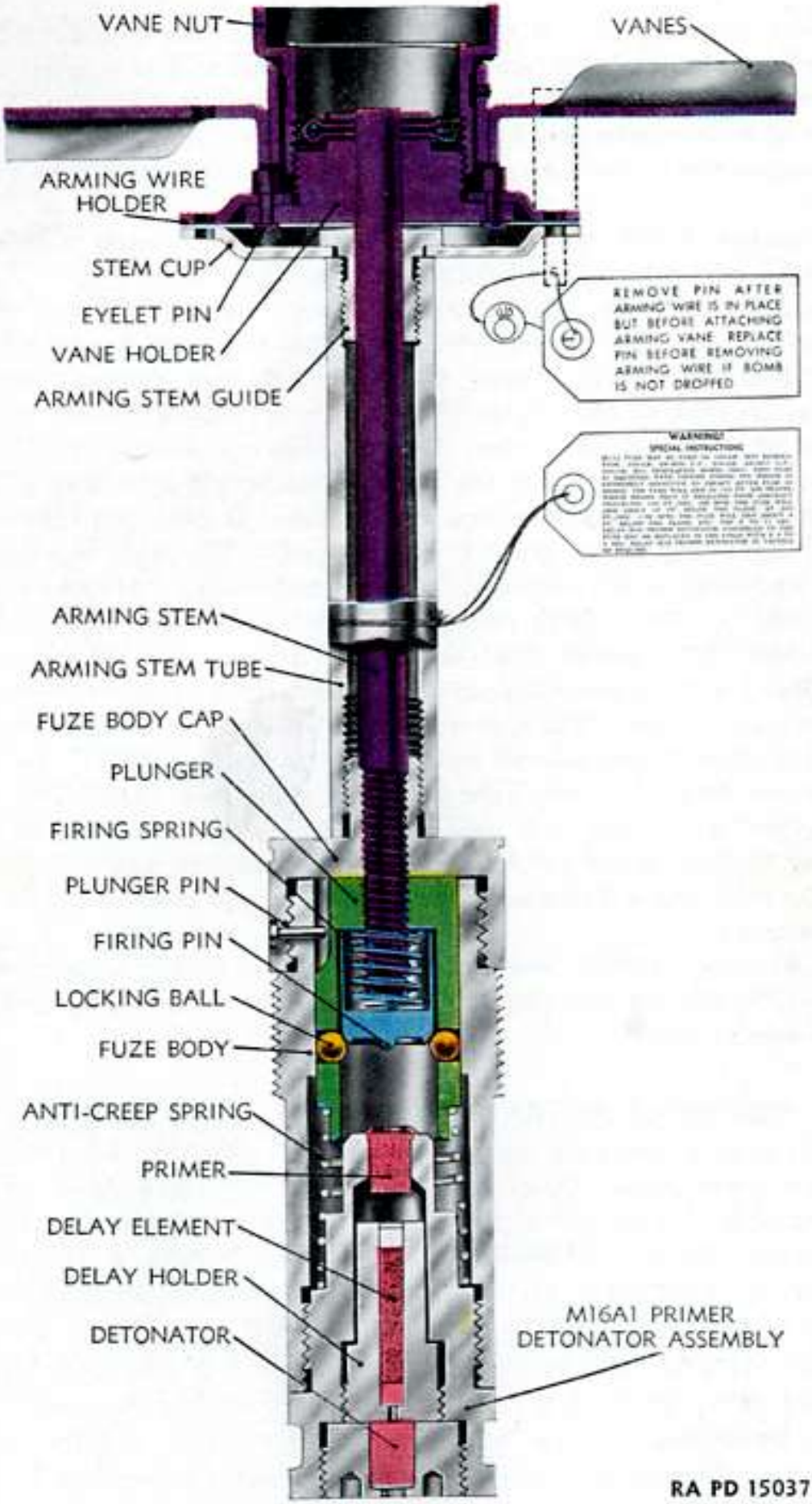


Figure 79. FUZE, bomb, M112A1.

release the firing pin. If the fuze is not fully armed, as indicated by the gap being less than 0.5 inch, it may be restored to original condition as follows: Remove vane assembly and primer detonator. Turn arming stem counterclockwise until the cups meet, then turn clockwise three-quarters to one turn and insert safety pin. Replace primer detonator.

Caution: If this fuze is armed or if there is any reason to believe that it is armed, it must be handled with the utmost care.

g. Partial arming. This fuze arms in approximately 100 feet of air travel, consequently partial arming is neither necessary nor permitted.

h. Marking. FUZE, bomb, M112A1 (tail) has, stamped on the body, the type, model, and lot. The amount of delay is stamped on the head of the primer detonator. The fuze has two tags attached to it. One, attached to the safety pin, reads: "Remove pin after arming wire is in place but before attaching arming vane. Replace pin before removing arming wire if bomb is not dropped." The other tag, tied to the stem tube, reads: "Warning. Special instructions. M112 fuze may be used in 100-lb. M30 demolition, 100-lb. AN–M30 G.P., 250-lb. AN–M57 G.P., 300-lb. M31 demolition bombs only. This fuze is equipped with cocked firing pin which is extremely sensitive to impact after fuze is armed. The fuze will arm in 100 ft. air travel which means that if released from aircraft traveling 100 ft./sec. (68 MPH) the fuze will arm about 16 ft. below the plane. At 200 ft./sec. (136 MPH) the fuze will arm about 4 ft. below the plane, etc. The 8 to 15 sec. delay M16A1 primer detonator assembled to the fuze may be replaced in the field with a 4 to 5 sec. delay M16A1 primer detonator if tactics so required."

i. Packing. FUZE, bomb, M112A1 (tail) is packed without vane assembly, one per container, 25 containers with 25 vanes on spindles in a wooden box.

58. FUZE, BOMB, M113A1 (TAIL). a. Data. FUZE, bomb, M113A1 (tail) is an arming vane type tail fuze which arms after 18 revolutions of the arming vane. Upon impact it acts to detonate the bomb with a delay of 8 to 15 seconds or 4 to 5 seconds, dependent upon the primer detonator used. PRIMER DETONATOR, M16A1, 8–15 second delay, is assembled to the fuze as issued. It may be replaced in the field by PRIMER DETONATOR, M16A1, 4–5 second delay. FUZE, bomb, M113A1 (tail) is authorized for use with G.P. and S.A.P. bombs of 500–600 pounds. It is 12.6 inches long and weighs 2.9 pounds.

b. Description. Except for the length of the stem and the corresponding differences in length, weight, and bombs authorized, FUZE, bomb, M113A1 (tail) is identical with FUZE, bomb, M112A1 (tail) described in paragraph 57. (See fig. 80.) With the exception noted,

all statements concerning the M112A1 apply equally to the M113A1, and all statements concerning the M112 apply equally to the M113.

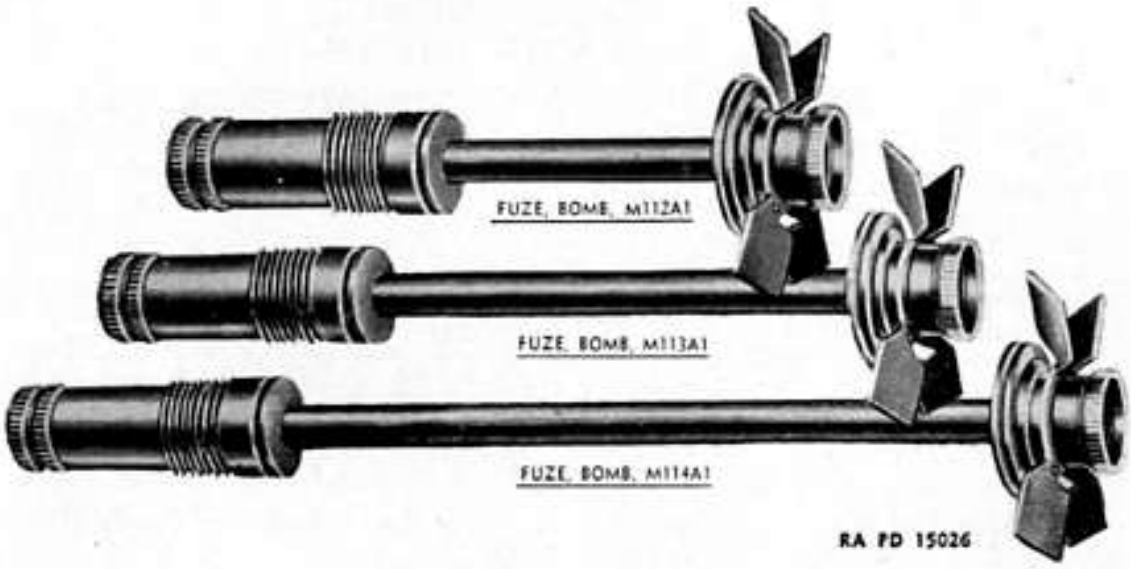


Figure 80. FUZE, bomb, M112A1, M113A1, and M114A1.

59. FUZE, BOMB, M114A1 (TAIL). a. Data. FUZE, bomb, M114A1 (tail) is an arming vane type tail fuze which arms after 18 revolutions of the arming vane. Upon impact it acts to detonate the bomb with a delay of 8 to 15 seconds or 4 to 5 seconds, dependent upon the primer detonator used. PRIMER DETONATOR, M16A1, 8–15 second delay is assembled to the fuze, as issued. It may be replaced in the field by PRIMER DETONATOR, M16A1, 4–5 second delay. FUZE, bomb, M114A1 (tail) is authorized for use with all G.P. and S.A.P. bombs of 1,000 pounds and over, and in all M-series A.P. bombs.

b. Description. Except for the length of the vane stem and the corresponding differences in over-all length, weight, and bombs authorized, this fuze is identical with FUZE, bomb, M112A1 (tail) described in paragraph 57. (See fig. 80.) With the exceptions noted, all statements concerning FUZE, bomb, M112A1 (tail) apply equally to the M114A1, and all statements concerning FUZE, bomb, M112 (tail) apply equally to the M114.

60. FUZE, BOMB, M115 (TAIL). a. Data. FUZE, bomb, M115 (tail) is an arming vane type fuze which arms after 150 revolutions of the arming vane. It has a cocked firing pin which is extremely sensitive when the fuze is armed. It acts to detonate the bomb 8 to 15 seconds or 4 to 5 seconds after impact dependent upon the primer detonator used. PRIMER DETONATOR, M16A1, 4–5 seconds delay,

is assembled to the fuze as issued. It may be replaced in the field by PRIMER DETONATOR, M16A1, 8–15 seconds delay. FUZE, bomb, M115 (tail) is authorized for use with G.P. bombs of 100 to 300 pounds. The fuze is 9.5 inches long and weighs 2.7 pounds.

b. Description. FUZE, bomb, M115 (tail) is similar to the FUZE, bomb, AN–M100A2 (tail) (par. 53) except that the body contains the cocked type firing pin similar to that in the FUZE, bomb, M112A1 (tail) (par. 57).

61. FUZE, BOMB, M116 (TAIL). a. Data. FUZE, bomb, M116 (tail), is an arming vane type tail fuze which arms after 150 revolutions of the arming vane. Upon impact, it acts to detonate the bomb with a delay of 8 to 15 seconds or 4 to 5 seconds, dependent upon the primer detonator used. PRIMER DETONATOR, M16A1, 4–5 second delay, is assembled to the fuze as issued. This may be replaced in the field by PRIMER DETONATOR, M16A1, 8–15 second delay. The fuze has a cocked firing pin which is extremely sensitive when the fuze is armed. FUZE, bomb, M116 (tail) is authorized for use with G.P. and S.A.P. bombs of 500 to 600 pounds. It is 12.5 inches long and weighs 2.9 pounds.

b. Description. Except for the length of the stem and the resultant differences in over-all length, weight, and bombs authorized, this fuze is identical with FUZE, bomb, M115 (tail), described in paragraph 60. With the exceptions noted, all statements concerning FUZE, bomb, M115 (tail) apply equally to FUZE, bomb, M116.

62. FUZE, BOMB, M117 (TAIL). a. Data. FUZE, bomb, M117 (tail) is an arming vane type tail fuze which arms after 150 revolutions of the arming vane. Upon impact it acts to detonate the bomb with a delay of 8 to 15 seconds or 4 to 5 seconds dependent upon the primer detonator used. PRIMER DETONATOR, M16A1, 4–5 second delay is assembled to the fuze as issued. This may be replaced in the field with PRIMER DETONATOR, M16A1, 8–15 second delay. The fuze has a cocked firing pin which is extremely sensitive when the fuze is armed. FUZE, bomb, M117 (tail) is authorized for use with G.P. and S.A.P. bombs of 1,000 pounds and over. It is 16.5 inches long and weights 3.2 pounds.

b. Description. Except for the length of the stem and the resultant differences in over-all length, weight, and bombs authorized, this fuze is identical with FUZE, bomb, M115 (tail) described in paragraph 60. With the exceptions noted, all statements concerning FUZE, bomb, M115 apply equally to FUZE, bomb, M117 (tail).

63. **FUZE, BOMB, M121 (TAIL).** a. **Data.** FUZE, bomb, M121 (tail) is an arming vane type tail fuze which arms after 675 revolutions of the arming vane. It has a cocked firing pin which explodes the non-delay-primer detonator upon impact. FUZE, bomb, M121 (tail) is authorized only for special use. It is approximately 10 inches long and weighs 2.7 pounds.

b. **Description.** This fuze consists of a body similar to that of the M112A1 and an arming head similar to the M100A1. As issued it is packed with the item for which it is authorized.

64. **FUZE, BOMB, M122 (TAIL).** a. **Data.** FUZE, bomb, M122 (tail) is an arming vane type tail fuze which arms after 700 revolutions of the arming vane. It has a cocked firing pin which detonates the bomb 4 to 5 seconds after impact.

b. **Description.** This fuze resembles the M117 except that only the 4–5 second primer detonator is used and the arming head is slow arming similar to the AN–M100A1. FUZE, bomb, M122 (tail) is authorized for special use only.

65. **FUZE, BOMB, M123 (TAIL).** a. **Data.** FUZE, bomb, M123 (tail) is a vane operated tail fuze which must be regarded as armed at all times. It acts to detonate the bomb (1) with a delay ranging from 1 hour to 6 days after release, or (2) immediately, on any attempt to unscrew the fuze or turn the fuze body counterclockwise once it is entered in the adapter. Each individual fuze is designed for a specific delay of 1, 2, 6, 12, 24, 36, 72, or 144 hours. The amount of delay is specified in the nomenclature and is stamped on the body of the fuze. The amount of delay desired is obtained by choosing a fuze of that particular delay. This type fuze is particularly responsive to heat and cold; high temperatures accelerate the action; low temperatures retard it. (See the table in c (3) below.) After withdrawal of the arming wire, air travel of 80 to 100 feet will initiate the delay action, but further air travel of 1,000 feet is necessary to seal the fuze and insure function of long delay fuzes. One-quarter turn in unscrewing the fuze body and fuze body extension, that is, a separation of the parts by 3/64-inch, will operate the antiremoval device and detonate the fuze. FUZE, bomb, M123 (tail) is 9.63 inches in length and weighs 2.9 pounds. It is authorized for use in G.P. and demolition bombs of 100 to 300 pounds.

b. **Description.** FUZE, bomb, M123 (tail) consists of vane and reduction gear assembly, stem, and body assembly. (See fig. 81.)

(1) The vane and reduction gear assembly resembles the arming head of the AN–M100A2 tail fuze except that it acts to screw the

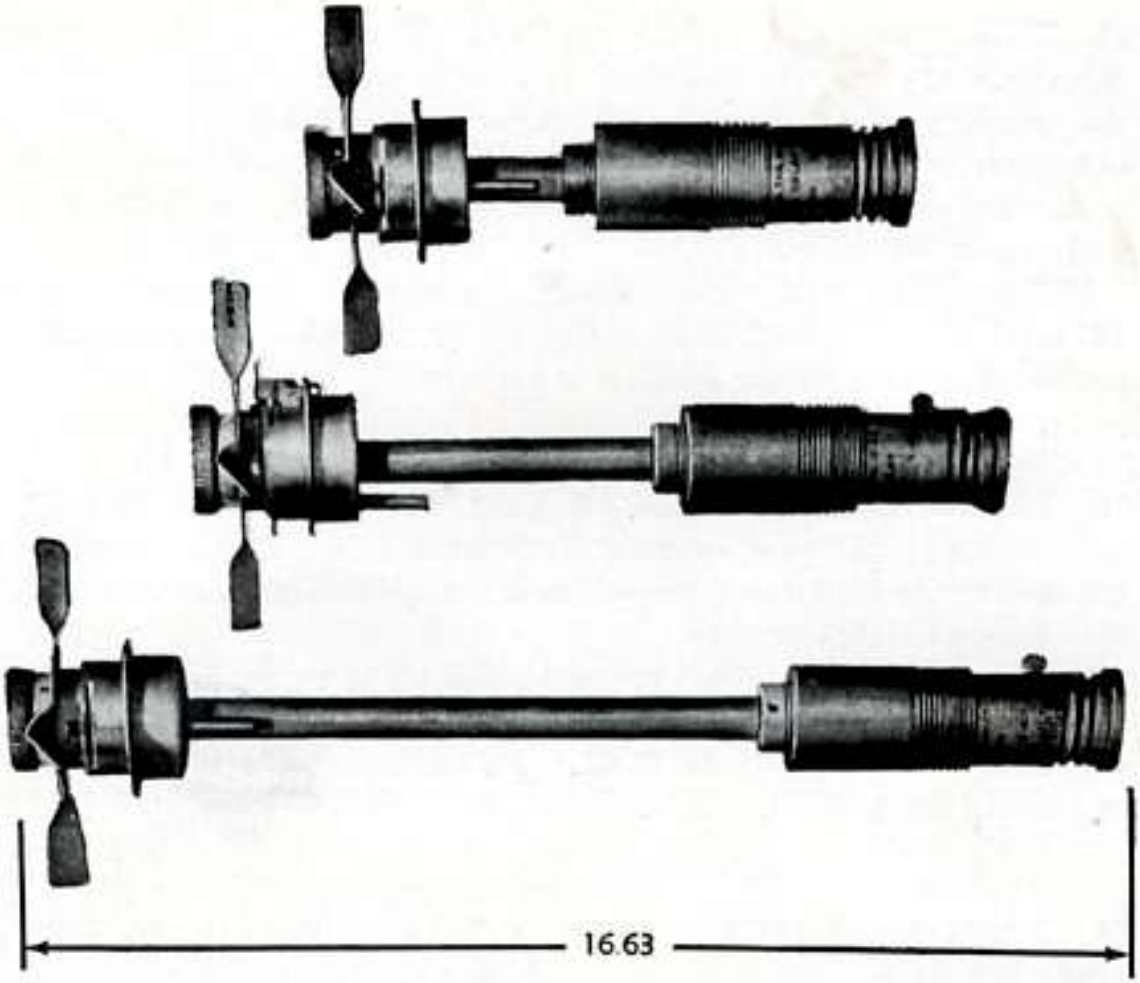


Figure 81. FUZE, bomb, M123, M124, and M125.

stem *into* the fuze and, to allow for this, the assembly extends about ¾-inch further from the stem cup. The space between the cup and the vane stop eyelet is taken up by an arming block which prevents the arming wire from being kinked by the twisting effect of the vane.

(2) The stem connects the head and body parts of the fuze. Its function is to position the vane assembly away from the bomb body so that it will be in the air stream within the bomb fin assembly.

(3) The body assembly consists of two parts, the fuze body and the fuze body extension. The fuze body contains the firing pin and sleeve assembly, a delay wad, and a glass ampoule filled with solvent. The body extension contains the detonator holder assembly screwed into the base and a locking ball and groove in the side. As shipped, the ball is held in place and the body extension is prevented from unscrewing from the body by a clamp and thumbscrew or a safety clip. The detonator holder and fuze vane are shipped unassembled.

(4) The firing pin (fig. 82) is held in place against the action of a compressed firing pin spring by the firing pin balls, which in turn are held in place under the firing pin screw by a celluloid collar. This assembly is mounted in a sleeve. The sleeve is held in place against

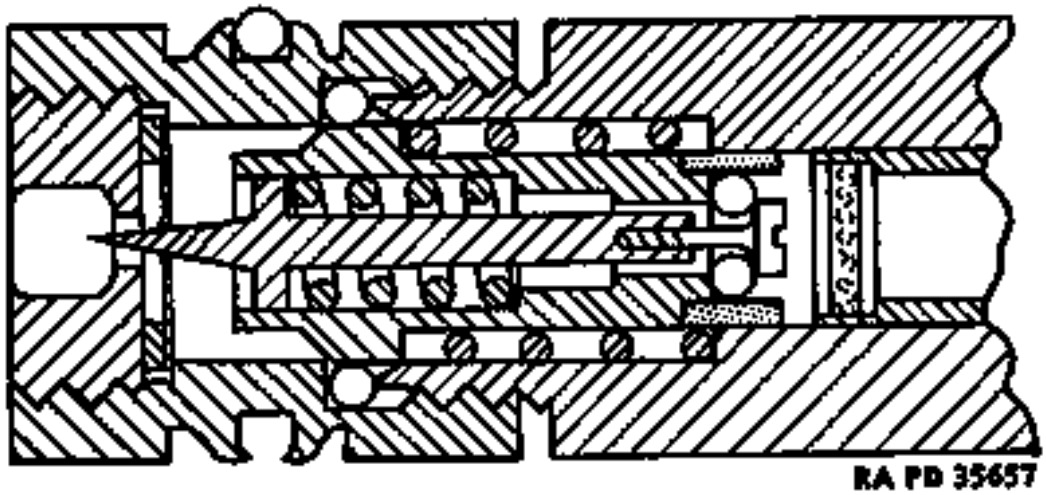


Figure 82 ①. Firing mechanism.

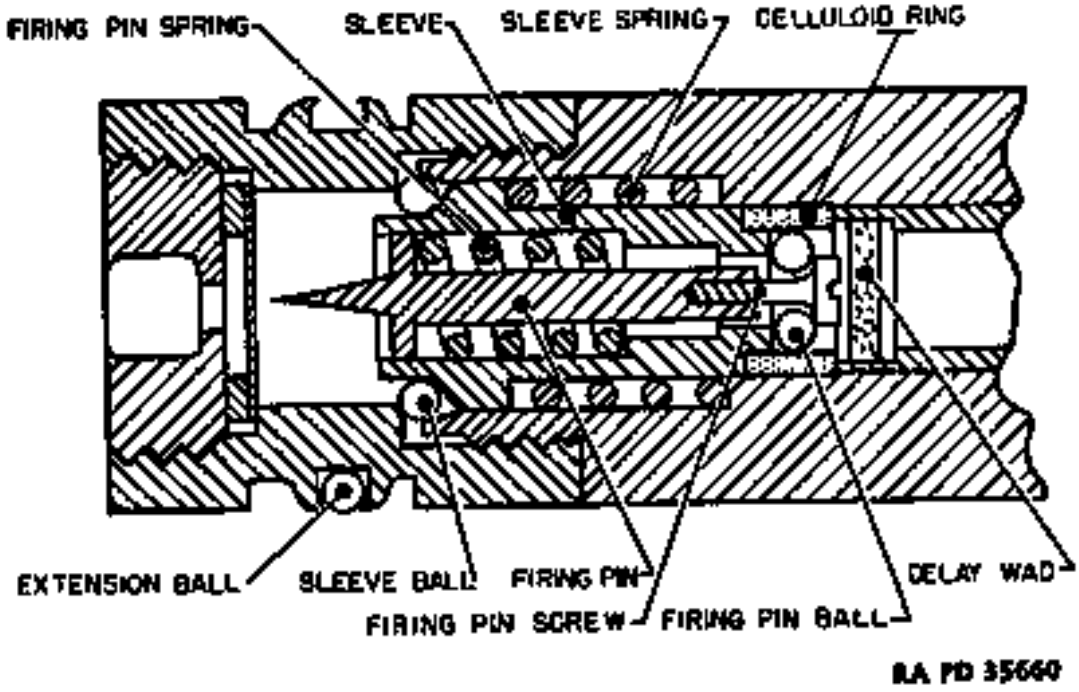


Figure 82 ②. Firing pin released due to dissolving of celluloid collar.

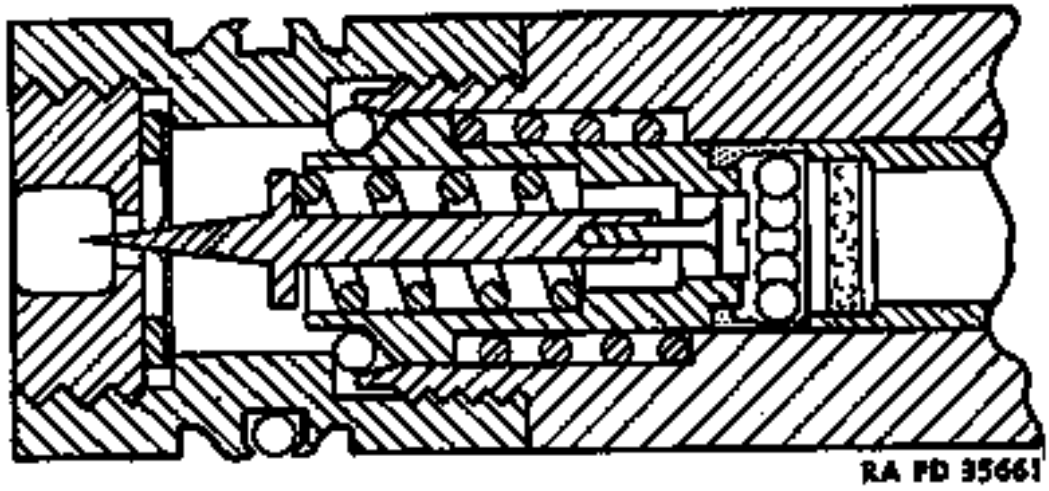


Figure 82 ③. Firing pin released by antiwithdrawal device.

the action of a compressed sleeve spring by a circle of balls bearing on a shoulder on the sleeve and held in position by the lip of the fuze body.

c. Function. (1) *Delay.* When the bomb is released "armed," the arming wire is withdrawn from the fuze, and the vane is rotated by the air stream. The rotation is transmitted through the reduction gearing to the stem, screwing it into the fuze body. After 80 to 100 feet of air travel, the stem has advanced into the body far enough to crush the glass ampoule of solvent. After 900 to 1,400 feet of air travel, the stem has advanced far enough to seat a collar against a rubber washer, thus sealing the outer end of the fuze against escape of the solvent and entrance of moisture. Meanwhile the solvent filters through the delay wad and starts to dissolve the celluloid collar. The collar dissolves sufficiently to release the firing pin balls in approximately the specified time. When released, the balls are forced outward; the firing pin is driven against the detonator by the firing pin spring.

(2) *Antiwithdrawal.* The ball groove on the body extension is deep at one end and shallow at the other so that, when the fuze is turned counterclockwise in the adapter, that is, in the direction of unscrewing, the ball is forced into the shallow end of the groove so that it locks the fuze body extension in place. Any further motion of the fuze in the direction of unscrewing will unscrew the body from the body extension. When the fuze body has unscrewed a quarter turn—that is, when the parts are separated by 3/64 inch—the sleeve balls are released and move outward. The sleeve, carrying the firing pin, is driven forward by its spring causing the firing pin to strike the detonator, exploding the bomb. Adapter boosters of current design are drilled for insertion of a metal pin supplied with the fuze. When this pin is in place, the adapter booster is locked to the base plug.

(3) *Effect of heat on delay action.* This fuze is responsive to changes in temperature. Temperatures above 50° F cause the fuze to function with a shorter delay; temperatures below 50° F. cause it to function with a longer delay than the nominal delay stamped on it.

Average actual delay, in hours and minutes, of M123 fuzes at various temperatures

Temperature	Fuze with nominal delay of —							
	1 hr.	2 hr.	6 hr.	12 hr.	24 hr.	36 hr.	72 hr.	144 hr.
115°	0:15	0:20	1:00	1:15	------	------	------	------
90°	0:20	0:50	1:30	2:30	------	------	------	------
80°	------	------	------	------	8:00	15:00	38:00	70:00
75°	0:30	1:00	2:00	3:50	------	------	------	------
55°	0:45	1:30	3:00	10:00	24:00	37:30	70:00	135:00
25°	2:10	3:15	11:00	30:00	------	------	------	------

d. **Inspection prior to use.** There are two indicator vials packed in each box of fuzes. Each of these vials contain a powder which melts at a critical temperature. When a box of fuzes is opened the vials will be inspected and action taken as follows:

(1) If the powder in the green-stoppered vial has melted, the fuzes have been exposed to temperatures higher than 150° F. None of the fuzes in the box will be used for low altitude bombing.

(2) If the powder in the red stoppered vial has melted, the fuzes have been exposed to temperatures over 170° F. No attempt will be made to assemble the detonators to the fuzes in the box. The fuzes will be destroyed.

e. **Preparation for use.** The detonator holder with disk and washer (fig. 83) must be assembled to the fuze, and the thumbscrew or safety clip must be removed before assembling the fuze to the bomb. The procedure is as follows:

Note. Hold the fuze by the body extension rather than by the body for this procedure so that the extension will not be unscrewed from the body.

(1) Remove the tape and shipping plug from the inner end of the fuze.

(2) Insert the closing disk (aluminum or copper) into the end of the fuze making certain that the disk seats on the shoulder in the body extension. If the firing pin interferes with the seating of the disk, reject the fuze.

(3) Insert the lead washer over the disk.

(4) Screw the detonator holder assembly into the body extension and tighten with the wrench supplied in the box of fuzes. Since the object of the disk and washer is to seal the fuze against escape of the solvent and entrance of moisture, care will be exercised to seat the detonator holder family.

(5) Remove the thumbscrew from the body extension and the clip from the ball. If a safety clip is used instead of thumbscrew, pull up on the handle.

Caution: After the thumbscrew or safety clip is removed, particular care should be exercised to keep the body extension from unscrewing from the fuze body. The fuze will detonate if the extension is unscrewed more than a quarter turn.

f. **Fuzing.** In fuzing bombs with FUZE, bomb, M123 (tail), the following sequence will be observed:

(1) If adapter booster M102A1 or M115A1 is not available, the adapter booster should be staked to the base plug and the base plug staked to the bomb body.

(2) Remove fuze and components from packings and inspect. Back off and replace lock nut to insure fuze threads are clear. Gauge adapter threads with a gauge supplied, an inert fuze, or any standard tail fuze with its primer detonator removed.

(3) Insert the lock pin supplied with the fuze into the hole in the adapter booster.

(4) Be sure lock nut is screwed all the way on. Then screw fuze into adapter as far as possible. Tighten lock nut with the wrench supplied in box of fuzes.

Caution: Once the fuze is inserted in the adapter, it must not be turned backwards by any amount however slight. Engage the threads by a "screwing-in" motion only. Do not attempt to unscrew the fuze, since a "screwing-in" motion will cause the ball to seize in the adapter and a quarter turn will detonate the fuze.

(5) Thread the arming wire through the rear suspension lug of the bomb. Straighten the safety cotter pin in the fuze and withdraw it, inserting the arming wire in its place through the stem cup eyelet, the arming block, the vane stop eyelet, and the eyelet in the vane. Assemble the vane, screwing the vane nut down tight. Be sure the slots in the vane hub are properly located over the heads of the eyelet pins.

(6) Adjust the arming wire to protrude 2 to 3 inches. Place a safety clip over the wire and push it up till it just touches the face of the vane. Be sure the arming wire is free of kinks and burs.

(7) Bombs fuzed with FUZE, bomb, M123 (tail) will be used on the mission for which they are fuzed. In the event of incomplete mission, such unused bombs will be dumped over enemy territory or deep water. *They will not be returned to the airfield.*

Caution: If anything interferes with the completion of the fuzing operation, no attempt will be made to unfuze the bomb. The bomb with fuze will be destroyed by bomb disposal personnel.

g. Precautions. In addition to the general precautions prescribed, the following will be observed in the care and handling of this fuze.

(1) Detonator holders will not be assembled to fuzes nor fuzes assembled to bombs in advance or in anticipation of future needs.

(2) Particular care must be exercised to protect this type of fuze from heat and shock.

(3) The indicator vials will be examined when the fuze packing box is opened. If not all of the fuzes in the box are used, the vials will be left in the box with the remaining fuzes and inspected again when the box is reopened.

(4) The natural tendency in engaging threads of mating parts is to turn one part back and forth until the threads engage. Do not do this. Extreme caution must be exercised to assemble the fuze to the bomb with a screwing-in motion only. The antiwithdrawal device will detonate the fuze if it is rotated backwards in the adapter *even before the threads are engaged.*

(5) The warning tag attached to the arming block should not be removed when the fuze is assembled to the bomb.

h. Marking. FUZE, bomb, M123 (tail) is marked on the body

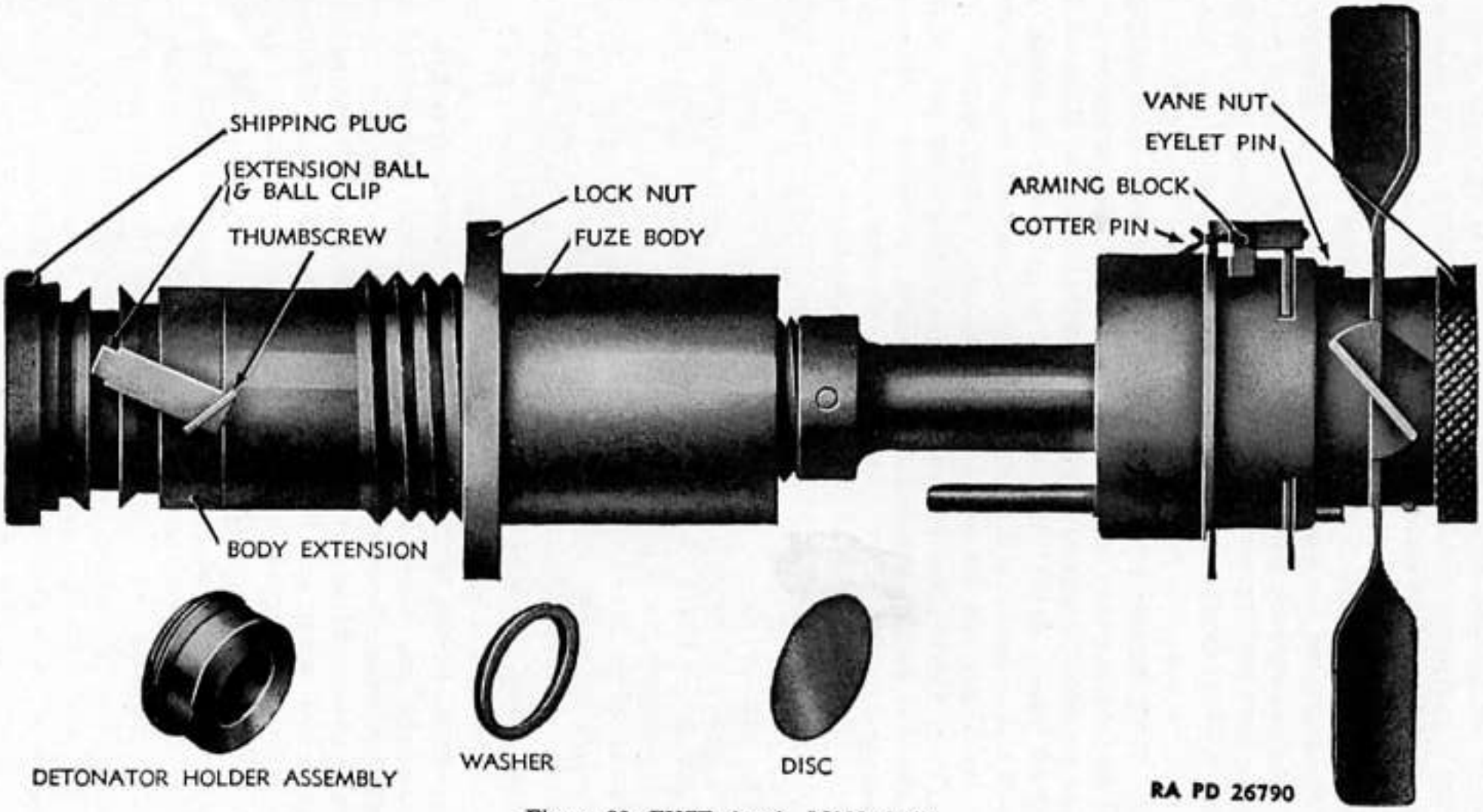


Figure 83. FUZE, bomb, M123 (tail).

below the threads, so that the marking will not be visible when the fuze is in place in the bomb. The marking includes type and model, nominal delay, lot number, and date loaded.

i. Packing. FUZE, bomb, M123 (tail) is packed without vane assembly, one per metal container. The detonator holder, washer, and disk are packed in a wooden block in the same container. Twenty-five such containers are packed, with 25 vanes on a spindle in a wooden box. Each packing box also contains two indicator vials, two wrenches, and a thread gauge.

66. FUZE, BOMB, M124 (TAIL). Except for difference in the length of the stem and the corresponding differences in over-all length, weight, and bombs authorized, FUZE, bomb, M124 (tail) is identical with FUZE, bomb, M123 (tail) described in paragraph 65 above, and, with the exceptions noted, all statements made concerning the M123 apply equally to the M124. (See fig. 81.) FUZE, bomb, M124 (tail) is 12.63 inches in over-all length; it weighs 3.1 pounds; it is authorized for use in demolition, G.P. and S.A.P. bombs of 500 to 600 pounds.

67. FUZE, BOMB, M125 (TAIL). Except for difference in the length of the stem and the corresponding differences in over-all length, weight, and bombs authorized, FUZE, bomb, M125 (tail) is identical with FUZE, bomb, M123 (tail), described in paragraph 65 above and, with the exceptions noted, all statements made concerning the M123 apply equally to the M125. (See fig. 81.) FUZE, bomb, M125 (tail) is 16.63 inches in over-all length; it weighs 3.4 pounds; it is authorized for use in all demolition, G.P. and S.A.P. bombs of 1,000 pounds and over. (Note that light case bombs are not included.)

68. FUZE, BOMB, M132 (TAIL). a. Data. FUZE, bomb, M132 is a vane type, long delay tail fuze which acts to detonate the bomb with delay dependent upon the temperature (table below) or upon an attempt to remove the fuze from the bomb. The fuze, 9.57 inches long, is authorized for use with 100- to 300-pound demolition and G.P. bombs,

Fuze temperature degrees F.	Average delay minutes
120	6
100	10
80	16
60	26
40	40
20	59
10	80

b. Description. (1) The vane reduction gears and arming vane of this fuze is the same as Tail Bomb Fuzes M123, M124, and M125, and the general over-all appearance is somewhat similar to these fuzes. (See fig. 84.) However the M132-series fuzes can be readily differentiated from the M123-series fuzes by the reduction of the diameter of the head beyond the lock nut in the M132-series.

(2) The time delay mechanism of these fuzes is somewhat different from that used in Fuzes M123, M124, and M125. This mechanism has a metal bellows containing a red-colored solvent which is released at the time of arming the fuze. The solvent acts upon a celluloid cylinder to produce the delay action.

(3) An antiwithdrawal device, which is the same as used in Tail Bomb Fuzes M123, M124, and M125, is contained in these fuzes.

Caution: Any attempt to unscrew fuze from the bomb will result in detonation of the bomb.

(4) When issued, the fuze contains a safety clip containing two studs. One stud engages a hole in the fuze body and the other engages a hole in the fuze head. This clip prevents rotation between the fuze head and the fuze body. A safety screw is also located in the fuze body. This screw must be removed and replaced by the closing screw and closing screw washer prior to fuzing the bomb.

(5) The detonator holder assembly and holder sealing washer are not assembled to the fuze when issued, but are packed in the fuze container. The detonator holder cavity of the fuze is plugged with absorbent cotton. This cotton will indicate leakage of the solvent prior to fuzing by being stained red. If the cotton indicates solvent leakage, the fuze should be destroyed.

(6) A lock nut which is located on the bomb mating threads is used to secure the fuze to the bomb firmly.

(7) An adapter booster lock pin is assembled to one of the wires holding a card to the fuze. This pin should be inserted in the hole in the adapter booster of the bombs listed below prior to assembly of the fuze to the bomb. The adapter booster is the threaded part in the tail of the bomb into which the fuze is screwed. The adapter booster lock pin prevents removal of the adapter booster after the fuze is inserted in the bomb.

(8) Long or short fuze adapters may be found in Bombs AN–M64, AN–M65, and AN–M66. The fuze adapters are bushings which screw into the adapter booster of these bombs so as to enable assembly of the fuzes to the bombs. The antiwithdrawal device of Fuzes M132, M133, and M134 will detonate these bombs when assembled into a bomb containing a long fuze adapter if an attempt is made to withdraw the fuze. However, if the fuze is assembled to a bomb containing a short fuze adapter, withdrawal of the fuze may detonate the fuze and the bomb may or may not detonate. Long fuze adapters have

been issued separately for the above bombs which now contain short fuze adapters. It is advisable to replace the short fuze adapters in the bombs listed above with long adapters prior to assembling these fuzes to the bombs.

c. Functioning. (1) When released armed, the arming wire is withdrawn and the vane is free to rotate. At approximately 100 feet of air travel, the metal bellows is punctured and the solvent forced onto the celluloid cylinder. This initiates a softening action of the celluloid and sometime later (par. 1), the softened celluloid allows the spring-loaded firing pin to move forward and detonate the bomb.

(2) When released safe, the arming wire does not allow the arming vane to rotate and the bellows is not punctured. There is no leakage of the solvent onto the celluloid cylinder and no resultant detonation of the bomb. *However, the antiwithdrawal device will detonate the bomb if an attempt is made to remove a fuze even though the bomb is dropped safe.*

d. Inspection before fuzing bombs. (1) Before assembling fuze, inspect the glass vials in the shipping box to determine whether the fuzes have been subjected to a temperature which might have damaged the fuze.

(2) If the powder in the green-stoppered vial has melted and solidified, the fuze must not be used for low-altitude bombing (temperature has exceeded 150° F).

(3) If the powder in the red-stoppered vial has melted and solidified, the fuze must be destroyed (temperature has exceeded 170° F).

e. Assembly of fuze to bomb. (1) *Preliminary operations* (½ hour prior to fuzing).

Caution: Remove the absorbent cotton from detonator holder cavity and be sure that no solvent has leaked onto the cotton. If the cotton indicates leakage by being stained red, destroy the fuze.

(*a*) Replace the cotton in the detonator holder cavity.

(*b*) Remove the safety screw. Shake the fuze several times, but do not strike it.

(*c*) Stand the fuze on the detonator holder end and let it remain in this position for ½ hour.

(*d*) After ½ hour, remove the cotton and inspect it for evidence of leakage. If the cotton has been stained red, destroy the fuze.

(*e*) Replace the safety screw in its opening in the fuze body. If the screw cannot be replaced, destroy the fuze.

(2) *Preparation of bomb.* (*a*) If the bomb to be fuzed is one of those listed in paragraph 3*h*, remove the adapter booster lock pin from the fuze and insert the pin into the hole provided inside the wall of fuze cavity of adapter booster. End of pin must be flush or below flush with inside surface of adapter booster before the fuze can be assembled to bomb.

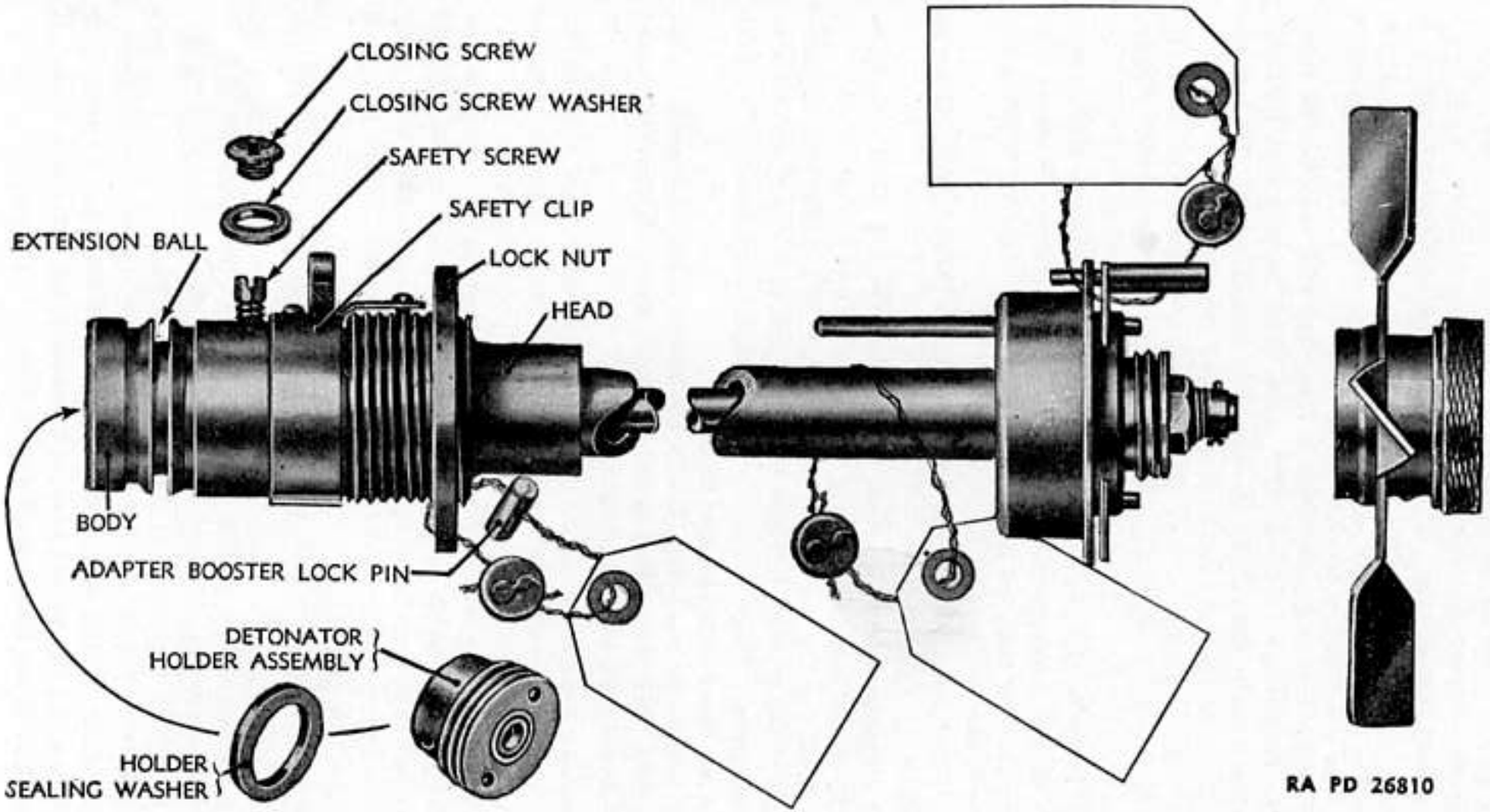


Figure 84. FUZE, bomb, M132, M133, and M134.

(*b*) If the bomb to be fuzed is an AN–M64, AN–M65, or AN–M66 Bomb, inspect the fuze cavity to check whether the bomb has a long or short fuze adapter. If a short fuze adapter is present, remove it and insert a long fuze adapter. Stake the long fuze adapter into place.

Note. The short fuze adapter can be used but may prevent detonation of the bomb if the antiwithdrawal device should be functioned.

(*c*) Screw thread gauge, which is furnished with each box of fuzes, into the bomb fuze cavity until it seats. This assures that fuze will assemble without difficulty. Remove the thread gauge. Do not use bomb if the bomb fuze cavity contains poor threads.

(3) *Fuzing operation.* (*a*) Remove safety screw from fuze body; insert in its place closing screw washer and closing screw. Tighten screw.

(*b*) Insert holder sealing washer (lead) into detonator end of fuze.

(*c*) Screw detonator holder assembly over washer. In doing this, support fuze by body so as to prevent rotation of parts. Tighten detonator holder securely with pin wrench.

(*d*) The extension ball should move freely through a small arc in its groove.

(*e*) Remove safety clip from fuze body. Do not allow fuze body to rotate about fuze head at any time after removal of safety clip.

(*f*) Hold fuze by the central tube and turn lock nut so that it passes over all of the threads in order to make sure that the threads are in good condition. Place nut as far as possible toward vane end of fuze. Do not use fuzes with damaged threads.

(*g*) Screw the fuze into bomb by hand as far as possible, then tighten the lock nut with L-wrench. Tap wrench lightly with small hammer to insure the nut is tight.

Caution: Fuze must not be unscrewed during, or after assembly to bomb, since unscrewing will cause extension ball to seize and fire the bomb.

(*h*) Thread longer end of arming wire assembly through rear suspension of lug of bomb and nearer pair of eyelets on the fuze. Should nearer pair of eyelets be occupied by safety pin and sealing wire, place a second pin through eyelets diametrically opposite, before removing original safety pin.

(*i*) Cut sealing wire and remove safety pin, complying with instructions on tag.

(*j*) Thread end of arming wire through appropriate eyelet in arming vane assembly. At same time, slip vane over end of fuze so that slots in hub fit over heads of the two eyelet pins.

(*k*) Screw vane nut on threaded end of bearing cup, handtight.

(*l*) Adjust arming wire to protrude beyond arming vane from 2 to 3 inches when the swivel loop is in position for the bomb rack. If arming wire is too long, cut off excess wire.

(*m*) Slip safety clip over end of arming wire until it just touches face of vane. The fuze is now completely assembled to the bomb.

f. Storage of fuzed bombs. Bombs which have been fuzed with Fuzes M132, M133, and M134 and which have not been dropped must be stored in a shaded area under special guard whose duty it is to prevent any attempt at removal of fuzes from bombs. If storage temperatures approach 140° F, bombs should be cooled by pouring water over roof of storage house or over bombs.

g. Packing. (1) Fuzes are packed 25 to a wooden packing box. Each fuze, less arming vane, is packed in a metal container. The holder sealing washer, detonator holder assembly, closing screw, and closing screw washer are secured in a wooden block by sealing tape. This block is packed in the fuze container. Twenty-five arming vanes are assembled in a rack which fits in one end of the packing box. Each packing box also contains—

(*a*) Pin wrench for tightening the detonator holder assembly.

(*b*) L-wrench for tightening the lock nut.

(*c*) The glass vials which indicate whether fuzes have been exposed to dangerous storage temperatures.

