AIRCRAFT BOMBS, FUZES AND ASSOCIATED COMPONENTS

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CONTENTS

ILLUSTRATIONS

SAFETY PRECAUTION

WARNING

For the protection of personnel handling aircraft bombs, fuzes, and associated components, it is imperative that the reader be familiar with the Safety Precautions contained in chapter 12.

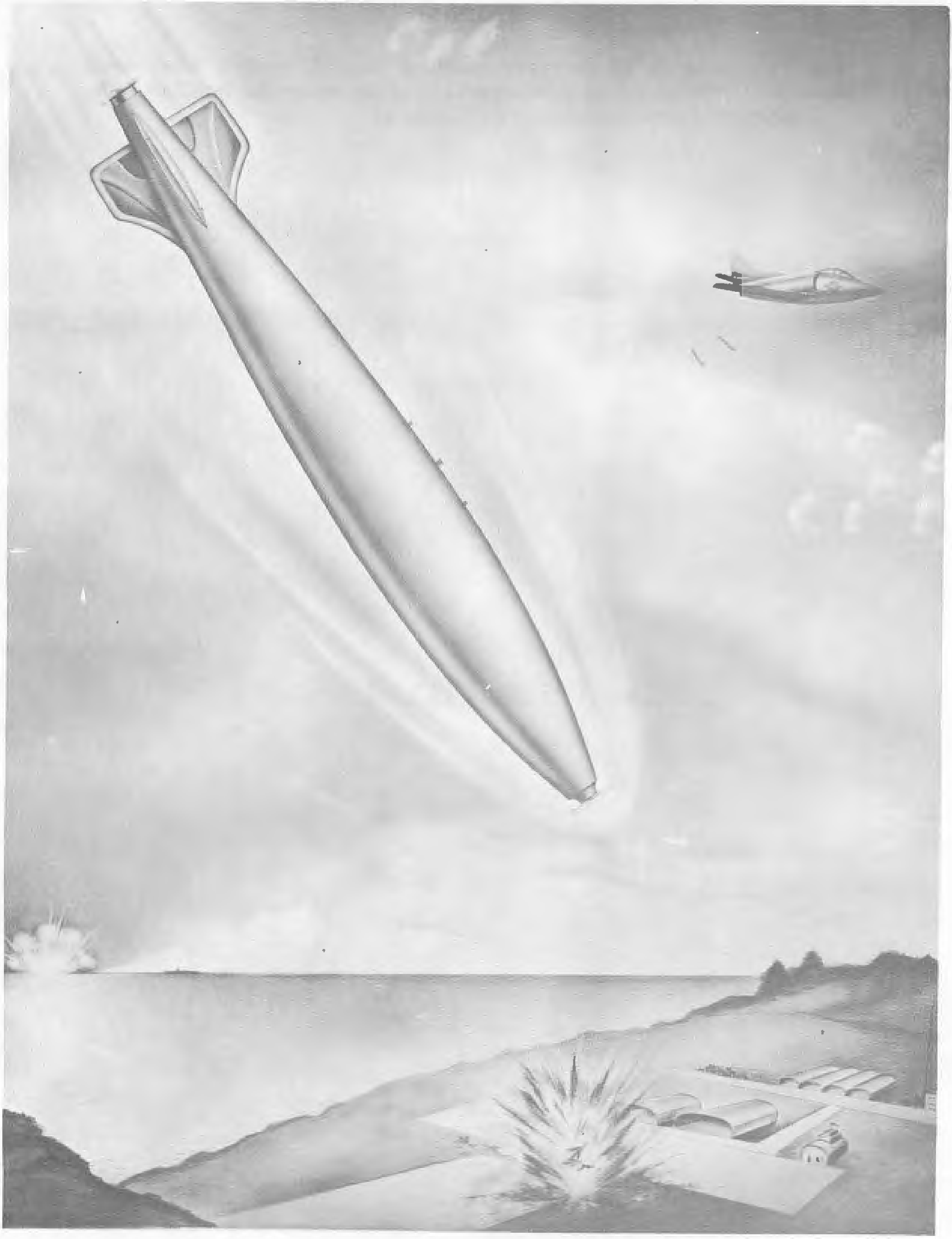


Figure 1–0.—Frontispiece: Bombing Attack Delivered by Carrier Aircraft.

Chapter 1
GENERAL INFORMATION

Scope

Ordnance Pamphlet 2216 (Volume 1) describes and illustrates aircraft bombs, fuzes, and associated components, used by the operating forces of the Navy. The text includes information on identification, differences in models, handling, safety procedures, and assembling of components.

This publication is intended to provide trained and authorized personnel with general and specific information including description, identification, assembly, and use of aircraft bombs, fuzes, and associated components. As new items are developed and accepted for use by the Naval Service, changes to this publication will be issued. Similarly, as items are removed from service use, notices will be promulgated to remove the applicable pages of the publication. Suggestions for additions or changes are invited from the users of this pamphlet; address suggestions to NAVY DEPARTMENT, Bureau of Naval Weapons, Washington 25, D.C.

To facilitate a wider dissemination of information, classified material is included in volume 2.

Specific information concerning installation or the releasing of bombs from aircraft is not included.

Purpose of Aircraft Bombs

Aircraft bombs, figure 1–1, are used to destroy installations, armament, and personnel, and to provide direct support of our land and sea forces engaged in offensive or defensive operations.

Obsolescent Items

The following material is obsolescent; however, descriptive data are being retained until disposition of all material is complete.

1. 90-lb Frag Bomb M82.
2. 500-lb Incendiary Bomb AN–M76.
3. 3-lb Miniature Practice Bomb Mk 5.
4. 13-lb Miniature Practice Bomb Mk 19.
5. 25-lb Practice Bomb Mk 76 Mod 0.
6. Impact Nose Fuze AN–M110A1.
7. Impact Nose Fuze AN–M126A1.
8. Impact Nose Fuze AN–Mk 219.
9. Hydrostatic Tail Fuze AN–Mk 230.
10. Mechanical Time Fuze T50E1.
11. Mechanical Time Fuze T50E4.
12. Mechanical Time Fuze T91.
13. 5-lb Practice Bomb Mk 106 Mods 0 and 2.
14. 100-lb Practice Bomb Mk 15 Mod 2.

Obsolete Items

The following material has been declared obsolete; however, descriptive data are being retained until disposition of all the material is complete.

1. All armor-piercing (AP) bombs.
2. 500-lb Semi-Armor Piercing (SAP) Bomb AN–M58, AN–M58A1, AN–M58A2.
3. 1000-lb Semi-Armor Piercing (SAP) Bomb AN–M59.
4. 2000-lb Semi-Armor-Piercing (SAP) Bomb M103.
5. 350-lb Aircraft Depth Bomb AN–Mk 54 Mod 0.
6. 100-lb Frag Bomb Cluster AN–M1A2.
7. 500-lb Frag Bomb Cluster M26A2, M27A1.
8. 4.5-lb Minature Practice Bomb Mk 43 Mod 1.
9. Tail Fuze AN–Mk 228.
10. Practice Bomb Signal Mk 5 Mod 0.
11. Practice Bomb Signal Mk 7 Mod 0.
12. Adapter-Booster M102A1.

Bomb Operation

General. Bombs are carried either in the bomb bay of aircraft or externally under the wings or fuselage. Hooks on aircraft racks and shackles engage suspension lugs attached to the bomb body. For mechanically fuzed bombs, the loop of an arming wire is attached to a separate hook at the center of the rack or shackle. The free ends of the arming wire are passed through

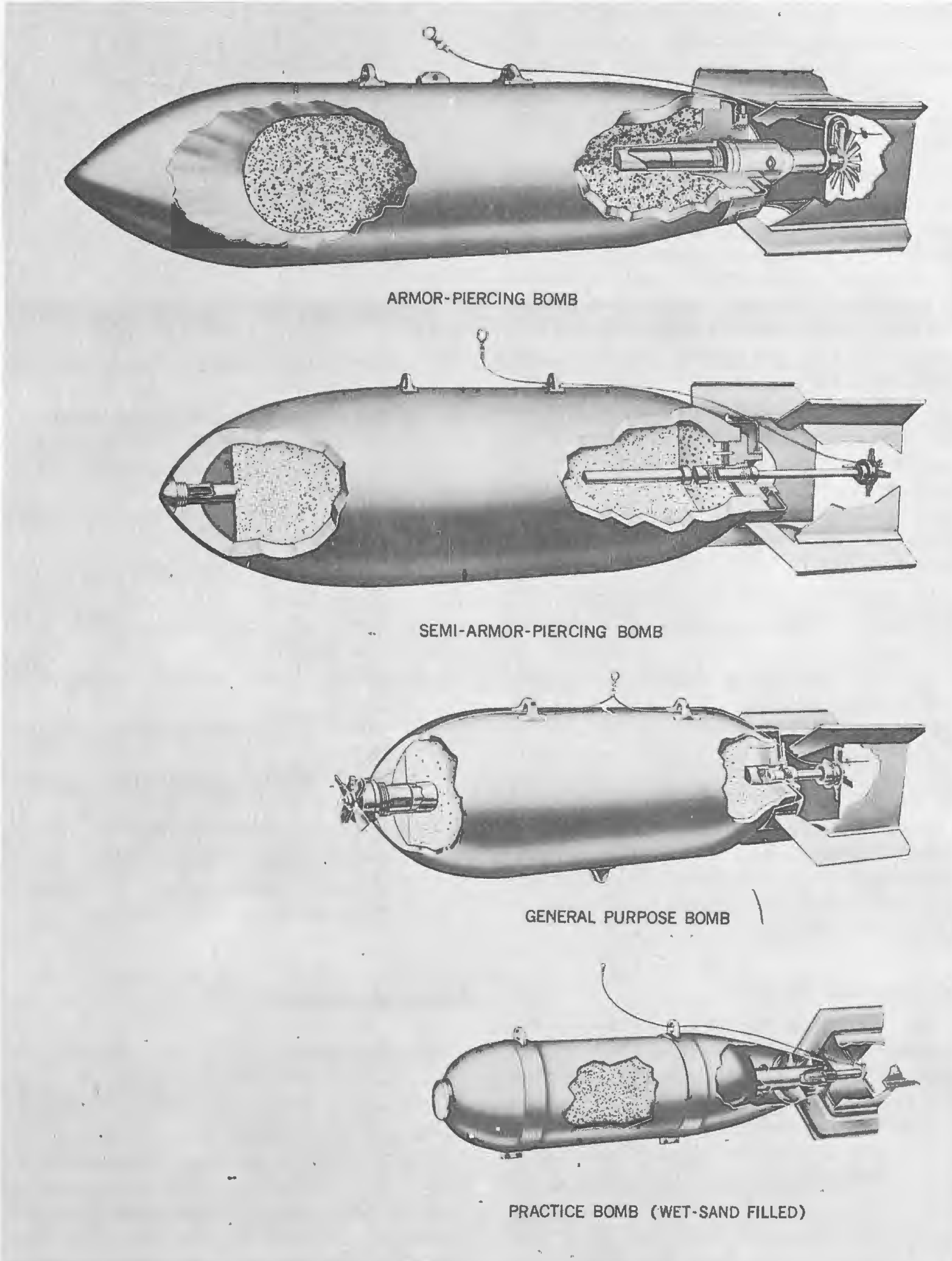


Figure 1–1.—Representative Bombs and Clusters.

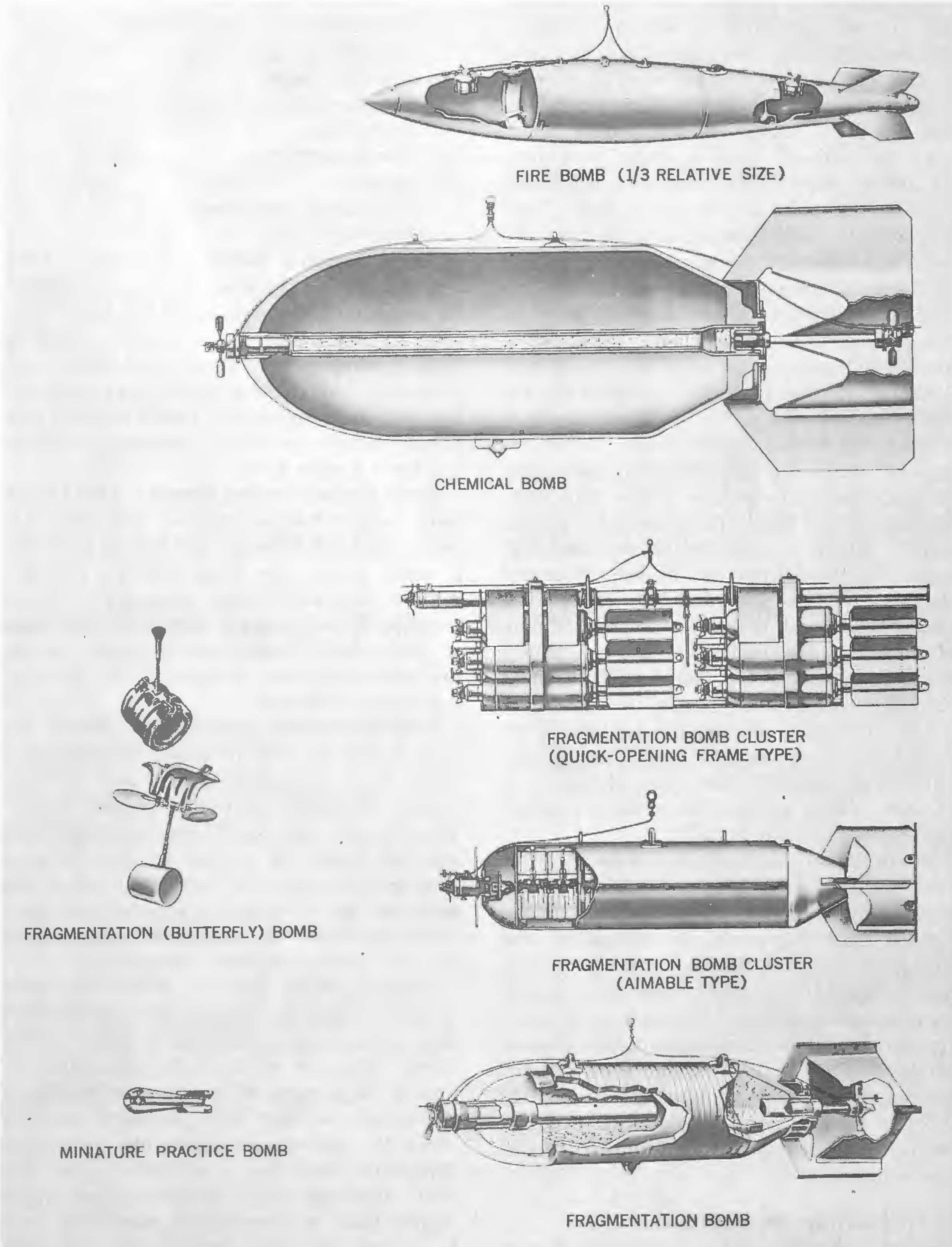


Figure 1–1.—Representative Bombs and Clusters. (continued)

safety devices in the fuze and maintain the fuze in an unarmed condition. Safety (Fahnestock) clips are placed over the protruding ends of the arming wire to prevent it from slipping out of the fuze safety devices prior to bomb release. If a bomb must be released over friendly territory, the arming wire is released with the bomb and stays in place as the bomb falls. This prevents the fuze from arming so that the bomb does not explode upon impact. When the bomb is released for effect, the arming wire is retained with the aircraft, and the fuze is free to become armed. Electrically fuzed bombs do not require arming wires. Refer to volume 2 of this publication for information.

Explosive Train (figure 1–2). After release of the bomb, the airstream causes the arming vane of the fuze to rotate, thus arming the fuze. Some fuzes arm by spring action, others by clockwork or electrical means, but most fuzes now in use are armed by action of the fuze arming vane. The arming vane may drive a gear train which, after a definite interval, removes safety blocks or alines the detonator with the next element in the explosive train.

The detonator is fired by mechanical or electrical action, and its explosion is amplified and relayed to the main charge by a booster. This pattern of action is called the explosive train.

Bomb Blast. More serious damage can be done by the blast effect of high-explosive bombs than by their fragmentation. When a high explosive bomb is detonated, the charge is instantaneously converted into high temperature gases which exert a tremendous pressure and burst the bomb body. Upon release from confinement, the gaseous products of detonation expand suddenly and move outward in all directions at a high velocity, generating shock and pressure waves, and shattering or displacing surrounding material.

Classification of Bombs

Bombs are classified according to use as follows; they are generally referred to by the abbreviations given in parentheses.

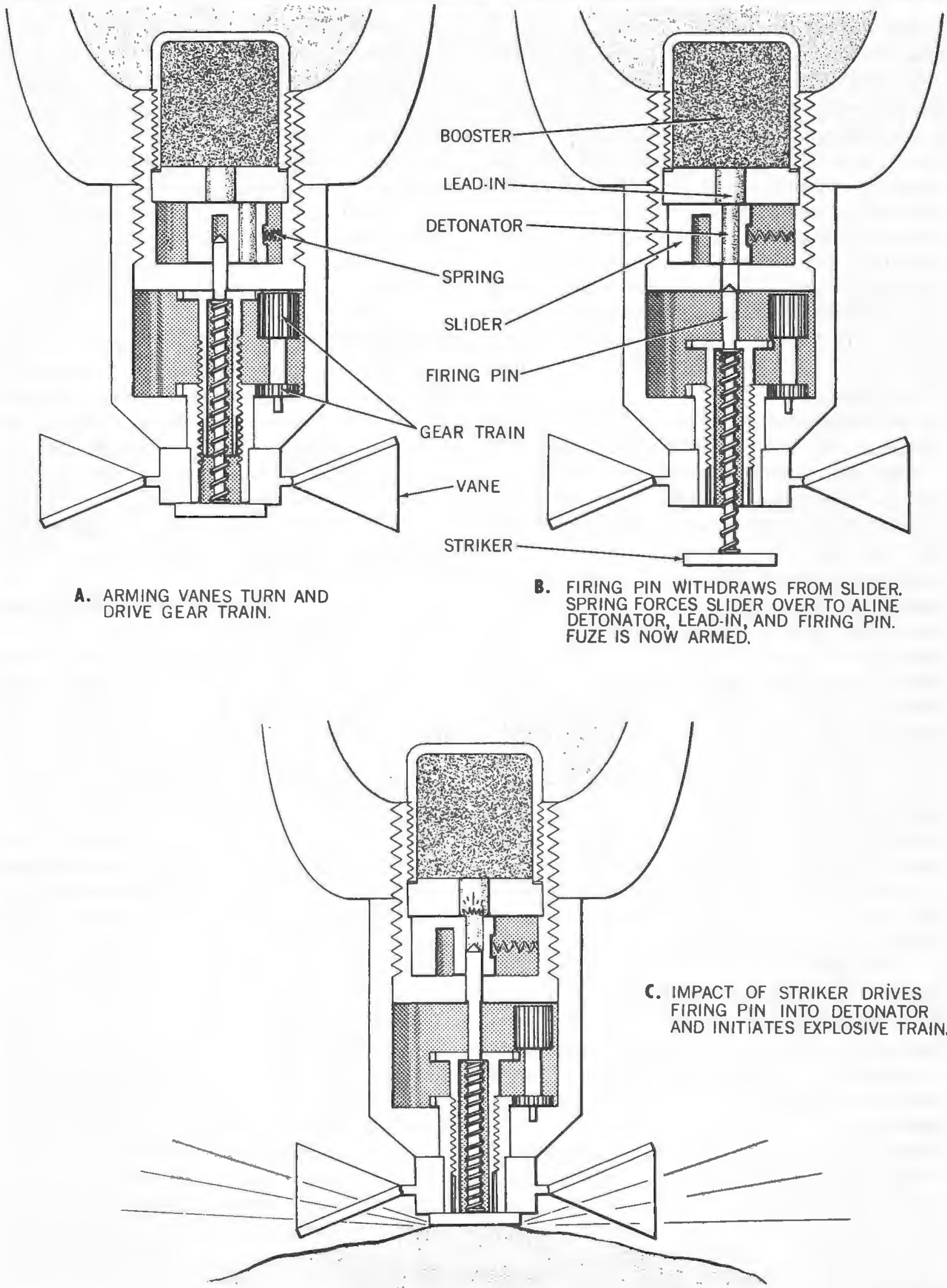
Armor-Piercing (AP).
Semi-Armor-Piercing (SAP).
General Purpose (GP).
Aircraft Depth (ADB).
Fragmentation (Frag).
Demolition.
Chemical (Gas).
Smoke.
Fire (and Incendiary).
Practice (PB).

Armor-Piercing Bombs. AP bombs have heavy cases and thick noses. Approximately 13 percent of the weight of the bomb consists of explosive. This type of bomb is used against heavy armor and reinforced concrete. AP bombs contain a delay action tail fuze to permit penetration of the target before the bomb explodes; they do not have a nose fuze.

Semi-Armor-Piercing Bombs. SAP bombs have wall thickness smaller than the AP bombs and are normally tail fuzed; however, a solid metal nose plug can be replaced with a nose fuze when necessary. Thirty percent of the complete weight of the bomb is explosive. Semi-armor-piercing bombs are sometimes used as substitutes for general purpose bombs.

General Purpose Bombs. GP bombs are used in the majority of bombing operations. Their cases are relatively light and approximately 50 percent of their complete weight is explosive. GP bombs may use both nose and tail fuzes. A conical fin may be used with the AN series GP bombs instead of the box-type fin to improve aerodynamic performance when carried externally and to provide greater ballistic accuracy.

Aircraft Depth Bombs. While the ADB is used primarily against underwater targets, it has a secondary use as a demolition bomb. Because of its light case, approximately 70 percent of its complete weight is explosive. A flat nose prevents ricochet when the bomb is dropped into the water. The depth bomb has a hydrostatic tail fuze that functions at a predetermined depth rather than on impact. A nose fuze may be armed and the hydrostatic tail fuze dropped safe when the ADB is used as a demolition bomb.



A. ARMING VANES TURN AND DRIVE GEAR TRAIN.

B. FIRING PIN WITHDRAWS FROM SLIDER. SPRING FORCES SLIDER OVER TO ALINE DETONATOR, LEAD-IN, AND FIRING PIN. FUZE IS NOW ARMED.

C. IMPACT OF STRIKER DRIVES FIRING PIN INTO DETONATOR AND INITIATES EXPLOSIVE TRAIN.

Figure 1–2.—Explosive Train.

Fragmentation Bombs. The body of a frag bomb usually consists of a thin steel tube with square wire spirally wound on the outside. The wire provides the principal source of fragments when the bomb is detonated. The explosive filler comprises about 14 percent of the total weight of the bomb. Fragmentation bombs are used against personnel and unarmored targets. Most frag bombs have provisions for either a nose or a tail fuze, although some of the smaller bombs can accommodate only a nose fuze. The lockring thread of frag bombs often is used for the attachment of a parachute unit.

Demolition Bombs. This type of bomb is designed to carry maximum explosive charge; the explosive comprises 48 percent or more of its total weight. To insure functioning upon impact, both a nose and a tail fuze are used.

Chemical (Gas) Bombs. Gas bombs resemble general purpose bombs in shape and size. The body of the gas bomb serves as the filling container and support for the components. These bombs have a full-length burster charge which splits the bomb case and disperses the filling over the area to be contaminated. Gas bombs are fuzed to explode instantaneously upon contact, or to provide an aerial burst.

Smoke Bombs. Smoke bombs are generally used for screening purposes to conceal shore areas and the movement of troops and ships. Their bodies are constructed of thin metal, somewhat similar to that used for 100-pound practice bombs. The bomb is filled with a smoke agent. Functioning of a fuze and a burster shatters the bomb on impact, dispersing the smoke agent over a wide area. Atmospheric oxygen ignites the filling, causing it to burn and to produce smoke.

Fire Bombs. Fire bombs are usually thin-skinned containers of gasoline gel designed for use against dug-in troops, supply installations, wooden structures, and land convoys. The bombs rupture upon impact or air burst in the air to spread burning gasoline gel on surrounding objects. Fuzes, bursters, and igniters are used to ignite the combustible filling.

Practice and Miniature Practice Bombs. These bombs are used for target practice. There is a wide range of types and weights in order to simulate all varieties of service bombs. Some practice bombs have a fuze and a spotting charge; others are completely inert. Practice bombs are usually filled with sand or water. Some are fabricated to the desired weight.

Classification of Fuzes

A fuze is a device which is utilized to initiate the detonation or dispersion of the filling of a bomb under desired conditions. Interchangeable arming vanes, figure 1–3, may be used on some fuzes. These vanes differ in degree of pitch, shape, and length of blade. This is necessary to control the arming distance of the fuzes when used with different types of bombs.

Many fuzes, figure 1–4, incorporate the following special safety features.

DETONATOR SAFE. Fuzes that are detonator safe have the elements of their firing train firmly fixed out of alinement in the fuze body while the fuze is unarmed. This increases safety during shipping, stowage, and handling. The arming action of the fuze alines the firing train.

SHEAR SAFE. A shear safe fuze will not become armed if its arming mechanism is damaged or completely severed from the fuze body. Shear safe fuzes afford additional security for bombs used in carrier operations and for externally mounted bombs.

DELAY ARMING. This feature, mechanically or electrically, slows the arming of the fuze and keeps it in the safe condition until the bomb has fallen a sufficient distance away from the plane to minimize the effects of a premature explosion. Delay arming helps to make dive bombing and carrier operations safer in that a bomb accidentally released on landing or takeoff will not ordinarily have sufficient air travel to arm the fuze.

Fuzes are classified according to use as follows.

Impact Nose.
Mechanical Time.
VT.
Impact Tail.
Long-Delay Tail.
Hydrostatic Tail.
Multi-Position.
Side.
Electric (Refer to volume 2 of this publication for information).

Impact Nose Fuze. Fuzes of this type are vane operated and delay armed. Their action can be instantaneous or delayed by the selective setting of a control pin.

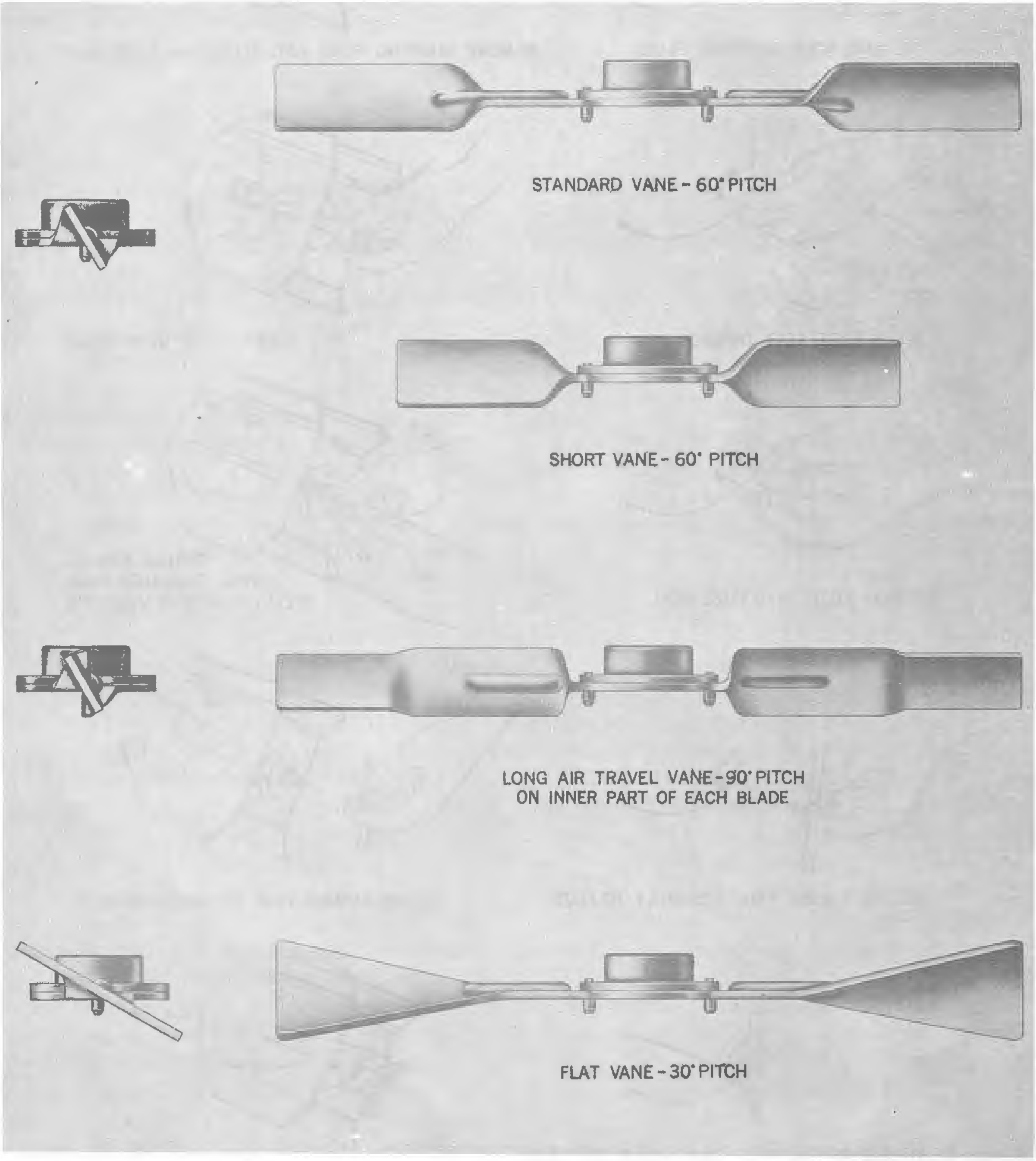


Figure 1–3.—Arming Vanes.

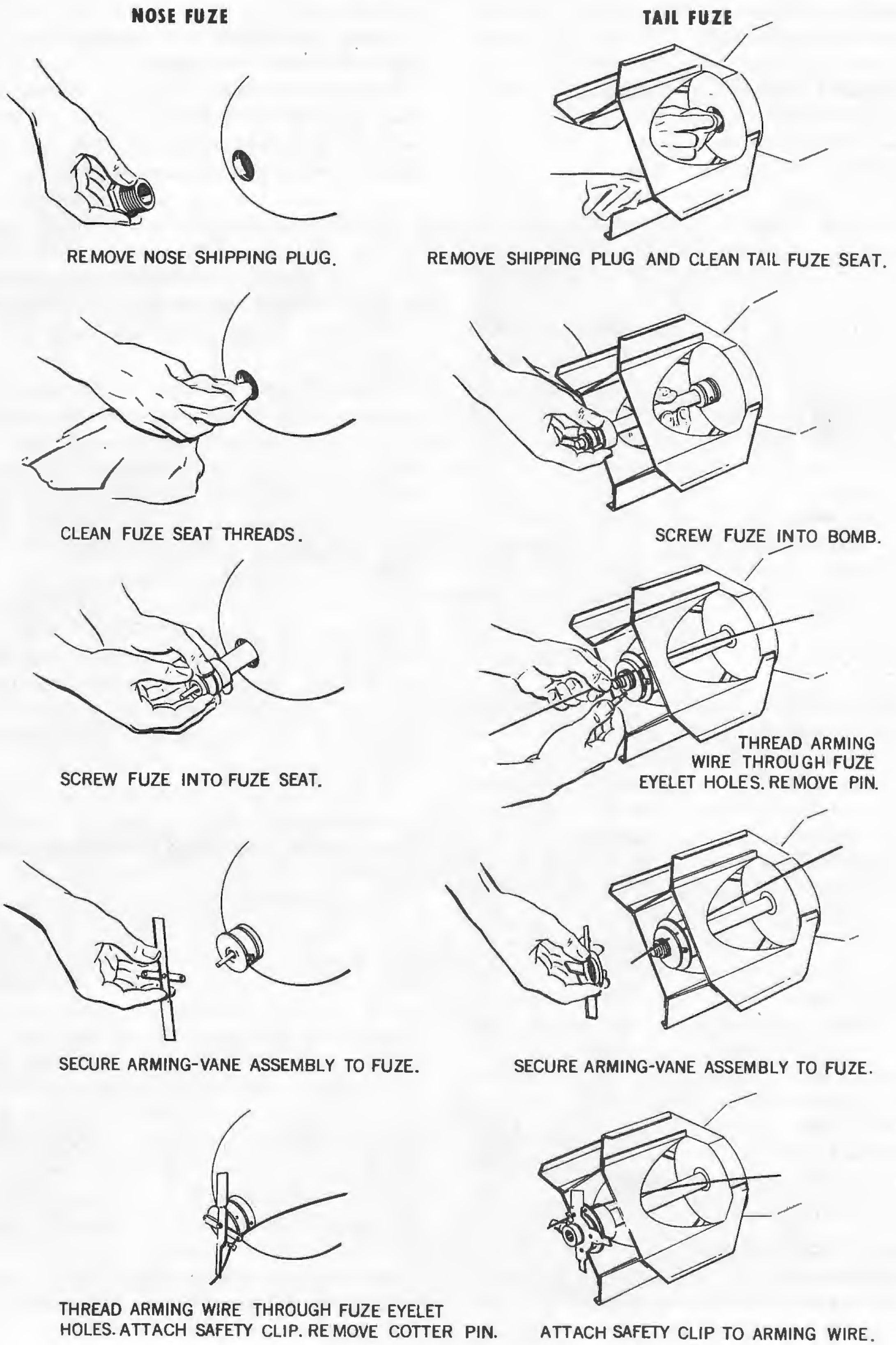


Figure 1–4.—Bomb Fuzing.

Mechanical Time Fuze. These fuzes are armed by mechanical and time mechanisms. The time of detonation after release can be preset for a predetermined time. If the time setting is greater than the time of flight, impact will cause the fuze to function.

VT Fuze. VT (proximity) fuzes are essentially radio transmitting and receiving units that function automatically on approaching or passing any material object, causing an air burst at an effective height or distance.

Impact Tail Fuze. Fuzes of this type are vane armed and inertia fired. The arming is mechanically delayed by reduction gearing. Fuzes of this type are used in bombs launched by carrier-based aircraft and dive bombers, armor piercing bombs, and practice bombs

Long-Delay Tail Fuze. These fuzes require less than 100 feet of air travel to initiate the delayed action. Any attempt to remove these fuzes after installation will result in functioning of the antiwithdrawal mechanism, followed by instantaneous detonation.

Hydrostatic Tail Fuze. The hydrostatic fuzes are vane operated and require 400 to 500 feet of air travel to arm. Water pressure operates the hydrostatic mechanism that detonates the fuze. The depth at which detonation occurs can be controlled.

Multi-Position Fuze. The inertia firing, impact, multi-position fuzes are fully armed by anemometer type vanes after completing the air travel. Once the fuzes are armed, impact forces from any direction will cause instantaneous detonation. These fuzes are principally assembled in conjunction with igniters or bursters in fire bombs.

Side Fuze. These fuzes are used only with fragmentation bombs. The fuzes are armed by the "butterfly wings" of the bomb and are preset to detonate in the air or on impact, either delayed (subject to handling, shock, or vibration) or instantaneous.

Bomb Components

Adapter-Booster. An adapter-booster is a bushing threaded on the outside for assembly to the bomb body and on the inside for assembly of the fuze. Adapter-boosters, normally assembled to high-explosive and chemical bombs as issued, are drilled for the insertion of lock pins to prevent their removal when antiwithdrawal type fuzes are to be assembled to the bomb. Since general purpose bombs are usually adapted for large diameter nose fuzes, a nose adapter-booster is issued separately to adapt these bombs for use with small diameter fuzes. Low-drag GP bombs, developed primarily for electrical fuzing, require nose and tail adapter-boosters when mechanical fuzes are installed.

Arming Wires. Arming wires, figure 1–5, usually consist of either one or two strands of wire attached to a swivel loop. They are used to lock the fuze arming mechanism in the unarmed position. Safety (Fahnestock) clips are attached to the ends of the wires after installation of fuzes in the bomb. This prevents accidental withdrawal of the wires while the aircraft is in flight. When a bomb is to be released ARMED from the rack, the wire is pulled from the fuze head, allowing the fuze vanes to rotate and to arm the fuze. When the bomb is to be released SAFE, the arming wire is not separated from the fuze head.

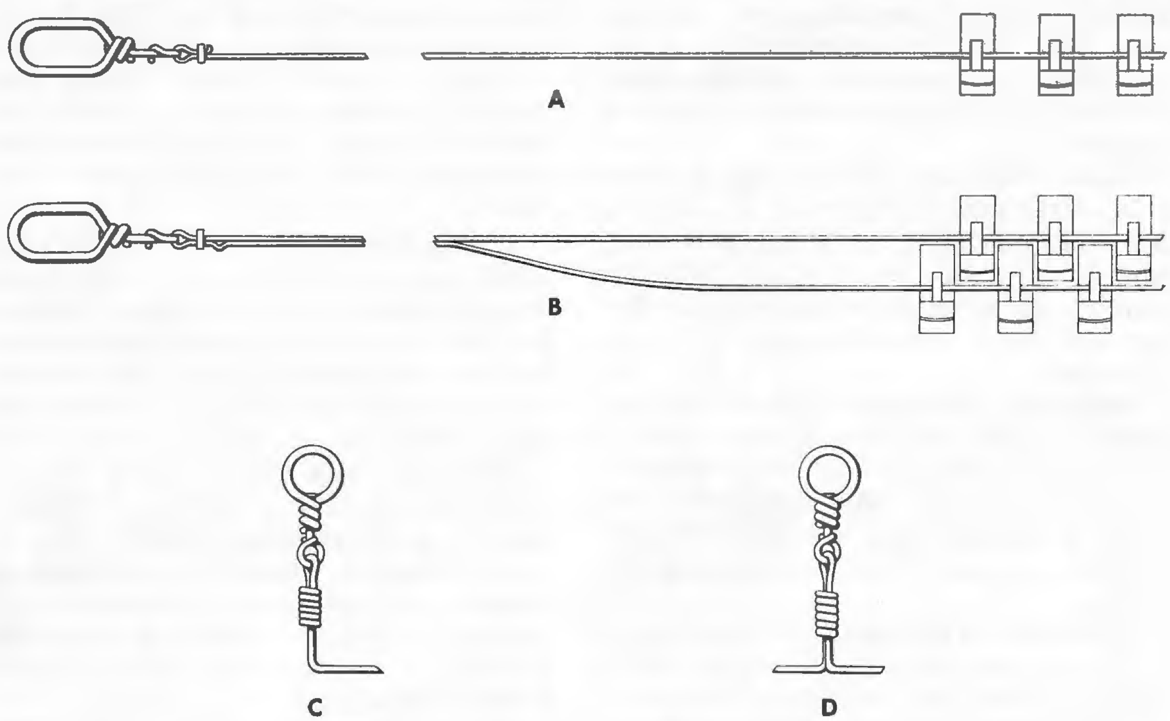
When installed, arming wires are subject to considerable wear caused by vibration; where reused, they must be inspected before each flight.

The standard arming-wire assemblies will fit any bomb up to and including a weight of 2000 pounds. For larger bombs an extension cable is supplied. After the bomb is installed on the shackle, the wire is cut approximately 2½ inches beyond the fuze. For proper release, wire must be free from twists, kinks, and burrs. Arming-wire brackets, which are furnished with armor-piercing bomb fin assemblies, must be requested separately for use with depth bombs. A metal tubular protector is used with the arming-wire bracket to prevent chafing of the wire by the fuze vane.

Arming wires are usually packed in metal containers holding 50 or 100 assemblies. Safety clips are packed with the wires.

Fragmentation bomb clusters, however, are supplied with their own arming-wire assemblies installed.

Auxiliary Booster. The auxiliary booster, which consists of a column of tetryl pellets in a suitable container, relays and amplifies detonation waves to insure the explosion of the main charge. The auxiliary booster may be cast within the explosive charge adjacent to the fuze seat liner, or the adapter-booster, or both. It also may be issued separately for installation in a fuze seat liner.



ARMING WIRES	FIGURE	TYPE	MATERIAL	DIAMETER (IN.)	LEG LENGTH (IN.)		TOTAL LENGTH (IN.)	DRAWING NUMBER
MK 1 MOD 0	A	SINGLE	BRONZE	0.064	57.0	—	57.0	422872
MK 3 MOD 0	A	SINGLE	STEEL	0.033	57.0	—	57.0	375994
MK 2 MOD 0	B	DOUBLE	BRONZE	0.064	57.0	57.0	114.0	422872
AN-M6A2	C	SINGLE	BRASS	0.064	57.0	—	57.0	82-3-234
* AN-M1A2	D	DOUBLE	BRASS	0.064	27.0	33.0	60.0	82-3-234
* AN-M7A1	D	DOUBLE	BRASS	0.064	36.5	45.0	81.5	82-3-234
AN-M8A1	D	DOUBLE	BRASS	0.064	57.0	60.0	117.0	82-3-234
M13	D	DOUBLE	BRASS	0.064	36.0	70.0	106.0	82-3-234
M16	D	DOUBLE	BRASS	0.064	56.0	90.0	146.0	82-3-234

* NOT STOCKED BY NAVY

Figure 1–5.—Arming Wires.

Base Plug. The base plug closes the filling hole in the end of the bomb body. An extension of the plug to the rear is threaded to provide space for attachment of the fin assembly by means of the fin locknut. In later (A1) modifications of GP bombs, the base plug has studs extending into the explosive charge to prevent removal of the plug. The plug is threaded to receive an adapter-booster, and has a circular groove which receives the adapter-booster lock pin.

Bomb Body. The bomb body is a metal container that holds an explosive, chemical, or inert filler. Its case may consist of a single piece of metal, or several pieces welded or otherwise joined together. It usually is formed in the shape of a streamlined cylinder, closed at each end.

Nose Fuze Seat. Seats for noze fuzes are usually machined into the bomb case and, to provide for maximum flexibility, their dimensions (thread size and depth of seat) are standardized as much as practicable. Large bombs have the GP-type fuze seat which has a 2-inch thread diameter and is 5 inches deep. Smaller bombs have the fragmentation-type fuze seat which is 1.5 inches in thread diameter by 1.3 inches deep. Aimable clusters have a flare-type fuze seat which is 1.5 inches in thread diameter by 0.84 inch deep. Adapter boosters also are used to provide fuze seats, as described fully in chapter 3.

Tail Fuze Seat. Tail fuze seats for GP, SAP, chemical, and fragmentation bombs are provided by adapter-boosters, as fully described in chapter 3.

Burster. A burster is an explosive charge used to open an incendiary or smoke bomb and to spread the bomb filling. It consists of a long plastic or paper and chipboard tube, closed at both ends, and is filled with TNT, black powder and magnesium, tetryl pellets, or other explosive. It fits into either the burster well or the igniter cavity. The bursters for bombs included in this publication are described in chapter 3.

Closing Plug. Metal closing plugs are used to protect the fuze seat cavity and threads from damage during shipping and stowage. They are removed only for inspection or for fuzing the bomb. If a bomb is returned to stowage after being prepared for use, the fuzes are removed and the closing plugs replaced. Low-drag GP bombs are equipped with steel nose and tail plugs. When these bombs are to be used with mechanical fuzes, the plugs are removed and discarded prior to the insertion of adapter-boosters. When the bombs require electrical fuzes, the nose and tail plugs are reinstalled after the electrical fuzes have been inserted.

Cluster Adapter. A cluster adapter, figure 1–6, is a mechanical device by means of which several bombs are suspended in the carrying station for one bomb. Two types are covered by this publication: the quick-opening (frame) type to which several bombs are attached by metal straps, and the aimable adapters which enclose the bombs in a cylindrical container.

Explosive Charge. When the bomb body is filled with an explosive charge, the type of explosive depends upon the prospective use of the bomb. In some bombs, thin pads of inert wax in the nose and tail cavities protect the explosive from moisture and also prevent the entrance of the explosive into thread crevices. These bombs can be identified by the marking "with pad."

The explosive charge in GP and fragmentation bombs is usually cast and is uniform throughout unless the explosive is amatol or composition B, in which case the nose and tail portions are pure TNT "booster surrounds" to provide protection from moisture.

The high explosives used in bombs are as follows.

AMATOL. Amatol, a mixture of ammonium nitrate and TNT, is less sensitive than TNT. When used in a 50/50 ratio, it has approximately the same rate of detonation and brisance (shattering ability) as TNT. Amatol is now obsolete, but it was used as a main charge in bombs prior to and during the early part of World War II.

COMPOSITION B. Composition B (comp B) is a very powerful explosive, particularly from the fragmentation standpoint. It consists of large percentages of RDX and TNT with a small amount of wax. The principal ingredient, RDX, is a powerful but sensitive explosive and is therefore always used in mixtures with other materials. Comp B is presently being used as the main filler in fragmentation bombs.

EDNATOL. Ednatol is a composition of 55 percent haleite and 45 percent TNT. It is more sensitive and has greater brisance than TNT. As an explosive for producing blast effect, it is superior to amatol and nearly equal to comp B. Ednatol is now obsolete, but it was normally used in fragmentation bombs.

EXPLOSIVE D (AMMONIUM PICRATE). Explosive D is the least sensitive to shock and friction of currently used military explosives. For this reason it is used in armor-piercing bombs which must withstand severe shock and stresses before detonating.

HBX. HBX is a chemically stable, noncorrosive explosive containing RDX, TNT,

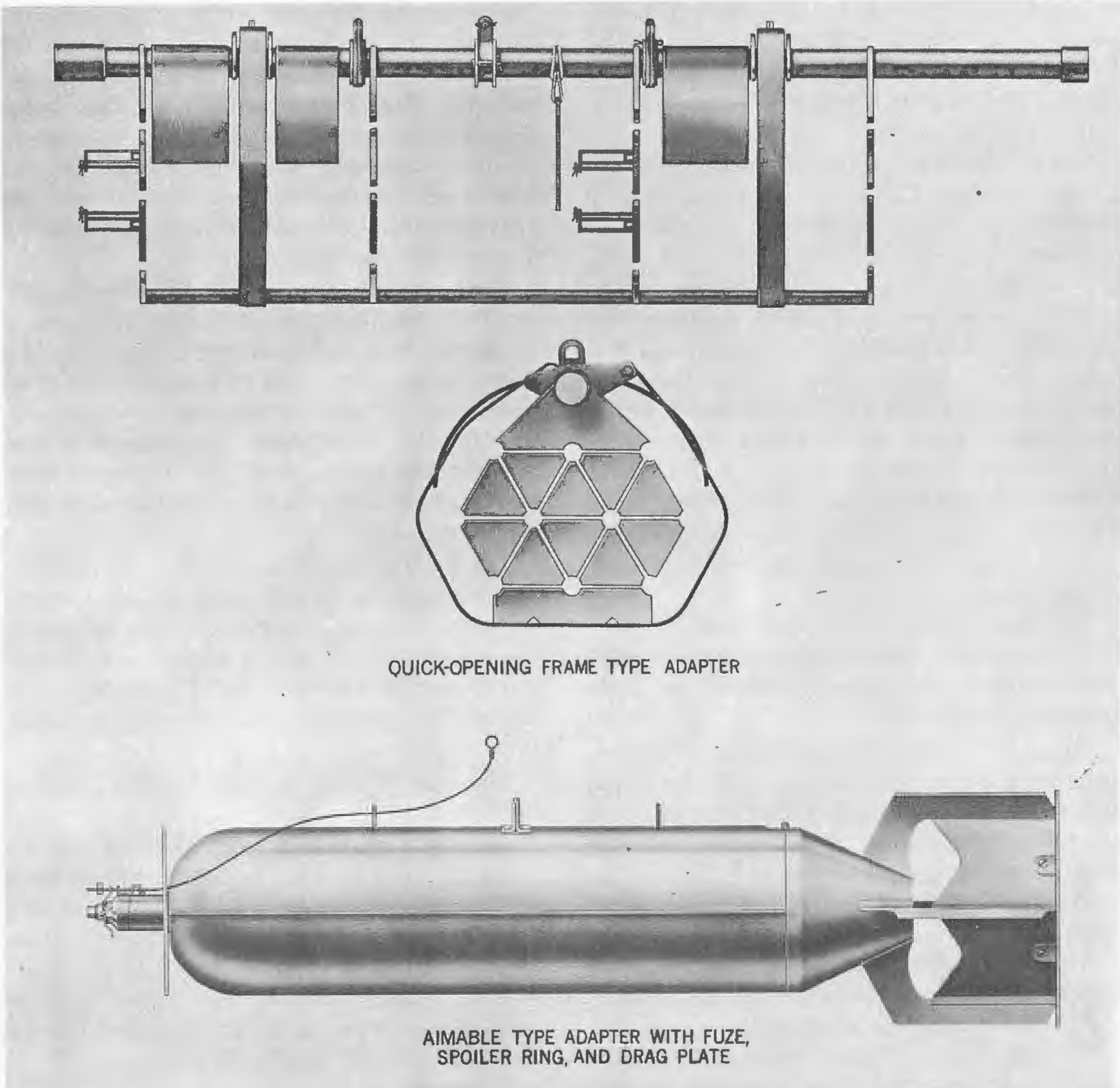


Figure 1–6.—Typical Cluster Adapters.

aluminum powder, and wax, that is in the same general class as TNT with respect to safety of handling. Although HBX is no longer used in its original form, it has some important variations. HBX–1 and HBX–3, which provide greater stability and power than HBX, are used as explosive fillers in underwater ordnance. H–6 is a variation of HBX developed for bombs.

PICRATOL. Picratol is a composition containing 52 percent of explosive D and 48 percent of TNT. Picratol is now obsolete, but it was normally used as an explosive charge in semi-armor-piercing bombs.

TNT (TRINITROTOLUENE). TNT is a relatively insensitive high explosive of great stability which has been used as the main charge in GP bombs. In recent years it has been superseded by more powerful explosives, such as tritonal.

TRITONAL. Tritonal, the previous standard explosive filler in GP bombs, is an 80/20 ratio by weight of TNT and aluminum powder. Its sensitivity properties are of the same order of magnitude as TNT; however, its blast effect is greater.

H–6. H–6, the present standard explosive filler in GP bombs, is a variation of HBX developed for use in bombs to give maximum air blast effect.

Fin Assembly. The fin assembly provides for stability of the bomb in flight. Smaller bombs (usually 100-pound and under) have the fin assembled to the bomb body prior to shipment. Some 100-pound and all larger bombs are shipped with the fin unassembled, in which case the fin assembly is shipped separately in a metal crate. There are two types of fin assemblies: the box-type assembly and the conical assembly.

BOX-TYPE FIN ASSEMBLY. The box-type fin assembly, figure 1–7, generally used with larger bombs, consists of a fin sleeve that fits over the tail of the bomb and is held in place by a thin locknut. Sheet metal fin blades are attached to the fin sleeve and to each other by supports to form a square box-like assembly.

Some fin assemblies (earlier than M118) were made of a light gage metal but increased bomb ceilings required the use of heavier metals to insure more reliable ballistics. Only those box-type fin assemblies designated by either A or M–A1, lower than M118, are made of a light gage metal. All model designations higher than M118 are made of the heavier gage metal.

CONICAL FIN ASSEMBLY, figure 1–8. Conical fins are designed for use on cylindrical-case GP and frag bombs to provide for bet-

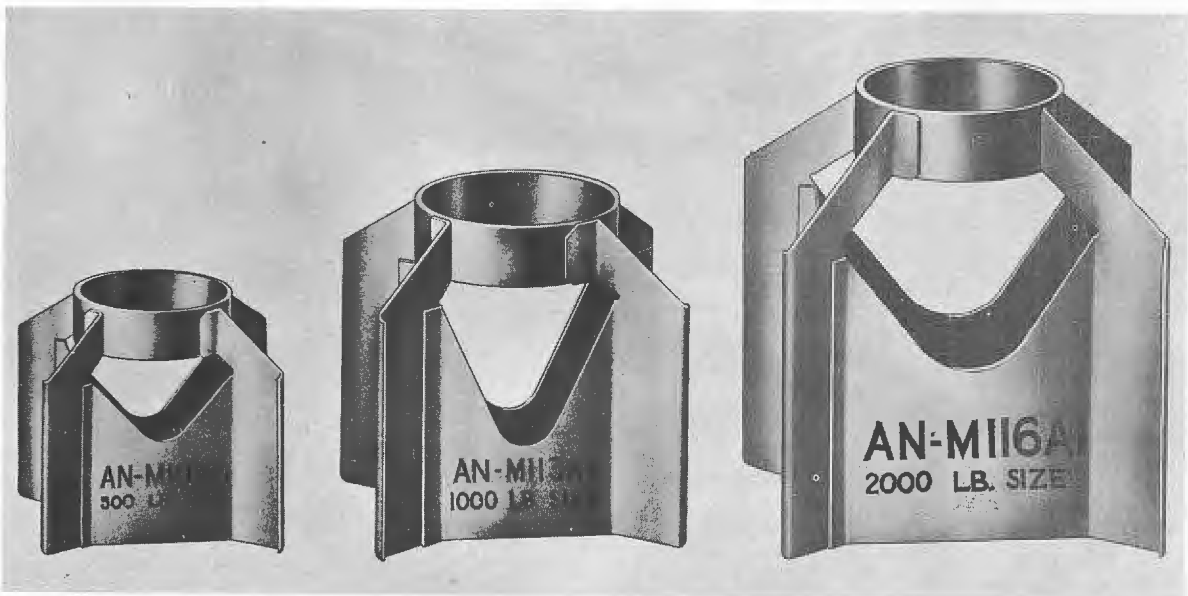


Figure 1–7.—Typical Box Fin Assemblies.

ter aerodynamic performance of these bombs when carried externally on high-speed aircraft. In addition, greater ballistic accuracy is obtained. The fin assemblies consist of four quarter sections of sheet steel welded together, with four integral fin blades. The fin assembly is secured to the bomb by means of a coupling tube, a metal locking web, and a special fin locknut. Each coupling tube has three equally spaced set-screws for locking the tube to the base plug of the bomb. The fin assembly is placed over the coupling tube and is secured by the locking web and fin locknut. Since these fin assemblies are longer than the box-type, they require longer tail fuzes and longer arming-wire assemblies.

FIN LOCKNUTS. The fin locknut, figure 1–9, is a bushing which is threaded onto a base plug or a coupling tube to secure the fin assembly to the bomb. Three types of locknuts are currently provided for varying conditions, as follows.

ORDINARY Or REGULAR-TYPE LOCKNUT. This type of locknut is assembled to the base plug of a bomb as shipped and is used on bombs assembled in the fields with box-type fin assemblies. During assembly, the locknut is removed, the fin assembly is placed over the tail of the bomb, and the locknut is then screwed onto the base plug and tightened with a wrench. The ordinary locknut provides no other means for attachment in the base plug; therefore, it is not normally used when bombs are to be carried externally on aircraft expected to exceed 350 knots, or in bomb bays subject to excessive air current.

NEW-TYPE LOCKNUT. The new-type locknuts differ from the regular locknuts in that they do incorporate a means of locking themselves to the base plug by setscrews.

These fin locknuts are intended for general use and should be installed when bombs with box-type fin assemblies are carried externally on aircraft expected to exceed 350 knots, or are carried in bomb bays subject to air currents that can cause rotation of

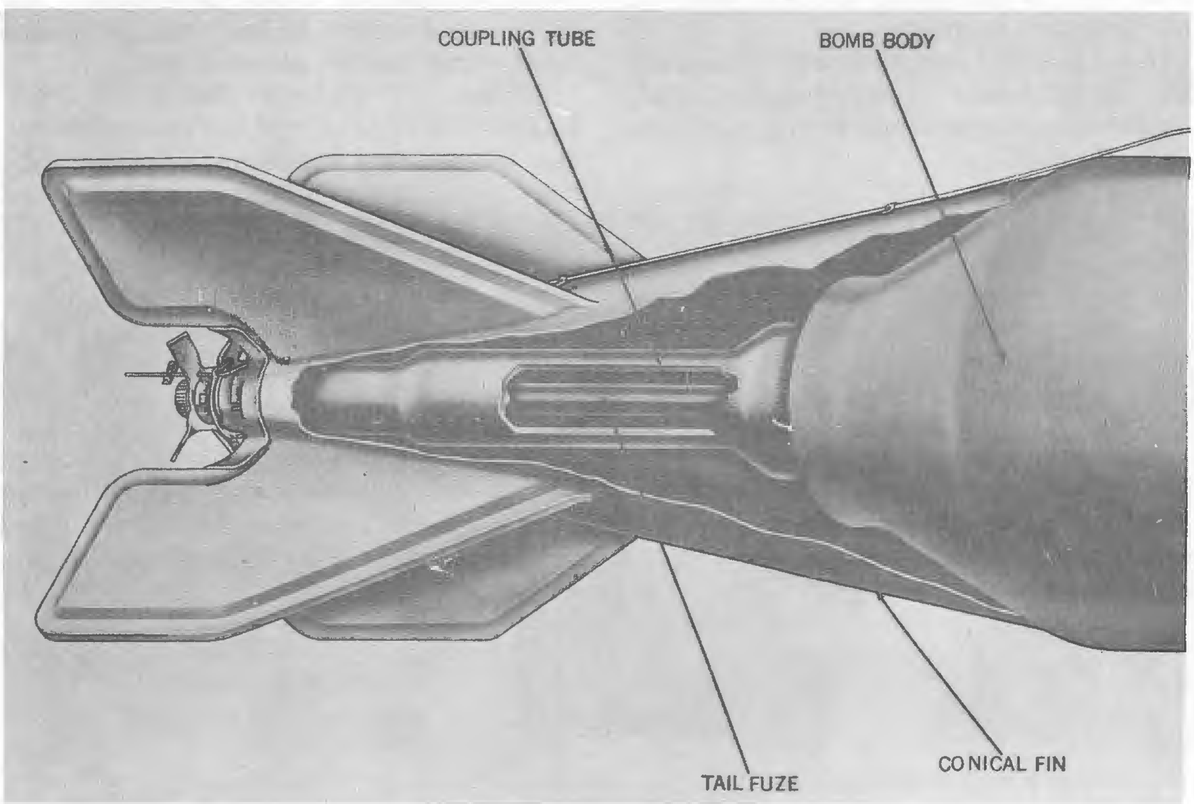


Figure 1–8.—Typical Conical Fin Assembly.

fins with the regular locknut installed. When the new type locknuts are not available, the regular type may be used. The new types are recommended for the type bombs as follows:

Fin Locknut	Bombs Used With
Mk 1 Mod 0	SAP AN–M58A1, AN–M58A2, and AN–M59A1.
Mk 2 Mod 0 or M1	GP AN–M30A1 and AN–M57A1. FRAG AN–M81 and AN–M88.
Mk 3 Mod 0 or M2	GP AN–M64A1 and AN–M65A1.
Mk 4 Mod 0 or M3	GP AN–M66A2.

The new-type fin locknut is installed in essentially the same manner as the regular-type locknut. However, after screwing the fin locknut onto the collar of the base plug as far as possible, the setscrews are tightened with an Allen wrench so that approximately equal pressure is exerted by each of a pair of opposite screws.

CONICAL FIN LOCKNUT and LOCKING WEB. The conical fin locknut and locking web, figure 1–10, secure the conical fin assembly to the coupling tube. During assembly, the regular fin locknut found on the bomb for use with box-type fin assemblies and the fin locknut packaged with the early models of conical fins are removed and discarded. After the conical fin assembly is placed over the coupling tube, the locking web is placed over the end of the coupling tube so that the corner slots engage the four fins. The fin locknut is screwed onto the coupling tube and tightened securely in such a manner that two slots in the fin locknut are directly over two tabs of the fin locking web. The two tabs are bent back to engage the slots of the fin locknut securely. The three setscrews of the fin locknut then are tightened.

Fuze Seat Liner. The fuze seat liner is a metal cup secured inside the nose of the bomb to keep a cavity clear for assembling the nose fuze and auxiliary booster.

Igniter. An igniter is a charge for setting fire to the fillings of incendiary and fire bombs. Igniters vary considerably in their

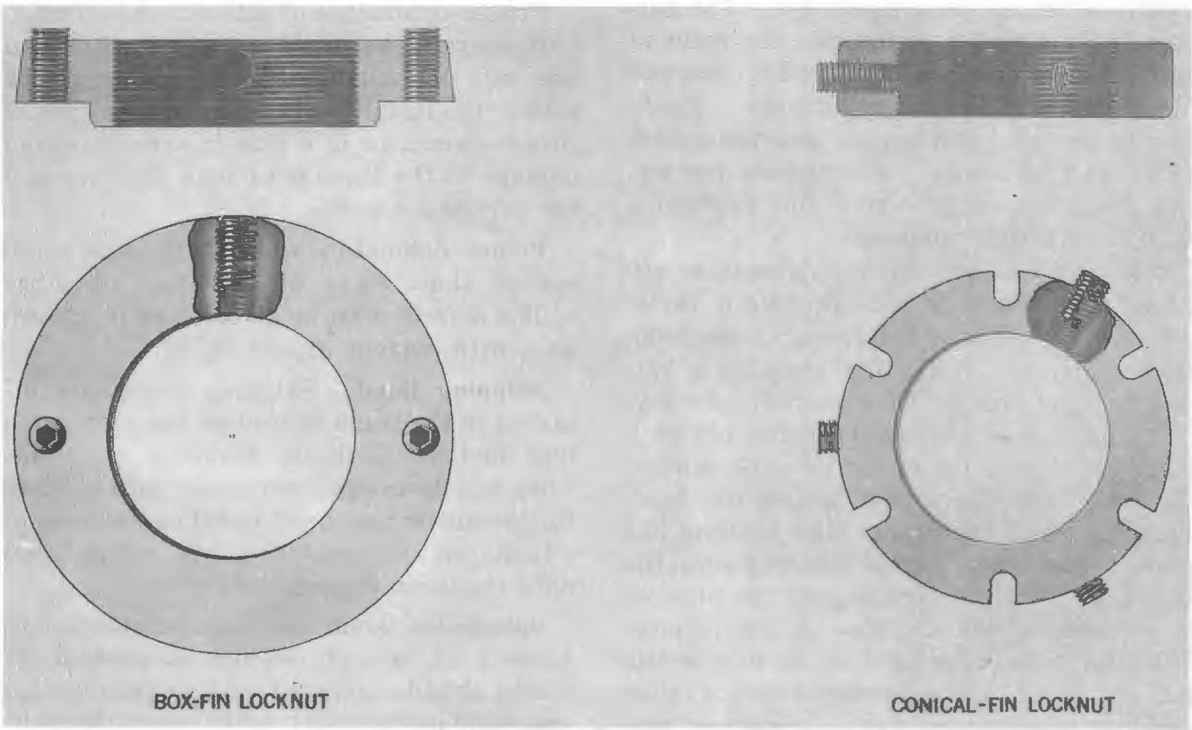


Figure 1–9.—Typical Fin Locknuts.

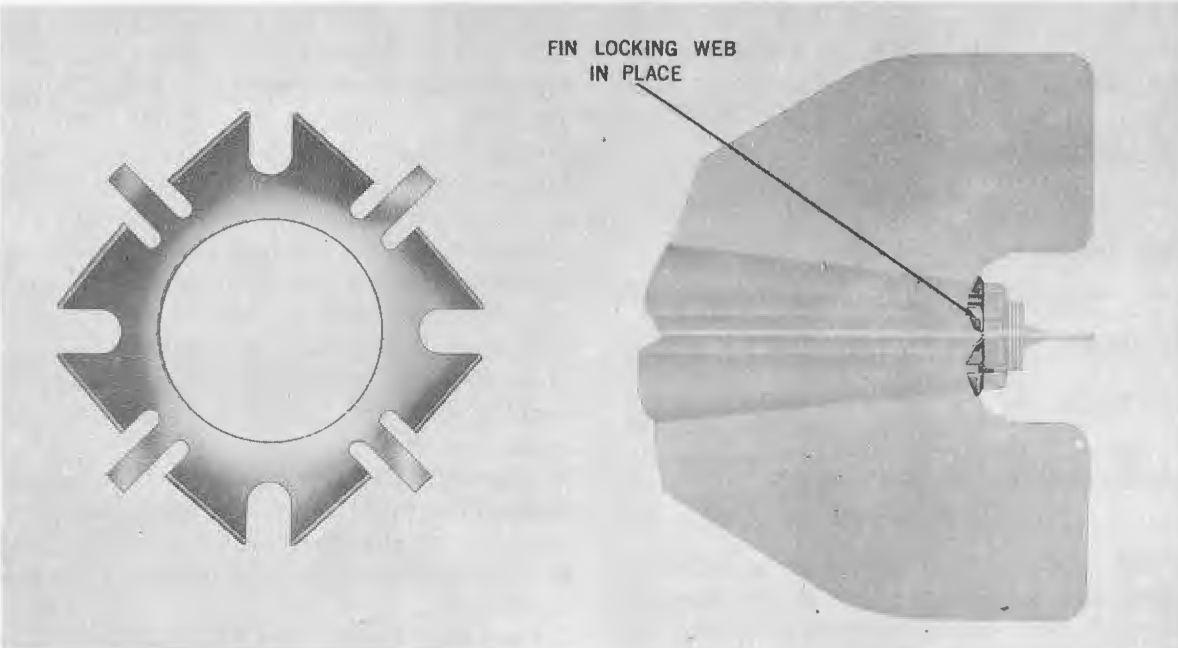


Figure 1–10.—Fin Locking Web.

shape and method of operation; they are fully illustrated and described in chapter 3.

Practice Bomb Signal. The practice bomb signal is a cylindrical container filled with black powder or a fluorescein dye. The purpose of the signal is to indicate the point of impact of a practice bomb when dropped either on land or water targets. Black-powder signals, upon impact, produce a flash and a puff of smoke. Fluorescein-dye signals are actuated by water and produce a slick for spotting purposes.

Primer-detonator. Primer-detonators are interchangeable units that provide a variation of delay action in tail fuzes. Some units are "nondelay." Each unit contains a primer, a delay charge (if required), a relay, and a detonator. When the firing pin of a fuze is driven by its spring into the primer, the flame from the primer ignites the delay element. After the proper time interval has elapsed, the relay ignites and explodes the detonator. Upon severe impact the plunger is arrested by the shoulder of the primer-detonator so that the blow on the primer has only the force of the firing-pin spring, thus avoiding malfunction due to a pierced primer.

Since a primer-detonator may be assigned one of a number of different delay periods, the units are stamped and painted to indicate the length of delay.

Primer-detonators of different model numbers vary in the pitch of their threads and are not interchangeable. Care must be taken to install only the proper model primer-detonator in a fuze in order to avoid damage to the threads of both the fuze and the primer-detonator.

Primer-detonators which have loose primers or show signs of corrosion or other visible defects must be disposed of in accordance with current directives.

Shipping Band. Shipping bands are attached to the bomb to protect the suspension lugs and to facilitate handling problems. They may be 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.

Suspension Band. Metal suspension bands, figure 1–11, provide 14-inch suspension for bombs already equipped with suspension lugs spaced 30 inches apart, as found on the 2000-pound Army-Navy GP bombs.

Figure 1–11.—Typical Suspension Band.

Marking and Identification

Bombs and bomb components are completely identified by standard nomenclature and ammunition lot numbers stamped on all packings as well as on the item itself.

Mark Numbers. In order to distinguish between different designs of the same type, a Mk/Mark number (Navy) or M/Model (Army) is assigned at the time a design is adopted as a standard item.

NAVY. Items of Navy designs are designated by the word Mark or its abbreviation Mk followed by an Arabic numeral (i.e. Mk 107). Modifications of the original design are indicated by the term Mod and an Arabic numeral following the Mark designation (i.e. Mk 107 Mod 1). An original design item includes the term Mod 0 to distinguish it from later modifications (i.e. Mk 107 Mod 0).

ARMY. On items of Army design the Model designation consists of the letter M followed by an Arabic numeral (i.e. M6). Modification of the original design is indicated by the letter A and the appropriate Arabic numeral added to the model designation (i.e. M6A1).

The designation T1, T2, etc., indicates a developmental item. While in the development stage, and when a major change is incorporated, the item will take a designation such as T1E1 or T1E2. Such a designation indicates a change affecting military characteristics or installation.

ARMY-NAVY. Certain items have been standardized for use by both the Army and the Navy. The model designation of such an item is prefixed by the letters AN (i.e. AN–Mk 107 Mod 0). When an AN is de-standardized by either the Army or the Navy, the AN is deleted from the model designation; however, to preclude loss of identity, the AN designation is carried parenthetically in standard nomenclature; for example, M120A1 (AN–M120A1). When an item is classified as AN standard, the previous model is carried parenthetically; for example, AN–M146 (M146).

Color Coding. Bombs are painted in various color schemes as a ready means of identification. Color bands, depending upon their color, size, and location, indicate the type of bomb and the type of explosive used. Identification marking and its color provide further identification of the bomb. Two color coding systems are indicated in the following chart. The newer system, applying to new-issue bombs, establishes a uniform color coding system (MIL–STD 709 NOrd) for various types of ammunition used by the Navy. The older system, applying to old-issue bombs, will be phased out when those bombs are depleted.

Ammunition Code. The code established by the Navy for the identification of ammunition is used: (1) to standardize nomenclature to insure positive identification of assembled ammunition and components; and (2) to permit the use of mechanical tabulating equipment to prepare consolidated records of station on-hand balances. Each item of ammunition is assigned a specific code; code numbers for bombs, components, and accessories are contained in OP 1219A. Fire bombs, components, and accessories are contained in OP 1219C.

Federal Supply Classification (FSC). The Federal Supply Classificaton and its indexes have been developed and adopted by the

Bomb Color Coding

Bomb Type	Body Color	Band Color		Marking Color	
		Old Issue	New Issue	Old Issue	New Issue
AP, SAP	Olive drab	Yellow	(No new Issue)	Black	(No new Issue.)
GP	Olive drab	Yellow	(No new Issue)	Black	(No new Issue.)
GP(LD)	Olive drab	Yellow	Yellow	Yellow	Yellow.
Depth	Olive drab	Yellow	Yellow	Black	Yellow.
Frag	Olive drab [1]	Yellow	Yellow	Black	Yellow
Demolition	Olive drab	(No band)	Yellow	Black	Yellow.
Chemical:					
Gas	Gray	Green	Red or Green [2,3]	Green	Red or Green.[3]
Smoke	Gray	Yellow	Blue	Yellow	Blue.
Incendiary	Gray	Purple	Purple	Purple	Purple.
Fire	Olive drab [4]	Purple	(No band)	Black [4]	Yellow.
Practice	Black [5] (Old Issue) Orange (New Issue).	(No band)[6]	(No band)[7]	White [8]	White.

[1] Small frag bombs (except M83) have yellow nose and tail.
[2] Red for harassing; green for casualty.
[3] One band for nonpersistent; two bands for persistent; three bands for G-series.
[4] FB Mk 77 Mod 0 and 1 has unpainted body and red marking.
[5] MPB Mk 5, AN-Mk 23, and Mk 43 are unpainted; PB Mk 19 tail section only is black.
[6] PB Mk 106, Mk 76 Mod 1, 2, and 4, and Mk 89 have white bands.
[7] PB Mk 106 has white bands.
[8] PB Mk 104 has white identification marking and yellow informational marking.

Office of the Secretary of Defense for use in classifying items of supply identified in the Federal Catalog System.

The FSC is a commodity classification designed to serve the functions of supply and is sufficiently comprehensive in scope to permit the classification of all items of personal property. In order to accomplish this, groups and classes have been established for the universe of commodities, with emphasis on the items known to be in the supply systems of the Federal Government.

The structure of the FSC, as presently established, consists of 75 groups, which are subdivided into approximately 540 classes. Each class covers a relatively homogeneous area of commodities, in respect to their physical or performance characteristics, or in the respect that the items included therein are such as are usually requisitioned or issued together.

The FSC utilizes a four-digit coding structure. The first two digits of the code number identify the group, and the last two digits of the code number identify the classes within each group. Code numbers are so assigned as to make it possible to expand the number of groups and classes when that becomes necessary. In most instances gaps have been left within each group, between the numbers assigned to adjacent classes, to permit the insertion of new classes in logical sequence, when necessary, because of technological advances or to accomplish other desirable additions and changes.

The primary application of the FSC class code number is in the Federal stock number (FSN). The FSC for an item of supply consists of the applicable four-digit FSC class code number plus the seven-digit Federal item identification number.

Ammunition 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 ammunition. When required, instructions for assembly are printed on the reverse side of the card.

Packaging

The following table provides packaging data for bombs and their components, figures 1–12 and 1–13.

Handling and Stowage

Because of the area of destructiveness of explosives in the event of accidental ignition

Packaging

Bomb Type	Bomb Body	Fin Assembly	Assembled Bombs
Armor Piercing (AP)	No protection; fuze cavities plugged.	Metal Containers with lugs, arming wires, and mounting screws.	
Semi-Armor Piercing (SAP).	Metal shipping rings; fuze cavities plugged.	Metal Containers	
General Purpose (GP).	Metal or Composition shipping rings; fuze cavities plugged.	Metal Containers	GP 100-lb bomb is shipped as a unit in a metal container.
Fragmentation (Frag).	Metal shipping rings; fuze cavities plugged.	Metal Containers	In clusters or wafers (See Frag Clusters).
Fragmentation Bomb Clusters.			Shipping bands
Aircraft Depth Bomb (ADB).	Metal containers	Metal containers	
Miniature Practice Bombs (MPB).			Metal or wood containers.
Practice Bombs (PB).	Fiberboard containers.	Metal containers	Wood or metal containers.
Fire Bomb [1]	Metal containers	Metal containers	
Smoke and Incendiary Bombs (100-lb size).			Wood containers.
Incendiary Bombs (500-lb size).	Metal shipping rings; fuze cavities plugged.	Metal containers	

[1] The center section of Fire Bomb Mk 79 Mod 1 is used as a shipping container for the bombs four sections: fins, filling-hole covers, lock pins, and a fiber pounding block.

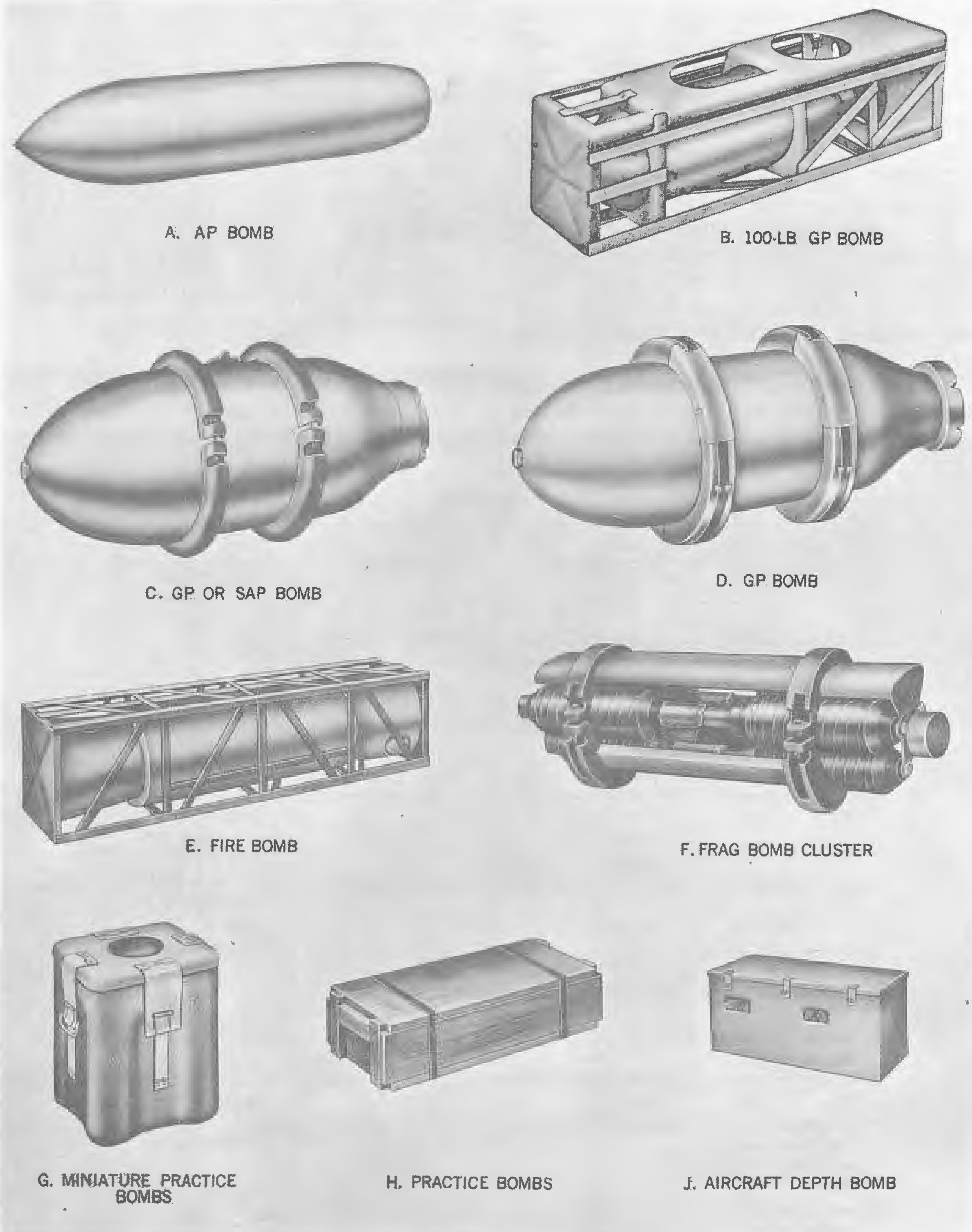


Figure 1–12.—Shipping Containers for Bombs.

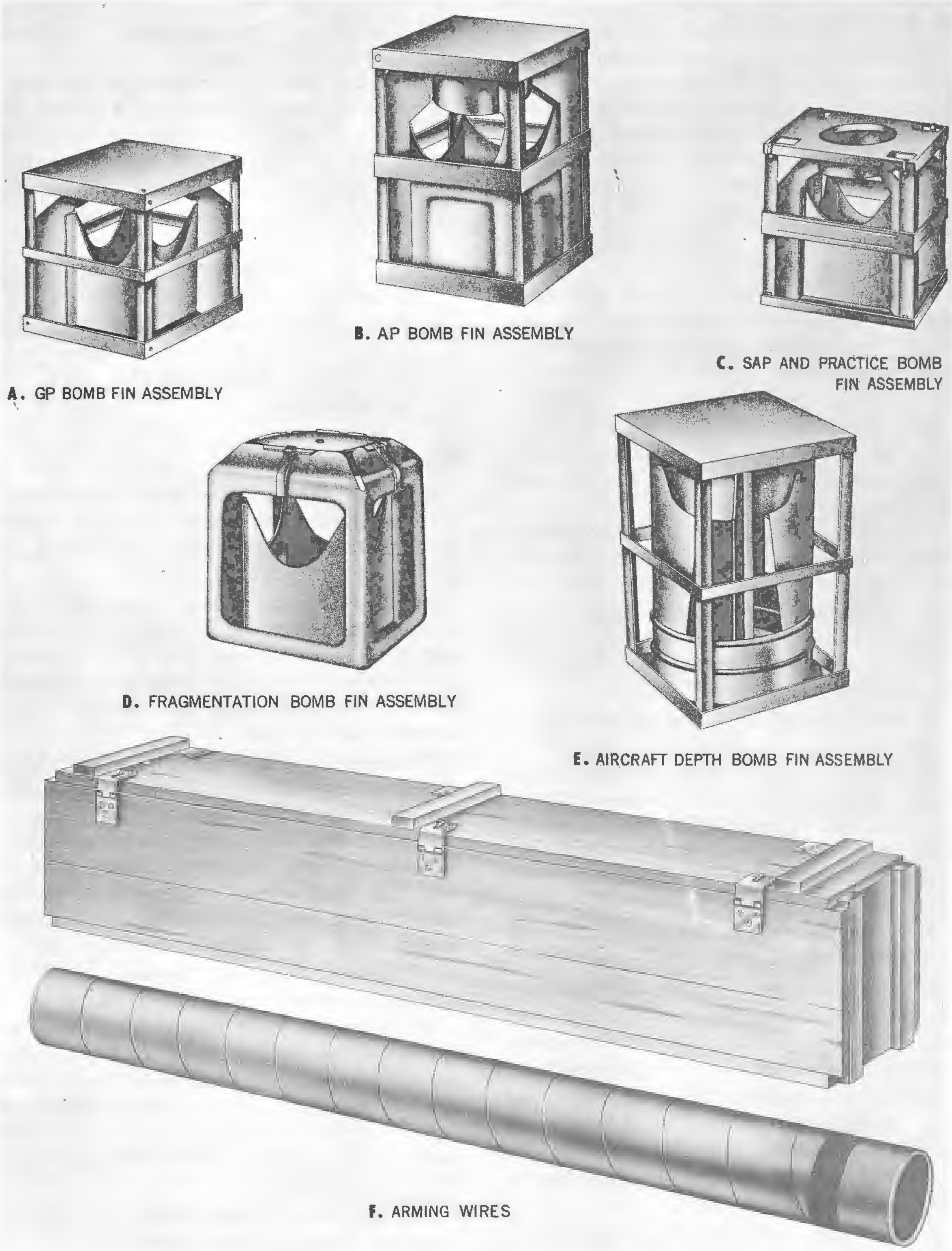


Figure 1–13.—Shipping Containers for Bomb Fins and Arming Wires.

or detonation, rigid regulations are required for the stowage of such materials.

Explosives are stowed in a specified location ashore removed from the operating area, inhabited buildings, public roads, and public railroads by distances prescribed in OP 5. Bombs are stowed in such quantities and at such distances to prevent sympathetic detonation of adjacent stores should one magazine explode. These quantities and distances are also given in OP 5.

Inert-loaded or empty bombs and fuzes shall not be stowed in magazines with live-loaded ammunition. Bomb stowage afloat is as prescribed in OP 4.

Since fuzes contain a charge of high explosive, they must be handled with great care. In addition to the precautions noted throughout this manual, the following also must be observed.

1. Fuzes are packed in sealed, moisture-proof containers and should not be unsealed until required for use. Fuzes unpacked and not used should be returned to their original condition and packings. The containers should be resealed in accordance with existing instructions.

2. Fuzes should be protected against excessive heat.

3. Fuzes must be handled with care at all times. Boxes should be carried or wheeled; they must not be dropped, tumbled, dragged, or thrown. Boxes should not be struck with a hammer or similar tool, either to open them or to aline them in a stowage stack.

4. Fuzes should not be packed or unpacked in a magazine.

5. When the fuze is unpacked, it should be examined to insure that the shipping seals are intact, the arming pins are in place, and the arming stem is not unscrewed.

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

7. Arming-vane assemblies should not be bent or distorted.

8. Only those primer detonators authorized for the particular fuze should be used.

9. Fuzes damaged to such an extent that they appear unfit for use should be disposed of by authorized personnel in accordance with current directives.

10. Never attempt to remove an antiwithdrawal fuze from a bomb; it is certain to detonate. If anything interferes with the completion of the fuzing operation, the bomb, with the fuze in place, will be destroyed by authorized personnel only.

WARNING

Unless specifically authorized, a Naval activity shall not attempt to render inert live-loaded bombs and fuzes to fill an order for inert material.

Disposal

Obsolete and unserviceable ammunition is to be disposed of in accordance with the latest instructions provided by the Chief of the Bureau of Naval Weapons.

In all instances where disposition by dumping is specified, NavOrd Instruction 8026.9 of 15 December 1956 shall be complied with. The area designated by the District Commandant or Sea Frontier Commander shall be used.

Commanding Officers of ships at sea which have been instructed to dispose of ammunition and chemicals by dumping shall insure that all chemicals, except pyrotechnics, are dumped in depths of 1000 fathoms or more and that bulk explosives, explosive-loaded ammunition, and pyrotechnics are dumped in depths of 500 fathoms or more.

All ammunition and chemicals must be dumped at least 10 miles from shore.

All activities shall insure that items to be dumped will readily sink. To avoid washing ashore, material shall be removed from outside packing and shipping containers before dumping (unless especially prepackaged or especially prepared to insure negative buoyancy).

All provisions prescribed for specific types of items to be dumped shall be observed carefully when disposing of that type of material.

As a safety precaution, it must be assumed that fuzes may function at some indeterminate time after the dumping of bombs, regardless of the method of disposal. Lower the bombs over the side to the water surface. Keep them off the hull to the fullest extent practicable. Release bombs into the water with the least amount of fall that circumstances permit.

Chapter 2
FUZES

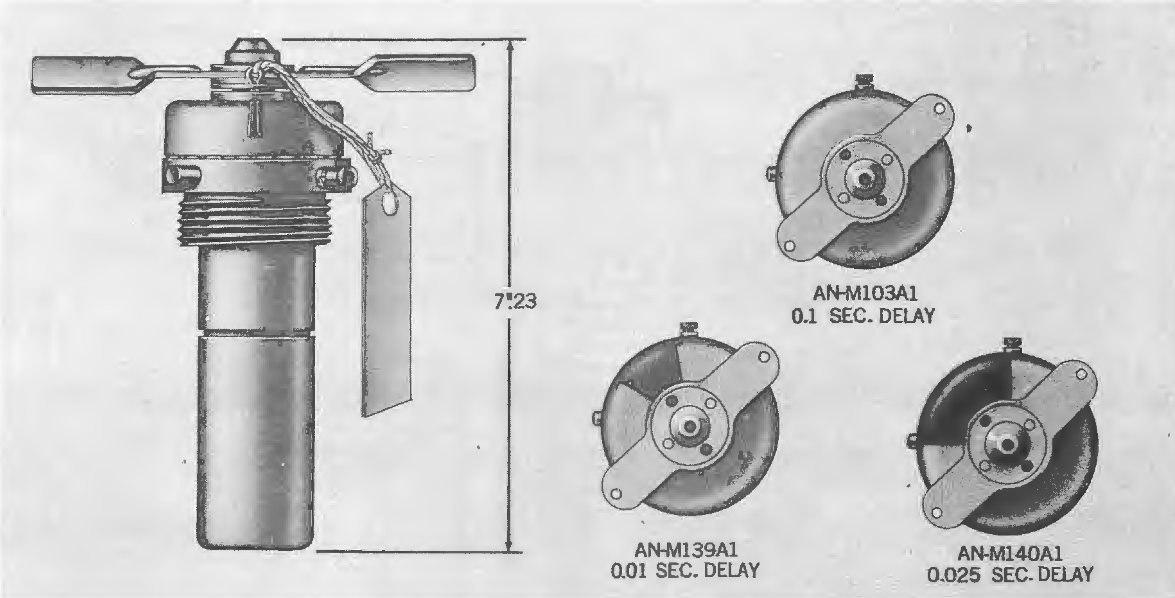


Figure 2–1.—Nose Fuzes AN–M103A1, AN–M139A1, and AN–M140A1.

Model	AN–M103A1	AN–M139A1	AN–M140A1.
Firing Action	Impact	Impact	Impact.
Firing Delay (sec)	0.1	0.01	0.025.
Assembly Drawing No	73–8–14	73–8–14	73–8–14.
Arming:			
Type	Delayed	Delayed	Delayed.
Instantaneous Setting (rev.)	302	302	302.
Delay Setting (rev.)	180	180	180.
Air Travel to Arm (ft)	510 to 5425	510 to 5425	510 to 5425.
Overall Length (in.)	7.23	7.23	7.23.
Protrusion from Bomb (in.)	2	2.13	2.
Vane Span (in.)	6	6	6.
Weight (lb)	3.7	3.7	3.7.
Number of Vanes	2	2	2.
Booster Charge:			
Type	Tetryl	Tetryl	Tetryl.
Weight (oz)	1.9	1.9	1.9.

General Description

The impact nose fuzes of this type, figure 2–2, are vane operated and delay armed. Their action can be either instantaneous or delayed by the selective presetting of a control pin.

The air travel (510 feet to 5425 feet) required to arm these fuzes makes them safe for use in dive bombing and carrier operations. Air travel is governed by the size of the bomb and the type of arming vane used.

Nose Fuzes AN–M103A1, AN–M139A1, and AN–M140A1 are structurally similar, differing only in their firing delay elements.

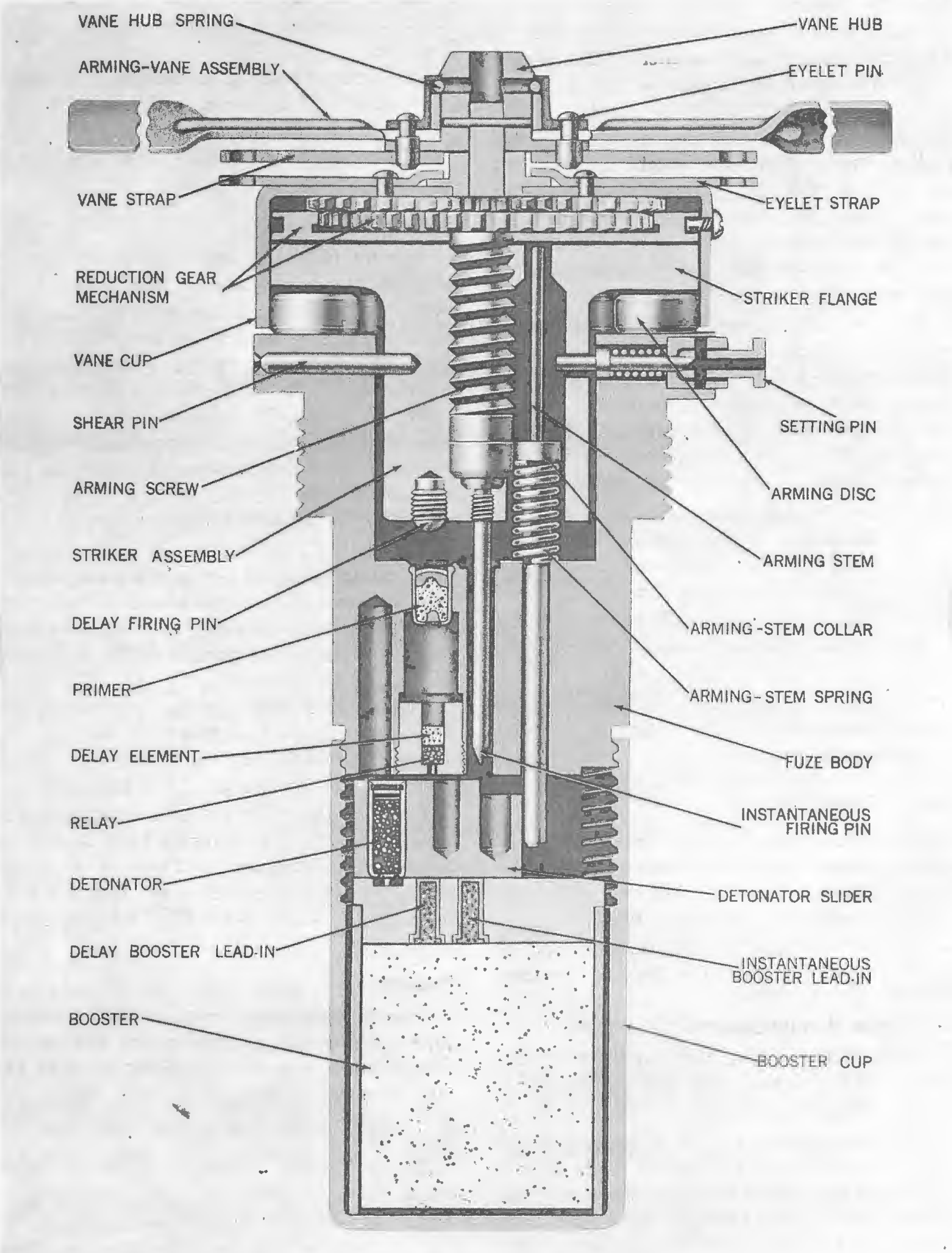


Figure 2–2.—Impact Nose Fuze AN–M103A1, Cross Section.

Arming Vanes

One of four types of interchangeable arming vanes may be used on these fuzes, figure 1–3, differing in the degree of pitch of the vane and the length of the blade: (1) a standard vane, M1 (60-degree pitch); (2) a short vane (60-degree pitch); (3) a flat vane (30-degree pitch); or (4) a long air travel vane, M2 (90-degree pitch on inner half of each blade). The bomb in which the fuze is installed and the required arming distance will determine the vane to be used.

For general-purpose bombs, the standard vane M1 (60-degree pitch) is used for a short arming distance, and the M2 (90-degree pitch on inner half of blade) is used for a longer arming distance. At present, only the M1 vane is provided with these fuzes. Separate action is necessary to requisition the M2 vane.

For flat-nosed depth bombs, where air travel to arm is necessarily shorter because of low altitude release, the fuze is equipped with a flat arming vane (30-degree pitch).

These fuzes also are used with certain fragmentation bombs in clusters. Cluster arrangement necessitates the use of short vanes having a 60-degree pitch; a long air travel to arm results.

Delay Elements

These fuzes differ in their firing delay elements. Some have a 0.1-second delay element, others have a 0.01-second delay element, and still others a 0.025-second delay element. Black wedge markings on the fuze head identify the delay time of the fuze.

Explosive Components

These fuzes contain two explosive trains, one for delay action and one for instantaneous action.

The delay action explosive train consists of a primer, a delay element, a relay, a detonator, a booster lead-in, and a booster. The primer and delay element assembly, containing the delay element and relay, are assembled in the fuze body and are sealed as a protection against moisture.

The instantaneous explosive train consists of a detonator, a booster lead-in, and a booster.

The same detonator is used in both explosive trains. It is alined with one of the explosive trains during the arming operations; its final position depends upon the preset position of the setting pin.

Safety Features

During shipping and stowage, a safety wire is threaded through the holes in the vane hub, vane strap, and eyelet strap. The ends of this wire are secured with a car seal. A safety cotter pin is secured through another set of holes in the eyelet strap and vane diametrically opposite the first set. The wire and cotter pin prevent operation of the arming mechanism. Instruction tags are attached to the seal wire, and on a wire attached to a pull ring through the eye of the cotter pin.

As installed in a bomb, with the arming wire in place, these fuzes are in the unarmed condition; both the delay and instantaneous explosive trains are broken by the detonator being out of alinement.

The arming discs prevent premature firing of the explosive train by holding the striker outward from the fuze body. These discs are not ejected until the fuze arms.

Fuzes of this type are both detonator safe and shear safe; these terms have been fully explained in chapter 1. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Presetting

Selection of either delay or instantaneous action is made by presetting the setting pin. The pin has two slots, one for each of the two possible actions. The deep slot is for delay action, the shallow slot for instantaneous action.

The fuzes are shipped and stowed with the setting pin in the deep slot or delay position. To set for instantaneous action, lift the pin, rotate it one quarter turn, and drop it into the shallow slot. The portion of the fuze body adjacent to the setting pin is stamped DEEP SLOT DELAY—SHALLOW SLOT INST.

Functioning

General. When the bomb is dropped ARMED, the arming wire is retained in the bomb rack. This frees the arming-vane assembly, which rotates in the air stream to operate the delay arming mechanism.

The air travel to arm these fuzes is approximately 510 to 5425 feet. Continued rotation of the arming-vane assembly, after arming is completed, unscrews the arming mechanism from the fuze. Arming distance varies with the vane type and bomb used.

Upon impact the fuze will detonate instantaneously, or after its rated delay, exploding the bomb.

Arming. The arming-vane assembly is mounted on the vane hub by means of the vane hub spring and positioned on the vane strap by pins. The arming-vane assembly is connected to the arming screw through a reduction gear train. A reduction ratio of 65 revolutions of the arming-vane assembly to 1 revolution of the arming screw is obtained with this gearing arrangement.

The arming screw engages a striker assembly which contains two firing pins, one for the delay and one for the instantaneous explosive trains. The striker is prevented from moving by the shear pin and the setting pin.

A ring of 13 arming discs, housed in the vane cup, are positioned between the flange of the striker body and the fuze body. These prevent the striker body from being driven into the fuze body before arming has occurred.

The fuzes do not become armed until the 13 arming discs are ejected and the detonator is brought into alinement with one of the explosive trains. The detonator is contained in the detonator slider, a block of metal that rides in a recess in the fuze. Compressed springs that act on the slider tend to move the detonator into alinement with one of the explosive trains.

An arming stem, acted upon by a compressed spring, bears against the inner surface of the reduction gear assembly. The inner end of the arming stem keeps the detonator slider, which contains the detonator, out of the functioning position until the fuze arms.

As previously described, the air stream rotates the arming-vane assembly and, through the reduction gear mechanism, unscrews the arming screw from the striker assembly, carrying the vane cup and the reduction gear outward. When the vane cup has progressed sufficiently, the arming discs are ejected by means of a flat spring assembled within the circle of discs. As the arming screw advances, carrying the reduction gear and vane cup outward, the arming stem follows, driven by its spring.

If the fuze setting pin has been preset in the deep slot (for delayed action), it is in the way of the advancing arming stem collar. The progress of the arming stem is stopped when the collar of the stem contacts the setting pin. At this point the arming stem has cleared the first step of the detonator slider. The two compressed springs force the slider over until its shoulder contacts the partially withdrawn arming stem. This alines the detonator with the delay element. The arming screw continues to free itself from the striker until the vane cup assembly (vane cup and reduction gears) drops off.

If the fuze has been set in the shallow slot (for instantaneous action), the setting pin stem will not stop the progress of the arming stem during the arming sequence described. During arming, the arming stem rides outward, clearing both steps of the detonator slider and allowing the detonator to aline with the instantaneous firing pin.

Action. When the arming discs have been ejected, the striker can be driven into the fuze body. Impact drives the striker inward, shearing the shear pin and the stem of the setting pin. The delay firing pin sets off the delay primer and the instantaneous firing pin is driven either into a cavity in the detonator slider or into the detonator.

A striker retaining pin passes through the fuze body and into a slot in the striker; it prevents the striker from moving outward but does not prevent the striker's motion inward.

Detonation. If the fuze has been set for delay action, the detonator is alined with the delay explosive components. Impact fires the delay primer. The flash from the primer sets off the black powder delay element which burns through and sets off, respectively, the relay, the detonator, the booster lead-in, and the booster.

When the fuze is set for instantaneous action, the detonator is in line with the instantaneous explosive components. Impact drives the instantaneous firing pin into the alined detonator, setting it off. The detonator relays the explosion to the booster lead-in, which explodes the booster.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb racks with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. When the arming mechanism is missing, or has unscrewed from the striker far enough to allow the arming discs between the striker flange and the fuze body to be ejected, the fuze is armed. If the clearance between the vane cup and the fuze body is greater than ⅛ inch, but the arming discs are not ejected, the fuze is partially armed.

Handling. The arming-vane assembly of both armed and partially armed fuzes may be turned backwards (counterclockwise looking at the nose of the fuze) with safety. This will not unarm a fuze when the detonator slider has already moved over, but will unarm a partially armed fuze.

Fuzes in which the clearance between the vane cup and the fuze body is greater than ⅛ inch, but in which the arming discs are still in place, are safe for handling although they are no longer detonator safe.

Fuzes which have had the arming discs ejected may be made safe for handling by placing metal (or wood) blocks between the striker flange and the fuze body. They must be held in place by some suitable means, such as adhesive tape. The blocks will prevent the striker from being driven into the fuze accidentally.

No attempt should be made to disassemble this fuze. Fuzes which are armed or partially armed should be disposed of by authorized and qualified personnel.

Fuzing

1. Unseal the fuze container and remove the fuze.
2. Inspect the overall appearance of the fuze; see that the arming-vane assembly and threads are in the proper condition.
3. Adjust the setting pin for the desired action (instantaneous or delay). The pin has two slots. The deep slot is for delay action, the shallow slot for instantaneous action. To change the delay setting, which is under spring action, pull out the setting pin from the fuze body, twist it a quarter turn, and then release it. The vane cup of the AN–M139A1 has a black painted segment covering one-eighth of the cup; the AN–M140A1 has a segment covering one-fourth of the cup; the AN–M103A1 has no painted segment.
4. Obtain the proper vane assembly and inspect it for damage.
5. Remove the nose shipping plug and inspect the fuze seat and threads for corrosion and stripping. If necessary, clean the fuze seat and threads.
6. Cut and remove the seal wire.

> CAUTION: Do not remove the cotter pin that locks the vane strap and eyelet strap until the bomb is installed in the bomb rack.

7. Screw the fuze, less the arming-vane assembly, into the nose of the bomb, hand tight. Use no tools.

8. Thread the arming wire through the forward bomb suspension lug, then through the upper pair of eyelets in the vane strap and eyelet strap. If upper pair of eyelets is occupied by a cotter pin, place a spare cotter pin in the opposite eyelets and replace the original pin with the arming wire.

9. Adjust the arming wire to protrude 2 to 3 inches from the vane strap.

10. Slip Fahnestock safety clips (normally two) over the end of the arming wire until they just touch the face of the vane strap. Be sure that the arming wire is free from kinks and burrs. See instructions for the particular bomb assembly to determine how many, if any, safety clips are to be used.

11. Slip the arming-vane assembly over the vane hub, so that the heads of the two vane pins enter the mating holes in the flange of the vane hub, and so that the vane-hub spring snaps into the groove on the vane hub.

12. Remove the cotter pin.

Defuzing

> CAUTION: Before attempting to remove a fuze from a bomb, be sure it is in the unarmed condition or safe to handle.

1. Replace the cotter pin and tag.
2. Remove the safety clips.
3. Remove the arming-vane assembly.
4. Remove the arming wire and repack.
5. Replace the seal wire and seal ends together.
6. Unscrew the fuze from the bomb, and replace it in the fuze container.

Packaging and Marking

Fuze Container. One fuze, including the standard arming vane M1, not marked as such, is packed in a cylindrical metal container having a maximum diameter of 3.46 inches and a maximum length of 7.51 inches. The weight of the fuze and container together is approximately 4.5 pounds. The container is sealed, and opened, by a metal tear strip soldered to it. A ring on the end of the tear strip facilitates opening. The container is painted black and is marked as follows:

FUZE, BOMB, NOSE AN–103A1

Loader's Initials	Loaded (Month and Year)
Drawing No.	Revision Date of Drawing

Packing Box. Twenty-five fuzes in containers are normally packed in a wood packing box. However one fuze and container may be removed, if necessary, to make room for a package of M2 arming vanes and instructions. The weight of the box and its contents is approximately 132.5 pounds. Its dimensions are 22¼ by 17⅛ by 9$\frac{3}{16}$ inches. The lid of the box is secured by wood screws, and the end of the box is marked as follows:

(No.) FUZES, BOMB, NOSE
AN–M103A1
LOT NO.

IMPACT NOSE FUZE AN-M904E2

Model	AN-M904E2
Firing Action	Impact
Firing Delay	Selectable; Instantaneous, 0.01 0.025, 0.05, 0.1, or 0.25 sec.
Delay Element	M9 (Formerly T2E3)
Assembly Drawing No.	8839301 Ordnance Corps Dept. of the Army.
Aiming:	
Type	Vane and Time
Time to Arm	Selectable; 2.0 to 18.0 sec. at 2 sec. intervals
Overall Length (in.)	9.318 max.
Thread	2-12NS
Protrusion from Bomb (in.)	4.125
Vane Span (in.)	3.75
Weight (lb.)	2.35
Number of Vanes	2
Booster Charge	74.3 grams Tetryl

GENERAL DESCRIPTION

Impact Nose Fuze AN-M904E2, shown in Figure 2-2A, is designed as a replacement for currently employed mechanical nose fuzes (AN-M103A1, M139A1, M140A1, M163, M164, and M165). It is compatible with tactical requirements of both low- and high-speed delivery and provides a constant arming time at bomb release speeds of 170 to over 525 knots.

Arming and Functioning Time. Variable arming time delays of from two to 18 seconds are preflight selected in two-second increments. Six functioning time delays are provided by six interchangeable delay elements M9. These delay elements provide either instantaneous detonation at impact, or delays of 0.01, 0.025, 0.05, 0.1 or 0.25 seconds, depending upon the delay element installed in the fuze. An M9 element is shown in Figure 2-2B. A nose vane coupled to a clutch-type governor limits the governor to a constant speed of 1800 ±100 RPM, thus providing constant arming time.

Explosive Components. The assembled fuze contains five explosive components: a delay element, a relay, detonator, booster lead in, and a booster charge. The booster charge consists of 74.3 grams of tetryl.

SAFETY FEATURES

A mechanical interrupter keeps the detonator out of alignment until after the fuze is armed. The armed condition of Fuze AN-M904E2 is indicated by the presence of a red color in both of the arming windows, shown in Figures 2-2A and 2-2B, indicating that the rotor is in the in-line position. A partially armed condition exists if red appears in either window, or if a white stripe is visible in the upper window at other than the 18 and six second markings. (Red is always visible in the upper window if the fuze is held at an angle so the observer can look downward into the body of the fuze and see the red top of the striker body. This does not indicate an unsafe condition. The striker body must move toward the nose of the fuze and completely fill the window with its red color when armed.) If inspection of the fuze shows it to be in either the armed or partially armed condition, the delay element is removed, the fuze is set aside, and the nearest EOD unit notified.

A safety sealing wire through the nose vane and flange of the nose retaining ring keeps the fuze in the unarmed condition. Figure 2-2C shows the sealing wire in position with the instruction and warning tags attached. The reduction gear is thus locked to prevent the fuze from arming during handling. The sealing wire is not removed until after the arming wire is installed. The arming wire then keeps the fuze unarmed until the wire is withdrawn at bomb release.

Additional operational safety is afforded by the fuze arming delay time being a function of time rather than speed of the aircraft.

PRESETTING

The fuze is pre-set manually prior to installation in the selected bomb. Arming times of 2, 4, 6, 8, 10, 12, 14, 16, or 18 seconds ±10% are available.

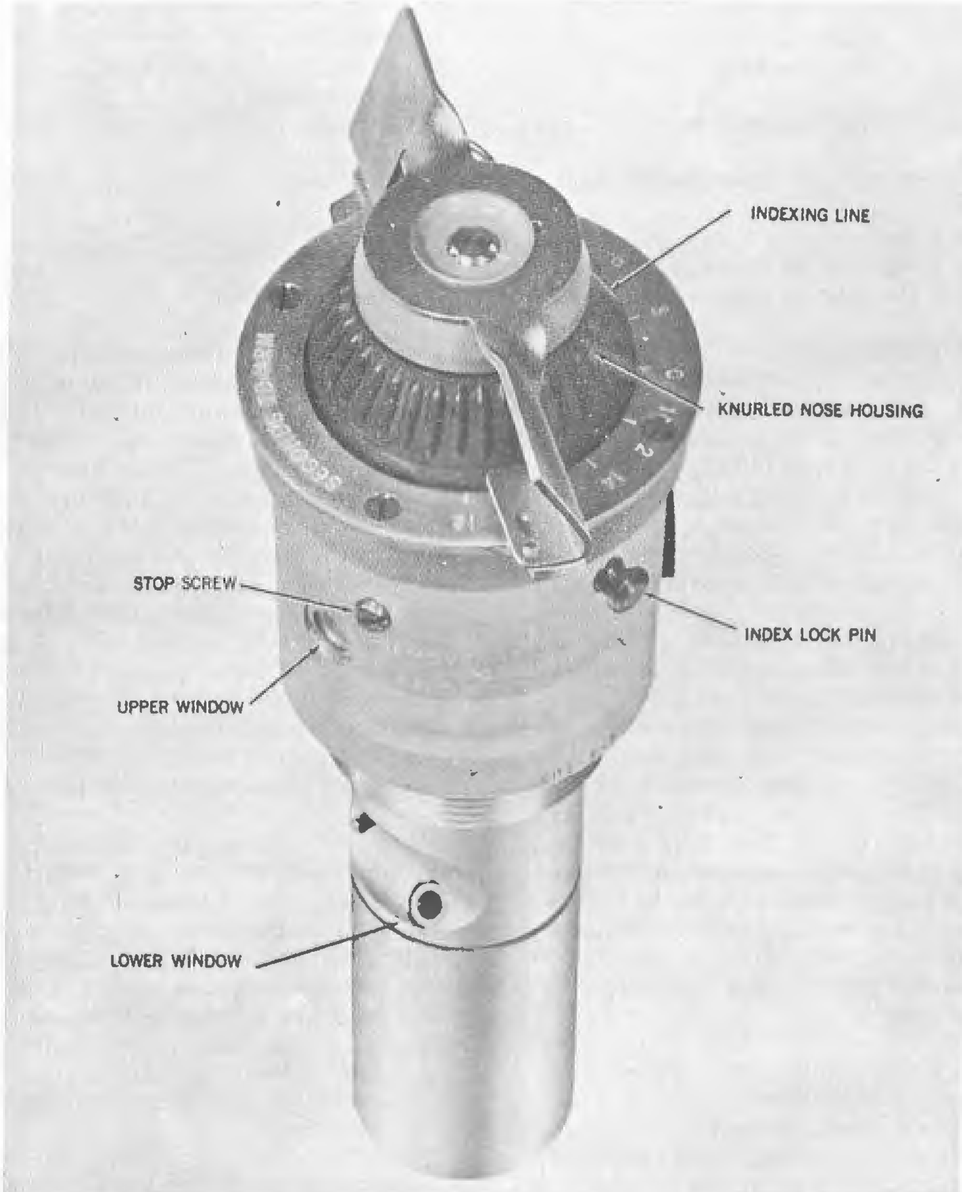


Figure 2-2A. Impact Nose Fuze AN-M904E2

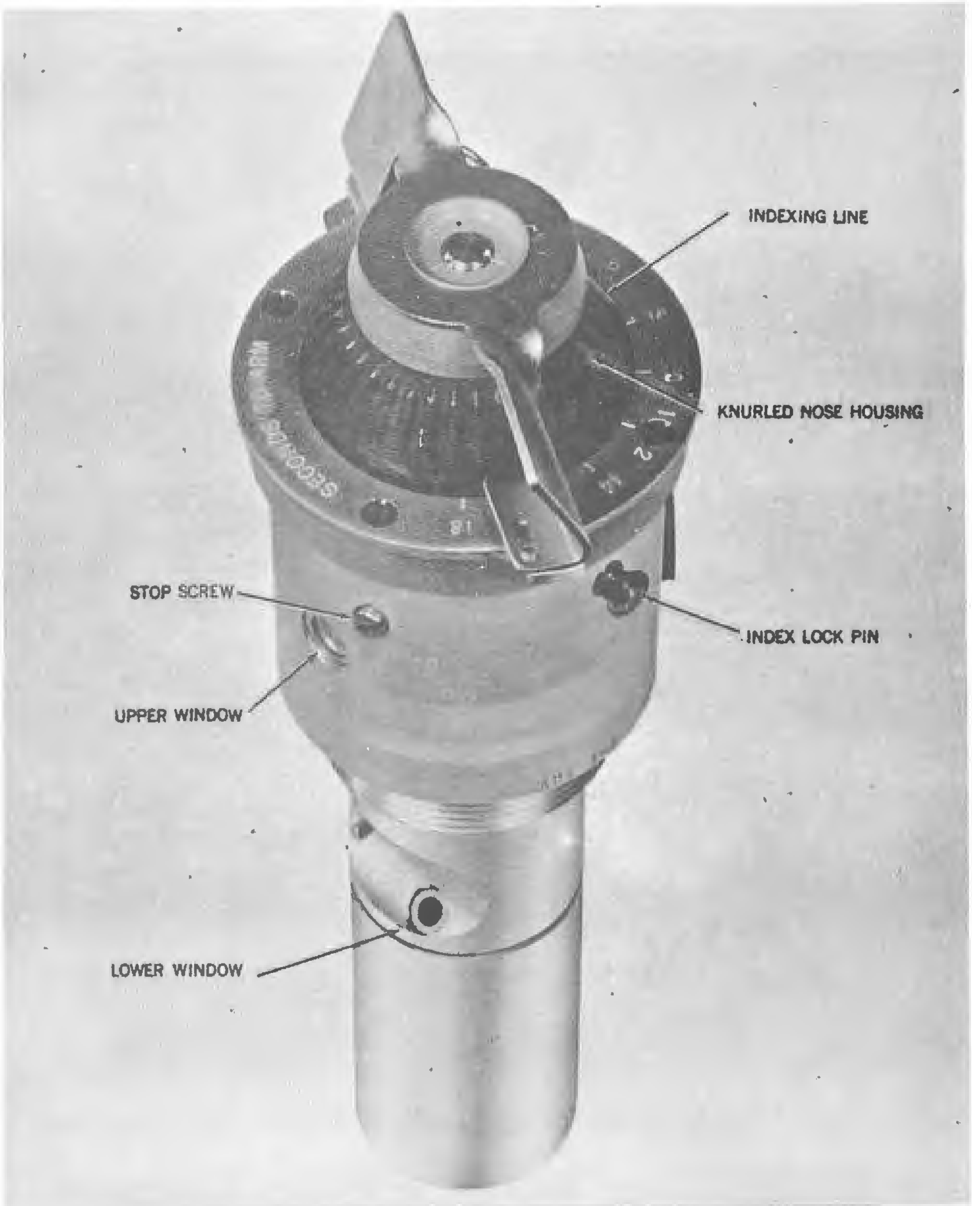


Figure 2-2B. M9 Delay Element Installation

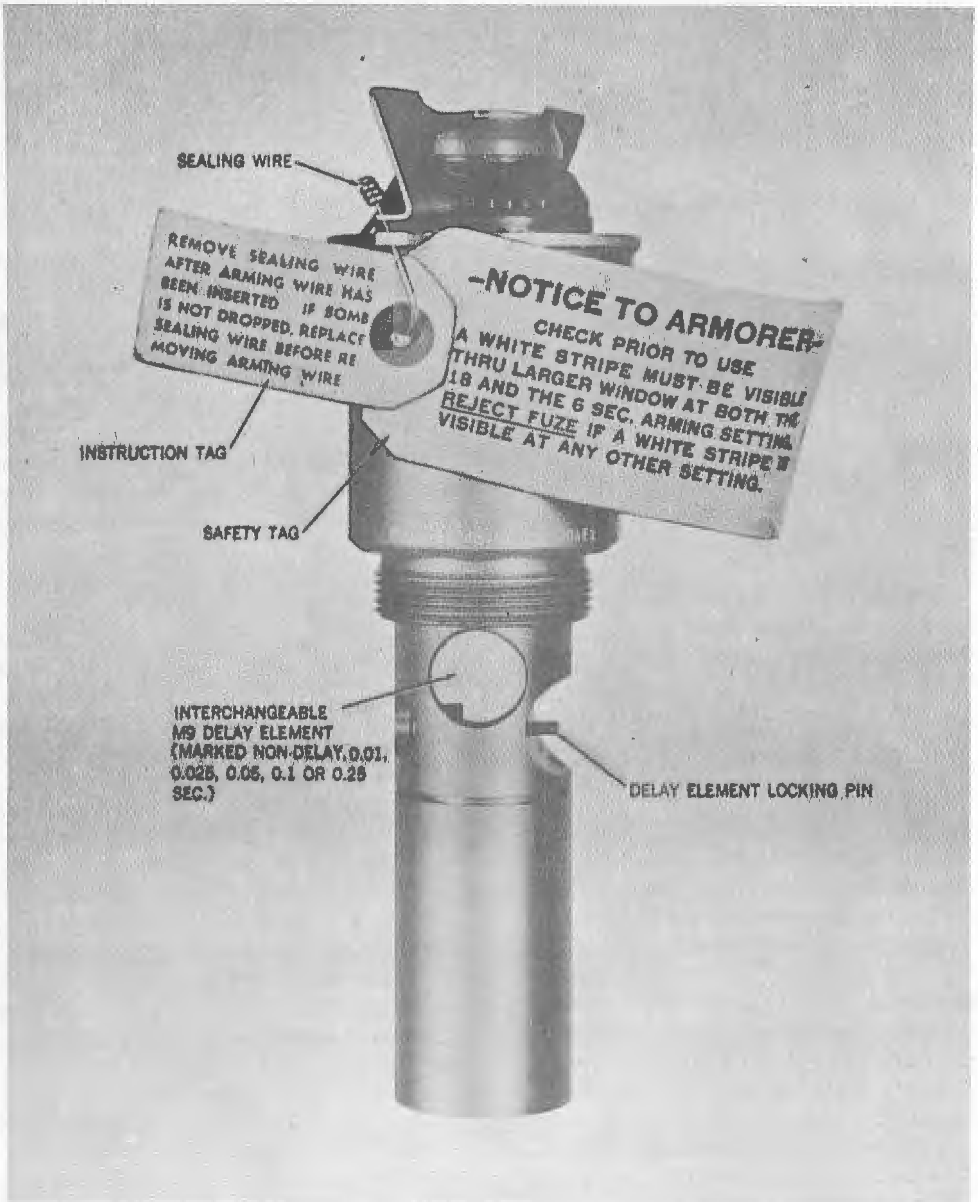


Figure 2-2C. Fuze with Delay Element Installed

WARNING

Do not use the two-second arming delay time with any configuration except SNAKEYE 1 retarded.

Set the arming delay as follows:

1. Depress the index lock pin shown in Figure 2-2A on the side of the fuze.

2. Select the proper arming delay time by rotating the nose housing of the fuze until the white line of the knurled surface of the housing is aligned with the desired arming time stamped on the nose retaining ring.

NOTE: The 2- and 4-second settings can be obtained only by removing the stop screw adjacent to the setting button.

FUNCTIONING

A cross-sectional view of the AN-M904E2 fuze is shown in Figure 2-2D, which illustrates the items described in this section.

When the bomb is released from the aircraft, the arming wire is withdrawn from the fuze assembly, permitting the nose vane to rotate in the wind stream. The vane is coupled to a clutch-type governor which limits the input speed of the gear assembly to a constant rate of 1800 ±100 rpm. The shaft from the governor is connected through a spur gear train, with a reduction ratio of 972 : 1, to a striker assembly. This assembly rotates at slightly less than 2 rpm. When the striker rotates to proper alignment, it rises because of force exerted by a compressed spring.

Initially, the firing pin is seated within the striker body. When the striker rises under its spring, a steel ball is propelled into the firing pin slot, effectively lengthening the firing pin to compensate for the longitudinal striker body movement. A shear member prevents the firing pin from rising within the striker body. Studs on the striker and striker guide engage a slot in the firing pin, causing the firing pin and striker guide to rotate.

In the bottom face of the fuze body is a spring-loaded rotor containing a detonator. In the unarmed fuze, the rotor is prevented from swinging into the armed position by the rotor release pin as shown in Figure 2-2D. A shear wire at the top of this pin rides in a groove in the underside of the striker guide. When the shear wire reaches the end of the groove, it breaks; and when the guide is fully rotated, the rotor release pin is forced into the circumferential slot on the edge of the striker guide. This releases the rotor, allowing it to swing into the in-line position, where it is locked by a spring-loaded detent which prevents rotor rotation at impact.

The M9 delay is held in the side of the fuze body by two pins, one spring-loaded. The delay element provides a link in the explosive train between the firing pin and the detonator in the rotor.

The force of impact shears the pins which hold the nose of the fuze in place, forcing the nose assembly to the rear. The force on the nose is transmitted to the firing pin by the striker and the steel ball. The force breaks the shear member and the firing pin hits the primer of the M9 delay. An explosive train is thus actuated through the delay and a lead azide M6 relay to the detonator, initiating the tetryl booster through a tetryl lead.

INSTALLATION OF FUNCTIONING DELAY ELEMENT M9

Functioning delay time is established by selection of the M9 delay device. The appropriate functioning time delay is stamped on the face of each M9 (non-delay for instantaneous, 0.01, 0.025, 0.05, 0.1, and 0.25 sec).

NOTE: A functioning delay element M9 must be installed in each fuze or the bomb will be a dud.

Certain lots of Fuzes AN-M904E2 are shipped with either an instantaneous or 0.025 M9 delay element already fitted. If these time delays are not operationally satisfactory, the element must be removed and the proper one installed.

Install the M9 delay element as follows:

1. Remove the previously installed element, as shown in Figure 2-2B, by depressing the spring-loaded locking pin on the side of the fuze body. Hold the fuze so that the delay element will fall out of its well into the hand.
2. Select the desired delay element, and align the keyway with the fixed pin inside of the delay element well.
3. Depress the spring-loaded locking pin

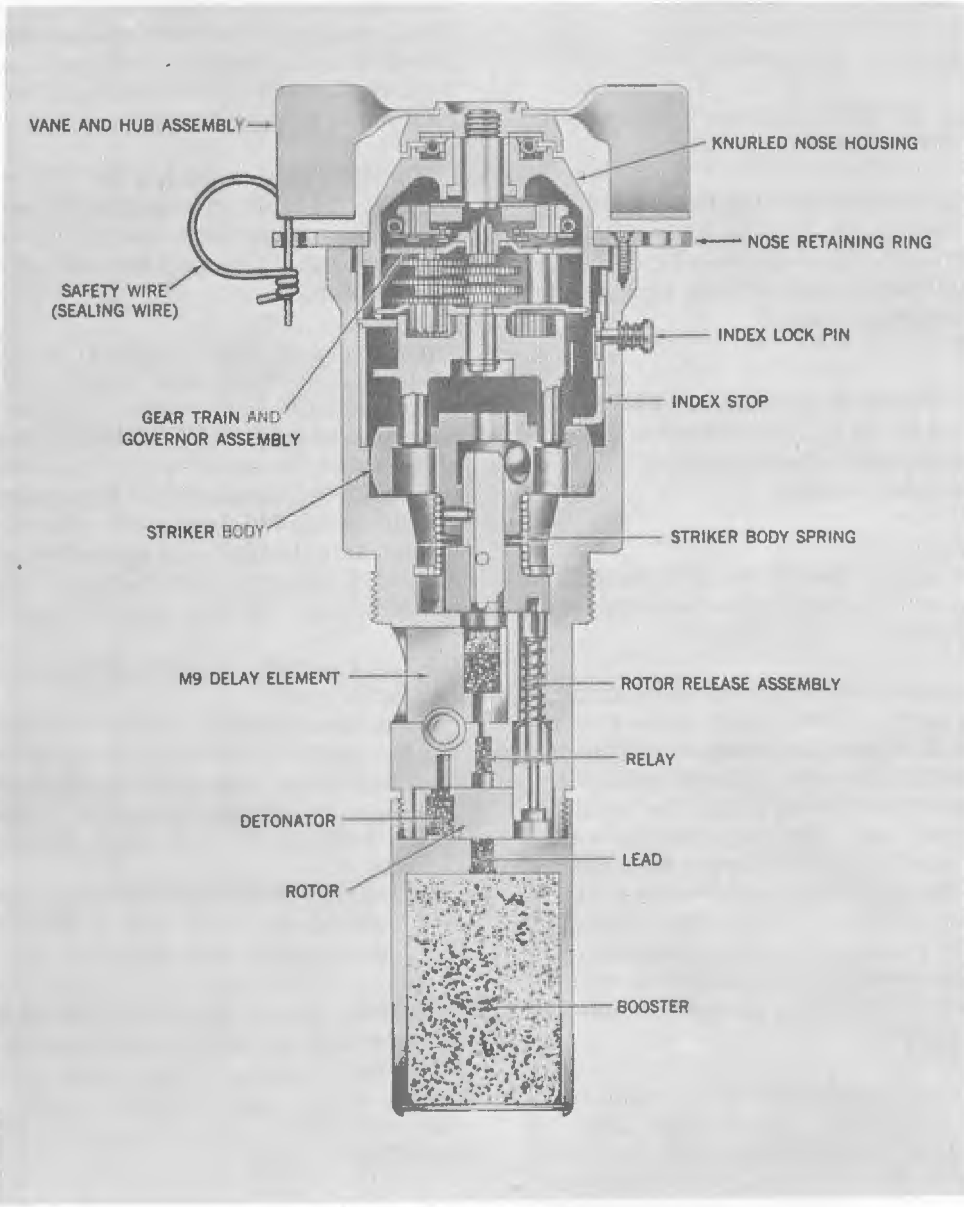


Figure 2-2D. Mechanical Nose Fuze AN-M904E2, Cutaway and press the delay element in until it seats. Release the pin and check that the element is firmly seated.

INSTALLING THE FUZE IN BOMB

Install Fuze AN-M904E2 as follows:

WARNING

> Observe each window with the line of sight nearly perpendicular to the plane of the window and, if a red color fills either or both the windows, or a white line shows in the upper one at other than the 18 and six second markings, the delay element must be removed, the fuze set aside, and the nearest EOD unit notified.

1. Set arming delay and insert proper M9 functioning delay element as described in the preceding sections.
2. For bombs requiring an adapter booster, screw the adapter booster in the nose fuze well and tighten with a spanner wrench.
3. Check again that the proper delay element M9 is installed and that the vane is secure by the safety sealing wire.
4. Screw the AN-M904E2 fuze into the nose well of the bomb (or into the adapter booster) until it is hand tight. Use no tools.
5. Ensure that the white indexing line on the knurled surface of the housing is perfectly aligned with the desired arming time marking.

For installation and use of the AN-M904E2 Fuze in Mk 81 SNAKEYE weapons, see Aviation Armament Bulletin 357. For installation and use of this fuze in Mk 82 SNAKEYE weapons, see Aviation Armament Bulletin 358.

INSTALLING ARMING WIRE

WARNING

> Do not remove the sealing wire from the vane until the bomb is installed on the bomb rack and the arming wire is inserted.

Install the arming wire as follows:

1. Adjust the arming wire to protrude two or three inches from the vane.
2. Slip two Fahnestock clips over the end of the arming wire until they touch the vane. Ensure that the arming wire is free of kinks and burrs.

DEFUZING THE BOMB

After bombs are unloaded from an aircraft, they are moved to a disassembly area with the arming wires still attached. Defuze the bomb as follows:

1. Check arming windows on AN-M904E2 fuze to ensure that fuze is unarmed.

WARNING

> Armed and partially armed fuzes should be removed from bombs by authorized and qualified personnel only.

2. Replace sealing wire. Seal the other half of the vane also for safety.
3. Remove Fahnestock safety clips and withdraw arming wire.
4. Carefully unscrew the AN-M904E2 fuze from the bomb, and immediately repack the fuze in its packing container.

PACKAGING

Twelve AN-M904E2 Fuzes are packaged in Ammunition Component Box Mk 2 Mod 0. The box contains three sets of molded polystyrene supports, each holding four fuzes. These supports and fuzes are inserted in a barrier bag (MIL-B-131), and then placed in the ammunition box.

IMPACT NOSE FUZE AN–M110A1, AN–M126, AN–M126A1, AN–M158, AND AN–M159

Model	AN–M110A1	AN–M126	AN–M126A1	AN–M158	AN–M159.
Status	Obsolescent		Obsolescent.		
Firing Action	Impact	Impact	Impact	Impact	Impact.
Firing Delay	Instantaneous	Instantaneous	Instantaneous	Instantaneous	Instantaneous.
Assembly Drawing No.	73–8–77	73–8–166	73–8–167	73–8–390	E14–15–256.
Arming:					
Type	Delayed	Delayed	Delayed	Delayed	Delayed.
Revolutions to Arm.	260	570	260	375 to 512	414 to 512.
Air travel to Arm (ft).	725		725	1200	1200.
Overall Length (in.)	3.7	3.12	3.24	3.76	3.24.
Protrusion from Bomb (in.).	2.39	2.28	2.4	2.4	2.4.
Vane Span (in.)	2.9	3.9	3.0	3	3.
Weight (lb)	1.02	.68 (alum.) 1.16 (steel).	1.10	1.02	0.65.
Number of Vanes	2	2	2	2	2.
Booster Charge:					
Type	Tetryl Pellet			Tetryl Pellet	Small Tetryl Column.

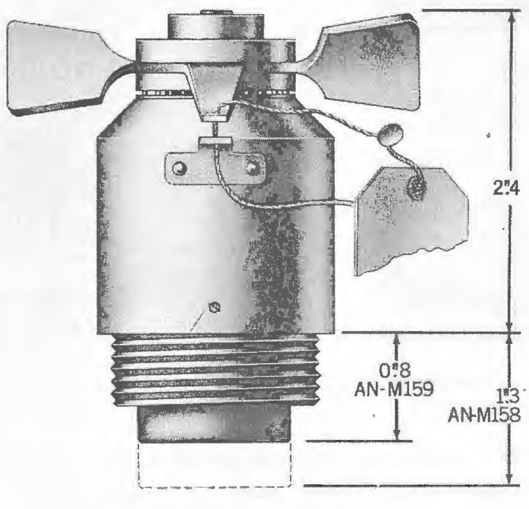


Figure 2–3.—Nose Fuzes AN–M158 and AN–M159.

General Description

The impact nose fuzes of this type, figure 2–4, are vane operated and delay armed. They act to detonate the bomb instantaneously upon impact. The lengthy air travel necessary to arm these fuzes (1200 feet) makes them suitable for use with land-based and carrier aircraft.

The AN–M158 and AN–M159 fuzes differ from each other only in the size of their main explosive element. Fuze AN–M158 has a booster containing 0.6 ounce of tetryl. This has been replaced on the AN–M159 by a smaller metal holder containing a column of tetryl. This difference in booster volume of the two fuzes has resulted in a variance in fuze length. In all other respects the two fuzes are identical.

Other fuzes similar to these are the following.

Nose Fuze AN–M110A1. Although very similar in external appearance, the AN–M110A1 (now obsolescent) differs in numerous features from the AN–M158. The AN–M110A1 does not have the spring-actuated detonator shutter; it has a gear reduction of 1:34 (instead of 1:40); its arming sleeve moves down (instead of up); it arms in 260 revolutions and 725 feet (instead of 440 revolutions and 1200 feet); it has a lighter striker and firing pin, and its striker has a retaining pin rather than a retaining ring. Detonator M13 in the AN–M110A1 extends into the booster charge; Detonator M20 in the AN–M158 is contained in the detonator shutter.

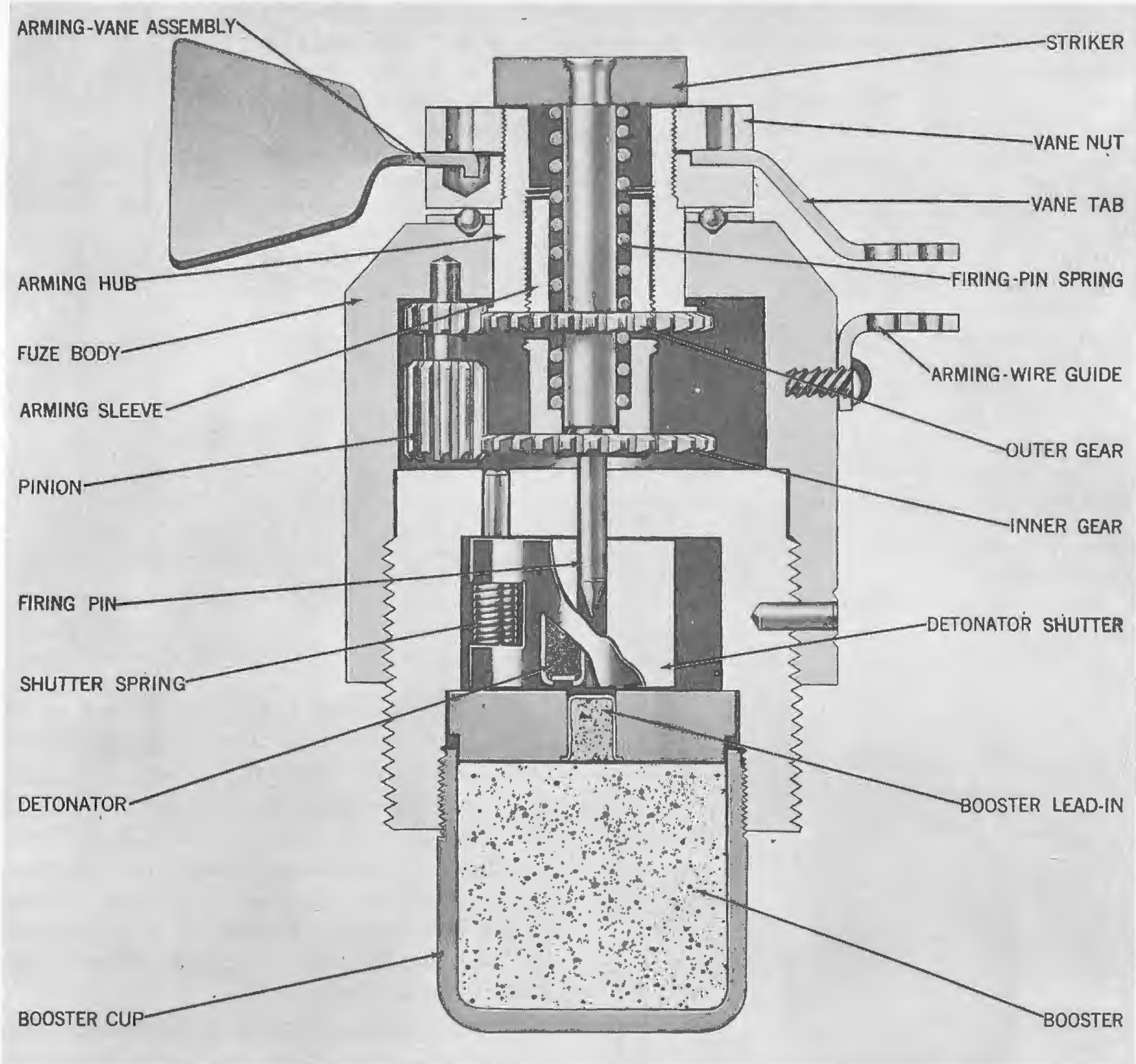


Figure 2–4.—Impact Nose Fuze AN–M158, Cross Section.

Nose Fuzes AN–M126 and AN–M126A1. The AN–M126A1 is identical both in construction and in operation to the AN–M110A1, except that instead of a booster, the AN–M126A1 has a steel cylinder the same size as the booster. This cylinder contains an enlarged firing train consisting of a primer, an upper detonator, and a lower detonator, which is seated against the tetryl burster in chemical bombs. The AN–M126 (now obsolescent) has more teeth on the gears than the AN–M126A1 and requires 570 vane revolutions to arm as opposed to 260 vane revolutions in the AN–M126A1. It also has three safety blocks, each 120-degree segments; the arming sleeve fits in a groove in the blocks in the unarmed position, preventing them from falling out.

Explosive Components

The main charge of the fuze is either a 0.6 ounce tetryl booster or a small column of tetryl in a metal holder. Two other elements complete the explosive components of both fuzes: a booster lead-in and a detonator. The detonator is fired by the penetration of the firing pin. Until arming, the detonator is out of alinement with the other explosive components.

Safety Features

During shipping and stowage, the fuze is made safe by a safety wire passing through the vane tab and arming-wire guide. The ends of the wire are secured with a car seal. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Functioning

General. When the bomb is dropped armed, the arming wire is retained in the bomb rack and frees the arming-vane assembly. The vanes rotate in the air stream to operate the delay-arming mechanism, and arm the fuze. The fuze becomes completely armed after the arming-vane assembly has completed between 375 and 512 revolutions; this requires approximately 1200 feet of air travel. After the fuze is completely armed, the arming-vane assembly is in a free-wheeling state in which its continued rotation produces no mechanical effect upon the fuze.

Impact drives the striker into the fuze and sets off the explosive components to detonate the bomb.

Arming. The delay arming mechanism is composed of the arming-vane assembly, an inner and outer gear, and a pinion. The arming-vane assembly is threaded onto the arming hub, outside the fuze body. Secured in place at the other end of the arming hub, within the fuze body, is the outer gear, which has 39 teeth. Threads are cut on the inside surface of the arming hub to accommodate the threaded arming sleeve. The inner gear, which has 40 teeth, is attached to the arming sleeve at its inner end. The pinion meshes with the outer and inner gears.

As the arming-vane assembly rotates, it revolves the arming hub and arming sleeve. The outer and inner gears contact the pinion, which has an equal number of teeth on its outer and inner portions. Since the number of teeth on the outer and inner gears is not equal, the outer gear turns the pinion, and the pinion meshing with the inner gear causes the inner gear to lag one tooth each revolution. Motion is then induced between the arming hub and arming sleeve, causing the sleeve to thread itself into the arming hub.

As the arming sleeve rises in the arming hub, it forces the firing-pin spring to push the striker outward. The firing pin is connected to the striker and is withdrawn with it.

The detonator is contained in the detonator shutter, which pivots on one corner under spring action. When the fuze is in the unarmed state, the firing pin extends into a cavity of the detonator shutter. This holds the shutter against the action of the shutter spring and keeps the detonator out of alinement with the explosive components.

The firing pin is withdrawn from the shutter cavity as the fuze arms. When the firing pin has moved outward between 1/4 and 1/3 inch, it clears the shutter. The shutter spring pivots the detonator into alinement with the explosive train, and a spring detent locks the shutter in place.

When the fuze is fully armed, the striker has moved outward 1/4 to 1/3 inch and is supported in this position by the firing-pin spring. The inner gear has risen to the point where it free-wheels in the groove of the pinion. The arming hub and arming sleeve now revolve together.

Action. Upon impact, the striker is driven inward against the firing-pin spring. The striker forces the firing pin into the alined detonator.

Detonation. The detonator explodes when struck by the firing pin. The explosion is transmitted to the booster lead-in and then to a booster, or to a column of tetryl, depending upon which particular fuze is used.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. If the striker has risen more than ¼ inch above the vane nut, the fuze must be considered armed.

Handling. Fuzes that have become armed can be made safe for handling by placing metal or wooden blocks between the striker and the vane nut. This will prevent the striker from driving the firing pin into the detonator. Secure the blocks with adhesive tape and unscrew the fuze from the bomb.

> CAUTION: Under no condition will any attempt be made to unarm a fuze of this type which is suspected of being armed.

Reverse rotation of the arming-vane assembly will force the firing pin into the detonator and fire the fuze. An armed fuze must be disposed of by authorized and qualified personnel.

Fuzing

1. Unseal the fuze container and remove the fuze.
2. Inspect the fuze threads to see that they are clean and serviceable and that the vanes are not bent. The striker must be firm against the vane nut.
3. Remove the nose shipping plug from the bomb. Inspect the fuze seat to see that it is clean and that the threads are in good condition. Clean the threads if necessary.
4. Screw the fuze into the nose of the bomb, hand tight. Use no tools.
5. If the bomb is clustered, install the vane lock in accordance with the instructions for the cluster adapter given in chapter 8. Be sure that the vane lock prevents rotation of the fuze's arming-vane assembly. Cut and remove the sealed wire and tag from the fuze.
6. If the bomb is for individual suspension, pass the arming wire through the forward bomb suspension lug, then through the inner holes in the arming-wire guide and vane tab. Adjust the arming wire so that the swivel loop is midway between the two bomb suspension lugs.
7. Adjust the arming wire to extend 2 to 3 inches beyond the vane tab. Cut off excess wire.
8. Slip two safety clips (Fahnestock clips) over the end of the arming wire, until they just touch the face of the vane tab. Be sure that the wire is not kinked or burred.

Defuzing

> CAUTION: Before attempting to remove a fuze from a bomb, be sure that it is unarmed or safe to handle. If the striker has risen more than ¼ inch above the vane nut, the fuze must be considered armed. See instructions for handling in the preceding section before proceeding further.

If the bomb was prepared for individual suspension and not dropped:

1. Replace the safety wire through the vane tab and arming wire guide, and twist the ends together.
2. Remove the safety clips (Fahnestock clips) and withdraw the arming wire. Repack the clips and wire.
3. Unscrew the fuze from the bomb, and repack in metal can; reseal the can with adhesive tape.

If the bomb is part of a cluster that was not dropped:

1. Replace safety wire in each fuze of the cluster. Secure the wire by twisting two ends together.
2. Remove the bomb from the cluster.
3. Unscrew the fuze from the bomb and repack in metal container. Reseal the container with adhesive tape.

Packaging and Marking

Fuze Container. Each fuze is individually packed in a black cylindrical metal container. Soldered to the container and cover is a metal strip which seals the container during shipping and stowage. A key is attached to the cover of the can to be used in removing the metal strip. The following is a typical container marking.

FUZE, BOMB, NOSE
AN–M158
LOADED (date)
DRG. 73–8–390 REV. (date)

Packing Box. Thirty fuzes, in containers, are packed in a single wooden box fastened together by wood screws and secured with steel bands. It weighs 58.5 pounds gross and its dimensions are $20\frac{7}{16}$ by 12 by $10\frac{31}{32}$ inches. The following is a typical packing box identification:

30 NOSE FUZES
BOMB, NOSE, AN–M158 (or as applicable)

IMPACT NOSE FUZE AN–Mk 219 Mods 3 and 4

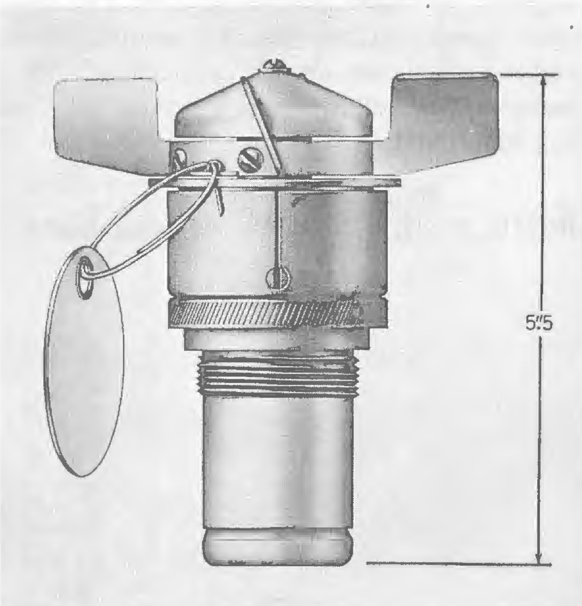


Figure 2–5.—Nose Fuze AN–Mk 219.

Mark	AN–Mk 219
Mods	3 and 4
Firing Action	Impact
Firing Delay	Instantaneous
General Arrangement	
Drawing No.	202656
Arming	
Type	Delayed
Revolutions to Arm	175
Air Travel to Arm (ft)	1000
Overall Length (in.)	5.5
Protrusion from Bomb (in.)	2.9
Vane Span (in.)	4.8
Weight (lb)	4.0
Number of Vanes	4
Detonator Designation	Mk 12 Mod 0
Booster Charge	
Type	Tetryl
Weight (oz)	0.9

General Description

This detonator-safe, vane-operated nose fuze, figure 2–6, is fired instantaneously upon impact. Approximately 1000 feet of air travel is necessary for the delay-arming mechanism to arm the fuze. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue. Mod 3 and Mod 4 are the same mechanically; the mod numbers merely designate different manufacturers.

Explosive Components

The explosive components consist of a detonator, an auxiliary booster lead-in, a booster lead-in, and a booster. The booster is about 0.9 ounce tetryl, either pellet-loaded or loaded in place. It is held into the fuze body by the booster cover, which is crimped into the groove provided. The fuze is set off when the firing pin is driven into the detonator upon impact.

Safety Features

The fuze is made safe during shipping and stowage by a safety cotter pin through the vane carrier lug and the flange of the striker, which locks the delay arming mechanism. This safety cotter pin is provided with a pull ring and an instruction tag. The fuze is further protected by the metal packing can in which it is sealed.

When unarmed, the explosive train is broken. The explosive components cannot become alined until the arming mechanism operates during arming and completes the necessary number of revolutions.

As installed in a bomb, the fuze is in an unarmed condition. The arming wire takes the place of the safety cotter pin and prevents rotation of the arming mechanism. Should the detonator explode when the fuze is in the unarmed condition, the gases would expand in the space above, and no further action would take place.

The delay arming mechanism furnishes maximum safety for dive bombing as well as protection against detonation when the bomb is accidentally released from an airplane flying at low altitudes.

Functioning

General. When the bomb is released free to arm, the vane carrier is unlocked from the striker flange by the withdrawal of the

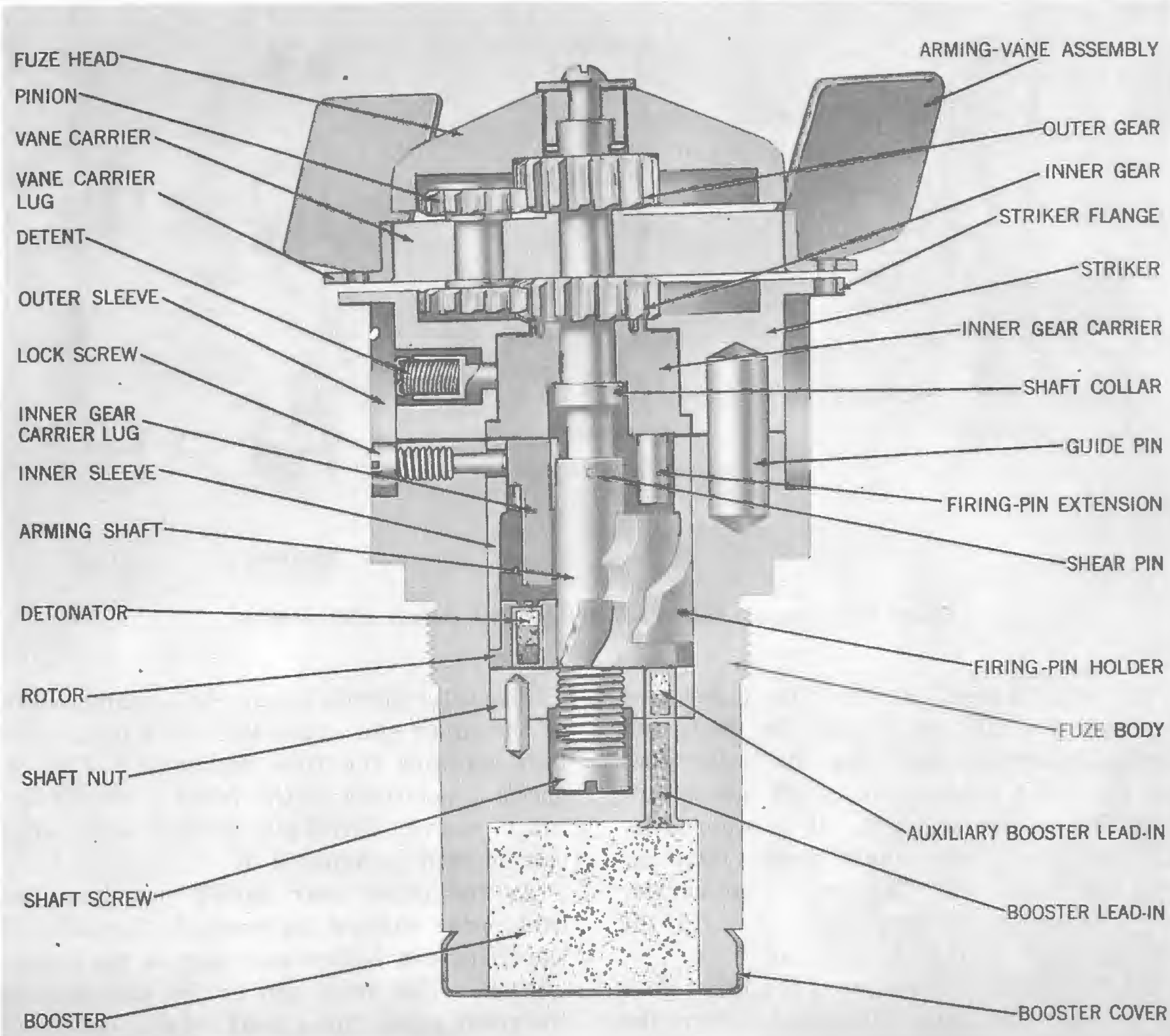


Figure 2–6.—Impact Nose Fuze AN–Mk 219, Cross Section.

arming wire. The vane carrier then rotates by action of the air stream on the arming-vane assembly, driving the reduction gears which arm the fuze. Completion of 175 revolutions of the arming-vane assembly arms the fuze fully; this requires about 1000 feet of air travel along the trajectory of the bomb. Impact drives the firing pin into the detonator and the fuze acts instantaneously to explode the bomb.

Arming. The revolving arming-vane assembly is connected to the arming shaft through the reduction gear train, which consists of an inner gear, an outer gear, and a pinion. The outer gear has 23 teeth and is connected directly to the arming shaft. The inner gear has 22 teeth and is secured to the inner gear carrier. The inner gear carrier is prevented from rotating by the inne gear carrier lug, which is set into a recess on the inner sleeve. The outer gear and the inner gear mesh with the pinion, which has an equal number of teeth on its inner and outer portions. As the pinion is driven around the inner and outer gears by the arming-vane assembly, it forces the outer gear one tooth ahead each revolution, resulting in a ratio of one turn of the outer gear to 23 turns of the arming-vane assembly.

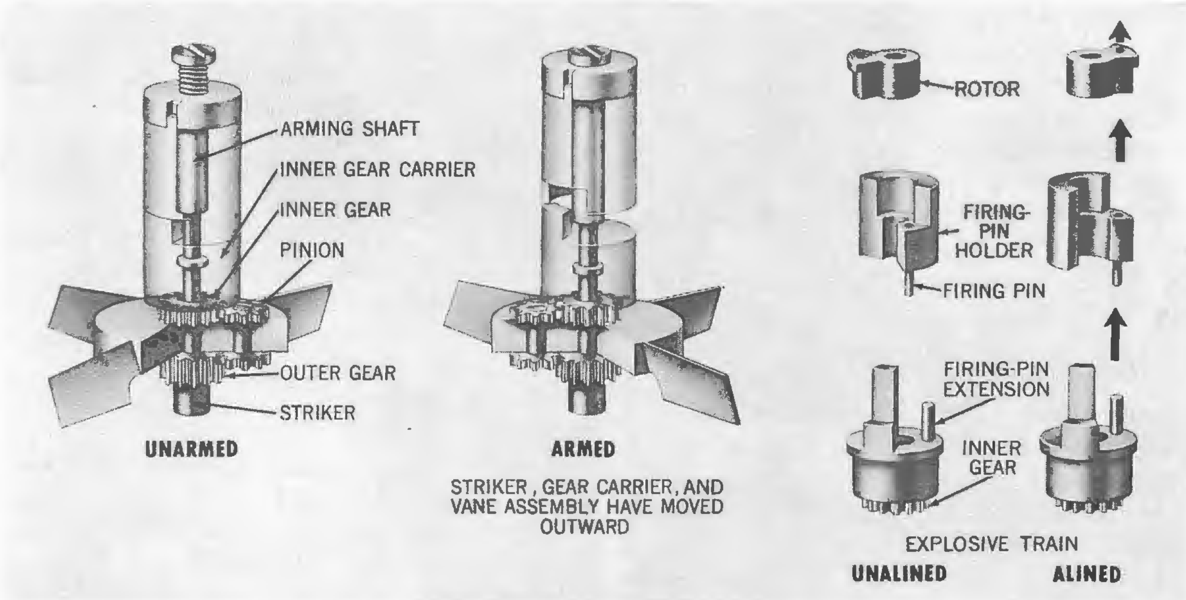


Figure 2–7.—Impact Nose Fuze AN–Mk 219, Details of Operation.

The arming shaft, to which the outer gear is secured, is threaded into the shaft nut at the innermost end. As the outer gear and the shaft revolve, the shaft moves outward from the shaft nut. It is stopped by the shoulder of the shaft screw jamming with the shaft nut. The inner gear carrier and striker are carried outward with the arming shaft by the shaft collar.

When the shaft screw jams, the inner gear carrier lug has been disengaged from the slot in the inner sleeve, freeing the inner gear carrier. The outer gear is prevented from rotating by the jammed shaft screw. Therefore, the pinion will act to turn the inner gear and the inner gear carrier. The guide pins prevent the striker from revolving with the inner gear carrier.

The inner gear carrier houses the firing-pin extension. Below the inner gear carrier, within the inner sleeve, is the firing-pin holder. This holder contains the firing pin, which is secured in position by a shear pin. The firing-pin holder is a partial cylinder fitting around the arming shaft. About one-third of the firing-pin holder cylinder is broken away; the inner gear carrier lug is located in the upper portion of the broken-away area.

The rotor pivots about the arming shaft, at the inner end above the shaft nut. This unit contains the fuze detonator. The respective positions of the inner gear carrier, inner sleeve, firing-pin holder, and rotor can be seen in figure 2–7.

As the inner gear carrier revolves, the inner gear carrier lug contacts the edge of the firing-pin holder and carries the holder with it. The firing pin holder then pushes the rotor as the inner gear carrier continues to rotate. When the inner gear carrier has revolved appoximately 345 degrees, the alinement of the firing-pin extension, the firing pin, the detonator, and the auxiliary booster lead-in is complete. At this point a detent locks the inner gear carrier to the striker, preventing further rotation.

Action. Impact drives the fuze head, vane carrier, striker, and inner gear carrier into the fuze body, thereby shearing the pin in the shaft. The firing-pin extension on the inner gear carrier strikes the firing pin and shears the firing-pin shear pin.

Detonation. The firing pin penetrates and initiates the detonator which, in turn, fires the auxiliary booster lead-in, the booster lead-in, and the booster. Fuze detonation is instantaneous upon impact.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. This fuze will be regarded as armed if the striker flange has advanced $\frac{3}{16}$ inch from the outer sleeve. From outward appearances, it is practically impossible to obtain a definite indication as to whether or not the fuze is partially or fully armed. When fully armed, the flange of the striker is separated from the outer sleeve by $\frac{5}{16}$ inch and the inner gear carrier has rotated 345 degrees, bringing the firing-pin extension, the firing pin, and the detonator into alinement.

Handling. Armed and partially armed fuzes should be removed from bombs by authorized and qualified personnel only. To remove an armed fuze from a bomb, carefully remove the lock screw in the outer sleeve. Gently withdraw the detonator and striker assembly by grasping the striker flange and pulling it outward along the axis of the fuze until completely withdrawn. Then unscrew the fuze body from the bomb.

Fuzing

1. Unseal the fuze container and remove the fuze. Inspect the overall appearance to insure that it is clean and serviceable; look particularly for bent vanes and damaged threads.

2. Remove the nose shipping plug from the bomb. Inspect the fuze seat and threads; clean if necessary. A fuze adapter and an auxiliary booster are required; inspect to see that they are in place.

3. Screw the fuze into the fuze adapter at the nose of the bomb until it is seated handtight. If the threads are not free running, a small spanner wrench may be used to seat the fuze.

4. Remove the safety cotter pin from the fuze and rotate the vane carrier slightly in each direction to insure free rotation. Do not rotate the vane carrier more than one turn in either direction.

5. Thread the end of arming wire through the forward bomb lug, then through the uppermost hole in the striker flange and the hole in the nearest vane carrier lug. Adjust the arming wire to protrude about 4 inches from the fuze.

6. Slip two safety (Fahnestock) clips over the end of the arming wire until they just touch the face of the vane carrier lug. Make certain that the arming wire is not kinked or burred. The arming wire may be assembled to the bomb and fuze either after the bomb is placed in bomb rack or immediately before. The safety pin must not be removed until just before the arming wire is threaded through the holes in the striker flange and the vane carrier lug.

Defuzing

> CAUTION: Before attempting to remove a fuze from a bomb, be sure it is unarmed or safe to handle. This fuze will be regarded as armed if the striker flange has advanced $\frac{3}{16}$ inch from the outer sleeve. From outward appearances it is practically impossible to obtain a definite indication as to whether the fuze is partially or fully armed. See the preceding subparagraph, Accidental Arming, for further information on recognition and handling of armed or partially armed fuzes.

1. Hold the arming vane assembly to prevent rotation and remove the safety clips from the arming wire.
2. Withdraw the arming wire and insert the original safety pin and tag.
3. Repack the safety clips and wire.
4. Unscrew the fuze from the bomb and repack in the metal can; reseal can with adhesive tape.

Packaging and Marking

Fuze Container. One fuze with two safety (Fahnestock) clips is hermetically sealed in a metal container; six loaded containers are packed in a metal packing box. The dimensions of the box are 15½ by 10 7/10 by 6 3/10 inches, and its weight about 36 pounds loaded.

The individual metal containers are marked as follows:

1 FUZE, BOMB, NOSE AN-Mk 219
(Date Loaded)
Lot No. Place Loaded
Inspector's Initials
Contract No.
Weight: Empty, loaded

The metal packing box is marked as follows:

6 FUZES, BOMB, NOSE AN-Mk 219
(Date Loaded)
Lot No. Inspector's Initials
Weight:

Packing Box. Shipments from the manufacturer contain a convenient number of metal packing boxes in an outside wooden shipping box. Each box is marked "Detonating Fuzes—Handle Carefully." The top is marked "This side up." It is also marked as follows.

(Number) Aircraft Bomb Fuzes, Mk 219,
Mod—Lot Number
Name of Manufacturer
Requisition, Contract, or Order Number
Inspector's Initials
Shipping Address

IMPACT NOSE FUZE Mk 243 Mod 0 and Mk 244 Mod 1

Mark	243	244.
Mod	0	1.
Firing Action	Impact	Impact.
Firing Delay (sec.)	0.025	4.
General Arrangement	344638	344764.
Arming		
Type	Delayed	Delayed.
Revolutions to Arm	130	130.
Air Travel to Arm (ft)	450	450.
Overall Length (in.)	8.9	8.9.
Protrusion from Bomb (in.)	3.9	3.9.
Body Diameter (in.)	2.5	2.5.
Vane Span (in.)	6	6.
Weight (lb)	4.4	4.4.
Number of Vanes	2	2.
Detonator Designation	Mk 22 Mod 0 344470	Mk 22 Mod 0 344470.
Booster Charge		
Type	Tetryl	Tetryl.
Weight (oz)	1.9	1.9.

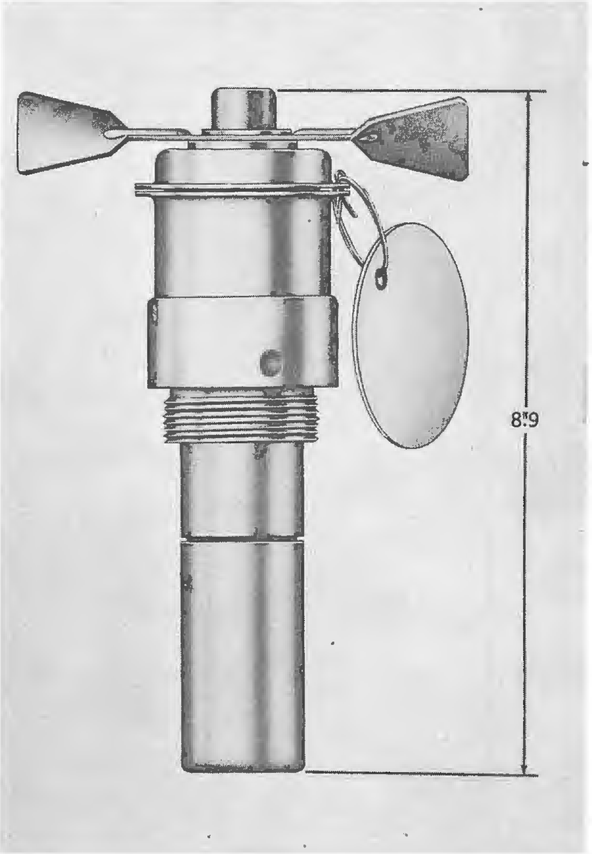


Figure 2–8.—Nose Fuzes Mk 243 Mod 0 and Mk 244 Mod 1.

General Description

These vane type, delay armed impact nose fuzes, figure 2–9, are either water-discriminating or not water-discriminating, depending upon the design of the striker plate and the shear threads supporting the striker. Approximately 450 feet of air travel is necessary to arm these fuzes for action.

Nose Fuze Mk 243 Mod 0 differs from Nose Fuze Mk 244 Mod 1 in external markings and in the delay element. Nose Fuze Mk 243 Mod 0 is water discriminating. It functions after a delay of 0.025 second, while Nose Fuze Mk 244 Mod 1 is not water discriminating and has a delay of 4 seconds.

When Nose Fuze Mk 243 Mod 0 is installed in a 500-pound GP bomb, a drop from 20,000 feet into water will not result in fuze action. Impact with at least ¼ inch steel plate or hard ground is necessary for detonation.

When used with certain inertia firing tail fuzes that have a 0.24-second M14 primer-detonator, a dual purpose effect is achieved. Nose Fuze Mk 243 Mod 0 will detonate the bomb with a 0.025-second delay in case of a direct hit on the target. In case of a near miss, the tail fuze will detonate the bomb at an optimum depth of about 25 feet to produce a mining effect.

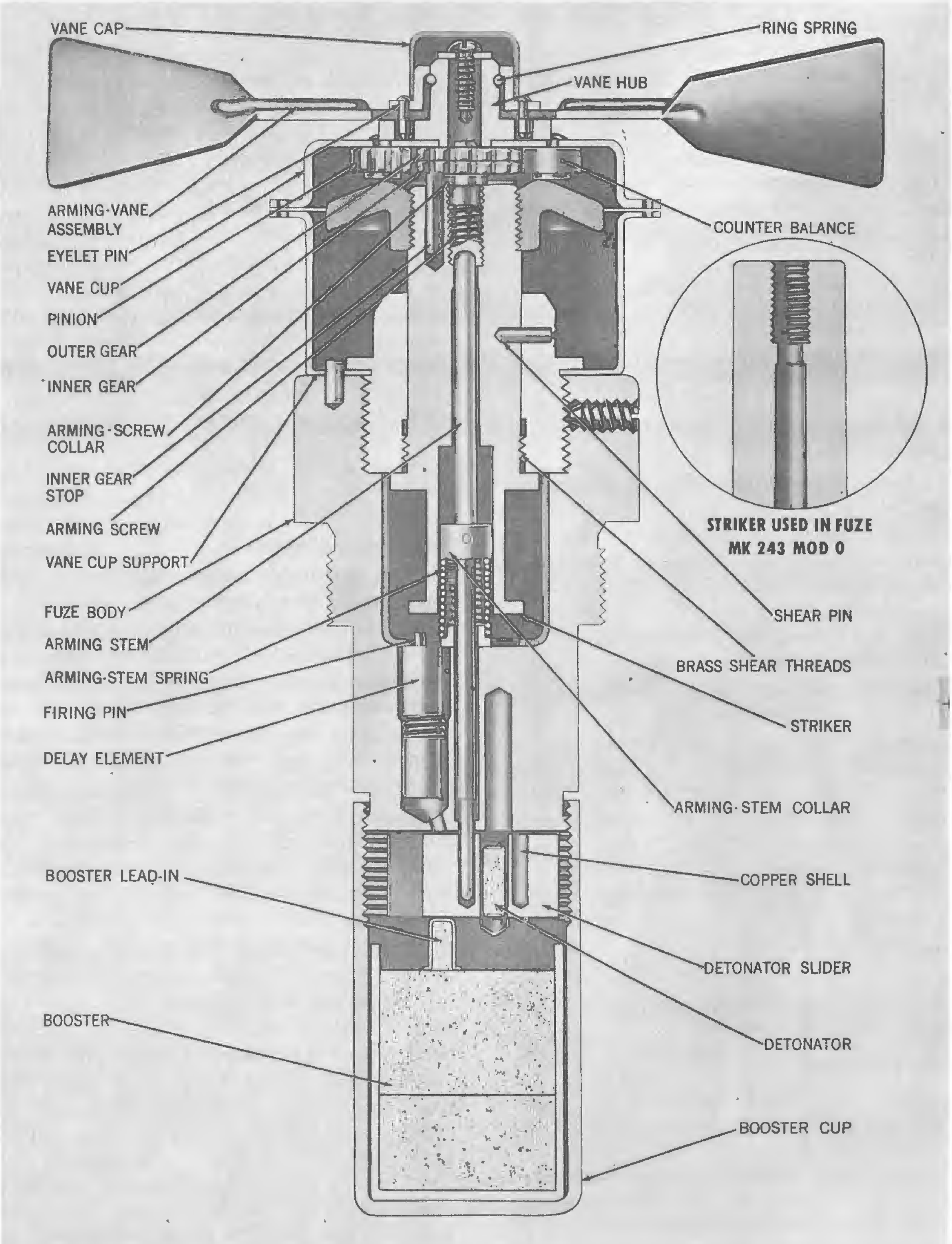


Figure 2–9.—Impact Nose Fuze Mk 244, Cross Section.

Nose Fuze Mk 244 Mod 1 is not water discriminating. It has an added striker plate which increases the striker surface seven times. Also, the number of shear threads supporting the striker is only half the number of those on Nose Fuze Mk 243 Mod 0. Nose Fuze Mk 244 Mod 1 will function when dropped on soft ground from an altitude of 1000 feet, or on water from an altitude of 3000 feet. The fuze body is labeled 4 SEC. DELAY.

Explosive Components

The explosive components consist of a delay element, a detonator, a booster lead-in, and a booster charge. The booster consists of 1.9 ounces of tetryl.

Safety Features

Each fuze is individually packed in a sealed metal container. The fuzes are kept in an unarmed condition by a safety cotter pin, with an attached tag, which passes through holes in the flange of the vane cup and in the flange of the vane cup support. This locks the reduction mechanism to prevent the fuze from arming.

The arming wire keeps the fuze unarmed until it is withdrawn when the bomb is released. This wire passes through the forward suspension lug of the bomb, through a pair of holes in the flange of the vane cup, and through the flange of the vane cup support, preventing rotation of the arming-vane assembly.

These fuzes are detonator safe since the detonator is out of alinement until the fuze is armed; they are also shear safe. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Functioning

General. When the bomb is dropped ARMED, the arming wire is retained in the bomb rack and withdrawn from the vane cup and vane cup support. This unlocks the reduction gear mechanism to arm the fuze.

After 130 revolutions of the arming-vane assembly, taking approximately 450 feet of air travel along the trajectory of the bomb, the fuzes become armed and the arming mechanism is released into the air stream. These fuzes will detonate upon impact with a sufficiently dense substance.

Arming. The vane cup and arming-vane assembly are connected directly by the eyelet pins. The revolving arming vanes turn the vane cup to operate the delay arming mechanism.

The delay arming mechanism is composed of an inner and outer gear, a pinion, an arming screw, and an arming stem. The movable outer gear, which is attached to the arming screw has 23 teeth. The inner gear, which has 22 teeth, is prevented from moving by the inner gear stop.

As the arming vanes turn the vane cup, the pinion is forced to walk around the outer and inner gears. The difference in the number of teeth between the outer and inner gears causes the pinion to advance the outer gear one tooth each complete revolution. This moves the arming screw outward on its threads. The reduction ratio obtained is one revolution of the arming screw to 23 revolutions of the arming-vane assembly.

The reduction gears, vane cup, and arming-vane assembly are carried outward by means of the arming-screw collar. The arming stem rides outward with the arming screw, under the action of the arming-stem spring. When the arming screw has advanced approximately one-fourth inch, the arming stem clears the detonator slider.

The detonator slider is a cube of metal containing the detonator. It is confined in a recess of the fuze body, and is under spring action from one side. The arming stem holds the slider against the slider springs to prevent the detonator from becoming alined with the explosive train. Raising of the arming stem during arming allows the slider springs to move the slider sideways. At a point where the detonator is alined properly with the delay element and the booster lead-in, the slider is locked in position by a spring loaded detent and a lock pin.

Continued rotation of the arming vanes unscrews the arming screw from the striker, freeing the reduction gears, the vane cup, and the arming-vane assembly to the air stream. The fuze now is armed.

Action. Impact with a sufficiently dense substance drives the striker inward. The striker shears the brass shear threads and shear pin, and then strikes the firing pin.

Detonation. The firing pin fires the delay element, setting off the explosive train. The delay element relays the explosion to the detonator which, in turn, sets off the booster lead-in and the booster.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming vane from rotating and arming the fuze. The unarmed fuze will not function on impact.

Accidental Arming

Recognition. If the arming assembly (arming vanes, vane cup, and reduction gears) is missing, the fuze is armed.

If the arming assembly is not missing, visual evidence of arming can be gained by measuring the distance between the flange of the vane cup and the flange of the vane cup support. When this distance measures 1/4 inch or more, the fuze is fully armed. Any distance less than 1/4 inch is an indication that the fuze is partially armed.

Handling. If a fuze has become armed and must be removed from a bomb, lock the vane cup (if still attached) to the vane cup support by means of a cotter pin. This will prevent partially armed fuzes from becoming fully armed. The vane cup offers some protection in handling partially and fully armed fuzes since it acts as a shield against sharp blows being transmitted directly to the striker. As long as the fuze is protected against severe blows, it is reasonably safe to handle.

Salvaging. If the fuze is in the partially armed condition, with less than 1/4 inch distance between flanges, it may be made safe by turning the vanes in a counterclockwise direction. This will force the screw to push the arming stem downward and, by means of its collar, compress the arming spring. The counterclockwise rotation must be continued until the mechanism jams; then the direction must be reversed one turn. A fuze returned to an unarmed condition will require approximately the same air travel to arm as was originally necessary. After returning the fuze of its unarmed condition, remove it from the bomb and repack.

Fully armed fuzes must be disposed of by authorized and qualified personnel. No attempt is to be made to return the fuze to its unarmed condition.

Fuzing

1. Remove the shipping plug from the bomb. Inspect the fuze seat threads to see that they are clean.

2. Remove the fuze from its sealed container and examine for any physical defects. Look for damaged threads and dented parts.

3. Unwrap the arming-vane assembly from its heavy waterproofed paper wrapping. The arming-vane assembly is in the fuze container together with the fuze.

4. Place the arming-vane assembly on the vane cup hub. Press down firmly on the arming-vane cap until the ring spring engages the groove in the vane cup hub. This operation will secure the arming-vane assembly to the fuze.

5. Remove the safety cotter pin and turn the arming-vane assembly one complete revolution in each direction in order to make sure that it will rotate freely. Replace the safety cotter pin.

6. Screw the fuze into the fuze seat hand-tight. Do not use a wrench or other tools since this might make it difficult to remove the fuze if defuzing becomes necessary.

7. Insert the arming wire through the forward suspension lug of the bomb and through the nearest pair of holes in the flange of the vane cup support and the flange of the vane cup. If the safety cotter pin

occupies the nearest set of holes, remove the cotter pin and place it through another set.

8. Cut the arming wire so that approximately 3 inches extends beyond the fuze. Place the two safety (Fahnestock) clips over the end of the arming wire, pushing them up against the vane cup. Remove the safety cotter pin.

Defuzing

CAUTION: Before attempting to remove a fuze from a bomb, be sure it is unarmed, or safe to handle. If the arming assembly (arming vanes, vane cup, and reduction gears) is missing, the fuze is armed. If the arming assembly is not missing, measure the distance between the flange of the vane cup and the flange of the vane cup support. If this distance is ¼ inch or more, the fuze is fully armed. If less than ¼ inch, the fuze is partially armed. See preceding subparagraph, Accidental Arming, for instructions on handling this type of fuze.

1. Replace and secure the safety cotter through a set of holes in the flange of the vane cup and the flange of the vane cup support.

2. Remove two safety (Fahnestock) clips and also the arming wire from the fuze.

3. Unscrew the fuze from the fuze seat of the bomb.

4. Free the arming vane assembly from the vane cup hub of the fuze. It may be necessary to place the end of a screwdriver between the vane cup hub and the vane assembly and gently pry the vane assembly free.

5. Return the fuze to its container. Rewrap the arming vane assembly in heavy, waterproof wrapping and place it into the fuze container along with the fuze.

Packaging and Marking

Fuze Container. Each fuze comes in a hermetically sealed metal container. The arming-vane assembly for each fuze is packed in the same container and is wrapped in heavy waterproofed paper. The container has a tear strip to facilitate opening, and is marked as follows.

BOMB FUZE
Mk 244 MOD 1

Packing Box. Fifteen containers are packed in a wooden box. The dimensions of the box are 26½ by 15½ by 11 inches, and it weighs 98 pounds. It is marked as follows.