(*d*) Thread gauge for gauging and clearing the threads in the bomb fuze cavity prior to fuzing.

(2) Fuzes may also be packed 12 to a wooden packing box in the same manner as above and with the same equipment.

69. **FUZE, BOMB, M133 (TAIL).** FUZE, bomb, M133, is the same as the M132 described in paragraph 68, except that a larger stem makes the over-all length of the fuze 12.57 inches. It is authorized for use in 500- to 600-pound bombs.

70. **FUZE, BOMB, M134 (TAIL).** FUZE, bomb, M134 is the same as the M132 described in paragraph 68, except that a larger stem makes the over-all length of the fuze 16.57 inches. It is authorized for use in bombs of 1,000 pounds and over.

71. **FUZE, BOMB, AN–MK. 228 (TAIL).** **a. Data.** FUZE, bomb, AN–Mk. 228 (tail), formerly designated Mk. 28 or Mk. XXVIII, is a detonator-safe, vane-type tail fuze which arms after 150 revolutions of the arming vane. Upon impact, it acts through two independent firing trains, to detonate the bomb with 0.08 second delay. The fuze is 16.36 inches long and weighs 10.5 pounds. It is authorized for use in 1,000- and 1,600-pound A.P. bombs of the AN-Mark series.

b. Description. FUZE, bomb, AN–Mk. 228 (tail) is in the shape of a bottle with a 16-blade arming vane attached to the outer end and a cylindrical extension containing the booster projecting from the base.

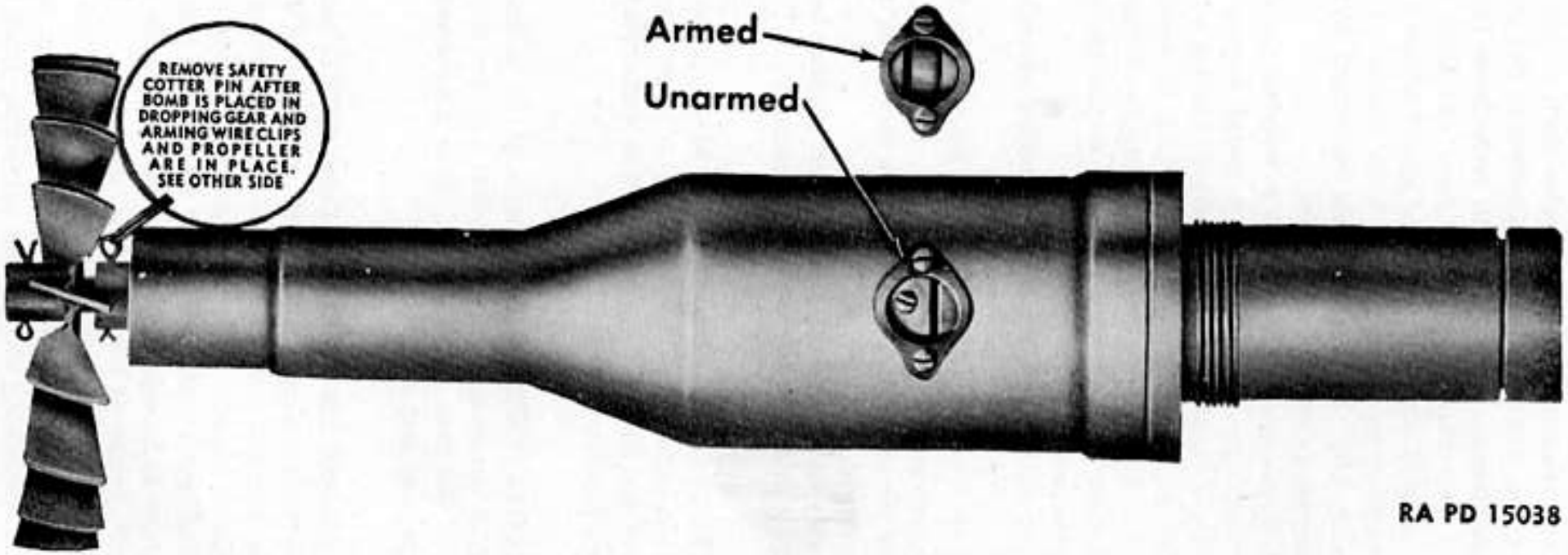


Figure 85. FUZE, bomb, AN–Mk. 228.

(See fig. 85.) The vane assembly is fastened in place on the shaft by a cotter pin. A second cotter pin, to which an instruction tag is attached, passes through the bushing and shaft and prevents rotation of the vane during storage and handling. There is a small round window in the side of the fuze to permit observation of the condition—armed or unarmed—of the fuze mechanism.

c. Function. When the bomb is released "armed," the air stream rotates the arming vane. (See fig. 86.) This rotation is transmitted through a reduction gear train to a central shaft which moves the

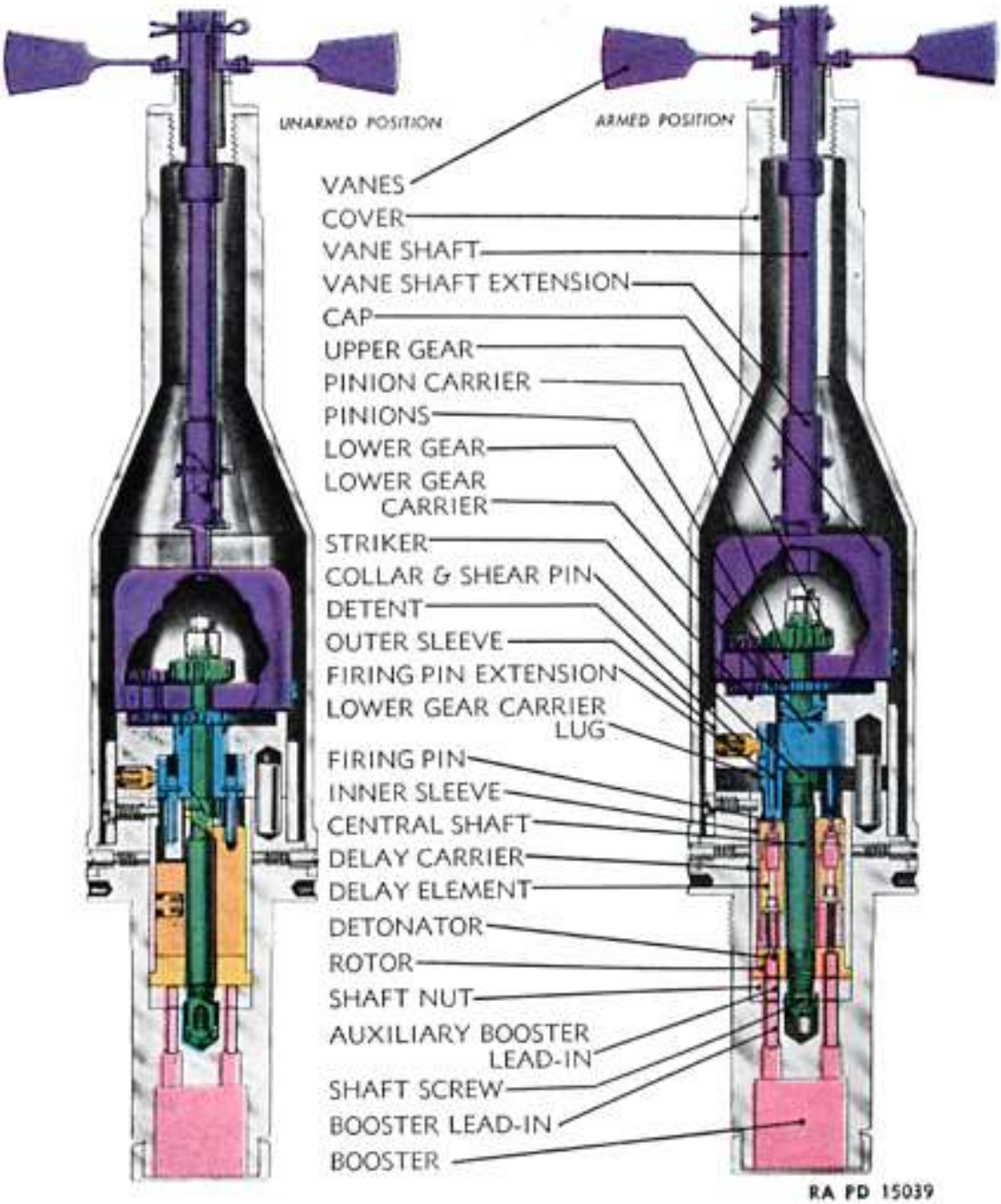


Figure 86. FUZE, bomb, AN-Mk. 228—sectioned.

striker into functioning position. When the striker has moved out (toward the vane) 0.34 inch the shaft locks and the striker takes up the rotation and lines up firing pins, delay elements, detonators, and booster leads. When the firing elements are in line they lock in the armed position and ordinarily the vane will stop. However, if the vane is forced to rotate in either direction, pins in the reduction gear assembly will shear and the vane will rotate without effect on the armed fuze mechanism. Upon impact inertia causes the striker to shear a pin in the shaft and move forward driving the firing pins into their respective primers.

d. Preparation for use. If there is no arming wire bracket on the fin assembly, it is necessary to attach an arming bracket to the neck of the fuze as follows:

(1) Remove the cotter pin holding the vane to the shaft and remove vane assembly. Do not remove safety cotter pin.

(2) Attach arming bracket loosely to fuze.

(3) Replace vane assembly and cotter pin. Spread ends of cotter pin 180°.

e. Fuzing. The following steps will be followed in assembling this fuze to the bomb:

(1) Unseal the container and remove fuze from packings. Inspect for bent vanes, damaged threads, or corrosion. Use only serviceable fuzes.

(2) Attach arming bracket if necessary.

(3) Screw fuze into bomb, handtight. If necessary, a small spanner wrench may be used.

(4) Place the arming bracket so that it will be in a vertical position when the bomb is placed in the rack and so that it will not interfere with the rotation of the vanes. Tighten in place.

(5) Remove the safety cotter pin and turn the vane in each direction to insure free rotation. Do not turn the vane more than one rotation in either direction.

(6) Thread the arming wire through the rear suspension lug of the bomb and then through the arming bracket. Be sure that the arming wire tube covers the arming wire where it passes between the vanes. Adjust the wire to protrude about 6 inches, place 2 safety clips on the wire and push them up to the bracket.

(7) If the bomb is not dropped, return to storage, reversing the steps listed above.

f. Accidental arming. If this fuze should become armed accidentally, it will be indicated by the position of the striker within the outer sleeve, as observed through the window in the side of the fuze. The outer sleeve occupies the lower half of the window. In the completely unarmed fuze, the top of the striker is about flush with the top of the outer sleeve. If the top of the striker has progressed not more

than 3/16 inch above the outer sleeve, the fuze is only partially armed and may be returned to the unarmed condition by turning the vane counterclockwise (looking at the vane end of the fuze) until it begins to bind and then turning clockwise 3 to 4 turns and locking with the safety cotter pin. If the top of the striker has progressed more than 3/16 inch from the top of the outer sleeve, the fuze will be regarded as armed and will be handled with the utmost caution not to jar the fuze until it can be disarmed, by personnel familiar with the construction of the fuze, in accordance with Navy Bureau of Ordnance Pamphlet No. 988.

g. Marking. The base of the fuze is stamped with the type and model, lot number, manufacturer's and inspector's initials, and date loaded. The arming vane assembly is painted red to distinguish it from vanes for other fuzes which have a different pitch. The safety cotter pin carries a tag which reads: "Remove safety cotter pin after bomb is placed in dropping gear and arming wire clips and propeller are in place."

h. Packing. FUZE, bomb, AN–Mk. 228 (tail) is packed one in a sealed metal container. Four such containers are packed in a metal crate.

SECTION VIII. GENERAL PURPOSE, LIGHT CASE, AND DEMOLITION BOMBS

72. GENERAL. The characteristics of all models of each type of bomb are similar, and the sequence of operations in assembling the complete round is the same. The opening paragraph of each section describes the common characteristics of each type and specifies the sequence of operations in assembling the complete round in order to avoid repetition. Tables of data concerning arming wire assemblies, fuze characteristics, bomb characteristics, dimensions, and typical targets and storage and shipping data will be found in the tables in section XX.

73. DESCRIPTION AND ASSEMBLY. a. Description. General-purpose (G.P.), light case (L.C.) and demolition (demo.) bombs comprise the so-called cylindrical bombs. The body of the bomb is cylindrical, tapering in an ogive to the nose and in a straight cone to the base. (See fig. 87.) A fuze seat liner is assembled in the nose. The base is closed with a large disk-shaped base plug which has a threaded extension for attaching the fin assembly. The center of the plug is closed with the adapter booster for the tail fuze. Single and double suspension lugs are welded to the side of the case. The single lug is

located in the plane of the center of gravity of the bomb. Double suspension lugs are located diametrically opposite the single lug and are on a line parallel to the axis of the bomb. They are 14 inches apart on bombs weighing 1,000 pounds and less; they are 30 inches apart on bombs weighing 2,000 pounds and more.

b. Assembly. The complete round may be assembled in the following steps:

(1) Inspect components as specified in paragraph 25.

(2) Remove shipping bands from bomb and remove fin assembly from fin crate. Remove the required number of fuzes and arming wires from packing boxes. Load them on the bomb service truck and trailer.

(3) Proceed to the assembly point.

(4) At the assembly point, cut shipping wire and remove fin lock nut and protector. Remove the protector from the lock nut.

(5) Place fin assembly over tail of bomb with one fin in line with suspension lugs. If bombs are intended for external racks, the fin is turned 45° from alignment with lugs. Replace fin lock nut and tighten with wrench or by hand.

(6) Remove nose and tail plugs and inspect the fuze seats.

(7) Deliver bomb to plane and install in accordance with instructions pertinent to the type of rack.

(8) Install fuzes and arming wire when bomb is securely locked in the rack. If space in the bomb bay does not permit fuzing, fuzes should be assembled to the bomb at the assembly point.

(9) Remove such safety cotter pins from fuzes as have not yet been removed.

(10) If bomb is not dropped it will be unfuzed and returned to storage by reversing the steps listed above.

c. Function. Light case bombs are fuzed with instantaneous fuzes for surface blast effect. General-purpose bombs may be fuzed with instantaneous fuzes for blast effect, with short delay (.1 second and less) for mining or penetration effect, with fuze delay of 4, 11, or 45 seconds for low-altitude bombing, or with fuzes of 1 hour to 6 days delay.

d. Limitations. Light case bombs cannot be used for penetration. The case will fail on any ordinary impact. Delay-fuzed general-purpose bombs, released from high altitudes will fail on impact with armor plate or heavy reinforced concrete, but these are proper targets if the fuzing is for instantaneous action or if the bomb is released from medium or low altitudes.

74. BOMB, G.P., 100-LB., AN–M30. a. Data. BOMB, G.P., 100-lb., AN–M30 (fig. 88) is a cylindrical bomb which is 38.46 inches long and weighs 108 pounds, as released. The body is 30 inches in length

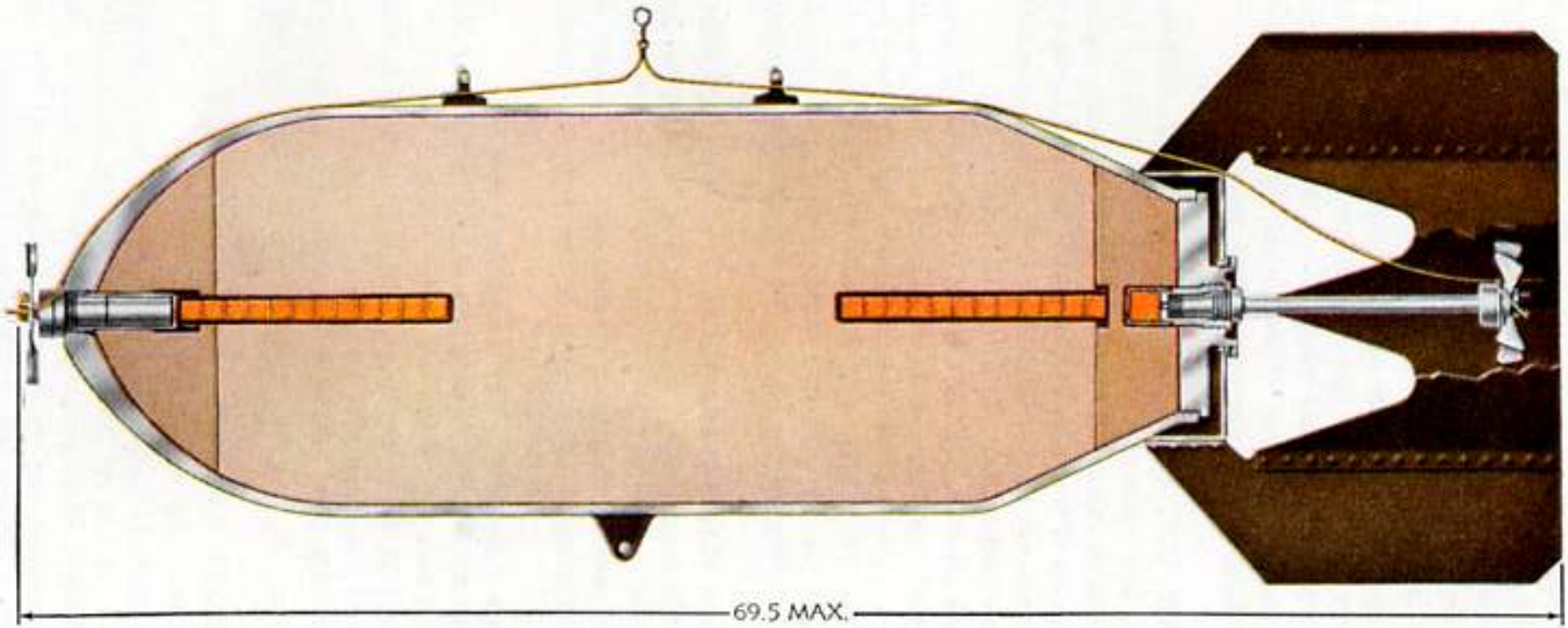


Figure 87. G.P. bomb—sectioned.

and 8.18 inches in diameter. It weighs 101 pounds, of which 54.2 pounds, 51 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. BOMB, G.P., 100-lb., AN–M30A1 differs in that the tail adapter booster M102A1 is used to provide for locking it into the base plug, and the base plug is equipped with studs extending into the charge, to prevent removal of the plug. BOMB, demolition, 100-lb., M30, is an earlier model of this bomb which does not have a lug for single suspension. When single lug suspension is required for dive bombing, BAND, suspension, M1, may be used.

75. BOMB, G.P., 250-LB., AN–M57. a. Data. BOMB, G.P., 250-lb., AN–M57 is a cylindrical bomb which is 47.8 inches long and weighs 252 pounds, as released. (See fig. 89.) The bomb body is 36.9 inches in length and 10.9 inches in diameter. It weighs 240 pounds of which 122.5, 49 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. BOMB, G.P., 250-lb., AN–M57A1, differs in that the adapter booster and base plug are locked in place. BOMB, demolition, 300-lb., M31, is an earlier model corresponding to this bomb. The M31, although nominally a 300-pound bomb, actually weighs 261 pounds and is 3 inches longer than the AN–M57. The M31 also differs by not having the lug for single suspension.

76. BOMB, G.P., 500-LB., AN–M64. a. Data. BOMB, G.P., 500-lb., AN–M64 is a cylindrical bomb which is 59.16 inches long and weighs 512 pounds, as released. (See fig. 90.) The bomb body is 47.1 inches in length and 14.18 inches in diameter. It weighs 492 pounds of which 262 pounds, 51 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. Other models of this size and type bomb, and the details in which they differ are listed below.

(1) BOMB, G.P., 500-lb., AN–M64A1, differs in that the adapter booster and base plug may be locked in place.

(2) BOMB, G.P., 500-lb., M64, differs in not having the single suspension lug. It may be used whenever single lug suspension is not required.

(3) BOMB, G.P., 500-lb., AN–M43, differs in not being adapted for the hydrostatic tail fuze.

(4) BOMB, G.P., 500-lb., M43, differs in not having the single suspension lug and in not being adapted for the hydrostatic tail fuze.

(5) BOMB, demolition, 500-lb., M43, differs in not having the single suspension lug, in not being adapted for the hydrostatic tail fuze, and in having a base cap instead of a base plug.

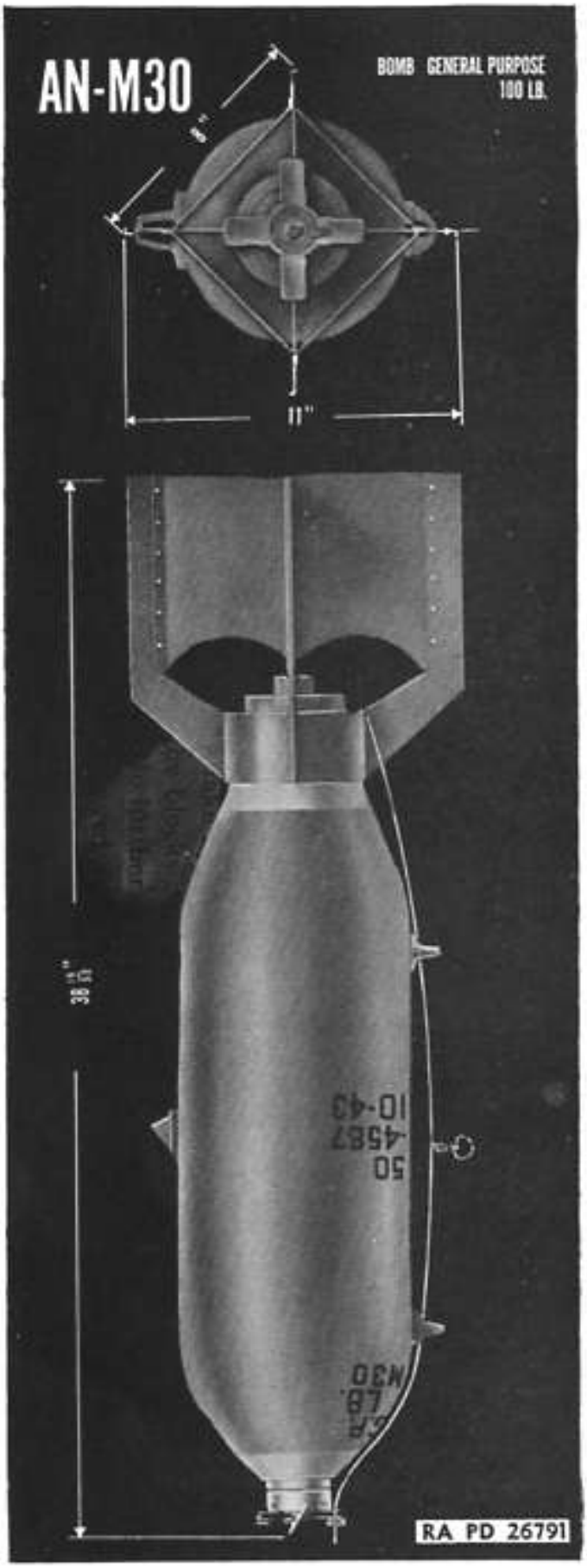


Figure 88. BOMB, G.P., 100-lb. AN–M30.

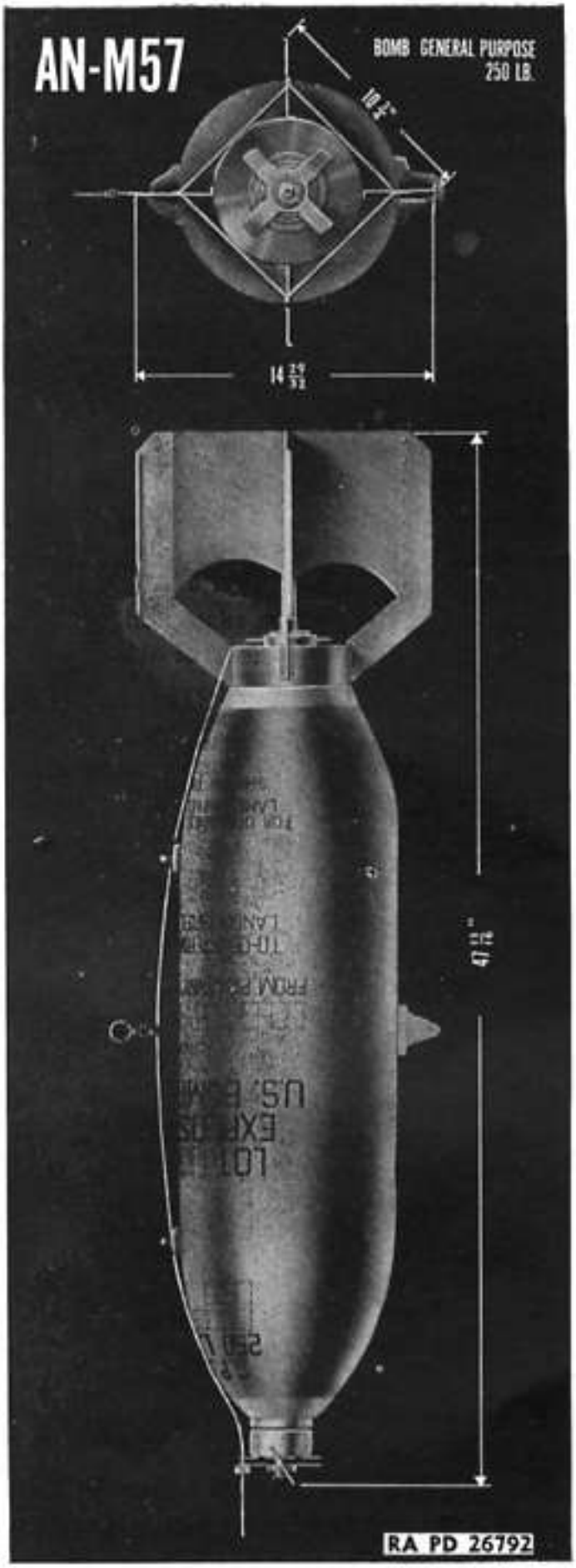


Figure 89. BOMB, G.P., 250-lb., AN–M57.

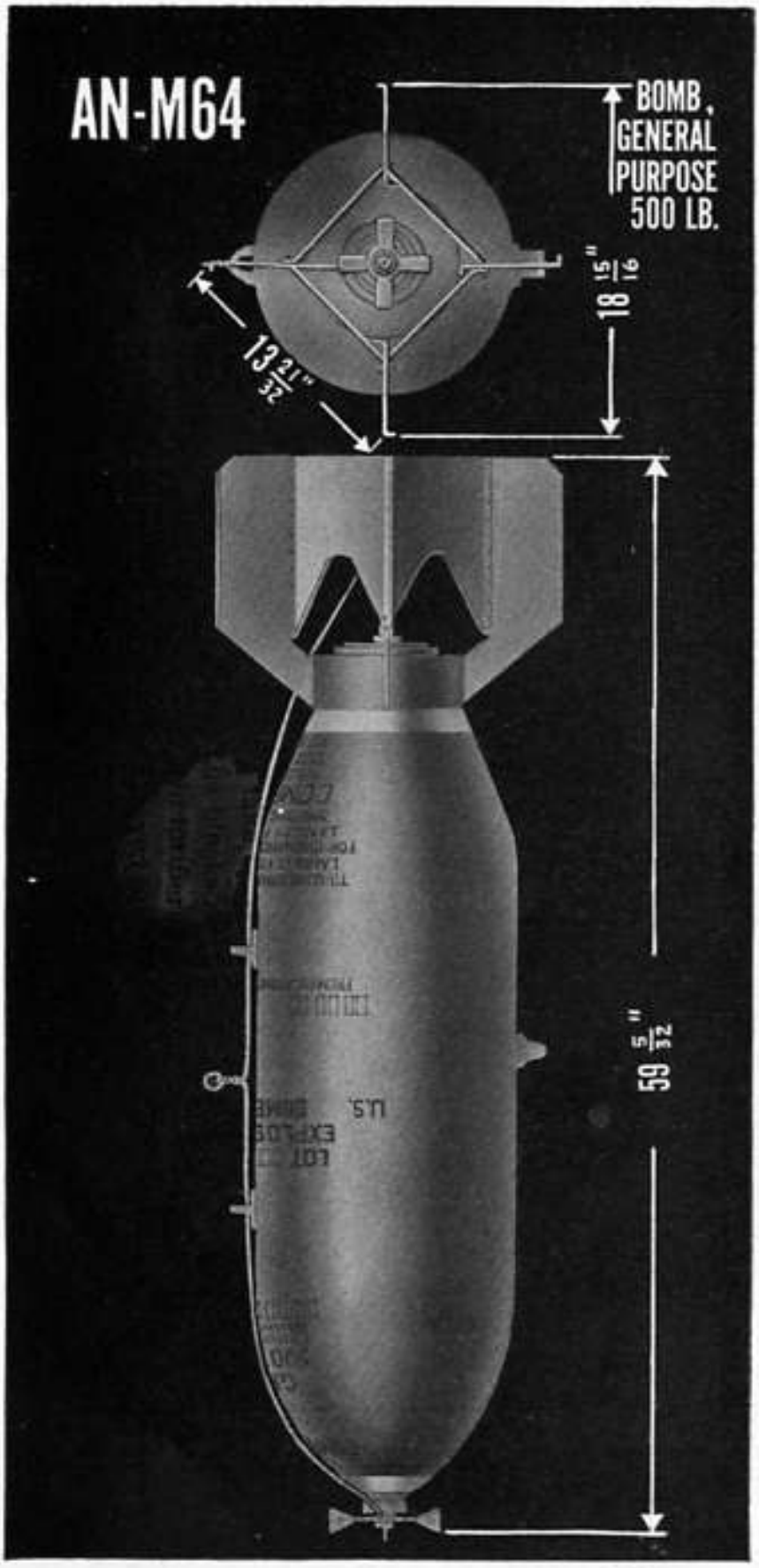


Figure 90. BOMB, G.P., 500-lb., AN–M64.

d. Typical targets. Typical targets for this size and type of bomb include: Railroad and highway bridges of comparatively light construction, industrial buildings, power plants and substations, wharves, docks, earth embankments and lightly armored shipping.

77. BOMB, G.P., 1,000-LB., AN–M65. a. Data. BOMB, G.P., 1,000-lb., AN–M65, is a cylindrical bomb which is 69.5 inches long and weighs 999 pounds, as released. (See fig. 91.) The bomb body is 53.3 inches in length and 18.8 inches in diameter. It weighs 970 pounds, of which 530 pounds, 53 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. Other models of this size and type of bomb, and the details in which they differ from the AN–M65A1, are listed below.

(1) BOMB, G.P., 1,000-lb., M65A1 differs in that the adapter booster and base plug may be locked in place.

(2) BOMB, G.P., 1,000-lb., M65, differs in not having the single suspension lug. It may be used whenever single lug suspension is not required.

(3) BOMB, G.P., 1,000-lb., AN–M44, differs in not being adapted for the hydrostatic fuze.

(4) BOMB, G.P., 1,000-lb., M44, differs in not having the single suspension lug and in not being adapted for the hydrostatic fuze.

(5) BOMB, demolition, 1,000-lb., M44, differs in not having the single suspension lug, in not being adapted for the hydrostatic fuze, and in having a base cap instead of a base plug.

78. BOMB, G.P., 2,000-LB., AN–M66. a. Data. BOMB, G.P., 2,000-lb., AN–M66, is a cylindrical bomb which is 92.83 inches long and weighs 2,053 pounds, as released. (See fig. 92.) The bomb body is 71 inches in length and 23.29 inches in diameter. It weighs 2,008 pounds of which 1,061 pounds, 53 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. Other models of this size and type of bomb and the details in which they differ from the AN–M66 are listed below:

(1) BOMB, G.P., 2,000-lb., AN–M66A1 differs in that the adapter booster and base plug may be locked in place.

(2) BOMB, G.P., 2,000-lb., AN–M34 differs in not being adapted for the hydrostatic tail fuze.

(3) BOMB, demolition, 2,000-lb., M34 differs in not having the single suspension lug, in not being adapted for the hydrostatic tail fuze, and in having a base cap instead of a closing plug.

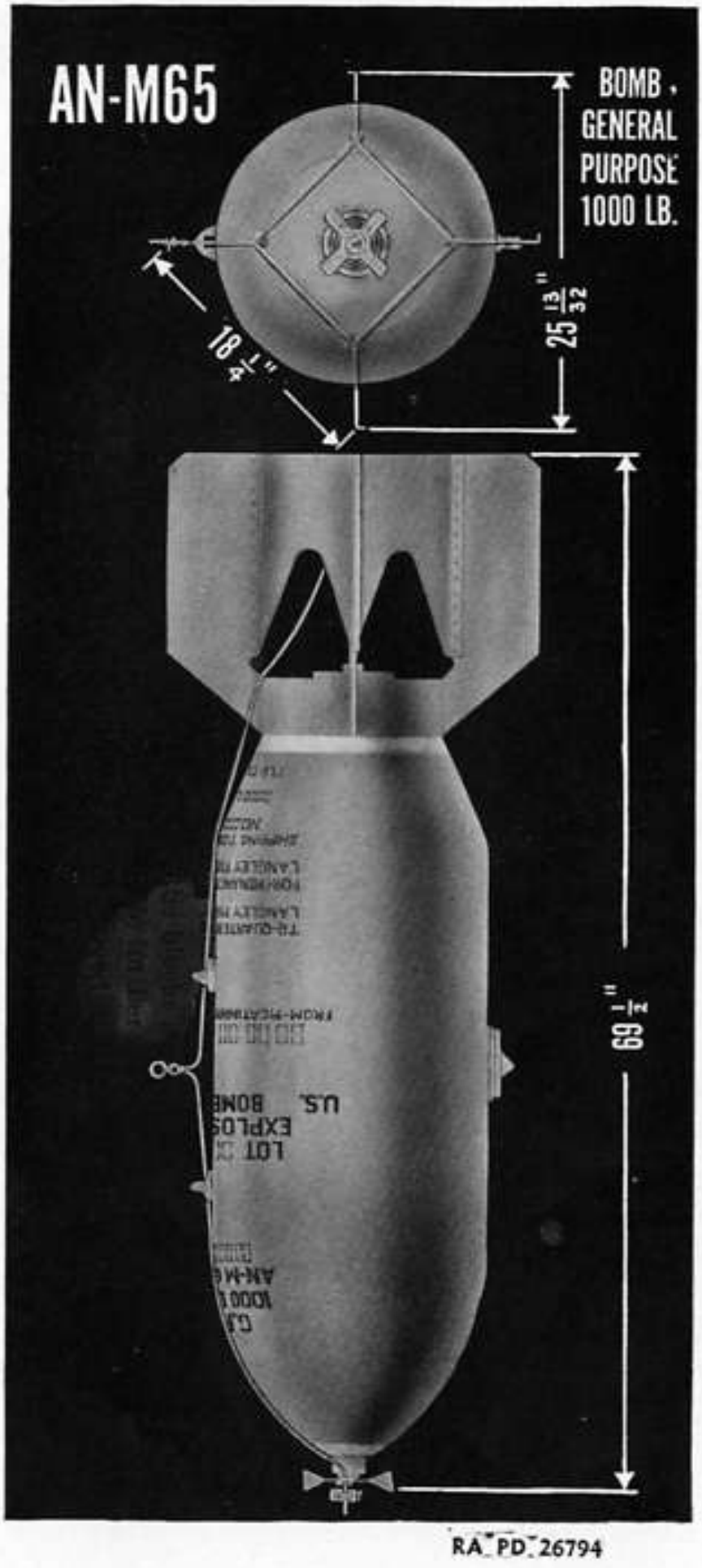


Figure 91. BOMB, G.P., 1000-lb., AN–M65.

79. BOMB, LIGHT CASE, 4,000-LB., AN–M56. a. Data. BOMB, light case, 4,000-lb., AN–M56 is a cylindrical bomb which is 117.25 inches long and weighs 4,201 pounds, as released. (See fig. 93.) The bomb body is 94.9 inches in length and 34.25 inches in diameter. It weighs 4,087 pounds of which 3,245 pounds, 77.3 percent of the complete round, is explosive charge.

b. Fuzes authorized. The combination of fuzes authorized for use in this bomb is FUZE, bomb, AN–M103 (set superquick) and FUZE, bomb, AN–M102A2 (tail), with Primer Detonator, M14, nondelay. FUZE, bomb, M103 may be substituted for the AN–M103 and FUZE, bomb, AN–M102A1, with Primer Detonator, M14, nondelay, may be substituted for the AN–M102A2.

c. Other models. BOMB, light case, 4,000-lb., AN–M56A1 differs in that it is modified for attachment of hoisting and single suspension lugs.

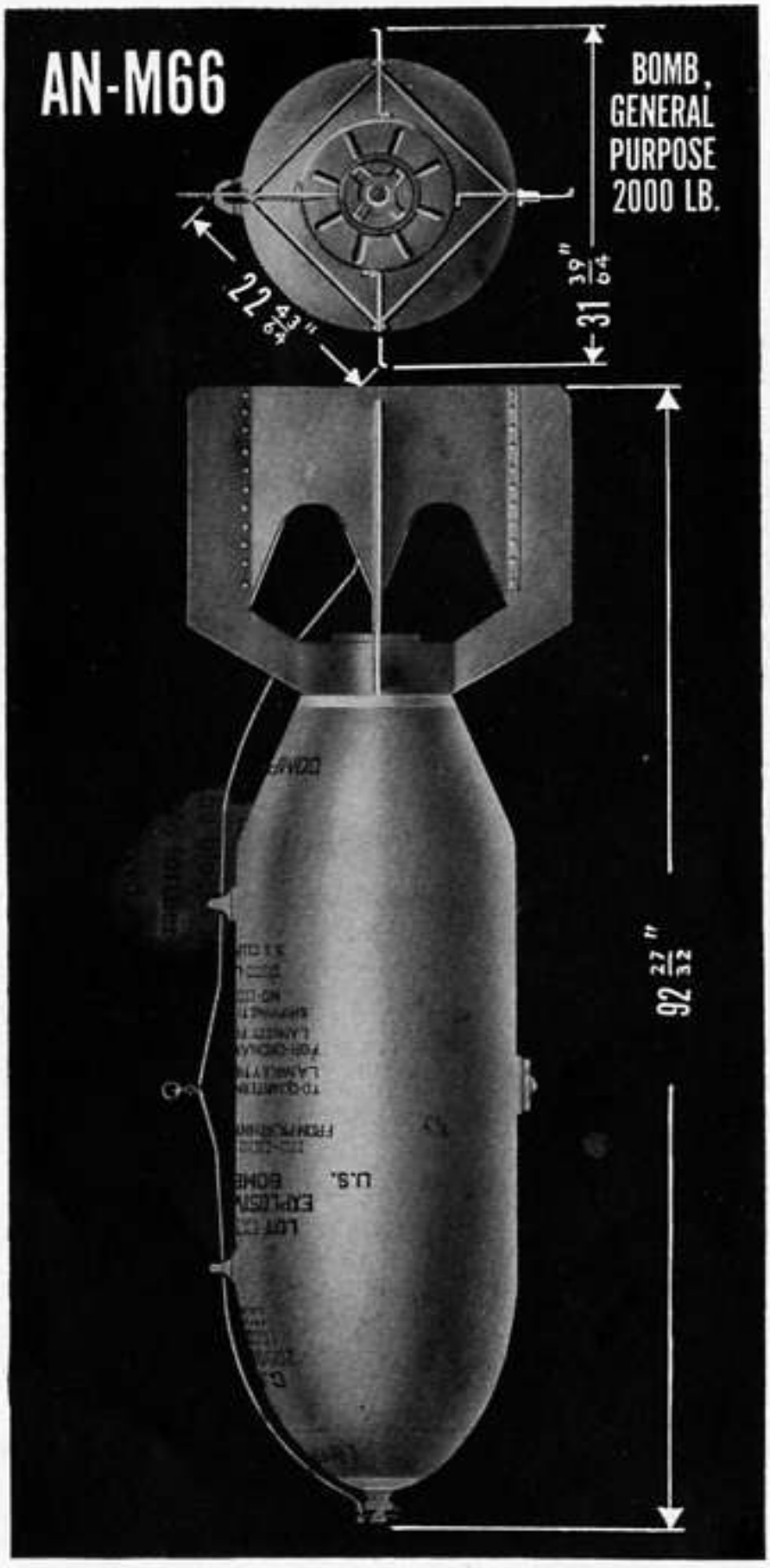


Figure 92. BOMB, G.P., 2,000-lb., AN–M66.

SECTION IX. ARMOR-PIERCING AND SEMIARMOR-PIERCING BOMBS

80. DESCRIPTION AND ASSEMBLY. a. Description. Armor-piercing (A.P.) and semiarmor-piercing (S.A.P.) bombs have heavier cases and are more streamlined than the cylindrical type. (See fig. 94.) S.A.P. bombs are designed for both nose and tail fuze but, in practice, the nose fuze seat is filled with a steel plug and only a tail fuze is used. A.P. bombs of the AN–Mk.-series—that is, those whose model numbers are prefixed AN–Mk.—are streamlined and have a solid metal nose. Suspension lugs, trunnions, and hoisting lugs are screwed into tapped holes in the bomb body. (Earlier models use suspension bands and trunnion bands.) This type has studs near the tail for properly locating the fin assembly. A.P. bombs of the M-series are converted heavy caliber artillery shell fitted with a bomb adapter-booster in place of the artillery fuze and equipped with suspension or trunnion bands and a fin assembly.

b. Components. The components of the complete round of each type are as follows:

(1) *S.A.P.* (*a*) Bomb, unfuzed, without fin assembly. Includes—
Bomb body.
Explosive charge of Amatol, TNT, or Comp. B.
One or more auxiliary boosters.
Fuze seat liner, with closing plug.
Base plug with fin lock nut.
Adapter booster with closing plug.

(*b*) Fin assembly.
(*c*) Tail fuze.
(*d*) Arming wire.
(*e*) Trunnion band (for dive bombing only).

(2) *A.P. (AN–Mk. series).* (*a*) Bomb, unfuzed, without fin assembly. Includes—
Bomb body.
Base plug with fin lock nut.
Adapter and fuze seat containing auxiliary booster.
Explosive charge of Explosive D.

(*b*) Suspension lugs, hoisting lug, and guide stud, with cap screws and safety wire (earlier models, suspension bands).
(*c*) Trunnions (earlier models, trunnion bands).
(*d*) Fin assembly.
(*e*) Tail fuze with arming bracket.
(*f*) Arming wire assembly.

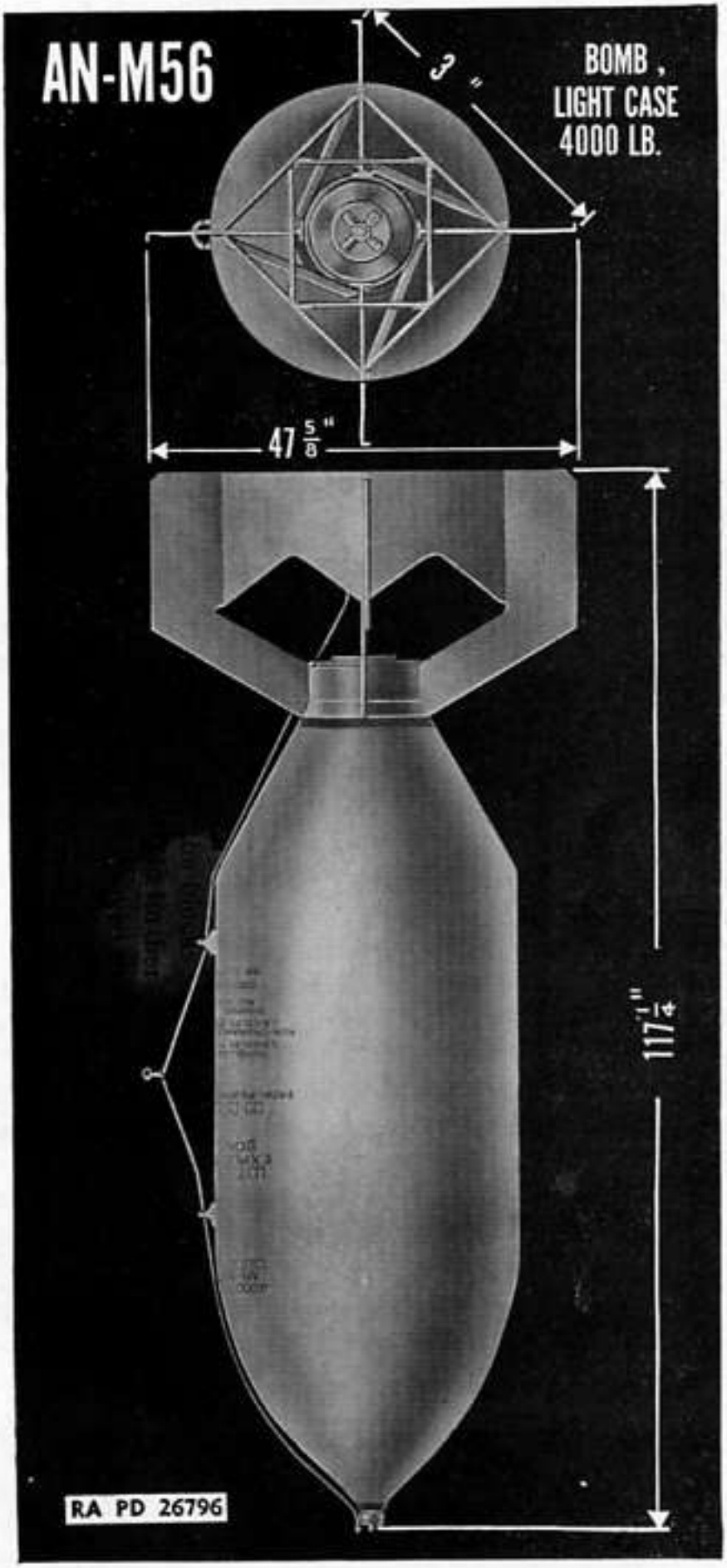


Figure 93. BOMB, light case, 4,000-lb., AN–M56.

c. Assembly. The assembly of the complete round for each type is as follows:

(1) *S.A.P. bombs.* Same as for G.P. (par. 73).

(2) *A.P. bombs (AN–Mk. series).* (*a*) Transport bombs, fin crates, and fuze crates to fuzing point.

(*b*) Remove shipping plugs from places for fittings required by type of suspension. Clean out holes.

(*c*) Unpack fin crate and attach suspension fittings required. For cap screws, use a screw driver of sufficient size to fill the slot and tighten securely. Screws holding suspension lugs should be safety wired in pairs. In attaching trunnions, be sure there is a shakeproof lock washer in place under the base of each trunnion before installing. Tighten the trunnion securely with wrench.

(*d*) Pry off fuze hole cover and inspect fuze seat and threads. Be sure the auxiliary booster is in place and that there is no foreign matter present.

(*e*) Remove fin lock nut. Place fin assembly over tail with one fin in line with suspension lugs. Replace fin lock nut and tighten. A few taps of a hammer on a wooden drift held against one of the pins on the nut will suffice. Set up setscrews.

(*f*) Attach arming bracket loosely to the neck of the fuze.

(*g*) Install fuze by the procedure outlined in paragraph 71.

(*h*) If bomb is not dropped, disassemble and return components to packings, reversing the above steps.

(3) *A.P. bombs (M-series).* (*a*) Transport bombs and fin crates to fuzing point.

(*b*) Open fin crate and inspect components.

(*c*) Assemble suspension bands, locating them according to markings on bomb body. Gauge lugs for alignment and distance, then tighten securely.

(*d*) Remove fuze hole plug and inspect cavity and threads.

(*e*) Screw coupling into adapter. If necessary, use a bar through the holes in the side to seat coupling firmly.

(*f*) Place fin assembly over tail and seat firmly with one fin aligned with suspension lugs. Screw fin lock nut on outer end of coupling and tighten with wrench.

(*g*) Assemble fuze and arming wire as described in paragraph 40.

(*h*) If bomb is not dropped reverse the above steps and return components to storage.

d. Function. A.P. and S.A.P. bombs are fuzed for delay action in order to permit penetration of the target before the bomb explodes. S.A.P. bombs are designed for use against reinforced concrete construction and lightly armored shipping. A.P. bombs are designed to pierce concrete bombproof construction and the heaviest deck armor known to be in use.

e. Limitations. If used on unarmored or lightly armored ships, A.P. bombs will probably pass entirely through the target before exploding. Because of the limited explosive content, direct hits are required for effect and because of the high impact velocity required, they must be released at high altitudes.