15 NOSE FUZES
BOMB, NOSE, Mk 244 Mod 1
4 SEC. DELAY
PACKED (MONTH AND YEAR) LOT NO.

MECHANICAL TIME NOSE FUZE AN–M145A1 and AN–M146A1

Model	AN–M145A1	AN–M146A1.
Firing Action	Mechanical time	Mechanical time.
Firing Delay	Aerial burst, 5–92 seconds, or instantaneous.	Aerial burst, 5–92 seconds, or instantaneous.
Assembly Drawing No	P-84247	P-83745.
Arming		
Type	Vane and time	Vane and time.
Revolutions to Arm	260–350	260–350.
Time to Arm (sec)	4.5	4.5.
Air travel to Arm (ft)	1000–1300	1000–1300.
Overall Length (in.)	6.3	5.7.
Protrusion from Bomb (in.)	4.9	4.9.
Body Diameter (in.)	1.93	1.93.
Vane Span (in.)	3	3.
Weight (lb)	1.6	1.6.
Time Setting Range (sec)	5–92	5–92.
Number of Vanes	2	2.
Detonator Designation	M19A2	M19A2.
Booster Charge		
Type	Tetryl	Black Powder.
Weight (grains)	125	110.

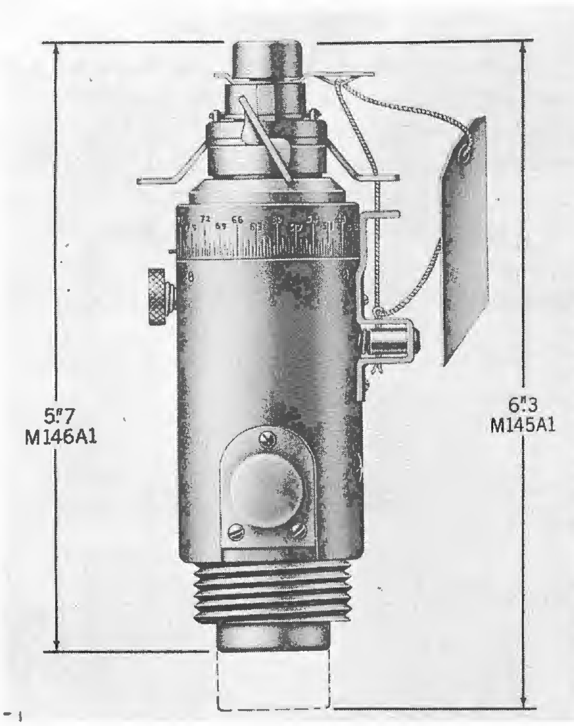


Figure 2–10.—Mechanical Time Nose Fuzes AN–M145A1 and AN–M146A1.

General Description

Nose fuzes of this type, figures 2–11 and 2–12, are armed by mechanical and time mechanisms. The time of detonation after release can be preset for 5 to 92 seconds. Should the time setting be greater than the time of the flight of the bomb, impact will cause the fuze to function instantaneously, provided it is armed. An air travel of 1000 to 1300 feet is necessary to arm these fuzes.

Mechanical Time Nose Fuzes AN–M145A1 and AN–M146A1 are identical except for their boosters. The AN–M146A1 has a black-powder booster which is used for ignition purposes. The AN–M145A1 contains tetryl and is used for detonating purposes. These fuzes are detonator safe. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Fuzes AN–M145 and AN–M146 modified an earlier Fuze M111A2 by the addition of a detonator slider held out of line until the fuze became partially armed by a crank-shaped arming stem. The later fuzes are also equipped with a spinner device to force safety blocks to rotate with the arming vane to insure positive ejection of the safety block after the arming sleeve has withdrawn. Fuze AN–M145E2 is the AN–M145 with a

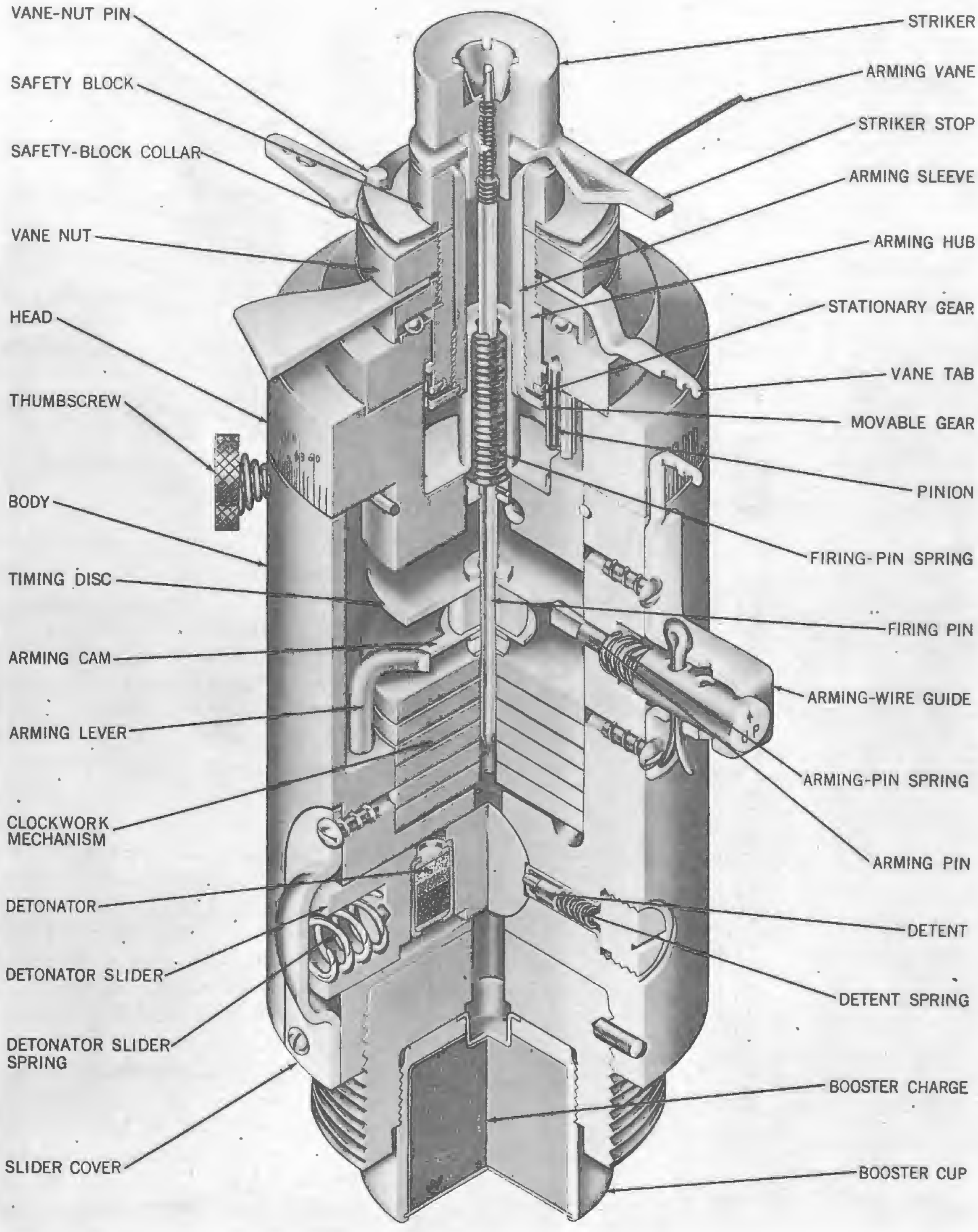


Figure 2–11.—Mechanical Time Fuze AN–M146A1, Cutaway View, Unarmed.

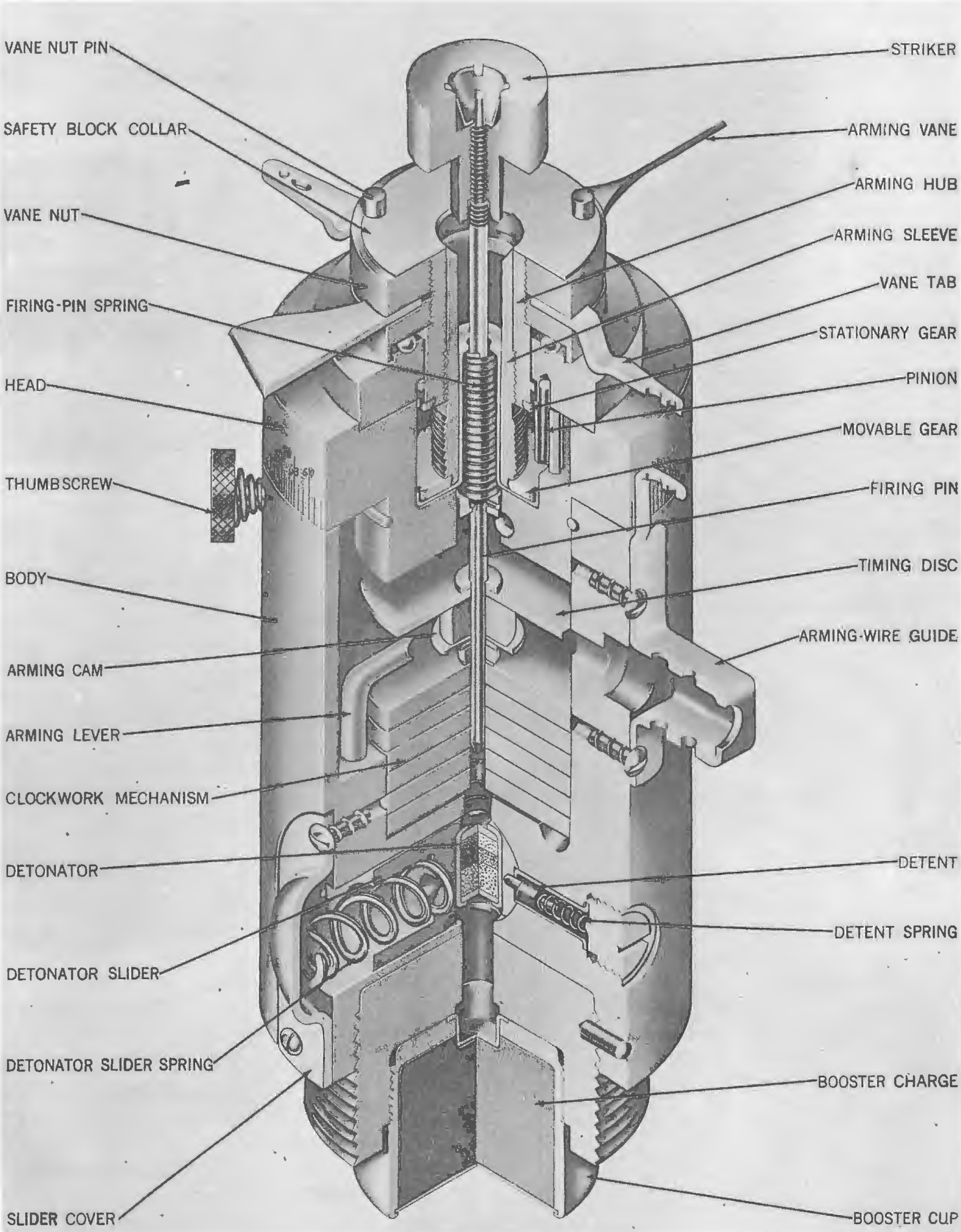


Figure 2–12.—Mechanical Time Fuze AN–M146A1, Cutaway View, Armed.

clockwork mechanism that has been reworked for low-temperature operation. An added protective finish changed the AN–M145E2 to the AN–M145E3, which became standardized as the AN–M145A1.

Fuze M146E1 is Fuze M146 with the booster charge increased from 70 to 110 grains of black powder. Fuze AN–M146E2 is Fuze AN–M146E1 with a clockwork mechanism reworked for low temperature operation. Fuze AN–M146E3, which was standardized to become Fuze AN–M146A1, is Fuze AN–M146E2 with an added protective finish.

Explosive Components

The explosive components of this type of fuze consist of a detonator, a booster lead-in, and a booster. The detonator is held out of alignment until arming occurs.

Safety Features

The fuze has a combination of four features to keep it in the unarmed state and to prevent detonation during shipping and stowage.

A sealed safety wire, with attached instruction tag, is threaded through the vane tab, the arming-wire guide, the striker stop, and the eye of the cotter pin which secures the arming pin. This wire locks the mechanical arming system.

A safety block is located between the striker and the vane nut, preventing the firing pin from being driven inward prematurely.

A cotter pin through the arming pin and the arming-pin bracket holds the arming pin in against the action of its spring. An arming pin locked in this position will not allow the time arming mechanism or time train to operate.

Additional safety is provided by having the detonator out of alinement with the explosive train until the fuze arms.

When installed in a bomb the arming wire prevents the arming pin from being ejected and the arming-vane assembly from rotating, thus keeping the fuze in the unarmed condition.

Presetting

The fuze can be preset to detonate from 5 to 92 seconds after release. Markings corresponding to these times are engraved on the fuze head. The graduations are divided into one-half second increments and numbered every 3 seconds. To set the time of detonation, loosen the thumbscrew and turn the fuze head so that the engraved line representing the desired time alines with the index mark on the fuze body. Tighten the thumbscrew to lock the setting.

Functioning

General. When the bomb is released ARMED, the arming wire withdraws from the fuze and remains in the bomb rack. As the arming wire is withdrawn, the arming pin is ejected by the arming-pin spring and the arming-vane assembly rotates in the air stream. When the arming pin is ejected, the time mechanism is set in motion, initiating the time train and turning the time arming cam. After 4.5 seconds the time arming cam places the detonator in alinement with the explosive train. The arming-vane assembly operates the delay-arming mechanism (mechanical arming) to remove the safety block between the striker and the vane nut. Approximately 1000 to 1300 feet of air travel is necessary for the arming-vane assembly to remove the safety block. After this distance the fuze will function on impact, if not previously fired by the timing mechanism of the time set.

Arming. There are two distinct operations for arming these fuzes. The mechanical arming mechanism functions to remove the safety block, and the time arming mechanism functions to bring the detonator into alinement with the rest of the explosive components. The mechanical delay arming mechanism is composed of the arming-vane assembly, an outer and inner gear, and a pinion. The arming-vane assembly is threaded onto the arming hub, outside the fuze body. The outer gear, containing 39 teeth, is secured in place at the other end of the arming hub, within the fuze body. Threads are cut on the inside surface of the

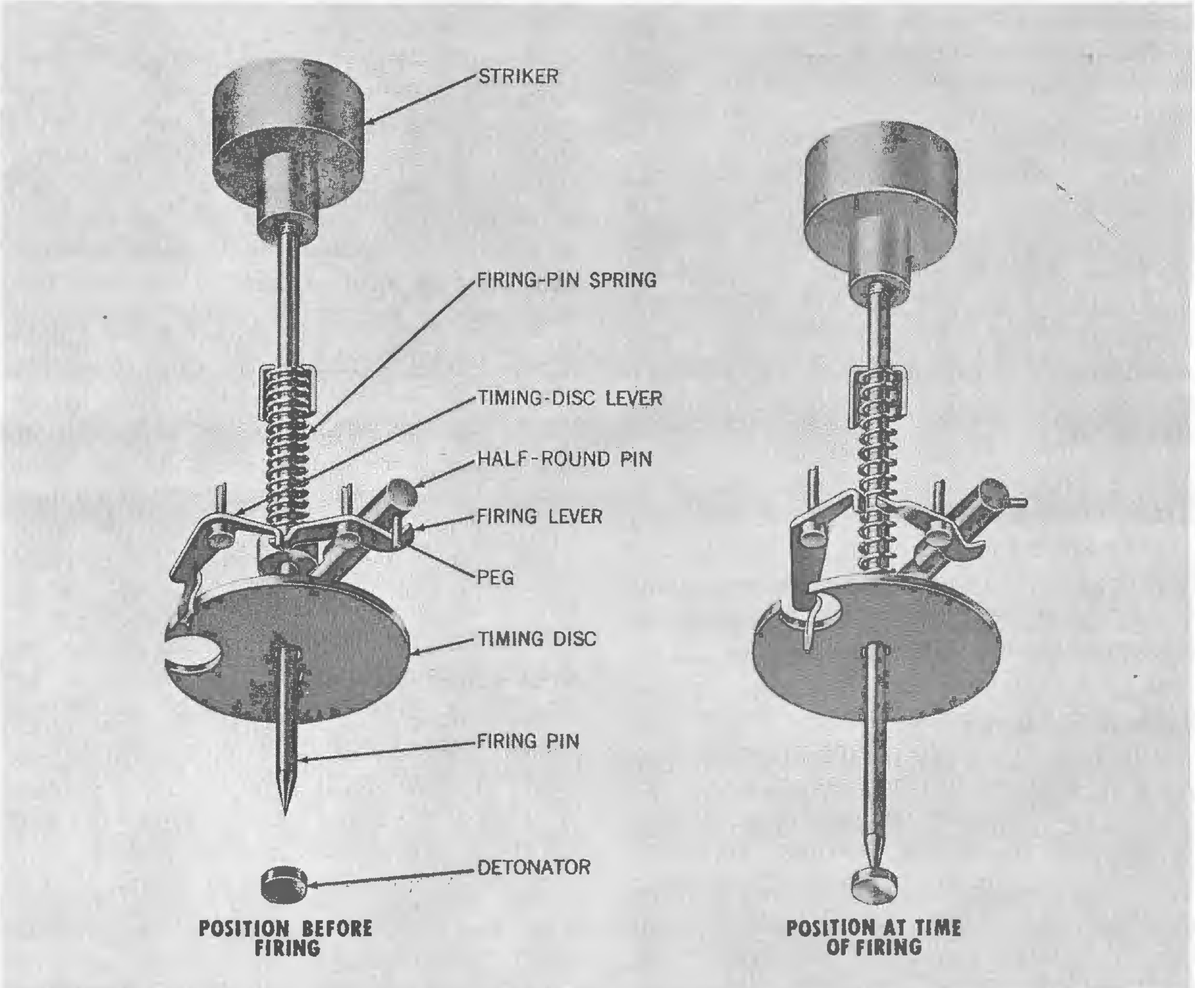


Figure 2–13.—Mechanical Time Fuze AN–M146A1, Details of Firing-Pin Operation.

arming hub to accommodate the threaded arming sleeve. The inner gear, containing 40 teeth, is attached to the arming sleeve at its innermost end. The pinion meshes with the outer and inner gears.

As the arming-vane assembly rotates, it turns the arming hub and arming sleeve. The outer gear meshes with the pinion and forces it to rotate. Since the number of teeth on the outer and inner gears are not equal, the outer gear turning the pinion and the pinion meshing with the inner gear causes the inner gear to lag one tooth each revolution of the outer gear. Motion is thereby induced between the arming hub and the arming sleeve, causing the arming sleeve to unscrew itself from the arming hub. When the arming sleeve is withdrawn from the safety block, centrifugal force throws the safety block clear of the fuze. As soon as the safety block is removed, the mechanical arming of the fuze is complete.

The safety block has a collar which bears on pins in the vane nut. This insures that the safety block will spin with the arming-vane assembly, and sufficient centrifugal force will be developed to throw the block clear when the arming sleeve is withdrawn.

The second phase of arming is the process of bringing the detonator into alinement with the rest of the explosive components. The detonator is contained in the detonator slider, which is under pressure from the compressed slider spring. The slider spring is prevented from forcing the slider inward by the arming lever, which contacts a shoulder of the detonator slider.

At the same time that the arming wire is withdrawn from the arming-vane assembly, it is also withdrawn from the arming pin. The arming pin is ejected by the arming-pin spring and the timing mechanism is set in motion. The timing mechanism turns a shaft on which the time arming cam is mounted. As the cam rotates, it strikes the arming lever, which pivots and releases the the detonator slider. The slider is driven by the slider spring deeper into the fuze body, alining the detonator with the firing pin. The elapsed time for alinement is 4.5 seconds after release.

Action. All mechanical time fuzes are essentially of one type. The principle of operation is that of the common alarm clock. A trigger arm assembly (firing lever and timing-disc lever), which restrains a spring-loaded firing-pin assembly, figure 2–13, rides on the edge of a circular timing disc. The disc has one notch cut into its edge which, in the unarmed condition, is occupied by the arming pin. The arming pin holds the timing disc in place against the action of the timing mechanism. When the arming pin is ejected upon withdrawal of the arming wire, the clockwork turns the timing disc at a uniform rate until the timing-disc lever drops into the notch and releases the firing lever. The firing lever pivots and releases a half-round pin, which had previously restrained the spring-loaded firing pin by contacting the firing pin collar. The collar had rested on one-half of the half-round pin, keeping the pin under a rotary force. Releasing the firing lever frees the half-round pin, which is forced to pivot by the spring-loaded firing pin. The firing pin is driven into the alined detonator.

Rotating the fuze head during the time setting operation moves the timing-disc lever around the timing disc. Locating the lever at different positions varies the distance the notch must travel to have the lever drop in, and thereby varies the time of detonation. The outside of the fuze head is engraved with time settings corresponding to locating positions for the timing-disc lever.

Detonation. The firing pin explodes the detonator, which relays the explosion to the booster lead-in. The booster lead-in fires the booster, exploding the main charge of the bomb.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and the arming pin from being ejected. The unarmed fuze will not function in the air or on impact.

Accidental Arming

Recognition. This fuze is considered armed when any of the following conditions exist: absence of the safety block; complete or partial ejection of the arming pin; and failure of the trigger arm assembly to support the striker as evidenced by the striker bearing down tightly against the safety block.

Handling. If any of these conditions exist, the safety block should be fastened in place with tape. If the original safety block is missing, a spare or improvised block should be used. The fuze then may be handled with comparative safety until it can be disposed of by authorized personnel. Such fuzes cannot be returned to a serviceable condition and no attempt should be made to do so.

Fuzing

1. Remove the fuze from its packing and inspect it to insure that the safety block is in place, the arming pin is in its proper position, the fuze threads are clean, and that there is no indication of serious corrosion or other evidence of unserviceability. Special attention should be given to exami-

nation for evidence of corrosion. A small amount of external corrosion may indicate sufficient internal corrosion to freeze the time mechanism or detonator slider and cause a dud or, conversely, it may indicate primer corrosion or weakening of light parts which would render the fuze unsafe to handle. Holding the safety block in place, remove the striker stop and examine for clearance between striker and safety block.

If a clearance does not exist, it is an indication that the half-round pin is not supporting the firing pin and the fuze may fire as soon as the safety block is ejected. In this event, the safety block should be taped in place and the fuze destroyed as soon as possible. Shake the fuze gently to see if the safety block falls out. If it does, replace it, secure it with tape, and dispose of the fuze as soon as possible. Replace the striker stop if these tests have indicated that the fuze is serviceable.

2. Loosen the thumbscrew and turn the head until the desired time is indicated by the index mark on the body. Tighten the thumbscrew to lock the setting. It should be noted that there is a time lag of 0.2 second between the release of the bomb and the starting of the time mechanism. This is due to the fact that the bomb falls for 0.2 second after release before the arming wire is withdrawn and the arming pin ejected. Consideration should be given to the time lag in selecting the time setting. Thus, if it is desired that the fuze function 21.5 seconds after release, the fuze should be set for 21.3 seconds.

3. Remove the nose plug from the bomb and inspect the fuze seat to be sure that it is clean and that the threads are not damaged. The fuze may be installed in the bomb before the bomb is placed in the rack, but it is preferred that all fuzing be done after the item is installed in the rack.

4. If the threaded hole in the bomb is too large, install the appropriate adapter booster.

5. Screw the fuze into the cavity, hand-tight.

6. Attach the arming-wire loop to the shackle. Straighten the free end of the wire and pass it through, in turn, the front suspension lug, the smaller hole in the spoiler ring (if present), the outer holes in the arming-pin bracket and arming pin, and the outer holes in the arming-wire guide and arming vane. Take up slack in the wire by pulling it forward through the arming pin and arming vane. The use of a Fahnestock clip on the arming wires of mechanical time fuzes is mandatory where munitions, so fuzed, are by tactical necessity carried on external bomb racks or carried on internal racks of aircraft whose rated cruising speed is in excess of 300 knots. Use is optional when the munitions are carried internally in slower rated aircraft. Cut off the arming wire 2 or 3 inches in front of the arming vane or safety Fahnestock clip. Be sure that no kinks or burrs are in the arming wire.

7. Check the time setting on the fuze.

8. Remove the striker stop, the safety cotter pin, and the seal wire. Check again for clearance between the striker and the safety block as described in step 1. If the safety block should fall out, replace it, secure it with tape, remove the fuze from the bomb, and set it aside for destruction.

Defuzing

CAUTION: Before removing a fuze from a bomb, be sure it is unarmed or safe to handle. Check for clearance between the striker and safety block as described in Fuzing, step 1. If the striker should snap down tightly against the safety block, or if the safety block should fall out, replace the block, secure it with tape, remove fuze from bomb or cluster, and set it aside for disposal by authorized personnel.

1. Replace the cotter pin in the fuze arming pin.

2. Replace the striker stop between the striker and safety block.

3. Pass the seal wire through the holes in the arming vane and the arming-wire guide, and fasten the ends of the wire together.

4. Remove the arming wire and unscrew the fuze.

5. Replace the closing plug in the bomb.

6. Return the fuze to its original container and seal with adhesive tape.

Packaging and Marking

Fuze Container. Each fuze is hermetically sealed in a metal container. Soldered to the container and cover is a metal strip, sealing the container during shipping and stowage. A key is provided to facilitate the removal of this strip. The following is a typical container marking.

FUZE, BOMB, NOSE, M. T.
AN–M145A1
PACKED (date)
(drawing no.) REV. DATE OF FUZE DRAWING

Packing Box. Fifteen fuzes in containers are packed in a wooden packing box fastened with wood screws and secured with steel bands. The following is a typical packing box marking.

15 NOSE FUZES
BOMB, NOSE, AN–M145A1, M. T.
PACKED (date) LOT NO.

MECHANICAL TIME FUZE M155A1

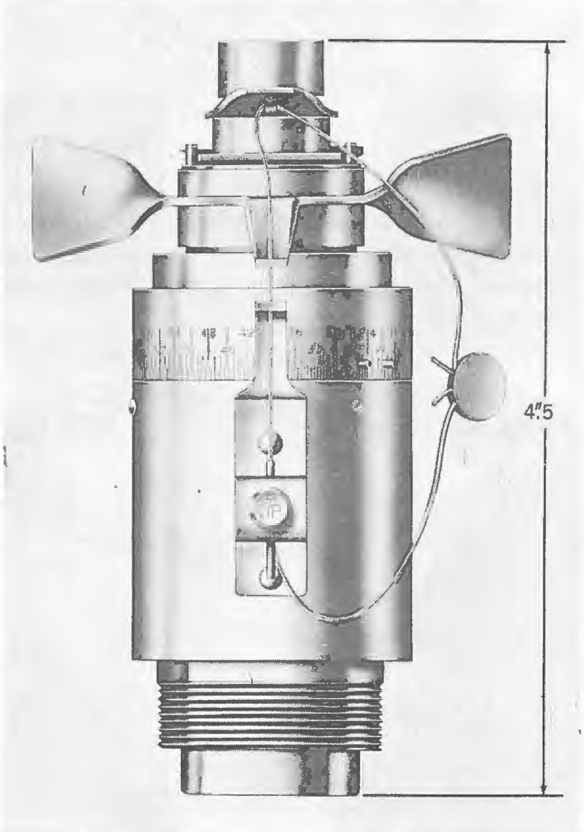


Figure 2–14.—Mechanical Time Fuze M155A1, Exterior View.

Model	M155A1.
Firing Action	Mechanical time.
Firing Delay	Aerial burst, 5–92 seconds or instantaneous.
Assembly Drawing No.	P–83912.
Arming	
Type	Vane and time.
Revolutions to Arm	6 to 9
Air travel to Arm (ft)	50
Overall Length (in.)	4.5
Protrusion from Bomb (in.)	3.7
Body Diameter (in.)	1.63
Vane Span (in.)	3
Weight (lb)	1.4
Time Setting Range (sec)	5–92
Number of Vanes	2
Percussion Primer Designation	M26
Booster Charge	
Type	Black powder
Weight (grains)	120

General Description

Mechanical Time Fuze M155A1 is similar in operation to Mechanical Time Fuze AN-M145A1 previously described in this chapter. It is a "detonator-in line" fuze; however it is not detonator safe. This fuze is not to be used from aircraft carriers and is not to be installed in a bomb or cluster before it is loaded in a plane. It may possibly function when dropped unarmed. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Fuze M155A1 differs from the earlier M111 series of fuzes in that it does not have reduction gearing but has direct mechanical arming instead. Fuze M111 had a minimum time setting of 15 seconds; it required 570 vane revolutions to arm; it had a 4-inch vane span and a three-segment safety block. M111A1 was similar but required a minimum time setting of about 8 seconds. M111A2 has a 3-inch vane span and a C-shaped safety block. It has a minimum time setting of 5 seconds. The M155 is similar to the M111A2 but has no reduction gearing and has a safety block ejection spinner. M155A1 has been reworked to provide for low-temperature operation.

Fuzing

1. Remove the fuze from its packing and inspect it to insure that the safety block is in place, the arming pin is in its proper position, the fuze threads are clean, and that there is no indication of serious corrosion or other evidence of unserviceability. Special attention should be given to examination for evidence of corrosion. A small amount of external corrosion may indicate sufficient internal corrosion to freeze the time mechanism and cause a dud or, conversely, it may indicate primer corrosion or weakening of light parts which would render the fuze unsafe to handle. Holding the safety block in place, remove the striker stop and examine for clearance between the

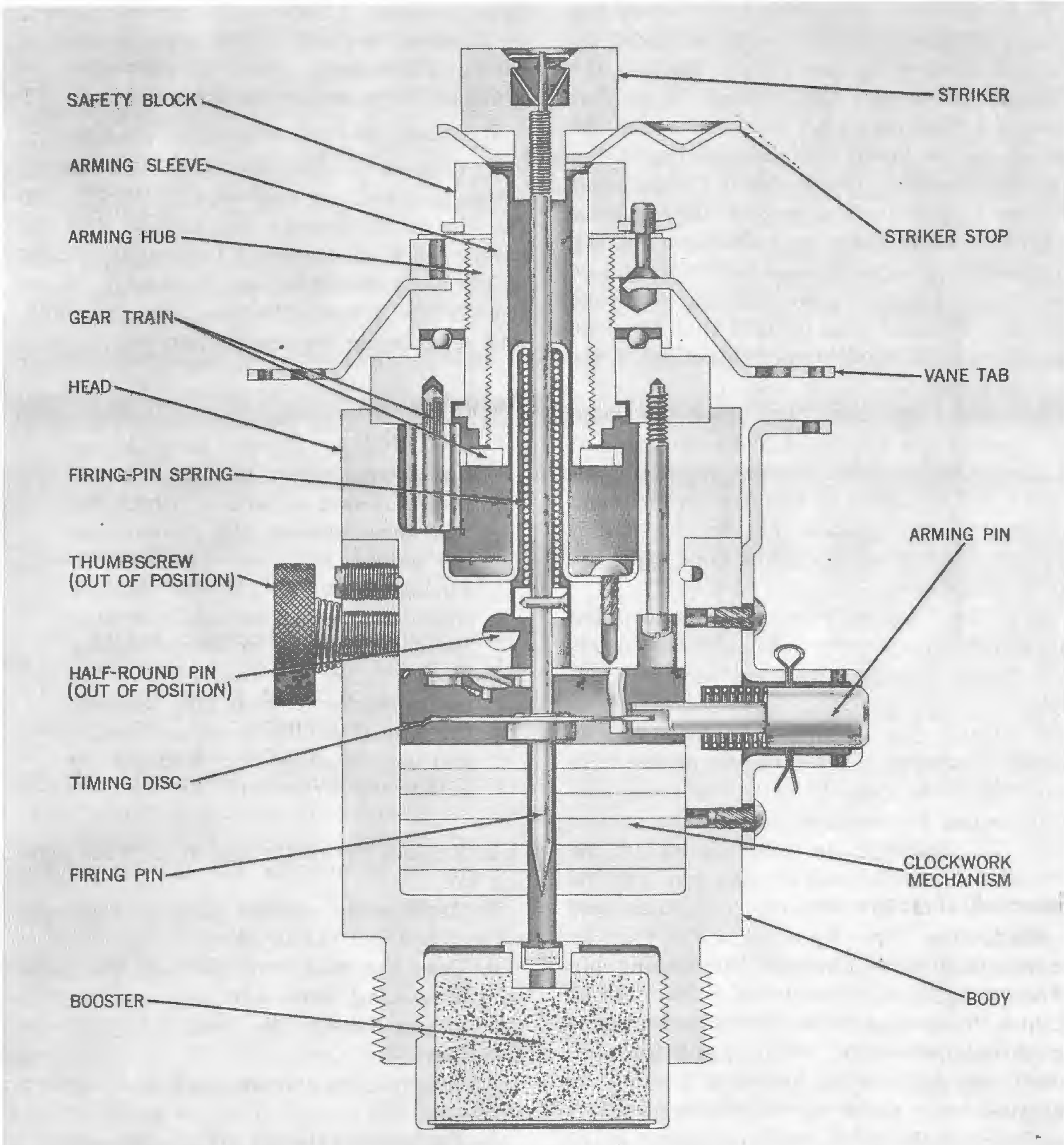


Figure 2–15.—Mechanical Time Fuze M155A1, Cross Section.

striker and the safety block. If a clearance does not exist, it is an indication that the half-round pin is not supporting the firing pin and that the fuze may fire as soon as the safety block is ejected. In this event, the safety block must be taped in place and the fuze destroyed as soon as possible. Otherwise, if the safety block should fall out, the fuze would fire immediately. If the clearance between the striker and the safety block does exist, however, shake the fuze gently to see if the safety block falls out. If it does, replace it, secure it with tape, and dispose of the fuze as soon as possible. Replace the striker stop if these tests have indicated that the fuze is serviceable.

2. Loosen the thumbscrew and turn the head until the desired time is indicated by the index mark on the body. Tighten the thumbscrew to lock the setting. Note that there is a time lag of 0.2 second between the release of the bomb and the starting of the time mechanism. This is due to the fact that the bomb falls for 0.2 second after release before the arming wire is withdrawn and the arming pin ejected. Consideration should be given to the time lag in selecting the time setting. Thus, if it is desired that the fuze function 21.5 seconds after release, set it for 21.3 seconds.

3. Remove the nose plug from the bomb and inspect the fuze seat to be sure that it is clean and that the threads are not damaged. The fuze may be installed in the bomb before the bomb is placed in the rack, but it is preferred that all fuzing be done after the bomb is installed.

4. If the threaded hole in the bomb is too large, install the appropriate adapter booster.

5. Screw the fuze into the cavity hand-tight.

6. Attach the arming-wire loop to the shackle. Straighten the free end of the wire and pass it through, in turn, the front suspension lug, the smaller hole in the spoiler ring (if present), the outer holes in the arming-pin bracket and arming pin, and the outer holes in the arming-wire guide and arming vane. Take up slack in the wire by pulling it forward through the arming pin and arming vane. The use of a Fahnestock clip on the arming wires of mechanical time fuzes is mandatory where munitions, so fuzed, are by tactical necessity carried on external bomb racks or on internal racks of aircraft whose rated cruising speed is in excess of 300 knots. Use is optional when the munitions are carried internally in slower rated aircraft. Cut off the arming wire 2 or 3 inches in front of the arming vane or safety Fahnestock clip. Be sure that no kinks or burrs are in the arming wire.

7. Check the time setting on the fuze.

8. Remove the striker stop, the safety cotter pin, and the seal wire. Check again for clearance between the striker and the safety block as described in step 1. If the safety block should fall out, replace it, secure it with tape, remove the fuze from the bomb, and set it aside for destruction.

Defuzing

CAUTION: Before removing a fuze from a bomb, be sure it is unarmed or safe to handle. Check for clearance between the striker and the safety block as described in Fuzing, step 1. If the striker should snap down or tightly against the safety block, or if the safety block should fall out, replace the block, secure it with tape, remove the fuze from the bomb or cluster, and set it aside for disposal by authorized personnel.

1. Replace the cotter pin in the fuze arming pin.

2. Replace the striker stop between the striker and the safety block.

3. Pass the seal wire through the holes in the arming vane and the arming-wire guide, and fasten the ends of the wire together.

4. Remove the arming wire and unscrew the fuze.

5. Replace the closing plug in the bomb.

6. Return the fuze to its original container and seal with adhesive tape.

FUZE, MECHANICAL TIME, MK 256 MOD 0

Firing Action	Airburst	Protrusion from Bomb (in.)	2.5
Firing Delay (sec.)	5 to 87	Body Diameter (in.)	2.0
LD	496893	Weight (oz.)	14
Assembly Dwg.	2118477	Thread Size	1½–12
Overall Length (in.)	3.20		

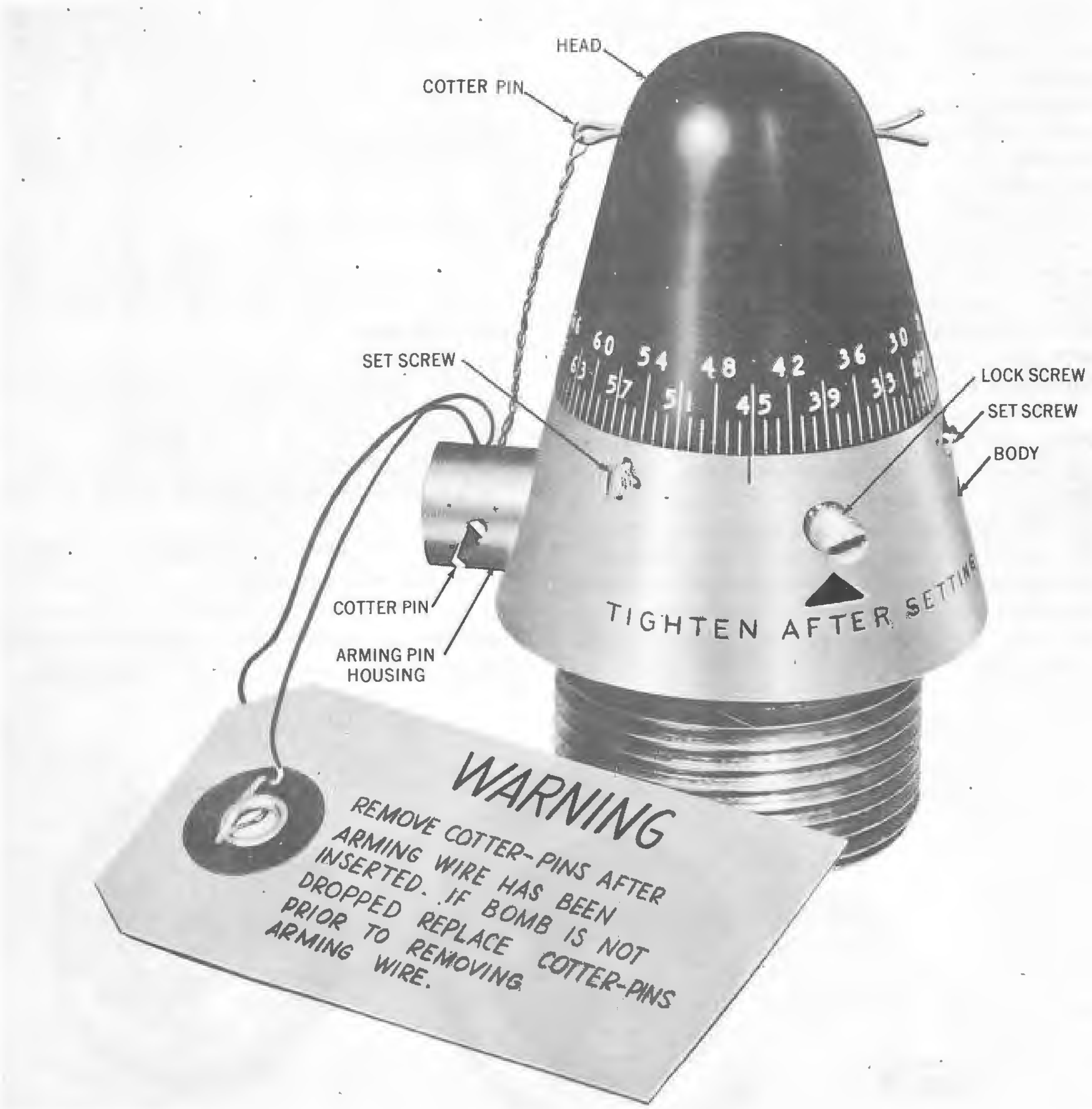


Figure 2–15A. Mechanical Time Fuze, Mk 256 Mod 0.

General Description

Fuze, Mechanical Time, Mk 256 Mod 0, figure 2–15A, is a mechanical time, airburst fuze that is designed for use with Practice Bombs Mk 76 Mods 4 and 6 and Mk 89 Mod 1. The fuze can be preset manually to operate at any time ranging from 5 to 87 seconds, after release from the aircraft. Prior to installation in the bomb, the fuze is assembled to Practice Bomb Signal Mk 4 Mod 3.

The fuze consists basically of an aluminum head and a steel body held together by an internal coupling ring. The aluminum head is inscribed with markings representing one second time intervals. The steel body has an index mark inscribed on its surface. A lockscrew on the body above an inscription TIGHTEN AFTER SETTING is loosened to permit the head to rotate so that the desired time marking can be aligned with the index mark and then the lockscrew is tightened.

Two cotter pins are used with the fuze. The one in the head provides a positive lock on the spring-loaded firing pin during shipping and handling. The second cotter pin provides a positive lock on the spring-loaded arming pin. The cotter pins are joined by a short length of twisted wire. A warning tag attached to one of the cotter pins alerts users to remove the cotter pins after the arming wire is installed in the arming pin.

The operating principle of the fuze essentially is the same as other mechanical time fuzes. This consists of a spring-loaded firing pin in the head that is restrained by a cocking pin assembly which is prevented from rotating by a trigger arm assembly. The trigger arm assembly, figure 2–15B, consists of a firing lever and a timing disc lever; this mechanical linkage is held rigid by the pressure of the timing disc lever against the edge of the timing disc which is a part of the clockwork mechanism in the steel body. The clockwork mechanism is held inoperative by an arming pin which fits into a notch on the timing disc, figure 2–15B.

Explosive Components

There are no explosive components in Fuze, Mechanical Time, Mk 256 Mod 0.

Safety Features

There are a number of safety features associated with this fuze. The fuze is shipped with its clockwork mechanism fully wound but held inoperative by the arming pin. The spring-loaded arming pin is held in position by a cotter pin.

A cotter pin in the head provides a positive lock on the spring-loaded firing pin during shipping and handling. It restrains the firing pin from striking Practice Bomb Signal Mk 4 Mod 0 if the fuze is damaged by accidental dropping.

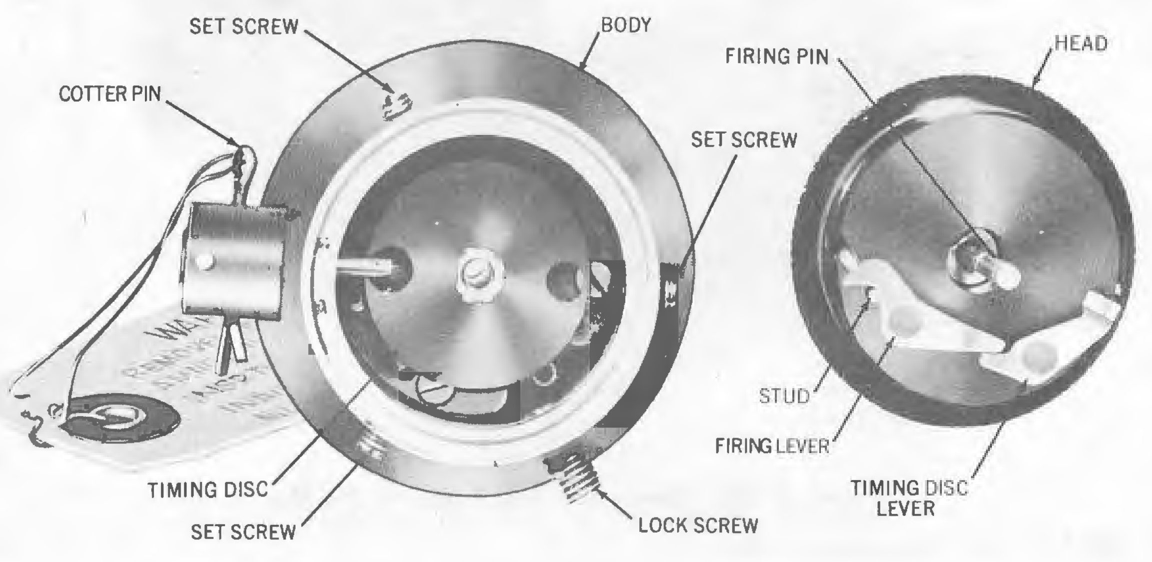


Figure 2–15B. Mechanical Time Fuze, Mk 256 Mod 0, Partial Disassembly.

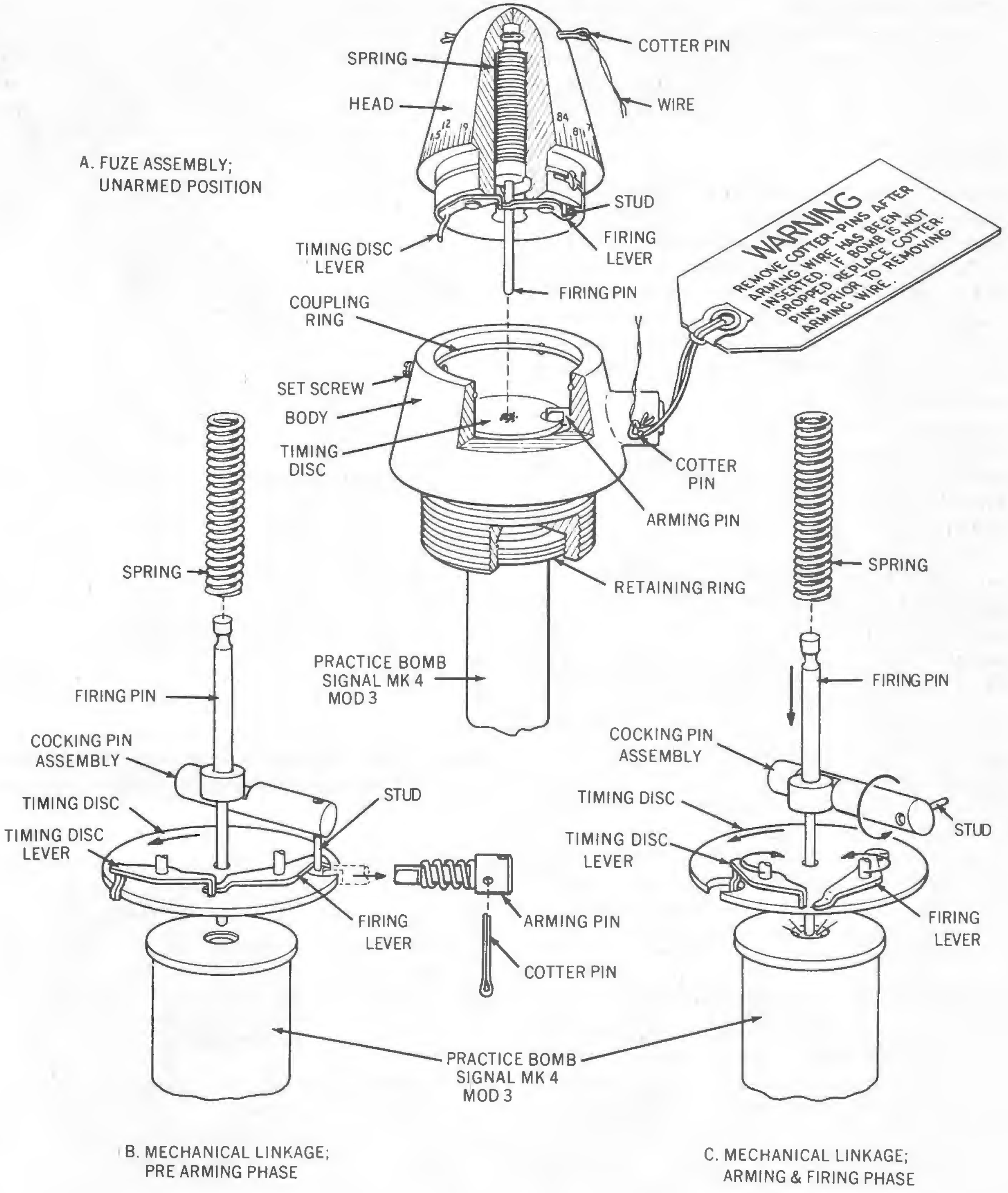


Figure 2–15C. Mechanical Time Fuze, Mk 256 Mod 0, Operation.

The two cotter pins are secured by a length of twisted wire so that one should not be withdrawn without withdrawing the other. A dud would result if the second cotter pin is not removed.

Presetting

The fuze is preset manually prior to installation in the bomb. The fuze is set by loosening the lockscrew above the inscription TIGHTEN AFTER SETTING and rotating the head to the desired delay firing time marking and locking the setting using the lockscrew. The effect of rotating the head is to change the relative position of the timing disc lever with respect to the notch in the timing disc.

Functioning

After the arming wire is installed in the fuze, the two cotter pins are removed. Removal of the cotter pin in the head removes the lock on the firing pin, figure 2–15C, while the arming wire restrains the spring-loaded arming pin.

When the bomb is released from the aircraft, the arming wire slips out of the arming pin housing, causing the spring-loaded arming pin to spring out of the notch on the timing disc, figure 2–15C; this action starts the clockwork mechanism operating. When the notch in the timing disc meets the tab on the timing disc lever, the timing disc lever drops into the notch. This breaks the mechanical linkage that restrains the cocking pin assembly by pivoting the firing lever away from the cocking pin assembly. The spring-loaded firing pin then rotates the cocking pin assembly and springs forward with sufficient energy to initiate the primer of Practice Bomb Signal Mk 4 Mod 3, figure 2–15D.

Fuzing the Bomb for Aircraft Loading

The following paragraphs give instructions on fuzing Practice Bombs Mk 76 Mods 4 and 6 Mk 89 Mod 1. Before the fuze is installed, it is manually preset and Practice Bomb Signal Mk 4 Mod 3 is secured to the fuze using Spanner Wrench, BuOrd Dwg. No. 2284064. The assembled fuze is screwed into the nose well of the bomb and finally the arming wire is installed in the fuze. The spanner wrench is not obtainable through regular supply channels. Refer to the drawing for design features and fabricate the tool locally.

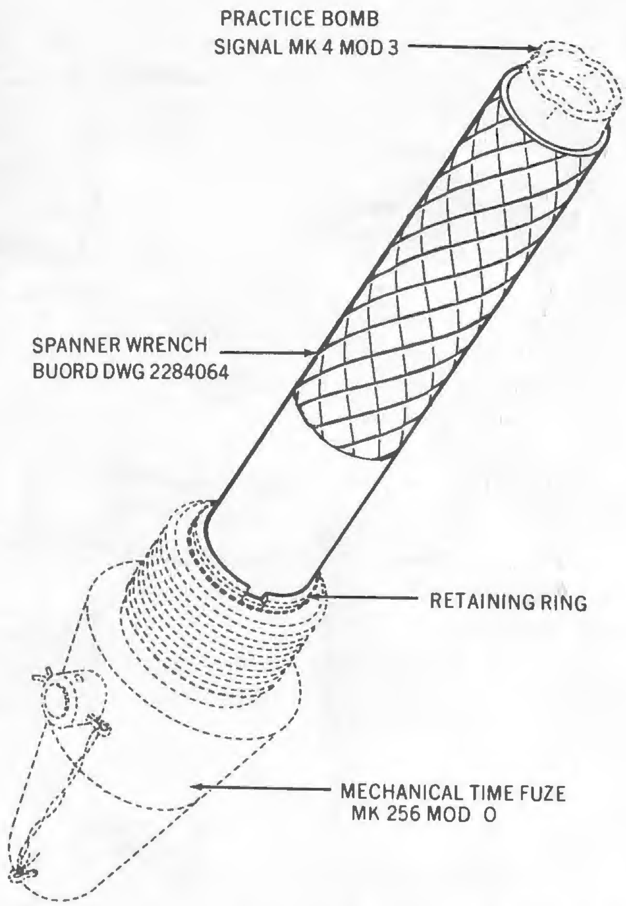


Figure 2–15D. Mechanical Time Fuze, Mk 256 Mod 0, and Practice Bomb Signal Mk 4 Mod 3, Assembly.

Presetting the Fuze. Remove the fuze from its container by opening the container with the key provided. Inspect the fuze for the presence of two cotter pins, a retaining ring, and a warning tag attached to one of the cotter pins. If any of these parts are absent, do not install the fuze.

WARNING

> Do not remove the cotter pin until the arming wire is installed. The cotter pin is the only means of keeping the spring-loaded arming pin in place.

The fuze is preset in the following manner:

1. Loosen the lockscrew with a small screwdriver.
2. Rotate the head and align the desired setting with the index on the body.
3. Tighten the lockscrew.

Installing the Fuze. Before the fuze is installed, Practice Bomb Signal Mk 4 Mod 0 must be assembled to it in the following manner:

1. Remove the retaining ring from the fuze body, using Spanner Wrench, Dwg. No. 2284064.
2. Insert Practice Bomb Signal Mk 4 Mod 3 into the fuze body.
3. Slip the retaining ring over the bomb signal, refer to figure 2–15D, and tighten the retaining ring into the fuze body with Spanner Wrench, Dwg. No. 2284064.
4. Loosen the set screw on the bomb nose well with a $\frac{3}{16}$ socket head wrench and remove the nose plug.
5. Thread the assembled fuze into the nose well handtight.

Installing the Arming Wire When Bomb Suspension Lugs Are Used. The arming wire is installed in the following manner:

1. Loosen the fuze and orient the arming pin housing in line with the bomb suspension lug.
2. Pass Arming Wire Mk 1 Mod 1 through the suspension lug of the bomb into the arming pin and arming pin housing until about six inches of wire protrude.
3. Secure bomb to rack and anchor the arming wire to the rack aft of the suspension lug.

   CAUTION: The arming wire must be secured aft of the suspension lug to prevent breakage of the wire after the bomb is released.

4. Remove the slack from the arming wire by drawing it through the fuze.
5. Allowing 3 or 4 inches of arming wire to protrude, cut the wire and attach two Fahnestock clips to it, refer to figure 2–15E.
6. Tighten the set screw on the bomb, maintaining the arming pin housing in line with the bomb suspension lug.
7. Remove the cotter pins.

Installing the Arming Wire When the Bomb Suspension Lugs Are Not Used. The arming wire is installed in the following manner:

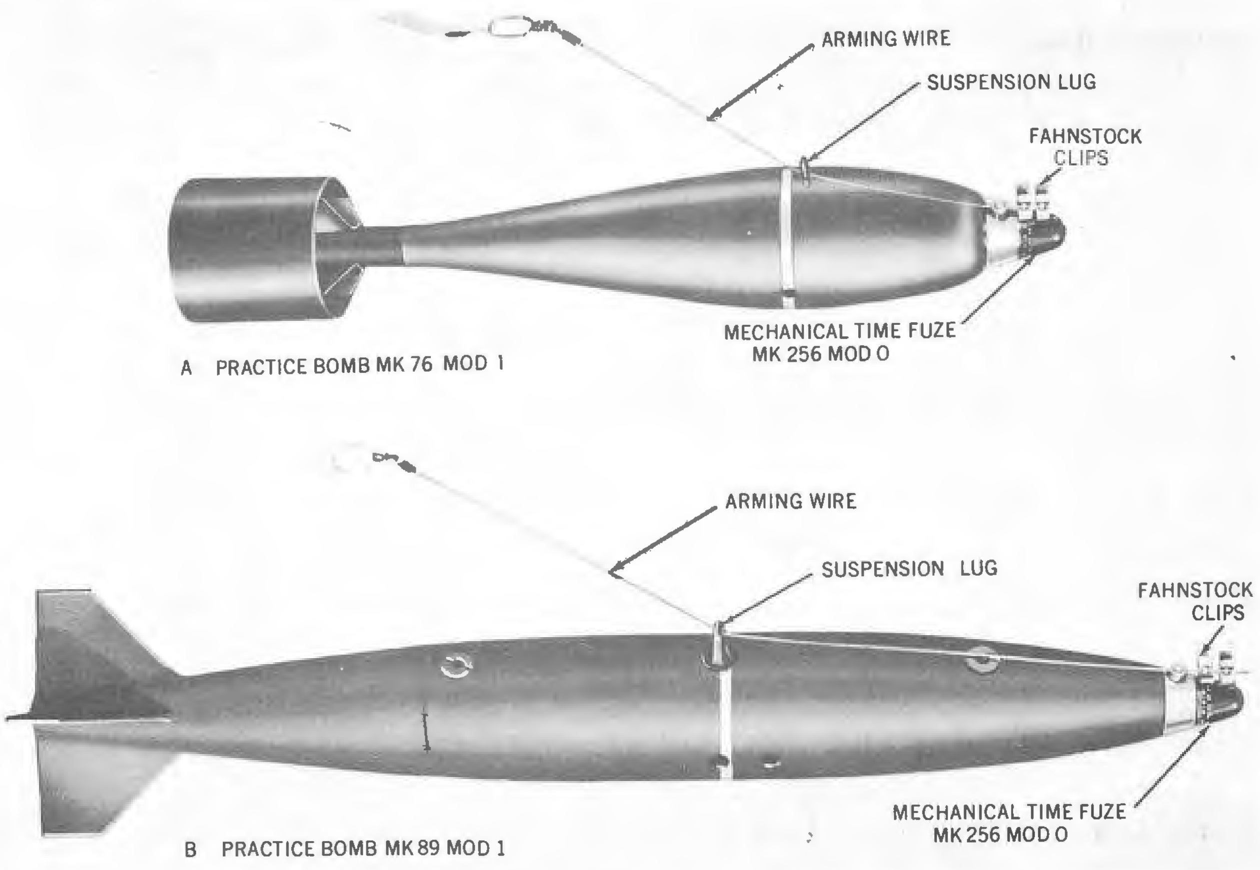


Figure 2–15E. Typical Practice Bomb with Fuze and Arming Wire Installed.

1. Loosen the fuze and orient the arming pin housing in line with one of the ⅜-inch indexing holes in the bomb body.

2. Pass Arming Wire Mk 1 Mod 1 through the arming pin and arming pin housing until about six inches of arming wire protrude.

3. Secure bomb into Aero 8A Practice Bomb Container and hook arming wire to the rear of container.

CAUTION: When the bomb is loaded, the arming wire should be anchored aft of the tail of the bomb to prevent breakage of the arming wire when the bomb is released.

4. Remove the slack from the arming wire by drawing it through the fuze.

5. Allowing 3 or 4 inches of wire to protrude, cut the wire and attach two Fahnestock clips to it. Refer to figure 2–15E.

6. Tighten the set screw on the bomb, maintaining the arming pin housing in line with the indexing hole.

7. Remove the cotter pins.

Defuzing the Bomb

The following steps are given under the assumption that the bomb has been unracked from the aircraft.

WARNING

Replace the two cotter pins in the fuze before removing the arming wire.

1. Replace the two cotter pins in the fuze removed previously.

2. Remove the arming wire.

3. Loosen the bomb set screw with a 5/16-inch socket head wrench and remove the fuze.

4. Replace the bomb nose plug and tighten the set screw.

5. With the spanner wrench, loosen the retaining ring and remove the practice bomb signal from the fuze body.

6. Reinstall the retaining ring in the fuze body and return the fuze to its original container.

7. Return the practice bomb signal to its original container.

Packaging

The fuzes are packaged in a tear strip container, figure 2–15F. The body of each fuze is inserted into an ammunition board support and the head of each fuze is protected by laminated chipboard, figure 2–15F. Two fuzes are assembled into a container and fillers are used to provide the fuzes with a snug fit. The containers are shipped in a reusable, nailed wood box. The wood box contains twenty cans or forty fuzes, figure 2–15F.

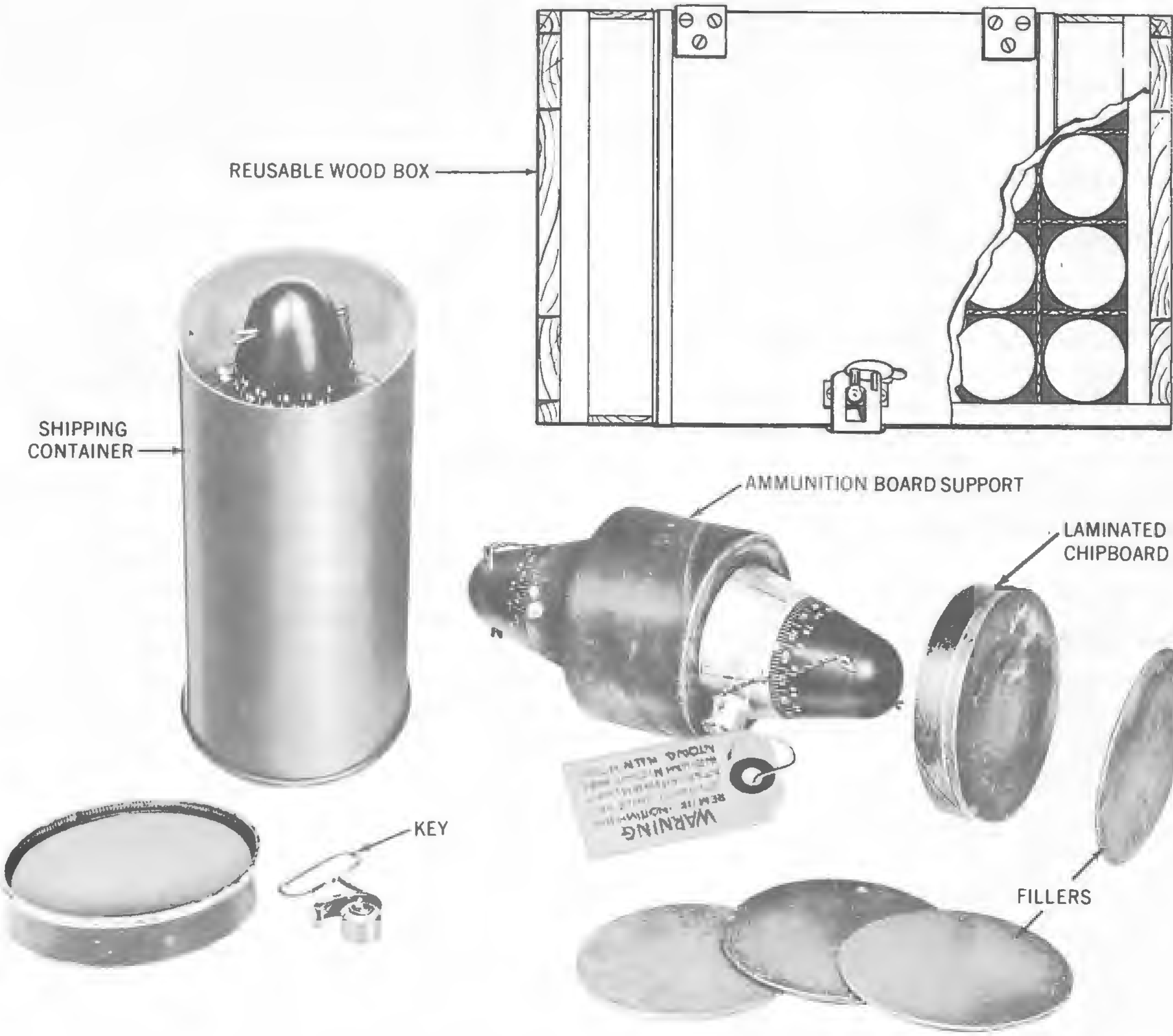


Figure 2–15F. Mechanical Time Fuze, Mk 256 Mod 0, Packaging.

VT FUZE—AN–M166, AN–M166E1, AN–M166E3, AN–M168, AN–M168E1, AN–M168E2, T50E1, T50E4, T51E1, T91 AND T93

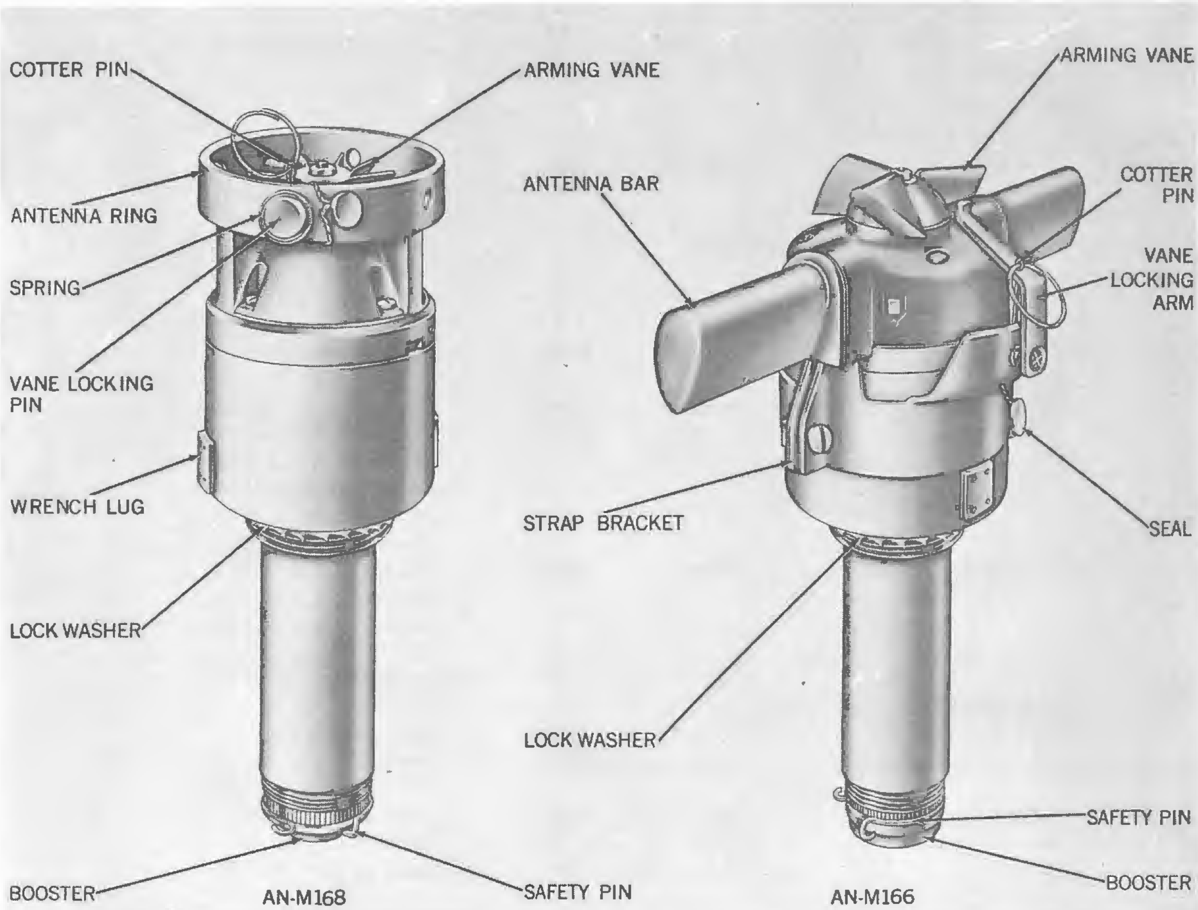


Figure 2–16.—VT Fuzes AN–M166 and AN–M168.

General Description

VT (proximity) fuzes are essentially radio transmitting and receiving units which function automatically on approaching or passing any material object, causing an air burst at an effective height or distance. VT fuzes are covered fully in volume 2 of this publication and in the following publications:

AD–305 024	Army-Navy-Air Force Fuze Catalog
OP 1444	VT Fuzes for Bombs
OP 2219	Proximity Time Fuzes; Bombs and Fin-Stabilized Rockets (under preparation)

Use of mechanically armed VT fuzes in externally carried bombs is restricted by NAVORDINST 8024.25, see latest issue.

Two types of mechanically armed VT fuzes are currently in use: the ring type and the bar type. They can be identified readily by their external appearance. The ring type has a heavy metal ring around its arming vane. The bar type has two metal bars extending radially from the fuze nose. Each fuze has an overall length of 10.4 inches.

The two types are similar in operation but somewhat different in behavior. The ring type is more sensitive to passing targets and generally gives lower bursts upon direct frontal approach to a target. The bar type

Fuze	Type	Minimum Safe Air Travel (Feet)	Application
AN-M166	Bar	3600	100-lb GP AN-M30A1. 250-lb GP AN-M57A1. 500-lb GP AN-M64A1. 1000-lb GP AN-M65A1. 2000-lb GP AN-M66A2. 220-lb Frag AN-M88. 260-lb Frag AN-M81.
AN-M166E1	Bar	2000	Same as AN-M166.
AN-M166E3*			
AN-M168	Ring	2000	100-lb GP AN-M30A1. 250-lb GP AN-M57A1. 500-lb GP AN-M64A1. 2000-lb GP AN-M66A2. 220-lb Frag AN-M88. 260-lb Frag AN-M81.
AN-M168E1	Ring	2000	100-lb GP AN-M30A1. 250-lb GP AN-M57A1. 500-lb GP AN-M64A1. 1000-lb GP AN-M65A1. 260-lb Frag AN-M81.
AN-M168E2*			
T50E1	Ring	3600	Same as AN-M168.
T50E4	Ring	3600	500-lb GP AN-M64A1. 1000-lb GP AN-M65A1.
T51E1	Bar	3600	Same as AN-M166.
T91	Ring	2000	Same as AN-M168.
T93	Ring	2000	Same as AN-M168E1.

* Information classified, see Fuze Catalog AD-305 024.

is quite sensitive to targets directly in front of it and correspondingly less sensitive to passing targets.

Fuze Components

The fuze body consists of two cylinders which house all the internal components. The larger cylinder is 3.4 inches in diameter, the smaller approximately 1.7 inches in diameter. Two wrench lugs are mounted on the large cylinder. The smaller cylinder contains a booster, a detonator, a firing condenser, and fuze threads.

The arming vane is a steel or plastic propeller which drives the internal mechanism. Ring-type fuze propellers are 10-finned; bar-type are 3-finned. The arming ring is approximately 3.8 inches in diameter; arming bars are 10.0 inches across.

The booster comprises an assembly of booster cup and retainer sleeve. The cup contains the booster charge; the retainer threads into the small cylinder of the body. The safety pin extends 2 inches into the fuze, locking the detonator rotor in a safe position. The pin is removed prior to assembly of the fuze to the bomb.

Some fuzes include a thumbscrew for manual setting of reduced fuze sensitivity. For normal sensitivity, the thumbscrew is removed. It remains in place for reduced sensitivity.

Internal components include a transmitter-receiver, a power supply, a firing condenser, and an electric detonator circuit.

Ring-Type VT Fuzes

VT Fuze AN-M168 is the preferred ring-type fuze. Minimum safe air travel (MINSAT) is 2000 feet; burst is 30 to 60 feet above ground. It has a steel body, plastic top, and either a steel or a plastic arming vane. VT Fuze AN-M168E1 is similar to the AN-M168 and is used as an alternate.

VT Fuze T93 is a ring-type fuze with a sensitivity-setting thumbscrew. It was designed by the Air Force to be used both for ground and for airborne targets; however, it is not intended that this feature be used by Naval forces. When the sensitivity-setting thumbscrew is removed, the fuze becomes the AN-M168E1 fuze. The T93 fuze is used only in case of AN-M168 shortage.

Bar-Type VT Fuzes

VT Fuze AN-M166E1 is the preferred bar-type fuze. MINSAT is 2000 feet; burst is 50 to 125 feet above ground at normal sensitivity, 25 to 65 feet at reduced sensitivity. It has a steel body, plastic top, aluminum bars, and a plastic arming vane.

CAUTION: If the fuze container for the AN-M166E1 Fuze is damaged, or if the seal is broken in any way, the fuze is to be considered unserviceable.

Use

The bar-type fuze can be used effectively in any bomb with a fuze well that will accommodate nose fuzes similar to the AN-M103 series. The ring-type fits the same size fuze well; however, it is used only in the bomb sizes for which it is specified. When not used in the proper size bombs, very low bursts of 3 to 10 feet will generally be obtained with ring-type fuzes.

IMPACT TAIL FUZE AN–M100A2, AN–M101A2, AN–M102A2, M160, M161, M162, M172, AN–M175, M176, AN–M177, AN–M184, AN–M185, AN–M194 AND AN–M195

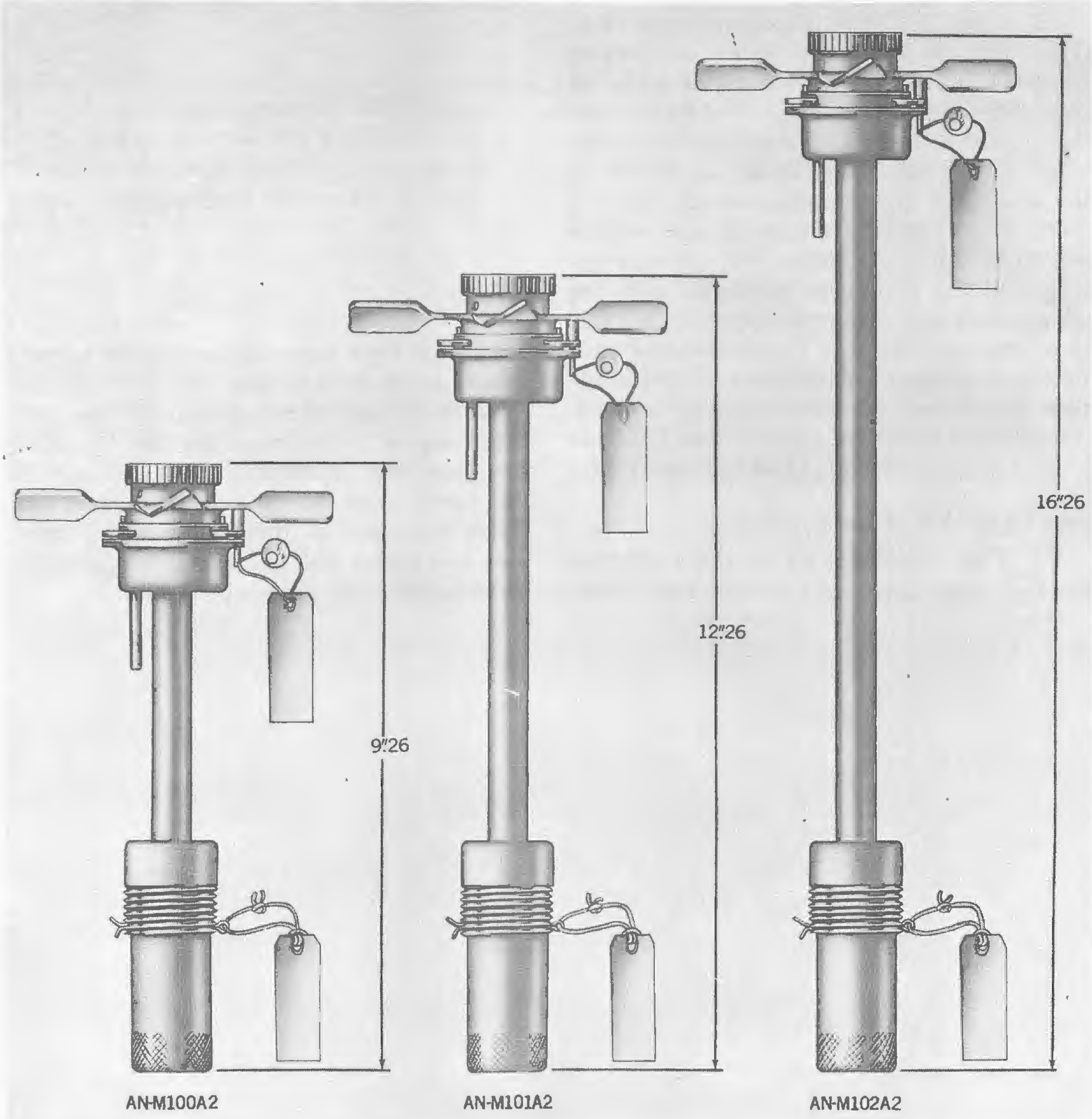


Figure 2–17.—Tail Fuzes AN–M100A2, AN–M101A2, and AN–M102A2.

Model	AN-M100A2	AN-M101A2	AN-M102A2	M160.
Firing Action	Impact	Impact	Impact	Impact.
Firing Delay	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.
Assembly	73-8-3	73-8-7	73-8-8.	
Drawing No.	73-8-183	73-8-181	73-8-72	73-8-359.
Arming:				
Type	Vane, delayed	Vane, delayed	Vane, delayed	Vane, delayed.
Revolutions to Arm	150 to 170	150 to 170	150 to 170.	
Air Travel to Arm (ft.):				
M4 Vane	445-650	445-650	445-650.	
M5 Vane	1225-1420	1225-1420	1225-1420.	
Overall Length (in.)	9.26	12.26	16.26	9.26.
Protrusion from Bomb (in.)	6.26	9.26	13.26	6.31.
Body Diameter (in.)	1.5	1.5	1.5	1.44.
Vane Span (in.)	5.0	5.0	5.0	4.85.
Weight (lb)	2.7	2.9	3.2	2.7.
No. of Blades on Vane	4	4	4	4.
Types of Vane	M4 or M5	M4 or M5	M4 or M5	M4 or M5.

Model	M161	M162	M172	AN-M175	M176.
Firing Action	Impact	Impact	Impact	Impact	Impact.
Firing Delay	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.
Assembly Drawing No.	73-8-359	73-8-359	73-8-470	73-8-471	73-8-471.
Arming:					
Type	Vane, delayed	Vane, delayed	Vane, delayed	Vane, delayed	Vane, delayed.
Revolutions to Arm.	--------------	--------------	--------------	150 to 170	150 to 170.
Air Travel to Arm (ft.):					
M4 Vane	--------------	--------------	500.		
M5 Vane					
Overall Length (in.)	12.26	16.26	25.29	25.29	37.05.
Protrusion from Bomb (in.).	9.31	13.31	22.29	22.29	34.05.
Body Diameter (in.)	1.44	1.44	1.5	1.5	1.5.
Vane Span (in.)	4.85	4.85	5.0	5.0	5.0.
Weight (lb)	2.9	3.2	3.65	3.65	4.4.
No. of Blades on Vane	4	4	4	4	4.
Types of Vane	M4 or M5	M4 or M5	M4 or M5	M5 or M4	M5 or M4.

Model	AN-M177	AN-M184	AN-M185	AN-M194	AN-M195.
Firing Action	Impact	Impact	Impact	Impact	Impact.
Firing Delay	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.	Delay or Nondelay.
Assembly Drawing No.	73-8-471	73-8-470	73-8-470	73-8-470	73-8-470.
Arming:					
Type	Vane, delayed	Vane, delayed	Vane, delayed	Vane, delayed	Vane, delayed.
Revolutions to Arm.	150 to 170.				
Air Travel to Arm (ft):					
M4 Vane	--------------	550	450, 460	500	550.
M5 Vane					
Overall Length (in.)	45.12	37.05	45.12	31.035	28.972.
Protrusion from Bomb (in.).	42.12	34.05	42.12	28.035	25.972.
Body Diameter (in.)	1.5	1.5	1.5	1.5	1.5.
Vane Span (in.)	5	5.0	5.0	5.0	5.0.
Weight (lb)	5.0	4.4	5.0	4.1	3.9.
No. of Blades on Vane.	4	4	4	4	4.
Types of Vane	M5 or M4	M4 or M5	M4 or M5	M4 or M5	M4 or M5.

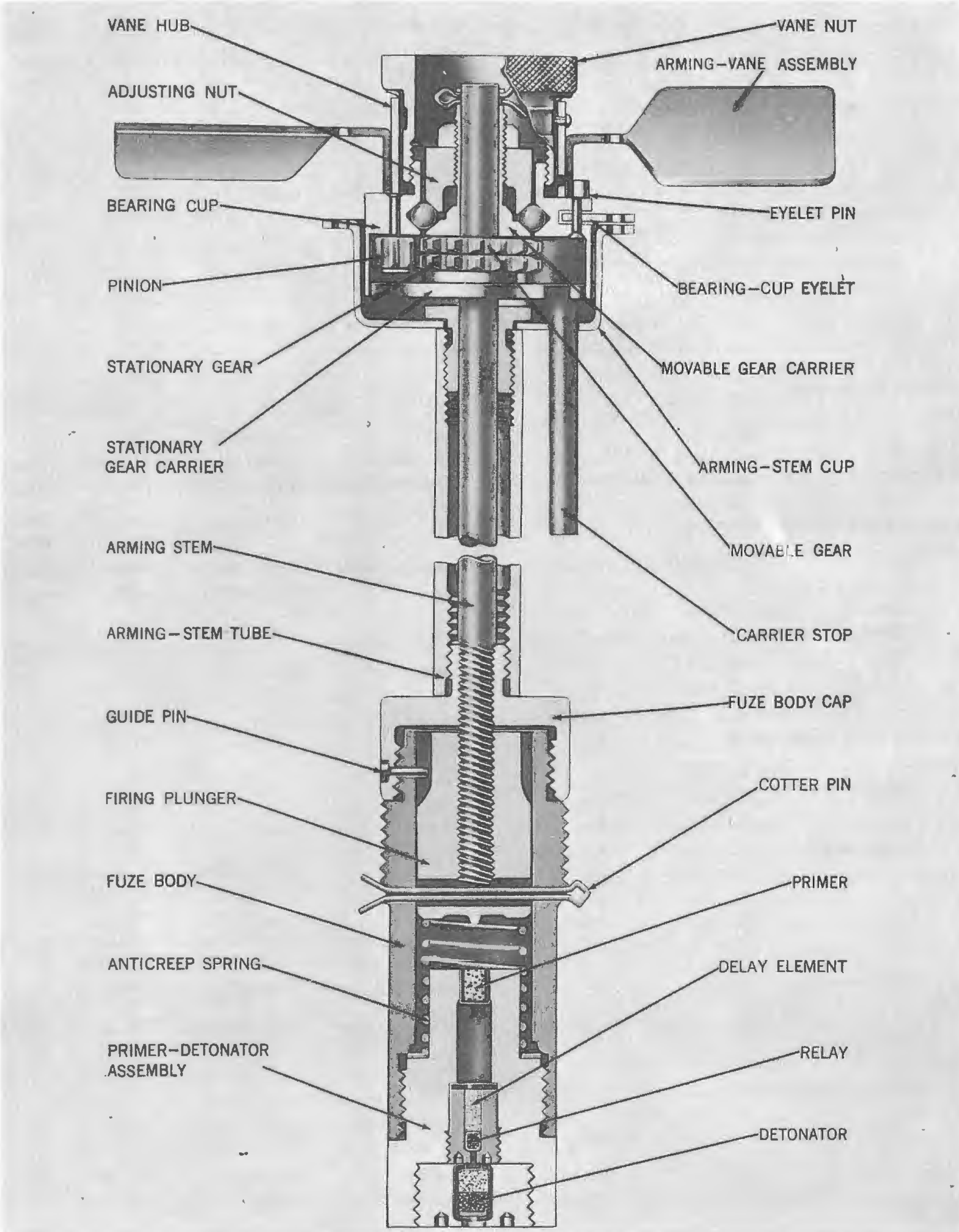


Figure 2–18.—Impact Tail Fuze AN–M100A2, Cross Section.

General Description

The impact tail fuzes of this type, figure 2–18, are armed and inertia fired. The arming is mechanically delayed by reduction gearing. When issued, the fuzes are equipped with an 0.025-second delay M14 primer detonator, which can be interchanged with other M14 primer detonators to give a selection of time delays. The lengthy air travel necessary to arm these fuzes (445 to 650 feet with M4 vane and 1225 to 1420 feet with M5 vane) makes them safe for use with carrier-based aircraft and for dive bombing. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

The overall length of the fuzes varies because of differences in the length of the arming-stem tube. These differences in length are necessary to properly locate the arming-vane assembly in the air stream so that the same time fuze can be used with various size bombs.

Tail fuzes AN–M100A2, AN–M101A2, and AN–M102A2 are for use with box-fin assemblies. Tail Fuzes M172, AN–M184, and AN–M185 are used with conical-fin assemblies. Tail fuzes AN–M185, AN–M194, and AN–M195 are used in low drag bombs.

Fuzes AN–M100A1, AN–M101A1, and AN–M102A1 are earlier models of the AN–M100A2 series. These differ from the AN–M100A2 series in that each of these fuzes has 24 single threads on the arming stem and eight broad vanes with less pitch than the A2 series; they require about 720 vane revolutions to arm. Each fuze incorporates the interchangeable Primer Detonator M14.

Fuzes M160, M161, and M162 are similar to the AN–M100A2 series except for the arming stem which has finer threads (28 single threads to the inch against 20 double threads in the AN–M100 series) and a longer engagement with the firing plunger (0.75 inch against 0.50 inch). The M160 therefore requires a longer arming time. The M160 series fuzes are distinguished from the AN–M100 group by a yellow band 3 inches wide painted around the arming-stem case.

Fuzes AN–M101A2C and AN–M102A2C were the first of the slower-arming tail fuzes. They have the same number of threads per inch as the M160 series, but have the shorter engagement of the AN–M100 series fuzes. The yellow band is painted on, as in the M160 series fuzes.

Fuzes AN–M175, M176, and AN–M177 are long-length fuzes developed for use with specific conical bomb fin assemblies. They are externally identical to the AN–M100A2 series tail fuze. The arming stem of the AN–M175 series, however, has finer threads than that of the AN–M100A2 series, increasing the air travel to arm.

Arming Vanes

Two types of interchangeable arming-vane assemblies are used on these fuzes. The difference between the two vanes is the degree of pitch of the vane with respect to the plane of rotation. This difference is necessary in order to vary the arming distance of the fuzes when required by operating conditions.

For shorter arming distances, the standard vane M4, which has a 45-degree pitch, is used. When longer air travel to arm is desired, an M5 vane, having a pitch of 75 degrees, is used.

At present only the M5 vane is issued with the M172 fuze, and only the M4 vane is issued with the others. Separate action is necessary to requisition the M4 vane for the M172 fuze, or the M5 vane for the other fuzes.

Safety Features

During shipment and stowage the fuze is made safe by a cotter pin, with attached tag, that extends through the fuze body and firing plunger. This prevents movement of the firing plunger, which fires the detonator. A safety pin, through a set of holes in the bearing-cup eyelet and arming-stem cup, locks the gear mechanism. A sealed safety wire, with attached instruction tag, is threaded through a hole in the lower end of the safety pin to prevent its removal. The fuze cannot be installed without first removing the cotter pin through the fuze body.

When a fuze is properly installed in a bomb, with the arming wire in place, the arming-vane assembly is prevented from rotating and arming the fuze. The fuze is in the safe condition until the bomb has been released and has traveled the distance required for arming. The firing plunger is in line with the explosive train at all times. The plunger is held in place, however, by the arming stem until the arming stem is unscrewed by rotation of the arming-vane assembly. The arming stem also is threaded to the fuze body cap. This prevents accidental blows on the arming-vane assembly from being transmitted to the firing plunger.

Functioning

General. When the bomb is dropped ARMED, the arming wire is retained in the bomb rack and withdrawn from the fuze. This frees the arming-vane assembly which rotates in the air stream to arm the fuze.

After the arming vanes have made from 150 to 170 revolutions, the fuze is fully armed. After approximately 200 more revolutions of the arming-vane assembly, the arming stem unscrews from the fuze body cap and the entire arming assembly (arming vanes, reduction gears, and arming stem) is released into the air stream. Air travel necessary to arm these fuzes is approximately 445 to 650 feet with an M4 vane, varying with the bomb used.

Upon impact, inertia drives the firing plunger into the primer to fire the fuze and detonate the bomb.

Arming. The arming-vane assembly is assembled to the bearing cup by the vane nut. Eyelet pins lock the bearing cup and arming-vane assembly together. The eyelet pins fit into notches in the vane hub to insure positive rotation of the bearing cup with the arming-vane assembly.

Delay arming is obtained by reduction gearing between the arming-vane assembly and the arming stem. The ratio is 30 revolutions of the arming-vane assembly to one revolution of the arming stem. Reduction is derived from a pinion gear, a movable gear, and a stationary gear.

The movable gear has 30 teeth; the stationary gear has 29 teeth. The idler gear (pinion) is driven around the stationary gear and movable gear by the bearing cup and arming-vane assembly. Since the movable gear contains one more tooth than the stationary gear, the movable gear is forced one tooth ahead with each complete revolution of the pinion around the stationary gear. When the pinion has circled the stationary gear 30 times, the movable gear has completed one revolution. The movable gear is connected to the arming stem by means of the movable gear carrier. The stationary gear is secured to the stationary-gear carrier. Rotation of the movable gear carrier is prevented by the carrier stop.

As the arming-vane assembly rotates, motion is transmitted through the reduction gears to the arming stem. As the arming stem revolves, it unscrews from the firing plunger and fuze body cap. The arming-vane assembly is strong enough to withstand air speeds up to 600 knots.

Action. When arming is complete, the arming stem has unscrewed itself from the firing plunger. The firing mechanism consists of a firing plunger and an anticreep spring. A guide pin through the fuze-body cap and into the firing plunger prevents rotation of the plunger as the arming stem unscrews, but does not prevent the plunger from sliding in and out.

The anticreep spring supports the plunger against the fuze-body cap. This spring is only strong enough to support the weight of the firing plunger. Upon impact, the plunger compresses the anticreep spring and is driven forward into the primer by inertia.

Detonation. The primer, when struck by the firing pin, explodes and sets off the delay element. After burning through, the delay element sets off the relay which fires the detonator and the bomb.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. If the arming-vane assembly and the reduction gear mechanism are missing, the fuze is armed. If they are not missing, however, the fuze is not necessarily in the unarmed or SAFE condition. The degree of arming can be determined by measuring the distance between the eyelet on the bearing cup and the flange on the arming-stem cup.

If the distance is less than ½ inch, the fuze is only partially armed. If the distance is from ½ to ¾ inch, arming is questionable, and the fuze must be considered armed. If the distance is greater than ¾ inch, the fuze is definitely armed.

Handling. If the fuze is not installed in a bomb, it may be made safe for handling by inserting a pin through the hole in the fuze body and the firing plunger, or by unscrewing the primer detonator in the base of the fuze. If the fuze is installed in a bomb, it is impossible to insert a pin through the fuze body and the firing plunger.

> CAUTION: No attempt should be made to unarm the fuze by turning the arming vane backwards. If the threads on the arming stem fail to engage the threads on the firing plunger, the firing plunger will be pushed into the primer with probable initiation of the explosive components.

To remove the fuze from a bomb, the vanes must be secured in their existing position and the fuze carefully unscrewed. Immediately upon removal, a pin should be inserted through the fuze body and firing plunger. Then the primer detonator may be unscrewed. Such removal shall be accomplished by authorized and qualified personnel only.

Salvaging. Fuzes which have become armed or partially armed may be salvaged by authorized and qualified personnel. Insert the safety cotter pin through the fuze body and firing plunger, turning the arming-vane assembly as far counterclockwise as it will go, and then turn it clockwise about twenty revolutions. Fuzes so salvaged will require approximately the same air travel to arm as when issued. To repack the fuze, remove the arming-vane assembly, replace the safety pin which locks the reduction gear mechanism, and pack in the fuze container.

Fuzing

1. Remove the fuze from its sealed container and inspect the general overall appearance, checking proper condition of the arming-vane assembly and threads. Vanes (M4) are not assembled to the fuze as issued, but come in the same shipping box as the sealed fuze container.
2. Inspect the adapter booster and threads in the bomb. Clean if necessary.
3. Check the fuze for installation of the desired primer detonator.
4. If a different time delay is required, unscrew the existing primer detonator.
5. Select a primer detonator with the proper delay; inspect for corrosion and loose primer. If the primer detonator has a loose primer, it must be disposed of by authorized personnel.
6. Screw the desired primer detonator into the fuze, hand tight. Use no tools.
7. Remove the cotter pin from the fuze body.
8. Screw the fuze, less the arming-vane assembly, into the adapter booster in the tail of the bomb until it seats hand tight. Use no tools. No auxiliary booster is required.
9. Draw one lead of the arming-wire assembly through the rear suspension lug of the bomb, and the nearer of two pair of holes in the bearing-cup eyelet and arming-stem cup. If the nearer pair of holes is occupied by the safety pin, place the spare pin through the holes diametrically opposite before removing the original pin. The other lead of the arming-wire assembly is for a

nose fuze. If no nose fuze is used, cut off the second lead.

10. Cut the sealed wire and remove the safety pin locking-gear mechanism.

11. Thread the end of the arming wire through the eyelet in the arming-vane assembly. Slip the arming-vane assembly over the end of the fuze so that the slots in the hub fit over the heads of the two eyelet pins of the bearing cup.

12. Screw the vane nut on the threaded end of the bearing cup, hand tight.

13. Adjust the arming wire to protrude 2 to 3 inches beyond the arming-vane assembly. Cut off excess arming wire; be sure the arming wire is free of kinks and burrs.

14. Slip two safety (Fahnestock) clips over the end of the arming wire until one clip just touches the face of the arming-vane assembly.

Defuzing

CAUTION: Before removing a fuze from a bomb, be sure that it is unarmed, or safe to handle. The fuze is armed if the arming-vane assembly and reduction-gear mechanism are missing. If these are not missing, the fuze is not necessarily in the unarmed or SAFE condition. Measure the distance between the eyelet on the bearing cup and the flange on the arming-stem cup. If the distance is less than ½ inch, the fuze is partially armed; if ½ to ¾ inch, arming is questionable; if more than ¾ inch, the fuze is definitely armed. In any case, it is important to see the sub-paragraph on Handling in the preceding section before proceeding further.

1. Unscrew the vane nut from the bearing cup.

2. Remove the safety clips and withdraw the arming-vane assembly from the fuze and arming wire.

3. Place the original safety pin in the unoccupied hole in the bearing-cup eyelet and stem cup. Secure the safety pin by threading a retaining wire through the hole in the lower end of the safety pin and twist the ends of the wire together.

4. Withdraw the arming wire from the fuze and repack.

5. Unscrew the fuze from the bomb and insert the cotter pin in the fuze body. Open the legs of the cotter pin to prevent it from slipping out. Repack the fuze in its container and seal with adhesive tape.

Packaging and Marking

Fuze Container. One fuze, less arming vane, is packed in a black cylindrical metal container. Soldered to the container and cover is a metal tear strip which seals the container during shipping and stowage. A ring, attached to one end of the tear strip, facilitates opening.

The following is a typical container marking.

FUZE, BOMB, TAIL, AN–M100A2
LESS ARMING VANE
.025 SEC. DELAY
LOADER'S INITIALS, LOT NO.
PACKED (Month and Year)
(Drawing No.)
REV. DATE OF FUZE DRAWING

Packing Boxes. Twenty-five fuzes, with a corresponding number of arming-vane assemblies, (Vane M4, not marked as such) are packed in a single wood box. The box is fastened with screws and secured with two steel bands. Each fuze is packed in an individual container. The following is a typical packing box marking.

25 TAIL FUZES
BOMB, TAIL, AN–M101A2
0.025 SEC. DELAY
Packed (Month and Year) LOT NO.

IMPACT TAIL FUZE AN–M112, AN–M112A1, AN–M113, AN–M113A1, AN–M114, AN–M114A1, AN–M115, AN–M116, AN–M117, M178, M179, M180, M181, M182, AND M183

Model	AN–M112A1.	AN–M113A1.	AN–M114A1.	AN–M115	AN–M116	AN–M117.
Firing Action	Inertial	Inertial	Inertial	Inertial	Inertial	Inertial.
Firing Delay	8–15 sec. or 4–5 sec.	8–15 sec. or 4–5 sec.	8–15 sec. or 4–5 sec.	According to primer detonator used.		
Assembly Dwg No	73–8–112	73–8–114	73–8–116	73–8–158	73–8–160	73–8–162.
Arming:						
Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed.
Revolutions to Arm	—	—	—	150–170	150–170	150–170.
Air Travel to Arm (ft):						
M4 Vane	—	—	—	445–650	445–650	445–650.
M5 Vane	—	—	—	1225–1420.		
Overall Length (in.)	9.6	12.6	16.6	9.54	12.54	16.54.
Protrusion from Bomb (in.).	6.6	9.7	13.7	6.54	9.54	13.54.
Body Diameter (in.)	1.43	1.5	1.43	1.5	1.5	1.5.
Vane Span (in.)	4.83	4.9	4.83	5	5	5.
Weight (lbs.)	2.3	2.5	2.8	2.7	2.9	3.2.
Number of Vanes	4	4	4	4	4	4.
Shipping Container:						
Number per Container.	—	—	—	25	25	25.
Type Container (outer).	—	—	—	Wood crate.		
Weight Filled (lb.)	—	—	—	116.3	128.9	145.3.

Model	M178	M179	M180	M181	M182	M183.
Firing Action	Inertial	Inertial	Inertial	Inertial	Inertial	Inertial.
Firing Delay	8–15 sec or 4–5 sec.	8–15 sec or 4–5 sec.	8–15 sec or 4–5 sec.	4–5 sec or 8–15 sec.	4–5 sec or 8–15 sec.	4–5 sec or 8–15 sec.
Assembly Dwg No	73–8–473A	73–8–473B	73–8–473C	73–8–473C	73–8–475B	73–8–475C.
Arming:						
Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed.
Revolutions to Arm.						
Air Travel to Arm (ft.):						
M4 Vane						
M5 Vane						
Overall Length (in.)	24.85	36.65	44.71	24.6	36.97	45.03.
Protrusion from Bomb (ft.).	21.85	33.65	41.71	21.6	33.97	42.03.
Body Diameter (in.).						
Vane Span (in.).						
Weight (lbs.)	3.4	4.1	4.6	3.65	4.4	5.0.
Number of Vanes	4	4	4	4	4	4.
Shipping Container:						
Number per Container.						
Type Container (outer).						
Weight Filled (lb.).						

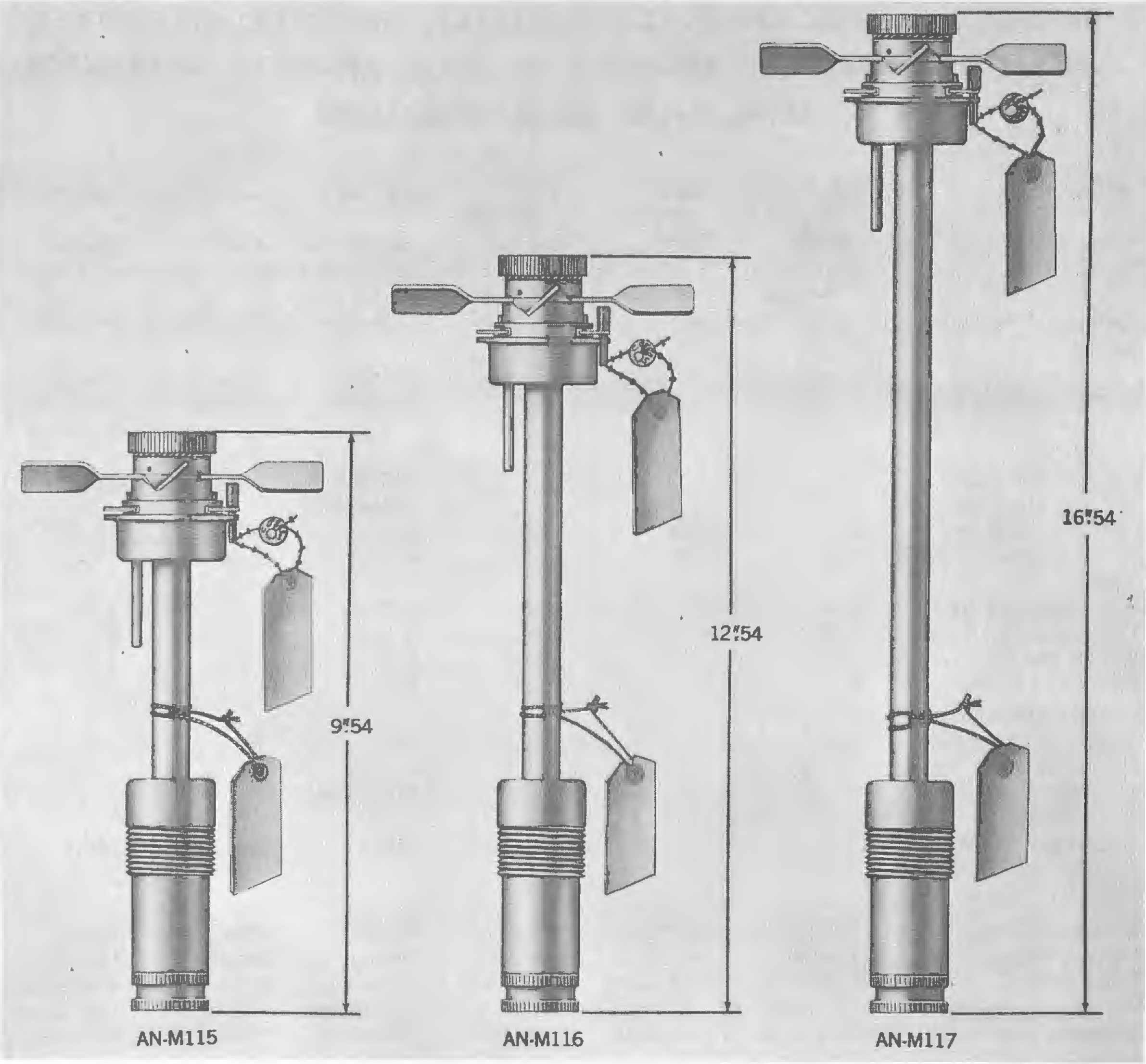


Figure 2–19.—Impact Tail Fuzes AN–M115, AN–M116, and AN–M117.

General Description

Impact Tail Fuzes AN–M115, AN–M116, and AN–M117. The impact tail fuze of this type, figure 2–20, are vane operated and inertia fired. Their arming is mechanically delayed by reduction gearing. The explosive components of the fuzes are contained in one interchangeable primer detonator. By substituting primer detonators with different delay elements, the delay time between impact and detonation can be varied.

The fuzes of this series differ in overall length so that the same type fuzes can be used in various size bombs. The differences in length are necessary to locate the arming-vane assemblies properly in the air stream.

The M4 and M5 arming-vane assemblies are used with the AN–M115 series. The standard vane M4 (45-degree pitch) is used for shorter arming distances; the M5 vane (75-degree pitch) is used for longer arming distances. At present, only the M4 vane is issued with these fuzes. Separate action is necessary to requisition the M5 vane.

Other fuzes similar to the AN–M115 series are the following.

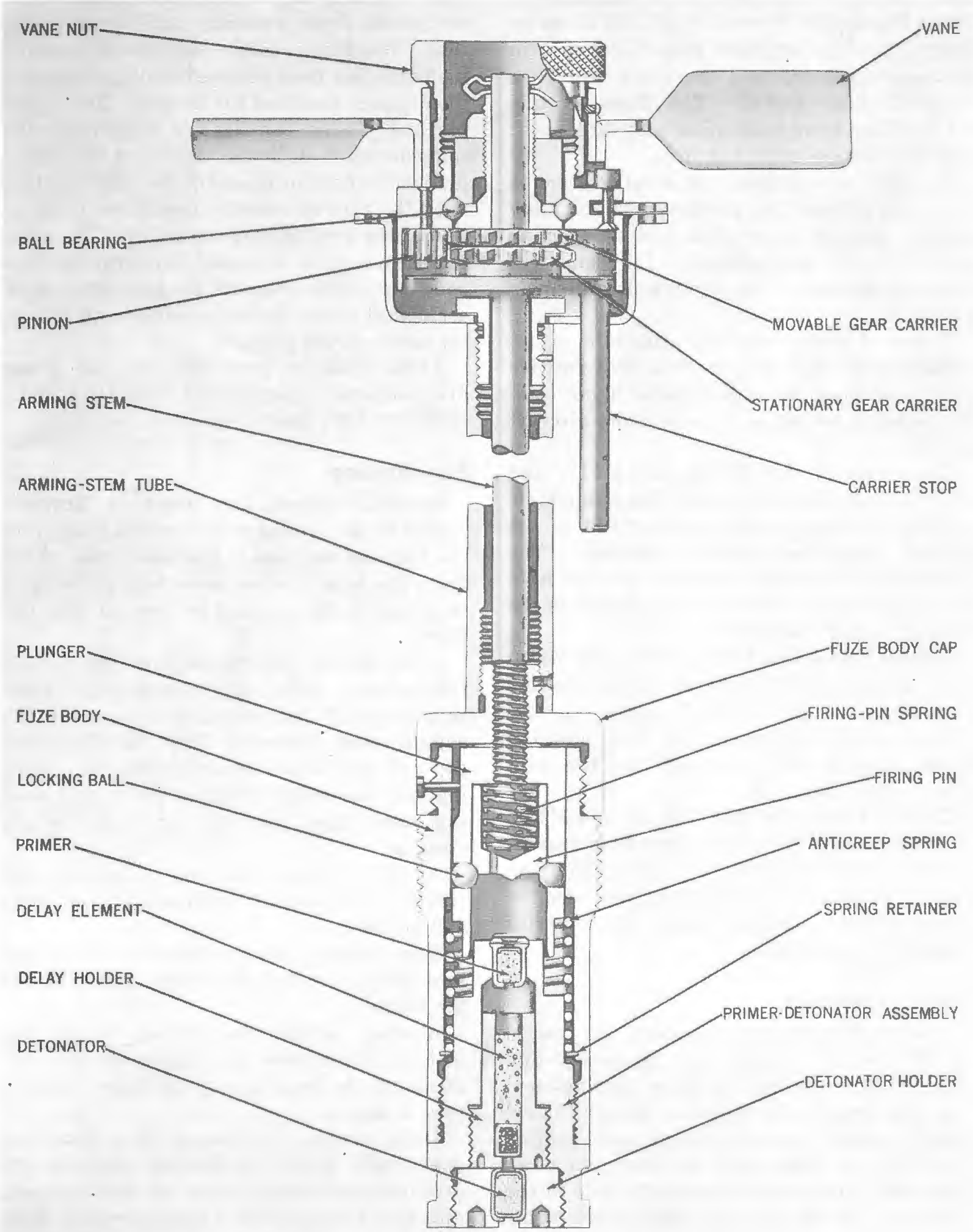


Figure 2–20.—Impact Tail Fuze AN–M115, Cross Section.

Impact Tail Fuzes AN–M112, AN–M113, and AN–M114 (and their A1 modifications). These fuzes differ from the AN–M115 series in that they do not have reduction gears in the vane assembly and therefore require a longer arming period. The fuzes in this series differ from each other only in length; they are for use with box fins.

As the vanes rotate, the arming stem is unthreaded from the plunger. The arming stem is secured to the vane nut by a cotter pin; 18 to 21 revolutions of the vane will free the plunger. The air travel to arm is 100 feet.

Fuzes of this series will function on an impact angle of 3 degrees and give positive action because of the cocked firing pin. These fuzes are not to be used from aircraft carriers.

The original AN–M112, AN–M113, and AN–M114 fuzes used Primer Detonator M16. This primer detonator was modified to the M16A1, which has a higher shoulder. The AN–M112 series was modified to the AN–M112A1 series in order to accommodate the M16A1 primer detonator.

Impact Tail Fuzes M178, M179, and M180. This series has the same operating characteristics as the AN–M112A1 series (no reduction gear, fast arming) but has the longer arming stem necessary for use with a conical-fin assembly.

Impact Tail Fuzes M181, M182, and M183. This series has the same operating characteristics as the AN–M115 series (reduction gear in arming-vane assembly), and also the longer arming stem necessary for use with conical fin assemblies.

Safety Features

During shipping and stowage, the fuze is in the unarmed condition. A safety pin, inserted through the hole in the arming-stem cup and bearing-cup eyelet, prevents the reduction gears from revolving and arming the fuze. A wire, with an instruction tag attached, is threaded through the hole in the lower end of the pin and sealed with a car seal. A second instruction tag is secured to the arming-stem tube.

When installed in a bomb with the arming wire in place, the arming-vane assembly is prevented from rotating and arming the fuze. The fuze is in the safe condition until the bomb has been released and has traveled the distance required for arming. The firing pin and plunger are in line with explosive components at all times. However, the firing plunger is held in place by the arming stem until the arming stem is unscrewed by rotation of the arming-vane assembly. The arming stem also is threaded through the fuze body cap. This prevents the transmission of accidental blows on the arming-vane assembly to the firing plunger.

These fuzes in externally carried stores are restricted in accordance with NAVORD-INST 8024.25, latest issue.

Functioning

General. When the bomb is dropped ARMED, the arming wire is withdrawn from the fuze and retained in the bomb rack. This frees the arming-vane assembly, allowing it to rotate in the air stream and to arm the fuze.

After 150 to 170 revolutions, the fuze is fully armed. After approximately 200 more revolutions of the arming-vane assembly, the arming stem unscrews from the fuze body cap and the entire arming assembly (arming-vane assembly, reduction gears, and arming mechanism) is released into the air stream.

As bomb sizes increase, a greater air travel is required for arming, ranging from 450 to 650 feet.

Upon impact, inertia drives the firing pin into the primer to fire the fuze and detonate the bomb.

Arming. Eyelet pins, fitting into notches in the arming-vane hub, insure positive rotation of the bearing cup with the arming-vane assembly.

Delay arming is obtained by a reduction gear train which is located between the arming-vane assembly and the arming stem, and which consists of a pinion gear, a movable gear, and a stationary gear. The ratio is 30 revolutions of the arming-vane assembly to one revolution of the arming stem. The movable gear has 30 teeth, while the stationary gear has 29. The idler gear (pinion) is driven around the stationary and movable gears by the bearing cup and the arming-vane assembly. Since the movable gear contains one more tooth than the stationary gear, the pinion pushes the movable gear one tooth forward for each complete revolution. When the pinion has made 30 revolutions, the movable gear has completed one revolution. The movable gear is connected to the arming stem through the movable gear carrier. The stationary gear is secured to the stationary gear carrier, which is prevented from rotating by the carrier stop.

As the arming-vane assembly rotates, motion is transmitted through the reduction gears to the arming stem. The arming stem revolves and unscrews itself from the firing plunger and fuze body cap.

The firing mechanism consists of a firing plunger, locking balls, an anticreep spring, a spring retainer, and a hollow firing pin, housing a cocked firing-pin spring.

The firing pin and spring are assembled inside the plunger; the compressed firing-pin spring is behind the firing pin. They are held in this position by two locking balls in the plunger, which are wedged in position by the inner surface of the fuze body and the beveled edge of the firing pin. The plunger is prevented from revolving with the arming stem by a pin passing through the fuze-body cap and into the vertical groove in the plunger. This pin does not prevent the plunger from sliding in and out.

Action. When arming is complete, the the arming stem has unscrewed itself from the firing plunger and the plunger is held back by the anticreep spring. This spring is strong enough only to offset the weight of the plunger and the firing-pin spring. Upon impact, the plunger is driven forward by inertia, compressing the anticreep spring. After moving forward a short distance, the locking balls pass a shoulder on the inner surface of the fuze body and are forced out by the spring-loaded firing pin, thereby unlocking the firing pin. The compressed firing-pin spring then drives the firing pin into the primer.

Detonation. The primer fires when struck by the firing pin, setting off the delay element. After burning through, the delay element sets off the relay, which fires the detonator, the booster, and the bomb.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the "SAFE" position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. If the arming-vane assembly and reduction-gear mechanism are missing, the fuze is armed. If they are not missing, however, the fuze is not necessarily in the unarmed or SAFE condition. The degree of arming can be determined by measuring the distance between the bearing-cup eyelet on the gear mechanism and the arming-stem-cup flange.

If the distance is less than ½ inch, the fuze is only partially armed. If the distance is ½ to ¾ inch, the arming is questionable and the fuze must be considered armed. If the distance is greater than ¾ inch, the fuze is definitely armed.

Handling. Armed or partially armed fuzes should be removed only by authorized and qualified personnel.

> CAUTION: Prevent the arming-vane assembly from rotating by inserting a cotter pin or wire through the holes in the arming-stem cup and the bearing-cup eyelet. This will not make the fuze any safer if it is fully armed, but will prevent partially armed fuzes from becoming completely armed.

Unscrew the fuze from the bomb; do not jar or drop either the fuze or the bomb.

The bomb must be maintained in a horizontal position, or with the nose end up. Immediately after removal, keep the fuze in a vertical position (vane end down) and unscrew the primer detonator from the fuze body.

Salvaging. Do not attempt to unarm fully or questionably armed fuzes by turning the arming vane; such fuzes should be turned over to authorized and qualified personnel.

Fuzing

1. Remove the fuze from its sealed container and inspect the general overall appearance. Check for proper condition of vanes and threads. The arming-vane assembly is not assembled to the fuze as issued but comes in the same shipping box as the sealed fuze container.
2. Change the primer detonator if a different delay is desired. To change, unscrew the primer detonator by hand and screw in the primer detonator with the desired delay. Primer detonators having loose primers, evidence of corrosion, or other visible defects should be disposed of by authorized personnel.
3. Screw the fuze, less the arming-vane assembly, into the adapter-booster in the tail of the bomb until it seats handtight. Use no tools. No auxiliary boosters are necessary.
4. Thread one lead of arming-wire assembly through the rear suspension lug of the bomb and the nearest of two pairs of holes through the arming-stem cup and bearing-cup eyelet. If the nearer pair of holes is occupied by the safety pin, place a spare pin through the pair of holes diametrically opposite the first pair before removing the original safety pin. The other end of the arming-wire assembly is for a nose fuze and should be cut off when a nose fuze is not installed.
5. Cut the sealed retaining wire and remove the safety pin.
6. Position the arming-vane assembly so that the slots in the vane hub will fit over the heads of the eyelet pins and the arming wire will pass through the hole in the alined vane. Attach two safety clips to the end of the arming wire.
7. Screw the vane nut on the threaded end of the bearing cup, handtight.
8. Slip two safety clips snugly against the vane. Cut off excess arming wire, allowing the end to extend 2 to 3 inches past the vane and clips. The end of the wire must be free of kinks and burrs.

Defuzing

> CAUTION: Before attempting to remove the fuze from the bomb, be sure it is in the unarmed condition, or safe to handle. If the arming-vane assembly and reduction-gear mechanism are missing, the fuze is armed. If the arming-vane assembly and gear mechanism are not missing, however, the fuze is not necessarily in the unarmed or SAFE condition. Measure the distance between the bearing-cup eyelet on the gear mechanism and the arming-stem-cup flange. If the distance is less than ½ inch, the fuze is partially armed; if ½ to ¾ inch, arming is questionable and the fuze must be considered armed; if greater than ¾ inch, the fuze is definitely armed. In any case, it is important to see the information on Handling in the preceding section before proceeding further.

1. Loosen the vane nut by unscrewing it.
2. Remove the safety clips. Withdraw the arming-vane assembly from the fuze and arming wire.
3. Place a safety pin through the unoccupied hole of the bearing-cup eyelet and arming-stem cup. Secure the safety pin by threading a retaining wire through the hole in its lower end. Twist the ends of wire together.
4. Withdraw the arming wire from the fuze and repack.
5. Unscrew the fuze from the bomb and repack it in its container.

Packaging and Marking

Fuze Container. One fuze, less arming-vane assembly, is packed in a black cylindrical metal container. A metal tear strip, soldered to the container and cover, seals it during shipping and stowage. A ring attached to the end of the tear strip facilitates opening.

The following is a typical container marking.

FUZE, BOMB, TAIL, AN–M115
LESS ARMING VANE
8 TO 15 SEC. DELAY
Loader's Initials Lot No. Packed (Month & Year)
Drawing No. Rev. Date of Fuze Drawing

Packing Boxes. Twenty-five fuzes in containers and 25 arming-vane assemblies are packed in a wooden packing box. The packing box cover is fastened with flathead screws and the box is bound with two steel straps. A sample marking on the side of the box follows.

25 FUZES
BOMB, TAIL, AN–M115
8 TO 15 SEC. DELAY
Packed (Month and Year) Lot No.

IMPACT TAIL FUZE AN–Mk 228

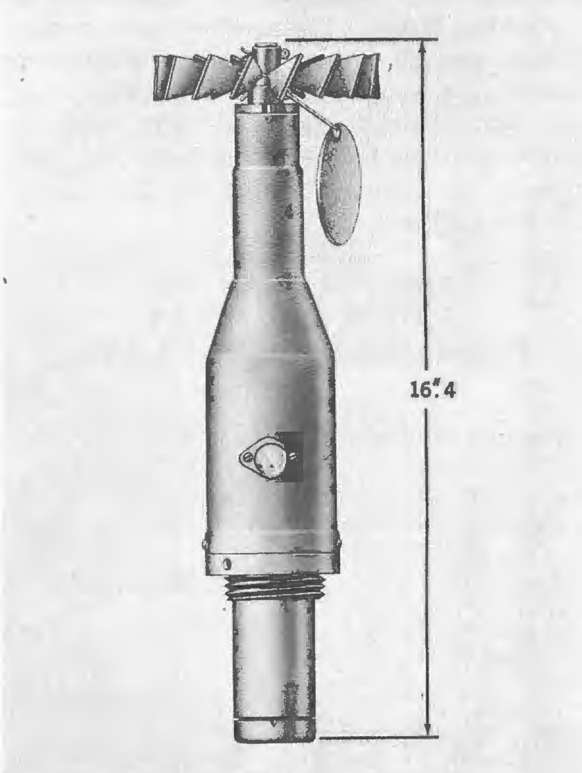


Figure 2–21.—Impact Tail Fuze AN–Mk 228.

Mark	AN–Mk 228
Firing Action	Impact
Firing Delay (sec)	0.08
General Arrangement	236220
Arming	
Type	Delayed
Air Travel to Arm (ft)	1100
Overall Length (in.)	16.4
Protrusion from Bomb (in.)	12.4
Vane Span (in.)	5.3
Weight (lb)	10.5
Number of Vanes	16
Booster Charge	
Type	Tetryl
Weight (grams)	38.2

General Description

The detonator safe, delay armed tail fuze of this type, figure 2–22, is vane operated and arms after 1100 feet of air travel. It functions upon impact through two independent trains of 0.08-second delay. The fuze is now obsolete; it generally was used in conjunction with armor-piercing bombs where the delay allowed penetration of the target before detonation.

The fuze is bottle-shaped with a 16-blade arming-vane assembly attached to its outer end. A cylindrical extension, housing the booster, projects from the base of the fuze body.

The designations Mod 0 and Mod 1 merely indicate different manufacturers. Because of the differences in manufacturing practices, however, the parts of a fuze made by one manufacturer are not necessarily interchangeable with parts of the same fuze made by another manufacturer.

Use extreme care in handling these fuzes; some lots are dangerously sensitive. Refer to OP 1515 (Ammunition: Unserviceable, Limited-Use, and Suspended) before using AN–Mk 228 fuzes. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

This type of fuze contains two explosive trains for greater reliability. Each consists of a primer, a delay element, a relay, a detonator, an auxiliary booster lead-in, a booster lead-in, and a booster of approximately 38.2 grams (1.346 ounces) of tetryl. The booster is located at the base of the fuze body.

Safety Features

Each fuze is individually packed in a hermetically sealed container. The arming mechanism is prevented from operating by a safety cotter pin, with a pull ring and instruction tag attached, which passes through the body of the fuze (bushing) and vane shaft. The fuze is detonator safe.

The arming wire keeps the fuze unarmed until it is withdrawn when the bomb is released. This arming wire passes through the rear suspension lug of the bomb and arming bracket on the fuze, preventing rotation of the arming-vane assembly.

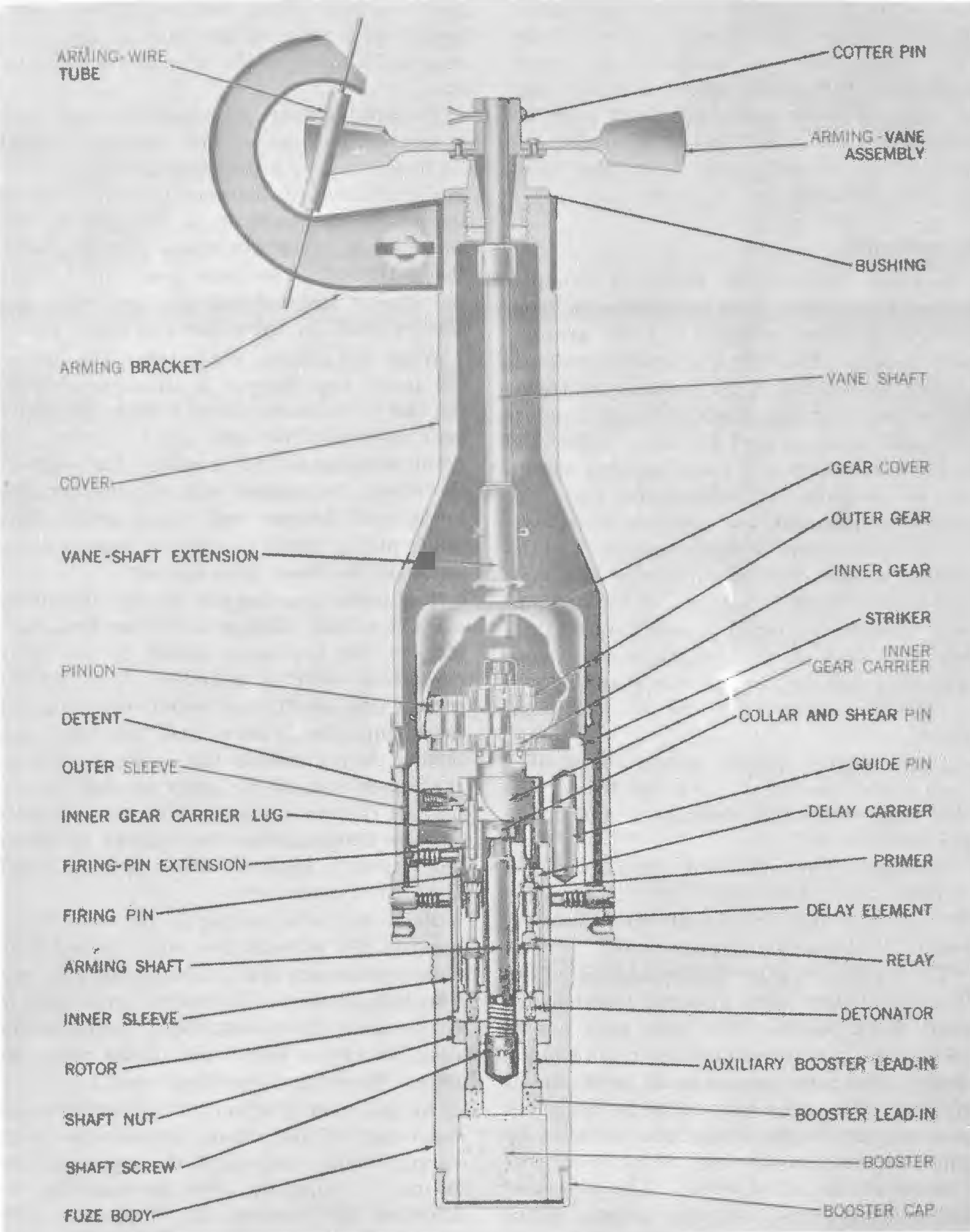


Figure 2–22.—Impact Tail Fuze AN–Mk 228, Cross Section.

A small glass window, figure 2–23, in the side of the fuze permits visual examination of the unarmed or armed condition of the fuze mechanism. If unarmed, the upper surface of the striker and the lower edge of the gear cover are about flush with the top edge of the outer sleeve. If armed, the striker has moved away from the outer sleeve approximately $^{11}/_{32}$ inch.

Functioning

General. When the bomb is dropped armed, the arming wire is withdrawn from the arming-vane assembly and the arming-wire bracket, allowing the arming-vane assembly to rotate. This rotation is transferred to the arming shaft, through a reduction-gear train, to arm the fuze. After 150 to 160 revolutions of the arming-vane assembly, all elements of the explosive train are locked in alinement, and the fuze is armed.

When the explosive components lock in the armed position, the arming-vane assembly will usually cease to rotate. If the arming-vane assembly is forced to continue rotating, however, pins in the reduction-gear train will shear and the arming-vane assembly will be free to rotate with the no additional effect.

Upon impact, inertia drives the striker toward the booster, forcing the firing pins into their respective detonators and firing the fuze.

Arming. The revolving motion of the arming-vane assembly is transmitted through the vane-shaft and vane-shaft extension to the reduction-gear train.

The reduction-gear train consists of an outer (movable) gear, an inner (stationary) gear, and a pinion. The outer gear has 23 teeth and is connected directly to the arming shaft. The inner gear has 22 teeth and is secured to the inner gear carrier. The inner gear carrier is prevented from revolving by the inner gear carrier lug, which is set into a recess on the inner sleeve. The outer and inner gears mesh with the pinion, which has an equal number of teeth on its outer and inner portions. As the pinion is driven around the outer and inner gears by the arming-vane assembly, it forces the outer gear one tooth ahead each revolution. This results in a ratio of one turn of the outer gear to 23 turns of the arming-vane assembly.

The arming shaft, to which the outer gear is secured, is threaded into the shaft nut at its lower end. As the outer gear and arming shaft revolve, the arming shaft rises in the shaft nut until it is stopped by the shoulder on the shaft screw jamming with the shaft nut. The inner gear carrier and the striker are carried outward with the arming shaft by the collar and shear pin.

When the arming shaft jams, the lug on the inner gear carrier is disengaged from the slot in the inner sleeve, freeing the inner gear carrier. The outer gear is prevented from rotating by the jammed shaft screw; therefore, the pinion will act to turn the lower gear carrier and lower gear. The guide pins prevent the striker from revolving with the inner gear carrier.

The inner gear carrier houses the firing pin extensions. Below the inner gear carrier, within the inner sleeve, is the delay carrier—a circular cylinder which rotates around the shaft and which contains the firing pin, the primer, and the delay element. A protruding lug is positioned on the upper end of the delay carrier, in the path of the inner gear carrier lug. Contact is made between these two lugs as the inner gear carrier revolves after freeing itself from the inner sleeve.

Below the delay carrier is the rotor, which consists of a hub and two wing-shaped detonator containers that project from the hub. The hub allows the detonator containers to rotate about the arming shaft. A lug on the delay carrier is positioned in the space between the detonator containers.

As the inner gear carrier lug contacts the outer lug of the delay carrier, the delay carrier turns, contacting the rotor and rotating it. When the inner gear carrier has traveled 170 degrees, the firing-pin extensions and all components of the two explosive trains are in alinement. At this point, detents lock the inner gear carrier to the striker, and also the delay carrier to the inner sleeve.

The fuze is now fully armed. The arming-vane assembly has made between 150 and 160 revolutions, and the bomb has traveled the necessary 1100 feet along its trajectory.

Action. Inertia, upon impact, forces the striker and inner gear carrier toward the booster, shearing the shear pin which runs through the supporting collar and arming shaft. The firing-pin extensions, protruding from the inner gear carrier, strike the firing pins, driving them into their primers.

One firing-pin extension is slightly longer than the other; therefore the explosive components are not initiated simultaneously. Greater reliability of fire results from this arrangement since all the force of the inner gear carrier and striker is directed onto one firing pin at a time.

Detonation. The firing pins ignite the primers, and the flash from the primers sets off the delay elements. The delay elements set off the relays which, in turn, fire the detonators, the auxiliary booster lead-ins, the booster lead-ins, and the booster.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb. This prevents the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. The degree of arming can be seen through a small glass window on the side of the fuze. Examining the relative positions of the striker, the cover, and the outer sleeve affords an indication of the degree of arming.

If the upper surface of the striker and the lower edge of the cover are about flush with the top edge of the sleeve, the fuze can be considered unarmed. If the position of the striker is not more than 3/16 inch away from the outer sleeve, the fuze can be considered only partially armed. If the striker has moved away from the outer sleeve about 11/32 inch, the fuze is to be considered fully armed.

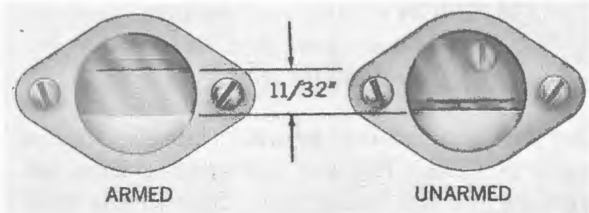


Figure 2–23.—Impact Tail Fuze AN–Mk 228, Indication of Armed Condition.

Handling. In the armed condition, all explosive components are alined with the firing pins and firing-pin extensions. A sharp blow to the arming-vane assembly may be severe enough to detonate the fuze. If a fuze is partially armed, the vanes should be taped to prevent further arming and turned over to authorized and qualified personnel. If a fuze is so distorted that it cannot be removed from the bomb, it must be considered armed. Tape the vanes to prevent further arming and turn both the bomb and the fuze over to authorized and qualified personnel. When removing an armed or partially armed fuze from a bomb, use the utmost caution. Do not jar either the bomb or the fuze.

Fuzing

1. Remove the shipping plug from the bomb; inspect the fuze seat and threads. Clean if necessary. Make sure Auxiliary Booster Mk 1 Mod 0 is in place in the bomb.

2. Unseal the hermetically sealed container and remove the fuze. Inspect its general appearance. Check for bent arming-vane assembly, damaged threads, or corrosion. Use only serviceable fuzes.

3. If there is no arming-wire bracket on the fin assembly of the bomb, it will be necessary to attach one to the neck of the fuze. To do this, remove the cotter pin holding the arming-vane assembly to the vane shaft and remove the arming-vane assembly.

CAUTION: Do not remove the safety cotter pin that locks the arming mechanism.

Attach the arming bracket loosely to the neck of fuze. Replace the arming-vane assembly and the cotter pin. Spread the ends of the cotter pin 180 degrees.

4. Screw the fuze into the bomb, hand-tight. A small spanner wrench may be used if necessary.

5. Rotate the arming bracket so that it will be in a vertical position when the bomb is placed in the rack; tighten the bracket.

6. Thread the arming wire through the rear suspension lug of the bomb and then through the arming bracket on the fuze. Be sure the arming-wire tube (the brass tube furnished with the bracket) covers the arming wire where it passes between the blades of the arming-vane assembly.

7. Adjust the wire to protrude 2 to 3 inches past the arming bracket on the fuze. Place two safety clips on the arming wire and push them up until they are just touching the arming bracket. Make sure the arming wire is free from kinks and burrs. Remove the safety cotter pin, passing it through the body of the fuze (bushing) and the vane shaft.

Defuzing

CAUTION: Before attempting to remove a fuze from a bomb, be sure that it is unarmed, or safe to handle. The degree of arming can be determined through a small glass window in the side of the fuze by examining the relative positions of the striker, cover, and outer sleeve. If the upper surface of the striker and the lower edge of the cover are about flush with the top edge of the sleeve, the fuze can be considered unarmed. If the position of the striker is not more than 3/16 inch away from the outer sleeve, the fuze can be considered only partially armed. If the striker has moved away from the outer sleeve about 11/32 inch, the fuze is to be considered fully armed. See the preceding section on handling for further information before proceeding further.

1. Replace and secure the safety cotter pin through the holes on the vane shaft and bushing directly behind the arming-vane assembly.

2. Remove the two safety clips and also the arming wire from the fuze.

3. Unscrew the fuze from the fuze seat in the bomb.

4. Remove the arming bracket from the fuze, if one was fastened to the fuze during the fuzing operation.

5. Return the fuze to its packing; reseal the fuze container with adhesive tape.

Packaging and Marking

Fuze Container. One loaded fuze, complete with arming-vane assembly, and two safety (Fahnestock) clips are packed in a hermetically sealed metal container. The fuze is stamped with the mark and mod number, lot number, year, manufacturer's initials, and inspector's initials. A typical fuze container is marked as follows.

FUZE, BOMB, TAIL AN–Mk 228
(Date Packed)

Contract No.	Manufacturer & Place loaded
Weight: Loaded; empty	Inspector's Initials
	Lot No.

Packing Box. Four fuzes in their metal containers are issued in one metal packing box weighing 60 pounds, the dimensions of which are 17.1 inches by 11.6 inches by 11.6 inches. The box is marked as follows.

4 TAIL FUZES
BOMB, TAIL, AN–Mk 228

Requisition No.	Manufacturer
Contract No.	Inspector's Initials
Weight of Crate & Contents	

IMPACT TAIL FUZE AN–Mk 247 Mod 0

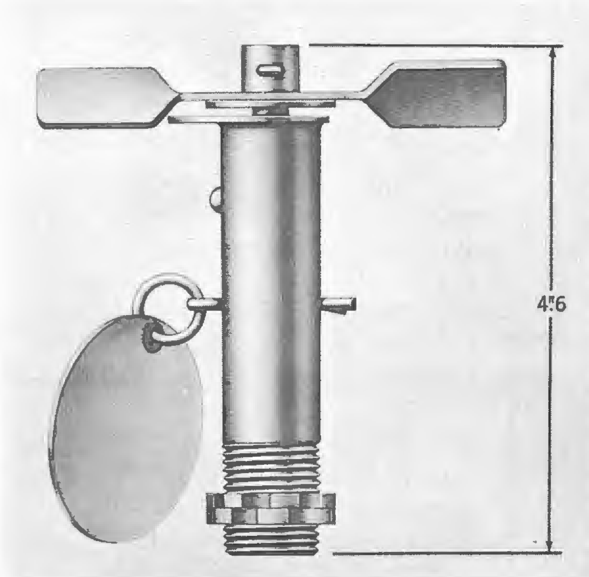


Figure 2–24.—Tail Fuze AN–Mk 247 Mod 0.

Mark	247
Mod	0
Firing Action	Inertial
Firing Delay (sec)	None
General Arrangement	398792
Arming	
Type	Direct
Revolutions to Arm	13
Air Travel to Arm (ft)	60 to 240 (depending upon launching conditions)
Overall Length (in.)	4.6
Protrusion from Bomb (in.)	3.85
Vane Span (in.)	4.0
Weight (oz)	10
Number of Vanes	2

General Description

This type of impact tail fuze, figure 2–25, is vane operated and inertia fired, and requires from 65 to 240 feet of air travel to arm, depending upon launching conditions. It acts instantaneously upon impact to detonate the signal of a practice bomb. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

There are no internal explosive components in this type of fuze since it serves only as a trigger for firing the signal in a practice bomb. The explosive elements are external; they consist of a black-powder-filled signal and a blank .38 caliber cartridge, both of which are shipped in the same container with the fuze. Upon impact, the fuze firing pin strikes the black cartridge and the exploding cartridge fires the signal.

Safety Features

Since the fuze is inert, it is safe to handle. The blank cartridge is not installed until the fuzing operation. A safety cotter pin, with pull ring and instruction tag, attached extends through the fuze body. This cotter pin locks the arming mechanism and firing mechanism so that the fuze will not accidently detonate the signal during fuzing. The cotter pin should not be removed until the fuze is completely installed and the arming wire attached. The fuze is shipped assembled to the practice bomb signal, less the blank cartridge.

When this fuze is properly installed in a signal which, in turn, is in place in a bomb, the arming wire of the bomb prevents the arming-vane assembly of the fuze from rotating and arming the fuze. The unarmed fuze cannot function.

Functioning

General. When the bomb is dropped ARMED, the arming wire is withdrawn from the fuze and retained in the bomb rack. This frees the arming-vane assembly which rotates in the air stream.

The arming-vane assembly arms the fuze after approximately 13 revolutions, which require from 65 to 240 feet of air travel depending upon launching conditions. When the arming-vane assembly completes approximately 25 revolutions, it is freed into the air stream.

Upon impact, the fuze firing pin is driven into the blank cartridge, igniting the signal.

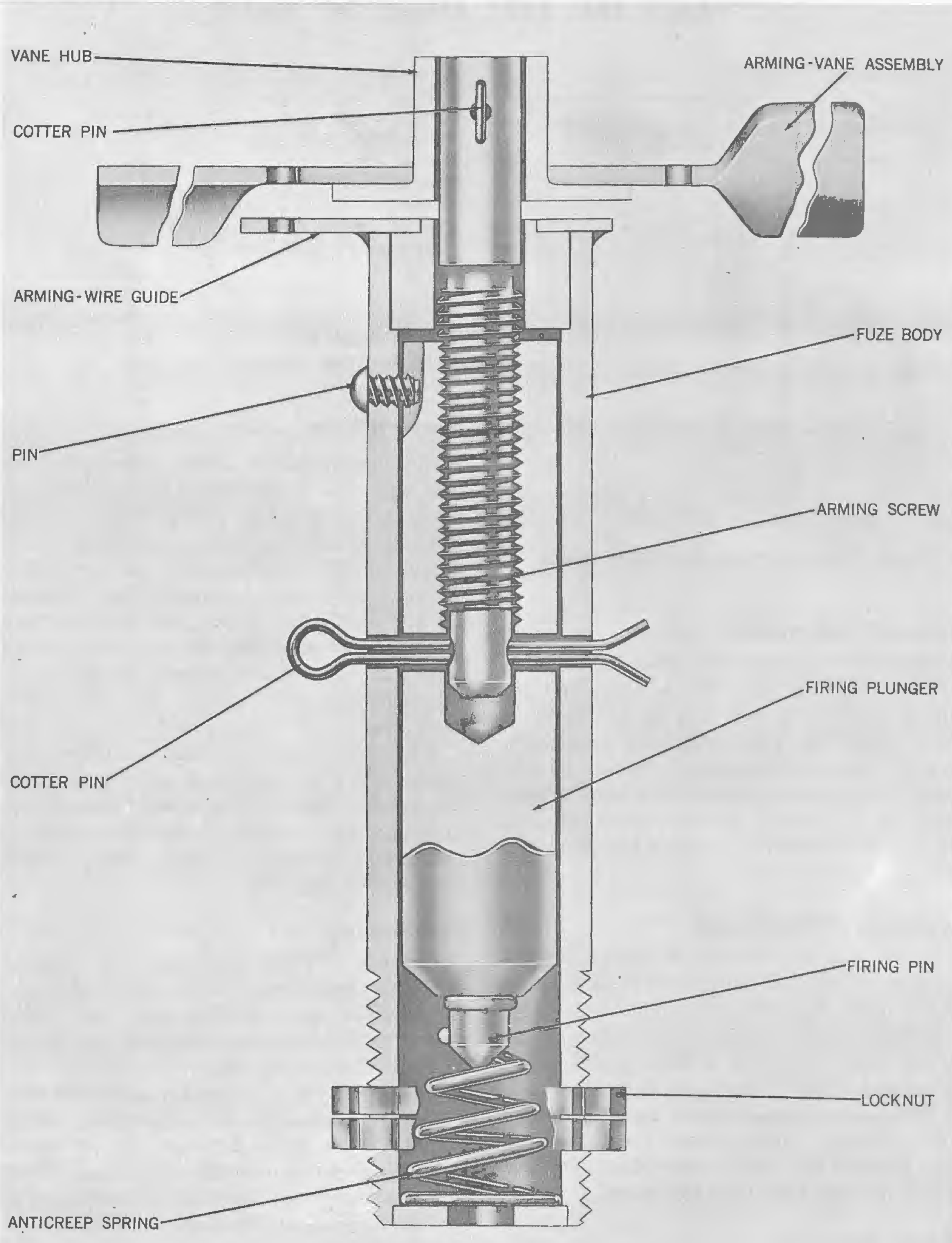


Figure 2–25.—Impact Tail Fuze AN–Mk 247, Cross Section.

Arming. The arming-vane assembly is connected to the arming screw, which is threaded into the firing plunger. As the arming-vane assembly rotates, it causes the arming screw to unscrew itself from the firing plunger. This raises the arming-vane assembly outward from the fuze.

The firing plunger rides vertically in the fuze body. It is prevented from rotating by a pin passing through the fuze body and into a vertical groove in the firing plunger.

The anticreep spring supports the weight of the plunger, the arming screw, and the arming-vane assembly. The spring is strong enough only to offset this weight; any added force will cause the spring to compress and the firing plunger to ride toward the blank cartridge in the signal.

Until the arming-vane assembly has made the necessary 13 revolutions, the fuze cannot fire the signal. This is because the arming-vane assembly has not raised sufficiently from the fuze to allow the firing plunger and pin to reach the blank cartridge. When 13 revolutions are completed, the plunger can move inward far enough to allow the firing pin to strike the blank cartridge. Continued rotation of the arming-vane assembly causes the arming screw to free itself from the firing plunger. Both the arming-vane assembly and the arming screw are released into the airstream.

Action. When the bomb strikes a target, the inertia of the firing plunger compresses the anticreep spring and drives the plunger toward the blank cartridge.

Detonation. The firing pin strikes the blank .38 caliber cartridge which ignites the signal.

Released Safe

When the bomb is released SAFE, the aircraft arming controls are set in the SAFE position. The arming wire is then released with the bomb when the bomb is jettisoned. With the arming wire in place, the arming-vane assembly cannot rotate and arm the fuze. The unarmed fuze will not function on impact.

Accidental Arming

Recognition. If the arming-vane assembly and the arming screw are missing, or if the arming-vane assembly is raised from the fuze ½ inch or more, the fuze is armed.

Handling. An armed fuze which is in place in a signal can be made safe for handling by inserting the original cotter pin or a duplicate through the fuze body. This will lock the firing plunger in place. The fuze and signal then can be removed from the bomb and separated.

The fuze is safe to handle once it is removed from the signal since it contains no explosive.

Salvaging. Armed or partially armed fuzes may be returned to their original condition by rotating the arming-vane assembly counterclockwise until the holes in the fuze body, the firing plunger, and the arming screw aline. Lock the fuze in this position by passing the cotter pin through the holes and securing it.

Fuzing

1. Remove the thumb nuts, lockwashers, and C-plate from the two studs next to the opening in the tail of the bomb.

2. Unpack from the corrugated carton Practice Bomb Signal Mk 7 Mod 0 with Tail Fuze Mk 247 Mod 0 attached, the arming-vane assembly of the fuze, and the cotter pin and blank .38 caliber cartridge which are sealed in an envelope in the carton.

3. Check the signal and fuze for any physical defects; look for dented parts.

4. Place the arming-vane assembly on the arming screw of the fuze and adjust it so that the holes in the vane hub aline with those in the arming screw. Insert the cotter pin provided through the holes and secure it by spreading its ends.

5. Loosen the locknuts on the fuze and unscrew it from the signal; insert the blank .38 caliber cartridge provided into the cartridge chamber of the signal. Rescrew the fuze into the signal; tighten the locknuts downward until they join.

6. Insert the fuzed signal into the opening in the tail of the bomb; adjust the signal so that the hole in the arming-wire guide of the fuze is in line with the rear suspension lug of the bomb. Seat the signal firmly.

7. Place the C-plate around the fuze and over the signal; secure the C-plate with thumb nuts and lockwashers; tighten the thumb nuts finger tight.

8. Thread the arming wire through the rear suspension lug of the bomb, the arming-wire guide, and the arming-vane assembly of the fuze.

9. Place the two safety clips on the end of the arming wire. Move the clips up the wire until they touch the arming-vane assembly. Be sure the wire is free of kinks and burrs.

10. Pull the safety cotter pin from the fuze body.

Defuzing

CAUTION: Before removing a fuzed signal from a bomb, be sure it is unarmed, or safe to handle. If the arming-vane assembly and the arming screw are missing, or if the arming-vane assembly is raised from the fuze ½ inch or more, the fuze is armed. See the paragraph, Accidental Arming, in the preceding section for information on handling before proceeding further.

1. Insert the safety cotter pin through the fuze body and secure it in place.

2. Remove the safety clips from the arming wire. Withdraw the arming wire from the arming-vane assembly and the arming-wire guide.

3. Loosen the thumb nuts and remove the C-plate from around the fuze and the signal. Withdraw the fuzed signal from the bomb. Replace the C-plate, thumb nuts, and lockwashers.

4. Loosen the locknuts at the base of the fuze; unscrew the fuze from the signal.

5. Remove the blank cartridge from the cartridge chamber of the signal. Rescrew the fuze into the signal; tighten the locknuts of the fuze.

6. Remove the cotter pin from the arming-vane assembly and arming screw of the fuze. Remove the arming-vane assembly from the fuze.

7. Return the signal, with attached fuze, arming-vane assembly, blank cartridge, and cotter pin to the cardboard container. Reseal the container with adhesive tape.

Packaging

Fuze Container. Each fuze comes assembled to Practice Bomb Signal Mk 7 Mod 0, less the blank cartridge. The arming-vane assembly of the fuze is detached and placed next to it in the carton. The cotter pin and blank .38 caliber cartridge are placed in an envelope and are also packed in the fuze carton which is made out of corrugated cardboard.

Packing Box. Twelve cartons, each containing a fuze, a signal, and accessories, are packed in a 20-mm ammunition box.

LONG-DELAY TAIL FUZE AN–M123, AN–M123A1, AN–M124, AN–M124A1, AND M125A1

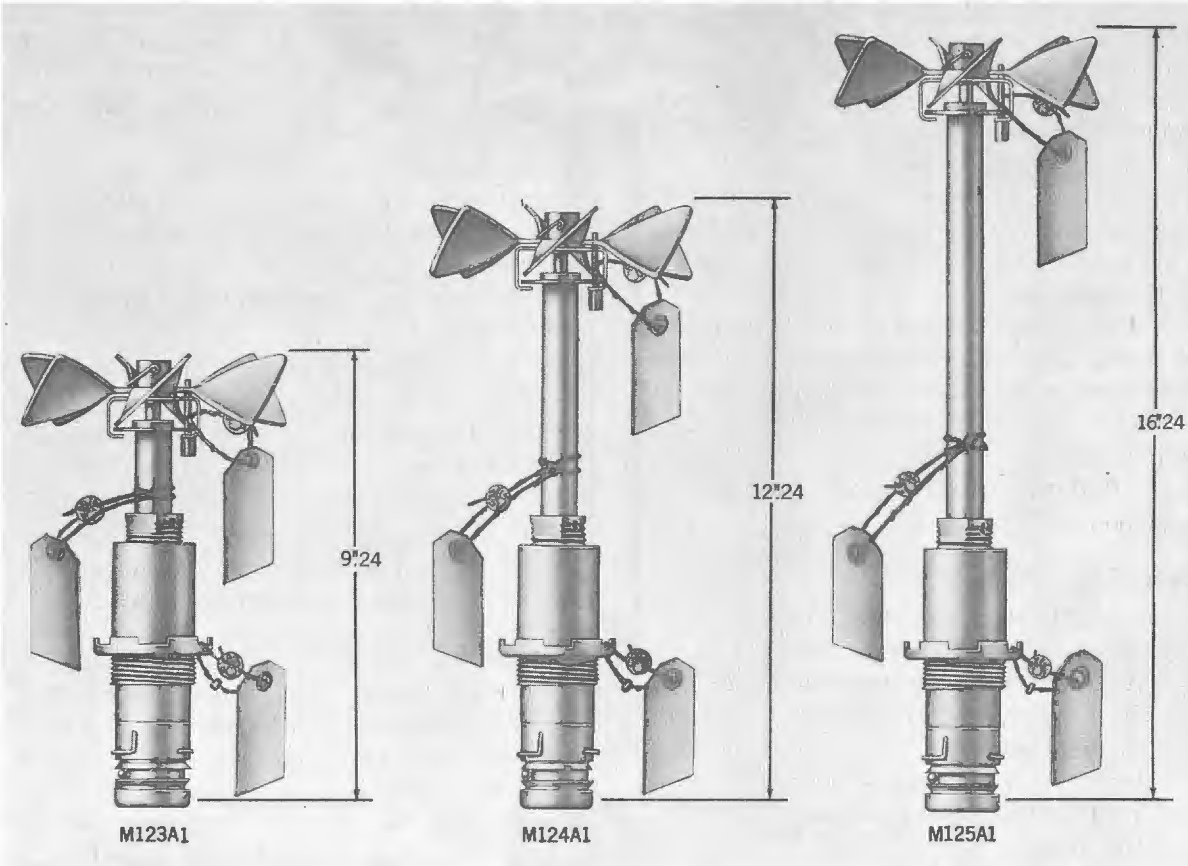


Figure 2–26.—Long-Delay Tail Fuzes AN–M123A1, AN–M124A1 and AN–M125A1.

Model	AN–M123A1	AN–M124A1	AN–M125A1.
Firing Action	Chemical long-delay or instantaneous on attempted withdrawal.	Chemical long-delay or instantaneous on attempted withdrawal.	Chemical long-delay or instantaneous on attempted withdrawal.
Firing Delay (hr)	1–44	1–44	1–44.
Assembly Drawing No	73–8–169 73–8–170	73–8–169 73–8–170	73–8–169. 73–8–170.
Arming:			
Type	Direct	Direct	Direct.
Air Travel to Arm (ft).	Less than 100	Less than 100	Less than 100.
Overall Length (in.)	9.24	12.24	16.24.
Protrusion from Bomb (in.).	6.24	9.24	13.24.
Body Diameter (in.)	1.3	1.3	1.3.
Vane Span (in.)	5.0	5.0	5.0.
Weight (lb)	2.9	3.1	3.4.
Number of Vanes	8	8	8.
Detonator Designation	M19A2	M19A2	M19A2.

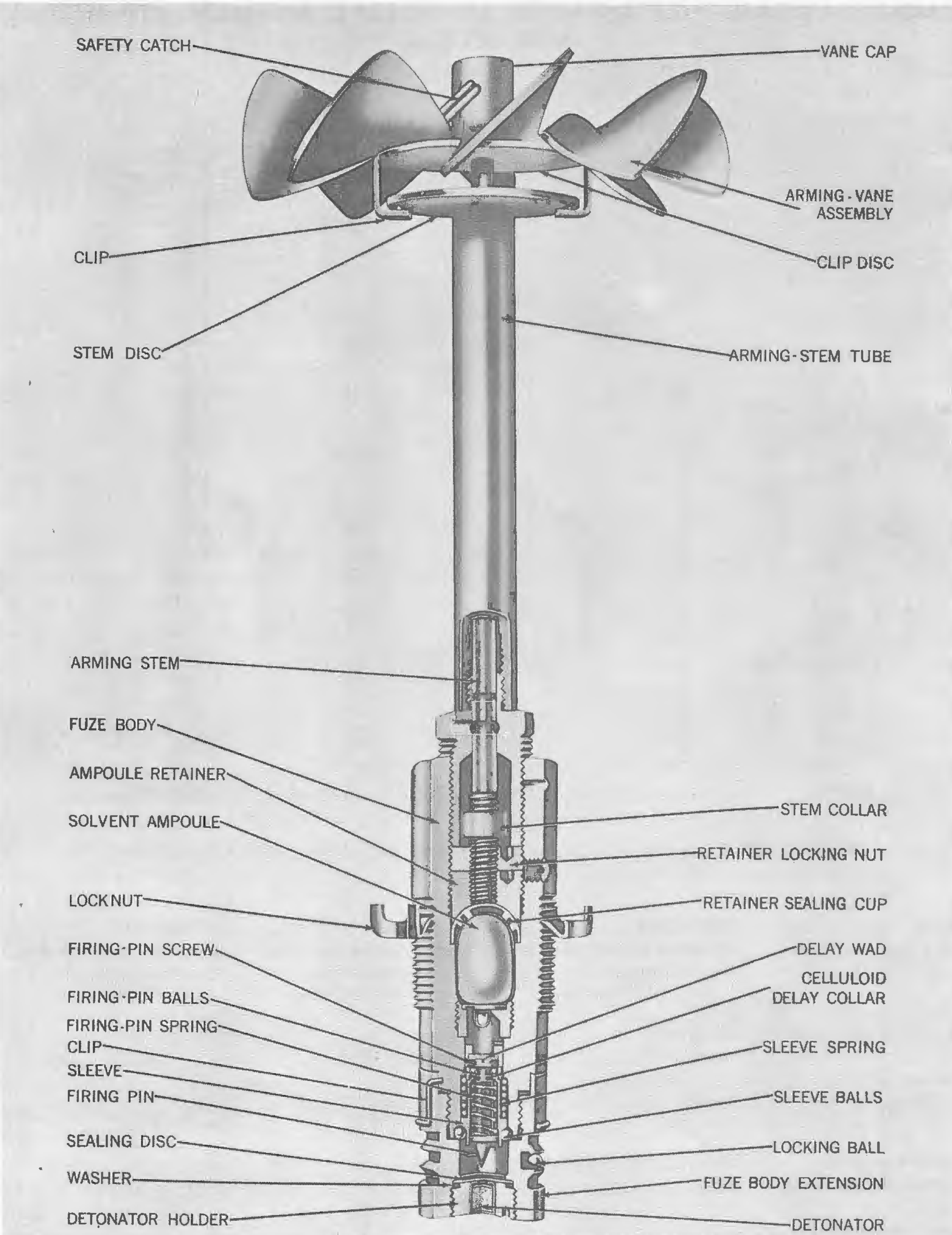


Figure 2–27.—Long-Delay Tail Fuze AN–M123A1, Cutaway View.

General Description

The vane operated, long-delay tail fuzes of this type, figure 2–27, are designed for limited use only. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue. These fuzes incorporate an antiwithdrawal device. The fuzes act to detonate the bomb after a delay of from 1 to 144 hours; specifically: 1, 2, 6, 12, 24, 26, 72, and 144 hours. Less than 100 feet of air travel is necessary to initiate this delay action. Any attempt to unscrew these fuzes will result in the functioning of the antiwithdrawal mechanism, followed by instantaneous detonation.

WARNING

Once installed, no attempt shall be made to remove these fuzes from bombs.

Long-Delay Tail Fuzes AN–M123A1, AN–M124A1, and AN–M125A1 differ in overall length so that the same type fuzes can be used in various size bombs. The differences in length are necessary to locate the arming vanes properly in the air stream. Each fuze of the series has a nominal delay-firing time of 1, 2, 6, 12, 24, 36, 72, or 144 hours; this nominal time is indicated on the fuze.

This type of fuze is particularly responsive to heat and cold; high temperatures accelerate its action while low temperatures retard it. Temperature effect must be taken into consideration when selecting a fuze of any particular delay. See the following table, Delay Times of Long-Delay Tail Fuzes for the effects of temperature on delay times.

These fuzes differ from the earlier AN–M123, AN–M124, and AN–M125 fuzes in that the AN–M123 series has reduction gearing and 4-bladed arming vanes. It also requires 80 to 100 feet to initiate delay action and 900 to 1800 feet to seal the fuzes against leakage of solvent or entrance of moisture. The AN–M123A1 series has no reduction gearing, has 8 vanes, and requires less than 100 feet both to initiate the delay action and to seal the fuze.

Explosive Components

The detonator is the only explosive element used in these fuzes. It is contained in the detonator holder and is always in line with the spring-loaded firing pin. The detonator holder screws into the base of the body extension. The detonator and detonator holder are not assembled in the fuze as issued, and must be installed prior to the bomb fuzing operation.

Restrictions

Return of bombs to airfields or carriers is restricted. Bombs with this type of fuze may be returned to airfields or carriers provided that the following conditions prevail.

1. Bomb rack malfunction prevents release.
2. Efforts to release by maneuvering of aircraft are unsuccessful.
3. Bombs and fin assemblies are undamaged and fuze arming wires are in place as observed by check of aircraft before landing.

Fuzed bombs are immediately disposed of by qualified and authorized personnel upon landing of aircraft. NO ATTEMPT SHALL BE MADE TO REMOVE FUZES FROM BOMBS.

Special Marking of Bombs

When this type of fuze is used with the possibility of return to airfields or carriers, special marking of bombs or fuzes is authorized if, in the judgment of the cognizant officer, safety considerations outweigh any possibility of enemy forces being able to identify long-delay fuzed bombs more readily.

Hung Bombs

When hung bombs are carried away in landing or separate from the aircraft during takeoff because of malfunction of gear, the resulting shock of impact may break the glass ampoule solvent containers in fuzes of this type. Under such conditions of accidental release, the fuze firing delay period allows time for the disposal of bombs. See the following table, Delay Times of Long-

Delay Tail Fuzes AN–M123 series, for the effect of temperature on delay times.

Bomb Disposal Time

As indicated by the following table, Delay Times of Long-Delay Tail Fuzes AN–M123 series, the minimum time available for clearing fuzed bombs under accident conditions will depend upon fuze delay and temperature. For example, action to complete a bomb removal and disposition must be taken within 15 minutes for fuzes having a time delay of 1 hour when the fuze temperature is estimated to be 115° F.

Effect of Temperature on Delay Action

These fuzes are responsive to changes in temperature. Temperatures above 50° F cause them to function earlier than specified; temperatures below 50° F cause them to function later than specified. The following table gives the average actual delay in hours and minutes at various temperatures, and must be consulted when selecting a fuze for a particular delay.

Safety Features

Each fuze is packed in an individual metal container during shipping and stowage. Until the fuzing operation the detonator holder, containing the detonator, is not assembled in the fuze. In place of the detonator holder, a shipping plug is seated in the fuze body extension. This makes the fuze safe for handling.

The fuze body extension is prevented from unscrewing by a wire safety clip which locks the fuze body extension to the fuze body. This clip is not removed until the fuze is prepared for installation in a bomb. A safety pin, held in place by a sealed safety wire, locks the clip disc and prevents the arming stem from rotating and arming the fuze. Four instruction tags are attached to the fuze.

The packing box, containing the fuzes, has indicator vials disclosing the various temperature ranges to which the fuzes have been subjected during shipping and stowage. This system of indicator vials will prevent the use of fuzes which have experienced temperatures rendering them dangerous to handle.

When the fuze is installed in a bomb, the arming wire prevents the arming stem from rotating and initiating the delay action. This is the only safety feature afforded these fuzes once they are installed. Attempted withdrawal or tampering with these fuzes will cause the fuze to detonate the bomb. Severe shock may cause the glass ampoule to be broken prematurely and begin the delay action before desired.

Delay Times of Long-Delay Tail Fuzes AN–M123 Series

Temperature (degrees F)	Average actual delay (hr: min) at various temperatures for fuzes having nominal delays 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	9:00	24:00	37:00	96:00	135:00
25	2:12	3:15	11:00	30:00				

Safety Precautions

The following precautions must be observed in handling these fuzes.

The detonator holder must not be assembled to fuzes, and fuzes must not be assembled to bombs in anticipation of future needs.

Particular care must be taken to protect these fuzes from heat and shock.

Examine the indicator vials when the fuze packing box is opened. If all fuzes in the box are not used, leave the vials in the box with the remaining fuzes and reinspect them when the box is reopened.

When engaging threads of mating parts in assembling this fuze to a bomb, do not turn one part back and forth until the threads engage. Use a "screwing-in" motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Functioning

General. When the bomb is dropped ARMED, the arming wire is withdrawn from the arming-vane assembly, stem disc, and clip. The freed arming-vane assembly rotates in the air stream.

After completion of less than 100 feet of air travel, the fuze is armed and sealed against the entrance of moisture and the escape of solvent.

Impact produces no effect upon the armed fuze. The fuze does not act to explode the bomb until the delay time has expired, figure 2–28, or until someone attempts to defuze the bomb.

Arming. The arming-vane assembly is connected directly to the arming stem by means of the safety catch. At its lower end, the arming stem is threaded into the retainer locking nut and ampoule retainer. As the arming-vane assembly turns the arming stem, the stem is screwed into the ampoule retainer and ampoule-retainer nut. After a short air travel, the stem, moving into the fuze body, crushes the solvent ampoule and frees the solvent. With additional air travel, the arming stem progresses far enough to force the stem collar against the retainer locking nut. This action seals the outer end of the fuze body to prevent the escape of solvent or the entrance of moisture.

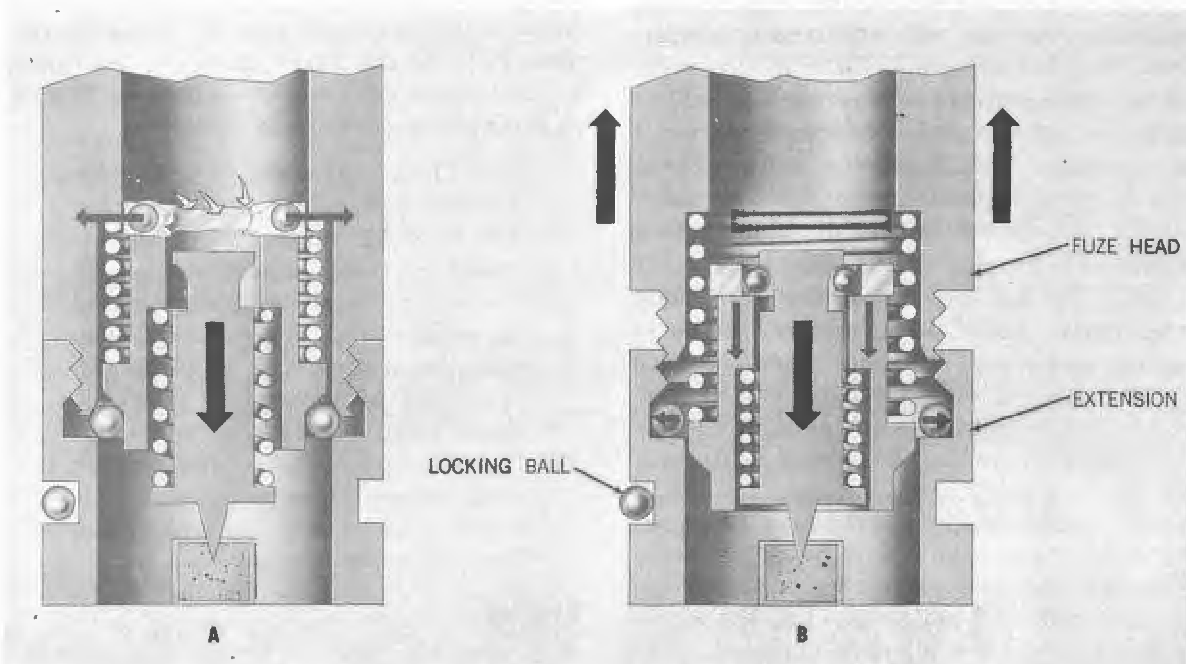


Figure 2–28.—Long-Delay Tail Fuze AN–M123A1, Details of Operation.

Action. The solvent from the crushed ampoule filters through the delay wad to contact the celluloid delay collar. It is this celluloid delay collar that is the key to the locking arrangement of the spring-loaded firing pin. The firing-pin balls are wedged between the head of the firing-pin screw and the sleeve. These balls lock the firing pin in place against the action of the compressed firing-pin spring. The celluloid delay collar prevents the firing-pin balls from being forced outward.

Antiwithdrawal. If any attempt is made to remove the fuze from the bomb before the delay time has expired, the antiwithdrawal device will detonate the fuze.

The following characteristics and mechanisms of the fuze are related to the antiwithdrawal feature.

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, the delay wad, and also the solvent-filled ampoule. The body extension contains the detonator holder, which is screwed into the base. An off-centered circumferential groove is machined into the outer surface of the body extension. This groove contains the locking ball, used in conjunction with the antiwithdrawal mechanism.

The sleeve within the fuze body is held in place against the action of the compressed sleeve spring by the sleeve balls. These balls are wedged between the sleeve shoulder and the body-extension shoulder and are held in place by the lips of the fuze body.

Since the ball groove of the fuze body extension is machined off-center, the locking ball is forced outward when the fuze is turned counterclockwise. This action wedges the ball between the adapter-booster wall and the fuze body extension, thus locking the fuze body extension in place. Any further counterclockwise rotation unscrews the fuze body extension from the fuze body. When the fuze body has been separated from the fuze body extension $\frac{3}{64}$ inch, the sleeve balls are released and move outward. The sleeve and firing-pin assembly are driven forward as a unit by the sleeve spring, causing the firing pin to puncture the sealing disc and strike the detonator.

As further insurance against withdrawal, the adapter-booster of current design is drilled for the insertion of a metal locking pin supplied with the fuze. When this pin is in place, the adapter-booster is locked to the base plug of the bomb, thus preventing removal of the fuze by the unscrewing of the adapter-booster.

Detonation. When the firing pin punctures the sealing disc and the detonator, the detonator explodes, setting off the booster and the bomb.

Accidental Arming

Recognition. From outward appearances there is no way of determining definitely whether these fuzes are armed or are in a safe condition. The best policy is to regard them as being armed at all times. Any fuze that has been dropped from a height of 10 feet or more, or has had its arming-vane assembly free to rotate, must be disposed of as quickly as possible by authorized and qualified personnel.

Handling. If the red-stoppered indicator vial in the fuze packing box shows that the fuzes have been subjected to temperatures over 170° F, the fuzes must be destroyed by authorized personnel. Return of bombs to airfields or carriers is restricted.

> CAUTION: Bombs fuzed with AN–M123A1, AN–M124A1, or AN–M125A1 fuzes cannot be released SAFE. Impact will cause the solvent ampoule to shatter and to initiate the delay train, even with the arming wire in place. In the event of incomplete missions, these fuzed bombs are to be jettisoned over enemy territory or deep water. Once installed, no attempt shall be made to remove the fuzes from the bombs.

Fuzing

General. Bombs fuzed with long delay impact tail fuzes normally do not have companion nose fuzes and are generally used for medium to high altitude bombing. Upon impact, the unsupported nose fuze seat liner may be crushed and may cause instantaneous functioning of the bomb with either high or low order detonation. In order to prevent this, a suitable support should be provided for the nose fuze seat liner. One of the following methods of support may be used.

(1) Replace nose closing plug (shipping plug) with nose plug for Bomb, semi-armor-piercing, 500 lb, AN-M58A2 and 1000 lb, AN-M59A1, Pc Mk 82-3-326A.
(2) Remove nose closing plug, insert a steel (or cast iron) cylinder, 1.59-.01" diameter x 4.31-.01" length, in nose fuze well, and replace nose closing plug.
(3) Replace nose closing plug with inert AN-M103 series fuze.

Inspection Prior To Use. There are two indicator vials packed in each box of fuzes. Each of these vials contains a powder which melts at a critical temperature. When a box of fuzes is opened, inspect the vials and proceed as follows.

1. If the powder in the green-stoppered vial has solidified, it indicates that the fuzes have been subjected to temperatures higher than 150° F. This temperature causes the powder to melt; it solidifies into a homogeneous mass upon cooling.

CAUTION: Use none of the fuzes in this box for low-altitude bombing.

2. If the powder in the red-stoppered vial is solidified, it indicates that the fuzes have been exposed to temperatures above 170° F. This temperature causes the powder in this vial to melt; solidification occurs upon cooling.

CAUTION: Make no attempt to install detonators in fuzes of this box. Fuzes must be disposed of by authorized personnel.

3. If there is any doubt whether the powder in either vial is solidified, open the vial and inspect its contents. Personnel handling these fuzes should be able to differentiate between powdered and solidified condition of the two vials. This is best learned by removing some powder from each vial, melting it, and allowing it to solidify.

Installing the Fuze.

1. Remove the fuze and its components from the container and inspect the general condition. Back off the locknut and then replace it to make sure the threads are clean and undamaged.

2. Hold the fuze body extension during the rest of the operation to prevent separation of the fuze body extension from the fuze body.

3. Remove the tape and shipping plug from the end of the fuze body extension.

4. Insert the sealing disc (aluminum or copper) into the end of the fuze. Be sure this disc rests on the shoulder of the fuze body extension. If the firing pin interferes with the seating of the disc, do not use the fuze.

5. Insert the washer over the disc.

6. Screw the detonator holder into the body extension and tighten with the wrench supplied in the box of fuzes. Since the purpose of the disc and washer is to seal the fuze against escape of solvent and entrance of moisture, care must be taken to seat the detonator holder firmly.

7. Remove the safety clip. After the safety clip is removed, particular care must be taken to prevent the fuze body extension from unscrewing from the fuze body.

WARNING
The fuze will detonate if the extension is unscrewed by any amount.

8. If the bomb is not fitted with an adapter-booster listed on the lockpin instruction tag, the adapter-booster that is assembled to the bomb must be staked to the base plug staked to the bomb body. Use nonsparking tools for the staking operation.

9. Gage the adapter-booster threads with the proper gage, or insert the fuze (any standard tail fuze, except one of the type with an antiwithdrawal device, without a primer-detonator may be used).

10. If the bomb is fitted with the listed adapter-booster, insert the lockpin (supplied with the fuze) into the hole in the adapter-booster.

11. Be sure the locknut is screwed all the way into the fuze. Then carefully insert and screw the fuze as far as possible into the adapter-booster. Tighten the locknut with the wrench supplied in the box of fuzes.

WARNING

Once the fuze is inserted in the adapter-booster, the fuze must not be turned backward (counterclockwise) by any amount, however slight. Engage the threads by a screwing-in motion only. Do not attempt to unscrew the fuze; screwing-out motion will cause the locking ball to become wedged against the wall of the adapter-booster and any further turning will detonate both the fuze and the bomb.

12. Remove the safety catch from the clip disc; position the arming-vane assembly so that the hole in the vane cap is alined with the hole in the clip disc.

13. Replace the safety catch and secure the hook end.

14. After threading the arming wire through the rear bomb suspension lug, pass it through the clip, the stem disc, the clip disc, and the arming-vane assembly, respectively. Adjust the arming wire to protrude 2 to 3 inches beyond the arming-vane assembly. Place two safety clips on the arming wire and slide them up until the inner one touches the arming-vane assembly. Be sure the arming wire is free of kinks and burrs.

15. Remove the safety pin. If it is intended to keep the fuze SAFE until the plane is airborne, replace the safety pin with the cotter-pin pull-ring assembly provided with the fuze. Remove the cotter pin while the plane is in flight.

16. Bombs fuzed with AN-M123A1, AN-M124A1, and AN-M125A1 type antiwithdrawal fuzes must be used on the mission for which they are fuzed. In the event of incomplete missions, unused bombs must be dropped over enemy territory or into deep water. Once installed, no attempt shall be made to remove these fuzes from bombs. Return of bombs to airfields or carriers is restricted.

CAUTION: If anything interferes with the completion of the fuzing operation, no attempt shall be made to defuze the bomb. The bomb, with the fuze in place, shall be disposed of by authorized personnel. See instructions for handling in the preceding section before proceeding further.

Defuzing

NO ATTEMPT SHOULD BE MADE TO DEFUZE A BOMB ASSEMBLED WITH AN-M123A1, AN-M124A1, or AN-M125A1 FUZES. THE COUNTERCLOCKWISE MOTION NECESSARY TO REMOVE THE FUZE WILL CAUSE THE ANTIWITHDRAWAL MECHANISM TO FUNCTION AND THE FUZE AND BOMB WILL DETONATE.

Packaging and Marking

Fuze Marking. Marking on the body of the fuze is located just below the threads and includes nomenclature, nominal delay, lot number, and date loaded. In addition, four tags attached to the fuze read as follows.

1. For the cotter pin pull ring assembly: "For use if safety pins are to be removed after the plane is airborne."

2. Around the stem tube: "DANGER never remove this tag. This fuze contains a booby trap. NEVER ATTEMPT TO REMOVE THIS FUZE FROM THE BOMB."

3. For the adapter-booster lock pin: "This

pin is used for the adapter-booster on the following bombs: GP 100–lb., AN–M30A1 and GP 250–lb., AN–M57A1." (This information will alter as applicable.)

4. The fourth tag contains some of the instructions given in the fuzing operations.

Fuze Container. One fuze, less its arming vane, is sealed in a cylindrical black metal container. The detonator holder, washer, and sealing disc are packed in the same container and are fitted into a drilled-out portion of a wood block. A key is soldered to the bottom of the can to facilitate opening the sealed container. The following is a typical fuze container marking.

FUZE, BOMB, TAIL, AN–M123A1
LESS ARMING VANES
(date packed)
Drawing No. REV. (date)

Packing Box. Twenty-five containers, with 25 vane assemblies on a spindle, are packed in a wood box. Each packing box contains two indicator vials, two wrenches, and a thread gage. These fuzes may also be packed 24 to a box, in which event all accessories will be included, or the box may contain 25 fuzes, but no wrenches or thread gage. The following is a typical packing box marking.

25 TAIL FUZES
BOMB, TAIL, AN–M123A1
PACKED (month and year) LOT NO.

LONG-DELAY TAIL FUZE AN–M132, AN–M133, AND AN–M134

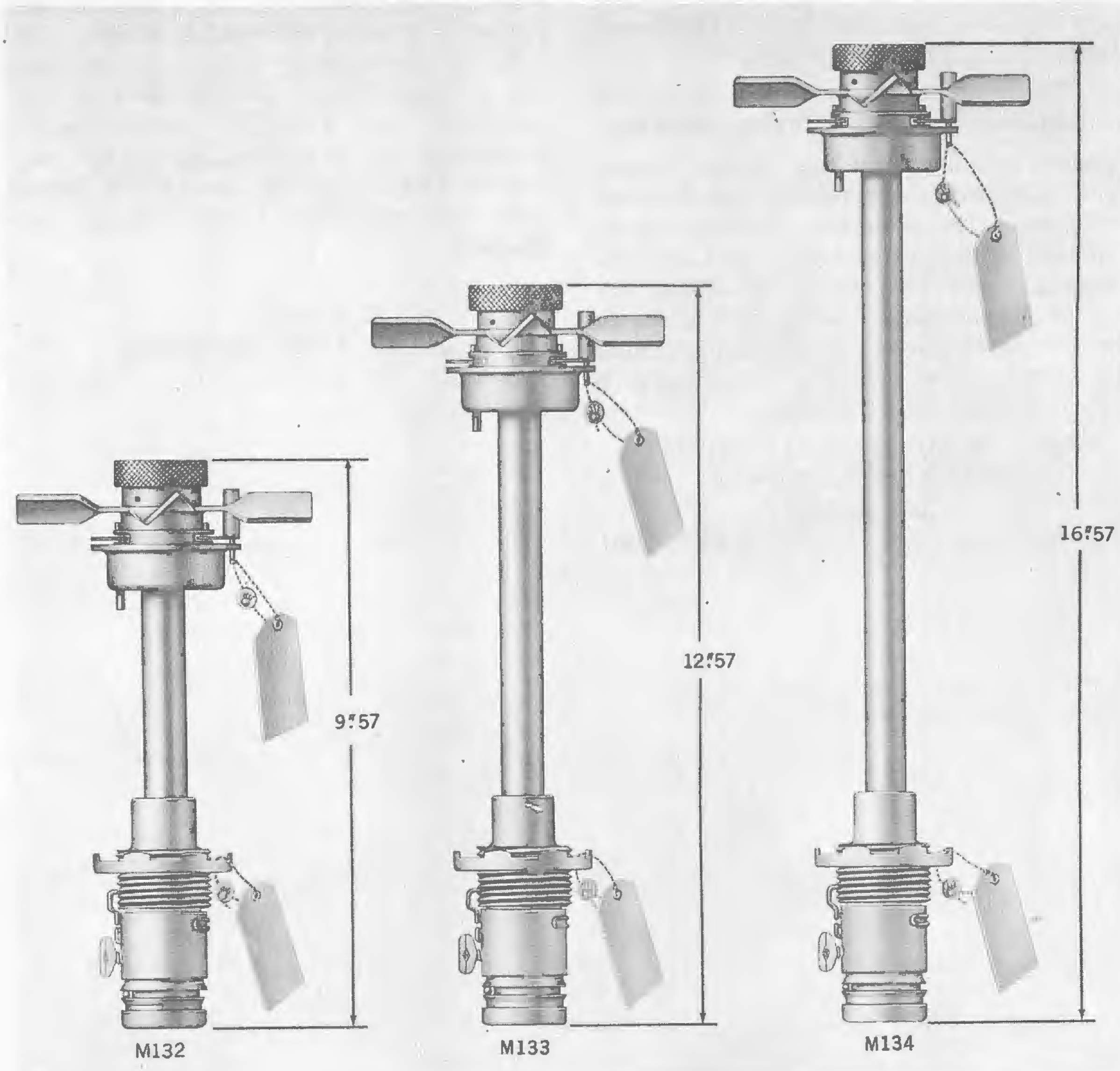


Figure 2–29.—Long-Delay Tail Fuzes AN-M132, AN–M133, and AN–M134.

General Description

The vane operated, long-delay tail fuzes of this type, figure 2–30, are delay armed and incorporate an antiwithdrawal feature. Approximately 100 feet of air travel is necessary for arming. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

All fuzes in this group have the same delay rating; they act to detonate the bomb 16 minutes after arming at a temperature of 80° F. The delay time will vary with changes in temperature; high temperature will accelerate it and lower temperature will retard it.

WARNING

Once installed, no attempt shall be made to remove these fuzes from bombs. Any attempt to remove them will cause the antiwithdrawal

Model	AN–M132	AN–M133	AN–M134.
Firing Action	Chemical long-delay or instantaneous on attempted withdrawal.	Chemical long-delay or instantaneous on attempted withdrawal.	Chemical long-delay or instantaneous on attempted withdrawal.
Firing Delay (min)	16 at 80° F	16 at 80° F	16 at 80° F.
Assembly Drawing No.	73–8–199	73–8–199	73–8–199.
Arming:			
Type	Direct	Direct	Direct.
Air Travel to Arm (ft)	100	100	100.
Overall Length (in.)	9.57	12.57	16.57.
Protrusion from Bomb (in.)	6.57	9.57	13.57.
Vane Span (in.)	5.0	5.0	5.0.
Weight (lb)	2.1	2.3	2.6.
Number of Vanes	4	4	4.
Detonator Designation	M19A2	M19A2	M19A2.

device to detonate the fuze instantaneously.

Long-Delay Tail Fuzes AN–M132, AN–M133, and AN–M134 differ in overall length so that the same type of fuze can be used in various size bombs. The differences in length are necessary to locate the arming vanes properly in the air stream.

The M4 and M5 arming-vane assemblies are used with these fuzes. For shorter arming distances, the standard vane M4 (45-degree pitch) is used; for longer arming distances, the M5 vane (75-degree pitch) is used. At present, only the M4 vane is issued with these fuzes. Separate action is necessary to requisition the M5 vane.

Explosive Components

The detonator is the only explosive element used in these fuzes. It is contained in the detonator holder and is always in line with the spring-loaded firing pin. The detonator and detonator holder are not assembled in the fuze as issued, and must be installed prior to the bomb fuzing operation.

Restrictions

Bombs having this type of fuze may be returned to airfields or carriers provided that the following conditions prevail.

1. Bomb rack malfunction prevents release.
2. Efforts to release by maneuvering of aircraft are unsuccessful.
3. Bombs and fin assemblies are undamaged and fuze arming wires are in place as observed by check of aircraft before landing.

Fuzed bombs are immediately disposed of by authorized and qualified personnel upon landing of aircraft. NO ATTEMPT SHALL BE MADE TO REMOVE FUZES FROM BOMBS.

Special Marking of Bombs

When this type of fuze is used with the possibility of return to airfields or carriers, special marking of bombs or fuzes is authorized if, in the judgment of the cognizant officer, safety considerations outweigh any possibility of enemy forces being able to identify long-delay fuzed bombs more readily.

Hung Bombs

When hung bombs are carried away in landing or separate from the aircraft during takeoff because of malfunction of gear, the resulting shock of impact may rupture the metal bellows solvent containers in these fuzes. Under such conditions of accidental release, the fuze firing delay period allows time for the disposal of bombs. See the following table, Delay Times of Long-Delay Tail Fuzes, Type II, for the effect of temperature on delay times.

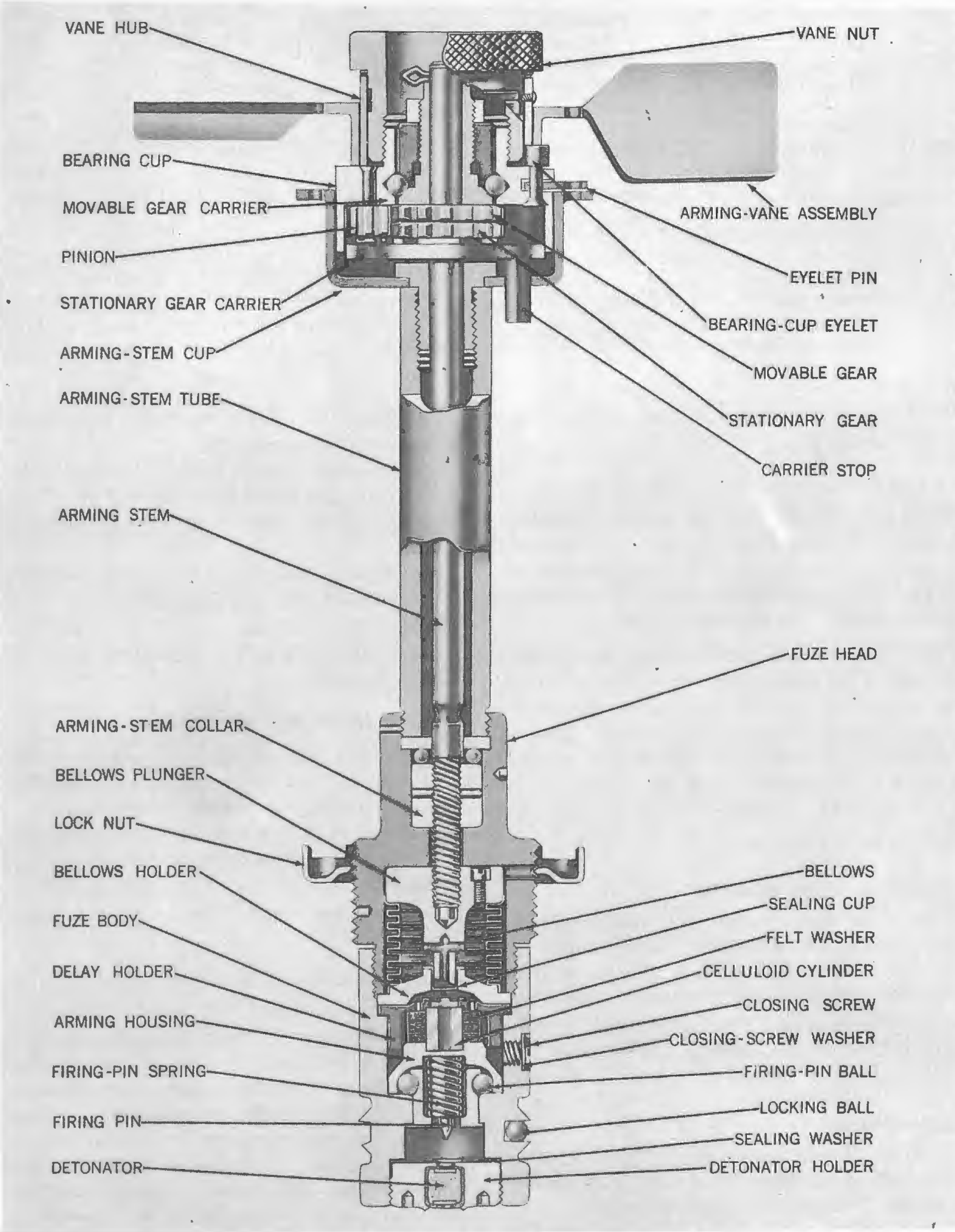


Figure 2–30.—Long-Delay Tail Fuze AN–M132, Cross Section.

Bomb Disposal Time

As indicated by the following table, Delay Times of Long-Delay Tail Fuzes AN–M132, AN–M133, and AN–M134, the minimum time available for clearing fuzed bombs under accident conditions will depend upon fuze temperature. For example, action to complete bomb removal and disposition must be taken within 6 minutes for this type of fuze when the fuze temperature is estimated to 120° F.

Effect of Temperature on Delay Action

These fuzes are responsive to changes in temperature. They are rated as having a 16-minute delay at 80° F. Higher temperatures cause the fuze to function earlier than specified; lower temperatures retard its functioning. The following table gives the average actual delay in minutes at various temperatures and should be consulted before using the fuze.

Delay Times of Long-Delay Tail Fuzes AN–M132, AN–M133, and AN–M134

Prevailing Temperature Degrees (F)	Average Delay (Minutes)
120	6
100	10
80	16
60	26
40	40
20	59
10	80

Safety Features

Each fuze is packed in an individual metal container. The detonator holder containing the detonator is not assembled in the fuze as issued, and the detonator-holder cavity in the fuze base is plugged with absorbent cotton. This leaves the fuze inert at all times during shipping and stowage. The cotton will show leakage of solvent prior to fuzing by being stained red, indicating fuzes that are unserviceable.

During shipping and stowage, these fuzes are equipped with a safety clip having two studs. One stud engages a hole in the fuze body and the other engages a hole in the fuze head. This safety clip prevents rotation between the fuze head and the fuze body. A safety screw located in the fuze body locks the firing mechanism in position. The safety clip and safety screw prevent premature activation of the antiwithdrawal mechanism. A safety pin locks the bearing cup to the arming-stem cup until fuzing, preventing operation of the delay arming mechanism.

The packing box in which the fuzes are shipped contains indicator vials that show the various temperature ranges to which the fuzes have been subjected during shipping and stowage. This prevents the use of those fuzes which have experienced temperatures rendering them dangerous to handle.

When the fuze is installed in a bomb, the arming wire prevents the arming stem from rotating and arming the fuze. This is the only safety feature afforded these fuzes once they are installed. Attempted withdrawal or tampering will cause the fuze to detonate the bomb.

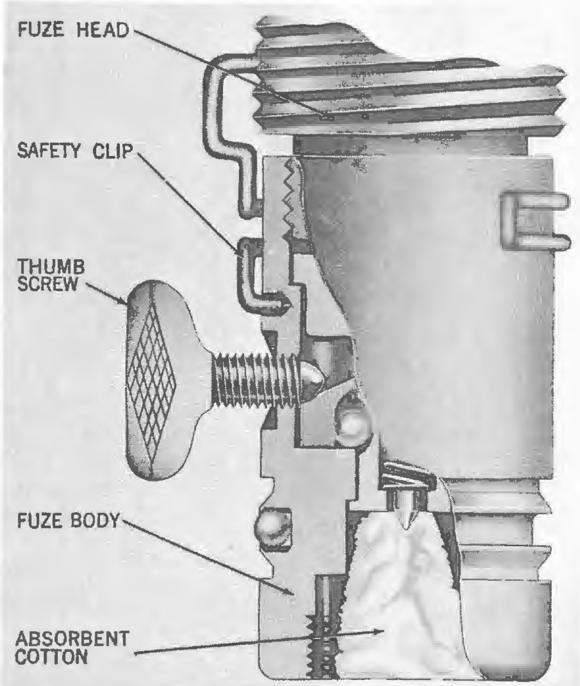


Figure 2–31.—Long-Delay Tail Fuze AN–M132, As Shipped, Detail.

Safety Precautions

The following precautions must be observed in handling these fuzes.

The detonator holder must not be assembled to fuzes, and fuzes must not be assembled to bombs in anticipation of future needs.

Particular care must be taken to protect these fuzes from heat and shock.

Examine the indicator vials when the fuze packing box is opened. If all fuzes in the box are not used, leave the vials in the box with the remaining fuzes and reinspect them when the box is reopened.

When engaging threads of mating parts in assembling this fuze to a bomb, do not turn one part back and forth until the threads engage. Use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

The warning tag attached to this fuze should not be removed when the fuze is assembled to the bomb.

Functioning

General. When the bomb is dropped ARMED, the arming wire is retained in the bomb rack and withdrawn from the fuze. This frees the arming-vane assembly which rotates in the air stream. The revolving motion of the arming-vane assembly is transmitted through the reduction gears to initiate the time train, arming the fuze. Approximately 100 feet of air travel along the trajectory of the bomb is necessary to complete this operation.

Impact will not cause the fuze to detonate. Detonation will take place when the delay time has run out or when an attempt is made to remove the fuze from the bomb. Such an attempt will cause the antiwithdrawal device to detonate the fuze instantaneously.

Arming. The arming-vane assembly is assembled to the bearing cup by the vane nut. Eyelet pins, which fit into notches in

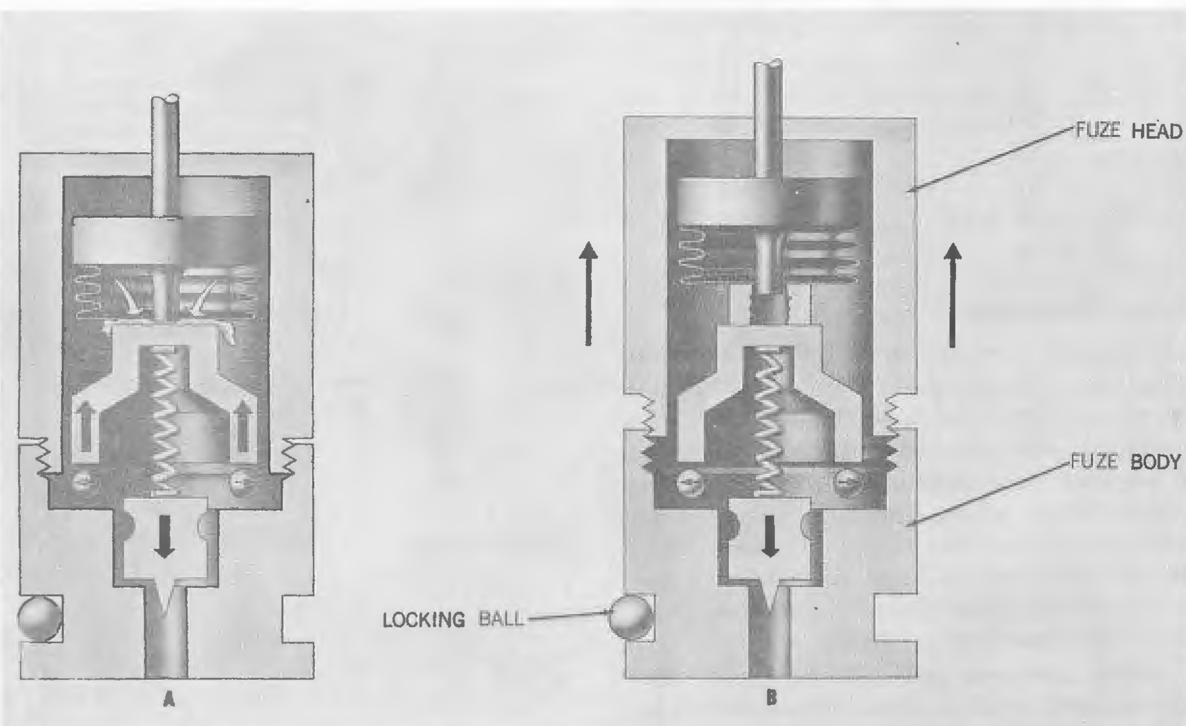


Figure 2–32.—Long-Delay Tail Fuze AN–M132, Details of Operation.

the vane hub, insure positive rotation of the bearing cup with the arming-vane assembly.

Delay arming is obtained by a reduction gear train between the arming-vane assembly and the arming stem. The ratio is one revolution of the arming stem to 30 revolutions of the arming-vane assembly. The reduction-gear train is composed of a pinion, a movable gear, and a stationary gear. The movable gear has 30 teeth while the stationary gear has 29. The idler gear (pinion) is driven around the stationary and movable gears by the bearing cup and the arming-vane assembly. Since the movable gear contains one more tooth than the stationary gear, the pinion pushes the movable gear one tooth forward each complete revolution. When the pinion has completed 30 revolutions, the movable gear has completed one. The movable gear is connected to the arming stem through the movable-gear carrier. The stationary gear is secured to the stationary-gear carrier, which is prevented from rotating by the carrier stop.

The lower end of the arming stem is threaded into the bellows plunger. The arming-stem collar is pinned to the arming stem to prevent any axial movement of the arming stem. As the arming stem revolves, it is unscrewed from the bellows plunger. This forces the bellows plunger inward, compressing the bellows and puncturing the sealing cup. The solvent contained in the compressed bellows is forced out through the bellows holder. The fuze is now armed.

Delayed Action. The delay element consists of a celluloid cylinder seated within three felt washers. The freed solvent filters through openings in the delay holder and is then absorbed by the felt washers. The celluloid cylinder serves as a lock for the firing mechanism.

The firing mechanism consists of a firing pin, an arming housing, a compressed firing-pin spring, and firing-pin balls. The firing-pin balls seat in the groove of the firing pin, rest on the inner shoulder of the fuze body, and prevent the compressed firing-pin spring from driving the firing pin into the detonator. The lower lip of the arming housing retains the firing-pin balls in this position, preventing them from riding up on the fuze body shoulder and releasing the firing pin.

The celluloid cylinder of the delay element is positioned between the delay holder and the arming housing. This prevents the compresssed firing-pin spring from raising the arming housing and freeing the firing-pin balls.

The solvent absorbed by the felt washers begins dissolving the celluloid cylinder as soon as contact is made. After a time lapse which depends upon the existing temperature, the cylinder is dissolved sufficiently so that the firing-pin spring can force the arming housing outward to release the firing-pin balls. This frees the firing pin which is then driven into the detonator by the firing-pin spring.

Antiwithdrawal. The body assembly consists of two parts, the fuze body and the fuze head. The fuze head contains the bellows assembly and the stem collar. The fuze body contains the spring-loaded firing pin, the arming housing, the delay element, and the holder. An off-centered circumferential groove is machined on the outer surface of the fuze body. This groove contains the locking ball used in conjunction with the antiwithdrawal mechanism.

The ball groove on the fuze body, being machined off-center, forces the locking ball outward when the fuze is turned counterclockwise in an attempt to defuze a bomb. This action wedges the ball between the adapter-booster wall and the fuze body, thus locking the fuze body in place. Any further counterclockwise rotation unscrews the fuze head from the fuze body. As the head is unscrewed, the firing-pin spring pushes the arming housing outward. When the housing has cleared the firing-pin balls, the firing pin is freed to detonate the fuze.

As further assurance against withdrawal, current adapter-boosters are drilled for the insertion of a metal locking pin supplied with the fuze. When this pin is in place, the adapter-booster is locked to the base plug of the bomb, thus preventing removal of the fuze by the unscrewing of the adapter-booster.

Detonation. When the firing pin punctures the sealing disc and the detonator, the detonator explodes, setting off the booster and the bomb.

Released Safe

Bombs fuzed with this type of antiwithdrawal fuze cannot be presumed to be released SAFE. In the event of incomplete missions, therefore, these fuzed bombs must be released over enemy territory or dropped in deep water. Once installed, no attempt shall be made to remove these fuzes from bombs.

Accidental Arming

Recognition. From outward appearances there is no way of definitely determining whether these fuzes are armed or in a safe condition after they have been installed in a bomb. The best policy is to regard them as being armed at all times. If a fuze has had its arming-vane assembly free to rotate, or if there is any doubt about it being in an armed condition, both fuze and bomb must be disposed of as quickly as possible by authorized personnel.

Handling. No attempt must be made to remove a fuze after it has been partially or completely installed in a bomb. If the red-stoppered indicator vial in the fuze packing box shows that the fuze has been subjected to temperatures exceeding 170° F, the fuze must be destroyed by qualified and authorized personnel. In the event of incomplete missions, fuzed bombs must be released over enemy territory or deep water. Return of bombs to airfields or carriers is restricted.

Fuzing

General. Bombs fuzed with long delay impact tail fuzes normally do not have companion nose fuzes and are generally used for medium to high altitude bombing. Upon impact, the unsupported nose fuze seat liner may be crushed and may cause instantaneous functioning of the bomb with either high or low order detonation. In order to prevent this, a suitable support should be provided for the nose fuze seat liner. One of the following methods of support may be used.

(1) Replace nose closing plug (shipping plug) with nose plug for Bomb, semi-armor-piercing, 500 lb, AN-M58A2 and 1000 lb, AN-M59A1, Pc Mk 82-3-326A.

(2) Remove nose closing plug, insert a steel (or cast iron) cylinder, 1.59-.01" diameter x 4.31-.01" length, in nose fuze well, and replace nose closing plug.

(3) Replace nose closing plug with inert AN-M103 series fuze.

Inspection Prior To Use. There are two indicator vials packed in each box of fuzes. Each of these vials contains a powder which melts at a critical temperature. When a box of fuzes is opened, inspect the vials and proceed as follows.

1. If the powder in the green-stoppered vial has solidified, the fuze has been subjected to temperatures higher than 150° F. This temperature caused the powder to melt; it solidified into a homogeneous mass upon cooling.

> CAUTION: Use none of the fuzes in this box for low-altitude bombing.

2. If the powder in the red-stoppered vial is solidified, the fuzes have been exposed to temperatures above 170° F. This temperature caused the powder in this vial to melt; solidification occurred upon cooling.

> CAUTION: Make no attempt to install detonators in the fuzes of this box. Fuzes must be disposed of by authorized personnel.

3. If there is any doubt whether the powder in either vial is solidified, open the vial and inspect the contents. Personnel handling these fuzes should be able to differentiate between powdered and solidified condition of vials. This is best learned by removing some powder from each vial, melting it, and allowing it to solidify.

Installing the Fuze.

1. Remove the fuze, detonator holder, sealing washer, closing screw, and closing-screw washer from the fuze container. Inspect the threads of the fuze for cleanliness and the safety clip for proper positioning. This must be done one-half hour before fuzing. Remove the absorbent cotton from the detonator-holder cavity. Be sure no solvent has leaked onto the cotton. If the cotton indicates leaking by being stained red, the fuze must be disposed of by authorized personnel.

2. Replace the cotton in the detonator-holder cavity.

3. Remove the safety thumb screw. Shake the fuze several times but do not strike it.

4. Stand the fuze on the detonator-holder end and let it remain in this position for one-half hour.

5. After one-half hour, remove the cotton and inspect it for evidence of leakage. If the cotton has been stained red, the fuze must be disposed of by authorized personnel.

6. Replace the thumb screw in the fuze body. If it cannot be replaced, the fuze must be disposed of by authorized personnel.

7. Check the bomb for presence of the proper adapter-booster. Remove the adapter-booster lockpin from the fuze. Insert the pin in the hole inside the wall of the fuze cavity in the adapter-booster. The end of the pin must be flush with or below the inside surface of the adapter-booster before the fuze can be assembled to the bomb.

8. If the bomb to be fuzed is not fitted with the adapter-booster listed on the lockpin instruction tag, it is necessary, before assembling the fuze to the bomb, to stake the adapter-booster to the base plug of the bomb, and to stake the base plug to the bomb body. Use nonsparking tools for the staking operation.

9. Screw the thread gage (supplied in the fuze packing box) into the bomb fuze cavity until it seats. This assures that the fuze will seat without difficulty. Remove the thread gage. Do not use the bomb if its threads are damaged.

10. Remove the safety screw from the fuze body and insert the closing screw washer and closing screw in its place. Tighten the closing screw.

11. Insert the sealing washer into the detonator-holder cavity.

12. Screw the detonator holder over the washer. In doing this, hold the fuze body (not the fuze head) to prevent rotation of parts. Tighten the detonator holder securely with the pin wrench supplied in the fuze packing box.

13. The locking ball should move freely in a small arc of the ball groove provided for it.

14. Remove the safety clip from the fuze body. Do not allow the fuze body to rotate around the fuze head at any time after removal of the safety clip.

15. Hold the fuze by the arming-stem tube and turn the locknut so that it passes over all the threads in order to make sure that the threads are in good condition. Position the locknut as far toward the vane end as possible. Do not use fuzes with damaged threads.

16. Screw the fuze into the bomb by hand as far as possible. Tighten the locknut with the L-wrench supplied with the fuzes. Tap the wrench lightly with a small hammer to insure that the nut is tight.

WARNING

> Once the fuze is inserted in the adapter-booster, the fuze must not be turned backward (counterclockwise) by any amount, however slight. Engage the threads by a screwing-in motion only. Do not attempt to unscrew the fuze; a screwing-out motion will cause the locking ball to become wedged against the adapter-booster. Further unscrewing action will cause the fuze to detonate.

17. Thread the longer end of the arming-wire assembly through the rear suspension lug of the bomb and the nearer pair of eyelets in the bearing cup and arming-stem cup. If the nearer pair of eyelets is occupied by the safety pin and sealing wire, place a

spare pin diametrically opposite before removing the original safety pin.

18. Cut the sealing wire and remove the safety pin.

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

20. Screw the vane nut on the threaded end of the bearing cup. Tighten the nut by hand.

21. Adjust the arming wire to protrude 2 to 3 inches beyond the arming-vane assembly. Cut off excess wire.

22. Slip two safety clips over the end of the wire. Push them up the wire until the inner one touches the arming-vane assembly. Be sure there are no kinks or burrs in the wire.

23. Remove the safety pin. If it is intended to keep the fuze SAFE until the plane is airborne, replace the safety pin with the cotter-pin pull-ring assembly provided with the fuze. Remove the cotter pin when the aircraft is in flight.

24. Bombs fuzed with AN-M132, AN-M133, and AN-M134 type antiwithdrawal fuzes must be used on the mission for which they are fuzed. In the event of incomplete missions, unused bombs must be dropped over enemy territory or into deep water. Once installed, no attempt should be made to remove these fuzes from bombs. Return of bombs to airfields or carriers is restricted.

> CAUTION: If anything interferes with completion of the fuzing operation, NO ATTEMPT SHALL BE MADE TO DEFUZE THE BOMB. The bomb, with the fuze in place, shall be disposed of by authorized personnel. See instructions for the disposal of fuzed bombs.

Defuzing

NO ATTEMPT SHOULD BE MADE TO DEFUZE A BOMB ASSEMBLED WITH AN-M132, AN-M133, AND AN-M134 FUZES. The counterclockwise motion necessary to remove the fuze will cause functioning of the antiwithdrawal mechanism and detonation of both the fuze and the bomb.

Packaging and Marking

Fuze Marking. Markings on the fuze body are located just below the threads and include nomenclature, lot number, and date loaded. In addition, four tags attached to the fuze read as follows:

1. For cotter pin pull ring assembly: "For use if safety pins are to be pulled after plane is airborne."

2. Around arming stem tube: "DANGER never remove this tag. This fuze contains a booby trap. NEVER ATTEMPT TO REMOVE THIS FUZE FROM THE BOMB."

3. For the adapter-booster lock pin: "This pin is for use in the adapter-booster of the following bombs: GP 100-lb AN-M130A1 and GP 250-lb AN-M57A1." (This data may alter as applicable.)

4. For seal wire and safety pin: "Remove this wire after arming wire has been inserted, before arming vane is attached. DO NOT UNSCREW FUZE DURING OR AFTER ASSEMBLY TO BOMB."

Fuze Container. One fuze, less its arming-vane assembly, is sealed in a black cylindrical metal container. The detonator holder, sealing washer, closing screw, and closing-screw washer are packed in a drilled-out portion of a wooden block, in the same container as the fuze. A key is soldered to the bottom of the can to facilitate opening the sealed container. The following is a typical fuze container marking.

FUZE, BOMB, TAIL AN-M132
LESS ARMING VANE
Drawing No. (Date packed) REV. (Date)

Packing Box. Twenty-five fuze containers, with 25 arming-vane assemblies on a rack, are packed in a wood box. Each packing box also contains two indicator vials, two wrenches, and a thread gage. These fuzes may also be packed 12 in a box in the same manner and with the same equipment. The following is a typical packing box marking.

25 TAIL FUZES
BOMB, TAIL, AN-M132
Packed (Month and Year) LOT NO.

HYDROSTATIC TAIL FUZE AN–MK 230 MODS 4, 5, AND 6

Mark	AN–Mk 230	AN–Mk 230	AN–Mk 230.
Mod	4	5	6.
Firing Action	Water pressure	Water pressure	Water pressure.
Firing Delay (ft) (Determined by Depth Setting)	25, 50, 75, 100, 125	25, 50, 75, 100, 125	25, 50, 75, 100, 125.
General Arrangement	344703	344740	344703.
Arming			
Type	Vane	Vane	Vane.
Revolutions to Arm	110	110	110.
Air Travel to Arm (ft)	300–400	300–400	300–400.
Overall Length (in.)	15.4	15.4	15.4.
Protrusion from Bomb (in.)	12.7	12.7	12.7.
Body Diameter (in.)	3.38	3.38.	
Vane Span (in.)	5.25	5.25.	
Weight (lb)	15	15	15.
Number of Vanes	16	16.	
Detonator Designation	Mk 20 Mod 0	Mk 20 Mod 0	Mk 20 Mod 0.
Booster Charge			
Type	Tetryl	Tetryl	Tetryl.
Weight (gm)	22	13	22.

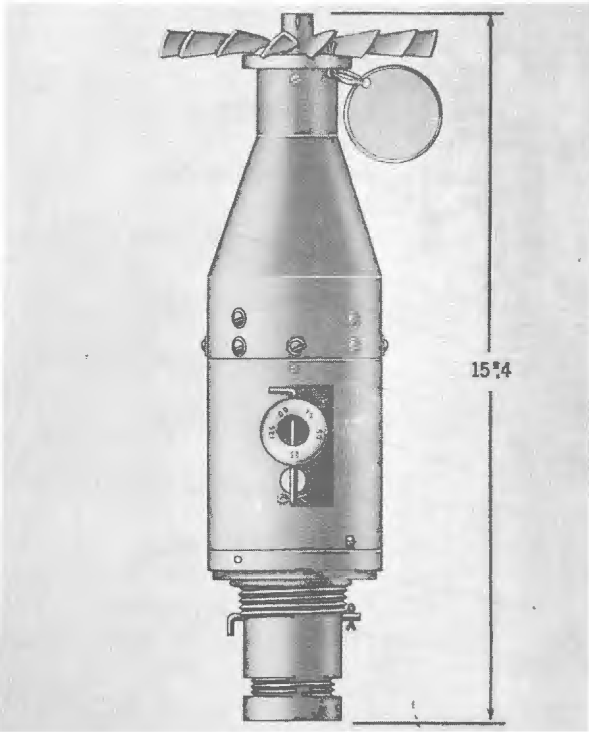


Figure 2–33.—Hydrostatic Tail Fuze AN–Mk 230 Mod 5.

General Description

Hydrostatic Tail Fuze AN–Mk 230, figure 2–34, is vane operated and requires from 400 to 500 feet of air travel to arm. It is bottle-shaped in appearance and has a 16-blade arming-vane assembly attached to its head. This type of fuze is sometimes used in conjunction with a nose fuze.

Water pressure operates the hydrostatic mechanism that detonates the fuze. The depth at which detonation will occur can be controlled by presetting the depth-setting knob. This knob is located on the side of the fuze and its face is marked with the five possible depth settings: 25, 50, 75, 100, and 125 feet. When issued, the fuze is locked at the 25-foot setting by means of the depth-setting rod and lock.

Hydrostatic Tail Fuzes AN–Mk 230 Mod 5 and Mod 6 differ from Mod 4 by having the accuracy of their 25-foot depth setting emphasized. Mod 4 has the accuracy of the 50-foot setting emphasized. The booster of Mod 5 differs from that of Mod 4 and Mod 6 in that the firing pins of Mod 5 are welded to the booster cap and its booster charge is

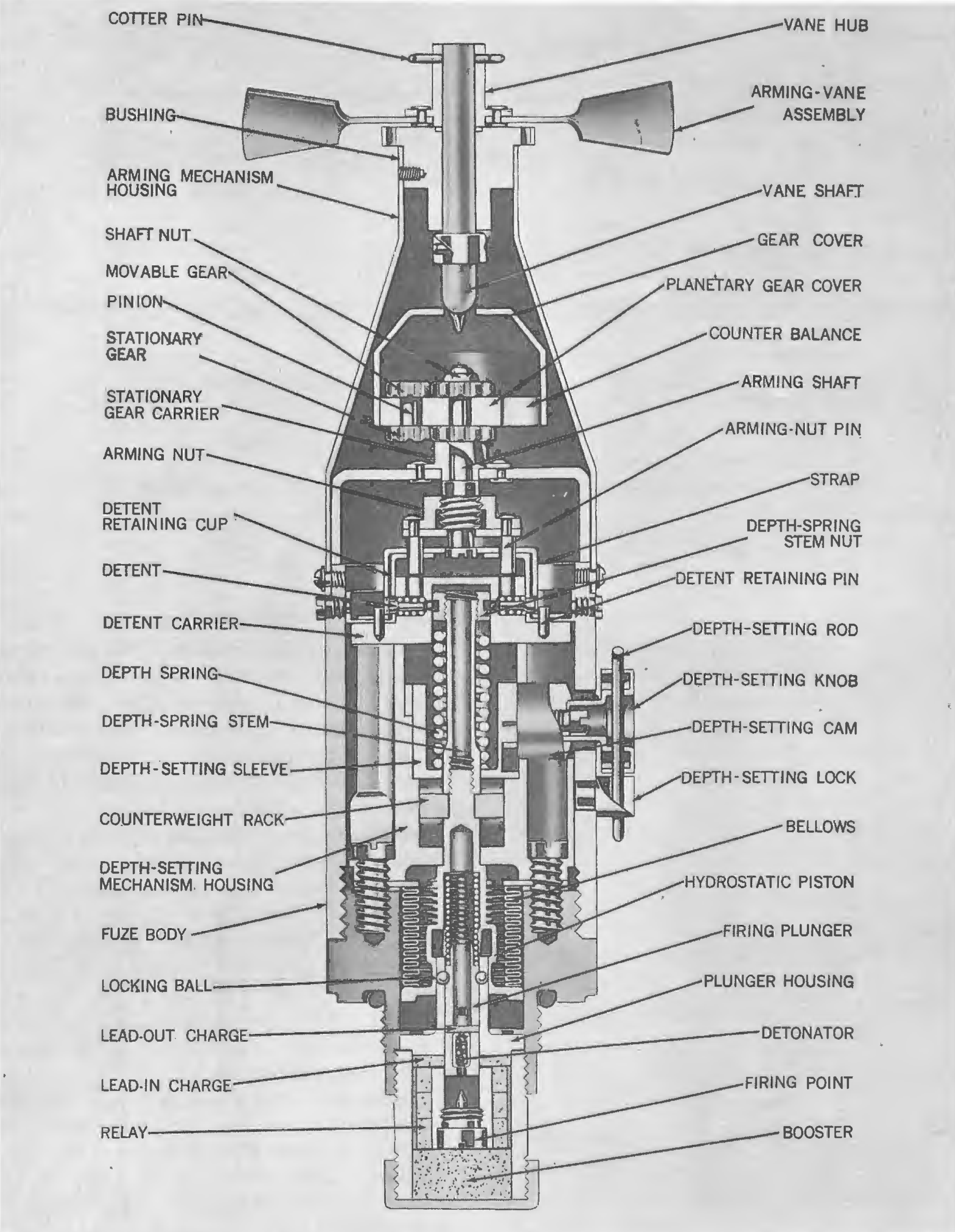


Figure 2–34.—Hydrostatic Tail Fuze AN–Mk 230, Cross Section.

smaller. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

The explosive components of this fuze consist of the detonator, the lead-out charges, the lead-in charges, a relay, and a booster charge. The detonator and lead-out charges are in the firing plunger. The booster charge, the relay, and the lead-in charges consist of approximately 25.5 grams (0.9 ounce) of tetryl.

Safety Features

Each fuze is individually packed in a sealed metal container. The fuze body, plunger housing, and firing plunger are locked by a safety rod to prevent operation of the hydrostatic mechanism and consequent premature functioning of the fuze. The safety rod is protected against accidental withdrawal by a cotter pin through a hole at the protruding end.

A safety cotter pin, provided with a pull ring and instruction tag, locks the bushing and arming-vane assembly together to prevent the arming vane from rotating and arming the fuze.

In all, four cotter pins are used externally on this fuze: one to prevent withdrawal of the setting rod, one to prevent withdrawal of the safety rod, one to lock the vane assembly in place, and a fourth to connect the arming-vane hub to the vane shaft.

An arming bracket is used with fuzes of this type when they are assembled in bombs that are to be carried on external racks of high-speed aircraft. The bracket insures that the arming wire will not shear, allowing the fuze to arm.

When placed in a bomb, the fuze is in an unarmed condition as long as the arming wire is in place. It will not begin to function until the bomb is dropped armed and the arming wire is withdrawn from the arming-vane assembly and bushing.

The fuze is detonator safe as well as shear safe. These terms have been fully explained in chapter 1.

Functioning

General. When the bomb is dropped ARMED, the arming wire is withdrawn and the arming-vane assembly is free to rotate in the air stream. After the bomb completes from 300 to 400 feet of air travel along its trajectory, the fuze is fully armed. The fuze begins functioning when water enters its body. Water pressure, increasing with depth, expands a bellows, causing alinement of the explosive elements and detonation of the fuze.

Arming. Delayed arming of the fuze is obtained by a reduction-gear mechanism between the vane shaft and the arming shaft.

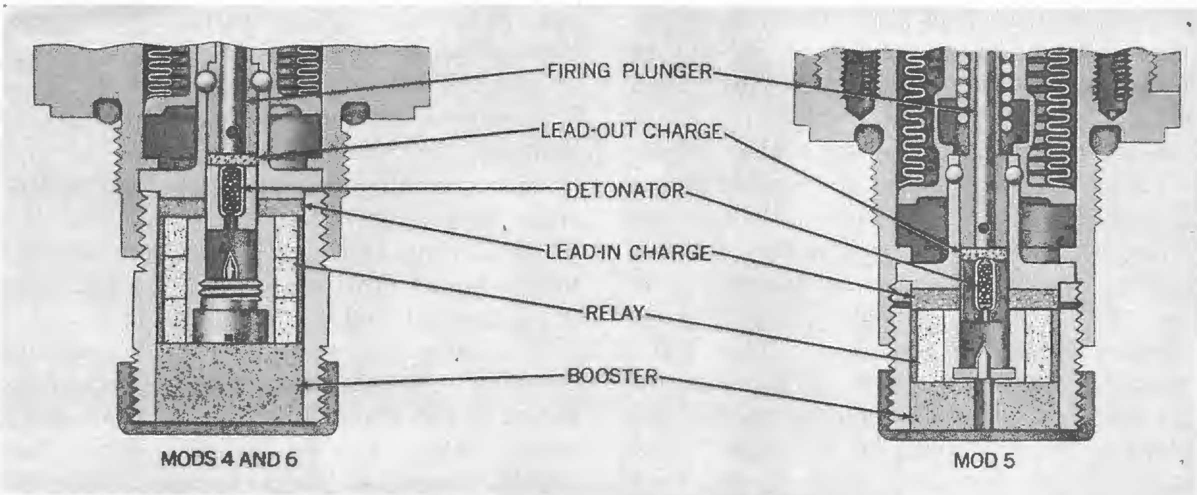


Figure 2–35.—Hydrostatic Tail Fuze AN–Mk 230, Comparison of Boosters.

The rotating arming vanes turn the vane shaft, the gear cover, and the planetary-gear cover. An idler gear (pinion) is mounted on the planetary-gear cover. The number of teeth on the upper and lower portions of the pinion is the same. The planetary-gear cover turns about the arming shaft and is supported vertically by the stationary gear and the stationary-gear carrier. The movable gear is secured to the arming shaft at its forward end, above the planetary-gear cover. The shaft nut locks the movable gear in place. The movable gear has 23 teeth while the stationary gear has 22. As the vanes revolve to turn the planetary-gear cover, the pinion is driven around the stationary and movable gears, with their teeth meshing. The difference between the number of teeth on the stationary and movable gears causes the pinion to force the movable gear one tooth ahead with each revolution of the planetary gear cover. This gives a reduction ratio of one revolution of the arming shaft to 23 revolutions of the arming-vane assembly.

Rotation of the arming shaft causes the arming-nut assembly to rise upward on the arming shaft, withdrawing the arming-nut pins from the detent carrier. When the pins are fully clear of the detent carrier, further rotation of the arming shaft causes the pins to turn the detent-retaining cup until openings on the cup sides are opposite the detents. The detents jump out, freeing the depth-spring-stem nut. The detents are prevented from jumping completely out of their holes by detent retaining pins which are fitted into the detent carrier.

A metal strap passes over the detent-retaining cup, preventing its removal from the detent carrier. If, therefore, the arming-mechanism housing is broken free without rotation of the arming-vane assembly, the fuze will not become armed (shear safe).

Depth-Setting Mechanism. The basic concept of the depth-setting arrangement of this fuze is a bellows expanding against the compressive resistance of a spring. The hydrostatic piston and depth-spring stem ride vertically through the depth-setting sleeve and the depth spring. The bellows is secured to the piston and the depth-spring-stem nut is secured to the depth-spring stem.

The depth-setting sleeve can be positioned in any one of five possible locations along the depth-spring stem by turning the depth-setting knob. Moving the depth-setting sleeve vertically up and down the depth-spring stem regulates the space between the depth-spring-stem nut and the base of the depth spring. The distance which the piston and the depth-spring-stem nut must move to detonate the fuze is constant for any depth. Selectivity is gained by causing a portion of the movement to be made against the compressive resistance of the depth spring. The closer the depth spring is brought to the stem nut, the greater the distance the hydrostatic piston has to move against the spring to detonate the fuze. Since hydrostatic pressure is the motivating force that operates the bellow-actuated piston, greater depths are necessary to produce sufficient pressure to overcome the compressive strength of the spring.

Action. The hydrostatic piston, the counterweight rack, the depth-spring stem, and the depth-spring-stem nut move as a single unit. One end of the hydrostatic bellows is secured to the hydrostatic piston; the other end is secured to the depth-setting-mechanism housing, which is stationary.

When the fuze goes below the water surface, water enters the fuze body through two port holes. The water then passes through four holes in the depth-setting-mechanism housing and enters the bellows. The bellows expands as water pressure is built up when the fuze submerges.

The expanding bellows draws the hydrostatic piston downwards, compressing the firing spring and depth spring. As the piston moves downwards, it rides over the firing plunger and plunger housing.

The detonator and lead-out charges are contained in the firing plunger, which is locked to the plunger housing by six locking balls. After the hydrostatic piston has moved downward about 3/8 inch (this distance is the same for all settings), the balls locking the firing plunger are forced out into the circular recess in the hydrostatic piston. The compressed firing spring then drives the freed plunger into the firing point. At this point the explosive train is completed by the alinement of the lead-out and lead-in charges and the fuze is detonated.

Detonation. The explosion, caused by the detonator being driven into the firing point, is passed to the lead-out charges, then to the lead-in charges, the relay, and finally the booster, which sets off the bomb.

Inertial Counterbalancing. Two inertia counterweights are attached to the hydrostatic piston through the counterweight rack to prevent inertial forces from firing the fuze. On impact, they provide a positive force (since they weigh slightly more than the piston assembly) which holds the hydrostatic piston up in the nonfiring position.

Released Safe

If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

Accidental Arming

Recognition. There is no way of determining from the visual appearance of the fuze whether or not is is armed. By turning the arming vane backwards, a partially armed fuze can be disarmed.

HANDLING. Even if the fuze is fully armed, it will not fire from handling or shock because the functioning mechanism is counterbalanced. It will fire, however, if sufficient air or water pressure enters the fuze through the ports.

Armed fuzes may be removed from a bomb with relative safety. However, the safety rod that locks the firing plunger to the plunger housing should be inserted immediately.

Salvaging. The only authorized salvaging operation is the removal of the delay-arming-mechanism subassembly. Only qualified and authorized personnel should attempt to do this work.

Fuzing

1. Unscrew the shipping plug and fuze adapter from the adapter-booster in the tail of the bomb. Inspect the adapter-booster and threads; if any dirt or other foreign material has collected, clean the threads with a pointed stick.

2. Remove the fuze from its packings and inspect it for damaged threads and dented surfaces.

> CAUTION: Do not partially prearm Hydrostatic Tail Fuze AN–Mk 230 to insure arming at low altitudes. The extent of arming cannot be determined by visual examination. If the fuze is already in a state of partial arming, additional rotation of the vanes may complete arming and render the fuze dangerous since fluid pressure (air or water) applied through parts in the body may build up sufficiently to detonate the fuze.

3. Set the desired depth as follows.

a. Remove the cotter pin from the depth-setting rod. Withdraw the rod from the depth-setting knob.

b. Turn the depth-setting knob to the desired depth. The figure on the setting dial closest to the lock indicates the depth for which the fuze is set.

c. Replace the depth-setting rod through the depth-setting knob and through the slot in the depth-setting lock. Replace the cotter pin in the depth-setting rod. It is easiest to set the depth desired before the fuze is placed in the bomb. The setting can be changed, however, after the fuze has been installed.

4. Remove the cotter pin from the safety rod and withdraw the rod from the fuze.

5. Make sure the fuze gasket is in place. Screw the fuze into the tail of the bomb. In order to obtain a watertight seal, tighten

the fuze with a large spanner wrench. Do not use grease or sealing compound. Grease or waterproofing preparations might seep into the fuze and cause a dud.

6. Thread one end of the arming wire through the rear suspension lug of the bomb and then through the nearest pair of four pairs of holes in the bushing and arming-vane assembly of the fuze. If the safety cotter pin occupies the nearest pair of holes, insert a spare cotter pin in another set of holes; then remove the original cotter pin to free the holes desired. If no nose fuze is used with the bomb, cut off the other end of the arming-wire assembly.

7. Adjust the arming wire to protrude from 2 to 3 inches beyond the arming-vane assembly. Secure two safety clips on the wire against the face of the arming-vane assembly. Be sure that the arming wire is free from kinks and burrs.

8. If an arming bracket is to be used, attach it so that it will be in a vertical position when the bomb is placed in the rack. Thread the long end of the arming wire through the bracket and arming-wire tube. Adjust the arming wire so that it extends 2 to 3 inches beyond the bracket. Be sure the arming wire is free of burrs and kinks. Slip two safety clips over the end of the arming wire until the first one just touches the bracket.

9. Remove the safety cotter pin from the arming-vane assembly and bushing.

Defuzing

CAUTION: Before attempting to remove a fuze from a bomb, be sure it is unarmed or safe to handle. THERE IS NO WAY OF TELLING FROM VISUAL INSPECTION OF THE FUZE WHETHER OR NOT IT IS ARMED. See preceding instructions on handling these fuzes before defuzing.

1. Replace the safety cotter pin through one pair of holes in the vane assembly and flange of the bushing to lock the arming mechanism.

2. Remove the two safety clips; remove the arming wire from the fuze.

3. Unscrew the fuze from the bomb. Replace the safety rod in the base of the fuze and secure it with the cotter pin. (If the safety rod cannot be reinserted into the fuze, the fuze must be considered dangerous and disposed of by authorized personnel. This rod locks the firing plunger in the plunger housing; if it is not in place, the firing plunger will be free to detonate the fuze if sufficient water or air pressure enter the fuze through the ports.)

4. Adjust the depth-setting knob to the 25-foot setting. Make sure both depth-setting rod and safety rod are secured with safety cotter pins.

5. Return the fuze to its container and reseal with adhesive tape.

Packaging and Marking

Fuze Container. Each fuze is packed in a sealed cylindrical metal container which is opened by a scored tear strip. The container has a maximum diameter of $5\frac{11}{16}$ inches and a maximum length of $16\frac{1}{20}$ inches. The weight of the fuze and the container together is 17 pounds. The container is marked as follows.

ONE HYDROSTATIC BOMB FUZE
AN–Mk 230 U.S.N.

LOT NO. YEAR OF MANUFACTURE
NAME OF MANUFACTURER
INSPECTOR

Fuze Container Crate. Four fuzes in their containers are packed in a metal fuze container crate, the approximate dimensions of which are $11\frac{3}{5}$ by $11\frac{3}{5}$ by $16\frac{1}{2}$ inches. The crate and fuzes weigh approximately 75 pounds. The top of the crate is marked as follows.

FOUR HYDROSTATIC BOMB FUZES
AN–Mk 230

LOT NO.	NAME OF MANUFACTURER
CONTRACT NO.	YEAR OF MANUFACTURE
	INSPECTOR'S INITIALS
NET WEIGHT LBS.	GROSS WEIGHT LBS.

MULTI-POSITION FUZE M157, AN–M173, AND AN–M173A1

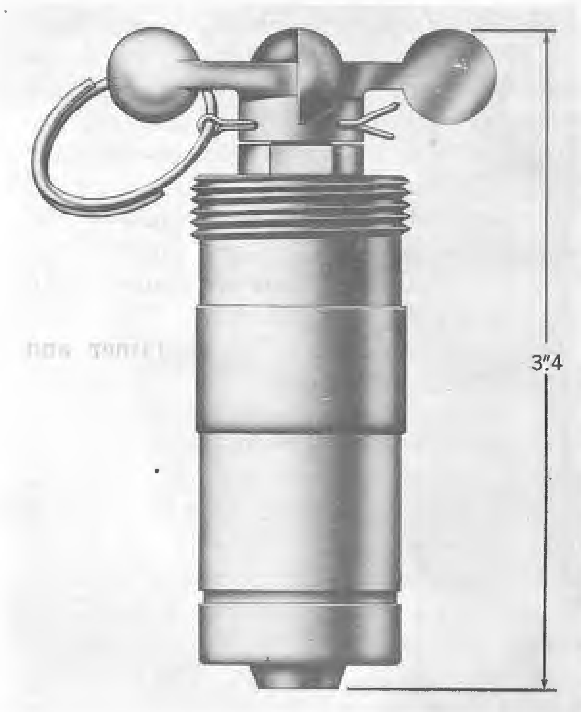


Figure 2–36.—Multi-Position Fuze M157, Exterior View.

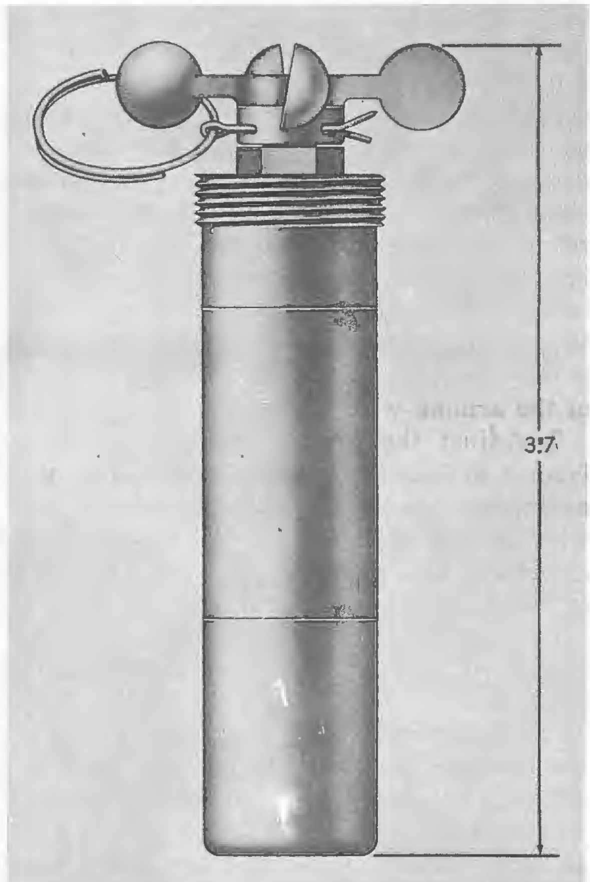


Figure 2–37.—Multi-Position Fuze AN–M173A1, Exterior View.

Model	M157	AN–M173A1.
Firing Action	Impact	Impact.
Firing Delay	Instantaneous	Instantaneous.
Assembly Drawing No	C14–15–191	C14–15–638.
Arming:		
Type	Vane	Vane.
Revolutions to Arm:		
For Impact along Fuze Axis	18	18.
For All-Ways Action	34	34.
Time to Arm (sec)		
Air Travel to Arm (ft):		
For Impact Along Fuze Axis	150	150.
For All-Ways Action	220	220.
Overall Length (in.)	3.4	4.19.
Protrusion from Bomb (in.)	0.6	0.6.
Vane Span (in.)	2.0	2.0.
Weight (lb)	0.4	0.45.
Number of Vanes	4	4.
Primer Designation	M26	M26.
Detonator Designation		M31.
Booster Charge:		
Type	Black powder	Tetryl.
Weight (grams)	0.75	12.

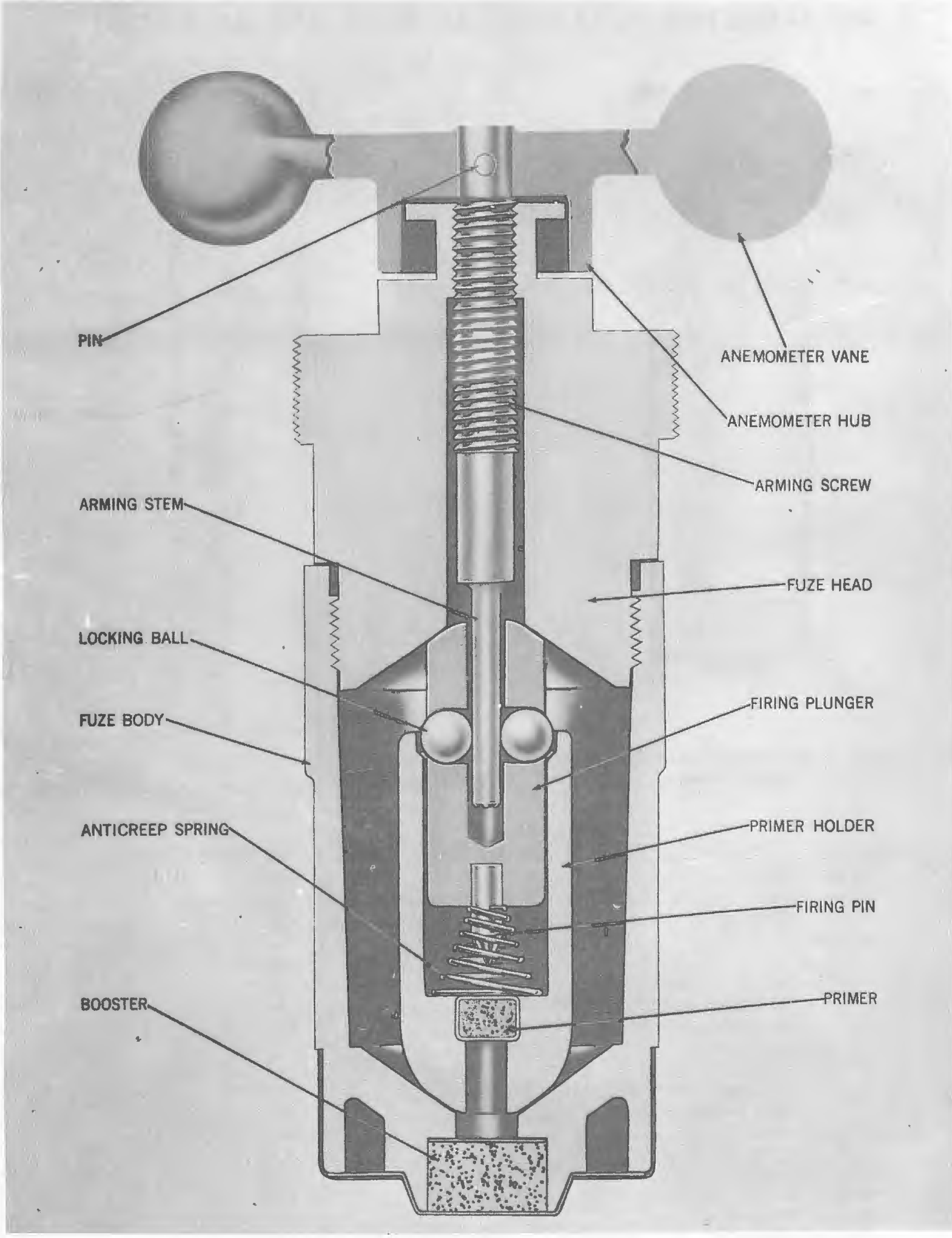


Figure 2–38.—Multi-Position Fuze M157, Cross Section.

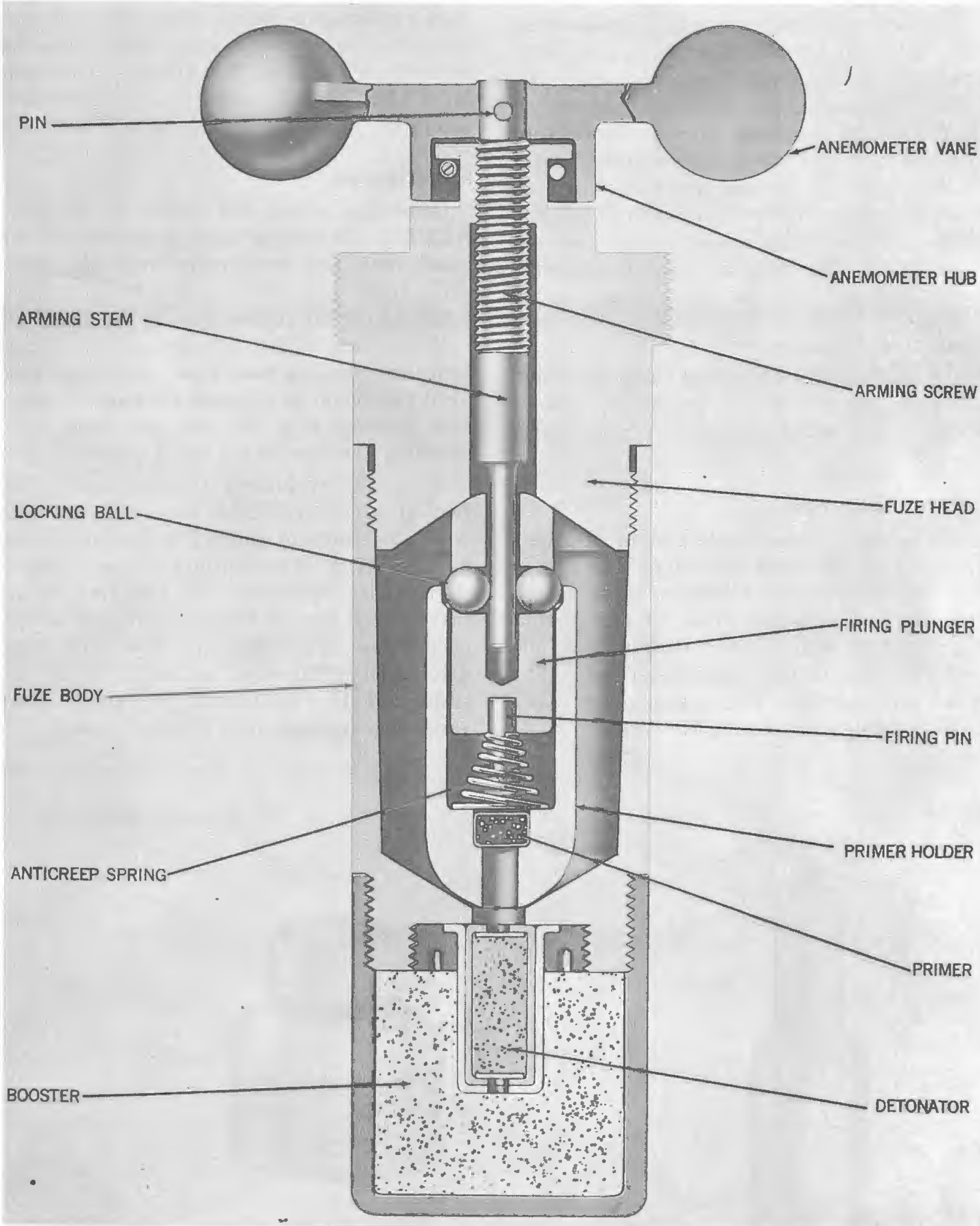


Figure 2–39.—Multi-Position Fuze AN–M173A1, Cross Section.

General Description

The inertia firing, impact, multi-position fuze M157 and AN–M173A1, figures 2–38 and 2–39, is fully armed by anemometer type vanes after completing 220 feet of air travel. Once the fuze is armed, impact forces from any direction will cause instantaneous detonation. These fuzes are assembled in conjunction with igniters or bursters in fire bombs. These fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

The AN–M173A1 employs three explosive elements: a primer, a detonator, and a booster. The M157 fuze has a primer and a booster.

Safety Features

Each fuze is individually packed in a hermetically sealed metal container. The fuze is kept in an unarmed condition by a safety cotter pin, with a pull ring and instruction tag attached, which passes through two off-centered holes in the anemometer hub. The cotter pin prevents the anemometer vanes from rotating and arming the fuze.

When installed in an igniter, the arming wire replaces the safety cotter pin and prevents the anemometer vanes from rotating and arming the fuze. The arming wire maintains this position until it is withdrawn, after the bomb is dropped ARMED.

Functioning

General. When the bomb is dropped ARMED, the arming wire is retained in the bomb rack and withdrawn with the fuze. This frees the anemometer vanes, which rotate in the air stream to arm the fuze.

When fuzes of this type are used with certain fire bombs, a nose cone covers the fuze until the bomb is released armed. A separate arming wire releases the nose cone, exposing the fuze to the air stream.

After 18 revolutions (approximately 120 feet of air travel) the fuze will detonate when the force of impact is directed along its axis. After 34 revolutions of the anemometer vanes (approximately 220 feet of air travel), the fuze is fully armed so that impact forces from any direction will cause detonation ("all-ways action"). With an additional 15 revolutions, the anemometer vanes are released into the air stream.

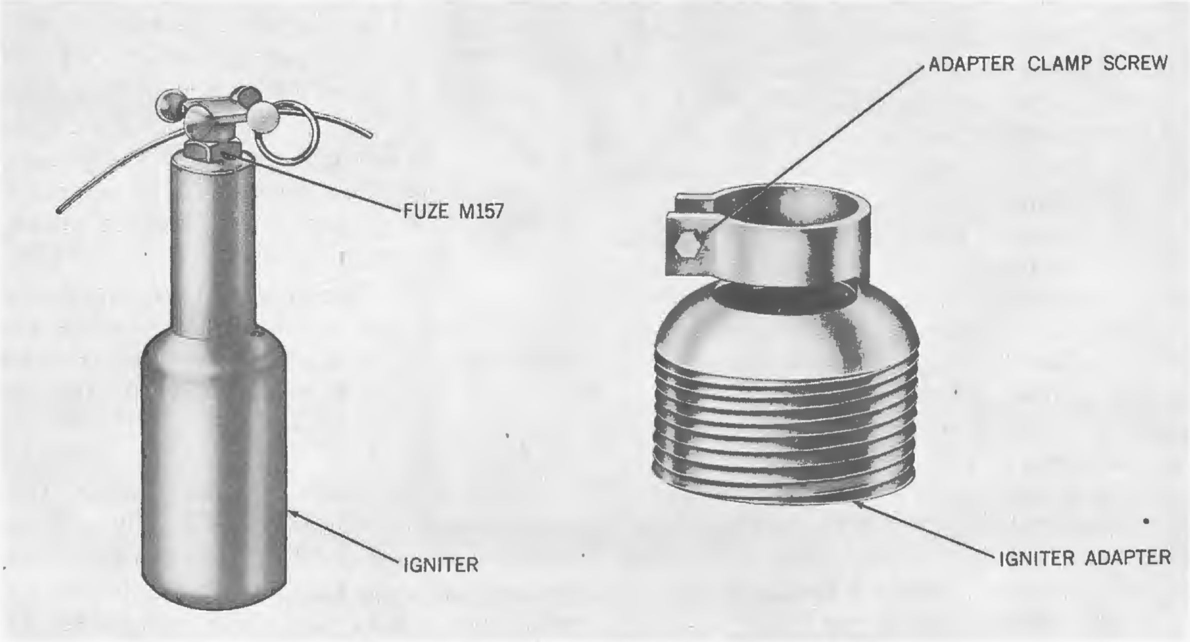


Figure 2–40.—Multi-Position Fuze M157, Installed in Igniter M15.

Figure 2-41.—Multi-Position Fuze AN–M173A1, Installed in Igniter M23.

Upon impact, the fuze detonates instantaneously.

Arming. The anemometer vanes are directly connected to the arming screw by a pin. The arming screw is threaded into the fuze head. At the inner end of the arming screw is the inner arming stem which locks the firing plunger in place.

Next to the fuze head, within the fuze body, are the firing plunger and the primer holder. The primer holder is a hollow cylindrical capsule with a round inward end and an open outward end. The primer is positioned in a seat provided at the inward end of the primer holder; it is always in line with the firing pin.

Two locking balls prevent the firing plunger from being driven into the primer holder and detonating the fuze. The locking balls extend from the firing plunger and bear against an internal shoulder of the primer holder. These locking balls are held outward in their extended position by the arming stem. The arming stem extends into the upper cavity of the firing plunger and seats between the two locking balls. The recess for the locking balls is bevelled to prevent them from falling out.

As the anemometer vanes rotate and the arming screw separates from the fuze head, the arming stem is withdrawn from the firing plunger. When it is withdrawn sufficiently so that it no longer holds the locking balls outward, the fuze is armed. When the anemometer vanes have completed approximately 60 revolutions, they are freed from the fuze head and released to the air stream.

Premature firing of the fuze is prevented by the anticreep spring, which holds the firing plunger away from the primer after arming is completed. This spring is strong enough only to offset the weight of the firing plunger; additional weight or force will overcome its strength.

Action. The shock produced by impact along the fuze axis drives the firing plunger inward, forcing the locking balls into the firing plunger and compressing the anticreep spring.

Shock, produced by impact, along the sides of the fuze, causes the firing plunger and the primer holder to be forced together by the tapered end of the fuze head and the tapered inside surface of the fuze body. This forces the locking balls into the firing plunger and causes the firing plunger to compress the anticreep spring.

The flash from the primer is sufficiently strong so that the flame will ignite the detonator, or booster, regardless of the position in the fuze body at which the primer fires.

Detonation. In Multi-Position Fuze AN–M173A1, the firing pin explodes the primer, which sets off the detonator. The detonator relays the explosion to the booster which, in turn, bursts the igniter.

In Multi-Position Fuze M157, the firing pin explodes the primer, which sets off the booster. The booster relays the explosion to a C8R1 Burster which bursts the igniter.

Released Safe

When assembled with an igniter, this fuze cannot be released SAFE. Even if the igniter is released SAFE and the fuze does not function, impact may break the igniter open and scatter its white phosphorus or sodium filler. This will ignite the gasoline gel just as though the explosion had scattered the filler.

Accidental Arming

Recognition. If the anemometer hub has separated from the fuze head by 1/8 inch or more, or if the anemometer vanes are completely removed from the fuze, the fuze is armed.

Handling. When the fuze is armed, the firing plunger is held away from the primer by the anticreep spring. This spring is strong enough only to offset the weight of the firing plunger. Therefore the fuze, the igniter, and the bomb must be protected against shock once the fuze is armed. A blow at any point on the surface may detonate the fuze since it is responsive to forces from any direction.

The removal of armed or partially armed fuzes from igniters must be performed by authorized and qualified personnel.

Fuzing

1. Remove the igniter from its sealed metal container and examine it for any obvious physical defects.
2. Unseal the metal fuze container and remove the fuze. Inspect the general appearance of the fuze; check for damaged threads, damaged anemometer vanes, or corrosion. Use only serviceable fuzes.
3. Screw the fuze into the threaded igniter adapter.
4. Install the igniter in the fire bomb.
5. Revolve the fuze until the open set of off-centered holes of the anemometer vane hub aline with the rack, shackle, or other point of attachment. The arming wire should pull straight out of the arming-wire hole in the fuze. Tighten the setscrew.
6. Thread the arming wire through the open set of off-centered holes drilled through the anemometer hub. Adjust the arming wire so that at least 3 inches extends beyond the fuze. Place two safety clips on the end of the arming wire and move them up until they touch the anemometer vane. Be sure the arming wire is free from kinks and burrs.
7. Pull the safety cotter pin out of the other set of holes drilled through the anemometer hub.

Defuzing

> CAUTION: Before removing a fuze from a bomb, be sure it is unarmed or safe to handle. If the anemometer hub has separated from the fuze head by 1/8 inch or more, or if the anemometer vanes are completely removed from the fuze, the fuze is armed. See the preceding section on accidental arming before defuzing.

1. Replace the safety cotter pin in the unoccupied set of holes drilled through the anemometer hub.
2. Remove the two safety clips from the arming wire. Pull the arming wire out of the off-centered holes of the anemometer hub.
3. Remove the igniter from the bomb.
4. Loosen the setscrew and remove the fuze.
5. Return the fuze to its metal container and reseal with adhesive tape.

Packaging and Marking

Fuze Container. Each fuze comes in a hermetically sealed container which has a tear strip to facilitate opening.

Packing Box. Fifty metal containers, each containing a fuze, are packed in a wood crate.

IMPACT SIDE FUZE M129

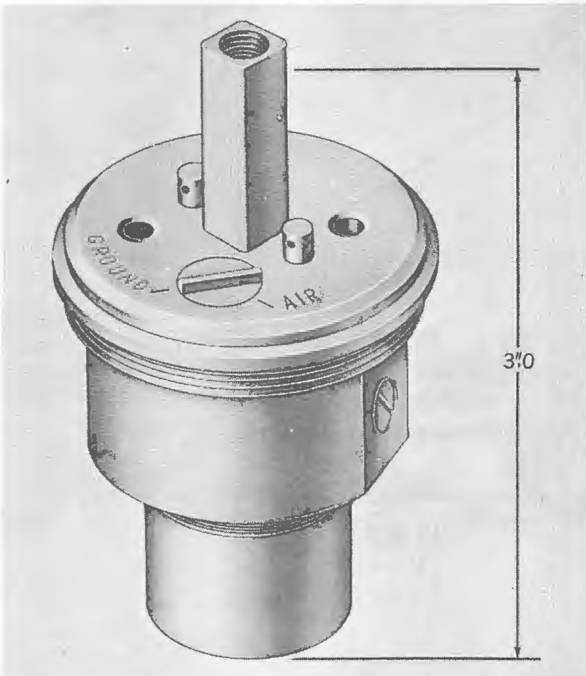


Figure 2–42.—Side Fuze M129.

Model	M129
Firing Action	Aerial burst or impact
Firing Delay	
Air	2.5 seconds after arming
Impact	Instantaneous
Asembly Drawing No.	73–8–252
Arming	
Type	Direct
Revolutions to Arm	3½ to 5
Air Travel to Arm (ft)	50
Overall Length (in.)	3.0
Protrusion from Bomb (in.)	1.2
Body Diameter (in.)	1.75
Weight (lb)	0.4
Detonator Designation	M31
Primer Designation	M41A1
Booster Type	Tetryl pellet

General Description

Impact Side Fuze M129, figure 2–43, is used only with the fragmentation (butterfly) bomb. It is armed by the "butterfly wings" of the bomb and can be preset to detonate in the air or instantaneously upon impact.

Fragmentation bombs are assembled into clusters which require mechanical time fuzes for cluster opening. These cluster assemblies are described in chapter 8, Fragmentation Bomb Clusters and Adapters.

Approximately 50 feet of air travel is required to arm the Type I impact side fuze. If set for aerial burst, the fuze is detonated 2½ seconds after arming. For ground burst, the delay train action is initiated after the fuze has completed 50 feet of air travel. Two and one-half seconds later, the delay train is halted and is not reactivated until impact occurs, resulting in detonation.

The words AIR and GROUND are embossed on the outside of the fuze cap and indicate the position of the setting plug. The embossing is a distinguishing feature of this type of fuze and differentiates it from similar fuzes.

The setting is made at the time of manufacture, and only fuzes set for ground burst are supplied to the Navy. No one except authorized personnel should attempt to change this setting, to remove the fuze from the bomb, or to work on the fuze in any manner. Because the time fuzes used with these fuzes utilize arming wires, these fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

The main charge of the fuze is a tetryl pellet booster which is housed in a metal cup protruding from the fuze base. A detonator is positioned in the center of the booster at its innermost end. The primer is housed in the main body of the fuze where it is alined with the firing pin at all times. When the fuze is in the unarmed condition, however, the arming stem tip is interposed between these components.

Safety Features

Some additional safety features not provided in the AIR burst setting are present

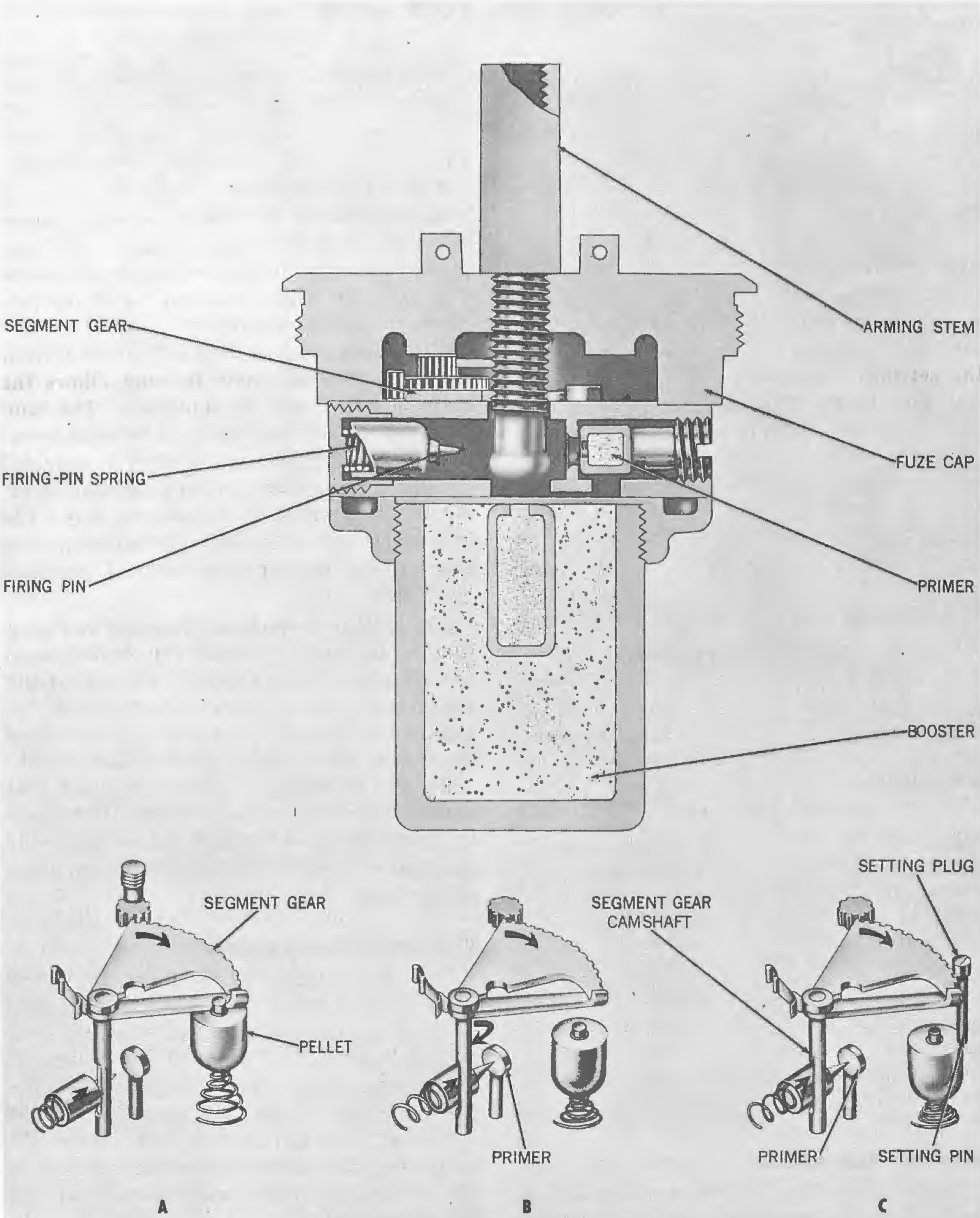


Figure 2–43.—Side Fuze M129, Cross Section and Details of Operation.

with the GROUND burst setting of the fuze. Should the arming stem become unscrewed prematurely, allowing the fuze to arm, the fuze will not function unless a shock sufficient to simulate the impact force of the bomb is applied to the fuze. In the AIR burst setting the fuze would detonate 2½ seconds after arming, under similar circumstances.

Presetting

The setting plug, located on the fuze cap, is used to select the AIR or GROUND burst setting. Turning the pointer to either of the settings operates a spring-actuated setting pin. In the AIR position, the cam surface on the underside of the setting plug forces the setting pin inward to contact the safety-pellet assembly. In the GROUND position, the setting pin is held in the fuze cap, away from the safety-pellet assembly, by the setting pin spring.

Functioning

General. When the fragmentation bomb is released from the cluster, the butterfly wings snap open and ride to the top of the cable attached to the arming stem. The rotation of the wings in this position causes the cable to turn, unscrewing the arming stem far enough to initiate the arming mechanism of the fuze. This action requires 3½ to 5 revolutions of the wings and approximately 50 feet of air travel.

If the fuze has been set for AIR burst, it will detonate 2½ seconds after the arming action is completed.

If the fuze has been set for GROUND burst, it will not detonate until impact occurs.

Arming. As the butterfly wings rotate in the air stream, the arming stem is unscrewed from its centrally threaded hole in the fuze cap. When the arming stem has completed between 3½ and 5 turns, it has withdrawn from the movement assembly housing sufficiently to free the clockwork mechanism. The fuze is technically armed at this time. The clockwork mechanism constitutes a delay firing mechanism.

The clockwork assembly is contained in the movement assembly housing and includes the segment gear (regulated by the gear train or movement assembly), the segment-gear stop, the segment-gear camshaft, and the safety-pellet assembly (pellet, shell, and spring).

The spring-loaded firing pin bears on one edge of the segment-gear camshaft, which is connected to the segment gear. The segment gear bears against the arming screw and prevents the spring-loaded firing pin from turning the camshaft.

The withdrawal of the arming screw from the movement assembly housing allows the firing pin to rotate the camshaft. The camshaft moves the segment gear in a clockwise direction. A gear train, which is contacted by the external teeth of the segment gear, controls the speed at which the firing pin will rotate the camshaft. The segment gear contacts the segment-gear stop 2½ seconds after it is freed.

Ground Burst Action. If the setting plug, located in the fuze body cap assembly, is turned to indicate GROUND, the setting pin is retracted into the cap. In this case, the segment gear stop is restrained by the tip of the safety pellet, which projects through the safety-pellet shell. When the segment gear contacts the segment-gear stop after withdrawal of the arming stem, it is stopped and held in place. In this position, the firing pin is still restrained from forward action by the camshaft. Upon impact, the complete safety-pellet assembly is depressed by inertia. Almost simultaneously with this action, the gear stop and segment gear pass over the safety pellet assembly, permitting the camshaft to rotate further until the halfround notch cut in the camshaft has alined with the firing pin. This frees the firing pin, which is driven into the primer.

Air Burst Action. If the setting plug is positioned to indicate AIR, the setting pin is forced downward and depresses the safety-pellet assembly. When the segment gear is freed and contacts the gear stop, the segment gear moves the segment-gear stop over the depressed safety-pellet assembly.

This allows the camshaft to rotate until its half-round notch alines with the firing pin. The firing pin then is freed and driven into the primer by the compressed firing-pin spring.

Detonation. The primer is ignited by the firing pin and the flash from the explosion passes through the explosive canal to the detonator. This sets off the detonator which, in turn, fires the booster and bomb.

Released Safe

If it is necessary to release the cluster SAFE over friendly territory, the aircraft arming controls are set in the SAFE position. In this position, the arming wire through the time fuze is released with the cluster when the cluster is jettisoned. This prevents the time fuze from functioning and opening the cluster. Bombs in the unopened cluster will not function upon impact since the individual fuzes are unarmed.

Accidental Arming

Recognition. From outward appearances it is impossible to tell the condition of the arming mechanism. Consider the fuzes armed if the arming stem has risen more than 1/8 inch from the fuze cap.

Handling. If the fuze has been set for GROUND burst and is armed, it is reasonably safe to handle but must be protected against shock. A severe shock may cause the safety-pellet assembly to depress enough to allow the segment gear to ride over it and free the firing pin.

A fuze set for AIR burst detonates approximately 2½ seconds after the arming stem frees the segment gear. If the arming stem has risen more than 1/8 inch and the fuze has not detonated, the fuze is only partially armed. It must be handled cautiously, however, since the margin of safety is uncertain. The segment gear may be held back by the lower edge of the arming stem. A severe shock may free the segment gear and fire the fuze.

WARNING

No attempt should be made to remove an armed, unarmed, or questionably armed fuze from a bomb. The fuzes are set and installed in the bomb by the manufacturer. In the event of an armed or questionably armed fuze, notify authorized personnel for destruction.

Packing and Marking

This fuze is installed in the bomb M83 by the manufacturer. No fuzes are shipped without bombs. The Navy is supplied with fuzes set for GROUND burst.

TIME SIDE FUZE M130 and M130A1

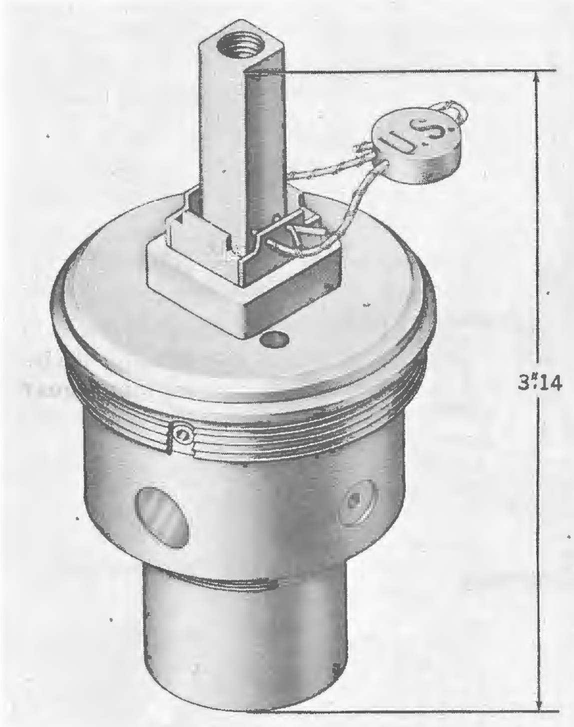


Figure 2–44.—Side Fuze M130A1.

Model	M130 AND M130A1
Firing Action	Mechanical time
Firing Delay (min)	10, 20, 30, 40, 50, or 60
Assembly Drawing No.	73–8–225 73–8–226
Arming	
Type	Direct
Revolutions to Arm	3½ to 5
Air travel to Arm (ft)	50
Overall Length (in.)	3.14
Protrusion from Bomb (in.)	1.2
Body Diameter (in.)	1.75
Weight (lb)	0.4
Detonator Designation	M31
Primer Designation	M41A1
Booster Type	Tetryl pellets

General Description

The mechanical time side fuze is used only with the fragmentation (butterfly) bomb. It is armed by the "butterfly wings" of the bomb. Its time train is initiated after 50 feet of air travel have been completed. Detonation will occur 10, 20, 30, 40, 50, or 60 minutes after arming, depending upon the setting made at the time of manufacture.

Fragmentation bombs are assembled into clusters which require mechanical time fuzes for cluster opening. These cluster assemblies are described in chapter 8, Fragmentation Bomb Clusters and Adapters.

Bomb Clusters and Adapters

Side Fuzes M130 and M130A1 are identical in operation and appearance with the exception that the M130A1 has a window in the side which permits visual inspection to determine whether or not the fuze is armed. This window is not visible once the fuze is installed in the bomb.

The fuze is very similar in appearance to the M129 (which is distinguishable by the words AIR and GROUND embossed on its cap); the M130, M130A1, and M131A1 are identical in appearance when assembled in a bomb.

These fuzes are installed in bombs by the manufacturer. In addition, the fuzed bombs are issued in wafer assemblies or in complete cluster assemblies. No attempt should be made to remove them except by authorized personnel.

From outward appearances, it is impossible to tell the condition of the arming mechanism of the M130 or M130A1 in a fuzed bomb. Consider the fuze armed if the arming stem has risen from the fuze cap more than ⅛ inch.

WARNING

DO NOT ATTEMPT TO REMOVE AN ARMED, UNARMED, OR QUESTIONABLY ARMED FUZE FROM A BOMB. FUZE M131A1, WHICH IS VERY SIMILAR IN APPEARANCE TO THE M130 AND M130A1 FUZES, HAS AN ANTIDISTURBANCE FEATURE WHICH WILL DETONATE AN ARMED BOMB WHEN SLIGHTLY VIBRATED.

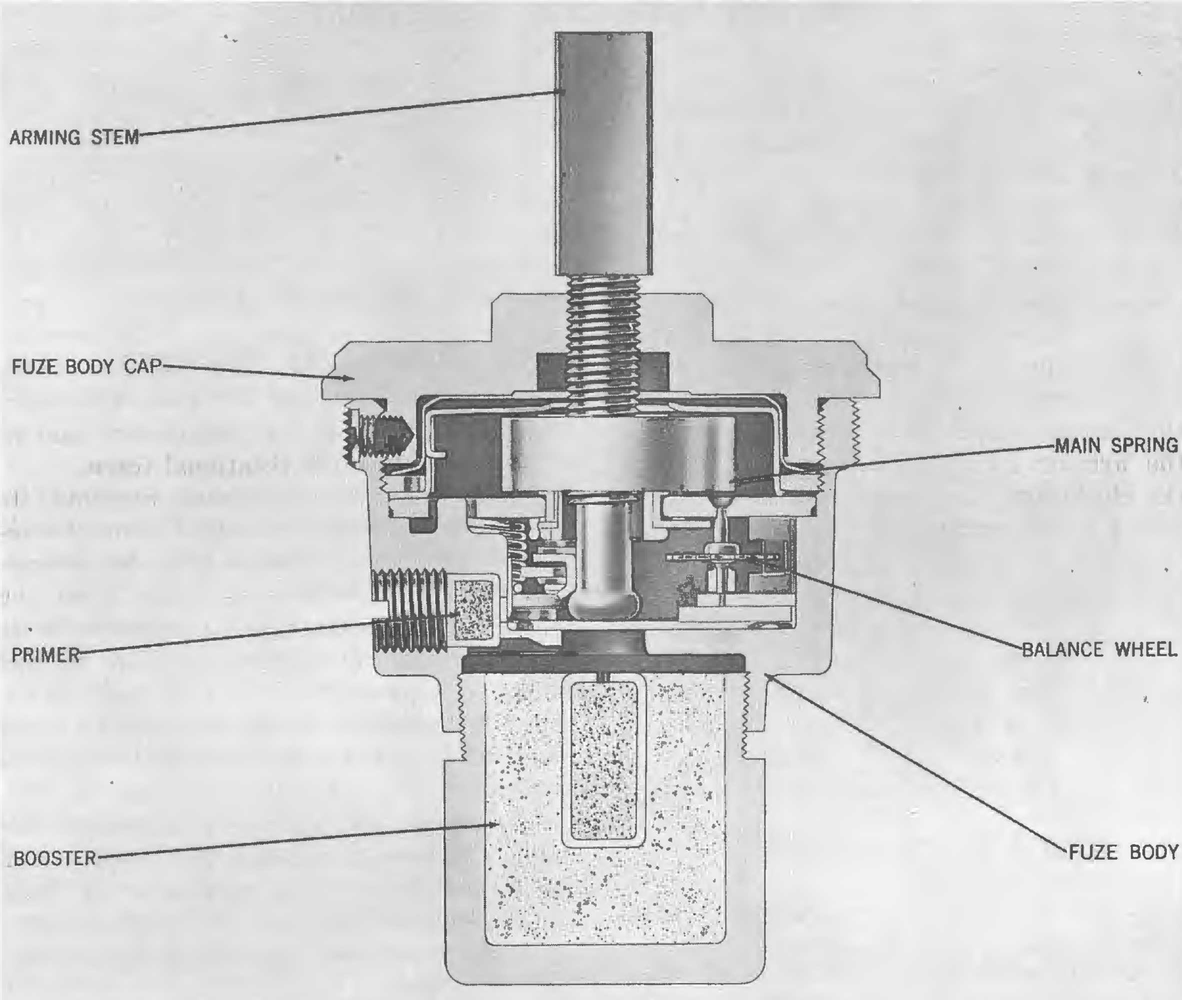


Figure 2–45.—Side Fuze M130A1, Cross Section.

Because the time fuzes used with these fuzes utilize arming wires, these fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

The main charge of the fuze is a tetryl booster, housed in a metal cup which protrudes from the fuze base. A primer and a detonator complete the explosive components of the fuze.

Safety Features

The fuze is not armed until the cluster is released to eject the bombs and the bombs have covered the necessary 50 feet of air travel to initiate the time train.

Functioning

General. When the fragmentation bomb is released from its cluster, the butterfly wings snap open and ride to the top of the cable (part of the bomb), attached to the arming stem. The rotation of the wings in this position causes the cable to turn and unscrew the arming stem.

When the arming stem is withdrawn approximately 1/4 inch, the fuze is armed and the timing mechanism is initiated. This action requires 3½ to 5 revolutions of the wings and approximately 50 feet of air travel.

The fuze detonates after the time train runs out. This may be 10, 20, 30, 40, 50, or 60 minutes after arming, depending upon the setting made at the time of manufacture.

Arming. When the arming stem is in place in the unarmed position, the arming lever is held against the stem by the action of the balance wheel pin, which bears on the projection of the arming lever. The balance wheel is under action of the clockwork (movement assembly) driven by the main spring. The wedging action of the arming lever and the arming stem prevents the balance wheel from turning as long as the arming stem is in place. This locks the clockwork mechanism against the force of the main spring.

As the butterfly wings rotate in the air stream, the arming stem is unscrewed from its centrally threaded hole in the fuze-body cap. When the arming stem is withdrawn, the pin on the balance wheel forces the projection of the arming lever to rotate and pivot the arming lever. The arming lever moves a limited distance until it is centered over the hole previously occupied by the arming stem. This action prevents reinsertion of the arming stem and starts the operation of the time mechanism as the projection on the arming lever frees the balance wheel.

Action. With the maximum time setting of 60 minutes the action is as follows. The timing gear, under the influence of the main spring, rotates in a counterclockwise direction. Near the end of its first revolution, the stud on the timing gear engages the first slot on the setting plate. The stud pulls the setting plate around with it a limited distance in a clockwise direction.

Near the end of the second revolution of the timing gear the stud engages the second slot in the setting plate, again moving the setting plate a limited distance in a clockwise direction.

This action of the gear and stud continues four more times. The setting plate is retained a slight amount each revolution of the timing gear. Near the end of the sixth revolution, the stud on the timing gear engages the heel of the setting plate and moves the setting plate clear of the timing gear. With the setting plate in this position, the setting-plate cam presents the cutaway section to the release arm.

Before it is released, the release arm bears against the setting-plate cam. The force of the spring-loaded striker is applied to the release arm cam, to which the release arm is secured, and keeps the release arm against the setting-plate cam. The spring-loaded striker engages the cam by a notch cut into the striker. The notch bears against one-half of the release-arm cam in order to produce the rotational force.

As the setting-plate cam presents its cutaway section to the release arm, the release arm pivots clockwise with the release-arm cam. The release-arm cam frees the striker, which rotates in a counterclockwise direction under the action of the spring and strikes the primer.

Each complete revolution of the timing gear takes approximately 9 to 10 minutes and, with the maximum setting of the setting plate, a delay of 54 to 60 minutes will result. By varying the initial position of the setting plate or the timing gear, or both, at the factory, the fuze can be set to function at any desired time up to 60 minutes.

Detonation. The primer is fired by the striker and sets off the detonator. The detonator ignites the booster, which sets off the bomb.

Released Safe

If it is necessary to release the cluster SAFE over friendly territory, the aircraft arming controls are set in the SAFE position. In this position, the arming wire through the time fuze is released with the cluster when the cluster is jettisoned. This prevents the time fuze from functioning and opening the cluster. Bombs in the unopened cluster will not function upon impact since the individual fuzes are unarmed.

Accidental Arming

Recognition. From outward appearances it is frequently impossible to tell the condition of the arming mechanism. The best policy is to consider the fuze armed if the arming stem has risen from the fuze cap more than 1/8 inch. Some fuzes have been modified and have a window in the side which permits visual examination to determine if the fuze is in the armed condition.

Handling. No attempt should be made to remove an armed, unarmed, or questionably armed fuze from a bomb. The fuzes are set and installed in the the bomb by the manufacturer. In the event of an armed or questionably armed fuze, notify authorized personnel for destruction.

Packing and Marking

This fuze is installed in the bomb M83 by the manufacturer. No fuzes are shipped without bombs.

ANTIDISTURBANCE SIDE FUZE M131 and M131A1

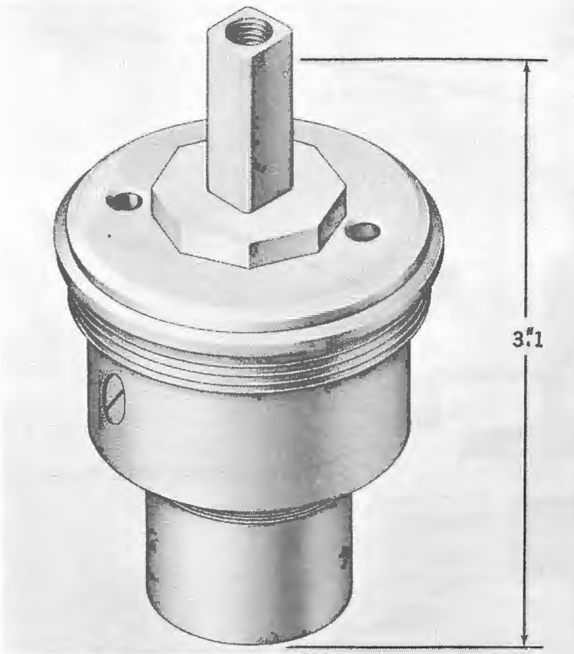


Figure 2–46.—Side Fuze M131A1.

Model	M131A1
Firing Action	Fired by any disturbance after initial impact
Firing Delay	None
Assembly Drawing No.	73–8–282
Arming	
Type	Direct by mechanical timing and impact
Revolutions to Arm	3½ to 5
Air Travel to Arm (ft)	50
Overall Length (in.)	3.1
Protrusion from Bomb (in.)	1.3
Body Diameter (in.)	1.75
Weight (lb)	0.4
Detonator Designation	M31
Primer Designation	M41A1
Booster Type	Tetryl pellets

General Description

The mechanical antidisturbance Side Fuze M131A1 is used only with the fragmentation (butterfly) bombs. It is armed by the "butterfly wings" of the bomb. It is a time fuze also and the time train is initiated after 50 feet of air travel. Detonation does not occur immediately upon impact, but only after a second shock initiates the sensitive antidisturbance mechanism.

Fragmentation bombs are assembled into clusters which require mechanical time fuzes for cluster opening. These cluster assemblies are described in chapter 8, Fragmentation Bomb Clusters and Adapters.

Side Fuze M131A1 is very similar in appearance to the M129 (which is distinguishable by the words AIR and GROUND embossed on its cap). The M131A1 fuze is identical to the M130 and M130A1 when assembled in a bomb.

These fuzes are installed in bombs by the manufacturer. In addition, the fuzed bombs are issued in wafer assemblies or in complete cluster assemblies. No attempt should be made to remove them except by authorized personnel.

From outward appearance it is impossible to tell the condition of the arming mechanism of the M131A1 in a fuzed bomb. Consider the fuze armed if the arming stem has risen from the fuze cap more than ⅛ inch.

WARNING

DO NOT ATTEMPT TO REMOVE AN ARMED, UNARMED, OR QUESTIONABLY ARMED FUZE FROM A BOMB. THE ANTIDISTURBANCE MECHANISM IN THE FUZE WILL DETONATE THE BOMB IF THE FUZE IS ARMED.

Because the time fuzes used with these fuzes utilize arming wires, these fuzes in externally carried stores are restricted in accordance with NAVORDINST 8024.25, latest issue.

Explosive Components

The main charge of the fuze is a tetryl booster housed in a metal cup which protrudes from the fuze base. A primer and a detonator complete the explosive components of the fuze.

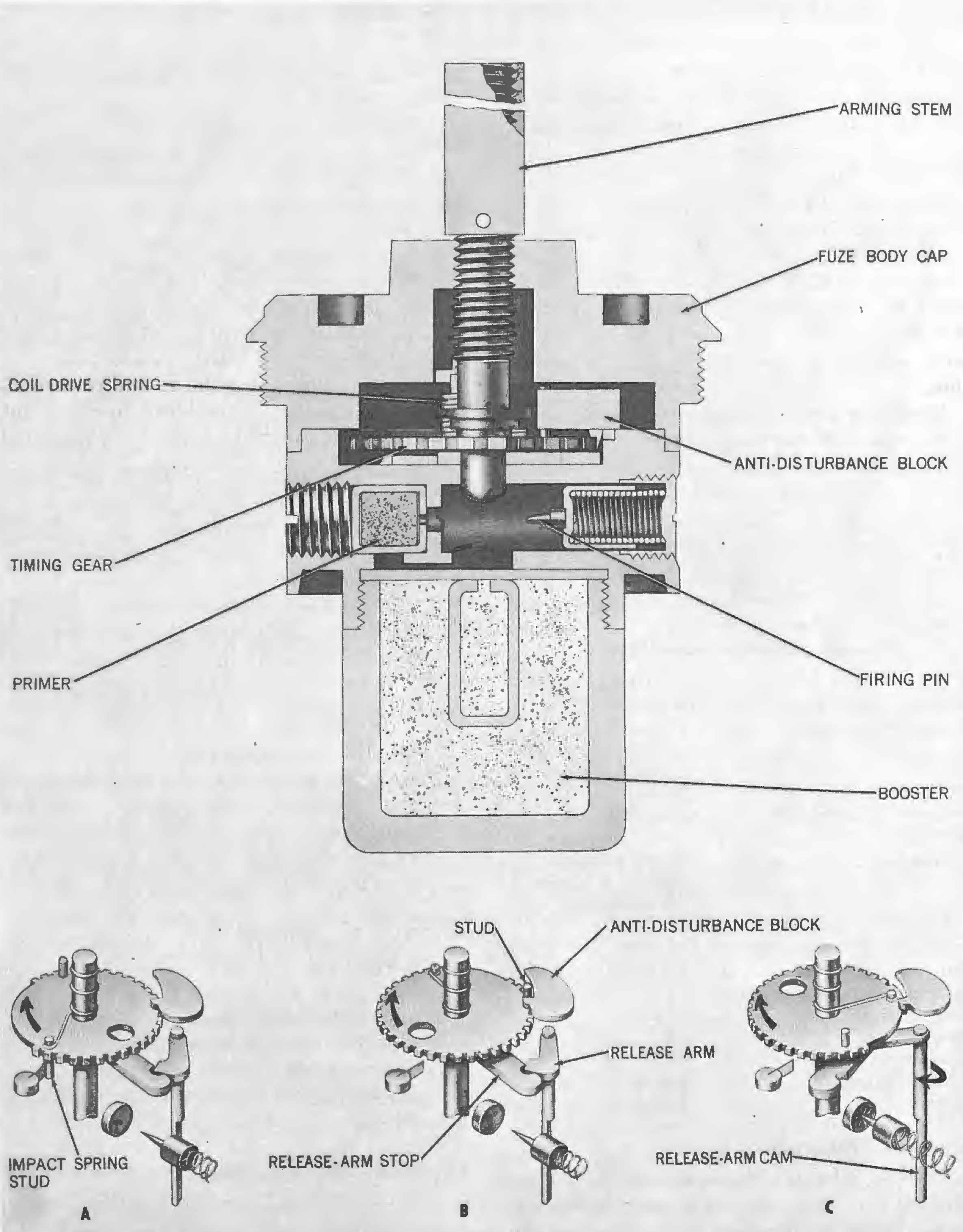


Figure 2–47.—Side Fuze M131A1, Cross Section and Details of Operation.

Safety Features

The fuze is not armed until the cluster is released to eject the bombs and the bombs have covered the 50 feet of air travel necessary to initiate the time train.

Functioning

General. When the fragmentation bomb is released from its cluster, the butterfly wings snap open and ride to the top of the cable attached to the arming stem. The rotation of the wings in this position causes the cable to turn and unscrew the arming stem, initiating the steps in the firing action.

When the arming stem has risen approximately 1/8 inch, the fuze is considered armed. After completion of approximately 50 feet of air travel, the arming stem has raised about 1/4 inch. This allows the "first release" in the firing action, which requires about 1/2 second, to take place.

The "second release" occurs upon impact. The force of impact is utilized to prepare the antidisturbance device of the fuze for action. This phase of the firing sequence is completed 2 seconds after impact.

After the second release, the fuze is in the extremely sensitive state. Should it be subjected to handling, shock, or vibration, the antidisturbance device will be released ("third release"), and the fuze will detonate.

Arming. When the arming stem has raised approximately 1/8 inch by action of the butterfly wings, it has been withdrawn from its original position between the firing pin and the primer. In this condition, the fuze is considered armed.

Action. When the arming stem has risen 1/4 inch, its inner end has cleared the escape-wheel spring and the timing gear, freeing them.

The released timing gear is rotated in a clockwise direction under the force of the coil drive spring. The speed of the timing gear is controlled by the escape movement (gear train, escape wheel, and escape-wheel spring).

After about 1/2 second, the stud on the inner surface of the timing gear contacts a projection on the second release weight (impact spring), bringing the entire mechanism to a halt and completing the first release. This condition exists until impact.

Upon impact, the second release weight deflects, disengaging the impact spring and the impact-spring stud. The timing gear again rotates under action of the coil-drive spring until a stud on the outer edge of the timing gear contacts the small projection at the end of the antidisturbance block (third release block). Here the timing mechanism is once more brought to a halt and the fuze is prepared for its third release phase.

The time delay after the second release allows the antidisturbance block to damp out the oscillation caused by impact. The second release time is about 2 seconds.

Detonation. The firing pin sets off the primer which relays the explosion to the detonator. The detonator explodes the booster.

Released Safe

If it is necessary to release the cluster SAFE over friendly territory, the aircraft arming controls are set in the SAFE position. In this position, the arming wire through the time fuze is released with the cluster when the cluster is jettisoned. This prevents the time fuze from functioning and opening the cluster. Bombs in the unopened cluster will not function upon impact since the individual fuzes are unarmed.

Accidental Arming

> CAUTION: When fully armed, this fuze is extremely sensitive and very dangerous. Only a slight vibration is needed to initiate the antidisturbance mechanism and explode the bomb. DO NOT HANDLE armed or questionably armed fuzes of this type; they are to be destroyed by authorized and qualified personnel, together with the bomb.

Recognition. From outward appearances, it is impossible to tell the condition of the arming mechanism. The best policy is to consider the fuze armed if the arming stem has risen from the fuze body cap more than 1/8 inch.

Handling. No attempt should be made to remove an armed, unarmed, or questionably armed fuze from a bomb. In the event of an armed or questionably armed fuze, do not disturb either the fuze or the bomb since the delicate antidisturbance mechanism may detonate both. Notify authorized personnel for destruction of both bomb and fuze.

Packing and Marking

This fuze is installed in the bomb by the manufacturer. No fuzes are shipped without bombs.

Chapter 3

BOMB COMPONENTS OTHER THAN FUZES

ADAPTER-BOOSTER M102A1

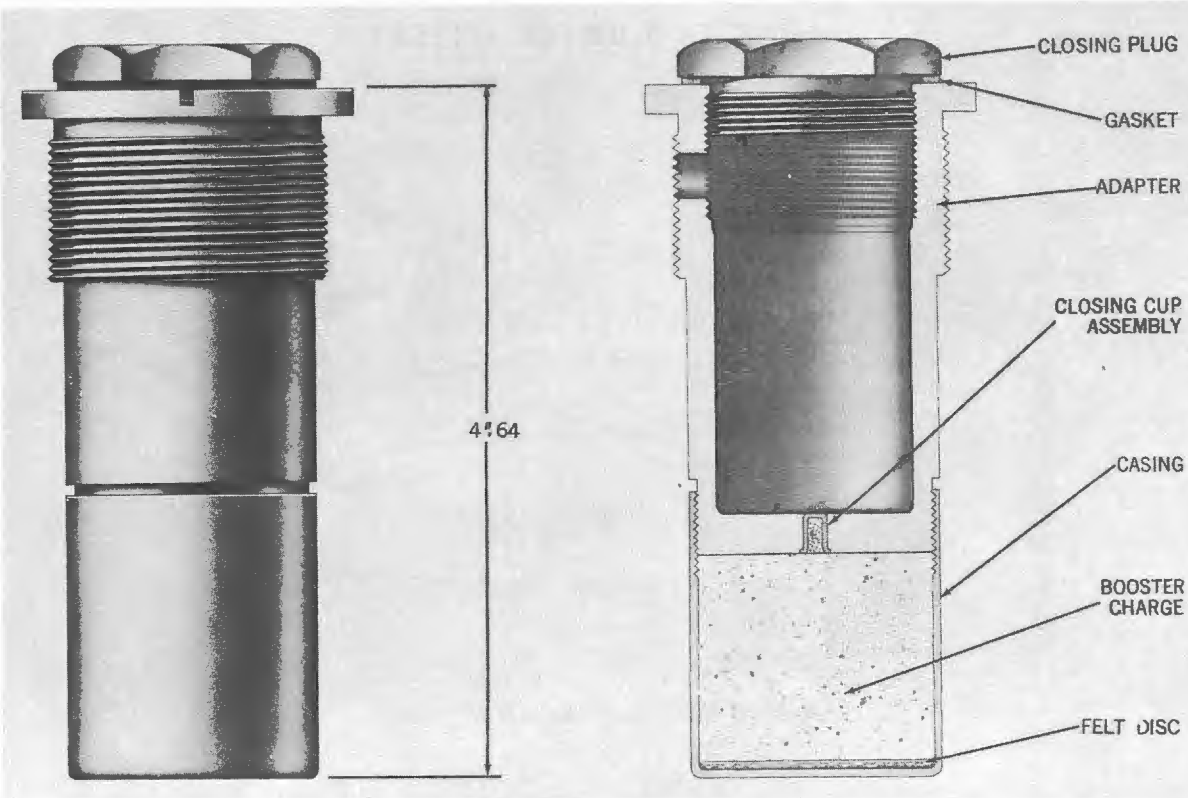


Figure 3–1.—Adapter-Booster M102A1.

Model	M102A1
Assembly Drawing No.	82–3–129
Length (in.)	4.61
Closing-Cup Assembly Charge	
Type	Tetryl
Weight (grains)	1.53
Booster Charge	
Type	Tetryl
Weight (grains)	884

General Description

Adapter-Booster M102A1 provides a tail fuze seat for certain GP and SAP bombs. It requires an adapter-booster lock pin to prevent its removal after an antiwithdrawal fuze is inserted in the bomb. The required lock pin is assembled to the wire holding the lock pin instruction card to the fuze. The M102A1 differs from the M102 in its provision for locking pins.

This adapter-booster has an inner diameter of 1.5 inches and its cavity is 2.86 inches deep. It is used on the following bombs:

500-lb SAP Bomb AN–M58
1000-lb SAP Bomb AN–M59
250-lb GP Bomb AN–M57
100-lb GP Bomb AN–M30

It receives Army designed fuzes only. Adapter-boosters are described in chapter 1.

ADAPTER-BOOSTER M115A1

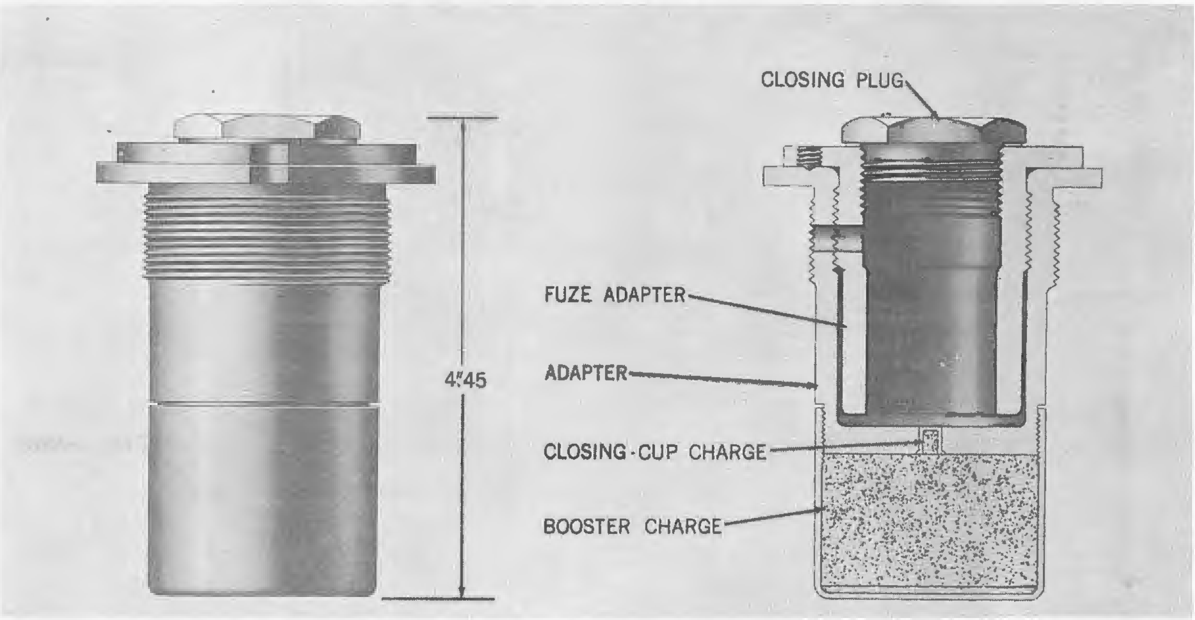


Figure 3–2.—Adapter-Booster M115A1.

Model	M115A1
Assembly Drawing No.	82–3–356
Length (in.)	4.64
Closing-Cup Assembly Charge	
Type	Tetryl
Weight (grains)	1.53
Booster Charge	
Type	Tetryl
Weight (grains)	1853

General Description

Adapter-Booster M115A1 provides a tail fuze seat for the following GP, chemical, and incendiary bombs.

500-lb GP Bomb AN–M64
1000-lb GP Bomb AN–M65
2000-lb GP Bomb AN–M66
500-lb Chemical Bomb AN–M78
1000-lb Chemical Bomb AN–M79
500-lb Incendiary Bomb AN–M76

The adapter-booster requires a lock pin to prevent its removal after an antiwithdrawal fuze is inserted in the bomb. The required lock pin is assembled to the wire holding the lock pin instruction card to the fuze. The M115A1 differs from the M115 in its provision for the locking pin.

This adapter-booster has an inner sleeve that has an inside diameter of 1.5 inches to accommodate Army designed fuzes. If the sleeve is removed, the adapter-booster will accommodate Navy fuzes, which have inner diameters of 2.00 inches. The cavity provided by the adapter-booster is 2.68 inches deep. Adapter-boosters are described in chapter 1.

ADAPTER-BOOSTER M117

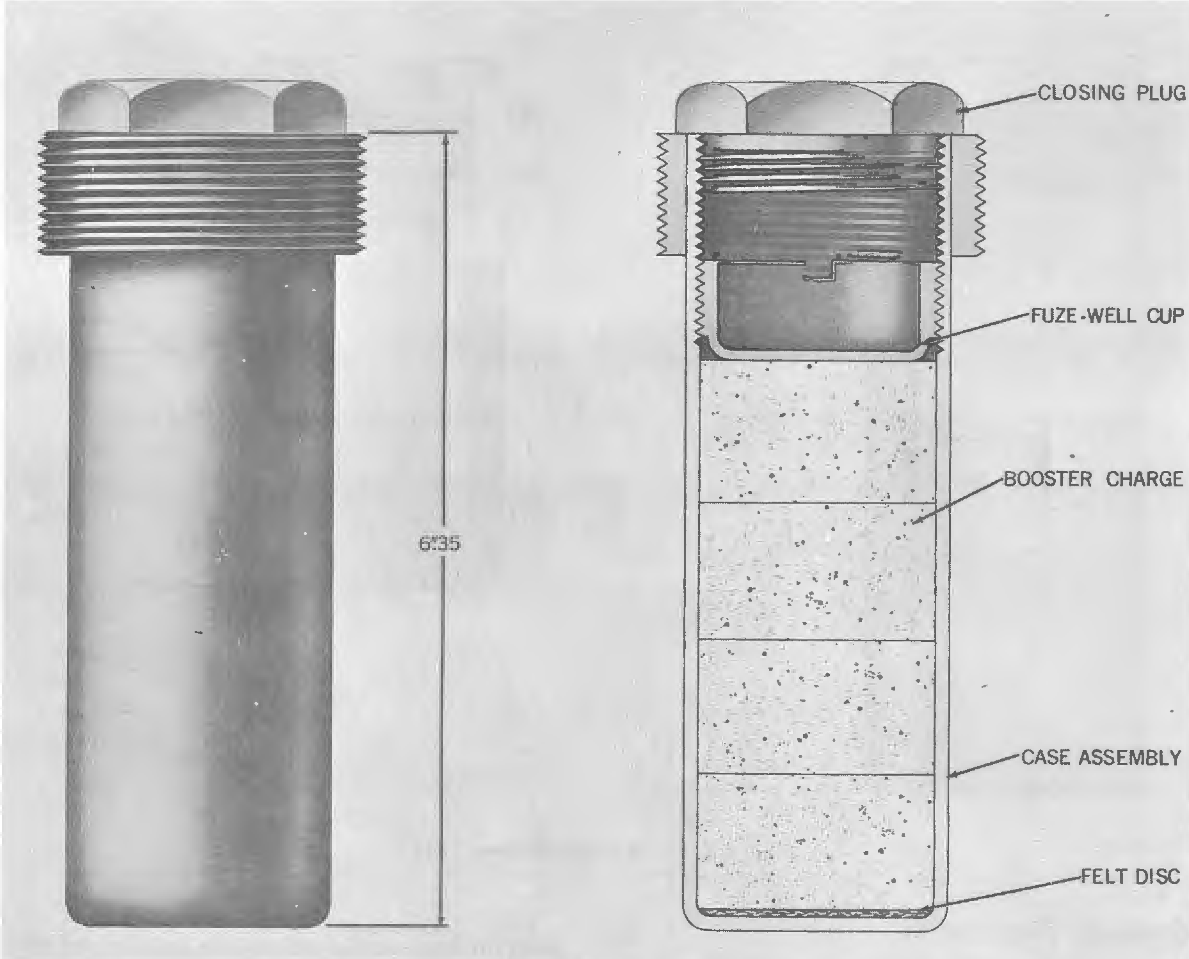


Figure 3–3.—Adapter-Booster M117.

Model	M117
Assembly Drawing No.	82–3–491
Length (in.)	6.35
Booster Charge	
Type	Tetryl
Weight (lb)	0.29

General Description

Adapter-Booster M117 adapts GP bombs with large nose fuze seats to small fragmentation-type fuzes.

Installation

To install this adapter-booster, proceed as follows.

1. Unpack the adapter-booster and remove the shipping plug. Inspect it both internally and externally to be sure that it is clean and the threads are clear. Inspect the bomb fuze seat.
2. Screw the adapter-booster into the bomb until it is firmly seated, but do not use force.
3. Unless the fuze is to be assembled immediately, replace the shipping plug, hand tight.
4. If the use of the adapter-booster becomes unnecessary, remove the unit and return it to its original packings and condition.

ADAPTER-BOOSTER T45E1

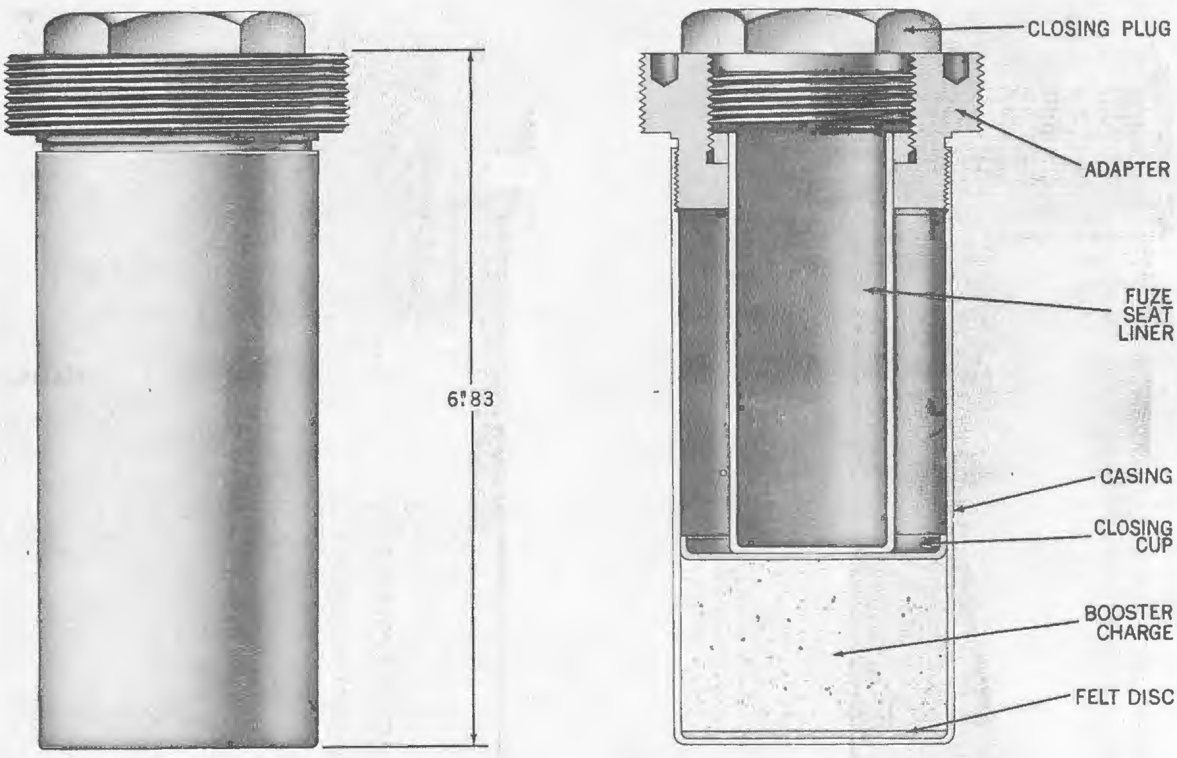


Figure 3–4.—Adapter-Booster T45E1.

General Description

Adapter-Booster T45E1 permits the use of 2-inch thread size mechanical or VT nose fuzes in low-drag GP bombs. This is an interim measure pending availability of electrical fuzes specially designed for these bombs.

ADAPTER-BOOSTER T46E4

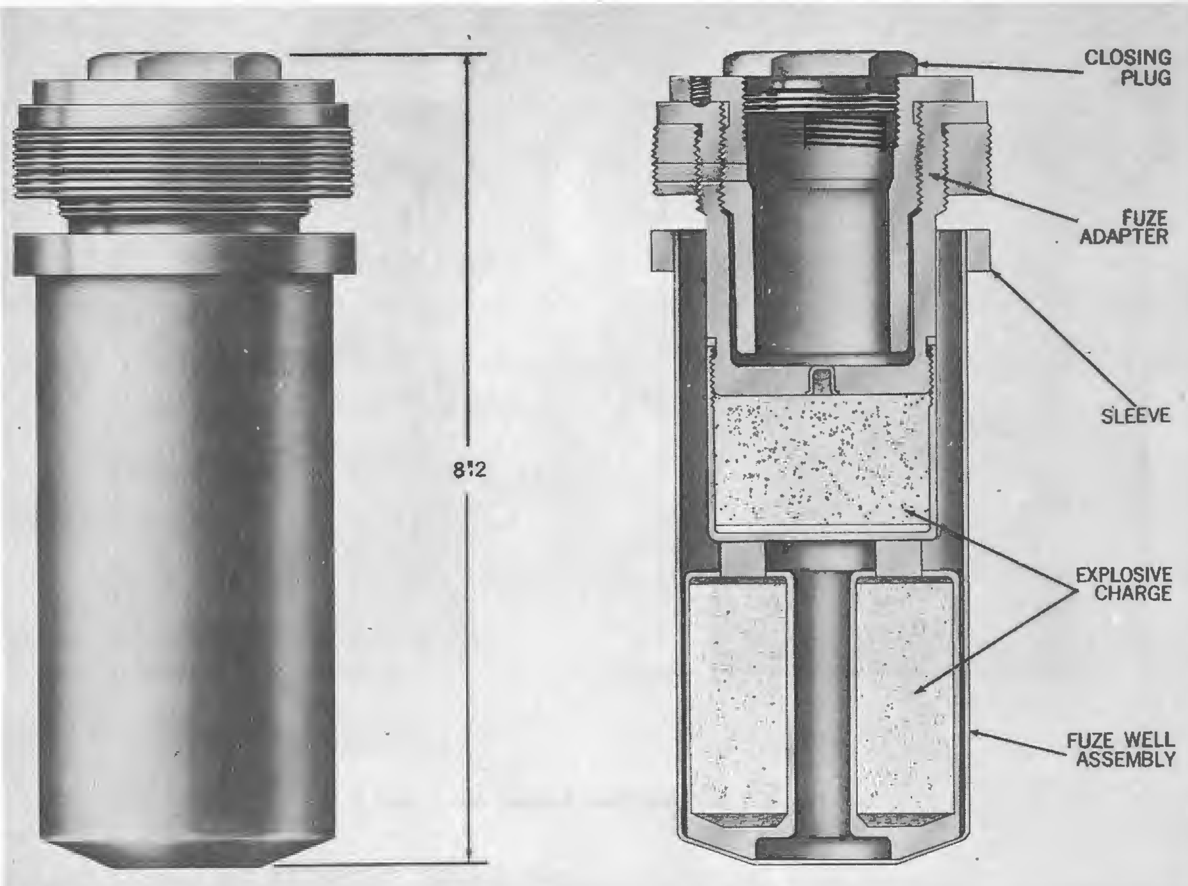


Figure 3–5.—Adapter-Booster T46E4.

General Description

Adapter-Booster T46E4 permits the use of 1.5-inch thread size mechanical tail fuzes in all low-drag GP bombs. This is an interim measure pending availability of electrical fuzes specially designed for these bombs.

AUXILIARY BOOSTER Mk 1 Mod 0

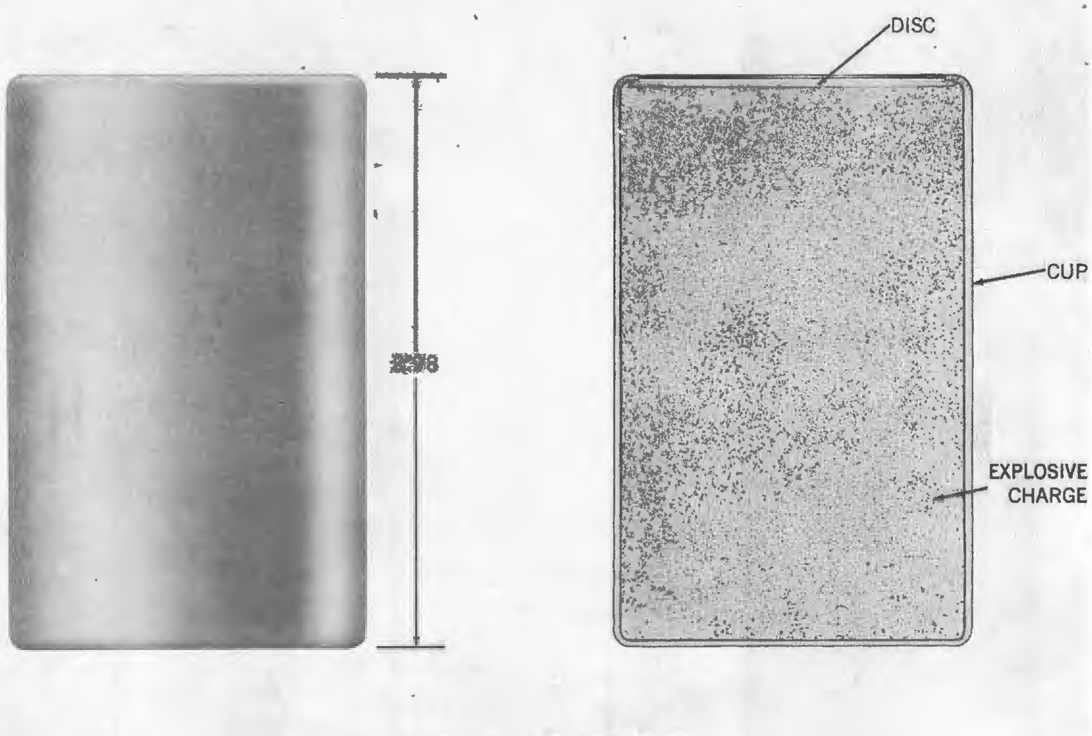


Figure 3–6.—Auxiliary Booster Mk 1 Mod 0.

Mark	1
Mod	0
General Arrangement	327960
Diameter (in.)	1.85
Height (in.)	2.98
Explosive Charge	
Type	TNT
Weight (grams)	180

General Description

Auxiliary Booster Mk 1 Mod 0 is a standard booster shipped in the nose or tail fuze seat liner, or both, of Navy designed bombs weighing over 100 pounds, with the exception of the low-drag series of GP bombs. Some bombs may require the use of two auxiliary boosters to complete the explosive train between the fuze and the main charge of the bomb.

AUXILIARY BOOSTER Mk 4 Mod 0

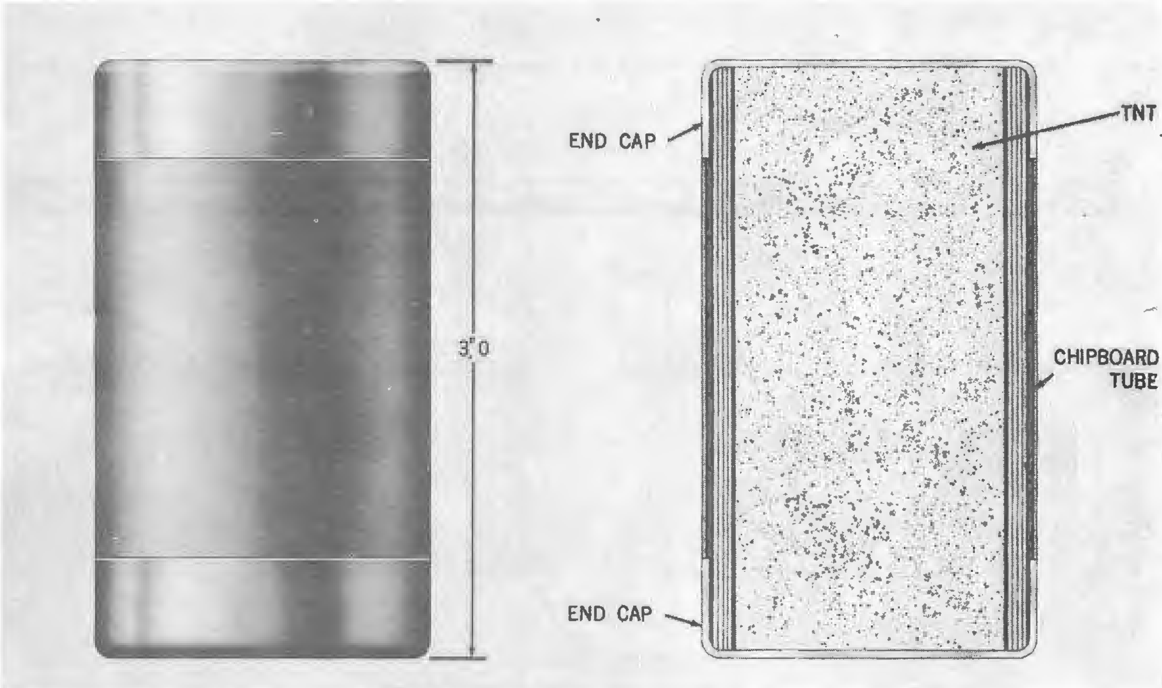


Figure 3–7.—Auxiliary Booster Mk 4 Mod 0.

Mark	4
Mod	0
General Arrangement	389101
Diameter (in.)	1.6
Height (in.)	3.0
Explosive Charge	
Type	TNT
Weight (grams)	63

General Description

Auxiliary Booster Mk 4 Mod 0 is an explosive contained in a chipboard tube which is closed at both ends by metal caps cemented to the tube. White bond paper is glued to the outside of the tube and is covered by a transparent lacquer or shellac.

The auxiliary booster is used in the nose fuze seat liners of AN–GP bombs when Nose Fuze Mk 219 is used. Navy bombs, with the exception of low-drag GP bombs, require the use of one auxiliary booster, which is usually shipped assembled in the bomb.

BURSTER M10

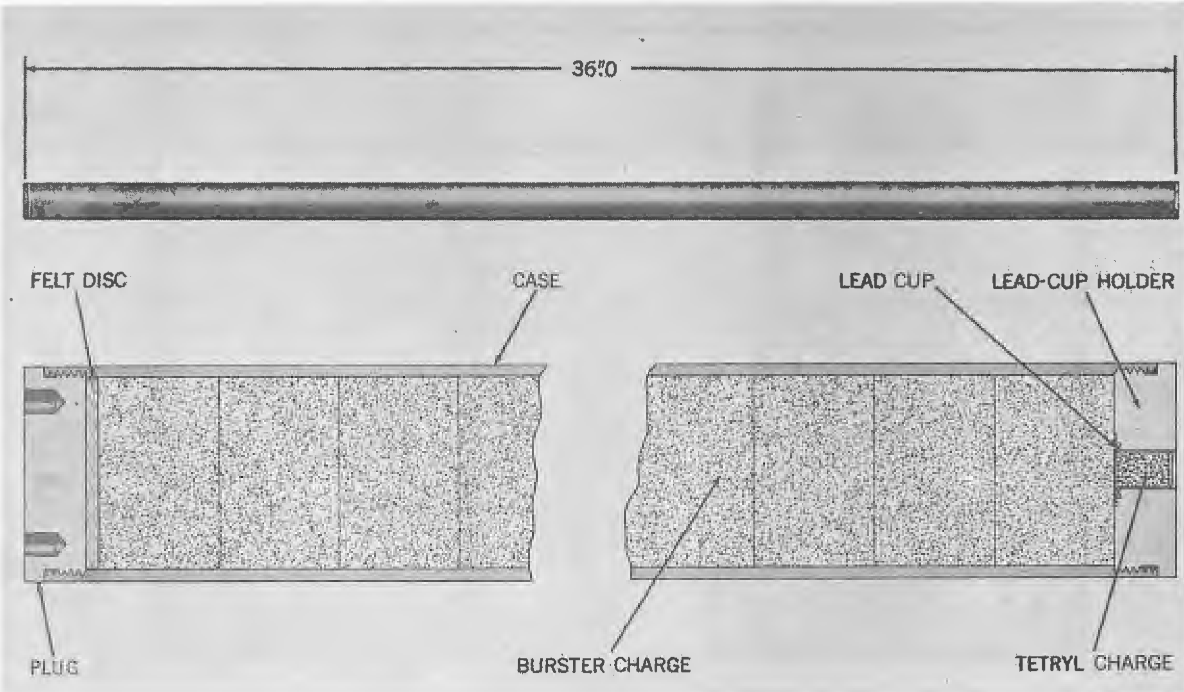


Figure 3–8.—Burster M10.

Model	M10
Assembly Drawing No.	82–3–385
Diameter (in.)	1.13
Length (in.)	36.00
Type of Tube	Paper or Plastic
Explosive Charge	
Type	Tetryl pellets
Weight (lb)	1.48
Shipping Container	
Number per container	50
Type Container	Wood box
Weight Filled (lb)	150
Cubage (ft)	2.7

General Description

Burster M10 is an explosive-filled tube that has a threaded plastic or steel round plug at one end. The other end is closed by a threaded plug assembly consisting of a gilding-metal cup and a steel cup holder with a hexagonal or round shoulder for positioning the burster. The cup, which is thin enough to be ruptured by the fuze detonator, is fitted into a hole in the cup holder and contains a small charge of tetryl. This burster is used in the 115-lb Chemical Bomb M70.

BURSTER AN–M12

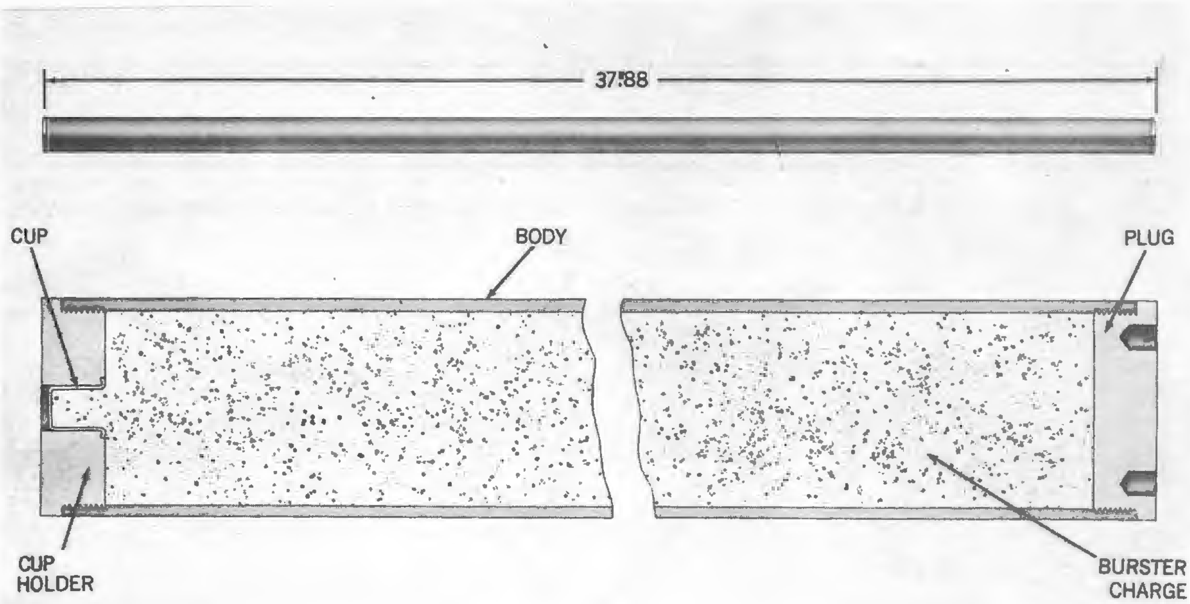


Figure 3–9.—Burster AN–M12.

Model	AN–M12	
Assembly Drawing No.	C14–5–315	
Diameter (in.)	1.3	
Length (in.)	37.88	
Type of Tube	Plastic or Aluminum	
Explosive Charge		
Type	Black Powder and Magnesium	
Weight (lb)	1.1	
Shipping Container		
Number per Container	50	20
Type Container	Wood box	Wood box
Weight Filled (lb)	113	54
Cubage (ft)	2.6	1.4

General Description

Burster AN–M12 is an explosive-filled tube that has a threaded plastic or steel round plug at one end. The other end is closed by a threaded plug assembly consisting of an aluminum cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the cup holder. This burster is used in AN–M47A4-type incendiary bombs.

BURSTER AN–M13

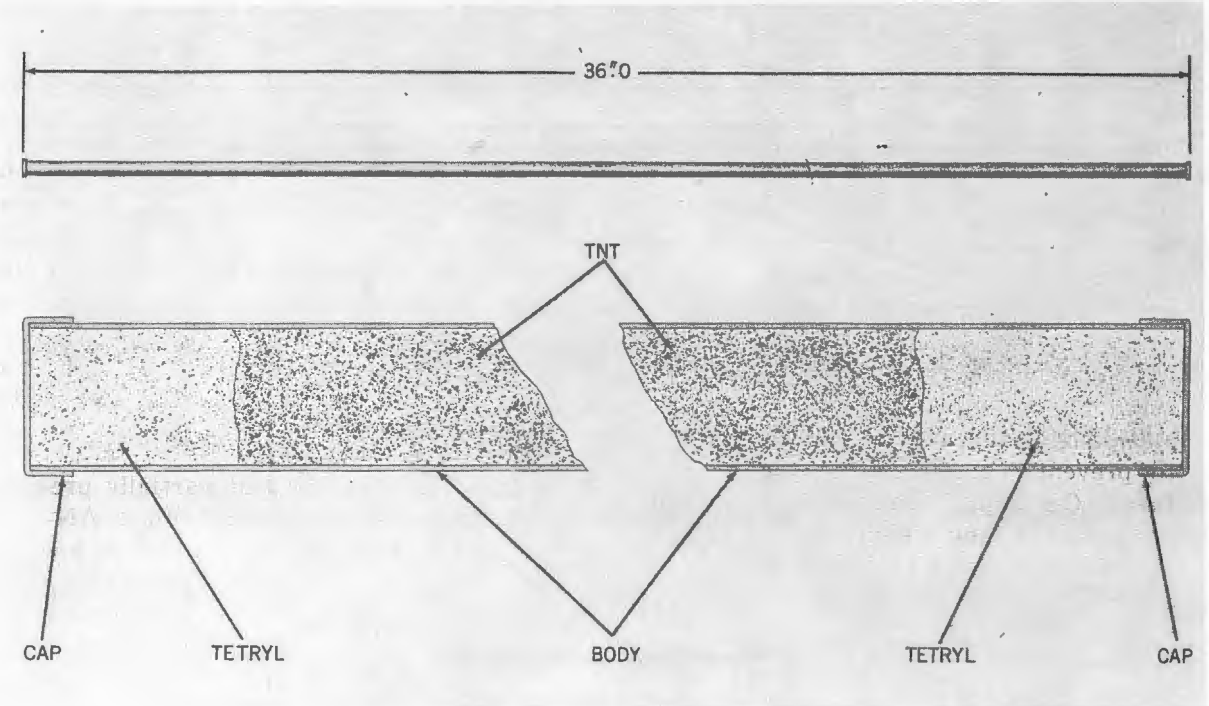


Figure 3–10.—Burster AN–M13.

Model	AN–M13
Assembly Drawing No.	C14–5–500
Diameter (in.)	0.45
Length (in.)	36.00
Type of Tube	Plastic
Explosive Charge	
Type	TNT and tetryl pellets
Weight (grams)	60–70
Shipping Container	
Number per Container	100
Type Container	Wood box
Weight Filled (lb)	85
Cubage (ft)	0.9

General Description

Burster AN–M13 is an explosive-filled tube closed at each end with a soft brass cap. It is filled with about 65 grams of TNT and has a 0.41-gram tetryl pellet at each end. This burster is used with Igniter AN–M9 in incendiary bombs AN–M47A4 type.

BURSTERS AN–M14, AN–M15, and AN–M16

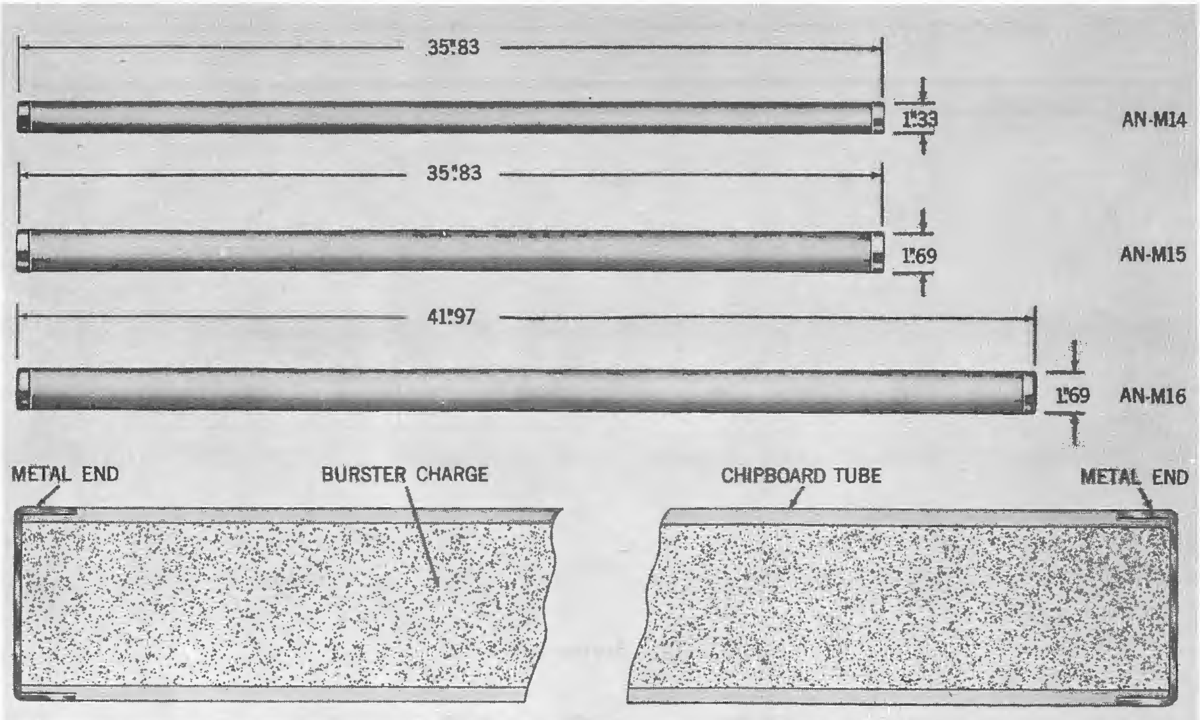


Figure 3–11.—Burster AN–M14, AN–M15, and AN–M16.

Model	AN–M14	AN–M15	AN–M16.
Assembly Drawing No	82–3–422	82–3–422	82–3–422.
Diameter (in.)	1.33	1.69	1.69.
Length (in.)	35.83	35.83	41.97.
Type of Tube	Paper and chipboard	Paper and chipboard	Paper and chipboard.
Explosive Charge:			
Type	TNT (25%) Cast tetryl (75%).	TNT (25%) Cast tetryl (75%).	TNT (25%) Cast tetryl (75%).
Weight (lb)	1.23	2.54	4.29.
Shipping Container:			
Number per Container.	50	12	8.
Type Container	Metal-lined wood box	Metal-lined wood box	Metal-lined wood box.
Weight Filled (lb)	70	70	65.
Cubage (ft)	1.6	1.7	1.5.

General Description

Bursters AN–M14, AN–M15, and AN–M16 consist of paper and chipboard tubes closed at both ends with thin steel caps. Bursters AN–M14 are used with Igniters AN–M5 in 500-pound incendiary bombs. Bursters AN–M15 are used in 500-pound chemical bombs. Burster AN–M16 is used in the 1000-pound chemical bomb.

BURSTER AN–M18

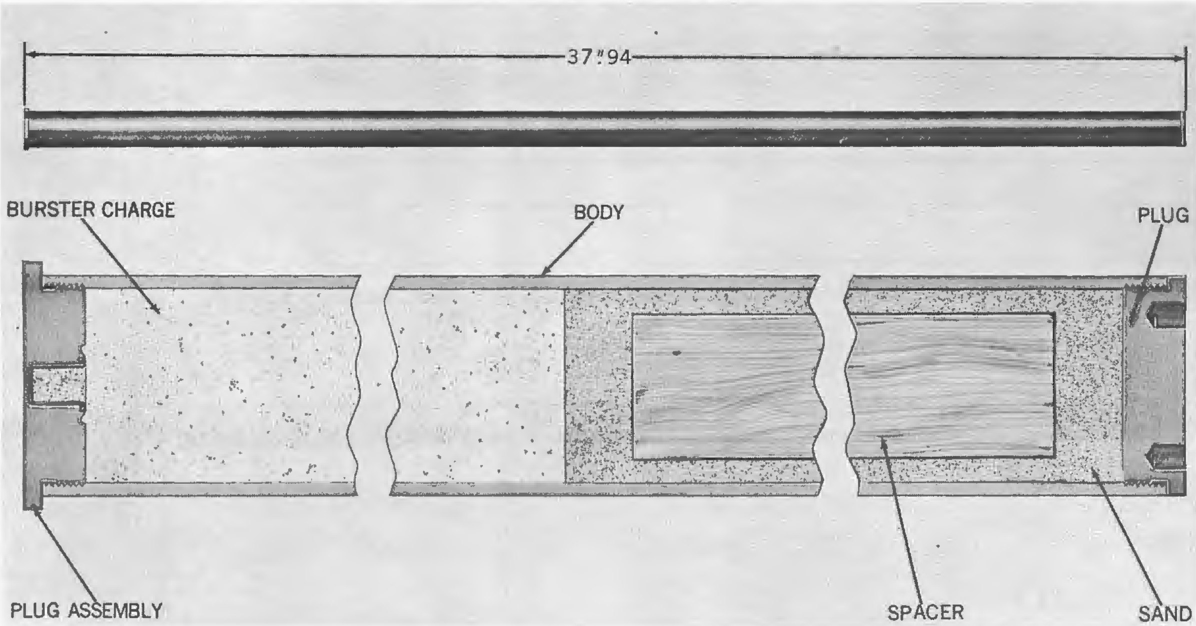


Figure 3–12.—Burster AN–M18.

Model	AN–M18
Assembly Drawing No.	82–3–516
Diameter (in.)	1.13
Length (in.)	37.94
Type of Tube	Plastic
Explosive Charge	
Type	Black powder
Weight (lb)	0.6
Shipping Container	
Number per Container	50
Type Container	Wood box
Weight Filled (lb)	120
Cubage (ft)	3

General Description

Burster AN–M18 is an explosive-filled plastic tube closed at one end by means of a threaded plastic or steel round plug. The other end is closed by a threaded plug assembly consisting of a gilding-metal cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonators, is fitted into a hole in the cup holder. This burster is used with 100-pound smoke bombs for low-altitude bombing.

BURSTER AN–M20

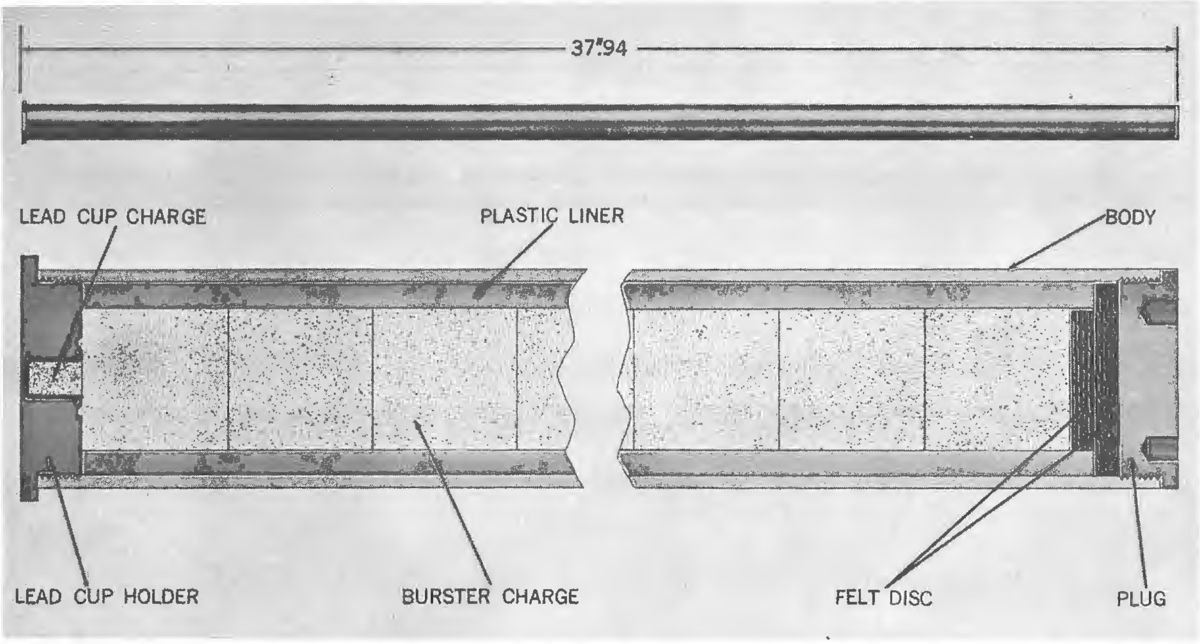


Figure 3–13.—Burster AN–M20.

Model	AN–M20
Assembly Drawing No.	C14–5–892
Diameter (in.)	1.13
Length (in.)	37.94
Type of Tube	Plastic
Explosive Charge	
Type	Tetryl pellets
Weight (lb)	0.87
Shipping Container	
Number per Container	50
Type Container	Wood box
Weight Filled (lb)	155
Cubage (ft)	3

General Description

Burster AN–M20 consists of an explosive-loaded plastic tube closed at one end by a threaded plastic or steel round plug. The other end is closed by a threaded plug assembly consisting of a gilding-metal cup and steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the cup holder and contains a small charge of tetryl. This burster is used in 100-pound smoke bombs.

IGNITER AN–M5

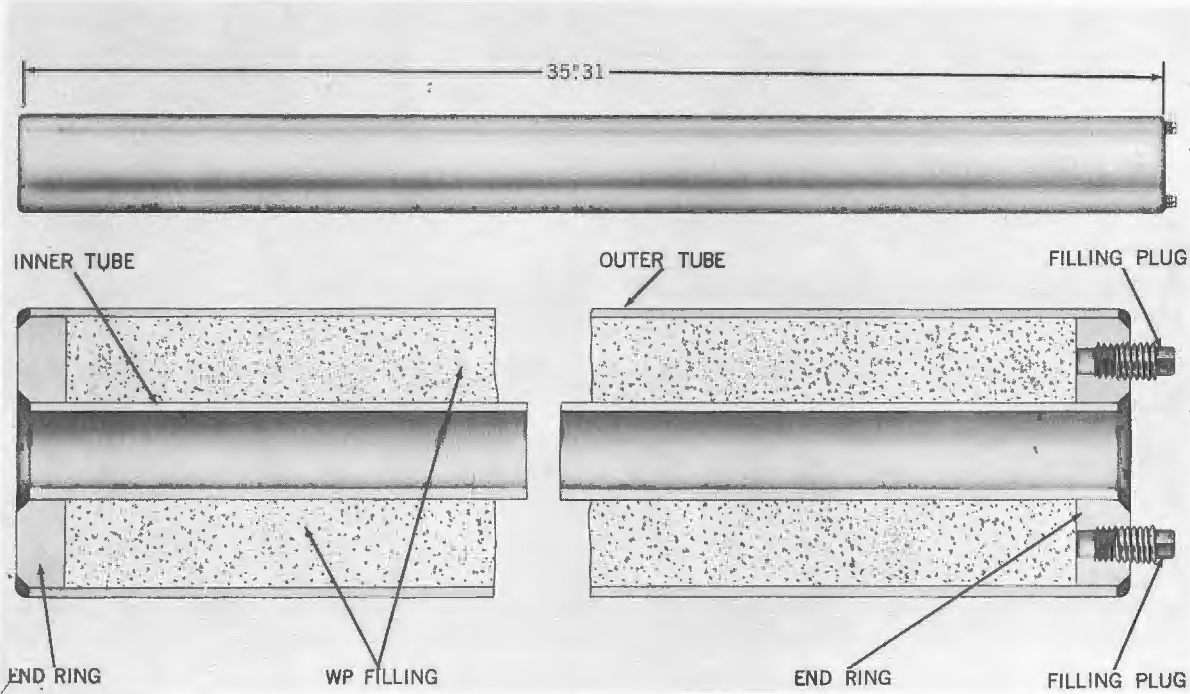


Figure 3–14.—Igniter AN–M5.

Model	AN–M5
Assembly Drawing No.	82–3–432
Outside Diameter (in.)	3
Inside Diameter (in.)	1½
Length (in.)	35⁵⁄₁₆
Filler	
Type	White Phosphorous (WP)
Weight (lb)	9
Shipping Container	
Number per Container	5
Type Container	Wood box
Weight Filled (lb)	28
Cubage (ft)	0.7

General Description

Igniter AN–M5, a component of the 500-lb Incendiary Bomb AN–M76, consists essentially of two concentric steel tubes welded to annular ends. One end ring has two filling holes which are closed with pipe plugs. These pipe plugs must not be tampered with or removed.

IGNITER AN–M9

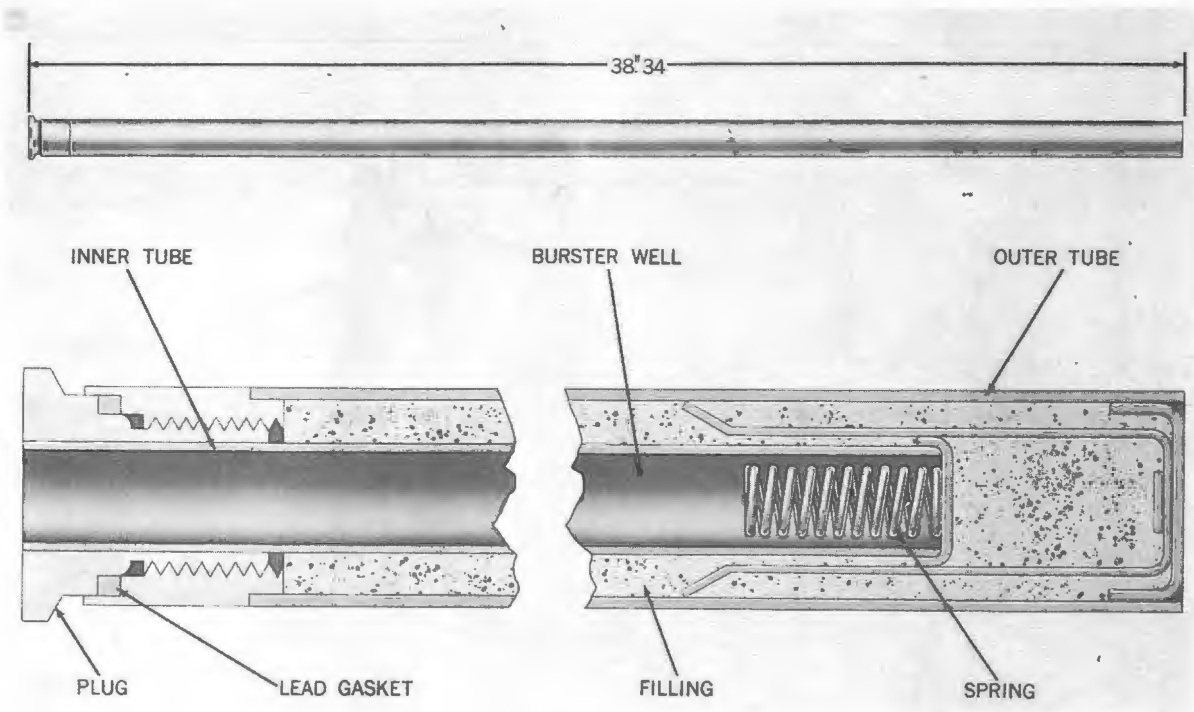


Figure 3–15.—Igniter AN–M9.

Model	AN–M9
Drawing No.	C14–5–218
Outside Diameter (in.)	1¼
Inside Diameter (in.)	⅞
Length (in.)	38 11/32
Filler	
Type	WP or Na
Weight (lb)	1.6
Shipping Container	
Number per Container	20
Type Container	Wood box
Weight Filled (lb)	80
Cubage (ft)	2.4

General Description

Igniter AN–M9 consists essentially of two concentric steel tubes joined at both ends to form an annular space which is filled with white phosphorus (WP) for land bombing or sodium (Na) for water bombing. The sodium-filled igniter was formerly called Igniter E2. The inner tube, which is about 1¼ inches shorter than the outer tube, contains a small coil spring for snubbing an inserted burster.

IGNITER M15

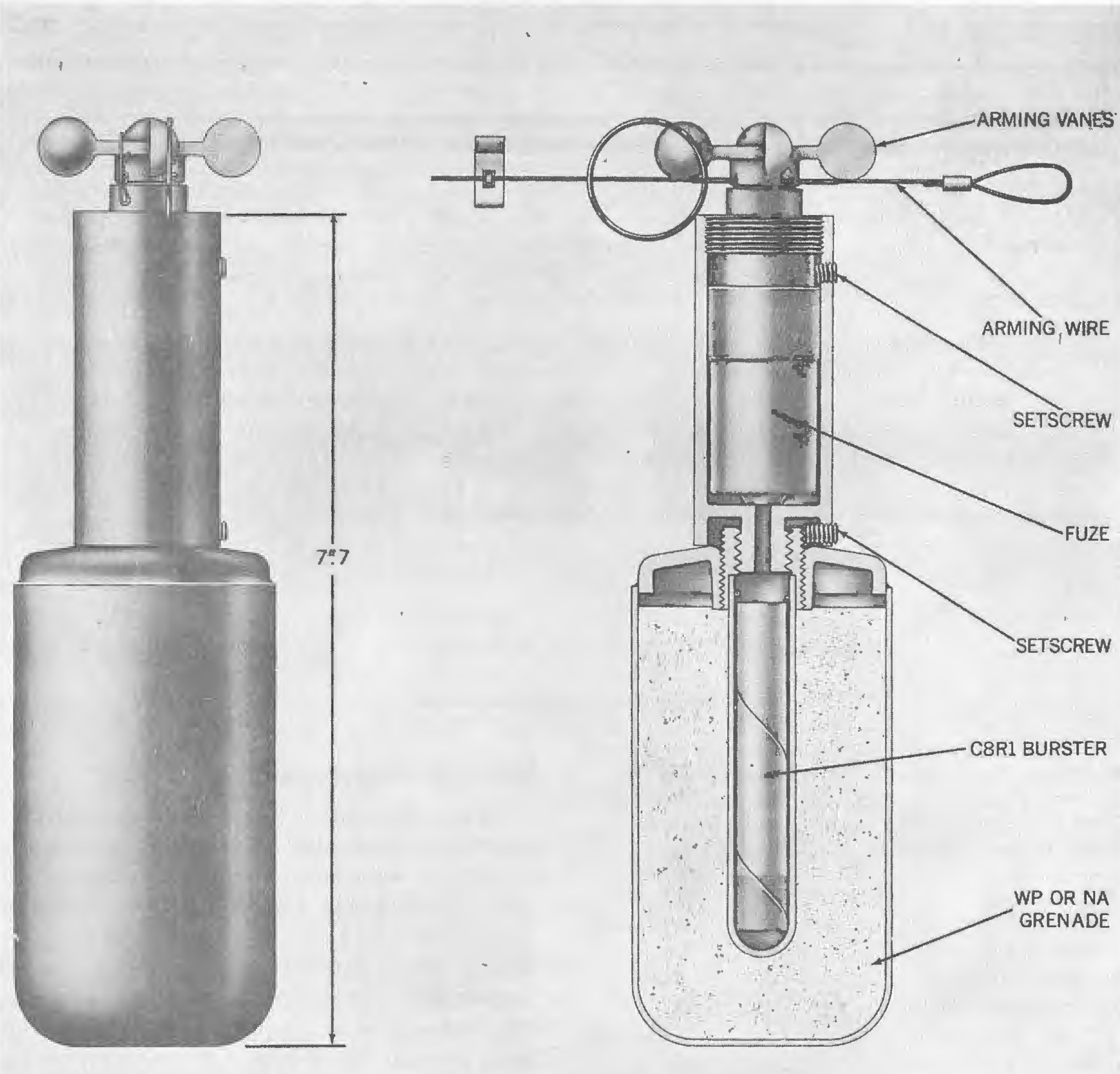


Figure 3–16.—Igniter M15.

Model	M15
Assembly Drawing No.	C4–6–75
Filler	
Type	WP or Na
Weight (lb)	0.95 (WP) 0.52 (Na)
Shipping Container	
Igniters	
Number per Container	16 (individually packaged in vacuum-type metal cans)
Type Container	Wood box
Weight Filled (lb)	
WP Filled	75
Sodium Filled	69
Cubage (ft)	2
Bursters and Fuzes	
Number per Container	50 cans
Type Container	Wood box
Weight Filled (lb)	46
Cubage (ft)	1.3

General Description

Igniter M15 is an incendiary explosive which is used to ignite the filling of fire bombs. It is an M15 hand grenade with the Bouchon fuze replaced by an impact all-ways anemometer-type fuze. A threaded igniter adapter is installed in the grenade for mounting the fuze. The fuze seats above a Burster C8R1 (a blasting cap and 2.5 grams of tetryl) in the grenade-burster well. The igniter is filled with white phosphorus (WP) for land bombing or sodium (Na) for water bombing.

Functioning

When a bomb assembled with this igniter is dropped, the arming wire is pulled and the fuze arms after about 100 feet of air travel. On impact, the fuze ignites the primer which initiates the fuze booster charge. This explodes Burster C8R1 which, in turn, breaks the grenade case, allowing WP or sodium to ignite the incendiary mixture scattered by the bursting tank. Even if the igniter is released SAFE and the fuze does not function, impact may break open the grenade and scatter the filler. This will ignite the chemical filler of the bomb. For this reason the igniter cannot be considered capable of SAFE dropping with absolute assurance of nonfunctioning.

> CAUTION: All igniters now in stock, with the exception of those procured during or after 1950, have Arming-Wire Assemblies C–10 packed in the same shipping box. Because of reported malfunctions, these wires are to be used only in the event that standard arming wires are not readily available. If used, precautions must be taken to crimp the ferrule (or slide) with pliers and to bend back the short length of the loop attached to the swivel 180 degrees on itself.

IGNITER AN–M16

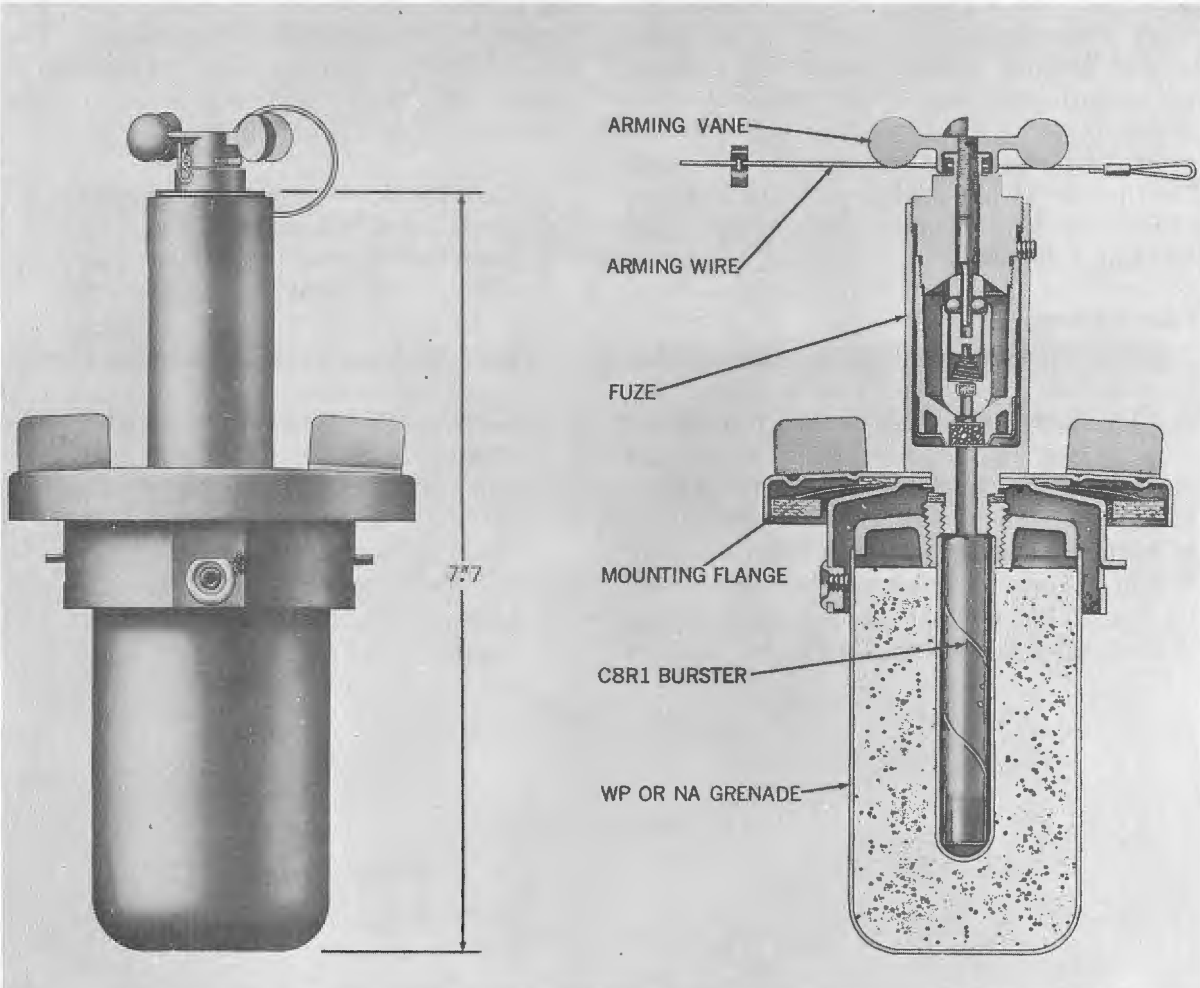


Figure 3–17.—Igniter AN–M16, Exterior View.

Model	AN–M16
Assembly Drawing No.	C4–6–33
Filler	
Type	WP or Na
Weight (lb)	0.95 (WP) 0.52 (Na)
Shipping Container	
Igniters	
Number per Container	16 (individually packaged in vacuum-type metal cans)
Type Container	Wood box
Weight Filled (lb)	
WP Filled	75
Sodium Filled	69
Cubage (ft)	2
Bursters and Fuzes	
Number per Container	50 cans
Type Container	Wood box
Weight Filled (lb)	46
Cubage (ft)	1.3

General Description

Igniter AN–M16 is an incendiary explosive type igniter used in fire bombs. It is an M15 hand grenade with the Bouchon fuze replaced by an impact all-ways anemometer-type fuze. A threaded igniter adapter is installed in the grenade for mounting the fuze. The fuze seats above a Burster C8R1 (a blasting cap and 2.5 grams of tetryl) in the grenade-burster well. A crimped locking flange for mounting in the fuel tank filler neck is attached to the igniter body with setscrews. The igniter is filled with white phosphorus (WP) for land bombing or sodium (Na) for water bombing.

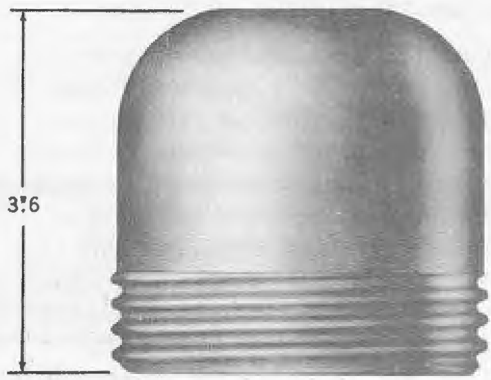
Functioning

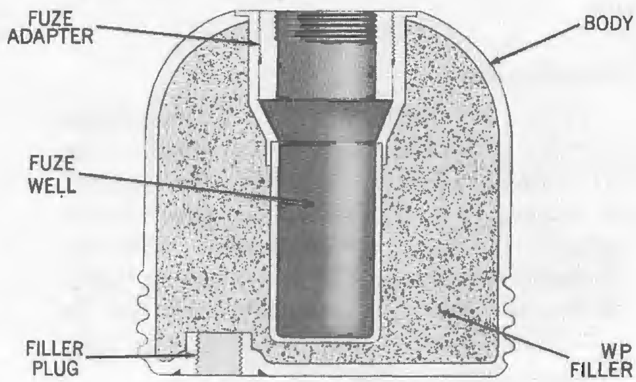
When a bomb assembled with this igniter is dropped, the arming wire is pulled and the fuze arms after about 100 feet of air travel. On impact, the fuze ignites its primer which initiates the fuze booster charge. This explodes the Burster C8R1 which, in turn, breaks the grenade case, allowing WP or sodium to ignite the incendiary mixture scattered by the bursting tank.