81. BOMB, S.A.P., 500-LB., AN–M58A1. a. Data. BOMB, S.A.P., 500-lb., AN–M58A1, is a cylindrical bomb which is 57.8 inches long

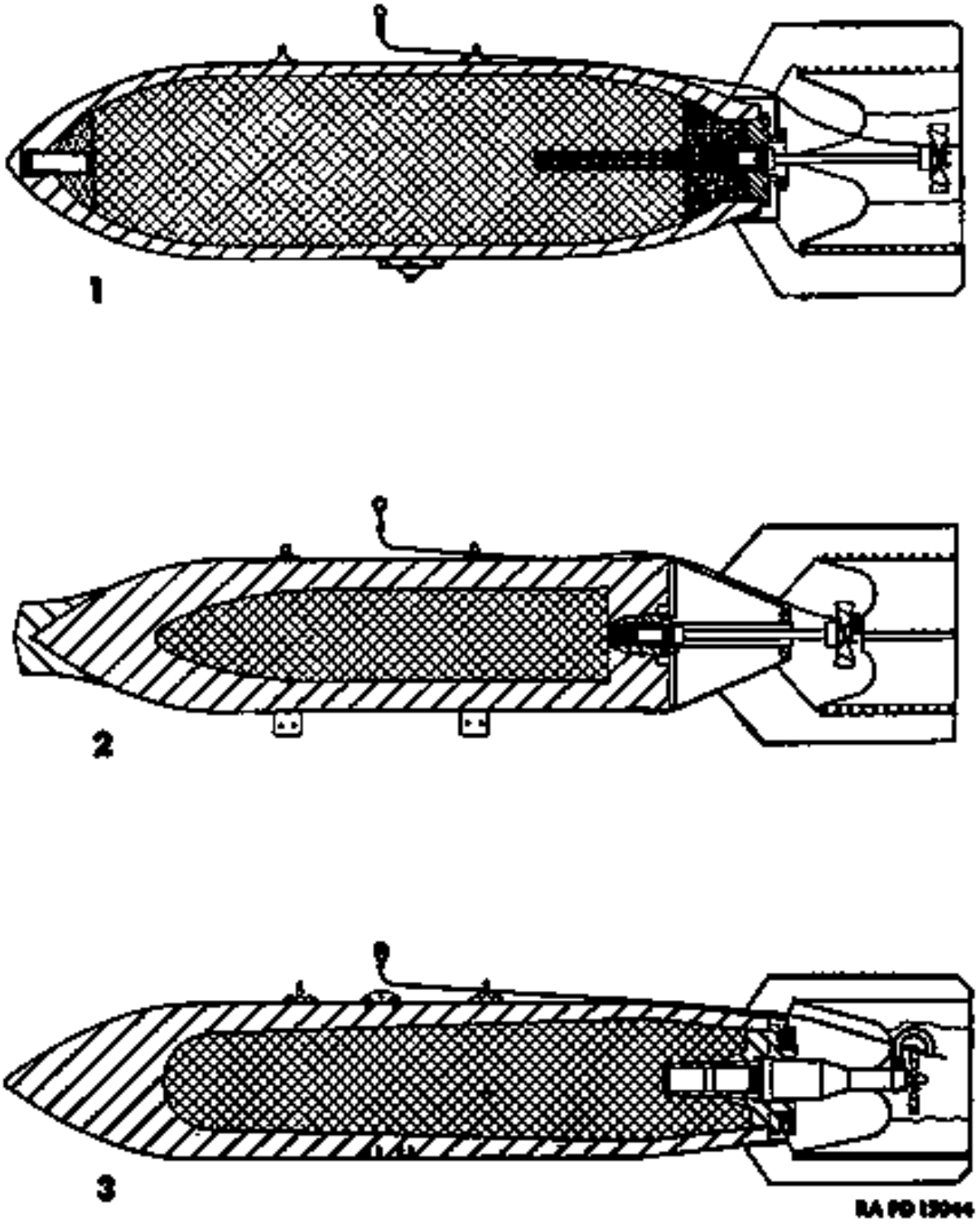


Figure 94. ① BOMB, S.A.P., 1000-lb., AN–M59; ② BOMB, A.P., 1000-lb., M52; ③ BOMB, A.P., 1000-lb., AN-Mk., 33.

and weighs 502 pounds, as released. (See fig. 95.) The bomb body is 47.2 inches in length and 11.8 inches in diameter. It weighs 488.5 pounds of which 144.5 pounds, 29 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. BOMB, S.A.P., 500-lb., AN–M58A2 has base plug and adapter booster locked in place. BOMB, S.A.P., 500-lb., AN–M58, is an earlier model which differed principally in having a slightly lighter body.

82. BOMB, S.A.P., 1,000-LB., AN–M59. a. Data. BOMB, S.A.P., 1,000-lb., AN–M59, is a cylindrical bomb which is 70.4 inches long and weighs 990 pounds, as released. (See fig. 96.) The bomb body is 57.3 inches in length and 15.1 inches in diameter. It weighs 970 pounds of which 303 pounds, 30.5 percent of the complete round, is explosive charge.

b. Fuzes authorized. See table IV, section XX.

c. Other models. BOMB, S.A.P., 1,000-lb., AN–M59A1, is modified to lock the base plug and adapter booster in place.

83. BOMB, A.P., 1,000-LB., AN–MK. 33. a. Data. BOMB, A.P., 1,000-lb., AN–Mk. 33 is a streamlined bomb which is 73 inches long and weighs 1,008 pounds, as released. (See fig. 97.) The bomb body is 59.75 inches in length and 12 inches in diameter. It weighs 991 pounds of which 140, 14 percent of the complete round, is explosive charge.

b. Fuze authorized. The only authorized fuze for this bomb is FUZE, bomb, AN–Mk. 228 (tail).

84. BOMB, A.P., 1,600-LB., AN–MK. 1. a. Data. BOMB, A.P., 1,600-lb., AN–Mk. 1, is a streamlined bomb which is 83.5 inches long and weighs 1,590 pounds, as released. (See fig. 98.) The bomb body is 68.9 inches in length and 14 inches in diameter. It weighs 1,575 pounds, of which 216 pounds, 14 percent of the complete round, is Explosive D.

b. Issue. The bomb is issued unfuzed, without fin assembly or suspension accessories. The fin assembly is packed separately in a steel crate which also contains arming bracket, arming wire assembly, trunnions with lock washers, and suspension lugs, guide stud, hoisting lug with cap screws and safety wires for their attachment. The fuze is issued separately packed one per can, 4 cans per crate.

c. Fuzes authorized. The only fuze authorized for use with this bomb is FUZE, bomb, AN–Mk. 228 (tail).

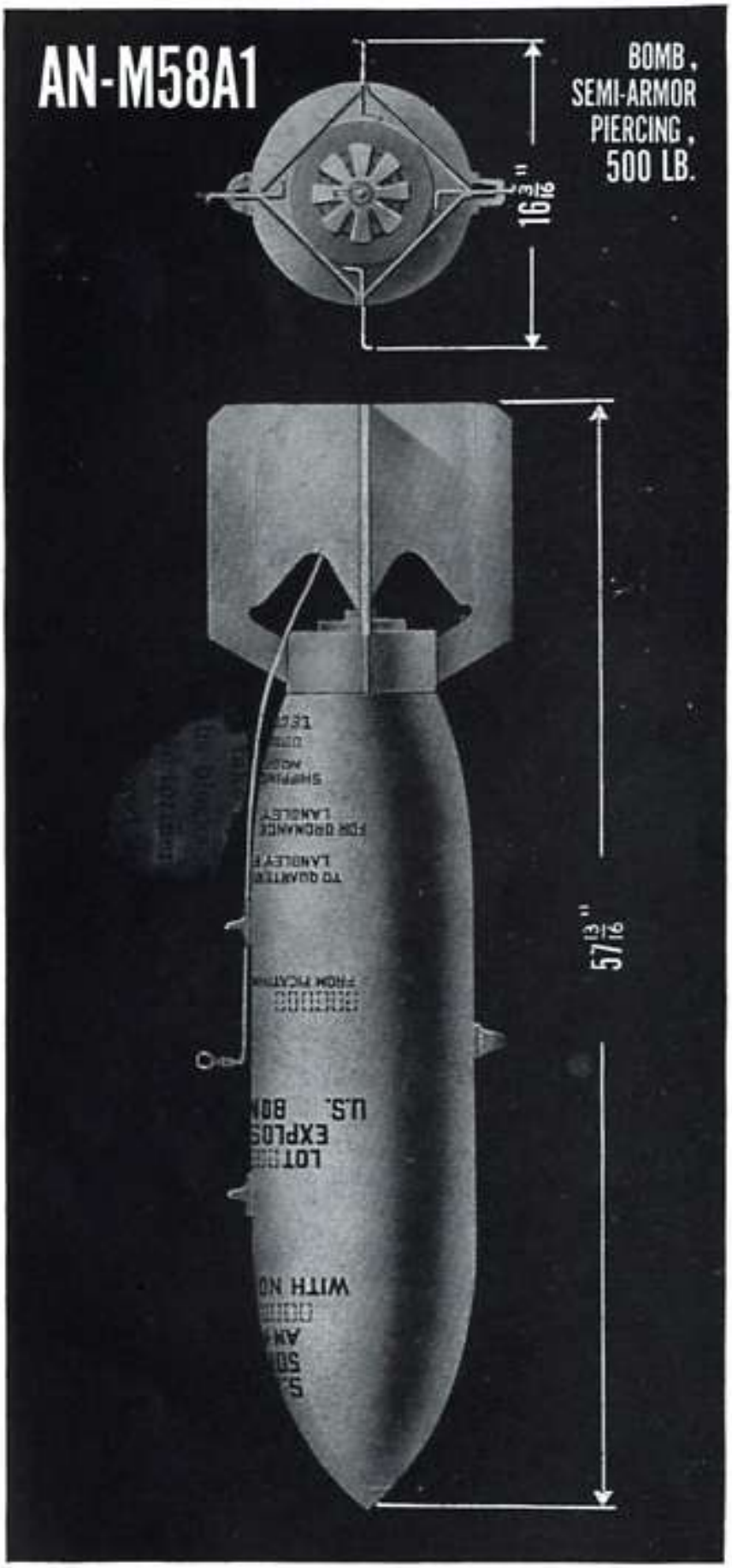


Figure 95. BOMB, S.A.P., 500-lb., AN–M58A1.

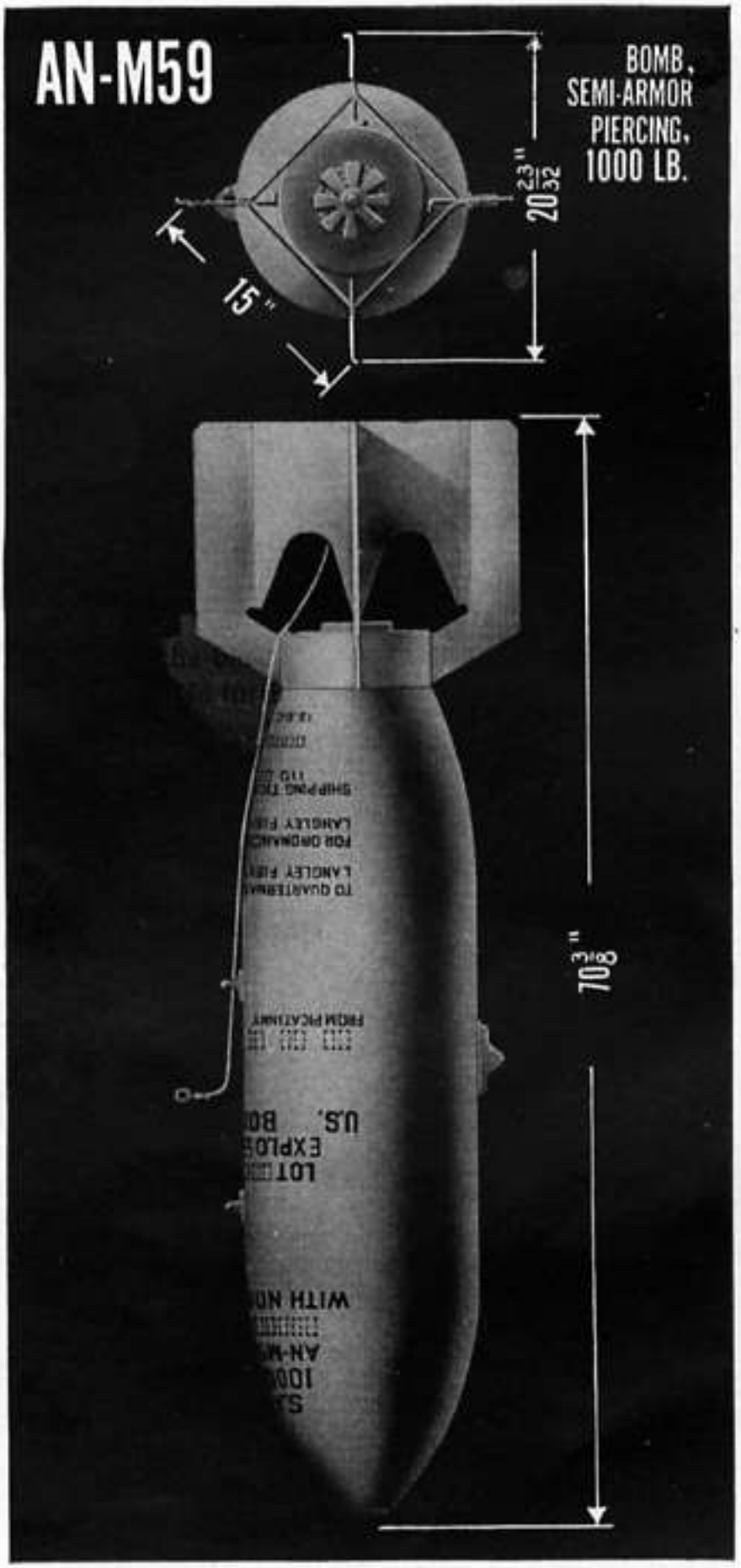


Figure 96. BOMB, S.A.P., 1000-lb., AN–M59.

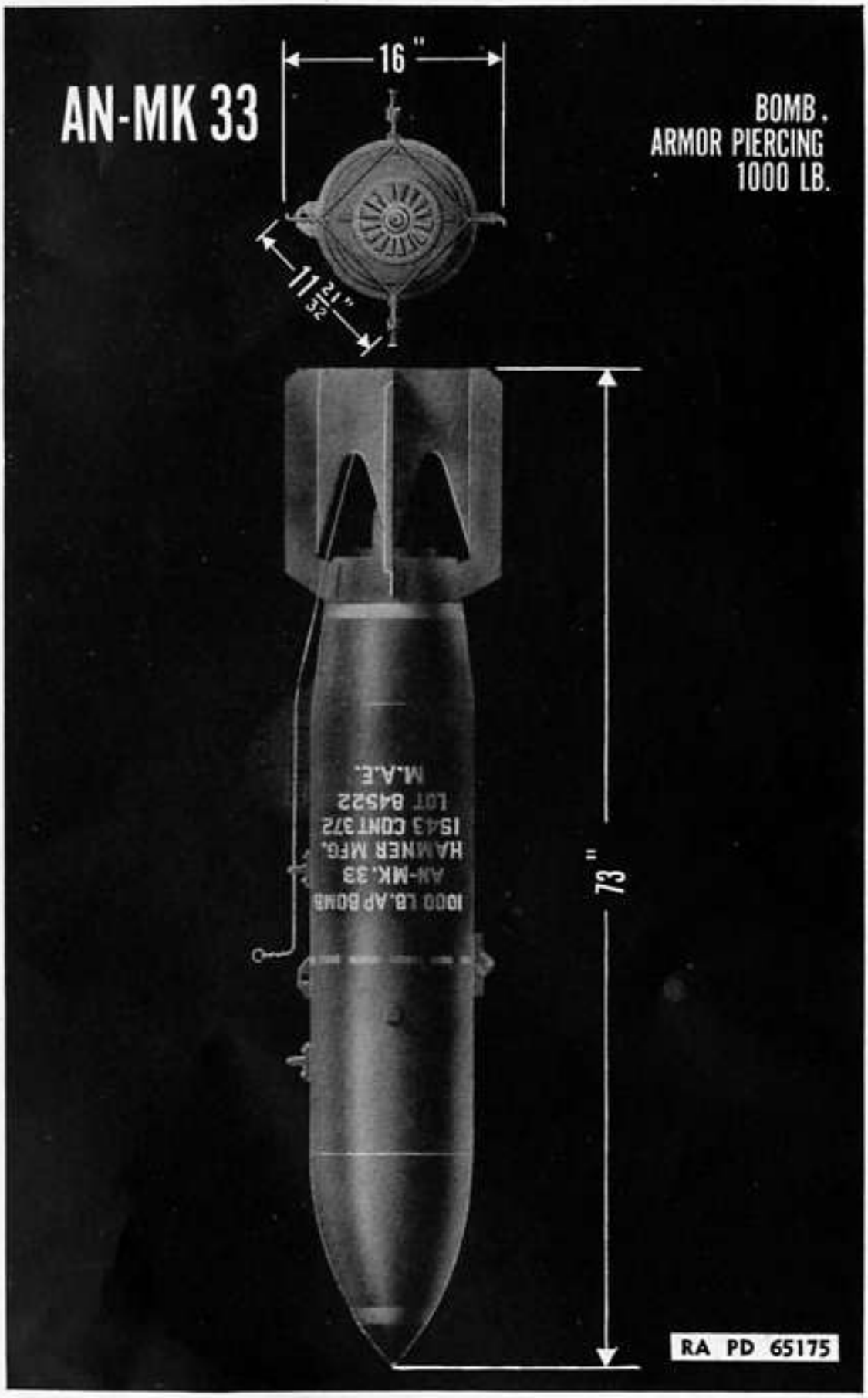


Figure 97. BOMB, A.P., 1000-lb., AN-Mk. 33.

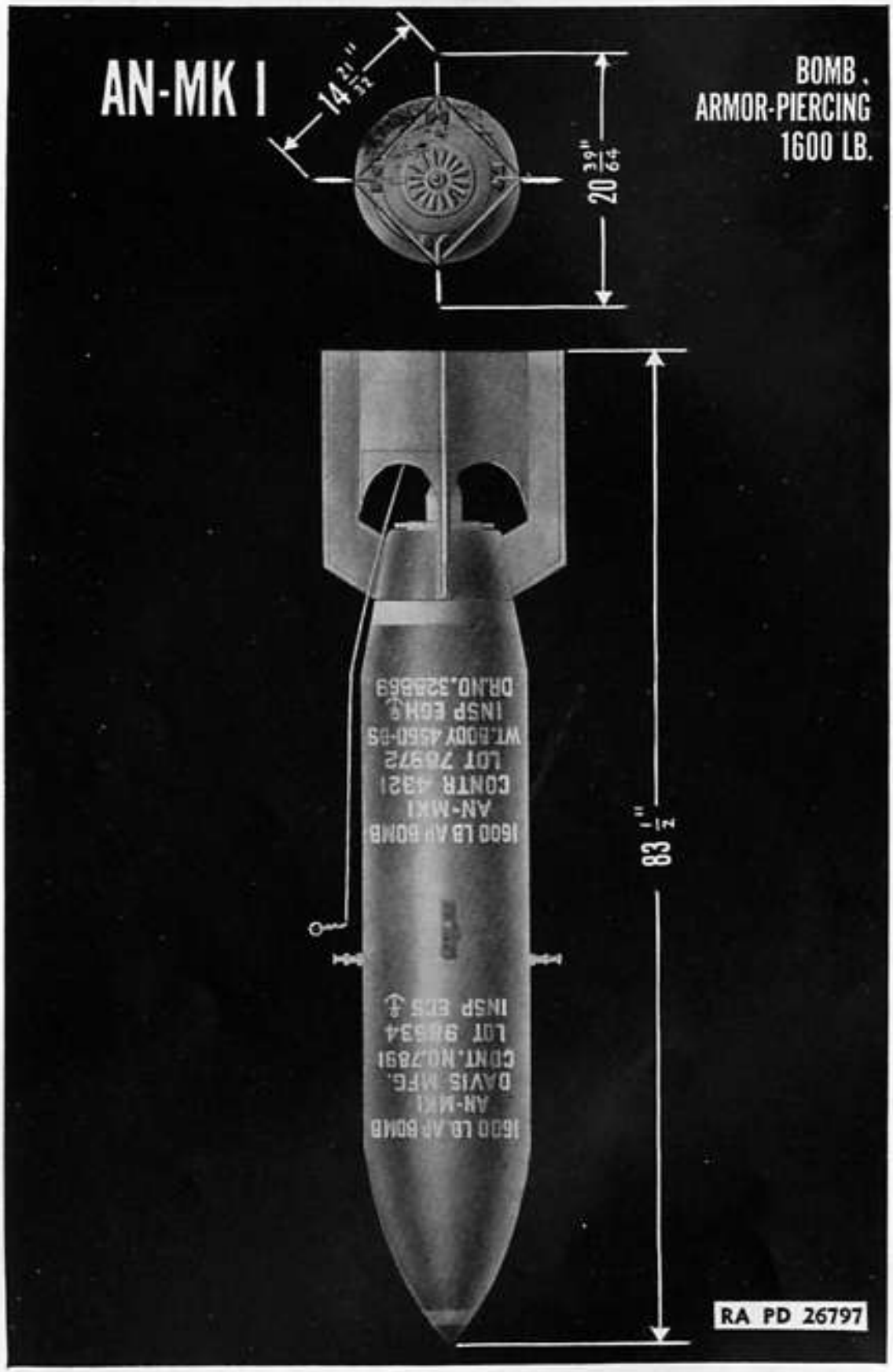


Figure 98. BOMB, A.P., 1600-lb., AN–Mk. 1.

d. Other models. Other models of this bomb and the details in which they differ (fig. 99) are as follows:

(1) *BOMB, A.P., 1,600-lb., Mk. I (Navy).* This bomb differs in that means of suspension are provided by suspension bands bolted around the bomb body. A stud on the band fits into a recess in the bomb body to prevent shifting. The recesses are located to space the

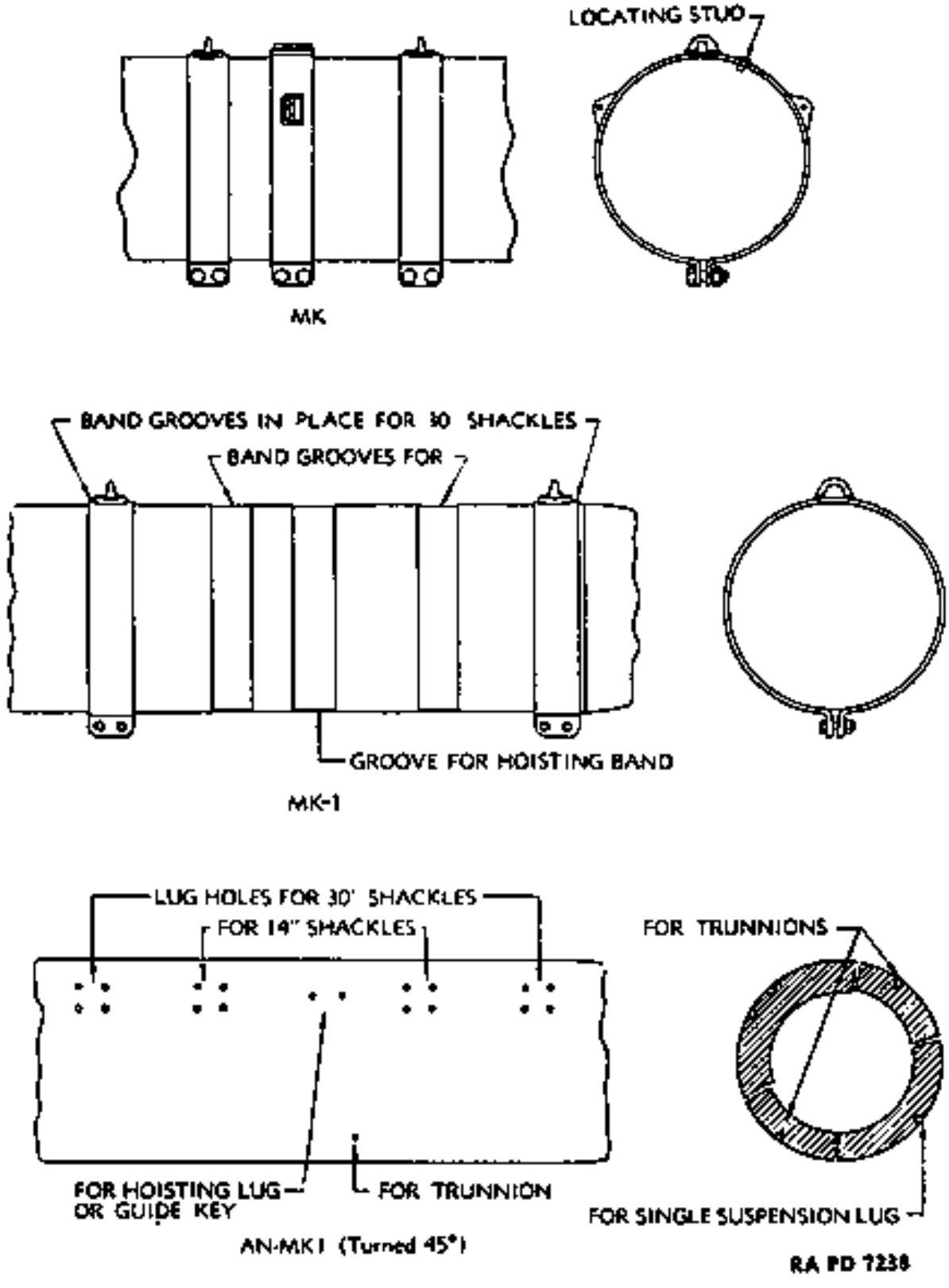


Figure 99. 1,600-lb., A.P., bombs (difference in detail).

lugs on the bands 14 inches apart center to center. If suspension from 30-inch racks is required, the bands are removed from the bomb, the studs are removed by any available means, as file or hacksaw, one band is installed with the center of the lug 18.5 inches from the nose of the bomb, and the other band is installed with the center of the lug 30 inches aft of the center of the lug on the forward band. Before final tightening, the lugs should be lined up with each other and with one tail fin. Care should be exercised to tighten the bands securely. Radical maneuvers should be avoided when carrying a bomb with this modified suspension. The bomb is shipped with suspension bands assembled and protected by shipping bands. This model also differs in that the arming bracket is attached to the fin assembly.

(2) *BOMB, A.P., 1,600-lb., Mk. 1–Mod. 1 (Navy).* This bomb also is equipped with suspension bands. However, the bands are positioned by shallow grooves machined in the bomb body. There are five grooves; the outer pair for locating the suspension bands for 30-inch racks, the next pair for locating the bands for 14-inch racks, and the center groove for locating the hoisting band. The bomb is issued with the suspension bands, protected by shipping bands, in position for 14-inch racks. If 30-inch suspension is required, the bands are removed, transferred to the outer set of grooves, aligned and tightened.

Caution: The lugs on the suspension bands are too small to take the hook of the D–6 shackle. When using the bomb with this shackle, it is necessary to file about ¼ inch of material from the lower face of the shackle hooks. Care should be exercised not to remove more than necessary, but particular attention should be given to obtaining freedom of the hooks in their fully closed position. The holes of the lugs should never be enlarged because such action would weaken the lug beyond the limits of safety.

85. BOMB, A.P., 600-LB., M62. a. Data. BOMB, A.P., 600-lb., M62, is a modified artillery shell type of bomb. (See fig. 100.) As released, the bomb is 62.1 inches long and weighs 634 pounds. The bomb body is 47 inches in length and 10 inches in diameter. It weighs 606 pounds of which 33.6 pounds, 5.5 percent of the complete round, is Explosive D.

b. Issue. The bomb is issued unfuzed, without fin assembly or suspension bands. The fin assembly is issued separately packed in a crate which also contains the tail fuze, arming wire assembly, suspension bands, coupling and fin lock nut. (See fig. 101.)

c. Fuzes authorized. See table IV, section XX.

d. Other models. Other models of this size and type differ only in details of the adapter booster assembled to the bomb since these shells from which these models were converted were fuzed with different types artillery fuzes.

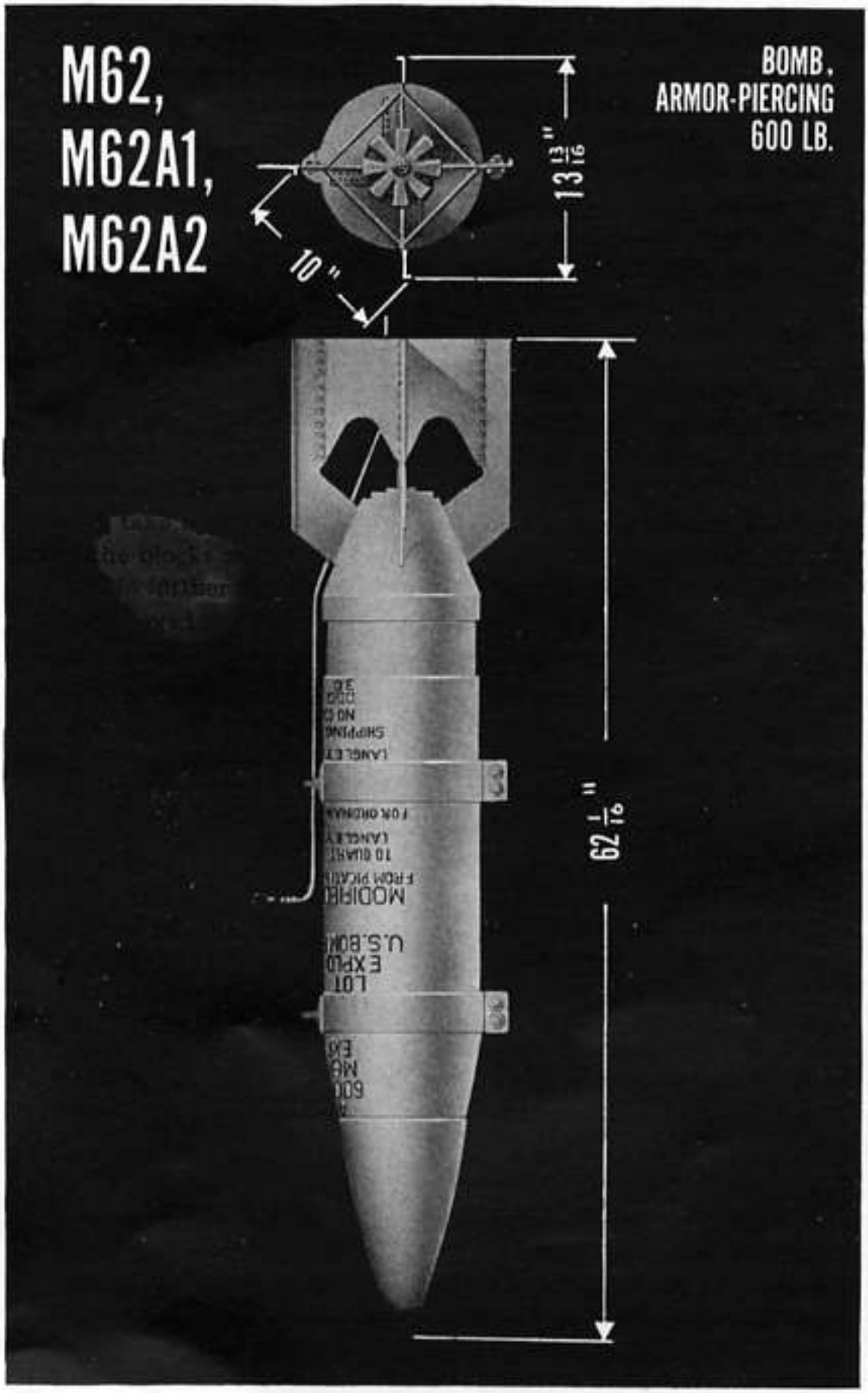


Figure 100. Bomb, A.P., 600-lb., M62.

86. BOMB, A.P., 800-LB., M61. a. Data. BOMB, A.P., 800-lb., M61, is a modified artillery shell type of bomb. (See fig. 102.) As released, the bomb is 58.7 inches long and weighs 853 pounds. The bomb body is 38.6 inches in length and 12 inches in diameter. It weighs 824 pounds of which 32.7 pounds, 3.8 percent of the complete round, is Explosive D.

b. This bomb is similar to the 600-pound bomb, M61 described in paragraph 86 above, and statements made there in regard to issue, authorized fuzes, and targets apply equally to the M61.

87. BOMB, A.P., 1,000-LB., M52. a. Data. BOMB, A.P., 1,000-lb., M52, is a modified artillery shell type of bomb. (See fig. 103.) As released, the bomb is 71 inches long and weighs 1,078 pounds. The bomb body is 50.5 inches in length and 12 inches in diameter. It weighs 1,049 pounds of which 58 pounds, 5.4 percent of the complete round, is Explosive D.

b. This bomb is similar to the 600-lb. bomb, M61, described in paragraph 86 above, and statements made there in regard to issue, authorized fuzes, and other models apply equally to the M52.

88. BOMB, A.P., 1,400-LB., M63. a. Data. This bomb is a modified artillery shell type of bomb. (See fig. 104.) As released, the bomb is 69.1 inches long and weighs 1,412 pounds. The bomb body is 45.74 inches in length and 14 inches in diameter. It weighs 1,364 pounds of which 35 pounds, 2.5 percent of the complete round, is Explosive D.

b. This bomb is similar to the 600-lb. bomb, M61, described in paragraph 86 above, and all statements made in regard to issue and fuzes authorized, apply equally to the M63.

SECTION X. DEPTH BOMBS

89. DESCRIPTION AND ASSEMBLY. a. Description. Depth bombs are cylindrical, flat-nosed, light-case bombs designed for underwater use. Older models with hemispherical noses are provided with flat nose attachments in order to reduce ricochet. Depth bombs are designed for a nose fuze, a transverse fuze, and, in the case of larger bombs, a tail fuze. The nose fuze is an impact fuze, for use when surface blast effect is desired. The transverse fuze is a double-headed hydrostatic fuze which is assembled in a tube running diametrically through the bomb body. The tail fuze, when used, is also

Figure 101. A.P. bomb components.

a hydrostatic fuze. Small depth bombs may be shipped in metal crates. Larger depth bombs are shipped in shipping bands.

b. Components. The components of the complete round are—

(1) Bomb, unfuzed, without fin assembly, includes—

Bomb body with single and double suspension lugs attached.

Explosive charge.

Nose fuze adapter and fuze seat liner with two auxiliary boosters.

Transverse fuze seat.

Fin lock nut or cap screws for attachment of fin assembly.

(2) Fin assembly (attaches with cap screws to light bombs, with fin lock nut to heavy bombs).

(3) Nose fuze (used for blast effect. Nose and hydrostatic fuzes both used only when selective arming is available).

(4) Transverse fuze.

(5) Arming wire assembly (ies).

(6) Trunnions (large bombs) or trunnion band.

(7) Tail fuze and arming bracket (large bombs only).

(8) Flat nose attachment (for round-nose bombs only).

c. Assembly. To assemble the complete round the following sequence may be followed:

(1) Remove bomb from packing and, if it is round-nose type, install flat-nose attachment as follows: Stand bomb on its base. Remove fuze seat adapter, place the flat-nose attachment over the nose of the bomb. Replace fuze seat adapter and tighten securely. Fill the space between the attachment and the bomb with plaster of paris, cement, or some other quick-setting material. Let the filler set.

Note. If a lime mixture is used, be sure the lime is completely slaked and reasonably cool before pouring.

(2) Remove the shipping plugs or cover plates from the fuze cavities to be used. Cleanse the cavities of the gun-slushing compound with which they are coated and of any other foreign material. Inspect to be sure threads are clear and fuze cavities are not distorted. Gauge the transverse tube by sliding a dummy booster completely through it.

(3) Attach the fin assembly so that one fin aligns with the suspension lugs.

(4) Assemble fuze or fuzes desired as described above, under the particular fuze.

(5) If bomb is not dropped and if it is to be returned to storage, reverse the above steps, coating the fuze cavities with compound, rust-preventive, light. Return all components to their original packings and reseal those which were originally sealed.

d. Function. Depth bombs are intended for attack on submarines and, as a consequence, must be equipped with hydrostatic fuzes. However, in order that advantage may be taken of the discovery of a

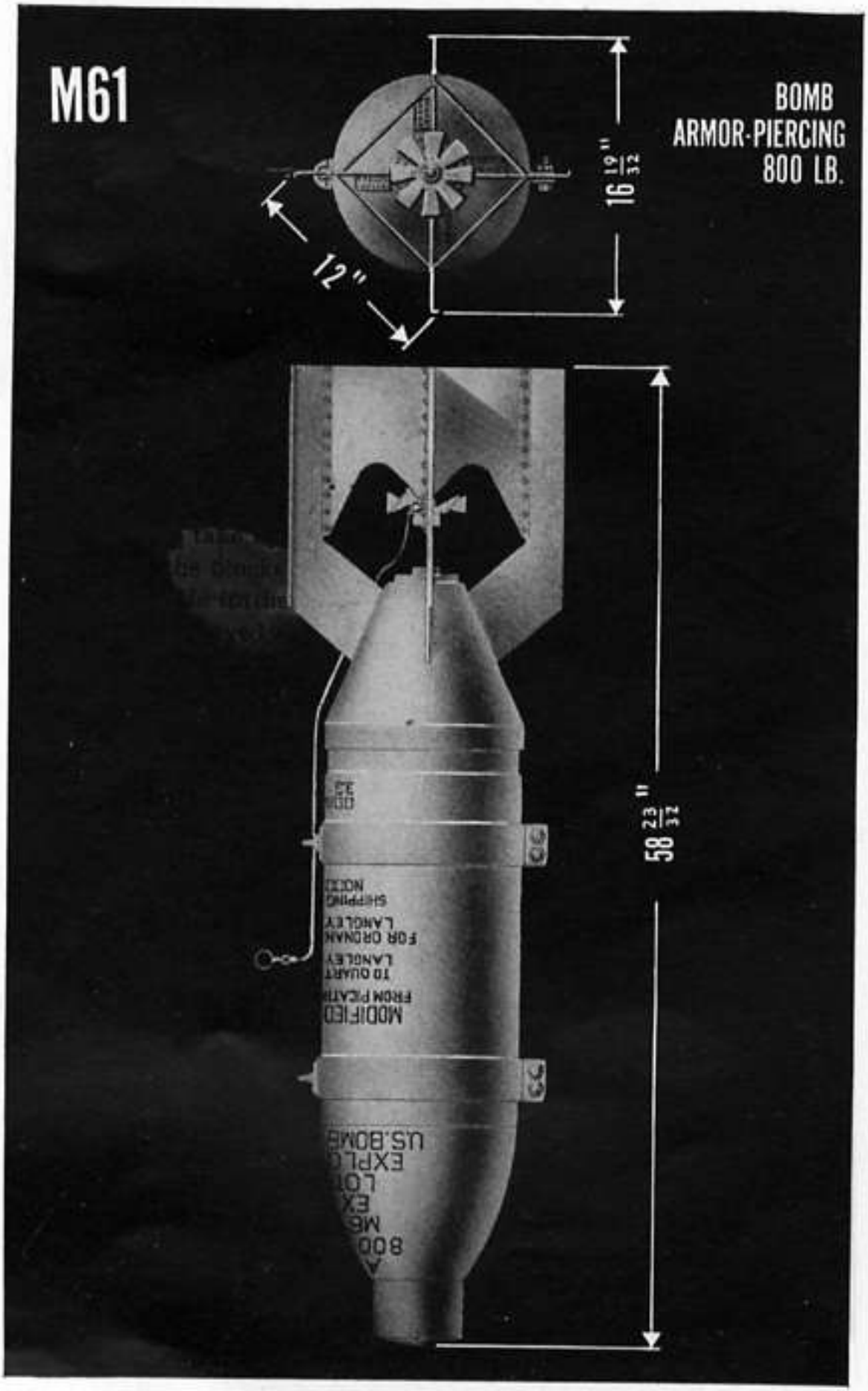


Figure 102. BOMB, A.P., 800-lb., M61.

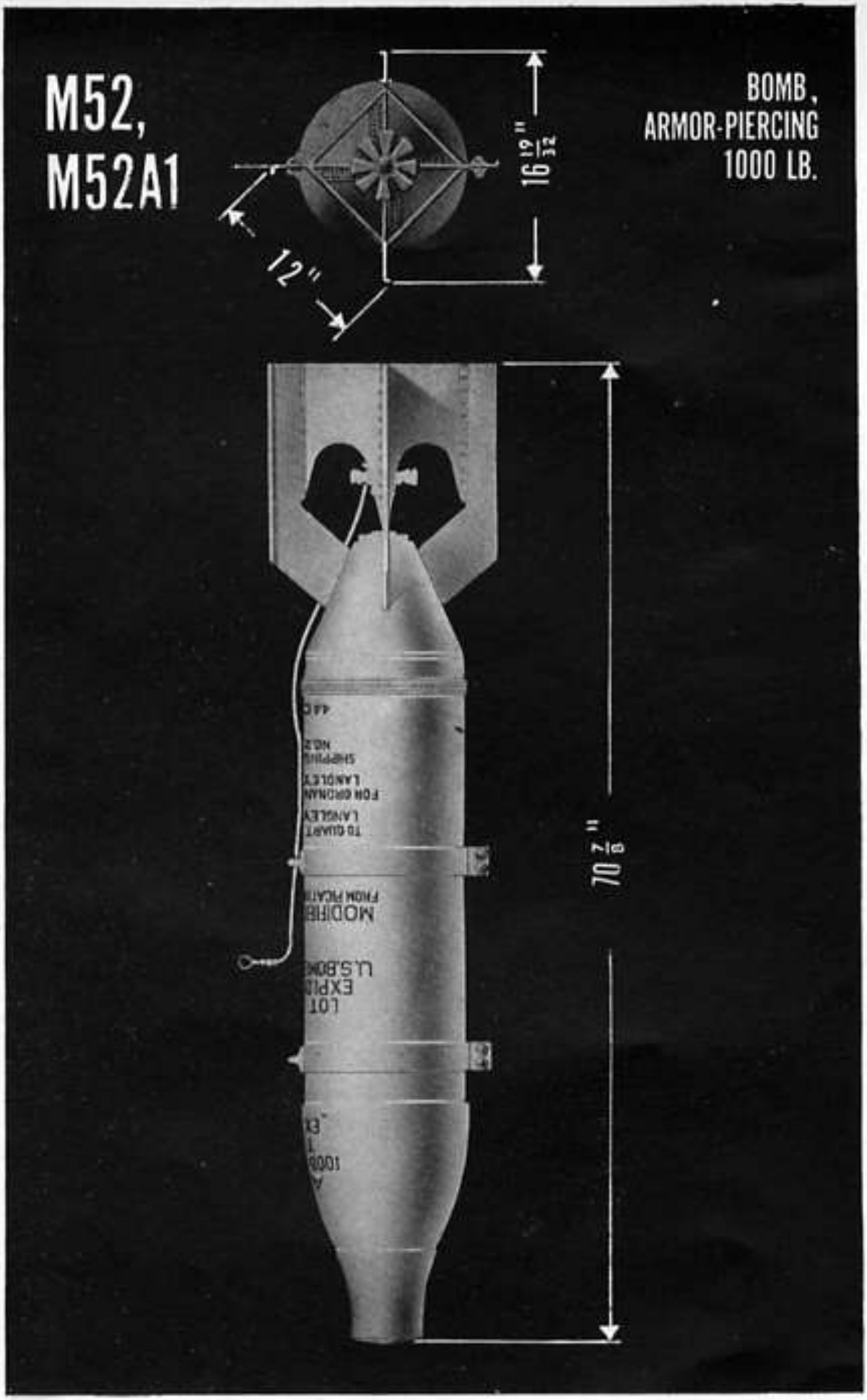


Figure 103. BOMB, A.P., 1000-lb., M52.

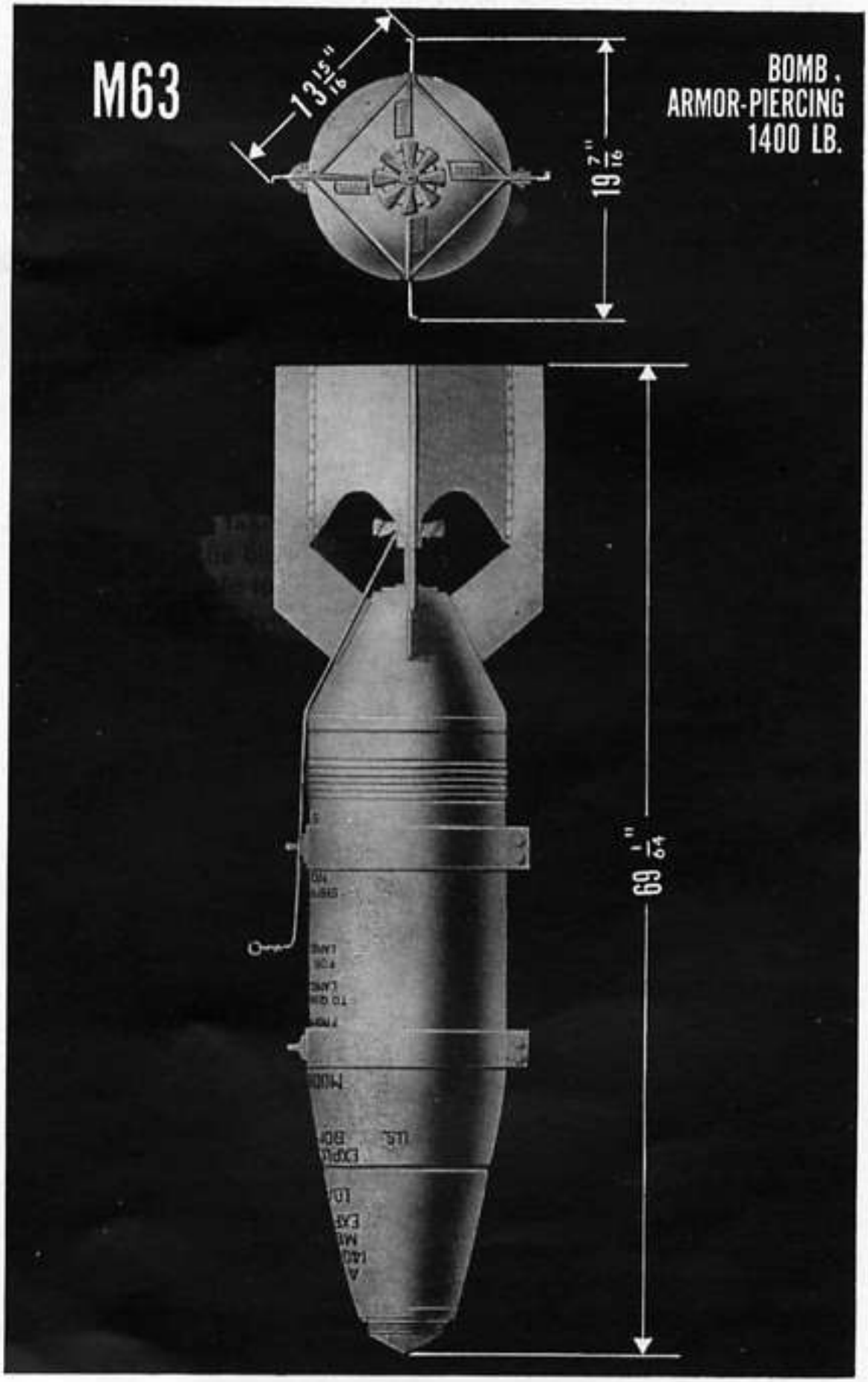


Figure 104. BOMB, A.P., 1,400-lb., M63.

surface target, they are also adapted for impact fuzes. Since the anti-submarine mission is primary, only hydrostatic fuzes will be used unless selective arming is available so that the bomb may be dropped with the impact fuze SAFE and the hydrostatic fuze armed. The blast effect from a depth bomb fuzed for impact is slightly greater than that from a G.P. bomb of equal weight, since the percentage of explosive is greater. The radius of underwater effectiveness, that is, the distance from the explosion at which a submarine will suffer probably fatal damage, is approximately 45 feet for 325-pound bombs and 56 feet for 650-pound bombs.

e. Limitations. Depth bombs cannot be used for penetration of solid material. They cannot be used from high altitude because the hydrostatic fuzes will function at depths greater than those for which they are set. In addition, impact with the water from high altitudes may warp the bomb body and fuze cavities so that the fuzes cannot function. Depth settings must be made in advance and are difficult if not impossible to change in flight.

90. CONDITIONS FOR STORAGE OF FUZED BOMBS. a. Depth bombs to which transverse hydrostatic fuzes are assembled may be stored in the open for overnight or similar temporary storage under the following conditions:

(1) This permission applies to alerted ammunition at tactical air bases only.

(2) Nose and tail fuzes, if assembled, will be removed and stored separately, and the corresponding fuze hole plugs replaced.

(3) The safety cotter pin in each head of the fuze will be replaced and wired in place.

(4) Both heads of the fuze are weatherproofed as described in c below, or weatherproofing against icing described in paragraph 49h is left in place.

b. The above permission is given in order to avoid damage to fuzes from repeated fuzing and unfuzing of the bomb. It will not be construed to allow magazine storage or any extended storage of transverse fuzed bombs.

c. The fuze will be weatherproofed for such temporary storage in the open as follows:

(1) Over each head of the fuze, place a piece of water-repellent paper which is sufficiently large to cover the fuze seat.

(2) Seal the edges of the paper to the bomb body with adhesive tape, scotch tape, or similar material. Be sure the sealing is smooth and tight. It may be necessary to clean and dry the bomb body to insure adhesion.

(3) Coat the entire application with compound, rust-preventive, light.

(4) When the bomb is reissued for use, this type of weatherproofing will be removed. If weatherproofing against icing was left in place, it will not be removed except to replace it or repair it.

91. BOMB, DEPTH, 350-LB., AN–MK. 47. a. Data. BOMB, depth, 350-lb., AN–Mk. 47, is a flat-nose light-case type. It is 53.1 inches long and weighs 355 pounds, as released. The bomb body is 28.46 inches in length and 15 inches in diameter. It weighs 354.5 pounds of which 252 pounds, 71 percent of the complete round, is high explosive charge of torpex.

b. Other models. Other models of this size and type (figs. 25 and 105), and the detail in which they differ are as follows:

(1) BOMB, depth, 325-lb., AN–Mk. 41, is the same as the AN–Mk. 47 except that it is loaded with 221 pounds of TNT.

(2) BOMB, depth, 350-lb., AN–Mk. 44, is the same as the AN–M47 except that it is a round nose type and requires attachment of the flat nose.

(3) BOMB, depth, 325-lb., AN–Mk. 17, is a round-nose type loaded with 243 pounds of TNT. This type usually requires attachment of the flat nose but BOMB, depth, 325-lb., AN–Mk. 17 may be issued with the flat-nose attached.

c. Authorized fuzes. The following fuzes are authorized:

(1) *FUZE, bomb, hydrostatic, AN–Mk. 234 (transverse).* FUZE, bomb, hydrostatic, AN–Mk. 224 (all mods.) may be substituted.

(2) *FUZE, bomb, AN–Mk. 219 (nose).* This fuze is used only when surface demolition effect is desired. FUZE, bomb, AN–M103 (nose) is preferred when special arming vane for use with flat-nose bombs is available. This fuze will not arm, however, if the regular vane is used on the fuze when it is used in flat-nose bombs.

92. BOMB, DEPTH, 650-LB., AN–MK. 29. a. Data. BOMB, depth, 650-lb., AN–Mk. 29, is a round-nose type, 70 inches in length. It weighs 729 pounds, as released, of which 72 pounds represents the weight of the flat-nose attachment. The bomb body is 42.25 inches in length and 17.7 inches in diameter. It contains an explosive charge of 464 pounds of TNT.

b. Fuzes authorized. (1) *Nose.* The preferred nose fuze is FUZE, bomb, AN–M103 with special arming vane. This fuze will not arm on flat-nose bombs if equipped with the standard vane. Consequently, if the special arming vane is not available, FUZE, bomb, AN–Mk. 219 and one additional auxiliary booster will be used.