Even if the igniter is released SAFE and the fuze does not function, impact may break open the grenade and scatter its filler. This will ignite the chemical filler of the bomb. For this reason the igniter cannot be considered capable of SAFE dropping with absolute assurance of non-functioning.

> CAUTION: All igniters now in stock, with the exception of those procured during or after 1950, have Arming-Wire assemblies C–10 packed in the same shipping box. Because of reported malfunctions, these wires are to be used only in the event that standard arming wires are not readily available. If used, precautions must be taken to crimp the ferrule (or slide) with pliers and to bend back the short length of the loop attached to the swivel 180 degrees on itself.

IGNITER M23





Model	M23
Assembly Drawing No.	C–14–5–805
Filler	
Type	WP
Weight (lb)	1.25
Shipping Container	
Igniters	
Number per Container	25 (individually packaged in vacuum-type metal cans)
Type Container	Wood box
Weight Filled (lb)	125
Cubage (ft)	2.1
Fuzes and Arming-Wires	
Number per Container	50
Type Container	Wood box
Weight Filled (lb)	60
Cubage (ft)	1.8

General Description

Igniter M23 is used with fire bombs. Its steel body has external threads for mounting in the tank flange and internal threads for mounting a fuze. The fuze used with this igniter is an impact anemometer-type. Fuze and arming wire are procured and issued separately.

Functioning

Upon release of the fire bomb, the arming wire is withdrawn from the fuze. The fuze is armed after about 8 feet of air travel or 17 vane revolutions. Upon impact, the fuze bursts and splits the igniter body. Scattered filling burns upon atmospheric contact and ignites the incendiary fuel from the tank.

PRACTICE BOMB SIGNAL Mk 4 Mods 3 and 4

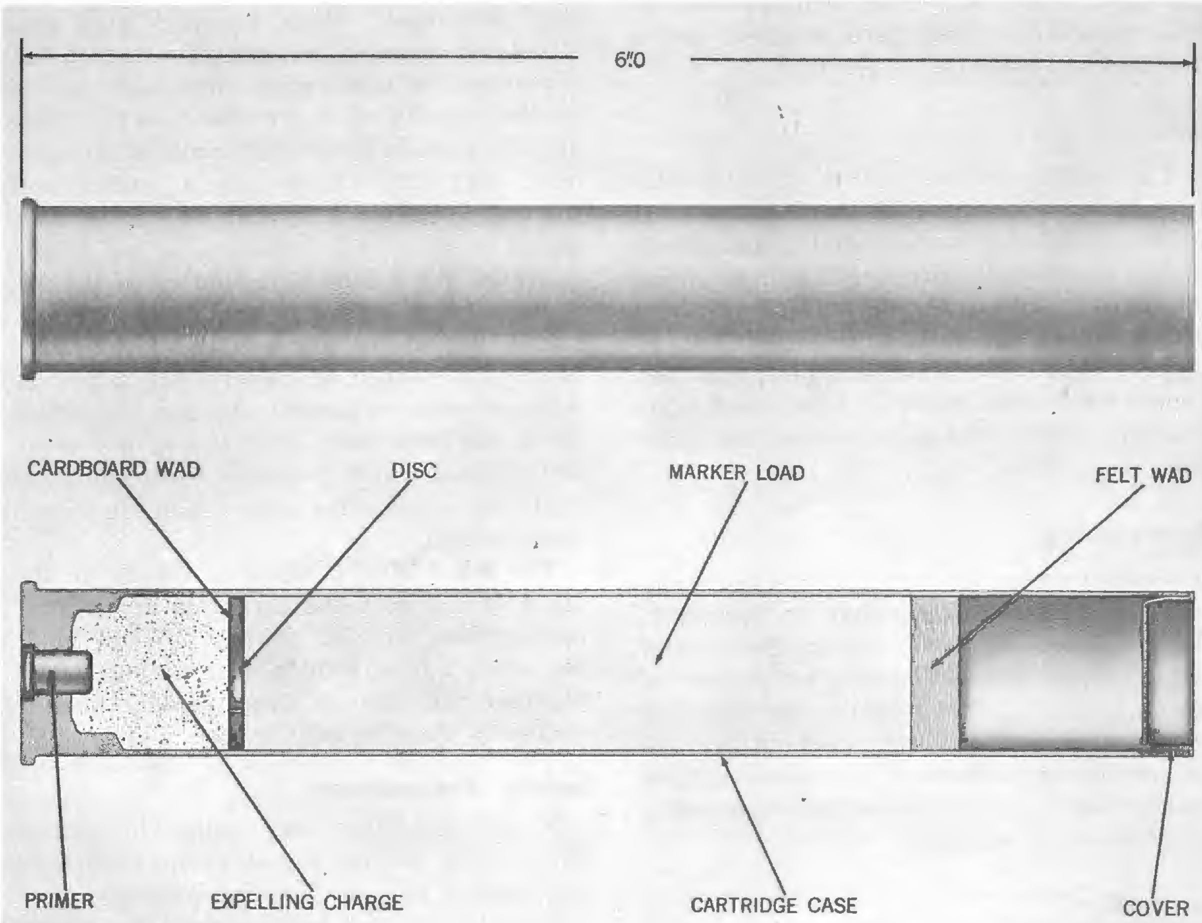


Figure 3–19.—Practice Bomb Signal Mk 4 Mods 3 & 4.

Mark	4	4.
Mod	3	4.
General Arrangement	398800	1211717.
List of Drawings	Sk 166560	256093.
Length (in.)	6.0	6.0.
Diameter (in.)	0.85	0.85.
Weight (lb)	0.16	0.16.
Case Material	Aluminum	Aluminum.
Expelling Charge	Smokeless powder	Smokeless powder.
Marker Load	Stabilized red phosphorous.	Zinc oxide.
Shipping Containers:		
Cardboard Carton	200 signals	200 signals.
Wood Box	25 cartons	25 cartons.

General Description

Practice Bomb Signals Mk 4 Mods 3 and 4 are essentially 10-gage shotgun shells of extra length. They contain an expelling charge of smokeless powder and are primed with a commercial primer. A pyrotechnic or inert marker load is separated from the expelling charge by a disc and cardboard gun-wad. The end of the shell is closed by felt gun-wads which are secured by a cemented cover.

Use

The signals are used either in the miniature or the larger practice bombs. Installed in the miniature practice bombs, the signals do not consistently produce a visible signal on impact with water or soft earth when dropped from an altitude of 10,000 feet or higher. The bomb, when dropped from that height, enters the water or earth so quickly that the signal frequently does not have time to function.

Functioning

When the practice bomb in which the signal is installed strikes water or the earth, impact causes the firing pin in the nose of the bomb to impinge upon the primer of the signal. The primer ignites the expelling charge, forcing the marker load out through an opening in the bomb. The resulting flash and puff of white smoke permit observation as to bombing accuracy.

Assembly

During loading operations, the signal is placed in position in the bomb. The firing-pin assembly then is inserted with the firing pin facing toward the signal. A cotter or plain pin is inserted in the nose of the bomb to prevent the firing-pin assembly and the signal from falling out. See assembly procedures under the particular bomb to be used.

Differences Among Mods

Signal Mk 4 Mod 0 was the first of this type developed. Mods 1 and 2 were procured for issue to activities limited by environment to performing practice bombing in the vicinity of flammable areas. These signals contain inert materials which produce very little flash and a smoke puff markedly inferior to that of the Mod 0 signal.

Signal Mk 4 Mod 3 is similar to the Mk 4 Mod 0 but differs in that: (1) the cartridge case of the Mk 4 Mod 3 is extruded aluminum instead of paper; (2) a primer mixture with improved storage characteristics has been used; and (3) a new pyrotechnic load which produces about the same flash, but a superior smoke puff, has been incorporated.

The Mk 4 Mod 4 signal is similar to the Mk 4 Mod 3 with the exception of an inert marker load of zinc oxide. In both mods the cover and cartridge case are cemented together; in Mod 3 the assembly also is staked in four equally spaced places.

Safety Precautions

Rough handling may cause immediate functioning of the signal or may damage it so that it will not function properly.

Signals must not be unpacked in advance of requirements. If unpacked and not used, return to original packing.

Swollen or deformed signals are not to be used. The primer must be flush with or slightly below the base of the signal. Defective signals will be turned over to a bomb disposal officer.

Under no circumstances should a signal case be opened or tampered with.

PRACTICE BOMB SIGNAL Mk 5 Mod 0

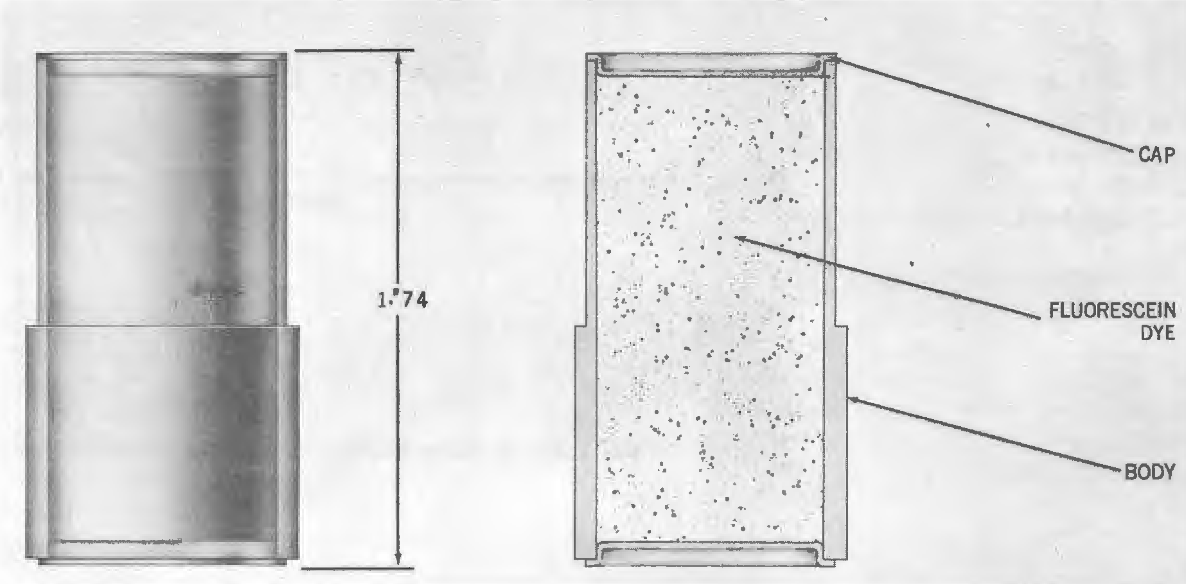


Figure 3–20.—Practice Bomb Signal Mk 5 Mod 0.

Mark	5
Mod	0
General Arrangement	344644
Length (in.)	1.74
Diameter (in.)	0.93
Weight (oz)	0.5
Cylinder Material	Plastic
Dye Filling (Type)	Fluorescein
Dye Color	
Dry	Brick red
Dissolved in Water	Bright green
Shipping Containers	
Cardboard Carton	200 signals
Wood box	5 cartons

General Description

Practice Bomb Signal Mk 5 Mod 0 is approximately the size of a 10-gage shotgun shell. A shoulder, which increases the diameter of one end, serves to locate the signal in the bomb. The signal is a plastic cylinder containing 10 grams of fluorescein dye. This dye is a highly-soluble salt of sodium, brick red in color, becoming bright green when dissolved in water.

Use

The signal, for use in dive-bombing practice, can be used in any miniature practice bomb in which Signal Mk 4 can be used. It is dropped only on water targets during daylight. When a wind is blowing, the smoke from the Mk 4 signal often blows away before the pilot can get into position to view the results of his attack. The slick from the Mk 5 signal can be seen from an altitude of 15,000 feet.

Functioning

The bombs are dropped in a normal manner. Upon impact, water enters the nose of the bomb, breaks the weak ends of the plastic container, and forces the dye out the tail end of the bomb.

Assembly

The bomb is prepared for use by removing the cotter pin and the firing-pin assembly. The signal then is inserted with the small end toward the tail of the bomb. The signal is fixed in place by replacing the cotter pin; the firing-pin assembly is not used.

PRACTICE BOMB SIGNAL Mk 6 Mod 0

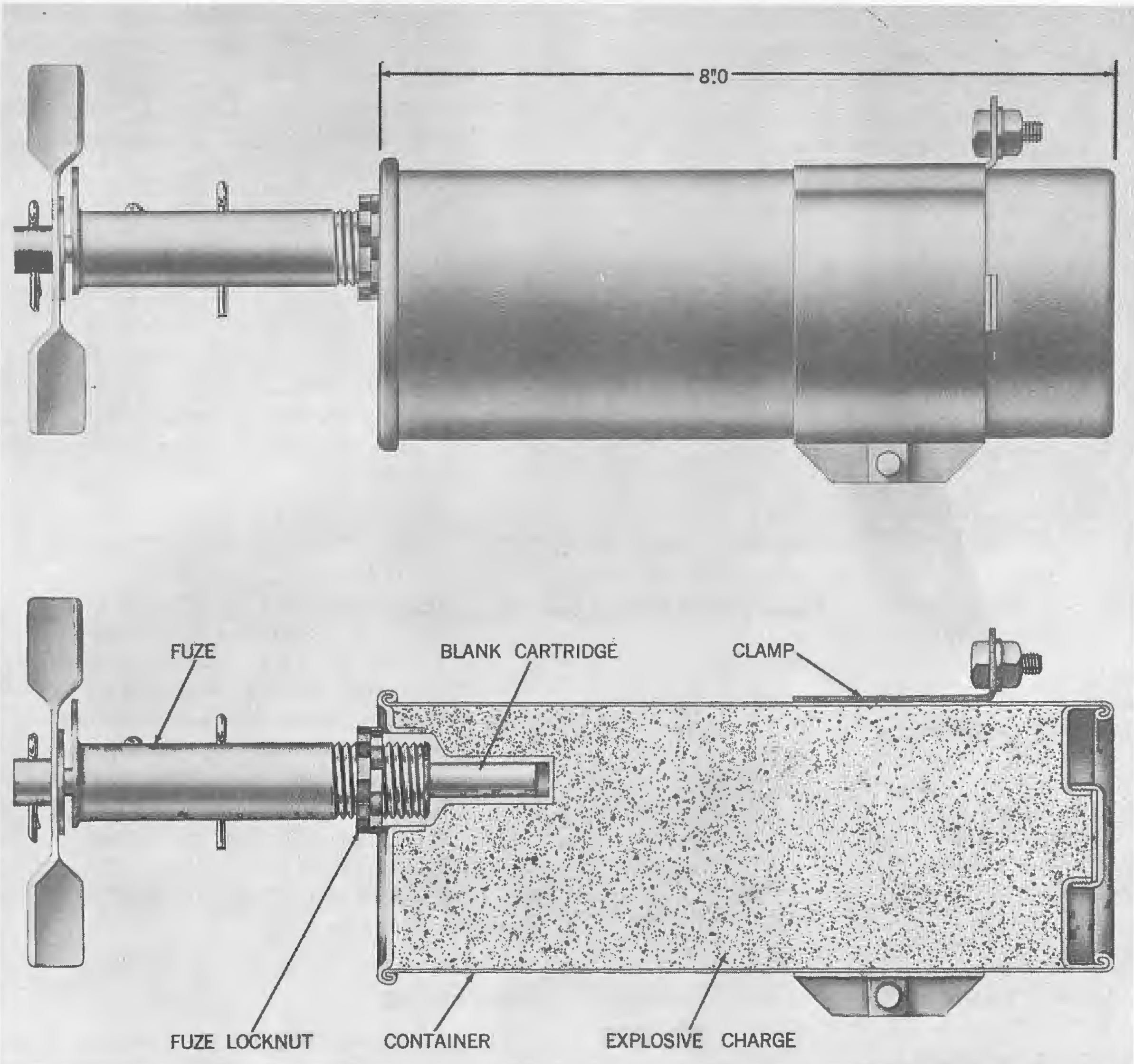


Figure 3–21.—Practice Bomb Signal Mk 6 Mod 0, Assembled with Fuze.

Mark	6
Mod	0
General Arrangement	438277
List of Drawings	109524
Length (in.)	8.0
Diameter (in.)	3.0
Weight of Assembled Signal (lb)	3.7
Container Material	Steel
Explosive Charge	
Type	Black powder
Weight (lb)	2.0

General Description

Practice Bomb Signal Mk 6 Mod 0 is essentially a can of black powder fitted with the inert Fuze AN–Mk 247 Mod 0 and a blank .38 caliber cartridge which is used as a detonator. The Mk 6 is generally the same as the Mk 7 signal except that the fuze is mounted off-center in the Mk 6 and its black powder filling weighs approximately 1 pound more. The Mk 6 signal is used with practice bombs for observation as to bombing accuracy.

Functioning

Upon release from the plane, the arming wire is withdrawn, permitting the fuze arming vane to rotate and arm the signal. Upon impact of the bomb, the firing pin in the fuze overcomes a creep spring and impinges upon the primer of the blank cartridge, which, in turn, ignites the black-powder charge. The resulting explosion produces a flash of light and a large puff of gray smoke.

Assembly

When the signal is placed in the bomb, the fuze is unscrewed and the blank cartridge is inserted in the cartridge chamber. The fuze then is re-inserted and secured by locknuts. At the time of loading the bomb into the plane, the arming wire is inserted through a flange on the fuze and through the fuze arming vane. After the bomb and arming wire completely and securely are installed in the plane, the safety pin is removed from the body of the fuze.

Packaging

When shipped, the signal is assembled with the fuze and packed in a corrugated cardboard carton. The carton also contains the blank cartridge (sealed in a separate envelope), the signal clamp assembly, the fuze arming vane, and a cotter pin for securing the vane to the fuze. 20-mm Ammunition Box Mk 3 Mod 1 will accommodate twelve of these cartons.

Safety Precautions

Signals should not be unpacked in advance of requirements. If unpacked and not used, return them to their original packing.

If signal cartons are punctured, split, or badly damaged, or if seals are broken, the contents are considered unserviceable. This does not apply to signals repacked in the field and sealed with adhesive tape for temporary protection. These assemblies must be examined carefully for serviceability by qualified personnel.

Avoid dropping or jarring signal at all times to prevent accidental detonation.

Stow signals in a dry, ventilated location, out of the direct rays of the sun.

Swollen or deformed signals or signal cartridges are not to be used. Defective signals will be turned over to a bomb disposal officer.

If necessary to disassemble the signal, the safety cotter pin must be installed in the body of the fuze before the arming wire is removed.

PRACTICE BOMB SIGNAL Mk 7 Mod 0

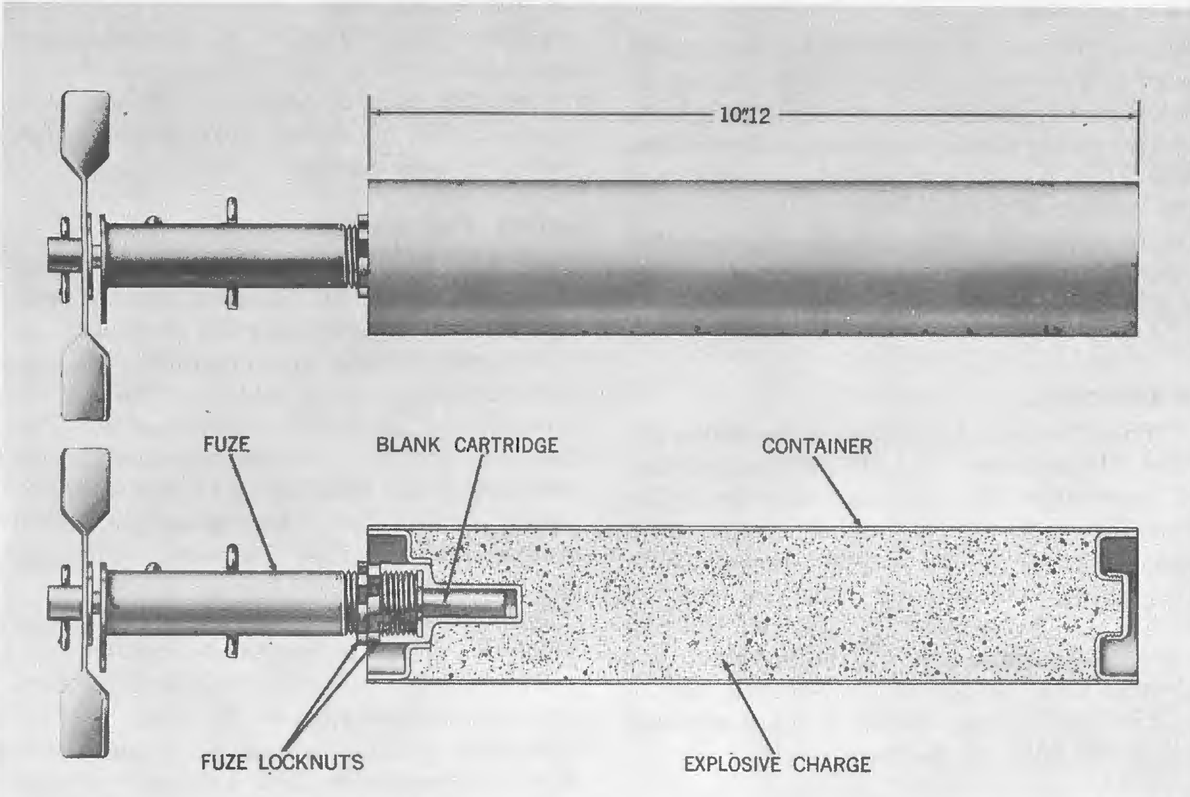


Figure 3–22.—Practice Bomb Signal Mk 7 Mod 0, Assembled with Fuze.

Mark	7
Mod	0
General Arrangement	439736
List of Drawings	109535
Length (in.)	10.12
Diameter (in.)	2.0
Weight of Assembled Signal (lb)	2.5
Container Material	Steel
Explosive Charge	
Type	Black powder
Weight (lb)	1.0

General Description

Practice Bomb Signal Mk 7 Mod 0 is essentially a can of black powder fitted with the inert Fuze AN–Mk 247 Mod 0 and a blank .38 caliber cartridge which is used as a detonator. The Mk 7 signal is generally the same as the Mk 6 signal except that the fuze is mounted off-center in the Mk 6 and its black-powder filling weighs about 1 pound more. The Mk 7 signal is used with practice bombs for observation as to bombing accuracy.

Functioning

Upon release from the plane, the arming wire is withdrawn, permitting the fuze arming vane to rotate and arm the signal. Upon impact of the bomb, the firing pin in the fuze overcomes a creep spring and impinges upon the primer of the blank cartridge which, in turn, ignites the black-powder charge. The resulting explosion produces a flash of light and a large puff of gray smoke.

Assembly

When the signal is placed in the bomb, the fuze is unscrewed, and the blank cartridge is inserted in the cartridge chamber. The fuze then is re-inserted and secured by two locknuts. At the time of loading the bomb into the plane, the arming wire is inserted through a flange on the fuze and through the fuze arming vane. After the bomb and arming wire are completely and securely installed in the plane, the safety pin is removed from the body of the fuze.

Packaging

When shipped, the signal is assembled with the fuze and packed in a corrugated cardboard carton. The carton also contains the blank cartridge (sealed in a separate envelope), the fuze arming-vane, and a cotter pin for securing the vane to the fuze. The 20-mm Ammunition Box Mk 3 Mod 1 will accommodate 12 cartons.

Safety Precautions

Signals should not be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

If signal cartons are punctured, split, or badly damaged, or if the seals are broken, the contents are considered unserviceable. The latter does not apply to signals repacked in the field and sealed with adhesive tape for temporary protection. These assemblies must be examined carefully for serviceability by qualified personnel.

Avoid dropping or jarring signals at all times to prevent accidental detonation.

Signals must be stowed in a dry, ventilated location, out of the direct rays of the sun.

Swollen or deformed signals or signal cartridges are not to be used. Defective signals will be turned over to a bomb disposal officer.

If necessary to disassemble the signal, the safety cotter pin must be installed in the body of the fuze before the arming wire is removed.

PRIMER-DETONATOR M14

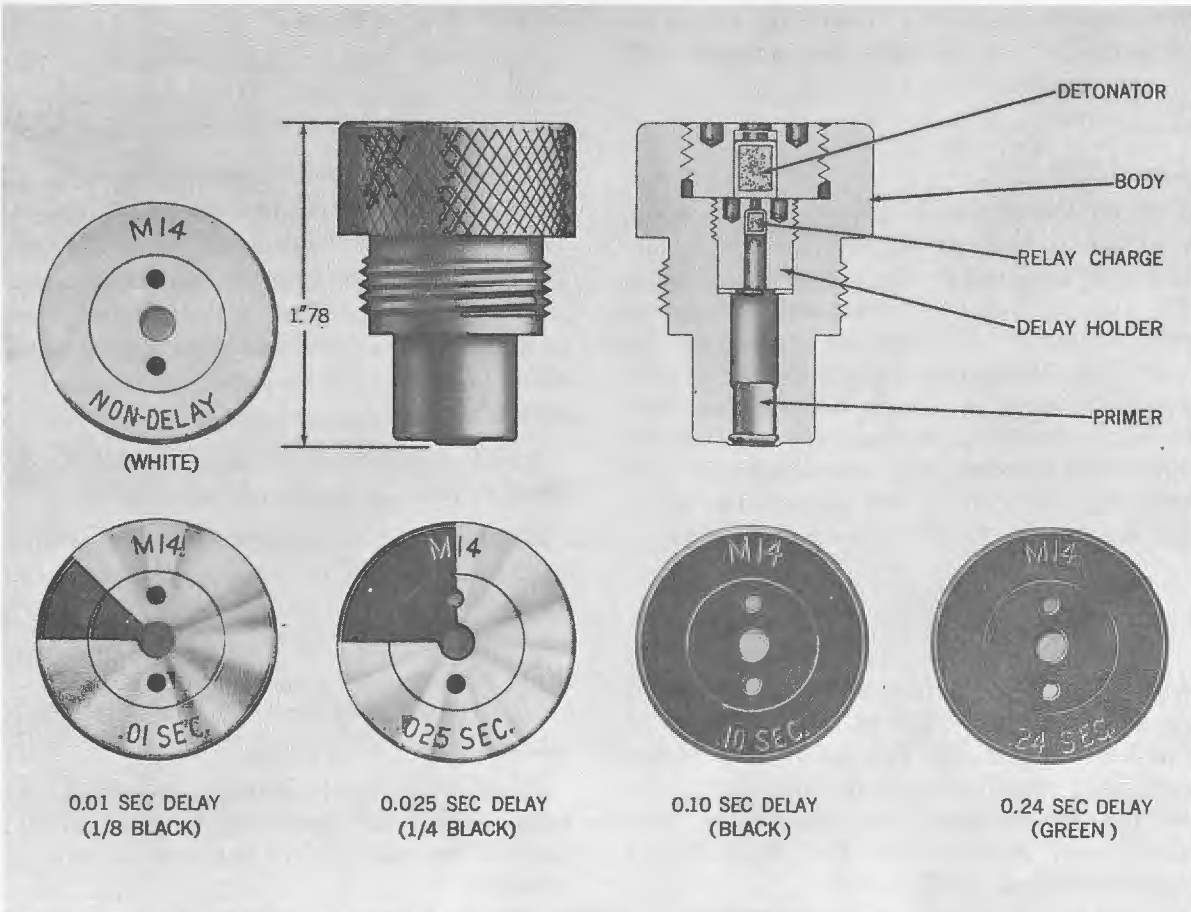


Figure 3–23.—Primer-Detonator M14.

Model	M14
Assembly Drawing No.	
Nondelay	73–8–70
0.01 sec delay	73–8–68
0.025 sec delay	73–8–69
0.10 sec delay	73–8–67
0.24 sec delay	73–8–354
Percussion Primer	M39
Detonator	M17

General Description

Primer-Detonator M14 is available with delays of 0.01, 0.025, 0.10, and 0.24 second. A nondelay primer detonator also is available. The delay length of time (or the word "nondelay") is stamped on the end of each primer-detonator. The time also is indicated by the color of the exposed surface: non-delay-white, 0.01-1/8 black, 0.25-1/4 black, 0.10-black, and 0.24-green. Primer-detonators are described fully in chapter 1.

The M14 has a plain knurled head and is threaded with 12 threads per inch. It is thus distinguished from the M16 and M16A1, each of which has a groove around the head and 20 threads per inch. Do not attempt to assemble the wrong type primer-detonator into a fuze; this will ruin both the fuze and the primer-detonator.

Changing a Primer-Detonator

To change a primer-detonator already installed in a fuze in order to provide a different delay, proceed as follows.

1. Remove a primer-detonator with the desired delay from its packing and inspect it for any obvious defects.
2. Unscrew the undesired primer-detonator from the fuze body. If the plunger spring or spring washer fall out, replace them before installing the new primer-detonator.
3. Screw the new primer-detonator into the fuze, hand tight. Do not use tools. If hand force is insufficient, turn in the fuze as unserviceable.
4. Seal the primer-detonator removed from the fuze in the packing of the substitute, and mark it to indicate the delay.

Packaging

One primer-detonator is packed in a black cylindrical metal container 1.3 inches in diameter and 2.2 inches long. The weight of the primer-detonator and container is about 0.5 pound. The cover is sealed with an adhesive-tape strip, with a tab to facilitate opening.

Twenty-five primer-detonators in metal cans are packed in an 8- by 8- by 2.25-inch metal container. The cover is sealed with an adhesive-tape sealing strip with a tab to facilitate opening. The weight of box and the contents is about 13¾ pounds.

PRIMER-DETONATORS M16 and M16A1

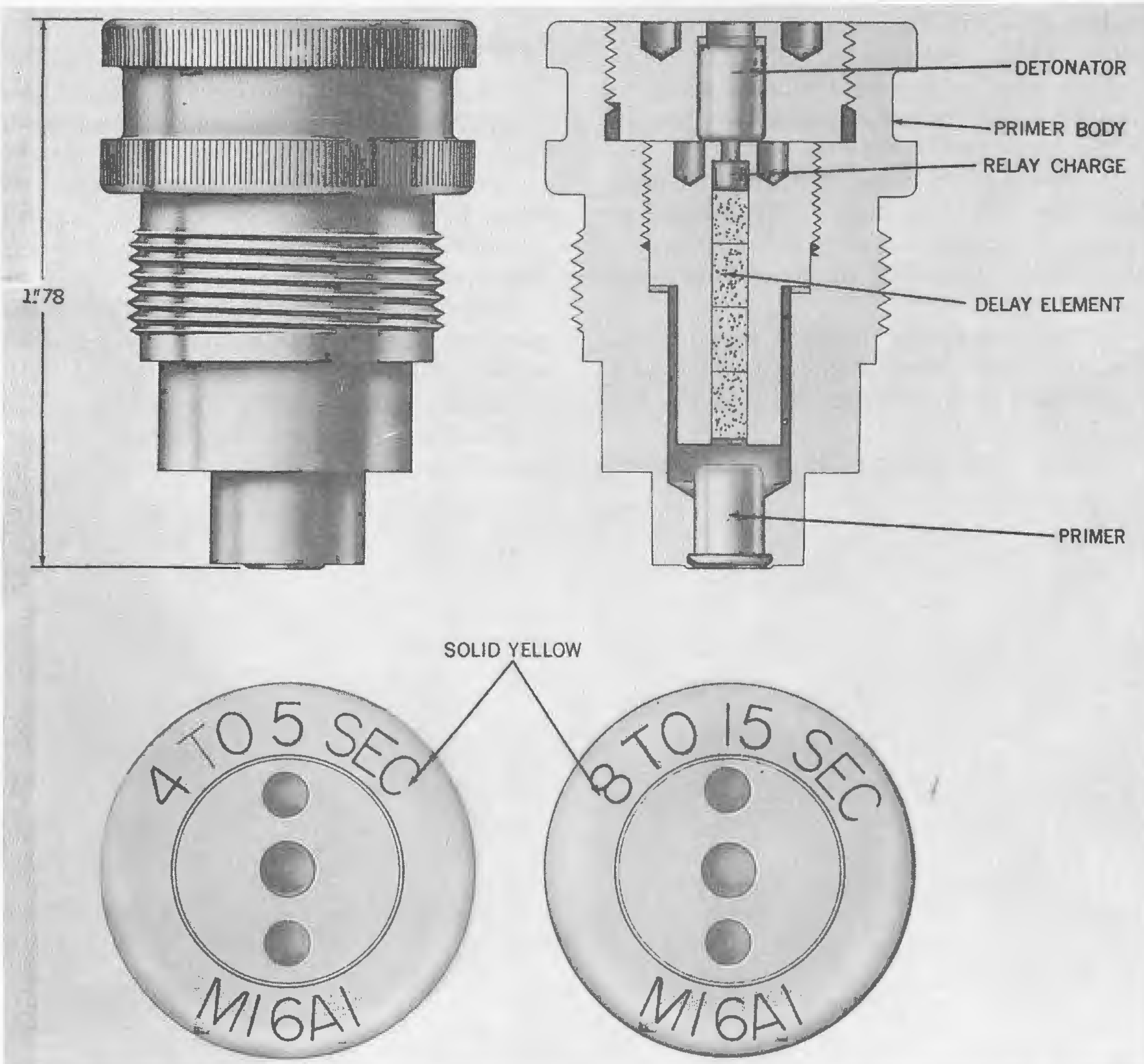


Figure 3–24.—Primer-Detonator M16A1.

Model	M16A1
Assembly Drawing No.	
4- to 5-sec delay	73–8–84
8- to 15-sec delay	73–8–83
Primer	M39A1
Detonator	M17

General Description

Primer-Detonators M16 and M16A1 are available with delays of 4 to 5 seconds or 8 to 15 seconds. The delay time is stamped on the end of each primer-detonator. Primer-detonators are described fully in chapter 1.

The M16 differs from the M16A1 structurally only in that the M16A1 has a higher shoulder. The end of the M16A1 is painted yellow. Both the M16 and M16A1 have a groove around the head as distinguished from the plain knurled head of the M14. They differ also in thread pitch from the M14. The M14 has 12 threads per inch; the M16 and M16A1 have 20 threads per inch. Do not attempt to assemble the wrong type primer-detonator into a fuze; to do so will ruin both fuze and primer-detonator.

The 4- to 5-second delay of the M16 and M16A1 is used against ship targets, the 8- to 15-second delay against shore targets.

Changing a Primer-Detonator

To change a primer-detonator already installed in a fuze in order to provide a different delay, proceed as follows.

1. Remove a primer-detonator with the desired delay from its packing and inspect it for any obvious defects.

2. Unscrew the undesired primer-detonator from the fuze body. If the plunger spring or spring washer fall out, replace them before installing the new primer-detonator.

3. Screw the new primer-detonator into the fuze, handtight. Do not use tools. If hand force is insufficient, turn in the fuze as unserviceable.

4. Seal the primer-detonator removed from the fuze in the packings of the substitute, and mark it to indicate the delay.

Packaging

One primer-detonator is packed in a black cylindrical metal container 1.3 inches in diameter and 2.2 inches long. The weight of the primer-detonator and container is about 0.5 pound. The cover is sealed with an adhesive-tape strip, with a tab to facilitate opening.

Twenty-five primer-detonators in metal cans are packed in an 8- by 8- by 2.25-inch metal container. The cover is sealed with an adhesive-tape sealing strip, which has a tab to facilitate opening. The weight of the box and its contents is about 13¾ pounds.

Chapter 4

ARMOR-PIERCING AND SEMI-ARMOR-PIERCING BOMB ASSEMBLIES

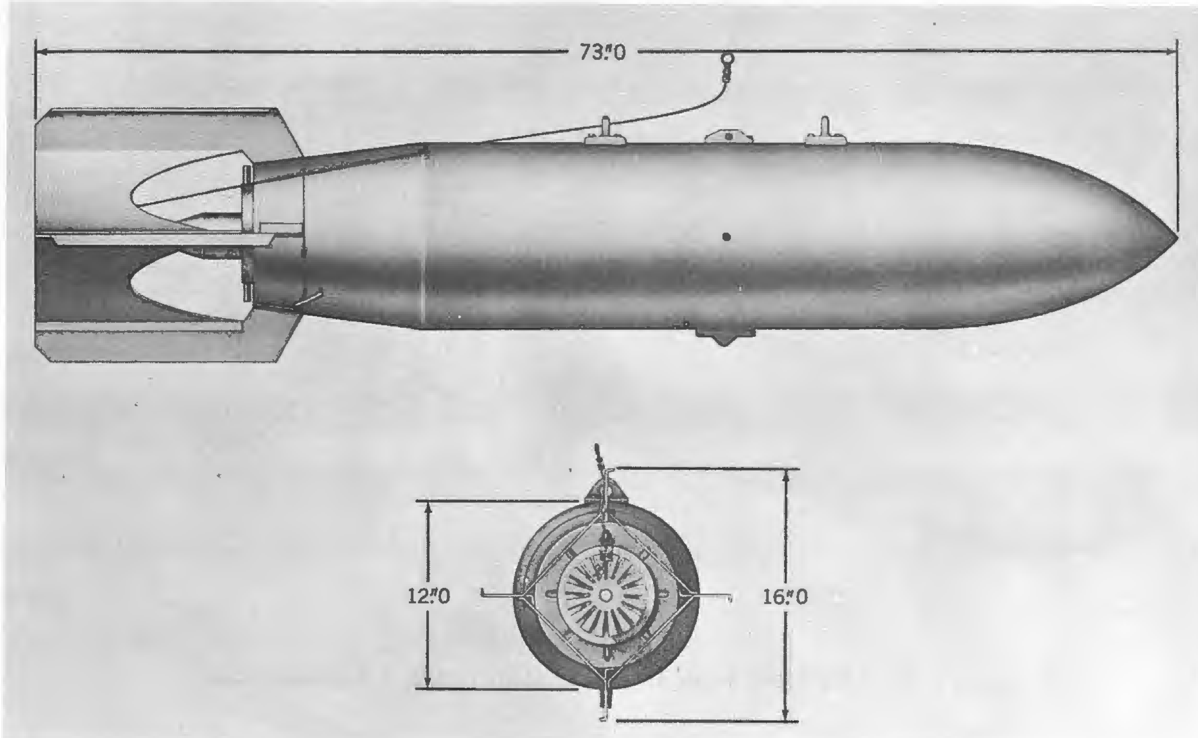


Figure 4–1.—1000-lb AP Bomb AN–Mk 33 Mods 1, 2, & 3, Exterior View.

AN–Mk	33
Mod	1, 2, 3
General Arrangement	329536
List of Drawings	Sk 90916
Fin Assembly Drawing No.	328811
Length of Assembled Bomb (in.)	73.0
Body Diameter (in.)	12.0
Fin Span (in.)	16.0
Weight of Explosive Charge (lb)	140.0
Weight of Fin Assembly (lb)	21.5
Weight of Assembled Bomb (lb)	1008.0
Arming-Wire Assembly	Mk 1 or AN–M6A2
Arming Bracket	Mk 1 Mod 0
Auxiliary Booster	Mk 1 Mod 0
Tail Fuze	AN–Mk 228 and Mods

General Description

The 1000-lb AP Bomb AN–Mk 33 Mods 1, 2, and 3, now obsolete, is a thick metal cased bomb with a solid, pointed nose; it is equipped with a box-type fin assembly.

The only fuze authorized for use with this bomb is the AN–Mk 228 tail impact fuze. The bursting charge is explosive D. Approximately 13 percent of the complete released weight of the bomb consists of the explosive charge.

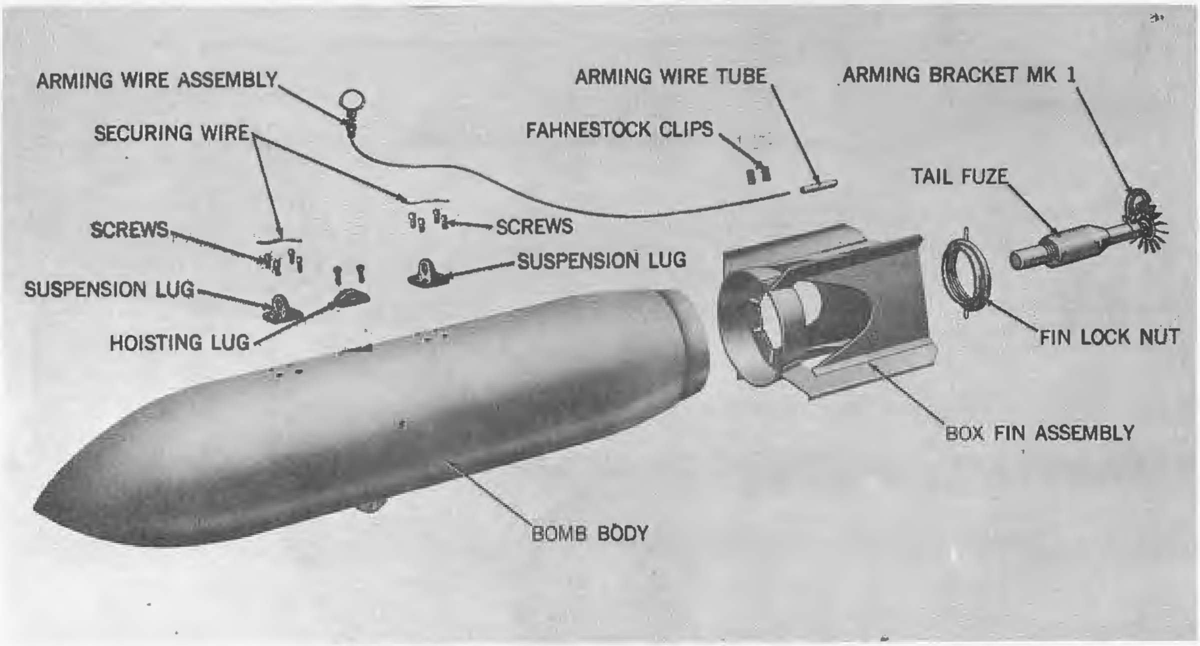


Figure 4-2.—1000-lb AP Bomb AN-Mk 33 Mods 1, 2, & 3, Exploded View.

Two suspension lugs, 14 inches apart, are attached to the bomb body by slotted cap-screws. A hoisting lug is attached similarly between the two suspension lugs.

Painting and Marking

The entire bomb has a protective coating of olive drab paint. A 1-inch wide yellow band is painted around the nose of the bomb, and a 3-inch wide yellow band encircles the conical after end. A 1/4-inch wide broken yellow band may encircle the bomb at its center of gravity; however, this is no longer required. Identifying nomenclature is stenciled on the cylindrical portion of the bomb body in black letters, and similar data is stamped on the conical after end.

Differences among Mods

There are no physical differences among Mods 1, 2, and 3. The mod number is used only to identify the manufacturer.

List of Attachments

A list of the attachments packed in each bomb tail crate (Drawing 328382) follows.

Quantity	Drawing and Piece Number	Attachment
2	328813-1	Suspension Lugs—for U.S. Rack and Shackles.
1	328813-2	Hoisting Lug—Single to U.S. Racks.
1	328813-3	Guide Stud—for U.S. Sling Suspension.
2	328813-5	Trunnions—for Dive Bombing.
11	328813-6	Cap Screws—1/2" x 3/4".
2	328813-7	Trunnion Lock Washers.
1	328813-10	Safety Wire—1/16" x 24", Coil.
1	328813-11	Single Suspension Lug—British type.
1	300207	Arming Bracket Assembly—for Tail Fuze.

Special Instructions

1. Paint on attachments may, in some cases, interfere with installing the screws. Removal of the paint may be necessary in such instances.

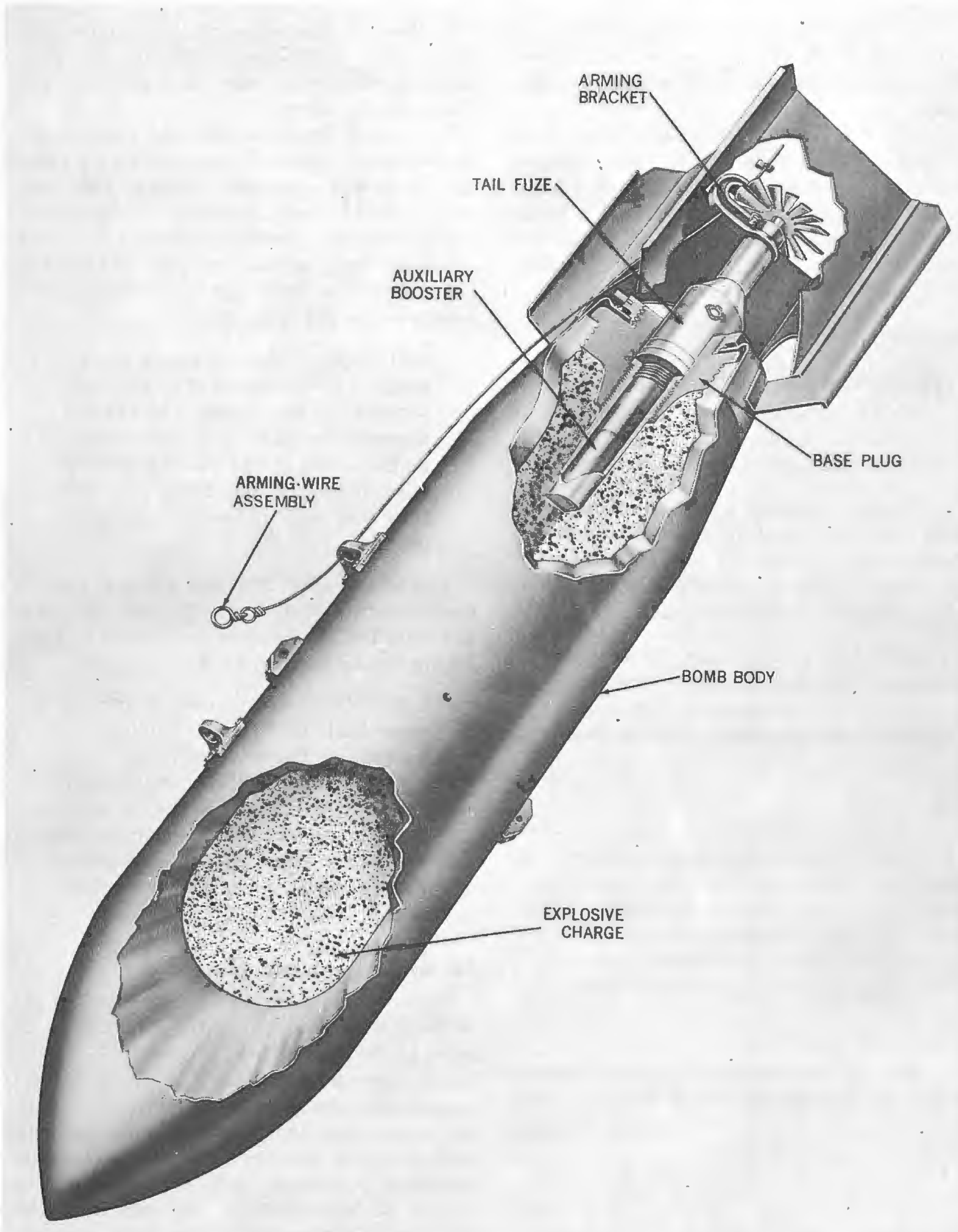


Figure 4-3.—1000-lb AP Bomb AN–Mk 33 Mods 1, 2, & 3, Cutaway View.

2. All attachments not used in fitting up bombs are to be disposed of in accordance with current Bureau of Weapons instructions.

3. Use hoisting lug 328813–2, when it is intended to hoist to a U.S.N. rack, using a single cable; use hoisting band Mark 8 (universal) when it is intended to hoist a bomb with or without shackle attached, using two hoisting cables or, with shackle attached, using one hoisting cable.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements and are to be returned to their original packings, if not used.

1. Remove shipping plugs from the holes to be used for securing suspension lugs or hoisting lug. Clean the holes.
2. Remove the fin assembly and attachments from their shipping crate.

CAUTION: Use only fin assemblies that are in good condition. Reject fin assemblies that are rusted, dented, bent, or have loose fins.

WARNING

Use extreme care in handling Impact Tail Fuze AN-Mk 228 Mods 0 and 1; some lots are extremely sensitive. Do not remove the safety cotter pin that locks the arming mechanism of AN-Mk 228 fuzes.

3. Remove the required fuze and arming wire from their packings and inspect; make sure the fuze is unarmed by looking through the inspection window in it.
4. Attach the required suspension fittings. Tighten securely. Screws holding the suspension lugs should be safety-wired in pairs.

CAUTION: Inspect suspension and hoisting lugs for damage or defects before securing them to the bomb body. Replace if necessary.

5. Remove the shipping plug from the fuze cavity of the bomb. Be sure the auxiliary booster is in place and that the tail fuze seat is clean.
6. Back off the setscrews and unscrew the fin locknut. Locate the fin vanes in a position that will clear the aircraft structure and ground, when installed on the plane. Replace the fin locknut and tighten it. Hold a wooden drift against the pins of the locknut. Tap the drift lightly. Tighten the setscrews on the locknut.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns while on the bomb, it will pull the arming wire from the tail fuze, and the fuze may arm before the bomb is dropped.

7. The AN–Mk 228 tail impact fuze is used with the 1000-lb AP AN–Mk 33 bomb. For detailed information on fuzing and defuzing, refer to chapter 2.

CAUTION: Never use an arming wire that is twisted, kinked, or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length or at any other point in the operation. File or recut to remedy the condition.

Fit of Suspension Lugs

Some difficulty may be encountered in attaching suspension lugs to the bomb. In some of the earlier lots, tapped holes in the bomb were mislocated. The holes in the suspension lugs were properly located with the result that they failed to line up with the mislocated holes in the bomb body. This condition has since been corrected at the source of manufacture. In addition, the holes in the suspension lugs have been increased in diameter from $\frac{33}{64}$ inch to $\frac{17}{32}$ inch to facilitate attachment.

Where a proper fit cannot be obtained, the holes of the suspension lug, dwg 328813, Piece 1, may be reamed out by increasing the diameter of each hole 1/64 inch, i.e., from a normal 33/64 inch to 17/32 inch. To maintain the required degree of safety, IN NO CASE SHOULD THE HOLES OF THE SUSPENSION LUGS BE ENLARGED MORE THAN 1/64 INCH. A 17/32 inch drill may be used if a suitable reamer is not available. In some cases only one or two holes need to be reamed out to insure proper fit. Since the head of the screw must seat properly to provide adequate strength, it may be necessary in some cases to increase also the diameter of the counterbore by 1/64 inch.

Suspension lugs that are reamed out should either be kept attached to the bomb body or so marked that they can be reinstalled exactly as fitted.

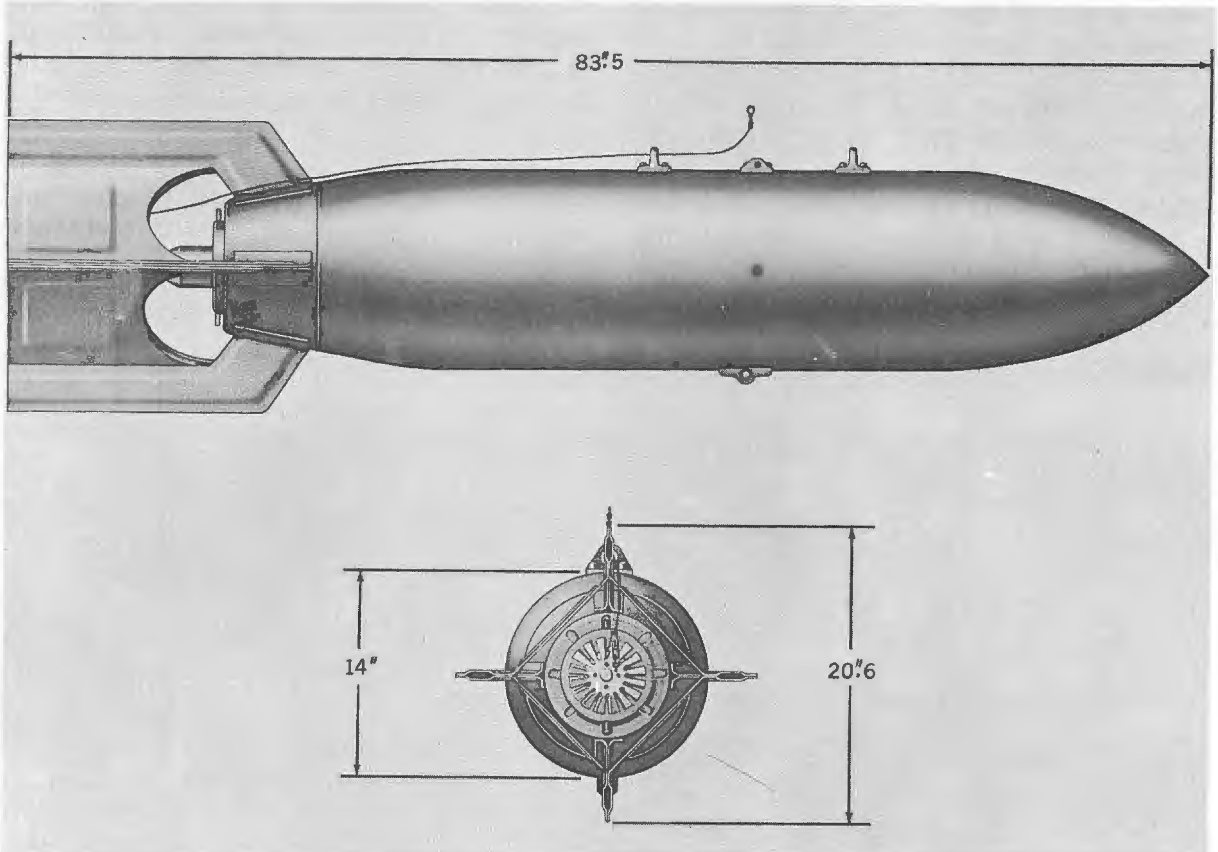


Figure 4-4.—1600-lb AP Bomb AN–Mk 1 Mods 1, 2, & 3, Exterior View.

AN–Mk	1
Mods	1, 2, 3
General Arrangement	329431
List of Drawings	Sk 91009
Fin Assembly Drawing No.	294201
Length of Assembled Bomb (in.)	83.50
Body Diameter (in.)	14.0
Fin Span (in.)	20.60
Weight of Explosive Charge (lb)	209.0
Weight of Fin Assembly (lb)	28.50
Weight of Assembled Bomb (lb)	1590.0
Arming-Wire Assembly	Mk 1 or AN–M6A2
Arming Bracket	Mk 1
Auxiliary Booster	Mk 1 Mod 0
Tail Fuze	AN–Mk 228

General Description

The 1600-lb AP Bomb AN–Mk 1 Mods 1, 2, and 3, now obsolete, is a thick metal cased bomb with a solid pointed nose. The thick case is designed to penetrate the heaviest horizontal armor of combat ships. The bomb is equipped with a box-type fin assembly.

The only fuze authorized for use with the AN–Mk 1 bomb is the AN–Mk 228 tail im-

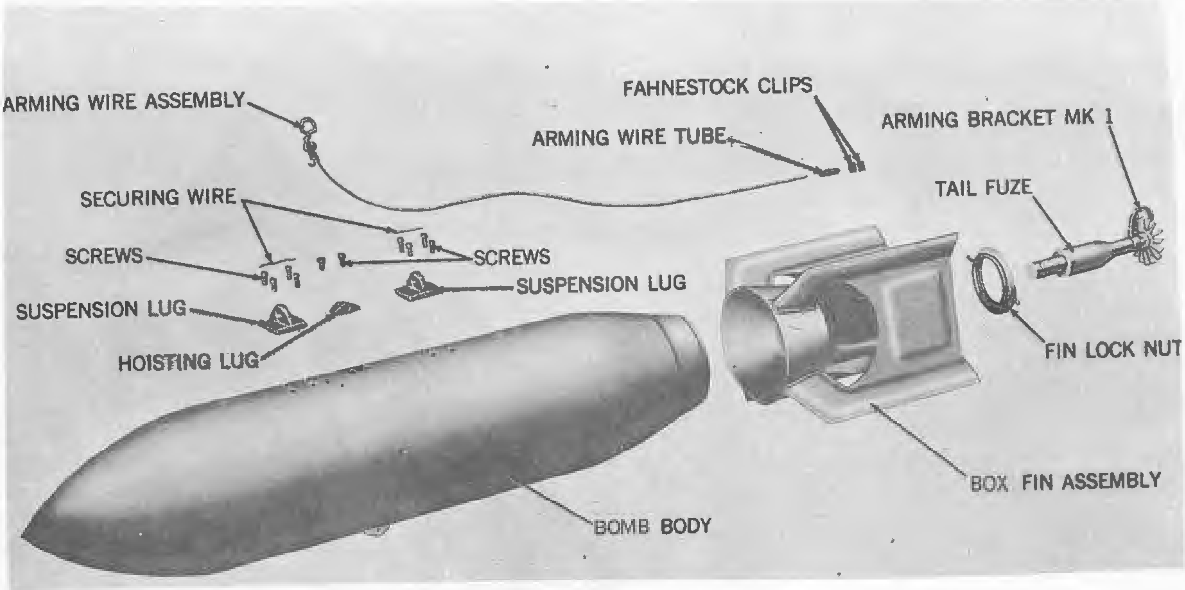


Figure 4-5.—1600-lb AP Bomb AN–Mk 1 Mods 1, 2, & 3, Exploded View.

pact fuze. The bursting charge of explosive D comprises approximately 13 percent of the weight of the complete round.

Four sets of threaded holes in the bomb body permit mounting of lugs for either 14- or 30-inch suspension. For single suspension, a lug may be secured to the underside of the bomb body by means of slotted capscrews. A hoisting lug is similarly attached between and in line with the two suspension lugs.

Painting and Marking

The bomb is painted olive drab. A 1-inch wide yellow band encircles the nose end of the bomb and a 5.75-inch wide band encircles its conical aft portion. A ¼-inch wide broken yellow band may be found at the center of gravity; however, this is no longer required. Identifying nomenclature is stenciled on the cylindrical portion of the bomb body in black letters, and similar data is stamped on the conical after end.

Differences among Mods

There are no physical differences among Mods 1, 2, and 3. The complete rounds contain the same components and the mod number is used only to identify the manufacturer.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements and are to be returned to their original packing if not used.

1. Remove shipping plugs from the threaded holes in the bomb body where it is desired to attach the suspension and hoisting lugs. Clean the threaded holes.
2. Remove the fin assembly and attachments from their shipping crate.

CAUTION: Use only fin assemblies that are in good condition. Reject fin assemblies that are rusted, dented, bent, or have loose fins.

WARNING

Use extreme care in handling Impact Tail Fuze AN-Mk 228 Mods 0 and 1; some lots are extremely sensitive. Do not remove the safety cotter pin that locks the arming mechanism of AN-Mk 228 fuzes.

3. Remove the required fuze and arming wire from their packings and inspect; make sure the fuze is unarmed by looking through the inspection window in it.

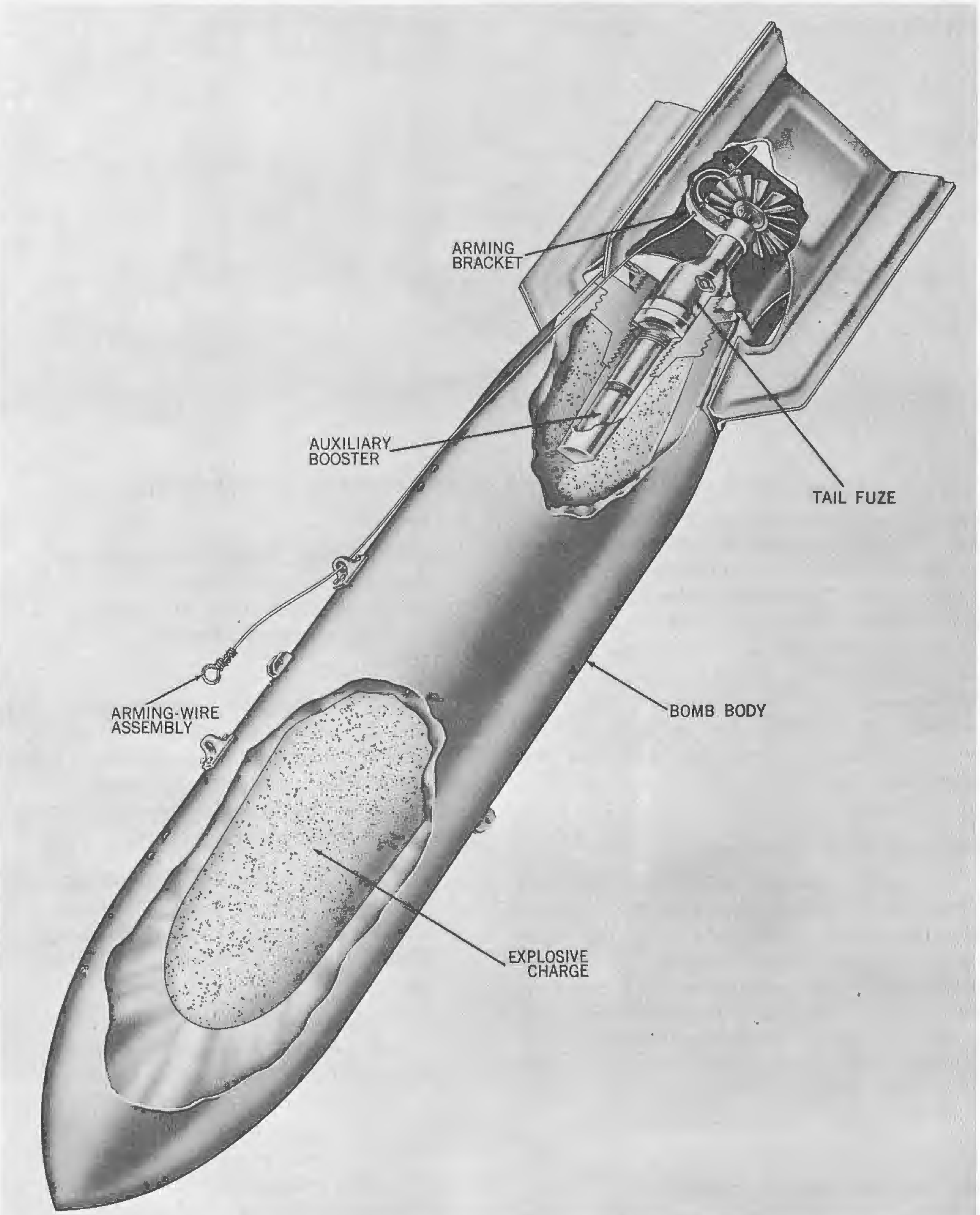


Figure 4–6.—1600-lb AP Bomb AN–Mk 1 Mods 1, 2, & 3, Cutaway View.

4. Attach the fittings for suspension and hoisting, using the slotted capscrews provided. Use a screwdriver of the proper size and tighten securely. Screws holding the suspension lugs to the bomb body should be safety wired in pairs.

> CAUTION: Inspect suspension and hoisting lugs for damage or defects before securing them to the bomb body. Replace if necessary.

5. Remove the fuze hole cover from the bomb and clean the threads if necessary. Be sure the auxiliary booster is in place.

6. Back off the two setscrews holding the tail locknut in place; remove the locknut and fit the tail to the body. Replace the tail locknut and tighten by hand. Rotate the vanes until their position clears the airplane structure and the ground when the bomb is installed. Tighten the locknut securely. Hold a wooden drift against the pins of the locknut. Tap the drift lightly. Tighten the setscrews on the locknut.

7. The AN–Mk 228 tail impact fuze is used with the 1600-lb AP AN–Mk 1 bomb. For detailed information on fuzing and defuzing, refer to chapter 2.

> CAUTION: Never use an arming wire that is twisted, kinked, or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length or at any other point in the operation. File or recut to remedy this condition.

500-LB SAP BOMB AN–M58A2

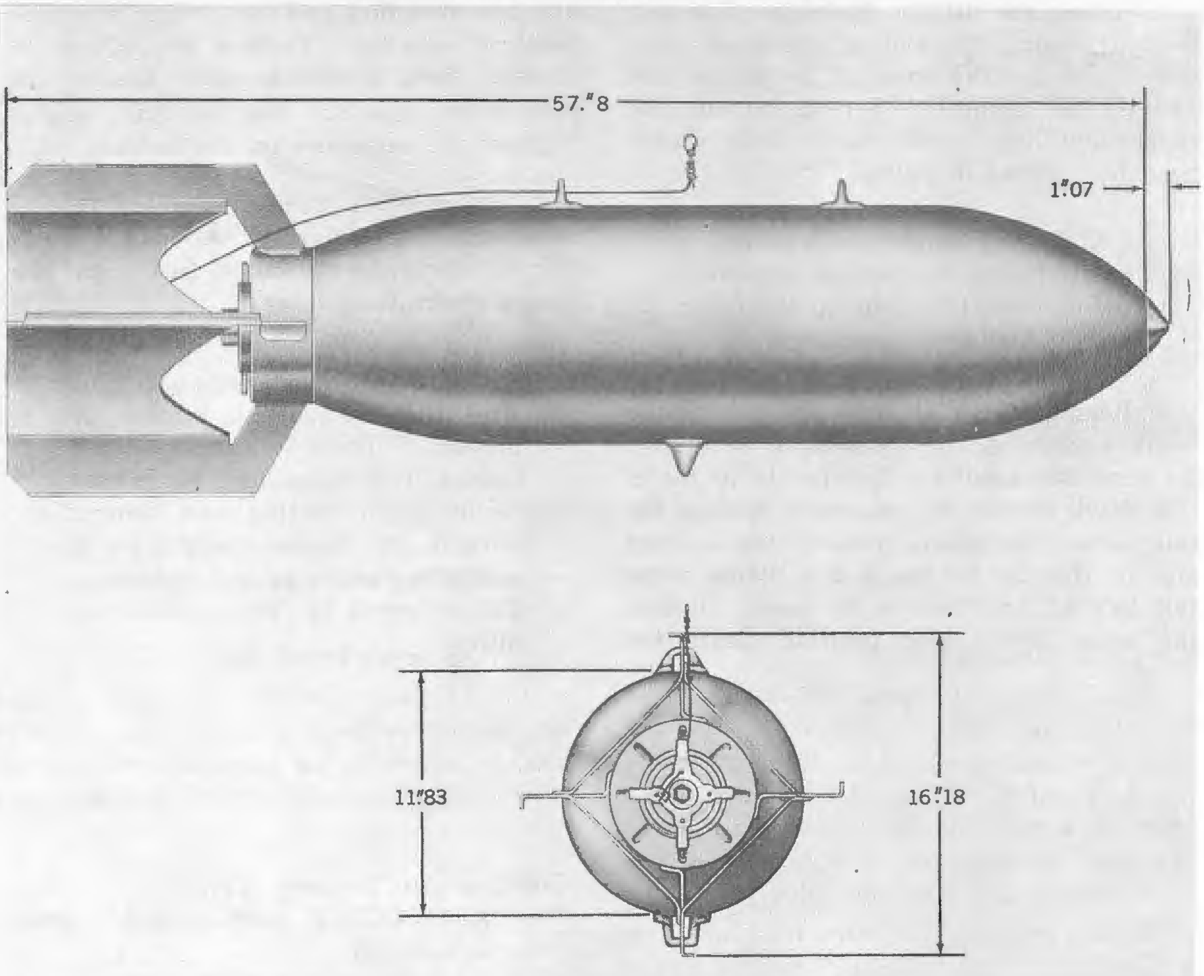


Figure 4-7.—500-lb SAP Bomb AN–M58A2, Exterior View.

Model	AN–M58A2
Assembly Drawing No.	82–0–61
Length of Assembled Bomb (in.)	57.80
Body Diameter (in.)	11.82
Fin Span (in.)	16.18
Weight of Explosive Charge (lb)	
TNT	152.0
Picratol	154.0
Weight of Fin Assembly (lb)	17.5
Weight of Assembled Bomb (lb)	
Loaded with TNT	552.0
Loaded with Picratol	554.0
Fin Assembly	AN–M110A1
Fin Locknut	Mk 1 Mod 0
Arming-Wire Assembly	Mk 1 or AN–M6A2
Adapter-Booster	M102A1
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1
Tail Fuze	AN–M101A2, AN–M116, AN–M124A1, AN–M113

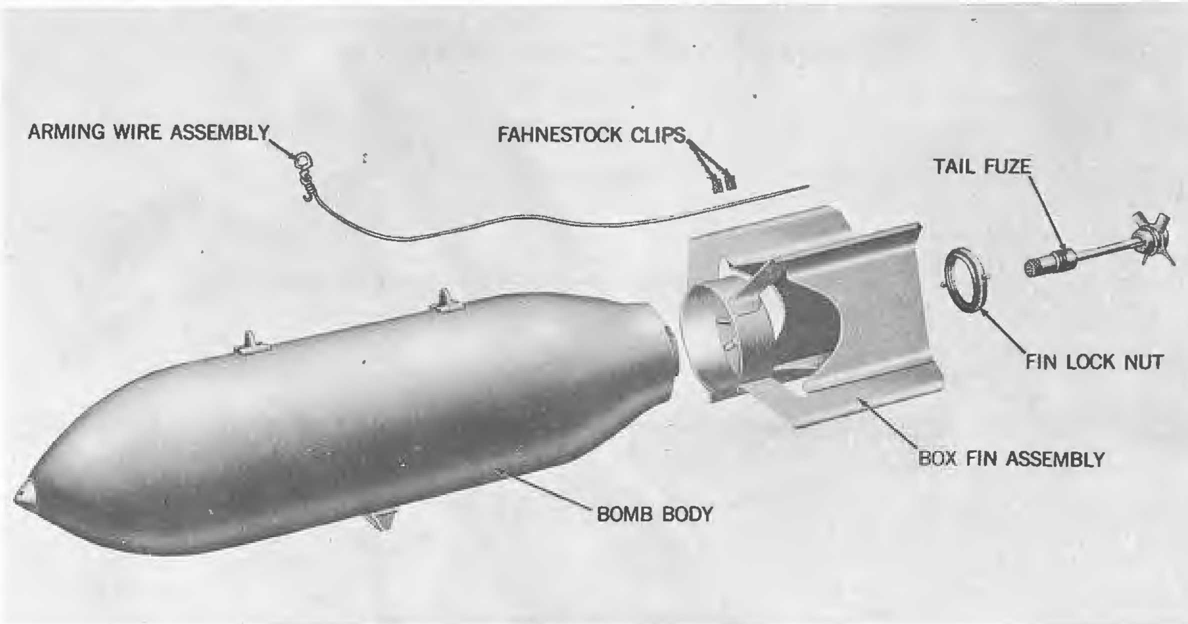


Figure 4-8.—500-lb SAP Bomb AN–M58A2, Exploded View.

General Description

The 500-lb SAP Bomb AN–M58A2, now obsolete, has a cylindrical heavy steel casing with a pointed nose. A box-type fin assembly is attached to the aft end of the bomb body by a fin locknut. The base plug locks securely in place and the adapter-booster may be locked to the base plug.

This bomb accommodates both nose and tail fuzes. Tactical requirements usually nullify the need for a nose fuze, in which case the nose fuze cavity is fitted with a solid steel plug. The 500-lb SAP Bomb AN–M58A2 was developed to provide greater penetrative ability than that afforded by a comparable weight GP bomb.

Picratol, AM 50–50 (Amatol), and TNT fillers account for the differences in released weights. Bombs filled with Amatol 50–50 include a booster surround of TNT and the Auxiliary Booster M104, which is inserted during the filling process. Bombs filled with Picratol include the auxiliary booster less the TNT surround; TNT filled bombs do not include the auxiliary booster.

Suspension lugs for either single or dual point suspension are welded to the bomb body.

Painting and Marking

Yellow bands on the nose and aft end of the bomb body identify the explosive charge. Identifying nomenclature is stenciled in black on an olive drab painted bomb casing.

Differences Among Bombs AN–M58A2, AN–M58A1, and AN–M58

The AN–M58A2, AN–M58A1, and AN–M58 bombs are similar to each other on outward appearance. However, the AN–M58A2 contains antiwithdrawal pins in the base plug, and an adapter-booster which can be locked in place, while the AN–M58 and AN–M58A1 bombs lack these features.

The three bombs also differ in their released weights. The AN–M58 has a lighter body than its two modifications. Its complete round weighs 480 pounds, of which 154.6 pounds, 32.3 percent of the total bomb weight, is explosive filler. The AN–M58A1 weighs 499.5 pounds as released; its explosive filler weighs 145.1 pounds, 29 percent of the total bomb weight.

Assembly

CAUTION: Fuzes and bombs are

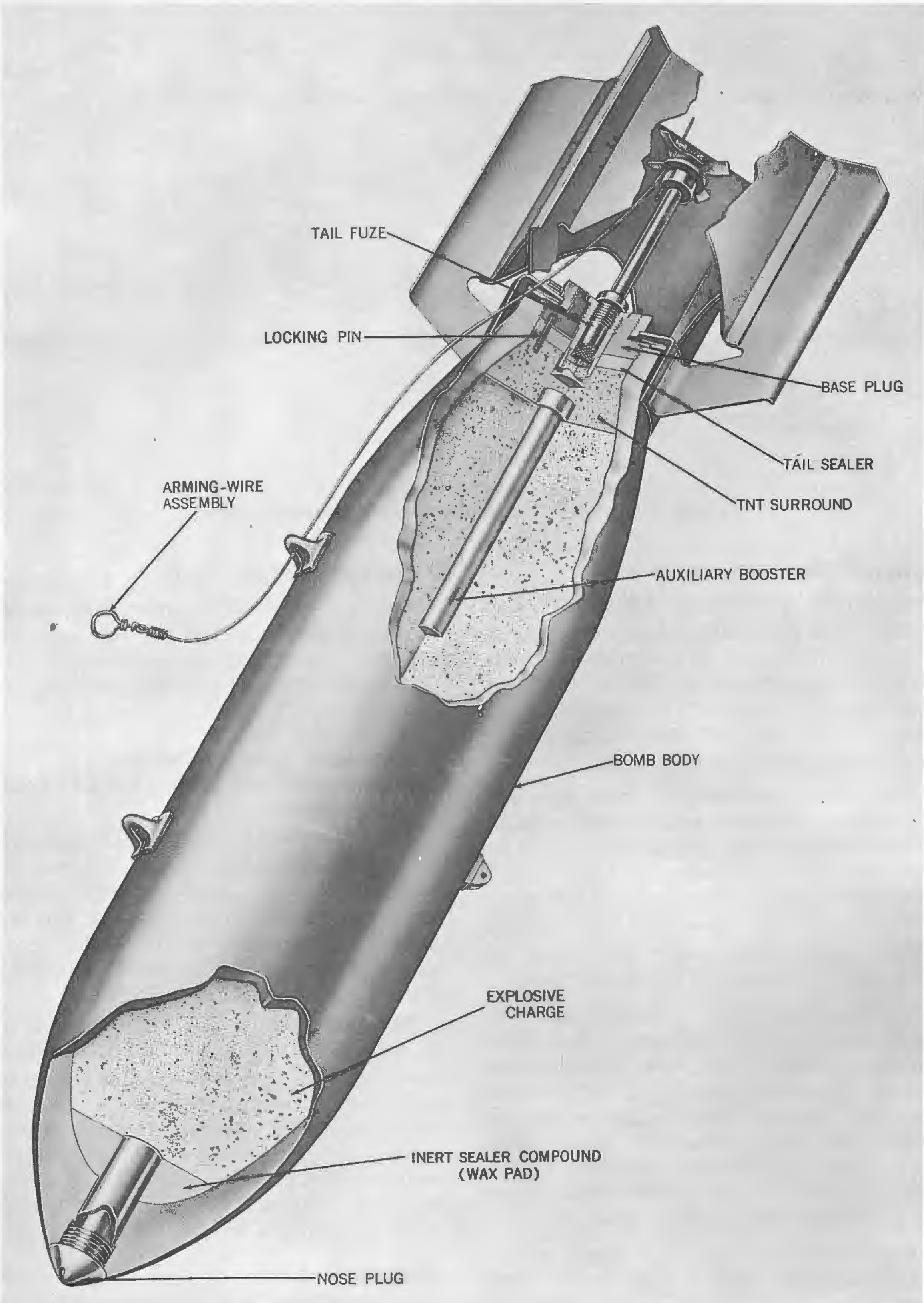


Figure 4–9.—500-lb SAP Bomb AN–M58A2, Cutaway View.

not to be unpacked in advance of requirements and are to be returned to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs.

CAUTION: Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and its protector. Remove the protector from the locknut.

3. Remove the fin assembly and its attachments from the shipping crate. Place the fin assembly over the end of the bomb with one fin in line with the suspension lugs. If hung in external racks, locate the fin to clear the aircraft and the ground when installed. Replace the fin locknut and tighten it with a wrench. When the bomb is to be carried externally at speeds in excess of 350 knots, Fin Locknut Mk 1 Mod 0 must be used in place of the regular fin locknut in order to prevent rotation of the fin assembly.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely. Use only those fin assemblies that are in good condition. Reject those that are rusted, dented, bent, or have loose fins.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: One of the fuzes used with this bomb is the AN–M124A1 tail fuze which incorporates the use of an antiwithdrawal device. Nondetonation of bombs fuzed with the AN–M124A1 cannot be relied upon when released SAFE because the glass solvent ampoules in the fuze may be broken upon impact of the bomb. Once an AN–M124A1 fuze is installed, no attempt should be made either to remove the fuze from the bomb or to return the bomb to an airfield or aircraft carrier upon an incomplete mission. Do not turn the fuze back and forth to engage threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and the bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

1000-LB SAP BOMB AN–M59A1

Model	AN–M59A1
Assembly Drawing No.	82–0–62
Length of Assembled Bomb (in.)	70.38
Body Diameter (in.)	15.13
Fin Span (in.)	20.72
Weight of Explosive Charge (lb)	
Amatol	292.25
TNT	315.0
Picratol	320.0
Weight of Fin Assembly (lb)	25.5
Weight of Assembled Bomb (lb)	
Loaded with Amatol	1032.0
Loaded with TNT	1039.0
Loaded with Picratol	1042.0
Fin Assembly	AN–M114A1
Fin Locknut	Mk 1 Mod 0
Arming-Wire Assembly	Mk 1 or AN–M6A2
Adapter-Booster	M102A1
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1
Tail Fuze	AN–M102A2, AN–M117, AN–M125A1, AN–M134

General Description

The 1000-lb SAP Bomb AN–M59A1 has a thick metal body designed to give greater penetration than a general purpose bomb of comparable weight. It is a heavy nosed cylindrical shaped bomb. A box-type fin assembly is attached to the aft end by a fin locknut. The base plug of the AN–M59A1 bomb locks securely in place and the adapter-booster may be locked to the base plug.

This bomb can accommodate both nose and tail fuzes. Tactical requirements usually nullify the need for a nose fuze, in which case the nose fuze cavity is fitted with a solid steel plug. Approximately 30 percent of the total weight of the 1000-lb SAP AN–M59A1 bomb is explosive charge. Bombs filled with Amatol 50-50 include a booster surround of cast TNT and the Auxiliary Booster M104, which is inserted during the filling process. Bombs filled with Picratol include the auxiliary booster less the TNT surround; TNT filled bombs do not include the auxiliary booster.

Painting and Marking

Yellow bands around the nose and aft end of the bomb identify the explosive charge. Identifying nomenclature is stenciled in black on an olive drab painted bomb casing.

Differences Between Bombs AN–M59A1 and AN–M59

The 1000-lb SAP Bomb AN–M59A1 has antiwithdrawal pins in the base plug and an adapter-booster which can be locked to the base plug. The AN–M59 bomb, now obsolete, lacks these features. The explosive charge in the AN–M59 bomb is approximately 315 pounds, or 31.8 percent of the bomb's complete weight of 990 pounds. In all other physical respects, the 1000-lb SAP Bomb AN–M59 is identical to the 1000-lb SAP Bomb AN–M59A1.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements and are to be returned to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs.

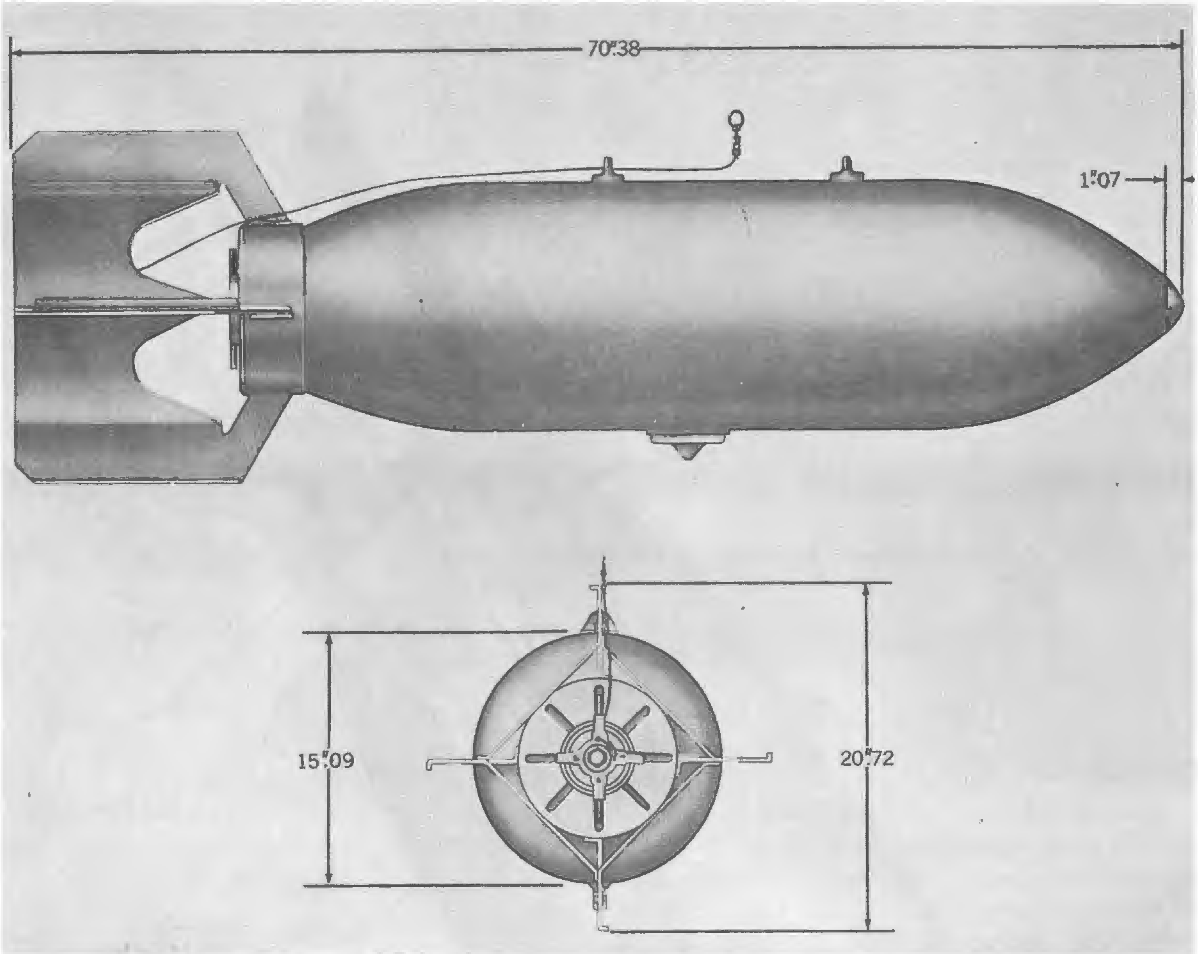


Figure 4–10.—1000-lb SAP Bomb AN–M59A1, Exterior View.

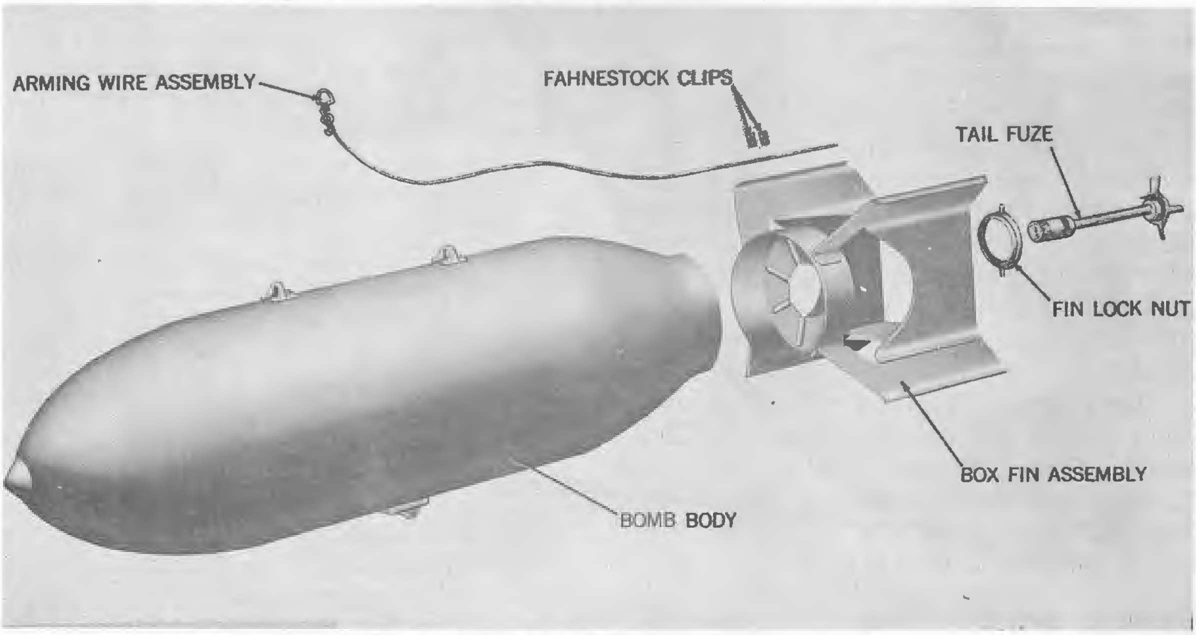


Figure 4–11.—1000-lb SAP Bomb AN–M59A1, Exploded View.

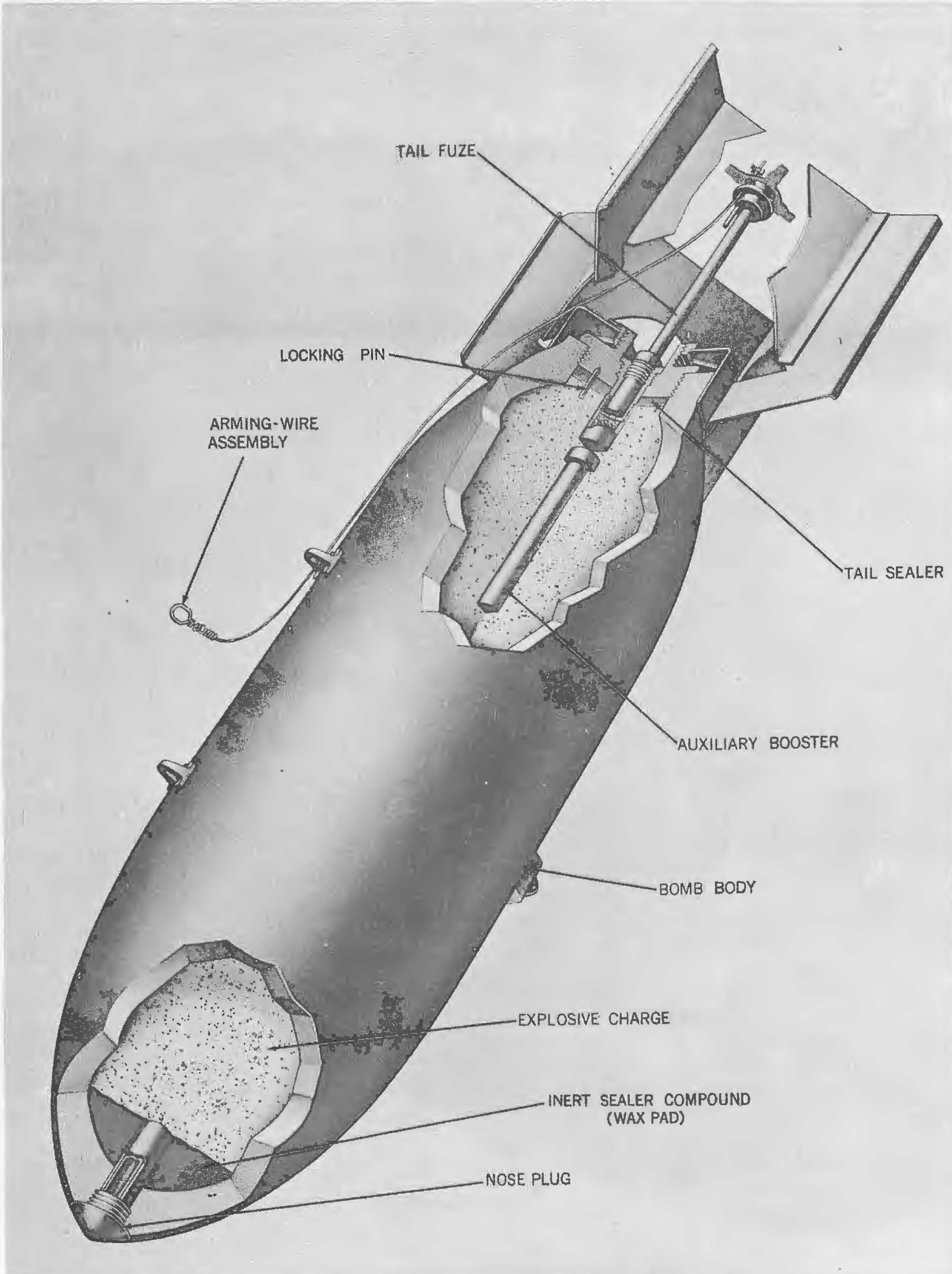


Figure 4–12.—1000-lb SAP Bomb AN–M59A1, Cutaway View.

CAUTION: Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and its protector. Remove the protector from the locknut.

3. Remove the fin assembly and its attachments from the shipping crate. Place the fin assembly over the end of the bomb with one fin in line with the suspension lugs. If hung in external racks, turn the fin and locate it so as to clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten with a wrench. When the bomb is to be carried externally at speeds in excess of 350 knots, Fin Locknut Mk 1 Mod 0 should be used in place of the regular locknut. Setscrews should be securely tightened in order to prevent rotation of the fin assembly.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming-wire from the tail fuze, causing it to arm prematurely. Use only those fin assemblies that are in good condition. Reject those that are rusted, dented, bent, or have loose fins.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: The AN–M59A1 bomb uses the AN–M125A1 and the AN–M134 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with the AN–M125A1 and AN–M134 fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may be broken upon impact of the bomb. Once an AN–M125A1 or AN–M134 fuze is installed, no attempt should be made to remove the fuze or to return the bomb to an airfield or aircraft carrier upon an incomplete mission. Do not turn an AN–M125A1 or an AN–M134 fuze back and forth to engage threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and the bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

2000-LB SAP BOMB M103

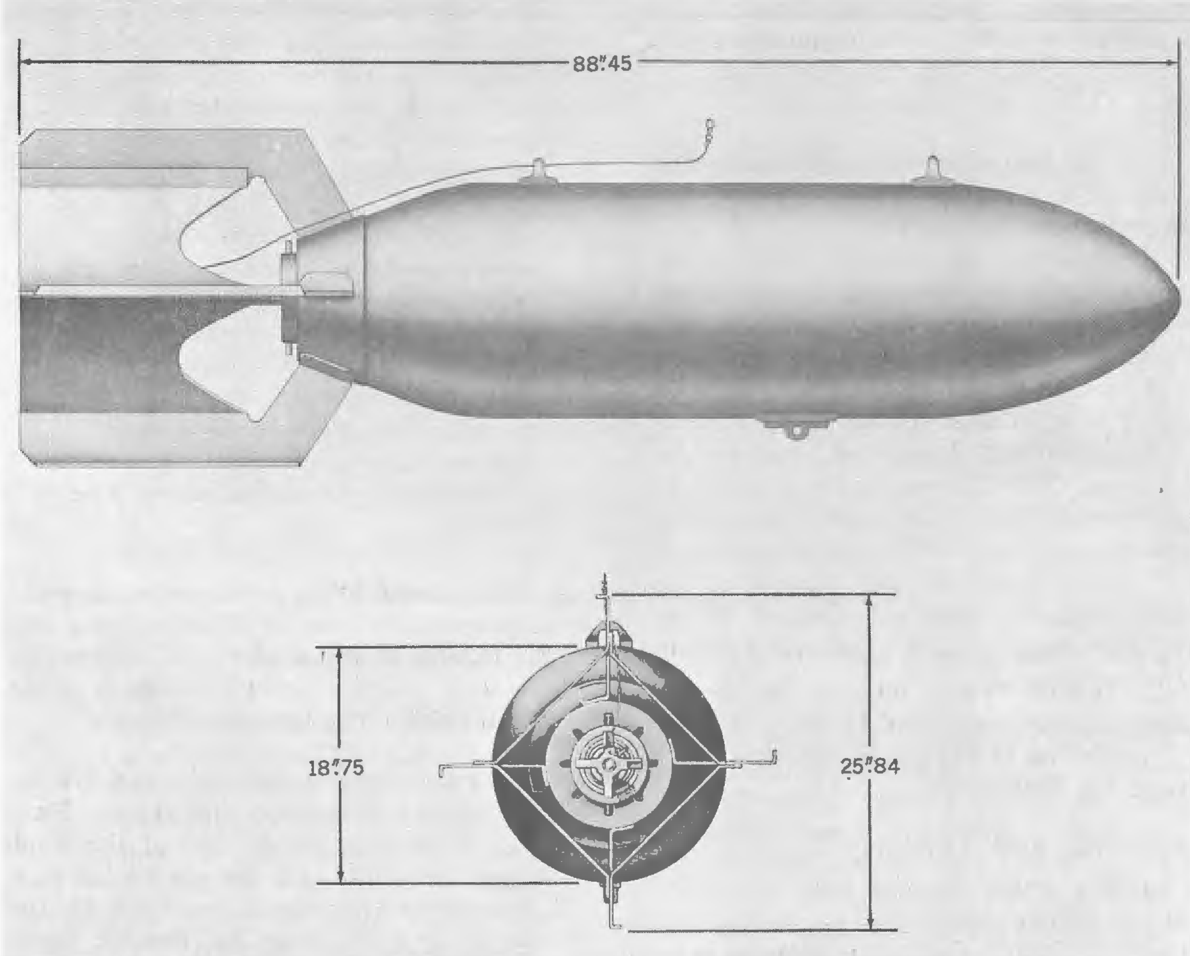


Figure 4–13.—2000-lb SAP Bomb M103, Exterior View.

Model	M103
Assembly Drawing No.	82–0–133
Length of Assembled Bomb (in.)	88.45
Body Diameter (in.)	18.75
Fin Span (in.)	25.84
Weight of Explosive Charge (lb)	556.48
Weight of Fin Assembly (lb)	52.75
Weight of Assembled Bomb (lb)	2039.35
Fin Assembly	M117A1
Arming-Wire Assembly	Mk 1 or AN–M6A2
Adapter-Booster	M115A1
Tail Fuze	AN–M102A2, AN–M117, AN–M125A1, AN–M134

General Description

The 2000-lb SAP Bomb M103, now obsolete, is fabricated from seamless steel tubing and has a solid, semipointed nose. This bomb takes only a tail fuze, having no provision for a nose fuze. A box-type fin assembly is used, as on other SAP bombs.

Approximately 27 percent of the total

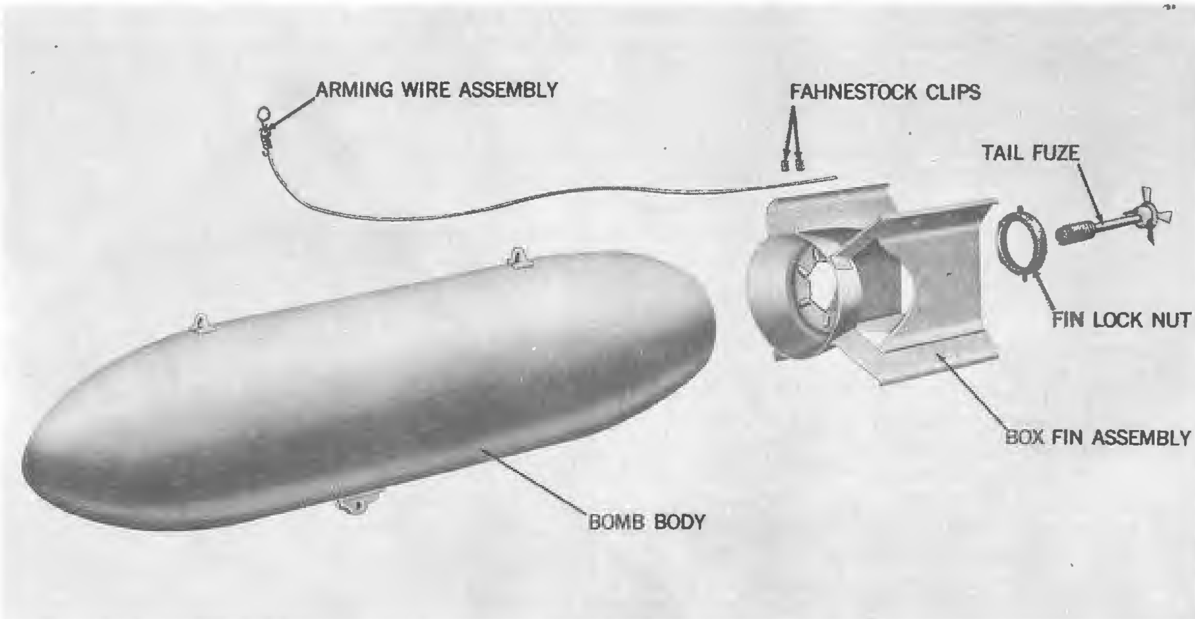


Figure 4–14.—2000-lb SAP Bomb M103, Exploded View.

weight of the bomb is explosive filler Picratol. Double suspension lugs having a 30-inch spacing are welded to the bomb casing. A single lug is located on the side opposite from the double lugs.

Painting and Marking

Yellow bands on the nose and aft end of the body identify the high-explosive charge. Identifying nomenclature is stenciled in black on an olive drab painted bomb casing.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements and are to be returned to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs.

CAUTION: Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and its protector. Remove the protector from the locknut.

3. Remove the fin assembly and its attachments from the shipping crate. Place the fin assembly over the end of the bomb with one fin in line with the suspension lugs. If hung in external racks, turn the fin and locate it so as to clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten it with a wrench.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming-wire from the tail fuze, causing it to arm prematurely. Use only those fin assemblies that are in good condition. Reject those that are rusted, dented, bent, or have loose fins.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

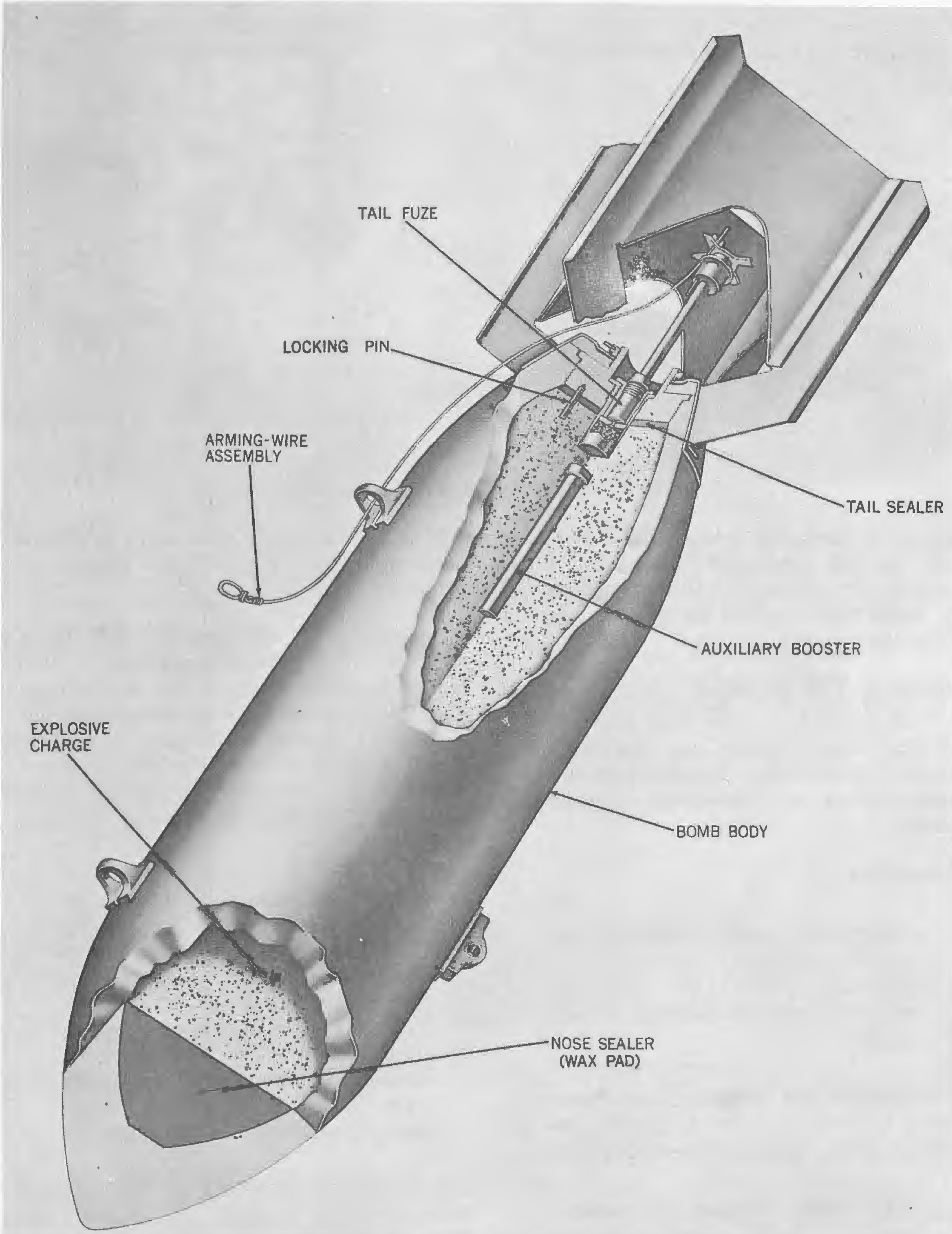


Figure 4–15.—2000-lb SAP Bomb M103, Cutaway View.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: The M103 bomb uses the AN–M125A1 and the AN–M134 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with the AN–M125A1 and AN–M134 fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may be broken upon impact of the bomb. Once an AN–M125A1 or AN–M134 fuze is installed, no attempt should be made to remove the fuze or to return the bomb to an airfield or aircraft carrier upon an incomplete mission. Do not turn an AN–M125A1 or an AN–M134 fuze back and forth to engage threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and the bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Chapter 5

GENERAL PURPOSE BOMB ASSEMBLIES

100-LB GP BOMB AN–M30A1

	With Fin Assembly AN–M103A1	With Fin Assembly M135
Model	AN–M30A1	AN–M30A1.
Assembly Drawing No	82–0–12.	
Length of Assembled Bomb (in.)	40.26	54.2.
Body Diameter (in.)	8.18	8.18.
Fin Span (in.)	11.0	11.18.
Weight of Explosive Charge (lb):		
TNT	57.0	57.0.
Tritonal	62.0	62.0.
Weight of Fin Assembly (lb)	5.6	17.5.
Weight of Assembled Bomb (lb):		
Loaded with TNT	119.5	131.5.
Loaded with Tritonal	124.5	136.5.
Fin Locknut	M1 or Mk 2	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 1, AN–M6A2	Mk 1 or AN–M6A2, and M13.
Adapter-Booster	M102A1	M102A1.
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M100A2, AN–M115, AN–M123A1, or AN–M132.	M–172 or AN–M175.

General Description

The 100-lb GP Bomb AN–M30A1 is a relatively thin cased bomb with an ogival nose, parallel side walls, and a tapered aft section. A box-type fin assembly is fastened to the aft end of the bomb with a fin locknut.

The bomb uses both nose and tail fuzes. The base plug of the bomb is locked securely to the bomb body by two studs which extend from the base plug into the solidified explosive charge. This bomb also provides a means of locking the adapter-booster to the base plug; a locking pin is passed through a hole in the adapter-booster into a groove in the base plug. These modifications were initiated to prevent removal of the base plug and adapter-booster to make the antiwithdrawal devices of long-delay fuzes more effective.

Two suspension lugs, 14 inches apart, are welded to one side of the bomb body. A single lug is welded to the opposite side at the center of gravity. Approximately 50 percent of the released weight of the bomb is its explosive charge of TNT or Tritonal.

Painting and Marking

Yellow color bands on an olive drab body identify the high-explosive charge. Identifying nomenclature is stenciled on the nose,

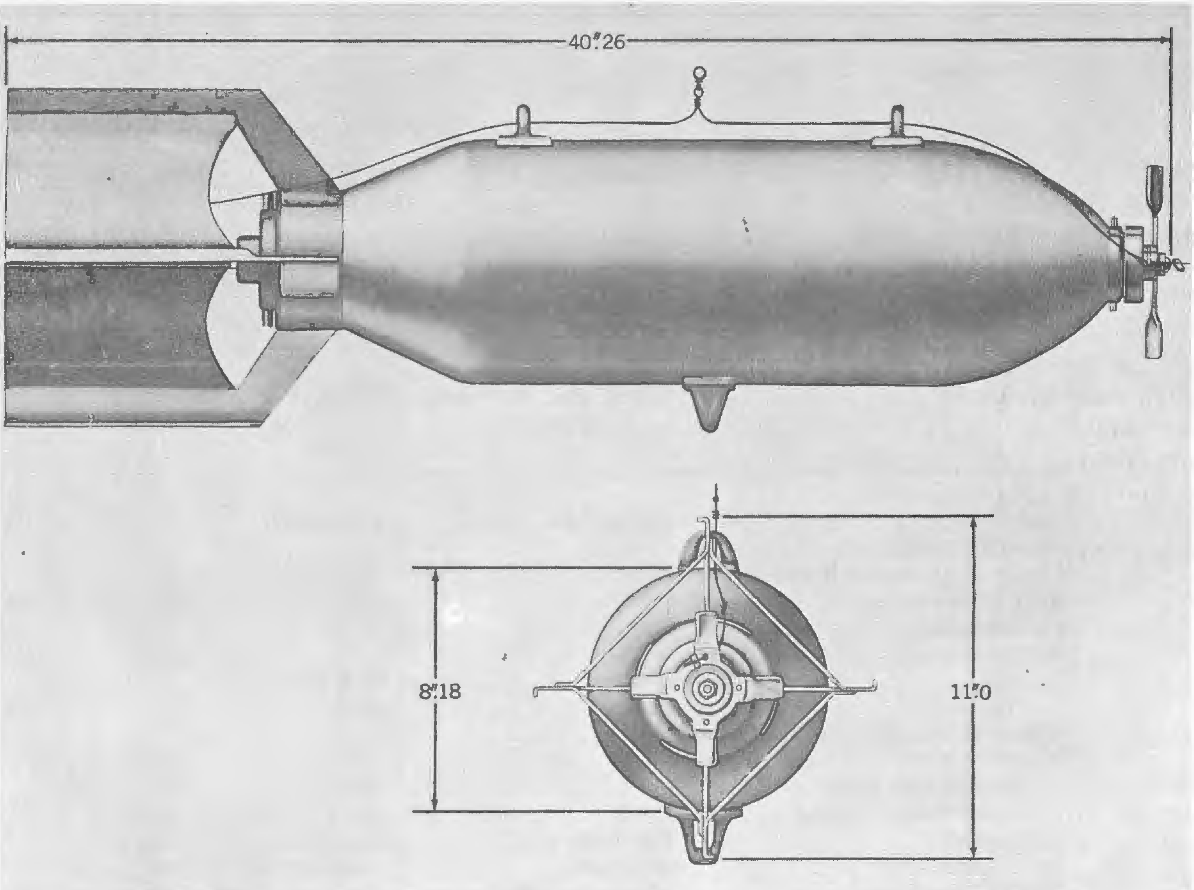


Figure 5–1.—100-lb GP Bomb AN–M30A1 with Fin Assembly AN–M103A1, Exterior View.

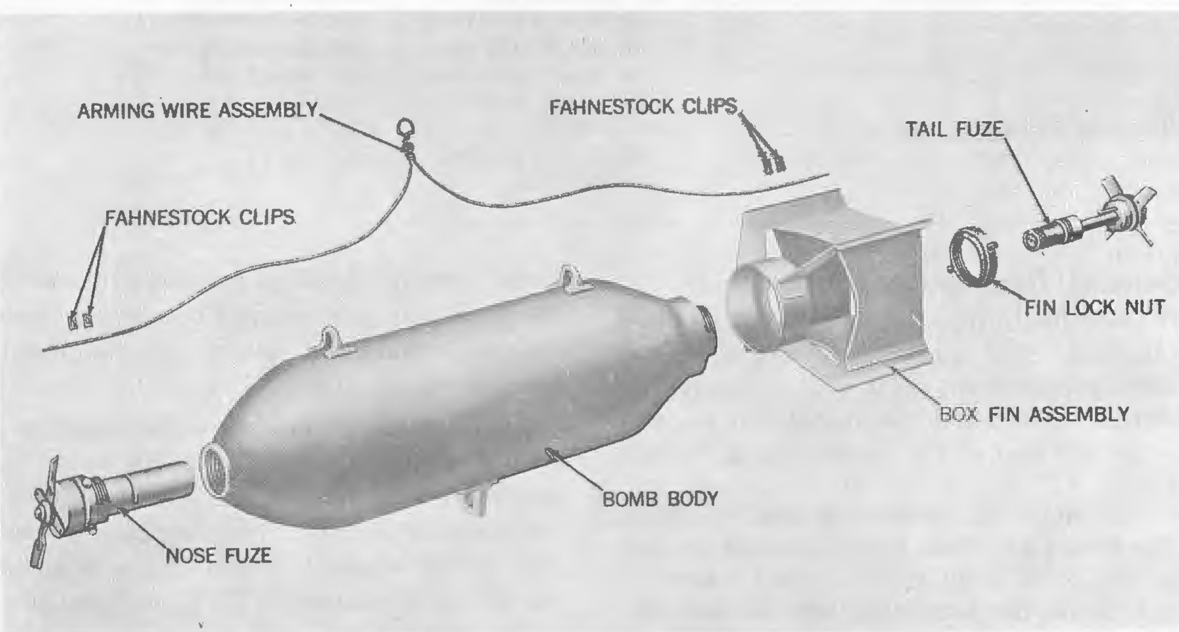


Figure 5–2.—100-lb GP Bomb AN–M30A1 with Fin Assembly AN–M103A1, Exploded View.

midsection, and conical aft section in black paint.

Difference Between Mods

The AN–M30A1 bomb contains antiwithdrawal pins in the base plug and a device for locking the adapter-booster to the base plug. The earlier model, AN–M30, does not have these features.

The AN–M30 bomb is lighter in weight than its modification, the AN–M30A1. The AN–M30 may be loaded with 105.5 pounds of Tritonal, 102.5 pounds of TNT, or 99.0 pounds of Amatol 50-50.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nut from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Place the fin assembly over the end of the bomb with one fin in line with the suspension lugs. If hung on external racks, turn the fin and locate it so that it will clear the aircraft and the ground when installed. Replace the fin locknut and tighten it with a wrench. Fin Locknut M1 or Mk 2 Mod 0 should always be used in place of the regular fin locknut. Fin locknut setscrews should be tightened securely. This is necessary to prevent rotation of the fin assembly.

CAUTION: Do not use fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: The AN–M30A1 bomb uses the AN–M123A1 and the AN–M132 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with AN–M123A1 and AN–M132 fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once an AN–M123A1 or AN–M132 fuze is installed, no attempt should be made to remove the fuze. Return of bombs to airfields or carriers is restricted. Bombs fuzed with AN–M123A1 or AN–M132 fuzes may be returned to an airfield or carrier provided that: (1) Bomb rack malfunction prevents release. (2) Efforts to release by maneuvering of aircraft

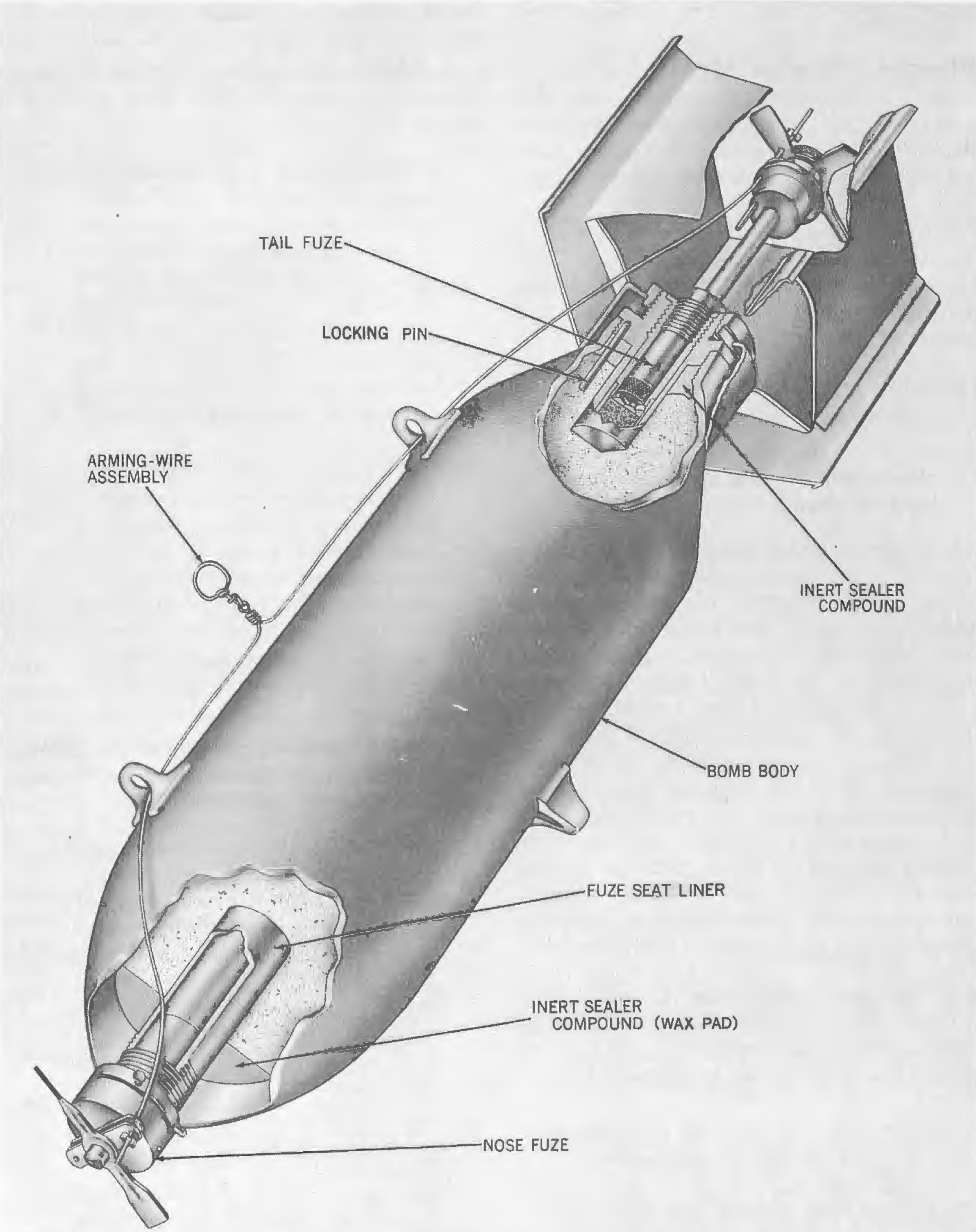


Figure 5–3.—100-lb GP Bomb AN–M30A1 with Fin Assembly AN–M103A1, Cutaway View.

100-LB GP BOMB AN–M30A1 WITH FIN ASSEMBLY M135

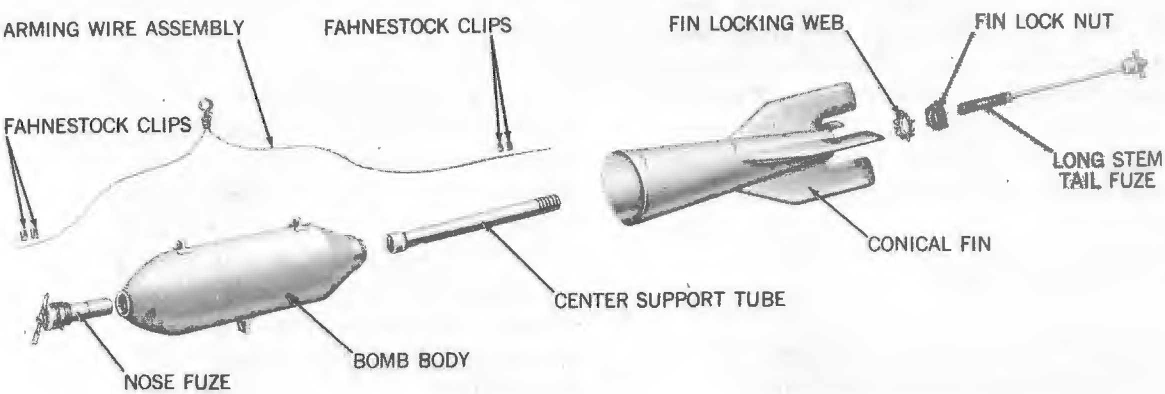


Figure 5–4.—100-lb GP Bomb AN–M30A1 with Fin Assembly M135, Exploded View.

are unsuccessful. (3) Bomb and fin assemblies are undamaged and fuze arming wires are in place, as observed by check of aircraft before landing. (4) Fuzed bombs are immediately disposed of by authorized personnel upon landing of aircraft. Do not turn an AN–M123A1 or AN–M132 fuze back and forth to engage the threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

General Description

When equipped with Fin Assembly M135, the 100-lb GP Bomb AN–M30A1 uses the standard AN–M30A1 bomb body. Fin Assembly M135 consists of an elongated fin cone with four integral fins spaced at equal distances on the cone surface. It was developed to increase aerodynamic performance and accuracy in bombing.

Use of the conical fin lengthens the overall dimension of the bomb. This necessitates the use of a tail fuze with an extra-long arming stem and tube (long stem fuze) so that the arming vane of the fuze can be located effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nut from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire. Remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat) and tighten the tube with a wrench. Tighten the setscrews in the support tube. Place the fin cone over the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so that they will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the fins of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut (discard the locknut supplied with the fin assembly). Tighten the locknut with the special notched wrench. Bend two tabs of the locking web into the

locknut slots. Secure the nut in position by means of setscrews.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

250-LB GP BOMB AN–M57A1

	With Fin Assembly AN–M106A1	With Fin Assembly M126
Model	AN–M57A1	AN–M57A1.
Assembly Drawing No	82–0–60	82–0–162.
Length of Assembled Bomb (in.)	47.8	62.2.
Body Diameter (in.)	10.9	10.9.
Fin Span (in.)	14.90	15.0.
Weight of Explosive Charge (lb):		
Amatol 50–50	98.4	98.4.
TNT	127.0	127.0.
Tritonal	136.0	136.0.
Weight of Fin Assembly (lb)	8.0	25.0.
Weight of Assembled Bomb (lb):		
Loaded with Amatol 50–50	256.63	273.63.
Loaded with TNT	263.35	280.35.
Loaded with Tritonal	272.35	289.35.
Fin Locknut	M1 or Mk 2 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 1 or AN–M6A2	Mk 1 or AN–M6A2, and M13.
Adapter-Booster	M102A1	M102A1.
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M100A2, AN–M115, AN–M123A1, AN–M132.	M172, AN–M175, M181.

General Description

The 250-lb GP Bomb AN–M57A1 is a relatively thin cased bomb with an ogival nose, parallel side walls, and a tapered aft section. A box-type fin assembly is fastened to the aft end of the bomb with a fin locknut.

A nose and tail fuze are used for the majority of bombing operations. The base plug of the AN–M57A1 bomb is locked securely to the bomb body by two studs which extend from the base plug into the solidified explosive filler. A locking pin is passed through a hole in the adapter-booster into a groove in the base plug. These modifications were initiated to prevent removal of the base plug and adapter-booster to make the antiwithdrawal devices of long delay fuzes more effective.

Double suspension lugs are welded to the body 14 inches apart. A single lug is welded to the opposite side of the body at the center of gravity. Approximately 50 percent of the complete weight of the round is its explosive charge of Amatol 50-50, TNT, or Tritonal. Bombs filled with Amatol 50-50 include nose and tail surrounds of TNT, a body gasket, and Auxiliary Booster M104. These features are not included with other explosives.

Painting and Marking

Yellow bands on an olive drab body identify the high-explosive charge. Identifying nomenclature is stenciled on the nose, mid-sections, and aft portion of the bomb in black paint.

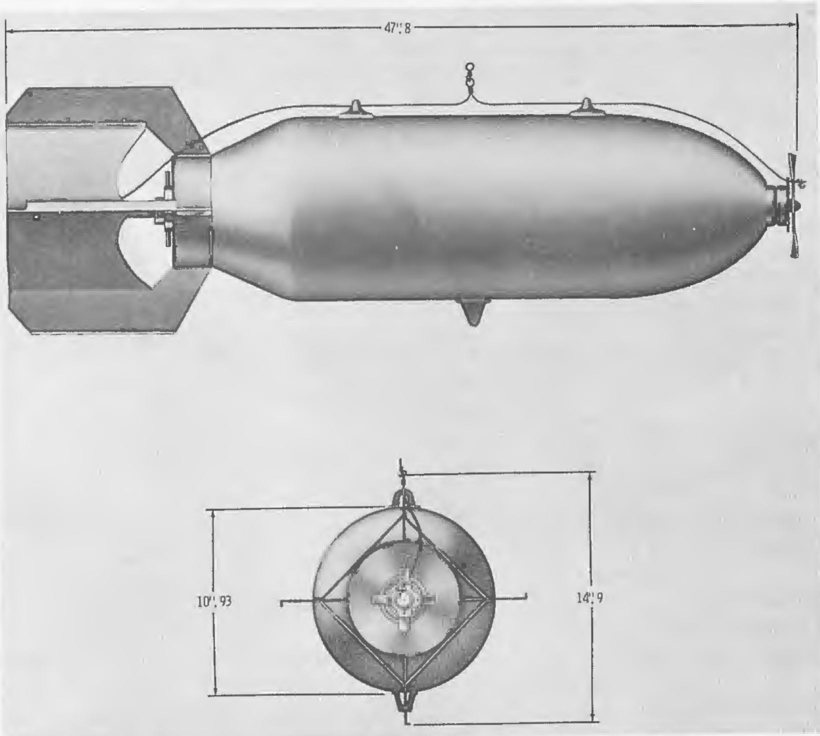


Figure 5-5.—250-lb GP Bomb AN-M57A1 with Fin Assembly AN-M106A1, Exterior View.

Differences Between Mods

The AN-M57A1 bomb contains antiwithdrawal pins in the base plug and an adapter-booster which can be locked to the base plug. The earlier model, AN-M57, does not have these features.

The AN-M57A1 bomb has also been modified with an alternate lug suspension system that allows the bomb to be suspended from all current Navy bomb racks, including multiple station bomb racks such as the A/A 37B-1 multiple bomb rack. Modification of the bomb entails removal of the center suspension lug and the addition of the alternate suspension system composed of special forged steel lugs (Federal Stock Number 1325-050-8360) that are fastened to the bomb with special banding straps. The straps are secured with flange-type seals. The bombs with this alternate suspension system are marked 250-lb GP Bomb AN-M57A1 (with banded lugs).

Before using a bomb with banded lugs, a visual inspection of the lugs, the strapping material, and the seals should be made. If the strapping material or the seals are loose, deformed, or broken, or if excessive corrosion is noted on these parts, the bomb should not be used nor should any attempt be made to repair it. Return the bomb to the issuing activity.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire and remove the fin locknut and discard it with its protector.
3. Remove the fin assembly and its attachments from the shipping crate. Position the fins so that they will clear the aircraft structure and the ground when installed. Fin Locknut M1 or Mk 2 Mod 0 should always be used in place of the regular fin locknut. Fin locknut setscrews should

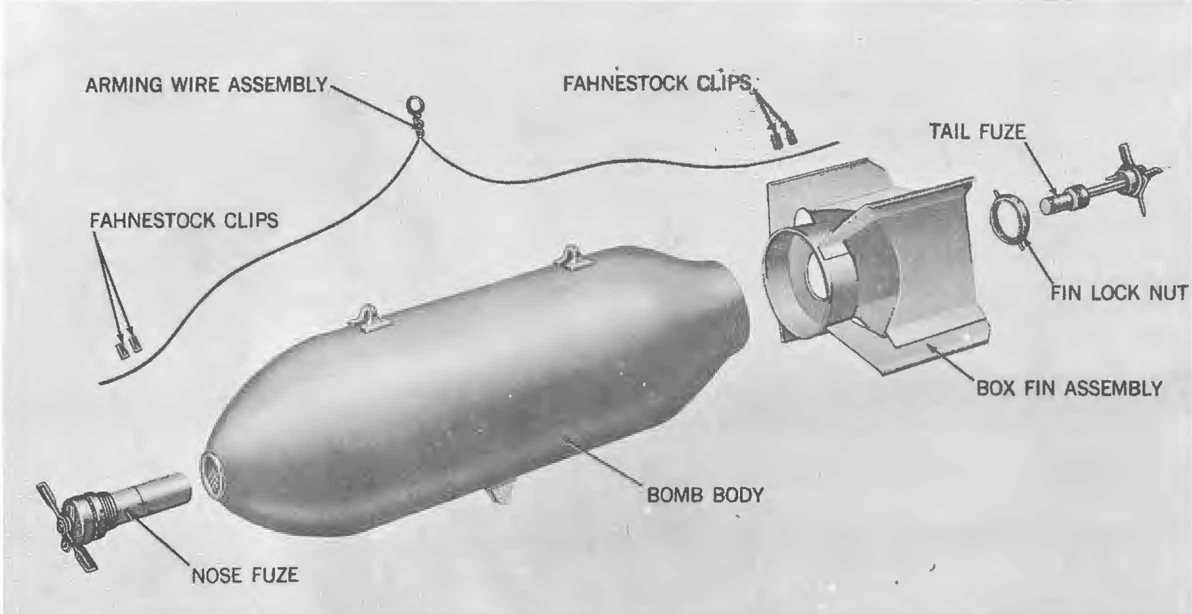


Figure 5–6.—250-lb GP Bomb AN–M57A1 with Fin Assembly AN–M106A1, Exploded View.

be tightened securely, in order to prevent rotation of the fin assembly.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: The AN–M57A1 bomb uses the AN–M123A1 and AN–M132 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with AN–M123A1 and AN–M132 fuzes cannot be relied upon when released "SAFE" because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once an AN–M123A1 or AN–M132 fuze is installed, no attempt should be made to remove the fuze or return the bomb to an airfield or aircraft carrier upon an incomplete mission. DO NOT TURN AN AN-M123A1 OR AN-M132 FUZE BACK AND FORTH TO ENGAGE THE THREADS; USE A SCREWING-IN MOTION ONLY. THE ANTIWITHDRAWAL DEVICE WILL CAUSE THE FUZE AND BOMB TO DETONATE IF THE FUZE IS ROTATED COUNTERCLOCKWISE WHILE IN THE ADAPTER-BOOSTER, EVEN BEFORE THE THREADS ARE ENGAGED.

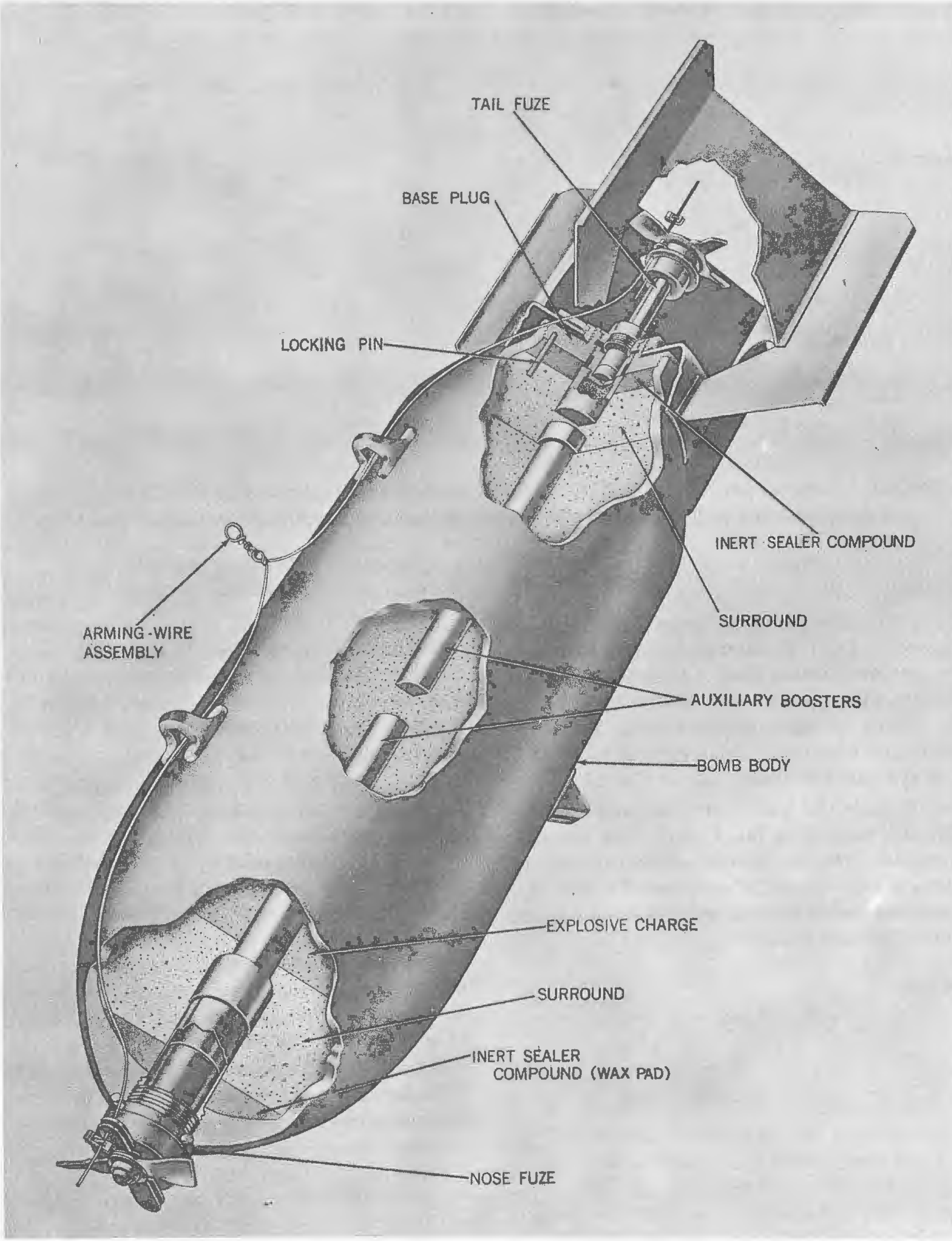


Figure 5–7.—250-lb GP Bomb AN–M57A1 with Fin Assembly AN–M106A1, Cutaway View.

250-LB GP BOMB AN–M57A1 WITH FIN ASSEMBLY M126

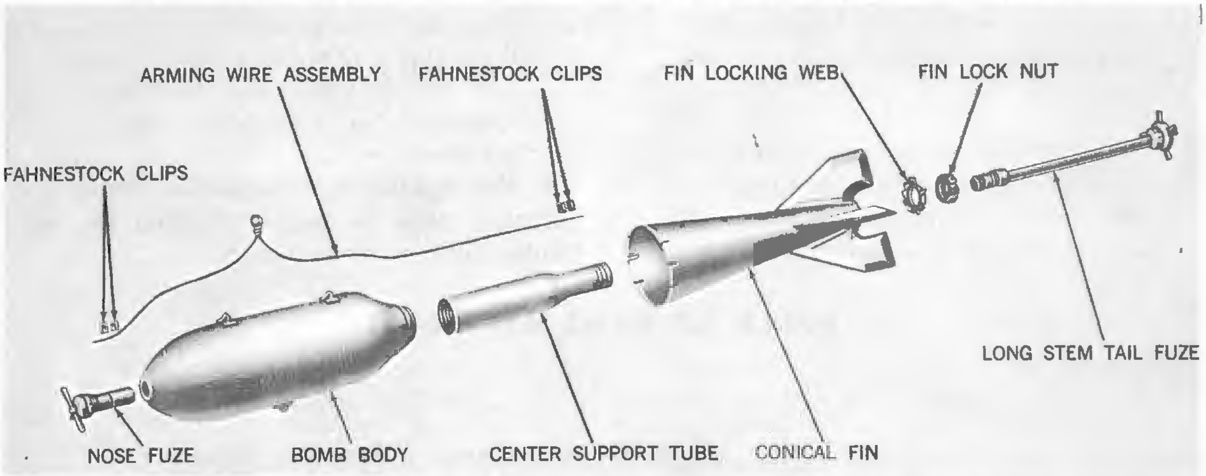


Figure 5–8.—250-lb GP Bomb AN–M57A1 with Fin Assembly M126, Exploded View.

General Description

When equipped with Fin Assembly M126, the 250-lb GP Bomb AN–M57A1 uses the standard AN–M57A1 bomb body. The fin assembly consists of an elongated fin cone with four integral fins spaced at equal distances on the cone surface. A support tube runs through the center of the cone and the fin assembly is secured to the bomb body by means of this support tube, a locking web, and a locknut. The conical fin lengthens the overall dimension of the 250-lb GP Bomb AN–M57A1. This necessitates the use of a long stem tail fuze so that the arming vane can be located effectively in the airstream. The M126 conical fin assembly improves aerodynamic performance and accuracy in bombing.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire. Remove the fin locknut and discard it with its protector.
3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat) and tighten the tube with a wrench. Tighten the setscrews in the support tube. Place the fin cone over the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so that they will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the fins of the fin assembly. Secure the conical fin asembly to the support tube by threading on the special locknut. Tighten the locknut with the special notched wrench. Bend two tabs of the locking web into the locknut slots. Secure the nut in position by means of setscrews.
4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.
5. Remove the required number of fuzes and arming-wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

500-LB GP BOMB AN–M64A1

	WITH FIN ASSEMBLY AN–M109A1	WITH FIN ASSEMBLY M128A1
Model	AN–M64A1	AN–M64A1.
Assembly Drawing No	82–0–74	82–0–160.
Length of Assembled Bomb (in.)	59.16	72.10.
Body Diameter (in.)	14.18	14.18.
Fin Span (in.)	18.94	19.56.
Weight of Explosive Charge (lb):		
Amatol 50–50	257.20	257.20.
TNT	265.70	265.70.
Composition B	272.40	272.40.
Tritonal	283.0	283.0.
Weight of Fin Assembly (lb)	18.6	41.0.
Weight of Assembled Bomb (lb):		
Loaded with Amatol 50–50	541.87	564.27.
Loaded with TNT	548.69	571.09.
Loaded with Composition B	555.39	577.79.
Loaded with Tritonal	560.99	585.78.
Fin Locknut	M2 or Mk 3 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 1 or AN–M6A2	Mk 1 or AN–M6A2, and M13.
Adapter-Booster	M115A1	M115A1.
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M101A2, AN–Mk 230, AN–M116, AN–M124A1, AN–M133.	M172, AN–M175, M181.

General Description

The 500-lb GP Bomb AN–M64A1 has a cylindrical metal casing, an ogival nose, and a tapered aft end. A box-type fin assembly is secured to the aft end of the bomb with a fin locknut.

Both a nose and a tail fuze are usually used for the majority of operations with this bomb. Unlike the smaller bombs of the GP series, the AN–M64A1 bomb has an adapter-booster capable of receiving a tail fuze with a two-inch thread (such as the AN–Mk 230 hydrostatic tail fuze) instead of the usual 1½ inch thread. A fuze adapter is used on the inside of the adapter-booster to convert the seat to accommodate fuzes with the smaller 1½-inch threads.

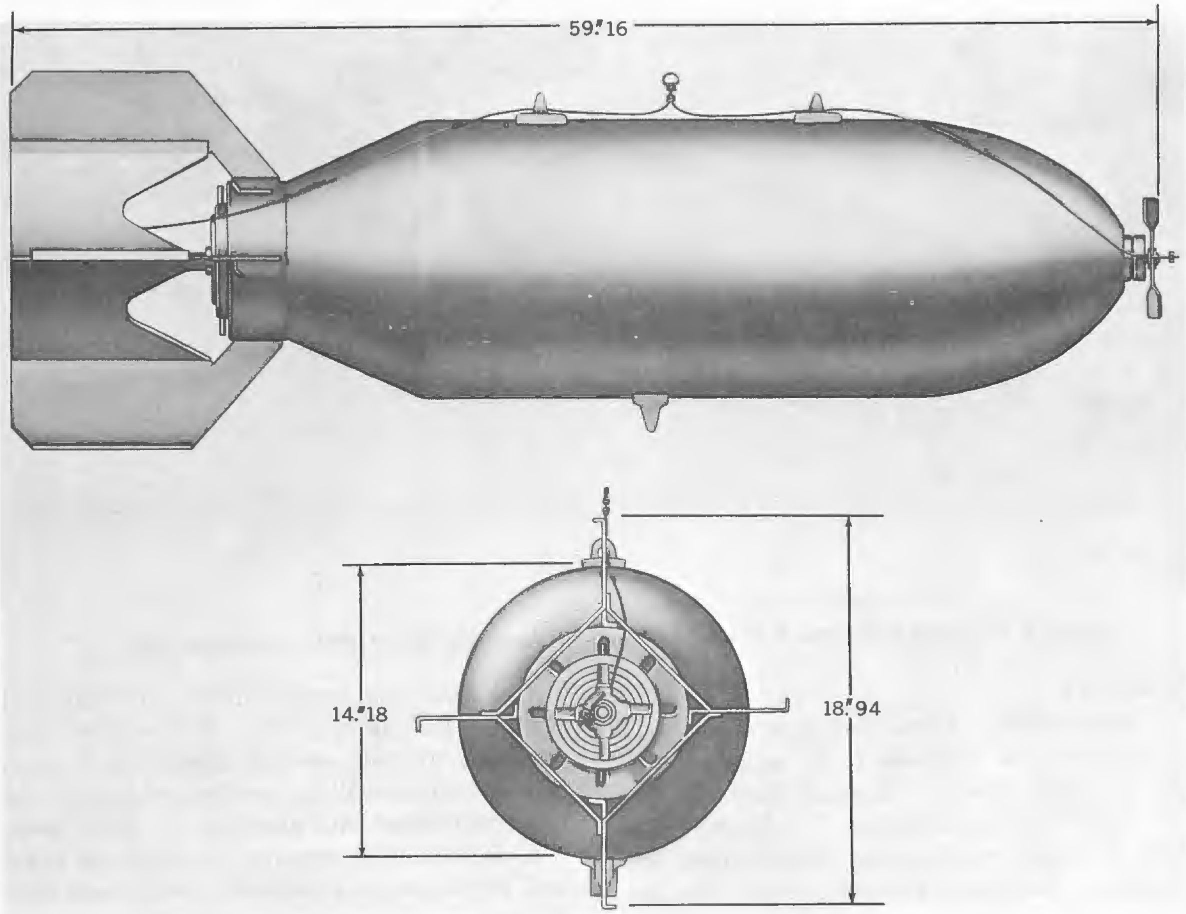


Figure 5-9.—500-lb GP Bomb AN–M64A1 with Fin Assembly AN–M109A1, Exterior View.

Special studs attached to the base plug are imbedded in the solidified explosive filler, locking the base plug to the bomb body. The adapter-booster and fuze adapter are locked in the base plug by a locking pin that extends from the adapter-booster to a groove in the base plug.

Approximately 50 percent of the complete weight of the bomb is an explosive filler of Amatol 50-50, TNT, Composition B, or Tritonal. Bombs filled with Amatol 50-50, such as that illustrated, include nose and tail surrounds of TNT, a body gasket, and an Auxiliary Booster M104. These features are not included with other explosives.

Double suspension lugs are welded 14 inches apart and a single suspension lug is welded to the opposite side of the bomb body.

Painting and Marking

The bomb is painted olive drab; yellow color bands and black stenciled nomenclature identify the bomb and its high-explosive charge.

Differences Among Mods

The AN–M64A1 bomb contains antiwithdrawal pins in the base plug and an adapter-booster and fuze adapter that can be locked in place. The earlier AN–M64 bomb lacks these antiwithdrawal features.

The AN–M43 bomb, an earlier model of the 500-lb GP bomb, is similar to the AN–M64, but has an Adapter-Booster M102 assembled which will accept only fuzes with a 1½-inch diameter thread.

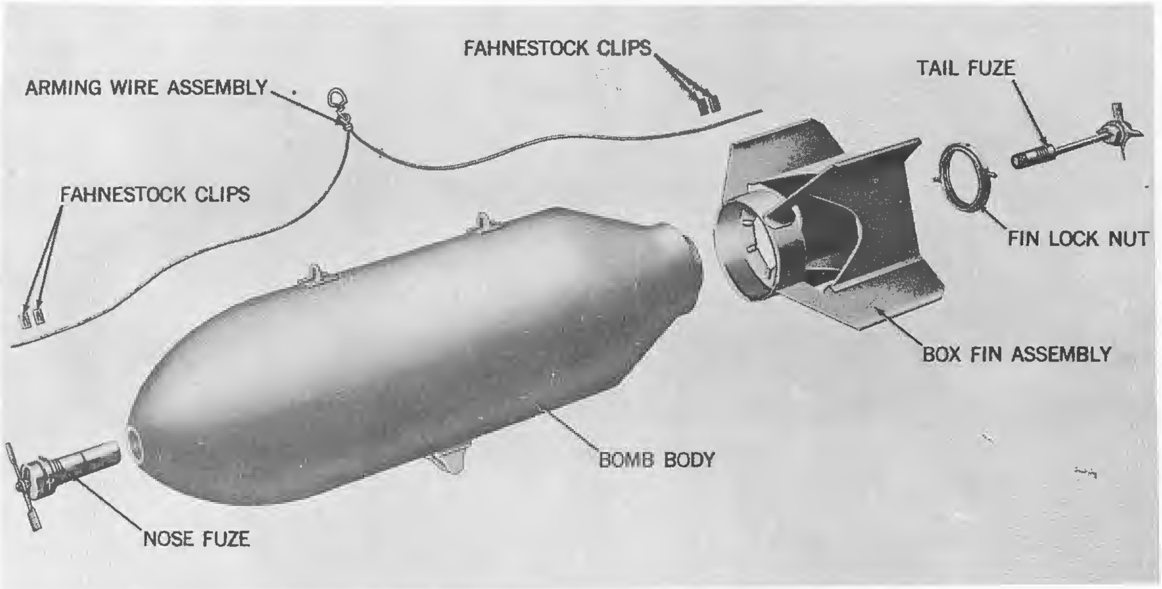


Figure 5–10.—500-lb GP Bomb AN–M64A1 with Fin Assembly AN–M109A1, Exploded View.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Position the fins so that they will clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten it with a wrench. Fin Locknut M2 or Mk 3 Mod 0 should always be used in place of the regular fin locknut. Fin locknut setscrews should be tightened securely in order to prevent rotation of the fin assembly.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming-wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

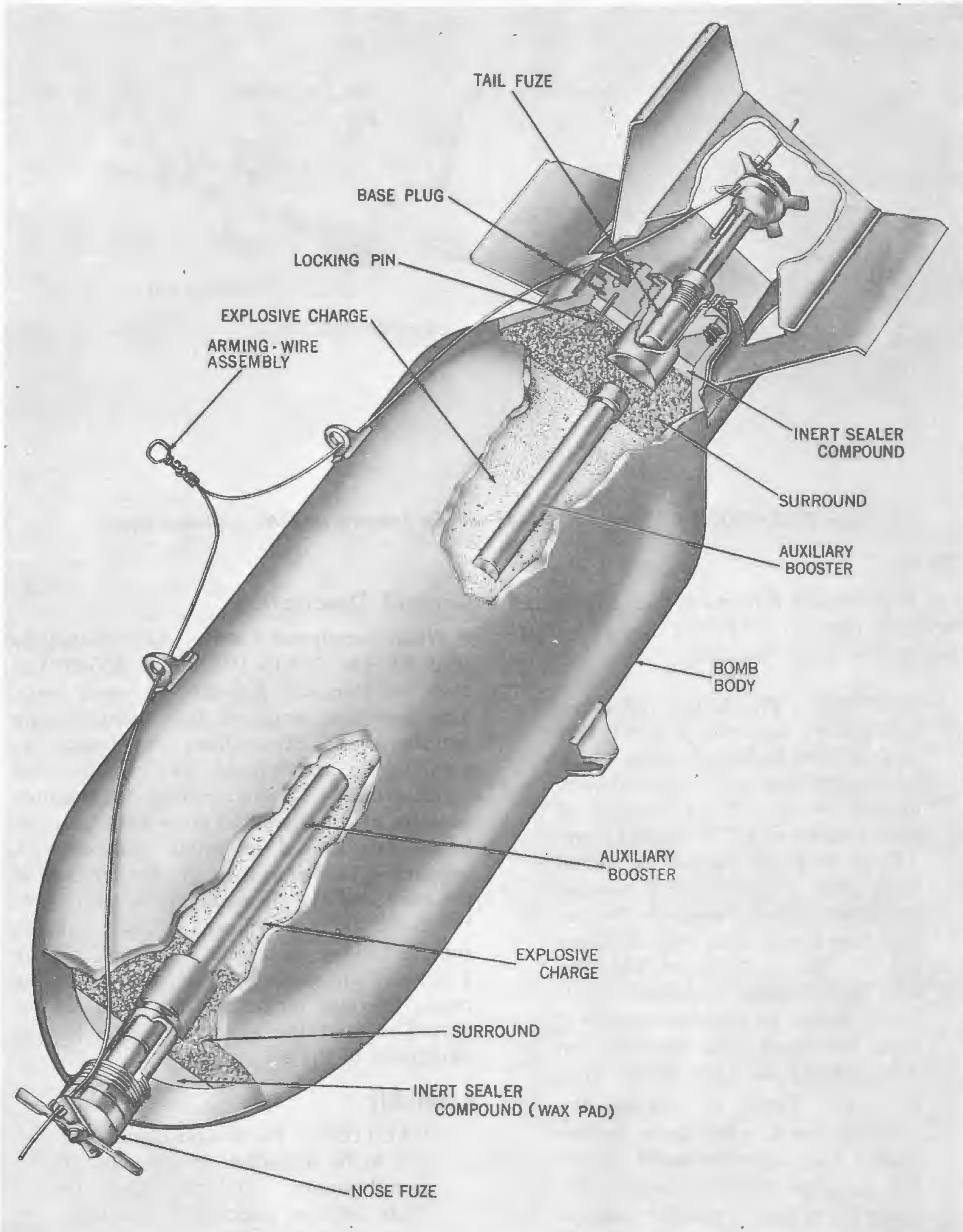


Figure 5–11.—500-lb GP Bomb AN–M64A1 with Fin Assembly AN–M109A1, Cutaway View.

500-LB GP BOMB AN–M64A1 WITH FIN ASSEMBLY M128A1

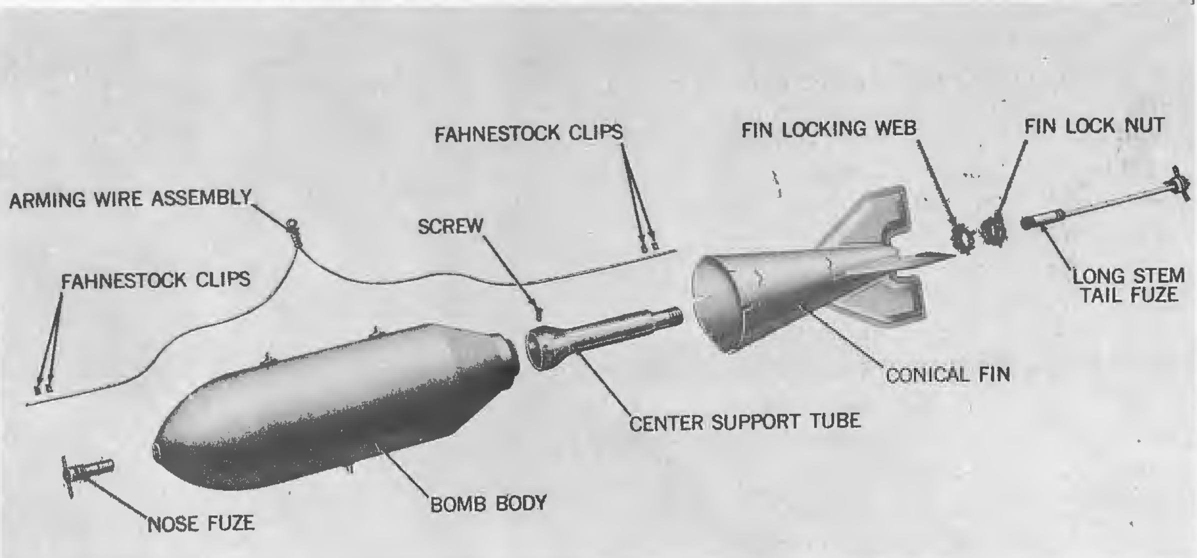


Figure 5–12.—500-lb GP Bomb AN–M64A1 with Fin Assembly M128A1, Exploded View.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

CAUTION: The 500-lb GP Bomb AN–M64A1 uses the AN–M124A1 and the AN–M133 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with AN–M124A1 and AN–M133 fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once an AN–M124A1 or AN–M133 fuze is installed, no attempt should be made to remove it from the bomb. Do not turn an AN–M124A1 or AN–M133 fuze back and forth to engage the threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

General Description

When equipped with Fin Assembly M128A1, the 500-lb GP Bomb AN–M64A1 uses the standard AN–M64A1 bomb body. The elongated cone of the assembled fin lengthens and streamlines the bomb, increasing its aerodynamic performance and accuracy. The M128A1 conical fin assembly consists of an elongated cone with four integral fins spaced at equal distances. A support tube runs through the center of the cone and the fin assembly is secured to the bomb body by means of this support tube, a locking web, and a locknut. When a conical fin assembly is installed on the bomb, the new long-stem tail fuzes are required so that the arming vane is located effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs.

Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire. Remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat) and tighten the tube with a wrench. Tighten the setscrews in the support tube. Place the fin cone over the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so that they will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the fins of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut. Tighten the locknut with the special notched wrench. Bend two tabs of the locking web into the locknut slots. Secure the nut in position by means of setscrews.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

1000-LB GP BOMB AN–M65A1

	With Fin Assembly AN–M113A1	With Fin Assembly M129
Model	AN–M65A1	AN–M65A1.
Assembly Drawing No	341696	341696.
Fin Assembly Drawing No	82–3–363	82–3–751.
Length of Assembled Bomb (in.)	69.5	91.1.
Body Diameter (in.)	18.8	18.8.
Fin Span (in.)	25.4	26.2.
Weight of Explosive Charge (lb):		
TNT	555.0	555.0.
Tritonal	595.0	595.0.
Weight of Fin Assembly (lb)	32.1	73.0.
Weight of Assembled Bomb (lb):		
Loaded with TNT	1064.0	1165.2.
Loaded with Tritonal	1104.0	1205.21.
Fin Locknut	M2 or Mk 3 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 1, AN–M6A2, or Mk 2.	Mk 1 or AN–M6A2, and M13.
Adapter-Booster	M115A1	M115A1.
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M102A2, AN–Mk 230, Mods 4, 5, 6; AN–M117, M125A1, AN–M134.	M176 (T744), M182 (T782), M184(T739).

General Description

The 1000-lb GP Bomb AN–M65A1 has a cylindrical metal casing, an ogival nose, and a tapered aft end. A box-type fin assembly is secured to the aft end of the bomb with a fin locknut.

Both a nose and a tail fuze are generally used for the majority of operations with this bomb. The AN–M65A1 uses an adapter-booster that will accommodate tail fuzes with 2-inch diameter threads. A fuze adapter is used on the inside of the adapter-booster to convert the seat to accommodate fuzes with the smaller 1½-inch threads.

Special studs attached to the base plug and imbedded in the solidified explosive filler prevent removal of the base plug. The adapter-booster and fuze adapter are locked to the base plug with a locking pin that extends from the adapter-booster to a groove in the base plug.

Approximately 50 percent of the complete weight of the bomb is explosive filler. Double suspension lugs are welded 14 inches apart and a single suspension lug is welded to the opposite side of the bomb case.

Painting and Marking

The bomb is painted olive drab; yellow color bands and black stenciled nomenclature identify the bomb and its high-explosive charge.

Differences Between Mods

The AN–M65A1 bomb contains antiwithdrawal pins in the base plug and an adapter-

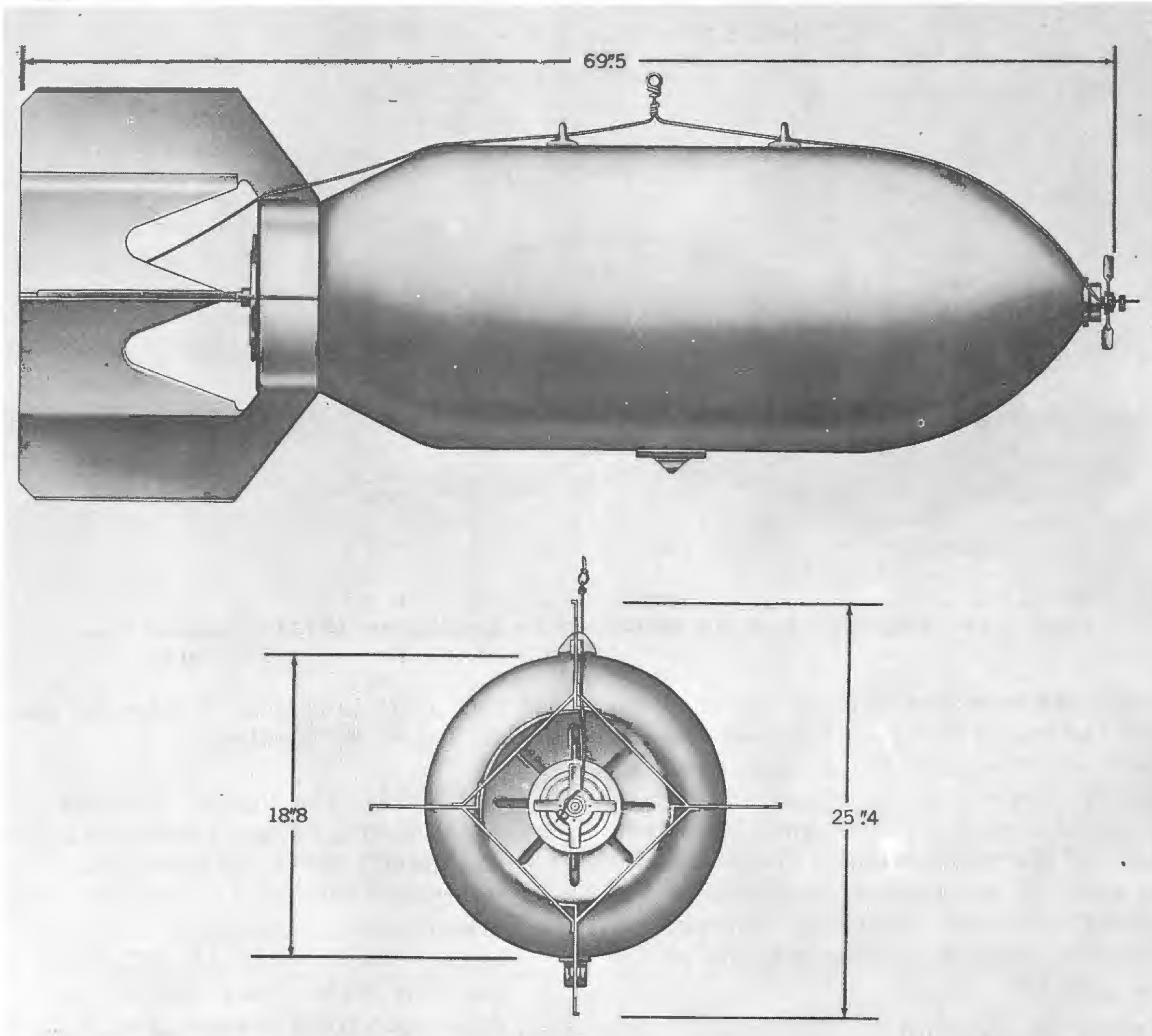


Figure 5–13.—1000-lb GP Bomb AN–M65A1 with Fin Assembly AN–M113A1, Exterior View.

booster and fuze adapter that can be locked in place. The earlier AN–M65 bomb lacks these antiwithdrawal features.

Released weight of the AN–M65 is greater than that of the AN–M65A1, the AN–M65 having an explosive charge of 53 percent as compared to the 50 percent ratio of the AN–M65A1 bomb.

"Old" Series Bombs

The AN–M44 bomb, an earlier model of the 1000-lb GP bomb, is similar to the AN–M65 but has an Adapter-Booster M102 assembled which will accept only fuzes with a 1½-inch diameter thread.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire and remove the fin locknut and discard it with its protector.
3. Remove the fin assembly and its at-

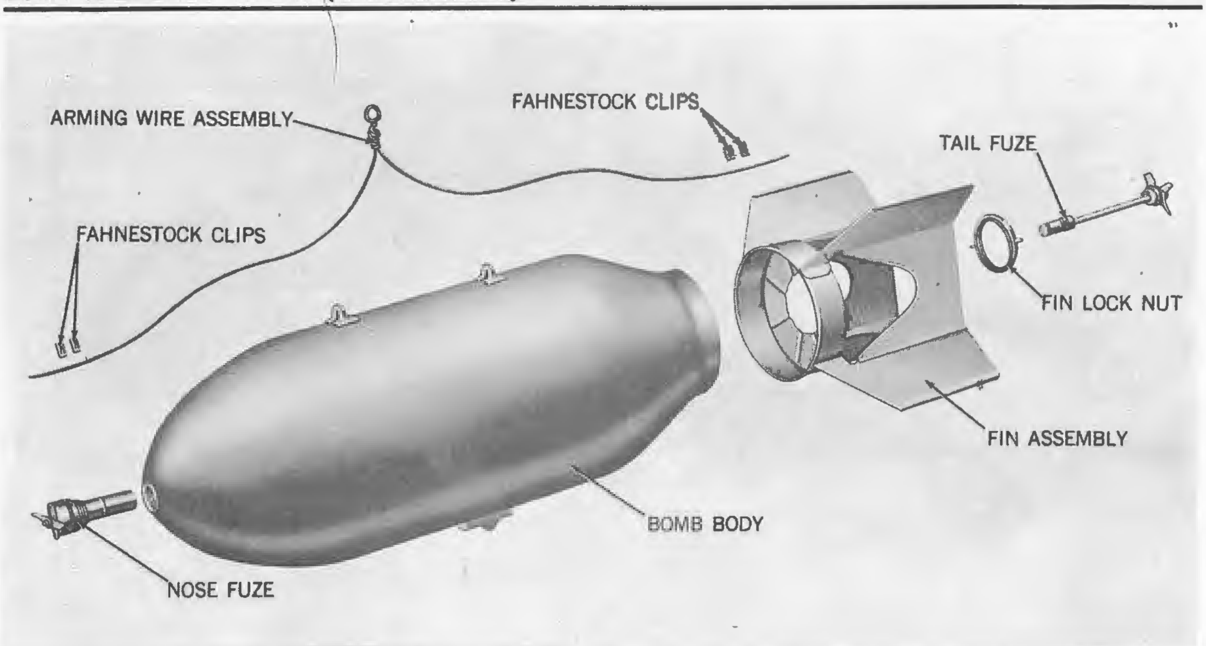


Figure 5-14.—1000-lb GP Bomb AN-M65A1 with Fin Assembly AN-M113A1, Exploded View.

tachments from the shipping crate. Position the fins so that they will clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten it with a wrench. Fin Locknut M2 or Fin Locknut Mk 3 Mod 0 should always be used in place of the regular fin locknut. Fin locknut setscrews should be tightened securely in order to prevent rotation of the fin assembly.

> CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming-wire assemblies from their containers and examine them carefully for serviceability.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

> CAUTION: The 1000-lb GP Bomb AN-M65A1 uses the AN-M125A1 and the AN-M134 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with AN-M125A1 and AN-M134 fuzes cannot be relied upon when released "SAFE" because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once an AN-M125A1 or AN-M134 fuze is installed, no attempt should be made to remove it from the bomb. DO NOT TURN AN AN-M125A1 OR AN-M134 FUZE BACK AND FORTH TO ENGAGE THE THREADS; USE A SCREWING-IN MOTION ONLY. THE ANTI-WITHDRAWAL DEVICE WILL CAUSE THE FUZE AND BOMB TO DETONATE IF THE FUZE IS ROTATED COUNTERCLOCKWISE WHILE IN THE ADAPTER BOOSTER, EVEN BEFORE THE THREADS ARE ENGAGED.

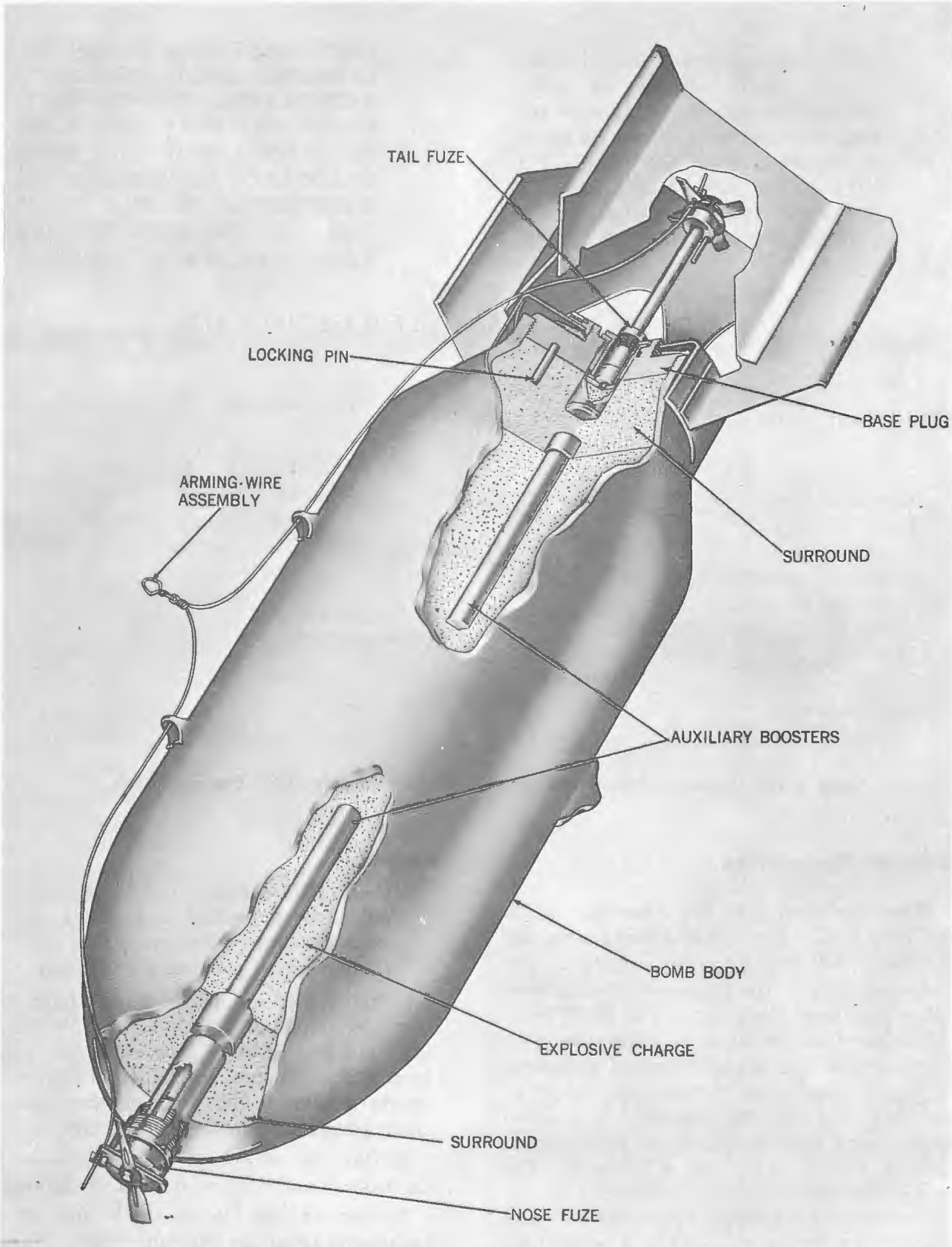


Figure 5–15.—1000-lb GP Bomb AN–M65A1 with Fin Assembly AN–M113A1, Cutaway View.

in the fuze may break upon impact of the bomb. Once an AN-M125A1 or AN-M134 fuze is installed, no attempt should be made to remove it from the bomb. DO NOT TURN AN AN-M125A1 OR AN-M134 FUZE BACK AND FORTH TO ENGAGE THE THREADS; USE A SCREWING-IN MOTION ONLY. THE ANTI-WITHDRAWAL DEVICE WILL CAUSE THE FUZE AND BOMB TO DETONATE IF THE FUZE IS ROTATED COUNTERCLOCKWISE WHILE IN THE ADAPTER BOOSTER, EVEN BEFORE THE THREADS ARE ENGAGED.

1000-LB GP BOMB AN-M65A1 WITH FIN ASSEMBLY M129

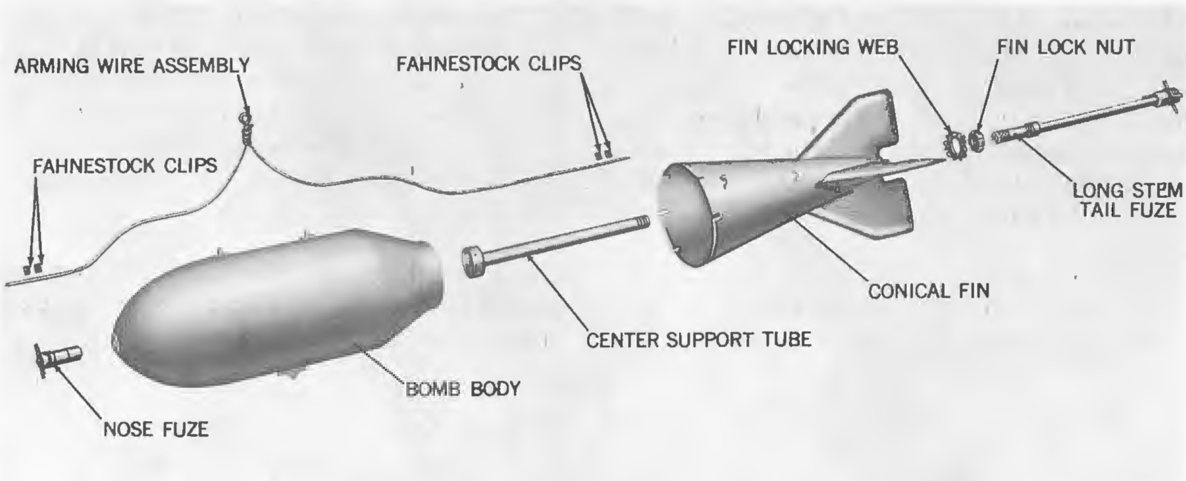


Figure 5-16.—1000-lb GP Bomb AN-M65A1 with Fin Assembly M129, Exploded View.

General Description

When equipped with Fin Assembly M129, the 1000-lb GP Bomb AN-M65A1 uses the standard AN-M65A1 bomb body. The elongated cone of the fin assembly lengthens and streamlines the bomb. The M129 conical fin assembly consists of a fin cone with four integral fins spaced at equal distances. A support tube runs through the center of the cone and the fin assembly is secured to the bomb body by means of this support tube, a locking web, and a locknut. The conical fin assembly was developed to increase the aerodynamic performance and accuracy of the bomb. When a conical fin assembly is installed on the AN-M65A1 bomb, the new long-stem tail fuzes are required so that the arming vane can be located effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire. Remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat) and tighten the tube with a wrench. Tighten the setscrew in the support tube. Place the fin cone over

the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so that they will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the fin of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut. Tighten the locknut with the special notched wrench. Bend two tabs of the locking web into locknut slots. Sesure the nut in position by means of setscrews.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by midhandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

2000-LB GP BOMB AN–M66A2

	With Fin Assembly AN–M116A1	With Fin Assembly M130
Model	AN–M66A2	AN–M66A2.
Assembly Drawing No	82–0–76	82–0–193.
Length of Assembled Bomb (in.)	92.63	116.80.
Body Diameter (in.)	23.29	23.29.
Fin Span (lb)	31.6	32.32.
Weight of Explosive Charge (lb):		
TNT	1097.7	1097.7.
Tritonal	1181.0	1181.0.
Weight of Fin Assembly (lb)	54.4	135.0.
Weight of Assembled Bomb (lb):		
Loaded with TNT	2113.2	2194.5.
Loaded with Tritonal	2196.5	2277.5.
Fin Locknut	M3 or Mk 4 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming Wire Assembly	Mk 1, AN–M6A2, or AN–M8A1 with Mk 1 Extension.	Mk 1 or AN–M6A2, and M16.
Adapter-Booster	M115A1	M115A1.
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M102A2, AN–Mk 230 Mods 4, 5, 6; AN–M117, AN–M125A1, AN–M134.	AN–M177, M183, AN–M185.

General Description

The 2000-lb GP Bomb AN–M66A2 has a cylindrical metal case, an ogival nose, and a tapered aft end. A box-type fin assembly is secured to the aft end of the bomb with a fin locknut.

The bomb accommodates a nose and a tail fuze, both of which are used for the majority of bombing operations. The bomb has an adapter-booster capable of receiving tail fuzes with a 2-inch thread diameter. A fuze adapter may be inserted into the adapter-booster to accommodate smaller fuzes with 1½-inch diameter threads.

Special studs attached to the base plug and imbedded in the solidified explosive filler prevent removal of the base plug. The adapter-booster (and fuze adapter, when used) are locked to the base plug with a locking pin that extends from the adapter-booster to a groove in the base plug.

Approximately 50 percent of the complete weight of the bomb consists of explosive filler. Two suspension lugs are welded to the bomb case with 30 inches between centers. A single suspension lug is welded to the case on the opposite side at the center of gravity.

Painting and Marking

The bomb is painted olive drab; yellow color bands and black stenciled nomenclature identify the bomb and its high-explosive charge.