Note. When equipped with the special vane, FUZE, bomb, AN–M103 will arm in 1,800 feet of air travel. The AN–Mk. 219 arms in 2,500 feet of air travel.

(2) *Transverse.* The preferred transverse fuze is FUZE, bomb, hydrostatic, AN–Mk. 234. FUZE, bomb, hydrostatic, AN–Mk. 224 (all mods.), may be substituted.

(3) *Tail.* FUZE, bomb, hydrostatic, AN–Mk. 229 is authorized when Mk. 37 fin assembly is used. This fuze will not arm when Mk. 29 fin is used.

c. Other models. BOMB, depth, 650-lb., Mk. 37, is the same body with a shorter (Mk. 37) fin assembly. BOMB, depth, 650-lb., Mk. 38, is a flat-nose type loaded with TNT. BOMB, depth, 700-lb., Mk. 49, is a flat-nose type loaded with torpex. (See fig. 25.)

SECTION XI. CHEMICAL BOMBS

93. GENERAL. Chemical bombs are those which have, as their main charge, a chemical agent which produces a toxic or irritating physiological effect, a screening smoke, an incendiary action, or a combination of any or all of these. Chemical bombs are produced in two designs: bombs released in clusters for area bombing, and bombs released individually for point bombing. Both types of bombs are described in this section. In some chemical bombs such as magnesium alloy incendiaries, the metal case serves as the main charge of the bomb; in others, the charge is contained in the bomb body, and requires an explosive burster to open the body and distribute the charge.

94. BOMBS RELEASED IN CLUSTERS. a. In general. Bombs designed for assembly in clusters have the following characteristics in common:

(1) They are small, ranging from 4 to 10 pounds.

(2) They are hexagonal, rather than round, to provide for solid packing in the cluster.

(3) They are equipped with an integral, inertia type fuze which is armed by release of the bomb from the cluster. The arming mechanism of the fuze consists of a safety plunger which is held depressed against spring action by the adjacent bomb in the cluster. When in this position the inner end of the plunger prevents the firing pin from firing the primer.

b. Caution: If a cluster should break up in handling or otherwise accidentally release its bombs, remember that fuzes of such bombs are armed and dropping a bomb several feet onto its nose may cause the fuze to ignite the bomb.

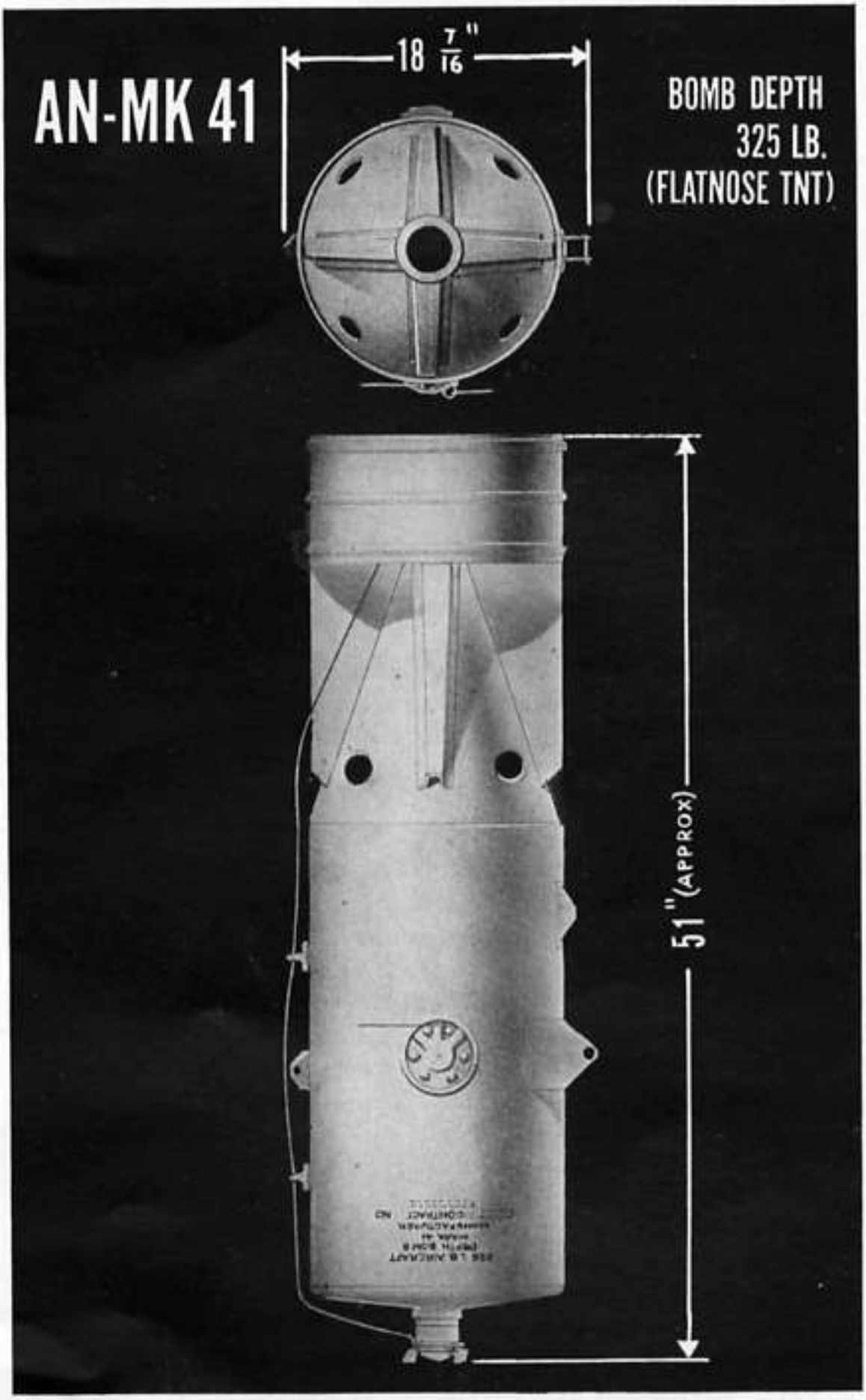


Figure 105. BOMB, depth, 325-lb., AN–Mk. 41.

95. **BOMBS RELEASED INDIVIDUALLY.** a. **General.** Bombs released individually for bombing of point targets are 100-pound size and larger and, as a consequence, have better flight characteristics than cluster bombs. Such bombs are cylindrical with a rounded or ogival nose. Small bombs are adapted for nose fuze only; larger bombs are adapted for both nose and tail fuzes. The fins may be attached to the bomb body (100-pound bombs) or issued separately. Each bomb contains a burster well, which is a tube opening into the fuze seat and extending the length of the bomb body.

b. **Complete round—small bombs.** The complete round of small chemical bombs consists of the following (fig. 106):

(1) Bomb body, including adapter, adapter sleeve, burster well, and chemical charge.

(2) Fin assembly (included in body for 100-lb. bombs).

(3) Burster and igniter.

(4) Nose fuze.

(5) Arming wire assembly.

c. **Complete round—large bombs.** The complete rounds for larger chemical bombs are described for the particular bomb in paragraphs 96 through 108, inclusive.

d. **Packing.** One hundred pound chemical bombs with fin attached are packed in a wooden box. Larger bombs, without fin assembly, are shipped with lug protectors or shipping bands. Fin assembly, arming wire, fuzes, and bursters are each packed separately.

e. **Assembly.** To assemble the complete round of the 100- and 115-pound bombs, the following procedure may be used:

(1) Remove bomb from packing and inspect to be sure there are no leaks or other evidence of unserviceability.

(2) If fin is shipped separately, assemble to the bomb by removing fin lock nut, placing assembly over tail of bomb with one fin in line with suspension lugs, replacing fin lock nut, and tightening with wrench.

(3) Remove fuze hole plug and adapter sleeve. Inspect fuze seat and burster well to be sure that threads are not damaged and that there is no foreign material present.

(4) Insert burster and press it in until the shoulder on the top of the burster seats against the shoulder of the adapter. *Do not use force.* If the burster will not enter or seat freely, turn the bomb in for disposal.

(5) Replace the adapter sleeve, seating it firmly against the burster.

(6) Assemble nose fuze as described in part two under the particular fuze.

(7) If the bomb is not dropped, reverse the above steps and return each component to its original condition and packing.

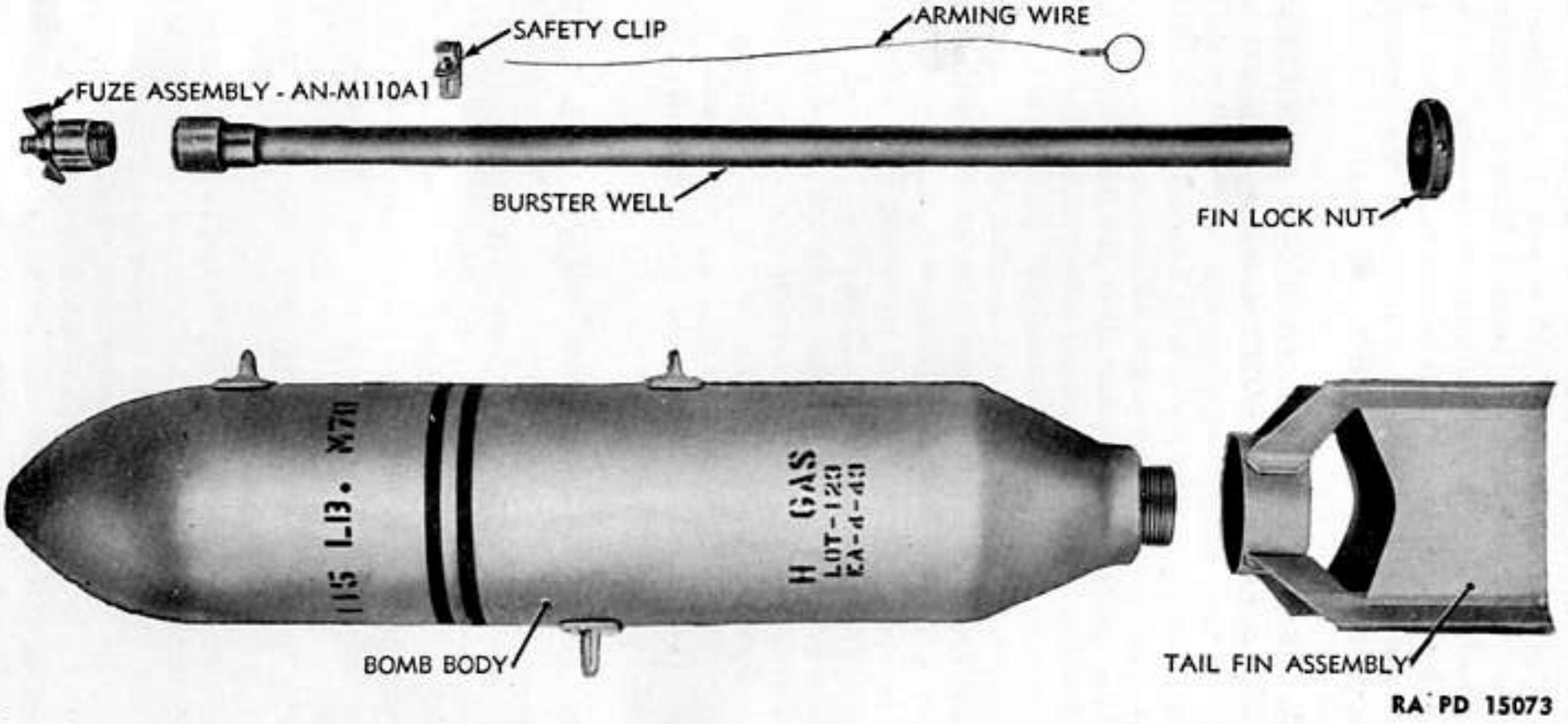


Figure 106. BOMB, gas, persistent, H, 115-lb., M70—components.

f. Assembly (large bombs). Assembly of larger bombs is described for the particular bomb in paragraphs 96 through 108, inclusive.

g. Function. This type chemical bomb is fuzed for instantaneous action on impact in order to prevent waste of the chemical agent. It should be noted that, when the bomb body is light sheet metal, impact on a hard surface may rupture the case and scatter the chemical agent even when the bomb is dropped SAFE.

96. BOMB, INCENDIARY, 4-LB., AN–M50A2, AN–M50XA1, AND AN–M50XA3. a. AN–M50A2. BOMB, incendiary, 4-lb., AN–M50A2 (fig. 107), has a hexagonal magnesium alloy body, an iron nose plug, and a sheet metal tail. The bomb is 21.3 inches in over-all length, 1.69 inches across the flats, and weighs 3.7 pounds. The main charge consists of 1.25 pounds of magnesium alloy (the bomb body) and 0.63 pound of thermate. Upon impact the thermate is ignited and burns for approximately 1.5 minutes melting and igniting the magnesium alloy case which burns for from 4 to 6 minutes longer.

b. AN–M50XA3. BOMB, incendiary, 4-lb., AN–M50XA3 (fig. 108), is the same as the AN–M50A1 described in a above, except that the nose plug is replaced by a steel shell containing a delay fuze, a detonator, and a tetryl bursting charge. This bomb burns for about 1.5 minutes at which time the delay fuze is ignited. The burning fuze provides a delay ranging from a few seconds to several minutes, and ignites the detonator which explodes the charge and projects fragments of the steel shell and particles of burning magnesium.

c. Issue. The above bombs are issued only in clusters as described in section XVIII.

97. BOMB, INCENDIARY, OIL, 6-LB., AN–M69. a. Data. BOMB, incendiary, oil, 6-lb., AN–M69, is hexagonal, 19.5 inches in length and 2.88 inches across the flats. (See fig. 109). It contains a main charge of 2.8 pounds of gelled gasoline and an ejection-igniter charge of 0.4 ounce of black powder and magnesium. The bomb is stabilized in flight by streamers of muslin which, until release of the bomb from the cluster, are packed loosely in the tail cup. The bomb is fuzed with FUZE, bomb, M1, which acts upon impact with 3 to 5 seconds delay. The fragments of the charge burn from 8 to 20 minutes, dependent upon their size.

b. Description. The hexagonal case is made of sheet steel. It is closed at the nose by a sheet steel nose cup and at the tail by a sheet steel tail cup. The charge of gelled gasoline is contained in a cheesecloth sock. The nose cup contains the fuze, the ejection charge, and a diaphragm. Upon functioning of the explosive train, the gel is ignited and ejected out of the tail of the bomb. The tail cup serves as attachment and container for the streamers.

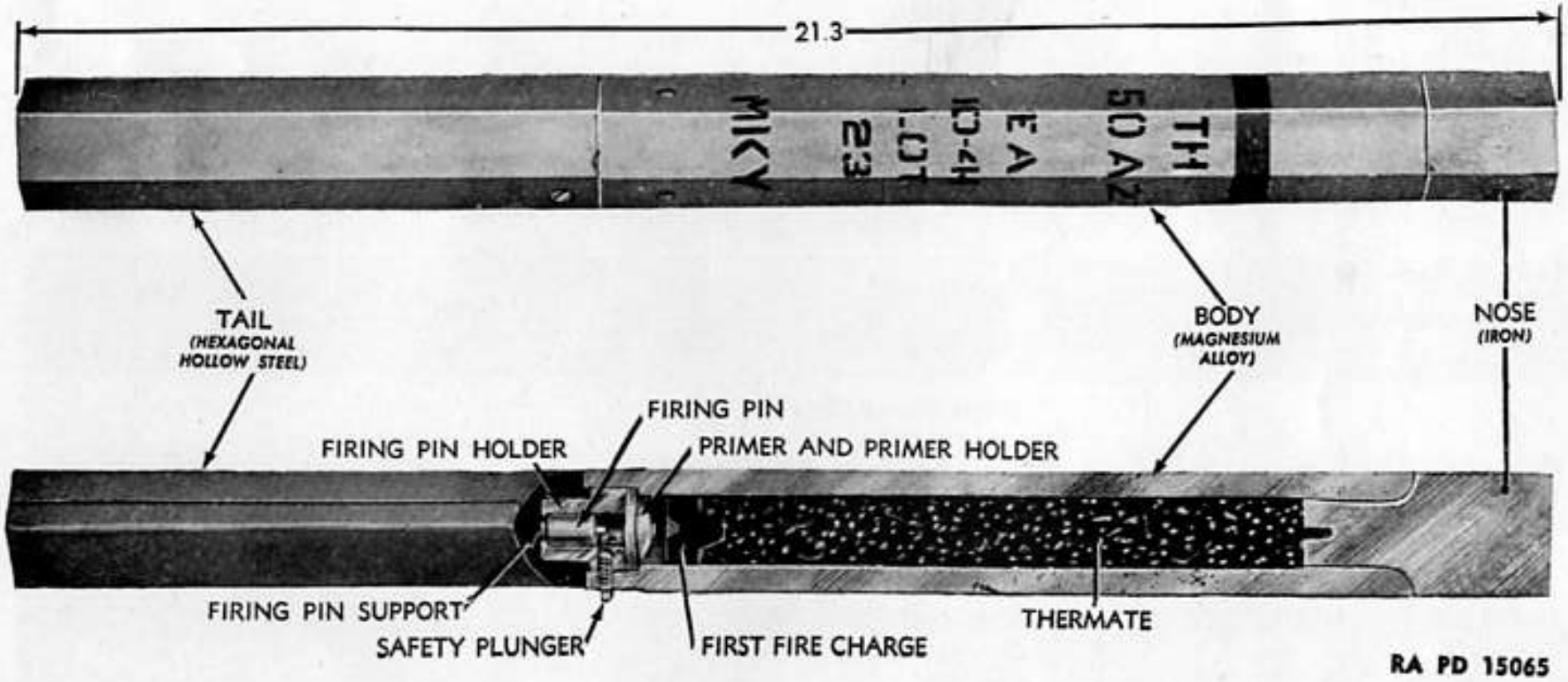


Figure 107. BOMB, incendiary, 4-lb., AN–M50A2.

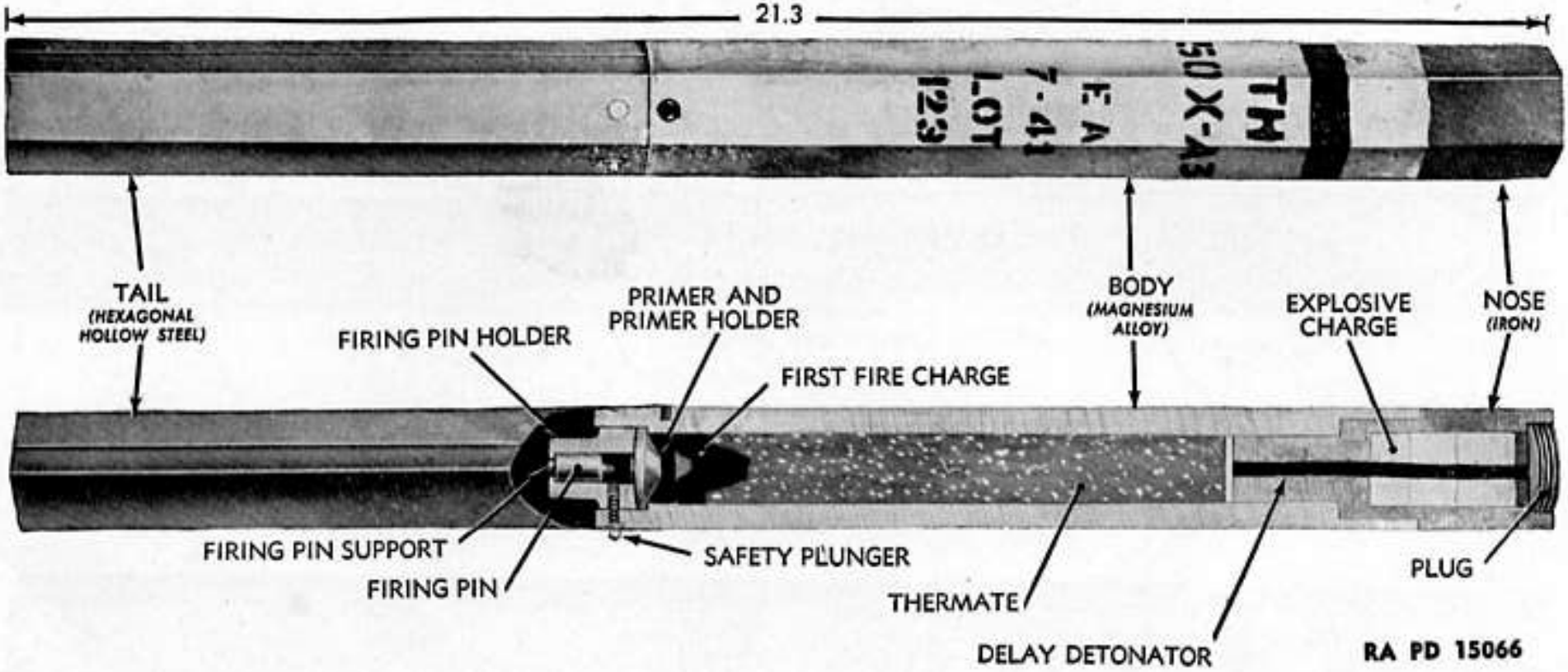


Figure 108. BOMB, incendiary, 4-lb., AN–M50XA2.

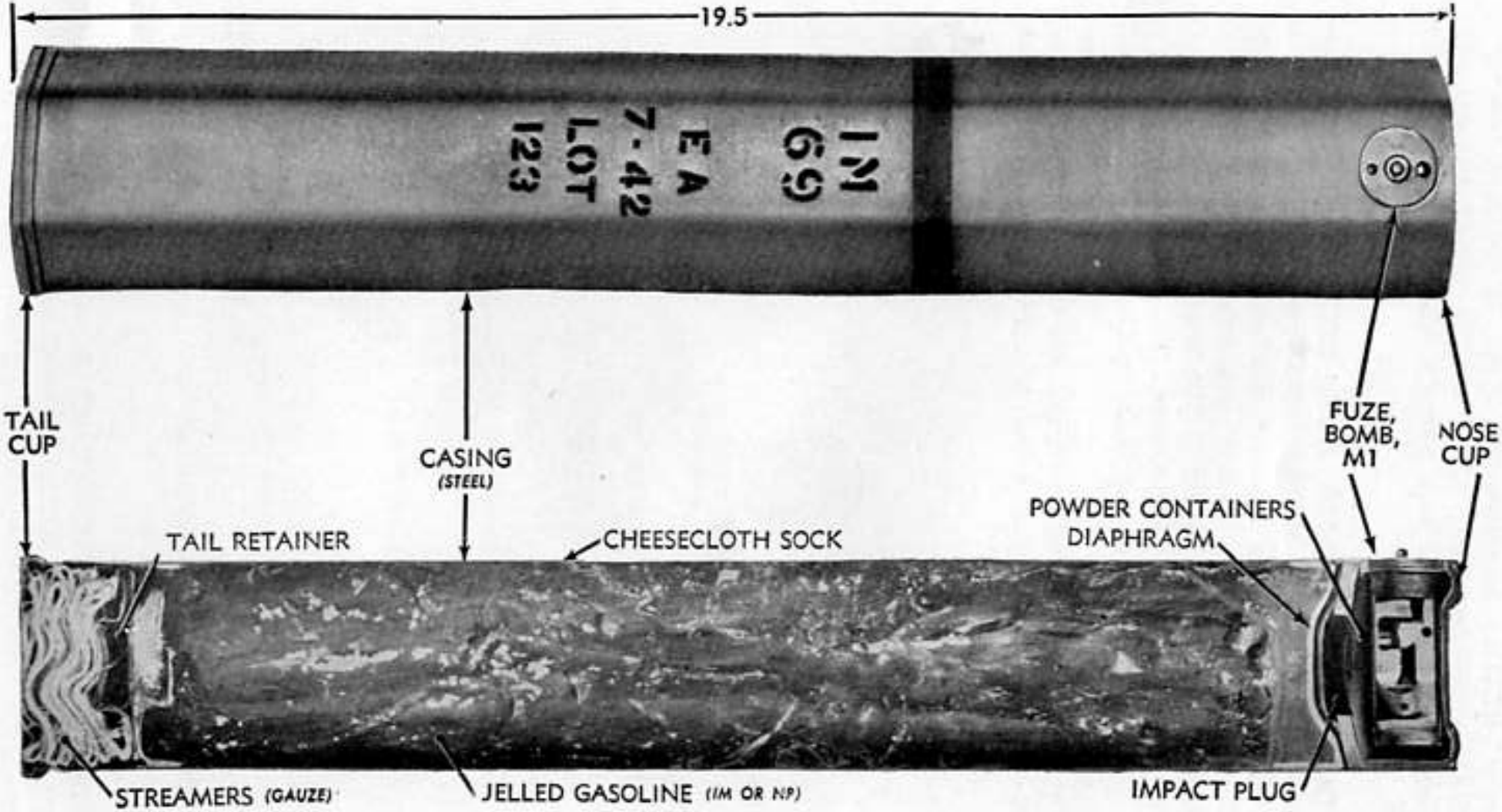


Figure 109. BOMB, incendiary, oil, 6-lb., AN–M69.

c. Issue. BOMB, incendiary, oil, 6-lb., AN–M69, is issued in CLUSTER, incendiary bomb, AN–M12 (100-pound) and AN–M13 (500-pound). This bomb may also be assembled in an aimable cluster.

98. BOMB, CHEMICAL, 100-LB., M47A2 (METAL PARTS). a. Data. BOMB, chemical, 100-lb., M47A2 (metal parts), is the designation of the bomb case before it is loaded with gas, smoke, or incendiary filler. (See pars. 99–101.) It is a round-nose, cylindrical type with fins attached. (See figs. 110–111.) The bomb is 48.92 inches maximum length and 8.125 inches diameter. The body is constructed of sheet steel and is coated on the inside with oil; unloaded, it weighs 26 pounds.

b. Other models. BOMB, chemical, 100-lb., M47A1, differs only from the M47A2 in that the interior is coated with acidproof black paint.

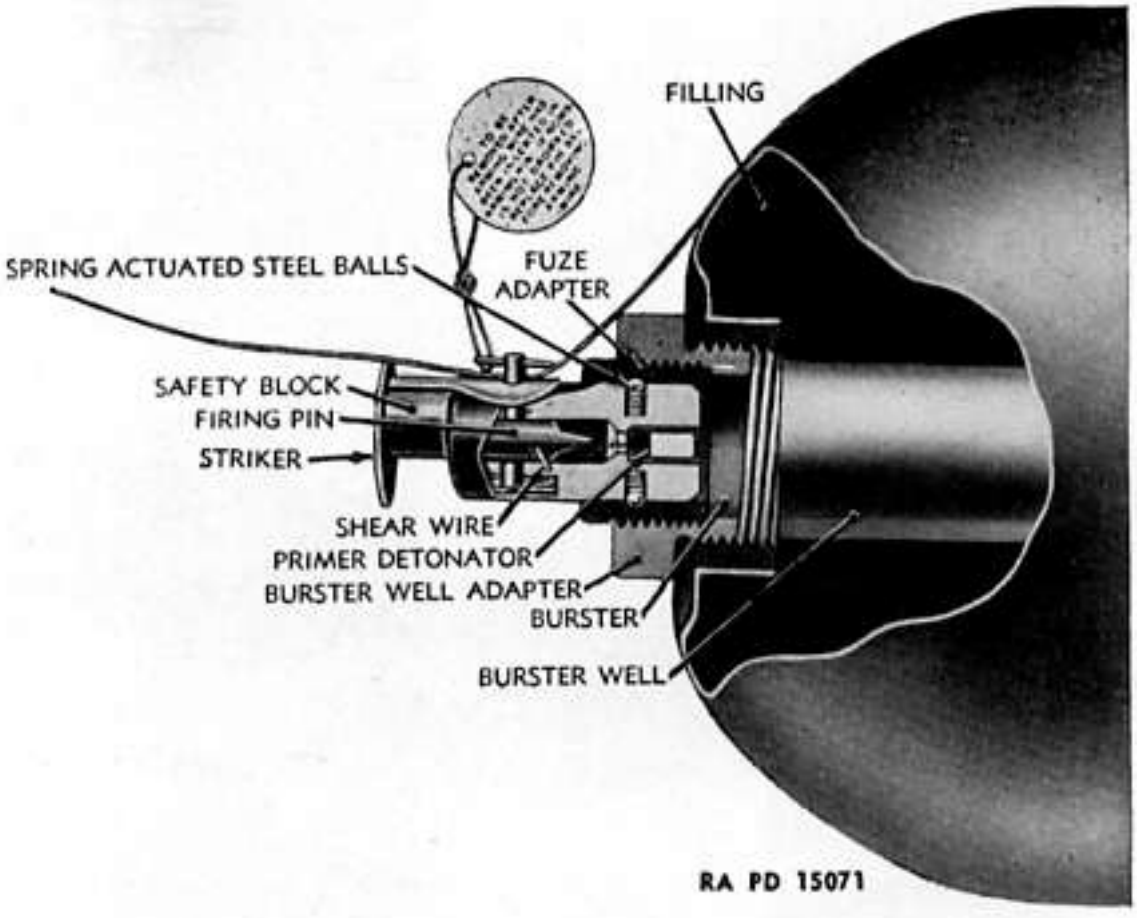


Figure 110. BOMB, chemical, 100-lb., section of nose.

99. BOMB, GAS, PERSISTENT, H, 100-LB., M47A2. a. Data. BOMB, gas, persistent, H, 100-lb., M47A2, is loaded with a 68.5-pound charge of mustard gas. The complete round weighs 98 pounds. (See fig. 111.)

Figure 111. BOMB, gas, persistent, H, 100-lb., M47A2.

b. Fuzes, and burster authorized. BURSTER, M4, is authorized for use in this bomb with H filling. As originally designed, this bomb is adapted for FUZE, bomb, M108 (nose). However, if FUZE, bomb, AN–M126 or AN–M126A1 is available, it is preferred to the M108 and may be used by omitting the fuze seat after assembling the burster. (See par. 95.)

c. Other models. BOMB, gas, persistent, H, 100-lb., M47A1, differs from the M47A2 only in that the interior is coated with acidproof black paint instead of oil. The M47 is not used for H filling.

100. BOMB, SMOKE, PHOSPHORUS, WP, 100-LB., M47A2. a. Data. BOMB, smoke, phosphorus, WP, 100-lb., M47A2, is loaded with a 100-pound charge of phosphorus. The complete round weighs 127 pounds.

b. Fuzes and burster authorized. BURSTER, M4, is authorized for high-altitude bombing; BURSTER, M18 is authorized for low-altitude bombing. BURSTER, M7, may be substituted for either. As originally designed, this bomb is adapted for FUZE, bomb, M108 (nose). However, if FUZE, bomb, AN–M126 or AN–M126A1 is available, it is preferred to the M108 and may be used by omitting the fuze seat after assembling the burster. (See par. 95.)

c. Other models. BOMB, smoke, phosphorus, WP, 100-lb., M47A1, differs in that it carries a charge of 100 pounds of phosphorus and weighs 127 pounds.

101. BOMB, INCENDIARY, 100-LB., AN–M47A2. a. Data. BOMB, incendiary, 100-lb., AN–M47A2, is loaded with a 40-pound charge of gelled gasoline IM or NP. The complete round weighs 69 pounds.

b. Fuzes and bursters authorized. BURSTER AN–M13 and Igniter, AN–M9 are authorized for use in this bomb with incendiary filler. As originally designed this bomb is adapted for FUZE, bomb, M108 (nose). However, if FUZE, bomb, AN–M126 or AN–M126A1,

is available, it is preferred to the M108 and may be used by omitting the fuze seat after assembling the burster. (See par. 95.)

c. Other models. BOMB, incendiary, 100-lb., M47A1, differs only in that the interior coating is acidproof paint instead of oil.

102. BOMB, GAS, PERSISTENT, H, 115-LB., M70. a. Data. BOMB, gas, persistent, H, 115-lb., M70, is a round-nose, cylindrical type. (See fig. 112.) The complete round is 48.7 inches over-all length and 8.1 inches in diameter. It weighs 116.1 pounds and carries a charge of 57.1 pounds of mustard gas. The bomb body is 40.4 inches long and weighs 107 pounds. It is shipped unfuzed, without fin or burster, with wooden lug protectors. Fin assembly, fuze, and burster are each shipped separately. The arming wire is packed with the fin.

b. Fuzes and burster authorized. FUZE, bomb, AN–M110A1 and BURSTER, M10, are authorized for use in this bomb. FUZE, bomb, M110 reworked, may be substituted if required.

c. Other models. This bomb may also be filled with Lewisite.

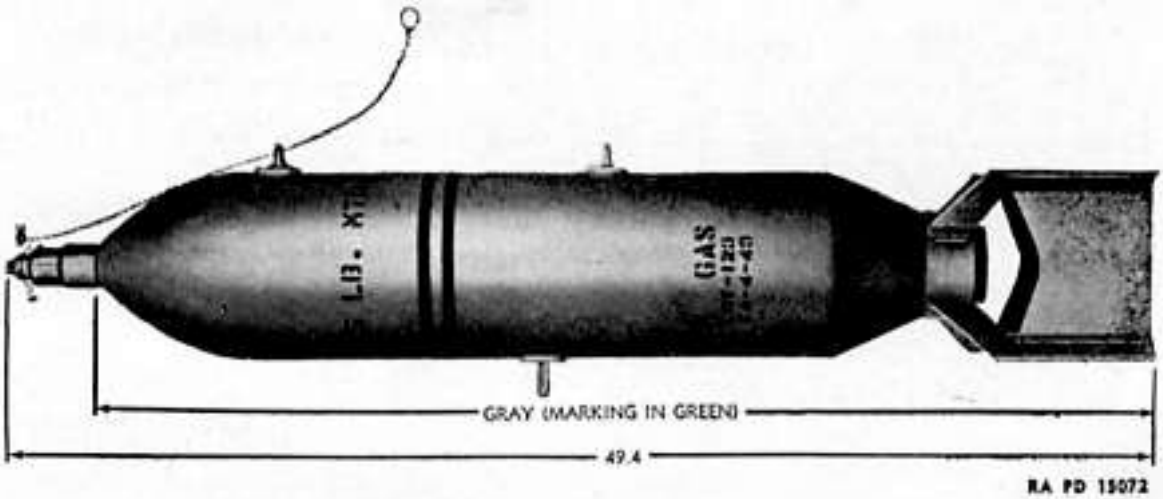


Figure 112. BOMB, gas, persistent, H, 115-lb., M70.

103. BOMB, INCENDIARY, 500-LB., AN–M76. a. Data. BOMB, incendiary, 500-lb., AN–M76, consists of the body for the 500-lb., G.P. bomb modified for field assembly of burster and igniter, and loaded with a gasoline gel-magnesium mixture. As released the bomb weighs 475 pounds, including 180-pounds of incendiary mixture.

b. Components. The complete round consists of the following separately issued items:

(1) Bomb, incendiary, 500-lb., AN–M76, unfuzed, without fuze seat liner, adapter-booster holder, igniter, burster, or fin assembly, in shipping bands, with nose and tail plugs and fin lock nut protector.

(2) Nose and tail fuze. (See e, below.)

(3) Fuze seat liner, packed separately in bulk.

(4) Adapter-booster holder, with adapter-booster, M115 or M115A1, packed separately, 12 per box.

(5) Igniter, AN–M5, packed separately, 5 per box.

(6) Burster, AN–M14, packed separately, 40 per box.

(7) Fin assembly for 500-lb. bombs, G.P., AN–M64 and AN–M64A1, incendiary AN–M76 and chemical AN–M78, packed separately, 1 per crate.

(8) Wire, arming, assembly, Pc. Mk. 82–3–234HB, packed 5 per can, 20 cans per box.

c. Authorized fuzes. The following fuzes may be used with this bomb: FUZE, bomb, AN–M103 (nose) set for instantaneous action, and FUZE, bomb, AN–M101A2, with primer detonator, M14, nondelay. FUZE, bomb, M103, partially armed if necessary, may be substituted for the AN–M103 and FUZE, bomb, AN–M101A1 may be substituted for the AN–M101A2. When air burst is desired, FUZE, bomb, mechanical time, M127, with adapter-booster M117 may be used. FUZE, bomb, M124 (tail) or M133 (tail) may be used when required.

d. Assembly. The procedure for assembling the complete round is:

(1) Remove nose and tail plugs and examine the burster well to insure that it is clear and free of foreign material. The nose fuze seat liner is shipped separately to facilitate this inspection.

(2) Insert fuze seat liner in the nose of the bomb and seat it firmly.

(3) Inspect igniter for leaks. Be sure that the igniter is straight, that there are no cracks or holes in the case, and that the central well is unobstructed.

(4) Insert a burster into the well of the igniter and insert both through the opening in the base of the bomb. Push them forward until they seat snugly.

(5) Inspect an adapter-booster-holder assembly and screw it into the base of the bomb. Tighten with wrench supplied.

(6) Remove fin lock nut and protector. Place fin assembly over the tail of the bomb so that one fin lines up with the suspension lugs. Replace fin lock nut and tighten.

(7) Assemble nose and tail fuzes as described in sections V and VII.

(8) If the bomb is not used, it will be disassembled and the components restored to their original condition and packings.

e. Issue. BOMB, incendiary, 500-lb., AN–M76 without components and igniter, AN–M5, are stored and issued by CWS. Fuzes, fins, burster, adapter-boosters, and fuze seat liners are stored and issued by Ordnance.

Note. The bomb is adapted for the AN–M103 nose fuze and the M127 time fuze is designed for a smaller fuze seat. Consequently, when air burst is desired, an adapter-booster, M117 is screwed into the fuze seat of the bomb and the time fuze is assembled in the fuze seat of the adapter.

104. BOMB, CHEMICAL, 500-LB., M78. a. Data. BOMB, chemical, 500-lb., M78, is a nonpersistent gas bomb which weighs approximately 450 pounds, as released. The chemical charge consists of about 170 pounds of CC filler. The bomb body is similar to that of the 500-pound G.P. bomb except that the base is welded to the case and burster well runs the length of the bomb. Valve, needle, AN–M1, is assembled in the base of the bomb for surveillance purposes. The outlet of the valve, closed by a ⅛-inch pipe lug, is located in a ⅝-inch hole, opening to the periphery of the plug. The valve stem is located in a recess in the base plug and is protected by a screw cap. The burster well is closed by a nose and a tail plug.

b. Components. The complete round consists of the following components:

(1) BOMB, chemical, 500-lb., M78, unfuzed, without fin assembly, fuze seat liner, adapter-booster, or burster.

(2) Fin, assembly for 500-lb., bombs, G.P., AN–M64 and AN–M64A1, incendiary, AN–M76 and chemical, M78.

(3) Nose and tail fuzes. (See c, below.)

(4) Adapter-booster, M115 or M115A1.

(5) Burster, AN–M15.

(6) Liner, fuze seat.

(7) Wire, arming, assembly, Pc. Mk. 82–3–234HB.

c. Authorized fuzes. The following fuzes are authorized for use in this bomb:

(1) FUZE, bomb, AN–M103, set superquick, and FUZE, bomb, AN–M101A2, with primer-detonator, M14, nondelay.

(2) FUZE, bomb, M103 and FUZE, bomb, AN–M101A1, partially armed if necessary, may be substituted for those above.

(3) FUZE, bomb, mechanical time, M127 (nose), with adapter-booster, M117, may be used if air burst is desired.

(4) FUZE, bomb, M124 or M133 (tail) may be used when required.

d. Assembly. The procedure for assembling the complete round is as follows:

(1) Remove nose and tail plugs and inspect the burster well to be sure that it is unobstructed and free of foreign material.

(2) Insert fuze seat liner in nose of bomb and seat it firmly.

(3) Insert booster through opening in base and push it forward until it seats against the fuze seat liner.

(4) Insert adapter-booster and screw it down firmly. Tighten with wrench supplied.

(5) Remove fin lock nut from protector. Place fin assembly over tail of bomb with one fin in line with suspension lugs. Replace fin lock nut, and tighten.

(6) Assemble nose and tail fuzes as described under the particular fuze.

(7) If bomb is not used, disassemble and return components to original condition and packings.

e. Precautions. In addition to the precautions for handling bomb, given above, and the precautions to be observed in storing chemical ammunition given in TM 9–1900, the following will be observed:

CC, AC, and CG bombs will not be stored in places where facilities for ventilation are poor. Test papers will be exposed near such stores and all personnel working in magazines will carry masks equipped with effective cannisters. Each bomb will be weighed before being placed in storage and again before shipment or use. Any bomb showing a loss of weight of 10 pounds will be considered as leaking seriously and will be destroyed. Extreme care will be exercised in such magazines since AC is not only poisonous but explosive. Masks equipped with the appropriate cannister will be worn by all personnel when surveillance or inspection requires the withdrawal of AC from the bomb, or when a leaking bomb is discovered.

105. BOMB, CHEMICAL, 500-LB., M78. BOMB, chemical, 500-lb., M78 resembles the CC bomb described above except that the chemical charge consists of approximately 205 pounds of phosgene. The weight of the complete round is approximately 485 pounds.

106. BOMB, CHEMICAL, 1,000-LB., AN–M79. a. Description. BOMB, chemical, 1,000-lb., AN–M79, resembles the 500-lb., chemical bomb M78 except in size. The body is a 1,000-pound, G.P. bomb body modified in the same manner as the 500-pound G.P. is modified for the 500-pound bomb. The chemical charge consists of about 200-lb. of AC filler.

b. Components. Complete round weighs 722 pounds and consists of the following:

(1) BOMB, chemical, 1,000-lb., AN–M79, unfuzed without fin assembly, fuze seat liner, adapter-booster, or burster.

(2) Fin assembly for 1,000-lb. bomb, G.P., AN–M65 and AN–M65A1 and chemical AN–M79.

(3) FUZE, bomb, AN–M103 or M103, or FUZE, bomb, mechanical time, M127 with adapter-booster, M117.

(4) FUZE, bomb, AN–M102A2 or AN–M102A1, with primer detonator M14, nondelay.

(5) Burster, AN–M16.

(6) Adapter-booster, M115 or M115A1.

(7) Liner, fuze seat.

(8) Wire, arming, assembly, Pc. Mk. 82–3–234ZA.

c. For assembly procedure and precautions, see paragraph 104.

107. **BOMB, CHEMICAL, 1,000-LB., AN–M79.** This bomb is similar to the AC bomb described above except for the differenece in filler and corresponding difference in weight. The chemical charge consists of approximately 340 pounds of CC filler, and the complete round weighs about 860 pounds.

108. **BOMB, CHEMICAL, 1,000-LB., AN–M79.** This bomb is similar to the AC bomb described above except for the difference in filler and corresponding difference in weight. The chemical charge consists of 417 pounds of phosgene, and the complete round weighs 939 pounds.

SECTION XII. FRAGMENTATION BOMBS

109. **GENERAL.** a. **Description.** Fragmentation bombs are heavy-case bombs designed for use against such targets as personnel and light matériel. They are so-called because their principal effect is produced by the fragments of the heavy case. Fragmentation bombs are fuzed to explode before penetration. Those used for minimum altitude attack are equipped with parachutes to retard the fall of the bomb until the plane has cleared the danger area; those used from higher levels are stabilized in flight by fins. In general, the bomb body consists of a thin steel cylinder closed at each end by a heavy metal plug. The side walls are reinforced by a heavy spiral steel bar. The nose plug is threaded to receive an impact fuze and the tail plug is threaded to provide attachment for the fin assembly or parachute unit assembly. Large fragmentation bombs are adapted for both nose and tail fuze.

b. **Components.** The components of complete fragmentation bombs are as follows:

(1) *Fin type.* (*a*) Unfuzed bomb; includes—

1. Bomb body, including case, nose, and base.

2. Explosive, TNT or Comp B.

3. Fin assembly.

(*b*) Vane type nose fuze.

(*c*) Vane type tail fuze (large bombs only).

Note. No arming wire is necessary for bombs assembled in clusters, since the vane stop of the cluster adapter keeps the fuze from arming until the bomb is released from the cluster.

(2) *Parachute type.* (*a*) Unfuzed bomb; includes—

1. Bomb body, including case, nose, and base.

2. Explosive TNT or Comp B.

3. Parachute unit assembly including parachute assembly, parachute case assembly, and arming wire assembly.

(*b*) Pin type nose fuze with delayed arming.

(3) *Body.* The same bomb body is used for both types of small fragmentation bomb. It is 11.4 inches in length and 3.64 inches in diameter. Its weight is 17.9 pounds, of which 2.7 pounds is high explosive.

(4) *Fins.* The stabilizer assembly of small bombs consists of an axial member to which four radial fins are attached. One end is threaded for attachment to the bomb and the other end is formed into a lug for vertical suspension of the bomb. Large fragmentation bombs have a box type fin.

(5) *Parachute unit assembly.* The parachute unit assembly consists of a cylindrical parachute case which is attached to the bomb body and contains the parachute and shrouds, arming cord, parachute top cord assembly; and, in the case of individually suspended bombs, a pull out wire and pull out wire container. The case is closed, in the cluster bomb, by a loose cap held in place by the cluster adapter. In the latter, the pull wire container serves to close the case, however, for handling a shipping cover is sealed in place.

c. **Assembly.** (1) Bombs issued in clusters are completely assembled. For assembly and installation of the cluster see section XVII.

(2) Large fragmentation bombs are assembled in accordance with directions for G.P. bombs. (See par. 73.)

(3) Small bombs for individual suspension are assembled and installed as follows:

(*a*) Remove the bomb from its packings and remove the fuze hole plug. Inspect to be sure that the cavity and threads are clear and the suspension cables on the parachute case are securely attached.

(*b*) Remove the fuze from its packing and inspect to insure that the safety cotter pin is in place and the fuze has not become armed and that the fuze is otherwise serviceable.

(*c*) Remove the tape holding the arming wire to the case and disengage the arming cord from the case coupling.

(*d*) Screw the fuze into the bomb handtight. If the fuze arming pin is not approximately in line with the arming wire, back off the fuze and use paper or cardboard shims so that when the fuze is handtight the pin will be in line.

(*e*) Thread the arming wire through the inner eyelet in the fuze arming pin.

(*f*) Move the suspension cables aside and remove sealing strip and shipping cover from the parachute case. Uncoil the pull out wire from the case, taking care not to loosen its container.

(*g*) Remove the safety cotter pin from the fuze and suspend the bomb in the rack by the S-hook on the suspension cables. Attach the loop on the pull out wire to the arming pawl.

(*h*) If the bomb is not dropped the above steps will be reversed and the components returned to their original condition and packing.

d. Function. The functioning of bombs in clusters is described in section XVII. Fragmentation bombs suspended individually function in the following steps.

(1) *Dropped armed.* The suspension hook releases the bomb; the arming hook retains the pull out wire, pulling out the container. The pilot disk of the top cord assembly is caught by the air stream and pulls the parachute from the case. The arming cord is attached to the parachute shrouds and, as the parachute opens and the shrouds straighten, the arming cord pulls the arming wire from the fuze and allows the fuze to arm in 2 to 2.5 seconds. Meanwhile, the bomb retarded by the parachute falls with a terminal velocity of approximately 20 miles per hour. Upon impact the bomb explodes, projecting fragments over an effective radius of 10 to 25 yards.

(2) *Dropped "Safe".* When dropped "Safe," the pull out cord is released with the bomb. The container remains in place keeping the parachute in the case. Since the parachute does not open, the arming wire is not pulled from the fuze and the fuze does not function on impact.

e. Typical targets. Typical targets for fragmentation bombs include personnel, unarmored and lightly armored vehicles, and airplanes on the ground.

f. Limitations. Because of their small size, direct hits or near misses are required for this type bomb to damage armored targets. Plane loads are limited by number of bombs and not by full weight carrying capacity.

110. BOMB, FRAGMENTATION, 23-LB., AN–M40 AND AN–M40A1. a. BOMB, fragmentation, 23-lb., AN–M40, is a parachute type fragmentation bomb, designed for assembly in clusters. The fuzed bomb is 29.5 inches in length, 4.35 inches in maximum diameter, and weighs 24.7 pounds. FUZE, bomb, AN–M104, AN–M120, or AN–M120A1 are authorized for use in this bomb. BOMB, fragmentation, 23-lb., AN–M40 is issued only in CLUSTER, fragmentation bomb, M4, AN–M4 and AN–M4A1. (See sec. XVII).

b. BOMB, fragmentation, AN–M40A1 is modified by the addition of a shoulder at the nose of the bomb, increasing the length by ½ inch. (See fig. 113.)

111. BOMB, FRAGMENTATION, 20-LB., AN–M41 AND AN–M41A1. a. BOMB, fragmentation, 20-lb., AN–M41, is a fin stabilized type. The fuzed bomb is 21.8 inches in length, 3.64 inches in diameter, and weighs 19.8 pounds. It is currently issued only in clusters. FUZE, bomb, M110, and FUZE, bomb, AN–M110A1 are authorized for use in this bomb. BOMB, fragmentation, 20-lb., AN–M41, is issued in CLUSTER, fragmentation bomb, M1. CLUSTER, fragmentation

bomb, AN–M1A1 and CLUSTER, fragmentation bomb, AN–M1A2. (See sec. XVII.)

b. AN–M41A1. This modification includes the addition of a shoulder at the nose of the bomb to provide a bearing for the cluster adapter so that the clustered bombs can be shipped unfuzed. The shoulder adds ½ inch to the length of the bomb. (See fig. 113.)

112. BOMB, FRAGMENTATION, 23-LB., M72. a. Data. BOMB, fragmentation, 23-lb., AN–M72 is a parachute type fragmentation bomb, designed for single suspension invertical racks. It is 31.3 inches in length including the length of the suspension cords, and weighs 24.6 pounds.

b. Complete round. The complete round consists of the unfuzed bomb, which is packed 2 per wooden box, and the nose fuze, which is packed in an individual metal container in a compartment in the box with the bomb.

c. Fuzes authorized. Fuzes authorized for use with this type and weight of bomb are—

(1) FUZE, bomb, AN–M120A1 (nose).

(2) FUZE, bomb, AN–M120 (nose).

Note. It should be noted that fuzes authorized for parachute type and those for fin type bombs are not interchangeable. The vane type fuze will not arm on the parachute bomb, and the pin type may function from wind pressure if used on the fin-stabilized bomb.

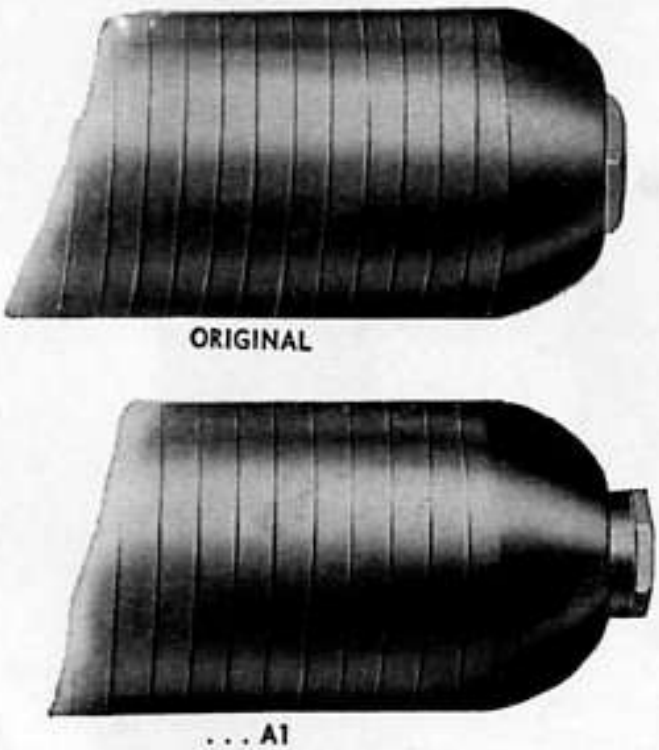
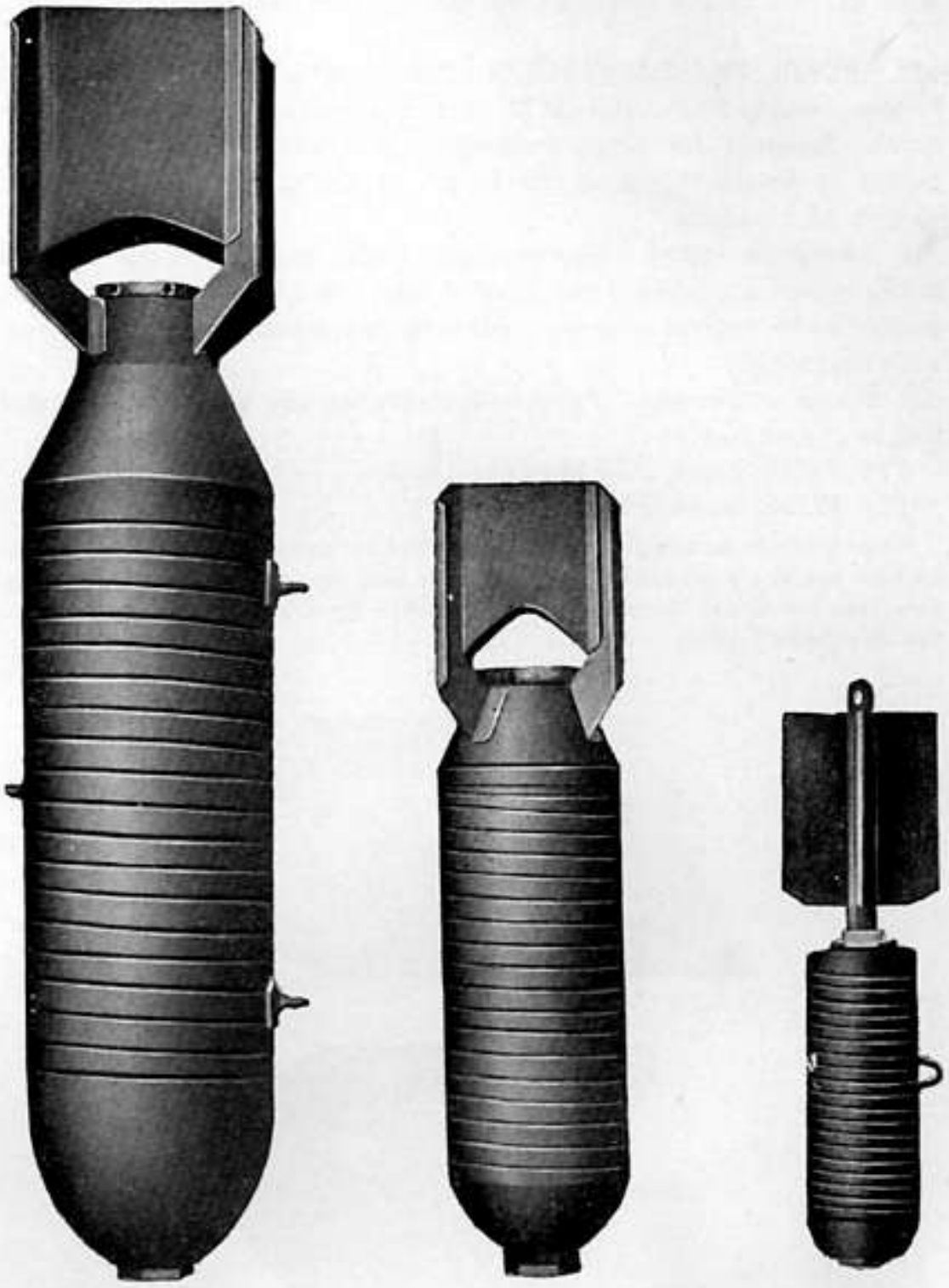


Figure 113. Modification of fragmentation bombs.

113. **BOMB, FRAGMENTATION, 90-LB., M82.** This bomb (fig. 114) is designed for use in clusters or in individual suspension. The bomb body is, approximately, 20 inches in length, 6 inches in diameter, and 85 pounds in weight. It is adapted for nose fuze AN–M103 which



RA PD 26811

Figure 114. Comparative sizes of 260-lb. bomb, fragmentation, AN–M81; 90-lb. bomb, fragmentation, M81; 20-lb. bomb, fragmentation, AN–M41.

must be equipped with a special short arming vane when the bomb is clustered. The bomb body is shipped unfuzed and without fin strapped, six to a pallet. The bomb is assembled as described under paragraph 153, CLUSTER, fragmentation bomb, T8.

114. BOMB, FRAGMENTATION, 260-LB., AN–M81. This bomb (figs. 114 and 115) is designed for individual suspension. The bomb body is approximately 34 inches in length, 8 inches in diameter, and 252 pounds in weight. The complete round is 43.7 inches over-all, and weighs 262 pounds. The authorized fuzes are FUZE, bomb, AN–M103 or M103, set instantaneous, and FUZE, bomb, AN–M100A2 or AN–M100A1 with primer detonator M14, nondelay. The assembly of the bomb is the same as that described for G.P. bomb. (Par. 73.)

RAPD 50358

Figure 115. BOMB, fragmentation, 260-lb., AN–M81.

115. BOMB, FRAGMENTATION, 4-LB., M83. This bomb (fig. 116) is a small cylindrical bomb used only in clusters. The fuze is set into the bomb body and has a cable extension on which the bomb case assembly (butterfly wings) is mounted. When the bomb is released from the cluster the butterfly wings open by spring action and begin to rotate, arming the fuze and retarding the fall of the bombs. The bomb is issued in CLUSTER, fragmentation bomb, M28 (100-pound) and M29 (500-pound) with fuze assembled. The action of the fuze is specified in the marking of the cluster and may be air-burst or impact, mechanical time, or antidisturbance.

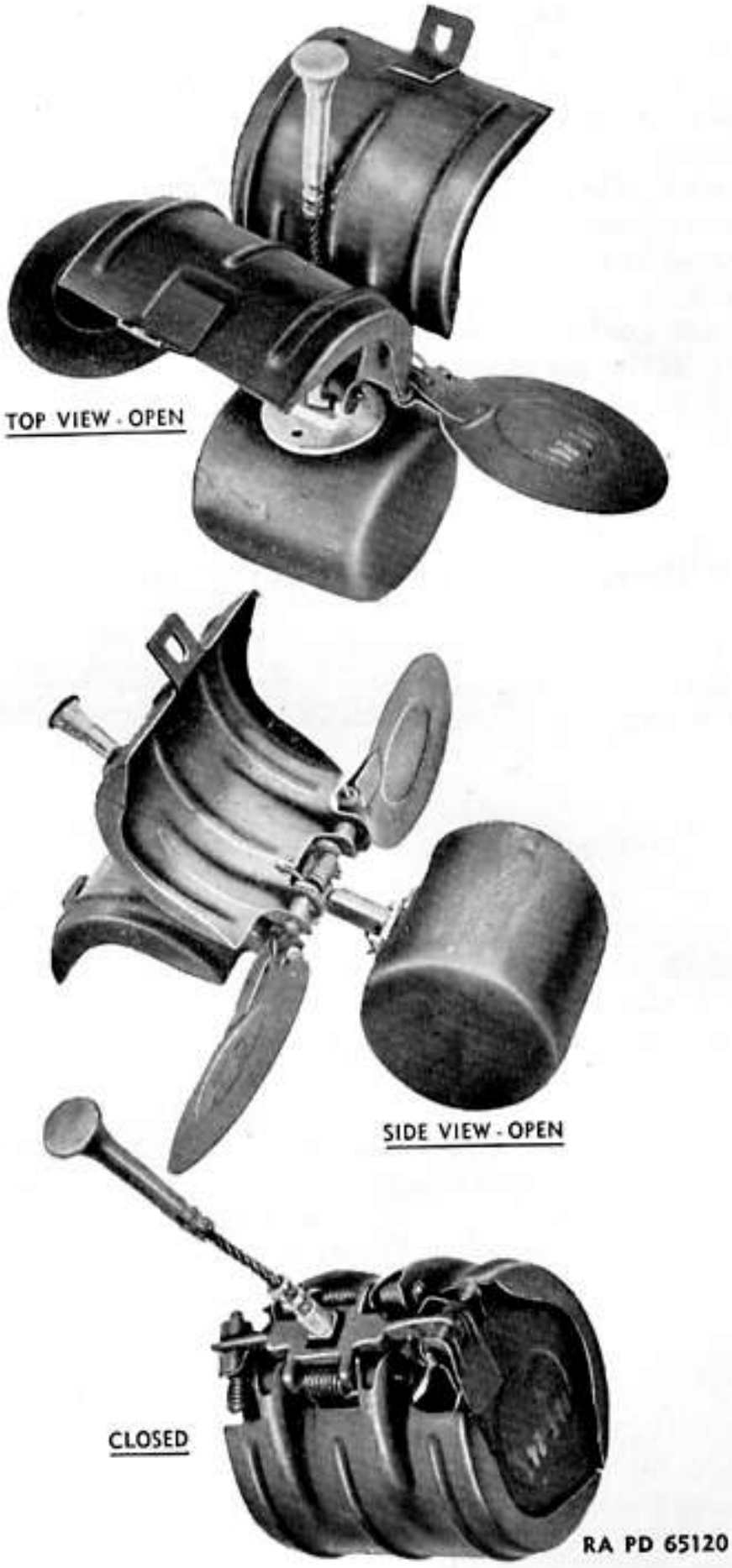


Figure 116. BOMB, fragmentation, 4-lb., M83 (closed and open).

SECTION XIII. PHOTOFLASH BOMBS AND BOMBARDMENT FLARES

116. **GENERAL.** Photoflash bombs and bombardment flares are pyrotechnic items which are described in detail in TM 9–1981. However, since photoflash bombs are properly called bombs because of their explosive qualities and bombardment flares are fuzed and prepared for use in the same manner as bombs, a brief description of these items is given below.

117. **BOMB, PHOTOFLASH, M46.** **a. Data.** **BOMB**, photoflash, M46, is cylindrical with a round nose. (See fig. 33.) It is adapted for a nose fuze and the fins are assembled to the bomb as issued. The bomb is 48.6 inches in length and 8 inches in diameter. It weighs 51.9 pounds and contains a charge of 25 pounds of flashlight powder in an inner fiber container. When the fuze functions, the charge explodes producing a light of 500,000,000 candle power, maximum, burning for 0.25 second.

b. Authorized fuze. The fuze authorized for use with this bomb is **FUZE**, flare, mechanical time, M111A2. This fuze has a time setting range of from 5 to 93 seconds and can be set to function at any altitude from 2,000 to 25,000 feet below the releasing plane. Earlier models of this fuze may also be used; the M111A1 has a longer arming time, the M111 has the longer arming time and has a time range of from 15 to 93 seconds.

c. Assembly. To assemble the complete round the following sequence will be observed:

(1) Remove the bomb from its packing and inspect bomb body and fuze well for any damage. If there is any evidence of leakage of photoflash powder either into the shipping box or into the fuze cavity, the bomb will be placed in a tight container and carefully transported to the disposal area and destroyed with a block of explosive.

(2) Set the fuze and assemble it to the bomb as described in paragraph 41.

(3) If the bomb is not used, return bomb and fuze to their original condition and packings.

d. Precautions. Photoflash bombs may not be stored with any other type of explosives and ammunition. They must be handled with exceptional care as the photoflash powder, with which they are loaded, is more sensitive than black powder. If any powder should be spilled, all work in the vicinity must be stopped until the powder is taken up, the source of the spillage located, and the spilled powder and the broken container placed in a tight container and removed. The spilled

powder should be covered with an inert, nonabrasive, powder such as talc, and brushed up with a soft brush. Any possible residue should be taken up by dabbing with a damp cloth.

118. FLARE, AIRCRAFT, PARACHUTE, AN–M26. a. Data. FLARE, aircraft, parachute, AN–M26, is a flare which is discharged from its case and ignited when the fuze functions. It is parachute supported and burns for 3 to 3.5 minutes with a yellowish light of 800,000 candle power. The fuzed flare is 50 inches in length, 8 inches in diameter, and weighs 52.5 pounds. Authorized fuzes are the same as those authorized for the photoflash bomb described in paragraph 117.

b. Assembly. To assemble the complete round, proceed as follows:

(1) Remove the flare and fuze from the packings and inspect for serviceability.

(2) Unseal and remove the shipping cover from the base of the flare case.

(3) Uncoil the hangwire-arming wire assembly from the container, pass it around the case and thread the wire through the forward suspension lug. Be careful not to pull on the hangwire so strongly as to pull out the hangwire container.

(4) Set and assemble the fuze as described in paragraph 41.

(5) If the flare is not used, reverse the steps above and return flare and fuze to their original condition and packing.

SECTION XIV. PRACTICE BOMBS

119. GENERAL. Practice bombs are provided for training of bombing crews in marksmanship. They resemble service bombs in appearance and flight characteristics and are provided with a fuze and spotting charge unless conditions make a special spotting charge unnecessary.

120. BOMB, PRACTICE, 3-LB., AN–MK. 5-MOD. 1. a. Data. BOMB, practice, 3-lb., AN–Mk. 5-Mod. 1, is a streamlined miniature practice bomb 8.25 inches in length and 2.5 inches in diameter. It is made of chromium plated steel. The authorized spotting charge is SIGNAL, bomb, practice, miniature, AN–Mk. 4.

b. Other models. BOMB, practice, 3-lb., AN–Mk. 23, is the same as the AN–Mk. 5-Mod. 1 except that it is made of cast iron. BOMB, practice, 4.5-lb., AN–Mk. 43, is the same except that it is made of lead. Cartridge, M4 or M5 may be substituted for SIGNAL, bomb, practice, miniature, AN–Mk. 4.

c. Assembly. In order to assemble the spotting charge it is only necessary to remove the cotter pin in the nose of the bomb, remove the firing pin, insert the signal or cartridge, and replace the firing pin and cotter pin.

121. BOMB, PRACTICE, 20-LB., M48. This bomb represents a finstabilized fragmentation bomb. It is 21.8 inches in length and weighs 19.7 pounds. This bomb is intended to simulate to BOMB, fragmentation, 20-lb., AN–M41. It resembles the latter except that the body has a sheet metal closing disk in the side, and the charge is 2 ounces of black powder. The fuzes authorized for this bomb are FUZE, bomb, AN–M110A1 (nose), or FUZE, bomb, M110 (nose). BOMB, practice, 20-lb., M48 is issued only in CLUSTER, practice bomb, M2 and CLUSTER, practice bomb, M2A1. (See sec. XVII.)

122. BOMB, PRACTICE, 23-LB., M71 AND M71A1. These bombs represent parachute type fragmentation bombs for assembly in clusters. The complete bomb consists of BODY, bomb, for 23-lb., practice bomb, M71 and M73, or M71A1 and M73A1 and parachute unit, assembly, M3 (modified from M4 by removal of suspension assembly, band assembly, and pull wire container). Note that fuze and spotting charge are unnecessary since the parachute is ample for spotting purposes. BOMB, practice, 23-lb., M71, is 26.8 inches long and weighs 21 pounds. The M71A1 is modified by the addition of the shoulder to the nose of the bomb. It is used only in CLUSTER, practice bomb, M5. (See sec. XVII.)

123. BOMB, PRACTICE, 23-LB., M73. BOMB, practice, 23-lb., M73, simulates a parachute type fragmentation bomb intended for individual suspension. The complete round consists of an empty service bomb body and a parachute unit assembly. It is assembled by setting back the set screw in the collar on the base of the bomb body, screwing in the coupling of the case assembly and tightening the set screw. No fuze or spotting charge is necessary since the parachute serves for spotting purposes. The bomb, 28.5 inches long, weighs 21.1 pounds.

124. BOMB, PRACTICE, 100-LB., M38A2. a. Data. BOMB, practice, 100-lb., M38A2, is a round-nosed cylindrical bomb designed to simulate general-purpose bombs. (See fig. 117.) It is 47.5 inches long and 8.13 inches in diameter. As issued, the fins are assembled to the bomb body which is empty for sand loading in the field. The empty bomb weighs 15.7 pounds, sand filled; with spotting charge assembled, it weighs 100 pounds. The spotting charge is assembled in a sleeve at the base of the bomb, within the fin box.

b. Spotting charge. The authorized spotting charges are CHARGE, spotting, assembly, M1A1, M3, and M4. These assemblies consist of a 3-pound charge and an integral fuze consisting of an inertia type firing pin restrained by an arming pin, with a blank loaded shotgun shell for a primer. The M3 produces a large amount of black smoke and is authorized for use over ranges completely covered with snow. The M4 is authorized for use on ranges equipped with sonic spotting devices. The M1A1 is authorized for all other uses.

c. Assembly. To assemble the complete round, the following procedure may be used:

(1) *Load with sand to weight:* Remove the bomb from the carton and inspect for serviceability. Remove the closing cover from its place in the sleeve. Place the bomb upright and fill completely with a uniform sand mixture. Shake the load down well so that there will be no room for it to shift. If a lighter loading is desired, mix sawdust or sifted ashes with the sand. The bomb must be filled, and the loading material must be uniform. Press the closing cap into place.

(2) *Assembly spotting charge:* Insert spotting charge assembly and seat firmly with arming pin pointing away from bomb suspension lugs. Pass arming wire through rear suspension lug and then through eyelet in arming pin. Adjust to protrude 2 to 3 inches.

125. BOMB, PRACTICE, TARGET, 100-LB., M75. a. Data. BOMB, practice, target, 100-lb., M75, is provided to furnish a target reference for practice bombing over snow covered ranges. The bomb resembles the 100-pound chemical bomb and consists of a light sheet metal case, a charge of red iron ore (hematite), a burster, and a fuze. The bomb is 47 inches long and 8 inches in diameter. It weighs 101.3 pounds of which 72 pounds is hematite. Upon impact the burster distributes the charge over an area 35 feet in diameter.

b. Complete round. The complete round consists of the bomb, unfuzed, without burster, BURSTER, M4, FUZE, bomb, M108 (nose), with pressure plate, and WIRE, arming, assembly. The complete round, except burster, is shipped unassembled in a wooden box.

c. Assembly. To assemble the complete round, the following sequence should be observed:

(1) Remove components from packing and inspect for serviceability.

(2) Remove the fuze seat and adapter sleeve from the adapter.

(3) Insert the burster in the burster well; push it in until the shoulder of the burster seats against the shoulder of the burster well. Use no force.

(4) Replace the adapter sleeve and screw firmly against the burster.

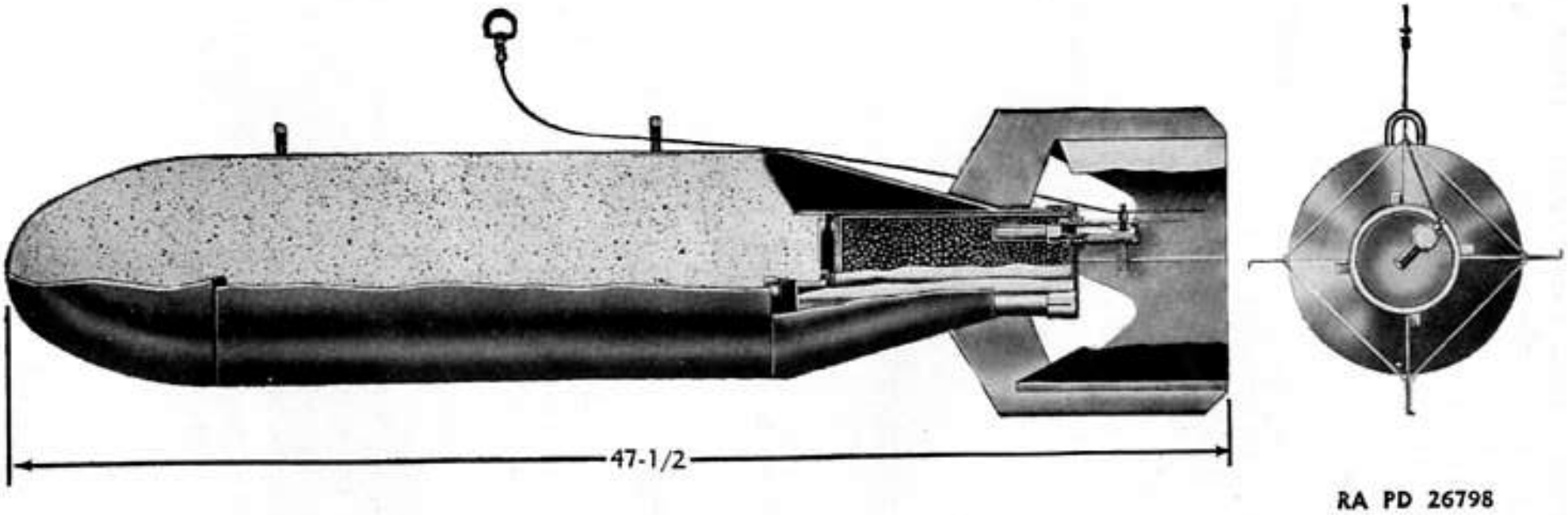


Figure 117. BOMB, practice, 100-lb., M38A2.

(5) Assemble the pressure plate to the striker of the fuze bending the lugs on the plate to hold it securely.

(6) Push the fuze into the fuze seat until both ball latches engage the groove in the seat.

(7) Screw the fuze seat, with fuze, into the bomb handtight. Arrange the arming pin so that the safety cotter pin is perpendicular to the length of the fuze.

(8) Thread the arming wire through the forward suspension lug of the bomb then, pressing the head of the arming pin to expose the lower hole, thread the arming wire through the inner eyelet in the arming pin.

(9) When the bomb is installed in the rack, remove the safety cotter pin in the fuze.

(10) If the bomb is not dropped, disassemble and return the components to their original condition and packing, reversing the above steps.

SECTION XV. DRILL BOMBS

126. **GENERAL.** Drill bombs are provided for training of ground crews in assembling, fuzing, unfuzing, and other handling of bombs. Drill bombs and their components are completely inert. They differ from inert practice bombs in that practice bombs are expendable; drill bombs are not.

127. **MODELS.** Each service bomb is represented by a corresponding drill bomb which bears the same model designation. When necessary to avoid confusion, the type represented may be indicated in the nomenclature, for example: CLUSTER, drill (frag. bomb) and CLUSTER, drill (practice bomb).

128. **COMPLETE ROUNDS.** The complete round for a drill bomb corresponds exactly to the complete round of the service bomb it represents except that the components are inert. Directions and precautions laid down for the assembly and disassembly of complete rounds of the corresponding service bomb will be observed.

SECTION XVI. CLUSTER ADAPTERS

129. GENERAL. a. Function. A cluster adapter is a device by means of which two or more small bombs may be—

(1) Held together for installation in a station for a single large bomb, thus providing for greater loading efficiency.

(2) Released from the plane as a unit, for area bombing rather than point-bombing.

(3) Released from the cluster, to arm and fall separately, after the cluster has been released from the plane, thus providing more efficient coverage of a large target than is possible when small bombs are released individually.

b. Construction. Cluster adapters, in general, consist of two or more longitudinal members for strength and rigidity, two or more cross members to hold the bombs in proper position, and straps or wires with means of release, to fasten the bombs in the cluster and release them at the desired time. Three suspension lugs are attached to one longitudinal member to provide for single or double hook suspensions. Each lug is held extended by a cotter pin which may be removed to allow the lug to drop back into the cluster. The release mechanism is operated by withdrawal of the arming wire.

c. Aimable cluster. Aimable clusters are clusters which may be adjusted to open and disperse the bombs at some predetermined time after release from the bomb bay.

130. ADAPTER CLUSTER, M1. a. Description. ADAPTER, cluster, M1, is constructed of two longitudinal members of tubular steel and four sheet metal supports joining them. The lower member serves as the backbone of the cluster. In addition to the four supports, two vane stops are welded to this member. These vane stops prevent the rotation of the fuze arming vanes while the bombs are still in the cluster. Suspension lugs are attached to the upper member. This is closed at the front end by a steel plug. Four holes are drilled through this member and the wires binding the bombs to the adapter pass through these holes. A pressure relief hole is drilled near the nose plug. A cartridge firing a steel plug and a firing mechanism, containing a spring loaded firing pin restrained by the arming wire, are assembled to the rear end. When the cluster is released armed the arming wire is withdrawn releasing the firing pin. The firing pin is driven by its spring into the primer of the cartridge which fires the slug through the tube cutting the wires which bind the bombs to the adapter. In this model adapter only two suspension lugs are welded to the upper member for double hook suspension.

b. Use. ADAPTER, cluster, M1, is used to assemble 6 fin type frag-

mentation or practice bombs in CLUSTER, fragmentation bomb, M1 (par. 145), and CLUSTER, practice bomb, M2 (par. 146).

131. ADAPTER, CLUSTER, AN–M1A2. a. Description. ADAPTER, cluster, AN–M1A2 resembles the M1 described in paragraph 130a above, except that instead of the cartridge type release it has a mechanical release. The bombs are bound to the adapter by metal straps. The straps are held in place by a toggle type clamp which is held closed by the arming wire. In storage and transit the clamps are locked by cotter pins which are removed when the arming wire is inserted. When the arming wire is withdrawn the toggles open and the bombs are released. Single and double suspension lugs are assembled to the upper member.

b. Use. ADAPTER, cluster, AN–M1A2, is used to assemble six fin type fragmentation or practice bombs in CLUSTER, fragmentation bomb, AN–M1A1 (par. 147), and CLUSTER, practice bomb, M2A1 (par. 148), respectively.

132. ADAPTER, CLUSTER, AN–M1A3. This modification permits shipping of the clustered bombs unfuzed, and fuzing in the field.

133. ADAPTER, CLUSTER, AN–M3. a. Description. ADAPTER, cluster, AN–M3, consists of two longitudinal members and three supports. (See fig. 118.) The upper member carries two mechanical release mechanisms, and 3 lugs for single and double suspension. The lower member carries five springs which aid in separating the bombs when they are released from the cluster.

b. Use. ADAPTER, cluster, AN–M3, is used to assemble three parachute type fragmentation or practice bombs in CLUSTER, fragmentation bomb, AN–M4 (par. 150) and CLUSTER, practice bomb, M5 (par. 151), respectively.

134. ADAPTER, CLUSTER, M4. a. Description. ADAPTER, cluster, M4, consists of an upper and a lower longitudinal member each 39.25 inches long, and two end plates each 7.75 by 8.38 inches. Attached to the upper member, are three lugs for single- and double-hook suspension and four mechanical release buckles for the strapping bands. (See fig. 119.) One branch of a four-branch arming wire assembly locks each of the buckles. In addition, for storage and transit, the buckles are locked by a safety wire which passes through all four buckles.

b. Use. ADAPTER, cluster, M4, is used to assemble 14 BOMB, incendiary oil, AN–M69, into CLUSTER, incendiary bomb, AN–M12. (See par. 158.)

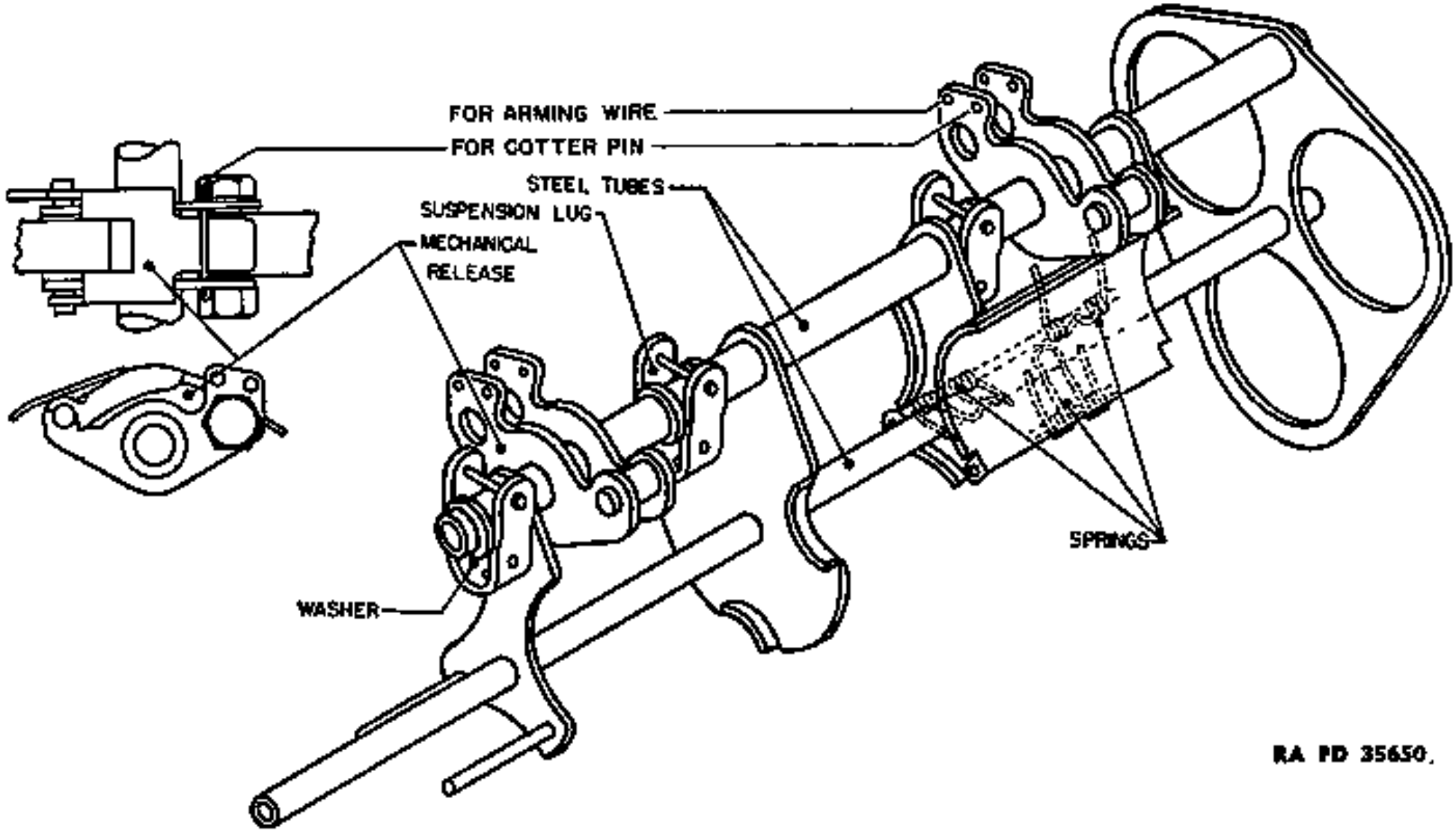


Figure 118. Adapter, cluster, AN–M3.

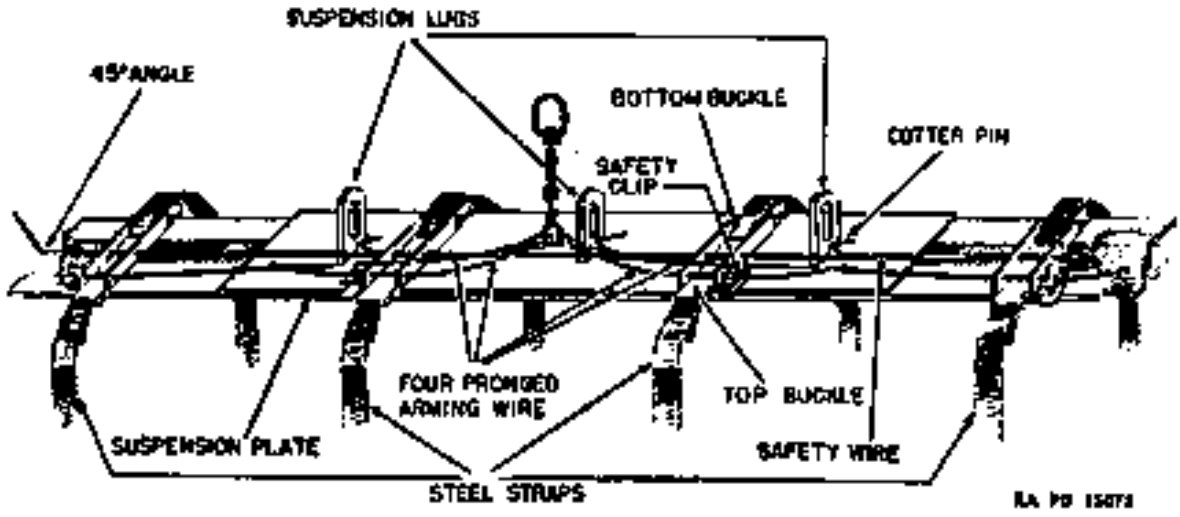


Figure 119. Adapter, cluster, M4.

135. ADAPTER, CLUSTER, M5. a. Description. ADAPTER, cluster, M5, formerly designated, ADAPTER, cluster, incendiary bomb, AN–M3, consists of upper and lower longitudinal members 42.78 inches long and two end plates 6.75 inches in diameter. (See fig. 120.) Three suspension lugs and six mechanical release buckles are assembled to the upper member. Six steel straps are locked in the buckles by a four-branch arming wire. In addition, for storage and transit, a safety wire passes through and locks all six buckles. When used for 2-pound incendiary bombs, this adapter has six straps and buckles as described above. When used for 4-pound bombs, only four straps are used.

b. Use. ADAPTER, cluster, M5, is used to assemble 34 four-pound incendiary bombs into CLUSTER, incendiary bomb, AN–M6. (See par. 156.)

136. ADAPTER, CLUSTER, M6. a. Description. ADAPTER, cluster, M6, was formerly designated ADAPTER, cluster, 500-lb., incendiary bomb, M1. This adapter (fig. 121) consists of one reinforced longitudinal member 42.78 inches long, three plain channel members of the same length, and two oval end supports 14.3 inches in vertical diameter and 12.63 inches in horizontal diameter. The reinforced member has three suspension lugs and eight mechanical release buckles assembled to it. The three plain members are attached to the end supports at 5, 6, and 7 o'clock, regarding the suspension member as attached at 12 o'clock. A four-branch arming wire locks steel straps in the release buckles. In addition, for storage and transit, a safety wire passes through and locks all the buckles.

b. Use. ADAPTER, cluster, M6, is used to assemble 128 four-pound incendiary bombs in CLUSTER, incendiary bomb (500-pounds), M7 (par. 157).

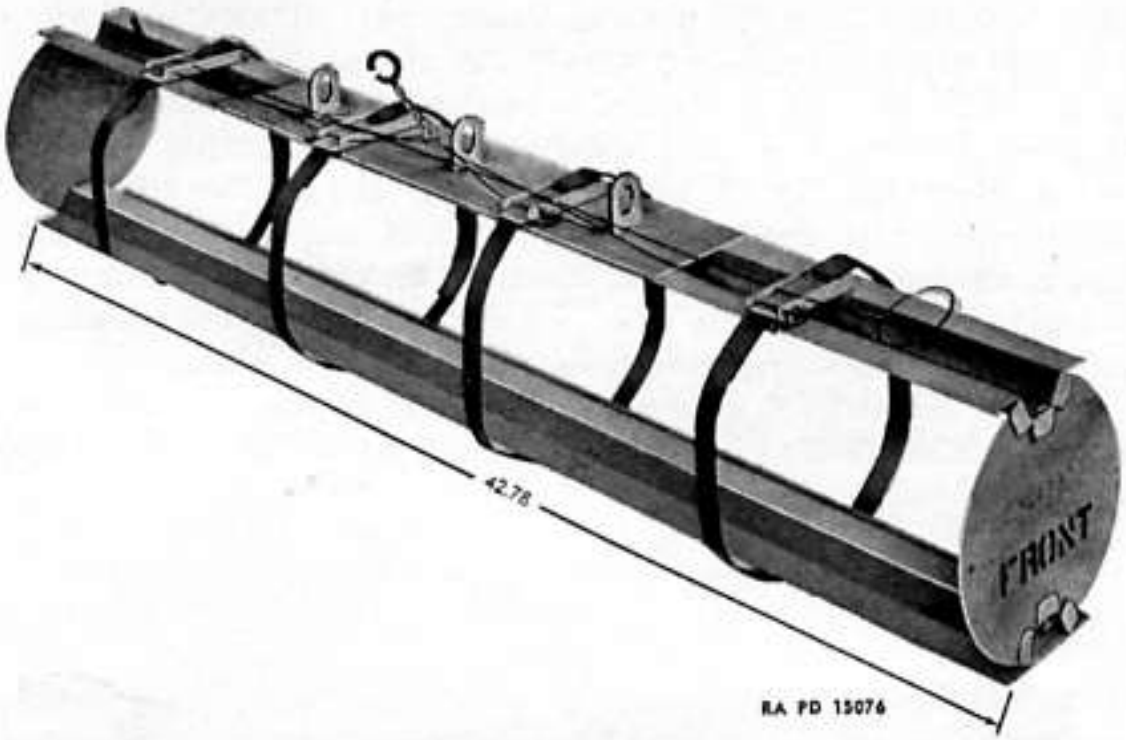


Figure 120. Adapter, cluster, M5.

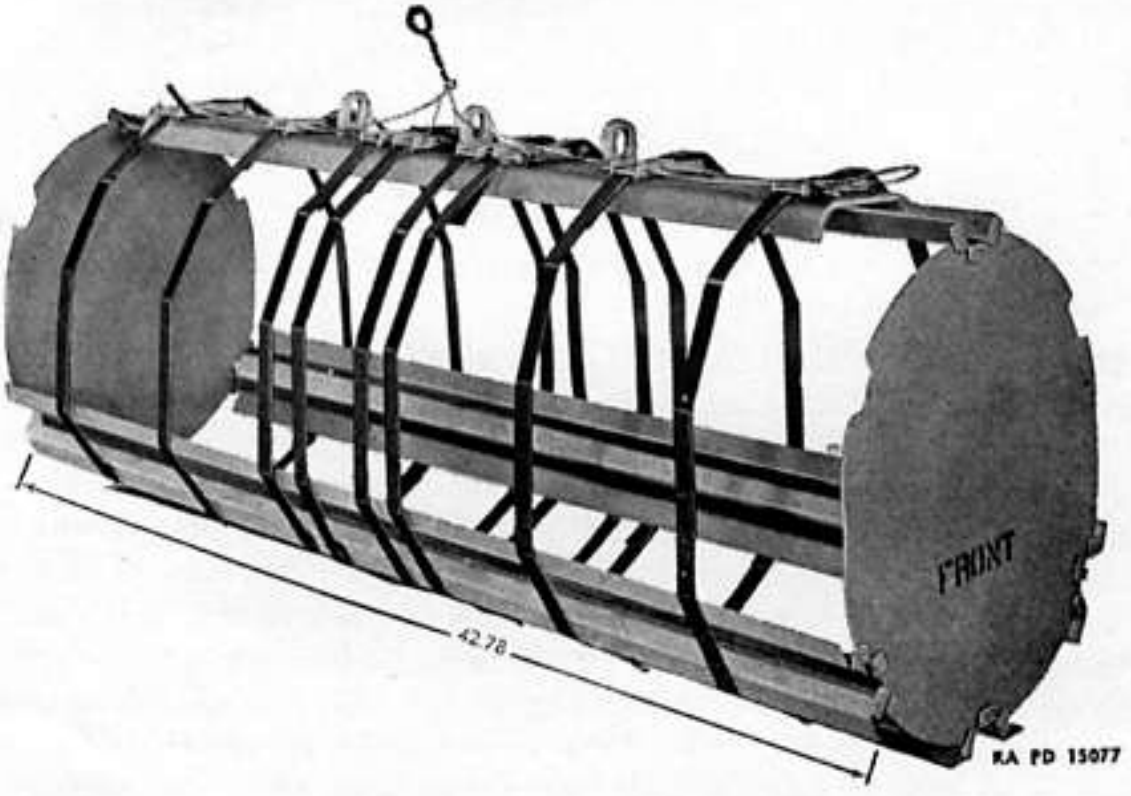
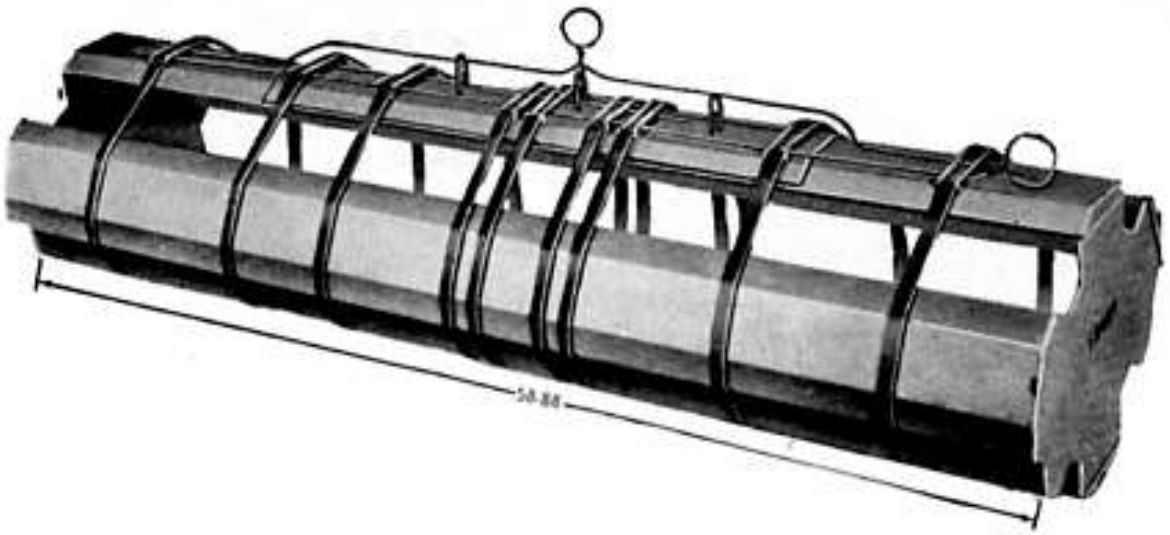


Figure 121. Adapter, cluster, M6.

137. ADAPTER, CLUSTER, M7. **a. Description.** ADAPTER, cluster, M7, was formerly designated ADAPTER, cluster, 500-pound, incendiary bomb, M2. It consists of a reinforced longitudinal member 58.88 inches long, three plain members of the same length, and two end supports 12.8 by 17 inches. (See fig. 122.) The reinforced member has nine mechanical release buckles and three suspension lugs assembled to it. Nine steel straps are locked in the buckles by a four-branch arming wire. In addition, for storage and transit, a safety wire passes through and locks all the release buckles.

b. Use. ADAPTER, cluster, M7, is used to assemble 60 six-pound bombs in CLUSTER, incendiary bomb, AN–M13 (500-pound size). (See par. 159.)



RA PD 15078

Figure 122. Adapter, cluster, M7.

138. ADAPTER, CLUSTER, M12. This adapter consists of two hook and cable assemblies. Each assembly consists of a harness hook with a 4.5-inch loop of steel cable attached. The adapter is used to suspend two 100-pound size bombs or clusters from a single station. Before the first bomb is installed, the loop of wire is placed over each suspension lug before the shackle is attached. The hook of each cable is then snapped to a suspension lug of the second bomb or cluster. The arming wire swivel loops from both bombs or clusters are attached to the arming hook of the shackle. Care should be taken to see that the arming wire of the second bomb or cluster is long enough so that it will not pull out of the fuzes when the loop is attached to the shackle.

139. **ADAPTER, CLUSTER, M13.** This adapter resembles the M14 described in paragraph 140 except that it is arranged to suspend 20 twenty-pound bombs in two banks of ten bombs each. It is used to assemble 20 BOMB fragmentation, 20-lb., AN–M41 in CLUSTER, fragmentation, bomb, M26. Fuze, flare, mechanical time, M111A2 is used to provide delayed opening of the cluster.

140. **ADAPTER, CLUSTER, M14.** a. The M14 cluster adapter (fig. 123) is designed for either immediate or delayed opening. The adapter consists of two longitudinal steel tubes to which are welded four sheet steel plates which form nose and tail supports for two banks of three bombs each. The lower member serves as backbone for the cluster and carries a fuze vane stop for each bank of bombs. The upper member carries a pair of suspension lugs, a hoisting lug, two buckles for holding and releasing steel straps holding the bombs in the cluster, and adapters for nose and tail fuzes.

b. The suspension and hoisting lugs consist of U-shaped shackles with bolt held in place by a cotter pin. The shackles are located by washers welded to the upper member. A long cotter pin passes through each lug to hold it in position. When suspension from single-hook racks is desired, the hoisting lug is removed and replaced by one of the suspension lugs.

c. The release mechanism consists of a toggle type buckle which is held closed as follows:

(1) For storage and handling, by a cotter pin which is removed only after the arming wire is installed.

(2) For carrying in the plane, by a branch of the arming wire, which is withdrawn when the cluster is released from the plane armed or, if the cluster is not dropped, by the cotter pin which has been replaced.

(3) For delayed opening of the cluster, by a shear wire which passes through the tongue of the clamp and the upper member of the cluster. When it is desired that the cluster discharge the individual bombs, immediately upon release from the plane, the shear wire is cut off after the arming wire is installed. When delayed action is desired, the shear wire is left in place. At the time set, the fuze functions to drive a steel slug through the upper member, shearing the wire and allowing the buckle to open.

d. Fuze adapters. A fuze adapter for the mechanical time fuze which is used for delayed cluster opening is assembled to the forward end of the upper member. A setscrew and lock nut, for holding the fuze in place, are shipped in an envelope inside the fuze adapter. A steel slug for cutting the shear wires of the release mechanism is wired in place in the upper member just inside the fuze adapter. A fuze

adapter for the rear end of the member is supplied separately with the cluster adapter.

e. Arming wire. The arming wire assembly for the cluster consists of a swivel loop assembly and four branches of wire, of which two are fine (0.036-in. diam) and two are heavy (0.064-in. diam). The fine branches are for the cluster time fuzes and, when either or both fuzes

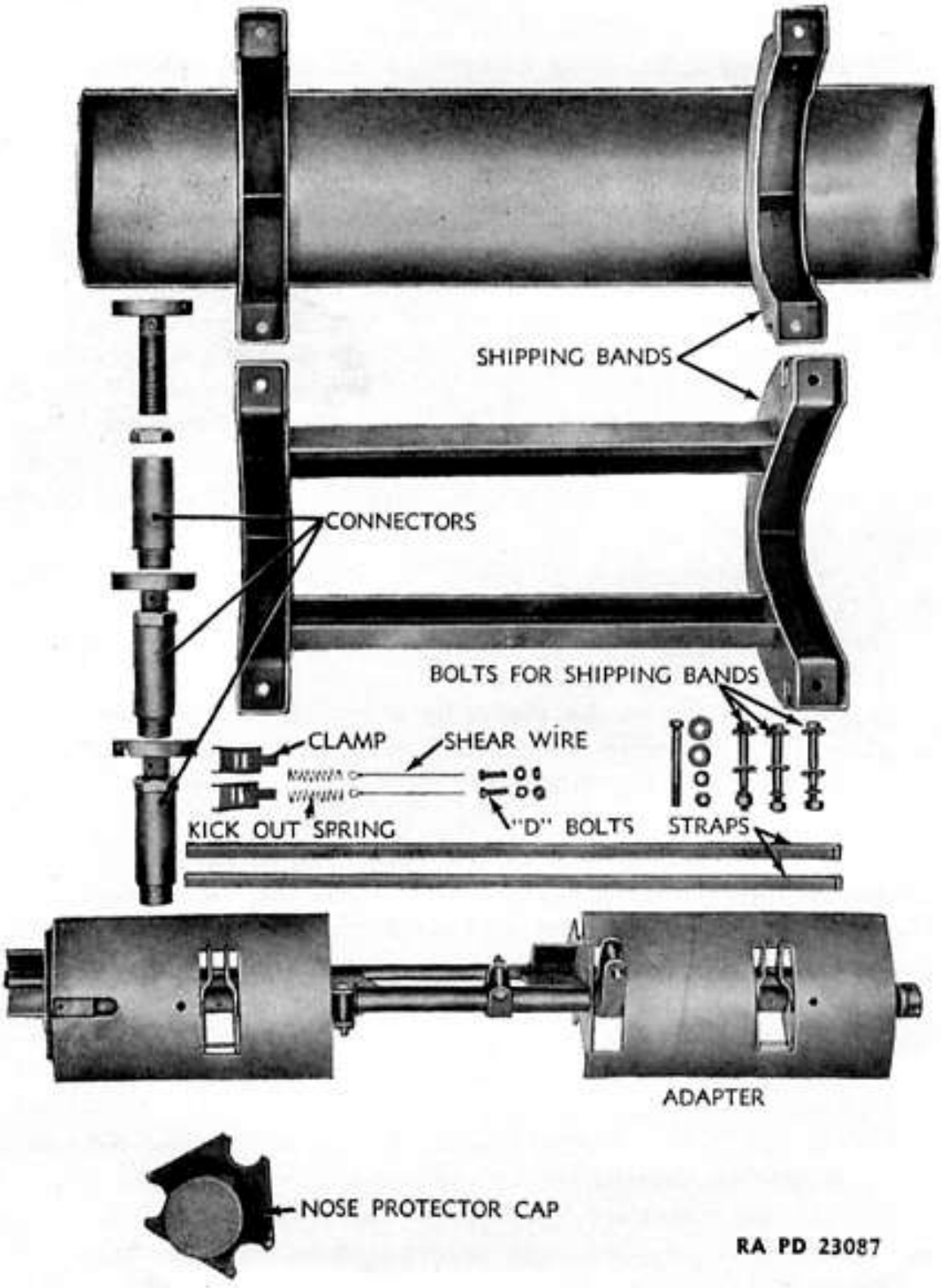


Figure 123. Adapter, Cluster M14—components and packing.

are omitted, the corresponding length of wire is cut off. The heavy branches are for the release mechanism.

f. **Shipping bands.** The shipping band (fig. 123) for the cluster consists of an upper and a lower member. Each consists of two semicircular channels joined by sheet metal troughs. The upper member has, in addition, extensions to protect the nose and tail of the cluster. When the cluster is placed in shipping bands, a nose protector cap and three connectors are installed. The nose protector cap is a flanged cup which fits over the forward vane stop of the adapter and is held in place by the fuze-hold plugs of the forward bank of bombs. The connectors are small screw jacks which are screwed into the fuze adapter of each of the bombs in the rear bank and butt against the cones of the corresponding bombs in the forward bank.

g. **Packing.** The ADAPTER, cluster M14, is packed one, complete, per box with shipping bands for the assembled cluster.