Differences Among Mods

The AN–M66A2 and AN–M66A1 bombs

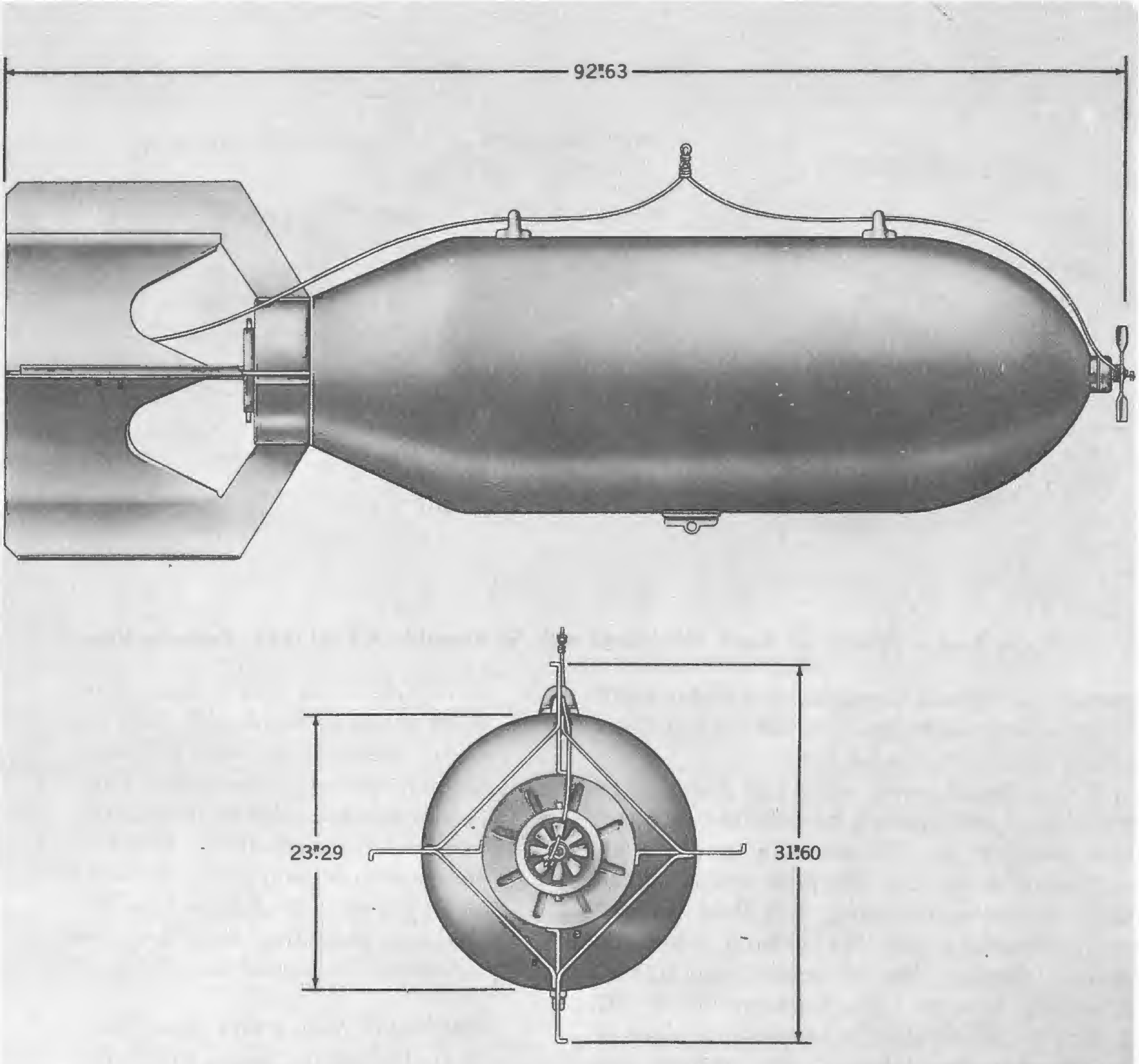


Figure 5–17.—2000-lb GP Bomb AN–M66A2 with Fin Assembly AN–M116A1, Exterior View.

contain antiwithdrawal pins in the base plug and an adapter-booster and fuze adapter that can be locked in place. The earlier AN–M66 bomb lacks these features.

The AN-M66A2 differs further from the AN–M66A1 and AN–M66 bombs by having a thicker and rounder nose. In the AN–M66A2 bomb, the ratio of explosive charge to total weight is approximately 50 percent as compared to an average weight ratio of 53 percent in the other two bombs.

"Old" Series Bombs

The AN–M34 bomb, an earlier model of the 2000-lb GP Bomb, is similar to the AN–M66 but has an Adapter-Booster M102 which will accept only those fuzes with a 1½-inch diameter thread.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs.

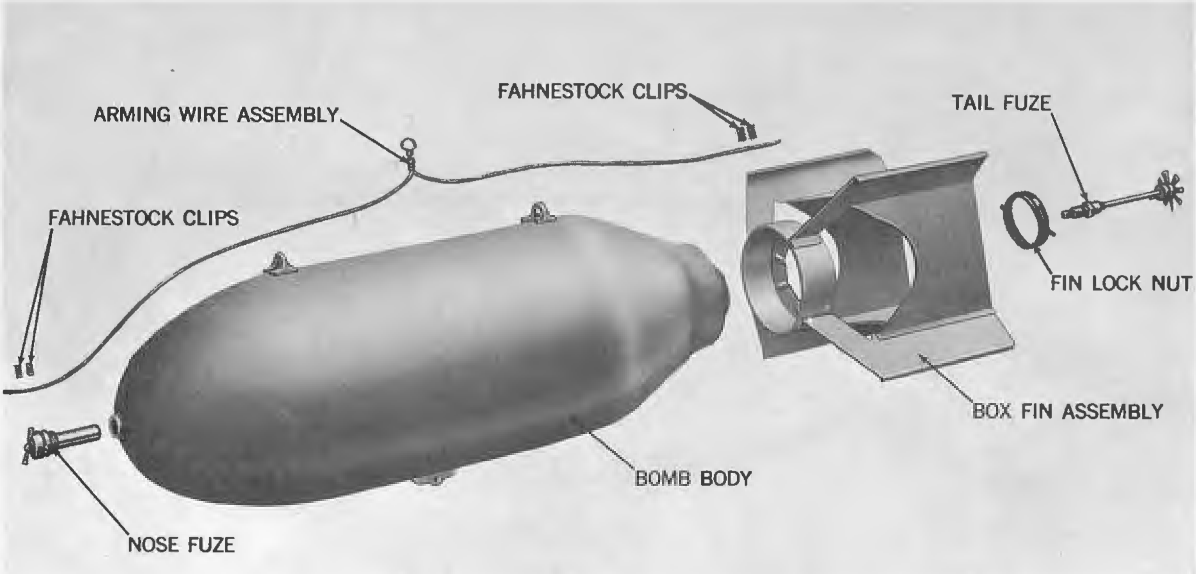


Figure 5-18.—2000-lb GP Bomb AN-M66A2 with Fin Assembly AN-M116A1, Exploded View.

Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Cut the shipping wire and remove the fin locknut and discard it with its protector.

3. Remove the fin assembly and its attachments from the shipping crate. Position the fins so that they will clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten it with a wrench. Fin Locknut M3 or Mk 4 Mod 0 should always be used in place of the regular fin locknut. Fin locknut setscrews should be tightened securely in order to prevent rotation of the fin assembly.

> CAUTION: Do not use a fin assembly if it cannot be secured properly to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

> CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

> CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

> CAUTION: The 2000-lb GP Bomb AN-M66A2 uses the AN-M125A1 and the AN-M134 tail fuzes which incorporate the use of an antiwithdrawal device. Nondetonation of bombs fuzed with AN-M125A1 and

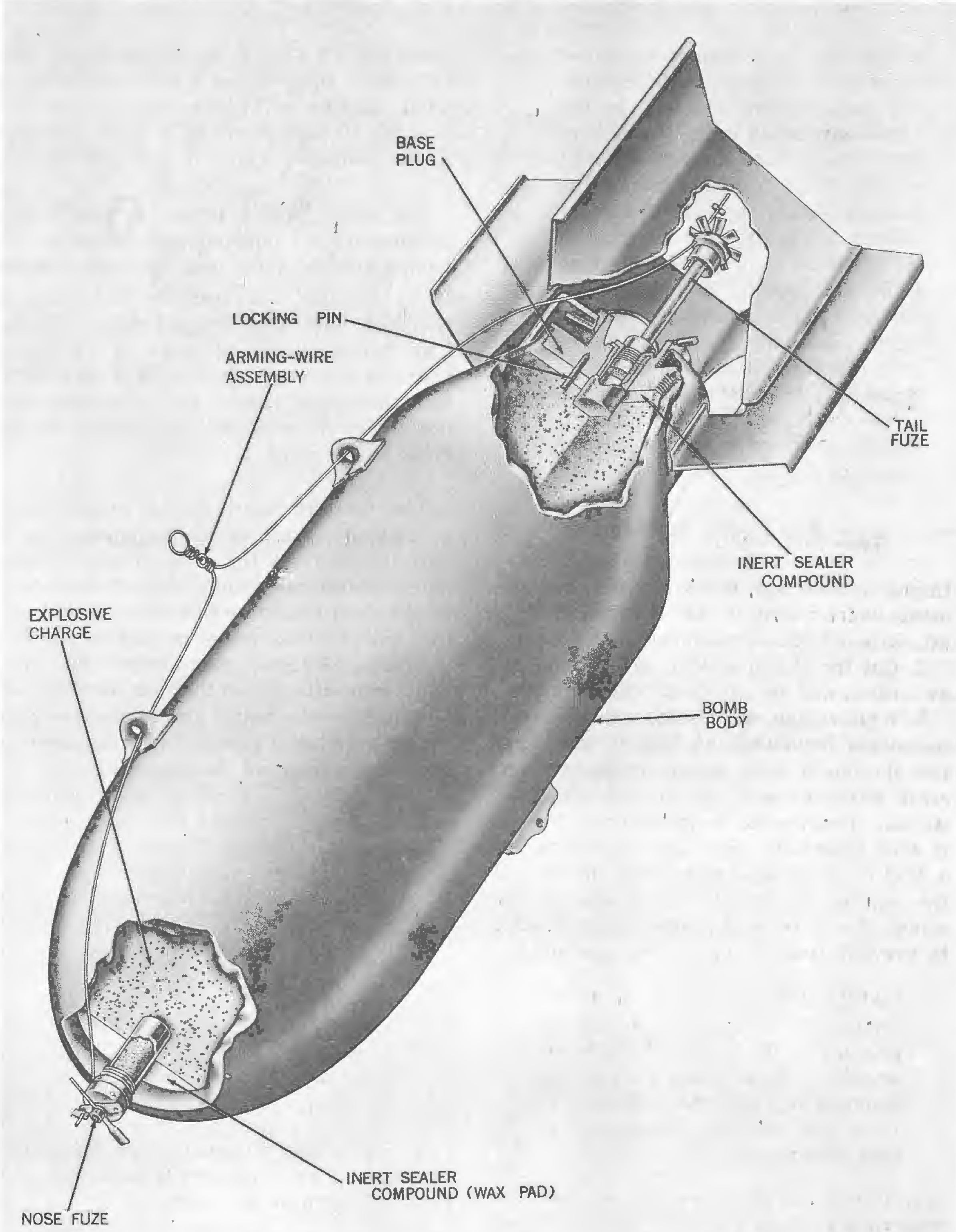


Figure 5–19.—2000-lb GP Bomb AN–M66A2 with Fin Assembly AN–M116A1, Cutaway View.

AN–M134 fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once an AN–M125A1 or AN–M134 fuze is installed, no attempt should be made to remove it from the bomb. Do not turn an AN–M125A1 or AN–M134 fuze back and forth to engage the threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Suspension Band Mk 34 Mod 0

Mk 34 Mod 0 Suspension Band, dwg 561640, was designed to provide 14-inch suspension for 2000-lb GP Bomb AN–M66 and Mods, which are equipped with suspension lugs 30 inches apart. This band is used primarily on aircraft carrying the 2000-lb GP bomb externally. Either two Suspension Bands Mk 34 Mod 0 (one suspension lug on each band) or Suspension Band Mk 10 Mod 1 (a double band) may be used to suspend the 2000-lb GP bomb in bomb bays or on 14-inch racks or shackles. The Mk 10 band is not to be used on bombs on the centerline station of AD type aircraft.

The Mk 34 band is lighter in weight (approximately 13 pounds) and presents less frontal area than previous suspension bands. It is suitable for use on AD aircraft equipped with the Douglas bomb ejector. Two bands should be oriented 14 inches apart on the bomb with respect to the 30-inch suspension lugs so that these lugs will not interfere with the installation of the bomb on the plane.

The forward band should be positioned so that the center of its suspension lug is 26.5 inches from the nose of the unfuzed bomb. After positioning, each of the 5 bolts on the band should be tightened, hand tight, then gradually tightened successively with a wrench to 28 foot-pounds torque. The after band is positioned so that the two suspension lugs on the bands are 14 inches apart, center-to-center. Tighten the after band in the same manner as the forward band.

2000-LB GP BOMB AN–M66A2 WITH FIN ASSEMBLY M130

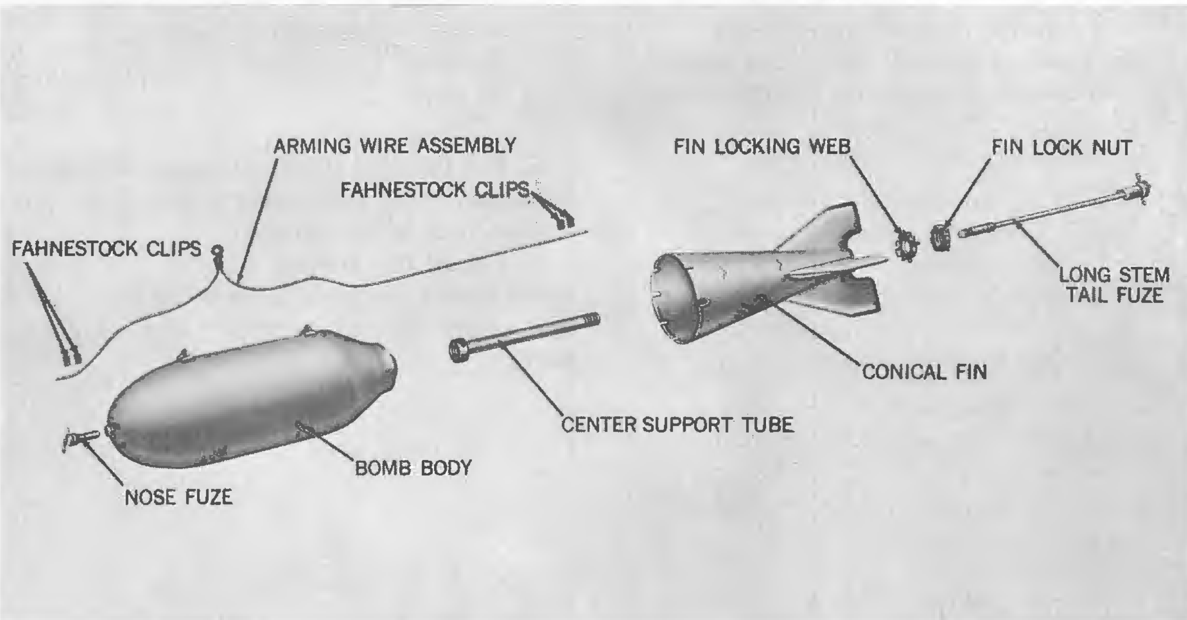


Figure 5-20.—2000-lb GP Bomb AN–M66A2 with Fin Assembly M130, Exploded View.

General Description

When equipped with Fin Assembly M130, the 2000-lb GP Bomb AN–M66A2 uses the standard AN–M66A2 bomb body. The elongated fin assembly lengthens and streamlines the bomb, improving its aerodynamic performance and accuracy. When the bomb is installed with a conical fin assembly, the new long-stem tail fuzes are required so that the arming vane can be located effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire. Remove the fin locknut and discard it with its protector.
3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat) and tighten the tube with a wrench. Tighten the setscrews in the support tube. Place the fin cone over the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so that they will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the fins of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut. Tighten the locknut with the special notched wrench. Bend two tabs of the locking web into the locknut slots. Secure the nut in position by means of setscrews.
4. Install the bomb on the aircraft and securely lock it in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the bomb rack.
5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

7. Install the arming wire so that two to three inches protrude beyond the fuze vanes, and attach the safety clips. Cut off excess wire.

250-LB LOW-DRAG BOMB (GP) Mk 81 Mod 1

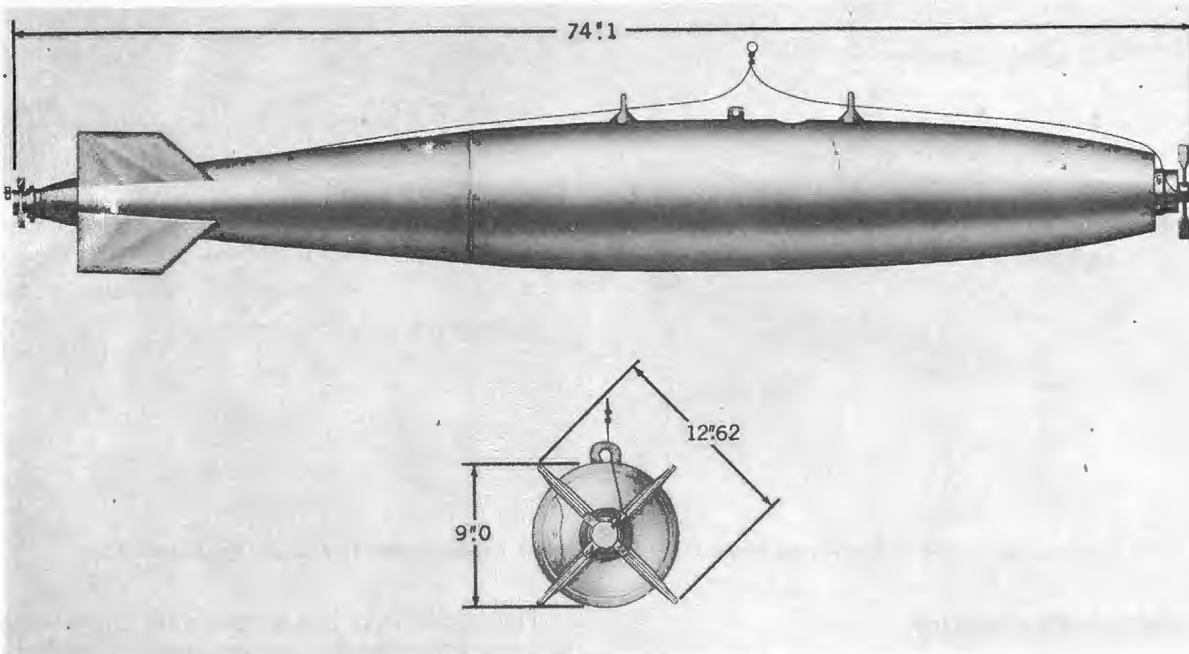


Figure 5-21.—250-lb Low-Drag Bomb (GP) Mk 81 Mod 1 (Mechanically Fuzed), Exterior View.

Mark	81
Mod	1
General Arrangement	1366064
List of Drawings	165790
Length of Assembled Bomb (in.)	74.1
Body Diameter (in.)	9.0
Fin Span (in.)	12.62
Weight of Explosive Charge (lb)	100.0
Weight of Assembled Bomb (lb)	260.0
Arming-Wire Assembly	Mk 1 or AN-M6A2 (for nose fuze) and M13 (for tail fuze)
Cable Assembly (for electric fuzing)	M71 (T26)
Adapter-Booster	
Nose	T45E1
Tail	T46E4
Nose Fuze	AN-M103A1, AN-M139A1, AN-M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN-M168 (VT), AN-M166 (VT), M193 (VT-T768 electric), M910 (VT-T750 with T49 drive), M990 (T905) (electric), M904 (T709)
Tail Fuze	T750 (VT) with T49 drive, M913 (VT) (T768 electric), XB-113 (electric), M905 (T771 with T49 drive), M906 (T778 with T49 drive), M990 (T905 electric), M194 (T791)

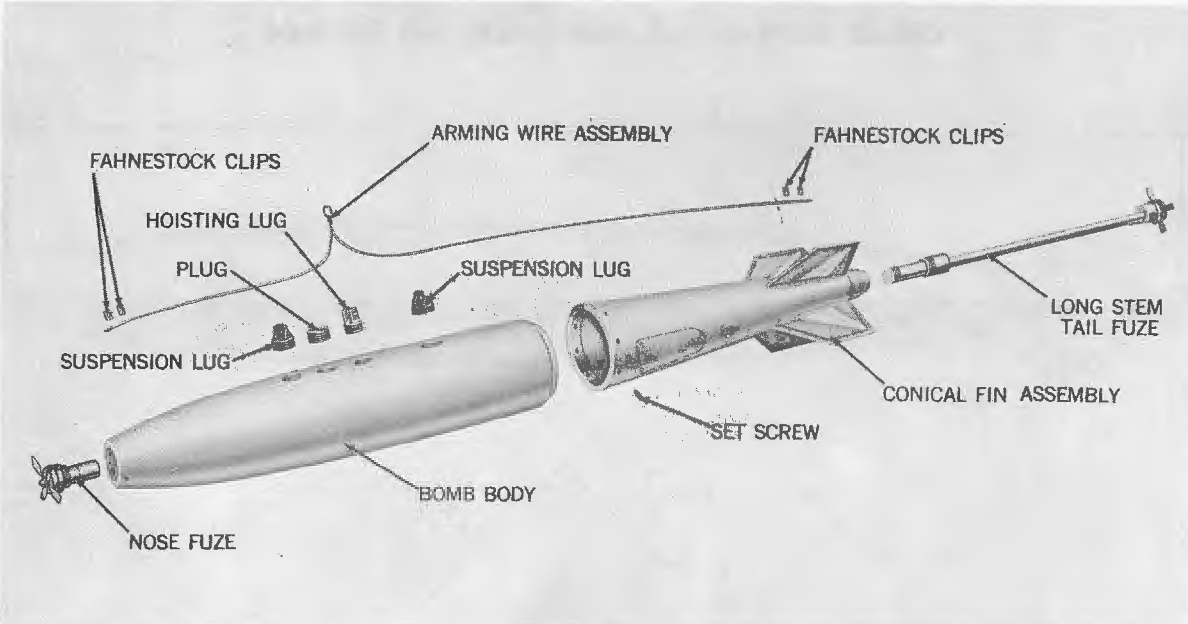


Figure 5-22.—250-lb Low-Drag Bomb (GP) Mk 81 Mod 1 (Mechanically Fuzed), Exploded View.

General Description

The 250-lb LD Bomb Mk 81 Mod 1 has a slender body with a long pointed nose. A conical type fin is attached to the aft end of the bomb body by eight setscrews.

The bomb uses VT, mechanical, or electrical fuzes. Mechanical and VT fuzes require the installation of adapter-boosters to provide fuze seats of smaller diameters. Two conduits for the electric fuze cable harness connect the nose and tail fuze cavities with the charging receptacle cavity between the lugs of the outer surface of the bomb case. When electric fuzes are not used, a plug is threaded into the charging receptacle cavity.

When fuzes are not installed, the bomb body has a nose fuze plug, a base fuze plug, and a support cup in the nose fuze cavity. When the bomb is mechanically fuzed, these three parts are removed and the adapter-boosters and fuzes are inserted. The nose fuze plug and base fuze plug are replaced after electric fuzes have been installed. Adapter-boosters and arming wires are not used with the electric fuzes. If the bomb is tail fuzed only, the support cup must be reinserted in the nose cavity to prevent collapse of the fuze cavity on heavy impact.

The bomb body has a base plug containing locking pins which are imbedded in the solidified explosive filler. Two suspension lugs spaced 14 inches apart and a hoisting lug at the center of gravity are threaded into lug inserts on the bomb body (at time of use).

Painting and Marking

The high-explosive filler of the bomb, Tritonal 80-20, or H-6, is identified by yellow stenciled nomenclature on the bomb body and a yellow band around the body. The base color of the bomb is olive drab.

Differences Between Mods

Bombs and fin assemblies of the A. O. Smith Corporation Lot Number 1 have locating pins in the bomb body and holes in the fin assemblies for receiving these locating pins. The reverse is true for bomb bodies and fin assemblies manufactured by the A. O. Smith Corporation subsequent to this lot. Bodies and fin assemblies of the later lots are not interchangeable with bomb bodies and fin assemblies of Lot Number 1. To ensure that Lot Number 1 bomb bodies and fin assemblies are not issued with bomb bodies and fin assemblies of later lots, the

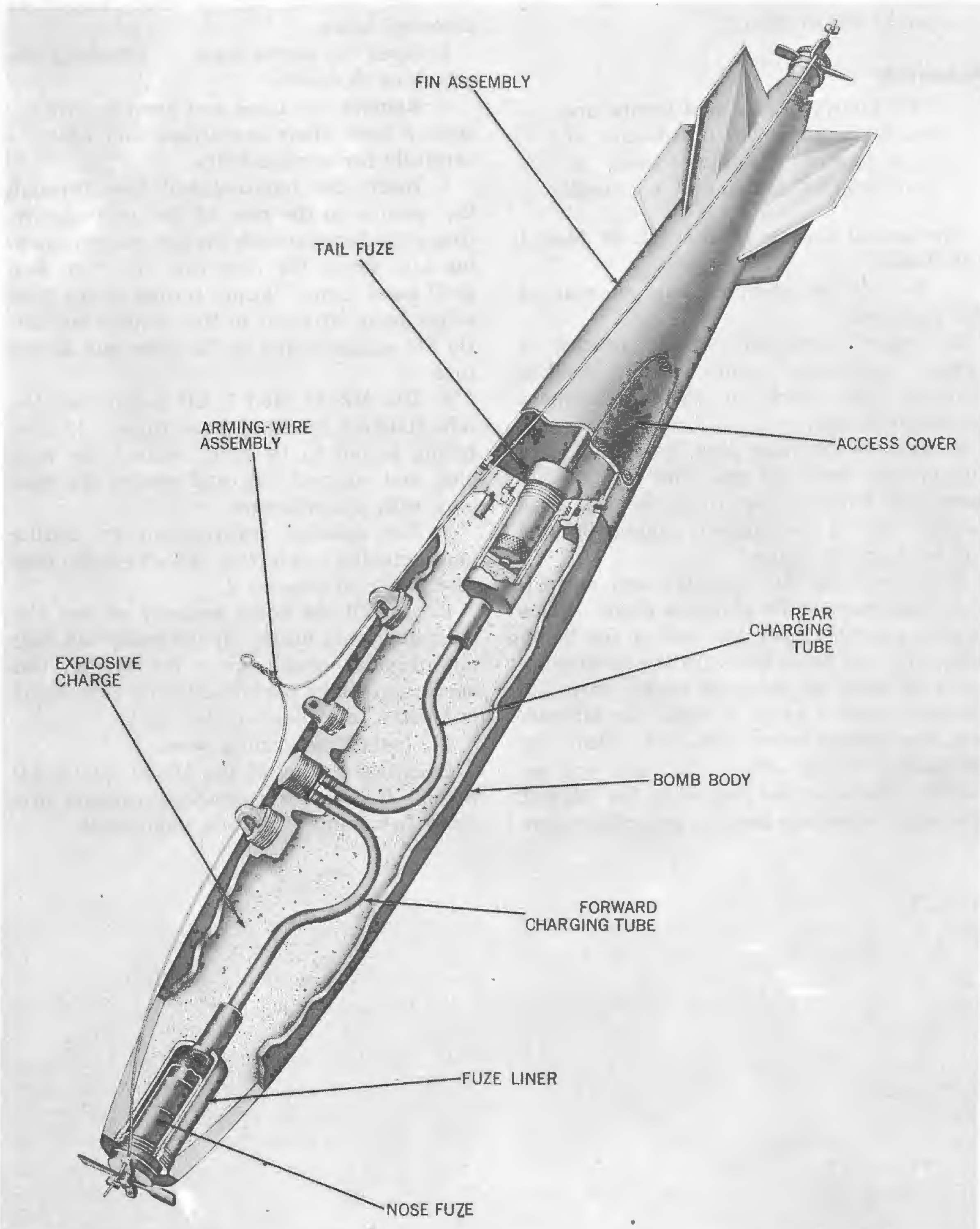


Figure 5–23.—250-lb Low-Drag Bomb (GP) Mk 81 Mod 1 (Mechanically Fuzed), Cutaway View.

designation of Lot Number 1 has been changed to Mk 81 Mod 0.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

Mechanical Fuzing of the Mk 81 Mod 1 LD Bomb.

1. Remove the shipping cap on rear of the bomb body.
2. Inspect bomb for damage, cracks, or broken weldments which might weaken threaded lug inserts or their attachment to the bomb body.
3. Remove the nose plug, base plug, and support cup from the nose fuze cavity. Remove the hoisting lug from the tail fuze cavity. Install the required adapter-booster for mechanical fuzing.
4. Remove the fin assembly and suspension lugs from the fin shipping crate. Place the fin assembly over the end of the bomb body with one fin in line with the suspension lugs; if hung on external racks, turn the fin and locate it so as to clear the aircraft and the ground when installed. Butt the fin against the aft end of the bomb and secure it with setscrews located on the edge of the cone. Assemble the two suspension lugs and the hoisting lug in their respective threaded holes.
5. Open the access door by unlocking the attaching fasteners.
6. Remove the fuzes and arming-wire assembly from their containers and examine carefully for serviceability.
7. Insert the required tail fuze through the opening in the rear of the fin assembly. Grasp the fuze through the access door opening and screw the fuze into the fuze well until hand tight. Apply torque to the fuze at the body adjacent to the adapter-booster. Do not apply torque at the vane end of the fuze.
8. The Mk 81 Mod 1 LD bomb uses the AN–M103A1 series of nose fuzes. If nose fuzing is not to be used, replace the nose plug and support cup and secure the nose plug with the setscrew.
9. For detailed information on fuzing and defuzing with the AN–M103A1 nose fuze, refer to chapter 2.
10. Install the bomb securely on the aircraft and sway brace. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.
11. Install the arming wire.

Electrical Fuzing of the Mk 81 Mod 1 LD Bomb. Follow the assembly procedure provided in volume 2 of this publication.

500-LB LOW-DRAG BOMB (GP) Mk 82 Mod 1

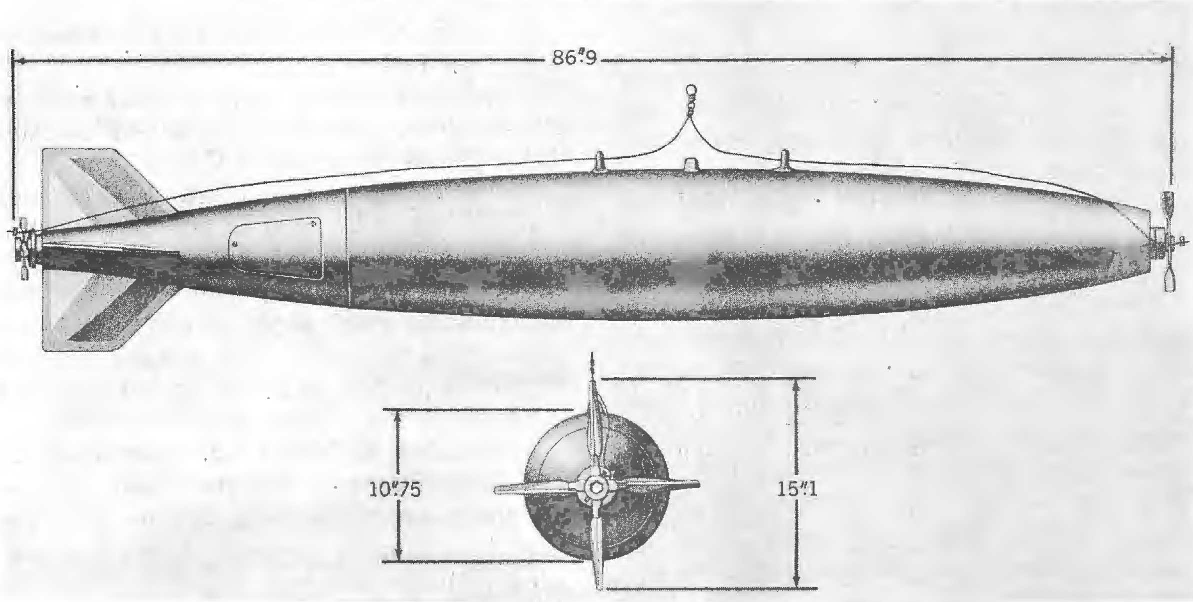


Figure 5-24.—500-lb Low-Drag Bomb (GP) Mk 82 Mod 1 (Mechanically Fuzed), Exterior View.

Mark	82
Mod	1
General Arrangement	1380543
List of Drawings	165796
Fin Assembly Drawing No.	1380512
Length of Assembled Bomb (in.)	86.90
Body Diameter (in.)	10.75
Fin Span (in.)	15.1
Weight of Explosive Charge (lb)	192.0
Weight of Assembled Bomb (lb)	531.0
Arming-Wire Assembly	Mk 1 or AN-M6A2 (for nose fuze) M13 (for tail fuze)
Cable Assembly (for electric fuzing)	M72 (T32)
Adapter-Booster	
Nose	T45E1
Tail	T46E4
Nose Fuze	AN-M103A1, AN-M139A1, AN-M140A1, Mk 243 Mod 0, Mk 244, AN-M166 (VT), AN-M168 (VT), M913 (VT) (T768) (electric), M990 (T905) (electric), M904 (T709), M910 (VT) (T750) (with T49 drive)
Tail Fuze	M195 (T792), M990 (T905) (electric), M910 (VT) (T750) (with T49 drive), M913 (VT) (T768) (electric), XB-113 (electric), M905 (T771) (with T49 drive), M906 (T788) (with T49 drive)

General Description

The 500-lb LD Bomb Mk 82 Mod 1 has a slender body with a long pointed nose. A conical type fin is attached to the aft end of the bomb body by six setscrews.

The bomb uses VT, mechanical, or electrical fuzes. Mechanical and VT fuzes require the installation of adapter-boosters to provide fuze seats of smaller diameters. Two conduits for the electric fuze cable harness connect the nose and tail fuze cavities with the charging receptacle cavity between the lugs of the outer surface of the bomb case. When electric fuzes are not used, a plug is threaded into the charging receptacle cavity.

When fuzes are not installed, the bomb body has a nose fuze plug, a base fuze plug, and a support cup in the nose fuze cavity. When the bomb is mechanically fuzed, these three parts are removed and the adapter-boosters and fuzes are inserted. The nose fuze plug and base fuze plug are replaced after electric fuzes have been installed. Adapter-boosters and arming wires are not used with the electric fuzes. If the bomb is tail fuzed only, the support cup must be reinserted in the nose cavity to prevent collapse of the fuze cavity on heavy impact.

The bomb body has a base plug containing locking pins which are imbedded in the solidified explosive filler. Two suspension lugs spaced 14 inches apart and a hoisting lug at the center of gravity are threaded into lug inserts on the bomb body.

Painting and Marking

The high-explosive filler of the bomb, Tritonal 80-20, or H-6, is identified by yellow stenciled nomenclature on the bomb body and a yellow band around the body. The base color of the bomb is olive drab.

Differences Between Mods

Bomb Mk 82 Mod 1 differs from Bomb Mk 82 Mod 0 only in the method used to construct the bomb body.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

Mechanical Fuzing of the Mk 82 Mod 1 LD Bomb.

1. Remove the shipping cap on the rear of the bomb body.
2. Inspect bomb for damage, cracks, or broken weldments which might weaken threaded lug inserts or their attachment to the bomb body.
3. Remove the nose plug, base plug, and support cup from the nose fuze cavity. Remove the hoisting lug from the tail fuze

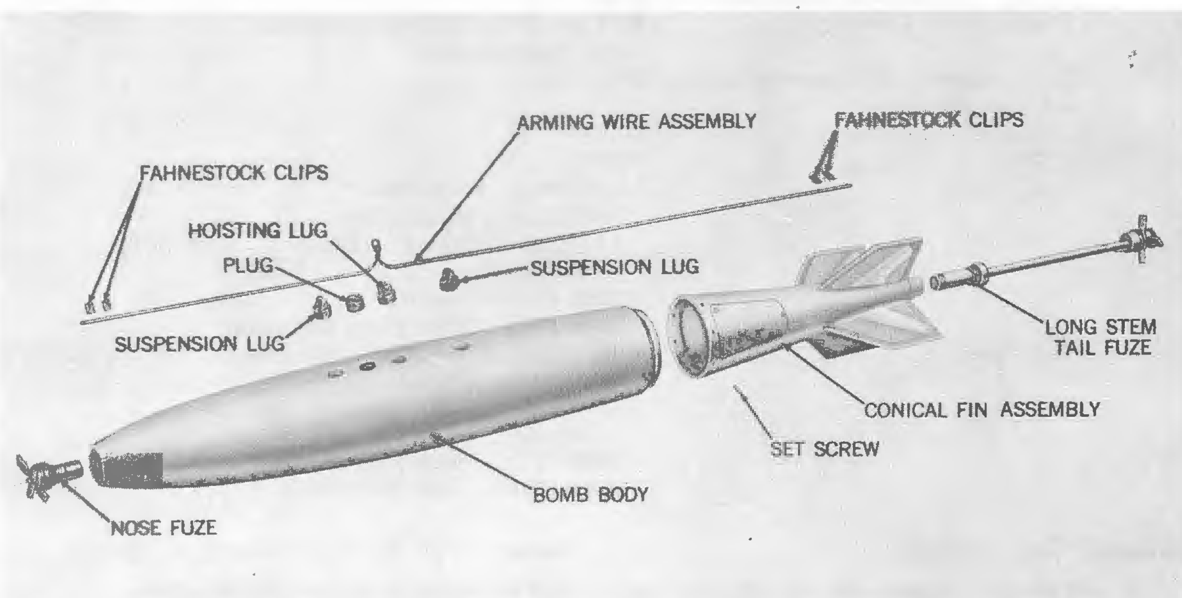


Figure 5–25.—500-lb Low-Drag Bomb (GP) Mk 82 Mod 1 (Mechanically Fuzed), Exploded View.

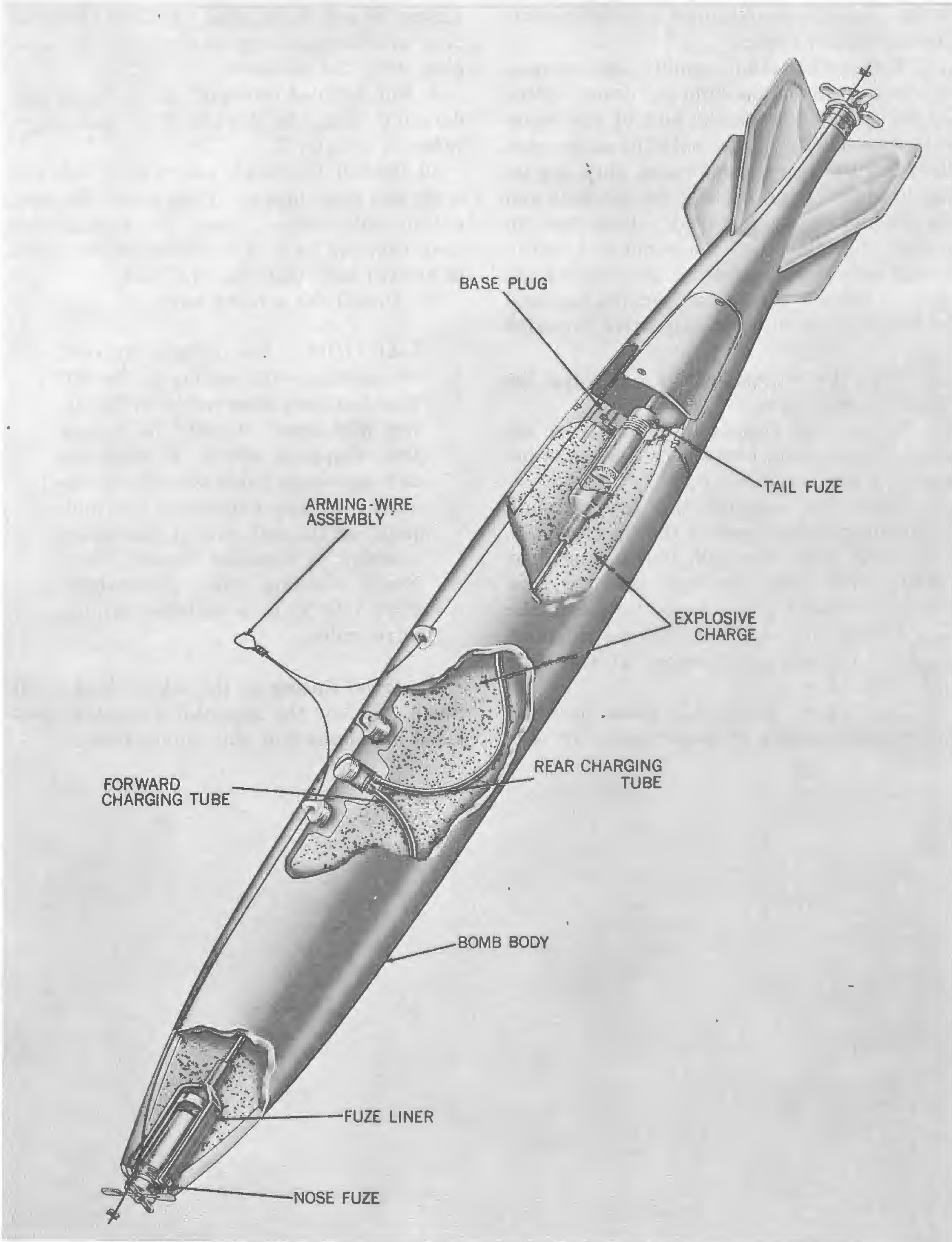


Figure 5-26.—500-lb Low-Drag Bomb (GP) Mk 82 Mod 1 (Mechanically Fuzed), Cutaway View.

cavity. Install the required adapter-booster for mechanical fuzing.

4. Remove the fin assembly and suspension lugs from the fin shipping crate. Place the fin assembly over the end of the bomb body with one fin in line with the suspension lugs; if hung in external racks, turn the fin and locate it so as to clear the aircraft and the ground when installed. Butt the fin against the aft end of the bomb and secure it with setscrews located on the edge of the cone. Assemble the two suspension lugs and the hoisting lug in their respective threaded holes.

5. Open the access door by unlocking the attaching fasteners.

6. Remove the fuzes and arming-wire assembly from their containers and examine carefully for serviceability.

7. Insert the required tail fuze through the opening in the rear of the fin assembly. Grasp the fuze through the access door opening and screw the fuze into the fuze well until hand tight. Apply torque to the fuze at the body adjacent to the adapter-booster. Do not apply torque at the vane end of the fuze.

8. The Mk 82 Mod 1 LD bomb uses the AN–M103A1 series of nose fuzes. If nose fuzing is not to be used, replace the nose plug and support cup and secure the nose plug with the setscrew.

9. For detailed information on fuzing and defuzing with the AN–M103A1 nose fuze, refer to chapter 2.

10. Install the bomb securely on the aircraft and sway brace. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

11. Install the arming wire.

> CAUTION: On certain aircraft, the arming wire leading to the tail fuze has been observed to whip during high-speed flight. To reduce this whipping action, at least one arming wire guide should be installed at approximately the midpoint on the tail cone of the fin assembly. A standard eyebolt, Navy Stock Catalog No. R5306–638–2217–GIAN, is a suitable arming wire guide.

Electrical Fuzing of the Mk 82 Mod 1 LD Bomb. Follow the assembly procedure provided in volume 2 of this publication.

1000-LB LOW-DRAG BOMB (GP) Mk 83 Mod 3

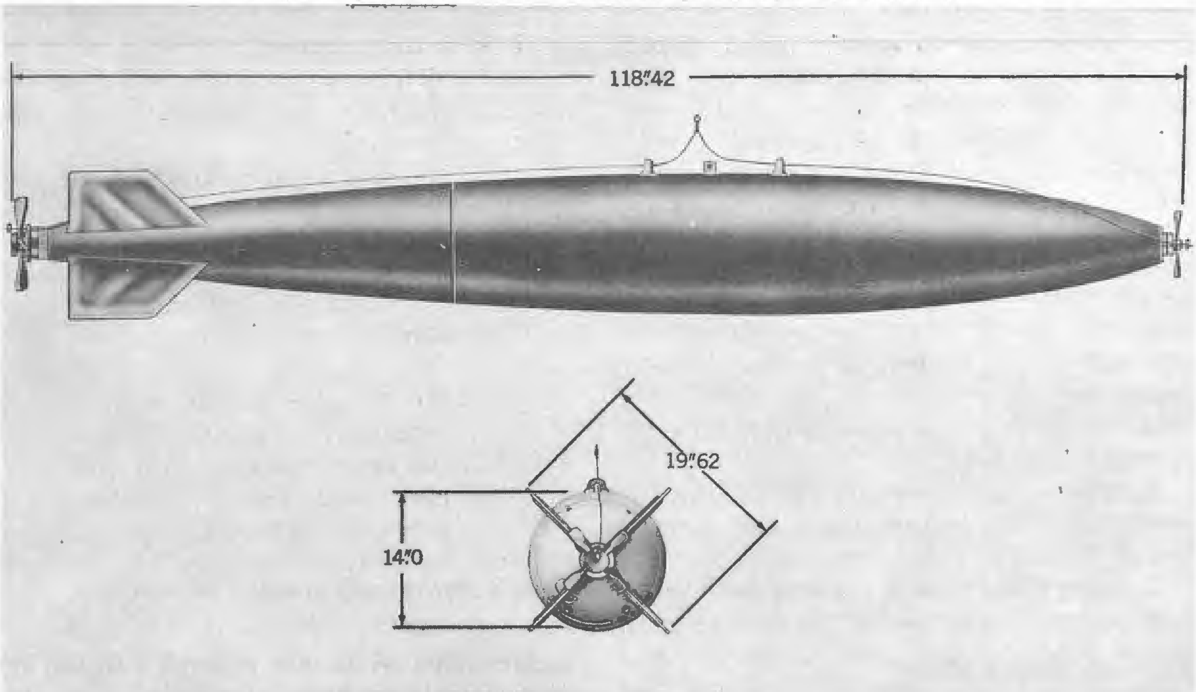


Figure 5–27.—1000-lb Low-Drag Bomb (GP) Mk 83 Mod 3 (Mechanically Fuzed), Exterior View.

Mark	83
Mod	3
General Arrangement	1380261
List of Drawings	165791
Fin Assembly Drawing No.	1380505
Length of Assembled Bomb (in.)	118.42
Body Diameter (in.)	14.0
Fin Span (in.)	19.62
Weight of Explosive Charge (lb)	445.0
Weight of Assembled Bomb (lb)	985.0
Arming-Wire Assembly	Mk 1 or AN–M6A2 (for nose fuze) M16 (for tail fuze)
Cable Assembly (for electric fuzing)	M73 (T27)
Adapter-Booster	
Nose	T45E1
Tail	T46E4
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, Mk 243 Mod 0, Mk 244 Mod 1, AN–M166 (VT), AN–M168 (VT), M910 (VT) (T750) (with T49 drive), M913 (VT) (T768) (electric), M990 (T905) (electric)
Tail Fuze	M913 (VT) (T768) (electric) M905 (T771) (with T49 drive), M906 (T788) (with T49 drive), M177 (T745) M183 (T783), M185 (T740), M990 (T905) (electric), XB–113 (electric)

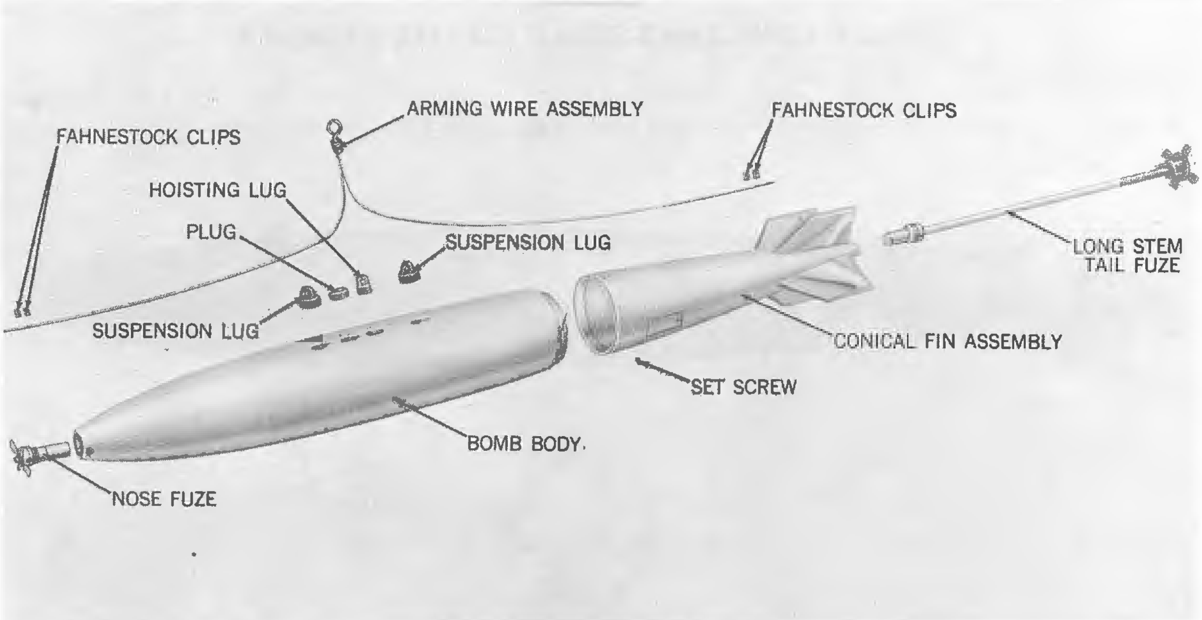


Figure 5-28.—1000-lb Low-Drag Bomb (GP) Mk 83 Mod 3 (Mechanically Fuzed), Exploded View.

General Description

The 1000-lb LD Bomb Mk 83 Mod 3 has a slender body with a long pointed nose. A conical type fin is attached to the aft end of the bomb body by six setscrews.

The bomb uses VT, mechanical, or electrical fuzes. Mechanical and VT fuzes require the installation of adapter-boosters to provide fuze seats of smaller diameters. Two conduits for an electric fuze cable harness connect the nose and tail fuze cavities with the charging receptacle cavity between the lugs on the outer surface of the bomb case. When the electric fuzes are not used, a plug is threaded into the charging receptacle cavity.

When fuzes are not installed, the bomb body has a nose fuze plug, a base fuze plug, and a support cup in the nose fuze cavity. When the bomb is mechanically fuzed, these three parts are removed and the adapter-boosters and fuzes are inserted. The nose fuze plug and base fuze plug are replaced after electric fuzes have been installed. Adapter-boosters are not used with the electric fuzes. If the bomb is tail fuzed only, the support cup must be used to prevent collapse of the fuze cavity on heavy impact.

The bomb body has a base plug containing locking pins which are imbedded in the solidified explosive filler. Two suspension lugs spaced 14 inches apart and a hoisting lug at the center of gravity are threaded into lug inserts on the bomb body.

Painting and Marking

The high-explosive filler of the bomb, Tritonal 80-20, or H-6, is identified by yellow bands around the nose and conical sections of the bomb body. The base color is olive drab; identifying nomenclature is stenciled in yellow and die-stamped on one side of the bomb body.

Differences Between Mods

Bomb Mk 83 consists of the Mod 2 and the Mod 3. Differences lie in the methods used in the construction of the bomb bodies.

Assembly

> CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

Mechanical Fuzing of the Mk 83 Mod 3 LD Bomb.

1. Remove the shipping cap on the rear of

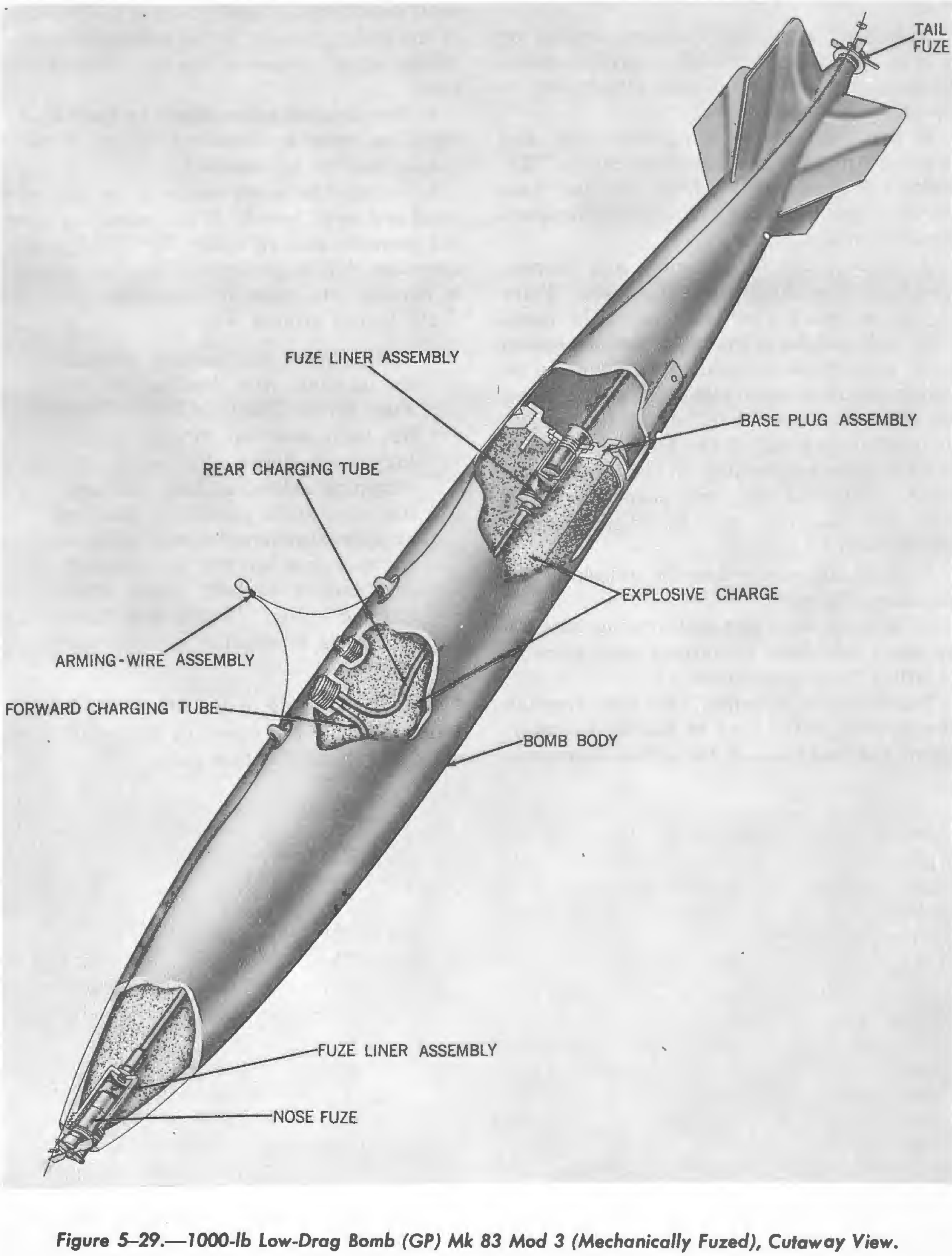


Figure 5–29.—1000-lb Low-Drag Bomb (GP) Mk 83 Mod 3 (Mechanically Fuzed), Cutaway View.

the bomb body by removing the hex head bolts.

2. Inspect bomb for damage, cracks, or broken weldments which might weaken threaded lug inserts or their attachment to the bomb body.

3. Remove the nose plug, base plug, and support cup from the nose fuze cavity. Remove the hoisting lug from the tail fuze cavity. Install the required adapter-boosters for mechanical fuzing.

4. Remove the fin assembly and suspension lugs from the fin shipping crate. Place the fin assembly over the end of the bomb body with one fin in line with the suspension lugs; if hung on external racks, turn the fin and locate it so as to clear the aircraft and the ground when installed. Butt the fin against the aft end of the bomb and secure it with setscrews located on the edge of the cone. Assemble the two suspension lugs and the hoisting lug in their respective threaded holes.

5. Open the access door by unlocking the attaching fastener.

6. Remove the fuzes and arming-wire assembly from their containers and examine carefully for serviceability.

7. Insert the required tail fuze through the opening in the rear of the fin assembly. Grasp the fuze through the access door opening and screw the fuze into the fuze well until hand tight. Apply torque to the fuze at the body adjacent to the adapter-booster. Do not apply torque at the vane end of the fuze.

8. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

9. Install the bomb securely on the aircraft and sway brace. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

10. Install arming wire.

> CAUTION: On certain aircraft, the arming wire leading to Tail Fuze M185(T740) or M177(T745) has been observed to whip during high-speed flight. To reduce this whipping action, at least one arming wire guide should be installed at approximately the mid point on the tail cone of the fin assembly. A standard eyebolt, Navy Stock Catalog No. R5306–638–2217–GIAN, is a suitable arming wire guide.

Electrical Fuzing of the Mk 83 Mod 3 LD Bomb. Follow the assembly procedure provided in volume 2 of this publication.

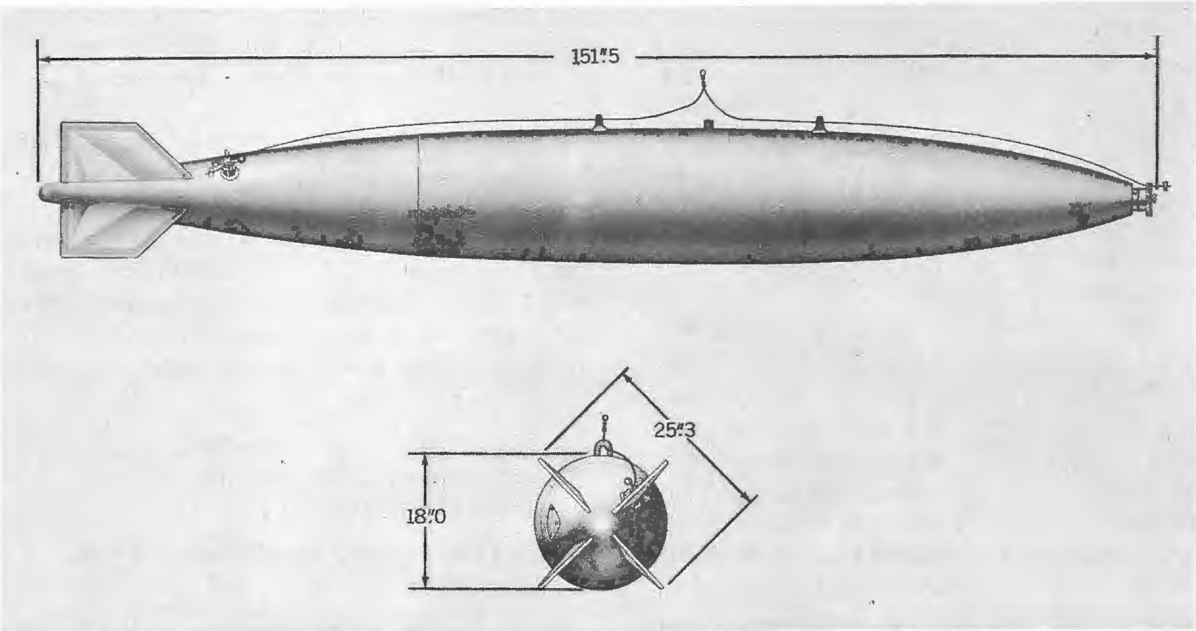


Figure 5–30.—2000-lb Low-Drag Bomb (GP) Mk 84 Mod 1 (Mechanically Fuzed), Exterior View.

Mark	84
Mod	1
General Arrangement	1380522
List of Drawings	165795
Fin Assembly Drawing No.	1380529
Length of Assembled Bomb (in.)	151.50
Body Diameter (in.)	18.0
Fin Span (in.)	25.31
Weight of Explosive Charge (lb)	945.0
Weight of Assembled Bomb (lb)	1970.0
Arming-Wire Assembly	Mk 1 or AN–M6A2 (for nose or tail fuze)
Cable Assembly (for electric fuzing)	M74 (T28)
Adapter-Booster	
Nose	T45E1
Tail	T46E4
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, AN–M166 (VT), AN–M168 (VT), T750 (VT), M904 (T709), M913 (VT) (T768) (electric), M990 (T905) (electric)
Tail Fuze	M913 (VT) (T768) (electric), M190 (T759), M990 (T905) (electric), XB–113 (electric)

General Description

The 2000-lb LD Bomb Mk 84 Mod 1 has a slender body with a long pointed nose. A conical type fin is attached to the aft end of the bomb body by eight setscrews.

The bomb uses VT, mechanical, or electrical fuzes. Mechanical and VT fuzes require the installation of adapter-boosters to provide fuze seats of smaller diameters. Two conduits for an electric fuze cable har-

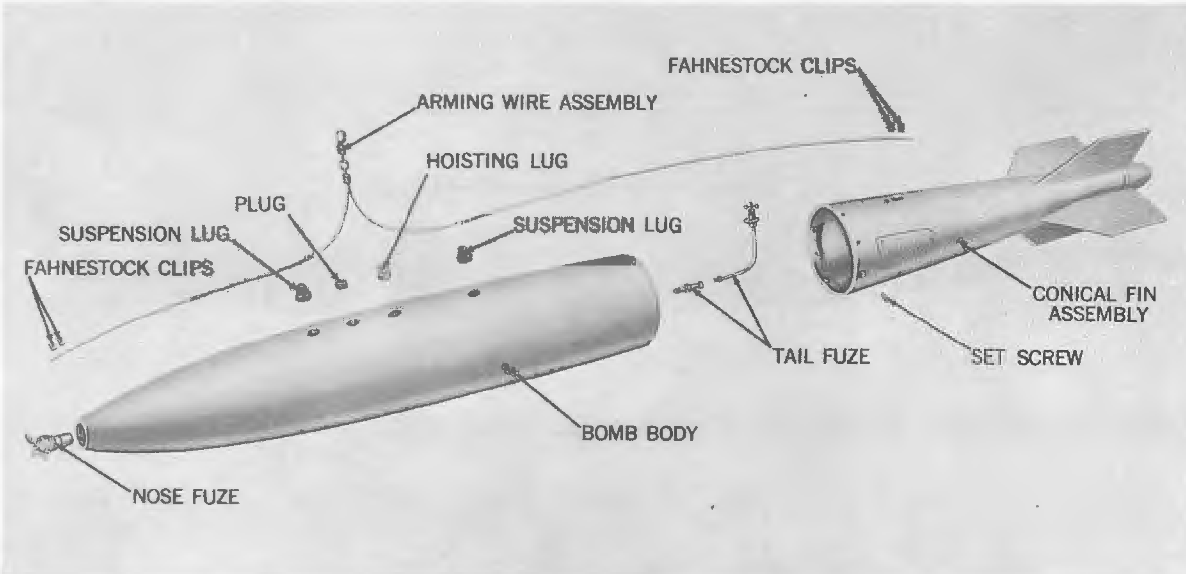


Figure 5-31.—2000-lb Low-Drag Bomb (GP) Mk 84 Mod 1 (Mechanically Fuzed), Exploded View.

ness connect the nose and tail fuze cavities with the charging receptacle cavity between the lugs on the outer surface of the bomb case. When the electric fuzes are not used, a plug is threaded into the charging receptacle cavity.

When fuzes are not installed, the bomb body has a nose fuze plug, a base fuze plug, and a support cup in the nose fuze cavity. When the bomb is mechanically fuzed, these three parts are removed and the adapter-boosters and fuzes are inserted. The nose fuze plug and base fuze plug are replaced after electric fuzes have been installed. Adapter-boosters are not used with the electric fuzes. If the bomb is tail fuzed only, the support cup must be used in the nose fuze cavity to prevent collapse upon heavy impact.

The bomb body has a base plug containing locking pins which are imbedded in the solidified explosive filler. Two suspension lugs spaced 30 inches apart and a hoisting lug located at the center of gravity are threaded into lug inserts on the bomb body.

Painting and Marking

The high-explosive filler of this bomb, Tritonal 80-20, or H-6, is identified by yellow bands around the nose and conical sections of the bomb body. The base color is olive drab; identifying nomenclature is stenciled in yellow and die-stamped on one side of the bomb body.

Differences Between Mods

Bomb Mk 84 Mod 1 differs from the earlier Mod 0 bomb in that the tail fins of the Mod 1 are canted 2 degrees for added stability.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

Mechanical Fuzing of the Mk 84 Mod 1 LD Bomb.

1. Remove the shipping cap on the rear of the bomb body by removing the hex head bolts.
2. Inspect bomb for damage, cracks, or broken weldments which might weaken threaded lug inserts or their attachment to the bomb body.
3. Remove the nose plug, base plug, and support cup from the nose fuze cavity. Remove the hoisting lug from the tail fuze cavity. Install the required adapter-boosters for mechanical fuzing.

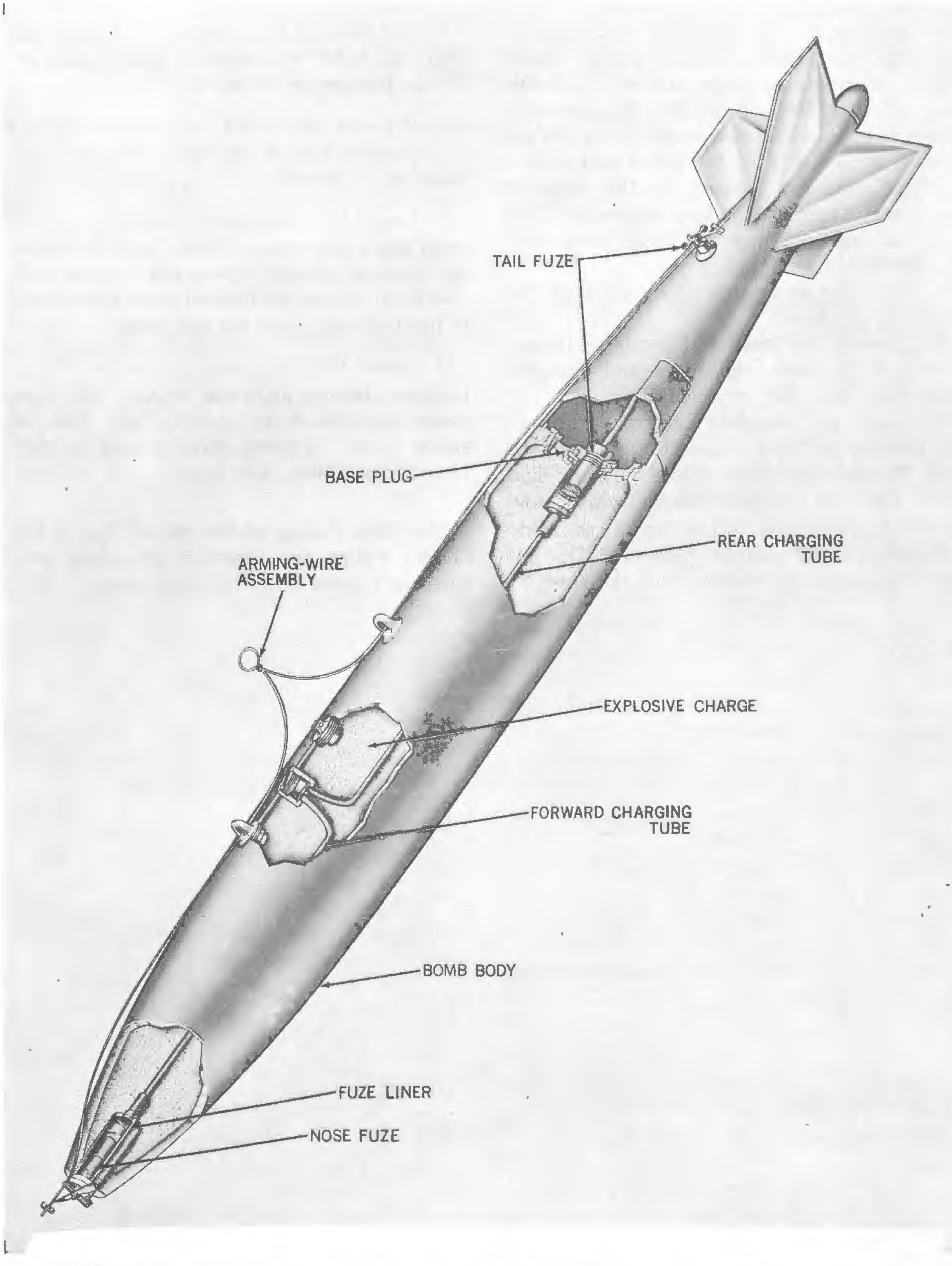


Figure 5-32.—2000-lb Low-Drag Bomb (GP) Mk 84 Mod 1 (Mechanically Fuzed), Cutaway View.

4. Remove the fin assembly and suspension lugs from the fin shipping crate. Place the fin assembly over the end of the bomb body so that the pin in the fin assembly alines with a hole in the body. Butt the fin against the aft end of the bomb and secure it with setscrews located on the edge of the cone. Assemble the two suspension lugs and the hoisting lug in their respective threaded holes.

5. Open the access door by unlocking the attaching fastener.

6. Remove the fuzes and arming-wire assembly from their containers and examine them carefully for serviceability.

7. Insert the required tail fuze through the opening in the fin assembly. Grasp the fuze through the access door opening and screw the fuze into the fuze well until hand tight. Apply torque to the fuze at the body adjacent to the adapter-booster. Do not apply torque at the vane end of the fuze.

8. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

9. If a nose fuze is **NOT** to be used, replace the nose plug and support cup and secure the nose plug with set screws.

10. Install the bomb securely on the aircraft and sway brace. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

11. Install the arming wire so that two to three inches protrude beyond the fuze vanes and attach the safety clips. Cut off excess wire. Arming wire should be free from kinks, twists, and burrs.

Electrical Fuzing of the Mk 84 Mod 1 LD Bomb. Follow the assembly procedure provided in volume 2 of this publication.

Chapter 6

AIRCRAFT DEPTH BOMB ASSEMBLIES

350-LB AIRCRAFT DEPTH BOMB AN–Mk 54 Mod 1

AN–Mark	54
Mod	1
General Arrangement	438064
List of Drawings	Sk 165766
Fin Assembly Drawing No.	394196
Length of Assembled Bomb (in.)	54.6
Body Diameter (in.)	13.5
Fin Span (in.)	13.88
Weight of Explosive Charge (lb)	
TNT	225.5
HBX or HBX–1	248.0
Weight of Fin Assembly (lb)	19.5
Weight of Assembled Bomb (lb)	
Loaded with TNT	323.8
Loaded with HBX or HBX–1	346.3
Arming-Wire Assembly	Mk 1 or AN–M6A2
Arming Bracket	Mk 1 Mod 0
Auxiliary Booster	Mk 1 Mod 0 (2)
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, AN–Mk 219* Mods 2, 3, 4
Tail Fuze	AN–Mk 230 Mods 4, 5, 6

*A fuze adapter and an additional Auxiliary Booster Mk 1 Mod 0 are required for the AN–Mk 219 fuze.

General Description

The 350–lb ADB AN–Mk 54 Mod 1 is a flat nosed, thin walled bomb. The fin assembly consists of a fin cone and four fin blades surrounded by a shroud; it is attached to the aft end of the bomb body by capscrews. This bomb is used against underwater targets. The flat nose prevents ricochet upon water impact. The depth of detonation is determined by the setting of the hydrostatic tail fuze.

Depth bombs are usually tail fuzed only, but provision is made for nose fuzing in the event that a blast effect is desired. With both fuzes installed, the aircraft depth bomb may be selectively armed by releasing one of the arming wires with the bomb. Depth settings are made prior to flight.

The lethal radius of underwater effectiveness of the bomb is approximately 17 feet; however, damage may be expected up to 45 feet from the center of the blast.

Two suspension lugs are welded to the body 14 inches apart and a single suspension lug is located diametrically opposite. Tapped holes are provided for attaching hoisting lugs which may be needed for the handling of the bomb when not in use. These holes are closed with special plugs. Approximately 70 percent of the weight of the bomb is high-explosive filler.

Painting and Marking

Yellow bands painted on the nose and aft end of the bomb body identify the high-explosive filler of TNT, HBX, or HBX–1. Identifying nomenclature is stenciled in black (old issue) or in yellow (new issue) on the olive drab bomb body.

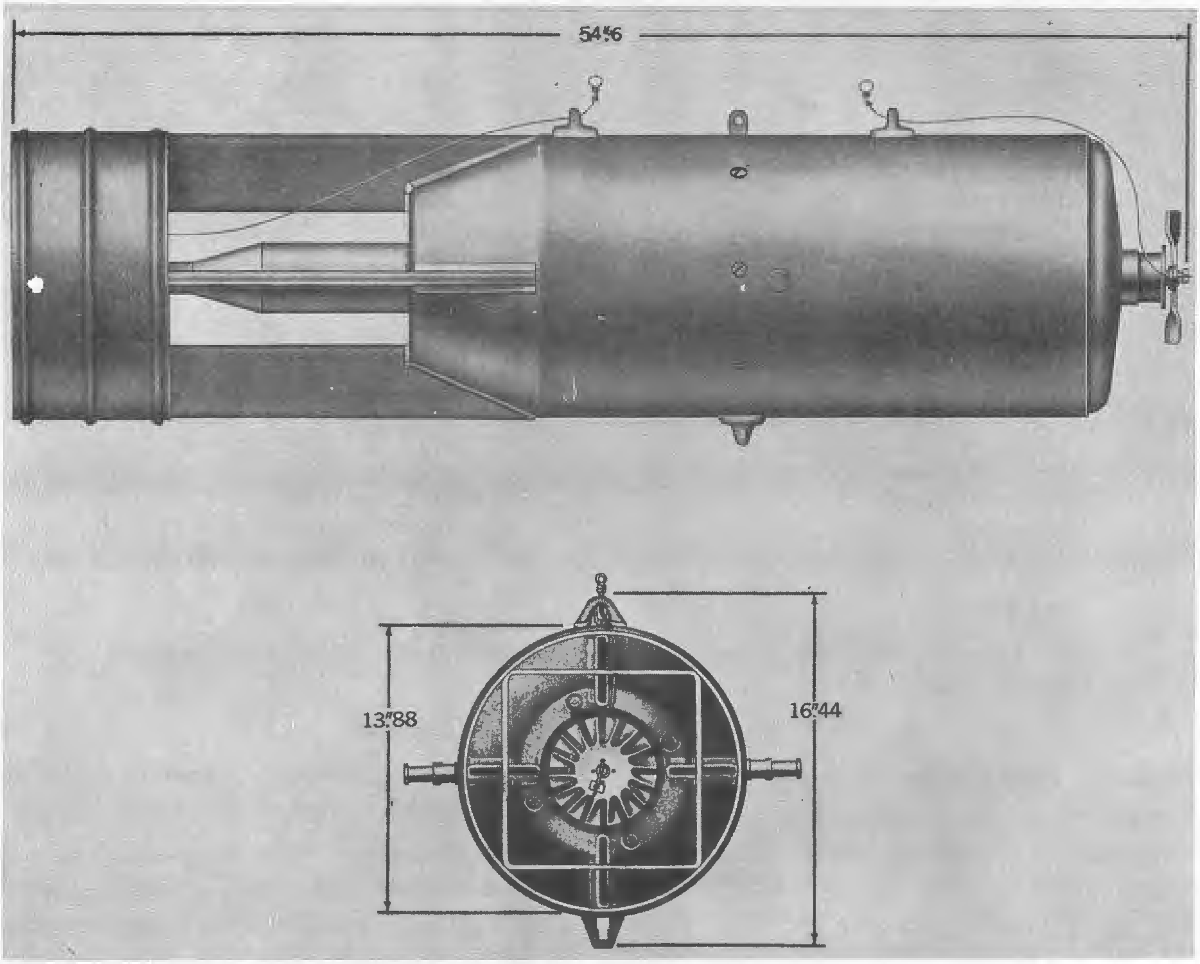


Figure 6–1.—350-lb Aircraft Depth Bomb AN–Mk 54 Mod 1, Exterior View.

Differences Between Mods

The earlier mod, now obsolete, Mk 54 Mod 0, had no attached suspension lugs. The suspension lugs were attached in the field with capscrews; all of the suspension lug fitting holes of the Mod 0 were plugged.

Assembly

> CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Open the shipping crate by removing the cotter pins from the three lid latches. Unthread the hex-head screws from the bands which secure the bomb in the case. Lift the bomb body out of the case.

> CAUTION: The bomb body is easily damaged because of its light construction. Inspect it for damage.

2. Remove the closing plugs which seal the fuze cavities.

3. Remove the fin assembly and its attachments from the shipping crate. Place the fin assembly over the conical end of the bomb so that one fin is in line with the suspension lugs. Secure with hex-head cap screws.

> CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb.

4. Hoist and secure the bomb to the aircraft. If the bomb bay does not provide sufficient room for fuzing, this operation must be performed before hoisting.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the comdition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

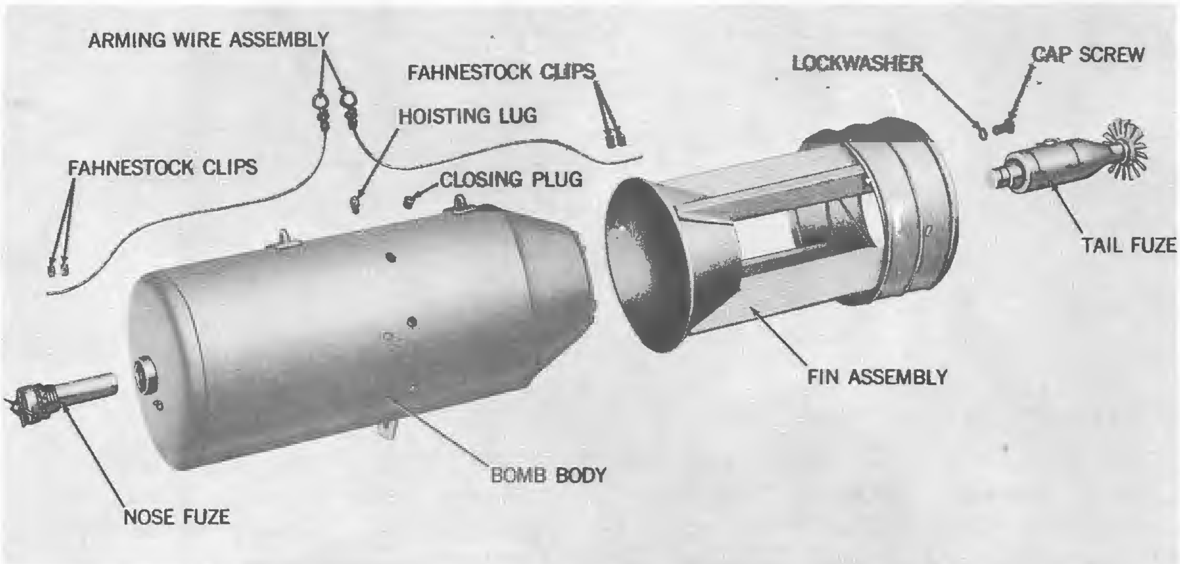


Figure 6–2.—350-lb Aircraft Depth Bomb AN–Mk 54 Mod 1, Exploded View.

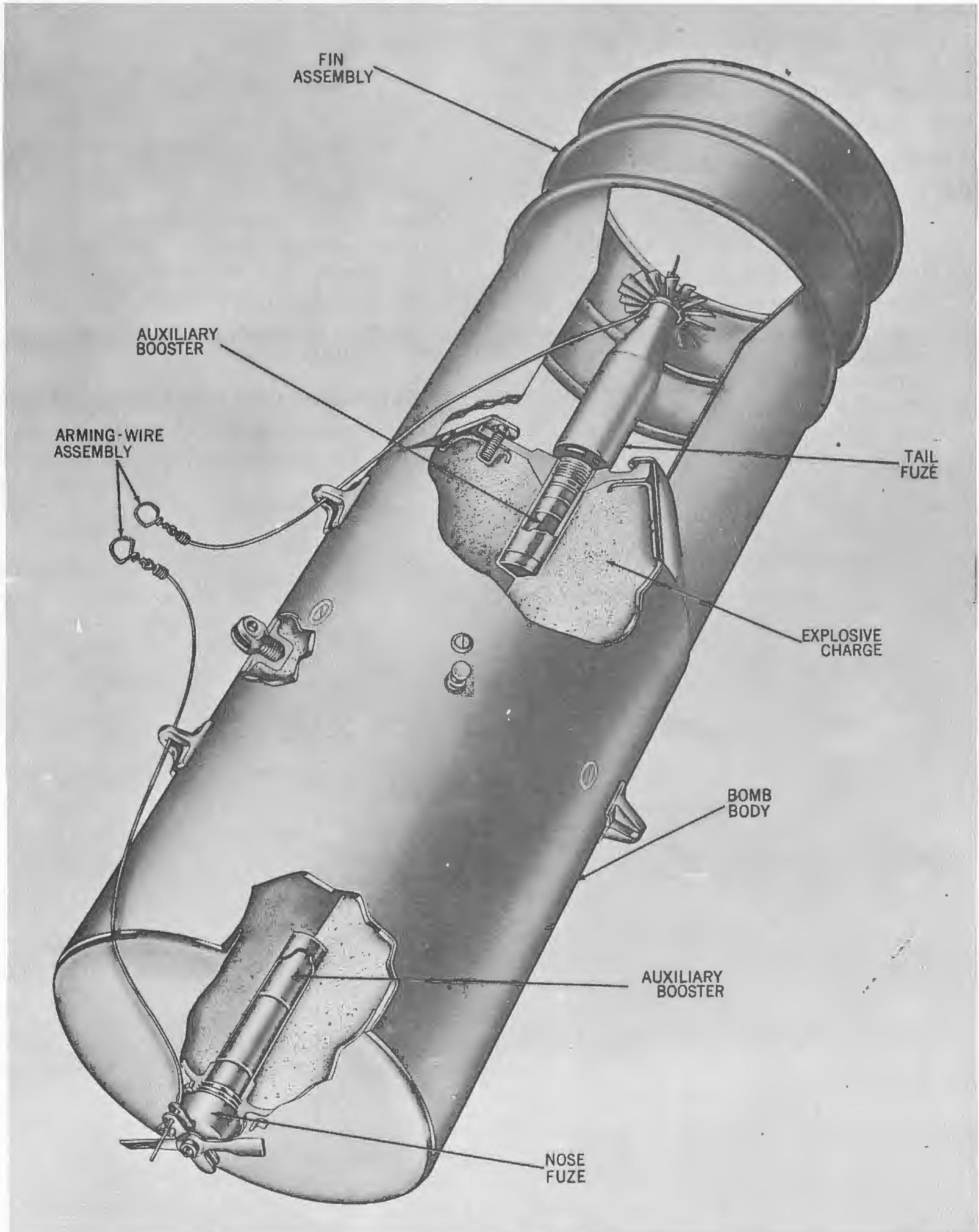


Figure 6-3.—350-lb Aircraft Depth Bomb AN-Mk 54 Mod 1, Cutaway View.

Chapter 7
FRAGMENTATION BOMB ASSEMBLIES

4-LB FRAG BOMB M83

Model	M83
Assembly Drawing No.	82–0–106
Length of Assembled Bomb (in.)	11.13
Body Diameter (in.)	3.12
Butterfly-wing Span (in.)	9.5
Butterfly-wing Length (in.)	3.0
Weight of Explosive Charge (lb)	0.5
Weight of Assembled Bomb (lb)	
Loaded with Composition B	3.82
Loaded with Ednatol	3.81
Loaded with TNT	3.80
Fuze (integral)	M129, M130, M131
Bomb Cluster	
100-lb size	M28A2
500-lb size	M29A1
Cluster Adapter	
100-lb size	M15A2
500-lb size	M16A1

General Description

The 4-lb Frag Bomb M83 is a small barrel-shaped bomb. Its fuze, assembled at the time of manufacture, is mounted on the bomb case midway between the cylinder ends. Two semicylindrical surfaces (butterfly wings) and two discs (propeller blades) are spring-hinged together independent of the bomb. In the unarmed position, these four pieces, or vanes, are folded about the bomb, forming a cylindrical outer bomb casing. A cable extension projects from the fuze through the folded outer bomb casing.

The 4-lb fragmentation bomb uses the M129, M130, and M131 fuzes. Impact, mechanical time delay, and antidisturbance firing actions are obtained by selection of the respective fuze. The fuzes are installed and their actions are set at the time of manufacture.

Approximately 12 percent of the complete weight of the bomb is explosive filler composition B, Ednatol, or TNT.

The M83 bombs are issued assembled in clusters of the M28 series or in the form of bomb wafers to be assembled in M29 clusters in the field.

Painting and Marking

The bomb is painted olive drab; yellow bands and black (old issue) or yellow (new issue) stenciled nomenclature identify the bomb and its high-explosive content.

Assembly of M29 Clusters

1. Ten 4-lb Frag Bombs M83 are shipped from the manufacturer in wafer assemblies which are bound with two metal straps. The wafer assemblies are individually packed in metal lined wafer boxes and are secured to plywood inserts. Fuzes are installed and set at the factory.

> CAUTION: No attempt should be made to remove the fuzes, change the setting, or work on them in any way.

2. Always handle wafers by the cable assemblies (pigtails) or by the flat side, not by the strapping.

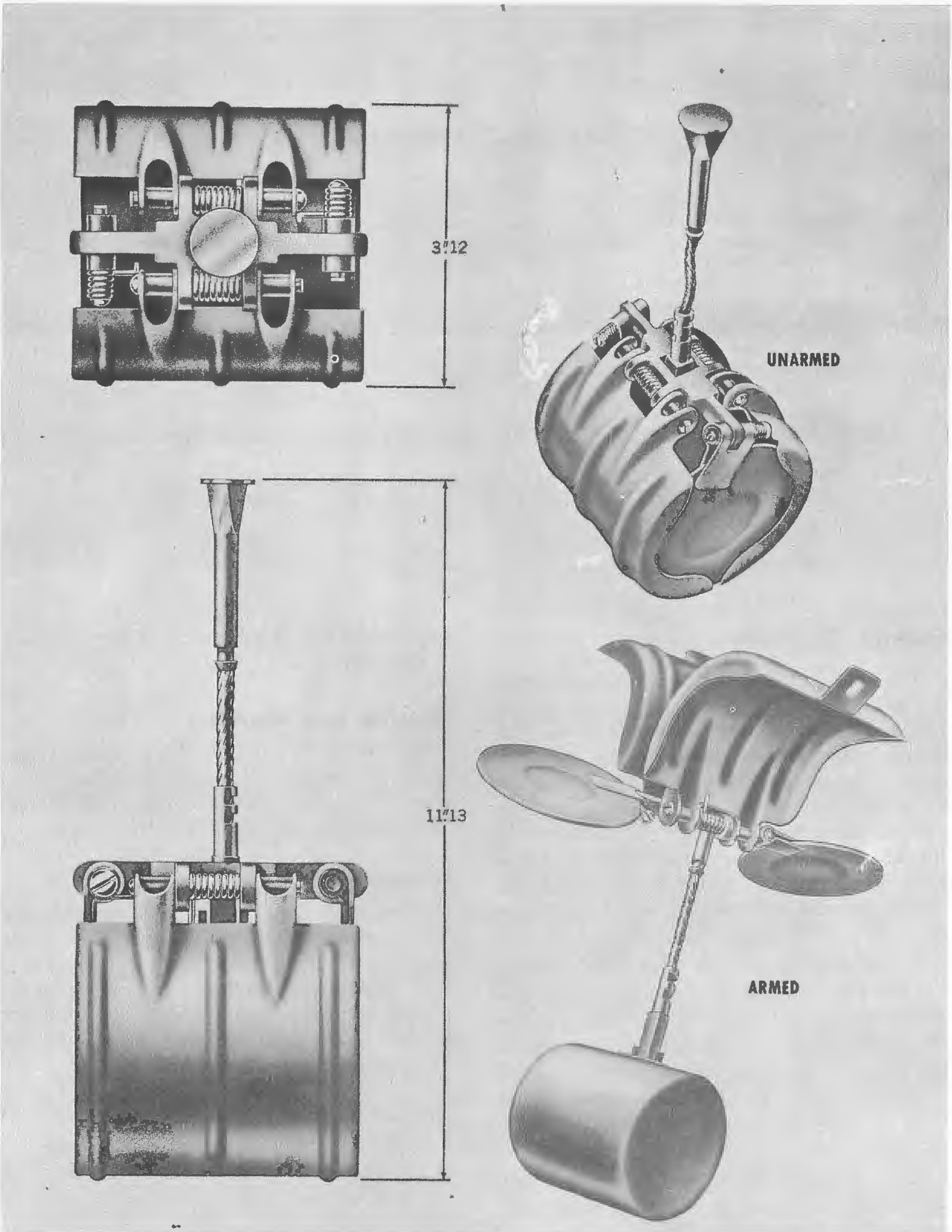


Figure 7–1.—4-lb Frag Bomb M83, Exterior View.

3. Refer to chapter 8, Fragmentation Bomb Clusters and Adapters, for detailed procedures on handling, installation, and general precautions for fragmentation bomb wafers. Failure to follow these instructions may permit the bomb to spring out of the cluster and the case assemblies (butterfly wings) to open.

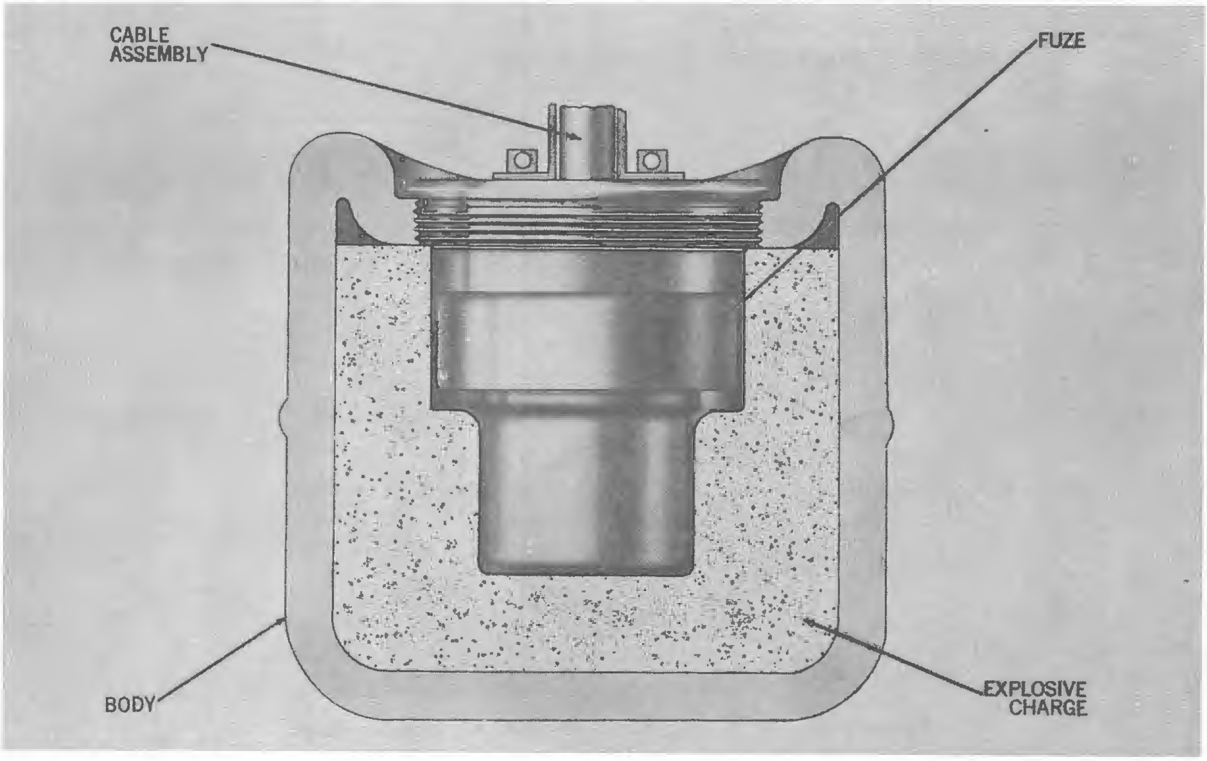


Figure 7-2.—4-lb Frag Bomb M83, Cutaway View.

20-LB FRAG BOMB AN–M41A1

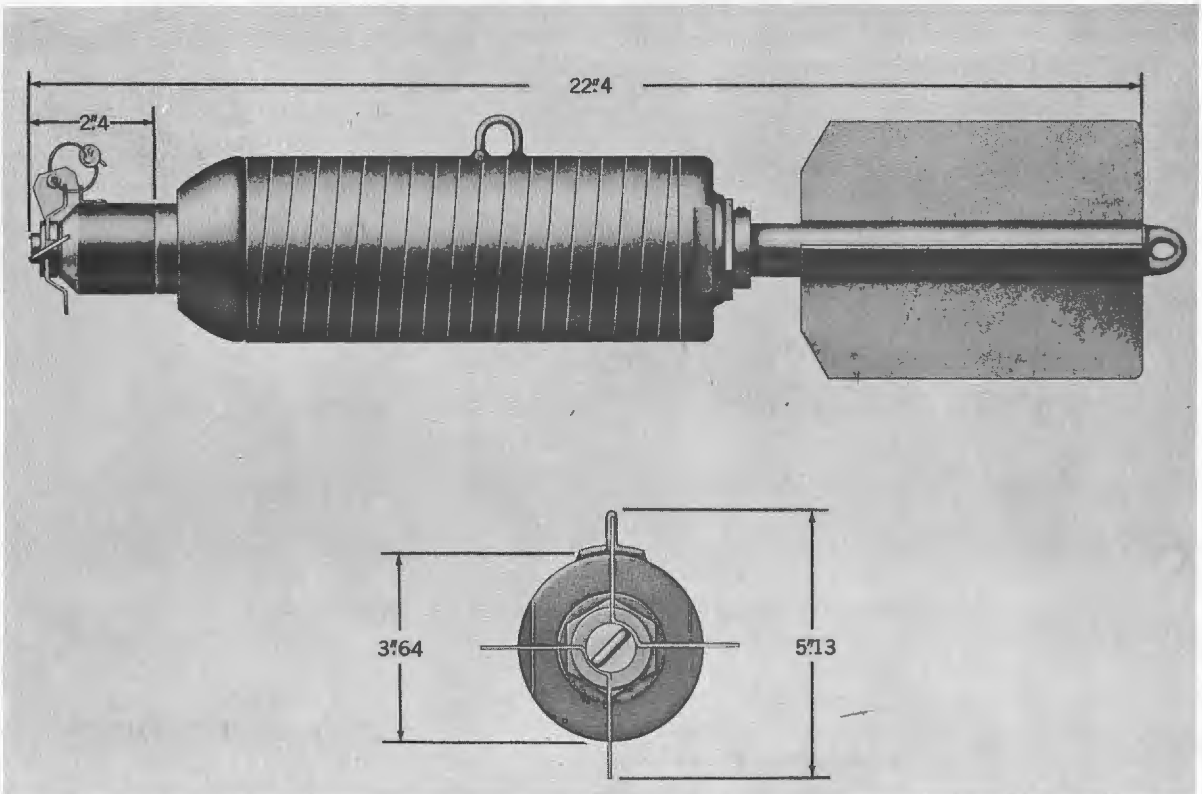


Figure 7–3.—20-lb Frag Bomb AN–M41A1, Exterior View.

Model	AN–M41A1
Assembly Drawing No.	82–0–39
Length of Assembled Bomb (in.)	22.4
Body Diameter (in.)	3.64
Fin Span (in.)	5.13
Weight of Explosive Charge (lb)	
AM50–50	2.57
TNT	2.7
Weight of Fin Assembly (lb)	1.6
Weight of Assembled Bomb (lb)	
Loaded with AM 50–50	19.7
Loaded with TNT	19.8
Nose Fuze	AN–M110A1, AN–M158
Bomb Cluster	
100-lb size	AN–M1A2
500-lb size	M26A2
Cluster Adapter	
100-lb size	AN–M1A3
500-lb size	M13A2

General Description

The 20-lb Frag Bomb AN–M41A1 is constructed of spirally wound wire and cast steel nose and tail pieces. A seamless steel inner tube is threaded to the nose and tail piece to form the base for the spiral wound wire. The fin assembly is made of four rectangular sheet steel vanes welded to a 1-inch

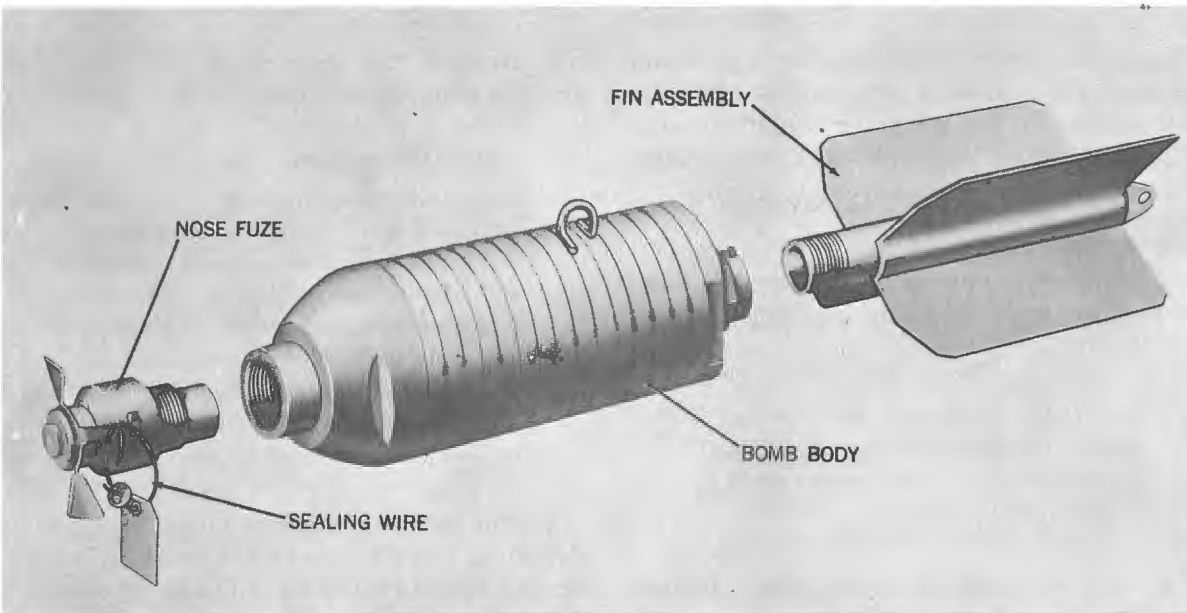


Figure 7–4.—20-lb Frag Bomb AN–M41A1, Exploded View.

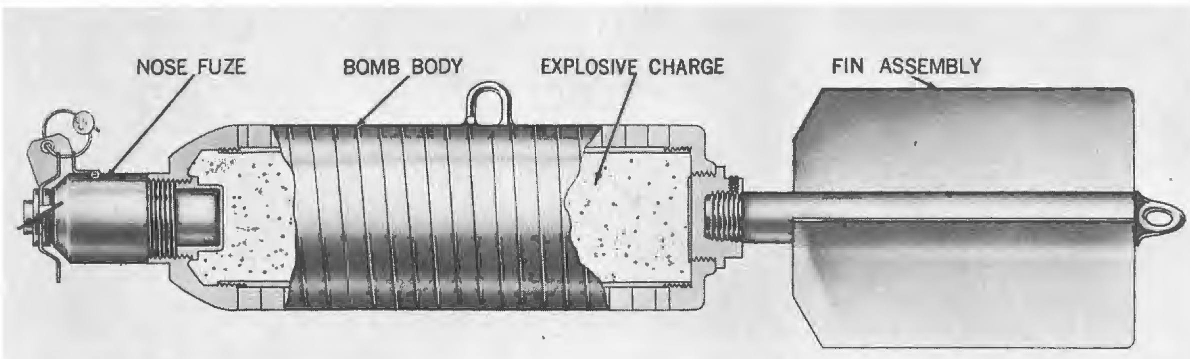


Figure 7–5.—20-lb Frag Bomb AN–M41A1, Cutaway View.

diameter pipe. The threaded end of the pipe is secured to the base filling plug. The nose section of the bomb is threaded to receive an impact fuze.

At the center of gravity, a U-shaped eyebolt of steel is welded to the bomb case for horizontal suspension; an eyebolt is welded to the tail for vertical suspension.

Approximately 13 percent of the complete weight of the bomb is explosive filler AM 50–50 or TNT.

The AN–M41A1 bomb is used in the 100- and 500-lb fragmentation bomb clusters of the AN–M1 and the M26 series.

Painting and Marking

Old issue bombs have a yellow colored head and base to identify the high-explosive filler; identifying nomenclature is stenciled in black on the bomb body. Body windings are painted olive drab.

New issue bombs have an olive drab body, yellow bands, and yellow identification markings.

"Old" Series Bombs

The AN–M41 bomb, which is the earlier model, differs from the AN–M41A1 in length. A change in construction added a

½-inch shoulder to the nose of the bomb to facilitate clustering with unfuzed bombs; this change in design alone constitutes the A1 modification. The AN–M41 bomb, when issued in cluster form, always is fuzed.

Assembly

1. This bomb is usually furnished in clusters which are completely assembled except for the fuzes.

CAUTION: Fuzes are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

2. Remove the bomb closing plug. Inspect the threads and clean, if necessary.

3. Remove the fuze from its container and examine it carefully for serviceability.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

4. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed, and to chapter 8 for the assembly of bomb clusters.

90-LB FRAG BOMB M82

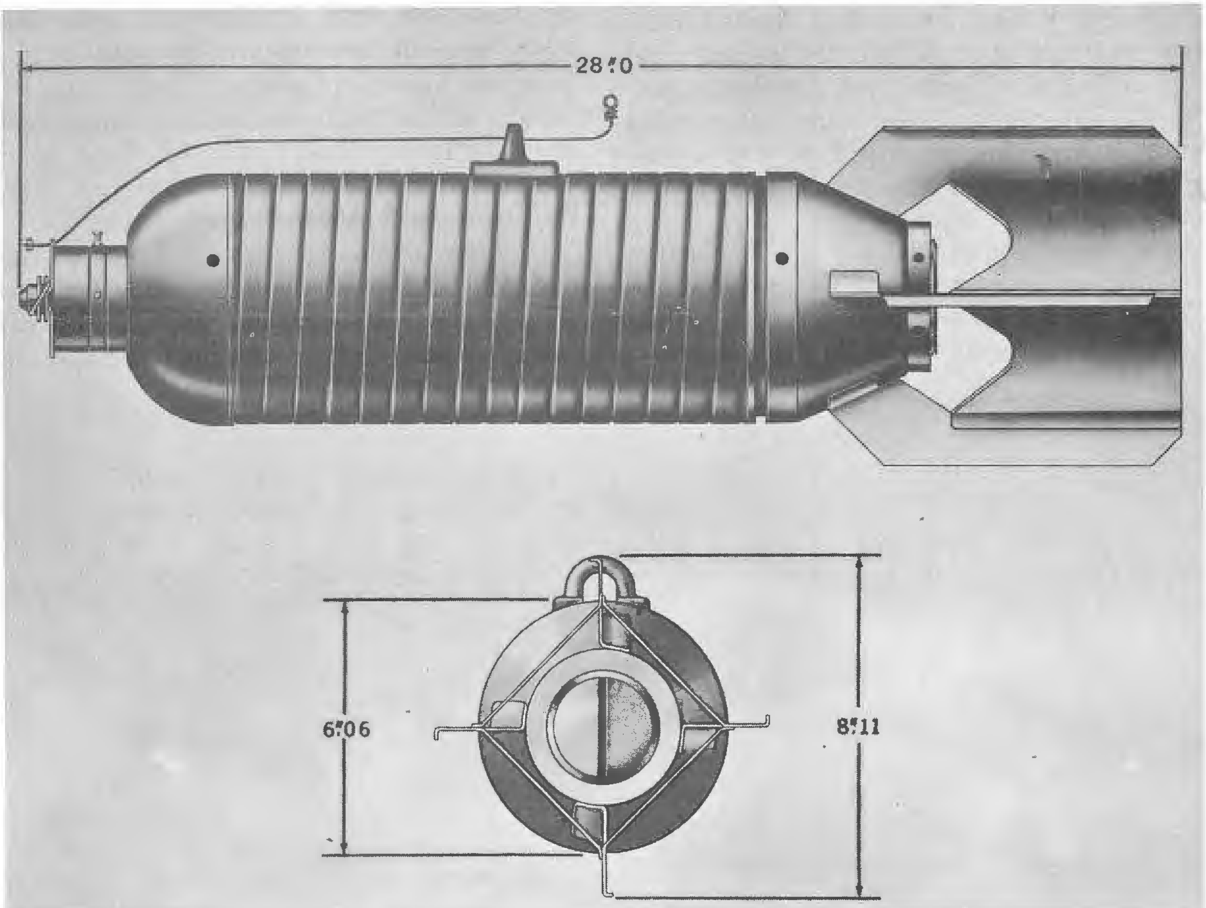


Figure 7–6.—90-lb Frag Bomb M82, Exterior View.

Model	M82
Assembly Drawing No.	82–0–105
Fin Assembly	M101
Length of Assembled Bomb (in.)	28.0
Body Diameter (in.)	6.06
Fin Span (in.)	8.11
Weight of Explosive Charge (lb)	
Composition B	12.3
TNT	11.4
Weight of Fin Assembly (lb)	2.46
Weight of Assembled Bomb (lb)	
Loaded with Composition B	86.6
Loaded with TNT	87.4
Arming-Wire Assembly	Mk 1 or AN–M6A2
Nose Fuze	AN–M103A1, AN–M139A1, AN–M140A1, AN–M166 (VT), AN–M168 (VT)*
Bomb Cluster	M27A1
Cluster Adapter	M14A1

*Short Vane Assembly (dwg 73–8–281) used when clustering bombs.

General Description

The 90-lb Frag Bomb M82, now obsolescent, is constructed of spirally wound wire. A seamless steel inner tube forms the base for the outer wound steel wire. A rounded nose piece houses the nose fuze, and a box-type fin assembly is attached to the tapered aft end by a fin locknut.

The bomb is designed for use in clusters and for single suspension. It has only one suspension lug welded to its casing. When adapted for single suspension, instantaneous or VT fuzes are used. The fitting of a mechanical time fuze is permitted with the addition of an adapter-booster.

Approximately 13 percent of the complete weight of the bomb consists of composition B or TNT.

Painting and Marking

Old-issue bombs have yellow bands on the nose end and aft end of the bomb body to identify the high-explosive charge. Identifying nomenclature is stenciled in black on

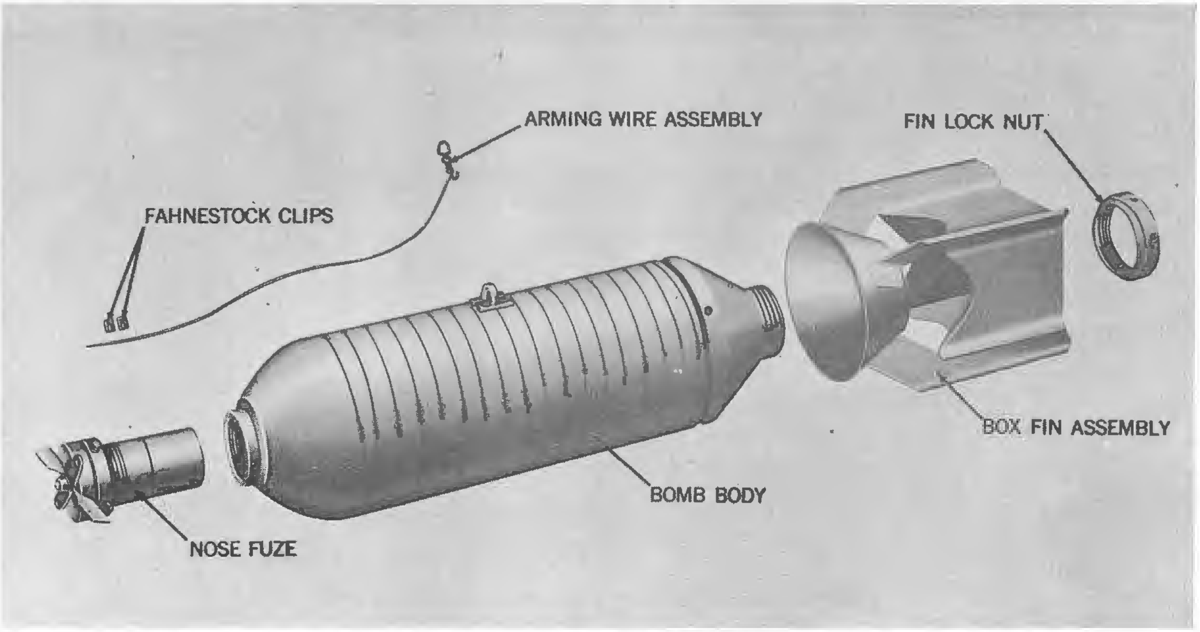


Figure 7–7.—90-lb Frag Bomb M82, Exploded View.

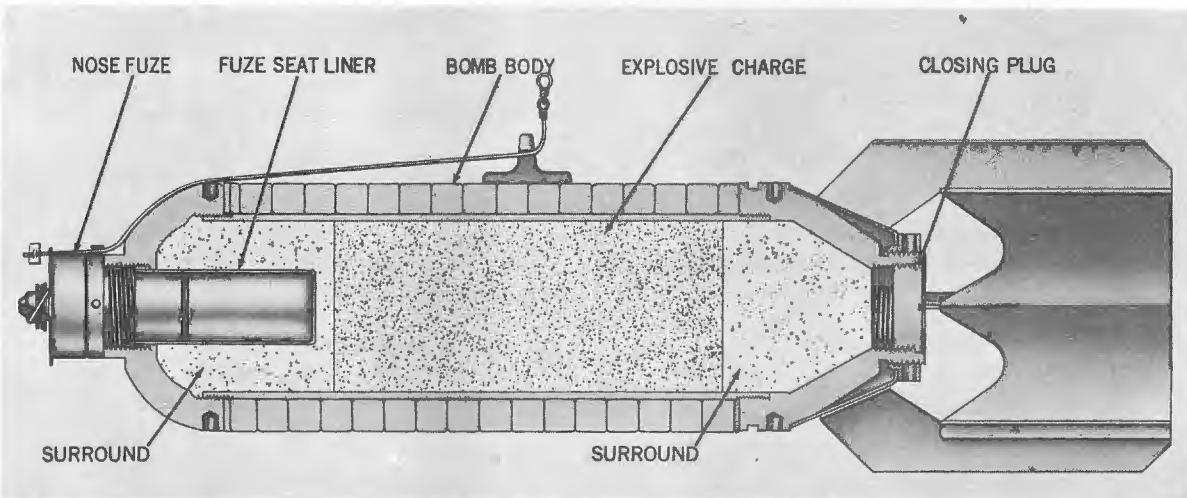


Figure 7–8.—90-lb Frag Bomb M82, Cross Section.

the olive drab painted bomb casing.

New-issue bombs have olive drab bodies, yellow bands, and yellow identification markings.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the shipping bands from the bomb by removing the nut from the securing bolts. Remove the closing plug from the nose end. Inspect for damage, cracks, or broken weldments which might weaken the lug or its attachment to the bomb body.
2. Cut the shipping wire and remove the fin locknut and its protector. Remove the protector from the locknut.
3. Remove the fin assembly and its attachments from the shipping crate. Position the fin on the bomb so that it will clear the aircraft and the ground when installed. Replace the fin locknut and tighten it with a wrench.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb.

4. Install the bomb in accordance with the type of rack in use, and lock it securely in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.
5. Remove the required fuze and arming wire assembly from their containers and examine them carefully for serviceability. All fuzes must have their safety devices (cotter, shear, and arming pins) in place. If any safety device is missing, handle the fuze with extreme care. Return it to its container and mark the container for disposal by authorized personnel.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed, and to chapter 8 for the assembly of bomb clusters.

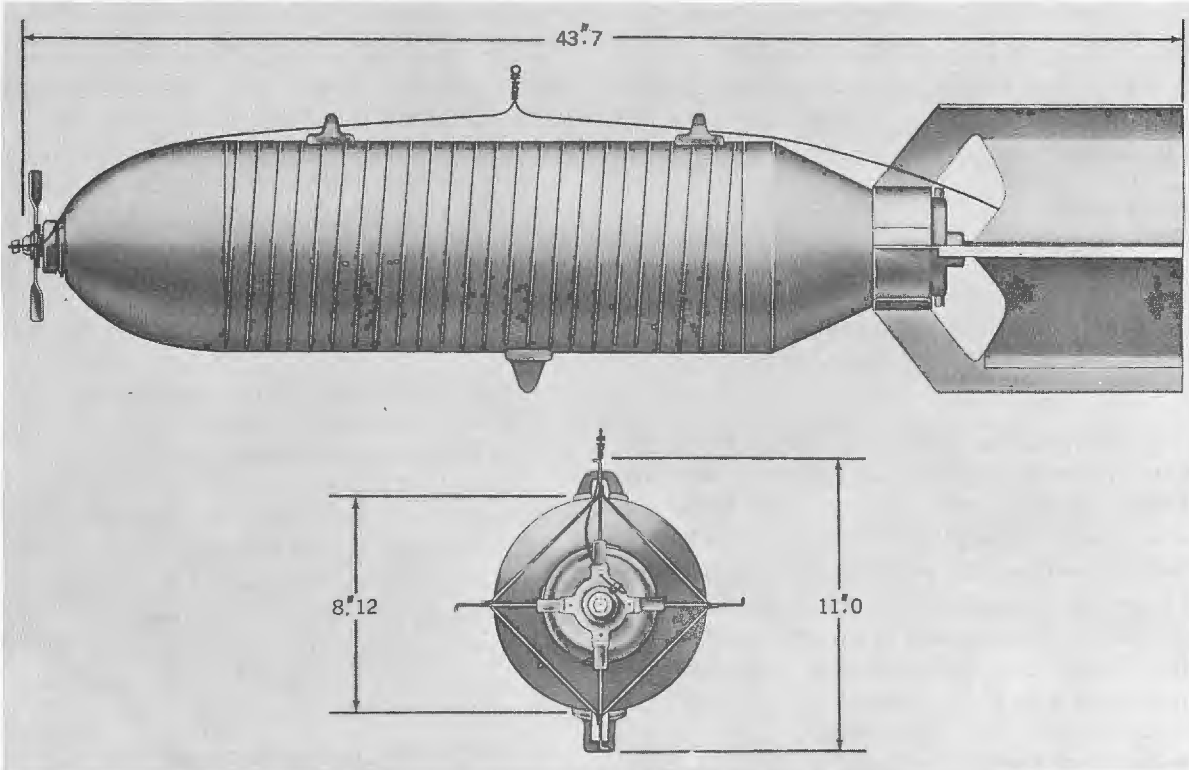


Figure 7–9.—220-lb Frag Bomb AN–M88 with Fin Assembly AN–M103A1, Exterior View.

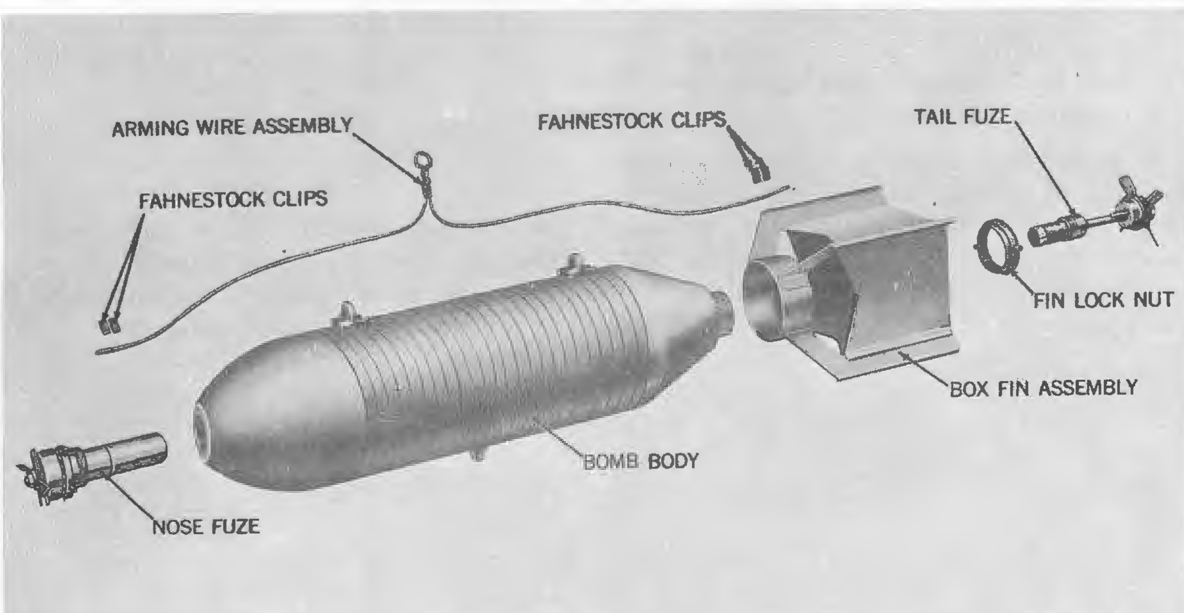


Figure 7–10.—220-lb Frag Bomb AN–M88 with Fin Assembly AN–M103A1, Exploded View.

220-LB FRAG BOMB AN-M88

	WITH FIN ASSEMBLY AN-M103A1	WITH FIN ASSEMBLY M135
Model	AN-M88	AN-M88.
Assembly Drawing No	82-0-132.	
Fin Assembly Drawing No	82-3-437	82-3-778.
Length of Assembled Bomb (in.)	43.7	58.0.
Body Diameter (in.)	8.12	8.12.
Fin Span (in.)	11.0	11.19.
Weight of Explosive Charge (lb):		
Composition B	41.4	41.4.
Ednatol	41.2	41.2.
TNT	41.2	41.2.
Weight of Fin Assembly (lb)	4.1	17.5.
Weight of Assembled Bomb (lb):		
Loaded with Composition B	216.2	229.6.
Loaded with Ednatol	217.7	231.1.
Loaded with TNT	217.7	231.1.
Fin Locknut	M1 or Mk 2 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 1 or AN-M6A2	Mk 1 or AN-M6A2, and M13.
Nose Fuze	AN-M103A1, AN-M139A1, AN-M140A1, AN-Mk 219 [1] Mods 3, 4; AN-M166 (VT), AN-M168 (VT).	AN-M103A1, AN-M139A1, AN-M140A1, AN-Mk 219 [1] Mods 3, 4; AN-M166 (VT), AN-M168 (VT).
Tail Fuze	AN-M100A2 (with Primer-Detonator M14 (nondelay)).	M172, AN-M175.

[1] Requires Adapter Ring (dwg 294376-2 and Auxiliary Booster Mk 4.

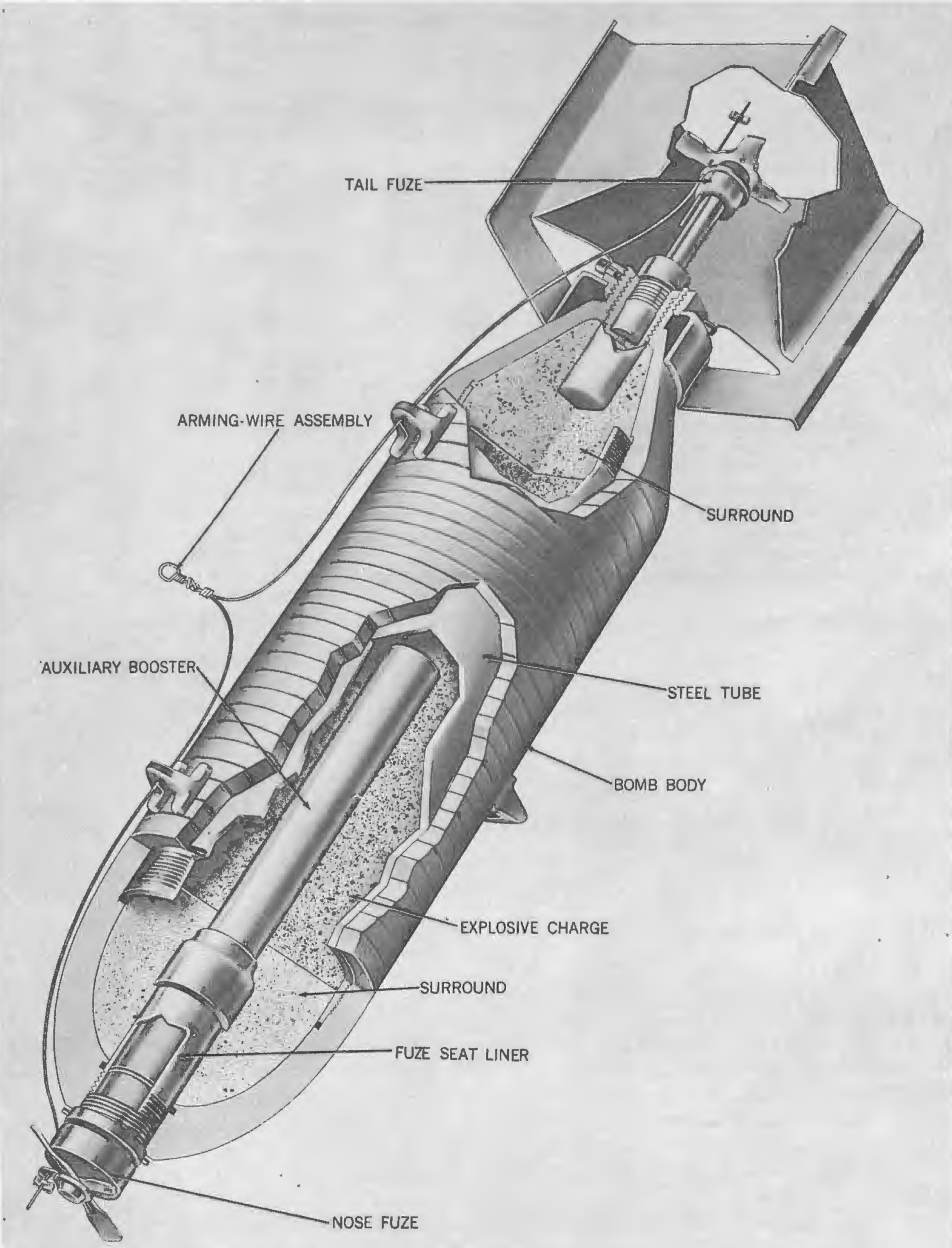


Figure 7–11.—220-lb Frag Bomb AN–M88 with Fin Assembly AN–M103A1, Cutaway View.

220-LB FRAG BOMB AN–M88 WITH FIN ASSEMBLY AN–M103A1

General Description

The 220-lb Frag Bomb AN–M88 has a body constructed of spirally wound $^{13}/_{16}$-inch square steel wire. A seamless steel tube forms the base for the outer wrapping. The steel wire winding is forged at the nose and tail to form solid nose and tail sections. A box-type fin is secured to the aft end by a fin locknut. The nose and tail sections are threaded to accommodate nose and tail fuzes.

Two suspension lugs are welded 14 inches apart on one side of the bomb body; a single lug is attached to the opposite side at the approximate center of gravity.

The explosive charge comprises approximately 19 percent of the complete weight of the bomb.

Painting and Marking

Older issues of Frag Bomb AN–M88 have yellow bands on the nose and aft end of the bomb body to identify its high-explosive filler of composition B, Ednatol, or TNT. When filled with composition B, nose and tail surrounds of TNT are employed. Identifying nomenclature is stenciled in black on the olive drab colored bomb casing.

Newer issues of the bomb have olive drab bodies, yellow bands, and yellow markings.

"Old" Series Bombs

The 260-lb Frag Bomb AN–M81 is an earlier modification of the AN–M88; it is heavier because of its thicker windings. Both bombs have the same outside diameter; however, the larger explosive cavity of the AN–M88 contains about 5 pounds more explosive filler. The physical characteristics of the two bombs are otherwise similar.

The 260–lb bomb is more effective for fragmentation effect than an equivalent bomb station load of 500-lb GP bombs, 100-lb GP bombs, and 20-lb frag bombs, except for the casualty effect on unprotected personnel by the 20-lb frag bomb when released from altitudes up to 10,000 feet. The 200-lb fragmentation bomb compares similarly in effectiveness with the 260-lb fragmentation bomb, with an overall increase of fragmentation effect under all conditions.

The Frag Bomb AN-M88 has been modified with an alternate lug suspension system that allows the bomb to be suspended from all current Navy bomb racks including multiple station bomb racks such as the A/A 37B-1 Multiple Bomb Rack. Modification of the Bomb entails removal of the center suspension lug and the addition of the alternate suspension system composed of special forged steel lugs (Federal Stock Number 1325-050-8359) that are fastened to the bomb with special banding straps. The straps are secured with flange-type seals. The bombs with this alternate suspension system are marked as follows: 220-Lb Frag Bomb AN-M88 (with banded lugs).

Before using a bomb with banded lugs, a visual inspection of the lugs, the strapping material, and the seals should be made. If the strapping material or the seals are loose, deformed, or broken, or if excessive corrosion is noted on these parts, the bomb should not be used nor should any attempt be made to repair it. Return the bomb to the issuing activity.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. When unpacked and not used, fuzes are to be returned to their original packing.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire and remove the fin locknut and discard it with its protector. Remove the protector from the locknut.
3. Remove the fin assembly and its attachment from the shipping crate. Position the fin on the bomb so that it will clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten

it with a wrench. Always use Fin Locknut M1 or Mk 2 Mod 0 in place of the regular fin locknut. Clean all threaded surfaces on the after end of the bomb before installing the fin assembly.

CAUTION: Reject any fin assembly which is cracked, deformed, or which cannot be properly secured to the bomb.

4. Remove the nose and tail shipping plugs and inspect the fuze cavities to be sure they are free from rust and corrosion.
5. Install the bomb on the aircraft and lock it securely in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.
6. Remove the required fuze and arming wire assembly from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

7. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

220-LB FRAG BOMB AN–M88 WITH FIN ASSEMBLY M135

General Description

When equipped with the conical fin assembly M135, the 220-lb Frag Bomb AN–M88 uses the standard AN–M88 bomb body. This elongated conical fin assembly lengthens and streamlines the bomb, improving its aerodynamic performance and accuracy.

The M135 fin assembly consists of an elongated cone with four integral blades spaced at equal distances. A support tube runs through the center of the cone; the fin assembly is secured to the bomb body by means of this support tube, a locking web, and a locknut. Installation of the M135 conical fin assembly requires the use of one of the new long-stem tail fuzes to locate the arming vane effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire. Remove and discard the fin locknut and its protector.
3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat). Tighten the tube with a wrench and tighten the setscrews in the support tube. Place the fin cone over the support tube. Slide the cone back until it is jammed against the bomb body. Position the fin assembly so that it will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the blades of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut,

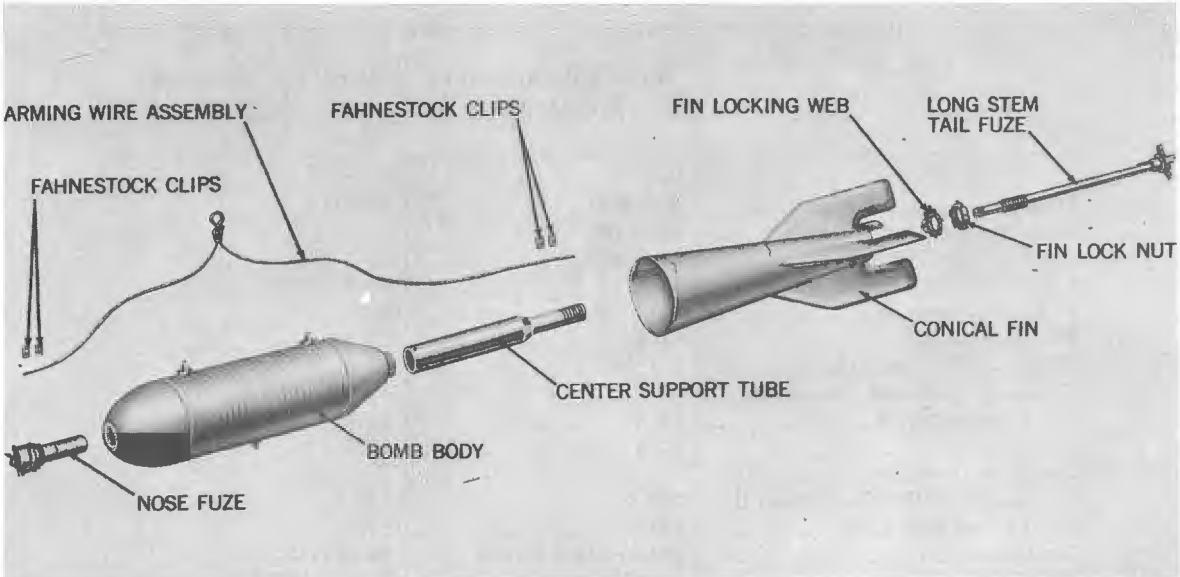


Figure 7–12.—220-lb Frag Bomb AN–M88 with Fin Assembly M135, Exploded View.

and tighten the locknut with special notched wrench. Bend two tabs of the locking web into the locknut slots. Secure the nut in position by means of setscrews.

4. Install the bomb on the aircraft and lock it securely in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.

5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the comdition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

260-LB FRAG BOMB AN–M81

	With Fin Assembly AN–M103A1	With Fin Assembly M135
Model	AN–M81	AN–M81.
Assembly Drawing No	82–0–102.	
Fin Assembly Drawing No	82–3–437	82–3–778.
Length of Assembled Bomb (in.)	43.7	58.0.
Bomb Diameter (in.)	8.13	8.13.
Fin Span (in.)	11.0	11.19.
Weight of Fin Assembly (lb)	4.1	17.5.
Weight of Explosive Charge (lb):		
Composition B	36.2	36.0.
TNT	34.5	34.5.
Weight of Assembled Bomb (lb):		
Loaded with Composition B	263.0	276.5.
Loaded with TNT	261.5	275.0.
Fin Locknut	M1 or Mk 2 Mod 0	Sk 329153.
Fin Locking Web	Not Used	Dwg 1350522.
Arming-Wire Assembly	Mk 2	Mk 2.
Nose Fuze	AN–M103A1, AN–M145,[1] AN–M166 (VT), AN–M168 (VT).	AN–M103A1, AN–M145,[1] AN–M166 (VT), AN–M168 (VT).
Tail Fuze	AN–M100A2 (with Primer-Detonator M14 (nondelay)).	M172 or AN–M175 (with Primer-Detonator M14 (nondelay)).

[1] Requires Adapter Booster M117

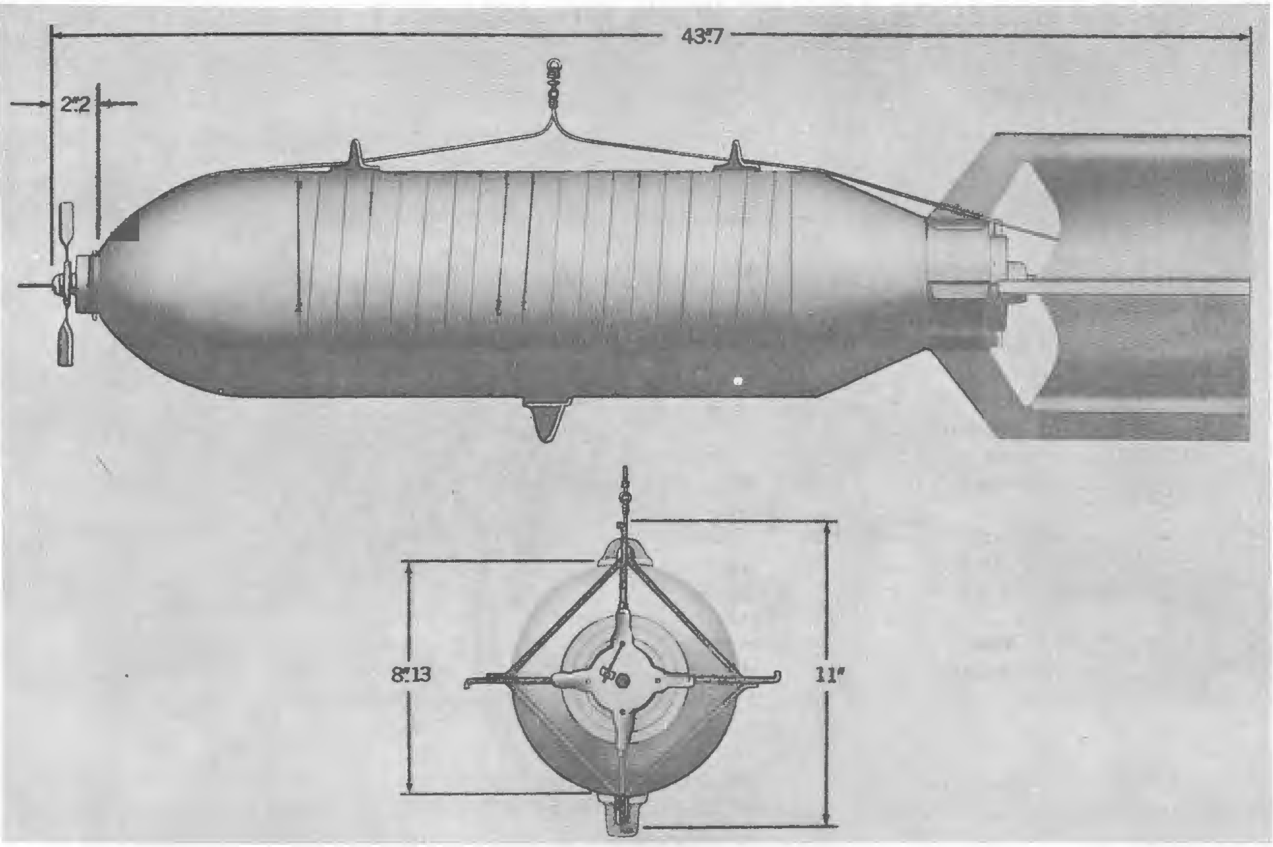


Figure 7–13.—260-lb Frag Bomb AN–M81 with Fin Assembly AN–M103A1, Exterior View.

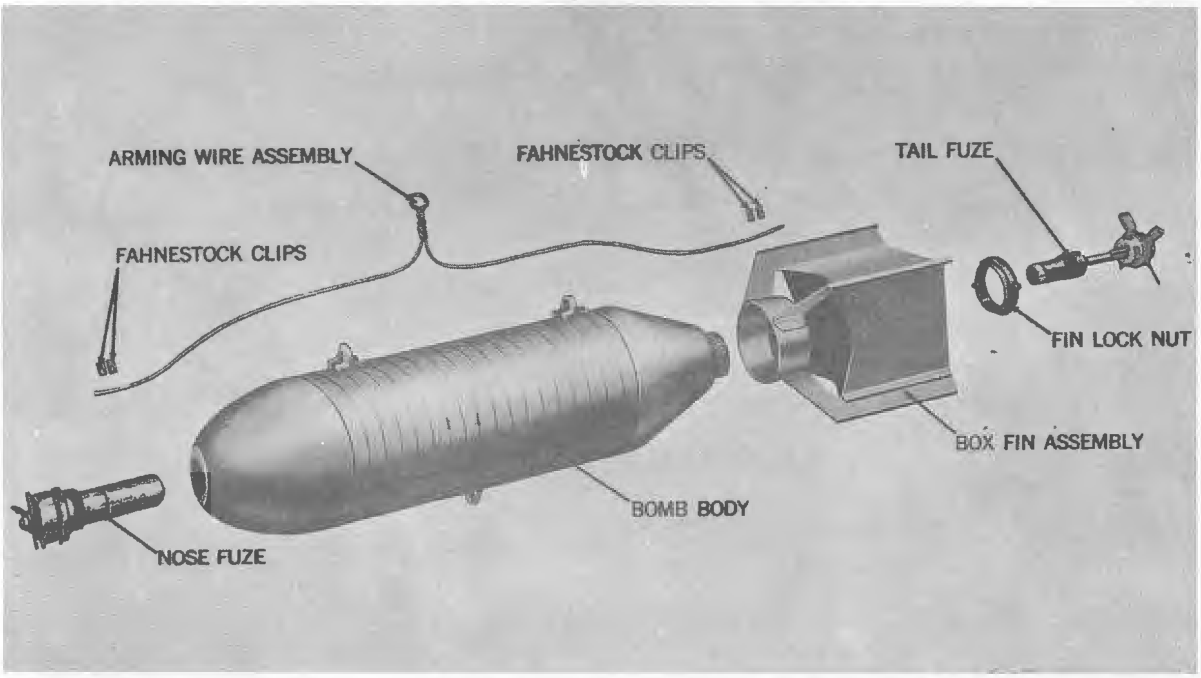


Figure 7–14.—260-lb Frag Bomb AN–M81 with Fin Assembly AN–M103A1, Exploded View.

260-LB FRAG BOMB AN–M81 WITH FIN ASSEMBLY AN–M103A1

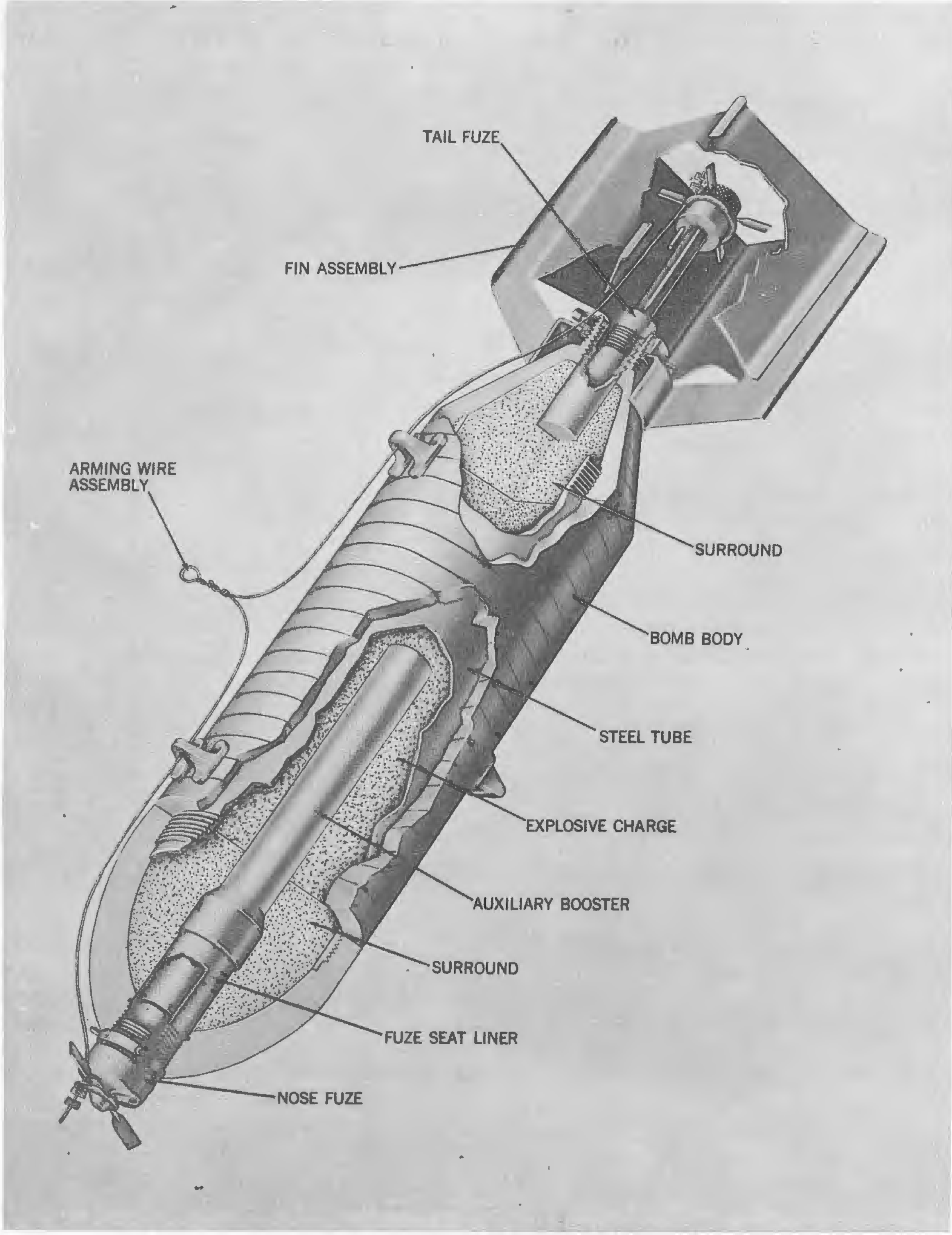


Figure 7–15.—260-lb Frag Bomb AN–M81 with Fin Assembly AN–M103A1, Cutaway View.

General Description

The 260-lb Frag Bomb AN–M81 has a body constructed of spirally wound 1-inch square steel wire. A seamless steel tube forms the basis for the outer wrapping. The steel wire winding is forged at the nose and tail to form solid nose and tail sections. A box-type fin is secured to the aft end by a fin locknut. The nose and tail sections are threaded to accommodate nose and tail fuzes.

Two suspension lugs are welded 14 inches apart on one side of the bomb body; a single lug is attached to the opposite side at the approximate center of gravity.

The explosive charge comprises approximately 13 percent of the complete weight of the bomb.

Painting and Marking

Older issues of the bomb have yellow bands on the nose and aft end of the body to identify its high-explosive filler of composition B or TNT. When filled with composition B, nose and tail surrounds of TNT are employed. Identifying nomenclature is stenciled in black on the olive drab colored bomb casing.

Newer issues of the bomb have olive drab bodies, yellow bands, and yellow markings.

New Series Bombs

The 220-lb Frag Bomb AN–M88 is a later modification of the AN–M81; it is lighter because of its thinner windings. Both bombs have the same outside diameter; however, the smaller explosive cavity of the AN–M81 contains about 5 pounds less explosive filler. The physical characteristics of the two bombs are otherwise similar.

The 260-lb Frag Bomb AN–M81 is more effective for fragmentation effect than an equivalent bomb station load of 500-lb GP bombs, and 20-lb frag bombs, except for the casualty effect on unprotected personnel by the 20-lb frag bomb when released from altitudes up to 10,000 feet. The 220-lb fragmentation bomb compares similarly in effectiveness with the 260-lb fragmentation bomb, with an overall increase of fragmentation effect under all conditions.

The Frag Bomb AN-M81 has been modified with an alternate lug suspension system that allows the bomb to be suspended from all current Navy bomb racks including multiple station bomb racks such as the A/A37B-1 Multiple Bomb Rack. Modification of the bomb entails removal of the center suspension lug and the addition of the alternate suspension system composed of special forged steel lugs (Federal Stock Number 1325-050-8359) that are fastened to the bomb with special banding straps. The straps are secured with flange-type seals. The bombs with this alternate suspension system are marked as follows: 226-LB Frag Bomb AN-M81 (with banded lugs).

Before using a bomb with banded lugs, a visual inspection of the lugs, the strapping material, and the seals should be made. If the strapping material or the seals are loose, deformed, or broken, or if excessive corrosion is noted on these parts, the bomb should not be used nor should any attempt be made to repair it. Return the bomb to the issuing activity.

Assembly

> CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. When unpacked and not used, fuzes are to be returned to their original packing.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire and remove the fin locknut and discard it with its protector. Remove the protector from the locknut.
3. Remove the fin assembly and its attachment from the shipping crate. Position the fin on the bomb so that it will clear the aircraft structure and the ground when installed. Replace the fin locknut and tighten it with a wrench. Always use Fin Locknut M1 in place of the regular fin locknut. Clean all threaded surfaces on the after end of the bomb before installing the fin assembly.

CAUTION: Reject any fin assembly which is cracked, deformed, or which cannot be properly secured to the bomb.

4. Remove the nose and tail shipping plugs and inspect the fuze cavities to be sure they are free from rust and corrosion.

5. Install the bomb on the aircraft and lock it securely in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the the bomb is hoisted into place on the rack.

6. Remove the required fuze and arming wire assembly from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

7. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

260-LB FRAG BOMB AN-M81 WITH FIN ASSEMBLY M135

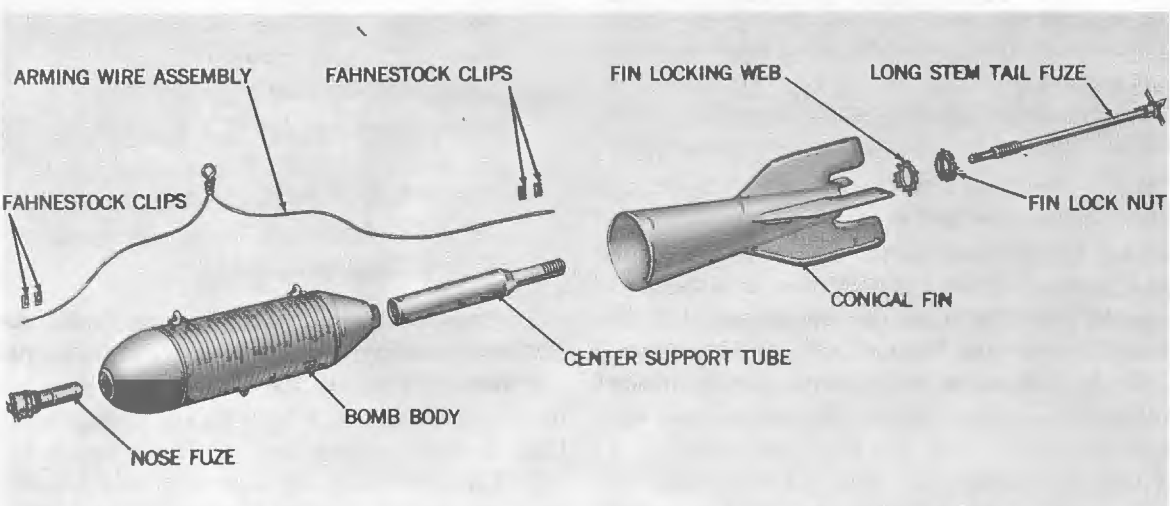


Figure 7–16.—260-lb Frag Bomb AN–M81 with Fin Assembly M135, Exploded View.

General Description

When equipped with the conical fin assembly M135, the 260-lb Frag Bomb AN–M81 uses the standard AN–M81 bomb body. This elongated conical fin assembly lengthens and streamlines the bomb, improving its aerodynamic performance and accuracy.

The M135 fin assembly consists of an elongated cone with four integral blades spaced at equal distances. A support tube runs through the center of the cone; the fin assembly is secured to the bomb body by means of this support tube, a locking web, and a locknut. Installation of the M135 conical fin assembly requires the use of one of the new long-stem tail fuzes to locate the arming vane effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Remove the closing plugs. Inspect for damage, cracks, or broken weldments which might weaken the lugs or their attachment to the bomb body.
2. Cut the shipping wire. Remove and discard the fin locknut and its protector.
3. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the base plug of the bomb (locknut seat). Tighten the tube with a wrench and tighten the setscrews in the support tube. Place the fin cone over the support tube. Slide the cone back until it is jammed against the bomb body. Position the fin assembly so that it will clear the aircraft structure and the ground when installed. Place the fin locking web over the support tube so that it engages the blades of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut, and tighten the locknut with the special notched wrench. Bend two tabs of the locking web into the locknut slots. Secure the nut in position by means of setscrews.
4. Install the bomb on the aircraft and lock it securely in place. If the bomb bay does not provide enough space for fuzing, this operation will be performed before the bomb is hoisted into place on the rack.
5. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If the fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable and shall be turned over to a bomb disposal officer. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes shall be carefully examined for serviceability.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

6. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuze to be installed.

Chapter 8

FRAGMENTATION BOMB CLUSTERS AND ADAPTERS

100-LB FRAG BOMB CLUSTER AN–M1A2

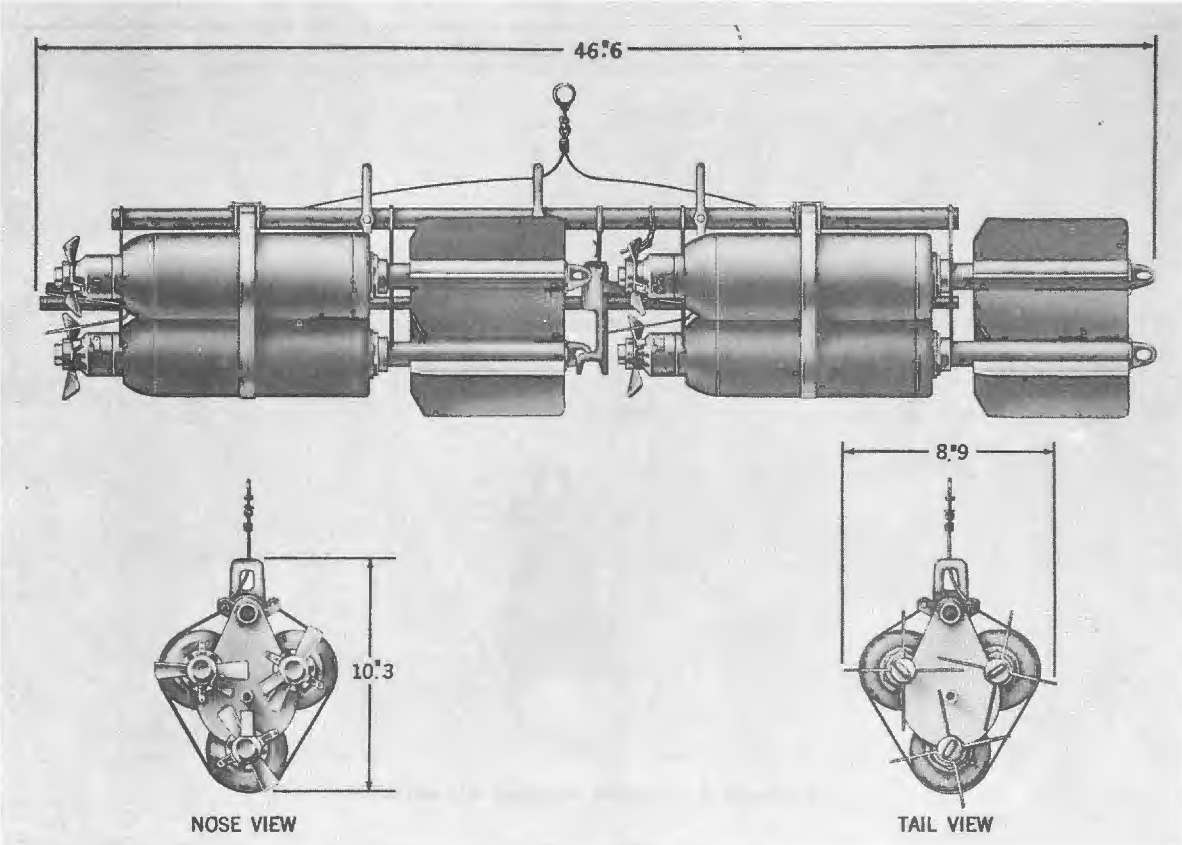


Figure 8–1.—100-lb Frag Bomb Cluster AN–M1A2.

Model	AN–M1A2
Assembly Drawing No.	82–0–69
Length of Cluster (in.)	46.6
Width of Cluster (in.)	8.9
Height of Cluster (in.)	10.3
Cluster Adapter	
Model	AN–M1A3
Length (in.)	38.25
Frag Bombs	
Model	AN–M41A1
Number Required	6
Weight of Each Bomb (lb)	20.0
Weight of Cluster (lb)	128.0
Nose Fuzes	
Model	AN–M110A1 or AN–M158
Number Required	6

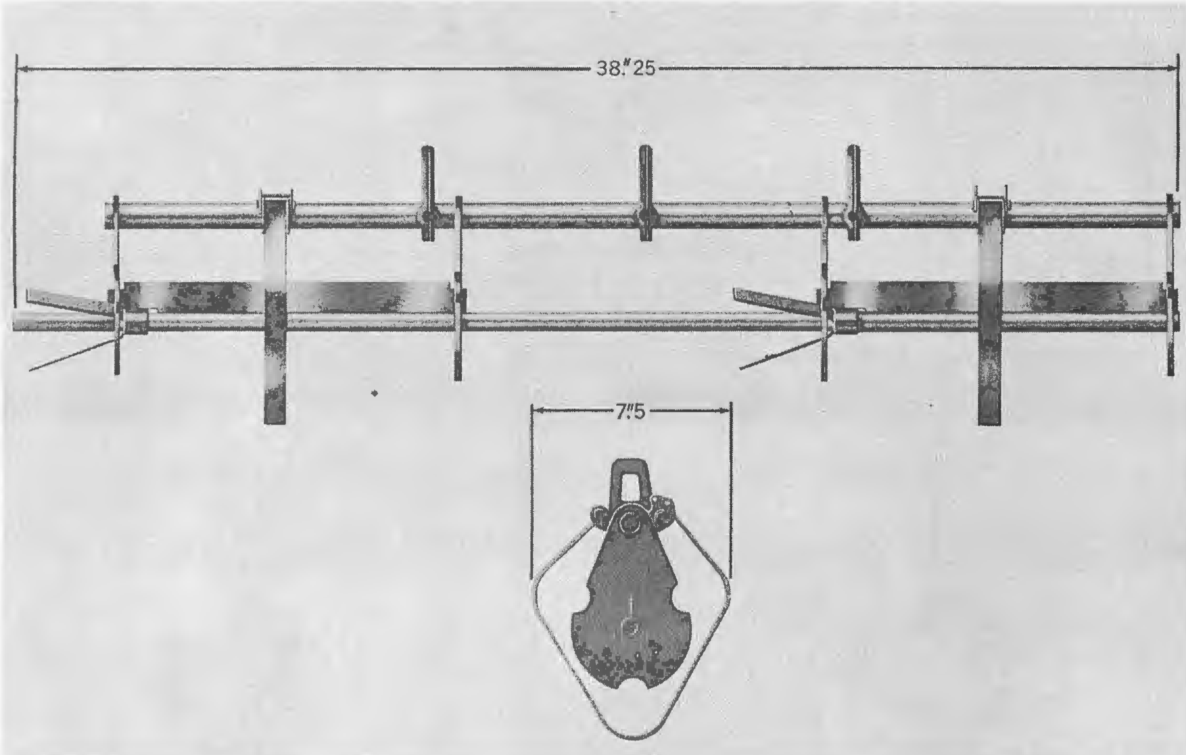


Figure 8-2.—Cluster Adapter AN–M1A3.

General Description

The 100-lb Frag Bomb Cluster AN–M1A2, now obsolete, consists of six 20-lb AN–M41A1 frag bombs assembled in an AN–M1A3 cluster adapter. The AN–M1A3 is a "quick-opening frame," mechanical type of adapter which holds the bombs in two banks of three bombs each and releases them upon withdrawal of the arming wires.

The bomb cluster is issued with individual bombs assembled but unfuzed; fuzing is performed before the cluster is installed in the aircraft.

The AN–M1A3 cluster adapter has four sheet metal bomb supports spaced at intervals on two tubes. Three flat steel suspension lugs and two side plates are attached to the upper tube. Two spring strips are fitted to the bottom tube. Fuze vane lock springs fit into a ferrule in front of the spring strips. Three lock springs pass through the front support and three through the third support. The fuze vane lock springs prevent the rotation of the fuze arming vanes while the bombs are in the cluster.

Two metal straps hold the bombs in place against the adapter; their free ends are locked in place by a toggle strap clamp secured by the arming wire. When the cluster is released armed, the arming wire is pulled out, the strap clamp opens, and the bombs are freed from the adapter. The spring strip aids in forcing the bombs away from the adapter. Flat steel lugs located on the upper tube provide for one or two point (14-inch) suspension.

Painting and Marking

Identifying nomenclature is stenciled in black on the face of the forward support. The high-explosive contents are identified by the yellow head and base of each of the 20-lb frag bombs.

Differences Between Frag Bomb Clusters AN–M1A2 and AN–M1A1

The difference between frag bomb cluster

AN–M1A2 and frag bomb cluster AN–M1A1 lies in the cluster adapters. The AN–M1A2 cluster is the only one of this series that is issued unfuzed. The AN–M1A1 cluster uses the M1A2 or M1A1 cluster adapter which has narrow U-type suspension lugs; with these lugs, the complete weight of the cluster is only 125 pounds.

Assembly

CAUTION: Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

1. Unpack the cluster and its components.

CAUTION: Upon opening the box, inspect the clusters to be sure that the fuze safety devices are in place. If a fuze is armed, the cluster will be destroyed by authorized and qualified personnel. Binding straps which hold the bombs in place should be tight and unbroken. Broken straps may be replaced and the cluster used.

2. Thread one branch of the arming wire through the forward suspension lug and through the holes in the front release mechanism.
3. Thread the other branch of the arming wire through the rear lug and release mechanism.
4. Place two safety clips at each end of the arming wire; cut off excess wire.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

5. Pull up the suspension lugs and fasten them with the cotter pins supplied.
6. Assemble the nose fuzes to the bombs according to the procedure outlined in chapter 2.
7. Install the cluster and remove the cotter pins from the release mechanism.
8. If the cluster is not dropped, replace all pins and tapes before repacking the cluster for storage.

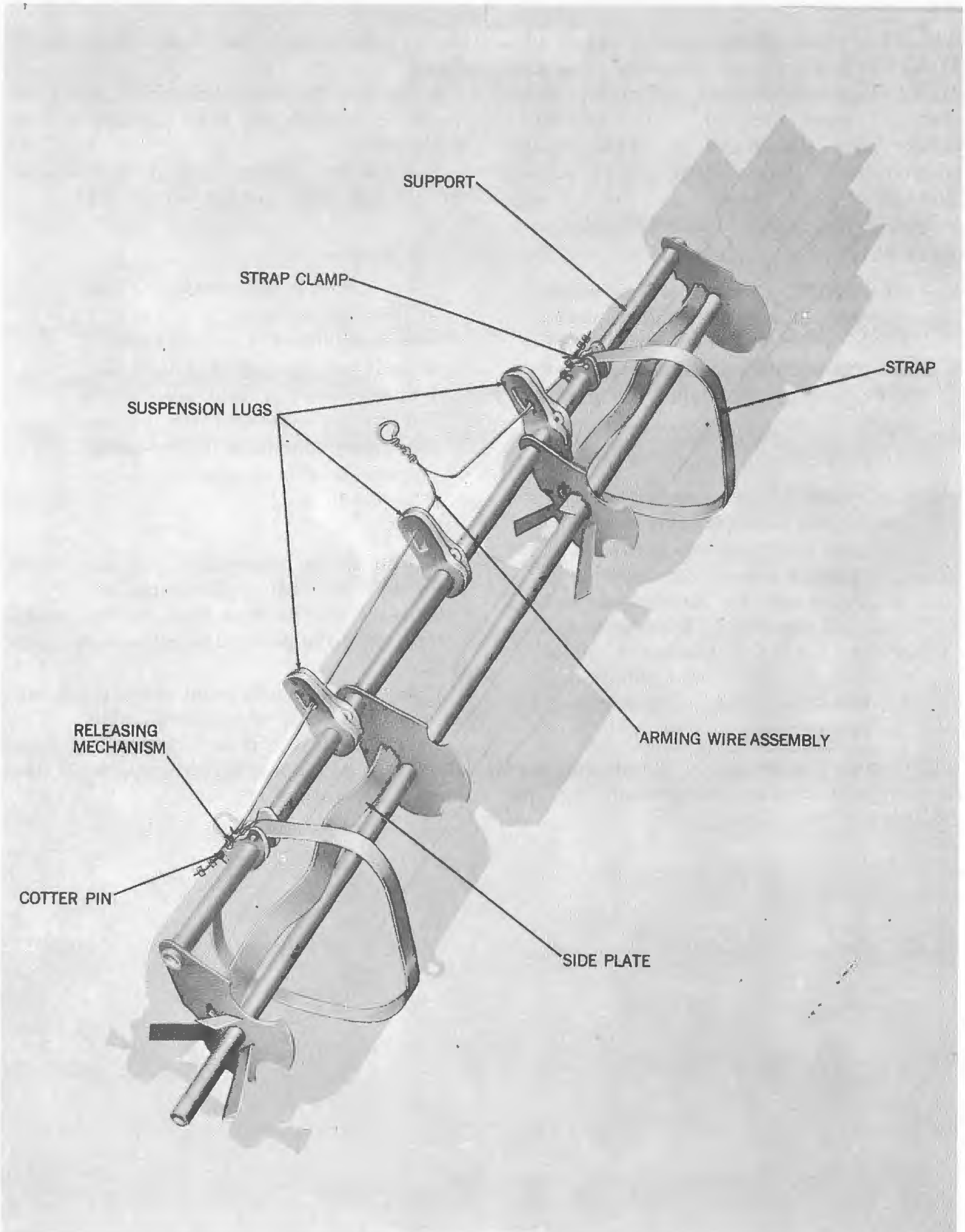


Figure 8–3.—100-lb Frag Bomb Cluster AN–M1A2, Perspective View.

100-LB FRAG BOMB CLUSTER M28A2

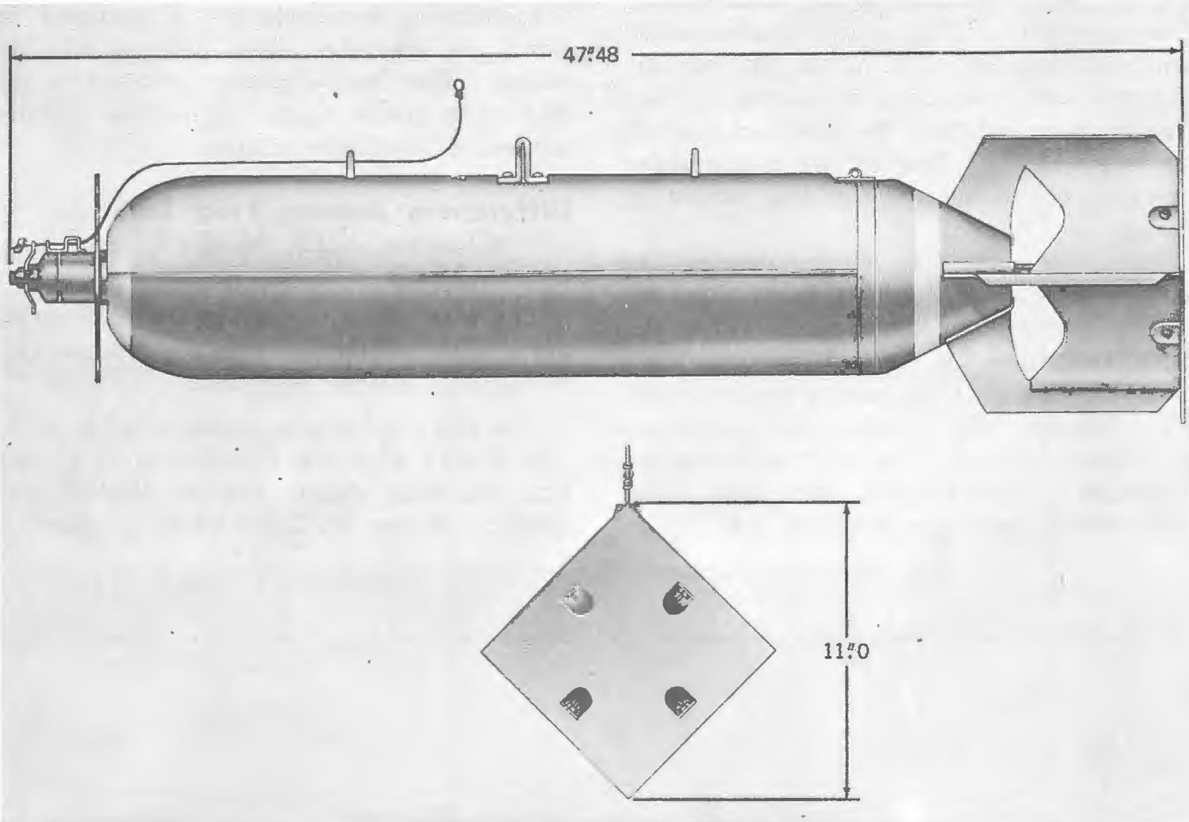


Figure 8–4.—100-lb Frag Bomb Cluster M28A2, Exterior View.

Model	M28A2
Assembly Drawing No.	82–0–107
Length of Cluster (in.)	47.48
Diameter (in.)	8.0
Cluster Adapter	
Model	M15A2
Length (in.)	43.67
Fin Span (in.)	11.0
Frag Bombs	
Model	M83
Number Required	24
Weight of Each Bomb (lb)	3.81
Weight of Cluster (lb)	115.7
Fuze (Cluster-Opening)	AN–M146A1
Bushing, Case Locking	438075

General Description

The 100-lb Frag Bomb Cluster M28A2 consists of 24 four-lb M83 frag bombs assembled in an M15A2 cluster adapter. The M15A2, an aimable type adapter, is bomb-like in appearance and has a standard type fin. It holds the frag bombs in eight banks of three each.

Loading and dispersal of bombs is accomplished through a hinged lid on the adapter which is held in place by a nose locking cup.

A spoiler ring is held in place against the nose of the adapter by the nose fuze, and a drag plate is secured to the fin assembly. Two suspension lugs, spaced 14 inches apart, protrude through slots in the lid section. If single hook suspension is desired, the two lugs are removed from the case and a single lug is attached by four screws to the upper surface of the adapter at the center of gravity.

When the cluster is released armed, the arming wire is withdrawn from the time fuze, allowing the fuze to arm. When the designated time has elapsed the fuze functions, blowing the nose locking bushing rearward into the adapter case and permitting the cluster to open. The 24 frag bombs are dispersed by spring action when their wings open and project them into the air.

Painting and Marking

Identifying nomenclature is stenciled in black on the olive drab painted adapter casing. The high-explosive content is indicated by yellow bands on the nose and aft section of the cluster adapter.

Differences Among Frag Bomb Clusters M28, M28A1, and M28A2

The frag bomb clusters in the M28 series are similar to each other in appearance, differing only in their adapters.

The M28 cluster uses cluster adapter M15; the M28A1 uses the M15A1 (with spoiler ring and drag plate); and the M28A2 uses cluster adapter M15A2 (which contains a

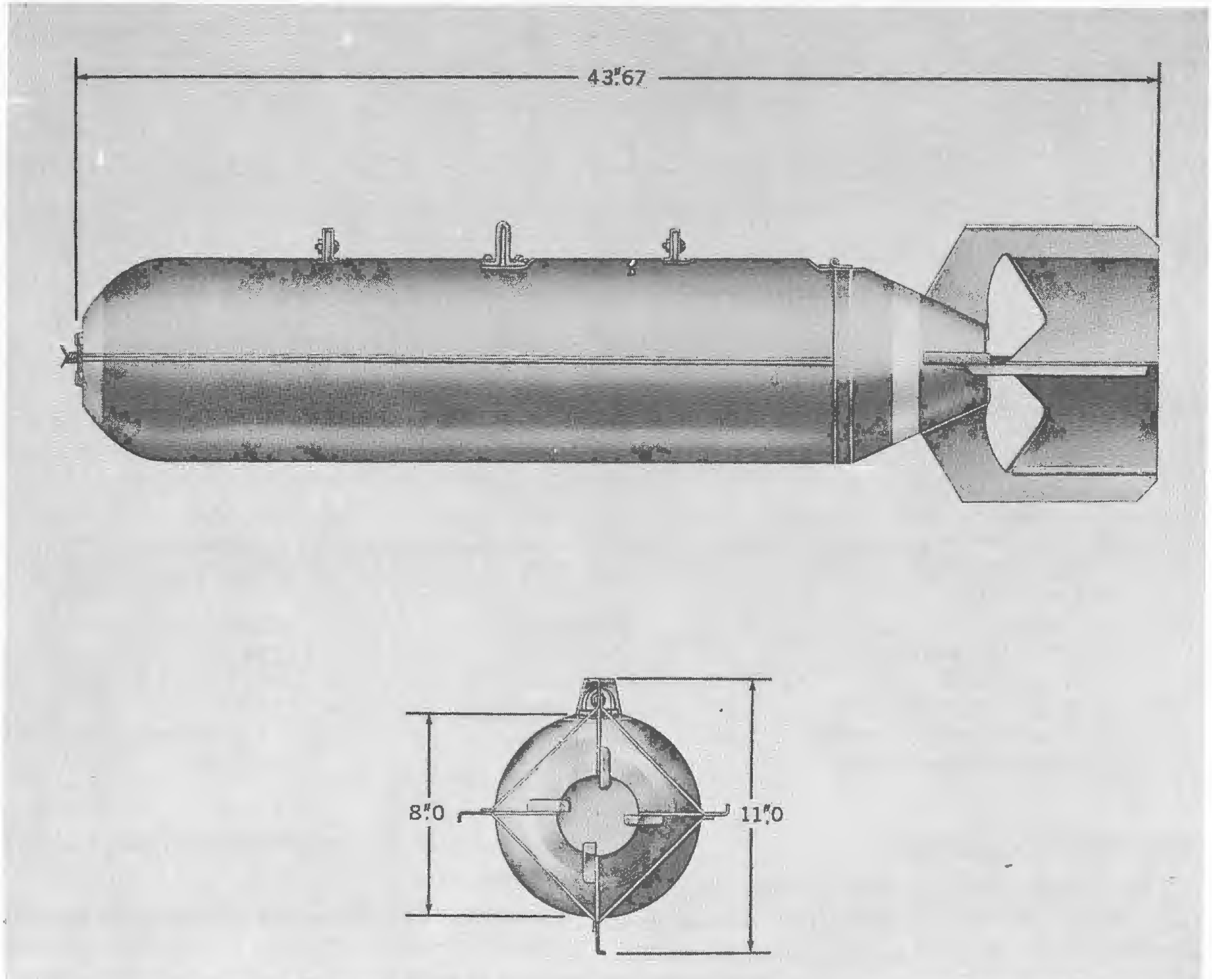


Figure 8–5.—Cluster Adapter M15A2.

new case locking bushing in addition to the spoiler ring and drag plate).

Assembly

CAUTION: Do not disassemble the cluster or any of its components.

CAUTION: Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

1. Unpack the cluster and its components. As issued, the cluster contains 24 M83 frag bombs.
2. Support the cluster in a horizontal position so that the tail fin is several inches above the ground.
3. Fit the drag plate over the tail fin so that one ear rests against the outside of each fin blade.
4. If holes are not drilled in the tail fin to accommodate the drag plate, drill holes with a No. 30 drill (0.128 inch in diameter). Use the holes in the drag plate ears as guides.
5. Screw the drag plate to the fin with the self-tapping screws that are issued with the drag plate. Tighten the screws securely.
6. Unthread the bolts and remove the L-shaped protectors from the suspension lugs. For single suspension, remove the double suspension lugs from the cases and attach the single lugs to the bomb cases with the screws provided.
7. Cut the wire on the nose cup retainer; remove the wire and the retainer.

CAUTION: The locking cup screws must be tight before the nose cup retainer is removed.

8. Place the spoiler ring over the fuze cavity of the cluster adapter so that the flange of the spoiler ring hole fits inside the cavity.
9. While holding the spoiler ring in the above position, screw the fuze into the fuze cavity. Tighten the fuze by hand, adjusting the spoiler ring at the same time; in its final position, the spoiler ring must be located so that the small hole in the ring is in line with the arming pin of the fuze. When the arming wire is installed, it must pass through the hole in the spoiler ring.
10. If the cluster is not used, restore the components to their original condition and return to their original packings.