Note. The upper and lower wooden cradles used to pack the adapter and shipping bands may be conveniently used to build an assembly cradle. (See par. 153.)

141. ADAPTER, CLUSTER M15. This adapter is a cylindrical sheet metal case which opens longitudinally to discharge 24 four-pound fragmentation bombs. The case is hinged at the rear and is held closed by a nose cup which is opened by the action of a time fuze. Double suspension lugs are attached to bulkheads and pass through the cover. When single hook suspension is desired, the outer double lugs should be pushed down into the case and the single lug should be attached with the screws supplied. The cluster is issued with bombs assembled and the nose locking cup wired in place. (See par. 154.)

142. ADAPTER, CLUSTER M16. This adapter resembles the M15 described in paragraph 141 except in size. It is used to assemble 90 four-pound fragmentation bombs in cluster, fragmentation bomb, M29. Assembly of this cluster is described in paragraph 155.

SECTION XVII. CLUSTERS OF EXPLOSIVE BOMBS

143. PRECAUTIONS. a. Since clusters of bombs supply the only instance in which it is permitted to store and ship fuzed bombs, they present a unique problem in care and handling and involve exceptional precautions. Clusters are shipped one in a wooden box as assembled complete rounds. They need only be unpacked and have the arming wire installed and the various safety devices removed (par. 144) to be ready for use.

b. Boxed clusters should be handled carefully. They should be carried and set down in place horizontally. They should not be slid, tumbled, or struck. Boxes should not be "walked" on the corners.

c. Upon opening a box, the cluster should be inspected to insure that fuze safety devices are in place. For pin type fuzes, the fuze arming wire and safety cotter pin should both be in place. For vane type fuzes, the safety block should be taped in place. The cluster arming wire and safety cotter pins should be in place. Binding wires or straps should be tight and unbroken. If pin type fuzes show evidence of having armed, the cluster will not be removed from the box but will be taken with the utmost care to a safe place and there destroyed with explosive. If the safety blocks of vane type fuzes have fallen out, they will be replaced and taped in place, the cluster broken down and such fuzes removed from the bomb and destroyed. Broken wires or straps may be replaced and the cluster used.

144. PREPARATION FOR USE. After inspection as specified above, the cluster is prepared for use as follows:

a. Assemble arming wire by threading the long branch through the forward suspension lug and through the holes in the front release mechanism. Thread the short branch through the rear lug and the rear release mechanism. Adjust the wire to protrude equally. Place a Fahnestock clip on each end. Remove all kinks and burs.

b. Pull up the desired suspension lugs and fasten with cotter pins supplied (unnecessary with M1 and M2 clusters).

c. Remove adhesive tape from safety blocks of vane type fuzes. If safety block falls out, replace and retape. Reject the cluster until the fuze can be replaced. *Or,*

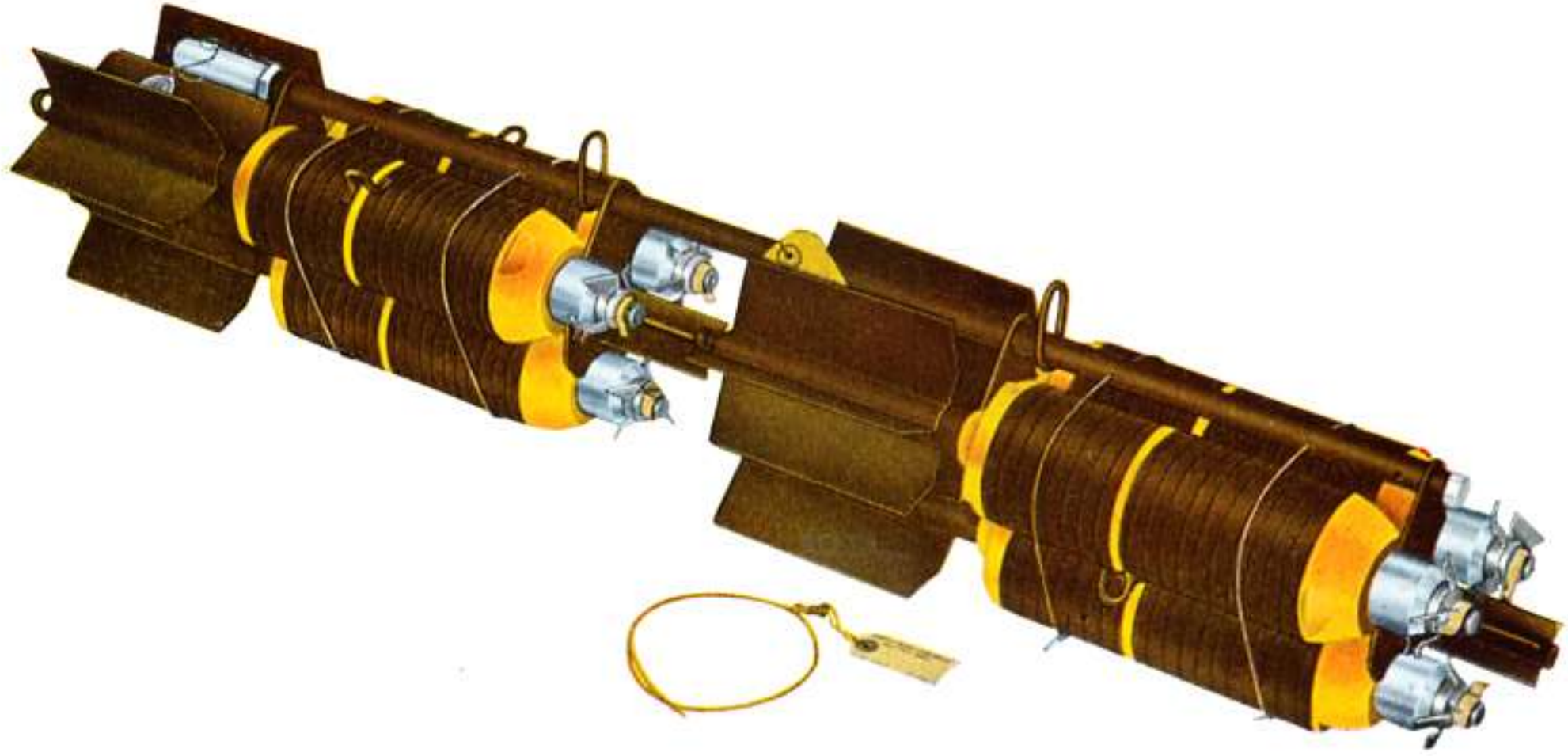
Remove adhesive tape from arming wire of pin type fuzes and remove safety cotter pin from fuze.

d. Install cluster and remove cotter pins from release mechanism.

e. If the cluster is not dropped replace all pins and taping before repacking cluster for return to storage.

145. CLUSTER, FRAGMENTATION BOMB, M1. CLUSTER, fragmentation bomb, M1 (100-lb. size) (6 BOMB, fragmentation, 20-lb., AN–M41, w/FUZE, bomb, AN–M110A1 or M110) is assembled by means of ADAPTER, cluster, M1. It is 46.75 inches long and weighs 125 pounds. (See fig. 124.) This cluster is provided with lugs for double-hook suspension only. The release mechanism operates by means of a cartridge and firing mechanism.

146. CLUSTER, PRACTICE BOMB, M2. CLUSTER, practice bomb, M2 (100-lb. size) (6 BOMB, practice, 20-lb., AN–M48, w/FUZE, bomb, AN–M110A1 or M110) is assembled by means of ADAPTER,



RA PD 15079

Figure 124. Cluster, fragmentation bomb, M1.

cluster M1. It is 46.75 inches long and weighs 125 pounds. It is provided with lugs for double-hook suspension only. The release mechanism operates by means of a cartridge and firing mechanism.

147. CLUSTER, FRAGMENTATION BOMB, AN–M1A1. CLUSTER, fragmentation bomb, AN–M1A1 (100-lb. size) (6 BOMB, fragmentation, 20-lb., AN–M41, w/FUZE, bomb, AN–M110A1) is assembled by means of ADAPTER, cluster, AN–M1A2 which is of the mechanical release type. The cluster is 46.6 inches long and weighs 125 pounds. It is provided with lugs for double- or single-hook suspension.

148. CLUSTER, PRACTICE BOMB, M2A1. CLUSTER, practice bomb, AN–M2A1 (100-lb. size) (6 BOMB, practice, 20-lb., AN–M48, w/FUZE, bomb, AN–M110A1) is assembled by means of ADAPTER, cluster, AN–M1A2 which is of the mechanical release type. The cluster is 46.6 inches long and weighs 125 pounds. It is provided with lugs for double- or single-hook suspension.

149. CLUSTER, FRAGMENTATION BOMB, AN–M1A2. This cluster is a modification of the AN–M1A1 in which the bombs are shipped unfuzed and the fuzes shipped in hermetically sealed individual containers in the same box.

150. CLUSTER, FRAGMENTATION BOMB, AN–M4 AND AN–M4A1. CLUSTER, fragmentation bomb, M4 (100-lb. size) (3 BOMB, fragmentation, 23-lb., AN–M40 or AN–M40A1, w/FUZE, bomb, AN–M120A1 or AN–M120) is assembled by means of ADAPTER, cluster, AN–M3 which is of the mechanical release type. (See fig. 125.) The cluster is 31 inches long and weighs 87.2 pounds. It is provided with lugs for double- or single-hook suspension. When issued with bombs unfuzed, it is designated AN–M4A1.

Note. This cluster is installed in the plane with the parachute case forward. Unsatisfactory dispersion may result if the bombs are installed nose forward.

151. CLUSTER, PRACTICE BOMB, M5. CLUSTER, practice bomb, M5 (100-lb. size) (3 BOMB, practice, 23-lb, M71) is assembled in the field from the following components:

ADAPTER, cluster, M3, complete.
BODY, bomb, for 23-lb., practice bomb, M71 or M73.
PARACHUTE, unit, assembly, for 23-lb., practice bomb, M71 and M72 (modified for M71).

The bomb body and parachute unit are assembled and the parachute unit assembly is modified by removing the suspension cable and

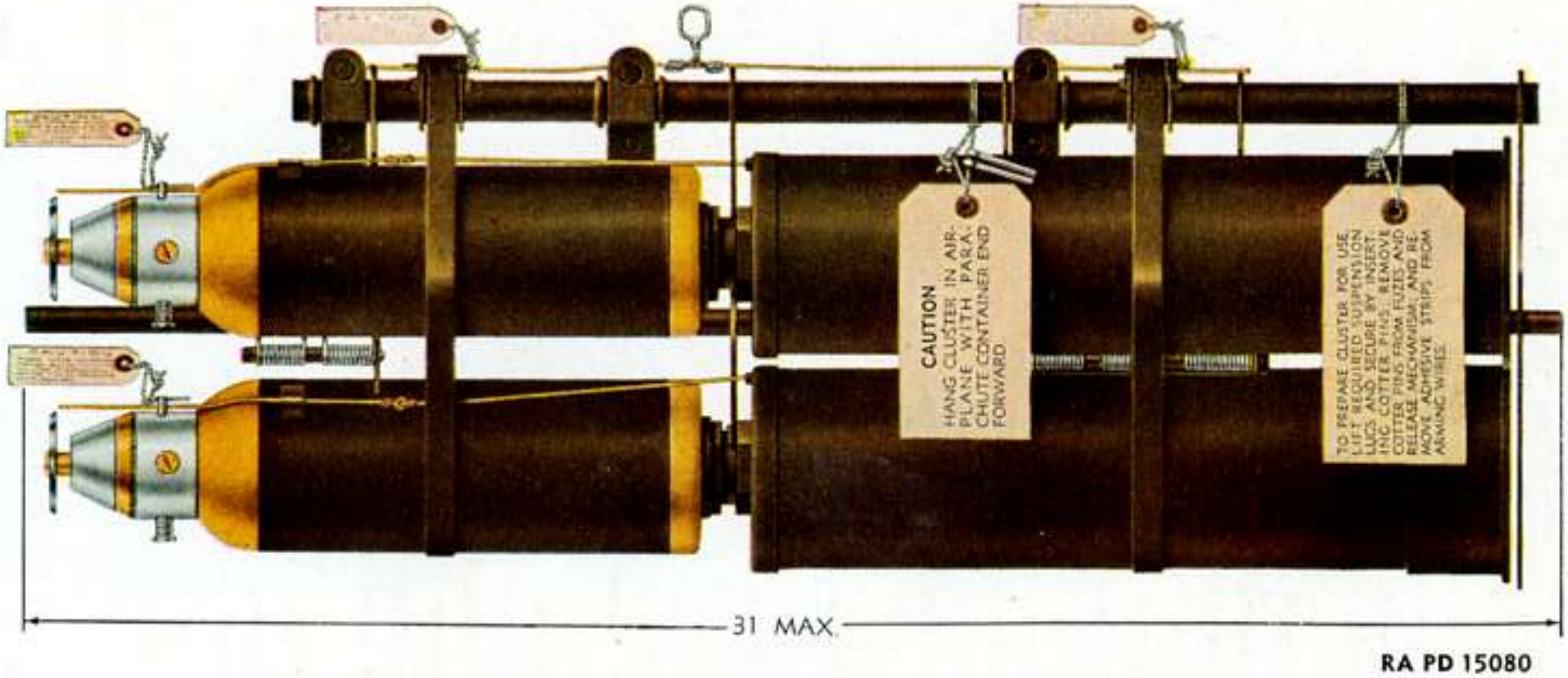


Figure 125. Cluster, fragmentation bomb, AN–M4.

removing the shipping cover and pull wire container and replacing them by the loose fitting cover supplied as part of the adapter assembly. Three bombs are bound in the cluster by the two steel straps which are fastened in place by cotter pins in the outer eyelets in the buckles. The arming wire is then inserted with one branch through the inner eyelets of each buckle and a safety clip placed on each end. The assembled cluster is 31 inches long and weighs 76 pounds.

152. CLUSTER, FRAGMENTATION BOMB, T4E3. CLUSTER, fragmentation bomb, T4E3 (500-lb. size) (20 BOMB, fragmentation, 20-lb., AN–M41, w/FUZE, bomb, AN–M110A1) is assembled by means of ADAPTER, cluster, T4E3. The cluster may be arranged for immediate or delayed opening. (See fig. 126.) When immediate opening is desired, the shear wires are cut off close to the release mechanisms and the fire branch of the arming wire is cut off close to the swivel loop. When delayed opening is desired, fuze flare, mechanical time is installed in the adapter. (See par. 41.) When the fuze functions it blows a steel slug through the horizontal member, shearing the wires, thus allowing the release mechanisms to open and discharge the individual bombs.

153. CLUSTER, FRAGMENTATION BOMB, T8. a. General. CLUSTER, fragmentation bomb, T8 (fig. 127) is a 500-pound size cluster of 6 BOMB, fragmentation, 90-lb., T9, assembled with ADAPTER, cluster, T3. This cluster may be adjusted to discharge the individual bombs immediately (fig. 128) or, by the action of one or two mechanical time fuzes, to discharge the bombs 5 to 92 seconds after release of the cluster from the plane. (See fig. 127.) The cluster components may be supplied unassembled, or partially assembled. The assembled cluster is 56 inches long and weighs approximately 585 pounds.

b. Assembly of cluster for storage and shipment. (1) *Cluster.* The preliminary assembly of the cluster is carried out as follows (fig. 130):

(*a*) Place four bombs, pointing in the same direction on an assembly cradle such as that illustrated in figure 129.

(*b*) Fit adapter over bombs and align bombs to fit the nose and tail supports.

(*c*) Thread a shear wire through each of the two holes in the upper member between the side plates of the release mechanisms.

(*d*) Assemble remaining two bombs to adapter.

(*e*) Attach formed end of straps to release mechanisms with "D" bolts, assembling lock washer and nut loosely.

(*f*) Pass straight ends of straps around bombs and attach clamp to strap.

Note. To attach clamp to strap, pass straight end of strap through the wide slot in the clamp from the top. Place the clamp in approximate position in release

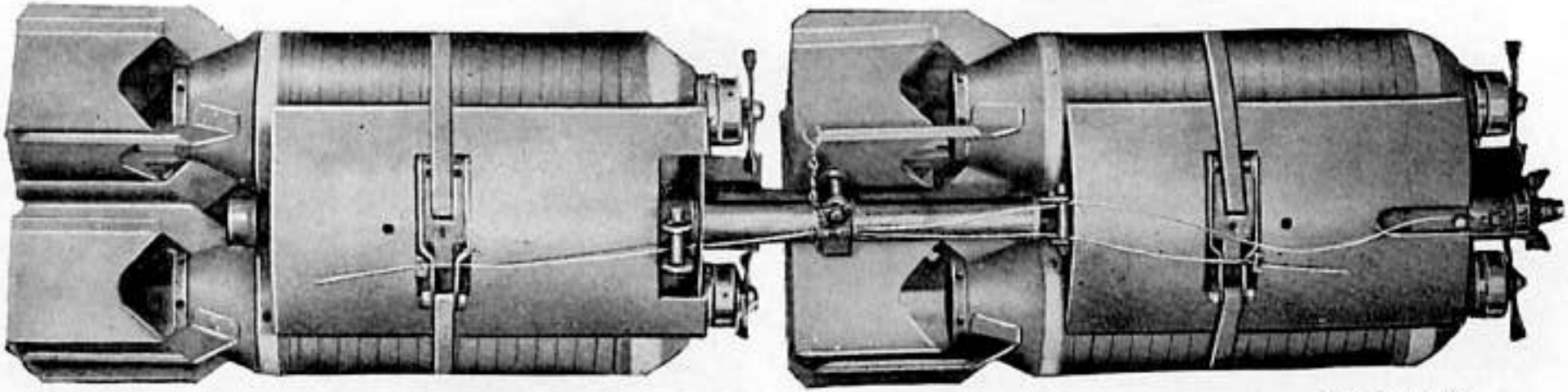
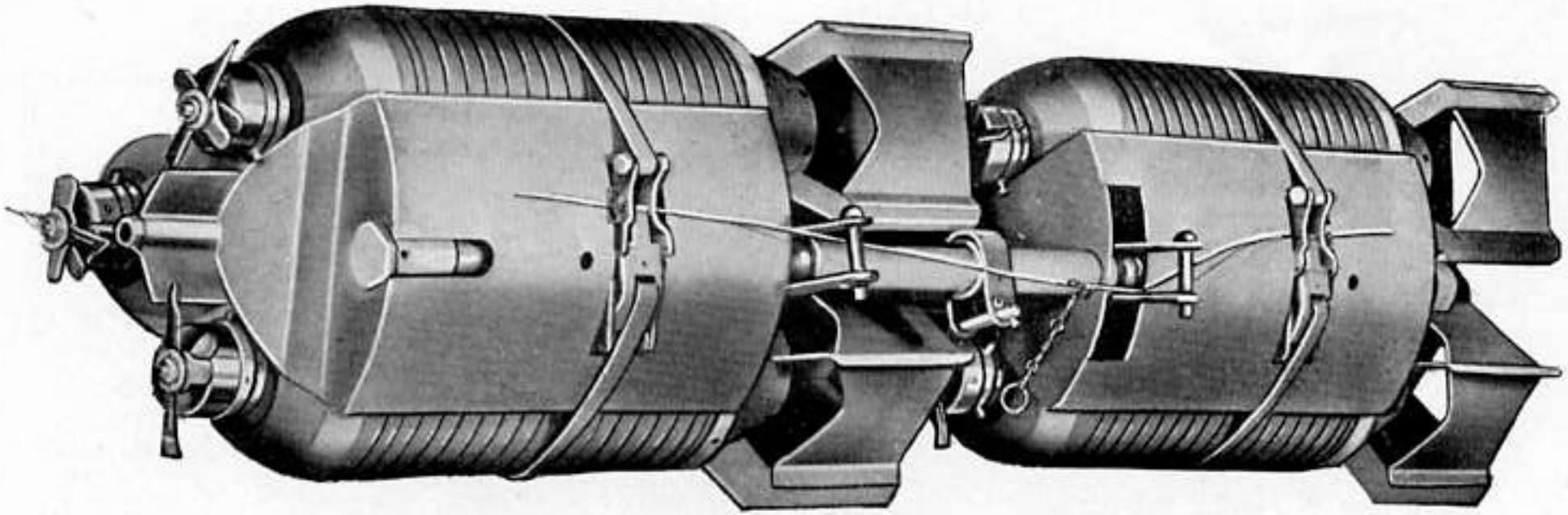


Figure 127. CLUSTER, fragmentation bomb, T8 delay opening.



RA PD 23085

Figure 128. CLUSTER, fragmentation bomb, T8 immediate opening.

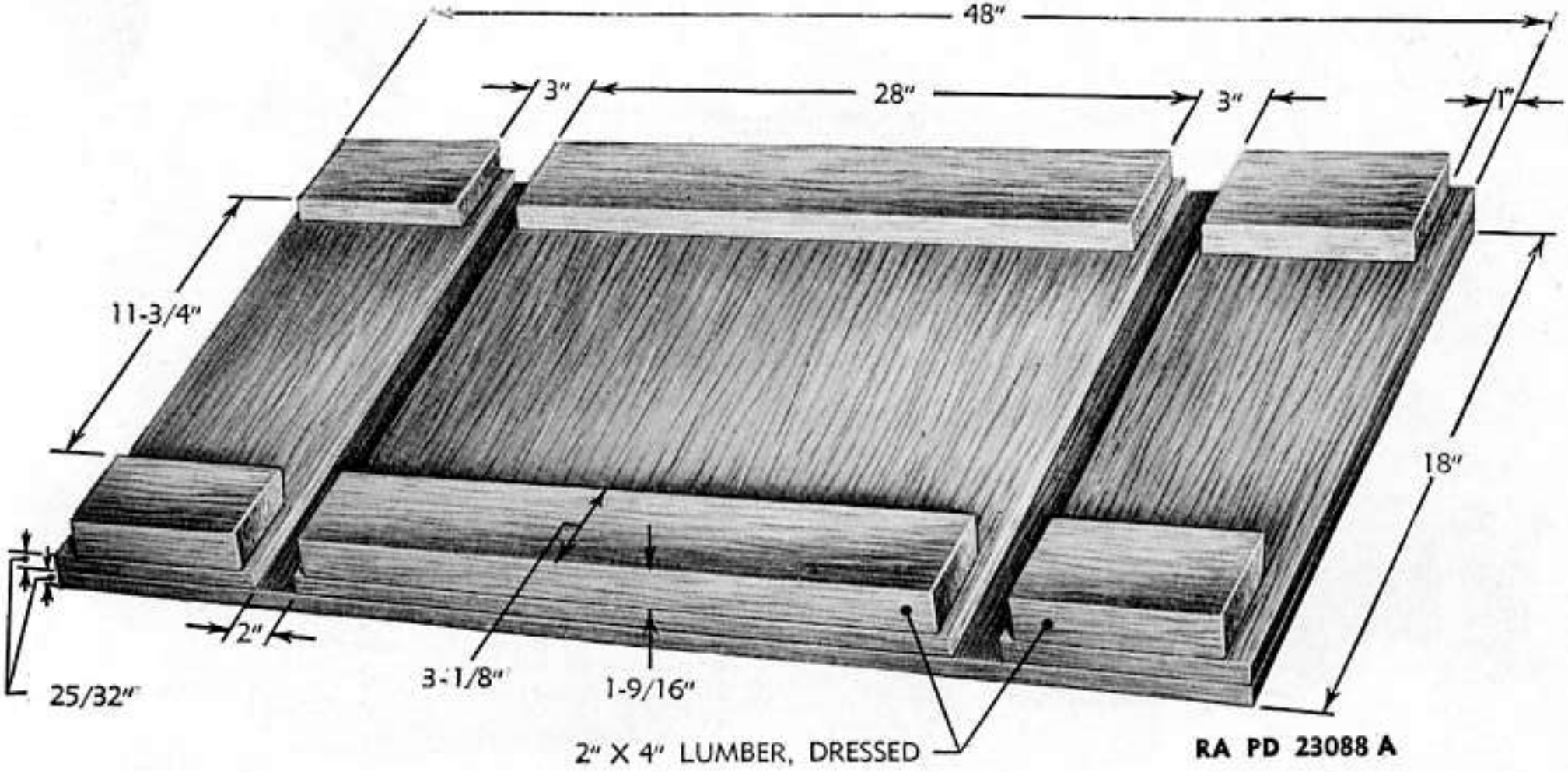
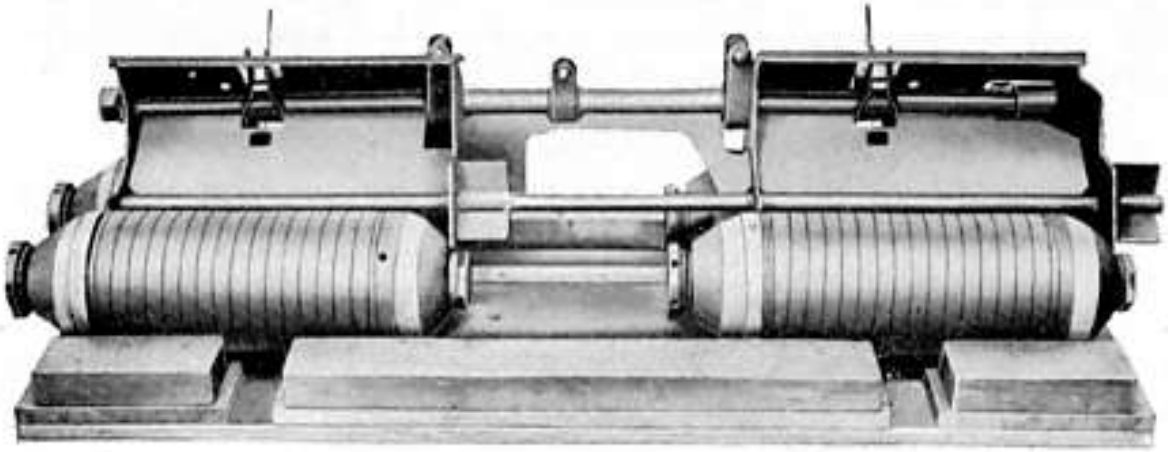
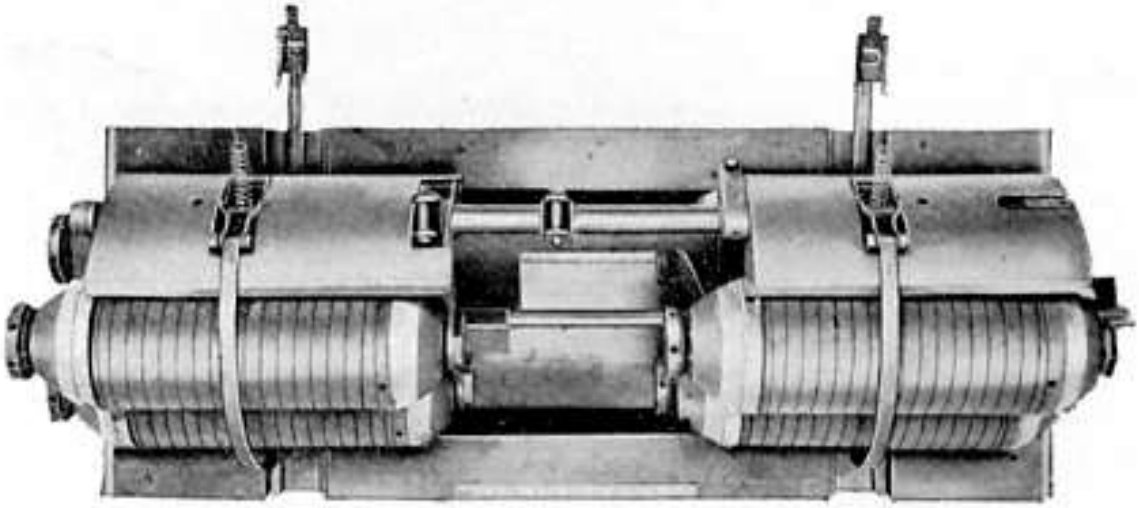


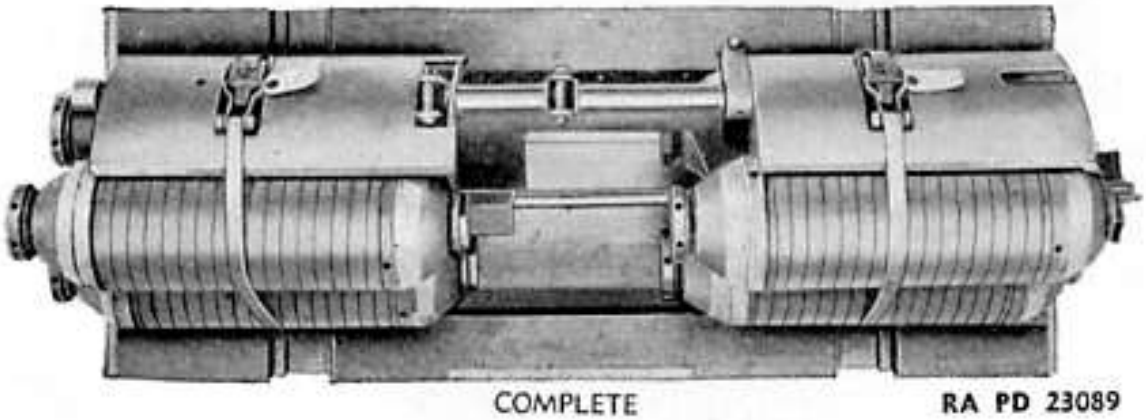
Figure 129. Assembly cradle.



FIT ADAPTER OVER ALINED BOMBS



PREPARE STRAPPING



COMPLETE

RA PD 23089

Figure 130. Steps in assembly.

mechanism and mark place for bending. Let the clamp slide down the strap and form a hairpin bend at the point marked. Bring the clamp back up the strap and pass the free end of the strap through the narrow slot. Pull up the clamp and, if necessary, seat it by tapping with a wooden block.

(*g*) Place kick-out spring over each shear wire.

(*h*) Place strap clamp on release mechanism, threading shear wire through clamps. Fasten clamp in position with cotter pin and tag, and spread ends of cotter pin.

(*i*) Tighten strapping around bombs by rolling strapping on "D" bolts with open-end wrench. When proper tension is had, tighten nut.

Note. The strap should be tight enough so that all slack is taken up, and tapping the strap with a wrench will cause it to rebound. However, it should not be so tight that the strap clamp cannot be depressed by thumb pressure.

(*j*) Form a loop in each shear wire, similar to the preformed loop at the other end (see fig. 131).

Note. If available, Nicopress sleeve may be used to fasten shear wire, by crimping two sleeves to the shear wire first and crimping pliers, then with special crimping tool. Another piece of wire is placed in the empty channel of the sleeve to insure tight crimp.

(2) *Connectors.* Connectors are assembled as follows (fig. 132):

(*a*) Remove nose plugs of bombs in rear bank and replace with tubular connector assembly.

(*b*) Screw extension out until the cup is against the cone of the bomb in the forward bank, wrenchtight.

(*c*) Holding the extension, tighten lock nut.

(3) *Nose protector cap.* Nose protector cap is assembled as follows:

(*a*) Remove nose plugs from the forward bank of bombs.

(*b*) Place nose protector cap in position and fasten in place by replacing nose plugs.

(4) *Shipping bands.* Shipping bands are assembled as follows:

(*a*) Brace the lower half of the shipping band assembly to prevent it from moving.

(*b*) Place the cluster into shipping band so that strapping is aligned properly within the bands.

(*c*) Place upper half of shipping band assembly over cluster and assemble bolts, washers, and lock washers.

(*d*) Examine assembly to see that bands bear properly against the bomb bodies.

c. Preparation for use. (1) The cluster, partially assembled as described above, is prepared for use by assembling the fins and fuzes to the individual bombs and adjusting the adapter for immediate or delayed opening on release.

(2) *Assembly of bombs.* (a) Remove cluster from shipping bands.

(*b*) Remove nose plugs and nose protector cap.

(*c*) Release lock nuts and remove connectors.

(*d*) Remove fin lock nuts from all bombs.

(*e*) Inspect fuze cavities and threads.

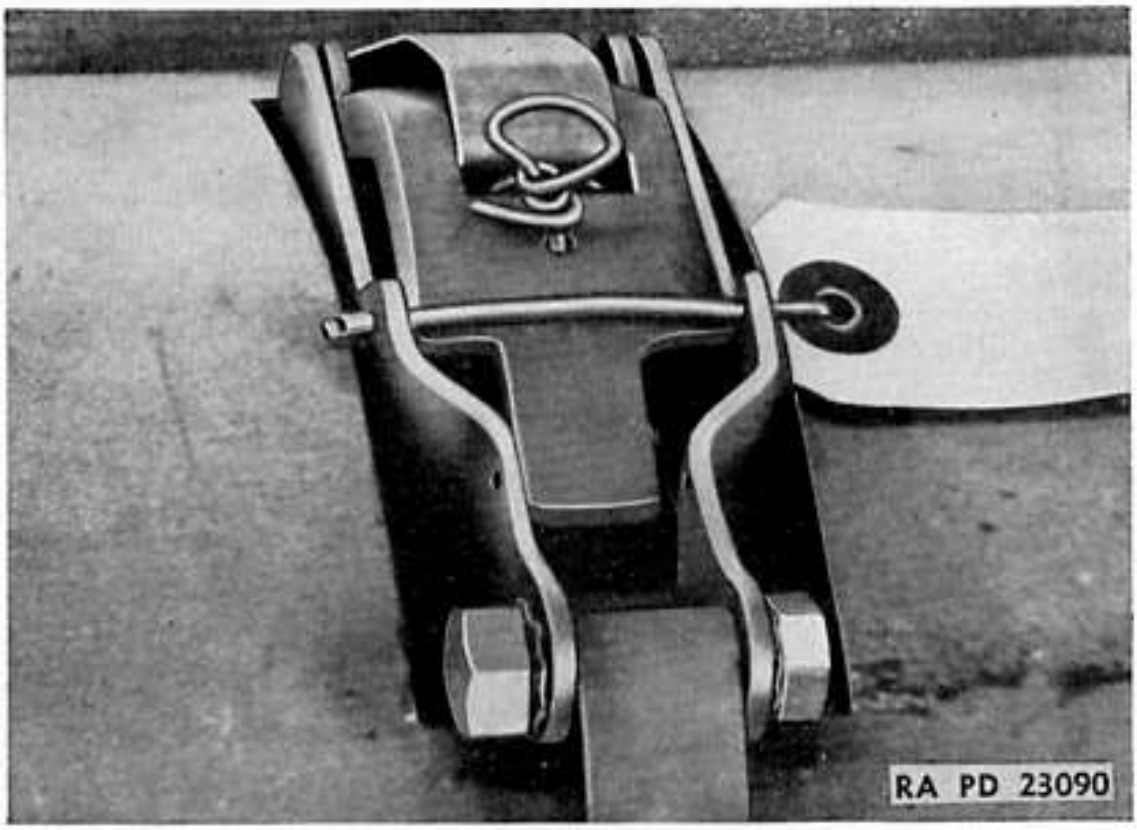


Figure 131. Shear wire assembly.

(*f*) Assemble fins to bombs. Be careful that fins are located so that they will not interfere with each other and will not be damaged when the cluster is installed in the plane. (See fig. 133.)

(*g*) Unpack six FUZE, bomb, AN–M103. Inspect for serviceability. Discard the vane assembly supplied with the fuze.

(*h*) Set each fuze for superquick action by pulling out the setting pin and turning it so that the locating pin seats in the shallow slot.

(*i*) Screw a fuze into the nose of each bomb, handtight. If necessary, transfer the safety cotter pin so that it will be accessible from the outside of the cluster.

(*j*) Cut and remove the fuze seal wire. Assemble the short (4.6 in.) vane supplied with the fin assembly.

(*k*) Remove the safety cotter pin and turn the vane each way to be sure that the adapter vane stop will prevent the fuze vane from rotating.

(3) *Preparation for delayed opening.* To prepare the cluster for delayed opening after release, prepare bombs as described above, then,

(*a*) Remove plug from nose end of upper member (fuze adapter) and remove envelope containing set screw. Inspect to see that the cavity is clear.

(*b*) Unpack FUZE, flare, mechanical time, M111A2, and inspect for serviceability. Remove and replace the striker stop to be sure that the safety block will not fall out.

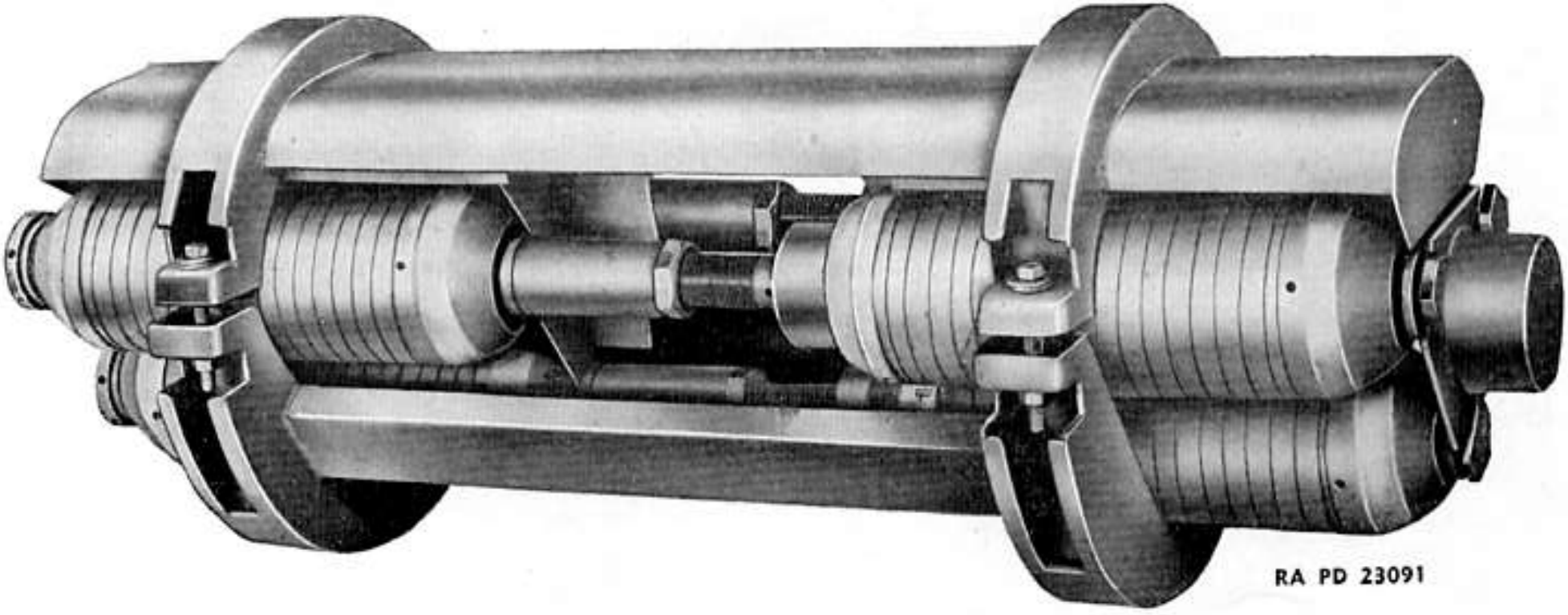


Figure 132. Cluster with shipping bands.

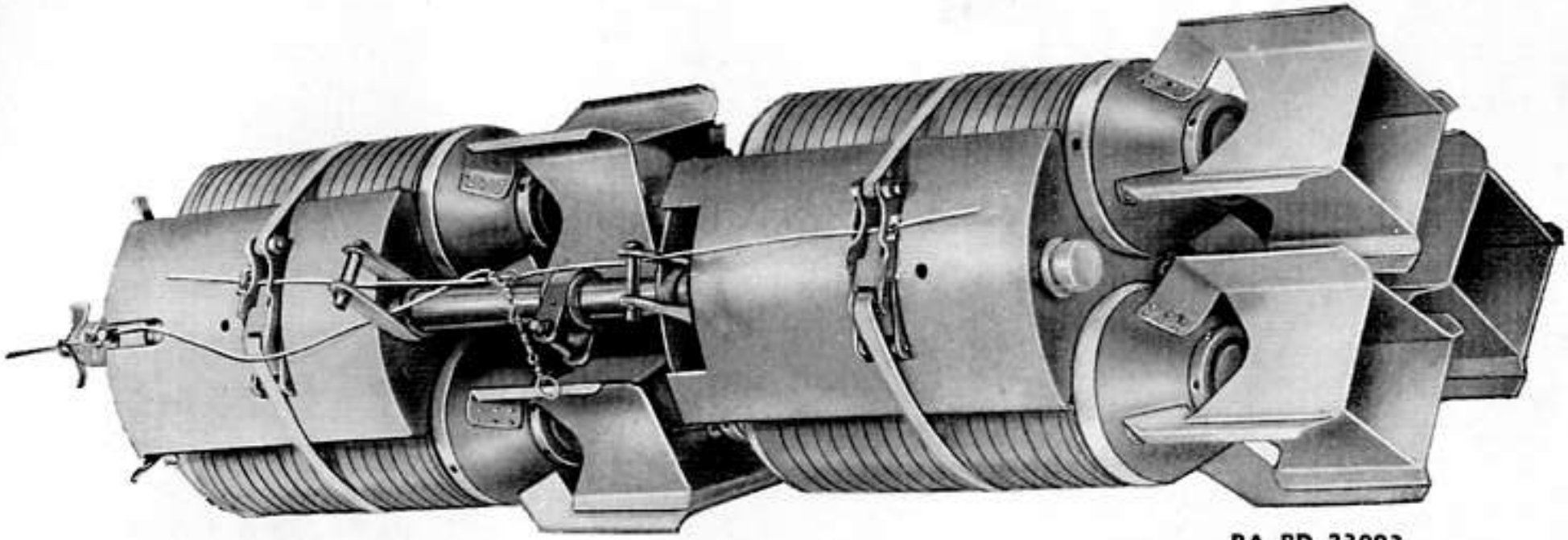


Figure 133. CLUSTER, rear view.

(*c*) Set the time desired on the fuze. (See d below.) Loosen the thumbscrew in the side of the fuze body, turn the head of the fuze until the index line is opposite the number of seconds desired, and tighten thumbscrew.

(*d*) Screw the fuze handtight into the fuze adapter. Assemble setscrew and lock nut loosely. Back off the fuze until the arming pin points up, that is, away from the lower member. Tighten the setscrew and lock nut.

(*e*) Thread a heavy and a fine branch of the arming wire through the forward suspension lug. Thread the heavy branch through the vacant holes in the release mechanism. Thread the fine branch through the inner holes of the fuze arming pin, arming wire guide, and vane tab so that about 2.5 inches protrudes beyond the vane tab. Place a safety clip (Fahnestock) on each branch of the wire.

(*f*) Thread the remaining branch of heavy wire through the rear suspension lug and through the holes in the rear release mechanism. Place a safety clip (Fahnestock) on the wire. Cut off the unused branch of fine wire close to the swivel loop attachment.

(*g*) Cut and remove fuze seal wire with safety cotter pin and striker stop.

(*h*) Install cluster in plane.

(*i*) Remove safety cotter pins from both cluster release mechanisms and from all six bomb fuzes.

(*j*) If cluster is not dropped, disassemble and return components to storage by reversing the above steps.

(4) *Preparation for immediate opening.* To prepare cluster for opening immediately on release, prepare bombs as described, then,

(*a*) Thread a heavy branch of the arming wire through each suspension lug and through the holes in the corresponding release mechanism. Place a safety clip (Fahnestock) on each branch.

(*b*) Cut off both branches of fine wire close to the swivel loop attachment.

(*c*) Cut the shear wire in each release mechanism close to the clamp.

(*d*) Install the cluster in the plane.

(*e*) Remove safety cotter pins from both release mechanisms and from all six bomb fuzes.

(*f*) If the cluster is not dropped, replace all cotter pins and tie a conspicuous tag to the release mechanism to indicate that the shear wire has been cut and the cluster cannot be used for delay opening.

d. Precautions. (1) The general precautions for handling bombs, clusters, and fuzes will be observed.

(2) Time fuze will crush and function if cluster is dropped on it.

(3) If immediate opening is desired and no fuze used, shear wire must be cut or cluster will not open.

(4) If delay opening is desired, shear wire must be left intact and fuze installed and set.

(5) Cluster must open at altitude of 1,000 feet minimum, to allow bomb fuze to arm.

(6) Immediate opening of the cluster produces the most favorable impact pattern. At openings greater than 10 to 12 seconds (approx. 2,000 ft. of fall), range errors increase appreciably.

154. CLUSTER, FRAGMENTATION BOMB, M28. a. This cluster consists of Adapter, cluster, M15, containing 24 BOMB, fragmentation, 4-lb., M83, in 8 banks of 3 bombs each. (See fig. 134.) It is adapted for Fuze, flare, mechanical time, M11A2 and each bomb, M129 (airburst or impact) M130 (mechanical time, 3 to 30 minutes) or M131 (antihandling). The fuze used is indicated in the marking on the cluster. The cluster is issued assembled except for nose fuze. It will not be disassembled in the field.

b. Preparation for use. (1) Unscrew the bolts and remove the L-shaped protectors from the suspension lugs. If single hook suspension is desired, push the double lugs down into the case and attach the single lug with the screws provided.

(2) Cut wire on nose cup retainer and remove wire and retainer being careful not to push cup off its seat.

(3) Install fuze, flare, mechanical time, M111A2, as directed in paragraph 41.

(4) If the cluster is not used, restore components to original condition and packings.

c. Precautions. (1) If the cluster is unpacked and not used it should be stored with particular care to avoid damage by atmospheric moisture.

(2) Because of great dispersion and drift, best results are obtained when the cluster is released at altitudes of 2,000 to 5,000 feet with fuze setting of 5 to 8 seconds.

155. CLUSTER, FRAGMENTATION BOMB, M29. a. General. The 500-pound bomb cluster M29 consists of 90 cylindrical-shaped, 4-pound fragmentation bombs M83, assembled in cluster adapter M16, each equipped with a case assembly (butterfly wings) and with a M129, T48, or T49 fuze. The cluster is fuzed with flare (cluster) fuze AN–M111A2. The cluster fits any 500-pound bomb station. (See fig. 135.)

b. Components. The M29 cluster consists of the following components:

(1) Adapter, cluster, M16. This is a bomb-shaped, metal adapter with hinged top cover and with partitions inside the body for inserting wafers of M83 bombs. (See fig. 136.)

RA PD 65122

Figure 134. CLUSTER, fragmentation bomb, M28.

RA PD 65123

Figure 135. CLUSTER, fragmentation bomb, M29.

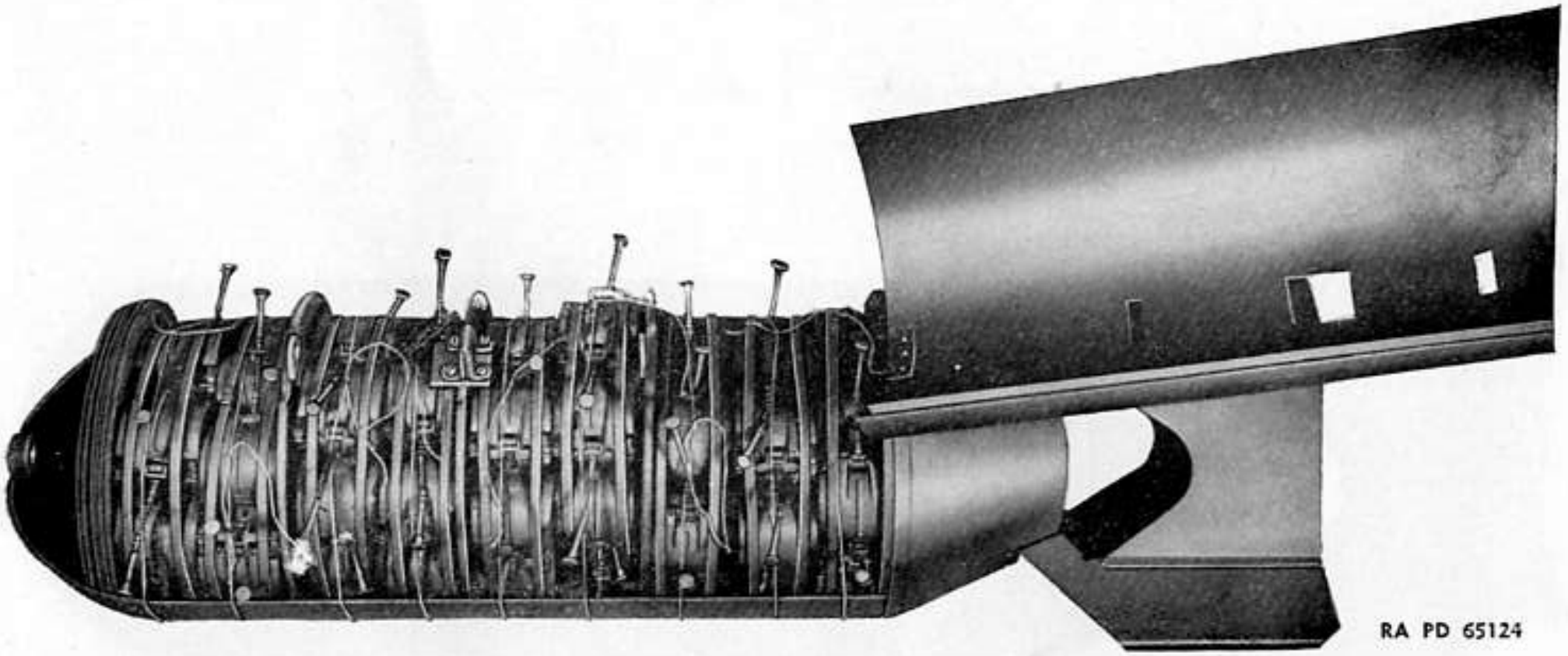


Figure 136. CLUSTER, fragmentation bomb, M29, open.