CAUTION: Protect unpacked clusters from moisture.

11. Aircraft armed with these clusters are not to be catapulted unless they have been equipped with the case locking bushing, dwg 438075. Clusters will be jettisoned before landing; they cannot be guaranteed to drop SAFE.

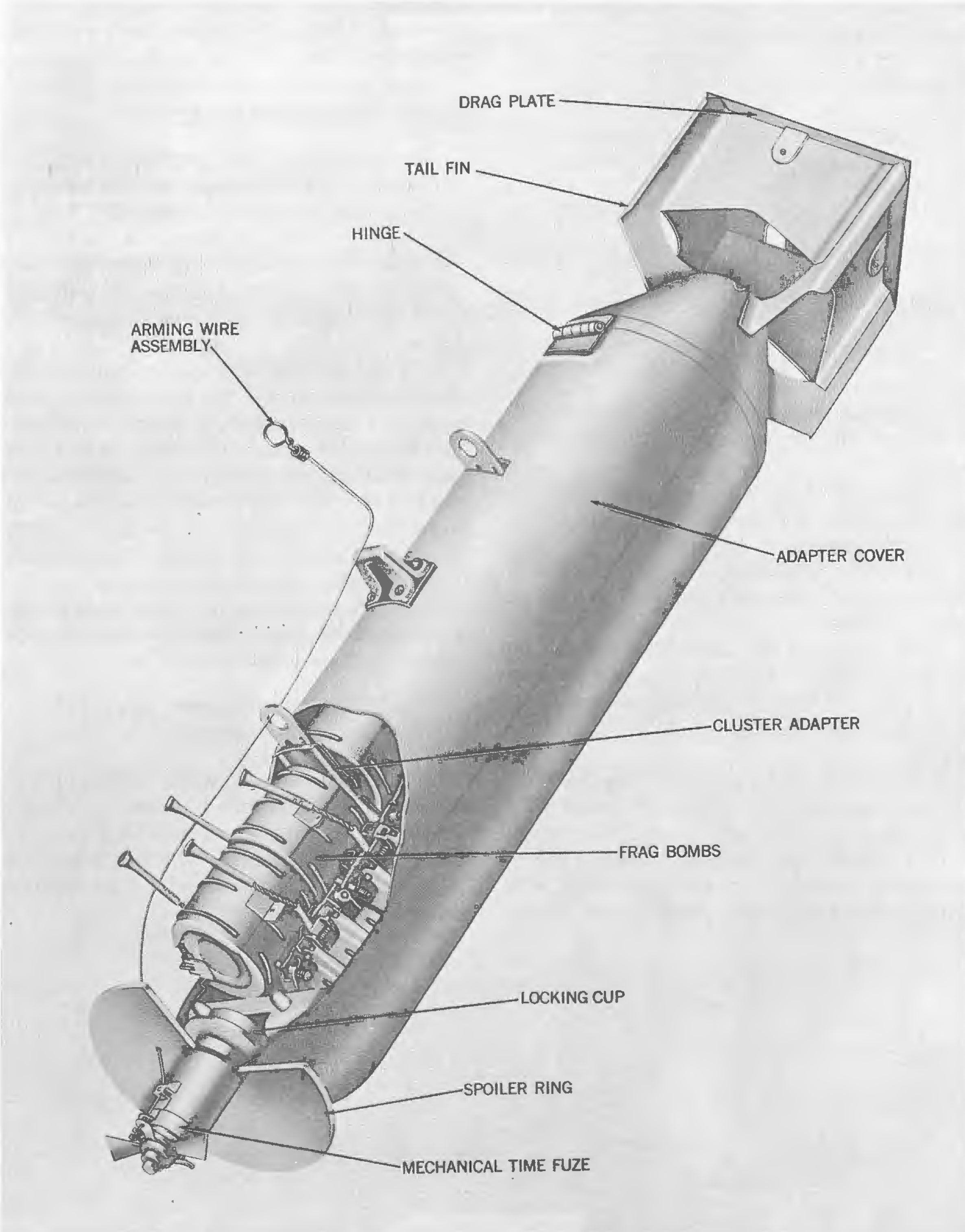


Figure 8–6.—100-lb Frag Bomb Cluster M28A2, Cutaway View.

500-LB FRAG BOMB CLUSTER M26A2

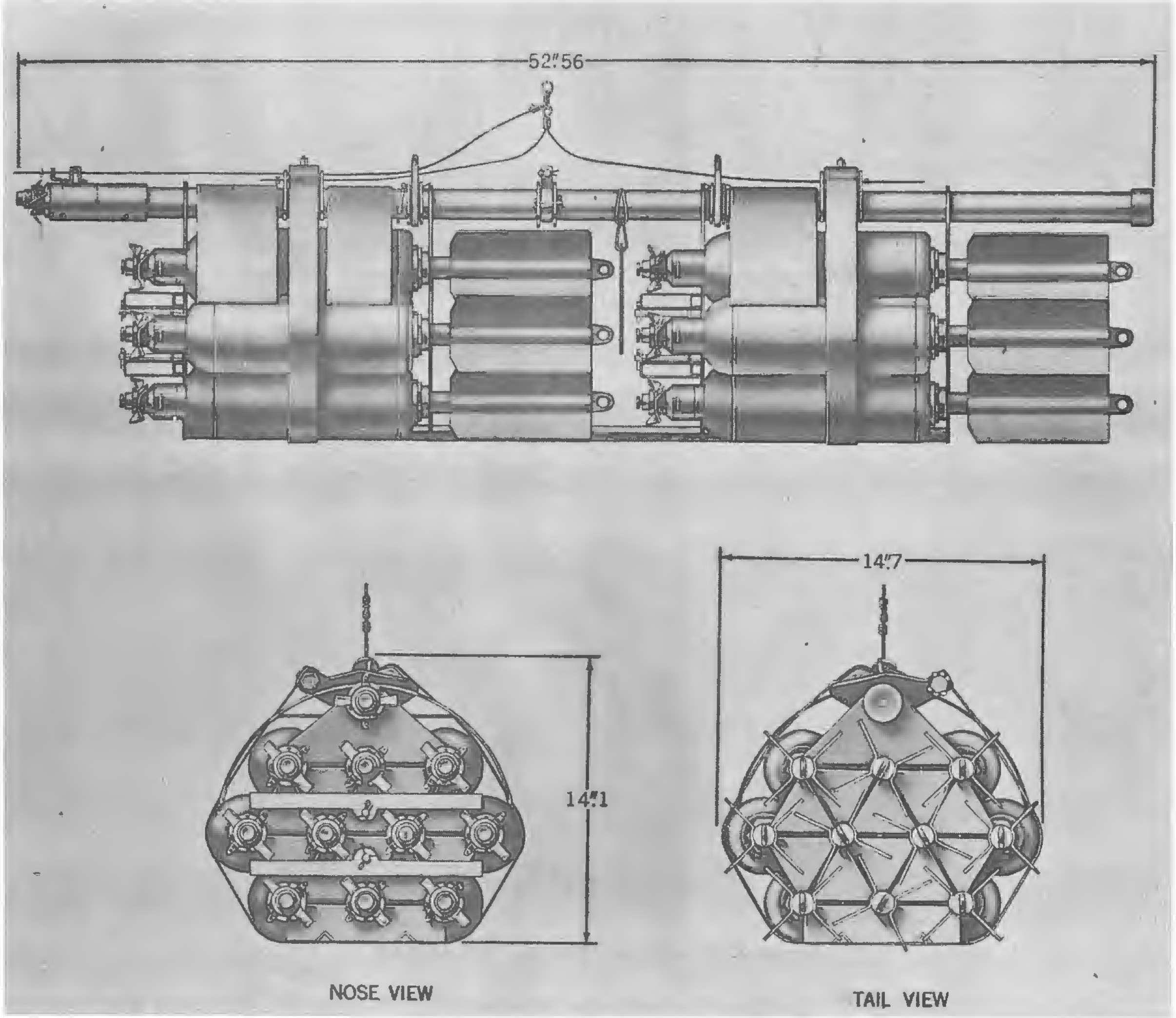


Figure 8–7.—500-lb Frag Bomb Cluster M26A2.

Model	M26A2
Assembly Drawing No.	82–0–111
Length of Cluster (in.)	52.56
Width of Cluster (in.)	14.7
Height of Cluster (in.)	14.1
Cluster Adapter	
Model	M13A2
Length (in.)	48.9
Frag Bombs	
Model	AN–M41A1
Number Required	20
Weight of Each Bomb (lb)	20.0
Weight of Cluster (lb)	416.0
Nose Fuzes Required	
For Each Bomb AN–M41A1	AN–M110A1 or AN–M158
For Cluster Adapter M13A2	M155A1

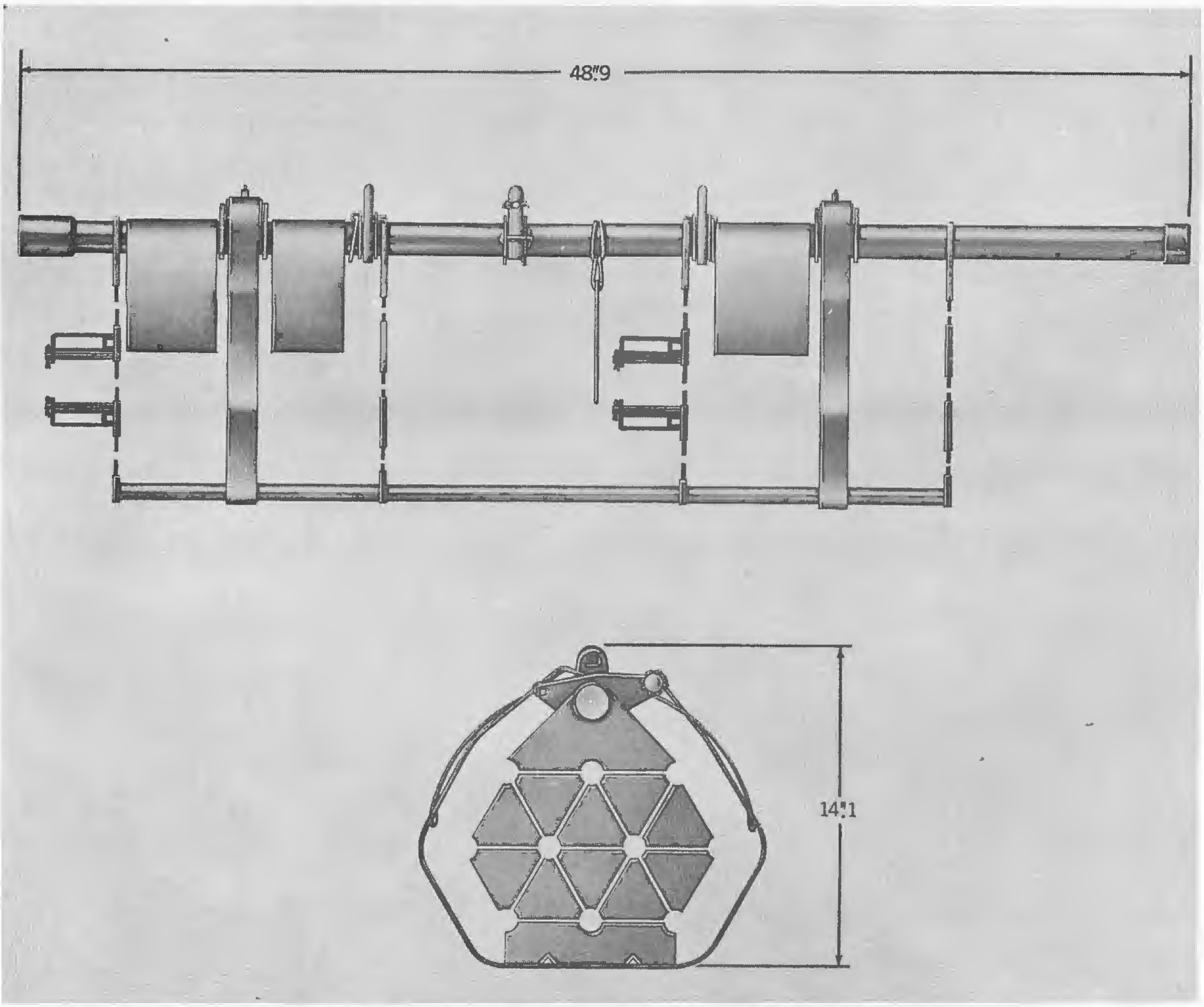


Figure 8–8.—Cluster Adapter AN–M13A2.

General Description

The 500-lb Frag Bomb Cluster M26A2, now obsolete, consists of twenty 20-lb AN–M41A1 frag bombs assembled in an M13A2 cluster adapter. The M13A2 is a "quick-opening frame" type of adapter which holds the bombs in two banks of ten bombs each.

The M13A2 adapter may be set for immediate or delayed action release of the bombs. A fuze is not required for immediate release since withdrawal of the arming wire opens the adapter. For delayed action, a mechanical time fuze is inserted in the adapter. The fuze is set to function after a specified time delay following release of the cluster from the aircraft. Fuze detonation drives a plug rearward, cutting the shear wires and opening the adapter.

The M13A2 cluster adapter is a steel framework consisting of a tubular center bar, suspension lugs, separator plates, and two metal bands. Each separator plate fits in front of a bank of bombs and contains arming vane stops.

Two suspension lugs spaced 14 inches apart provide for two point suspension. A lug located at the center of gravity provides for single point suspension.

Painting and Marking

Identifying nomenclature is stenciled in black letters on the face of the first support plate. The overall frame is olive

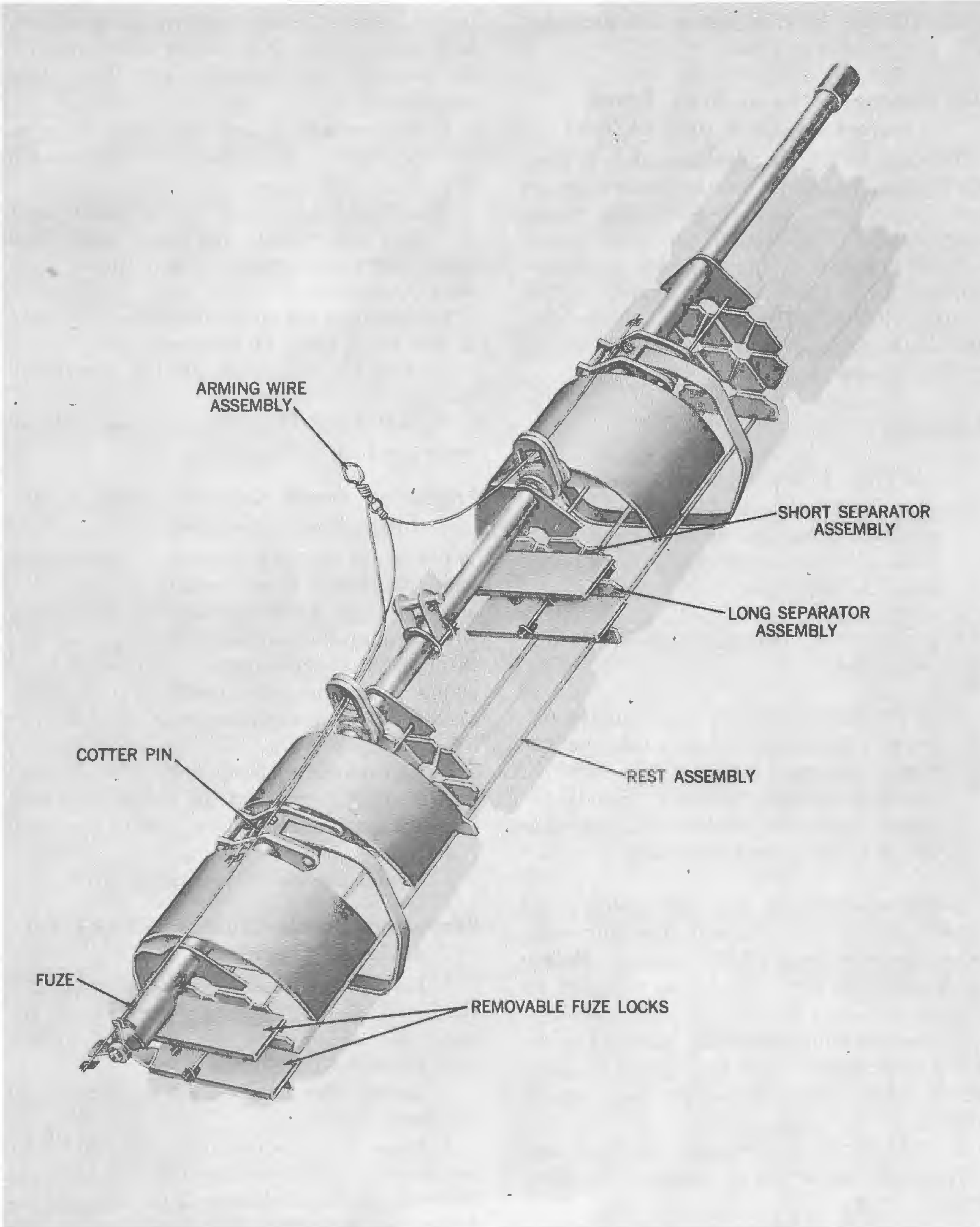


Figure 8–9.—500-lb Frag Bomb Cluster M26A2, Perspective View.

drab. The high-explosive contents of the 20-lb AN–M41A1 frag bombs are identified by a yellow head and base.

Differences Between Frag Bomb Clusters M26A2 and M26A1

The M26A2 frag bomb cluster differs from the M26A1 frag bomb cluster in the adapters and bombs used, as well as in the fuzing components. The M26A1 cluster is issued with 20 fuzed AN–M41 frag bombs assembled in an M13A1 cluster adapter. The M26A2 cluster is issued with 20 unfuzed AN–41A1 frag bombs assembled in an M13A2 cluster adapter.

Assembly

> CAUTION: Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

1. Unpack the cluster and remove all packing accessories.

> CAUTION: Inspect the cluster for serviceability. Be sure that the cotter pins and shear wires are secure in the band clamps. Bands which hold the bombs in place should be tight and unbroken.

2. Cut and remove the wire holding the removable fuze vane locks on the long-separator assembly rods of the cluster. Retain the two cotter pins which are threaded on the wire.
3. Unpack and inspect the fuzes. For detailed information on fuzing, refer to chapter 2 under the particular fuze to be installed.
4. Cut, but do not remove, the fuze seal wires; hold the wires in place by twisting them.
5. Assemble the fuzes to the lower layer of the rear bank of bombs. Adjust the arming-wire guide on each fuze body so that it does not interfere with the assembly of the fuze vane lock.
6. Assemble fuzes to the middle layer of bombs; adjust the arming-wire guide of each fuze body so that it does not interfere with the assembly of the upper and lower fuze vane locks.
7. Replace the lower fuze vane lock on the rod; insert the cotter pin and spread it at least 90 degrees.
8. Assemble the fuzes to the upper layer of bombs and replace the upper fuze vane lock; insert the cotter pin and spread it at least 90 degrees.
9. Assemble the fuzes and fuze vane locks to the front bank of bombs exactly as described in the procedure for the rear bomb banks.
10. After the vane locks are secured, remove the fuze sealing wires.

Preparing Bomb Cluster M26A2 for Immediate Opening

1. Cut off the fine branch of the arming wire, which has three branches.
2. Pass one heavy branch of the arming wire through the forward suspension lug and through the outer holes in the forward band clamp. Pass the other heavy branch of the arming wire through the rear lug and rear band clamp.
3. At each band clamp, cut the shear wire between the clamp and the sleeve, and pull the wire out from the under side of the tube.
4. Remove the band clamps.
5. Install the cluster on the aircraft.

Preparing Bomb Cluster M26A2 for Delayed Opening

1. Inspect the fuze well in the center tube for serviceability; clean it if necessary. Inspect the center tube for presence of the steel plug and its holding wire.
2. Install the bomb cluster securely to the bomb rack.
3. Inspect mechanical time fuze M155A1 for serviceability. Set the fuze for the time desired. Refer to chapter 2 for detailed information on setting this fuze.
4. Screw the fuze into the center tube until it is hand tight.
5. Pass the fine branch of the arming wire through the front suspension lug and

through the holes in the mechanical time fuze arming pin bracket and vane. Cut off excess wire so that it extends 2 to 3 inches beyond the fuze. If the bomb is to be carried on external racks, or carried internally at speeds in excess of 300 knots, place one safety clip on the end of the wire.

6. Pass the heavy branches of the arming wire through the suspension lugs and band clamps. Do not cut the shear wire of each band clamp. Arming wires must be free from kinks, twists, and burrs.

7. Remove the cotter pins from the band clamps. Remove the sealing wire, cotter pin, and striker stop from the mechanical time fuze.

Disassembly

If the cluster is not used, replace the sealing wire, cotter pin, and striker stop in the time fuze. Replace the cotter pins in the cluster band clamps. Remove the arming wire from the time fuze and remove the time fuze for separate storage. Remove the cluster from the bomb rack. For temporary storage (alerted ammunition) the cluster may be stored without unfuzing the individual bombs. For other than temporary storage the individual bombs will be unfuzed as follows.

1. Replace and secure the seal wires in the fuzes in the top layer of bombs.
2. Remove the upper fuze vane lock.
3. Replace and secure the seal wires in the fuzes in the middle layer of bombs.
4. Remove the fuzes from the top layer of bombs; refer to chapter 2 for the removal of fuzes from the bombs.
5. Replace and secure the seal wires on the fuzes in the bottom layer of bombs.
6. Remove the lower fuze vane lock.
7. Remove the fuzes from the center and bottom layers of bombs.
8. Repack the fuzes in containers and seal with adhesive tape.
9. Replace the fuze well plugs and return the cluster to its original packing.

NOTE: If the cluster was prepared for immediate opening, new shear wires must be installed before the cluster can be used for delayed opening.

500-LB FRAG BOMB CLUSTER M27A1

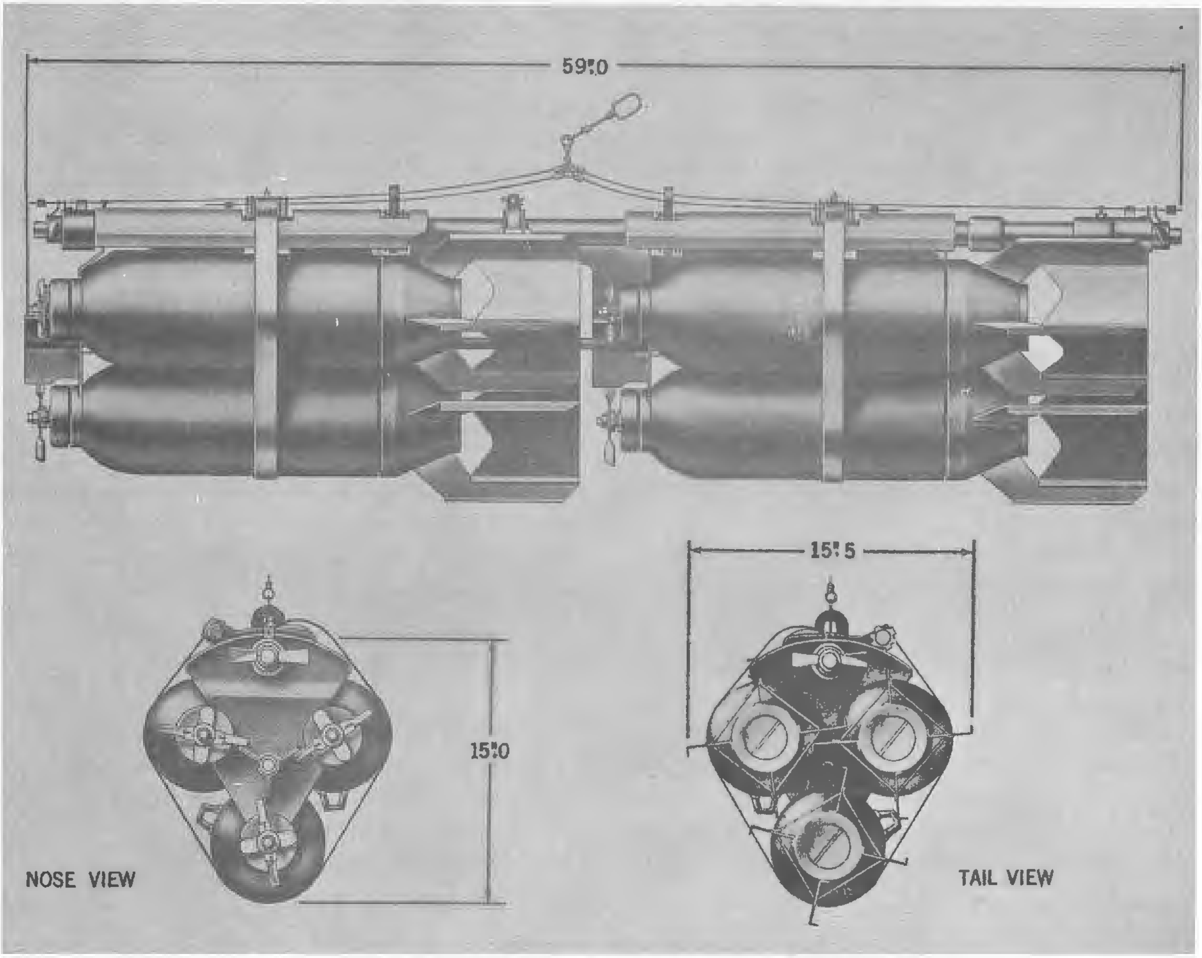


Figure 8–10.—500-lb Frag Bomb Cluster M27A1.

Model	M27A1
Assembly Drawing No.	82–0–124
Length of Cluster (in.)	59.0
Width of Cluster (in.)	15.5
Cluster Adapter	
Model	M14A1
Length (in.)	55.33
Frag Bombs	
Model	M82
Number Required	6
Weight of Each Bomb (lb)	86.6
Weight of Cluster (lb)	585.0
Nose Fuzes Required	
For Each Bomb M82	AN–M103A1
For Cluster Adapter M14A1	M155A1

General Description

The 500-lb Frag Bomb Cluster M27A1, now obsolete, consists of six 90-lb M82 frag bombs assembled in an M14A1 cluster adapter. The M14A1 is a "quick-opening frame" type of adapter which holds the bombs in two banks of three bombs each.

The M14A1 adapter may be set for immediate or delayed action release of the bombs. A fuze is not required for immediate release since withdrawal of the arming wire opens the adapter. For delayed action, one or two mechanical time fuzes are inserted in the adapter. The fuzes are set to function after a specified time delay following release of the cluster from the aircraft. Fuze detonation drives a plug rearward, cutting the shear wires and opening the adapter.

The M14A1 adapter consists of two steel tubes, to which four steel support plates are welded. These plates form the support for the six M82 frag bombs. The lower tube is the backbone of the cluster, and the upper tube carries the suspension lugs, buckles, and the fuze adapters.

The M27A1 frag bomb cluster is assembled in the field, and its components may be supplied unassembled or partially assembled. Two lugs, spaced 14 inches apart, provide for two point suspension. A lug located at the center of gravity provides for single suspension.

Painting and Marking

The adapter frame is olive drab and nomenclature is stenciled in black. The high-explosive contents are identified by yellow painted heads and bases on each bomb.

Differences Between Frag Bomb Clusters M27 and M27A1

The difference between the M27 and the M27A1 clusters lies in the cluster adapter. The M27 cluster uses the M14 adapter and the M27A1 cluster uses the M14A1 adapter.

The M14A1 adapter is similar to the M14 adapter except that the M14 has wider fuze

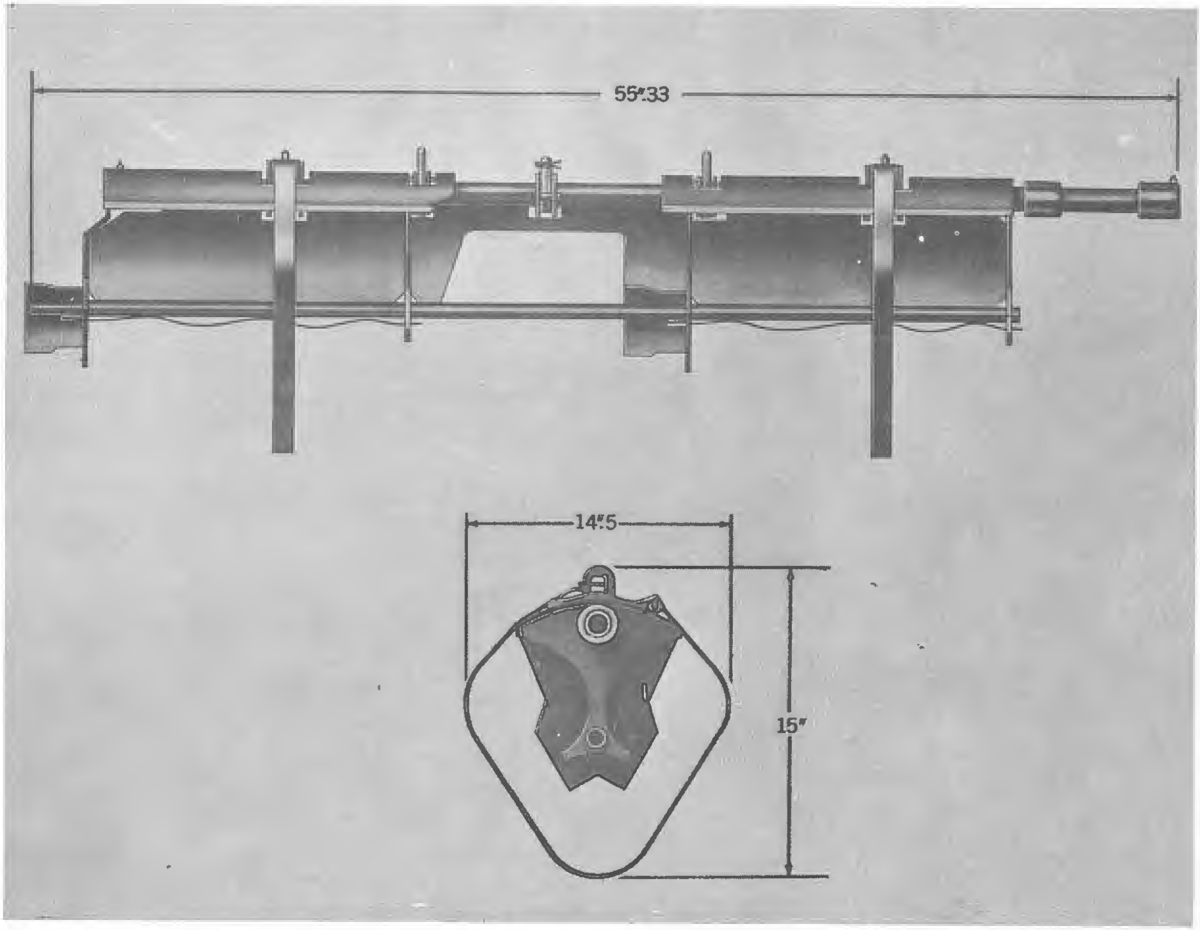


Figure 8–11.—Cluster Adapter M14A1.

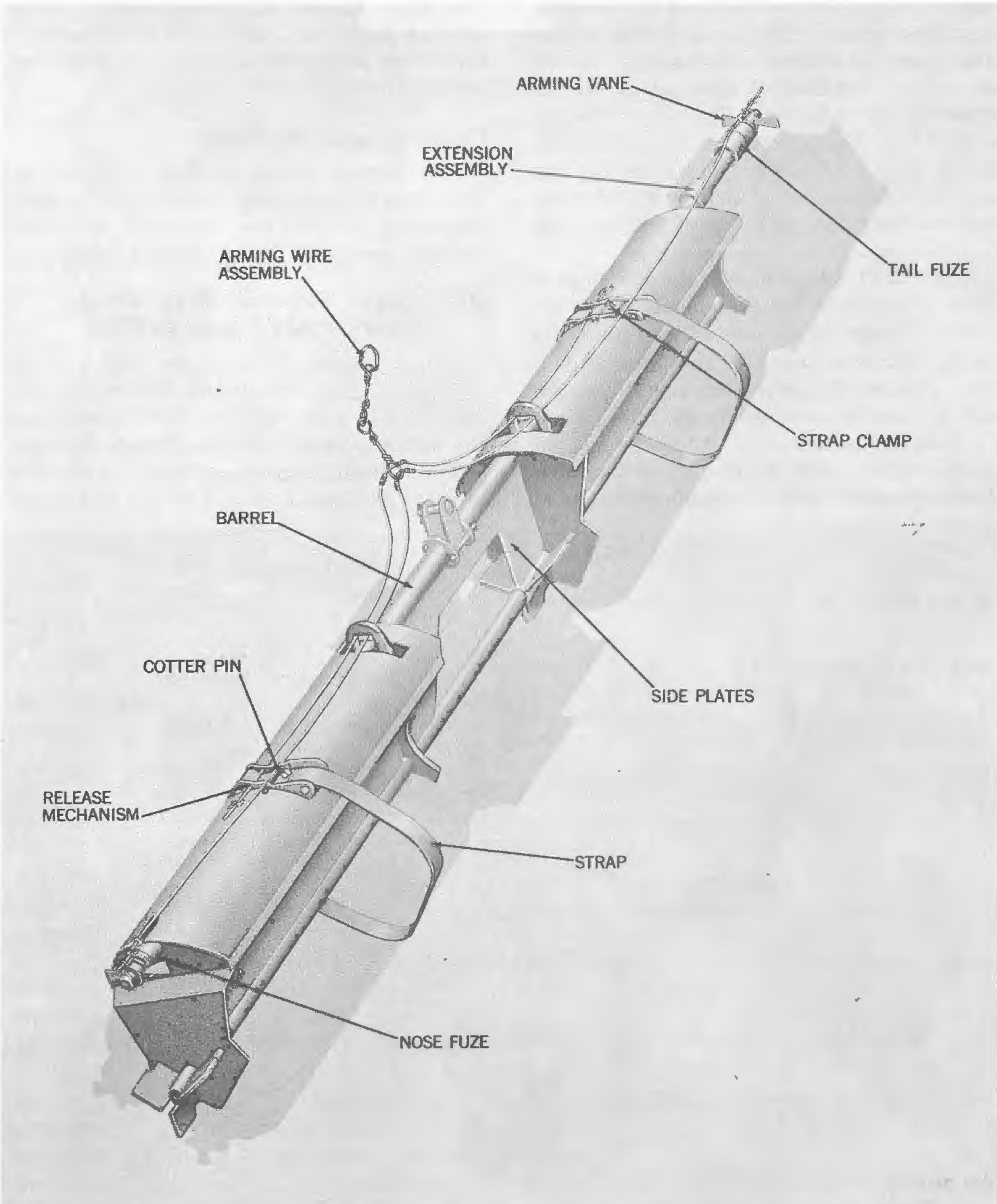


Figure 8–12.—500-lb Frag Bomb Cluster M27A1, Perspective View.

vane lock plates, reinforced sway brace plates, a leaf spring for the bottom bomb, and a 1⅛-inch wide release strap.

Assembly

CAUTION: Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

1. Remove the bomb cluster from the shipping bands.
2. Remove the nose plugs and nose protector caps.
3. Release the locknuts and remove the connectors.
4. Remove the fin locknuts from all the bombs in the cluster.
5. Inspect the fuze cavities and threads.
6. Assemble the fin assemblies to the bombs. Fins must not interfere with or damage each other when the cluster is assembled in the aircraft.
7. Unpack six bomb fuzes and inspect them for serviceability. Discard the vane assembly supplied with the fuze.
8. Set each fuze for instantaneous action by pulling out the setting pin and turning it so that the locating pin seats in the shallow slot.
9. Screw a fuze, handtight, into the nose of each bomb. Safety cotter pins must be accessible from the outside of the cluster.
10. Cut and remove the fuze seal wire. Assemble the short (4.6-inch) vane supplied with the fin assembly.
11. Remove the safety cotter pin and turn the vane each way to insure that the adapter vane stop will prevent the fuze vane from rotating.

Preparing Bomb Cluster M27A1 for Immediate Opening

Prepare the bombs as in steps 1 through 11 above; then proceed as follows.

1. Thread a heavy branch of arming wire through each suspension lug and through the holes in each corresponding release mechanism. Place a safety clip on each branch of wire.
2. Cut off both fine branches of arming wire at the swivel loop.
3. Cut the shear wire in each release mechanism close to the clamp.
4. Install the cluster securely in the aircraft and sway brace.
5. Remove the safety cotter pins from both release mechanisms and from the six bomb fuzes.
6. If the bomb cluster is not used, replace all cotter pins and shear wires, or tie a conspicuous tag to the release mechanism to indicate that the shear wire has been cut and that the cluster is prepared for immediate opening only.

Preparing Bomb Cluster M27A1 for Delayed Opening

Prepare the bombs as outlined in steps 1 through 11 of the assembly instructions above; then proceed as follows.

1. Remove the plug from the nose fuze adapter in the upper steel tube. Remove the envelope containing the setscrew. Inspect to see if the cavity is clear.
2. Unpack the mechanical time nose fuze and inspect it for serviceability. Remove and replace the striker stop to be sure that the safety block will not fall out. If the trigger mechanism is intact, there will be a noticeable gap between the striker and the safety block.
3. Set the time desired on the mechanical time fuze, referring to chapter 2 for instructions.
4. Screw the fuze into the fuze adapter, handtight. Insert the setscrew and locknut. Back off the fuze until the arming pin points up. Tighten the setscrew and locknut.
5. Thread a heavy branch of arming wire through each suspension lug to the front and rear release buckles. Thread each wire through the empty hole in the release mechanism and attach a safety clip to the end of each wire.
6. Thread a fine branch of arming wire through each suspension lug to the two mechanical time fuzes. If only one fuze is used, cut off the rear branch of fine wire at the swivel loop. Pass the wire through the fuze arming pin, the arming wire guide, and the

vane tab of each fuze so that the wire protrudes about 2.5 inches beyond the vane tab. If the cluster is to be carried externally, or if it is to be carried internally at speeds in excess of 300 knots, place a safety clip on each arming wire past the fuze vane tabs.

7. Cut and remove the fuze sealing wire, the safety cotter pin, and the striker stop.

8. Install the cluster securely on the aircraft and sway brace.

9. Remove the safety cotter pins from the cluster release mechanisms and from the six bomb fuzes.

500-LB FRAG BOMB CLUSTER M29A1

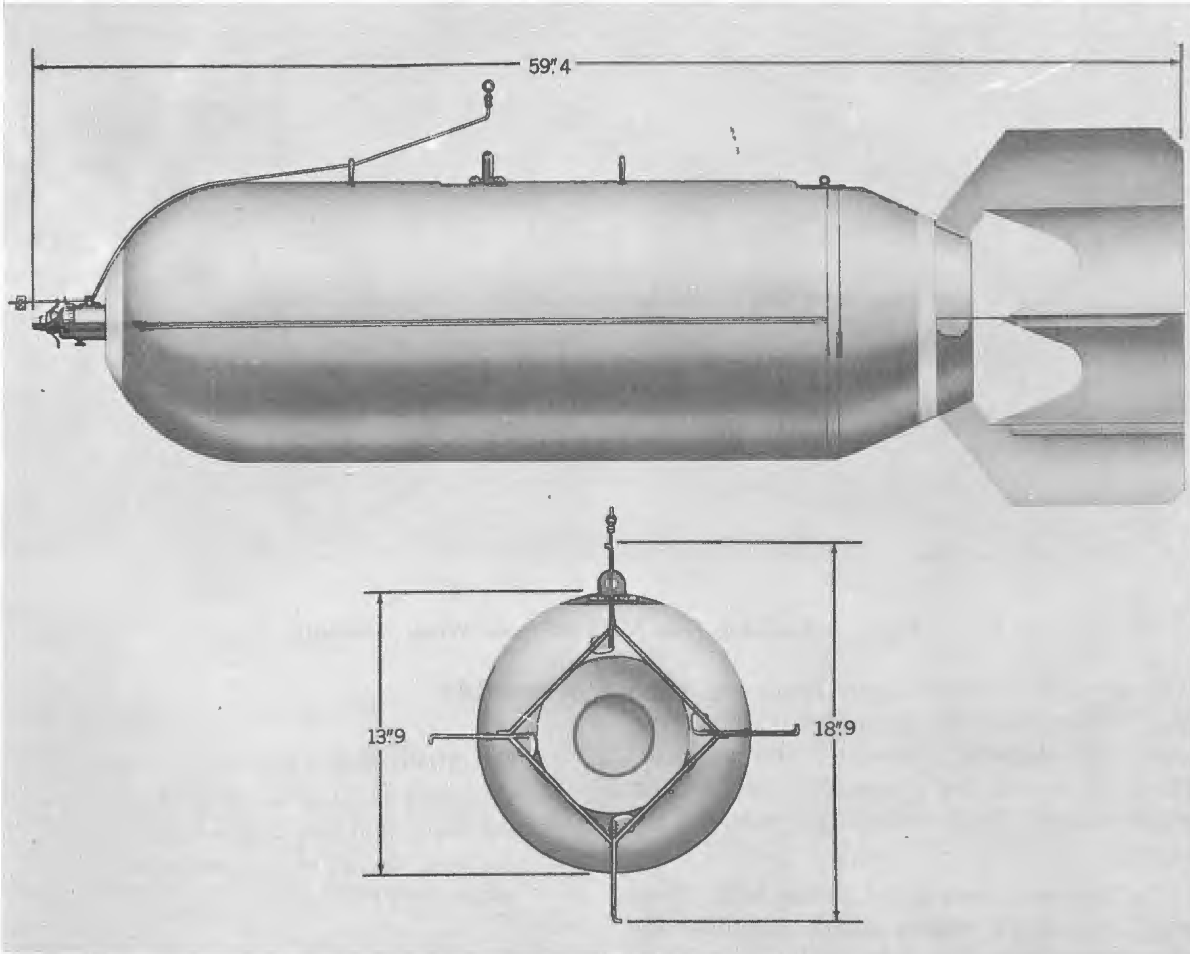


Figure 8–13.—500-lb Frag Bomb Cluster M29A1.

Model	M29A1
Assembly Drawing No.	82–0–108
Length of Cluster (in.)	59.4
Width of Cluster (in.)	13.9
Cluster Adapter	M16A1
Frag Bombs	
Model	M83
Number Required	90
Weight of Each Bomb (lb)	4
Weight of Cluster (lb)	415.1
Nose Fuzes Required	
For Each Bomb M83	M129, M130, or M131
For Cluster Adapter M16A1	M155

General Description

The 500-lb Frag Bomb Cluster M29A1 consists of ninety 4-lb Frag Bombs M83 assembled in a cluster Adapter M16A1. The M29A1 is a "quick-opening frame" type of adapter which holds the bombs in nine banks of ten bombs each.

When the cluster is released armed, the

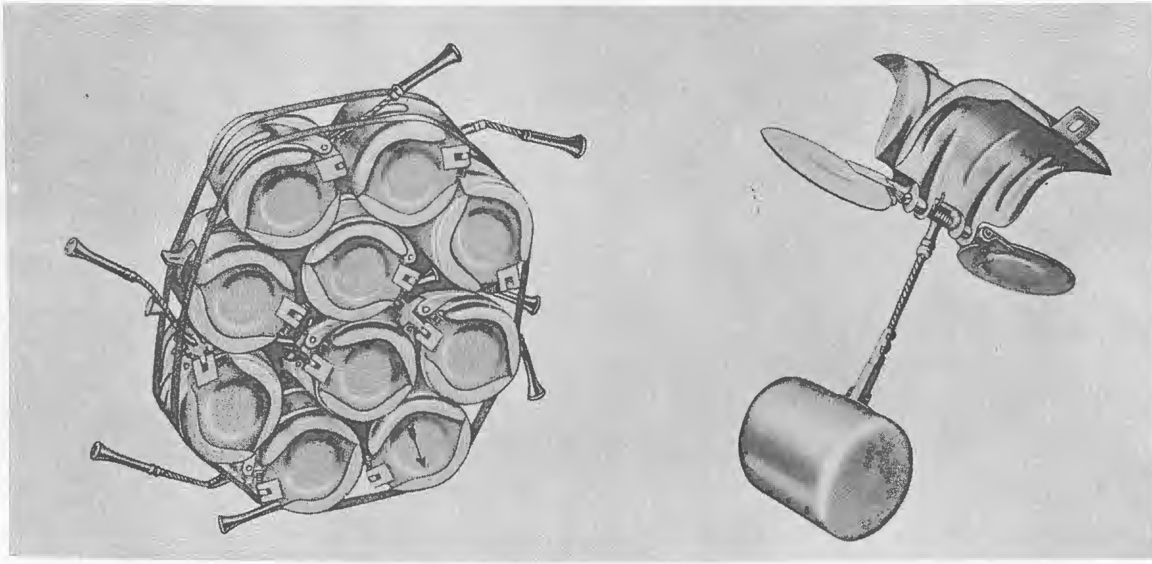


Figure 8-14.—4-lb Frag Bomb M83 and Wafer Assembly.

arming wire is withdrawn from the time fuze. When the fuze detonates it drives the nose cup rearward, opening the adapter. The frag bombs are dispersed when spring action opens their wings to release the bombs.

The cluster is assembled in the field. Two lugs, spaced 14 inches apart, provide for two point suspension. A lug located at the center of gravity provides for single suspension.

Painting and Marking

The bomb cluster case is olive drab and nomenclature is stenciled in black. The high-explosive contents are identified by two one-inch yellow painted stripes.

Differences Between Frag Bomb Clusters M29 and M29A1

The difference between the M29 and M29A1 clusters lies in the cluster adapter. The M29 cluster uses the M16 adapter and the M29A1 cluster uses the M16A1 adapter.

The M29A1 adapter is similar to the M29 adapter except that the M16A1 has a new-type locking cup and a case-locking bushing.

Assembly

CAUTION: Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

1. Remove Cluster Adapter M16A1 from the crate and place the adapter on horizontal supports so that the tail fin is off the ground.
2. Unscrew and remove the suspension lug guards.
3. Cut the shipping wire on the cup container located in the adapter nose.
4. Turn the screws of the locking cup in a counterclockwise direction forcing the locking cup inward. Open the adapter cover by prying with a screwdriver along the seam, a little way from the nose. For Adapter M16, 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.
5. Thread a cord through the hole in the pull piece of the locking cup, passing the free end through the nose fuze well opening. Close the lid and pull the locking cup into place.

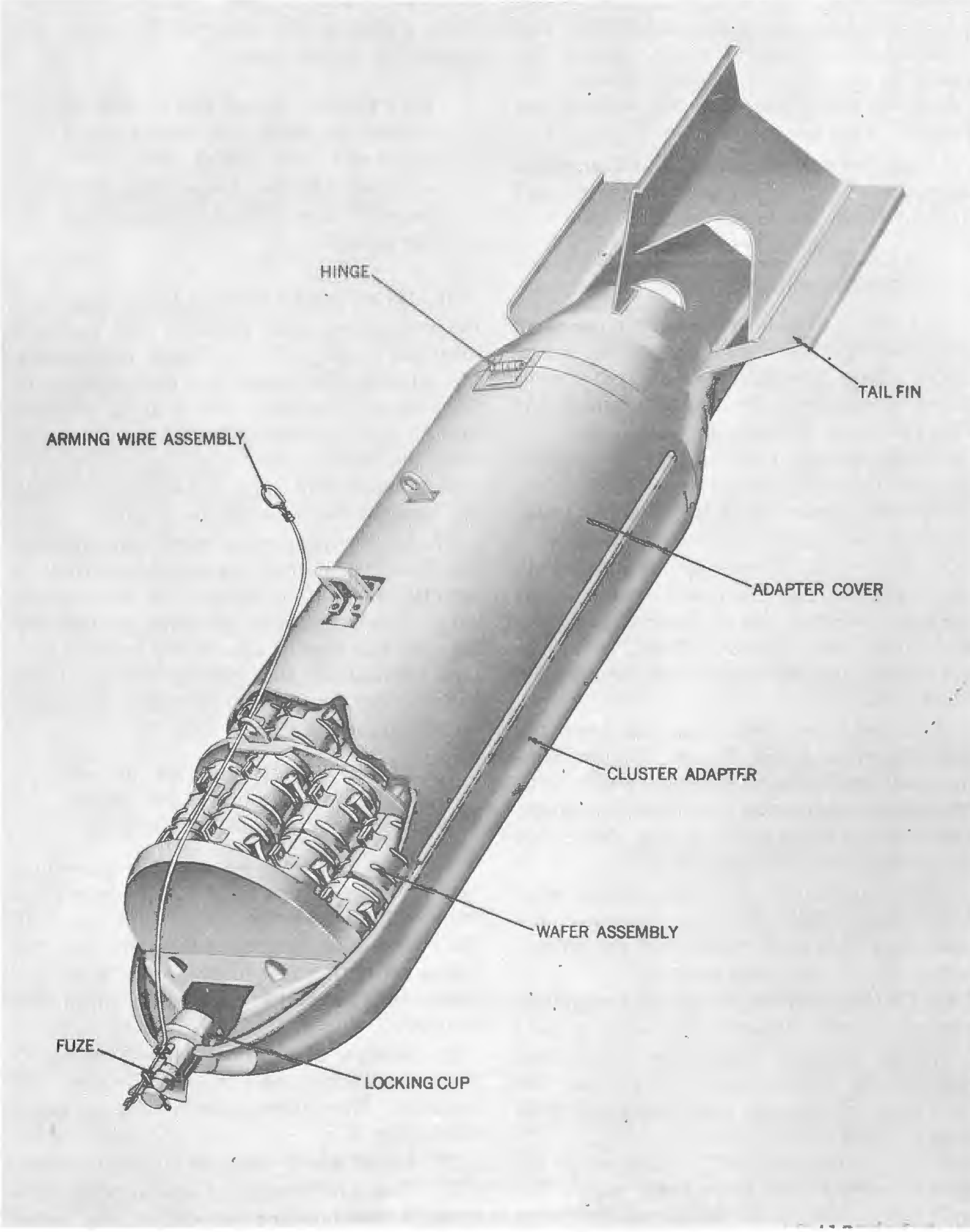


Figure 8–15.—500-lb Frag Bomb Cluster M29A1, Cutaway View.

6. Open the individually packed wafer boxes by tearing open the metal liner and removing the strapping which secures the wafers to the plywood inserts. Remove the twine that is packed with the wafers and save for later use.

7. Lift the wafers by the cable assemblies and place four wafers in the two center bays of the bottom half of the adapter.

CAUTION: Do not handle wafers by the strappings.

8. If the cluster is to be suspended from a single suspension lug, remove the metal brace, single suspension lug, and screws from the inside of the case in which the adapter cluster is packed.

9. Remove the two regular suspension lugs and fasten the metal brace in place between the partitions using screws taken from the two lugs.

10. 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 adapter. There are three sets of holes on the brace; the forward set is not used.

11. Fasten the suspension lug over the center portion of the cluster adapter with the small portion of the lug forward. The two regular suspension lugs remain in place.

12. Place two wafers in the front bay and three wafers in the rear bay.

13. Tie all wafers down separately with the twine provided. Pass the twine over the bombs and around the outside of the bottom half of the adapter; tie securely.

14. Cut and remove the metal strappings from the bombs, leaving the twine to hold the bombs together. Settle the bombs into place by careful shifting of the wafers. No rigid part of a bomb must interfere with closing of the cluster lid.

15. Close the adapter by lowering the cover slowly; at the same time, adjust the cable assemblies of the bombs so that they do not rest across the partitions and do not obstruct the cover. When closing the cover, see that the rear corners of the cover are seated under the rear flange of the bottom half of the adapter, and that the reinforcement strips on the edge of the cover are inside the bottom half.

CAUTION: When the adapter is closed, the cover may cut some of the twine with which the wafers are tied. Do not reopen the cover because the untied bombs will spring out.

16. When using Cluster Adapter M16, pull the locking cup into position with the cord attached to it. Use the hook and prying tool provided to wedge the cup securely in the forward position. When using Adapter M16A1, pull the locking cup into position and turn the locking screws in a clockwise direction which will draw and hold the locking cup against the nose of the cluster.

17. Insert measuring gage, provided in kit, into fuze well of the adapter until it is against the bottom surface of the locking cup. The maximum distance permissible between the nose of the cluster and the bottom surface of the locking cup is 1.375 inches. For Cluster Adapter M29, the minimum distance is 0.8437 inch.

CAUTION: If adapters do not gage properly and cannot be adjusted, they should not be used.

18. With the cover securely in place and held by the locking cup, cut and remove the twine with which the wafers are tied. If the twine does not pull out easily, cut the pieces on both sides of the adapter at the seam, and leave the upper portion in the adapter.

19. Remove Mechanical Time Fuze M155 from the packing and inspect the fuze for damage. For information on fuzing refer to chapter 2.

20. Install bomb securely on the aircraft.

21. Pass one branch of the arming wire through the forward suspension lug, arming bracket, and vane of the fuze. Remove the fuze cotter pin and sealing wire. The arming wire should extend 2 to 3 inches beyond the fuze vane. If the bomb is to be

carried externally, or internally at speeds in excess of 300 knots, place one Fahnestock clip on the end of the wire.

22. If Bomb Cluster M29A1 is not used, remove arming wire and fuze as outlined in chapter 2.

CAUTION: Store loaded clusters off the ground and under cover. Store for as short a period as possible, because this material is susceptible to damage by atmospheric moisture. Once loaded, the adapter shall not be reopened. Locking cups must be in the fully locked position before the time fuze is inserted.

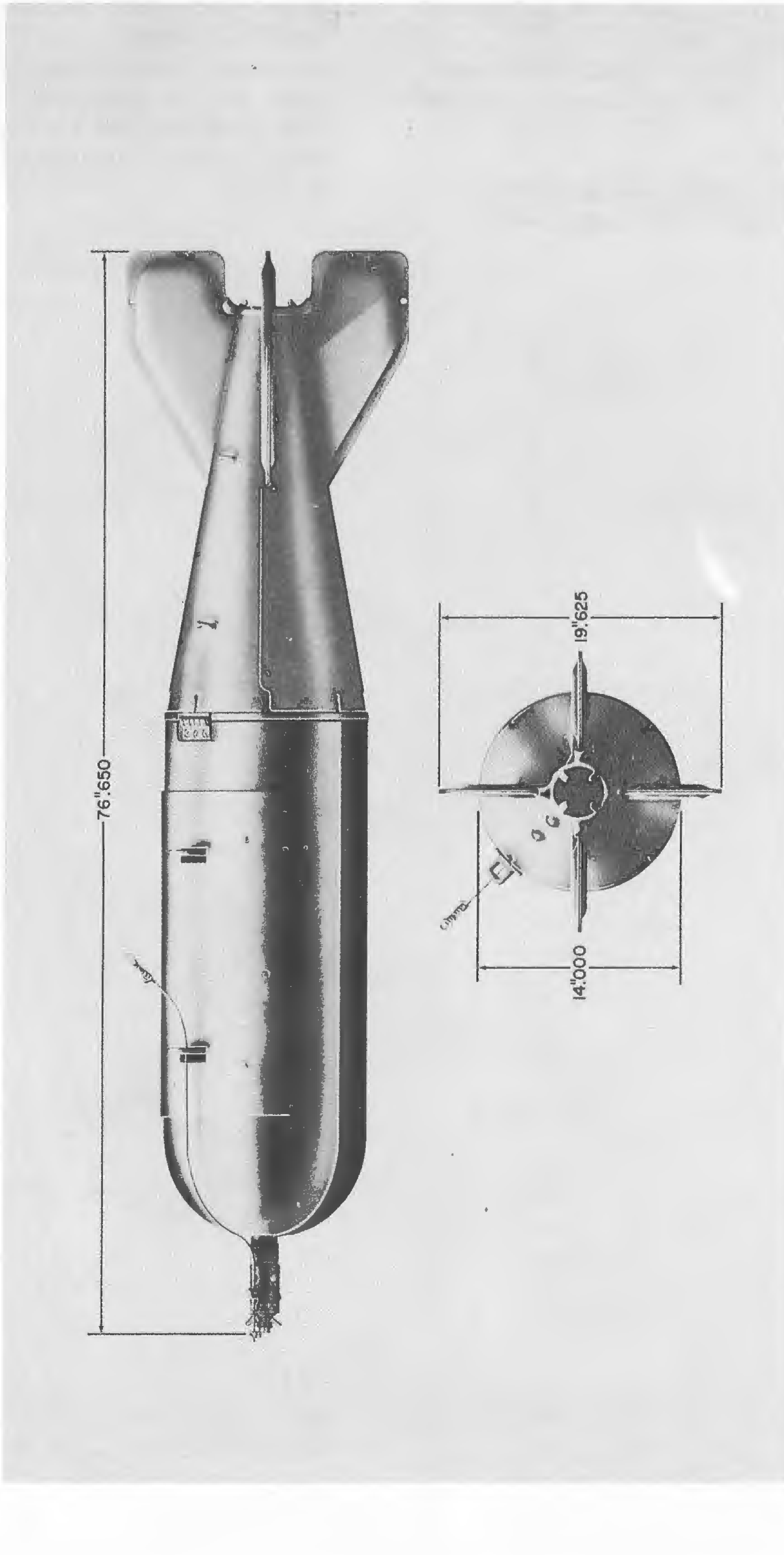


Figure 8-16. —500-lb Missile Cluster Mk 44 Mod 0.

500-LB MISSILE CLUSTER ADAPTER MK 44 MOD 0

Mark		44
Mod		0
Assembly Drawing No.		2518259
Length of Cluster (in.)		72.75 (Approx.)
Body Diameter (in.)		14.0
Cluster Adapter		
Model	M16	M16A1
Drawing No.	None	82-3-452
Length (in.)	55.5	55.5
Weight (lb.)	100	100
Fin Assembly		
Model		M128A1
Drawing No.		82-3-747A
Fin Span (in.)		19.625
Missile, Anti-Personnel		
Model		Shape 2B, Lazy Dog
Drawing No.		None
Number Required		10,000
Total Weight (lb.)		400
Weight of Missile Cluster (lb.)		500
Nose Fuze (cluster-opening)		AN-M146A1
Bushing, Case Locking		
Assembly Drawing No.	(2518261)	438075

General Description

The 500-lb Missile Cluster Mk 44 Mod 0 consists of 10,000 Lazy Dogs assembled in a modified M16 or M16A1 cluster adapter. The cluster adapter is modified by the addition of a streamlined fin assembly, a strong back, and two stronger suspension lugs spaced 14 inches apart to provide for two point suspension. The Mk 44 Mod 0 is a "quick-opening frame" type of cluster which holds the missiles in four compartments; about 3100 in the aft compartment and about 2300 in each of the other compartments. Although there is sufficient volume to load 130 lb of additional material (3,000 missiles) the weapon is weight limited so as not to impose flight restrictions other than those normally associated with a 500-lb. externally carried store.

When the cluster is released, the arming wire is withdrawn from the AN-M146A1 mechanical time fuze. When the fuze functions, the booster detonates and drives the locking cup rearward, unlocking the two halves of the adapter. The missiles are dispersed by the resulting tumbling of the adapter.

Painting and Marking

The missile cluster case is olive drab and nomenclature is stenciled in black.

Differences Between Adapter Clusters M16 and M16A1

The M16A1 adapter is similar to the M16 adapter except that the M16A1 has a new type locking cup and a case-locking bushing.

Assembly

1. Remove cluster adapter M16A1 or M16 from the crate and place the adapter on horizontal supports so that the tail fin is off the ground.

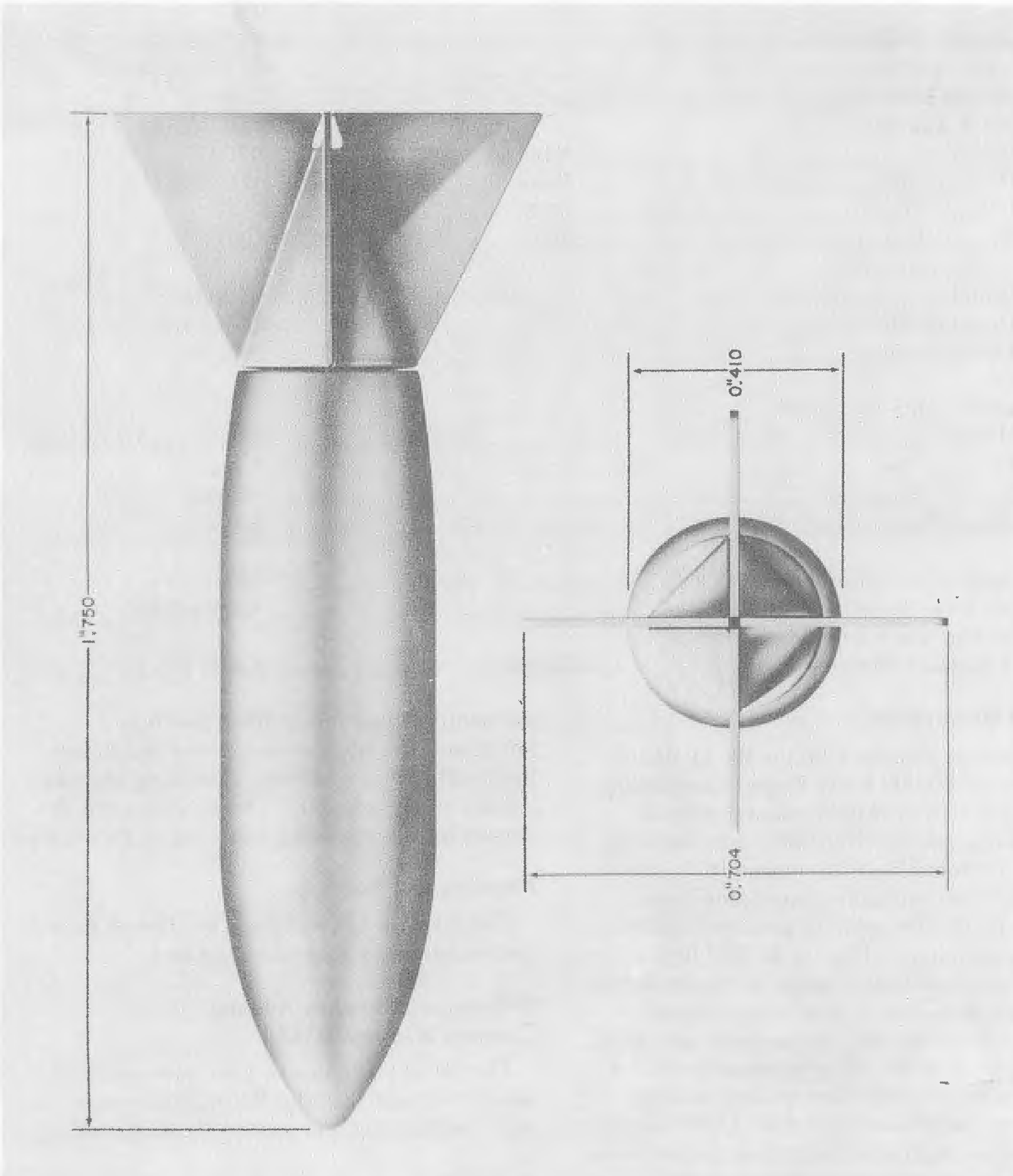


Figure 8-17. — Anti-Personnel Missile, Shape 2B Lazy Dog.

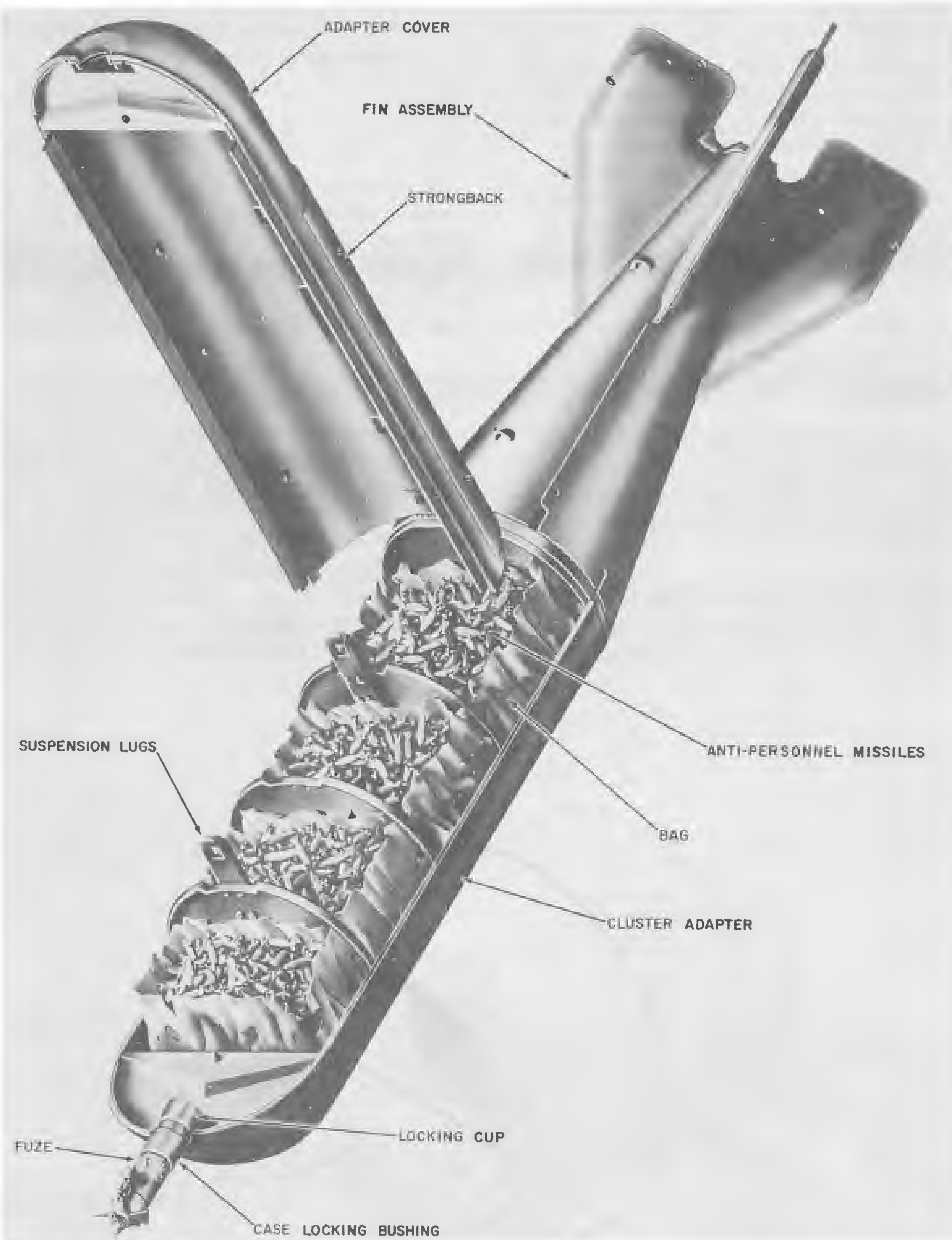


Figure 8-18. — 500-lb Missile Cluster Mk 44 Mod 0, Perspective View.

2. Cut the shipping wire on the cup retainer located in the adapter nose. Remove cup retainer and wire.

3. For the adapter M16A1, turn the screws of the locking cup in a counterclockwise direction forcing the locking cup inward. For adapter M16, 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. Open the adapter cover by carefully prying with a screwdriver along the seam.

CAUTION: Do not pry loose until locking cup actually falls free into the nose.

4. Place the tail retaining bar, previously removed from the crate, across the two upper tail-fins in such a manner as to support the adapter cover when in the fully opened position.

CAUTION: The hinge area and the hinge itself are very easily damaged to an extent that can cause the unit to malfunction. Any handling of the adapter cover, either opening or closing, must be done with caution to prevent springing of the hinge area.

5. After the cover is open, inspect the body. There should be a grocery bag in each compartment, slit or mutilated to ensure scattering of missiles. If not slit, put six slits (6 inches long) in the lower sidewalls of each bag.

6. Loosen the set-screw and <u>unscrew the threaded insert located at the back or inside end of the fuze-well and discard.</u> (Note: With the cover open, both ends of the threaded fuze well are visible.) Failure to <u>REMOVE and DISCARD THIS THREADED INSERT</u> will result in premature opening of the munition immediately after release from the bomb rack during flight. (See figure 8-19.)

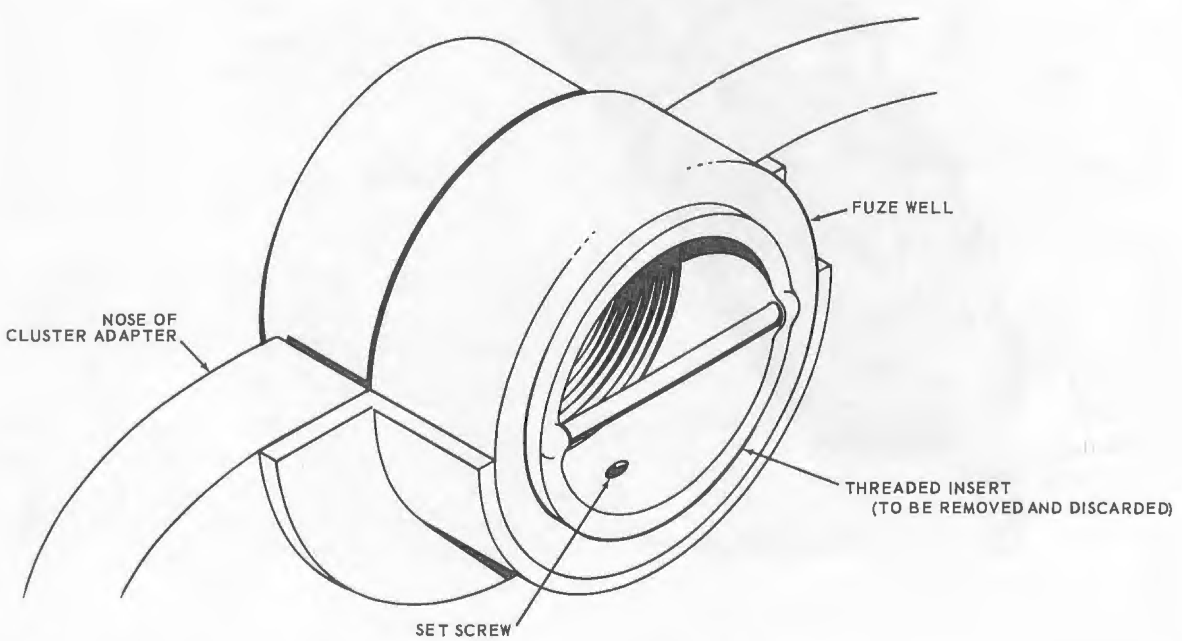


Figure 8-19. Threaded Fuze Well.

7. Thread a 30 inch length of 0.035 diameter safety wire three times through the hole in the pull piece of the locking cup, passing the free ends and the two loops through the nose fuze well. Position the attached locking cup back of the fuze well assembly where it can be pulled into its final locking position.

> CAUTION: The suspension lugs which project through the adapter cover, may have to be pried carefully into alignment with the holes in the adapter cover while closing. If the adapter cover is forced and these lugs are not properly aligned through the lug openings, damage to the hinge area will result and the adapter cover will not seat.

8. Close the cover and pull the locking cup into position. When using cluster adapter M16A1, pull the locking cup into position with wire attached to it and turn the locking screws in a clockwise direction which will draw and hold the locking cup against the nose of the cluster. When using the cluster adapter M16, pull the locking cup into position with wire attached to it. A pair of long nose pliers may be used to secure the cup in the forward position.

9. Remove the case locking bushing from the packing and inspect for a No. 10-32 UNF-3 tapped hole with a setscrew (MS51024) installed approximately 3/8 inches back from the outside front edge. Modify as described above if not previously accomplished.

10. Pass the locking cup securing wire, both the loop and loose ends, out through the case-locking bushing; screw the case-locking bushing hand tight into the fuze well.

11. Insert a scale into the fuze well of either the M16 or M16A1 adapter. The forward end of case locking bushing should not exceed 2.875 inches from the bottom surface of the locking cup.

12. Slip a 3/16 inch diameter cotter pin through the case-locking bushing. The cotter pin must pass through the wire loops previously threaded through the case-locking bushing. Pull the loose ends of the safety wire until the loops have pulled taut around the cotter pin and the pull piece of the locking cup. Twist the loose ends together to form another closed loop taut around the cotter pin. Cut off excess wire leaving 3/4 inch of twisted end. Spread the cotter pin and push the twisted end back into the fuze well.

> CAUTION: This locking cup must be positioned as above, as it alone holds the adapter cover closed after the cluster adapter drops free of the aircraft.

13. Remove Mechanical Time Fuze M146A1 from the packing and inspect the fuze for damage.

14. Set the time desired on the mechanical time fuze, referring to Chapter 2 for instructions.

15. Loosen the set screw in the case locking bushing and screw the fuze into the case locking bushing until it just bottoms. Back the fuze out only that portion of a turn necessary to align the arming pin with the suspension lugs. Tighten the set-screw to lock the fuze in this position.

16. Install the cluster securely on the aircraft.

17. Pass the arming wire from the rack attachment point, through the forward suspension lug, the arming pin and arming pin housing, the arming wire guide, and out through the vane tab of the fuze so that four to five inches protrude beyond the vane tab. Place two Fahenstock clips on the arming wire one inch ahead of the fuze. Remove the striker stop, the safety cotter pin, and the seal wire.

18. For detailed information on fuzing and defuzing, refer to Chapter 2 under the particular fuze to be installed.

19. Ejection Cartridges

a. Firing of two Mk 2 Ejection Cartridges simultaneously (a normal occurrence) in either the Aero 7A or the Aero 20A Bomb Racks provides a force sufficiently high to damage the lid and the fuze well area of Missile Cluster Adapter Mk 44 and cause premature opening of the store (prior to functioning of the mechanical time fuze). However, evaluation tests indicate that the firing of one Mk 2

Ejection Cartridge in the Aero 3A, Aero 7A, or Aero 20A Bomb Racks provides sufficient energy to ensure reliable ejection of this particular store without causing premature opening.

b. For Carriage on Aero 7 and Aero 20A Bomb Racks.

(1) All activities which posses or have custody of Missile Cluster Adapters Mk 44 have previously been instructed to stencil or otherwise plainly mark the following notation on the tail assembly or lid of each store:

CAUTION: USE ONE LIVE
MK 2 CTG AND ONE FIRED
(INERT) CTG FOR EJECTION.
REFER BUWEPS INST 8190.3

(2) The following information was included in BUWEPS INST 8190.3:

Whenever a Missile Cluster Adapter Mk 44 is to be carried on the Aero 7A or the Aero 20A Bomb Rack, the ordnanceman shall place one live Mk 2 Ejection Cartridge in one of the cartridge wells of the ejector and shall place one fired cartridge (100,000 ohms minimum resistance) in the other cartridge well. For this use the ordnanceman shall check the electrical resistance of a quantity of fired Mk 2 Ejection Cartridges and retain a supply of those which have a minimum resistance value of 100,000 ohms between the fired cartridge (fired primer) and ground (cartridge chamber).

c. For Carriage on Areo 3A Bomb Rack. Whenever a Missile Cluster Adapter Mk 44 is to be carried on the Aero 3A Bomb Rack, the ordnanceman shall place one live Mk 2 Ejection Cartridge into the cartridge well of the rack. Fired ejection cartridges (described above) are <u>NOT</u> used in the Aero 3A Bomb Rack.

d. <u>Safety Caution:</u> OP 4, Second Revision, Chapter 7, Volume 2 prohibits Fleet unloading of explosives from cartridges; therefore, Fleet units <u>POSITIVELY MUST NOT</u> dismantle unfired cartridges (by removing the charge pellets from the interior of the cartridge case) for use in place of the fired cartridges described above.

e. <u>Reliability Caution:</u> Inasmuch as the electrical resistance of the primer in the fired cartridge changes if the cartridge is reused, be sure that the 100,000 ohms minimum resistance requirement (paragraph 19.b (2)) is met in each instance.

Chapter 9
DEMOLITION BOMBS

750-LB DEMOLITION BOMB M117

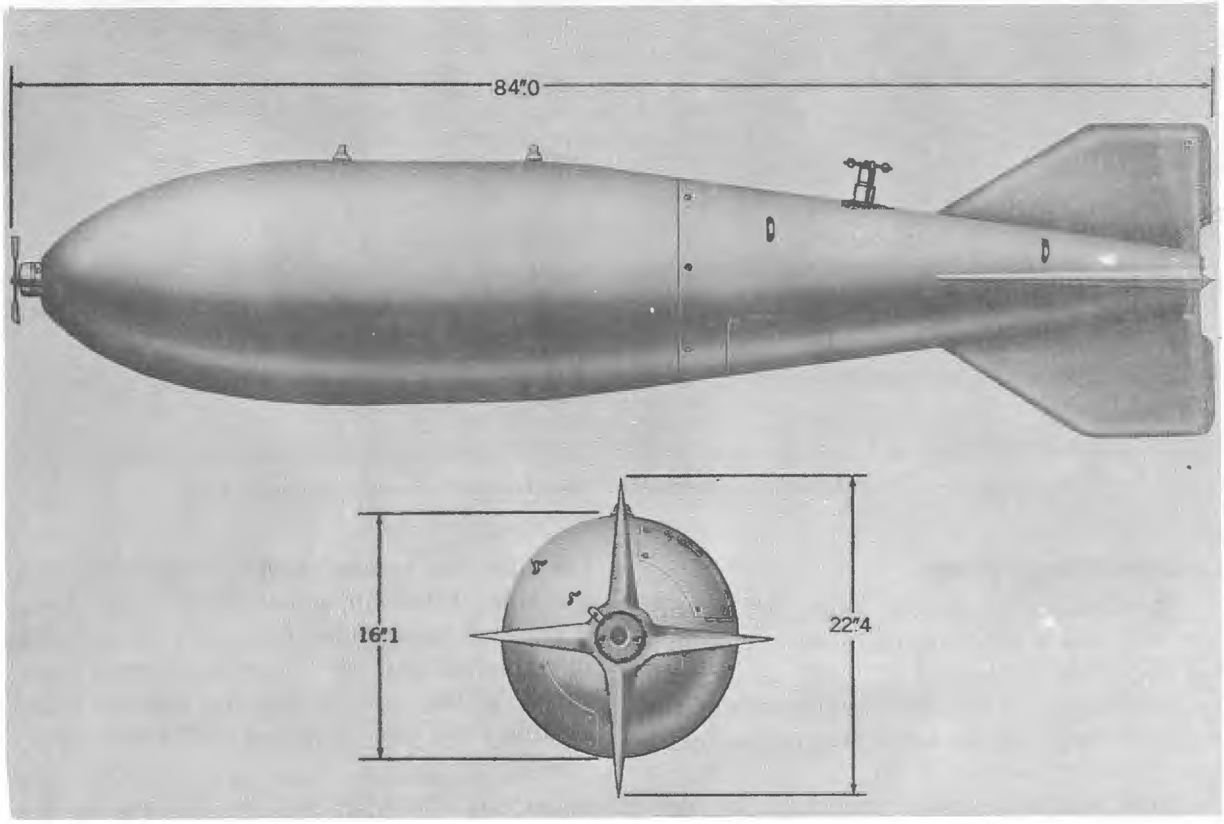


Figure 9–1.—750-lb Demolition Bomb M117 (Mechanically Fuzed), Exterior View.

Model	M117
Assembly Drawing No.	
Electrically Fuzed	F8796759
Mechanically Fuzed	F8796758
Length of Assembled Bomb (in.)	84.0
Body Diameter (in.)	16.1
Fin Span (in.)	22.4
Weight of Explosive Charge (lb)	
Tritonal	386
Weight of Fin Assembly M131 (lb)	44
Weight of Assembled Bomb (lb)	
Loaded with Tritonal	799
Nose Fuze	AN–M103A1 VT Fuze T750 VT Fuze AN–166 M990 (T905) (electric)
Tail Fuze	M190 (T759) M990 (T905) (electric)
Adapter-Boosters (for mechanical fuzing)	T45E1 (nose) T46E4 (tail)
Arming Wire Assembly	

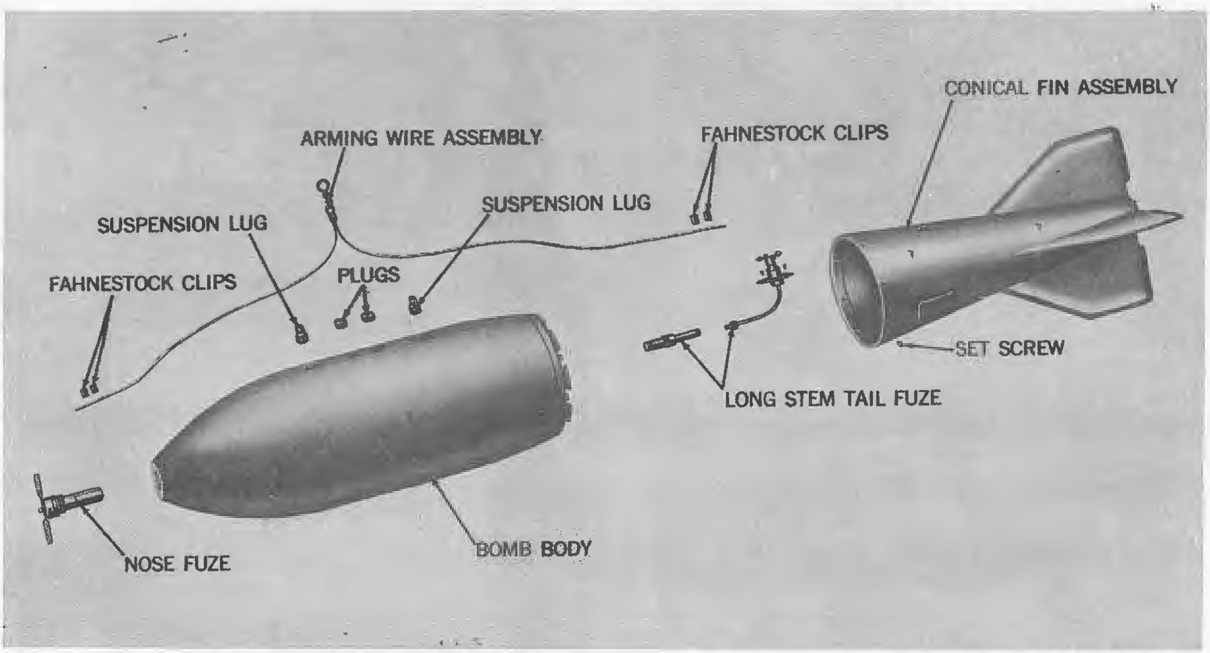


Figure 9–2.—750-lb Demolition Bomb M117 (Mechanically Fuzed), Exploded View.

General Description

The 750-lb Demolition Bomb M117, figure 9–1, has a short ogival nose, a cylindrical body, and a tapered aft end. A conical-type fin assembly is bolted to the rear of the bomb to improve its aerodynamic performance and accuracy in flight.

The bomb is designed primarily for electric fuzing. Two conduits for the electric fuze cable harness connect the nose and tail fuze cavities with a charging receptacle located between the suspension lugs on the surface of the bomb case. When electrical fuzes are not used, a plug is threaded into the charging receptacle cavity. The steel nose fuze-hole plug and base fuze-hole plug are replaced in their respective cavities after electric fuzes have been installed.

Pending the availability of electric fuzes, mechanical fuzes are used in the nose cavity, tail cavity, or both. Adapter-boosters must be installed in the fuze cavities to permit use of the mechanical fuzes.

The bomb uses a mechanical tail fuze which projects into the airstream on the side of the bomb fin cone, rather than straight out the aft end. To accomplish this, the fuze has a flexible arming stem. To install the fuze, an access cover is removed from the side of the fin cone and the fuze body is inserted through the opening and threaded into the fuze cavity. The arming head is secured to the side of the fin cone and the arming stem then is joined to the fuze body.

Two suspension lugs spaced 14 inches apart, are threaded into lug inserts on the bomb case. All seams and crevices are sealed with an inert sealing compound to prevent leakage. Approximately 50 percent of the total bomb weight is explosive charge.

Painting and Marking

The bomb is painted olive drab. On bombs of recent issue, the identification data is stenciled in yellow letters in at least two places adjacent to a yellow band. On bombs of older issue, the identifying nomenclature was stenciled in black on the olive drab body. For permanent identification, nomenclature is stamped into the bomb body.

Use

The 750-lb Demoltion Bomb M117 is designed for a higher blast effect than a general purpose bomb of comparable weight.

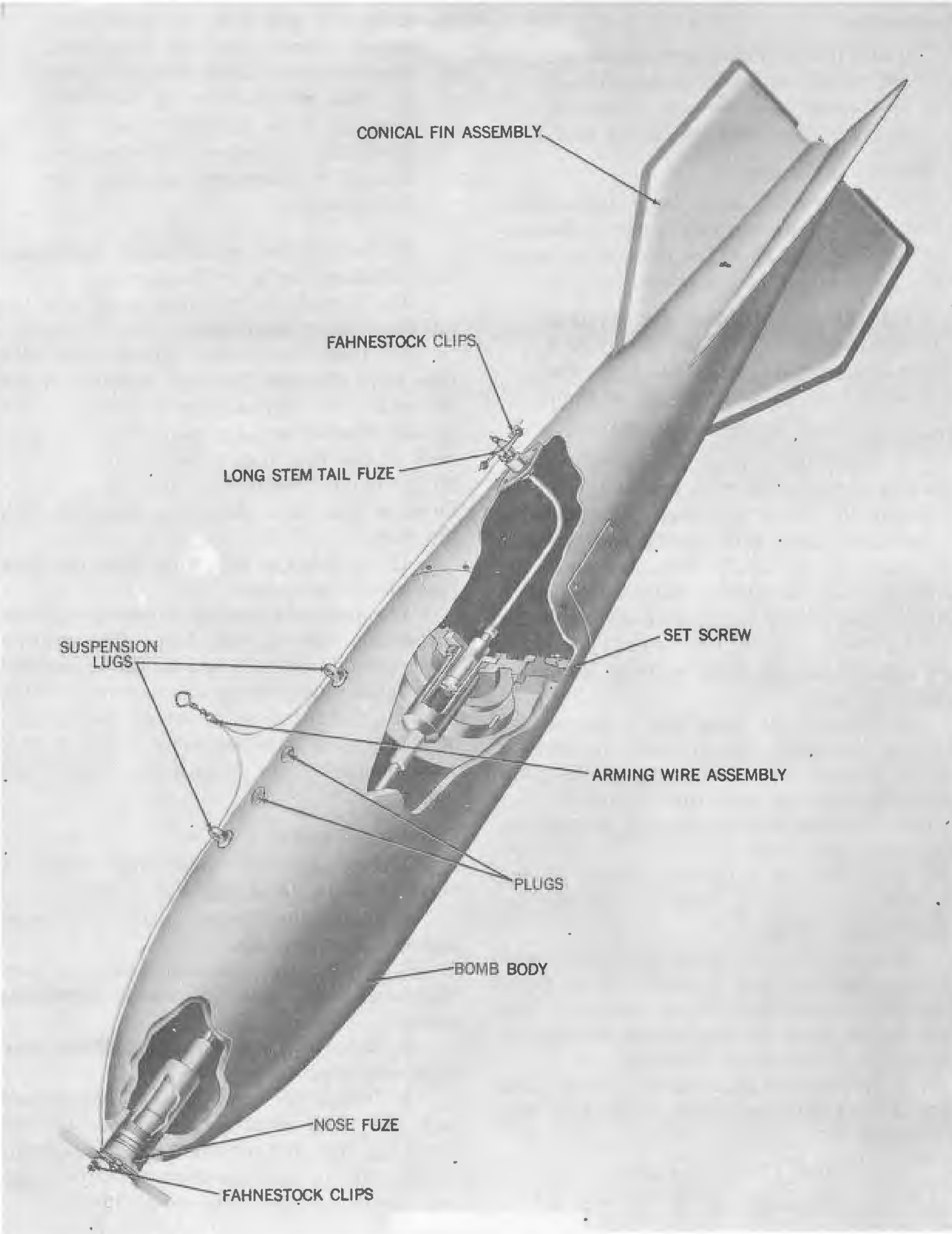


Figure 9–3.—750-lb Demolition Bomb M117 (Mechanically Fuzed), Cutaway View.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

Mechanical Fuzing.

1. Remove the bomb body and components from their packing cases. Remove the shipping ring from the rear of the bomb body by unscrewing the studs.

CAUTION: Inspect for damage (cracks, broken weldments, etc.) which might cause leaks in the bomb body or weaken lugs or their attachment to the bomb body.

2. Place the conical fin assembly over the end of the bomb with one of the fins in line with the suspension lugs. If suspended in external racks, turn the fin and locate it to clear the aircraft structure and the ground when installed. Secure the fin to the aft end of the bomb with setscrews located on the edge of the cone. Assemble the two suspension lugs in their respective threaded holes.
3. Remove the hand-hole cover on the fin cone by taking out the securing screws.
4. Remove the base fuze-hole plug threaded into the rear fuze cavity.
5. If a nose fuze is required, remove the nose fuze-hole plug.
6. Install the adapter-boosters in the nose and tail fuze cavities as required for mechanical fuzing.
7. Install the bomb on the aircraft and securely lock the bomb in place. If the bomb bay does not provide enough space for fuzing, fuzing shall be done prior to hoisting the bomb into place on the rack.
8. Remove the required number of fuzes and arming wire assemblies from their containers.

CAUTION: If containers are punctured, split, or if the seal is broken in any way, the fuzes contained therein shall be considered unserviceable. This does not apply to fuzes repacked in the field and resealed with adhesive tape for temporary protection. These fuzes should be examined carefully for serviceability.

9. For detailed information on fuzing and defuzing, refer to chapter 2.
10. Thread the tail fuze body into the tail fuze cavity handtight.
11. Insert the flexible arming stem with fuze head through the fuze opening in the fin cone skin. Thread the retaining collar on the flexible arming stem over the fuze neck of the fuze body, and tighten the collar by hand. Secure the fuze head to the fin cone skin with the studs supplied with the fuze.
12. Install the nose fuze into the nose fuze cavity handtight.
13. Insert the arming wires through the suspension lugs to each fuze. The arming wires should protrude two inches beyond the fuze vanes. Cut off the excess wire. If the bomb is tail-fuzed only, cut off one branch of the arming wire assembly. The arming wire should be free from kinks, twists, and burrs.

Electric Fuzing.

1. Perform the preceding steps 1 through 5 under Mechanical Fuzing.
2. Install the electric fuzes in the nose and tail fuze cavities.
3. Replace the nose fuze-hole plug, base fuze-hole plug, and fin access hand-hole cover.
4. Remove the charging receptacle plug from the bomb body.
5. Install the bomb on the aircraft and lock the bomb securely in place. If the bomb bay does not provide enough space for fuzing, fuzing shall be done prior to hoisting the bomb into place on the rack.

3000-LB DEMOLITION BOMB M118

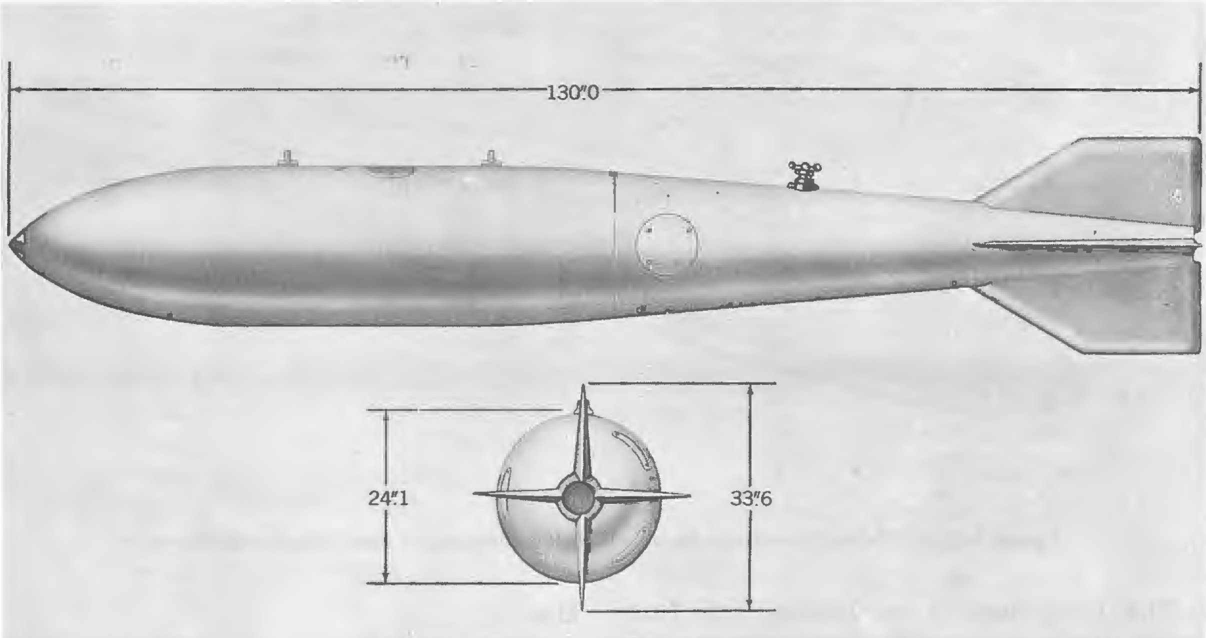


Figure 9–4.—3000-lb Demolition Bomb M118 (Mechanically Fuzed), Exterior View.

Model	M118
Assembly Drawing No.	
Electrically Fuzed	82–0–197
Mechanically Fuzed	82–0–203
Length of Assembled Bomb (in.)	130
Body Diameter (in.)	24.13
Fin Span (in.)	14.1
Weight of Explosive Charge (lb)	
Tritonal	1888
Weight of Fin Assembly M132 (lb)	162
Weight of Assembled Bomb (lb)	
Loaded with Tritonal	3020
Nose Fuze	AN–M103A1 VT Fuze T750 VT Fuze AN–M166
Tail Fuze	M192 (T761)
Adapter-Boosters (for mechanical fuzing)	T45E1 (nose) T46E4 (tail)
Arming Wire Assembly	

General Description

The 3000-lb Demolition Bomb M118, figure 9–4, has a short ogival nose, a cylindrical body, and a tapered aft end. A conical-type fin assembly is bolted to the rear of the bomb to improve its aerodynamic performance and accuracy in flight.

Two conduits for an electric fuze cable harness connect the nose and tail fuze cavities with a charging receptacle located between the suspension lugs on the surface of the bomb case. Since electric fuzes are not used, a plug is threaded into the charging receptacle cavity.

Mechanical fuzes are used in the nose cavity, tail cavity, or both. Adapter-boosters are installed in the fuze cavities to permit use of the mechanical fuzes.

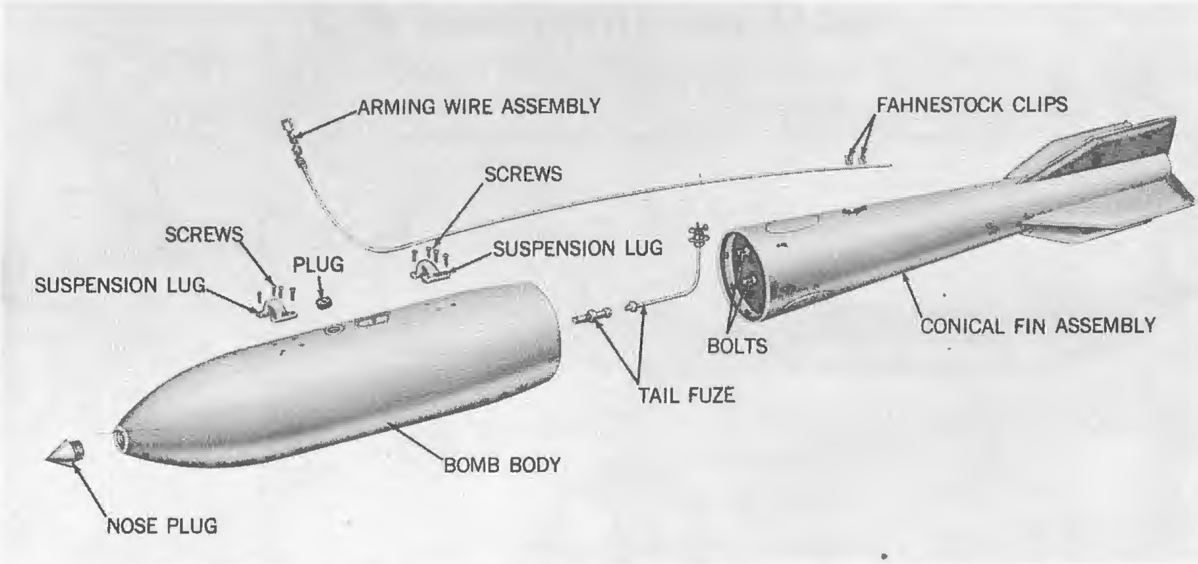


Figure 9-5.—3000-lb Demolition Bomb M118 (Mechanically Fuzed), Exploded View.

The bomb uses a mechanical tail fuze which projects into the airstream on the side of the bomb fin cone, rather than straight out the aft end. To accomplish this, the fuze has a flexible arming stem. To install the fuze, an access cover is removed from the side of the fin cone, and the fuze body is inserted through the opening and threaded into the fuze cavity. The arming head is secured to the side of the fin cone, and then the arming stem is joined to the fuze body.

Two suspension lugs, spaced 30 inches apart, are bolted to the bomb body. A single hoisting lug may be attached to the bomb at the center of gravity and may be used for an alternate 14-inch suspension mount. All seams and crevices are sealed with an inert sealing compound to prevent leakage. Approximately 65 percent of the total bomb weight is explosive charge.

Painting and Marking

The bomb is painted olive drab. On bombs of recent issue, the identification data is stenciled in yellow letters in at least two places adjacent to a yellow band. On bombs of older issue, the identifying nomenclature was stenciled in black on the olive drab body. For permanent identification, nomenclature is stamped into the bomb body.

Use

The 3000-lb Demolition Bomb M118 is designed for a higher blast effect than a general purpose bomb of comparable weight.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original packing if not used.

1. Remove the bomb body and components from their packing cases. Remove the shipping ring from the rear of the bomb body by unscrewing the studs.

CAUTION: Inspect for damage (cracks, broken weldments, etc.) which might cause leaks in the bomb body or weaken lugs or their attachment to the bomb body.

2. Remove the hand-hole covers on the fin cone by unthreading the fasteners.

3. Place the conical fin assembly over the end of the bomb with one fin in line with the suspension lugs. If suspended in external racks, turn the fin and locate it to clear the aircraft structure and the ground when installed. Align holes on the facing plate of the fin assembly with the bolt holes on the base plate of the bomb. Place lockwashers

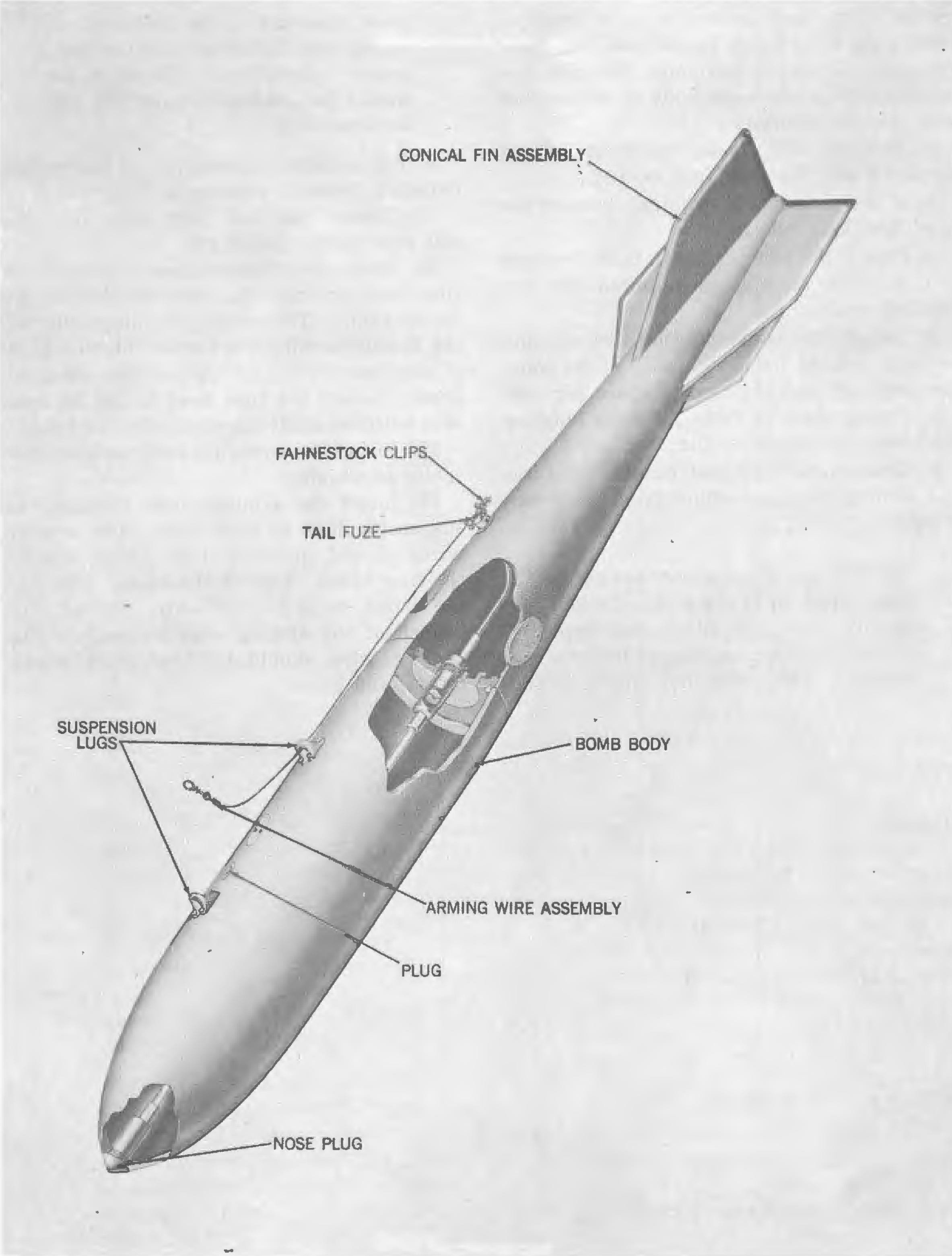


Figure 9–6.—3000-lb Demolition Bomb M118 (Mechanically Fuzed), Cutaway View.

on the bolts, and screw the bolts into the bomb body from inside the fin cone. Tighten the bolts securely. Assemble the two suspension lugs to the bomb body by assembling with four cap screws.

4. Remove the base fuze-hole plug threaded into the rear fuze cavity.

5. If the nose fuze is required, remove the nose fuze-hole plug.

6. Install the adapter-boosters in the nose and tail fuze cavities as required for mechanical fuzing.

7. Install the bomb on the aircraft and securely lock the bomb in place. If the bomb bay does not provide enough space for fuzing, fuzing shall be done prior to hoisting the bomb into place on the rack.

8. Remove the required number of fuzes and arming wire assemblies from their containers.

> CAUTION: If containers are punctured, split, or if the seal is broken in any way, the fuzes contained therein shall be considered unserviceable. This does not apply to fuzes repacked in the field and resealed with adhesive tape for temporary protection. These fuzes should be examined carefully for serviceability.

9. For detailed information on fuzing and defuzing, refer to chapter 2.

10. Thread the tail fuze body into the tail fuze cavity handtight.

11. Insert the flexible arming stem with fuze head through the fuze opening in the fin cone skin. Thread the retaining collar on the flexible arming stem over the fuze neck of the fuze body, and tighten the collar by hand. Secure the fuze head to the fin cone skin with the studs supplied with the fuze.

12. Install the nose fuze into the nose fuze cavity handtight.

13. Insert the arming wires through the suspension lugs to each fuze. The arming wires should protrude two inches beyond the fuze vanes. Cut off the excess wire. If the bomb is tail-fuzed only, cut off one branch of the arming wire assembly. The arming wire should be free from kinks, twists, and burrs.

Chapter 10

SMOKE AND INCENDIARY BOMB ASSEMBLIES

The basic information on the M70A1, AN-M78, and AN-M79 bombs, and other chemical bombs has been incorporated into NAVWEPS OP 2217. Pages 10-1 through 10-11 and Figures 10-1 through 10-9 have been deleted.

100-LB SMOKE BOMB AN–M47A4 and 100-LB INCENDIARY BOMB AN–M47A4

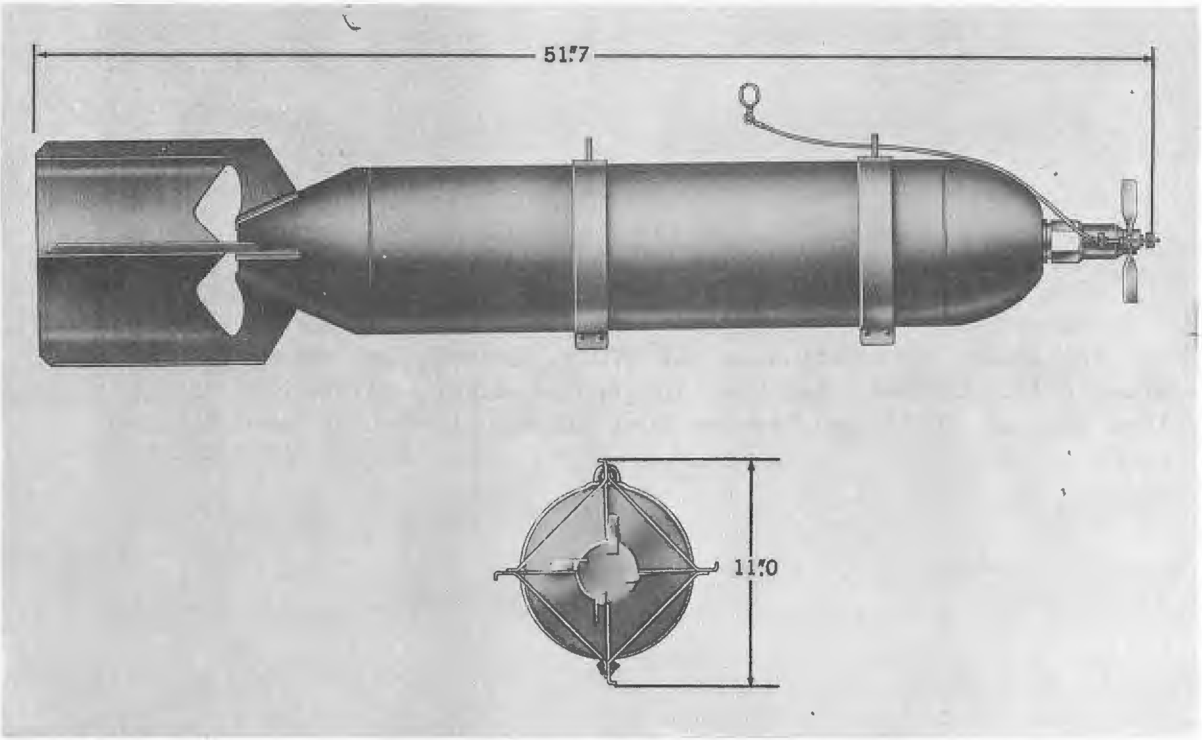


Figure 10–10.—100-lb Smoke or Incendiary Bomb AN–M47A4, Exterior View.

	Smoke	Incendiary
Model	AN–M47A4	AN–M47A4.
Assembly Drawing No	82–0–80	C14–5–651.
Length of Assembled Bomb (in.)	51.7	51.7.
Body Diameter (in.)	8.1	8.1.
Fin Span (in.)	11.0	11.0.
Weight of Empty Bomb (lb)	26.0	26.0.
Weight of Filler:		
PT1, IM, or NP (lb)		42.0.
WP (lb)	100.0.	
PWP (lb)	74.0.	
Weight of Assembled Bomb (lb)	105.1 or 130.6	70.0.
Arming-Wire Assembly	Mk 3	M2.
Igniter	None	AN–M9 (used with Burster AN–M13).
Burster	AN–M18 or AN–M–20	AN–M12 or AN–M13.
Nose Fuze	AN–M159	AN–M159.

General Description

The 100-lb smoke and the 100-lb incendiary bombs are similar in outward appearance and in many details, the chief differences consisting of their chemical fillings, their functioning, and their use.

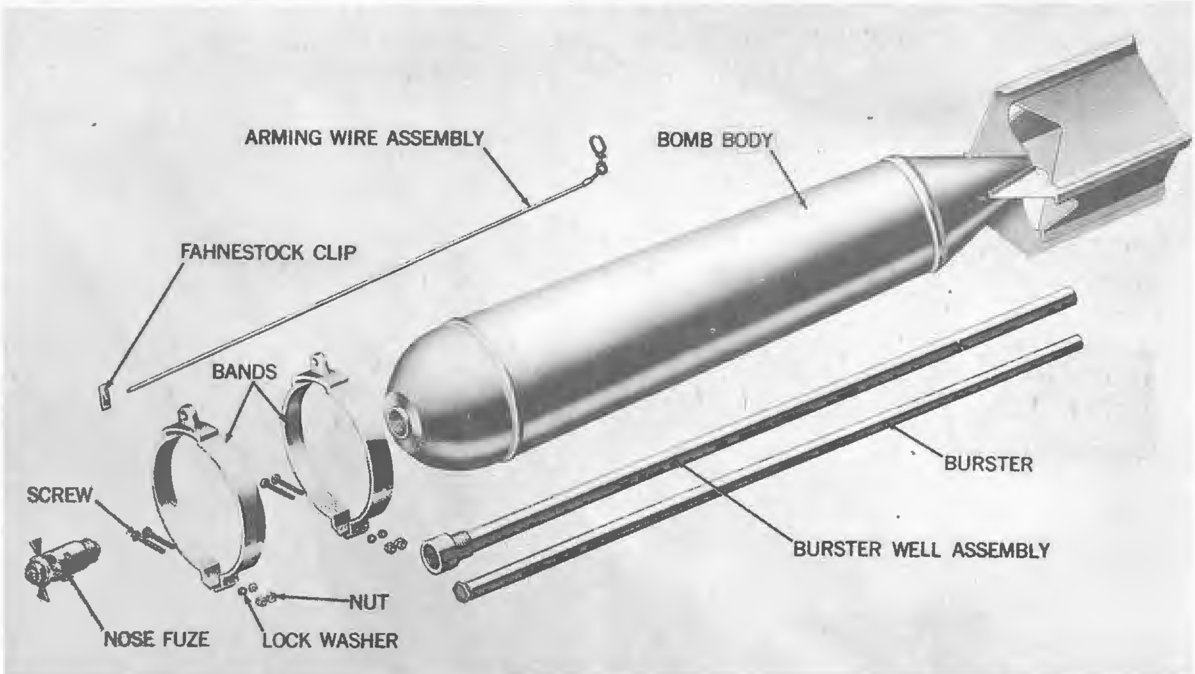


Figure 10–11.—100-lb Smoke or Incendiary Bomb AN–M47A4, Exploded View.

The 100-lb Smoke Bomb AN–M47A4 has a cylindrical body, a rounded nose, and a tapered aft section to which a box-type fin assembly is welded. The bomb is constructed of thin sheet steel and is threaded at the nose to receive an axial burster well which extends to the aft end of the bomb body.

Two suspension bands of sheet steel, each equipped with a heavy-gage suspension lug, circumscribe the bomb body. For single suspension, one band is removed; the other band is loosened, slid to the approximate center of gravity, and then retightened.

The AN–M47A4 smoke bomb is filled with PWP (plasticized white phosphorous) or WP. PWP is more effective than WP because of its longer burning, reduced pillaring, and antipersonnel effect.

Either the AN–M20 or the AN–M18 burster is used with this bomb. The burster is secured in place by an impact type nose fuze which is threaded into the foward end of the burster well. The AN–M18 burster is used when the bomb is to be dropped from low altitudes.

Use

Smoke bombs are used to conceal all types of troop and ship movements and installations in both the combat zone and rear areas.

Functioning

Upon impact of the bomb, functioning of the fuze detonates the burster. The burster shatters the bomb and disperses the agent over a circular area of 30 to 50 yards in radius. Atmospheric oxygen ignites and causes the agent to burn and produce smoke; an effective white smoke screen may be produced with a duration up to 5 minutes.

Painting and Marking

The base color of the bomb is blue-gray. A yellow band one inch in width, denoting the smoke filling, is painted around the midsection of the bomb. Identifying nomenclature is stenciled in yellow letters forward of the rear metal suspension band.

Packaging

Each bomb is shipped in a wooden box; the shipping box is marked with the same

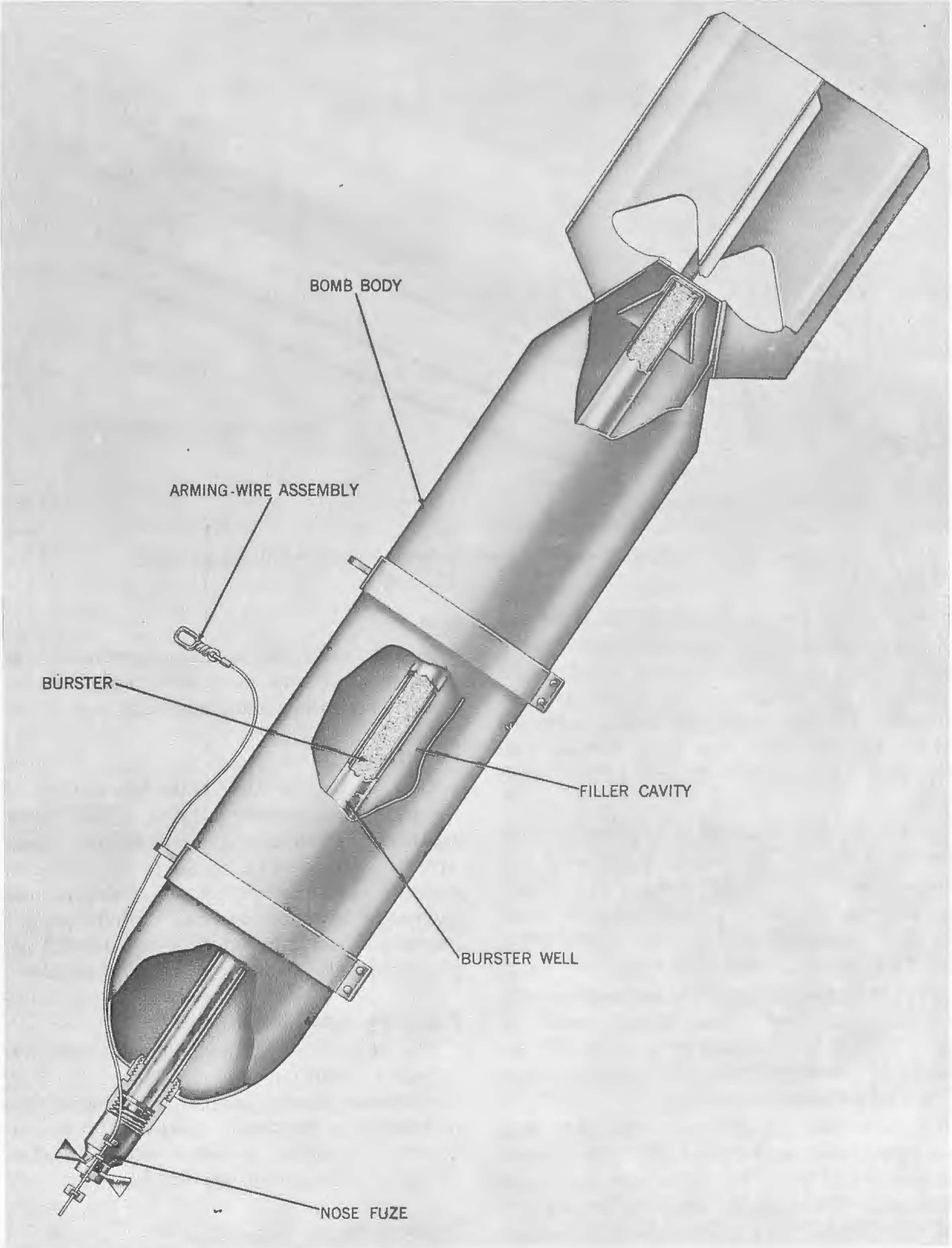


Figure 10–12.—100-lb Smoke or Incendiary Bomb AN–M47A4, Cutaway View.

information that appears on the bomb body. The markings are applied to the shipping box to identify the material and to comply with Interstate Commerce Commission Regulations. If smoke bomb shipping containers are repainted, they should be marked with a facsimile of the original markings.

The burster, fuze, and arming wire are assembled to the bomb in the field to form a complete round.

Differences Among Mods

The AN–M47A3 has lighter-gage suspension lugs; otherwise, it is identical to the AN–M47A4 bomb.

The only difference between the AN–M47A2 the AN–M47A3 is in the length of the tail fins. The tail fins of the AN–M47A3 are 3 inches longer for increased flight stability.

Assembly

> CAUTION: Bombs, fuzes, and bursters are not to be removed from stowage or packings in advance of requirements. If unpacked and not used, return them to their original condition.

1. Inspect the suspension lugs and fin assembly for alinement, straightness, and security of attachment to the bomb body. For single suspension, remove one suspension band; loosen the other, slide it up to the approximate center of gravity, and retighten it.

2. Remove the shipping plug and cork stopper from the nose of the bomb. Inspect the burster well. Threads must be clean and all surfaces must be free from foreign matter.

3. Install the bomb on the aircraft and lock it securely in place.

4. Remove the required number of fuzes, bursters, and arming wires from their containers; examine them carefully for serviceability. Refer to chapters 2 and 3 for detailed information on the particular fuze and burster to be used.

5. Seat the burster in the burster well, hand tight; do not use force.

6. Thread the fuze into the fuze adapter hand tight, until it seals firmly. Use no tools.

7. Thread the arming wire through the front suspension lug, then through the arming-wire guide and the tab on the fuze. Adjust the wire to protrude 4 inches beyond the fuze vane. Cut off excess wire. Arming wire must be free from kinks, burrs, and corrosion.

8. Slip two safety clips over the arming wire and push them up to the tab on the fuze vane.

9. Remove the sealing wire from the fuze and the adhesive tape from the fuze collar, if present.

Safety Precautions

Handling. As WP munitions ignite spontaneously upon contact with the air, they should not be handled roughly. If a fire does occur, personnel should wear gloves and keep both gloves and shoes wet. WP smoke is toxic on prolonged and repeated inhalation, but is not likely to be harmful in the concentrations found in smoke screens in the open air. Gas masks afford complete protection from concentrated WP smoke, but they tend to become clogged and therefore should not be worn except where serious exposure in enclosed spaces is involved.

Stowage. Any bomb leakage or malfunctioning in stowage would result in the generation of quantities of acrid smoke and fires which are difficult to extinguish permanently while aboard ship. Bomb stowage afloat shall be in accordance with OP 4, Ammunition Afloat. Ashore, the bombs should be stowed in fireproof magazines away from all other types of munitions. No WP munitions should be stowed where temperatures exceed 100° F.

Decontamination. White phosphorus fires are easily extinguished permanently with a 5 percent copper-sulphate solution. If this solution is not available, water or wet sand may be used to extinguish the fire temporarily. Fires thus extinguished, however, will re-ignite when the phosphorus has dried out; therefore, they must be kept wet until all the white phosphorus has been removed. WP in contact with the skin will cause severe and lingering burns. Places of contact should be washed immediately and kept wet until the phosphorus has been removed. Washing the affected area with a soda solution, followed by a 5 percent copper sulphate solution, is very effective. Greasy ointments should never be used since they merely spread the contamination.

100-LB INCENDIARY BOMB AN–M47A4

General Description

The 100-lb Incendiary Bomb AN–M47A4 uses the same body as the 100-lb Smoke Bomb AN–M47A4. Whereas the smoke bomb is used as an obscurant, the incendiary bomb is designed for use against combustible land targets where large and numerous fires will cause serious damage, and for use over water to ignite oil slicks. The types of land targets against which the incendiary bomb is effective include warehouses, factories, docks, storage dumps, barracks, and residential and industrial structures. When ships in a harbor or oil storage tanks near a harbor are damaged, oil slicks are formed which are frequently of sufficient thickness to be ignited by incendiary bombs and to burn intensely.

Three types of incendiary fillings are used in the incendiary bomb: PT1, IM, and NP. PT1 is a complex mixture based on "goop," which is comprised of magnesium dust, magnesium oxide, and carbon, with a sufficient amount of petroleum distillate and asphalt to form a paste. IM (Oil, Incendiary, Isobutyl Methacrylate, Type I) is a mixture of 88.75 percent gasoline, 5 percent isobutyl methacrylate, 3 percent stearic acid, 2 percent calcium oxide, and 1.25 percent water. NP (Oil, Incendiary, Napalm Type I) is a mixture of 88.5 percent gasoline and 11.5 percent Napalm thickener.

The AN–M47A4 incendiary bomb uses Igniter AN–M9 (white phosphorus or sodium filled) with Burster AN–M13 (TNT and tetryl filled). Burster AN–M12 (black powder and magnesium) may be used in lieu of the AN–M9 igniter and an AN–M13 burster when the bomb is to be dropped on land targets. When the AN–M9 igniter and AN–M13 burster combination is used, a small coil spring is placed in the bottom of the inner tube of the igniter before the burster is installed to insure firm contact between the burster and the fuze. No spring is used when the AN–M12 burster is installed. Bursters and igniters are secured in the burster well by an impact type nose fuze which is threaded into the nose of the burster well.

With the burster well installed, the empty bomb weighs approximately 26 pounds. When filled and assembled with the fuze, burster, and igniter, the bomb weighs approximately 70 pounds.

Functioning

When the incendiary bomb, equipped with a sodium igniter, impacts on the target, it bursts and scatters burning gobs of incendiary gel containing particles of sodium. These gobs of gel will float and the sodium will ignite spontaneously upon contact with water, thereby insuring the ignition of flammable oil slicks. If the incendiary bomb penetrates the surface of a wooden dock or pier and bursts below the dock, the incendiary gel will continue to burn in spite of the water present. If a white phosphorus-filled igniter is used, the scattering and ignition of the gel takes place, but ignition of the gel on water is not assured. Burning gobs of incendiary gel will produce a temperature of 50 to 675° C at a height of 3 inches above the flame over a maximum period of approximately 8 minutes.

Painting and Marking

The base color of the bomb is blue-gray. A purple band one inch in width, denoting the incendiary filling, is painted around the midsection of the bomb. Identifying nomenclature, filling, lot number, date of loading, and identification mark of the loading facility are stenciled in purple letters on the bomb body.

Packaging

Each bomb is shipped in a wooden box; the shipping box is marked with the same information that appears on the bomb body. The markings are applied to the shipping box to identify the material and to comply with Interstate Commerce Commission Regulations. If smoke bomb shipping containers are repainted, they should be marked with a facsimile of the original markings.

Bursters, igniters, fuzes, and arming wires are assembled to the bomb in the field to form a complete round.

Assembly

CAUTION: Bombs, fuzes, igniters, and bursters are not to be removed from stowage or packing in advance of requirements. If removed and not used, return them to their original condition.

1. Inspect the suspension lugs and fin assembly for alinement, straightness, and security of attachment to the bomb body. For single suspension, remove one suspension band; loosen the other, slide it up to the approximate center of gravity, and retighten.
2. Remove the shipping plug and cork stopper from the nose of the bomb. Inspect the burster well. Threads must be clean and all surfaces must be free from foreign matter.
3. Install the bomb on the aircraft and lock it securely in place.
4. Remove the required number of fuzes, bursters, igniters, and arming wires from their containers; examine them carefully for serviceability. Refer to chapters 2 and 3 for detailed information on each item to be used.
5. Insert Igniter AN–M9 all the way into the burster well in the bomb until the flange on the igniter seats against the shoulder in the fuze adapter. Do not use force.
6. Screw the retainer ring into the fuze adapter to insure a tight fit of the igniter.
7. Place the small spring at the bottom of the inside of the igniter tube.
8. Insert the explosive burster AN–M13 into the igniter tube.
9. Thread the fuze into the fuze adapter, hand tight, until it seats; use no tools.
10. Thread the arming wire through the front suspension lug, then through the arming-wire guide and tab on the fuze. Adjust the wire so that it protrudes 4 inches beyond the fuze vane. Cut off excess wire. The arming wire must be free from kinks and burrs.
11. Slip two safety clips over the arming wire and push them up to the tab on the fuze vane.
12. Remove sealing wire from the fuze and adhesive tape from the fuze collar, if present.

Safety Precautions

Handling. Incendiary bombs and components have satisfactorily withstood tests simulating the normal handling expected to be received during loading, shipment, unloading, and stowage. However, they can easily be damaged by unnecessarily rough treatment and should be handled with care at all times. Sodium-loaded igniters should be handled very carefully to prevent leakage of the sodium, which ignites spontaneously and with great violence when it comes into contact with moisture. WP-loaded igniters should be handled very carefully to prevent leakage of the white phosphorus, which ignites spontaneously when it comes into contact with the atmosphere.

Stowage. Incendiary bombs, unfuzed and without burster or igniter, should be stowed in a magazine containing incendiary bombs only. Sodium igniters should be stowed only with other sodium-filled items. White phosphorus igniters should be stowed only with other white phosphorus loaded items. This is necessary because of the different firefighting techniques employed in combating sodium and white phosphorus fires.

Fire. If fire occurs in a magazine containing incendiary bombs, it should be fought with the same equipment and in the same manner as a gasoline fire. Fire in a magazine containing WP loaded igniters should be fought with water or wet sand. Care must be taken that white phosphorus fires extinguished with water do not re-ignite when the firefighting water has drained away or evaporated from the exposed white phosphorus. If air is excluded from WP, it will not burn. WP may be extinguished permanently with a 5 percent solution of copper sulphate in water, provided the white phosphorus layer is not too thick, in which case repeated application of the copper sulphate solution may be necessary.

Water must never be used on burning sodium or on burning buildings or equipment in which sodium is stored or used. Dry soda-ash, dry graphite, or dry sand will quickly smother sodium fires. Chemical solution type, vaporizing liquid type, or carbon-dioxide extinguishers are not effective, and their use will add to the hazard instead of reducing it. The chemical solution type of extinguisher (soda acid) contains water, while the vaporizing liquid type (carbon-tetrachloride) and carbon dioxide both react violently with sodium. The fumes of burning sodium are essentially caustic and therefore irritating. An approved type of respirator should always be available, and personnel should always put on the respirator before attempting to fight a sodium fire.

500-LB INCENDIARY BOMB AN–M76 WITH FIN ASSEMBLY AN–M109A1 (BOX-TYPE)

	With Fin Assembly AN–M109A1 (Box-type)
Model	AN–M76.
Assembly Drawing No	82–0–100.
Length of Assembled Bomb (in.)	59.2.
Body Diameter (in.)	14.18.
Fin Span (in.)	18.94.
Weight of Filler (lb)	174.0.
Weight of Fin Assembly (lb)	18.6.
Weight of Assembled Bomb (lb)	468.8.
Fin Locknut	M2 or Mk 3 Mod 0.
Fin Locking Web	Not Used.
Arming-Wire Assembly	Mk 1 or AN–M6A2.
Igniter	AN–M5.
Burster	AN–M14.
Nose Fuze	AN–M103A1, AN–M139A1, or AN–M140A1.
Tail Fuze	AN–M101A2.

General Description

The 500-lb Incendiary Bomb AN–M76, now obsolescent, resembles the 500-lb AN–M64A1 GP bomb and uses the same fin assembly. It has a cylindrical metal casing, an ogival nose, and a tapered aft end to which a box-type fin assembly is secured by a fin locknut.

The rear section of the bomb tapers down to about 8 inches; a base plate is welded on at this point. The base plate has two filling holes and a threaded center hole to receive an adapter-booster holder assembly consisting of the M115A1 adapter-booster, an adapter-booster holder, and a fuze closing plug. An impact-type tail fuze having a non-delay primer-detonator (M14) is threaded into the adapter-booster. A burster-well, attached to the base plate, extends throughout the axial length of the bomb body. The burster well is secured to the nose of the bomb and is threaded at its forward end to receive a nose fuze.

Suspension lugs, 14 inches apart, are welded to the bomb body; a single lug is attached 180 degrees from the other lugs at the center of gravity of the bomb.

The bomb is filled with approximately 174 pounds of Incendiary Mixture PT1, consisting essentially of gasoline, magnesium, and carbon, with a sufficient amount of petroleum distillate and asphalt to form a paste. The AN–M5 (white phosphorus) igniter and AN–M14 (tetrytol) burster are used with this bomb.

Functioning

Impact of the bomb causes both the nose and tail fuzes to function, the nose fuze acting faster. The nose fuze normally detonates the burster; if the nose fuze should fail, however, the tail fuze sets off the burster through the adapter-booster charge. The burster shatters the igniter and the bomb body, causing the white phosphorus in the igniter to burn on contact with the air and to ignite the incendiary filling. The bomb has a dispersal area of 300 by 600 feet.

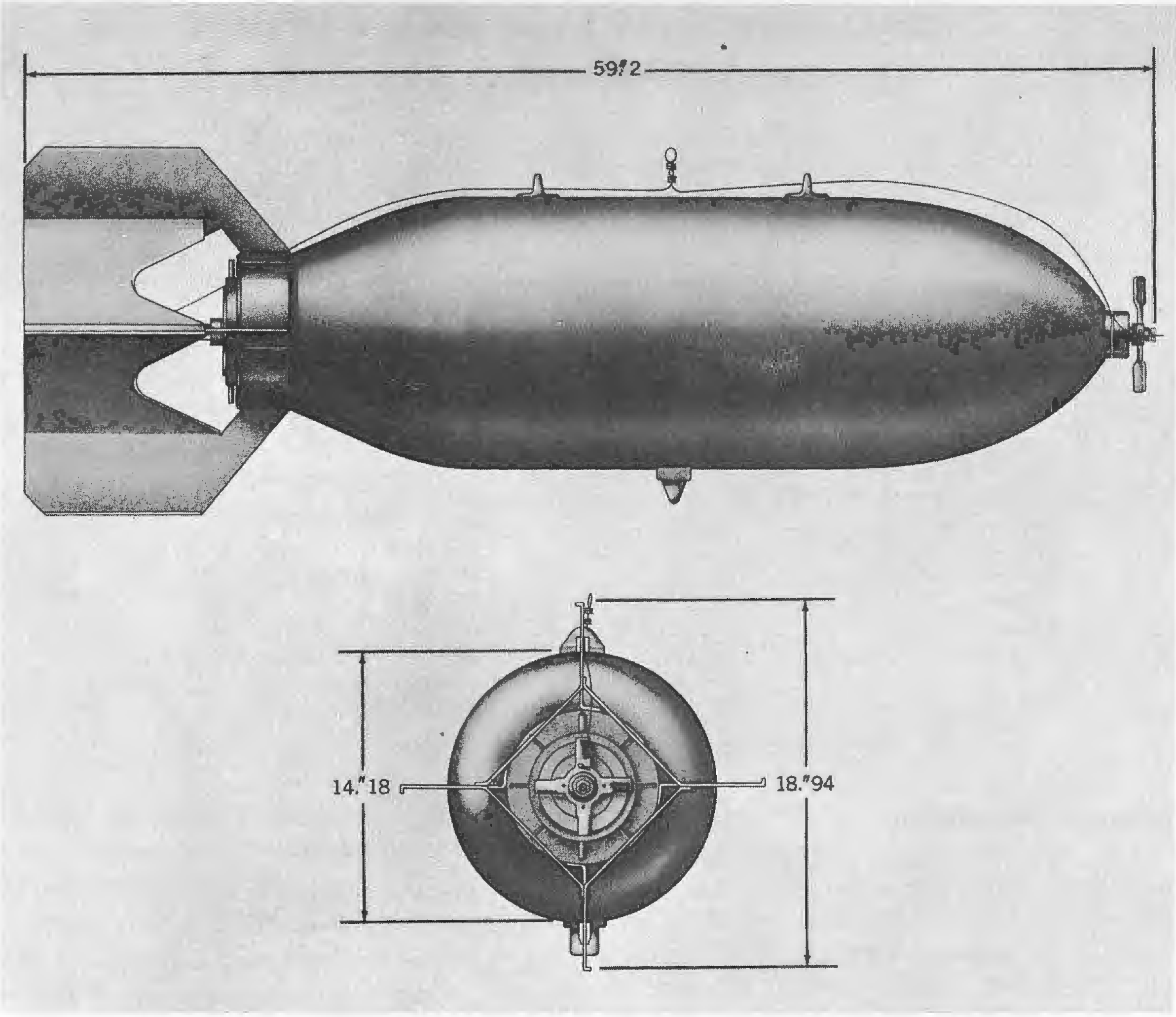


Figure 10–13.—500-lb Incendiary Bomb AN–M76 with Fin Assembly AN–M109A1, Exterior View.

Painting and Marking

The base color of the bomb is gray. Purple identification bands are painted around the nose, middle, and tail sections. Weight, type, filling, model number, and lot number are stenciled in purple on the bomb body.

Packaging

During shipment and stowage, the bomb is protected by shipping bands. The explosive components, fin assembly, and arming wires are assembled to the bomb in the field to form a complete round.

Assembly

CAUTION: Bombs, fuzes, bursters, and igniters are not to be removed from stowage or packing in advance of requirements. If removed and not used, return them to their original condition.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Inspect for damage, cracks, and broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Remove the nose plug and shipping plate which is attached to the base plate by four screws. Inspect and clean all threads, cavities, and mating parts. Make sure that the fuze seat liner is properly installed in the nose of the bomb.

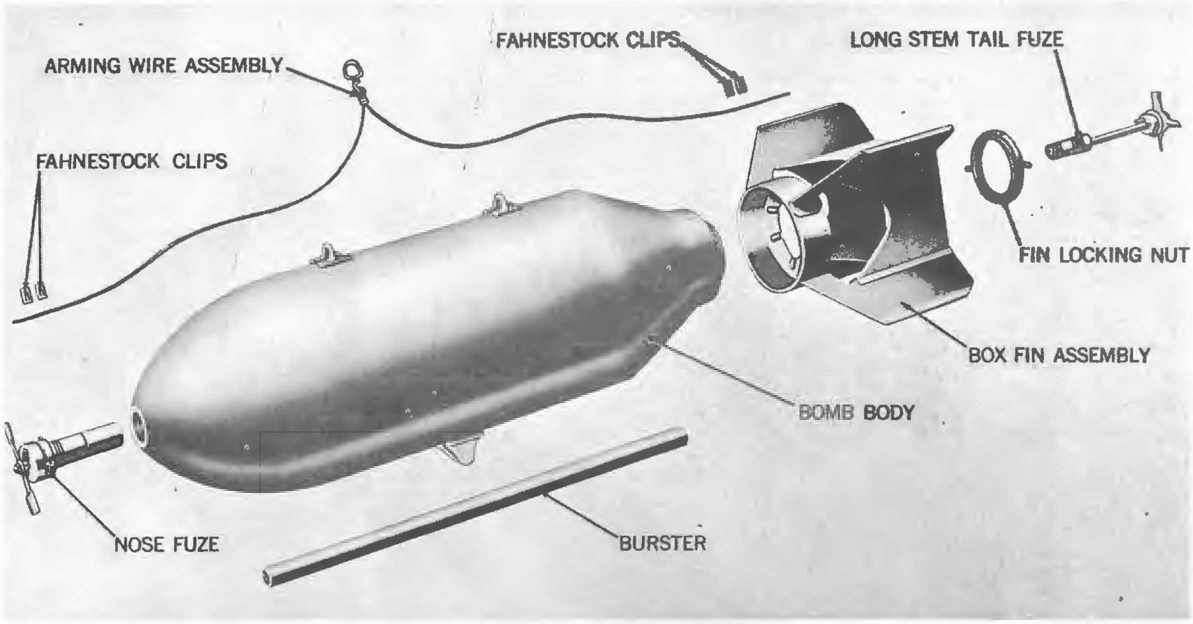


Figure 10–14.—500-lb Incendiary Bomb AN–M76 with Fin Assembly AN–M109A1, Exploded View.

3. Remove the required number of fuzes, bursters, igniters, arming wires, and adapter-booster holder assemblies from their containers. Examine them carefully for serviceability. Refer to chapters 2 and 3 for detailed information on the explosive components to be installed.

4. Insert the igniter, with its two pipe plugs facing aft, in the burster well from the rear of the bomb. Insert the burster in the igniter cavity.

5. Install the adapter-booster holder assembly in the base plate and remove the fin locknut.

6. Remove the fin assembly from the shipping crate. Place the fin assembly over the rear of the bomb with fins positioned 45 degrees from the suspension lugs. Thread the fin locknut on the external threads of the adapter-booster holder and tighten it with a wrench. Fin Locknut M2 or Mk 3 Mod 0 is always used in place of the regular fin locknut. Fin locknut screws should be tightened securely to prevent rotation of the fin assembly.

CAUTION: Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns on the bomb, it will pull the arming wire from the tail fuze, causing it to arm prematurely.

7. Install the bomb on the aircraft and lock it securely in place.

8. Remove the plug from the adapter-booster and install the tail fuze. After making sure that the nose fuze seat liner is properly seated, install the nose fuze. Do not use tools in the fuzing process; fuzes are to be seated hand tight.

9. Install the arming wire so that 4 inches of wire protrude beyond the nose and tail fuze vanes. Clip off excess wire. Place two safety clips on both ends of the wire and slide them up close to the fuze vanes. Arming wires must be free from kinks, twists, and burrs.

Safety Precautions

The pipe plugs in the igniter and filling plugs in the bomb body should not be removed under any circumstances.

Bombs and components must be handled as little as possible. Do not drop them or subject them to bumps, shocks, or blows. Protect them from rain, spray, and the direct rays of the sun. Stored bombs should be inspected frequently so that leakers may be detected and properly processed.

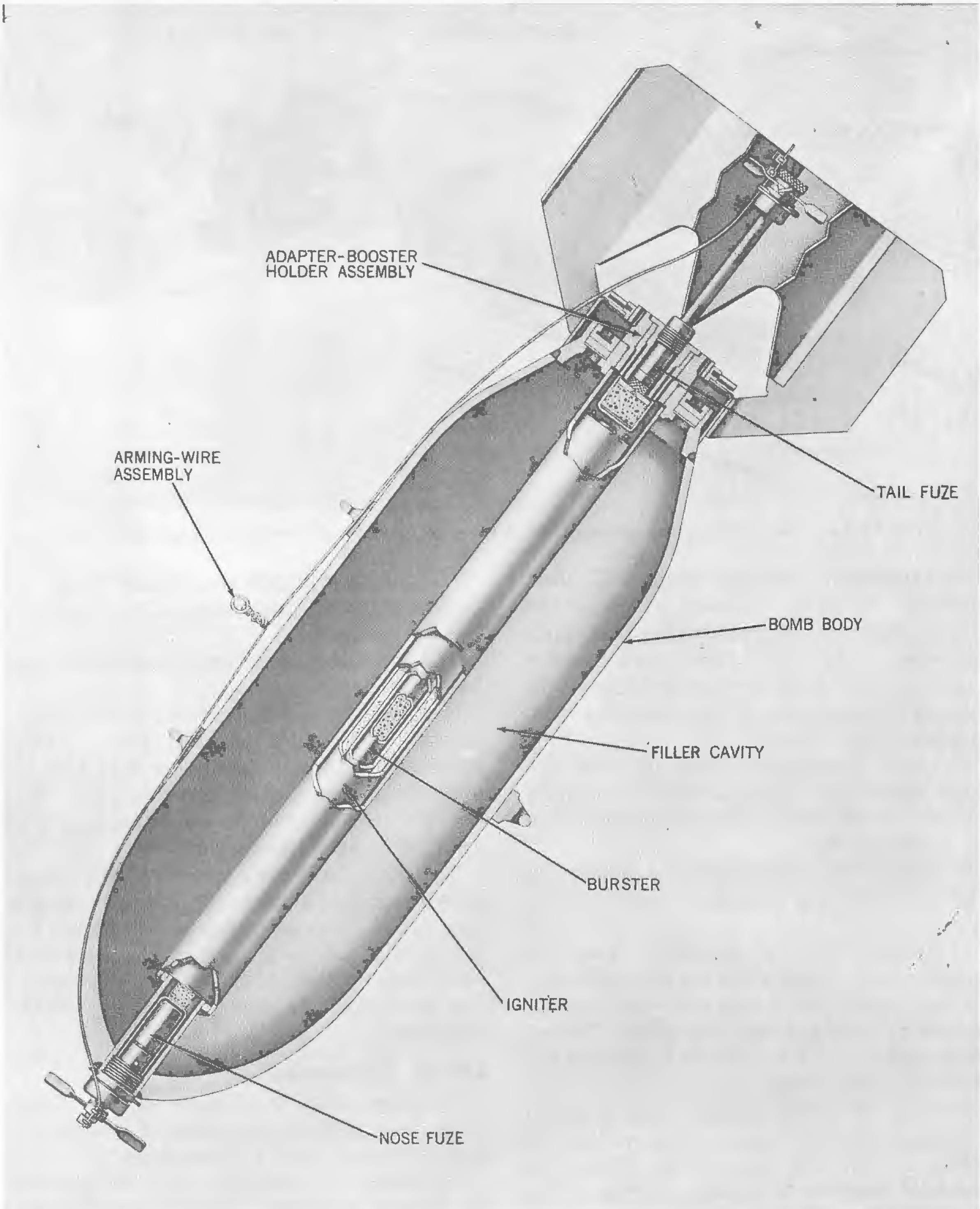


Figure 10–15.—500-lb Incendiary Bomb AN–M76 with Fin Assembly AN–M109A1, Cross Section.

500-LB INCENDIARY BOMB AN–M76 WITH FIN ASSEMBLY M128A1 (CONICAL)

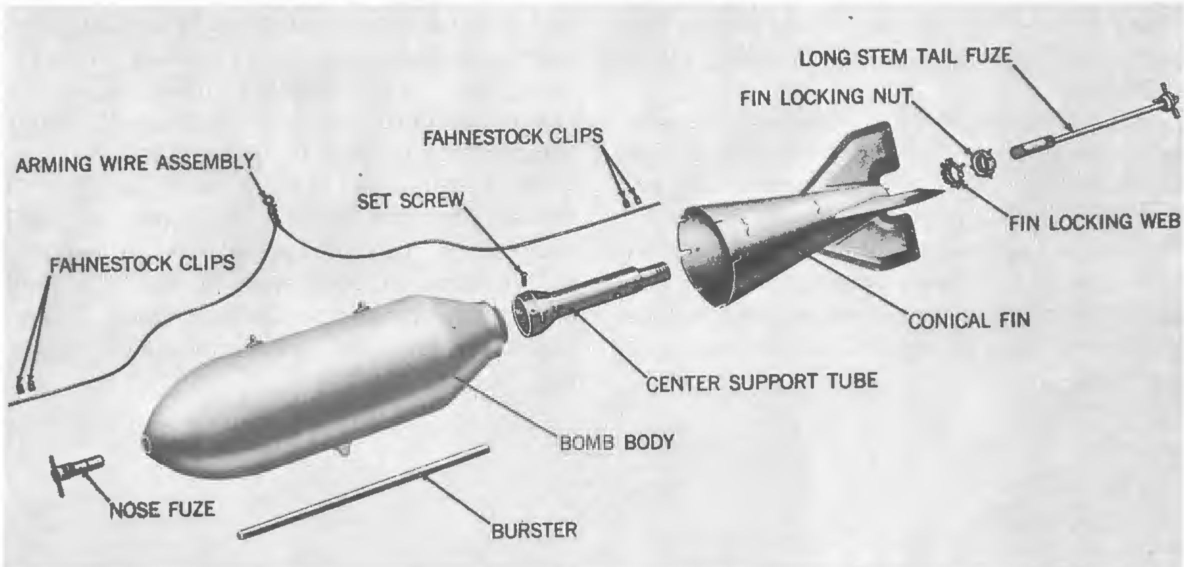


Figure 10–16.—Incendiary Bomb AN–M76 with Fin Assembly M128A1, Exploded View.

General Description

Equipped with Fin Assembly M128A1, the 500-lb Incendiary Bomb AN–M76, now obsolescent, uses the standard AN–M76 bomb body. The elongated cone of the assembled fin lengthens and streamlines the bomb, increasing its aerodynamic performance and accuracy. The M128A1 conical fin assembly consists of an elongated cone with four integral fins spaced at equal distances on the cone. A support tube runs through the center of the cone; the fin assembly is secured to the bomb body by means of the support tube, a locking web, and a fin locknut. When a conical fin assembly is installed on the bomb, the new long-stem tail fuzes are required so that the arming vane is located effectively in the air stream.

Assembly

CAUTION: Fuzes and bombs are not to be unpacked in advance of requirements. Return them to their original condition if not used.

1. Remove the shipping bands from the bomb by removing the nuts from the securing bolts. Inspect for damage, cracks, and broken weldments which might weaken the lugs or their attachment to the bomb body.

2. Remove the nose plug and shipping plate which is attached to the base plate by four screws. Inspect and clean all threads, cavities, and mating parts. Make sure that the fuze seat liner is properly installed in the nose of the bomb.

3. Remove the required number of bursters, igniters, and adapter-booster holder assemblies from their containers. Examine them carefully for serviceability.

4. Insert the igniter, with its two pipe plugs facing aft, in the burster well from the rear of the bomb. Insert the burster in the igniter cavity.

5. Remove the plug from the adapter-booster holder assembly. Install the assembly in the base plate and remove the fin locknut. Discard the locknut.

6. Remove the fin assembly and its attachments from the shipping crate. Thread the center support tube onto the external threads of the adapter-booster holder. Tighten the tube with a wrench. Tighten

the setscrews in the support tube. Place the fin cone over the support tube and slide the cone back until it is jammed against the bomb body. Position the fins so as to clear the aircraft structure and ground when installed.

7. Place the fin locking web over the support tube so that it engages the fins of the fin assembly. Secure the conical fin assembly to the support tube by threading on the special locknut. Tighten the locknut with special notched wrench. Bend two tabs of the locking web into the locknut slots and secure the nut in position by means of setscrews.

8. Install the bomb on the aircraft and lock it securely in place.

9. Remove the required number of fuzes and arming-wire assemblies from their containers and examine them carefully for serviceability. For detailed information on fuzing and defuzing, refer to chapter 2 under the particular fuzes to be installed.

10. Install the arming wire so that 4 inches protrude beyond the nose and tail fuze vanes. Clip off excess wire. Place two safety clips on both ends of the wire and slide them up close to the fuze vanes. Arming wires must be free from kinks, twists, and burrs.

500-LB FIRE BOMB Mk 77 Mod 1

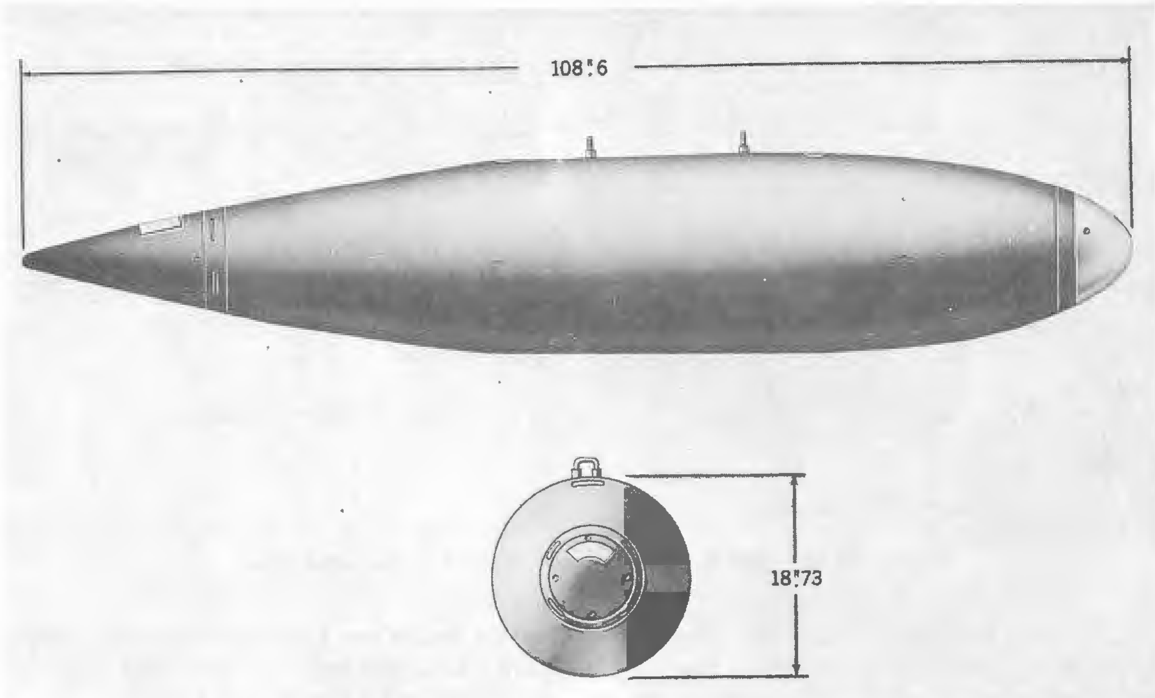


Figure 10–17.—500-lb Fire Bomb Mk 77 Mod 1, Exterior View.

Mark	77
Mod	1
General Arrangement	1380243
List of Drawings	165789
Length of Assembled Bomb (in.)	108.59
Body Diameter (in.)	18.73
Filler Capacity (gal)	75.0
Weight of Empty Bomb (lb)	63.0
Weight of Filler (lb)	450.0
Weight of Assembled Bomb (lb)	520.0
Igniter	M15, M16, or M23
Fuzes	M157 (used with Igniters M15 and M16), or AN–M173 (used with Igniter M23)

General Description

The 500-lb Fire Bomb Mk 77 Mod 1 is a 75-gallon capacity bomb obtained by modifying the 750-lb Fire Bomb Mk 77 Mod 0. The modification consists of cutting off approximately 2 inches from the nose and tail body sections and approximately 12 inches from each end of the center section of the Mod 0, and welding the remaining pieces together to form the smaller Mod 1.

Igniters and fuzes are used in the nose and tail of the Mk 77 Mod 1 fire bomb. Three igniters may be used; the M15, the AN–M16, and the M23. The bomb is designed for primary use of the M23 igniter with the AN–M173 fuze in both the nose and the tail.

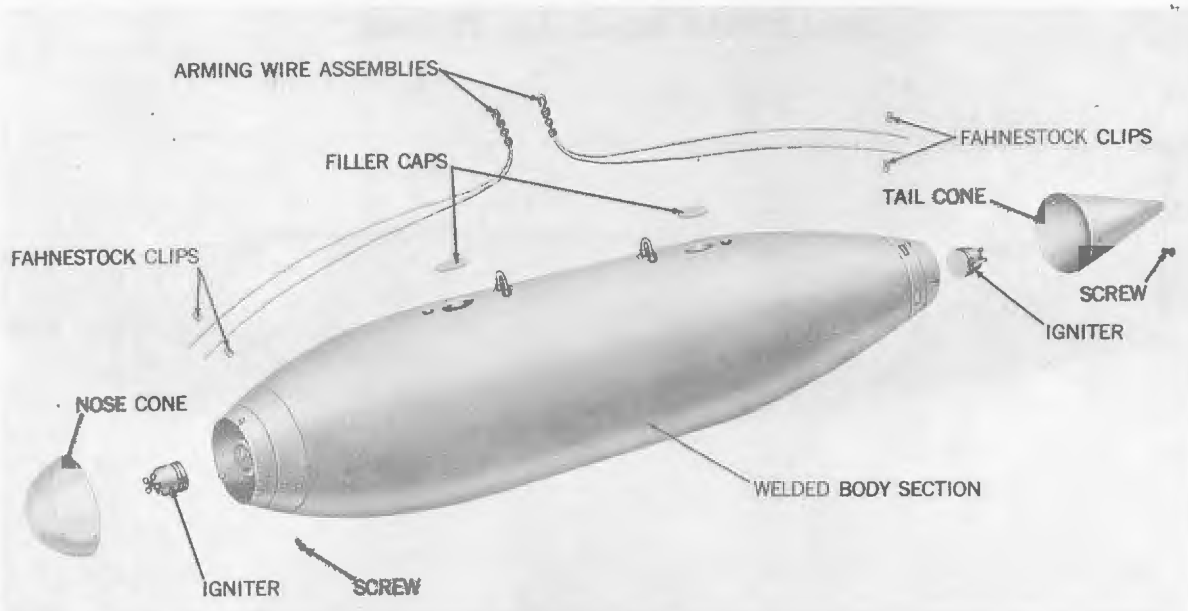


Figure 10–18.—500-lb Fire Bomb Mk 77 Mod 1, Exploded View.

Adapters are furnished with the bomb so that the M15 igniter with the M157 fuze can be used in the nose or tail of the bomb. The M16 igniter with the M157 fuze is normally used only in the tail of the bomb, since the nose cone will not accommodate this larger igniter. If the nose cone is left off the bomb, however, the M16 igniter can be used in the nose.

The arming wires and cone-release wires are carried to the nose and tail of the bomb through internal tubes. When the cone-release wires are withdrawn, the springs in the cone-ring adapters eject both nose and tail cones from the bomb, exposing the fuzes to the air stream.

Two suspension lugs are mounted on the body 14 inches apart. Two gasket sealed filler holes are located on the upper bomb surface. The bomb is filled with 75 gallons of gasoline gel; a minimum air space of 3 percent of the capacity of the bomb is required. Once a bomb is filled it cannot be disassembled; it must either be used or jettisoned.

Painting and Marking

The base color of the bomb is the natural aluminum color of the body. Purple identification bands are painted around it. Identifying nomenclature is stenciled on this modified bomb body in red letters.

Assembly

NOTE: The assembly instructions following do not cover the uncrating or the physical modification details for converting the Mk 77 Mod 0 bomb to the Mk 77 Mod 1. For unpacking, refer to the section on the Mk 77 Mod 0 fire bomb.

1. Check the bomb for damage, broken weldments, or cracks that may weaken the suspension or cause leaks in the casing.
2. Check the nose and tail sections for the presence of cones, cone-ring adapters, shipping pins, igniter adapters, and filling-hole covers.
3. Remove the tail-cone screws from the tail-cone adapter.
4. Pull the shipping pin from the clevis pin in the tail-cone adapter and remove the clevis pin and clevis-pin spring to release the tail-cone adapter.
5. Remove the igniter adapter from the tail end-plate casting.
6. Remove the nose cone.

7. Follow the procedure given in step 4 above to release the nose-cone adapter.

8. Remove the igniter adapter from the nose end-plate casting.

9. Screw the igniter adapter in the nose end-plate casting until it bottoms.

10. Replace the nose-cone adapter, the clevis-pin spring, and the clevis pin. Replace the shipping pin in order to secure the assembly. Check the nose-cone adapter release mechanism by pulling out the shipping pin.

11. Reassemble the nose-cone adapter and assemble the nose cone.

> CAUTION: Do not damage the nose cone by tightening the screws excessively. If the bomb is not to be used immediately, the nose cone need not be assembled to the nose-cone adapter until the bomb is fuzed.

12. Screw the igniter adapter into the tail end-plate casting until it bottoms.

13. Replace the tail-cone adapter, following the procedure given in steps 10 and 11.

14. The 500-lb Fire Bomb Mk 77 Mod 1 is normally loaded on the aircraft while empty and then filled with gasoline gel. However, this procedure is not always practical. Detailed instructions for mixing the gasoline gel and filling the bomb are given in OP 2183.

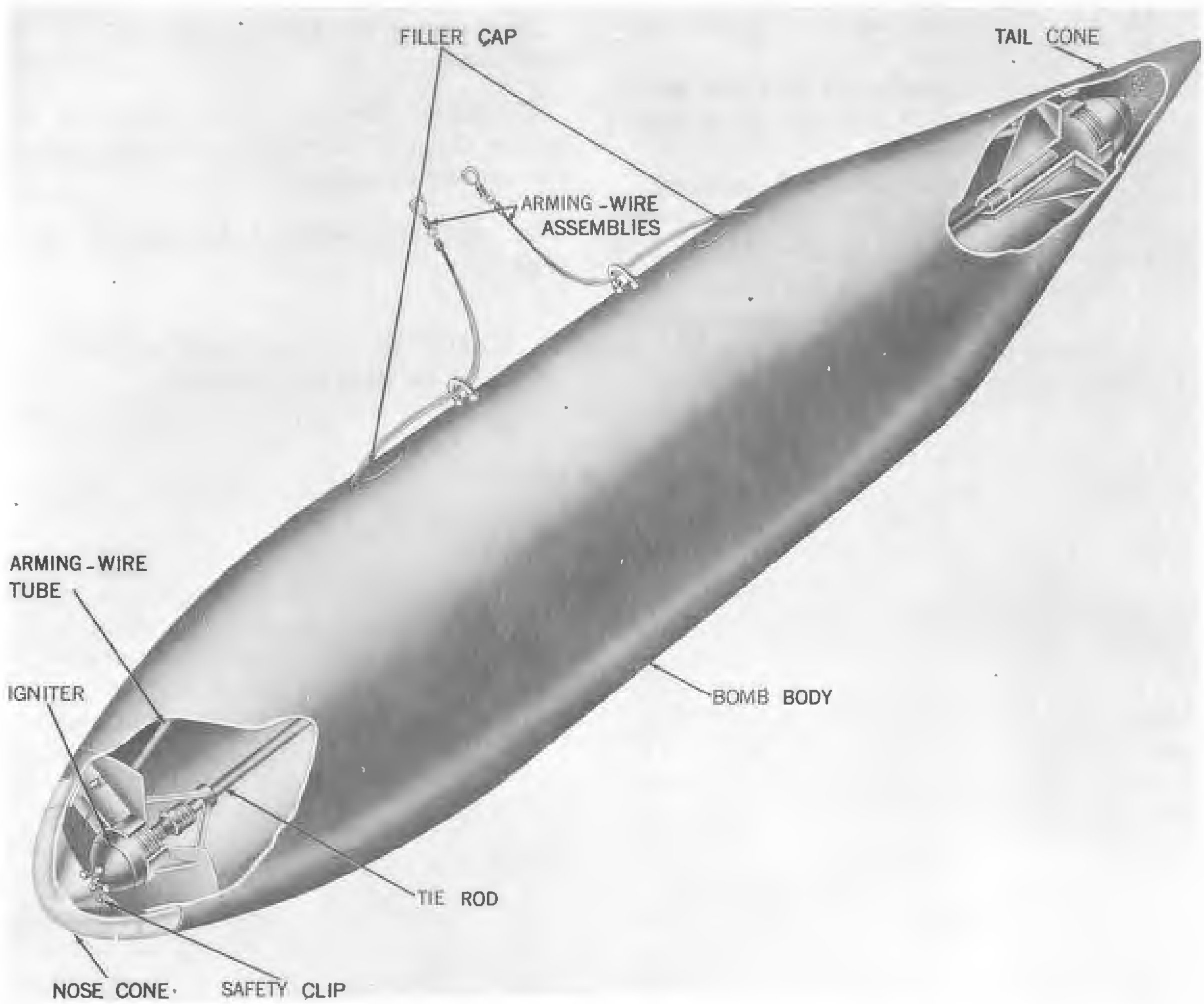


Figure 10–19.—500-lb Fire Bomb Mk 77 Mod 1, Cutaway View.

15. Fill the bombs either through one or through both filling holes; both covers must be removed even if the bomb is filled through one hole. Secure the covers after filling.

16. Install the bomb securely on the aircraft and sway brace. After the bomb is installed and filled, fuze and arm it as follows.

17. Remove the screws securing the nose cone to the adapter, and remove the nose cone.

18. Thread the two nose arming wires through the suspension fittings and internal arming-wire guide tube to the nose end-plate casting.

19. Insert one wire through the hole in the end of the clevis pin.

20. Attach the arming wire to the bomb rack.

21. Remove the clevis-pin shipping pin.

22. Repeat steps 17 through 21 to install the rear arming wires.

23. Install the nose and tail igniters.

a. Clamp Igniter M15 into the igniter adapter in the nose, and Igniter M15 or M16 into the igniter adapter in the tail.

b. If Igniters M23 are used, unscrew the adapters and screw the igniters into the forward and rear walls.

24. Insert the arming wires into the nose and tail fuzes.

25. Attach the safety clips to the ends of the arming wire of each fuze. Cut off excess arming wire.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked, or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

26. Remove the safety pins from the igniter fuzes.

27. Install the nose and tail cones and secure them with screws. Do not tighten the screws excessively.

28. Only an unfilled bomb may be disassembled.

CAUTION: Once filled, a bomb must be used or jettisoned.

500-LB FIRE BOMB Mk 77 Mod 2

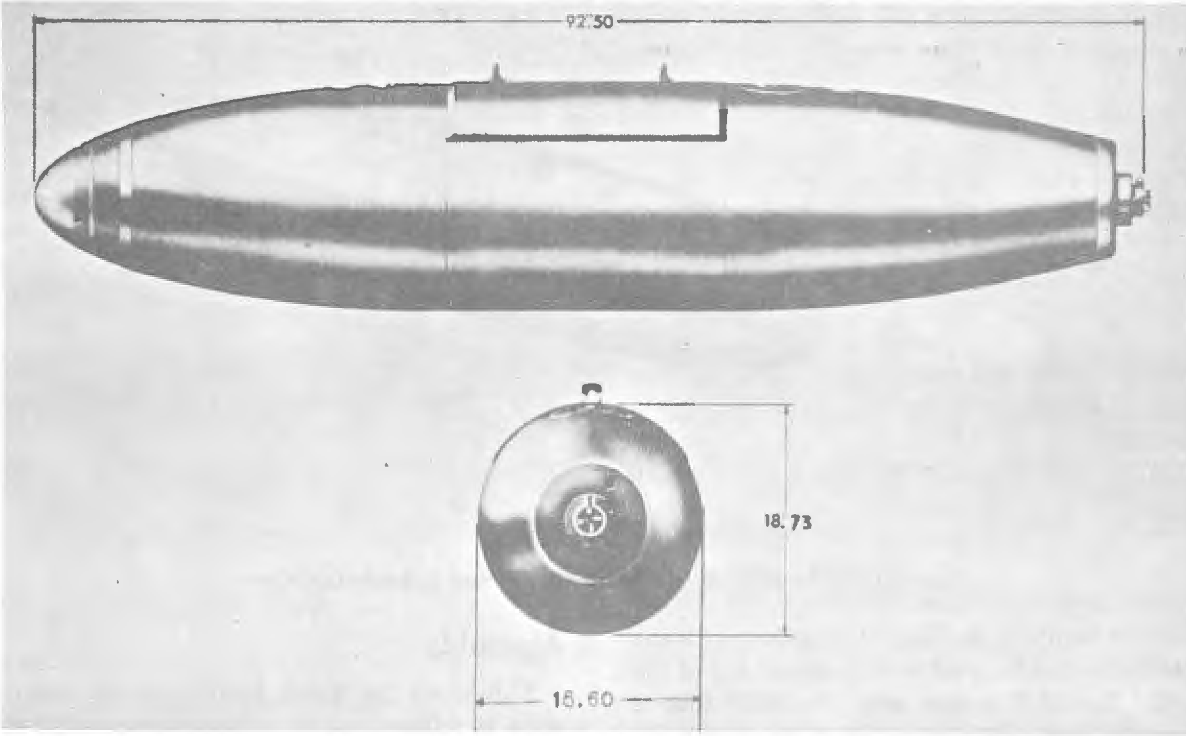


Figure 10-19A—500-lb Fire Bomb Mk 77 Mod 2, Exterior View.

Mark	77
Mod	2
General Arrangement	Dwg 2518334
List of Drawings	DL 2518334
Length of Assembled Bomb (in.)	92.5
Body Diameter (in.)	18.60
Filler Capacity (gal)	75.0
Weight of Empty Bomb (lb)	63.0
Weight of Filler (lb)	450.0
Weight of Assembled Bomb (lb)	520.0
Igniter	M15, M16, or M23
Fuzes	M157 (used with igniters M15 and M16), or AN-M173 (used with Igniter M23)

General Description

The 500-lb Fire Bomb Mk 77 Mod 2 is a 75-gallon capacity bomb similar to the Mk 77 Mod 1 except for structural modifications, and the fact that it is not obtained by modifying an existing bomb.

The main changes incorporated in the Mk 77 Mod 2 are: removal of the tie rod and strengthening of the body, the addition of screw-in suspension lugs, removal of the aft tail cone for more versatile fit among aircraft, the inclusion of different filling hole covers and modification of the strongback.

Igniters and fuzes are used in the nose and tail of the Mk 77 Mod 2 fire bomb. Any two, in pairs or combinations of the following three igniters may be used; the M15, the AN-M16, or the M23. The bomb is designed for primary use of the M23 igniter with the AN-M173 fuze in both the nose and the tail. Adapters are furnished

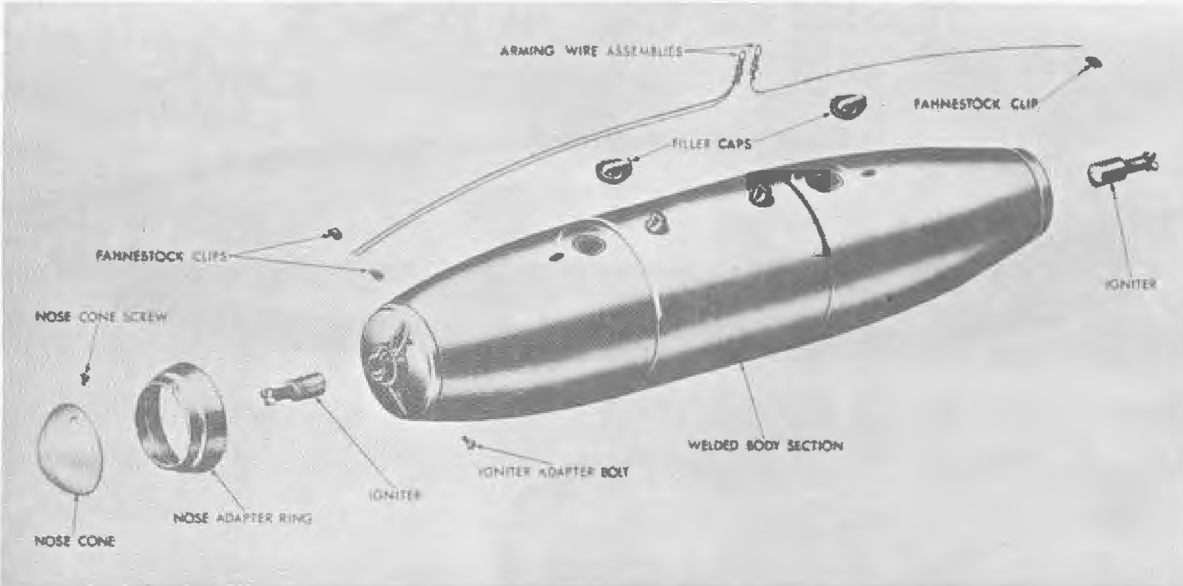


Figure 10-19B—500-lb Fire Bomb Mk 77 Mod 2, Exploded View.

with the bomb so that the M15 igniter with the M157 fuze can be used in the nose or tail of the bomb. The M16 igniter with the M157 fuze is normally used only in the tail of the bomb because the nose cone will not accommodate this larger igniter. If the nose cone is left off the bomb, however, the M16 igniter can be used in the nose.

The arming and cone-release wires are carried to the nose and tail of the bomb through internal tubes. When the nose cone-release wire is withdrawn, the springs in the cone-ring adapter eject the nose cone and adapter from the bomb, exposing the fuze to the air stream.

Two suspension lugs are mounted on the body 14 inches apart. Two gasket sealed filler holes are located on the upper bomb surface. The bomb is filled with 75 gallons of gasoline gel; a minimum air space of 3 percent of the capacity of the bomb is required. Once a bomb is filled it cannot be disassembled; it must either be used or jettisoned.

Painting and Marking

The base color of the bomb is the natural aluminum color of the body. Identifying nomenclature is stenciled on the bomb body in red letters.

Assembly

1. Remove the bomb body from its wooden crate as follows:
   a. Cut the three strapping bands and remove top.
   b. Open and crate loops and remove sides and ends.
   c. Cut strapping bands around bomb body.
   d. Remove bomb body.
2. Check the bomb and suspension lugs for damage, broken weldments, or cracks that may weaken the suspension or cause leaks in the casing.
3. Verify the presence of nose cone, cone-ring adapter, shipping pins, igniter adapters, and filling-hole covers.
4. Check filling-hole sealing gaskets. Gaskets must be in place and the sealing surfaces must be free of foreign matter, dents and nicks.
5. Remove the nose cone screws from the nose cone adapter.
6. Remove the nose cone.
7. Pull the shipping pin from the clevis pin in the nose cone adapter and remove the clevis pin and clevis-pin spring to release the nose cone adapter.

8. Remove the igniter adapter from the tail end-plate casting.

9. Remove the igniter adapter from the nose end-plate casting.

10. Screw the igniter in the nose end-plate casting until it bottoms.

11. Replace the nose-cone adapter, the clevis-pin spring, and the clevis pin. Replace the shipping pin in order to secure the assembly. Check the nose-cone adapter release mechanism by pulling out the shipping pin.

12. Reassemble the nose-cone adapter and assemble the nose cone.

> CAUTION: Do not damage the nose cone by tightening the screws excessively. If the bomb is not to be used immediately, the nose cone need not be assembled to the nose-cone adapter until the bomb is fuzed.

13. Screw the igniter adapter into the tail end-plate casting until it bottoms.

14. The 500-lb Fire Bomb Mk 77 Mod 2 may be loaded on the aircraft while empty and then filled with gasoline gel. However, this procedure is not always practical. Detailed instructions for mixing the gasoline gel and filling the bomb are given in OP 2183.

15. Fill the bombs either through one or through both filling holes; both covers must be removed even if the bomb is filled through one hole. Secure the covers after filling.

16. Install the bomb securely on the aircraft and sway brace. After the bomb is installed and filled, fuze and arm it as follows.

17. Remove the screws securing the nose cone to the adapter, and remove the nose cone.

18. Thread the two nose arming wires through the suspension lugs and internal arming-wire guide tube to the nose end-plate casting.

19. Insert one wire through the hole in the end of the clevis pin.

20. Attach the arming wire to the bomb rack.

21. Remove the clevis-pin shipping pin.

22. Thread the tail fuze arming wire through the suspension lugs and internal arming wire guide tube to the tail end-plate casting.

23. Attach the arming wire to the bomb rack.

24. Install the nose and tail igniters.

a. Clamp Igniter M15 into the igniter adapter in the nose, and Igniter M15 or M16 into the igniter adapter in the tail.

b. If Igniters M23 are used, unscrew the adapters and screw the igniters into the forward and rear walls.

25. Insert the arming wires into the nose and tail fuzes.

26. Attach the safety clips to the ends of the arming wire of each fuze. Cut off excess arming wire.

> CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any point in the loading operation. File or recut to remedy the condition.

27. Remove the safety pins from the igniter fuzes.

28. Install the nose cone and secure with screws. Do not tighten the screws excessively.

29. Only an unfilled bomb may be disassembled.

> CAUTION: Once filled, a bomb must be used or jettisoned.

750-LB FIRE BOMB Mk 77 Mod 0

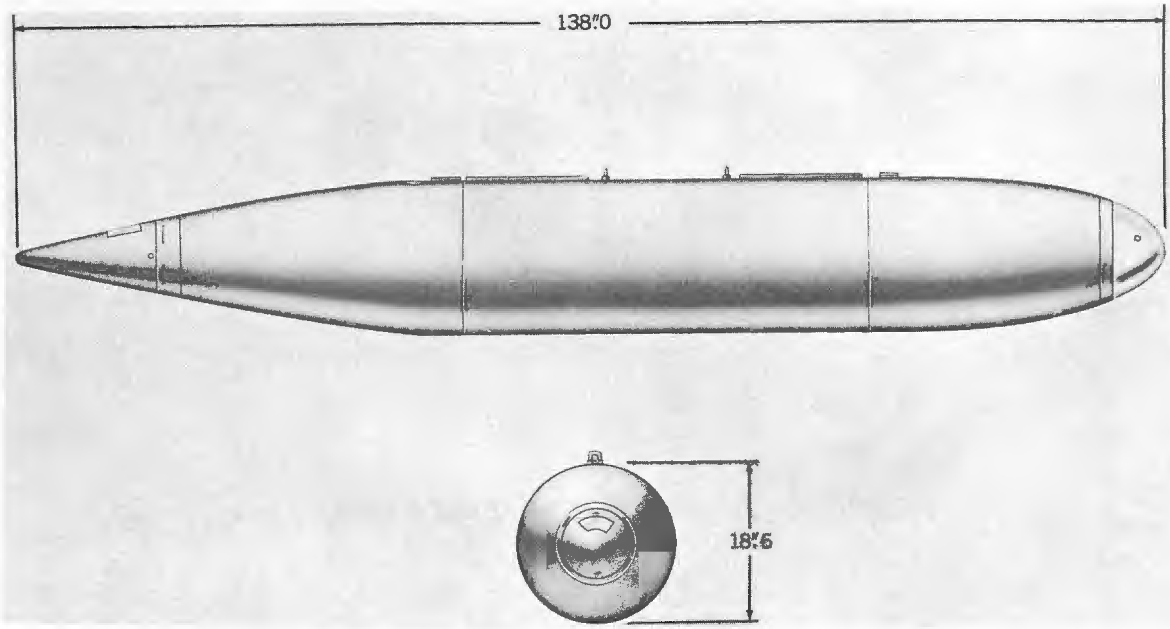


Figure 10–20.—750-lb Fire Bomb Mk 77 Mod 0, Exterior View.

Mark	77
Mod	0
General Arrangement	434200
List of Drawings	165788
Length of Assembled Bomb (in.)	138.0
Body Diameter (in.)	18.63
Filler Capacity (gal)	110.0
Weight of Empty Bomb (lb)	82.0
Weight of Filler (lb)	668.0
Weight of Igniters (lb)	10.0
Weight of Assembled Bomb (lb)	760.0
Weight of Bomb and Crate as shipped (lb)	138.0
Nose Igniter	M15 or M23
Tail Igniter	M15, M16, or M23
Fuzes	M157 (used with Igniters M15 and M16) AN–M173 (used with Igniter M23)

General Description

The 750-lb Fire Bomb Mk 77 Mod 0 is a nonstabilized cigar-shaped bomb constructed of aluminum. It consists of three main sections and two end cones. A center tie rod holds the nose, center, and aft sections together and aluminum ring adapters secure the nose and tail cones to the main sections. The bomb is filled with 110 gallons of gasoline gel and uses two igniter and fuze combinations to ignite the gel upon impact.

Three igniters may be used with the Mk 77 Mod 0 fire bomb: the M15, the M16, or the M23. The bomb is designed for primary use of Igniter M23. Adapters are furnished with the bomb so that Igniter M15 may be

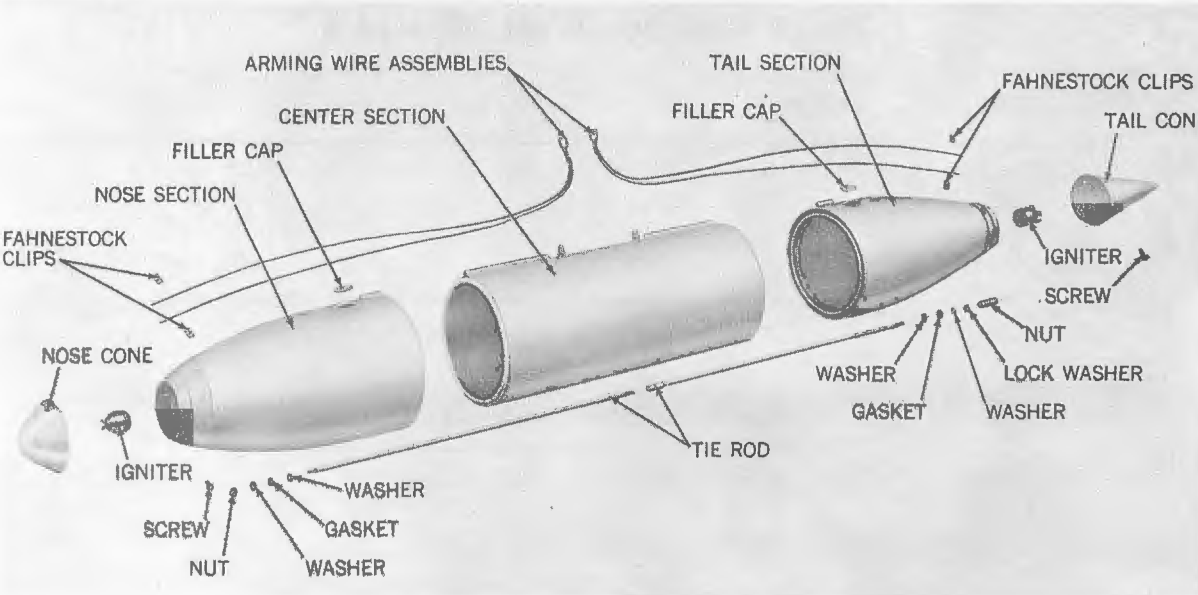


Figure 10–21.—750-lb Fire Bomb Mk 77 Mod 0, Exploded View.

used for either nose or tail fuzing. Igniter M16 normally is used only for tail fuzing. When the bomb is assembled, one igniter is attached to each end.

Tubes carry the arming wires and cone release wires from the outside of the bomb to the inside. When the release wires are withdrawn, springs in the ring adapters eject both adapters and cones.

Double suspension lugs are mounted on the body 14 inches apart. Two gasket sealed filler holes are located on the upper side of the bomb body. A gasoline and napalm mixture (gel) fills the bomb body; gaskets between the three main sections prevent leakage of the gasoline gel. A minimum air space of 3 percent of the capacity of the bomb is required. Once a bomb is filled it cannot be disassembled; it must be used or jettisoned.

Painting and Marking

The base color of the bomb is olive drab, and purple identification bands are painted around it. Identifying nomenclature is stenciled on the bomb assembly in red letters.

Assembly

CAUTION: Igniters, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb body and its components from their packing crate as follows.
   a. Remove the eight screws securing the end panel of the shipping crate of the bomb.
   b. Remove the end panel of the crate.
   c. Cut the four metal straps which secure the bomb sections to the crate.
   d. Slide the bomb sections out of the open end of the crate.
   e. Remove and open the package containing the tie rods, washers, and nuts.
   f. Remove the tail cone from the shipping crate end plate.
   g. Check the sealing gaskets. Gaskets must be in place and sealing surfaces must be free of foreign matter, dents, and nicks.
   h. Check to see that the nose and tail sections include cones, cone adapters, shipping pins, igniter adapters, and filling hole covers.
   i. Check the suspension lugs for damage.
2. Remove the tail-cone screws from the tail-cone adapters.
3. Pull the shipping pin from the clevis

pin in the tail-cone adapter and remove the clevis pin and clevis-pin spring to release the tail-cone adapter.

4. Remove the igniter adapter from the tail end-plate casting.

5. Remove the nose cone.

6. Follow the procedure given in step 3 above to release the nose-cone adapter.

7. Remove the igniter adapter from the nose-plate casting.

8. Wipe the gasket surfaces on all sections with carbon tetrachloride or gasoline.

9. Assemble the tie rod sections. Screw the ends of the forward and rear tie rods, which have a 1-inch length of thread, into the center nut until the tie rods come together.

10. Pass the end of the tie rod with the shortest end of threads through the hole in the nose end-plate casting. Slide the large

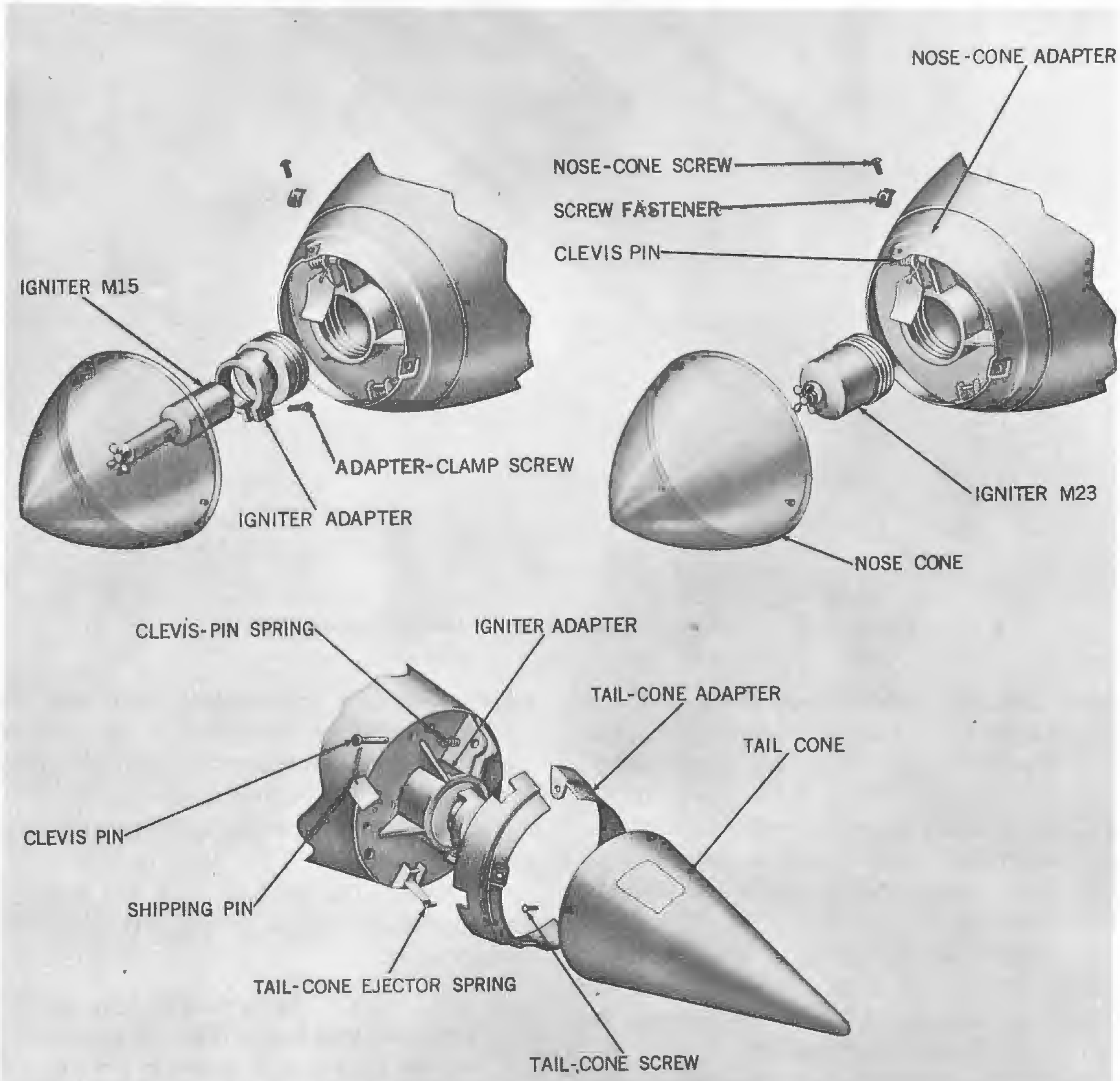


Figure 10–22.—750-lb Fire Bomb Mk 77 Mod 0, Assembly Details.

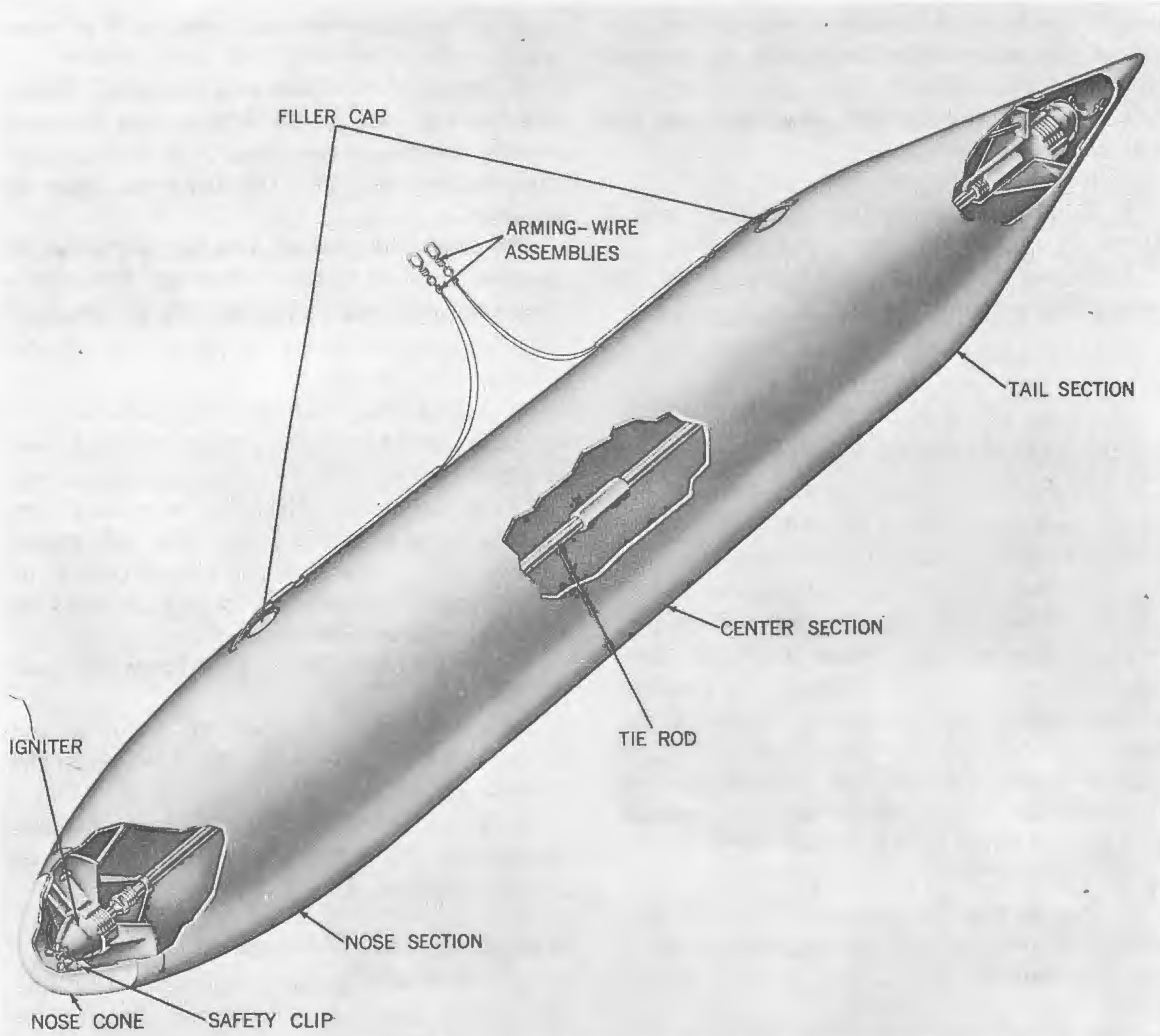


Figure 10–23.—750-lb Fire Bomb Mk 77 Mod 0, Cutaway View.

inside diameter washer over the end of the tie rod and fit it into the recess; place the gasket, small inside diameter flat washer, lockwasher, and self-locking nut on the tie rod, in the order given. Secure by tightening the self-locking nut on the tie rod.

11. Pass the tie rod assembly through the center section.

12. Move the tail section into position; remove the rear filler cap, reach through the filling hole, and guide the tie rod through the hole in the tail end-plate casting.

13. Slide the large inside diameter washer over the end of the tie rod and fit it into the recess; place the gasket, small inside diameter washer, lockwasher, and long nut on the tie rod, in the order given, making certain that the counterbored end of the nut is placed over the tie rod first.

14. Aline the arming-wire tubes on all sections.

15. Secure the tie rod with the long nut and tighten it with a torque wrench to 325 inch-pounds.

> CAUTION: Before tightening the long nut, make sure that the gaskets on the tie rod are properly seated.

16. Screw the igniter adapter in the nose end-plate casting until it bottoms.

17. Replace the nose-cone adapter, clevis-pin spring, and clevis pin. Replace the shipping pin to secure the assembly. Check the nose-cone adapter release mechanism by pulling out the shipping pin.

18. Reassemble the nose-cone adapter and assemble the nose cone. Do not damage the nose cone by tightening the screws excessively. If the bomb is not to be used immediately, the nose cone need not be assembled to the nose-cone adapter until the bomb is fuzed.

19. Screw the igniter adapter into the tail end-plate casting until it bottoms.

20. Replace the tail-cone adapter, following the procedure given in steps 17 and 18.

21. The 750–lb Mk 77 fire bomb is normally loaded on the aircraft while empty and then filled with gasoline gel. However, this procedure is not always practical. Detailed instructions for mixing the gasoline gel and filling the bomb are given in OP 2183.

22. Fill the bomb either through one or through both filling holes; both covers must be removed even if it is filled through one hole. Secure the covers after filling.

23. Install the bomb securely on the aircraft and sway brace. After the bomb is installed and filled, fuze and arm it as follows.

24. Remove the screws securing the nose cone to the adapter and remove the nose cone.

25. Thread the two nose arming wires through the suspension fitting and arming-wire guide tubes to the nose endplate casting.

26. Insert one wire through the hole in the end of the clevis pin.

27. Attach the arming wire to the bomb rack.

28. Remove the clevis-pin shipping pin.

29. Repeat steps 24 to 28 to install the rear arming wires.

30. Install the nose and tail igniters.

31. Insert the arming wires into the nose and tail fuzes.

32. Attach safety clips to the ends of the arming wire of each fuze. Cut off excess arming wire. Remove all kinks, twists, or burrs from the arming wires to prevent possible malfunctioning.

33. Remove the safety pins from the igniter fuzes.

34. Install the nose and tail cones and secure them with screws. Do not tighten the screws excessively.

35. Only an unfilled bomb may be disassembled. Once filled, a bomb must be used or jettisoned.

Handling and Stowage

Special care must be taken when handling the bomb sections to prevent denting or nicking the sealing gasket seats.

750-LB FIRE BOMB Mk 77 Mod 0 WITH BOMB CONVERSION KIT Mk 19 Mod 0

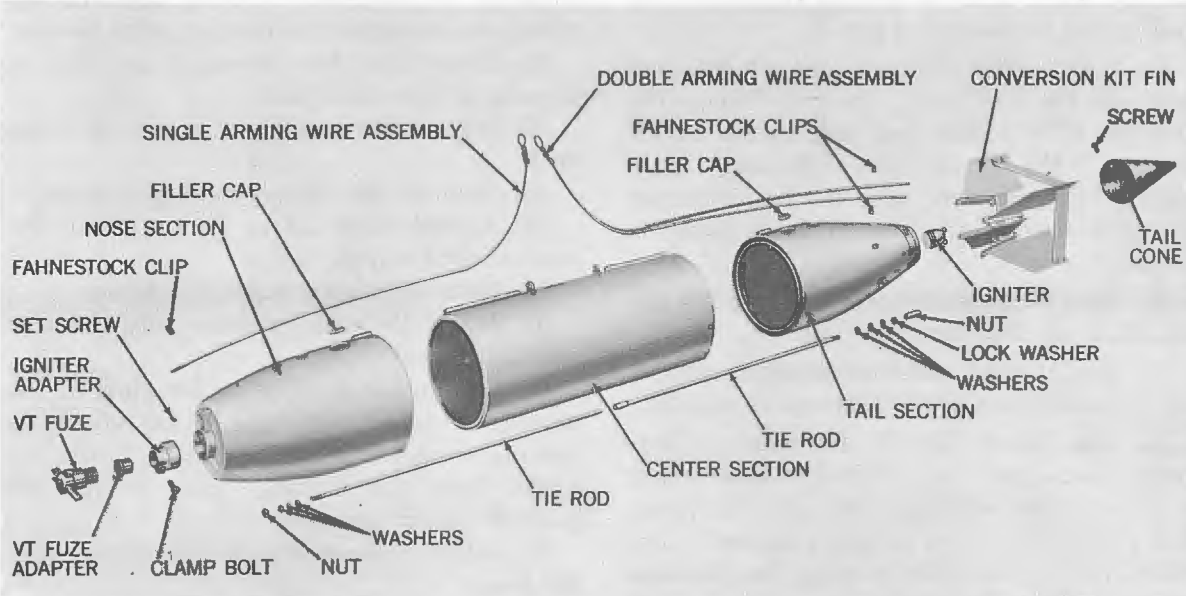


Figure 10–24.—750-lb Fire Bomb Mk 77 Mod 0 with Bomb Conversion Kit Mk 19 Mod 0, Exploded View.

Mark	77
Mod	0
Installation Drawing No.	1380246
List of Drawings	165787
Length of Assembled Bomb (in.)	
With Tail Cone Installed	138.0
Without Tail Cone	131.0
Body Diameter (in.)	18.63
Fin Span (in.)	31.75
Filler Capacity (gal)	110.0
Weight of Empty Bomb (lb)	82.0
Weight of Filler (lb)	668.0
Weight of Conversion Kit Components (lb)	17.3
Weight of Assembled Bomb (lb)	777
Weight of Conversion Kit As Shipped (lb)	24.0
Nose Fuze	AN–M166E1 (VT)
Tail Igniter	M15, M16, or M23
Igniter Fuze	M157 (used with Igniters M15 and M16) AN–M173A1 (used with Igniter M23)

General Description

Bomb Conversion Kit Mk 19 Mod 0 consists of component parts for a shrouded fin assembly, an adapter for the AN–M166E1 VT fuze, and two setscrews to lock in place the igniter clamp which holds the VT fuze adapter. The conversion kit was developed to convert 750-lb Fire Bomb Mk 77 Mod 0 into a weapon that could be used in normal dive-bombing tactics.

The Mk 77 Mod 0 bomb, modified with the Mk 19 Mod 0 conversion kit, is stabilized during flight by a shrouded fin assembly. The AN–M166E1 VT fuze, housed in the nose of the bomb, functions before impact to rupture the nose casting of the bomb and free the tie rod that holds the three main body sections together. The bomb sections separate upon impact of the bomb; consequently, the gasoline gel is distributed over a greater area and a smaller crater is created than when all the sections remain attached on impact.

The nose cone and nose-cone adapter ring are discarded when the VT fuze is installed. The use of a tail cone and tail-cone adapter ring is optional with the converted Mk 77 Mod 0 bomb.

Assembly

CAUTION: Igniters, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb components from their packing crate as follows.

a. Remove the eight screws securing the end panel of the shipping crate of the bomb.

b. Remove the end panel of the crate.

c. Cut the four metal straps that secure the bomb sections to the crate.

d. Slide the bomb sections out of the open end of the crate.

e. Remove and open the package containing the tie rods, washers, and nuts.

f. Remove the tail cone from the shipping-crate end plate.

g. Check the sealing gasket. Gaskets must be in place and sealing surfaces free of foreign matter, dents, and nicks.

h. Check to see that the nose and tail sections include cones, cone adapters, shipping pins, igniter adapters, and filling-hole covers.

i. Check the suspension lugs for damage.

2. Remove the tail-cone screws from the tail-cone adapter.

3. Pull the shipping pin from the clevis pin in the tail-cone adapter, and remove the clevis pin and clevis-pin spring to release the tail-cone adapter.

4. Remove the igniter adapter from the tail end-plate casting.

5. Remove and discard the nose cone.

6. Release the nose-cone adapter as in step 3 and discard it.

Components of Bomb Conversion Kit Mk 19 Mod 0

Item	Quantity	Drawing Number	Stock Number
Fin Blade	4	1212123.	
Fin Base	4	1212124.	
Fin Support	4	1212125.	
Headless Setscrew	2		AN 565–416–8.
Instruction Card	1	1380254.	
O-Ring Seal	4		AN 123961 (spare part).
Safety Wire	1		
Self-Locking Nut	8		AN 364–1032.
Shroud	4	1212126.	
VT Fuze Adapter	1	1212127.	
Washer	8		AN 960–10.
Washer	4		AN 960–516.
Washer Head Screw	8		AN 525–10–11.

7. Remove the igniter adapter from the nose-plate casting.

8. Remove the four bolts, washers, O-ring seals, and nuts from the tail section skin of the bomb. Inspect the O-ring seals; if damaged, replace with those furnished with the conversion kit.

9. Remove the eight bolts, washers, and the safety wire from the fin mounting holes in the tail end-plate casting.

10. Mount the four fins from the conversion kit to the tail section, using the screws, washers, and nuts removed in steps 8 and 9. Care must be taken to see that the O-ring seals seat properly at the bolts passing through the tail section skin. The O-ring seals should be next to the bomb skin with the large flat washer on top so that the washer contains the O-ring seals.

11. Secure the four sections of the tail-fin shroud to the fins with the eight screws, washers, and locking nuts contained in the conversion kit.

12. Safety wire the eight fin-securing bolts in the tail end-plate casting.

13. Wipe the gasket surfaces on the three body sections with carbon tetrachloride or gasoline.

14. Assemble the tie rod sections. Screw the ends of the forward and rear tie rods (which have a 1-inch length of thread) into the center nut until the tie rods come together.

15. Pass the end of the tie rod with the shortest end of thread through the hole in the nose end-plate casting. Slide the large inside diameter washer over the end of the tie rod and fit it into the recess; place the gasket, small inside diameter flat washer, lockwasher, and self-locking nut on the tie rod, in the order given. Secure by tightening the self-locking nut on the tie rod.

16. Pass the tie rod through the center section.

17. Move the tail section into position. Remove the rear filler cap, reach through the filling hole, and guide the tie rod through the hole in the tail end-plate casting.

18. Slide the large inside diameter flat washer, lockwasher, and long nut on the tie rod (in the order given), making certain that the counterbored end of the nut is facing inward.

19. Aline the arming-wire tubes on all sections and tighten the long nut with a torque wrench to 325 inch-pounds. Before tightening the long nut, make sure that the gaskets on the tie rod are properly seated.

20. In the igniter-adapter seat of the nose end-plate casting, drill and tap two holes ¼-20NC on opposite sides of the casting flange. Screw the igniter adapter into the nose end-plate casting and lock it in place with the two headless setscrews supplied with the conversion kit.

21. Install the VT fuze adapter in the igniter adapter and tighten it in place with the clamping bolt on the igniter adapter.

22. Screw the igniter adapter into the tail end-plate casting until it bottoms.

23. Replace the tail-cone adapter, clevis-pin spring, and clevis pin. Replace the shipping pin to secure the assembly. Check the tail-cone-adapter release mechanism by pulling out the shipping pin.

24. Reassemble the tail-cone adapter and assemble the tail cone. Do not damage the tail cone by tightening the screws excessively. If the bomb is not to be used immediately, the tail cone need not be assembled to the tail-cone adapter until the bomb is fuzed.

25. The 750-lb Fire Bomb Mk 77 Mod 0 is normally loaded on the aircraft while empty and then filled with gasoline gel. However, this procedure is not always practical. Detailed instructions for mixing the gasoline gel and for filling the bomb are given in OP 2183.

26. Fill bombs either through one or through both filling holes; both covers must be removed even if the bomb is filled through one hole. Secure the covers after filling.

27. Install the bomb securely on the aircraft and sway brace. After the bomb is installed and filled, fuze and arm it as follows.

28. Remove the screws securing the tail cone to the adapter and remove the tail cone.

29. Thread the two tail arming wires

through the rear suspension lug and the arming-wire guide tubes to the tail end-plate casting.

30. Insert one wire through the hole in the end of the clevis pin.

31. Attach the arming wire to the bomb rack.

32. Remove the clevis-pin shipping pin.

33. Install the igniter and fuze into the tail igniter adapter. Refer to chapter 2 for detailed fuzing instructions.

34. Insert the arming wire into the fuze and attach Fahnestock clips to the end of the wire. Replace the tail cone and secure it in place as in step 24.

35. Remove the AN–M166E1 VT fuze from its packings.

CAUTION: If the fuze container is damaged or if the seal is broken in any way, the fuze is to be considered unserviceable.

36. For installation of the AN–M166E1 VT fuze, see the instruction card, dwg 1380254, which is attached to the VT fuze adapter in Bomb Conversion Kit Mk 19 Mod 0. See also OP 1444, 2nd Revision.

37. Thread a single arming wire through the front suspension lug and arming-wire guide tubes to the nose end-plate casting.

38. Pass the arming wire through the VT fuze arming-wire guides and attach one safety clip to the end of the wire.

39. Cut off exess wire at the nose and tail fuze installations.

CAUTION: Arming wire must pass freely through the arming wire hole. Never use an arming wire that is twisted, kinked, or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length, or at any other point in the loading operation. File or recut to remedy the condition.

750-LB FIRE BOMB Mk 78 Mod 2

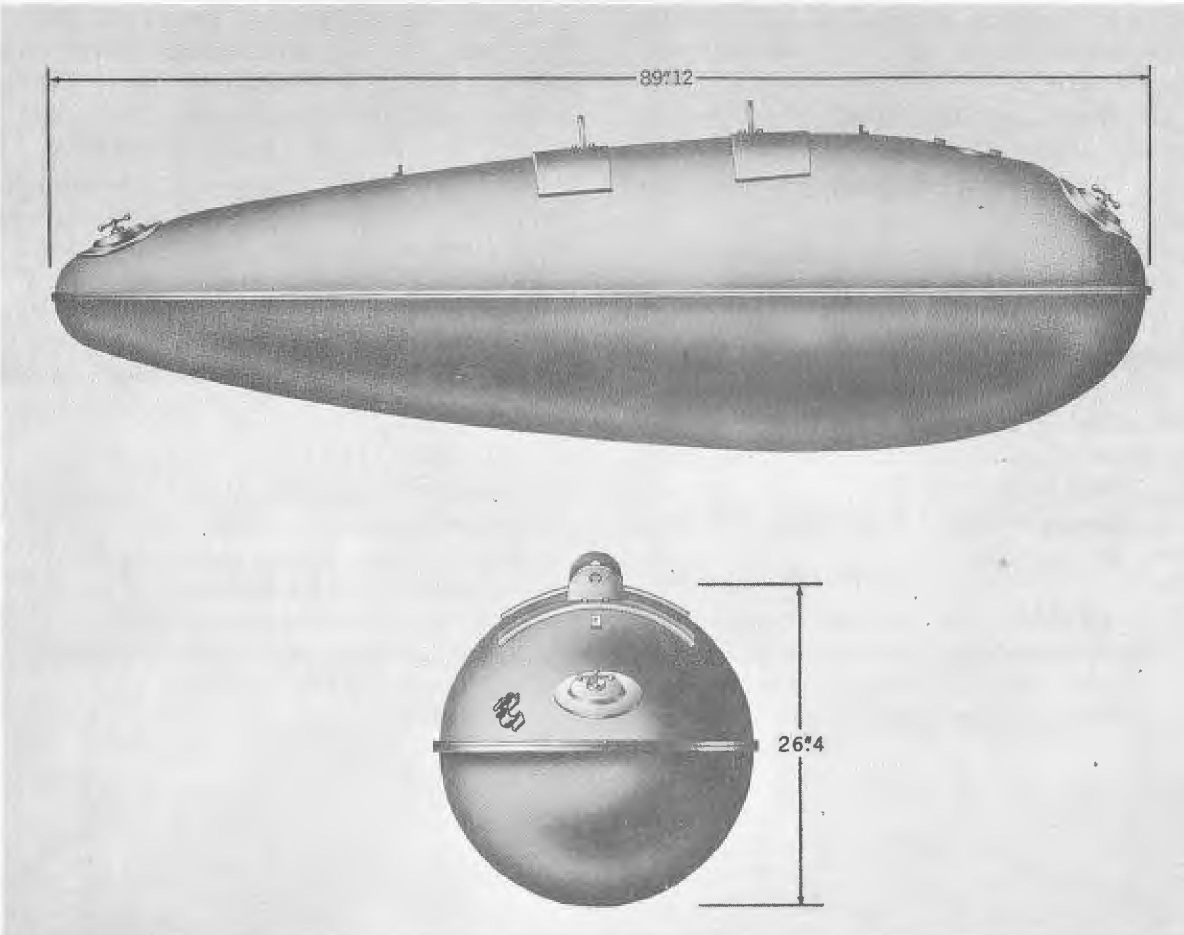


Figure 10–25.—750-lb Fire Bomb Mk 78 Mod 2, Exterior View.

Mark	78
Mod	2
General Arrangement	1380217
List of Drawings	165785
Length of Assembled Bomb (in.)	89.12
Body Diameter (in.)	26.4
Filler Capacity (gal)	110.0
Weight of Empty Bomb (lb)	90.0
Weight of Filler (lb)	660.0
Weight of Assembled Bomb (lb)	760.0
Arming-Wire Assembly	Mk 1, AN–M6A2, or Mk 2
Igniter	M23 (or Mk 15 or Mk 16 with Fuze Mk 157)
Fuze	AN–M173

General Description

The 750-lb Fire Bomb Mk 78 Mod 2 consists of two thin sheet-steel half-shells welded together. It is non-stabilized and has a 110-gallon capacity.

The bomb has two wells located fore and

aft on the upper surface. These wells house two M23 igniters which are secured in place with igniter caps. A filler opening for the gasoline gel is located on the upper surface of the bomb between the fore igniter well and the suspension lugs. Two reinforced lugs provide for a 14-inch suspension. A gasoline gel fills the bomb to 97 percent of its capacity. Once a fire bomb is filled, it cannot be disassembled; it must be used or jettisoned.

Painting and Marking

This bomb is identified by a purple stripe painted on the nose and tail end of its body. Identifying nomenclature is stenciled in black letters on the upper shell. The base color of the bomb is olive drab.

Differences Among Fire Bombs Mk 78 Mods 0, 1, and 2

There are three modifications of 750-lb Fire Bomb Mk 78 Mods 0, 1, and 2. Differences exist in the construction and location of the wells, brackets, and adapters for use of igniters.

The Mod 0 bomb uses an M16 igniter with an M157 fuze installed in the filler hole of the bomb. A second igniter, an M15 with an M157 fuze, is clamped externally to the aft end of the bomb in a bracket.

The Mod 1 bomb is identical to the Mod 0 except for the addition of two external igniter adapters. These adapters, located fore and aft on the upper bomb surface, accommodate M23 igniters with AN–M173 fuzes.

The Mod 2 bomb is identical to the Mod 1 except that it has internal igniter wells in place of the external igniter adapters. The wells of the Mod 2 are located higher on the bomb body than the igniter adapters

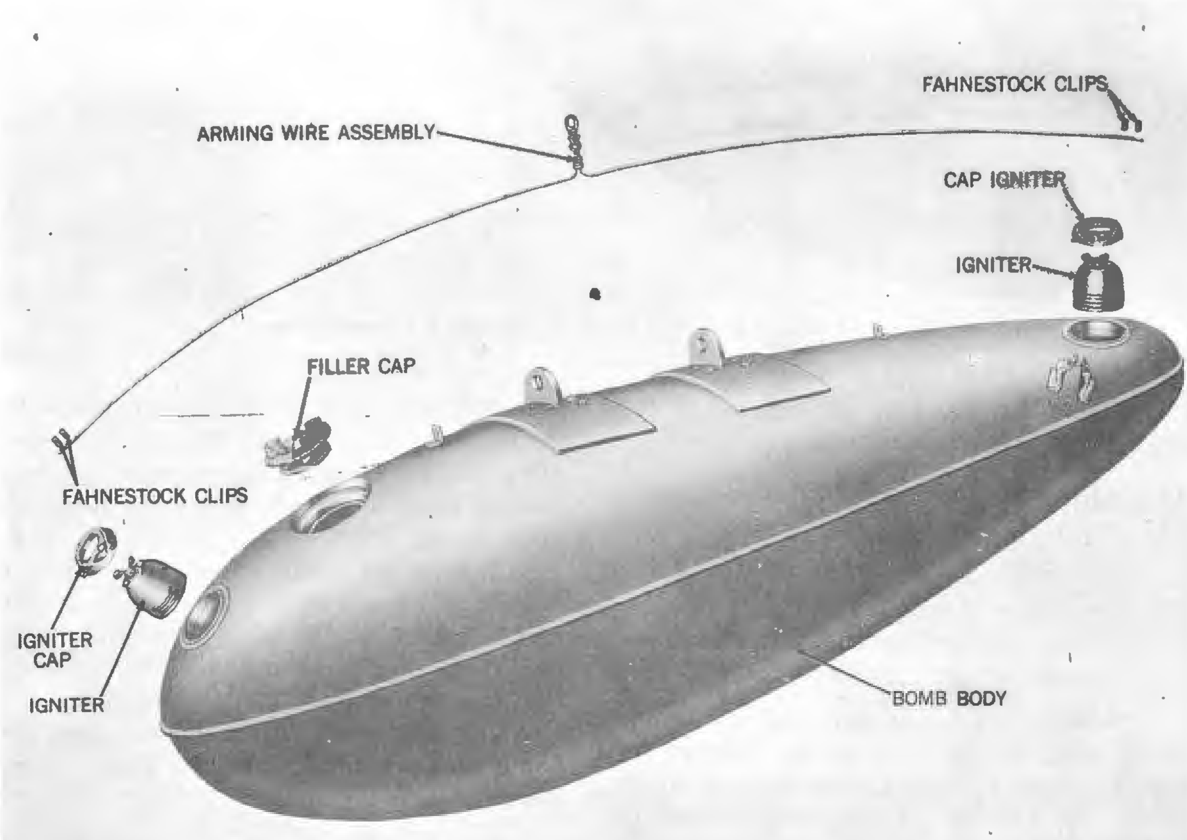


Figure 10–26.—750-lb Fire Bomb Mk 78 Mod 2 Exploded View.

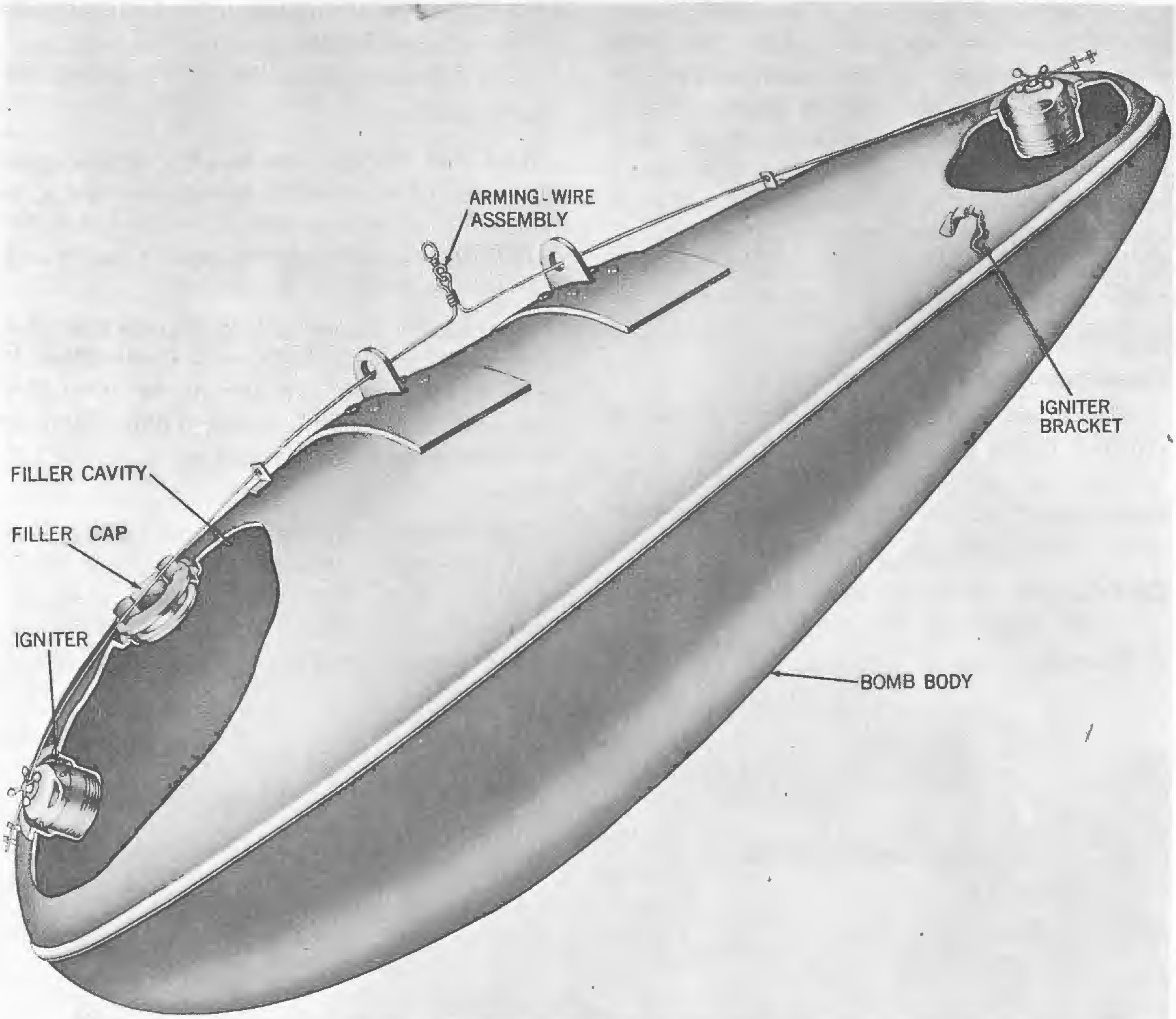


Figure 10–27.—750-lb Fire Bomb Mk 78 Mod 2, Cutaway View.

of the Mod 1. The M23 igniters set in the wells are secured by igniter caps.

Assembly

> CAUTION: Igniters, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb body and its components from the packing crate. Inspect for damage, cracks, or broken weldments which might cause leaks in the bomb body, or damage that might weaken the lugs or their attachment to the bomb body.

2. Fill the bomb to its required capacity through the filler hole. Secure the cover after filling. Detailed instructions for mixing the gasoline gel and filling the bomb are given in OP 2183.

3. Install the bomb securely on the aircraft and sway brace. This bomb is normally loaded on the aircraft while empty and then filled with gasoline gel, although this procedure is not always practical.

After the bomb is suspended from the bomb rack and filled, fuze and arm it as follows:

> NOTE: For the Mod 2 bomb, disregard steps 4 through 7.

4. Loosen the bolt on the rear igniter clamp.

5. Install Igniter M15 and tighten the clamp bolt until the igniter is secure.

6. Install Igniter M16 in the filler hole.

7. Remove the igniter well caps and install the M23 igniters. Replace the well caps, securing the igniters. On Mod 1, install M23 igniters in the external adapters.

8. Thread the arming wire through the suspension fittings and arming-wire guide brackets.

9. Attach the arming wire to the bomb rack.

10. Insert the arming wires through the nose and tail fuzes.

11. Attach safety clips to the ends of the arming wire of each igniter; the arming wire should protrude approximately 2 inches beyond the fuze vanes (cut off excess wire) and should be free from kinks, twists, or burrs.

12. Remove the safety pins from the igniter fuzes.

13. Only an unfilled bomb may be disassembled. Once filled, the bomb must be used or destroyed; all bombs not used shall be jettisoned prior to landing afloat or ashore.

1000-LB FIRE BOMB MK 79 MOD 1

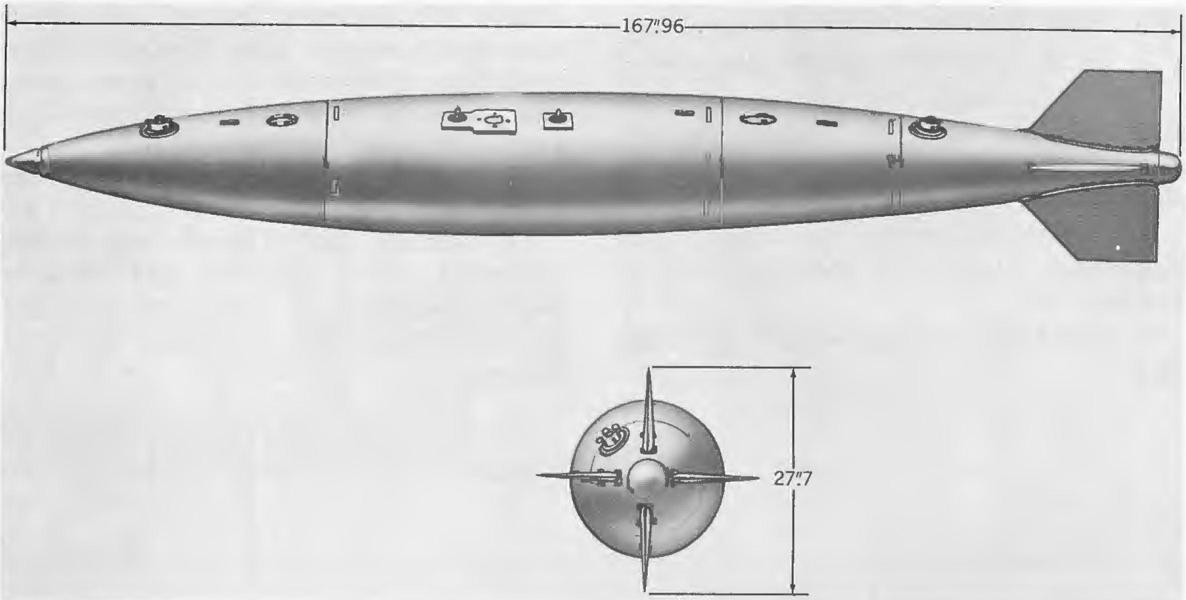


Figure 10–28.—1000-lb Fire Bomb Mk 79 Mod 1, Exterior View.

Mark	79
Mod	1
General Arrangement	1884353
List of Drawings	517551
Length of Assembled Bomb (in.)	167.9
Body Diameter (in.)	19.6
Fin Span (in.)	27.7
Filler Capacity (gal)	112
Weight of Filler (lb)	700
Weight of Assembled Bomb (Empty) (lb)	212
Weight of Bomb as Shipped (lb)	275
Arming Wire Assembly	
Igniter	M23
Fuzes	AN–M173 (Mech.) (used with Igniter M23) Mk 257 Mod 0 used with Proximity Fuze Sensing Element M20 (T–18E2)

General Description

The 1000-lb Fire Bomb Mk 79 Mod 1 is a thin-skinned bomb of low-drag design. The bomb is made up of four basic sections, plus certain accessory parts. These four sections are designated: forward (or nose) section, called Section I; center (or main) section, called Section II; first aft section, called Section III; and second aft (or tail) section, called Section IV.

The center (or main) section of the bomb is used as a shipping container into which the other sections (nose, aft, and tail) are nested together and stowed. In this packaged condition, the bomb has an enlarged protective cover at each end of the center section. On one end is a built-up metal dish having four lever handles on its face; this is the forward (or nose) end of the bomb. On the other end is a built-up, drum-like construction having no exterior lever handles; this is the aft (or tail) end of the bomb. This aft, drum-like cover contains the bomb accessories, and must be removed before the lever handles on a separate tail cover can be reached.

The bomb, which has a capacity of approximately 112 gallons, is filled with gasoline mixed with Napalm.

This bomb can be fuzed with either standard mechanical fuzing utilizing the Fuze AN–M173 with the Igniter M23 (two places) for impact functioning or an electric fuzing system consisting of the Electric Fuze Mk 257 Mod 0 with the Proximity Fuze Sensing Element M20 (T18E2) for either airburst or impact functioning.

The following items are furnished with each bomb: one Bomb Cable Assembly Mk 8 Mod 0; two screw-in Suspension Lugs Mk 6 Mod 0, providing for 14-inch suspension; special tools required for assembly consisting of a combination wrench, pounding block, and fuze inserting dowel; and lock pins to hold sections extended for assembly. Other than the special tools furnished with each bomb, the only tools required for unpacking and assembly of the bomb are a hammer and a screw driver.

Painting and Marking

The base color of the bomb is olive drab. No stripes encircle the bomb. Identifying nomenclature is stenciled on the bomb assembly in yellow.

Differences Between Fire Bombs Mk 79 Mods 0 and 1

The Mod 0 bomb was designed to accept standard fuzing only and was never released to procurement.

Unpacking

CAUTION: The sealed bomb package should not be opened until required for use because these bombs, as shipped are protected internally against corrosion by volatile corrosion inhibitor (VCI) powder.

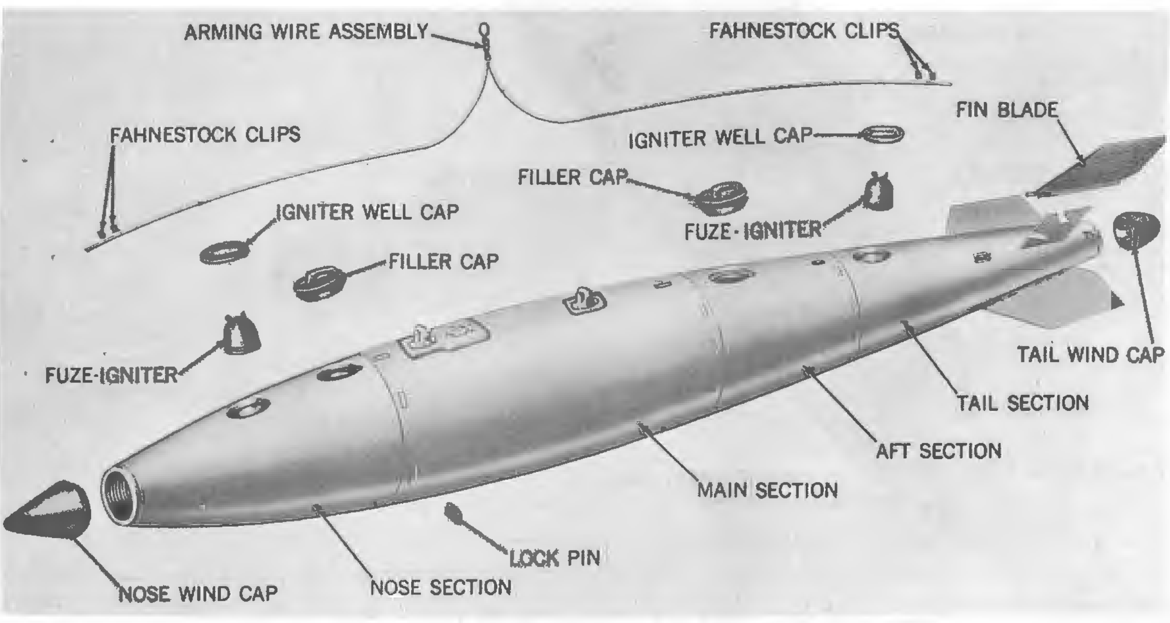


Figure 10–29.—1000-lb Fire Bomb Mk 79 Mod 1, Exploded View.

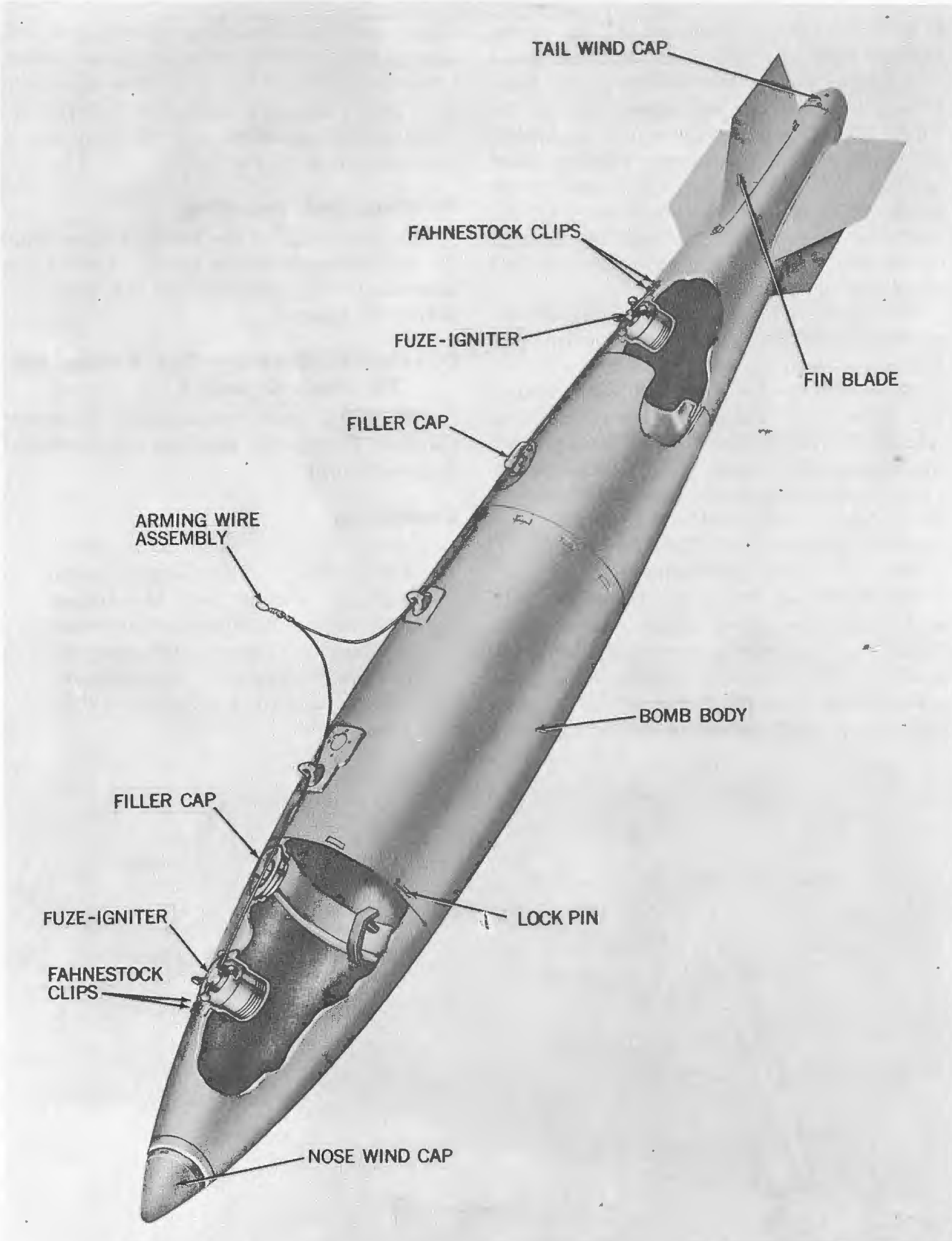


Figure 10–30.—1000-lb Fire Bomb Mk 79 Mod 1, Cutaway View.

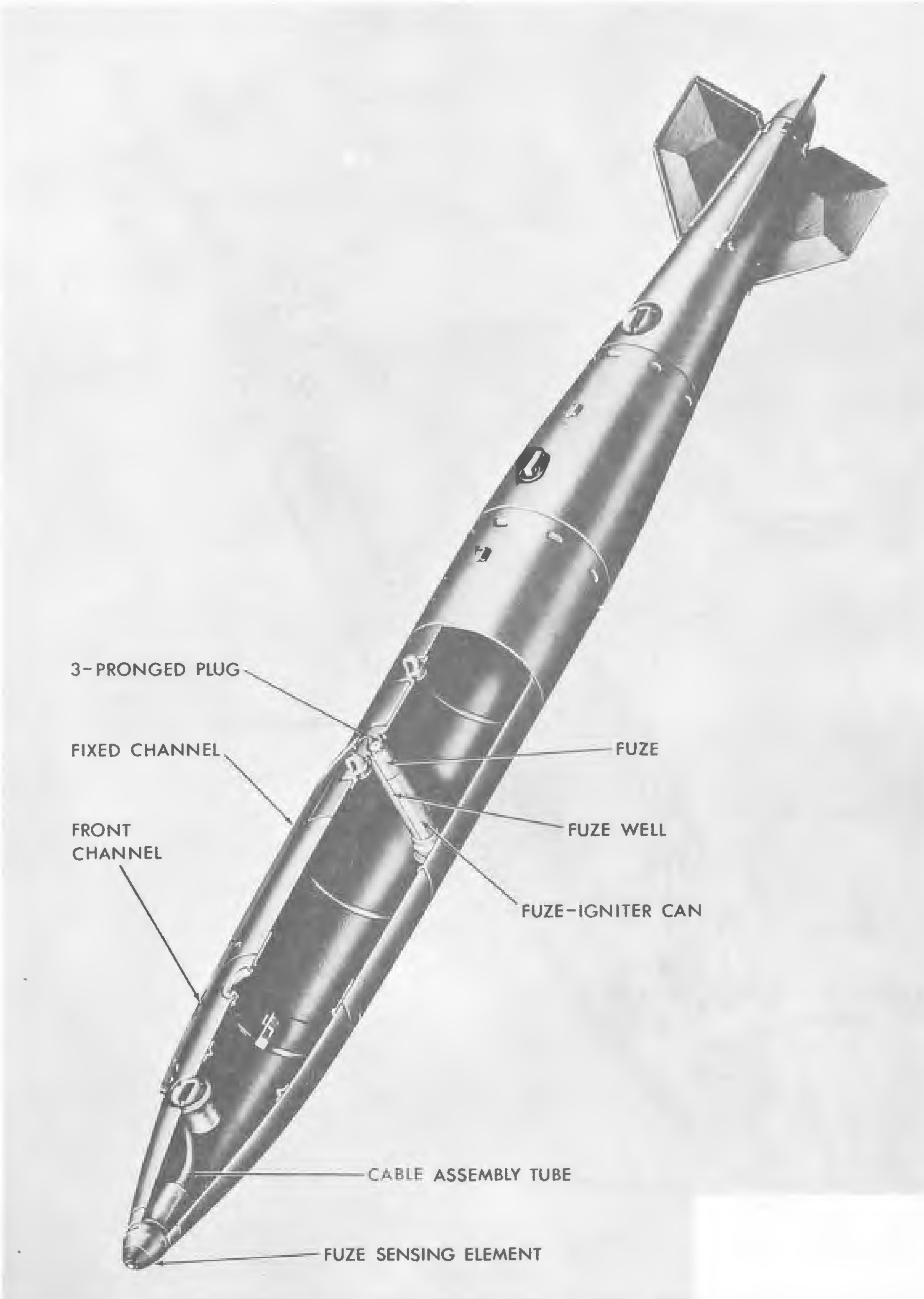


Figure 10-31. 1000-lb Fire Bomb Mk 79 Mod 1 With Electric Fuzing, Cutaway View.

1. Lay the bomb on its side and place it on a bomb truck, hand truck, dolly, or other support so that the shipping ends are free of the ground. Block the bomb in place to prevent its rolling. The bomb may however be unpacked on any hard, reasonably smooth surface, such as a deck or flight apron. If this is done, care must be taken to see that the bomb is not allowed to fall when the projecting shipping ends are removed.

2. Inspect the packaged bomb for visible damage to Section II (center section). Some damage to the shipping ends is to be expected.

3. Using a screw driver, pry up the four lever handles on the nose shipping end until they release. After these handles are released, grasp each one in turn and rotate the attached shafts one-half turn (it may be necessary to push the handle in toward the face of the cover while turning). Turning the handle will release an internal hook attached to the handle shaft; when properly unhooked, there will be no restraint from turning the handle.

4. When (and only when) the four internal hooks are released, remove the nose cover and the gasket at the edge of this cover. It may be necessary to use a hammer.

5. Attached to the inside of the nose shipping cover are a cone-shaped nose cap and a tail cap. Remove the tail cap from its holding bracket by inserting a screw driver tip into one of the holes in the side of the bracket and depressing the spring pin on the cap. The nose cap should be removed by prying or pulling the holding brackets away from the nose cap. Remove the Bomb Cable Assembly Mk 8 Mod 0 which is packaged inside the tail cap. The nose shipping cover may now be discarded.

6. Reach into the bomb, grasp the forward end of Section I (nose section) and move it up and down or side to side until it is free; pull it forward a out one foot. Do not slam or jerk the section; pull firmly and evenly. Wiggle the section from side to side if friction occurs.

CAUTION: Do not remove the tail cover (see step 10) before step 6 is accomplished.

7. At the tail end, note that the accessory cover (aft portion of the tail cover) is held in place by a hooplike clamp ring similar to that found on a commercial open-top steel or fiber shipping drum. This ring is located about four inches forward of the aft end of the cover, and is fastened at one point by a toggle arrangement. Remove the cotter pin, and pry open the toggle. This will allow removal of the clamp ring.

8. Remove the accessory cover by pulling or driving it aft with a hammer. Use care in removing this cover so that the fins do not fall to the ground and become damaged. Discard the O-ring gasket.

9. The following parts are stowed in the accessory cover:

a. Four fins
b. One fuze inserting dowel
c. Two oval-shaped filling hole covers
d. One cloth bag containing:
(1) Twenty-four lock pins
(2) One grooved fiber block (pounding block)
(3) One cable retainer assembly consisting of one cable retainer, two bolts, and two lockwashers
(4) Two bolts and lockwashers. Remove these parts by unclamping them, and inspect them for damage. Place the parts on the deck or in the accessory cover for future use.

10. After removing the accessory cover and accessories, remove the inside tail cover by means of the four lever handles, similar to those previously found on the nose cover. Pry up the handles and turn them to release the internal hooks. (Refer to steps 3 and 4.) Discard the tail shipping cover.

11. Reach into the tail, grasp the tab to unwind the tape that secures the athwartship fuze well package; remove the package and unpack it. Reach into the open tail, grasp the aluminum tail cone section, and pull it out. Do not slam or jerk the section; pull firmly and evenly. Continue to pull the tail section until both parts extend to approximately full length. The end of the tail will

be about five feet beyond the center section when fully extended. Do not slam or jerk the sections; pull them firmly and evenly. Wiggle the sections from side to side if friction occurs.

Assembly

1. Place the bomb on a bench, hand truck, dolly, or on the ground and block it so that it cannot roll.

2. Turn the bomb so that the white painted alinement stripe is clearly visible. This stripe, near the suspension lugs, extends over all the joints on top of the bomb.

3. Pull out the three fore-and-aft sections to full length, so that the white stripe is in line (by eye) at all joints. Do not slam or jerk the sections; pull firmly and evenly. Wiggle the sections from side to side if friction occurs. The joint ends of the white alinement stripe should line up within approximately the thickness of a five cent piece when the bomb sections are properly alined. With the bomb in alinement the two fuze wells, the two filling holes, and the suspension lugs should all be in line; the fin stubs should be at 45 degree to the suspension lugs.

4. There are outside lock-pin slots approximately one inch long by one-quarter inch wide near the end of each bomb section. If necessary, insert a screwdriver in the slots and pry or drift the sections into exact alinement.

> NOTE: When the sections are properly in line and are out to proper length, a mating slot in each under section will appear underneath the slot on the outside.

5. Install the lock pins. These pins are in the cloth bag previously removed from the accessory cover. (See step 9 under Unpacking.) There are twenty-four lockpins; twenty are required to assemble the bomb and four are included as spares. These pins drive like nails and can be driven with any hammer. The pins are self-locking and should be driven flush with the bomb skin.

> CAUTION: If the pins appear to drive too hard, check for misalinement of the bomb sections. Do not force the pins without first being sure of alinement. Damage may be caused to the bomb skin by improper driving of the pins.

For easier assembly, drive the lock pins in the following sequence:

a. Drive one pin in each joint, preferably on top near the alinement stripe.

b. Turn the bomb over and drive a second pin in each joint directly opposite the first pin.

c. Drive the remaining pins in any sequence.

6. Place the fins over the fin stubs on the tail of Section IV, with the sloping edge forward. Using the fiber pounding block, hammer the fins solidly down and aft until they bottom, making sure that the lower edge of each fin enters the fore-and-aft guide clips properly.

> CAUTION: Do not hammer directly on the fins. They are soft aluminum and are easily damaged. Instead, place the groove in the fiber pounding block over the edge of each fin and hammer on the block.

When each fin is properly in place, bend the longer of the two forward guide clips over the leading edge of the fin, to lock the fin and thus prevent its removal or displacement.

7. Line up the tail cap with the open hole at the tail, and push solidly with the hands until the cap bottoms and the spring pins engage properly. The cap will seem rather loose when properly installed. When necessary, an installed tail cap can be removed by grasping the cap between the hands, and turning and pulling aft at the same time.

8. The nose cap fits into the open hole at the nose of the bomb and is needed only when the standard fuzing system Fuze M173 with Igniter M23 is used. The nose cap may be discarded when the electric fuzing system is to be installed. The wrench furnished

with each bomb may be used to tighten the nose cap in place.

9. To make the athwartship fuze well hole accessible, remove the shipping plug from the top center of the bomb by means of the spanner pins on the furnished wrench; turn the bomb over and remove the bottom shipping plate using the same wrench. Discard both the shipping plug and the plate.

> CAUTION: Do not discard the nuts and lockwashers holding the bottom plate. Save them for future use.

Inspect the athwartship fuze well, making sure that the O-rings in the top and bottom nest firmly in the grooves. Slip the top of the fuze well through the large hole in the bottom of the bomb; align the pilot slot in the bottom flange of the fuze well with the pilot pin on the bomb. Install the two lockwashers and nuts finger tight. Turn the bomb on its side and install the cable retainer assembly in the slot in the top of the bomb. Engage the bolts in the top of the fuze well assembly; then install the other two bolts and lockwashers through the back bone and screw them into the top of the fuze well. Tighten all four bolts evenly and securely. Return to the bottom of the bomb to tighten the two nuts holding the lower flange of the fuze well to the bomb.

> NOTE: The athwartship fuze well is always installed regardless of whether the electric fuzing system or the alternate standard fuzing system Fuze M173 with Igniter M23 is to be used.

10. Open a filling hole by lifting the cam handle of the cover. Pry up the cam handle with a screwdriver; the spring will keep it open. To insert a cover in the bomb grasp the cover by the cam handle and insert the small end of the bottom plate crosswise in the filling hole. When the bottom plate has entered, turn the cover at right angles so that the small end is aft and the shape of the cover lines up with shape of the hole. The cover should be very free and loose until the cam handle is pushed down. Push the cam handle down flush. This locks and seals the cover. The cam handle should go down smoothly and easily. If it does not, the cover may be fouled on the internal rubber extension sleeve. Shaking the cover in the hole should free it.

> NOTE: It is suggested that the filling hole covers not be inserted in the bomb until after the bomb is filled with Napalm. If the bomb is stored empty for a period of more than several hours, it is advisable to leave the cam handles open and the covers loose.

Electric Fuzing

The following steps contain instructions for preparing the Mk 79 Mod 1 fire bomb for impact or VT airburst capability using the Mk 257 Mod 0 electric bomb fuze. Personnel should note that instructions for installing the bomb burster tube, Bomb Burster Mk 4 Mod 0, are not presented here. The burster tube is installed as a final step under AIRCRAFT BOMB LOADING INSTRUCTIONS for the Mk 79 Mod 1 fire bomb, section 16.2 of volume 2.

When preparing the bomb for VT airburst capability, begin with step 1; for impact capability, begin with step 6 and continue through step 10.

1. Slide the front cable channel out of the channel clip on the nose section of the bomb.

2. Pass the three-pin plug of Cable Assembly Mk 8 Mod 0 through the opening in the nose of the bomb, and feed it through the tube and out of the opening in the nose section. Pull the cable through until the single-pronged plug reaches the mouth of the tube.

> CAUTION: Do not engage the plug in the tube by pulling on the cable. Instead, place the hollow end of the fuze inserting dowel over the single prong and force the plug base firmly into the tube. Remove the dowel.

3. Feed the three-pin plug through the fixed channel on the main section and remove the slack.

4. Insert the front channel through the channel clip on the nose section, pass it over the cable as far as it will go being sure that the front end of the channel slips under the fixed channel.

5. Using a suitable tool, bend down the ear on the channel clip to approximately 45 degrees.

6. Screw the igniter can to the fuze.

7. Insert the fuze-igniter can assembly, fuze end first, into the athwartship fuze well.

8. Place the fuze inserting dowel through the cap assembly furnished in the bomb with the tongue of the dowel at the spring-end of the cap. Using the dowel-cap assembly, push the fuze-igniter can assembly to the top of the well and rotate the dowel until the 3-pin receptacle of the fuze positions in the cutout at the top of the athwartship well.

9. Lock the fuze in the well by turning the cap assembly until the slots in the cap assembly engage the bayonet pins in the fuze well; turn the cap assembly as far as possible manually.

10. Remove the wooden dowel and tighten the cap assembly using the square projection on the wrench furnished.

11. Unscrew and remove the two bolts and lockwashers nearest the cutout on the top of the athwartship well. Some bombs may be provided with the obsolete cable retainer, BuOrd Dwg. 2036180; this cable retainer is to be discarded and replaced with new cable retainer, BuOrd Dwg. 2263197, that is provided with new-procurement bombs.

12. Note the oversized male orienting pin on the three-pin plug of the cable assembly. Aligning the male orienting pin on the plug with the over-sized female receptacle in the fuze, plug the three-pin plug of the cable assembly into the fuze.

CAUTION: Great care should be taken to insure that the plug inserts properly in the fuze.

13. Place cable retainer, BuOrd Dwg. 2263197, over the holes on either side of the athwartship well cutout. Check to be sure that the designated side of the cable retainer is up.

14. Using the two bolts and lockwashers provided, secure the cable retainer firmly.

15. Install Proximity Fuze Sensing Element M20 (T–18E2) in the nose of the bomb according to the directions in OP 2216, Volume 2.

Standard Fuzing

The igniter-fuze combinations are to be installed in the flush mounting wells provided. Two igniter-fuze combinations are used. One of each is installed on Sections I and IV (the nose and tail) as follows:

1. Remove the igniter well covers. These covers are shipped in place in the wells and are held in place by three springs, two of which have tabs extending above the cover to facilitate removal. To remove a cover, squeeze a pair of tabs together between the thumb and forefinger until the springs release. The cover can then be lifted out.

2. Place the igniter-fuze combinations into the wells, lining up the arming wire holes in the arming vanes so that they are in line with the suspension lugs of the bomb. Replace the well cover over each fuze and push down against the spring until the lock pins snap into place. It should not be necessary to remove the safety pins until the well covers have been installed. Install the arming wires, passing them through the guides on top of the bomb.

Chapter 11

PRACTICE BOMB ASSEMBLIES

3-LB MINIATURE PRACTICE BOMB Mk 5 Mods 2 and 3
3-LB MINIATURE PRACTICE BOMB AN–Mk 23 Mod 1
4.5-LB MINIATURE PRACTICE BOMB Mk 43 Mod 1

Mark	Mk 5	AN–Mk 23	Mk 43.
Mod	2 and 3	1	1.
General Arrangement	452859	452860	452858.
List of Drawings	Sk 165595	Sk 165597	Sk 165596.
Length of Assembled Bomb (in.)	8.25	8.25	8.25.
Diameter (in.)	2.18	2.18	2.18.
Fin Span (In.)	2.5	2.5	2.5.
Weight:			
Without Signal (lb)	2.56	2.87	4.31.
With Mk 4-Type Signal (lb)	2.68	3.00	4.43.
With Mk 5-Type Signal (lb)	2.62	2.94	4.37.
Firing-Pin Assembly	Mk 1 Mod 0	Mk 1 Mod 0	Mk 1 Mod 0
Signal	Mk 4 Mods or Mk 5 Mod 0.	Mk 4 Mods or Mk 5 Mod 0.	Mk 4 Mods or Mk 5 Mod 0.

General Description

The 3-lb MPB Mk 5 Mods 2 and 3, the 3-lb MPB AN–Mk 23 Mod 1, and the 4.5-lb MPB Mk 43 Mod 1 are similar in physical appearance and differ basically in the metal used to cast the body.

Bomb Mk 5, now obsolescent, is manufactured from zinc alloy and weighs the least of the three bombs. Bomb AN–Mk 23 is made of cast iron. Bomb Mk 43, now obsolete, was manufactured from cast lead and was the heaviest of the three bombs.

The cast body has a bore throughout its transverse axis which houses a signal and firing-pin assembly.

Four fins are cast integrally with the bomb body. A rectangular sheet-metal shroud attached to the fins is used to stabilize the bomb in flight. Two crimps, 180 degrees apart, anchor the shroud to the fin blades.

The firing-pin assembly consists of two shallow metal cups, separated by a spacer which houses the firing pin. A cotter pin through the nose of the bomb body and two recesses in the lip of the forward cup lock the firing-pin assembly and signal in place.

Painting and Marking

Identification data is cast integrally on the body of the bomb during manufacture, and the bomb has no color marking other than that of the cast metal.

Use

The 3-lb MP Bomb Mk 5 is used for bombing practices on armored-deck target boats. The Bomb AN-Mk 23 is authorized for all bombing practices except those involving armored-deck target boats. The 4.5-lb MP Bomb Mk 43, now obsolete, was used for low-altitude, horizontal or dive bombing and on armored-deck target boats. The Bombs Mk 5, AN–Mk 23, and Mk 43 are used with the Mk 4-type signal, which expels a large puff of smoke rearward through the bore of the bomb when detonated by action of the firing pin. They also are used with the Mk 5 type signal, which contains a fluorescein dye and is actuated by a water inertia load on the firing pin. When the Mk 5 type signal is installed, the firing-pin assembly is not used. Special containers are utilized by aircraft to carry and release these bombs.

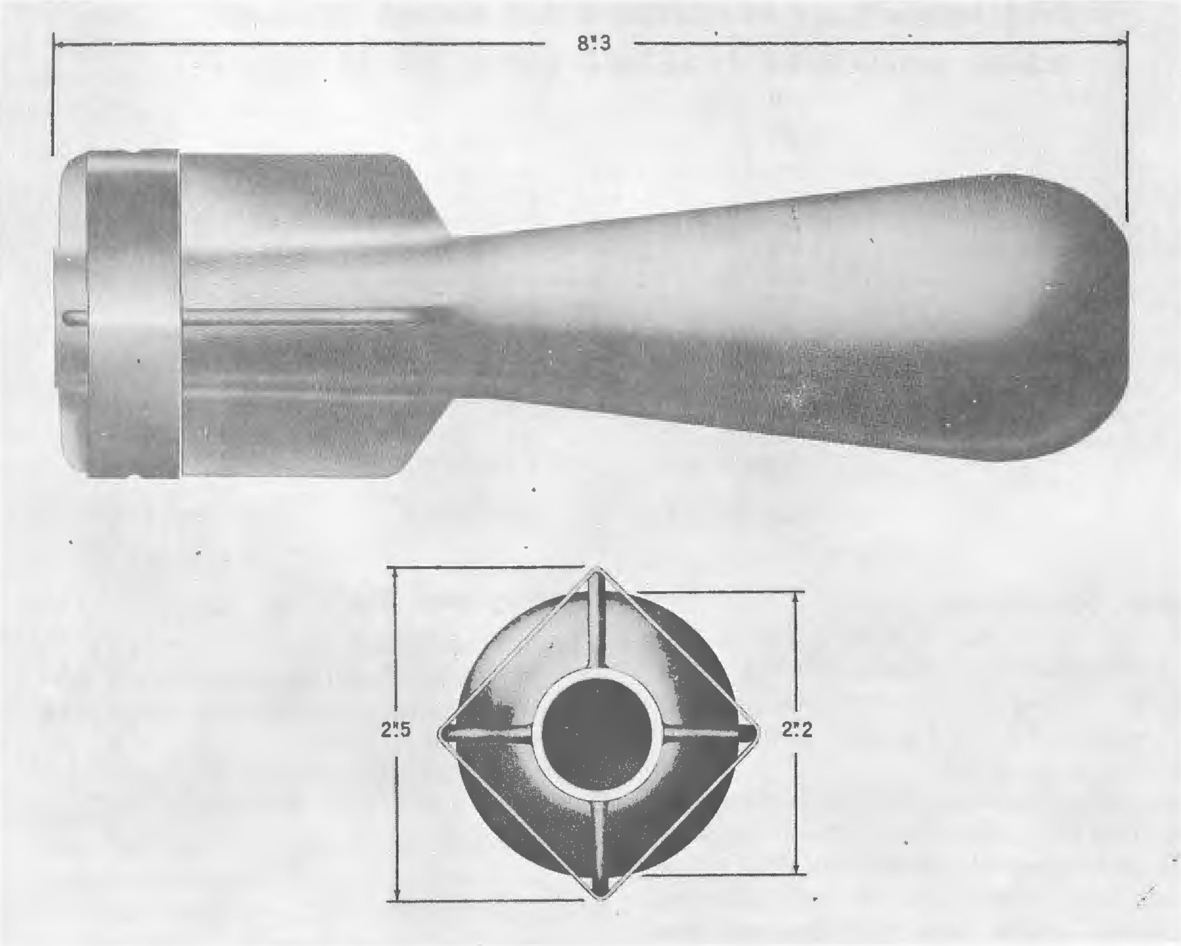


Figure 11–1.—3-lb Miniature Practice Bomb AN–Mk 23 Mod 1, Exterior View.

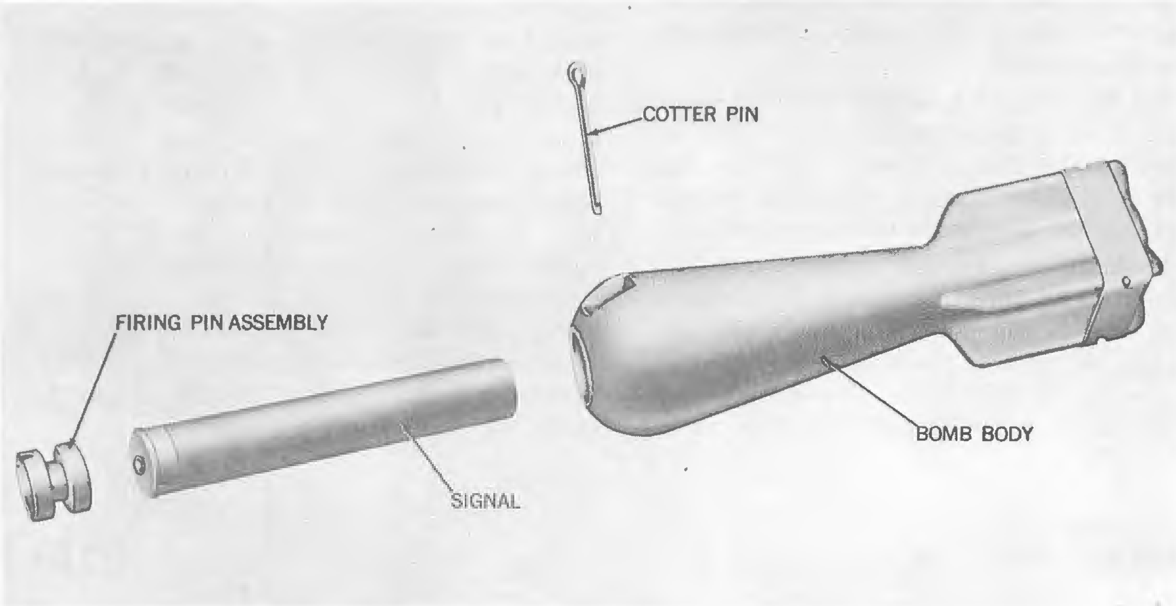


Figure 11–2.—3-lb Miniature Practice Bomb AN–Mk 23 Mod 1, Exploded View.

Assembly With the Mk 4 Type Signal

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb and the signal from their packings.

2. Remove the cotter pin and the firing-pin assembly from the nose of the bomb. The firing-pin assembly should fit loosely in the bomb and not bind when being removed.

3. Check the bore through the center of the bomb; it must be clean, smooth, and not damaged in any way.

4. Inspect the firing-pin assembly for

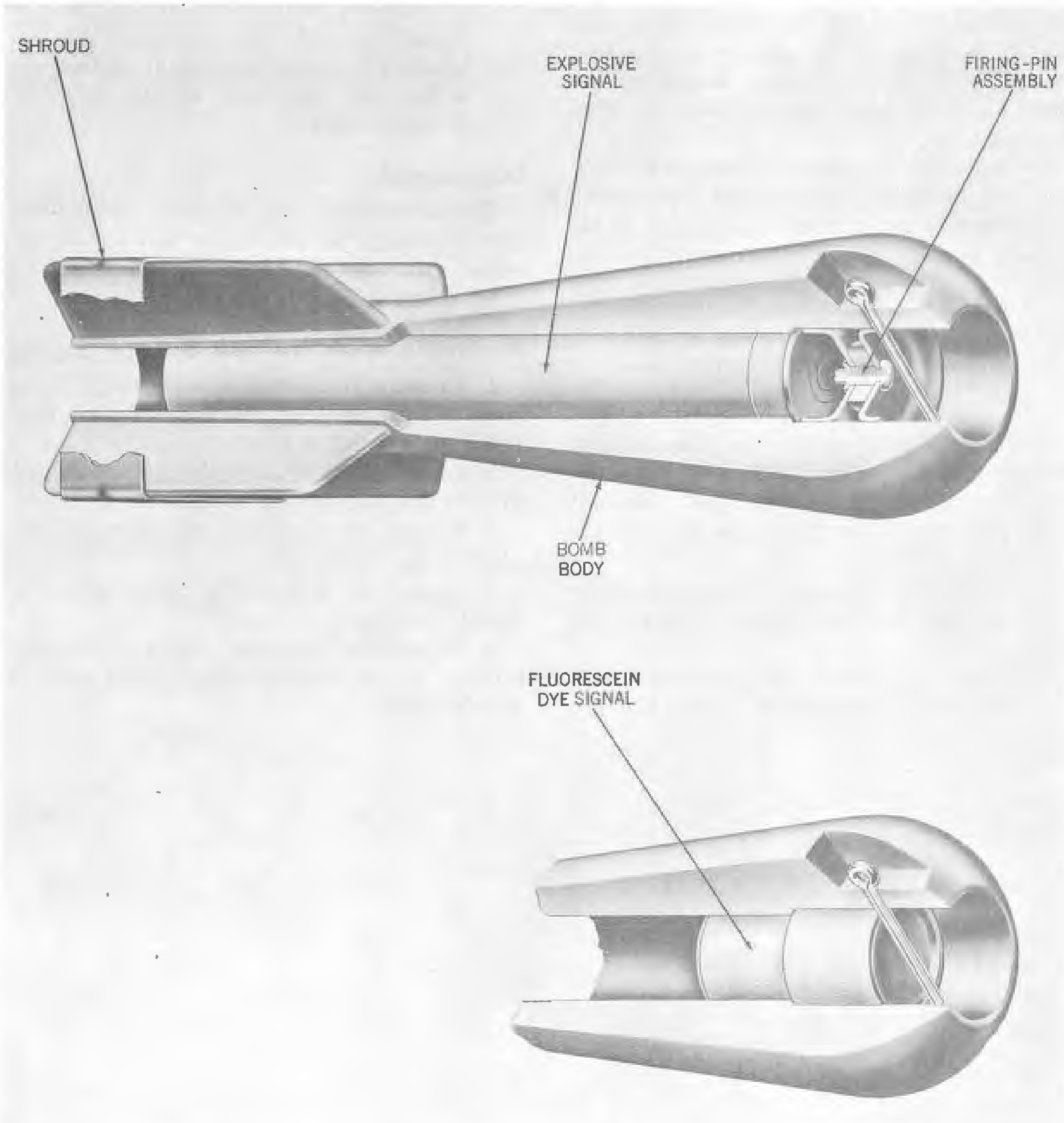


Figure 11–3.—3-lb Miniature Practice Bomb AN–Mk 23 Mod 1, Cutaway View and Detail Showing Signal Mk 5 Mod 0 Installed.

damage. Be sure the firing-pin cup is not deformed and that the firing-pin point is below the lip of its cup.

5. Place the bomb in a vertical position, nose end up.

6. Check that the signal is not swollen or deformed in any way. The primer must be flush or slightly below the base of the cartridge. Do not use a signal cartridge that is deformed in any way.

7. Insert the signal into the bomb, primer end up, and let it fall gently into place; do not force it. The base flange of the signal cartridge must rest on the bomb bore shoulder.

8. Insert the firing-pin assembly carefully with the firing-pin end toward the signal. The assembly must drop into place under its own weight.

> CAUTION: Do not apply pressure to force the firing-pin assembly into the bomb. The assembly may collapse and fire the signal.

9. Rotate the firing-pin assembly so that the two notches in the lip line up with the two pin holes in the bomb nose. Do not apply pressure to the firing pin during this operation.

10. Insert the cotter pin through the nose holes and the recesses in the firing-pin assembly.

11. Spread the ends of the cotter pin with a screwdriver sufficiently to retain the pin in the bomb. Do not bend the ends of the cotter pin at a right angle to the axis of the cotter pin or strike the ends to bend them into position.

> CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

Disassembly

To disassemble the complete bomb, the previous steps should be carried out in reverse order and the components restored to their original condition.

Assembly With the Mk 5 Type Signal

1. Prepare the bomb in accordance with steps 1 through 6 of the assembly instructions for the Mk 4 type signal.

2. Insert the signal with the small end toward the tail of the bomb.

3. Secure the signal in the bomb by replacing the cotter pin.

4. Spread the ends of the cotter pin sufficiently to lock it in place.

5. Retain the discarded firing-pin assemblies as spares or return them to the nearest supply point.

13-LB MINATURE PRACTICE BOMB MK 19 MODS 0 AND 1

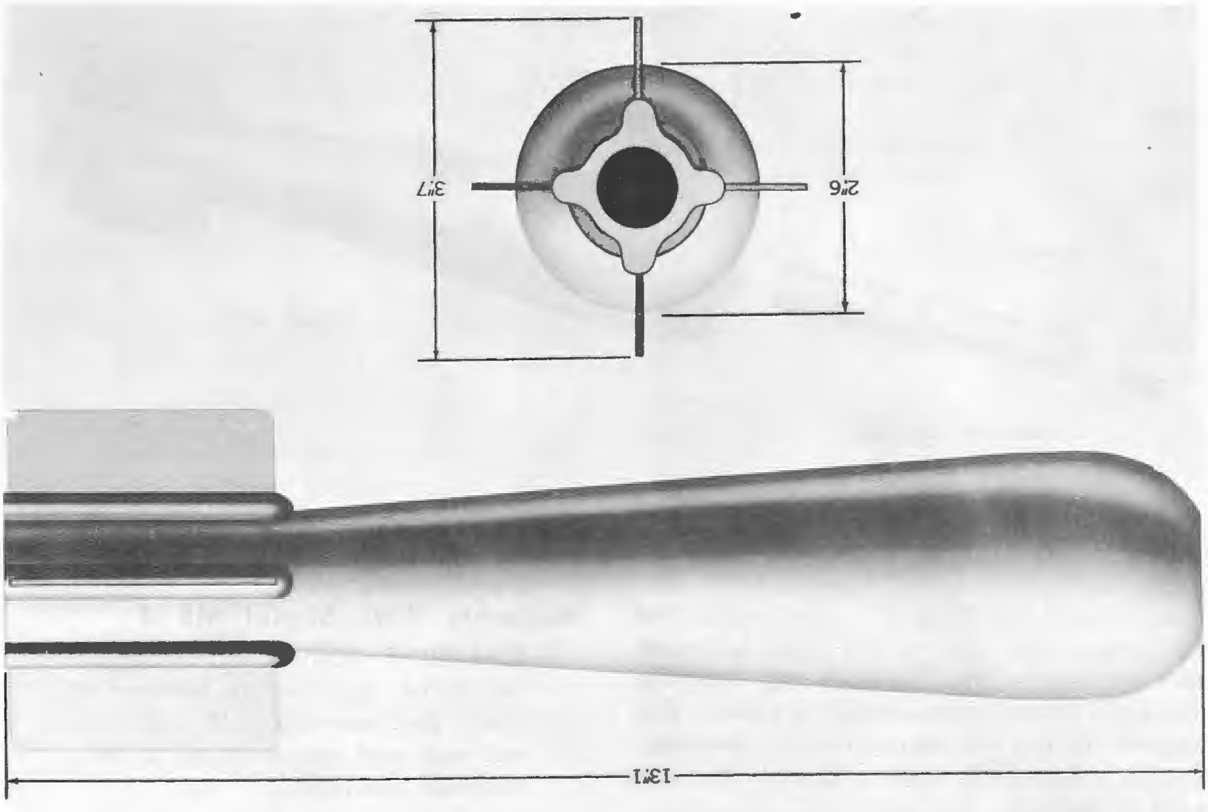


Figure 11–4.—13-lb Miniature Practice Bomb Mk 19 Mod 1, Exterior View.

Mark	19	19.
Mod	0	1.
General Arrangement	284480	300617.
List of Drawings	Sk 90553	Sk 90842.
Length of Assembled Bomb (in.)	13.1	13.1.
Diameter (in.)	2.6	2.6.
Fin Span (in.)	3.7	3.7.
Weight:		
Without Signal (lb)	13	13.
With Signal Mk 4 (lb)	13.2	13.2.
With Signal Mk 5 (lb)	13.1	13.1.
Signal	Mk 4 Mods or Mk 5 Mod 0.	Mk 4 Mods or Mk 5 Mod 0.
Firing Pin Assembly	Mk 1 Mod 0	Mk 1 Mod 0.

General Description

The 13-lb MPB Mk 19 Mods 0 and 1, now obsolescent, is made of cast metal and has a bore through its transverse axis which houses a signal and firing-pin assembly. The body is cast lead-antimony. Four steel sheet-metal fins are cast integral with the bomb body.

The firing-pin assembly consists of two shallow metal cups, separated by a spacer

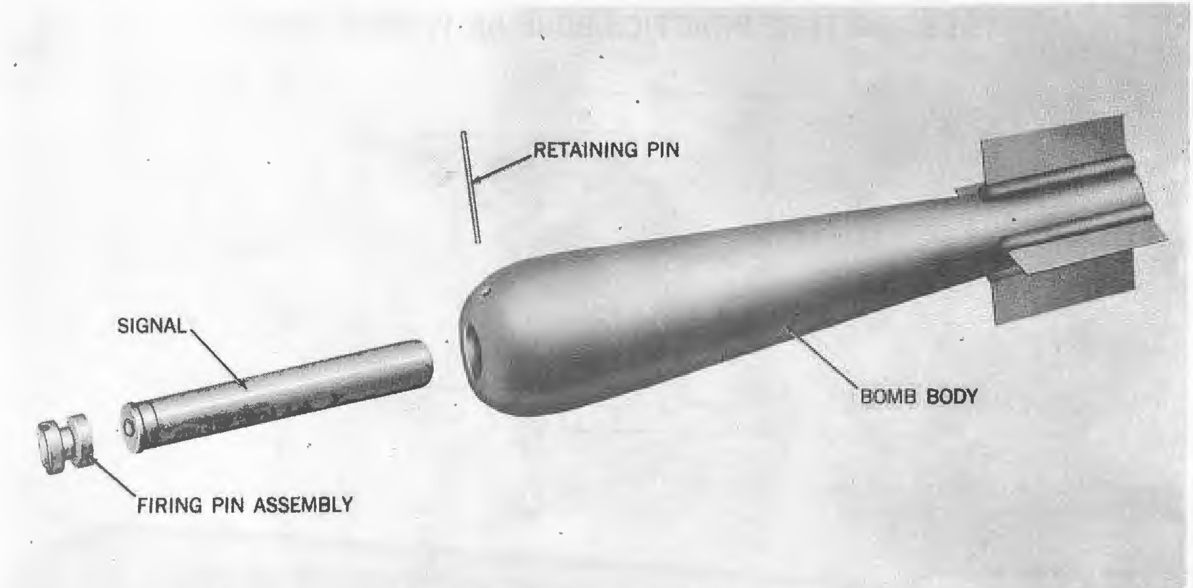


Figure 11–5.—13-lb Miniature Practice Bomb Mk 19 Mod 1, Exploded View.

which houses the firing pin. A straight steel pin through the nose of the bomb body and two recesses of the forward cup lock the firing-pin assembly and signal in place. The ends of the pin are peened over at assembly and, for shipment, tape is placed over the ends of the pin.

The difference between mods 0 and 1 is the bore construction. The center bore of mod 0 is lined with a steel sleeve; mod 1 has no such lining.

Painting and Marking

The bomb body is painted black; identification data is stenciled on the body in white letters.

Use

The bomb is used for high altitude horizontal bombing practice and mod 1 also may be used on armored-deck target boats. The bomb is used with Signal Mk 4 which expels a large puff of smoke rearward through the bore of the bomb when detonated by action of the firing pin. It is used also with Signal Mk 5, which contains a fluorescein dye and is actuated by a water inertia load on the firing pin. When the Signal Mk 5 is installed, the firing pin assembly is not used.

Assembly With Signal Mk 4

CAUTION: Signals and bombs are not to be unpacked in advance of their requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb and signal from their respective packings.
2. Inspect the bomb for damaged seams, cracked weldments, and deformed areas.
3. Remove the tape covering the ends of the retaining pin. Remove the retaining pin and the firing pin assembly.
4. Inspect the firing-pin assembly for damage. The firing-pin cups must not be deformed, and the point of the firing pin must be below the lip of its cup.
5. Inspect the bore through the center of the bomb. The bore must be clean, smooth, free of obstructions, and undamaged.
6. Inspect the signal to see that it is not swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Deformed signals must not be used.
7. With the firing pin assembly removed, stand the bomb vertically with its nose up. Insert the signal, primer end up, into the

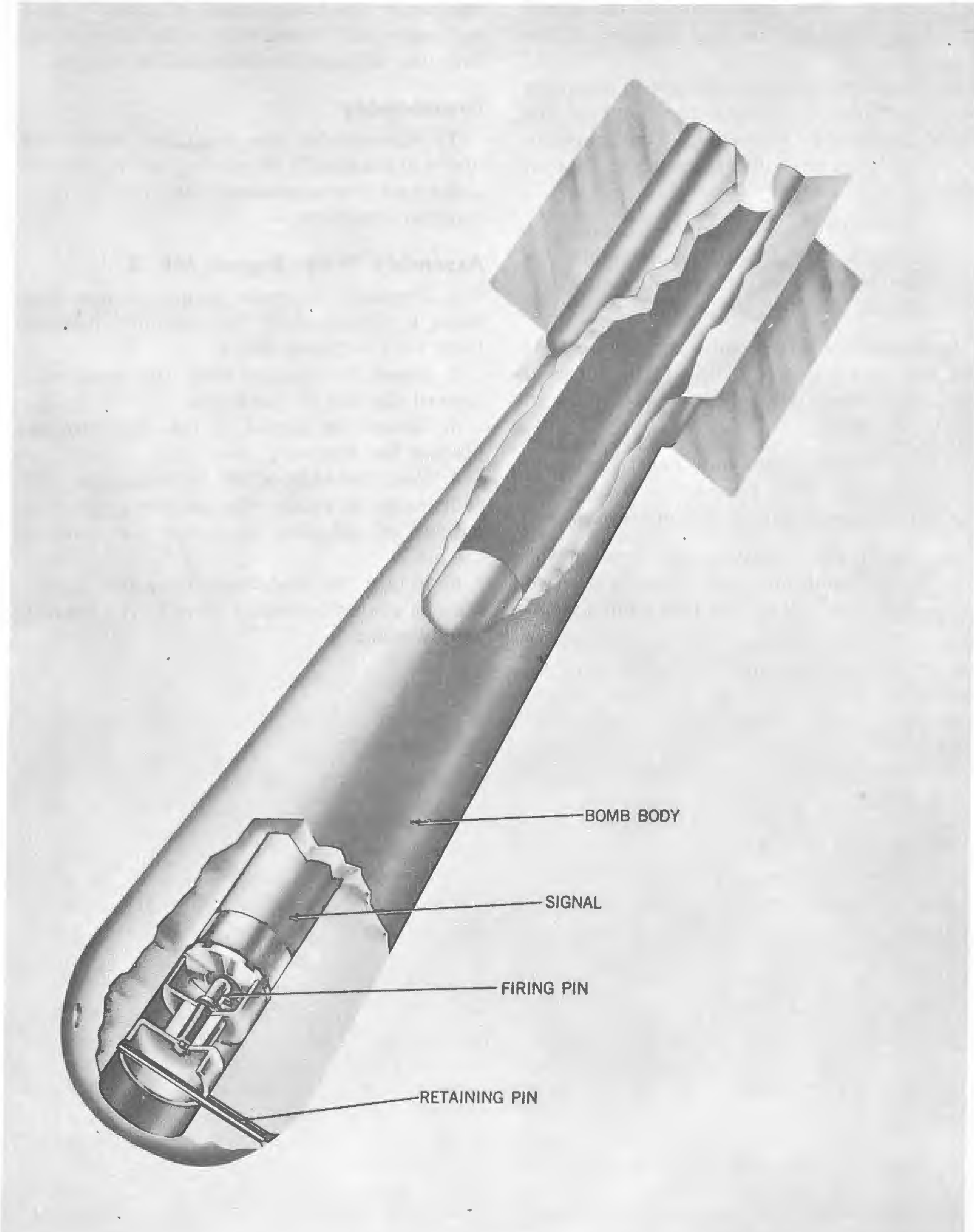


Figure 11–6.—13-lb Miniature Practice Bomb Mk 19 Mod 1, Cutaway View.

bomb and let it slide gently into place; do not force it. The base flange of the signal cartridge must rest on the shoulder of the bomb bore.

8. Carefully insert the firing-pin assembly into the bomb nose, with the point of the firing pin facing the signal. The firing-pin assembly must drop into place under its own weight.

> CAUTION: Do not apply pressure to force the firing-pin assembly into the bomb as the assembly may collapse and fire the signal.

9. Rotate the firing-pin assembly so that the two recesses in the lip of the forward cup are aligned with the two pin holes in the bomb nose.

> CAUTION: Do not exert any downward pressure on the firing-pin assembly during this operation.

10. Insert the retaining pin through the holes in the bomb nose and through the two recesses in the cup of the firing-pin assembly.

11. Peen lead over the ends of the retaining pin or use two patches of adhesive tape to retain pin. Peen only sufficiently to retain pin, to permit withdrawal of the pin.

Disassembly

To disassemble the complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

Assembly With Signal Mk 5

1. Prepare the bomb in accordance with steps 1 through 6 of the assembly instructions for the Signal Mk 4.
2. Insert the signal with the small end toward the tail of the bomb.
3. Secure the signal in the bomb by replacing the retaining pin.
4. Peen the ends of the retaining pin only sufficiently to retain the pin, or apply two patches of adhesive tape over the ends of the pin.
5. Retain the discarded firing-pin assemblies as spares or return them to the nearest supply point.

5-LB PRACTICE BOMB MK 106 MODS

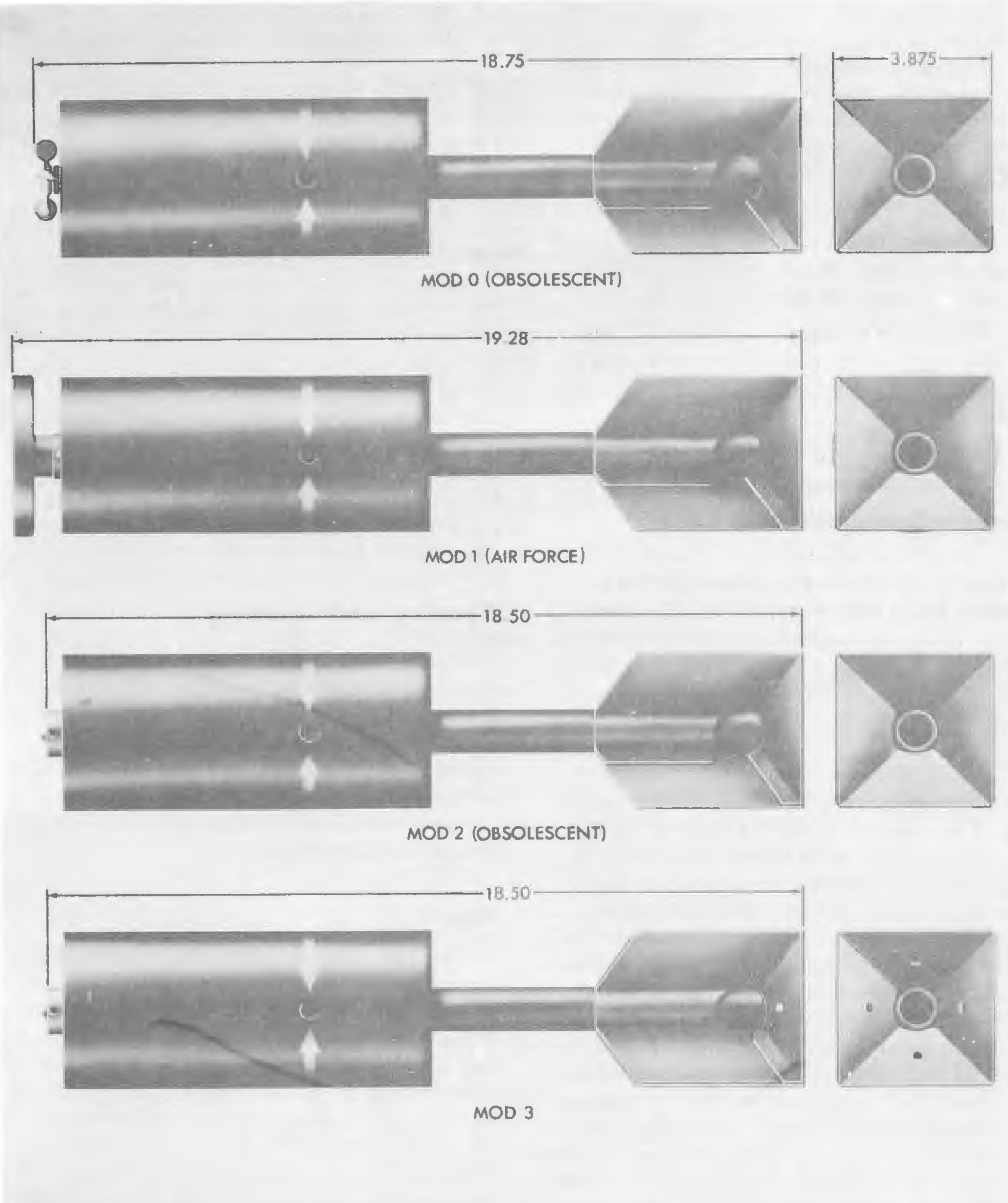


Figure 11-7. 5-lb Practice Bomb Mk 106 Mods.

MARK	106	106	106	106	106
MOD	0	1	2	3	4
ASSEMBLY DWG	1985656	. . .	1517152	2176117	2518432
LIST OF DRAWINGS	414455	. . .	269463	534530	2518432
LENGTH OF ASSEMBLED BOMB (in.)	18.75	19.28	18.50	18.50	18.50
DIAMETER (in)	3.875	3.875	3.875	3.875	3.875
FIN SPAN	3.875	3.875	3.875	3.875	3.875
WEIGHT OF ASSEMBLED BOMB (lb)	4.56	. . .	4.65	4.85	5.00
SIGNAL	MARK 4 MOD 3	MARK 4 MOD 3	MARK 4 MOD 3	MARK 4 MOD 3	MARK 4 MOD 3
FIRING DEVICE	AN-M173 Fuze Modified	60D90955 Dwg 561648	LD 269457 Dwg 1211501	LD 534530 Dwg 2176117	LD 534530 Dwg 2176117
COMPATIBILITY:					
AERO 8A-1 CONTAINER	Yes	N.A.	Yes	Yes	Yes
A/A37B-3 PMBR	No	N.A.	No	Yes	Yes

5-LB PRACTICE BOMB MARK 106 MOD 0

General Description

The 5-lb Practice Bomb Mk 106 Mod 0 (OBSOLESCENT) is a thin-cased cylindrical bomb. It is composed of a bomb body assembly, a Mk 4 Mod 3 Practice Bomb Signal, and a modified AN-M173 Multi-Position Fuze Assembly.

The bomb body is composed of an inner cylinder, an outer cylinder, and a fin assembly. The inner cylinder is composed of two seamless steel tubes; one is smaller in diameter and is partially inserted into the larger and welded in position. The inner cylinder has internal threads on the forward end for receiving the AN-M173 fuze assembly. It also forms the base for the outer cylinder and fin assembly. The outer cylinder is fabricated of sheet steel. It is suspended on the forward end of the inner cylinder by two sheet steel supports which are welded to both the inner and outer cylinders. A box-type fin assembly, consisting of four metal vanes welded together, is welded to the aft end of the inner cylinder.

The bomb has two 3/8 inch indexing holes drilled into the body 2 inches forward of the center of gravity. These holes accommodate the Aero 8A-1 Practice Bomb Container.

This bomb is not compatible for carriage on external bomb racks.

Painting and Marking

Identifying nomenclature is stenciled in white marking ink on the side of the body. Early issues of the bomb are coated externally with black enamel. Later issues are coated with orange enamel and are encircled with one-fourth inch enamel or lacquer white stripes terminated by arrowheads which point to the indexing holes.

Use

The 5-lb Practice Bomb Mk 106 Mod 0 is designated for retarded or laydown delivery modes. The modified AN-M173 Multi-Position Fuze Assembly, consisting of an adapter and the AN-M173 Fuze Assembly less booster, is installed in the nose of the bomb. The fuze is fully armed by anemometer-type vanes, after completing 220 feet of air travel. When the fuze is armed, impact forces from any direction will cause instantaneous detonation of the fuze, which in turn fires the signal.

The Practice Bomb Signal Mk 4 Mod 3 is seated in the inner cylinder of the bomb body. Smoke produced from the detonated signal is discharged rearward through the inner cylinder.

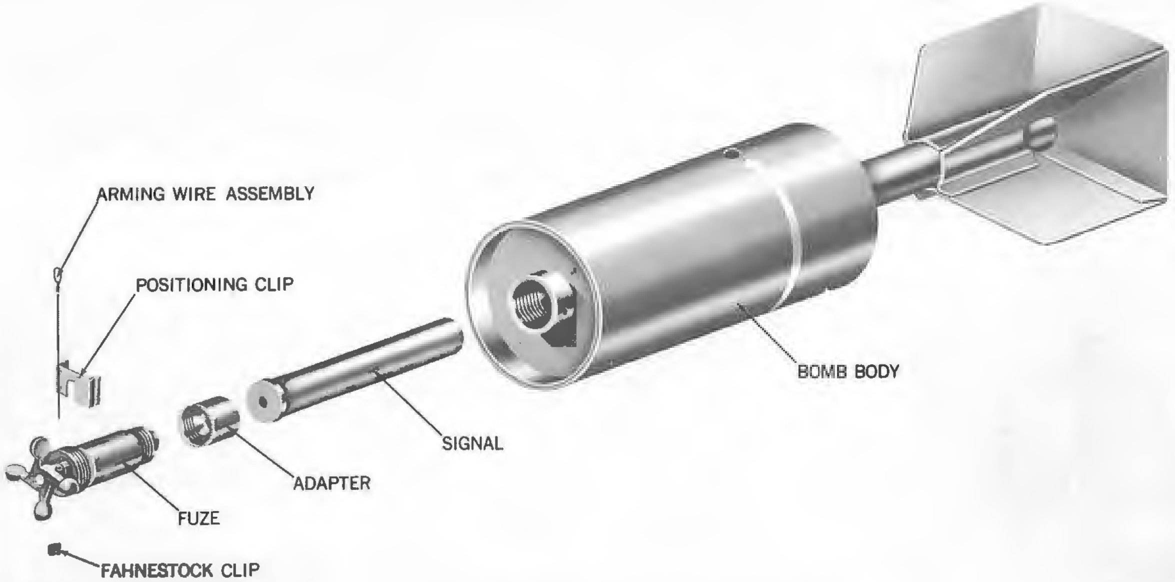


Figure 11-8.—5-lb Practice Bomb Mk 106 Mod 0, Exploded View.

Assembly

CAUTION: Signals, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from container.

2. Remove the signal from its packing and check that the signal is not swollen or deformed in any way. The primer must be flush or slightly below the base of the cartridge. Do not use a signal cartridge that is deformed in any way.

3. Place the bomb in a vertical position, nose end up.

4. Insert the signal into bomb, primer end up, and let it fall gently into place; do not force it. The base flange of the signal cartridge must rest on the bomb bore shoulder.

5. Remove the fuze and the adapter from their packings, and inspect the fuze to ensure that the fuze safety devices are in place.

WARNING

If a fuze is armed or otherwise unsafe to handle, the fuze shall be disposed of by authorized personnel.

6. Carefully screw fuze assembly into nose of bomb until seated. Install positioning clip.

7. Insert arming wire into off-center holes on the fuze anemometer vane hub and install Fahnestock clip.

8. Remove safety cotter pin from fuze.

Disassembly

To disassemble the complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

5-LB PRACTICE BOMB MARK 106 MOD 1

General Description

The 5-lb. Practice Bomb Mark 106 Mod 1, used only by the Air Force, is the same as Mark 106 Mod 0 except the modified AN-M173 Fuze Assembly used on the Mod 0 is replaced by a striker plate type firing device, Air Force Assembly Drawing No. 60D90955, and firing pin Mk 1 Mod 0 Drawing 561648.

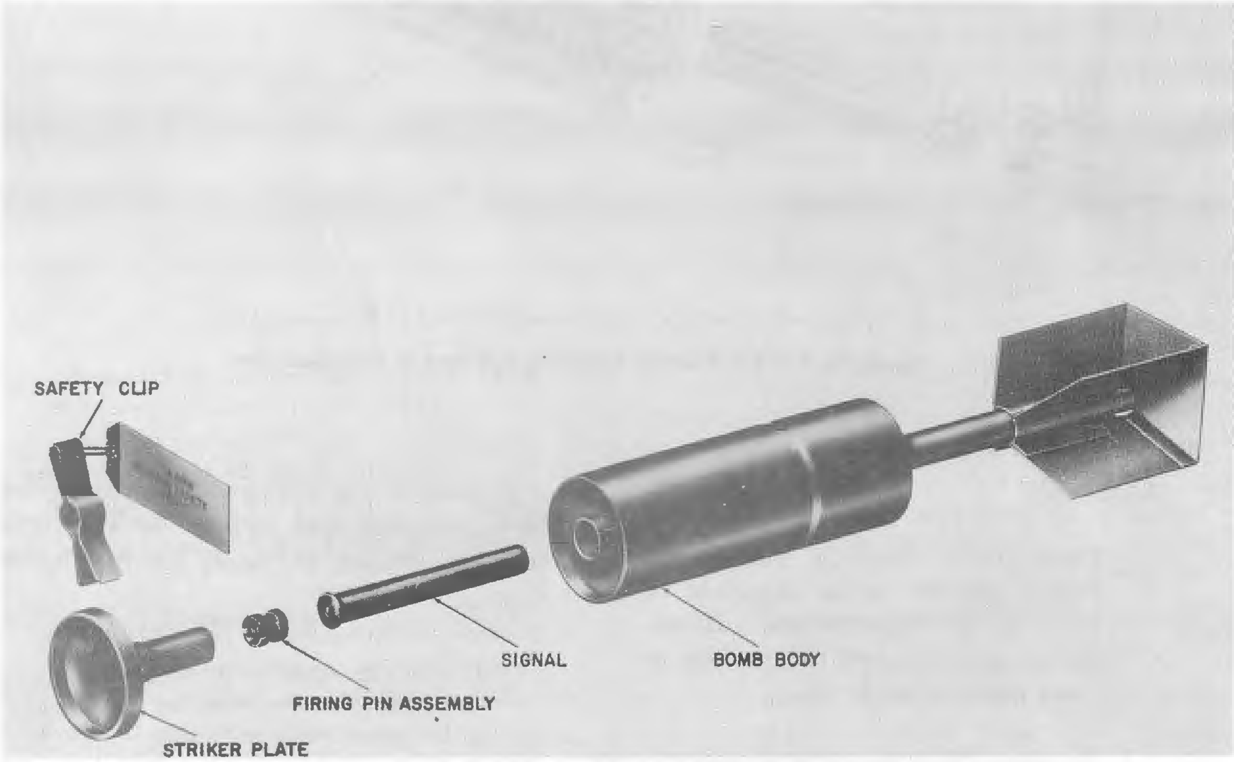


Figure 11-9a. 5-lb Practice Bomb Mark 106 Mod 1, Exploded View.

5-LB PRACTICE BOMB MARK 106 MOD 2

General Description

The 5-lb Practice Bomb Mark 106 Mod 2 (OBSOLESCENT) has the same bomb body assembly as the Mark 106 Mod 0, and differs only in that a firing pin device, in lieu of the modified AN-M173 Fuze, actuates the smoke signal. A steel sleeve, approximately 1-inch in diameter by 2-inches long, is also provided for use in conjunction with the smoke signal and is required for proper functioning.

The latest version of the firing device for the Mod 2 bomb consists of a firing pin head, tapered spring, brass puncture disc, safety pin, and cotter pin, furnished in the assembled condition. Earlier firing devices supplied require assembly by the using activity. Initially, the brass puncture disc was not provided, and these units are restricted from use, unless a 1.0 inch diameter by 0.032 inch thick disc made from commercial half hard sheet brass can be supplied locally.

The cotter pin, which retains the safety pin in the assembled firing device, must be replaced by an arming wire when the bomb is loaded into the Aero 8A-1 Practice Bomb Container.

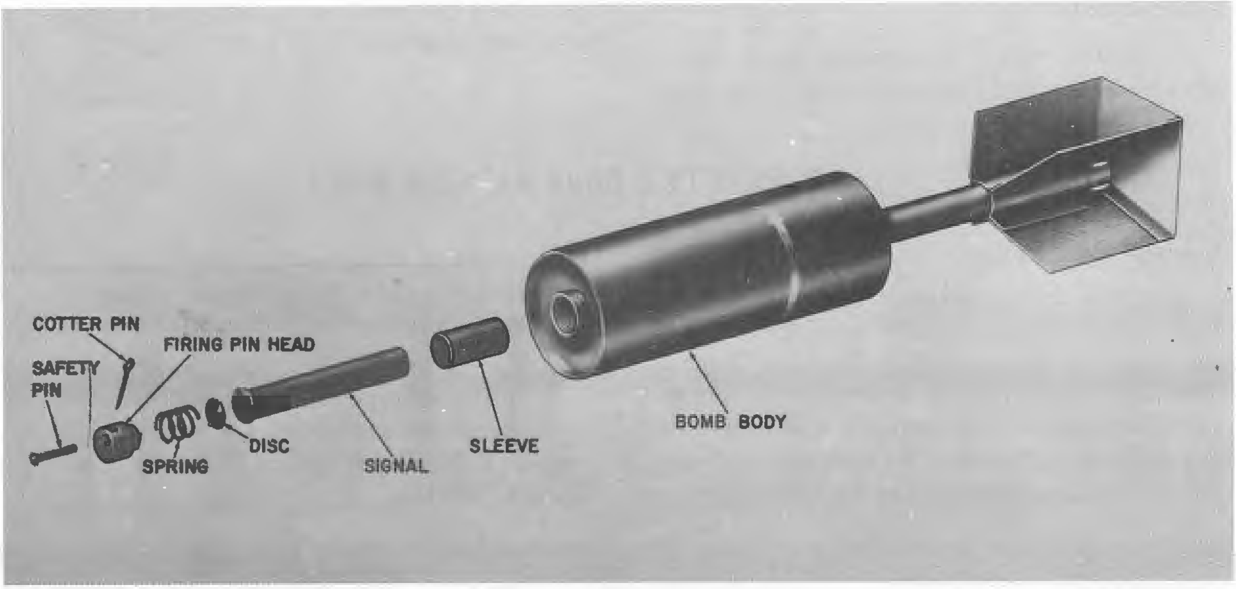


Figure 11-9b. 5-lb Practice Bomb Mark 106 Mod 2, Exploded View.

Painting and Marking

The bomb is coated externally with orange enamel. Identifying nomenclature is stenciled in white on the side of the body. One-fourth inch wide stripes encircle the body and are terminated by arrowheads which point to the two index holes.

Use

The 5-lb Practice Bomb Mark 106 Mod 2 is designated for retarded or laydown delivery modes. The bomb is armed when the arming wire is withdrawn from the firing device. When armed, impact forces will cause the signal to fire.

The Practice Bomb Signal Mark 4 Mod 3 seats in the sleeve inside the bomb body. Smoke produced from the detonated signal is discharged rearward through the inner cylinder.

Assembly

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from container.
2. Remove the signal from its packing and check that the signal is not swollen or deformed in any way. The primer must be flush or slightly below the base of the cartridge. Do not use a signal cartridge that is deformed in any way.
3. Place the bomb in a vertical position, nose end up.
4. Remove the firing device assembly and sleeve from the nose of the bomb.
5. Insert the signal in the sleeve.
6. Insert the signal and sleeve into the bomb, primer end up, and let it fall gently into place; do not force it.
7. Carefully screw firing device into nose of bomb until seated.
8. Remove safety cotter pin from firing pin head and replace with arming wire.

NOTE: If firing device is not received in the assembled condition, assembled as follows:

a. Attach (snap-on) brass puncture disc to larger end of tapered spring.
b. Fit firing pin head into smaller end of spring.
c. Install safety pin and retaining cotter pin.

Disassembly

To disassemble the complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

5-LB. PRACTICE BOMB MARK 106 MOD 3

General Description

The 5-lb Practice Bomb Mark 106 Mod 3 has a bomb body assembly similar to that of the Mark 106 Mods 0 and 2 Practice Bombs. The Mod 3 box-type fin assembly has been strengthened to withstand the additional aerodynamic loads imposed by external carriage. Also, the fin assembly has four holes for attachment of drag tabs to obtain higher drag, if necessary. The firing device differs from the Mod 2 only in that the puncture disc is 1/32 inch thick instead of 1/16 inch.

A split-ring type suspension bracket is furnished with each bomb for suspension on the A/A37B-3 Practice Multiple Bomb Rack (PMBR).

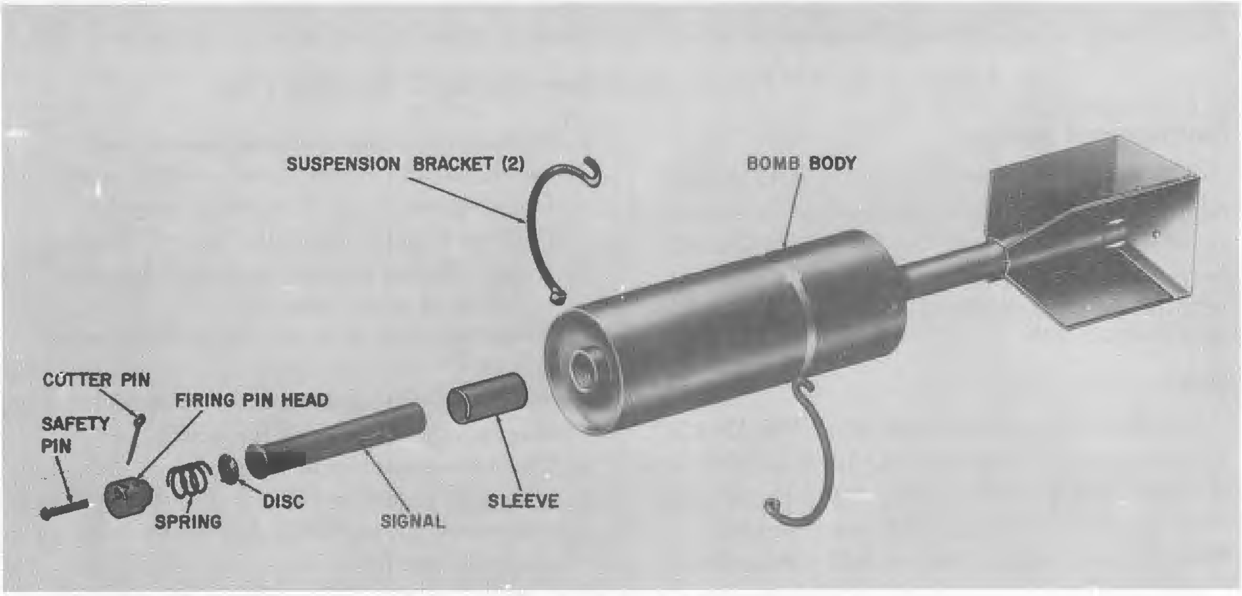


Figure 11-9c. 5-lb Practice Bomb Mark 106 Mod 3, Exploded View.

Painting and Marking

The bomb is coated externally with medium blue enamel. Identifying nomenclature is stenciled in white on the side of the body. One-fourth inch wide white stripes encircle the body and are terminated by arrowheads which point to the two index holes.

Use

The 5-lb Practice Bomb Mark 106 Mod 3 is designated for retarded or laydown delivery modes. The bomb is armed when the arming wire is withdrawn from the firing device. When armed, impact forces will cause the signal to fire.

The Practice Bomb Signal Mark 4 Mod 3 seats in the sleeve inside the bomb body. Smoke produced from the detonated signal is discharged rearward through the inner cylinder.

This bomb is compatible for carriage either internally in the Aero 8A-1 Practice Bomb Container or externally on the A/A37B-3 Practice Multiple Bomb Rack.

Assembly

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from container.
2. Remove the signal from its packing and check that the signal is not swollen or deformed in any way. The primer must be flush or slightly below the base of the cartridge. Do not use a signal cartridge that is deformed in any way.
3. Place the bomb in a vertical position, nose end up.
4. Remove the firing device assembly and sleeve from the nose of the bomb.
5. Insert the signal in the sleeve.
6. Insert the signal and sleeve into bomb, primer end up, and let it fall gently into place; do not force it.
7. Carefully screw firing device into nose of bomb until seated.
8. Remove safety cotter pin from firing pin head and replace with arming wire.

CAUTION: To assure satisfactory separation from the A/A37B-3 Practice Multiple Bomb Rack the following procedures must be adhered to:

a. Use steel arming wire (0.033 inch diameter)
b. Do not use Fahnestock clips.
c. Clip arming wire off approximately 3 inches beyond the firing pin head.

Disassembly

To disassemble the complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

5-LB PRACTICE BOMB MARK 106 MOD 4

General Description

The 5-lb Practice Bomb Mark 106 Mod 4 has a bomb body assembly similar to that of the Mark 106 Mods 0, 2 and 3 practice bombs. The Mod 4 box-type fin assembly has been retained, but redesigned for added strength to withstand the additional aerodynamic loads imposed by external carriage at increased aircraft speeds. Also, the four holes for attachment of drag tabs have been eliminated. The firing device is the same as that in the Mod 3.

The split-ring type suspension bracket furnished with the Mod 3 has been replaced with a permanent retractable lug which is compatible with all practice bomb racks.

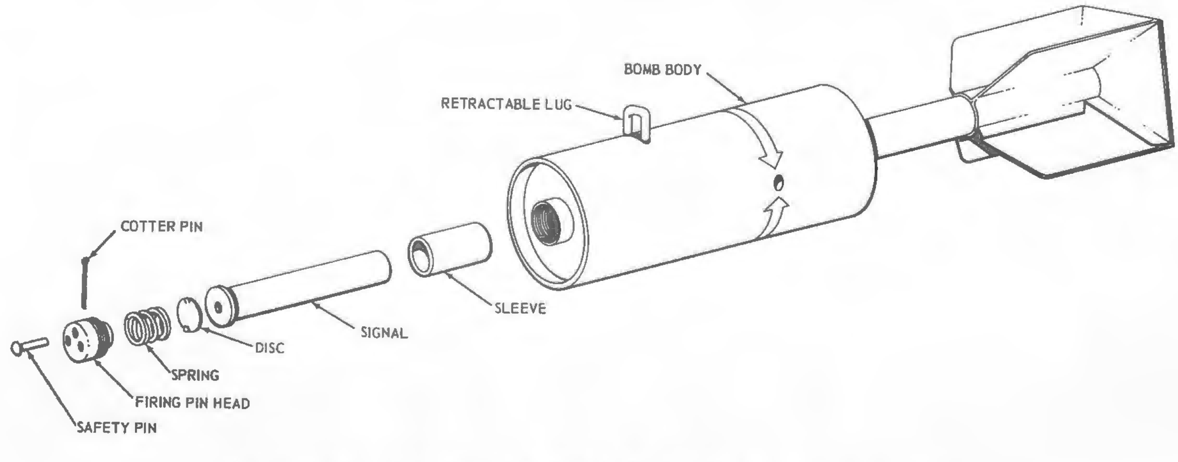


Figure 11-9d. 5-lb Practice Bomb Mk 106 Mod4, Exploded View.

Painting and Marking

The bomb is coated externally with medium blue enamel. Identifying nomenclature is labeled in white on the side of the body. One-fourth inch wide white stripes encircle the body and are terminated by arrowheads which point to the two index holes.

Use

The 5-lb Practice Bomb Mark 106 Mod 4 is designated for retarded or laydown delivery modes. The bomb is armed when the arming wire is withdrawn from the firing device. When armed, impact forces will cause the signal to fire.

The Practice Bomb Signal Mark 4 Mod 3 is seated in the inner cylinder of the bomb body. Smoke produced from the detonated signal is discharged rearward through the inner cylinder.

This bomb is compatible for carriage either internally in the Aero 8A-1 Practice Bomb Container or externally on the A/A37B-3 Practice Multiple Bomb Rack and other bomb racks.

Assembly

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from container, and from the plastic bag.
2. Remove the signal from its packing and check that the signal is not swollen or deformed in any way. The primer must be flush or slightly below the base of the cartridge. Do not use a signal cartridge that is deformed in any way.
3. Place the bomb in a vertical position, nose end up.
4. Remove the firing device assembly and sleeve from the nose of the bomb.
5. Insert the signal in the sleeve.
6. Insert the signal and sleeve into bomb, primer end up, and let it fall gently into place; do not force it.
7. Carefully screw firing device into nose of bomb until seated.
8. Remove safety cotter pin from firing pin head and replace with arming wire.

CAUTION: To assure satisfactory separation from the A/A37B-3 Practice Multiple Bomb Rack the following procedures must be adhered to:

a. Use steel arming wire (0.033 inch diameter).
b. Do not use Fahnestock clips.
c. Clip arming wire off approximately 3 inches beyond the firing pin head.

Disassembly

To disassemble the complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

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25-LB PRACTICE BOMB Mk 76 Mods 0, 1, and 2

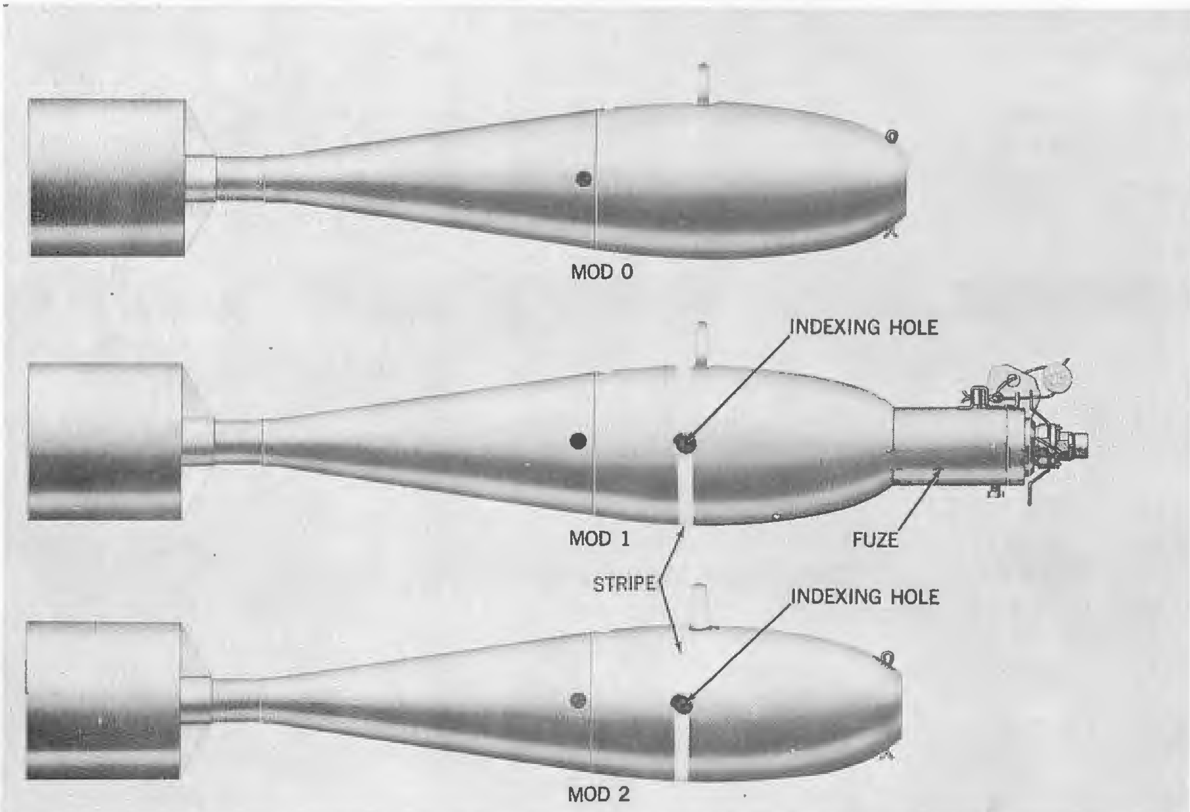

Figure 11–10.—25-lb Practice Bomb Mk 76 Mods.

Mark	76	76	76.
Mod	0	1	2.
General Arrangement	561638	1381205	1381208.
List of Drawings	Sk 165603	165802	165803.
Length of Complete Bomb (with fuze) (in.)	22.5	27.155	22.5.
Weight of Complete Bomb (lb)	23.8	25.10	23.70.
Signal	Mk 4 Mods 0, 1, 2, 3	Mk 4 Mod 3	Mk 4 Mod 3.
Fuze	Not Used	AN–M146E3	Not Used.
Firing Pin	Mk 1 Mod 0	Not Used	Mk 1 Mod 0.

General Description

The 25-lb PB Mk 76 Mod 0, now obsolescent, has a tear-drop shaped, cast-metal body which is centrally bored. The tail-tube assembly fits into the end of the bore. The conical afterbody covers the tail-tube assembly and is threaded to the body. The two sections are staked together to prevent unscrewing. The fin assembly is welded to the tail tube. Firing-Pin Assembly Mk 1 Mod 0 and the signal are assembled into the bore of the body and secured in place by a safety cotter pin.

In the Mod 0 a single lug is positioned just forward of the center of gravity of the bomb. Some bombs of early manufacture have a suspension lug with a small opening which precludes use of the bomb on Shackle Mk 8 All Mods or Aero 14 and 15 series racks. Later manufacture provided lugs with a larger opening that permits use on this type shackle or rack. Activities may replace the older type lugs with lugs having the larger opening (ASRS 307140–A). The threads in the bomb body should be cleaned after the smaller lug is removed. Glycerine-litharge cement should be applied to the threads to hold the newer type lug in position.

The Mod 1 is designed for air-burst firing only. The Time Fuze AN-M146A1 is used to fire the Signal Mk 4 Mod 3 which is seated in the bore of the body section. A setscrew (AN-565-D-1032 H5) is threaded into the nose of the bomb to retain the fuze and signal. Smoke produced from the detonated signal is discharged rearward through the tube of the fin assembly.

> CAUTION: Tests have shown that the fuze will fragment the bomb body producing a maximum fragment weight of 254 grams and a maximum fragment velocity of 98 feet per second. Proper precautions should be taken to insure that any personnel who may be scoring drops of this bomb are beyond the maximum range of the burst.

In the Mod 1 a single suspension lug is threaded into the bomb body just forward of the center of gravity and cemented in place. Two 3/8-inch indexing holes are drilled into the body to assist in the proper positioning of the bomb in the Aero 8A Practice Bomb Container.

The Mod 2 is similar in appearance and functioning to the Mod 0 except that two 3/8-inch indexing holes are drilled into the body at the center of gravity to assist in the proper positioning of the bomb in the Aero 8A Practice Bomb Container.

Painting and Marking

Early issues of the bombs are painted with black enamel and identification data is stenciled in white letters on the body. The Mods 1 and 2 have a 1/4-inch white stripe painted around the body over the index holes. The purpose of the stripe is to assist ordnance men in properly positioning the bomb in the Aero 8A PB container.

Functioning

The firing-pin assembly fires the signal in the Mod 0 and the Mod 2. The time fuze fires the signal in the Mod 1. Smoke from the signal is discharged rearward through the central tube.

Assembly

> CAUTION: Signals, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

> CAUTION: Signals must not be swollen or deformed in any manner. The primer must be flush or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used.

To assemble the Mod 0 or Mod 2, proceed as follows:

1. Remove the bomb and the signal from their packings.
2. Remove the cotter pin and firing-pin assembly from the nose of the bomb.

> CAUTION: The firing-pin assembly should fit loosely in the bomb and not bind when dropped into position. Inspect firing-pin assembly for damage. Be sure firing-pin cup is not deformed and that the firing-pin point is below the lip of the cup. Check the bore through the center of the bomb; it must be clean, smooth, and not damaged in any way.

3. With the firing-pin assembly removed, place the bomb in a vertical position, nose end up.
4. Insert the signal into the bomb, primer end up, and let it slide gently into place; do not force it. The base flange of the signal

cartridge must rest on the bomb bore shoulder.

5. Insert the firing-pin assembly carefully with the firing-pin end toward the signal.

> CAUTION: The assembly must drop into place under its own weight. Do not apply pressure to force the firing-pin assembly into the bomb because the assembly may deform and fire the signal.

6. Rotate the firing-pin assembly so that the two U-shaped notches in the lip line up with the two pin holes in the bomb nose. Do not apply pressure to the firing pin during this operation.

7. Insert the cotter pin through the nose holes and the recesses in the firing-pin assembly.

8. Spread the ends of the cotter pin just enough to retain it in place.

> CAUTION: Do not bend the ends of the cotter pin at a right angle to the axis of the cotter pin, or strike the ends to bend the cotter pin into position.

To assemble the Mod 1 proceed as follows.

1. Remove the bomb assembly from its crate.

2. Verify that the setscrew is backed off sufficiently to permit entrance of fuze.

3. Place bomb in vertical position, nose end up.

4. Remove the signal from packing and insert the signal into the bomb, primer end up, and let it gently slide into place. Do not use force. The base flange of the signal must rest on the bomb bore shoulder (about 1.0 inch from the nose of the bomb).

5. Remove fuze from packing and inspect it to insure that the safety block and arming pin are in proper position, fuze threads are clean, and there is no evidence of corrosion or damage.

6. Hold the safety block in place and remove the striker stop. Examine for clearance between striker and safety block. Shake fuze to determine if safety block will fall out.

7. Replace striker stop.

> CAUTION: If the striker snaps down tightly against the safety block when the striker stop is withdrawn, or if the safety block falls out when the fuze is shaken, the fuze shall be disposed of by authorized personnel.

8. Loosen time-setting thumbscrew, and turn head until desired time is indicated by index mark on fuze body. Tighten thumbscrew to lock time setting.

9. Carefully screw the fuze into the nose of the bomb until seated, then back it off a portion of one turn until the arming pin is in line with the suspension lug.

10. Tighten the setscrew to lock fuze in place.

> CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

11. For bombs individually suspended from bomb racks by their suspension lugs, pass an arming wire AN–M6A2 or Mk 1 Mod 0 through the suspension lug, outer holes in the arming pin bracket, arming pin, outer eyelets of wire guide, and vane tab.

12. Install a Fahnestock clip on the arming wire flush against the vane tab. Cut off the excess arming wire two or three inches in front of the vane tab.

13. Remove striker stop, safety pin, and the seal wire. Check again for clearance between striker and the safety block as described in step 6. If the safety block should fall out, replace it, secure it with tape, remove the fuze from the bomb, and set it aside for destruction.

14. When used in Aero 8A Containers the

arming wire is secured to the forward section of the container and passed through the fuze from fore to aft in reverse of step 11. Fahnestock clip is placed flush against the after edge of the arming pin bracket.

15. When suspended from Mk 55 Bomb Racks, the arming wire should be led through the suspension lug to the tail arming solenoid to obtain a fair lead of the wire.

Disassembly

To disassemble a complete bomb, the above steps should be carried out in reverse order and the components restored to their original condition.

56-LB PRACTICE BOMB Mk 89 Mods 0 and 1

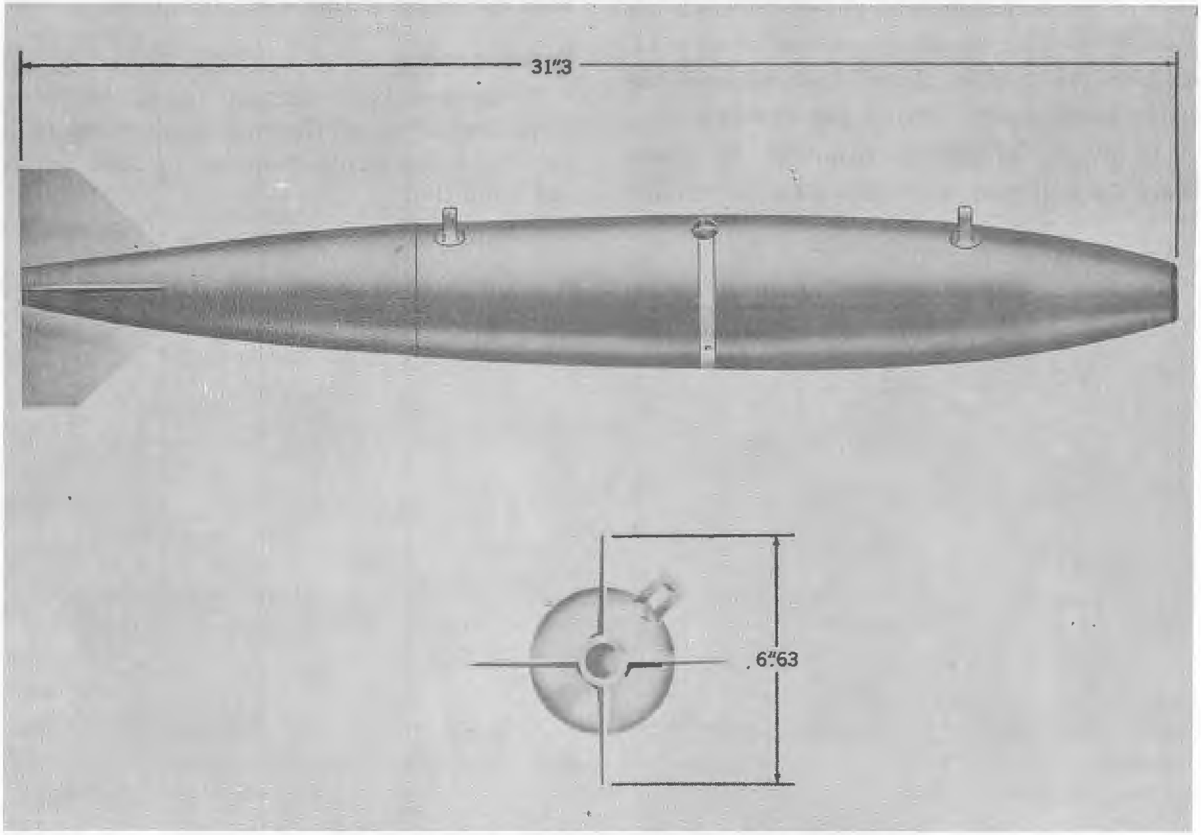

Figure 11–11.—56-lb Practice Bomb Mk 89 Mod 0, Exterior View.

Mark	89	89.
Mod	0	1.
General Arrangement	1525310	1367164.
List of Drawings	413702	290694.
Length of Bomb (in.)		
Assembled with Firing Pin	31.3	31.3.
Assembled with Fuze		32.9.
Body Diameter, maximum (in.)	4.0	4.0.
Fin Span (in.)	6.6	6.6.
Distance between Suspension Lugs, center-to-center (in.)	14.0	14.0.
Weight of Bomb (lb)		
Assembled with Firing Pin	56.6	56.6.
Assembled with Fuze AN–M146E3		57.3.
Assembled with Fuze XB–125A		57.0.
Practice Bomb Signal	Mk 4 Mod 3	Mk 4 Mod 3.
Firing Pin	Mk 1 Mod 0	Mk 1 Mod 0.
Fuze*		XB–125A.

* This fuze was designed specially for use with the Mk 89 Mod 1 bomb. However, as an interim measure the AN–M146E3 fuze may be used until the XB–125A fuze becomes available.

General Description

The 56-lb PB Mk 89 Mod 0 is a low-drag (sub-caliber) practice bomb, similar in shape to the low-drag series of general purpose bombs. The cast iron body is slender, with a long pointed nose. The conical type

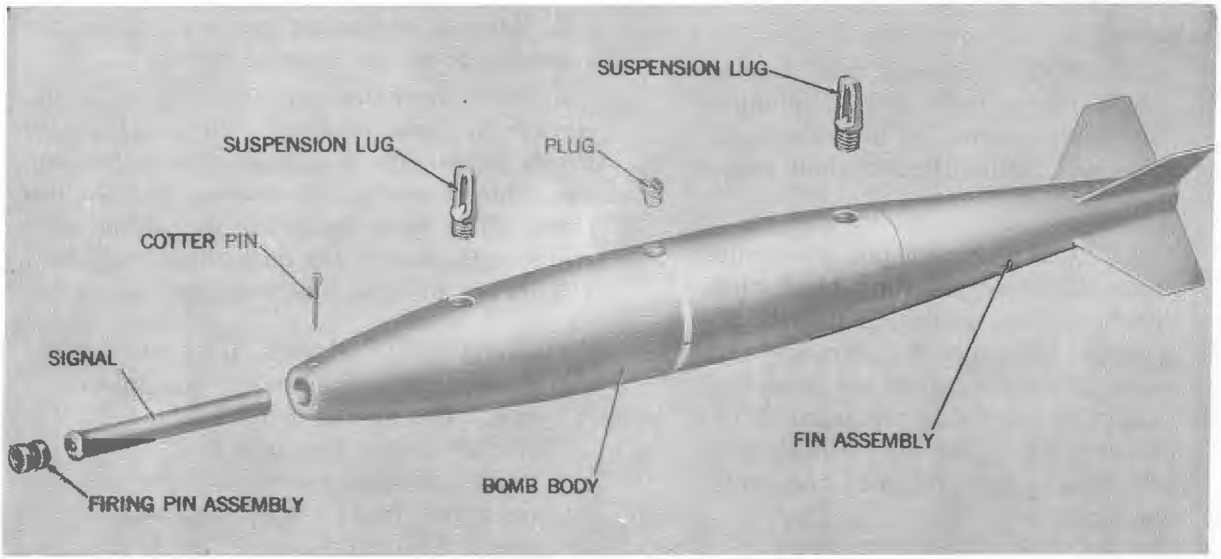

Figure 11–12.—56-lb Practice Bomb Mk 89 Mod 0, Exploded View.

fin assembly is of welded sheet metal or cast almag construction. The tail fins are canted 2 degrees to impart spin to the bomb for the purpose of obtaining repeated consistent trajectories.

Practice Bomb Signal Mk 4 Mod 3 is installed in the forward end of the bomb. The smoke produced by the detonated signal is discharged out the rear of the tail fin.

Practice Bomb Mk 89 Mod 0 is designed for impact firing. Firing Pin Mk 1 Mod 0 detonates the signal on land or water impact.

Practice Bomb Mk 89 Mod 1 is designed for impact or air-burst firing. The signal is detonated by a firing pin or a fuze. A removable nose-bushing provides this dual capability. For impact firing, the bomb is assembled with the bushing installed, secured by a setscrew. Firing Pin Mk 1 Mod 0 fits within the bushing and is held there by a cotter pin. For air-burst firing, the bomb is assembled without the bushing, cotter pin, firing pin. Instead, Fuze XB–125A is threaded into the nose of the bomb. The setscrew retains the fuze and signal.

Both mods of Practice Bomb Mk 89 have three threaded holes equally spaced over a 14-inch span on the bomb body. These holes receive suspension lugs or shipping plugs. In some applications, suspension lugs (Mk 10 Mod 0) are installed in the two outer holes; in other applications, a suspension lug is installed in the center hole only. Shipping plugs are installed in all three holes when the bomb is to be used in a dispenser.

In the Mod 0, two 3/8-inch holes are drilled into the body near the center of gravity; these holes assist in proper positioning of the bomb in the Aero 8A Practice Bomb Container. In the Mod 1, an additional set of two 3/8-inch holes are drilled 1.385 inches closer to the nose end. Two white arrows point to each of these four holes. The forward set of the holes are used to facilitate positioning of bomb in the forward compartment of the container when the bomb is assembled with a fuze.

Painting and Marking

Identifying nomenclature is stenciled in white marking ink on the side of the body. The exterior surface of the early issues of the bomb are coated with black enamel. In the Mod 0, a 1/4-inch white stripe is painted around the body over the indexing holes. In the Mod 1, two white arrows are painted at each of the indexing holes.

Functioning

The firing pin assembly or the fuze fires the signal. Smoke from the signal is discharged rearward through the central tube.

Assembly

CAUTION: Signals and bombs shall not be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

CAUTION: Firing pin assemblies must fit loosely and not bind when dropped into position. Inspect firing pin assembly for damage. Be sure firing-pin cup is not deformed and that the firing-pin point is below the lip of its cup. Check bore through center of bomb; bore must be clear.

To assemble the Mod 0 or 1 for impact firing, proceed as follows.

1. Remove the bomb assembly and the signal assembly from their packings. Each bomb is shipped from the manufacturer with the firing pin assembly installed and with a retaining cotter pin through the nose end.

2. Remove the cotter pin and firing pin assembly from the nose of bomb.

3. With the firing pin assembly removed, elevate the nose of bomb. Insert Practice Bomb Signal Mk 4 Mod 3, primer end up, and slide it gently into place. Do not use force. The base flange of the signal cartridge must rest on the bore shoulder (about $1\frac{1}{4}$ inches in from the nose of the bomb).

CAUTION: Signals must not be swollen or deformed in any manner. The primer must be flush or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used.

4. Carefully insert firing pin assembly with firing pin end toward the signal.

CAUTION: Firing pin assembly must slide into place under its own weight. Do not apply pressure to force the firing pin assembly into

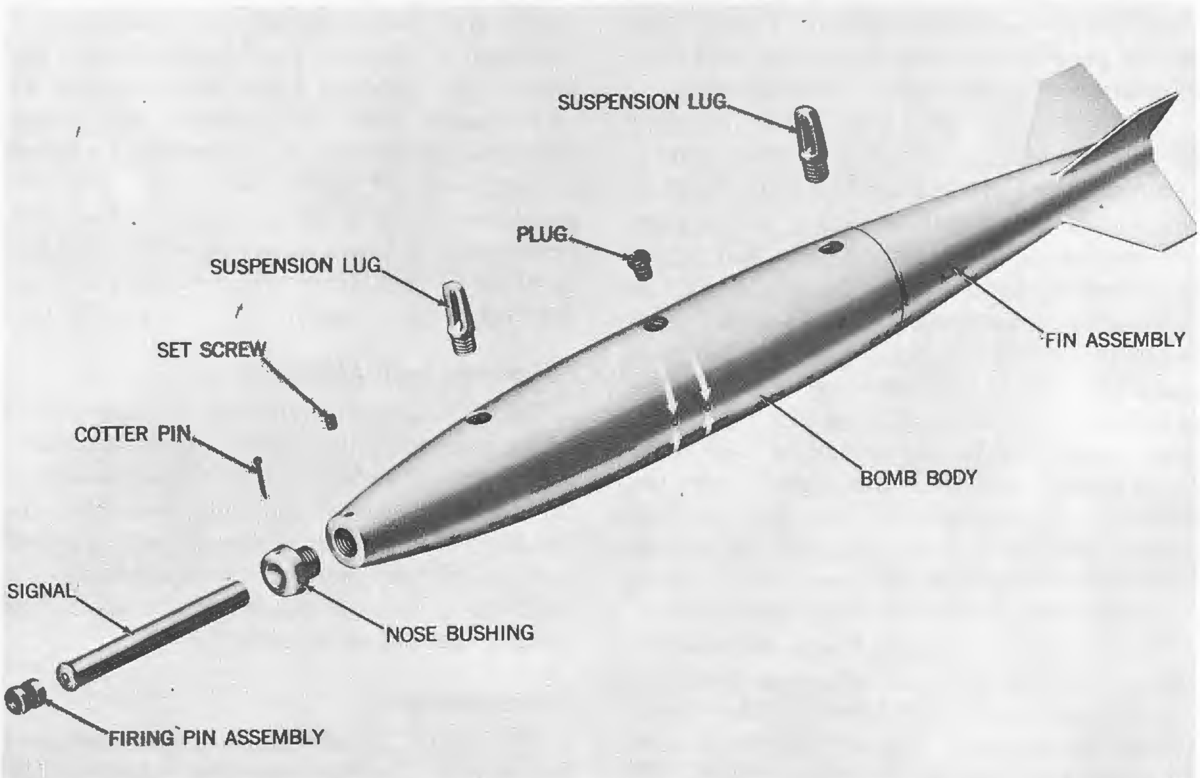

Figure 11–13.—56-lb Practice Bomb Mk 89 Mod 1, Exploded View.

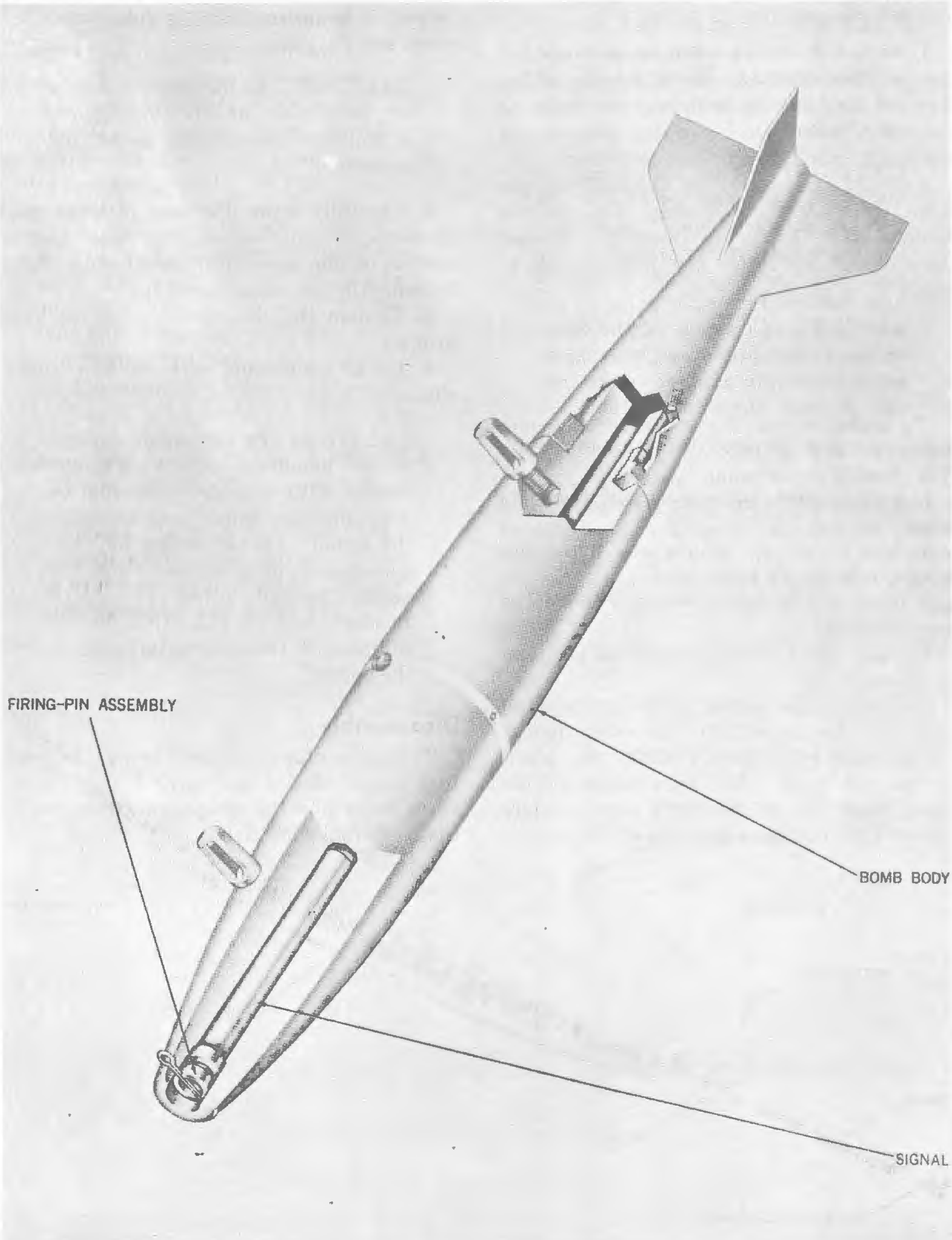

Figure 11–14.—56-lb Practice Bomb Mk 89 Mod 0, Cutaway View.

the bomb because the assembly may deform and fire the signal.

5. Rotate the firing pin assembly so that the two U-shaped notches in the lip of the forward cup line up with the pin holes in the bomb nose. Do not apply pressure to the firing pin during this operation.

6. Insert the cotter pin through the pin holes in the nose, passing through the notches in the firing pin assembly. Spread the ends of the cotter pin just enough to retain it in place.

> CAUTION: Do not bend the ends of the cotter pin at right angles to the cotter pin axis, or strike the ends to bend them in position.

To assemble the Mod 1 for air-burst firing, proceed as follows.

1. Remove the bomb assembly from its crate.

2. Remove the cotter pin and firing pin assembly from the bomb nose.

3. Back off the setscrew and remove the nose bushing.

4. Place the bomb in a vertical position, nose end up.

5. Remove the signal from its packing and insert the signal into the bomb, primer end-up, and let it gently slide into place. Do not use force. The base flange of the signal must rest on the bomb bore shoulder (about 1.25 inch from the nose of the bomb).

6. Remove the fuze from its packing and inspect it to insure that the fuze safety devices are in place.

> CAUTION: If the fuze is armed or otherwise unsafe to handle, it shall be disposed of by authorized personnel.

7. Carefully screw the fuze into the nose of the bomb until seated, then back it off a portion of one turn until the arming pin is in line with the suspension lug.

8. Tighten the setscrew to lock the fuze in place.

9. Install the arming wire and Fahnestock clip.

> CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

Disassembly

To disassemble a complete bomb, the steps just listed should be carried out in reverse order and the components restored to their original condition.

100-LB PRACTICE BOMB Mk 15 Mods 2, 3, and 4

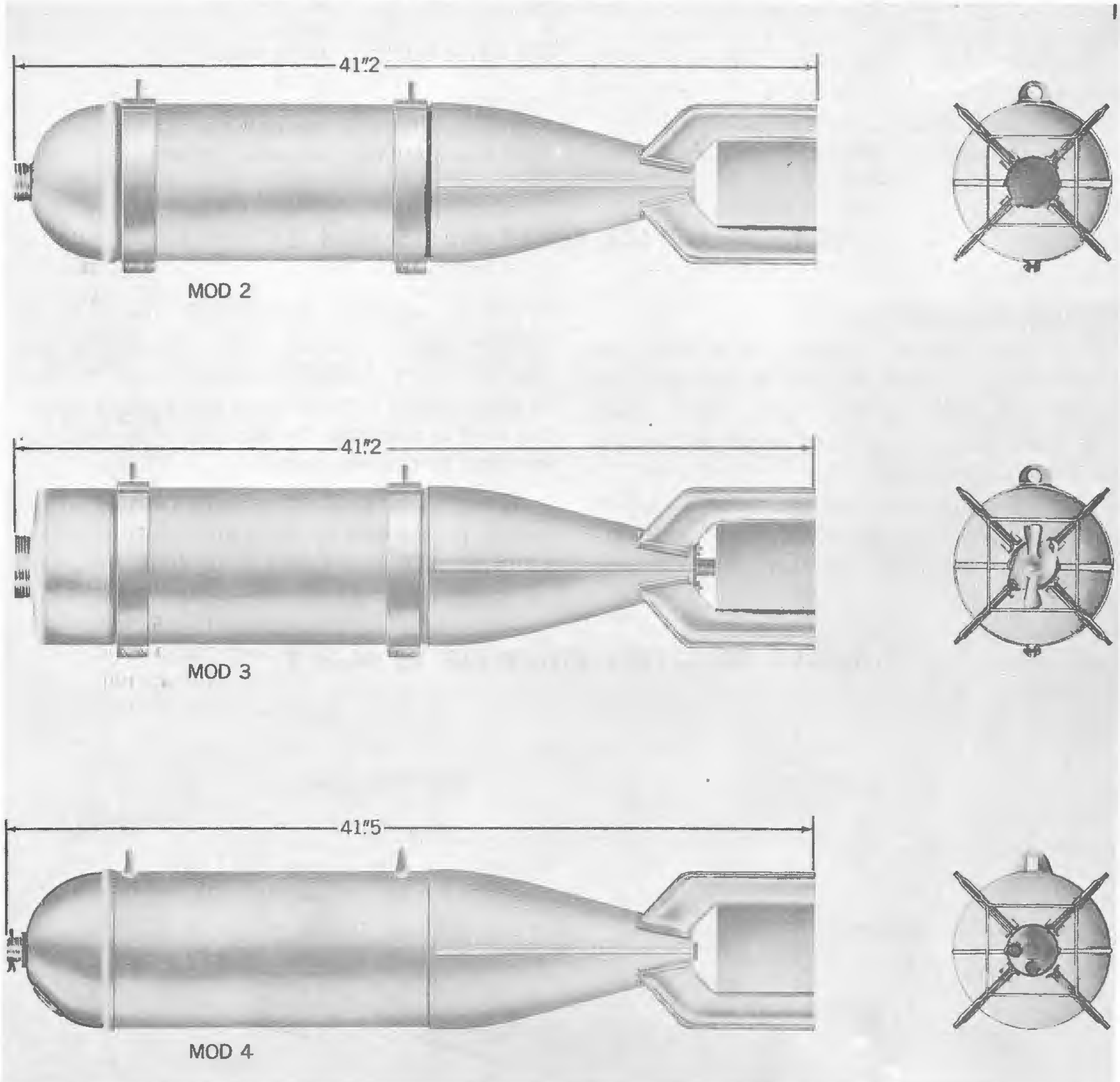

Figure 11–15.—100-lb Practice Bomb Mk 15 Mods.

Mark	15	15	15.
Mod	2	3	4.
General Arrangement	204276	439738	516342.
List of Drawings	Sk 58152	Sk 109536	261462.
Length of Assembled Bomb (in.)	41.2	41.2	41.5.
Diamter (in.)	8.0	8.0	8.0.
Fin Span (in.)	11.24	11.24	11.24.
Weight of Assembled Bomb (lb):			
Loaded with Wet Sand	100	100	97.0.
Loaded with Water	56	67	60.

Wet Sand Filler (lb)	76	77.4	76.0.
Water Filler (lb)	39	40	39.
Water Filler (gal)	4.6	4.7	4.6.
Signal	None	Mk 7 Mod 0	Mk 4 Mods 0, 1, 2, 3, 4.
Fuze	None	Mk 247 Mod 0	None.
Firing-Pin Assembly	None	None	Mk 1 Mod 0.
Arming-Wire Assembly	Mk 1 or AN-M6A2	Mk 1 or AN-M6A2	No Arming Wire.

100-LB PRACTICE BOMB Mk 15 Mod 2

General Description

The 100-lb PB Mk 15 Mod 2 is identical to the Mod 3 except that it is not adapted for the use of a fuze and signal. It is filled with water or a mixture of sand and water for spotting purposes.

For training purposes, a small washer may be soldered to the nose of the bomb to simulate a fuze. The end of an arming wire which is normally inserted in the fuze of service-type bombs is then secured to the washer. For ARMED releases, the washer is torn free of the bomb by the arming wire; for SAFE releases, the arming wire remains secured to the washer.

When used against armored-deck target boats, it is filled with water and released from an altitude of less than 7000 feet.

100-LB PRACTICE BOMB Mk 15 Mod 3

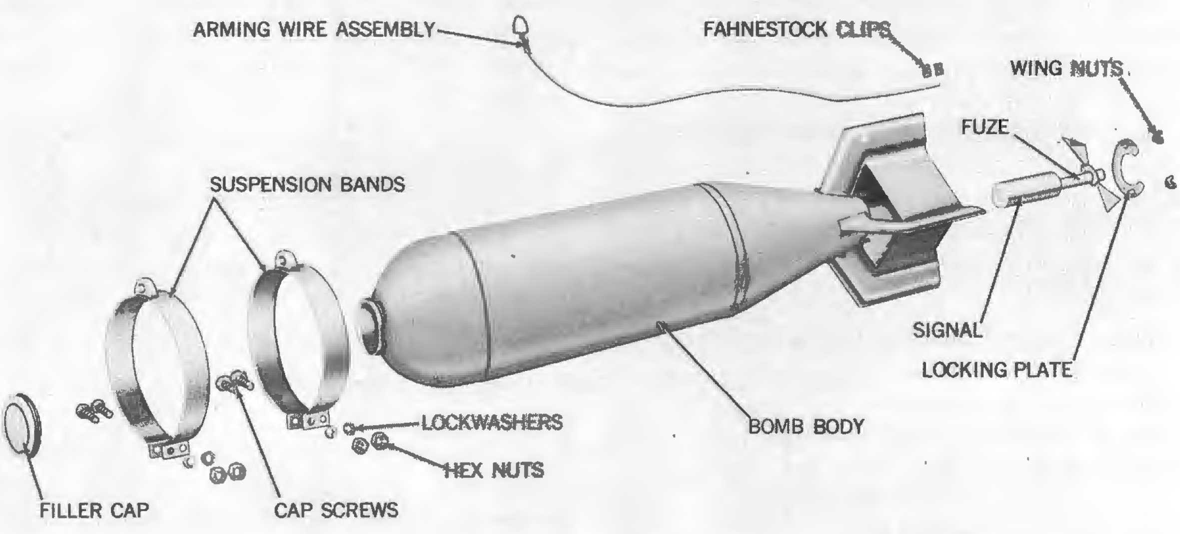

Figure 11–16.—100-lb Practice Bomb Mk 15 Mod 3, Exploded View.

General Description

The 100-lb PB Mk 15 Mod 3 has a light-cased, cylindrical body with a threaded filling hole in its rounded nose. A box-type fin assembly, consisting of four metal vanes attached to a cone, is welded to the after end of the body. A flat nose attachment that prevents ricochet of the bomb at en-

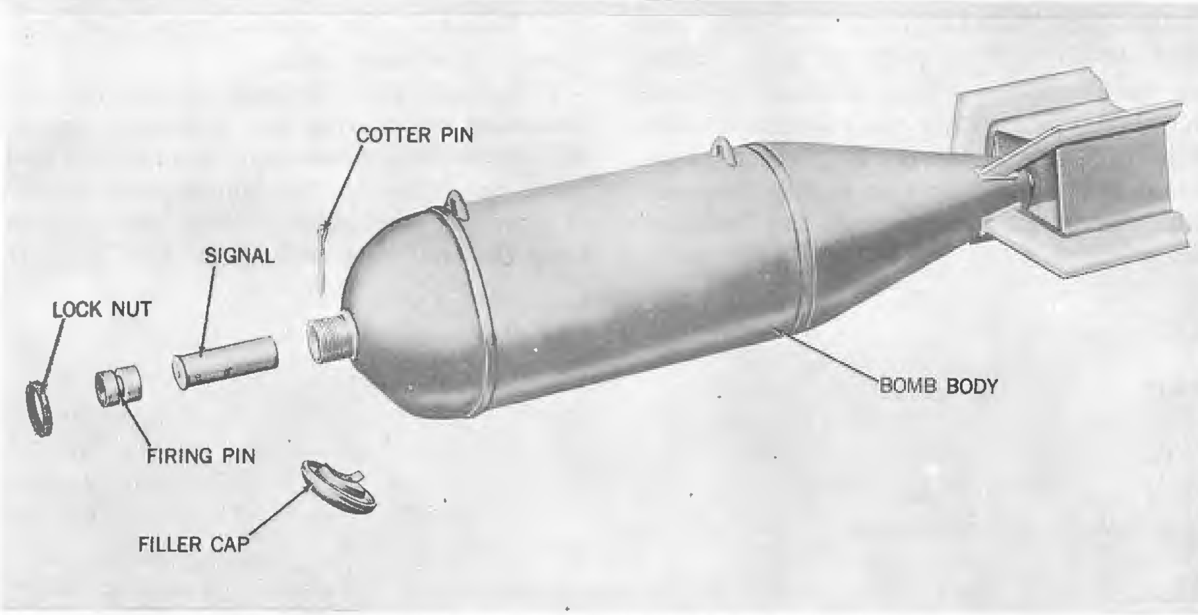

Figure 11–17.—100-lb Practice Bomb Mk 15 Mod 4, Exploded View.

trance angles as low as 90 degress is used during antisubmarine practice. The attachment is secured in place by a cap which threads onto the filling hole.

The bomb has two metal suspension band assemblies, each consisting of a circular clamp, a suspension lug, and two cap screws for tightening the band to the bomb. The band may be adjusted for double suspension of the bomb by orienting to suit the rack or shackle to which the bomb is to be attached. For single suspension, one band is installed at the approximate center of gravity of the bomb.

The bomb is filled either with water or with a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the bomb case caused by freezing of the filler.

Painting and Marking

The bomb is painted black; identification data is stenciled on the body in white letters.

Use

It is used with Practice Bomb Signal Mk 7 Mod 0 and inert Fuze Mk 247 Mod 0, which are secured to the after end of the bomb.

Functioning

Upon impact of the bomb, the firing pin in the fuze detonates a blank .38 caliber cartridge in the signal which, in turn, explodes the signal. The explosion of the signal produces a flash and a large puff of smoke, permitting observation of bombing accuracy.

Assembly

> CAUTION: Signals, fuzes, and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from its crate.
2. Inspect for damaged seams, cracked weldments, and deformed areas which might cause leaks, weaken the suspension bands, or prevent serviceable use.
3. Stand the bomb vertically with its nose up and remove the filler cap and gasket. Replace the gasket if damaged.
4. Fill the bomb with the required amount of water or wet sand. When necessary, add antifreeze to the filler. In order to fill the bomb with a maximum quantity of wet sand

mixture, approximately one quarter of the bomb should be filled with dry sand. Saturate the sand with water, followed by more sand and more water in successive steps until the bomb is filled. If possible, check the weight of the bomb on a scale to ascertain when the correct weight has been obtained.

5. Reinstall the gasket and filler cap, threading on hand tight.

6. Adjust for 14-inch suspension by loosening and moving the suspension bands. For single suspension, take off one band and move the other to the approximate center of gravity of the bomb. Aline the bands so that the tail fins will clear the aircraft

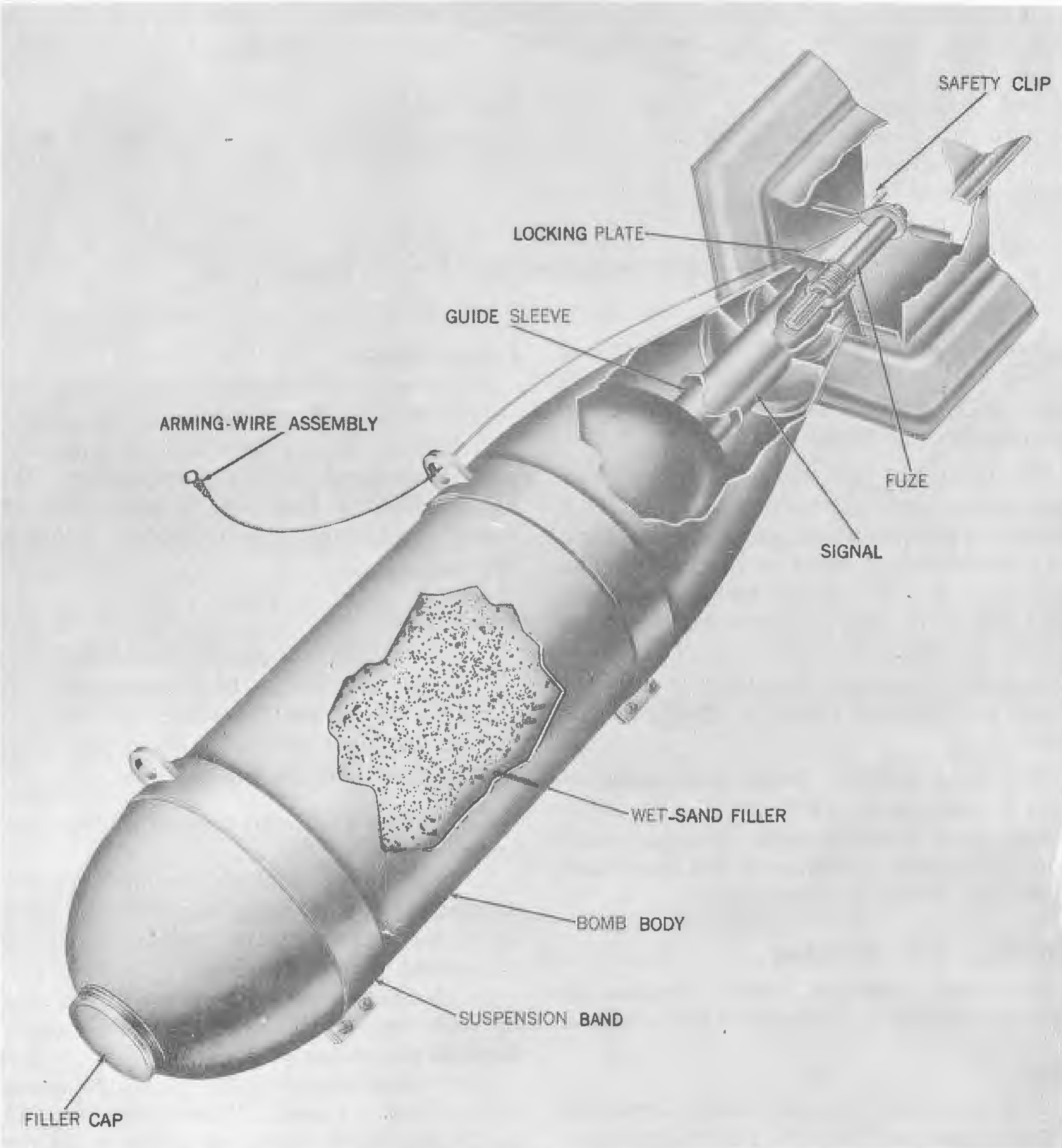

Figure 11–18.—100-lb Practice Bomb Mk 15 Mod 3, Cutaway View.

structure and ground when the bomb is installed. Secure the bands in place by tightening the band securing screws.