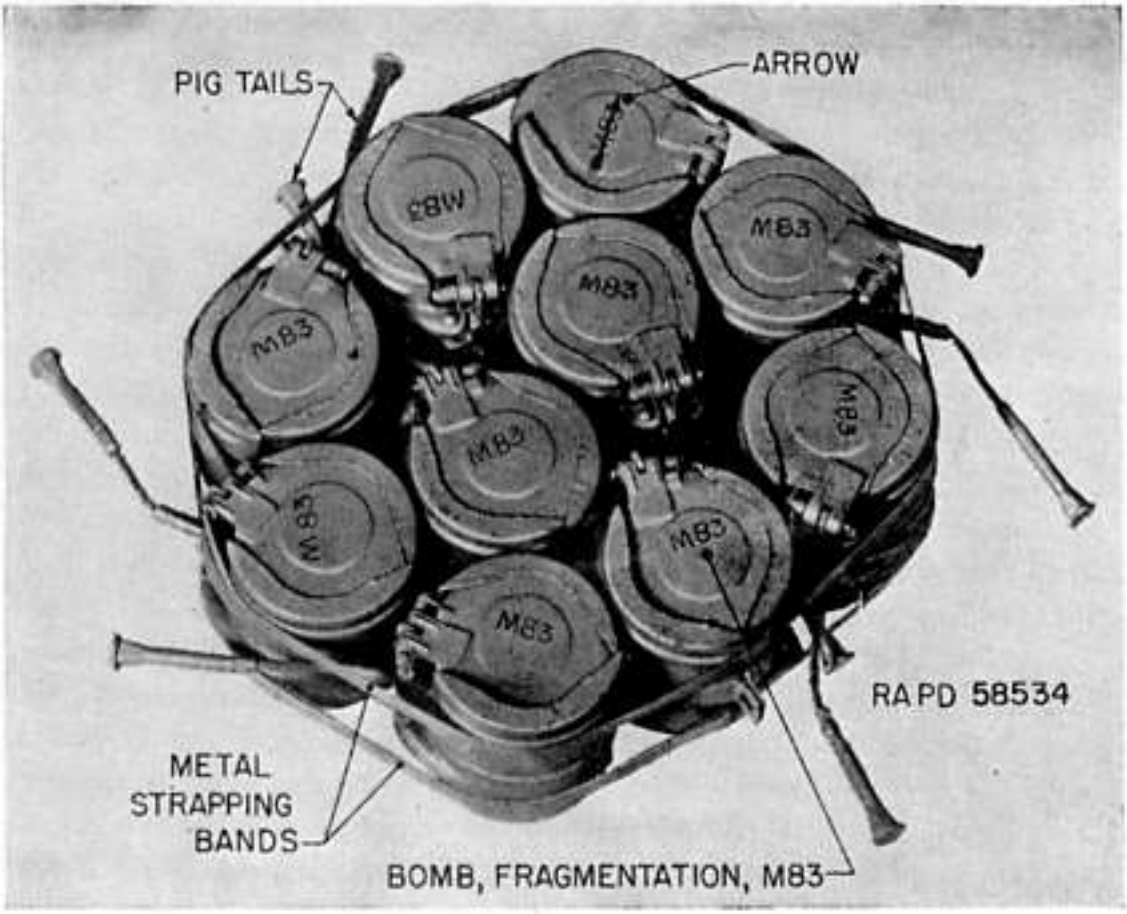


Figure 137. Wafer, assembly.

(2) Ninety Bomb, fragmentation, 4-lb., M83 in wafer form. (See fig. 137.) Ten bombs each from nine wafers are placed inside the adapter.

(3) Fuze, flare, mechanical time, AN–M111A2, for insertion in the nose of the adapter.

(4) Wire, arming assembly, for bomb cluster M29.

c. Preparation for use. The cluster components are shipped separately and must be assembled in the field. The steps listed below should be followed carefully:

(1) *Preparing an adapter.* (a) Unpack cluster adapter M16 from wooden shipping box, and place it on suitable horizontal supports so that no weight will be on the tail fins.

(*b*) Unscrew and remove the suspension lug guards.

(*c*) Cut wire on cup retainer located in the nose of adapter. Remove cup retainer and wire.

(*d*) Drive back the locking cup by inserting a wooden stick or similar object into the nose fuze well and tapping inward to dislodge the cup. The cover of the adapter may now be opened by prying with a screw driver along the seam a short distance back of the nose.

(*e*) Thread a cord through the hole in the pull piece of the locking

cup, passing the free end through the nose fuze well opening so that the locking cup can be pulled into place when the lid is closed.

(2) *Loading bombs in cluster.* (*a*) Open individually packed wafer boxes by tearing open the metal liner and removing the strapping which secures the wafers to plywood inserts. Remove the twine which is packed with the wafer and lay it aside for later use.

(*b*) Lift wafers by cable assemblies (pigtails) and place four wafers in two center bays of the bottom half of the adapter. (See fig. 136.)

Caution: Always handle wafers by cable assemblies or by the flat surface of the wafer. Do not handle by the strapping.

(*c*) If the cluster is to be suspended from a single suspension lug (BRITISH), remove the metal brace, single suspension lug, and screws from the inside of the wooden case in which the adapter cluster is packed and proceed as follows:

1. Remove the two regular suspension lugs of the adapter and fasten the metal brace in place between the partitions, using screws taken from the two regular suspension lugs.
2. Fasten the single suspension lug in place on the metal brace with the machine screws in the two sets of holes nearest the tail end of the cluster adapter. (There are three sets of holes on the brace; the first (forward) set is not used.)

(*d*) If the navy hoisting lug is used, fasten it over the center partition of the cluster adapter with the small portion of the lug forward (toward the nose of the adapter). The two regular suspension lugs remain in place.

(*e*) Place three wafers in the rear bay and two wafers in the front bay.

(3) *Arranging bombs in cluster.* (*a*) Tie all wafers down separately and firmly with the twine provided, passing the twine over the bombs and outside of the bottom half of the adapter.

(*b*) Cut and remove metal strapping from the bombs, and settle the bombs in place by careful shifting of the wafers so that no rigid part of any bomb will interfere with closing the cluster cover.

(4) *Closing the cluster.*

Caution: The following operations should be performed slowly and carefully. Failure to follow these directions may permit the bombs to spring out of the cluster, and the case assemblies (butterfly wings) to open. Before cutting any strings, be certain that the adapter cover is closed.

(*a*) Close the adapter by lowering the cover slowly; at the same time, adjust the cable assemblies (pigtails) of the bombs so that they do not rest across either of the partitions and do not get in the way of the cover. When closing cover of cluster, be certain that the back corners of the cover are seated *under* the rear flange of the bottom half

of the adapter, and that the strips reinforcing the edge of the cover are *inside* the bottom half. If the flange does not seat properly, it can be seated by tapping lightly with a hammer along the edge of the flange.

Note. When the adapter is being closed, its cover will probably cut some of the strings with which the wafers are tied. If this occurs, the cover must not be allowed to open or the untied bombs will spring out.

(*b*) Pull the locking cup into position with the string which was attached to it, and the hook and prying tool provided for this purpose.

Caution: Do not exert sufficient force on the locking cup to distort it. (This tool is part of a kit which is issued separately to all theaters performing this work. The kit also contains pliers, tinsnips, and a measuring gauge.)

(*c*) Insert the special measuring gauge into the fuze seat well, up against the bottom surface of the locking cup. (This gauge has a measurement of 1.375 inches on one end and 0.8437 inches on the other.) The distance between the bottom surface of the locking cup and the nose of the cluster adapter should be a maximum of 1.375 inches.

(*d*) Turn the gauge around and insert it in the fuze well against the pull piece of the locking cup. The distance between the pull pieces and the nose of the adapter should be a minimum of 0.8437 inches.

(*e*) With the cover securely in place and held by the locking cup, cut and remove the twine with which the wafers are tied and which was not cut when the cover was closed. If the twine does not pull out easily, the pieces may be cut on both sides of the adapter at the seam and the upper portion left in the adapter.

(*f*) Set the flare fuze to the desired time and install as directed in paragraph 41.

(*g*) *Removal.* If not dropped, arming wire and flare fuze will be removed by reversing the order of the procedure listed above. Store the loaded cluster off the ground and under a tarpaulin. Store for as short a period as possible since this matériel, particularly the fuzes, is susceptible to damage by atmospheric moisture.

d. Precautions. (1) *Under no circumstances will the using arm attempt to disassemble the cluster or any of its bomb components. When once loaded, the cluster adapter will not be reopened.*

(2) Because of the great dispersion and drift of the butterfly bombs when released from a high altitude, best results are obtained when the cluster is dropped from an altitude of from 2,000 to 5,000 feet, with a time setting on the AN–M111A2 flare (cluster) fuze ranging from approximately 5 to 8 seconds.

(3) Care should be taken to make certain that the locking cup is in the fully locked position before the AN–M111A2 flare fuze is inserted.

SECTION XVIII. CLUSTERS OF INCENDIARY BOMBS

156. **CLUSTER, INCENDIARY BOMB, AN–M6.** CLUSTER, incendiary bomb, AN–M6 (fig. 138), is a 100-pound size cluster. It consists of 28 BOMB, incendiary, 4-pound, AN–M50–A2, 6 BOMB, incendiary, 4-pound, AN–M50X–A3, and ADAPTER, cluster, M5. It is 42.78 inches in length and weighs 145 pounds.

157. **CLUSTER, INCENDIARY BOMB, M7.** CLUSTER, incendiary bomb, M7 (fig. 139), is a 500-pound size cluster. It consists of 102 BOMB, incendiary, 4-lb., AN–M50–A2, 26 BOMB, incendiary, 4-lb., AN–M50X-A3, and ADAPTER, cluster, M6. It is 42.78 inches in length and weighs approximately 540 pounds.

158. **CLUSTER, INCENDIARY BOMB, AN–M12.** CLUSTER, incendiary bomb, AN–M12 (fig. 140) is a 100-pound size cluster. It consists of 14 BOMB, incendiary oil, 6-lb., AN–M69, and ADAPTER, cluster, M4. It is 39.25 inches long and weighs 105 pounds.

159. **CLUSTER, INCENDIARY BOMB, AN–M13.** CLUSTER, incendiary bomb, AN–M13 (fig. 141) is a 500-pound size cluster. It consists of 60 BOMB, incendiary oil, 6–lb., AN–M69, and ADAPTER, cluster, M7. It is 58.88 inches long and weighs 417 pounds.

160. **CLUSTER, AIMABLE, INCENDIARY BOMB, M17A1.** a. This type cluster is assembled in a closed adapter which resembles a bomb in shape. It contains 110 four-pound incendiary bombs and is adapted for FUZE, bomb, mechanical time, M127 or M138. The fuze is assembled after the cluster is securely installed in the plane in the usual manner (par. 41) with the following exceptions:

(1) When a solid arming wire is used, the wire is not passed through the forward suspension lug. However, if an arming wire of braided steel is supplied, the wire is passed through the lug.

(2) The arming wire is inserted in the fuze before the fuze is screwed into the cluster. Care should be exercised to prevent kinking the wire while screwing the fuze into its seat.

b. Composition of the various models:

Cluster	*Size*	*Adapter*	*Bombs*
M14	500-lb.	M10A1	110 AN–M50T–A2
M17	500-lb.	M10	88 AN–M50–A2 & 22 AN–M50X–A3
M17A1	500-lb.	M10A1	88 AN–M50–A2 & 22 AN–M50X–A3

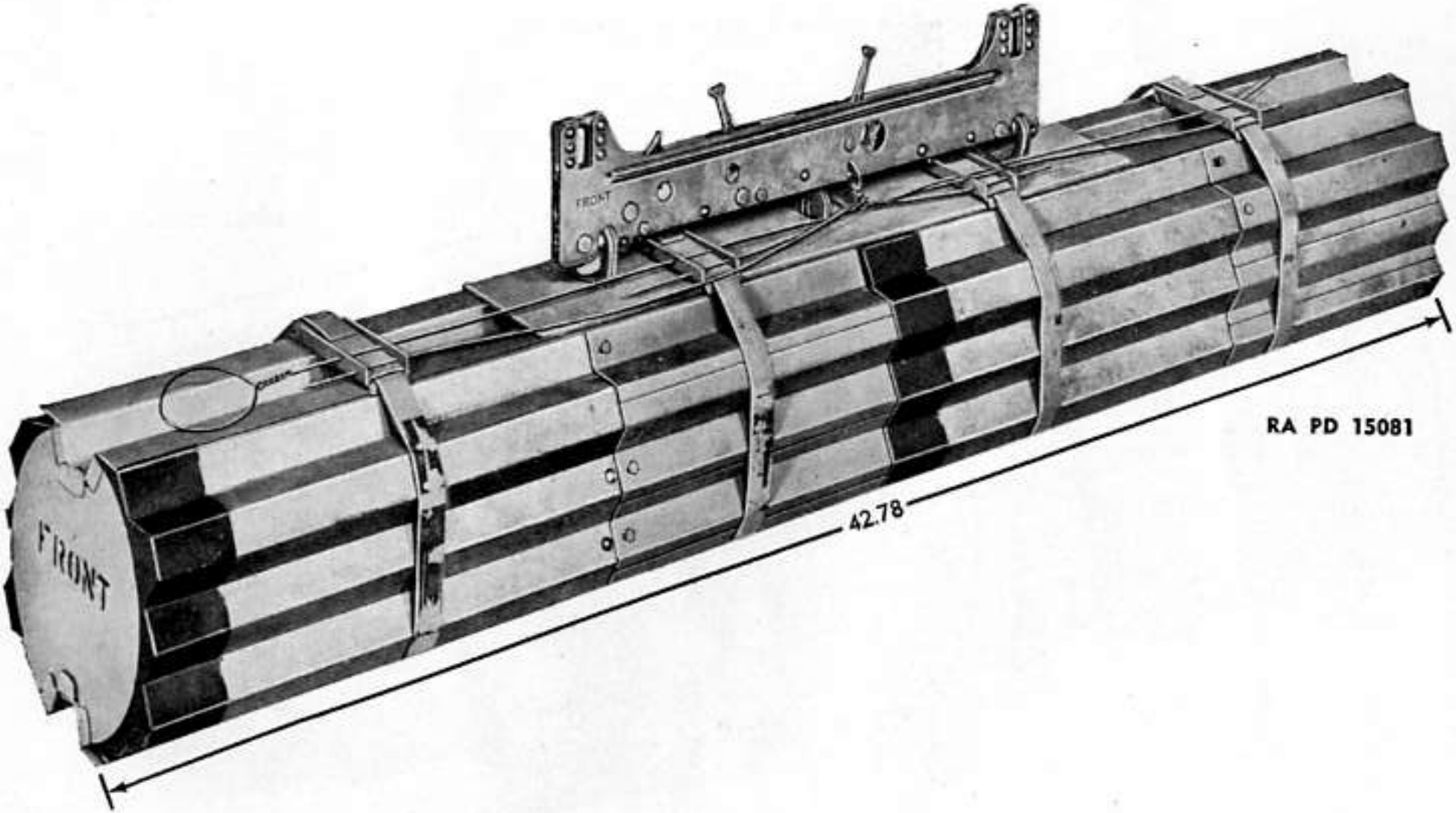


Figure 138. CLUSTER, incendiary bomb, AN–M6.

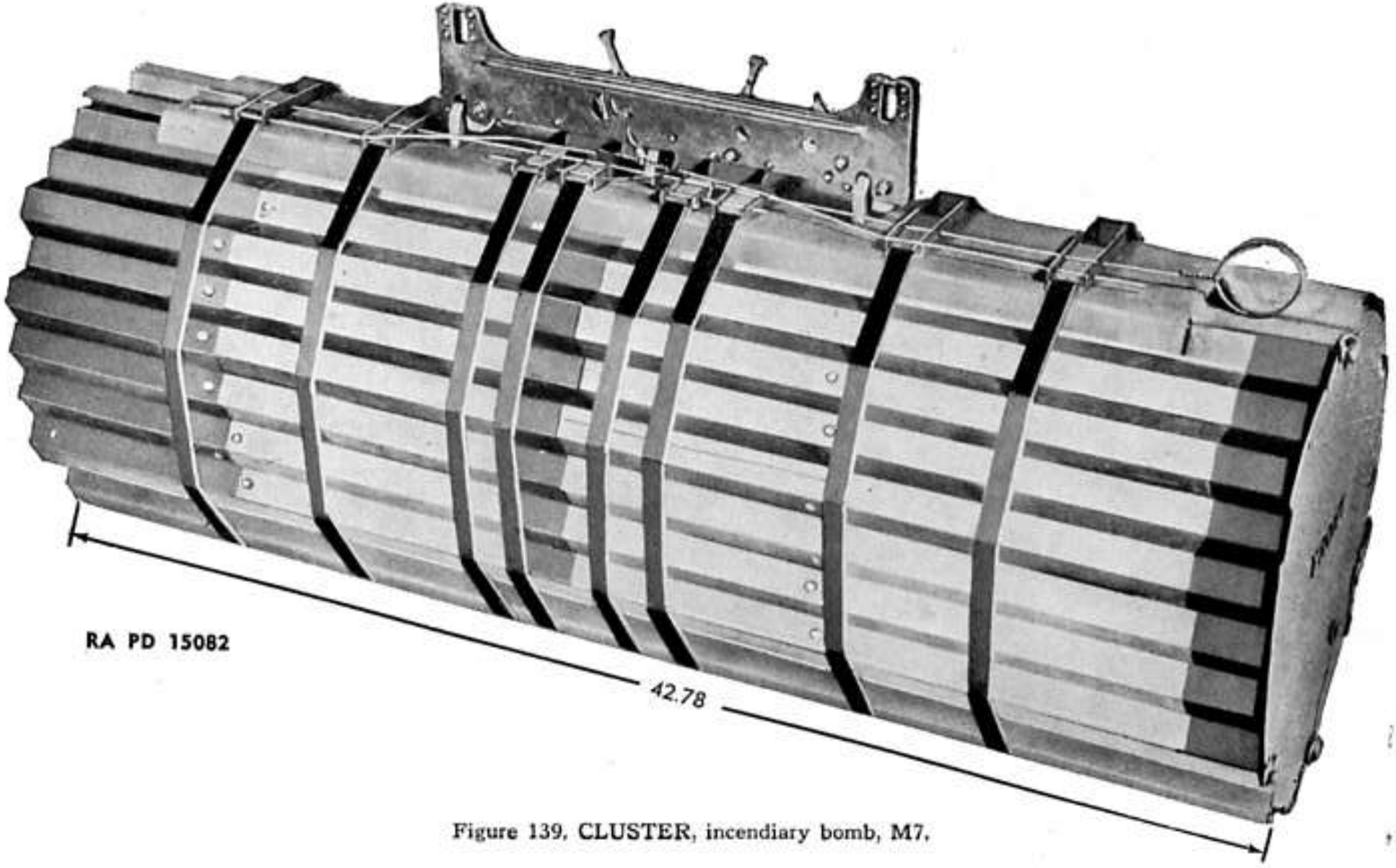


Figure 139. CLUSTER, incendiary bomb, M7.

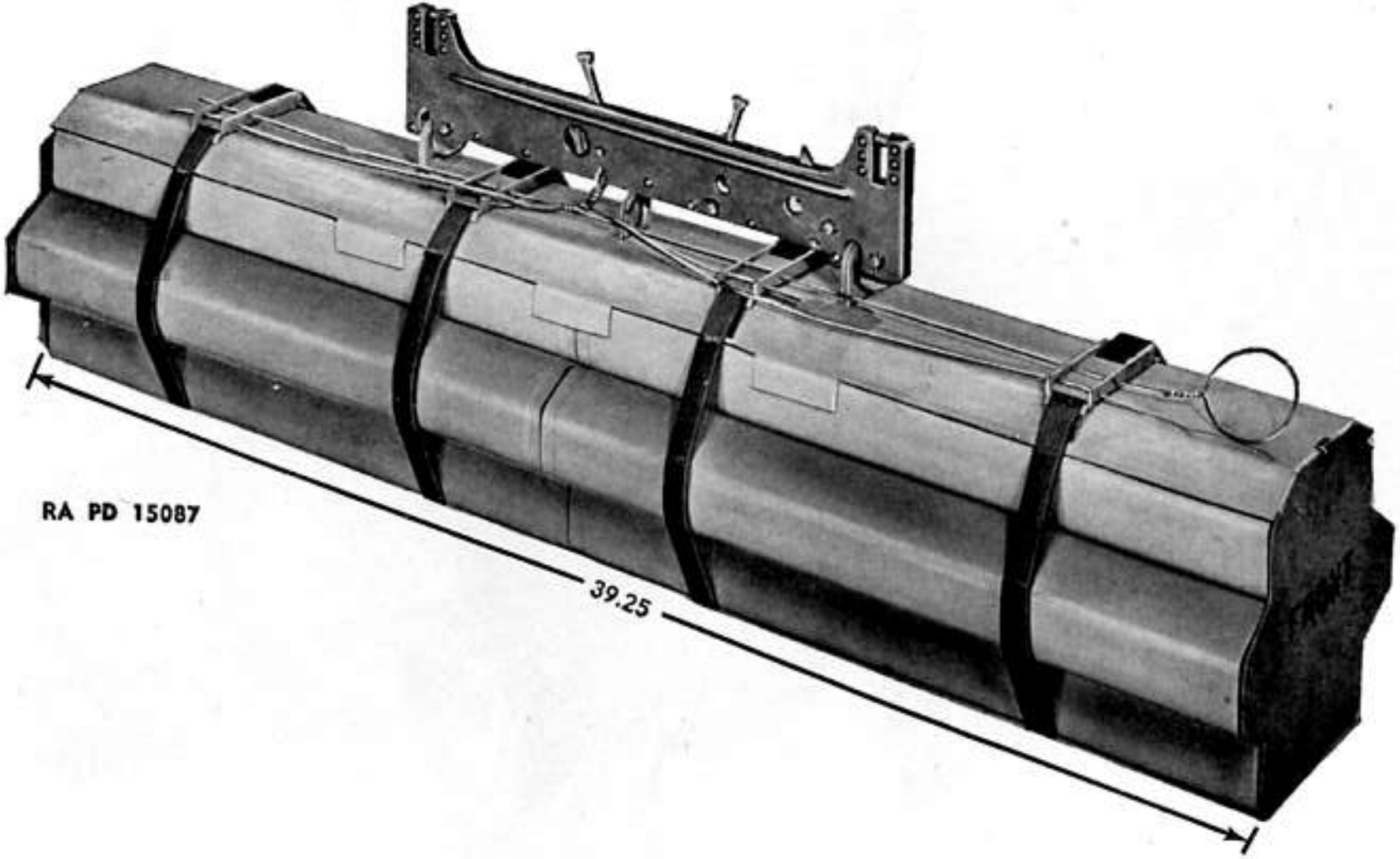


Figure 140. CLUSTER, incendiary bomb, AN-M12.

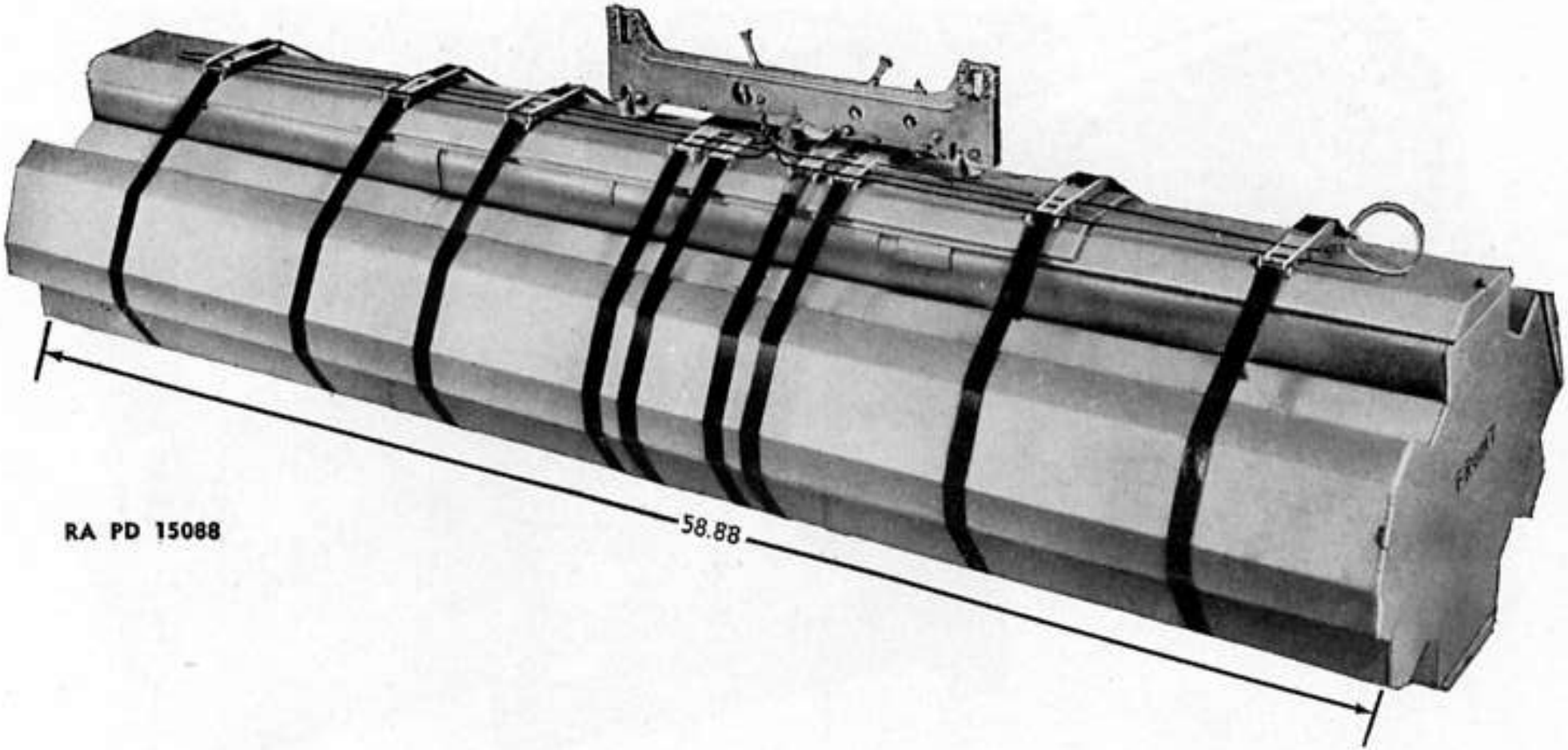


Figure 141. CLUSTER, incendiary bomb, AN–M13.

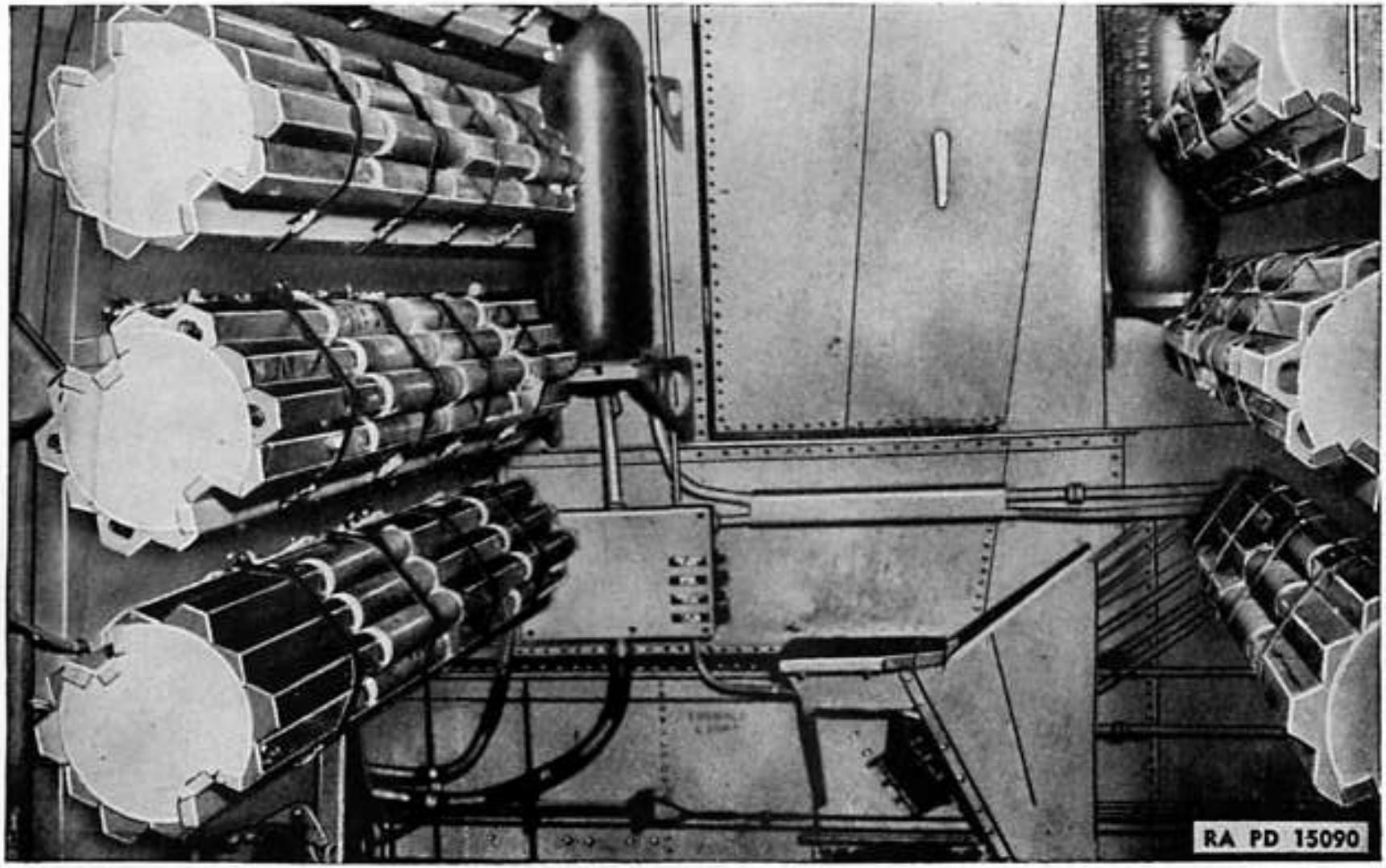


Figure 142. CLUSTER, incendiary bomb, installed in bomb bay.

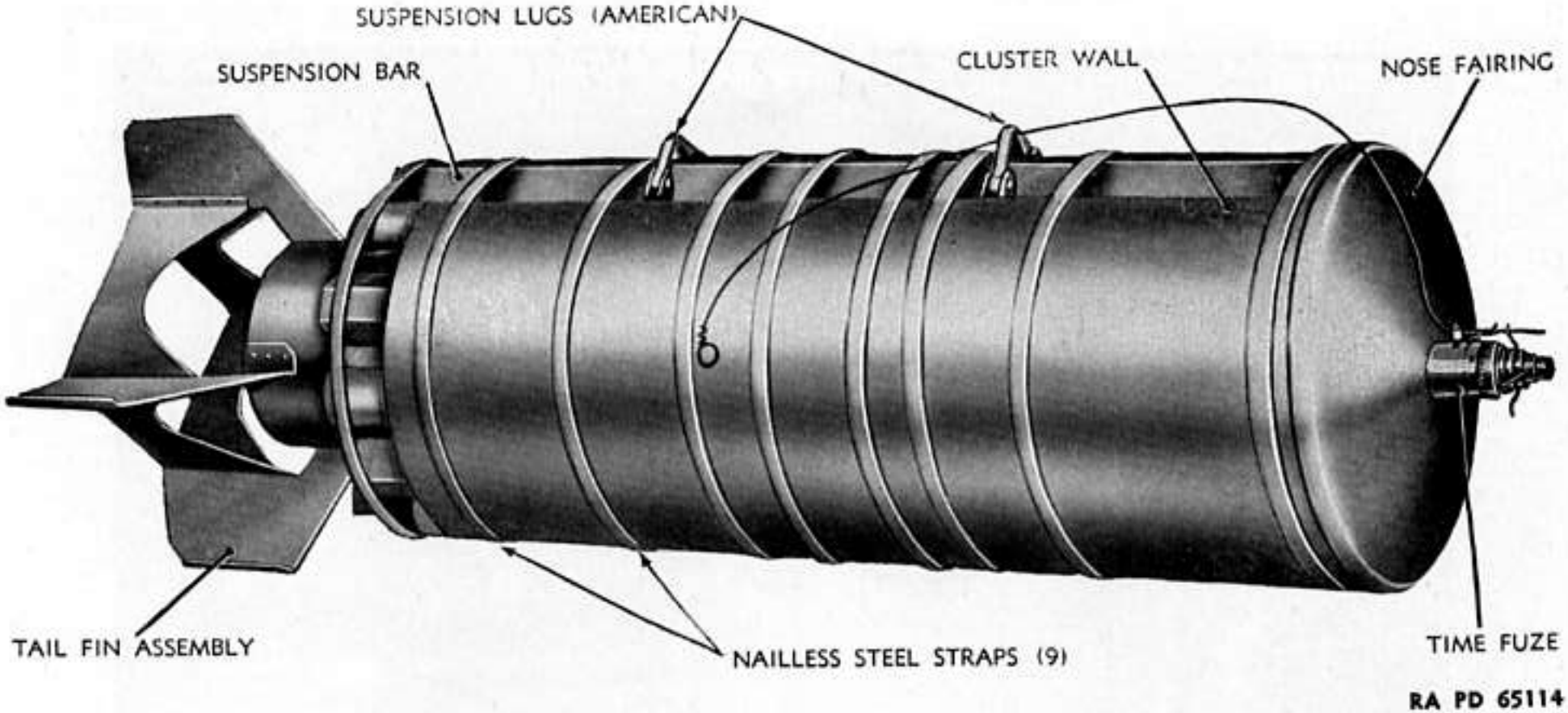


Figure 143. CLUSTER, aimable, incendiary bomb, M17A1.

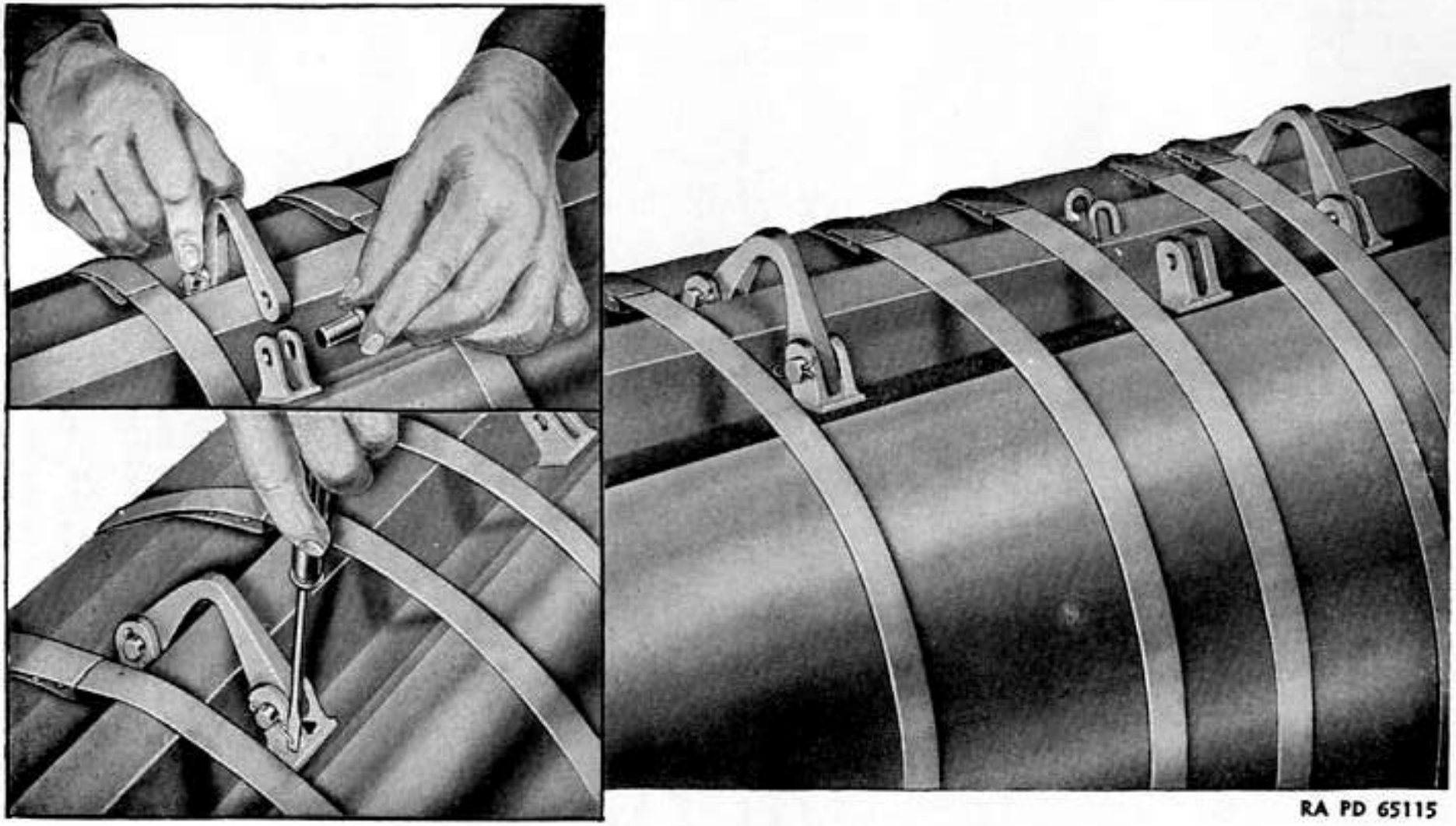


Figure 144. CLUSTER, aimable, incendiary bomb, attaching suspension lugs.

SECTION XIX. REFERENCES: PUBLICATIONS

161. PUBLICATION INDEXES. The following publications indexes should be consulted frequently for latest changes or revisions of references given in this section and for new publications relating to matériel covered in this manual:

a. Introduction to Ordnance Catalog (Explaining SNL system) ..... ASF Cat. ORD 1 IOC

b. Ordnance Publications for Supply Index (Index to SNL's) ..... ASF Cat. ORD 2 OPSI

c. Index to Ordnance Publications (listing FM's, TM's, TC's, and TB's of interest to Ordnance personnel, OPSR, FSMWO's, BSD, S or SR's, OSSC's and OFSB's. Includes Alphabetical Listing of Ordnance Major Items with publications pertaining thereto) ..... OFSB 1–1

d. List of Publications for Training (listing MTP's, FM's, TM's, TR's, TB's, MWO's, SB's, WDLO's and FT's) ..... FM 21–6

e. List of Training Films, Film Strips, and Film Bulletins (listing TF's, FS's, and FB's by serial no. and subject) ..... FM 21–7

f. Military Training Aids (listing Graphic Training Aids, Models, Devices, and Displays) . FM 21–8

g. Index to Bombing Tables (listing current bombing tables for bombs, clusters and flares) . Index to BT's

162. STANDARD NOMENCLATURE LISTS. a. Current SNL's are listed below. An up-to-date list of Standard Nomenclature Lists is maintained in OPSI, currently published in OFSB 1–1.

b. Bombs and components.

Bombs, aircraft, all types ..... SNL S–1
Fuzes and miscellaneous explosive components for aircraft bombs .... SNL S–2
Fin assemblies and miscellaneous inert components for aircraft bombs . SNL S–3
Pyrotechnics, military, all types ..... SNL S–5
Ammunition instruction material for grenades, pyrotechnics, and aircraft bombs ..... SNL S–6
Packing materials used by field service for bombs, grenades, pyrotechnics, torpedoes, mines and rockets ..... SNL S–11

ASF Catalog: Chemical Warfare Service

c. Cleaning, preserving and lubricating materials; recoil fluids, special oils, and miscellaneous related items ..... SNL K–1

163. EXPLANATORY PUBLICATIONS. *a.* Ammunition.

Ammunition, General ..... TM 9–1900
Ammunition, General ..... SB 9–AMM1
Ammunition Prices ..... SB 9–AMM3
Ammunition Identification Code ..... SB 9–AMM5
Aircraft Bombs and Bomb Components.. OFSB 3–8
Qualification in Arms and Ammunition Training Allowances ..... AR 775–10
Range Regulations for Firing Ammunition for Training and Target Practice. AR 750–10
Unsafe Ammunition ..... SB 9–AMM2
Ordnance Safety Manual ..... O.O. 7224
Military Chemistry and Chemical Agents. TM 3–215
Complete Round Chart ..... O.O. 5981
Military Explosives ..... TM 9–2900
Military Pyrotechnics ..... TM 9–1981
Ammunition Condition Report ..... O.O. 7235

b. Shipment.

Pamphlet No. 6, Bureau of Explosives, I.C.C.
Storage and Shipment of Dangerous Chemicals ..... TM 3–250

c. Matériel and handling equipment.

Truck, Bomb Service, M6 ..... TM 9–765
Trailer, Bomb, M5 ..... TM 9–760
Truck, Lift, M22 ..... TM 9–762
Bomb Racks, Tow Target Equipment, and Flare Racks ..... TM 1–500

d. Miscellaneous.

Precision Bombing Practice ..... TM 1–250
Tactics of Chemical Warfare ..... FM 3–5
Chemical Warfare Service Supply and Field Service ..... FM 3–15
Defense Against Chemical Attack ..... FM 21–40
Handbook for Bombardiers ..... TM 1–251
Aircraft Armament and Pyrotechnics.... TM 1–409
Precautions in Handling Gasoline ..... AR 850–20
Military Sanitation and First Aid ..... FM 21–10
Ordnance Service in the Field ..... FM 9–5
Ammunition Supply ..... FM 9–6

SECTION XX. TABLES

Table 1. Wire, Arming, Assembly—Components and Data.

(See figure 39 for dimension key)

Bombs and clusters	Arming wire[1]							
	Fr. Mk.	Over-all length (inches)	Number of branches	Length (fig. 39)				Clips required
				f	e	b	c	
BOMBS								
A.P., and S.A.P.								
All M-series	82-3-234VA	48	1	48.25	1.25	....	...	1
All AN-Mk.-series	150931 (Navy)	108	1	55	1.25	....	...	2
G.P., L.C., and Demo.								
100-lb. to 300-lb. incl., all models.	82-3-234FB	60	2	62	34	27	33	2
500-lb. to 600-lb. incl., all models.	82-3-234HB	75	2	77	34	33	42	2
1000-lb. all models	82-3-234ZA	81.5	2	83.5	37.5	36.5	45	2
2000-lb. all models	82-3-234AB	109	2	111	50	49	60	2
4000-lb	82-3-234UA	130	.....	132	63	62	68	2
Depth								
All (for each fuze used)	150931 (Navy)	108	2	[2]	....	....	...	4
260-lb. AN-M81 fragmentation.	82-3-234FB	60	2	62	34	27	33	2
Gas								
100-lb. M47 and mods.	82-3-277C	26	1	26.25	1.5	....	...	1
115-lb. M70	82-3-234KC	28[1]	1	28	1	....	...	1
500-lb. AN-M76, M78	82-3-234HB	75	2	77	34	33	42	2
1000-lb. AN-M79	82-3-234ZA	81.5	2	83.5	37.5	36.5	45	2
Photoflash								
M46	82-3-281B	28[1]	1	28.25	1	....	...	1
Practice								
100-lb. M38A2	82-3-213D	34	1	34.25	1.5	....	...	.....
Smoke								
100-lb. M47, all mods.	82-3-277C	26	1	26.25	1.5	....	...	1
CLUSTER								
Fragmentation bomb, M1 or Practice bomb, M2.	82-3-312B	26	1	76.25	1.5	....	...	.....
Fragmentation bomb, AN-M1A2 or Practice bomb, M2.	82-3-350H	32	2	34	19	18	14	2
Fragmentation bomb, AN-M4 or Practice bomb M5.	82-3-378F	18	2	20	8	7	11	2
Incendiary bomb								
All types	B14-23-131 (CWS).	[3]	4	[3]	.....	...	...	4-9

[1] Arming wire is 0.064" diameter except where indicated by this symbol where it is 0.036" diameter.
[2] Two pieces, each 55".
[3] Four branches 7, 8.5, 16.5, and 20.5 inches long, respectively; made up from two pieces 15.5 and 37 inches long, respectively.

Table II. Fuze Data.

Paragraph in text	Fuze		Arming			Action		Primer detonator model[1]	Booster weight (gr.)	Length of fuze (in.)	Weight fuze (lb.)	Bombs authorized for
	Model	Type	Type	Delay	Air travel (feet)	Type	Delay (sec.)					
53...	M100 ..... AN-M100A1	Tail.....	Vane.....	675 rev.....	2,000....	Impact.....	.025[2].....	*M14*....	0	8.8	1.7	G.P., 100 to 300 lb.
53...	AN-M100A2	Tail.....	Vane.....	175 rev.....	445.....	Impact.....	.025[2].....	*M14*....	0	8.8	1.7	G.P., 100 to 300 lb.
54...	M101 ..... AN-M101A1	Tail.....	Vane.....	675 rev.....	2,000....	Impact.....	.025[2].....	*M14*....	0	11.8	1.9	G.P., 500–600 lb. S.A.P., 500 lb.
54...	AN-M101A2	Tail.....	Vane.....	175 rev.....	450–650..	Impact.....	.025.....	*M14*....	0	11.8	2.9	G.P., 500–600 lb. S.A.P., 500 lb.
55...	M102 ..... AN-M102A1	Tail.....	Vane.....	675 rev.....	2,000....	Impact.....	.025[2].....	*M14*....	0	15.8	3.2	G.P., 1,000 lb. and over. S.A.P., 1,000 lb. A.P., all M-series.
55...	AN-M102A2	Tail.....	Vane.....	175 rev.....	450–650..	Impact.....	.025[2].....	M14....	0	15.8	3.2	G.P., 1,000 lb. and over. S.A.P., 1,000 lb. A.P., all M-series.
37...	M103.....	Nose.....	Vane.....	525 rev. D 750 rev. SQ	1,140.... 1,710....	Impact.....	0.1 sec. or SQ..	M20....	825	7.0	3.7	Depth[3] all except Mk. 17. G.P., all.
37...	AN-M103....	Nose.....	Vane.....	230 rev. D 340 rev. SQ.	510..... 765.....	Impact.....	0.1 sec. or SQ..	M20....	825	7.0	3.7	Depth[3] all except Mk. 17. G.P., all.
38...	M104..... AN-M104....	Nose.....	Pin.....	2.5 sec.....	.....	Impact.....	SS..... SQ.....	M19....	310	4.4	1.15	Fragmentation, parachute type.
56...	M106.....	Tail.....	Pin.....	0.....	0.....	Impact.....	45 sec.....	(M106)	0	9.4	2.4	G.P., S.A.P., A.P., all.
56...	M106A1.....	Tail.....	Pin.....	0.....	0.....	Impact.....	8–11 sec.....	(M106)	0	9.4	2.4	G.P., S.A.P., A.P., all.
56...	M106A2.....	Tail.....	Pin.....	0.....	0.....	Impact.....	4.5 sec.....	(M106)	0	9.4	2.4	G.P., S.A.P., A.P., all.
39...	M108.....	Nose.....	Pin.....	0.....	0.....	Impact.....	SQ.....	(M108)	0	2.6	.54	Practice target.
40...	M110.....	Nose.....	Vane.....	455 rev.....	.....	Impact.....	SQ.....	M13....	259	3.6	.6	Fragmentation, fin type; chemical, 115-lb.
40...	AN-M110A1	Nose.....	Vane.....	325 rev.....	.....	Impact.....	SQ.....	M13....	268	3.7	1.12	Fragmentation, fin type; chemical, 115-lb.
41...	M111.....	Nose.....	Vane.....	455 rev.....	.....	Time impact...	15–90 sec. or SQ	M26[4]...	[5]20	4.2	.9	Flare, M26. PP, M46.

Continued on following page. See end of table for explanation of symbols.

Table II. Fuze Data. (Continued)

Paragraph in text	Fuze		Arming			Action		Primer[1] detonator model	Booster weight (gr.)	Length of fuze (in.)	Weight fuze (lb.)	Bombs authorized for
	Model	Type	Type	Delay	Air travel (feet)	Type	Delay (sec.)					
41...	M111A1	Nose	Vane	455 rev		Time impact	5–90 sec. or SQ	M25[1]	[1]70	4.2	.9	Flare, M26. PF, M46.
41...	M111A2	Nose	Vane	325 rev		Time impact	5–90 sec. SQ	M25[1]	[1]70	4.5	1.4	Flare, M26. PF, M46.
57...	M112 M112A1	Tail	Vane	18 rev	73	Impact	8–15 sec.[4]	*M16A1*	0	9.6	1.9	G.P., 100–300 lb.
58...	M113 M113A1	Tail	Vane	18 rev	73	Impact	8–15 sec.[4]	*M16A1*	0	12.6	2.1	G.P., 500–600 lb. S.A.P., 500.
59...	M114 M114A1	Tail	Vane	18 rev	73	Impact	8–15 sec.[4]	*M16A1*	0	16.6	2.4	G.P., and S.A.P., 1,000 lb. and over.
60...	M115	Tail	Vane	175 rev	450–650	SS impact	4–5 sec.[4]	M16A1	0	9.5	2.7	G.P., 100–300 lb.
61...	M116	Tail	Vane	175 rev	450–650	SS impact	4–5 sec.[4]	*M16A1*	0	12.5	2.9	G.P., 500–600 lb.
62...	M117	Tail	Vane	175 rev	450–650	SS impact	4–5 sec.[4]	*M16A1*	0	16.5	3.2	G.P., 1,000 lb. and over.
42...	AN–M120	Nose	Pin	2.5 sec		SS impact	SQ	M19	300	4.6		Fragmentation (parachute type).
42...	AN–M120A1	Nose	Pin	1.9 sec		SS impact	SQ	M19	300	4.6		Fragmentation parachute.
63...	M121	Tail	Vane	675 rev	2,000	SS impact	Non		0	9±	2.7±	Destructor, M4.
64...	M122	Tail	Vane	700 rev	2,500	SS impact	4.5 sec.	M27	0	15.6	3.2	G.P., 2,000 lb.
65...	M123	Tail	Arming wire	0	0	Time	[7]		0	9.63		G.P., 100–300 lb.
66...	M124	Tail	Arming wire	0	0	Time	[7]		0	12.63		G.P., 500–600 lb.
67...	M125	Tail	Arming wire	0	0	Time	[7]		0	16.63		G.P., 1,000 lb. and over.
43...	M126 AN–M126	Nose	Vane	455 rev		SS impact	SQ	M28	0	3.12	.68	100-lb. chemical, M47 and mods.
43...	M126A1 AN–M126A1	Nose	Vane	325 rev		SS impact	SQ	M28	0	3.24	1.10	100-lb. chemical, M47 and mods.
44...	M127	Nose	Vane	255 rev		Time impact	5–90 sec. or SQ	M13	268			Airable clusters.
158...	M129	Body	Vane			Air-burst impact						4-lb. frag.
158...	M130	Body	Vane			Time	3–30 min. or SQ					4-lb. frag.
158...	M131	Body	Impact	2–3 sec		Anti-handling						4-lb. frag.
68...	M132	Tail	Arming wire	0	0	Time	10 min		0	9.6		G.P., 100–300 lb.

69...	M133.....	Tail.....	Arming wire	0.....	0.....	Time.....	10 min.....		0	12.6	.....	C.P., 500-600 lb.
70...	M134.....	Tail.....	Arming wire	0.....	0.....	Time.....	10 min.....		0	16.6	.....	C.P., 1,000 lb. and over.
45...	M138.....	Nose.....	Vane.....	325 rev.....	.....	Time.....	5-90 sec.....	M13 ..	134	.....	.....	Aimable clusters.
46...	M139.....	Nose.....	Vane.....	230 rev. D	510.....	Impact.....	0.01 sec. or SQ..	M20 ..	825	7	3.7	Same as AN-M103.
				340 rev. SQ.	765.....							
47...	M140.....	Nose.....	Vane.....	230 rev. D.	510.....	Impact.....	0.025 sec. or SQ.	M20....	825	7	3.7	Same as AN-M103.
				340 rev. SQ.	765.....							
48...	AN-Mk. 219	Nose.....	Vane.....	175 rev.....	700-1,000	Impact.....	SQ.....	.....	390	5.5	4.0	Depth, Mk. 17 (for demo).
49...	AN-Mk. 224	Transverse	Hydrost.....	.....	.....	Hydrost.....	25' to 125'.....	.....	0.55[1]	.....	.....	Depth, all.
71..	AN-Mk. 228	Tail.....	Vane.....	155 rev.....	900.....	Impact.....	.08 sec.....	.....	590	16.4	10.5	A.P., Mk.-series.
50...	AN-Mk. 229	Tail.....	Vane.....	110 rev.....	450.....	Hydrost.....	25-125.....	.....	390	16.4	14.5	Depth, Mk. 29.
51..	AN Mk. 230	Tail.....	Vane.....	110 rev.....	450.....	Hydrost.....	25-125	.....	340	15.4	14.5	G.P., AN-M64-M65-M66.
52...	AN-Mk. 234	Transverse	Hydrost.....	.....	.....	Hydrost.....	25-125	.....	0.55[1]	.....	.....	Depth, all.

rev.—revolutions.
sec.—seconds.
SQ—superquick.
as—supersensitive.
[1] Italics, replaceable in the field; roman, permanently assembled.
[2] .025 as issued. .1, .01, and nondelay may be substituted.
[3] Must use special vane assembly for flat-nose bombs.
[4] Primer, M26.
[5] Black powder.
[6] 8-15 as issued. 4 to 5 may be substituted.
[7] 1, 2, 6, 12, 24, 36, 72, 144 hours delay—SQ on withdrawal.
[8] 4-5 as issued; 8-15 may be substituted.
[9] Pound.

Table III. Bomb and Cluster Data.

Bomb			Body			Charge			Complete Round	
Type	Weight	Model	Length (in.)	Diameter	Weight (lb.)	Type	Weight (lb.)	Percentage	Length (in.)	Weight (lb.)
G.P.	100	AN-M30, -A1	30.0	8.18	101.0	AM 50-50	54.2	51.0	38.46	108.C
G.P.	250	AN-M57, -A1	36.9	10.93	240.0	AM 50-50	122.5	49.0	47.8	252.0
Demo	300	M31	40.16	10.9	262.0	AM 50-50	137.0	50.0	51.0	274.0
G.P.	500	AN-M43	46.9	14.18	489.0	AM 50-50	262.0	52.0	59.16	506.0
		AN-M64, -A1	47.1	14.18	492.0	AM 50-50	262.0	51.0	59.16	512.0
G.P.	1,000	AN-M44	53.1	18.8	965.0	AM 50-50	530.0	53.0	69.5	994.0
		AN-M65, -A1	53.3	18.8	970.0	AM 50-50	530.0	53.0	69.5	999.0
G.P.	2,000	AN-M34	71.0	23.29	2,004.0	AM 50-50	1,061.0	53.0	92.83	2,049.0
		AN-M66, -A1	71.0	23.29	2,008.0	AM 50-50	1,061.0	53.0	92.8	2,053.0
L.C.	4,000	AN-M56	94.9	34.25	4,087.0	AM 50-50	3,245.0	77.3	117.25	4,201.0
A.P.	1,000	M52, -A1	50.5	12.0	1,049.0	D	58.0	5.4	71.0	1,078.0
S.A.P.	500	AN-M58A1, -A2	47.2	11.8	4,885.0	AM 50-50	144.5	29.0	57.8	502.0
S.A.P.	1,000	AN-M59, -A1	57.3	15.1	970.0	AM 50-50	303.0	30.5	70.4	990.0
A.P.	800	M61	38.6	12.0	824.0	D	32.68	3.8	58.72	853.0
A.P.	600	M62 and Mods.	47.0	10.0	606.0	D	33.61	5.5	62.1	634.0
A.P.	1,400	M63	45.74	14.0	1,363.5	D	35.0	2.4	69.1	1,412.0
Depth	650	AN-Mk. 29	42.25	17.7		TNT	464.0	71.0	70.0	657.0
Depth	325	AN-Mk. 17	31.14	15.0		TNT	243.0	75.0	52.5	345.0
A.P.	1,000	AN-Mk. 33	59.75	12.0	991.0	D	140.0	14.0	73.0	1,008.0
A.P.	1,600	AN-Mk. 1	68.9	14.0	1,575.0	D	216.0	14.0	83.5	1,590.0
Depth	350	AN-Mk. 47		15.375		TX	252.0	71.1	53.1	355.0
Depth	325	AN-Mk. 41	68.9	15.375	1,575.0	TNT	227.0	68.9	53.1	330.0

Practice Target	100	M75	47.0	8.0	29.0	Hematite	72.0		47.0	101.3
Incendiary	4	AN-M50A2	13.356	1.69		TH	.63		21.3	3.6
						Mg	1.25			
Incendiary	4	AN-M50XA2	13.356	1.69		TH	.58		21.3	
						Mg	1.25			
						Tetryl	X			
Incendiary oil	6	AN-M69	19.5	2.88		Black powder	0.016		19.5	6.1
						Mg	0.011			
						Gel	2.6			
Incendiary	10	M74								
H	100	M47A2	46.88	8.125	26.0	Burster	2.4		48.92	98.0
						H	68.5			
Incendiary	100	M47A2	46.88	8.125	26.0	GA	39.0		48.92	68.1
WP	100	M47A2	46.88	8.125	26.0	WP	100.0		48.92	129.5
WP	100	M47A1	46.88	8.125	26.0	WP	103.6		48.92	133.1
H	100	M47A1	46.88	8.125	26.0	H	73.0		48.92	102.5
Chemical	100	M47	46.88	8.125	17.0	GA	39.0		48.92	59.0
H	115	M70	40.4	8.1	119.5	H	60.6		49.4	126.0
Incendiary	500	AN-M76	45.3	14.2	431.0	PTI	180.0		59.2	475.0
Chemical	500	AN-M78	47.5	14.2	464.0	CG	205.0		60.7	488.0
					359.0	AC	100.0			383.0
Chemical	1,000	AN-M79	53.6	18.8	904.0	CG	417.0		70.9	939.0
					687.0	AC	200.0			722.0
Fragmentation	20	AN-M41	11.31	3.64	17.9	TNT	2.7		21.8	19.8
Fragmentation	23	AN-M40	11.31	4.35	17.9	TNT	2.7		29.5	24.7
Fragmentation	23	M72	11.37	4.35	17.9	TNT	2.7		31.26	24.6
Fragmentation	90	M82	20.5	6.0	80.6	TNT	11.4	13.0	28.0	85.7
Fragmentation	260	AN-M21	34.1	8.1	252.0	TNT	34.8	13.0	43.7	261.5

Continued on following page.

Table III. Bomb and Cluster Data. (Continued)

Bomb			Body			Charge			Complete Round	
Type	Weight	Model	Length (in.)	Diameter	Weight (lb.)	Type	Weight (lb.)	Percentage	Length (in.)	Weight (lb.)
PF		M46	45.25	8.0	51.0	PF	25.0		48.64	51.9
FL		M26	46.0	8.0	51.5	Flare			50.0	52.5
Practice	3	Mk. 5-1	8.25	2.5	3.0	Signal, AN-Mk.4	0.13		8.25	3.5
Practice	20	M48	11.31	3.64	15.2	Black powder	0.13		21.8	19.7
Practice	23	M71	11.37	3.64	15.2	0	0	0	26.77	21.0
Practice	23	M73	11.37	3.64	15.2	0	0	0	28.53	21.1
Practice	100	M38A2	47.5	8.125	15.7	Black powder	3.0		47.5	100.0
						Sand	80.0			
Target	100	M75	47.0	8.0	36.5	Burster, M4			47.0	101.3
						Hematite	72.0			

CLUSTERS

Cluster		Length	Weight	Cluster, Incendiary Bomb	Length	Weight (lb.)
Fragmentation	M1	46.75	125 0	AN-M6 (100-lb. size)	42.78	145
Practice	M2	46.75	124.0	M7 (500-lb. size)	42.78	540
Fragmentation	M1A1	46.6	125.0	AN-M12 (100-lb. size)	39.25	98
Practice	M2A1	46.6	124.0	AN-M13 (500-lb. size)	58.88	417
Practice	M4	31.0	87 2	M17 (500-lb. size)		462
Practice	M5	31.0	76.0	M17A1 (500-lb. size)		462
Fragmentation	M26	52.6	465.0			
Fragmentation	M27	56.0	585.0			
Fragmentation	M28	47.35	155.2			
Fragmentation	M29	59.37	415.1			

Table IV. Complete Round Data.

Bomb and fin	Fuze combinations: Nose fuze	Fuze combinations: Tail fuze	Fuze combinations: Primer-detonator	Other components	Arming wire Pt. Mk.
BOMB, A.P., 600-lb., M62 BOMB, A.P., 600-lb., M62A1 BOMB, A.P., 600-lb., M62A2 BOMB, A.P., 800-lb., M61 BOMB, A.P., 1,000-lb., M52 BOMB, A.P., 1,000-lb., M52A1 BOMB, A.P., 1,400-lb., M63	None	AN-M102A2 AN-M102A1	M14, 0.025-sec. delay M14, 0.1-sec. delay M14, 0.01-sec. delay M14, nondelay	BAND, trunnion, for dive bombing only (M6 for 600-lb. bombs, M3A1 for 800- and 1,000-lb. bombs, M1A1 for 1,400-lb. bombs).	82-3-234VA
BOMB, A.P., 1,000-lb., AN-Mk. 33 BOMB, A.P., 1,600-lb., AN-Mk. 1 BOMB, A.P., 1,600-lb., Mk. 1 (Navy) BOMB, A.P., 1,600-lb., Mk. 1-Mod. 1 (Navy)	None	AN-Mk. 223	None	Suspension accessories packed w/fin for AN-bombs only (Suspension and hoisting lugs w/cap screws, trunnions w/lock washers, guide key w/screws). BOOSTER, auxiliary (supplied in fuze cavity of bomb) BAND, suspension (supplied w/bomb body, Mk. bombs only). BAND, trunnion (Mk. bombs only).	Navy drg. 150931

Continued on following page.

Table IV. Complete Round Data. (Continued)

Bomb and fin	Fuze combinations: Nose fuze	Fuze combinations: Tail fuze	Fuze combinations: Primer-detonator	Other components	Arming wire Pc. Mk.
	AN–M103 M103 AN–M110A1, w/adapter-booster, M117.	AN–M100A2 AN–M100A1	M14, 0.025-sec. delay M14, 0.1-sec. delay M14, 0.01-sec. delay M14, nondelay	EXTENSION, fuze, M1, all lengths.	
BOMB, G.P., 100-lb., AN–M30 BOMB, G.P., 100-lb., AN–M30A1 BOMB, G.P., 250-lb., AN–M57 BOMB, G.P., 250-lb., AN–M57A1 BOMB, demolition, 100-lb., M30 BOMB, demolition, 300-lb., M31	M127, w/ adapter-booster, M117.	M112A1	M16A1, 4–5 sec. delay	None	82–3–234FB 82–3–234XA (100-lb. only) 82–3–234WA 82–3–234EB
		M112	M16, 4–5 sec. delay		
		Any combination above or none.			
	None	M123, all delays	None	None	
		M132	None		
		M115	M16A1, 4–5 sec. delay M16A1, 8–15 sec. delay		

BOMB, G.P., 500-lb., AN-M64A1 BOMB, G.P., 500-lb., AN-M64A1, COMP. B.	AN-M103 M103 AN-M110A1, w/adapter-booster, M117.	AN-M101A2 AN-M101A1	M14, 0.025-sec. delay M14, 0.1-sec. delay M14, 0.01-sec. delay M14, nondelay	EXTENSION, fuze, M1, all lengths.	
BOMB, G.P., 500-lb., AN-M64 BOMB, G.P., 500-lb., AN-M64, COMP. B.		M113A1	M16A1, 4–5 sec. delay		
		M113	M16, 4–5 sec. delay		
BOMB, G.P., 500-lb., AN-M64, COMP. B–2. BOMB, G.P., 500-lb., M64 BOMB, G.P., 500-lb., AN-M43 BOMB, G.P., 500-lb., M43 BOMB, demolition, 500-lb., M43	M127, w/ adapter-booster, M117.	Any combination above or none.		BAND, trunnion, M1A1 (for dive bombing only, G.P. and demo. bombs).	82–3–134HB
BOMB, demolition, 600-lb., M33 BOMB, semiarmor-piercing, * 500-lb., AN-M58.		M116	M16A1, 4–5 sec. delay M16A1, 8–15 sec. delay	BAND, trunnion, M4 (for dive bombing only, semi-armor-piercing bombs).	82–3–134YA
BOMB, semiarmor-piercing, * 500-lb., AN-M58A1.		M124, all delays.	None		
BOMB, semiarmor-piercing, * 500-lb., AN-M58A2.	None	M133	None		
		AN-Mk. 230 (M64 mods. only)	None		

* Nose fuze usually omitted with semiarmor-piercing bombs.

Continued on following page.

Table IV. Complete Round Data. (Continued)

Bomb and fin	Fuze combinations: Nose fuze	Fuze combinations: Tail fuze	Fuze combinations: Primer-detonator	Other components	Arming wire Pc. Mk.
BOMB, G.P., 1,000-lb., AN-M65A1	AN-M103 M103 AN-M110A1, w/adapter-booster, M117.	AN-M102A2 AN-M102A1	M14, 0.025-sec. delay M14, 0.1-sec. delay M14, 0.01-sec. delay M14, nondelay	EXTENSION, fuze, M1, all lengths	
BOMB, G.P., 1,000-lb., AN-M65A1, COMP. B.		M114A1	M16A1, 4-5 sec. delay		
BOMB, G.P., 1,000-lb., AN-M65					
BOMB, G.P., 1,000-lb., AN-M65, COMP. B.		M114	M16, 4-5 sec. delay		
BOMB, G.P., 1,000-lb., AN-M65, COMP. B-2.	M127, w/ adapter-booster, M117	Any combination above or none.		BAND, trunnion, for dive bombing only (M2A1 for 1,000-lb. G.P. and demo. bombs, M5 for 1,000-lb. semiarmor-piercing bombs, AN-M7 for 2,000-lb. bombs).	82-3-234ZA (1,000-lb. bombs).
BOMB, G.P., 1,000-lb., M65					
BOMB, G.P., 1,000-lb., AN-M44					
BOMB, G.P., 1,000-lb., M44					82-3-234VA (semi-armor-piercing bombs, w/1 fuse).
BOMB, demolition, 1,000-lb., M44		M116	M16A1, 4-5 sec. delay M16A1, 8-15 sec. delay		
BOMB, demolition, 1,100-lb., M33					
BOMB, demolition, 2,000-lb., M34					
BOMB, semiarmor-piercing, * 1,000-lb., AN-M59		M125, all delays	None		
BOMB, semiarmor-piercing, * 1,000-lb., AN-M59A1		M134	None		82-3-234AH (2,000-lb. bombs)
BOMB, G.P., 2,000-lb., AN-M66A1	None				

* Nose fuze usually omitted with semiarmor-piercing bombs.

BOMB, G.P., 2,000-lb., AN–M66 BOMB, G.P., 2,000-lb., AN–M34		AN–Mk. 230 (M65 & mods. or M66 & mods. only).	None		
BOMB, light case, 4,000-lb., AN–M56 BOMB, light case, 4,000-lb., AN–M56A1	AN–M103 M103 AN–M110A1, w/adapter-booster, M117. M127, w/ adapter-booster, M117.	AN–M102A2 AN–M102A1	M14, nondelay	BAND, trunnion, AN–M8, for dive bombing.	82–3–234LIA
DEPTH CHARGE, aircraft 250-lb. Mk. VIII (British)		(Pistol) Mk. X** Mk. XIIIA	DETONATOR percussion, W.T.,D.C.,Mk.VII.	PRIMER, depth charge, Mk. VIII (British).	82–3–277C
BOMB, depth, 325-lb., AN–Mk. 17 BOMB, depth, 350-lb., AN–Mk. 44	AN–Mk. 219	Transverse AN–Mk. 234 AN–Mk. 224	None	ATTACHMENT, flat nose, BAND, trunnion, drg. 387706 Navy.	Navy drg. 150931
BOMB, depth, 325-lb., AN–Mk. 41 BOMB, depth, 350-lb., AN–Mk. 47	AN–M103, w/ special vane. AN–Mk. 219, w/fuze adapter and extra auxiliary booster.	Transverse AN–Mk. 234 AN–Mk. 224	None	BAND, trunnion, drg. 387706.	Navy drg. 150931

Continued on following page.

Table IV. Complete Round Data. (Continued)

Bomb and fin	Fuze combinations			Other components	Arming wire Pc. Mk.
	Nose fuze	Tail fuze	Primer-detonator		
BOMB, depth, 650-lb., AN-Mk. 37 BOMB, depth, 700-lb., AN-Mk. 49	AN-M103, w/ special vane, AN-Mk. 219, w/fuze adapter and extra auxiliary booster.	AN-Mk. 229	None	Transverse fuze, AN-Mk. 234 or AN-Mk. 224. Flat-nose attachment (Mk. 37 only). Spacer for transverse fuze (shipped in fuze cavity). Trunnions w/lock washers, arming wire bracket w/tube (shipped with fin).	Navy drg. 150931
BOMB, fragmentation, 23-lb., AN-M40 (for cluster only).	AN-M120A1 AN-M120 AN-M104	None	None	PARACHUTE, unit, assembly, M3.	None
BOMB, fragmentation, 23-lb., M72 BOMB, fragmentation, 23-lb., M72A1	AN-M120A1 AN-M120	None	None	PARACHUTE, unit, assembly, M4.	None
BOMB, fragmentation, 90-lb., M82 BOMB, fragmentation, 90-lb., M82, COMP. B (See also Cluster, M27	AN-M103 M103 M127, w/ adapter-booster, M117.	None	None	EXTENSION, fuze, M1, all lengths.	None

BOMB, fragmentation, 260-lb., AN–M81 BOMB, fragmentation, 260-lb., AN–M81, COMP. B	AN–M103 M103 M127, w/ adapter-booster, M117.	AN–M100A2 AN–M100A1	M14, nondelay	EXTENSION, fuze, M1, all lengths.	82–3–234FB
BOMB, gas, persistent, H, 100-lb., M47A2 BOMB, gas, persistent, H, 100-lb., M47A1	M126A1 M126 M108, w/ fuze adapter	None	None	BURSTER, M4	82–3–277C 82–3–234S
BOMB,gas,persistent,H,115-lb.,M70 BOMB,gas,persistent,L,115-lb.,M70	AN–M110A1 M110 M127	None	None	BURSTER, M4	82–3–234KC
BOMB, CC, 500-lb., M78 BOMB, CG, 500-lb., M78	AN–M103 M103 M127, w/ adapter-booster, M117.	AN–M101A2 AN–M101A1	M14, nondelay	LINER, fuze seat BURSTER, M15 ADAPTER-BOOSTER, M115A1 or M115.	82–3–234HB
BOMB, AC, 1,000-lb., AN–M79 BOMB, CC, 1,000-lb., AN–M79 BOMB, CG, 1,000-lb., AN–M79	AN–M103 M103 M127, w/ adapter-booster, M117.	AN–M102A2 AN–M102A1	M14, nondelay	LINER, fuze seat BURSTER, M16 ADAPTER-BOOSTER, M115A1 or M115.	82–3–234ZA
BOMB, photoflash, M23A1	None	None	None	2 BAND, suspension	None
BOMB, photoflash, M46	M111A2 M111A1 M111	None	None	None	82–3–281B
BOMB, practice, 3-lb., AN–MK. 23 BOMB, practice, 4.5-lb., AN–Mk. 43	None	None	None	SIGNAL, bomb, practice, miniature, AN–Mk. 4.	None

Continued on following page.

Table IV. Complete Round Data. (Continued)

Bomb and fin	Fuze combinations			Other components	Arming wire Pc. Mk.
	Nose fuze	Tail fuze	Primer-detonator		
BOMB, practice, 17-lb., M37 BOMB, practice, 23-lb., M73	None	None	None	PARACHUTE, unit, assembly, M4.	None
BOMB, practice, 23-lb., M71 (for cluster only).	None	None	None	BODY bomb PARACHUTE, unit, assembly, M3.	None
BOMB, practice, 100-lb., M38A2	None	None	None	CHARGE, spotting, assembly, M1A1. CHARGE, spotting, assembly, M3 (for snow covered ranges). CHARGE, spotting, assembly, M4 (for sonic spotting).	82-3-213D
BOMB, practice, target, 100-lb., M75	M108, w/ striker plate	None	None	BURSTER, M4	82-3-409C
BOMB, smoker, phosphorus, WP, 100-lb., M47A1 BOMB, smoke, phosphorus, WP, 100-lb., M47A2	M126A1 M126 M108, w/ fuze adapter.	None	None	BURSTER, M4 (high altitude). BURSTER, M18 (low altitude). BURSTER, M7.	82-3-277C

CLUSTER		BOMBS					ADAPTER	
Code	Model	Size	No.	Wt.	Model	Fuze	Model	Cartridge or Fuze
FRAGMENTATION BOMB CLUSTERS								
S1ZVB	M1	100-lb.	6	20-lb.	M41	M110	M1	M6
S1ZVG	M1	100-lb.	6	20-lb.	M41	M110A1	M1	M6
S1ZVD	M1A1	100-lb.	6	20-lb.	M41	M110	M1A1	None
S1ZVH	M1A1	100-lb.	6	20-lb.	M41	M110A1	M1A1	None
S1ZVL	AN-M1A1	100-lb.	6	20-lb.	AN-M41	AN-M110A1	AN-M1A2	None
S1VAA	AN-M1A2	100-lb.	6	20-lb.	AN-M41A1	Unfuzed	AN-M1A3	None
S1ZVF	M4	100-lb.	3	23-lb.	M40	M104	M3	None
S1ZVK	M4	100-lb.	3	23-lb.	M40	M120	M3	None
S1ZVN	AN-M4	100-lb.	3	23-lb.	AN-M40	AN-M104	AN-M3	None
S1ZVO	AN-M4	100-lb.	3	23-lb.	AN-M40	AN-M120	AN-M3	None
S1VBA	AN-M4A1	100-lb.	3	23-lb.	AN-M40 AN-M40A1	Unfuzed	AN-M3	None
S1ZVQ	M26	500-lb.	20	20-lb.	AN-M41	AN-M110A1	M13 (T4E2)	M111,-A1,-A2
ϕ	M27	500-lb.	6	90-lb.	M82	AN-M103	M16 (T8)	M111,-A1,-A2
PRACTICE BOMB CLUSTERS								
S1ZVA	M2	100-lb.	6	20-lb.	M48	M110	M1	M6
S1ZVI	M2	100-lb.	6	20-lb.	M48	M110A1	M1	M6
S1ZVE	M2A1	100-lb.	6	20-lb.	M48	M110	M1A1	None
S1ZVJ	M2A1	100-lb.	6	20-lb.	M48	M110A1	M1A1	None
S1ZVT	AN-M2A1	100-lb.	6	20-lb.	AN-M48	AN-M110	AN-M1A2	None
S1ZVP	AN-M2A1	100-lb.	6	20-lb.	AN-M48	AN-M110A1	AN-M1A2	None
ϕ	M5	100-lb.	3	23-lb.	M71	None	M3	None

ϕ Assembled in the field.

Table V. Typical Bomb Targets.

Bomb	Fuze delay		Altitude of attack	Target	Radius effective within
	Nose	Tail			
Fragmentation, fin type	SQ	Non	High	Personnel. Light vehicles. Planes in open	25′
Fragmentation, parachute type	SQ	Non	Low	Personnel, Light vehicles. Planes in open	25′
100-lb. G.P	0.1	0.25	High	Planes in open	75′
	SQ	Non	High	Ammunition dump	dh
	0.1	Non	High	Hangars	dh
	0.1	Non	High	Vehicles, light	75′
	0.1	Non	High	Vehicles, heavy	dh
	0.1	Non	High	Oil tanks	25′
	0.1	Non	High	Railroad engines and cars	dh
	0.1	Non	High	Railroad trackage	7′
250-lb. G. P	0.1	0.025	High	Hangars	dh
	SQ	Non	High	Planes in open	100′
	SQ	Non	High	Ammunition dump	dh
	0.1	Non	High	Vehicles, light	100′
	0.1	Non	High	Vehicles, heavy	dh
	0.1	0.025	High	Light industrial building	dh
	0.1	0.025	High	Residential	dh
	0.1	Non	High	Oil tanks	50′
	0.1	Non	High	Railroad stock	10′
	0.1	Non	High	Railroad trackage	9′
	0.1	0.025	High	Unarmored ships less than 1,500 tons	25′
500-lb. G. P		4, 11, or 45 sec	Min., or low	Light railroad bridges	15′
	0.1	0.01	High	Light railroad bridges	15′
	0.1	0.025	High	Light industrial buildings	dh
	0.1	0.025	High	Heavy industrial buildings	dh
	0.1	0.025	High	Residential	dh
	0.1	0.025	High	Power plants and substations	dh
		4, 11, or 45 sec	Min	Railroad embankment	dh

	0.1	0.025	High	Destroyers, ships, larger than 1,500 tons	35′
	0.1	0.025	High	Wharves and docks	25′
		4, 11, or 45 sec	Min	Wharves and docks	dh
1,000-lb. G. P		4, 11, or 45 sec	Min., or low	Concrete pier bridges	15′
	0.1	0.10	High	Concrete pier bridges	15′
		4, 11, or 45 sec	Low	Heavy railroad steel bridge	15′
	0.1	0.01	High	Heavy railroad steel bridge	15′
	0.1	0.025	High	Bombproof buildings, 2 story	dh
	0.1	0.1	High	Bombproof buildings more than 2 story	dh
	0.1	0.025	High	Heavy industrial building	dh
	0.1	0.025	High	Residential	dh
	0.1	0.025	High	Aircraft carrier, cruisers	35′
	0.1	0.025	High	Battleships and battle cruisers	30′
		4, 11, or 45 sec	Min	All ships except battleships and battle cruisers	dh
	0.1	0.025	High	Wharf locks and gates	dh
		4, 11, or 45 sec	Min	Wharf locks and gates	dh
		4, 11, or 45 sec	Min	Submarine slips, open end	dh
1,000-lb. S.A.P		0.1	High	Battleship and cruiser	10′
		0.025	High	Heavy concrete buildings	dh
		4, 11 or 45 sec	Min	All ships except battleships and cruisers	dh
1,000-lb. A.P		0.1	High	All ships	dh
1,600-lb. A.P		0.1	High	All ships	dh
2,000-lb. G.P		4, 11, or 45 sec	Min	Heavy reinforced concrete bridges and buildings	15′
	0.1	0.01	High	Heavy reinforced concrete bridges and buildings	15′
	SQ	Non	High	Residential	100′
	0.1	0.025	High	Dams, light masonry	15′
	4	4	Min	Dams, heavy masonry	75′ upstream
	0.1	0.025	High	Battleship and cruiser	45′
		4, 11, or 45 sec	Min	All ships	Side of ship
		4, 11, or 45 sec	Min	Battleship and cruiser—at anchor	75′
4,000-lb. L.C	SQ	Non	High	Residential	900

Dh—Direct hit required. Min.—Minimum.

Table VI. Packing and Shipping Data

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
BOMB, A.P., 600-lb., M62 unfused, w/o suspension bands or fin assembly.	Explosive bombs[E]		None	82-14-35	3.92	0.85	0.85	3.34	2.84	606	3	0.071	4	8	132	165
BOMB A.P., 600-lb., M61 unfused, w/o suspension bands or fin assembly.	Explosive bombs[E]		None	82-14-41	3.22	1.00	1.00	3.23	3.22	815	2	0.080	3	6	97	121
BOMB, A.P., 1,000-lb., M52, unfused, w/o suspension bands or fin assembly.	Explosive bombs[E]		None	82-14-38	4.22	1.00	1.00	4.22	4.22	1,041	1	0.110	2	4	66	96
BOMB, A.P., 1,000-lb., AN-Mk. 33, unfused, w/o fin assembly.	Explosive bombs[E]		None	(Navy)	4.98	1.00	1.00	4.98	4.98	993	2	0.123	3	5	80	100
BOMB, A.P., 1,400-lb., M63, unfused, w/o suspension bands or fin assembly.	Explosive bombs[E]		None	82-14-36	3.82	1.17	1.17	4.47	5.24	1,343	1	0.130	2	3	58	73
BOMB, A.P., 1,600-lb., AN-Mk. 1, unfused, w/o fin assembly.	Explosive bombs[E]		None	(Navy)	5.74	1.17	1.17	6.72	7.86	1,575	1	0.197	2	3	50	63

[D] Dangerous placard required.
[E] Explosives placard required.
[G] Poison gas placard required.
[V] Limited by volume.
[X] Shipping name not required.
[Y] Yellow label required.

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
BOMB, chemical, 100-lb., M47A2 (metal parts only).	(X)		1/wdn bx	76-16-243	4.14	0.81	0.81	3.40	3.00	53	37	0.085	56	94	[Y]810	[Y]810
BOMB, G.P., 100-lb., AN-M30, unfused.	Explosive bombs[Z]		1/mtl cr W/fuses	76-16-219 20-4-205	3.60	0.80	0.81	3.09	2.50	145	13	0.063	20	34	550	690
BOMB, G.P., 250-lb., AN-M57, unfused, w/o fin assembly.	Explosive bombs[Z]		Shipping bands	76-39-4	3.08	1.36	1.35	4.19	5.70	356	7	0.143	11	19	310	390
BOMB, G.P., 500-lb., AN-M64, unfused, w/o fin assembly.	Explosive bombs[Z]		Shipping bands	76-39-8	3.93	1.60	1.60	6.28	10.02	515	3	0.260	5	9	154	193
BOMB, incendiary, 500-lb., AN-M76.	Chemical ammunition[Y], nonexplosive incendiary.		Shipping bands		3.78	1.59	1.59	6.01	9.57	453	4	0.239	6	11	176	220
BOMB, chemical, 500-lb., M78.	Chemical ammunition, nonexplosive (name of filler)[12],		Shipping bands		3.96	1.59	1.59	6.31	10.1	492	4	0.253	6	10	162	203
BOMB, G.P., 1,000-lb., AN-M65, unfused, w/o fin assembly.	Explosive bombs[Z]		Shipping bands	76-39-9	4.44	1.99	1.99	8.83	17.60	994	2	0.440	3	5	80	100
BOMB, chemical, 1,000-lb., AN-M79.	Chemical ammunition, nonexplosive (name of agent)[Y].		Shipping bands		4.47	1.98	1.98	8.85	17.51	942	2	0.438	3	5	84	105
BOMB, G.P., 2,000-lb., AN-M66, unfused, w/o fin assembly.	Explosive bombs[Z]		Shipping bands	76-39-7	5.92	2.36	2.36	13.97	33.00	2,048		0.825	1	2	38	48

Continued on following page. For explanation of symbols see page 256.

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
BOMB, light case, 4,000-lb., AN-M56, unfuzed, w/o fin assembly.	Explosive bomb[E].	.....	Shipping bands..	76-39-10..	7.90	3.28	3.28	25.80	85.00	4,152		2.12		1	[F]12	12
BOMB, depth, 325-lb., AN-Mk. 17, unfuzed, w/o fin assembly.	Explosive bomb[E]..	.....	1/intl cr.....	294246 Navy.	2.80	1.41	1.32	3.97	5.22	360	5	0.132	8	13	232	278
BOMB, fragmentation, 23-lb., M72, unfuzed.	Explosive bomb[E]..	.....	2/wdn bx ..... W/2 fuzes.....	76-16-351. 2Q-4-374	2.83	1.02	0.61	2.89	1.76	84	23	0.044	35	59	950	1,187
BOMB, fragmentation, 90-lb., M82.	Explosive bomb[E]..	.....	6/pallet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
BOMB, fragmentation, 260-lb., AN-M81.	Explosive bomb[E]..	.....	Shipping bands..	.....	1.84	1.06	1.06	3.02	3.21	267	7	0.080	11	18	249	374
BOMB, gas, persistent, H, 100-lb., M47A2, unfuzed, w/o burster.	Chemical ammunition, nonexplosive.[G]	.....	1/wdn bx.....	76-16-243 20-4-244	4.15	0.81	0.81	3.40	3.00	116	15	0.075	33	39	622	797
BOMB, gas, persistent, H, 115-lb., M70, unfuzed, w/o burster or fin assembly.	Mustard gas[G] ..... Chemical ammunition, nonexplosive.	.....	W/lug protectors	82-3-389. 82-3-390	3.43	0.92	0.67	3.16	2.12	122	16	0.063	25	40	656	819
BOMB, photoflash, M46, unfuzed.	Explosive bomb[H] (flashlight powder).	.....	1/wdn bx.....	76-16-325 20-4-338	4.05	0.82	0.88	3.32	2.93	76	26	0.074	39	65	[F]864	[F]864

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg. Method and drg. No.	Outer packing Method	Drg. Nos.	Dimensions, ft. L.	W.	H.	Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton	Ship tons per pkg.	Estimated packing per Truck 1½ T	2½ T	R. R. car 40 T.	50 T.
BODY, bomb, for 23-lb.; practice bomb, M71 and M73, unfuzed, w/o parachute unit.	(X)		3/bndl	20-4-386	0.98	0.81	0.57	0.79	0.45	36	43	0.011	65	109	1,739	2,173
BOMB, practice, 100-lb., M38A2, less spotting charge.	(X)		1/ctn	76 B 62 20-4-188	4.02	0.72	0.72	2.90	2.08	18	111	0.052	[V]96	[V]138	[V]1310	[V]1,210
BOMB, S.A.P., 500-lb., AN-M58A1, unfused, w/o fin assembly.	Explosive bombs[E]		Shipping bands	76-39 11	3.93	1.42	1.42	5.55	7.89	506	3	0.197	5	9	157	197
BOMB, S.A.P., 1,000-lb., AN-M59, unfused, w/o fin assembly[V]	Explosive bombs[E]		Shipping bands	76-39-12	4.89	1.69	1.69	8.26	13.95	1,012	1	0.349	2	4	78	98
BOMB, smoke, phosphorus, MP, 100-lb., M47A2, unfused, w/o burster.	Phosphorus, Chemical ammunition Nonexplosive[S Y]		1/wdn bx	76-16-243 20-4-345	4.15	0.81	0.81	3.40	3.00	154	13	0.075	19	32	520	650
CLUSTER, fragmentation bomb, M1 or AN-M1A1.	Explosive bombs[E]		1/mtl lin bx	76-16-262 20-4-281	4.20	0.90	1.04	3.77	3.93	168	11	0.098	17	29	476	596
CLUSTER, practice bomb, M2 or M2A1.	Explosive bombs[E]		1/mtl lin bx	76-16-262 20-4-281	4.20	0.90	1.04	3.77	3.93	171	11	0.098	17	29	468	586
CLUSTER, fragmentation bomb, AN-M4.	Explosive bombs[E]		1/mtl lin bx	76-16-336 20-4-352	2.97	1.11	1.24	3.29	4.08	127	15	0.102	23	39	548	[V]546
CLUSTER, incendiary bomb, AN-M6.	Fireworks[D] Handle carefully; keep fire away.		1/wdn bx 1/fbr cyl	CWS CWS	4.18 3.88	0.98 0.86	1.07 0.86	4.10 3.34	4.39 2.89	192 157	10 12	0.110 0.072	15 19	26 31	416 509	520 636

Continued on following page. For explanation of symbols see page 256.

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing								Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
CLUSTER, incendiary bomb, M7.	Fireworks[b] Handle carefully; keep fire away.		1/wdn bx	CWS	4.12	1.46	1.78	6.02	10.71	625	3	0.268	4	8	128	160
CLUSTER, incendiary bomb, AN-M12.	Fireworks[b], Handle carefully; keep fire away.		1/fbr cyl	CWS	3.57	0.93	0.93	3.32	3.08	112	17	0.077	26	44	714	[y]792
CLUSTER, incendiary bomb AN-M13.	Fireworks[b], Handle carefully; keep fire away.		1/wdn bx	CWS	5.37	1.69	1.66	9.08	15.09	525	3	0.377	5	9	152	190
FIN, assembly, for 115-lb. gas bomb, M70.	([y])	1/ctn w/arming wire.	8/wdn bx													
FIN, assembly, for 250-lb. G.P. bomb, AN-M57.	Detonating fuses[c], Handle carefully.		1/mtl cr W/fuses	76-16-267. 20-4-283	0.99	0.93	1.03	0.92	0.95			0.024				
FIN, assembly, for 325-lb. depth bombs.	([y])		1/mtl cr	(Navy)	1.86	1.37	1.37	2.36	3.00			0.075				
FIN, assembly, for 500-lb. G.P. bomb, AN-M64.	([y])		1/mtl cr W/fuses	76-16-269. 20-4-286	1.23	1.17	1.17	1.45	1.69	37	54	0.042	81	135	[y]1,344	[y]1,344
FIN, assembly, for 500-lb. S.A.P. bombs.	([y])		1/mtl cr W/fuse	76-16-271. 20-4-287	1.07	1.02	1.27	1.09	1.39	29	68	0.035	103	171	[y]1,776	[y]1,776
FIN, assembly, for 600-lb. A.P. bombs.	([y])		1/mtl cr W/fuse	76-16-281 20-4-292	1.21	0.92	0.87	2.03	1.76	50	40	0.044	60	100	[y]1,458	[y]1,458
FIN, assembly, for 1,000-lb. A.P. bomb, AN-Mk. 33.	([y])		1/mtl cr	328382 Navy	1.08	1.02	1.44	1.10	1.58	31	64	0.040	96	161	[y]1,512	[y]1,512
FIN, assembly, for A.P. bombs, 1,000-lb., M52, and 600-lb., M61.	Detonating fuses[c], Handle carefully.		1/mtl cr W/fuse	76-16-251. 20-4-265.	1.08	1.04	1.38	1.12	2.67	57	35	0.057	52	87	[y]896	[y]8 16

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
FIN, assembly, for 1,000-lb. G.P. bombs.	(Y)		1/mtl cr, W/fuse	76-16-273. 20-4-210	1.61	1.55	1.57	2.50	3.94	55	36	0.099	Y45	Y84	Y625	Y625
FIN, assembly, for 1,000-lb. S.A.P. bomb, AN-M59.	(Y)		1/mtl cr, W/fuse	76-16-277. 20-4-291	1.34	1.29	1.43	1.73	2.46	45	44	0.062	66	Y108	Y930	Y930
FIN, assembly, for 1,400-lb. A.P. bomb, M63.	Detonating fuses[K]. Handle carefully.		1/mtl cr, W/fuse	76-16-300. 20-4-321	1.25	1.20	2.56	1.50	3.84	75	26	0.097	39	66	Y630	Y630
FIN, assembly, for 1,600-lb. A.P. bombs.	(Y)		1/mtl cr	300211 Navy	1.33	1.20	1.80	1.60	2.88	.....	.....	0.072	.....	.....	.....	.....
FIN, assembly, for 2,000 lb. G.P. bombs.	(Y)		1/mtl cr, W/fuses	76-16-279. 20-4-291	1.99	1.94	2.12	3.86	8.16	88	22	0.204	Y24	Y36	Y320	Y320
FIN, assembly, for 4,000-lb. light case bomb.	(Y)		1/mtl cr, W/fuses	76-16-281. 20-4-292	2.37	2.94	2.87	7.00	20.00	168	11	0.500	Y6	Y16	Y78	Y78
PARACHUTE, unit assembly, for 23-lb. practice bomb, M71 and M73.	(Y)		8/wdn bx	76-16-194. 20-4-169	1.89	0.95	1.47	1.80	2.65	74	27	0.066	40	67	Y840	Y840
BURSTER, M4	Boosters (explosive).[K] Handle carefully; do not load or store with any high explosive.		50/wdn bx	76-16-249. 20-4-259	3.44	1.09	0.69	3.76	2.60	146	13	0.065	20	33	533	676
BURSTER, M7 or M15.	Boosters (explosive)[K]. Handle carefully; do not load or store with any high explosive.		50/wdn bx	76-16-249. 20-4-259	3.44	1.09	0.69	3.76	2.60	146	13	0.065	23	39	625	769

Continued on following page. For explanation of symbols see page 256.

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
BURSTER, M10	Boosters (explosive)[E]. Handle carefully; do not load or store with any high explosive.	.....	50/wdn bx	76-16-249. 20-4-259	3.28	1.09	0.69	3.58	2.99	144	13	0.075	20	34	555	695
BURSTER, AN-M14	Boosters (explosives)[E]. Handle carefully, do not load or store with any high explosive.	.....	20/bx	20-4-433.	3.38	0.77	0.73	2.58	1.89	73.6	27	0.047	41	68	1,087	[V]1,210
BURSTER, AN-M15	Boosters (explosives)[E]. Handle carefully, do not load or store with any high explosive.	.....	12/bx	20-4-433.	3.38	0.73	0.66	2.46	1.63	70	28	0.041	43	71	1,143	1,428
BURSTER, AN-M16	Boosters (explosives)[E]. Handle carefully; do not load or store with any high explosive.	.....	8/bx	20-4-433.	3.88	0.73	0.52	2.83	1.48	65	30	0.037	46	77	1,225	1,530
CHARGE, spotting, assembly.	Explosive bombs[E] (black powder).	.....	20/wdn bx	76-16-214 20-4-189	1.81	1.37	1.07	2.48	2.64	113	17	0.066	26	44	707	884

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
FUZE, bomb, AN-M100A2.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-222	25/wdn bx	76-16-166 20-4-147	2.02	1.23	1.26	2.49	3.14	119	16	0.078	25	42	672	840
FUZE, bomb, AN-M101A2.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-224	25/wdn bx	76-16-166 20-4-147	2.27	1.23	1.26	2.80	3.52	132	15	0.088	23	37	601	752
FUZE, bomb, AN-M102A2.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-225	25/wdn bx	76-16-166 20-4-147	2.62	1.23	1.26	3.22	4.05	149	13	0.101	20	33	[4]540	[V]540
FUZE, bomb, AN-M103, M139, M140.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-262	25/wdn bx	76-16-211 20-4-186	1.85	1.43	0.78	2.65	2.06	132	15	0.052	22	37	603	754
FUZE, bomb, AN-M104 or AN-M120.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-279	50/wdn bx	76-16-216 20-4-198	1.43	1.30	0.95	1.86	1.77	98	20	0.044	30	51	816	1,020
FUZE, bomb, M106 (all mods.)	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-284	50/wdn bx	76-16-222 20-4-206	2.03	0.89	0.95	1.81	1.72	157	12	0.043	19	31	509	637
FUZE, bomb, M108	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-329	200/wdn bx	76-16-238 20-4-231	1.48	1.35	0.68	1.96	1.39	131	15	0.035	22	38	610	764
FUZE, bomb, AN-M110A1.	Detonating fuzes[E]. Handle carefully.	12/ctn. 76-1-284	48/wdn bx	76-16-333	1.92	0.94	0.93	1.82	1.69	77	25	0.042	38	64	1,039	1,298
FUZE, bomb, M112A1 or M115.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-222	25/wdn bx	76-16-166 20-4-363	1.55	1.23	1.32	1.91	2.62	112	17	0.066	26	44	713	892
FUZE, bomb, M113A1 or M116.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-224	25/wdn bx	76-16-166 20-4-363	1.80	1.23	1.32	2.27	3.00	124	16	0.075	24	40	645	816
FUZE, bomb, M114A1 or M117.	Detonating fuzes[E]. Handle carefully.	1/can.	25/wdn bx	76-16-166	2.13	1.23	1.32	2.62	3.32	141	14	0.083	21	35	577	710
FUZE, bomb, M123 and M132.	Detonating fuzes[E]. Handle carefully.	1/can.	25/wdn bx		1.23	1.32	1.60	1.62	2.61	124	15	0.065	24	40	645	[V]768
FUZE, bomb, M124 and M133.	Detonating fuzes[E]. Handle carefully.	1/can.	25/wdn bx		1.23	1.32	1.85	1.62	3.01	137	14	0.075	21	36	583	730
FUZE, bomb, M125 and M134.	Detonating fuzes[E]. Handle care ully.	1/can.	25/wdn bx		1.23	1.32	2.19	1.62	3.56	153	12	0.089	19	32	522	[V]576
FUZE, bomb, AN-M126A1.	Detonating fuzes[E]. Handle carefully.	1/can. 76-1-597	50/wdn bx	20-4-417	1.75	1.57	0.82	2.75	2.26	101	19	0.057	30	50	792	990

Continued on following page. For explanation of symbols see page 256.

Table VI. Packing and Shipping Data. (Continued)

Nomenclature	Marking required by I. C. C. regulations	Inner pkg.	Outer packing									Ship tons per pkg.	Estimated packing per			
		Method and drg. No.	Method	Drg. Nos.	Dimensions, ft.			Area sq. ft.	Vol. cu. ft.	Wt. lbs.	No. per ton		Truck		R. R. car	
					L.	W.	H.						1½ T	2½ T	40 T.	50 T.
FUSE, bomb, mechanical time, M127 or M138.	Detonating fuzes[F]. Handle carefully.	1/can 76-1-573	25/bx.	20-4-400	1.70	1.57	0.65	2.67	1.79	59	33	0.045	50	84	1,356	[V]1,380
FUZE, bomb, AN-Mk. 219.	Detonating fuzes[E]. Handle carefully	1/can	6/mtl cr	163611 Navy	1.26	0.86	0.57	1.09	0.62	36	55	0.016	84	139	2,232	2,790
FUZE, bomb, hydrostatic, AN-Mk. 224.	Detonating fuzes[E] Handle carefully.	1/can	4/mtl cr		1.43	0.65	9.65	0.93	0.60	57	35	0.015	52	87	1,403	1,753
FUZE, bomb, AN-Mk. 228	Detonating fuzes[E] Handle carefully	1/can	4/mtl bx		1.42	0.96	0.96	1.36	1.30	60	33	0.033	50	83	1,333	1,666
FUZE, bomb, hydrostatic, AN-Mk. 229.	Detonating fuzes[E]. Handle carefully.	1/can	4/mtl cr		1.46	0.96	0.96	1.40	1.34	60	33	0.034	50	83	1,333	1,666
FUZE, bomb, hydrostatic, AN-Mk. 230.	Detonating fuzes[E]. Handle carefully.	1/can	4/mtl cr		1.38	0.96	0.96	1.33	1.28	75	26	0.032	40	66	1,066	1,233
FUZE, bomb, hydrostatic, AN-Mk. 234.	Detonating fuzes[E]. Handle carefully.	1/can	4/mtl cr		1.43	0.65	0.65	0.93	0.60	57	35	0.015	52	87	1,403	1,753
FUZE, flare, mechanical time, M111A2.	Detonating fuzes[E]. Handle carefully.	1/can 76-1-355	50/wdn bx	76-16-247 20-4-255	1.31	1.26	1.00	1.65	1.65	74	27	0.041	40	68	1,089	1,360
PRIMER DETONATOR, M14.	Detonating fuzes[E]. Handle carefully.	1/can 76-7-648 25 cans/cntr 76-7-661	100/wdn bx	76-7-649 20-4-272	1.64	0.82	0.57	1.35	0.76	70	28	0.019	42	71	1,142	1,428
PRIMER DETONATOR, M16A1	Detonating fuzes[E]. Handle carefully.	1/can 76-7-648 25 cans/cntr 76-7-661	100/wdn bx	76-7-649 20-4-272	1.64	0.82	0.59	1.35	0.79	66	30	0.020	45	76	1,212	1,515

Continued on following page. For explanation of symbols see page 256.

INDEX

INDEX (Continued)

INDEX (Continued)

INDEX (Continued)

☆ U. S. GOVERNMENT PRINTING OFFICE : 1944—611316