7. Remove the wing nuts, lockwashers, and locking plate from the two studs in the after end of the bomb.

8. Open the box containing Signal Mk 7, Fuze Mk 247, the fuze arming-vane assembly, the cotter pin, and the blank .38 caliber cartridge which is sealed in an envelope in each carton. If the containers are punctured, split, or badly damaged, or if the seals are broken, the fuze and signal assembly is to be considered unserviceable. This does not apply to fuze and signal assemblies repacked in the field and sealed with adhesive tape for temporary protection. Such assemblies must be examined carefully for serviceability.

9. Place the arming-vane assembly on the arming screw of the fuze and adjust it so that the holes in the vane hub aline with those in the arming screw. Insert the cotter pin through the holes and secure it by spreading its two ends.

10. Loosen the locknuts on the fuze and unscrew the fuze from the signal. Insert the blank .38 caliber cartridge into the chamber of the signal, primer end facing aft. Thread the fuze into the signal and secure it by tightening the locknuts.

11. Insert the fuzed signal into the opening in the after end of the bomb, seating it firmly in the guide sleeve attached to the bomb body. Adjust the fuze for correct position to permit a straight pull of the arming wire.

12. Place the locking plate of the bomb around the fuze and over the signal, securing it handtight with the wing nuts and lockwashers.

13. Thread the arming wire through the rear suspension lug of the bomb, then through the arming-wire guide and vane assembly of the fuze. The arming wire must be free of kinks and burrs, and should extend 2 to 3 inches beyond the flange of the fuze.

14. For external suspension of the bomb, place one safety (Fahnestock) clip on the free end of the arming wire, adjacent to the arming vane of the fuze. If the bomb is to be installed in a bomb bay, do not install a safety clip on the arming wire.

15. Install the bomb in accordance with the type of rack or shackle in use, and lock it securely in place.

> CAUTION: Do not remove the safety cotter pin from the body of fuze before the bomb is secured in the aircraft and the arming wire is completely installed.

Disassembly

To disassemble the complete bomb, the steps should be carried out in reverse order and the components restored to their original condition.

100-LB PRACTICE BOMB Mk 15 Mod 4

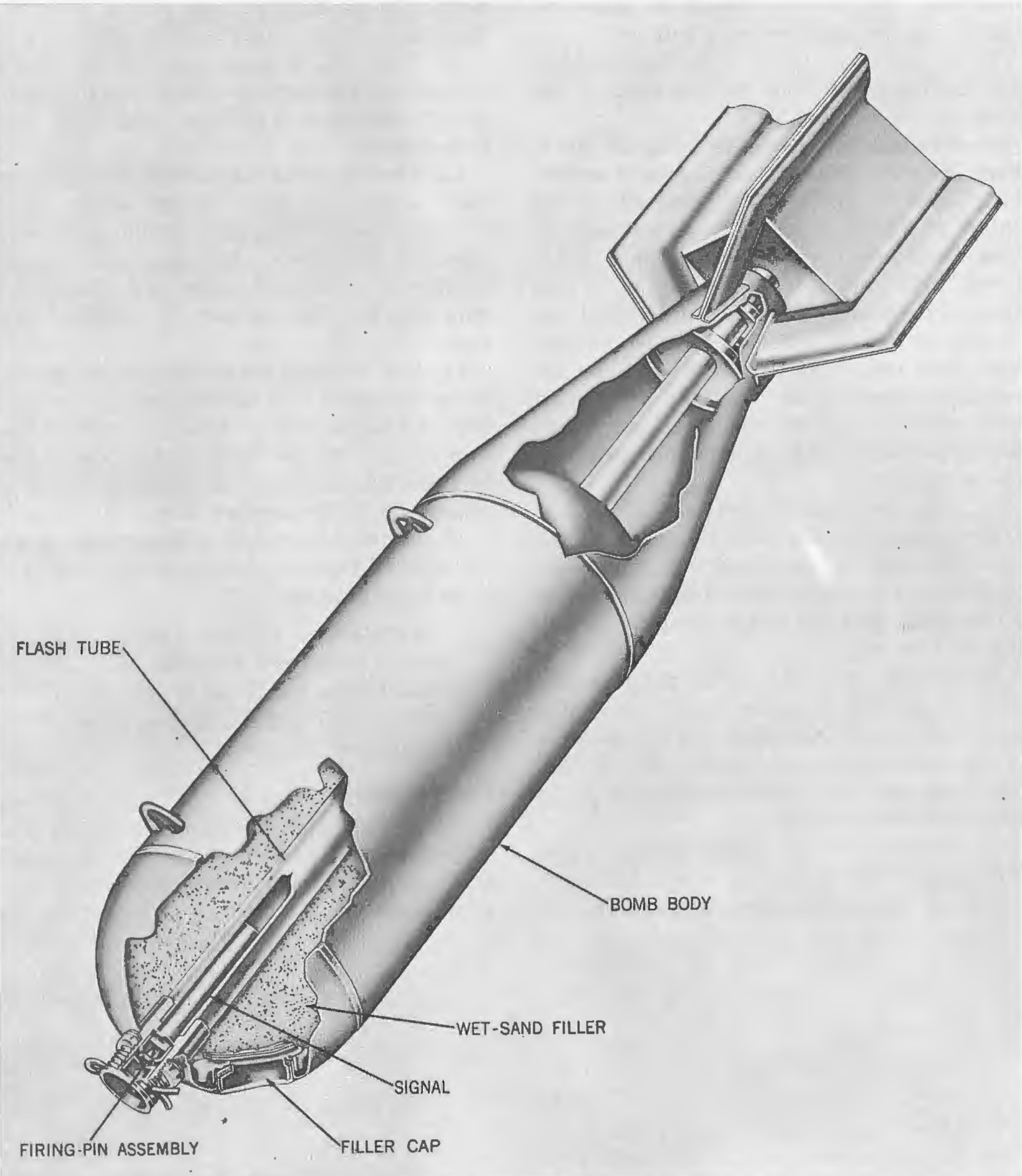

Figure 11–19.—100-lb Practice Bomb Mk 15 Mod 4, Cutaway View.

General Description

The 100-lb PB Mk 15 Mod 4 is a light-cased, cylindrical bomb with a round nose and an integral box-type fin and cone. A flash tube, extending throughout its transverse axis, houses a pyrotechnic signal and firing-pin assembly. Two suspension lugs are welded to the bomb body 14 inches apart. A filling hole is located off-center on the bomb nose and is sealed by a filler cap similar to those used on automobile gas tanks.

The firing-pin assembly consists of two shallow metal cups, separated by a spacer which houses the firing pin. A cotter pin through the nose end of the flash tube and two recesses in the lip of the forward cup locks the firing-pin assembly and signal in place.

The bomb is filled either with water or with a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the bomb case caused by freezing of the filler.

Painting and Marking

The Mk 15 Mod 4 bomb is painted black; identification data is stenciled on the cylindrical section of the bomb in white letters.

Use

It is used with Signal Mk 4.

Functioning

The signal is detonated by action of the firing pin upon impact of the bomb. The explosion of the signal produces a flash and a large puff of smoke, permitting observation of bombing accuracy.

Assembly

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used return them to their original packings.

1. Remove the bomb and the signal from their respective packings.
2. Inspect the bomb for damaged seams, cracked weldments, and deformed areas which might cause leaks in the bomb body or weaken the suspension lugs, or their attachment to the bomb case.
3. Stand the bomb vertically with its nose up. Remove the filler cap and gasket and replace the gasket if damaged.
4. Fill the bomb with the required amount of water or wet sand exactly as for the Mod 3.
5. Replace the filler cap and gasket; be sure the gasket is properly installed. Twist the filler cap on with a spanner wrench until it is locked securely in place.
6. Remove the cotter pin and firing-pin assembly from the nose end of the flash tube.
7. Inspect the firing-pin assembly for damage. The firing-pin cups must not be deformed, and the point of the firing pin must be below the lip of its cup.
8. Inspect the bore of the flash tube through the center of the bomb. The bore must be clean, smooth, free of obstructions, and undamaged.
9. Inspect the signal to see that it is not swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Deformed signals must not be used.
10. Insert the signal, primer end up, into the bomb and let it slide gently into place; do not force it. The base flange of the signal cartridge must rest on the shoulder of the flash tube, approximately 1⅛ inches from the nose of the tube.
11. Carefully insert the firing-pin assembly into the flash tube, with the point of the firing pin facing toward the signal. The firing-pin assembly must drop into place under its own weight.

CAUTION: Do not apply pressure to force the firing-pin assembly into the bomb as the assembly may collapse and fire the signal.

12. Rotate the firing-pin assembly so that the two recesses in the lip of the forward cup are alined with the two pin holes in the nose of the flash tube.

CAUTION: Do not exert any downward pressure on the firing-pin assembly during this operation.

13. Insert the cotter pin through the holes in the nose of the flash tube and the two recesses in the cup of the firing-pin assembly.
14. Spread the ends of the cotter pin suffi-

ciently to lock the pin in the bomb. Do not bend the ends at right angles to the axis of the cotter pin or strike the ends to bend them into position.

CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

Disassembly

To disassemble the complete bomb, these steps should be carried out in reverse order and the components restored to their original condition.

250-LB PRACTICE BOMB Mk 86 Mod 0 and 1

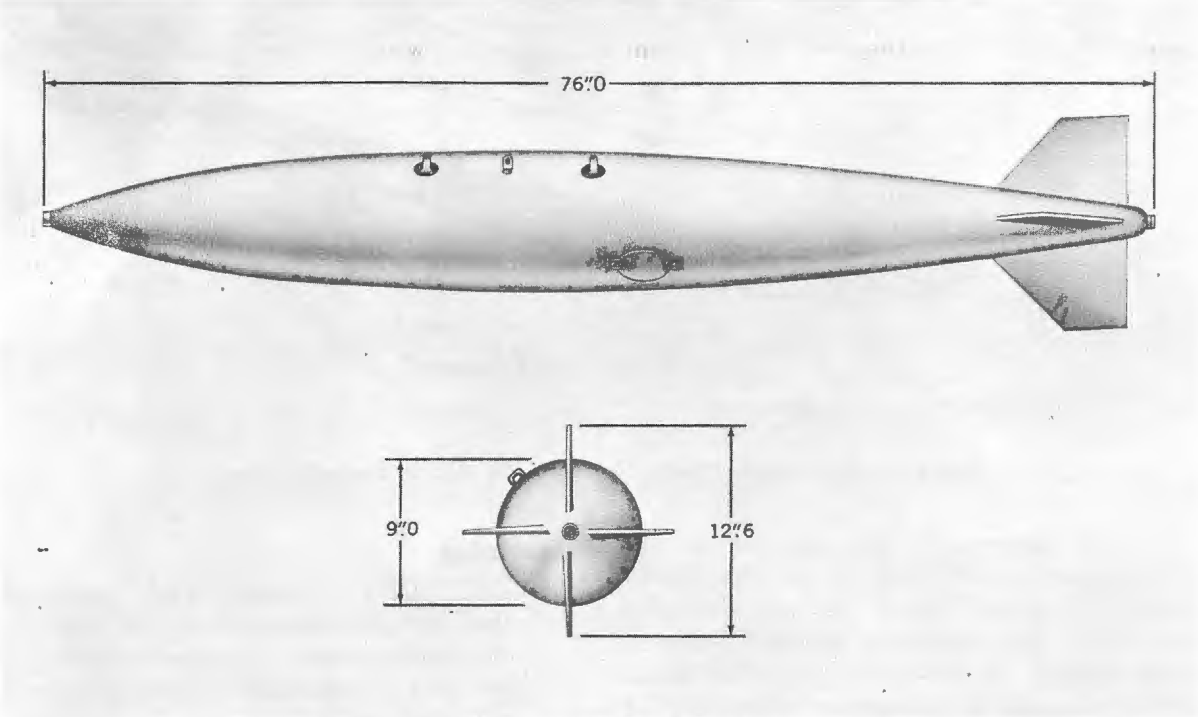

Figure 11–20.—250-lb Practice Bomb Mk 86 Mod 0, Exterior View.

Mark	86	86.
Mod	0	1.
General Arrangement	1583317	2116448.
List of Drawings	165797	418759.
Length of Assembled Bomb (in.)	76.0	76.0.
Body Diameter, maximum (in.)	9.0	9.0.
Fin Span (in.)	12.6	12.6.
Distance between Suspension Lugs center-to-center (in.)	14.0	14.0.
Weight of Assembled Bomb (lb):		
Empty Assembled Bomb	65.4	65.4.
Loaded with Wet Sand	217	216.5.
Loaded with Water	141	141.
Practice Bomb Signal	Mk 4 Mod 3	Mk 4 Mod 3.
Firing Pin	Mk 1 Mod 0	Mk 1 Mod 0.

General Description

The 250-lb PB Mk 86 Mod 0 is a low-drag bomb of the same size and shape as the Mk 81 low-drag general purpose bombs. It has a streamlined nose and a conically tapered aft end. One filler hole is located on the side, aft of the cylindrical section. Four fin blades perpendicular to each other are located forward of the rear end of the bomb.

The 250-lb PB Mk 86 Mod 0 is of thin-case construction with internal reinforcement for the sway brace and ejection areas. To provide rigidity, bulkheads and channel reinforcements are used on the inside of the bomb shell.

Practice Bomb Signal Mk 4 Mod 3 is used with 250-lb PB Mk 86 Mod 0. A blast tube extends from the nose to the aft end of the bomb and allows for exit of the signal smoke when fired. The firing pin assembly and signal are held in place inside the blast tube by a retaining cotter pin.

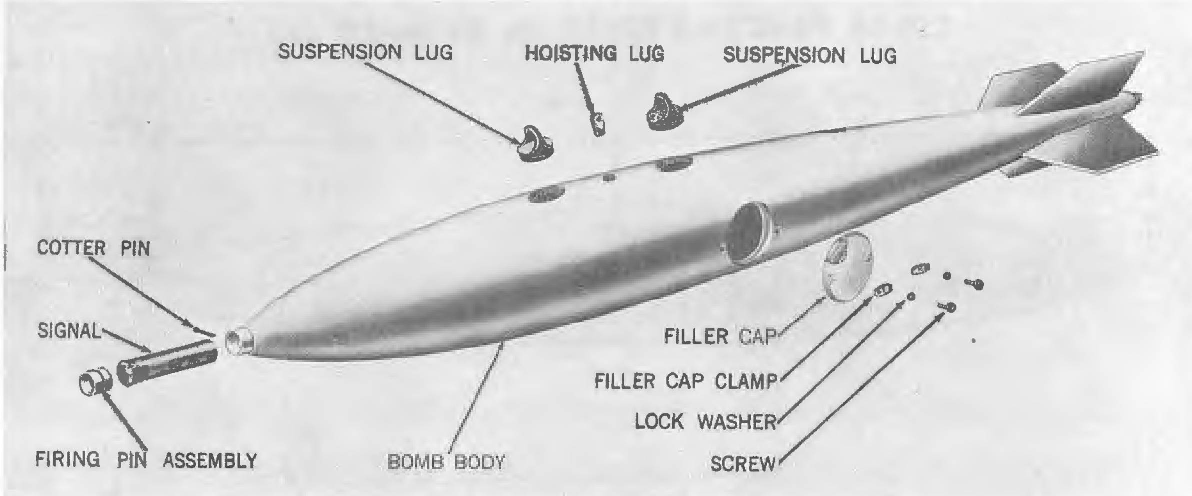

Figure 11-21.—250-lb Practice Bomb Mk 86 Mod 0, Exploded View.

Double suspension lugs are spaced 14 inches apart on the body of the PB Mk 86 Mod 0. The lugs are of the screw-in type used with the low-drag general purpose bomb family. A screw-in type of hoisting lug is provided at the center of gravity of the bomb.

This bomb is filled with water or wet sand. Antifreeze is added to the filler during freezing conditions.

The Practice Bomb Mk 86 Mod 1 is similar to the Mk 86 Mod 0. The major differences between the two mods are that the Mod 1 uses an integrally welded suspension lug and a slightly different internal design. The assembly and disassembly procedures for both mods are identical. There is only a small quantity of the PB Mk 86 Mod 1 in supply.

Painting and Marking

On bombs of recent issue, the identification data is stenciled in white letters on the orange body. On bombs of older issue, the identification data is stenciled in white letters on the black body.

Functioning

When the bomb strikes its target, the firing pin is forced into the signal primer. The smoke produced from the detonated signal is discharged out of the end of the bomb through the blast tube.

Assembly

CAUTION: Signals and bomb shall not be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove bomb assembly from crate.

CAUTION: Inspect for damage, such as cracked weldments, which might cause leaks in the bomb casing or damage to suspension lugs.

2. Remove safety wire from suspension lugs and hoisting lug.

3. Remove the filler cap from the filler hole by backing off the screws holding the two clamps in place until the clamps can be turned aside. Do not completely remove these screws in order to prevent possible loss of the screws or lockwashers. Inspect the gasket. Damaged gaskets should be replaced.

4. Fill with required amount of water or wet sand at loading base; during freezing conditions add antifreeze. Filling the bomb with wet sand can be facilitated by hoisting the tail so the filler will flow toward the nose.

5. Replace filler cap making sure the gasket and gasket seat are free of loose grains of sand. Turn the filler cap clamps

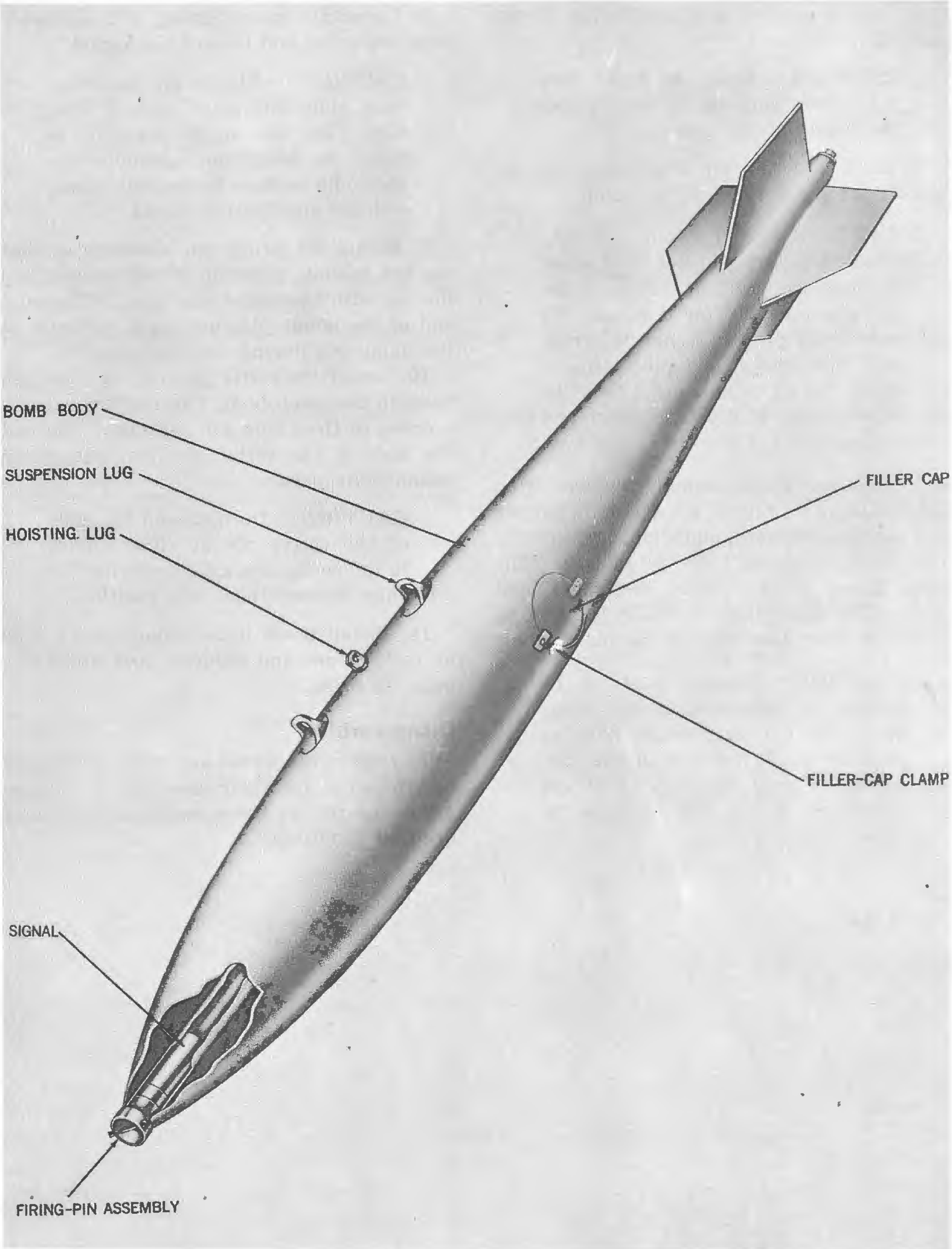

Figure 11–22.—250-lb Practice Bomb Mk 86 Mod 0, Cutaway View.

into locking position and tighten the screws securely.

CAUTION: Check to make sure the lockwashers are in place under the heads of the screws.

6. Remove cotter pin and firing pin assembly from the nose of the bomb.

CAUTION: Firing pin assembly must fit loosely and not bind when sliding into position. Inspect firing pin assembly for damage. Be sure firing pin cup is not deformed and that the firing pin point is below the lip of its cup. Check the blast tube. It must be clean and not damaged or blocked in any way.

7. With firing pin assembly removed from the bomb, insert Signal Mk 4 Mod 3, primer end pointing forward, and slide signal gently into place. Do not force into place. The base flange of the signal cartridge must rest on the blast tube shoulder (about 1⅛ inches in from the front of the blast tube).

CAUTION: Signals must not be swollen or deformed in any manner. The primer must be flush or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used.

8. Carefully insert firing pin assembly with firing pin end toward the signal.

CAUTION: Firing pin assembly must slide into place without friction. Do not apply pressure to force the firing pin assembly into the bomb because the assembly may collapse and fire the signal.

9. Rotate the firing pin assembly so that the two notches in the lip of the forward cup line up with the cotter pin holes in the nose end of the bomb. Do not apply pressure to the firing pin during this operation.

10. Insert the cotter pin through the pin holes in the bomb body, passing through the notches in the firing pin assembly. Spread the ends of the cotter pin just enough to retain it in place.

CAUTION: Do not bend the ends of the cotter pin at right angles to the cotter pin axis, or strike the ends to bend them into position.

11. Install bomb in accordance with type of rack in use and securely lock and sway brace in place.

Disassembly

To remove the signal and firing pin, carry out the steps for their assembly in reverse order and restore these components to their original condition.

500-LB PRACTICE BOMB Mk 65 Mod 0

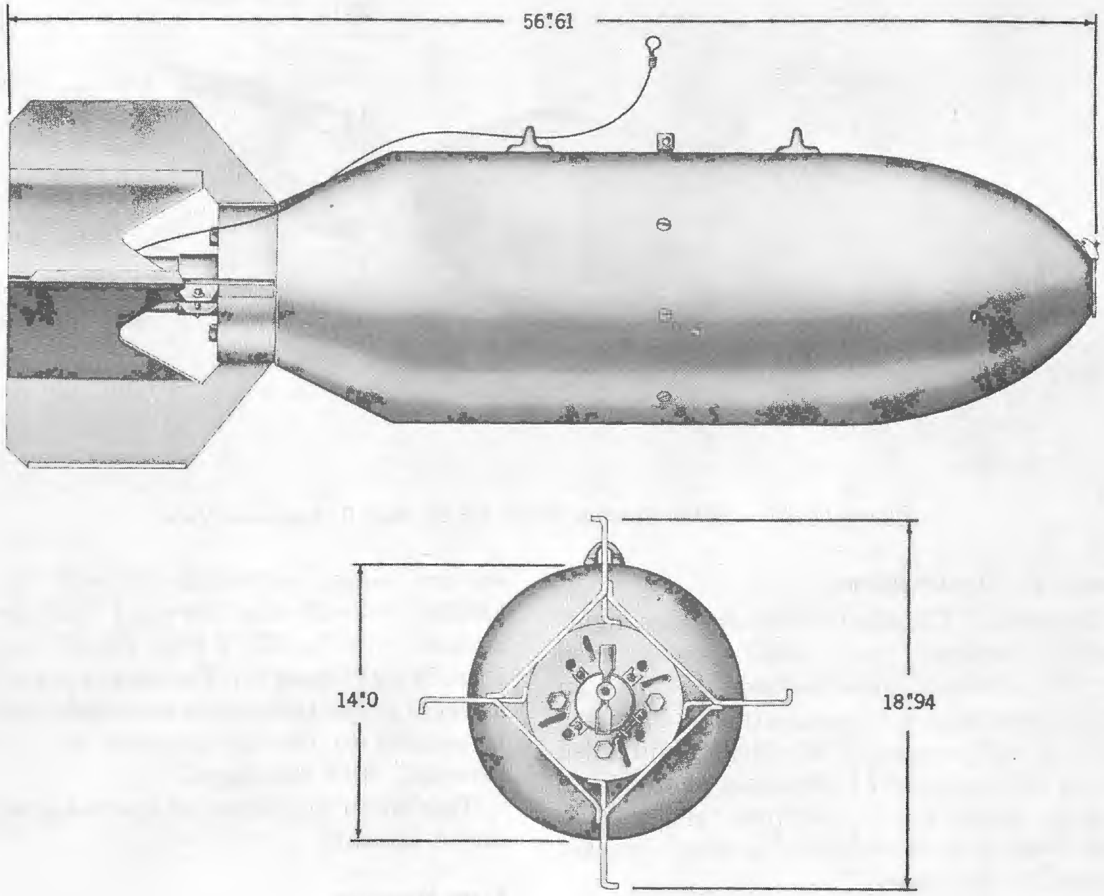

Figure 11–23.—500-lb Practice Bomb Mk 65 Mod 0, Exterior View.

Mark	65
Mod	0
General Arrangement	439700
List of Drawings	Sk 109523
Fin Assembly Drawing No.	438267
Length of Assembled Bomb (in.)	56.61
Diameter (in.)	14.0
Fin Span (in.)	18.94
Weight of Assembled Bomb (lb)	
Loaded with Wet Sand	443.2
Loaded with Water	248.8
Wet Sand Filler (lb)	395.0
Water Filler (lb)	200.6
Water Filler (gal)	20.0
Signal	Mk 6 Mod 0
Fuze	Mk 247 Mod 0
Arming-Wire Assembly	Mk 1 or AN–M6A2

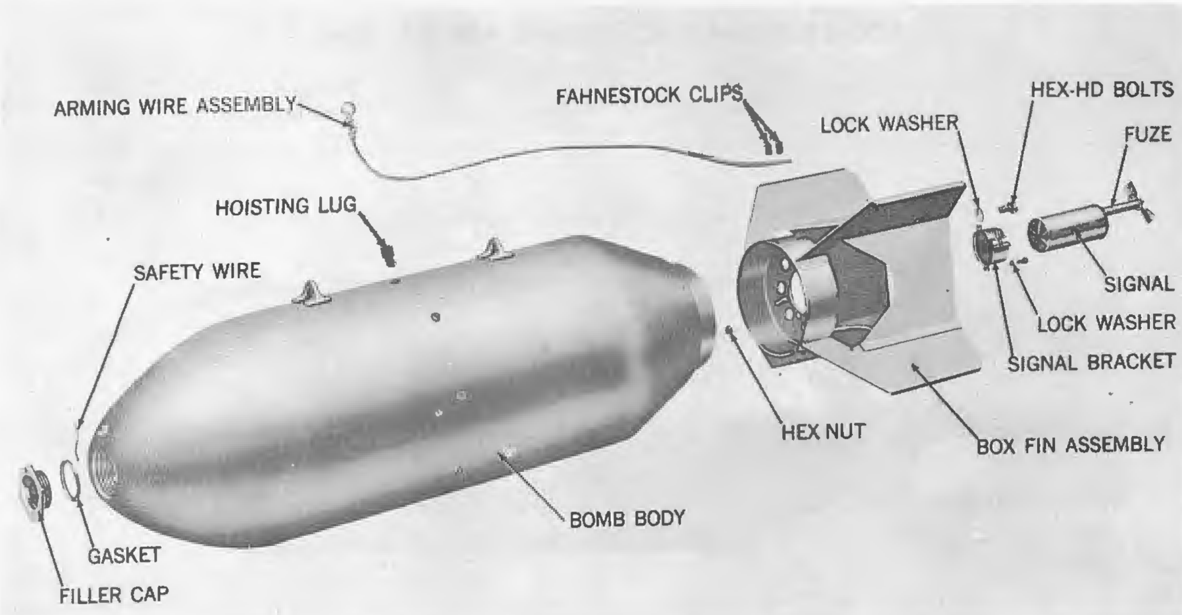

Figure 11–24.—500-lb Practice Bomb Mk 65 Mod 0, Exploded View.

General Description

The 500-lb PB Mk 65 Mod 0 has a light-cased, cylindrical body and is constructed of welded sheet steel sections. It has an ogival nose and a tapered aft end to which a box-type fin assembly is bolted. A threaded filling hole is located in the nose of the bomb and is sealed by a nose plug and gasket. The nose plug is wired to a small bracket welded to the nose.

Two suspension lugs 14 inches apart are welded to the bomb body and seven threaded recesses are located on the periphery of the bomb at the approximate center of gravity. One or two hoisting lugs, screwed into these recesses, permit hoisting of the bomb by either one or two cables.

The bomb is filled either with water or with a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the bomb case caused by freezing of the filler.

Painting and Marking

The bomb is painted black; identification data is stenciled on the cylindrical section of the bomb in white letters.

Use

This bomb is authorized for all types of service usage, including catapult and jet-assisted takeoffs and arrested landings. It is used with the Mk 6 type signal and inert Fuze Mk 247 Mod 0. The signal is seated in a recess in the tail-end of the bomb body and is secured to the fin assembly by a clamp provided with the signal.

This bomb should not be carried externally on jet aircraft.

Functioning

Upon impact of the bomb, the fuze firing pin initiates a blank .38-caliber cartridge which, in turn, explodes the signal to produce a flash and a large puff of gray smoke.

"Old" Series Practice Bombs

No fuzes were used in the "old" series practice bombs, and they contained no spotting charge, being filled either with water or with wet sand.

Assembly

CAUTION: Signals and fuzes are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb body from storage

"Old" Series Practice Bombs—Data

Bomb	Length	Diameter	Color	Total Weight	
				Water-Filled	Wet-Sand Filled
500-lb Mk 5	67".3	16".0	Black	360.0 lbs.	500.0 lbs.
500-lb Mk 11	61".8	15".0	Black	268.0 lbs.	448.0 lbs.
500-lb Mk 21	61".8	15".0	Black	273.0 lbs.	489.0 lbs.

and the fin assembly with its attachment from the shipping crate. Inspect each for damaged seams, cracked weldments, or deformed areas which might cause leaks, weaken the suspension lugs, or prevent serviceable use.

2. Remove the shipping wire and nose plug.

3. Inspect the gasket and replace it if damaged.

4. Fill the bomb with the required amount of wet sand or water. When necessary, add a sufficient quantity of antifreeze to the filler.

5. In order to fill the bomb with a maximum quantity of wet sand mixture, fill approximately one quarter of it with dry sand. Saturate the sand with water, followed by more sand and more water in successive steps until the bomb is filled. If possible, check the bomb on a suitable scale to ascertain when the correct weight has been obtained.

6. Replace the gasket and nose plug, threading in hand tight.

7. Open the box containing the signal, the fuze, the fuze arming-vane assembly, the cotter pin, and the blank .38 caliber cartridge which is sealed in an envelope in each carton. If the containers are punctured, split, or badly damaged, or if the seals are broken, the fuze and signal assembly is considered unserviceable. This does not apply to assemblies repacked in the field and sealed with adhesive tape for temporary protection; these assemblies must be examined carefully for serviceability.

8. Place the arming-vane assembly on the arming screw of the fuze and adjust it so that the holes in the vane hub aline with the hole in the arming screw. Insert the cotter pin through the holes and secure it by spreading its ends.

9. Loosen the locknuts on the fuze and unscrew the fuze from the signal.

10. Inspect the fin assembly for any cracks or deformation and discard it if cracked or badly deformed. All mating surfaces must be thoroughly cleaned prior to assembly. Fin assemblies with bent vanes may be repaired and used if the vanes can be straightened easily. If straightened, inspect again for cracking.

11. Fasten the signal clamp to the fin sleeve by means of the clamp taps. To do this, it is necessary to squeeze the clamp ends together so that the slots in the tabs can be slipped under the rivets on the fin sleeve. Secure the clamp to the fin assembly with the nut, bolt, and lockwasher provided.

12. Slip the fin assembly over tail end of the bomb. Aline the holes in the fin-assembly base with the holes in the bomb base so that the tail fin will clear the aircraft structure and ground when the bomb is installed.

13. Use a wrench to secure the fin assembly to the bomb body with bolts and lockwashers.

14. Slide the cylindrical section of the signal through the signal clamp with the

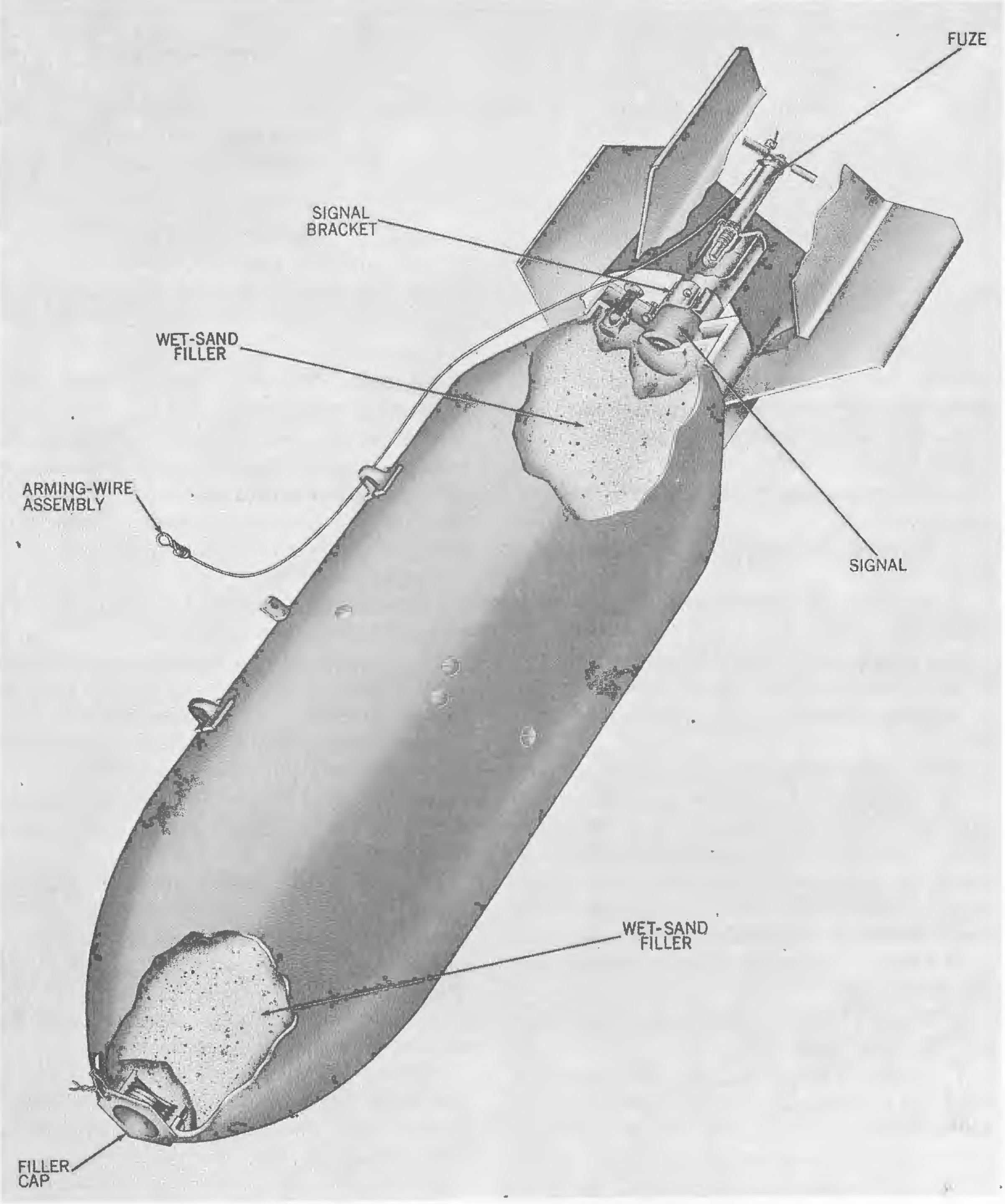

Figure 11–25.—500-lb Practice Bomb Mk 65 Mod 0, Cutaway View.

cartridge chamber of the signal facing aft. Rotate the signal until the cartridge chamber is alined with the suspension lugs, pressing the signal firmly in place so that its forward end seats snugly into the indentation in the bomb body. Insert a bolt through the holes in the clamp and tighten it until the signal is held securely in place.

15. Insert the blank .38-caliber cartridge into the chamber of the signal. Thread the fuze into the signal, seating it firmly. Adjust the fuze to permit a straight pull of the arming wire (when installed), and lock the fuze in position by tightening the fuze locknuts.

16. Thread the arming wire through the rear suspension lug of the bomb, then through the arming-wire guide and vane assembly of the fuze. The arming wire must be free of kinks and burrs, and should extend 2 to 3 inches beyond the flange of the fuze.

17. For external suspension of the bomb, place one safety (Fahnestock) clip on the free end of the arming wire adjacent to the arming vane of the fuze. If the bomb is to be installed in a bomb bay, do not install a safety clip on the arming wire.

18. Install the bomb in accordance with the type of rack or shackle in use, using hoisting lugs supplied for various hoisting conditions.

> CAUTION: Do not remove the safety cotter pin from the body of the fuze prior to securing the bomb in the aircraft and completely installing the arming wire.

Disassembly

To disassemble the complete round, the preceding steps should be carried out in reverse order and the components restored to their original condition.

500-LB PRACTICE BOMB Mk 87 Mod 0

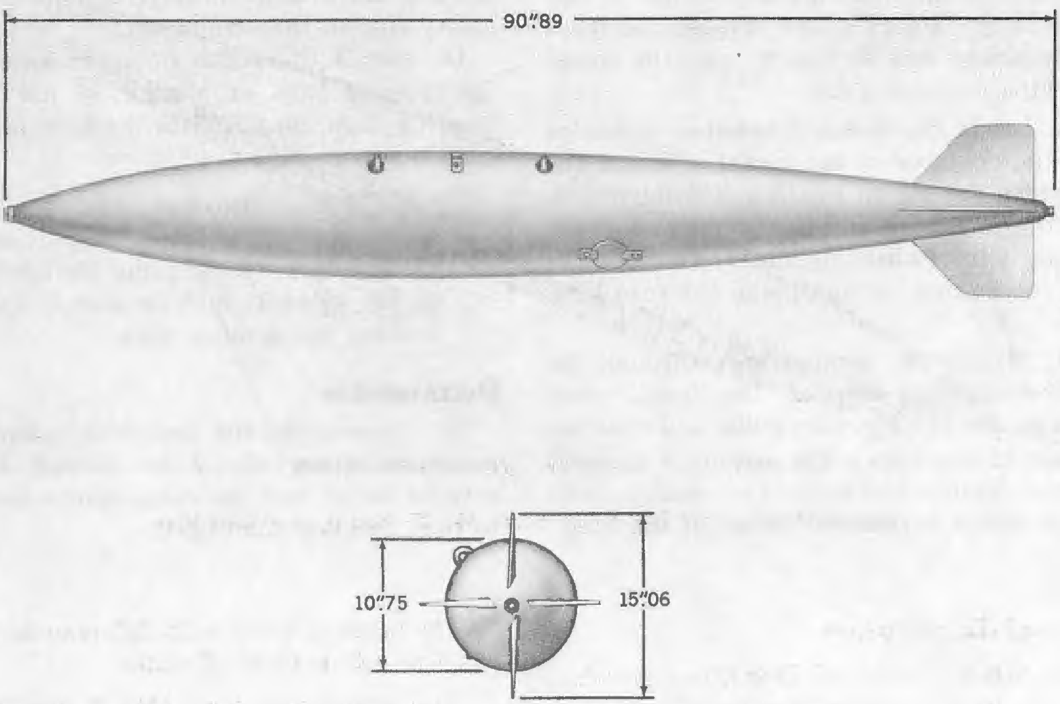

Figure 11–26.—500-lb Practice Bomb Mk 87 Mod 0, Exterior View.

Mark	87
Mod	0
General Arrangement	1695657
List of Drawings	165798
Length of Assembled Bomb (in.)	90.89
Body Diameter, maximum (in.)	10.75
Fin Span (in.)	15.06
Distance between Suspension Lugs, center-to-center (in.)	14
Weight of Assembled Bomb (lb)	
Empty Assembled Bomb	98
Loaded with Wet Sand	333
Loaded with Water	221
Practice Bomb Signal	Mk 4 Mod 3
Firing Pin	Mk 1 Mod 0

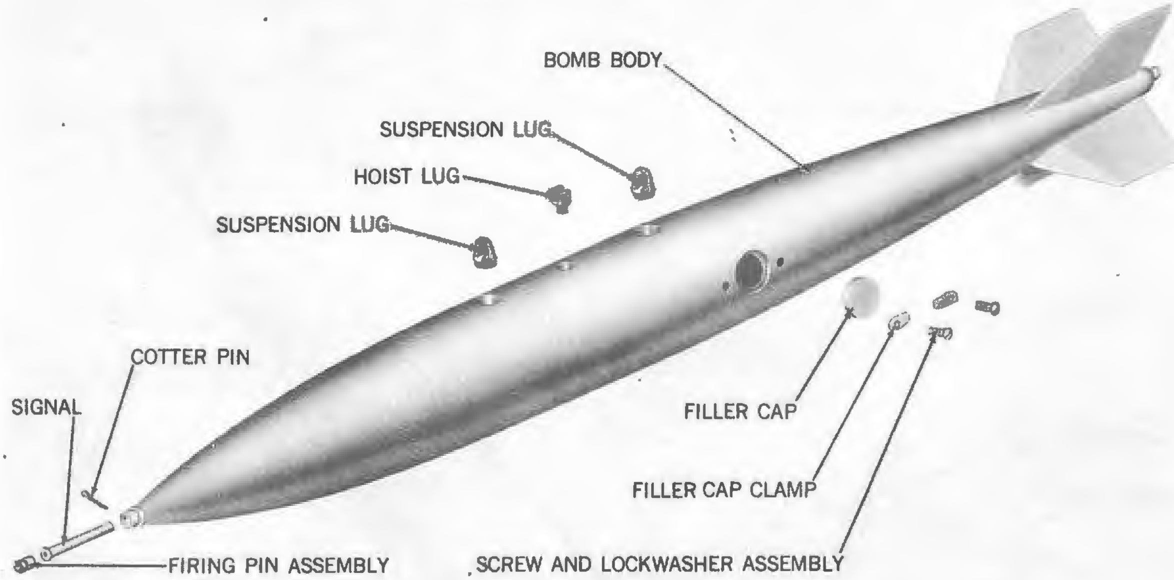

Figure 11–27.—500-lb Practice Bomb Mk 87 Mod 0, Exploded View.

General Description

The 500-lb PB Mk 87 Mod 0 is a low-drag practice bomb, similar in size and shape to the Mk 82 general purpose bomb. It has a long pointed nose and a concially tapered aft end. One filler hole is located on the side, aft of the rear suspension lug. The four tail fins are canted 1½ degrees to impart spin to the bomb to insure good flight stability.

The 500-lb PB Mk 87 Mod 0 is of thin-case construction with internal reinforcement for the sway brace and ejection areas. To provide rigidity, bulkheads and channel reinforcements are used on the inside of the bomb casing.

Firing Pin Mk 1 Mod 0 and Practice Bomb Signal Mk 4 Mod 3 are installed in the forward end of the bomb, and are secured by a cotter pin.

The bomb is filled with 235 pounds of wet sand or 123 pounds of water.

Two suspension lugs (Mk 6 Mod 0) are spaced 14 inches apart on the body. A hoisting lug is located midway between the suspension lugs.

Painting and Marking

Bombs of recent issue are painted orange, with identification markings in white.

Bombs of older issue have white markings but the overall color is black.

Functioning

The firing pin assembly fires the signal. The detonated signal produces smoke which is discharged out the rear of the central tube.

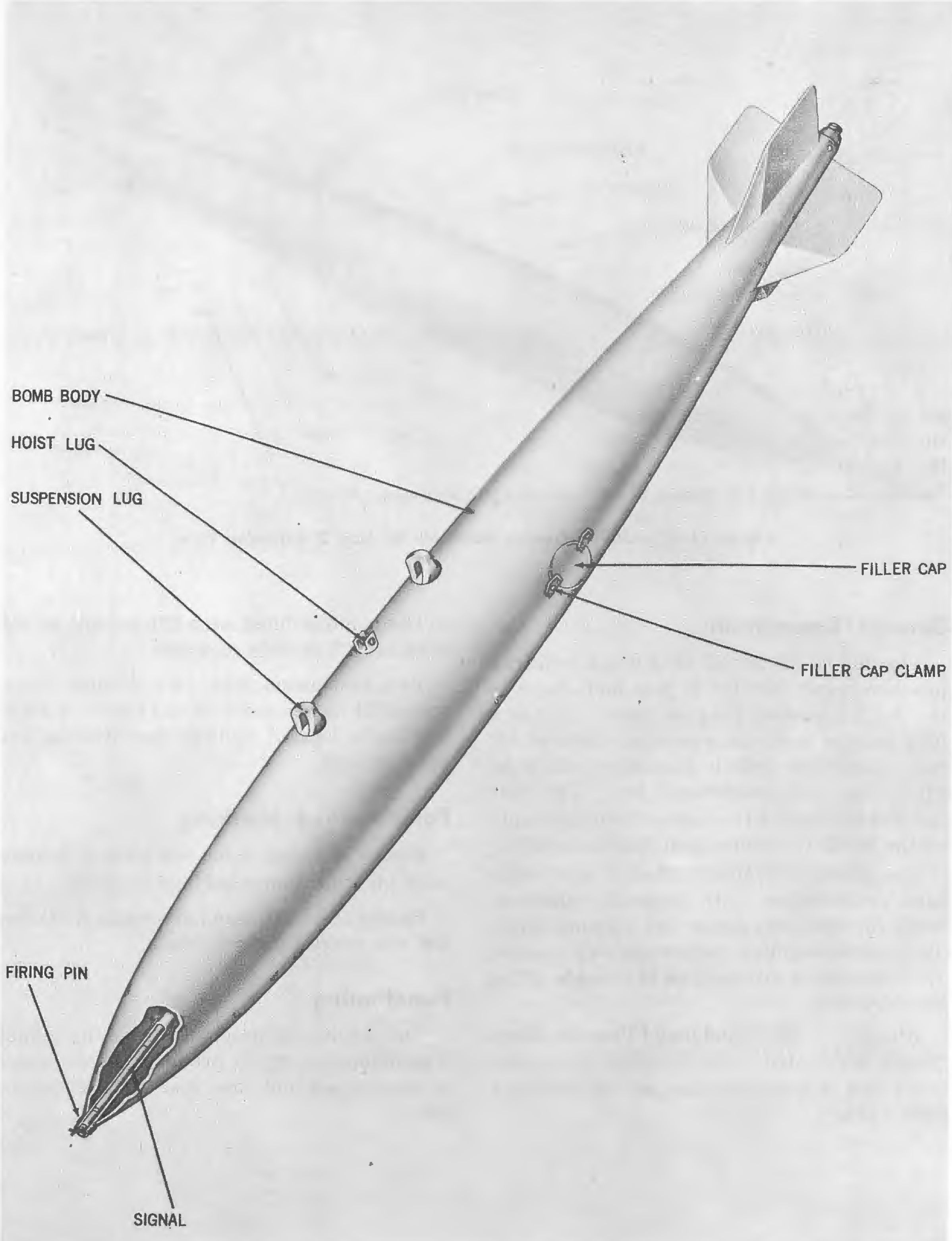

Figure 11–28.—500-lb Practice Bomb Mk 87 Mod 0, Cutaway View.

Assembly

CAUTION: Signals and bomb shall not be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb assembly from the packing.

CAUTION: Inspect for damage, such as cracked weldments, which might cause leaks in the bomb casing or damage to suspension lugs.

2. Remove filler cap by backing off the screws holding the two clamps in place until the clamps can be turned aside. Inspect the cap gasket and clamps for proper fit. Replace damaged gaskets.
3. Fill with the required amount of wet sand or water at the loading base. During freezing conditions add antifreeze. Filling the bomb with wet sand can be facilitated by hoisting the tail so the filler may flow toward the nose.
4. Replace filler cap after clearing channel and gasket seal of loose grains of sand. Turn the filler cap clamps into the locking position and tighten the screws securely.
5. Remove cotter pin and firing pin assembly from the nose of the bomb.

CAUTION: Firing pin assembly must fit loosely and not bind when sliding into position. Inspect firing pin assembly for damage. Be sure firing pin cup is not deformed and that the firing pin point is below the lip of its cup. Inspect the blast tube. It must be clean and not damaged or blocked in any way.

6. With firing pin assembly removed, insert signal, primer end forward, and slide the signal gently into place. Do not force into place. The base flange of the signal cartridge must rest on the blast tube shoulder (about 1⅛ inches in from the nose of the blast tube).

CAUTION: Signal must not be swollen or deformed in any manner. The primer must be flush or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used.

7. Carefully insert firing pin assembly with firing pin end toward the signal.

CAUTION: Firing pin assembly must slide into place under its own weight. Do not apply pressure to force the firing pin assembly into the bomb because the assembly may deform and fire the signal.

8. Rotate the firing pin assembly so that the two U-shaped notches in the lip of the forward cup line up with the pin holes in the nose of the blast tube. Do not apply pressure to the firing pin during this operation.
9. Insert the cotter pin through the pin holes in the bore, passing through the notches in the firing pin assembly. Spread the ends of the cotter pin just enough to retain it in place.

CAUTION: Do not bend the ends of the cotter pin at right angles to the cotter pin axis, or strike the ends to bend them into position.

10. Install bomb in accordance with type of bomb rack in use and securely lock in place.

Disassembly

To remove the signal and firing pin, carry out the steps for their assembly in reverse order and restore these components to their original condition.

1000-LB PRACTICE BOMB Mk 66 Mod 0

Mark	66
Mod	0
General Arrangement	439701
List of Drawings	Sk 109521
Fin Assembly Drawing No.	438257
Length of Assembled Bomb (in.)	66.96
Diameter (in.)	18.63
Fin Span (in.)	25.4
Weight of Assembled Bomb (lb)	
Loaded with Wet Sand	883.5
Loaded with Water	480.5
Wet Sand Filler (lb)	788.3
Water Filler (lb)	385.3
Water Filler (gal)	45.0
Signal	Mk 6 Mod 0
Fuze	Mk 247 Mod 0
Arming-Wire Assembly	Mk 1 or AN–M6A2

General Description

The 1000-lb PB Mk 66 Mod 0 has a light-cased, cylindrical body and is constructed from welded sheet steel sections. It has an ogival nose and a tapered aft end, to which a box-type fin assembly is bolted. A threaded filling hole is located in the nose of the bomb and is sealed by a nose plug and gasket. The nose plug is wired to a small bracket welded to the nose. A second filler hole, located on the side of the bomb, is capped with a circular plate and gasket and is secured to the bomb with hex-head bolts.

Two suspension lugs 14 inches apart are welded to the bomb body and seven threaded recesses are located on the periphery of the bomb at the approximate center of gravity. One or two hoisting lugs, screwed into these recesses, permit hoisting of the bomb by either one or two cables.

The bomb is filled either with water or with a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the bomb case caused by freezing of the filler.

Painting and Marking

The bomb is painted black; identification data is stenciled on the cylindrical section of the bomb and the box section of the fin assembly in white letters.

Use

The bomb is authorized for all types of service usage, including catapult and jet-assisted takeoffs and arrested landings. It is used with the Mk 6-type signal and inert Fuze Mk 247 Mod 0. The signal is seated in a recess in the tail end of the bomb body and is secured to the fin assembly by a clamp provided with the signal.

Functioning

Upon impact of the bomb, the fuze firing pin initiates a blank .38-caliber cartridge which, in turn, explodes the signal to produce a flash and a large puff of gray smoke.

"Old" Series Practice Bombs

No fuzes were used in the "old" series practice bombs and they contained no spotting charge, being filled either with water or with wet sand. Filling holes were located on the top of the bomb near the nose.

Assembly

CAUTION: Signals and fuzes are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb body from stowage and the fin assembly with its attachments

"Old" Series Practice Bombs—Data

Bomb	Length	Diameter	Color	Total Weight	
				Water-Filled	Wet-Sand Filled
1000-lb Mk 7	80"0	19"0	Black	580.0 lbs.	1000.0 lbs.
1000-lb Mk 22	79"0	19"0	Black	573.0 lbs.	1013.0 lbs.

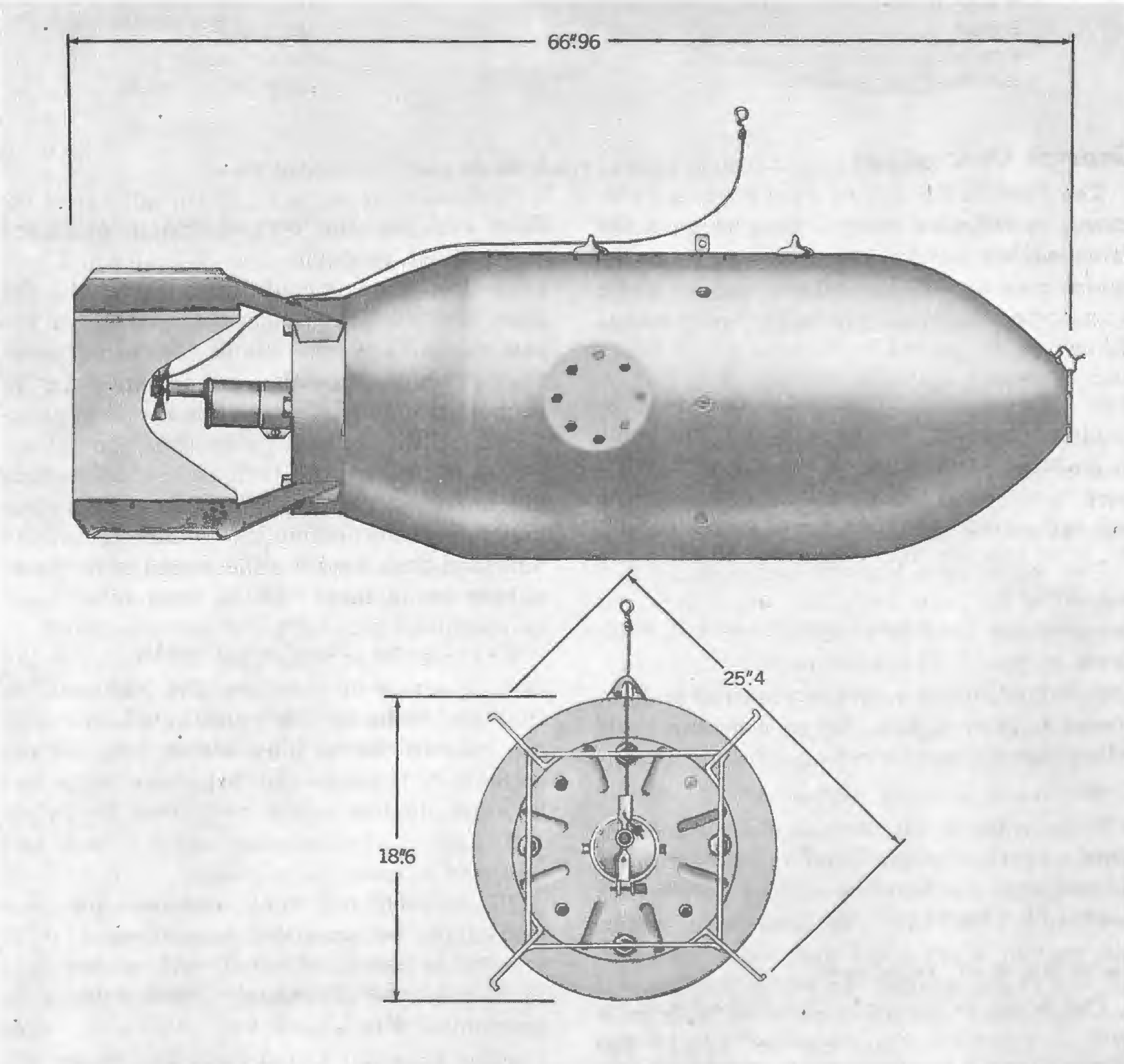

Figure 11–29.—1000-lb Practice Bomb Mk 66 Mod 0, Exterior View.

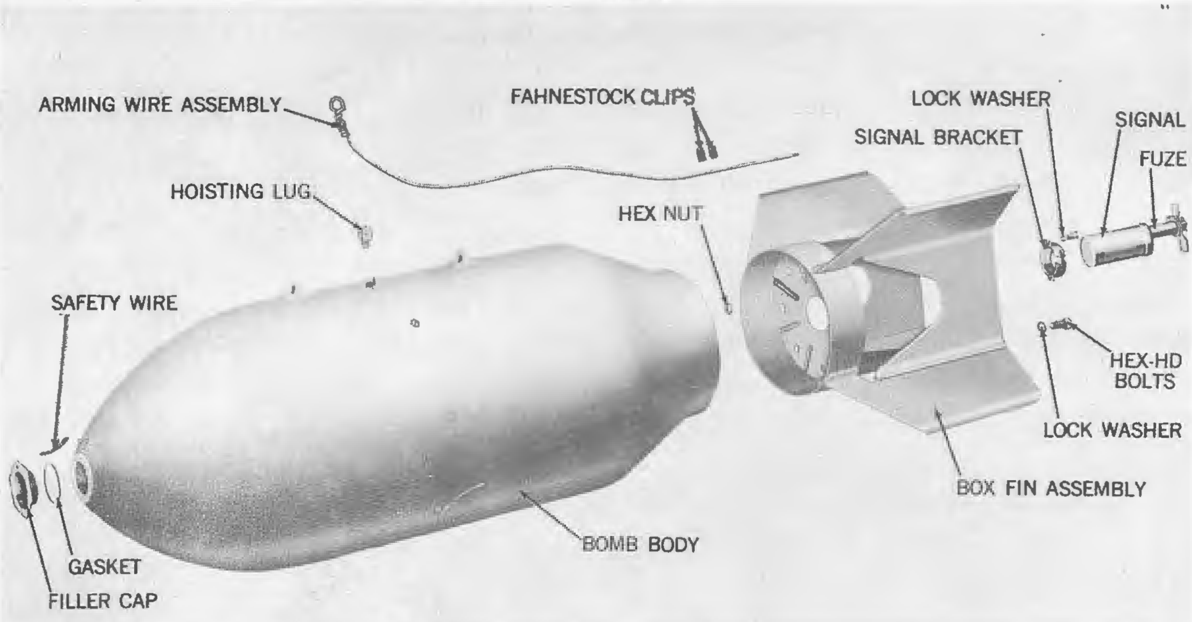

Figure 11–30.—1000-lb Practice Bomb Mk 66 Mod 0, Exploded View.

from the shipping crate. Inspect each for damaged seams, cracked weldments, or deformed areas which might cause leaks, weaken the suspension lugs, or prevent serviceable use.

2. Fill the bomb through the nose or side. If filling through the nose, stand the bomb on its tail end and remove the shipping wire, nose plug, and gasket. If filling through the side, place the bomb on its side with the filler hole on top. Remove the filler cap and gasket.

3. Inspect the gasket and replace if damaged.

4. Fill the bomb with the required amount of wet sand or water. When necessary, add a sufficient quantity of antifreeze to the filler.

5. In order to fill the bomb with a maximum quantity of wet sand mixture, fill approximately one quarter of the bomb with dry sand. Saturate the sand with water, followed by more sand and more water in successive steps until the bomb is filled. If possible, check the bomb on a suitable scale to ascertain when the correct weight has been obtained.

6. Replace and secure the nose plug or filler cap, making certain that the gasket is installed properly.

7. Open the box containing the signal, the fuze, the fuze arming-vane assembly, the cotter pin, and the blank .38-caliber cartridge which is sealed in an envelope in each carton. If the containers are punctured, split, or badly damaged, or if the seals are broken, the fuze and signal assembly is considered unserviceable. This does not apply to assemblies repacked in the field and sealed with adhesive tape for temporary protection. These assemblies must be examined carefully for serviceability.

8. Place the arming-vane assembly on the arming screw of the fuze and adjust it so that the holes in the vane hub aline with the hole in the arming screw. Insert the cotter pin through the holes and secure it by spreading its ends.

9. Loosen the locknuts on the fuze and unscrew it from the signal.

10. Inspect the fin assembly for any cracks or deformation, and discard it if cracked or badly deformed. All mating surfaces must be thoroughly cleaned prior to assembly. Fin assemblies with bent vanes may be repaired and used if the vanes can be straightened easily. If straightened, inspect again for cracking.

11. Fasten the signal clamp to the fin sleeve by means of the clamp tabs. To do this, it is necessary to squeeze the clamp ends together so that the slots in the tabs can be slipped under the rivets on the fin sleeve. Secure the clamp to the fin assembly with the nut, bolt, and lockwasher provided.

12. Lay the bomb on its side and slip the fin assembly over its tail end. Aline the holes in the fin-assembly base with the holes in the bomb base so that the tail fin will clear the aircraft structure and ground when the bomb is installed.

13. Use a wrench to secure the fin assembly to the bomb body with bolts and lockwashers.

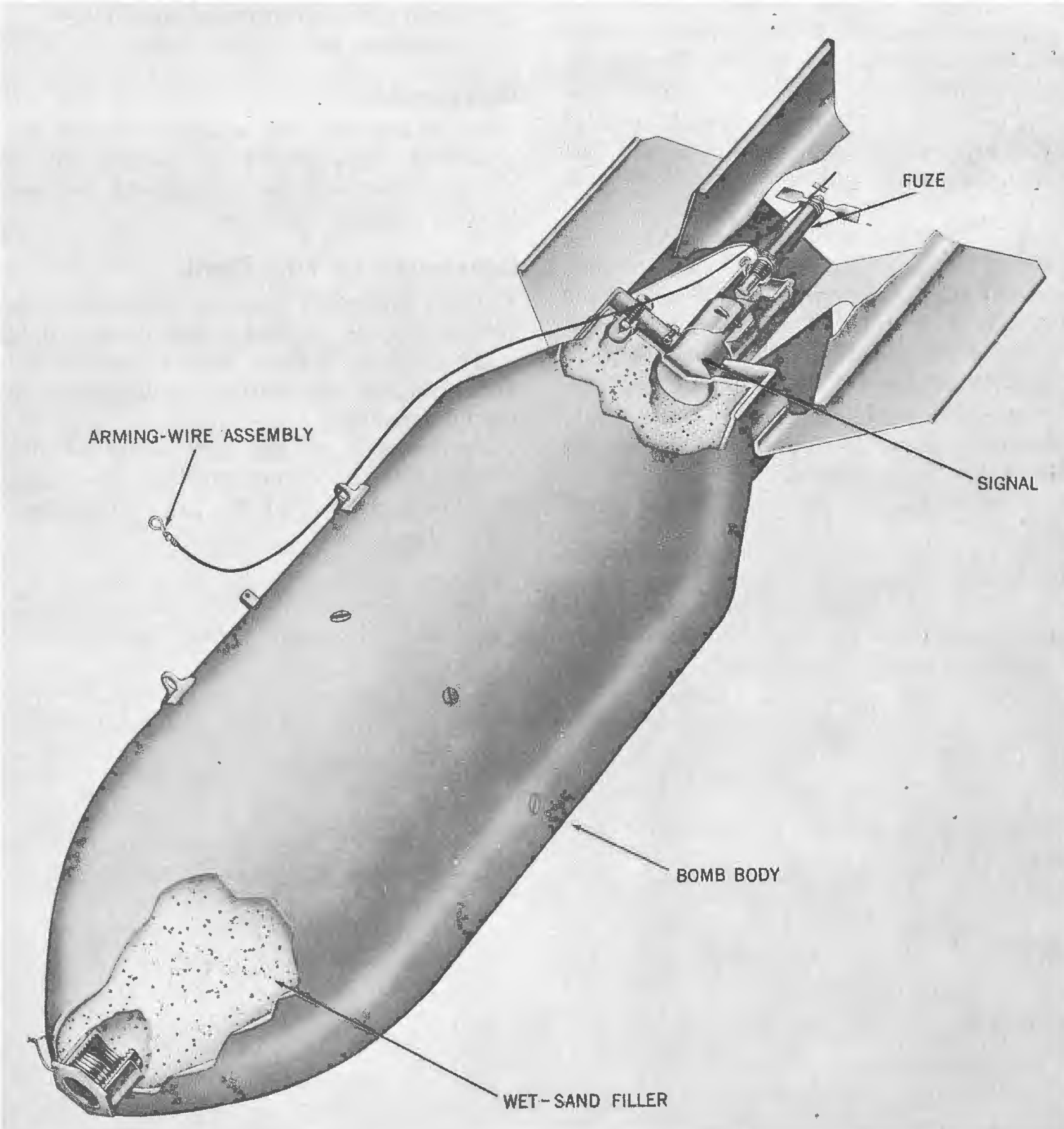

Figure 11–31.—1000-lb Practice Bomb Mk 66 Mod 0, Cutaway View.

14. Slide the cylindrical section of the signal through the signal clamp with the cartridge chamber of the signal facing aft. Rotate the signal until the cartridge chamber is alined with the suspension lugs, pressing the signal firmly in place so that its forward end seats snugly into the indentation in the bomb body. Insert a bolt through the holes in the clamp and tighten it until the signal is held securely in place.

15. Insert the blank .38-caliber cartridge into the chamber of the signal. Thread the fuze into the signal, seating it firmly. Adjust the fuze to permit a straight pull of the arming wire (when installed), and lock it in position by tightening the fuze locknuts.

16. Thread the arming wire through the rear suspension lug of the bomb, then through the arming-wire guide and vane assembly of the fuze. The arming wire must be free of kinks and burrs and should extend 2 to 3 inches beyond the flange of the fuze.

17. For external suspension of the bomb, place one safety (Fahnestock) clip on the free end of the arming wire adjacent to the arming vane of the fuze. If the bomb is to be installed in a bomb bay, do not install a safety clip on the arming wire.

18. Install the bomb in accordance with the type of rack or shackle in use, using hoisting lugs supplied for various hoisting conditions.

> CAUTION: Do not remove the safety cotter pin from the body of the fuze prior to securing the bomb in the aircraft and completely installing the arming wire.

Disassembly

To disassemble the complete round, the preceding steps should be carried out in reverse order and the components restored to their original condition.

Conversion to Fire Bomb

As an emergency measure in the past, the 1000-lb PB Mk 66 Mod 0 was converted to a fire bomb by loading with a gasoline gel and installing igniter-fuze combinations on the fin assembly.

Development of the new series of fire bombs by the Navy now precludes the necessity for conversion of the practice bombs.

1000-LB PRACTICE BOMB Mk 88 Mod 0

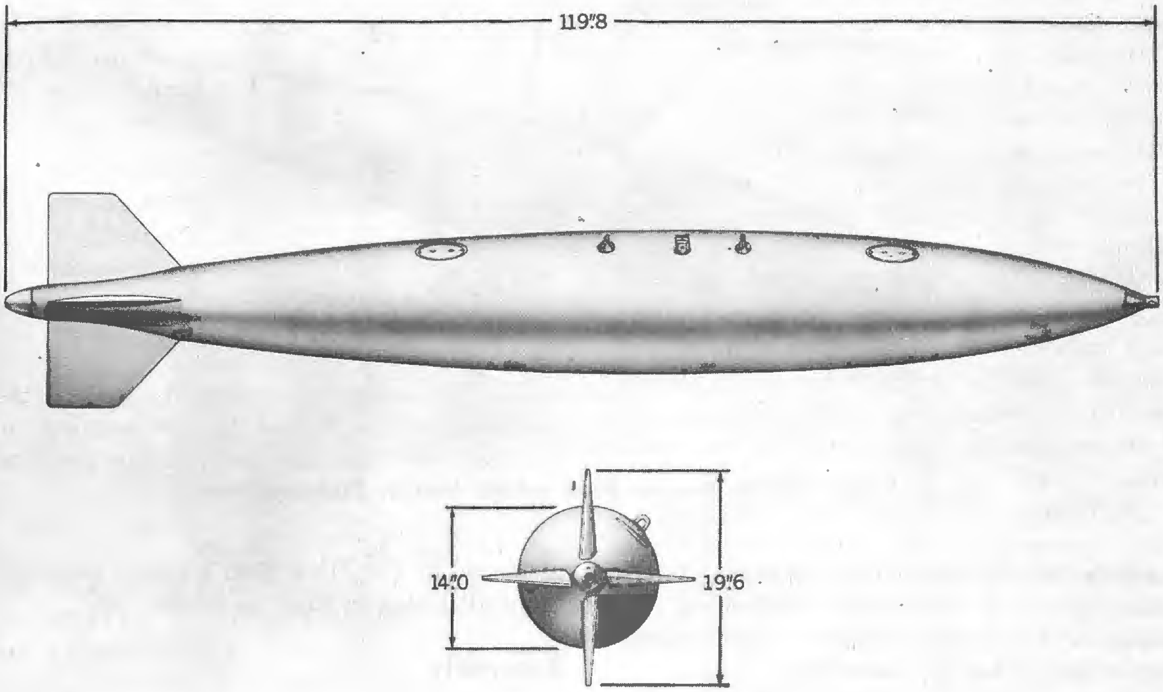

Figure 11–32.—1000-lb Practice Bomb Mk 88 Mod 0, Exterior View.

Mark	88
Mod	0
General Arrangement	1290158
List of Drawings	165799
Length of Assembled Bomb (in.)	119.8
Diameter (in.)	14.0
Fin Span (in.)	19.6
Weight of Assembled Bomb (lb)	
Loaded with Wet Sand	783.13
Loaded with Water	458.13
Wet Sand Filler (lb)	640.0
Water Filler (lb)	315.0
Water Filler (gal)	37.7
Signal	Mk 4 Mods 0, 1, 2, 3, 4

General Description

The 1000-lb PB Mk 88 Mod 0 has a long, slender body and is constructed of thin sheet metal, with internal reinforcement for the sway brace and ejection areas. Internal bulkheads and channel reinforcements provide for rigidity of the casing. The bomb has a sharp nose and a tapered aft end to which four fin blades are attached. The blades are set perpendicular to the axis of the bomb, approximately 5.5 inches forward of the tail end, and are canted 2 degrees for added stability. Two filling holes are located topside in the bomb body and are sealed with filler caps. A single hoisting lug is screwed into the body over the approximate center of gravity. Two suspension lugs, 14 inches apart and equidistant from the hoist-

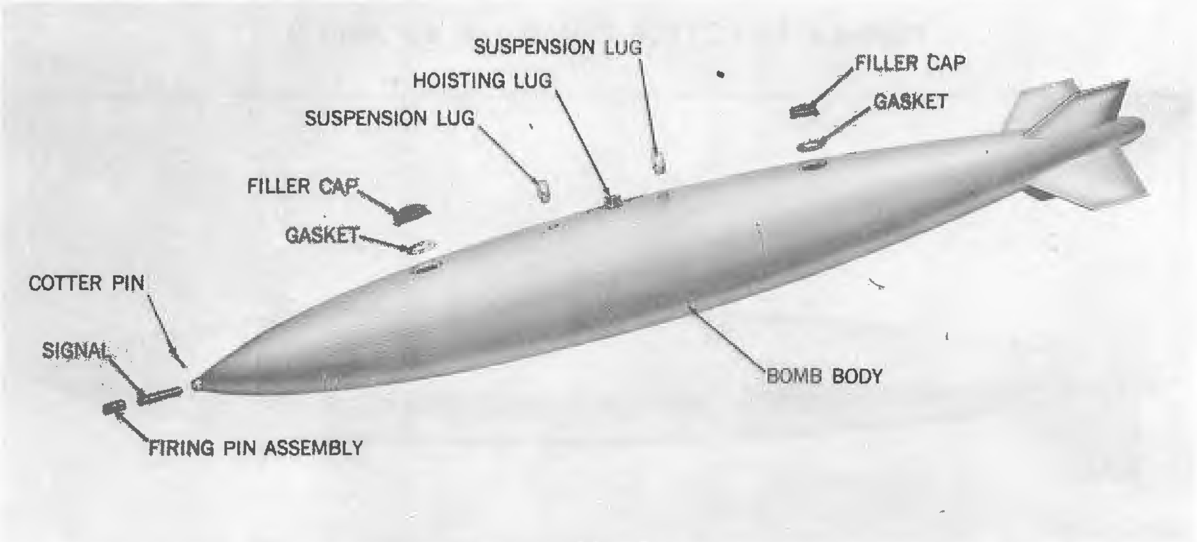

Figure 11–33.—1000-lb Practice Bomb Mk 88 Mod 0, Exploded View.

ing lug, are threaded into recesses in the bomb body. A blast tube, extending the length of the bomb, houses a pyrotechnic charge and firing-pin assembly.

The bomb is filled either with water or with a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the bomb case caused by freezing of the filler.

Painting and Marking

The entire bomb is painted black (old issue) or orange (new issue); identification data is stenciled on the side in white letters.

Use

The 1000-lb PB Mk 88 Mod 0 is similar in size and shape to the 1000-lb GP (low-drag) bombs of the Mk 83 series and is authorized for all types of service use. It is used with Firing-Pin Assembly Mk 1 Mod 0 and Signal Mk 4 Mod 3, both of which are seated in the forward end of the flash tube and locked in place by a cotter pin.

Functioning

Upon impact of the bomb, the firing pin initiates a blank .38-caliber cartridge which, in turn, explodes the signal to produce a flash and a large puff of smoke. Smoke produced by the Mk 4 Mod 3 signal is visible from altitudes as high as 30,000 feet.

Assembly

CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original container.

1. Remove the bomb assembly from its crate and inspect it for damaged seams, cracked weldments, or deformed areas which might cause leaks, weaken the suspension lugs, or otherwise prevent serviceable use.
2. Remove the two filler caps, using a suitable spanner wrench.
3. Inspect the filler-cap gaskets and replace if damaged.
4. Fill the bomb with the required amount of wet sand or water. When necessary, add a sufficient quantity of antifreeze to the filler. To facilitate filling, put in as much wet sand as possible when the bomb is on its side. Then close the forward filling hole, hoist the tail of the bomb, and finish filling through the rear hole.
5. In order to fill the bomb with a maximum quantity of wet-sand mixture, fill approximately one quarter of it with dry sand. Saturate the sand with water, followed by

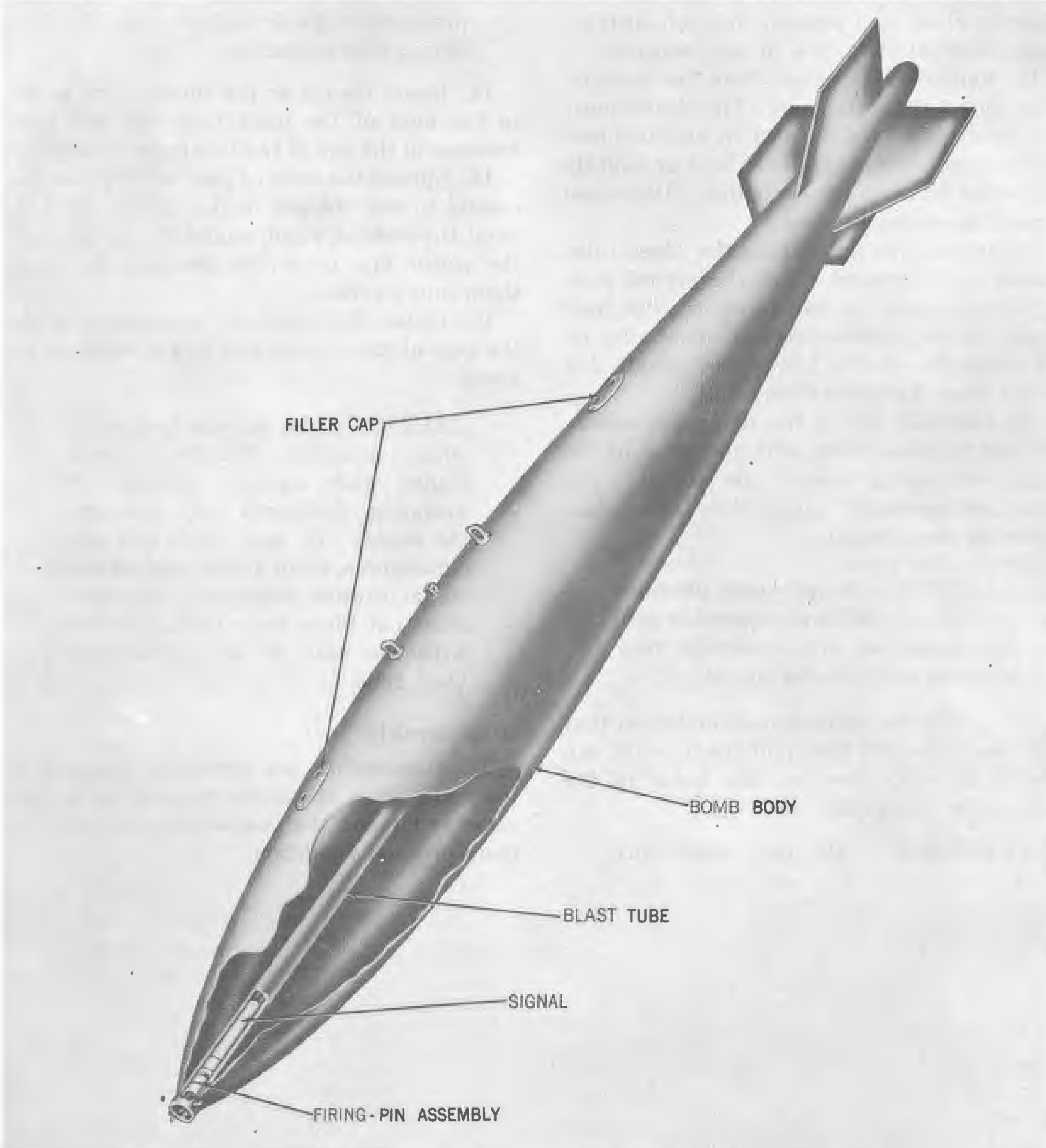

Figure 11–34.—1000-lb Practice Bomb Mk 88 Mod 0, Cutaway View.

more sand and more water in successive steps until the bomb is filled. If possible, check the bomb on a suitable scale to ascertain when the correct weight has been obtained.

6. Twist on the filler caps with a spanner wrench until they are securely locked in place.

7. Remove the cotter pin and firing-pin assembly from the nose of the bomb.

8. Inspect the firing-pin assembly for damage. The firing-pin cups must not be deformed and the point of the firing pin must be below the lip of its cup.

9. Inspect the bore of the blast tube. It

must be clean and smooth, free of obstructions, and not damaged in any manner.

10. Remove the signal from its packing and inspect it for damage. The signal must not be swollen or deformed in any manner, and the primer must be flush with or slightly below the base of the cartridge. Deformed signals must not be used.

11. Insert the signal into the blast tube, primer end forward. Let the signal slide gently into place; do not force it. The base flange of the signal cartridge must rest on the shoulder of the blast tube about 1⅛ inches from the nose of the tube.

12. Carefully insert the firing-pin assembly into the blast tube, with the point of the firing pin facing toward the signal. The firing-pin assembly must slide into place under its own weight.

> CAUTION: Do not apply pressure to force the firing-pin assembly into the bomb as the assembly may collapse and fire the signal.

13. Rotate the firing-pin assembly so that the two recesses in the lip of the forward cup are alined with the two pin holes in the nose of the blast tube.

> CAUTION: Do not exert any pressure on the firing-pin assembly during this operation.

14. Insert the cotter pin through the holes in the nose of the blast tube and the two recesses in the cup of the firing-pin assembly.

15. Spread the ends of the cotter pin sufficiently to lock the pin in the bomb. Do not bend the ends at right angles to the axis of the cotter pin, or strike the ends to bend them into position.

16. Install the bomb in accordance with the type of rack in use and lock it securely in place.

> CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward personnel. Loaders must not place their bodies in line with the nose or aft end of the blast tube.

Disassembly

To disassemble the complete bomb, the foregoing steps should be carried out in reverse order and the components restored to their original condition.

2000-LB PRACTICE BOMB Mk 67 Mod 0

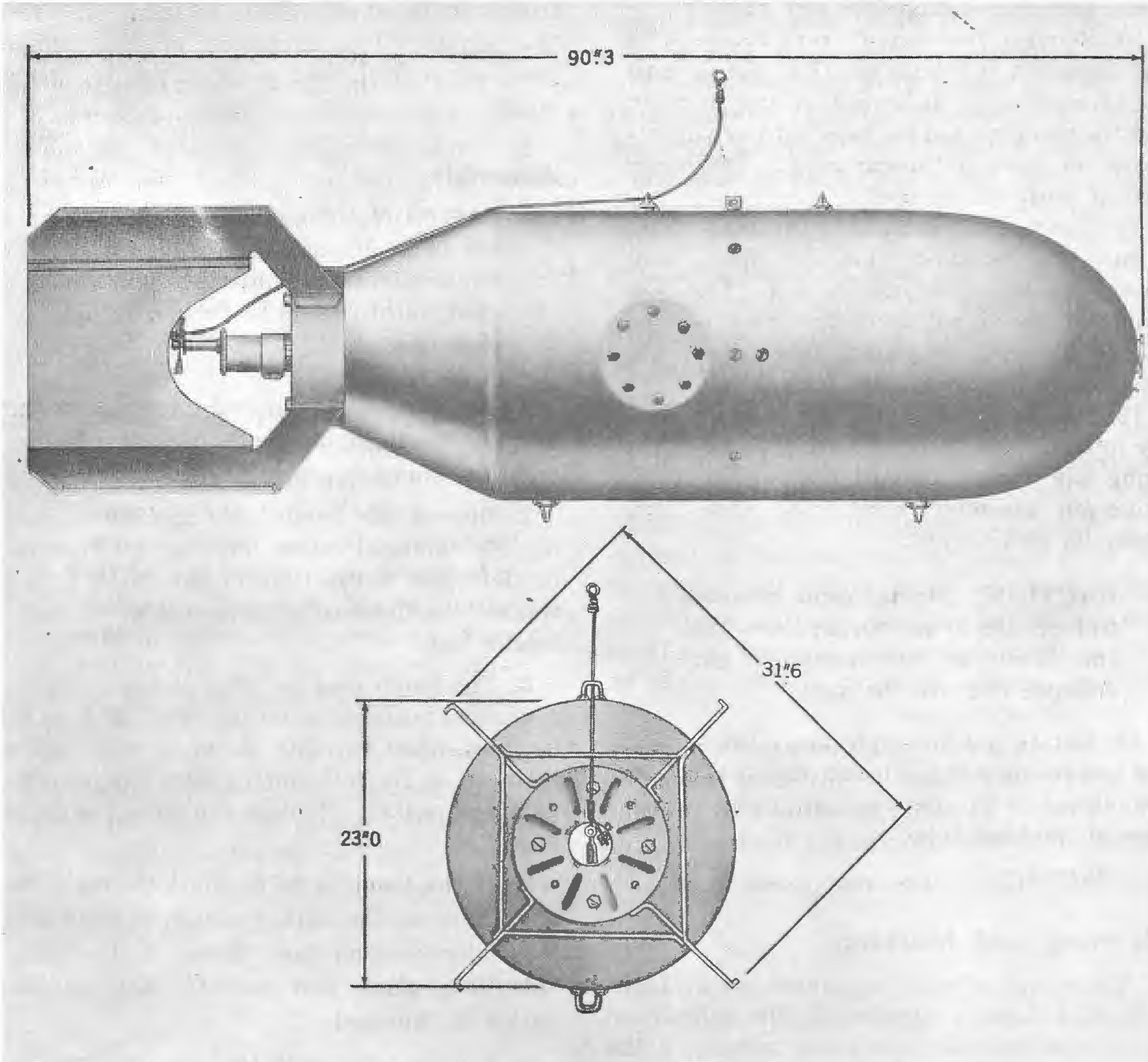

Figure 11–35.—2000-lb Practice Bomb Mk 67 Mod 0, Exterior View.

Mark	67
Mod	0
General Arrangement	439703
List of Drawings	Sk 109522
Fin Assembly Drawing No.	438265
Length of Assembled Bomb (in.)	90.3
Diameter (in.)	23.0
Weight of Assembled Bomb (lb)	
Loaded with Wet Sand	1617.25
Loaded with Water	960.75
Wet Sand Filler (lb)	1473.05
Water Filler (lb)	816.55
Water Filler (gal)	97.0
Signal	Mk 6 Mod 0
Fuze	Mk 247 Mod 0
Arming-Wire Assembly	Mk 1 or AN–M6A2

General Description

The 2000-lb PB Mk 67 Mod 0 has a light-cased, cylindrical shaped body and is constructed of welded sheet steel sections. For added strength and rigidity, reinforcement strips are welded to the inside of the bomb casing. The bomb has an ogival nose and a tapered after end to which a box-type fin assembly is bolted. A threaded filling hole in the nose of the bomb is sealed by a nose plug and gasket. A second filling hole, located on the side of the bomb, is capped with a circular plate and gasket and secured by bolts. Two suspension lugs, 30 inches apart, are welded to the body of the bomb 90 degrees from the center of the side filling hole. Two additional lugs, 14 inches apart, are welded to the opposite side of the body. Seven threaded recesses, located on the periphery of the bomb about the center of gravity, permit various hoisting conditions. One or two hoisting lugs, screwed into these recesses, enable hoisting of the bomb by either one or two cables.

The bomb is filled with water or a mixture of water and sand. Antifreeze must be added under freezing conditions to prevent bursting of the case caused by freezing of the filler.

Painting and Marking

The complete bomb is painted black. Identification data is stenciled on the cylindrical section of the bomb and box section of the fin assembly in white letters.

Use

The bomb is authorized for all types of service use. It is used with Signal Mk 6 Mod 0 and inert Fuze Mk 247 Mod 0. The signal is seated in a recess in the tail end of the bomb body and is secured to the fin assembly by a clamp provided with the signal. This bomb should not be carried externally on jet aircraft.

Functioning

Upon impact of the bomb, the firing pin in the fuze detonates a blank .38-caliber cartridge in the signal which, in turn, explodes the signal. The explosion of the signal produces a flash and a large puff of gray smoke.

Assembly

CAUTION: Signals and fuzes are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

1. Remove the bomb body from stowage and the fin assembly, with its attachments, from the shipping crate.

2. Inspect the bomb body and fin assembly for damaged seams, cracked weldments, or deformed areas that might cause leaks, weaken the suspension lugs, or prevent serviceable use.

3. The bomb may be filled either when in a vertical position or on its side. If it is to be filled when vertical, stand it with either its nose or its tail end up and remove the plug and gasket. Replace the gasket if damaged.

4. If the bomb is to be filled through the filler hole on the side, position it with the side filler hole on top. Remove the bolts, side filler plate, and gasket. Replace the gasket if damaged.

5. Fill the bomb with the required amount of wet sand or water. When necessary, add a sufficient quantity of antifreeze to the filler. In order to fill the bomb with a maximum quantity of wet sand mixture, fill approximately one quarter of it with dry sand. Saturate the sand with water, followed by more sand and more water in successive steps until the bomb is filled. If possible, check the bomb on a suitable scale to ascertain when the correct weight has been obtained.

6. Replace and secure the plug or cover, making certain that the gasket is properly installed.

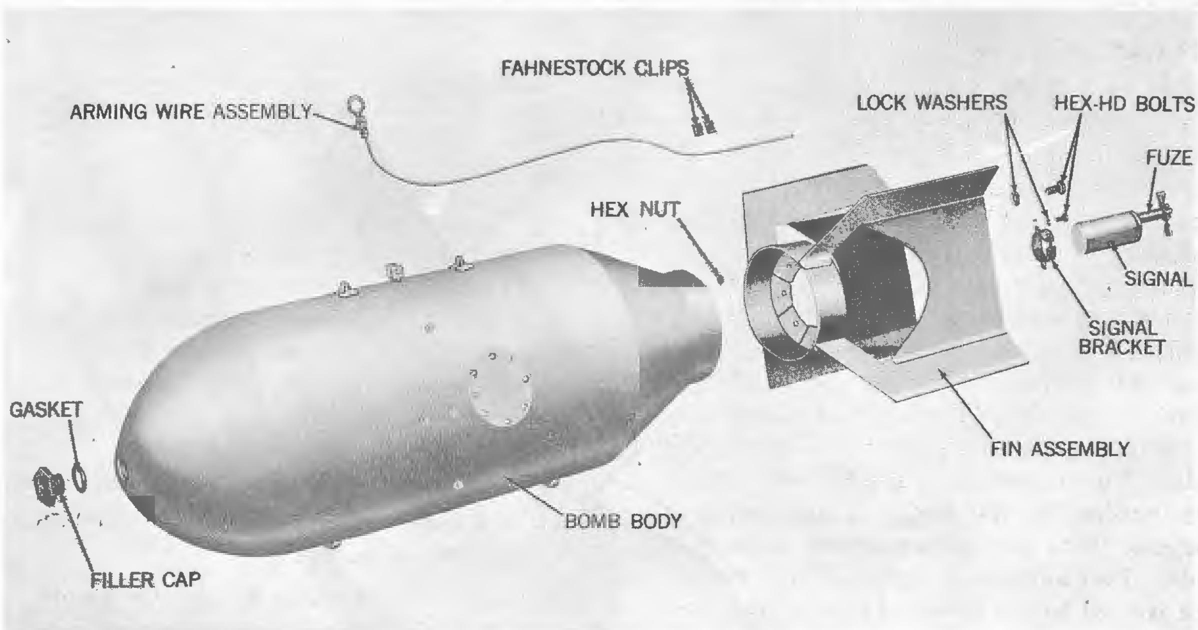

Figure 11–36.—2000-lb Practice Bomb Mk 67 Mod 0, Exploded View.

7. Open the box containing the signal fuze, the fuze arming-vane assembly, the cotter pin, and the blank .38-caliber cartridge which is sealed in an envelope in each carton. If the containers are punctured, split, or badly damaged, or if the seals are broken, the fuze and signal assembly is considered unserviceable. This does not apply to assemblies repacked in the field and sealed with adhesive tape for temporary protection; these assemblies must be examined carefully for serviceability.

8. Place the arming-vane assembly on the arming screw of the fuze and adjust it so that the holes in the vane hub aline with the hole in the arming screw. Insert the cotter pin through the holes and secure it by spreading its ends.

9. Loosen the locknuts on the fuze and unscrew the fuze from the signal.

10. Inspect the fin assembly for any cracks or deformation, and discard if cracked or badly deformed. All mating surfaces must be thoroughly cleaned prior to assembly. Fin assemblies with bent vanes may be repaired and used if the vanes can be straightened easily. If straightened, inspect again for cracking.

11. Fasten the signal clamp to the fin sleeve by means of the clamp tabs. To do this, squeeze the clamp ends together so that the slots in the tabs can be slipped under the rivets on the fin sleeve. Secure the clamp to the fin assembly with the nut, bolt, and lockwasher provided.

12. Lay the bomb on its side and slip the fin assembly over its tail end. Aline the holes in the fin-assembly base with the holes in the bomb base so that the tail fin will clear the aircraft structure and ground when the bomb is installed.

13. Use a wrench to secure the fin assembly to the bomb body with bolts and lockwashers.

14. Slide the cylindrical section of the signal through the signal clamp, with the cartridge chamber of the signal facing aft. Rotate the signal until the cartridge chamber is alined with the suspension lugs, pressing the signal firmly in place so that its forward end seats snugly into the indentation in the bomb body. Insert a bolt through the holes in the clamp and tighten it until the signal is held securely in place.

15. Insert the blank .38-caliber cartridge into the chamber of the signal. Thread the fuze into the signal, seating it firmly. Adjust the fuze to permit a straight pull of

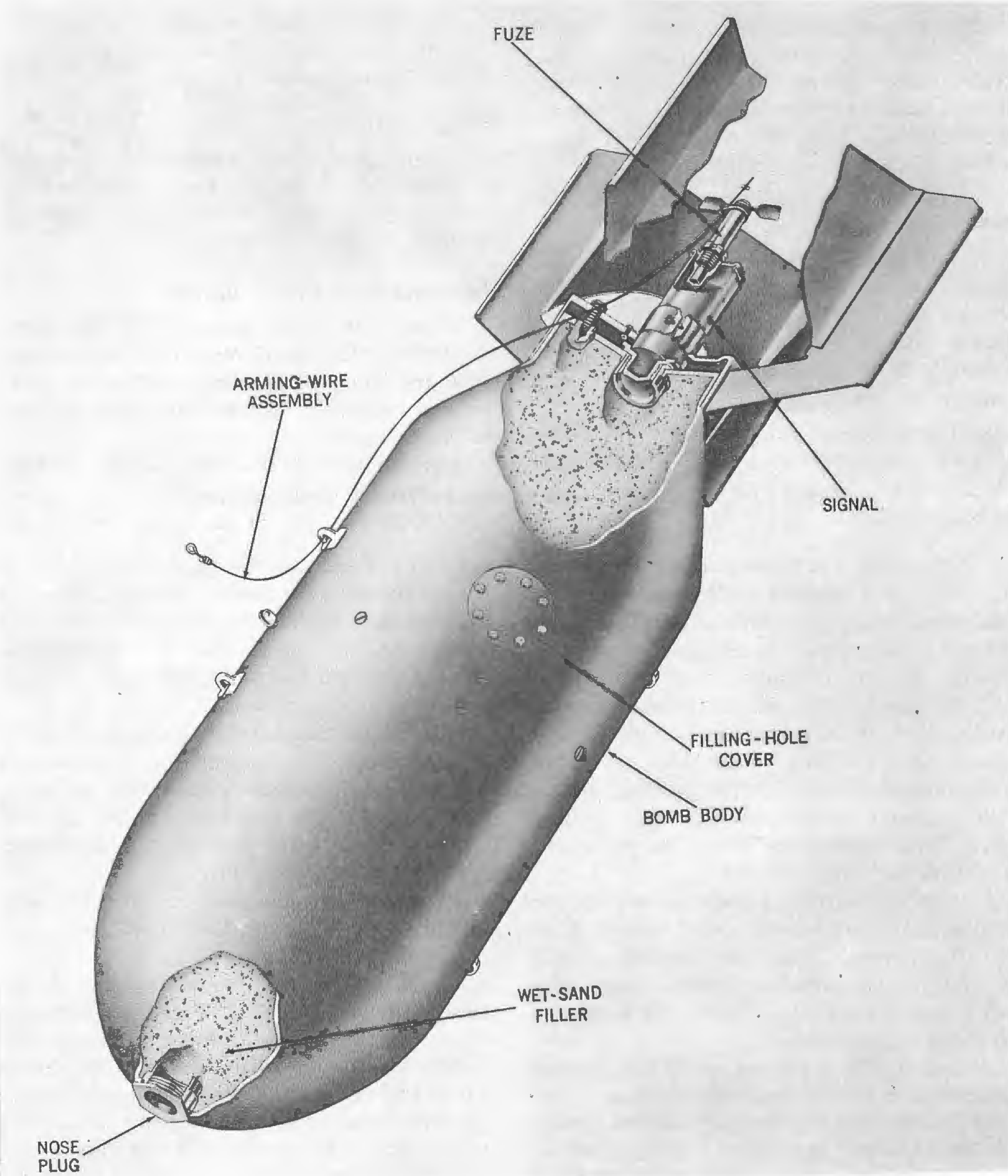

Figure 11–37.—2000-lb Practice Bomb Mk 67 Mod 0, Cutaway View.

the arming wire (when installed), and lock the fuze in position by tightening the fuze locknuts.

16. Thread the arming wire through the rear suspension lug of the bomb, then through the arming-wire guide and vane assembly of the fuze. The arming wire must be free of kinks and burrs, and should extend 2 to 3 inches beyond the flange of the fuze.

17. For external suspension of the bomb, place one safety (Fahnestock) clip on the free end of the arming wire adjacent to the arming vane of the fuze. If the bomb is to be installed in a bomb bay, do not install a safety clip on the arming wire.

18. Install the bomb in accordance with the type of rack or shackle in use, using hoisting lugs supplied for various hoisting conditions.

CAUTION: Do not remove the safety cotter pin from the body of the fuze prior to securing the bomb in the aircraft and completely installing the arming wire.

Disassembly

To disassemble the complete round, the preceding steps should be carried out in reverse order and the components restored to their original condition.

Conversion to Fire Bomb

As an emergency measure in the past, the 2000-lb PB Mk 67 Mod 0 was converted to a fire bomb by loading with a gasoline gel and installing igniter-fuze combinations on the fin assembly.

Development of the new series of fire bombs by the Navy now precludes the necessity for conversion of the practice bombs.

2000-LB PRACTICE BOMB Mk 104 Mod 0

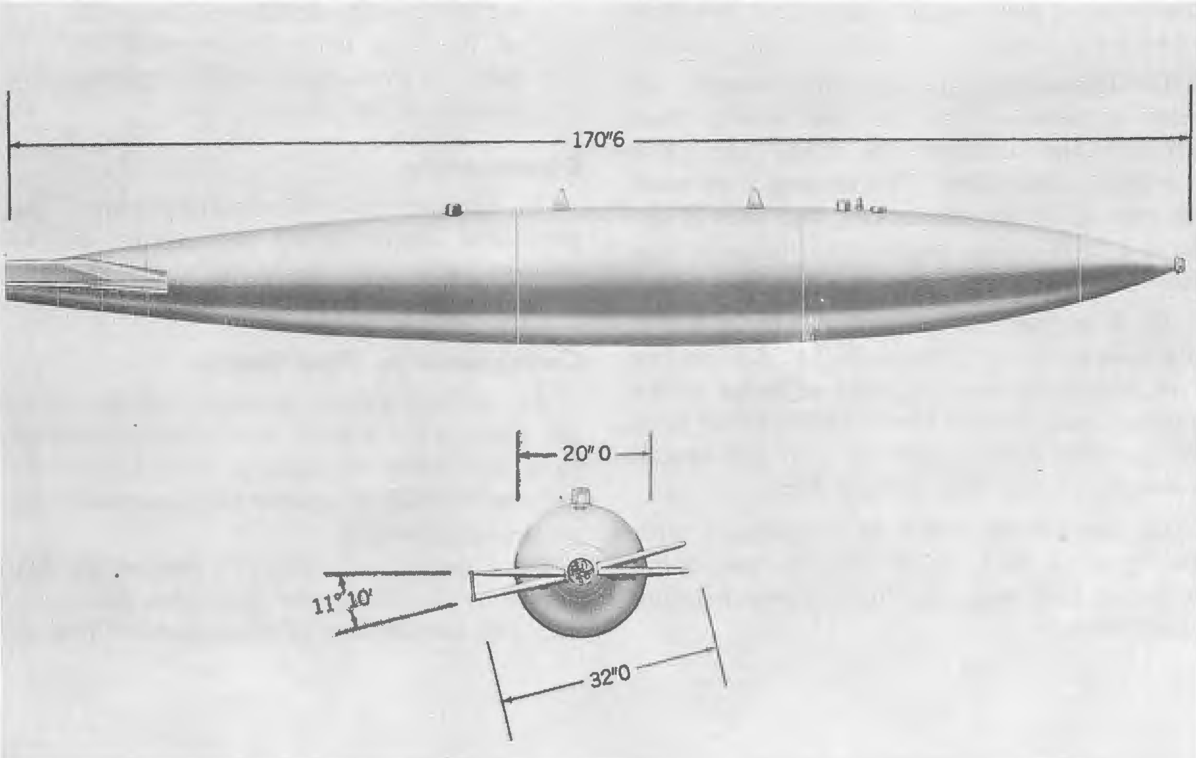

Figure 11–38.—2000-lb Practice Bomb Mk 104 Mod 0, Exterior View.

Mark	104
Mod	0
General Arrangement	1997659
List of Drawings	499774
Length of Assembled Bomb (in.)	170.6
Diameter (in.)	20.0
Fin Span (in.)	32.0
Weight of Assembled Bomb (lb)	2020
Concrete and Steel Shot Filler (lb)	1234
Signal	Mk 4 Mod 3
Cable Assembly	CF–3104

General Description

The 2000-lb PB Mk 104 Mod 0 has a long, slender welded body and is composed of two sheet steel fore and aft conical sections and a heavy steel plate central cylindrical section. The body is internally reinforced in the sway brace and ejection areas. Internal bulkheads and a solidified filler provide for rigidity of the casing. The bomb has a conical nose cap and a tapered aft end to which four fins (two folding) are attached. Arrows on the bomb body and tail cone line up the tail cone to index position "O". The tail cone can be rotated from position "O" and secured with two index screws at position every 15 degrees from position "O" and at positions 6 degrees 30 minutes from each 15-degree position. The index screws must be installed 180 degrees apart and staked in place. Of the four fins on the tail cone, two 180 degrees opposed are permanently fixed and the other two 180 degrees opposed are

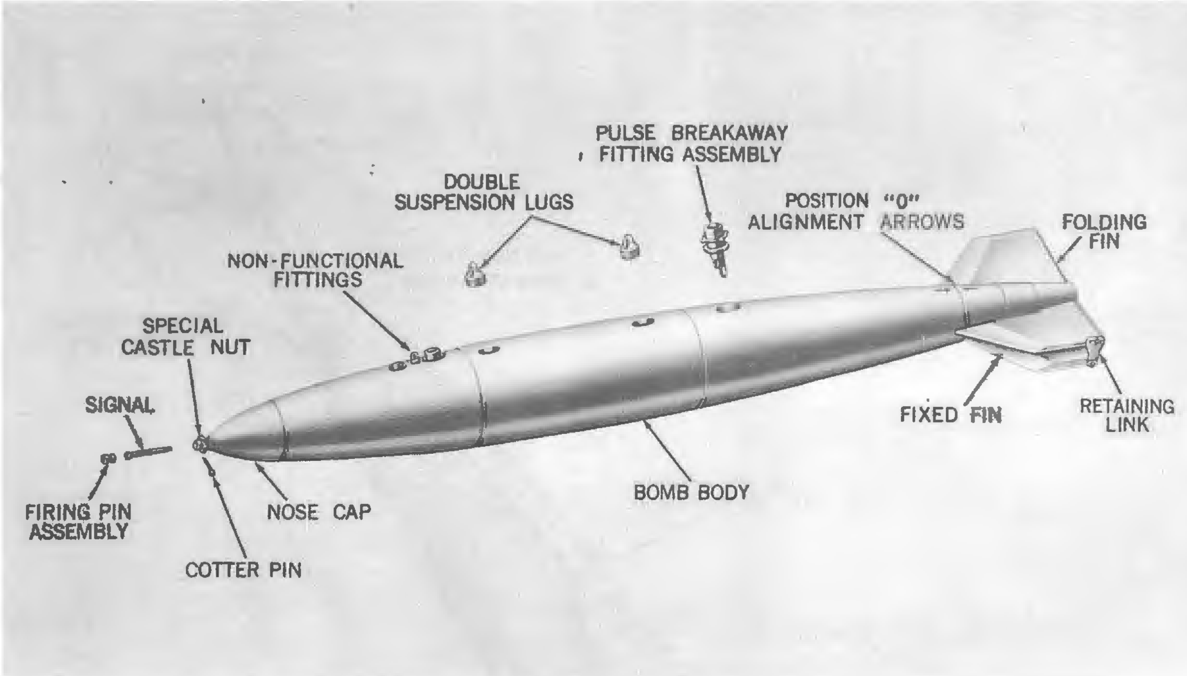

Figure 11–39.—2000-lb Practice Bomb Mk 104 Mod 0, Exploded View.

folded and latched until the bomb is released. There is a fin latch release of the folding fins by an explosive actuator at separation of the bomb. The fixed fins have no angle of incidence whereas the folding fins have a 1½-degree cant, which provides a roll moment for spin stabilization in a clockwise direction as viewed from the aft end of the bomb. Two suspension lugs, 30 inches apart, are threaded into recesses in the bomb body. A blast tube, extending at a slight angle down and aft from the nose cap of the bomb to the lower rear of the aft cone weldment, houses a pyrotechnic charge and firing-pin assembly.

The bomb is filled with a concrete and steel shot mixture which is cast in place by the manufacturer of the bomb.

When the Mk 104 Mod 0 Practice Bomb is to be carried externally on aircraft fitted with the standard stub pullout connector system, Cable Assembly CF–3104 is required to provide an electrical connection between the standard stub pylon and the bomb pulse plug. Cable Assembly CF–3104 is not required if the aircraft to be used has not been converted to the standard stub connector system.

Painting and Marking

Bombs of recent issue are painted orange, with identifying nomenclature in white, and notations for field-handling personnel in black.

Bombs of older issue are painted black, with identifying nomenclature in white, and notations for field-handling personnel in yellow.

Use

The 2000-lb PB Mk 104 Mod 0 is similar in size and shape to the Mk 28 Special Weapon and is the primary full scale practice bomb for the Mk 28 series. It is used with Firing-Pin Assembly Mk 1 Mod 0 and Signal Mk 4 Mod 3, both of which are seated in the forward end of the flash tube and locked in place by a cotter pin. The cotter pin also secures the castellated nut holding the nose cap in position.

Fittings on the top centerline of the forward cone weldment are dimensionally similar to the corresponding parent weapon fit-

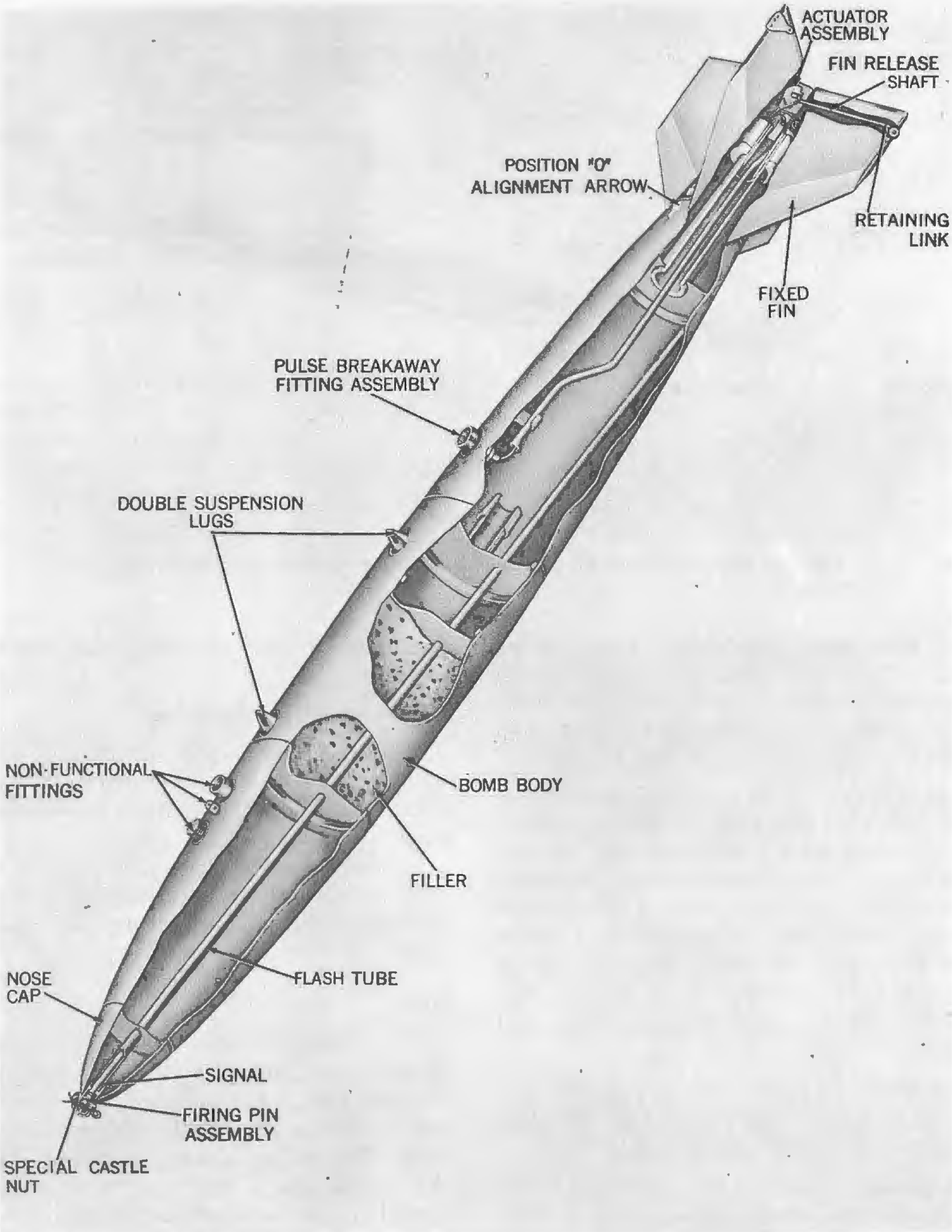

Figure 11–40.—2000-lb Practice Bomb Mk 104 Mod 0, Cutaway View.

tings. They are non-functional and are of value only as drill features.

Functioning

One pair of fins (180° opposed) are shipped in folded position and are secured at the tips of one fixed and one folded fin. The tips are connected by a sheet metal link, a fixed pin on the folding fin and a retractible pin on the fixed pin. The retractible pin is attached to an explosive powered linear actuator. The following actuation cycle is initiated when the bomb separates from the pylon.

1. Bomb is released and falls.
2. Tension in pylon cable breaks a tension wire in pulse breakaway fitting. As the fitting continues to separate, a ground wire and a 28-volt wire, within the fitting, remain as the only connection between the pylon system and the bomb. A 28-volt pulse is initiated and maintained for approximately two inches of additional separation, after which the two wires break.
3. The 28-volt pulse energizes a transformer that transmits a higher voltage output to the M52A4 primer. The primer fires and forces a diaphragm outward to retract the pin securing one end of the retaining link at the fin tip. The folding fins are now free to rotate to the open position where they are locked by spring-loaded pins.

Upon impact of the bomb, the firing pin initiates the spotting signal to produce a flash and a large puff of smoke. Smoke produced by the Mk 4 Mod 3 signal is visible from altitudes as high as 30,000 feet.

Assembly

> CAUTION: Signals and bombs are not to be unpacked in advance of requirements. If they are unpacked and not used, return them to their original containers.

1. Remove the bomb assembly from its crate by means of a hoist on the suspension lugs. Inspect the bomb for damaged seams, cracked weldments, or deformed areas which might weaken the suspension lugs or otherwise prevent serviceable use.
2. Remove the cotter pin, firing-pin assembly, special castle nut, and nose cap from the nose of the bomb.
3. Inspect the nose cap and the firing-pin assembly for damage. The firing-pin cups must not be deformed and the point of the firing pin must not project beyond the lips of the inner cup.
4. Inspect the bore of the flash tube. It must be clean and smooth, free of obstructions, and not damaged in any manner.
5. Remove the bomb fittings and the wrench, for the bolts and cap screws of the tail fin assembly, that are packed inside the nose cap. Then replace the nose cap on the bomb and install the non-functional fittings.
6. Two M52A4 primers are packaged in a plastic vial taped to the firing pin. Remove the screws securing the fairing at the extreme aft end of the bomb for access to the actuator and the firing pin. Unscrew firing pin assembly. Remove sealing washer and discard. Unpack and insert primer into chamber cavity. Finger-tighten firing pin assembly. Install one or both set screws and tighten. Replace fairing.
7. Remove the signal from its packing and inspect it for damage. The signal must not be swollen or deformed in any manner, and the primer must be flush with or slightly below the base of the cartridge. Deformed signals must not be used.
8. Insert the signal into the flash tube, primer end last. Slide it into place gently; do not force it. The base flange of the signal cartridge must rest on the shoulder of the blast tube about 1.08 inches from the nose of the tube.
9. Carefully insert the firing-pin assembly into the flash tube, with the point of the firing pin facing toward the signal.

> CAUTION: Do not apply pressure to force the firing-pin assembly into the bomb because the assembly might collapse and fire the signal.

10. Rotate the firing-pin assembly so that the two recesses in the lip of the forward

cup are alined with the two cotter pin holes in the nose of the flash tube.

CAUTION: Do not exert any pressure on the firing-pin assembly during this operation.

11. Replace the special castle nut on the flash tube, tighten the nut until it is flush with the nose of the flash tube, and insert the cotter pin through the nut, flash tube, and recesses in the cup of the firing-pin assembly.

12. Spread the ends of the cotter pin sufficiently to lock the pin in the bomb. Do not bend the ends at right angles to the axis of the cotter pin, or strike the ends to bend them into position.

13. Install the bomb in accordance with the type of rack in use and lock it securely in place.

CAUTION: Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward personnel. Loaders must not place their bodies in line with the nose or aft end of the flash tube.

Disassembly

To disassemble the complete bomb, the foregoing steps should be carried out in reverse order and the components restored to their original condition.

It should rarely be necessary to remove the complete tail fin assembly. If necessary, proceed as follows:

1. Remove the 11 flat head sheet metal screws that secure the fairing, and remove the fairing.

2. Remove the round head machine screw, self-locking nut, and plain washer securing the cable clamp at the transformer. Remove the clamp.

3. Remove the four self-tapping screws that secure the pulse plug in the aft cone weldment of the bomb. Remove the pulse plug and detach the wire at the pulse plug.

4. Remove the two field-break index screws and rotate the tail fin assembly to position "O."

5. Through the access hole toward the rear of the aft cone weldment, remove the socket head cap screw, and slide the complete tail fin assembly aft.

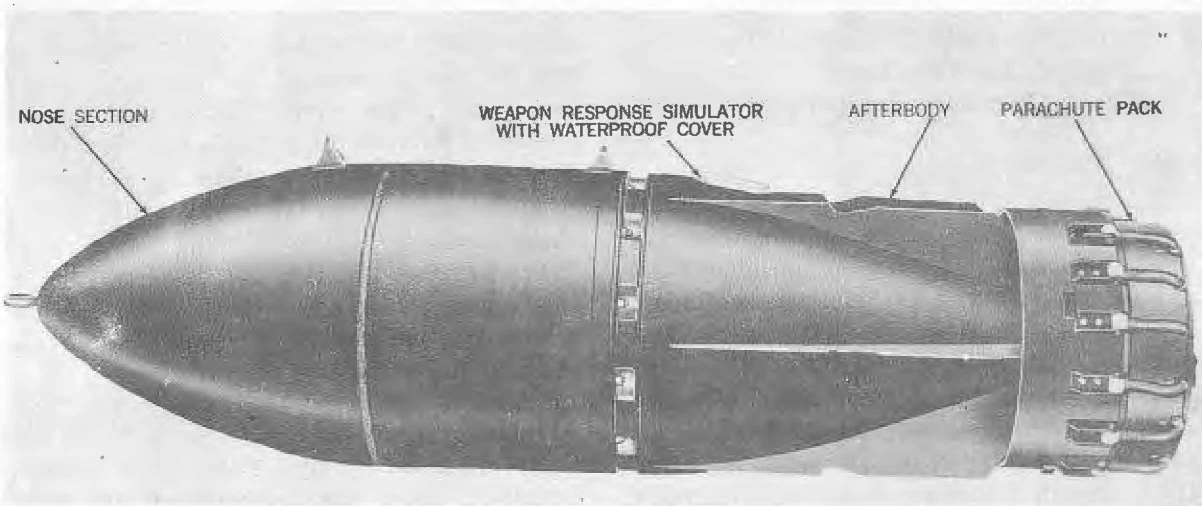

Figure 11–41.—Practice Depth Bomb Mk 100 Mod 0, Major Components.

Mark	100
Mod	0
General Arrangement	1438551
Length (in.)	122.0
Length (marker to parachute pack) (in.)	125.2
Diameter (in.)	31.34
Weight (lb)	2500
Spacing of suspension lugs (in.)	30.0
Parachute Pack	Mk 25 Mod 0
Practice Bomb Marker	Mk 17 Mod 0
Weapon Response Simulator	Mk 4 Mod 0

General Description

Practice Depth Bomb Mk 100 Mod 0, figure 11–41, is a practice bomb for Depth Bomb Mk 90 Mod 0. The nose section of the practice bomb has an afterbody and a parachute pack attached to it.

The practice bomb has four functions:

1. Trains flight personnel in the use of Control Boxes Aero 2A, Aero 2B, and Aero 3B.
2. Provides a means for target practice.
3. Provides the pilot with information about how the aircraft will respond when it is carrying the service bomb.
4. Trains ground personnel in methods of loading the service bomb on the aircraft.

The monitoring system, the IFI operation, and the manual safety switch of the service bomb are simulated in the practice bomb by means of a weapon response simulator. The simulated signals are required for training personnel in the operation of Control Boxes Aero 2A, Aero 2B, and Aero 3B. A marker can be inserted in place of the eyebolt at the nose of the practice bomb for use in target practice. The marker produces a deep red color on the water surface at the point where the bomb enters the water.

The service bomb is described in NAVY SWOP B90–1, Assembly, Test, and Storage Procedures. For information on postloading, pretakeoff, and inflight procedures, refer to the applicable Pilot's Handbook for the aircraft involved. The procedures included in the pilot's handbook also apply to the practice bomb.

The practice depth bomb consists of the following major components:

Nose Section.
Afterbody.

Parachute Pack Mk 25 Mod 0.
Practice Bomb Marker Mk 17 Mod 0.
Weapon Response Simulator Mk 4 Mod 0.

Nose Section

The nose section, figure 11–42, is a steel shell with an ogive-shaped forward end. A 1½-inch threaded opening for an eyebolt or marker, is located at the apex of the ogive. The shell is 63.27 inches long and 31.34 inches in diameter. Two suspension lugs mounted on 30-inch centers are welded to the top of the middle section of the shell. A solid steel cylinder about 18 inches long and 9½ inches in diameter, is located internally to provide the proper weight, center of gravity, and moment of inertia for the practice bomb. The cylinder is mounted in an opening through the center of a steel disk. The disk is welded in place in a circumferential groove on the inside wall of the shell.

The after end of the shell is faced with a steel disk containing twelve threaded studs around the periphery. These studs provide the securing points for the afterbody.

Afterbody

The afterbody, figure 11–43, is a tapered aluminum shell that streamlines the nose

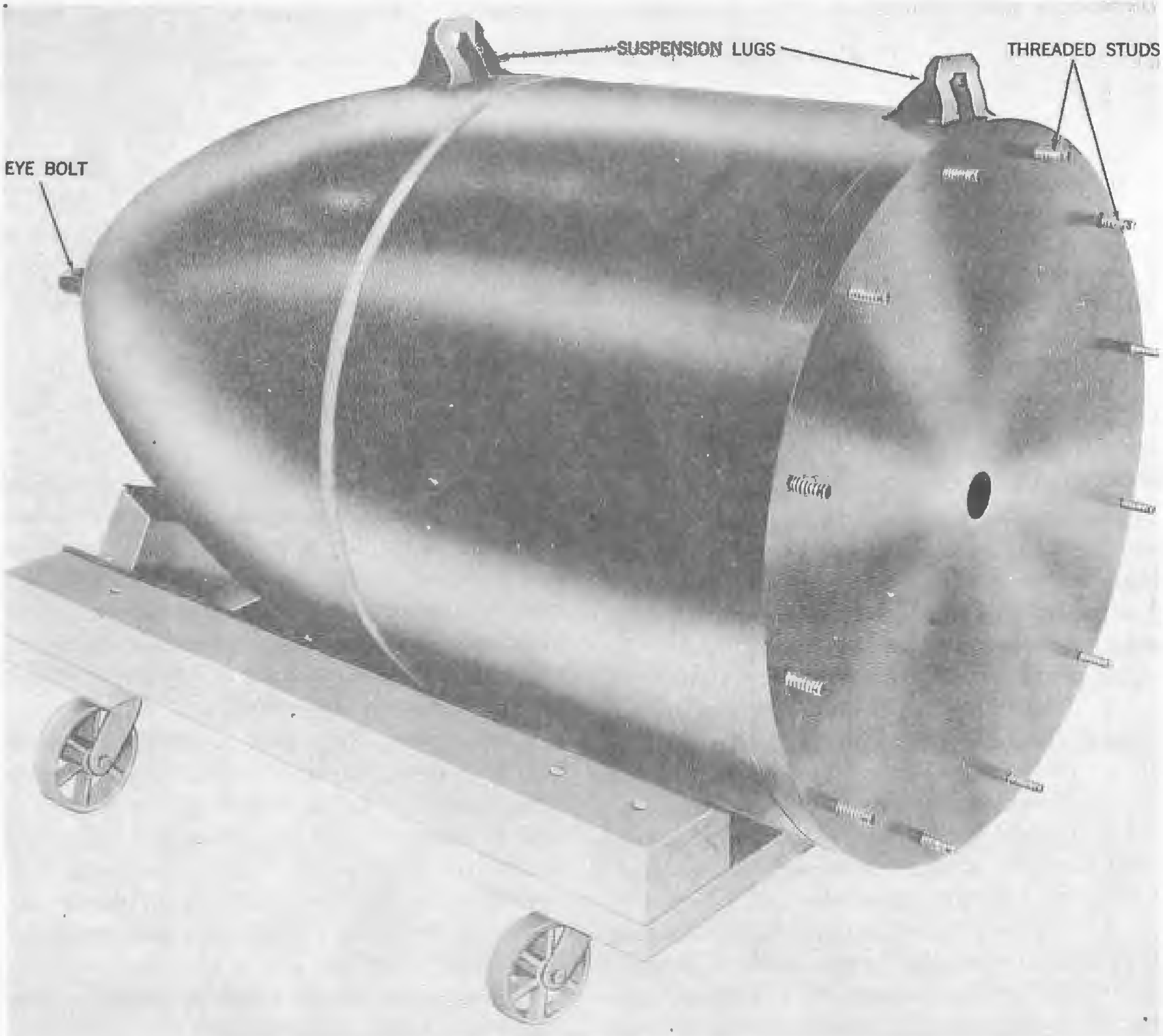

Figure 11–42.—Nose Section.

section. The shrouded fins stabilize the underwater trajectory.

The forward section of the afterbody has a steel facing with twelve bolt holes which receives the studs of the nose section. An oval-shaped cutout at the top of the afterbody has a flange with six tapped holes used to secure the weapon response simulator.

The shroud ring at the after end has twelve lugs bolted to it for attachment of the parachute suspension lines. Two socket-head bolts secure each lug to the shroud ring. Three right-angled clamps, located at the bottom and both sides of the shroud ring, and a key at the top, secure the parachute pack housing.

Parachute Pack

Parachute Pack Mk 25 Mod 0, figure 11–44, consists of a main and an extraction parachute packed in an aluminum pack housing with a cover secured by a ball-lock pack opener. The parachute pack is secured to the shroud ring with the right-angled clamps. The key at the top fits into a cutout at the top of the flange of the pack housing. It secures the top of the pack and prevents the pack from rotating.

A threaded inspection plug is located in the center of the reverse side of the pack housing. When removed, the condition of

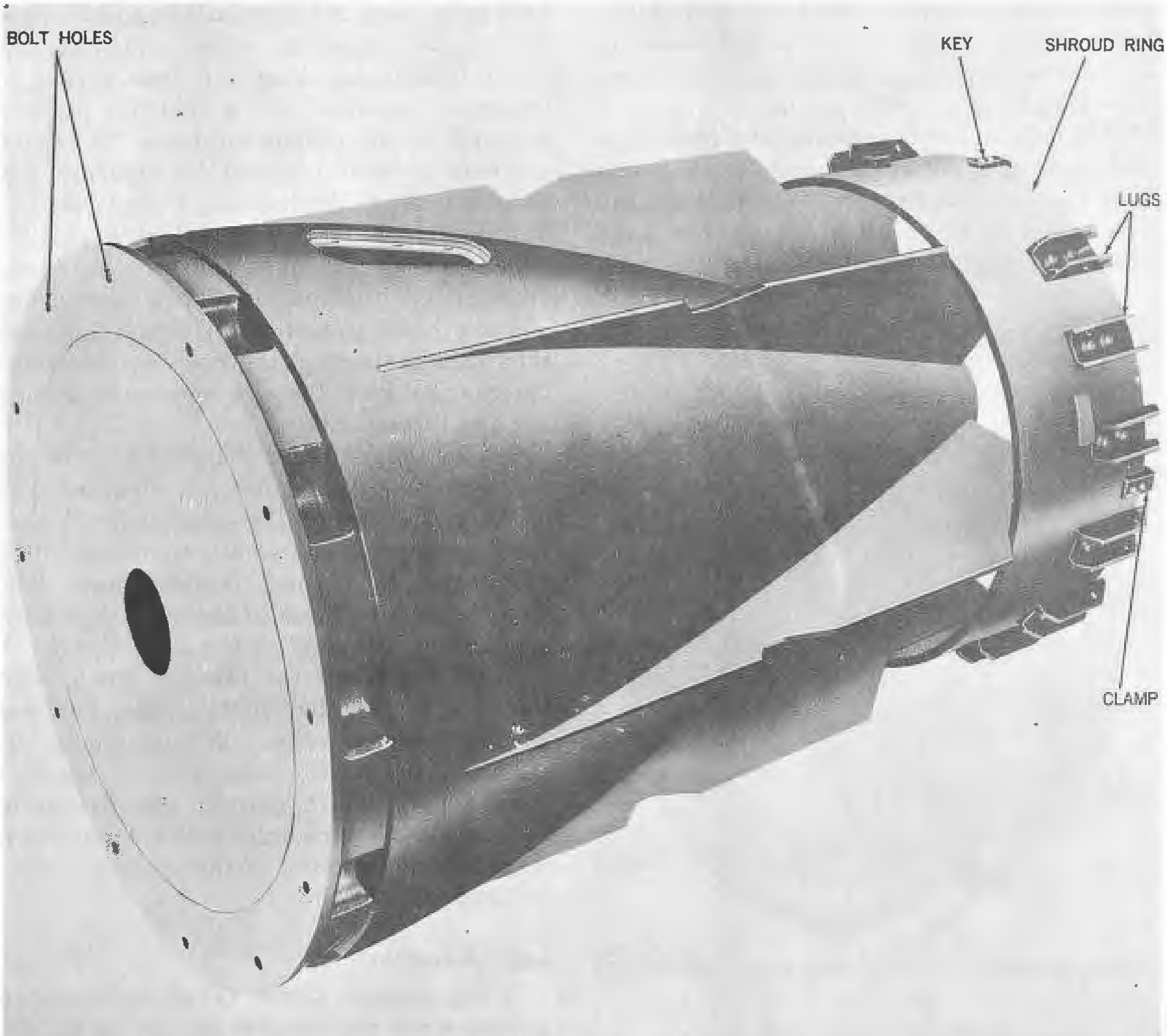

Figure 11–43.—Afterbody.

the E-ring on the base of the plunger of the pack opener may be observed.

The main canopy, when inflated, is an elliptical nylon parachute 15 feet across its largest diameter.

A red 30-inch elliptical nylon extraction parachute is attached to the vent lines of the main canopy. The suspension lines of the main parachute (which emerge from the sides of the pack housing) are attached by clevis pins to the lugs on the shroud ring of the afterbody.

The static line is folded in a replaceable pocket secured to the pack cover. One end of the static line is fitted with an adjustable slide fastener and a snap hook for attachment to the aircraft. The other end of the static line is engaged with pack opener by means of a loop and is joined to a static line extension from the main canopy.

When the bomb is released, the parachute static line pays out of the pocket as the bomb falls clear of the aircraft. When the static line comes taut, it pulls up on the pack opener, releasing it and allowing the pack cover to be ejected into the air stream by a spring inside the parachute pack. The pack cover pulls out the extraction parachute, which in turn pulls out the main canopy. In addition, the static line is connected to the main canopy by a break cord which assists the extraction parachute in pulling the main canopy out before it breaks free. As the main canopy deploys, its suspension lines pay out of the pockets in the deployment bag in which they are folded and the canopy inflates.

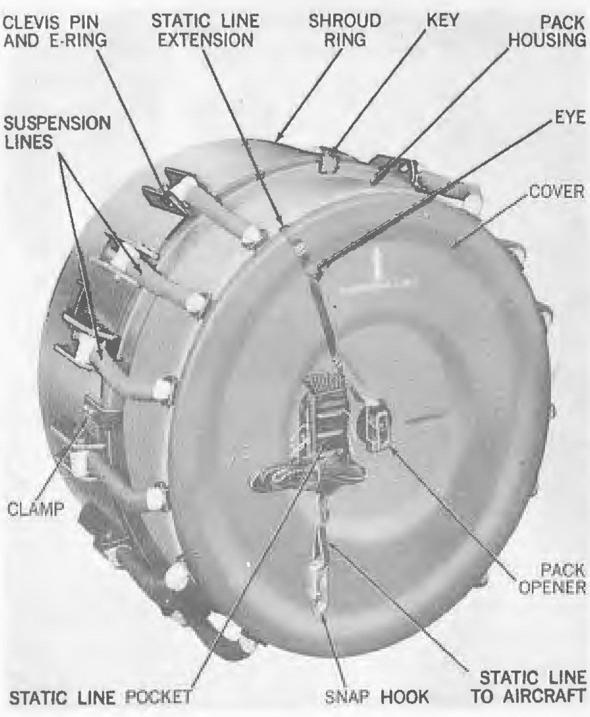

Figure 11–44.—Parachute Pack Secured to Shroud Ring.

Marker

Practice Bomb Marker Mk 17 Mod 0, figure 11–45, is used in target practice to produce a deep red color at the point where the weapon enters the water. The marker, about four inches long and four inches in diameter, consists of a plastic housing screwed to an aluminum base. A single lockwire is used between the housing and base to prevent the housing from loosening. The housing is filled with a dark green dye which is sealed against moisture by an O-ring between the housing and the base. The housing breaks open when a bomb strikes the water releasing the dye. A chemical reaction between the dye and water causes the dye to turn red.

The marker is secured to the nose of the practice bomb by means of a threaded boss on the underside of the base, figure 11–46. It replaces the eyebolt and is tightened to the nose section by use of a special wrench. The wrench fits into three of the six notches cut around the periphery of the base.

In some aircraft the practice bomb, with the marker mounted on the nose, will not fit into the bomb bay. In such cases, the marker is mounted on an adapter bracket, figure 11–47, which permits the marker to be located below the ogive surface and somewhat behind the point of the ogive as shown in figure 11–48.

Lug Adapter

A lug adapter, figure 11–49, is furnished for use when the bomb is carried on an aircraft that does not have sufficient ground

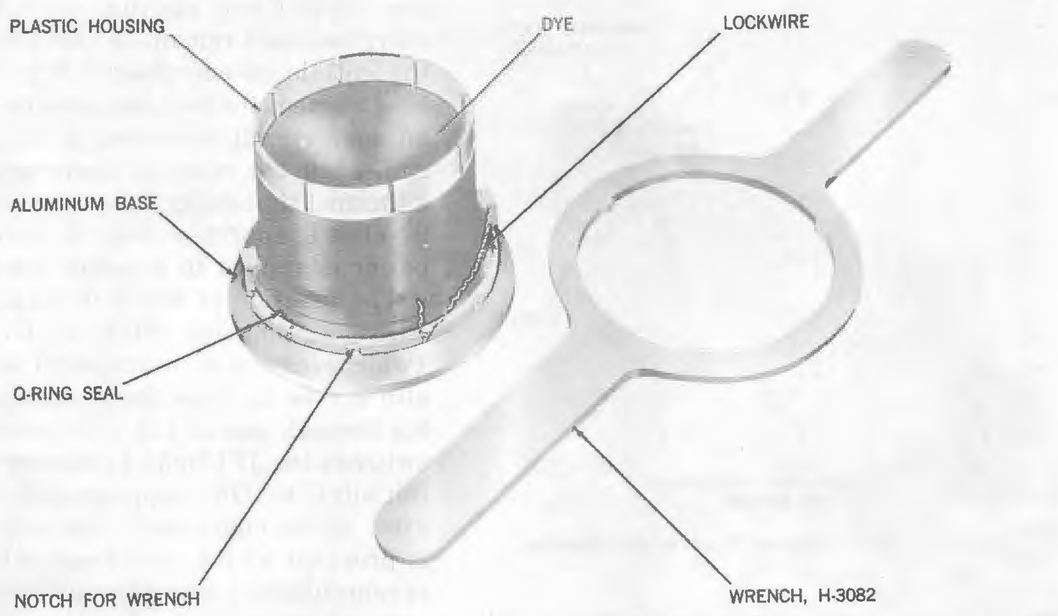

Figure 11–45.—Parachute Bomb Marker Mk 17 Mod 0 and Wrench.

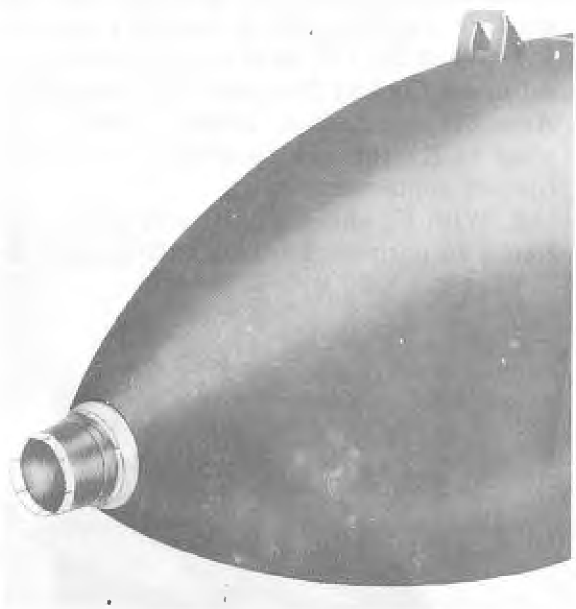

Figure 11–46.—Marker Mounted on Nose of Practice Bomb.

clearance for the weapon. The lug adapter is mounted on the forward suspension lug to raise the tail of the bomb to provide adequate ground clearance.

Weapon Response Simulator

Weapon Response Simulator Mk 4 Mod 0 figure 11–50, simulates the monitoring circuits, the IFI unit, and the manual safety switch of the service bomb. It can be used with Monitor Test Set Mk 274 Mod 0 or 1 (T–3009 or T–3009A respectively) or Control Box Aero 2A, Aero 2B or Aero 3B.

Physical Description. The simulator consists of a flanged aluminum housing that encloses three connectors and the circuit components. The flange has six bolt holes for securing the simulator to the afterbody. Eight threaded holes are located in the flange for attaching the dust cover.

Each connector is equipped with a spring-loaded ball-lock sleeve which mates with a similar sleeve on the aircraft pull-out connectors. The sleeve protects the connectors from oil and dirt while the practice bomb is carried on the aircraft. The ball-lock mechanism permits the aircraft connectors to disconnect from the connectors in the weapon response simulator when the practice bomb is released.

A red pin associated with the ball-lock

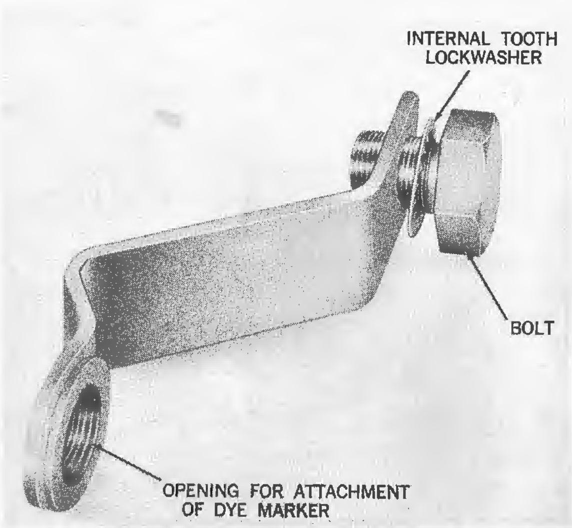

Figure 11–47.—Adapter Bracket for Marker.

mechanism of each connector indicates full engagement with the aircraft connector by protruding above the face of the weapon response simulator when the aircraft connector is inserted fully.

The connectors have 35, 14, and 8 pins respectively. However, only 21 of the pins are used in the 35-pin connector, and two each in the 14-pin and 8-pin connectors.

A two-position screwdriver-operated switch, located on the face of the simulator, is used to simulate the manual safety switch. A screwdriver is used to turn it to A (armed) or S (safe) position.

Operation. The electrical circuit of the simulator, figure 11–51, consists of components which simulate the IFI operation, the manual safety switch, and the monitoring circuit. The relay and switch designations used in the following discussion are for reference only; the designations do not appear on the components. These statements assume that the simulator is connected to the test set; and the lights referred to here are located on this test set.

The IFI operation is simulated by use of rotary relays K1, K2, and K3 and a thermal time-delay relay K4. K1 and K2 are stepping relays. The relay coil of K1 operates a single pole switch S1; K2 operates a two-pole switch S2A and S2B. These switches are stepped one position when the coil is energized, and remain in this position when the coil is de-energized. When relay K3 is energized, the contacts change position to an open circuit returning to the closed circuit when the relay is de-energized. K4 is a thermal time-delay relay in which a switch is closed approximately 5 seconds after power is applied to a heater circuit.

The function of K1 is to step S1 one position so that the OUT or IN IFI light (whichever one is on initially) goes out. It also serves to close the electrical circuit to K4 through one of the switches in K2. K2 switches the IFI light (whichever one is off initially) to ON approximately 5 seconds after K1 is energized. The 5-second delay is provided by K4. K3 keeps K1 and K2 in synchronization and thereby maintains the proper sequence of operation between the IFI operate switch and the IFI IN and OUT lights.

The operations of the weapon response simulator is described in the following steps, starting with the IFI in the OUT position.

1. When the IFI switch on either the test set or on Control Box Aero 2A, Aero 2B or Areo 3B is actuated, 28-volt power is applied to K1 through terminal d on the 35-contact connector.

2. With K1 energized, S1 steps from position 1 to position 2. This extinguishes the

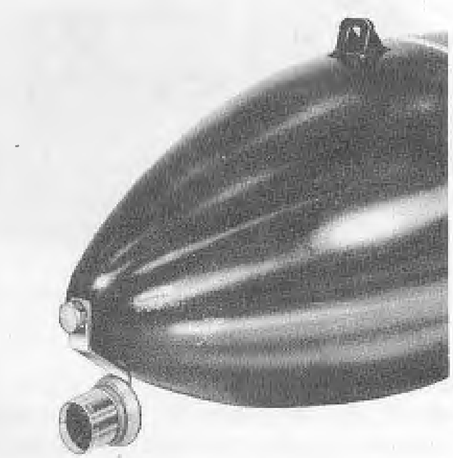

Figure 11–48.—Practice Bomb with Marker Mounted on Adapter Bracket.

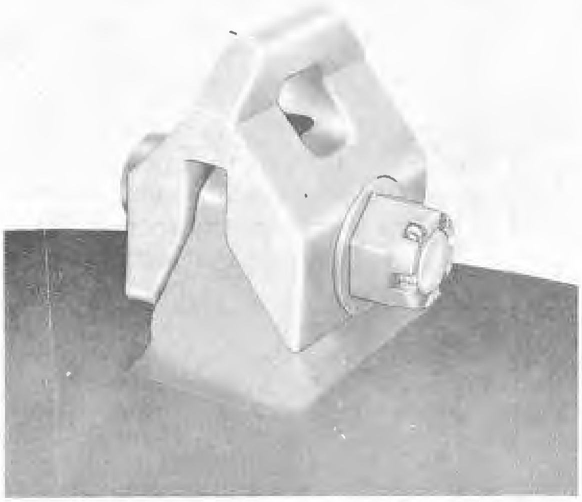

Figure 11–49.—Lug Adapter Mounted on Forward Suspension Lug.

IFI OUT light and channels the 28-volt power from L through S2A1 of K2, to the heater of K4.

3. After approximately 5 seconds, S4 closes, energizing K2 and K3 simultaneously.

4. With K2 energized, S2A and S2B step from position 1 to position 2 and the IFI IN light goes on. Between 5 and 10 seconds later, the heater in K4 cools off, S4 opens and the K3 contacts return to the closed position.

5. With K3 energized, the relay contacts open, interrupting the coil circuit of K1 and the heater circuit of K4. If the IFI switch on the test set or the control box is actuated while S4 is closed, K1 cannot be energized until S4 opens again.

The manual safety switch simulator is a

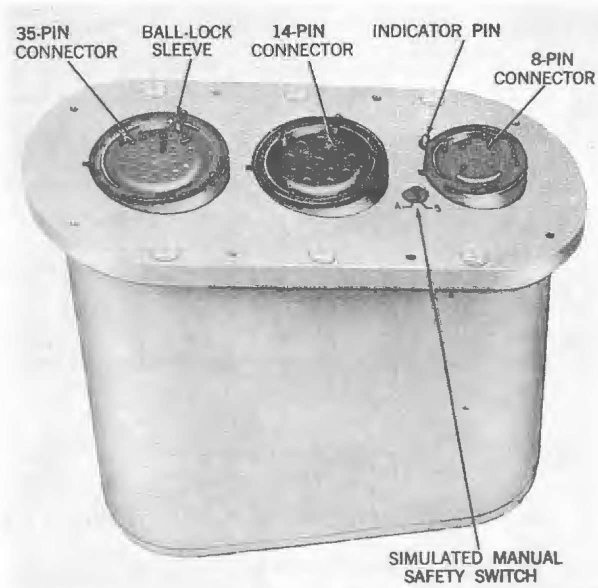

Figure 11–50.—Weapon Response Simulator Mk 4 Mod 0.

two position switch. The common lead, figure 11–51, completes a 28-volt circuit to either the MSS ARMED or SAFE light on the test set or on the control box.

The monitor circuit consists of jumpered and grounded terminals which simulate the continuity path through the connectors to components in the service weapon.

Unpackaging and Inspection

The practice weapon is packaged as five separate pieces. The packaging configuration, dimensions, and gross weights are listed in the following table.

Packaging Data

Item	Packing Configuration	Dimensions Inches	Weight Pounds
Nose Section (and Lug Adapter)	Nailed wood crate	78.5 x 41 x 41.25	2400
Afterbody	Wirebound wood crate	57 x 35 x 35	546
Parachute Pack	Cylindrical metal container	36.2 diam. x 13.5	200
Fairing	Wirebound wood crate	99 x 37 x 46	440
Accessory Box	Rectangular metal container	18.3 x 9.3 x 6.2	40

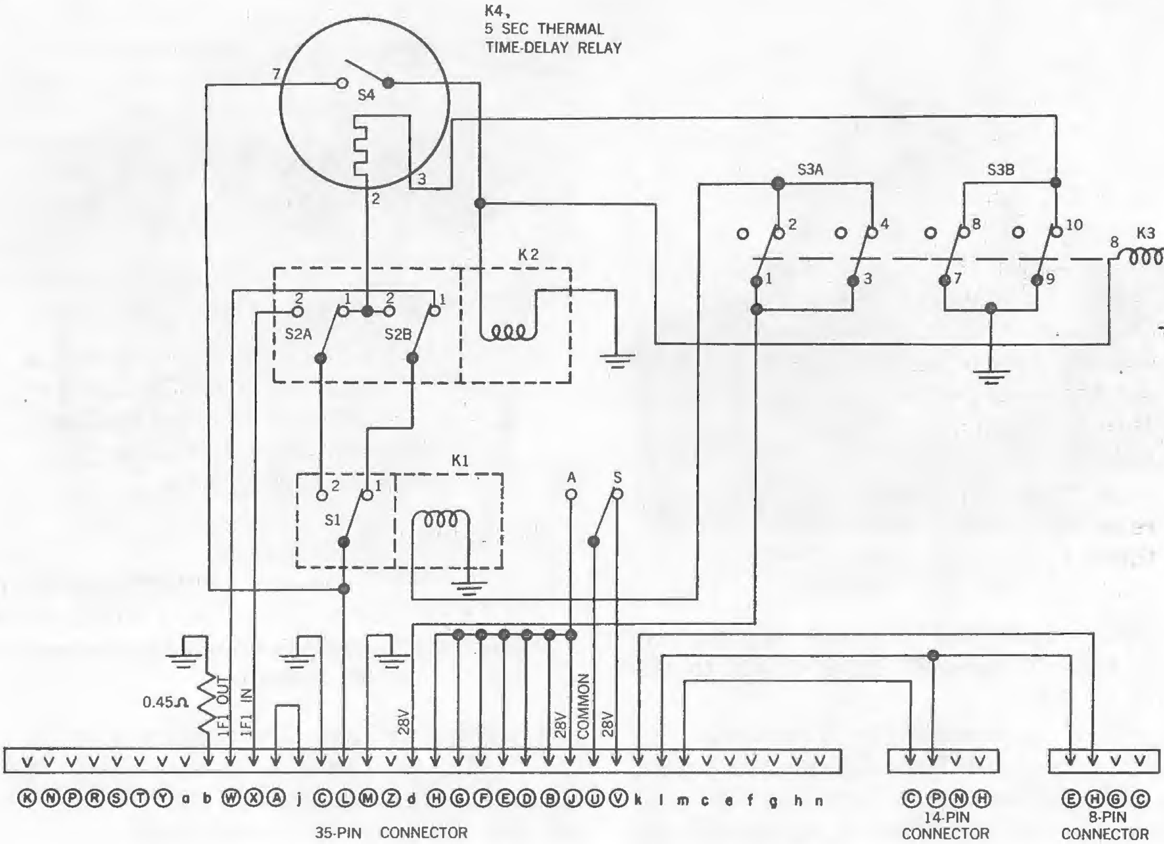

Figure 11–51.—Weapon Response Simulator Mk 4 Mod 0, Schematic Wiring Diagram.

Nose Section. The nose section is clamped to the base of the crate in a horizontal position. A metal band around the body of the nose is anchored to the base of the crate by six half-inch hex-heads bolts and nuts. The top, sides, and ends of the unsheathed crate are assembled to the crate base to form the complete crate.

The lug adapter is secured to a bracket attached to the base of the crate beneath the ogive of the nose section. The bolt that secures the lug adapter also is used to mount it on the forward suspension lug when the lug adapter is required.

UNPACKAGING. Unpackage the nose section as follows:

1. Remove the corner strappings at the top of the crate using a claw hammer or crowbar.
2. Knock away the sides and ends of the crate from the top panel, and remove the top panel.
3. Remove all nails that project into the crate leaving the sides and ends in position.
4. Remove the nuts on the six bolts, which anchor the metal frame, using a 1 3/16-inch open-end wrench.
5. Lift and remove the metal frame from the crate.
6. Using a hoist capable of lifting 2500 pounds minimum and an H–3070 sling or equal, lift the nose section by the suspension lugs, and remove it from the crate.
7. Place the nose section on an H–3045 dolly or equal, with the ogive resting against the pillow block, figure 11–42.
8. Remove the tape from the twelve bolts at the aft end of the nose section and inspect for damaged or dirty threads. Clean with trichloroethylene (stock number 55–T–5751), or similar solvent if necessary. The

washers, nuts, and cotter pins should be left on the studs until ready for assembly.

9. The base of the crate may be used as a skid for local handling by fork-lift truck. When the base is used as a skid for handling the nose section, the metal frame must be secured to the base by the six anchor bolts and nuts. The sides and end panels should be disassembled from the base.

INSPECTION. The nose section should be inspected for damage or deformation; reject if it is deformed or if deep gouges, dents, or scratches are found. Superficial abrasions or scratches are not cause for rejection.

Afterbody. The afterbody, positioned vertically, is packaged in a wirebound, slatted-wood crate which is expendable. The forward end of the afterbody rests on a felt pad at the base of the crate and is anchored with carriage bolts. The after end is secured at the top of the crate with hold-down strips. All end fasteners terminate at the same corner. The crate is unpackaged by opening these fasteners and knocking the slats away from the top and bottom of the crate.

UNPACKAGING. Unpackage the afterbody as follows:

1. Open the fastened ends of each wire loop.
2. Remove the nails at the top of the slats.
3. Knock the slats away from the top and bottom framework. As each side is freed from the top and bottom panels, it can be unfolded from the crate.
4. Remove the top of the crate and then the two hold-down strips and pads from the top of the shroud ring. Loosen the carriage bolts with a 5/8-inch open-end wrench.
5. Place the afterbody on a skid or dolly so that it lies horizontally. Three men can lift it conveniently.

INSPECTION. Inspect the afterbody for damage or deformation; reject if it is deformed or if deep gouges, dents, or deep scratches are found. Superficial abrasions or scratches are not cause for rejection.

Parachute Pack. The parachute pack is shipped and stored in a reusable steel container. The pack is secured to the inside of the cover of the container by means of a metal band consisting of two semicircular segments. The ends of each segment terminate in two bolt eyes which are locked by 5/16-inch bolts. The shroud lines are held together by cotton seine-twine.

A four-spot humidity indicator, located in the cover of the parachute pack container, provides a means for checking humidity within the container. The spots register relative humidity from 20 percent to 50 percent in 10 percent increments. The humidity inside the container is indicated by the spot that most closely approximates the lavender shade of the background. If all spots are blue, the humidity is too low; if the 50 spot is lavender, the humidity is above the safe level. In either case, the parachute should be unpackaged and left for 36 to 48 hours in an area with a relative humidity between 25 percent and 40 percent and repackaged if continued storage is planned.

UNPACKAGING. Unpackage the parachute pack as follows:

1. Check the humidity indicator on the cover of the container. If the humidity indicator shows excessive humidity, the container should be examined for failure after it is opened. This would be indicated by the presence of excessive dust, foreign matter, grease, or fungus growth in the container or packing material. A defective container should not be reused unless the cause of failure can be corrected.
2. Remove the twelve hex nuts that secure the cover to the base using a 5/8-inch speed wrench.
3. Lift the cover off the container and turn it over.
4. Remove the twine from the eyes of the parachute suspension lines.
5. Using a 5/8-inch speed wrench, loosen the two nuts which secure the retaining band and remove the parachute pack.
6. If the container is in satisfactory condition, replace the cover and secure it with the bolts.
7. Retain the empty container for future use or return it to the issue point.

INSPECTION. Inspect the parachute pack

assembly after unpackaging and before each mission as follows:

1. Inspect the parachute pack for damage or deformation; reject if deformed or punctured.

2. Inspect the exposed portions of the parachute suspension lines for abrasion; reject the assembly if the lines are damaged.

3. Inspect the static line for wear, abrasion, or improper assembly. Carefully check the tie cords that hold the static line in the pocket, figure 11–52, to be sure they are not loose. Replace the static line if unsatisfactory. A spare static line is located in the accessory box; instructions follow for replacing the static line.

CAUTION: Failure of the static line tie cords or improper assembly of the pack opener will cause the parachute pack to open before it is released from the aircraft.

4. Inspect the pack opener to make certain that the setscrew on the plunger and the E-ring on the pin are in place and tight.

5. Unscrew the inspection plug on the bottom of the pack housing. Shine a spotlight through the cylinder to examine the E-ring at the end of the plunger of the pack opener. Be sure the E-ring is inserted fully and is not deformed. If it is deformed, reject the parachute pack. Replace the inspection plug.

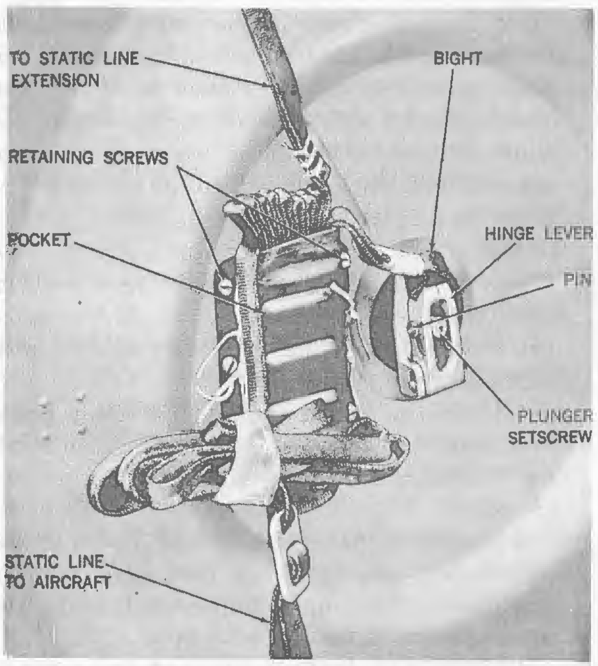

Figure 11–52.—Parachute Static Line Replacement.

Accessory Box. The accessory box is a metal container in which the following seven items are packaged:

1. Wrench (H–3082).
2. Parachute static line.
3. Practice Bomb Marker Mk 17 Mod 0.
4. Unit spares bag.
5. Accessory bag.
6. Bracket.
7. Weaon Response Simulator Mk 4 Mod 0.

These items are wrapped in fiberboard sealed with paper tape, or enclosed in waterproof bags.

UNPACKAGING. Unpackage the accessory box as follows:

1. Open the box by removing the lockwire from the latch and opening the hinged cover.

2. The wrench is in a fiberboard wrap at the top of the box. Open it by cutting the tape at the seam and unraveling the fiberboard.

3. To open the static line bag, manipulate the static line away from one edge of the bag and cut the edge with scissors.

4. Open the marker container by removing the tape and pulling apart the two halves of the container.

5. The unit spares bag is opened as follows:

a. Cut one edge of the waterproof bag, with scissors.

b. Remove the fiberboard box container, and pull apart the two halves of the container.

c. Remove the waterproof bag, cut one edge of the bag with scissors and remove the contents.

6. Open the accessory bag in accordance with step 5.

7. Unpackage the bracket in accordance with step 2.

8. Open the container of the weapon response simulator by removing the tape from the fiberboard box and opening the lid. Remove the waterproof bag containing the

simulator. Cut along the edge of the bag with scissors and remove the simulator.

INSPECTION. The following items should be inspected before using:

1. Check the parachute static line for abrasion or tears. Check the action of the snap hook to be certain it closes fully.

2. Check the marker for a cracked housing, loose lockwire, or damaged threads. If the housing is cracked, reject the marker.

3. Inspect the weapon response simulator as follows:

a. Remove the 8–32 NC–2 x ⅝-inch socket-head screws with a ⅛-inch socket wrench.

b. Examine the gasket for cracks or checks.

c. Inspect the ball-lock sleeve, connector and the red indicator pins for any deformation cracks, or breaks.

d. Inspect the base to be certain the lockwire is in place. If not, replace it after the simulator has been tested and found satisfactory. Test instructions follow.

e. Replace the dust cover, and secure it with the eight retaining screws.

Assembly and Test

The assembly procedure consists essentially of securing the afterbody to the nose section and installing the parachute pack and weapon response simulator.

The marker, when used, is not installed until the practice bomb has been placed under the aircraft prior to loading. This procedure avoids cracking the plastic housing of the marker and losing the dye.

In some instances the bomb bay may be too short to accomodate the marker when it is mounted at the nose of the weapon. In such cases an adapter bracket is used to bring the forward edge of the marker back in line with the apex of the ogive.

A horizontal assembly system is used for putting together the major components of the practice bomb. Components are assembled in the following sequence. The afterbody is bolted to the nose section. The parachute pack is installed by removing the key and the two clamps at the top and sides of the shroud ring respectively. The parachute pack is lowered so that the flange rests in the clamp at the bottom of the shroud ring with the cutout oriented at the top. The key is hooked into the cutout and secured to the shroud ring, and the two side clamps reinstalled.

The weapon response simulator is tested with Monitor Test Set Mk 274 Mod 0 or Mod 1 (T–3009 or T–3009A respectively) before it is installed, in accordance with test instructions following.

If parts such as nuts, washers, or clevis pins are missing, extras will be found in the unit spares bag and accessory bag located in the accessory box. These bags contain the items listed in the following table.

In addition to the items listed in the table, there also is a bag containing a parachute static line.

Assembly of Afterbody to Nose Section. The afterbody and nose section should be oriented so that the forward end of the afterbody faces the after end of the nose section. Four men will be required for handling the afterbody to avoid damaging the bolt threads on the nose section. If a hoist is available, an alternate method is to place a manila rope of ½-inch or ⅝-inch diameter and about 10 feet long around the notches in the fins of the afterbody. The hoist hook then can be hooked on to the rope and the afterbody raised. Since the afterbody will be unbalanced when raised, one person will be required to guide it. The procedure is as follows:

1. Remove the cotter pins, nuts, and washers from the studs on the nose section.

2. With the afterbody on the skid or dolly, bring it within about two feet of the nose section.

3. Lift the afterbody and carefully guide is so that the bolt holes pass over the studs on the nose section without damaging the threads.

4. Insert a flat washer and ½-20 NF–2 castellated hex nut over each stud. Hand tighten all the nuts before releasing the afterbody.

5. Release the afterbody and use a torque

Contents of Accessory Bag and Unit Spares Bag

Accessory Bag			Unit Spares Bag			
Afterbody	Parachute Pack	Market	Afterbody	Parachute Pack	Weapon Response Simulator	Marker
12 Castellated hex nuts.	12 Clevis	2 Internal tooth lock-washers.	4 Castellated hex nuts.	4 Clevis pins	2 Slotted fillister head screws.	2 Internal tooth lock washers.
12 Flat washers.	12 E-rings		4 Flat washers.	4 E-rings	2 Spring washers.	
12 Cotter pins		1 Special bolt	4 Cotter pins.			

wrench with a $\frac{3}{4}$-inch socket to tighten the nuts to a torque of 570 $\pm$ 20 inch-pounds.

6. Insert a 1-inch cotter pin through the hole in each stud and spread the end of the pin. If necessary, back off the nut slightly until the pin can be inserted.

Assembly of Parachute Pack to Afterbody. The parachute pack should be inspected as previously described before it is installed.

The parachute pack may be assembled to the shroud ring by two men as follows:

1. Using a $\frac{3}{16}$-inch socket wrench, remove the retaining screws and lockwashers from the key at the top of the afterbody shroud ring and the two clamps at either side. Do not remove the bottom clamp.
2. Locate the cutout in the flange of the parachute pack. With the cutout oriented at the top, lift the pack by the handles and place it in the shroud ring so that the flange drops into the bottom clamp.
3. Place the key in the cutout, figure 11–44, and replace the lockwashers and retaining screws. The screws are $\frac{1}{4}$-20 NC x $\frac{3}{4}$-inch socket-head screws and the lockwashers are internal tooth.
4. Replace the two side clamps. Be sure the lockwashers are in place.

Replacement of Parachute Static Line. If the practice weapon has been flown three missions without being dropped, it should be inspected in accordance with previous instructions and the static line should be replaced as follows:

> CAUTION: Do not disturb the position of the plunger when engaging or disengaging the static line. Inward or outward plunger movement of only $\frac{1}{4}$ inch will actuate the pack opener, ejecting the cover with force sufficient to cause injury.

1. Remove the static line pocket by unscrewing the retaining screws, figure 11–52.
2. Remove the E-ring from the pin. Loosen the plunger setscrew and remove the pin. Open the hinge lever and remove the static line bight.
3. Open the eye in the end of the static line, figure 11–44, and pass the static line assembly through this eye to disengage the assembly from the static line extension.
4. Put the eye of the new static line through the eye of the static line extension, pass the static line assembly through its eye, and pull the resulting knot tight.
5. Place the bight of the static line under the hinge lever of the pack opener, replace the pin, tighten the setscrew, and install a new E-ring.
6. Secure the static line pocket in place

with the five 10-32NF x ½-inch slotted fillister-head screws previously removed.

Installation of Weapon Response Simulator. Install the weapon response simulator as follows:

1. Using a ⅛-inch socket wrench, remove the eight socket-head screws from the dust cover. These screws are 8–32NC–2 x ⅝-inch long.
2. Remove the bag hanging from the simulator. The bag contains the mounting screws for the simulator. Place the simulator in the afterbody opening with the 35-pin connector facing forward.
3. Insert the six ¼-20 UNF–2 x ¾-inch slotted fillister-head screws using ¼-inch spring lockwashers in the six holes around the flange of the simulator. Tighten the screws uniformly.
4. Replace the dust cover and secure it with the socket-head screws.

Installation of Marker. The marker, if externally carried, is installed in the nose section after the weapon is loaded, or if internally carried, it is installed just prior to raising the practice bomb into the bomb bay.

INSTALLATION FOR EXTERNAL CARRIAGE. Install the marker as follows:

1. Unscrew the eyebolt from the nose section.
2. Make sure the 1¼-inch internal tooth lockwasher is on the threaded boss of the marker.
3. Insert the boss in the eyebolt hole and tighten with the special wrench (H–3082) shown in figure 11–45. The marker should be tightened so that the flange comes up flush with the apex of the ogive.

> CAUTION: Do not tighten the marker by turning the plastic housing. The dye will disperse over a wide area if lost from the case and will penetrate cracks and crevices; it turns red on contact with moisture.

INSTALLATION FOR INTERNAL CARRIAGE. Install the marker as follows:

1. Check the length of the bomb bay to see if the weapon with the marker attached at the nose, figure 11–46, will fit. The length of the weapon from parachute pack to marker is 125.125 inches. The bomb bay should be about 135 inches long to allow room for any pitch of the weapon when it is loaded or dropped during a mission.
2. If the bomb bay is too short, use the adapter bracket, figure 11–47. Orient the bracket as shown in figure 11–48 and install it in the nose using the special bolt and internal tooth lockwasher. A two-inch wrench is necessary. Insert the bolt through the bolt hole. The threaded hole should be below and behind the apex of the ogive.
3. Secure the marker with the lockwasher to the threaded hole in the bracket using the special wrench.

> CAUTION: Do not tighten the marker by turning the plastic housing. The dye will disperse over a wide area if lost from the case and will penetrate cracks and crevices, turning red on contact with moisture.

4. Check the lockwire on the marker to be sure it has not been damaged by the wrench. If necessary, replace the lockwire.

Installation of Lug Adapter. A lug adapter may be installed on the forward suspension lug, figure 11–49, to provide additional ground clearance for the tail of the practice bomb when it is carried externally on some aircraft. When directed by the officer-in-charge, install the lug adapter as follows:

1. Fit the lug adapter snugly over the forward suspension lug.
2. Secure the lug adapter to the suspension lug with a 1-14NF x 4⅛-inch socket-head bolt. Insert the bolt, from front to rear, into the bolt hole in the lug adapter.
3. Place a ⅛-inch thick flat washer on the bolt.
4. Screw a 1-14 castellated hex nut tightly onto the bolt.
5. Insert a ⅛ x 1½-inch cotter pin

through the castellated nut and spread the cotter pin.

Test Instructions

The weapon response simulator is the only component tested in the practice bomb. It is tested with Monitor Test Set Mk 274 Mod 0 or Mod 1 (T–3009 or T–3009A respectively). The test set indicates by pilot lights that the relays and manual safety switch simulator are operating properly and that the jumpered terminals do not have any loose connections and are connected correctly. The procedure for performing the test is described in the following paragraphs.

Preparation of Test Set.

1. Locate the test set in an area near a 115-volt, 60- to 460-cycle supply.
2. Set the test set on top of the practice weapon and secure it by fastening the straps to the bomb suspension lugs.
3. Open the test set cover and remove the cables from the case.
4. Connect the GROUND CHECK terminal on the test set panel to a good earth ground. If the test set is a Mod 1, connect the power cable to the test set receptacle labeled 95–130V, 55–460 cycles per second.
5. See that the ON-OFF switch is OFF and plug the test set power cable into a 115-volt, 60- to 460-cycle supply.

Self-Test of Test Set. Check the test set as follows:

1. Turn the ON-OFF switch ON. The POWER, GROUND CHECK, and BATTERY HEATER lights should come on and the meter should indicate a reading.
2. Rotate the LIGHT TEST switch to ON momentarily. All lights on the panel should come on. Turn the switch OFF.
3. If Monitor Test Set Mk 274 Mod 0 is used, proceed as follows:

   a. Plug the 35-pin connector of the test cable into the TEST CONNECTOR receptacle on the test set panel. All the remaining lights except the IFI IN light should come on; the BATTERY HEATER and GROUND CHECK lights should go out.

   b. Operate the IFI OPERATE switch momentarily. The IFI IN light should come on while the switch is operated.

   c. Rotate the BATTERY TEST switch to the X-UNIT position. The meter should indicate in the orange band.

   d. Turn the POWER switch OFF and disconnect the test cable.
4. If Monitor Test Set Mk 274 Mod 1 is used, proceed as follows:

   a. Rotate the BATTERY TEST switch to MC–134.

   b. If the meter does not read full scale rotate the METER ADJUST control until the meter reads at the high limit of the scale.

   c. Plug one end of the test cable into the TEST CONNECTOR receptacle on the test set panel.

   d. Plug the other end of the test cable into the CT–3111 receptacle on the test set panel, and tighten it.

   e. When the two ends of the cable are connected, all lights should be on except the IFI IN, BATTERY HEATER, and GROUND CHECK lights.

   f. Operate the IFI OPERATE switch momentarily. The IFI IN light should come on while the switch is operated.

   g. With the BATTERY TEST switch at MC–134, the meter should read in the orange band.

   h. Turn the ON-OFF switch OFF and disconnect the test cable.

Test Procedure. The weapon response simulator provides simulated indications of all monitor circuits in the service bomb. It does not simulate the battery load test however. If any of the following tests fail, reject the simulator.

Perform the test as follows:

1. Remove the dust cover from the weapon response simulator.
2. Remove the test cable from the TEST CONNECTOR receptacle and plug it into the 35-pin connector of the weapon response simulator. Install the 14-pin and 8-pin test plugs in proper receptacles. Turn the ON-OFF switch ON. All the lights in the top panel should come on. The condition of the bottom row lights should be as follows:

LIGHT	CONDITION
IFI IN	Off
IFI OUT	On
MSS SAFE	On
MSS ARMED	Off
IMPACT SWITCH	On
PULL-UP CONN 1	On
PULL-UP CONN 2	On
PULL SWITCH	On

3. Operate the IFI switch. The light that initially is on should go out when the switch is operated. Five seconds later the other light should come on.

4. If the MSS ARMED light is on, turn the screwdriver-operated switch so that the SAFE light on the test set goes on and the ARMED light goes off.

5. Pull the 14-pin test plug out of the connector with a quick hard pull. The PULL-UP CONN 1 light should go out.

6. Repeat step 5 with the 8-pin test plug. The PULL-UP CONN 2 light should go out.

7. Operate the IFI OPERATE switch momentarily if three minutes have elapsed since the last operation. The IN light should go out immediately and the OUT light should come on in approximately five seconds. Wait three minutes then depress the IFI switch again momentarily and see that the OUT light goes off and the IN light comes on. The IFI should be left in OUT position.

8. Turn the manual safety switch simulator (screwdriver-operated switch) to A and check to see that the SAFE light goes off and the ARMED light comes on. Set the switch back to S.

9. Turn the POWER switch OFF and disconnect the test gear.

10. Install the simulator in the afterbody as directed in the assembly instructions and replace the dust cover if the practice bomb will not be used immediately.

PRACTICE DEPTH BOMB MK 102 MOD 0

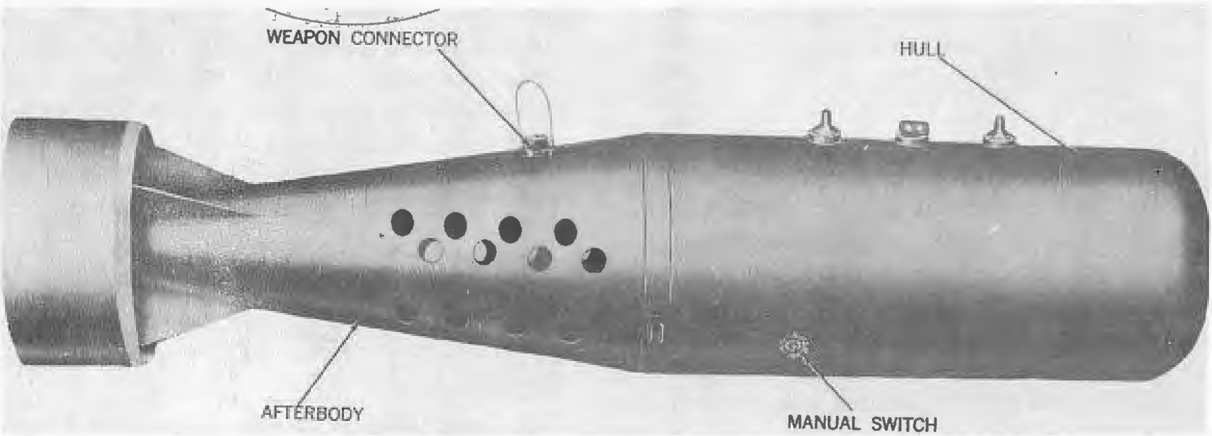

Figure 11–53.—Practice Depth Bomb Mk 102 Mod 0.

Mark	102
Mod	0
List of Drawings	LD 479317
Hull Assembly (dwg)	1501413
Afterbody	Mk 5 Mod 0 (LD 299769)
Connector	Mk 22 Mod 0 (LD 479307)
Manual Switch	Mk 52 Mod 0 (LD 479311)
Diameter (in.)	18
Length (in.)	92.375
Weight (lb)	1200
Suspension Lug Spacing (in.)	14

General Description

Practice Depth Bomb Mk 102 Mod 0, figure 11–53, is a nonexpendable practice bomb for Depth Bomb Mk 101 Mod 0. The practice bomb simulates the external outline and the weight of the service bomb. It provides a means of electrical connection with internal switches and wiring to simulate the service bomb electrically when used with Aero 6A Control Box; Monitor Test Set T-3024. It also includes a switch that can be adjusted to simulate various fault conditions.

The functions of the practice bomb are:

1. Trains personnel in the use of the Aero 6A Control Box; Monitor Test Set T-3024.

2. Aids in training air crews in the operation and capabilities of Magnetic Airborne Detection (MAD) equipment when used with the Mk 102.

3. Trains pilots and ground personnel in procedures for handling the service bomb and loading it onto the aircraft.

4. Provides pilots with information on how the aircraft will respond when carrying the service bomb.

5. Depth Dummy Bomb Mk 108 Mod 0, described later, provides a means of checking aircraft fit and separation characteristics.

The weapon response simulator assembly simulates the weapon connector, the MC–725 Arming-Safing Motor Switch (often called the inflight safety switch), the manual safety switch, and monitor circuits of the service bomb. In addition, a selector-type fault switch makes it possible for an instructor to simulate defects in the circuits and switches of the service bomb by rotating the fault switch to a desired position in setting up a training problem.

The service bomb is described in NAVY SWOP B101–1. Postloading, pre-takeoff, and inflight procedures are the same for the practice bomb as for the service bomb.

Practice Depth Bomb Mk 102 Mod 0 has three major components: a hull assembly, an afterbody, and a weapon response simulator assembly. The simulator assembly consists of a weapon connector and a manual switch for the practice bomb.

Hull. The hull assembly, figure 11–54, is a blunt-nosed steel cylinder, 45⅜ inches long 18 inches in diameter. A steel bulkhead is welded into the after-end of the hull as a closure and provides a mount for the weapon connector. The practice bomb suspended in a bomb rack by means of two suspension lugs, dwg 1252628, threaded into the top of the hull. The bomb is hoisted into the aircraft by means of a hoisting lug, dwg 1636182, threaded into the top of the hull midway between two suspension lugs. The manual switch is mounted flush with the side of the hull in an opening 2½ inches in diameter with a flanged mounting seat. The switch is properly oriented by an aligning pin in the mounting seat and a mating notch in the switch housing.

Inside the forward section of the hull, a steel disk is welded across the diameter. This steel disk makes the weight, center of gravity, and the moment of inertia of the practice bomb equivalent to those of the service bomb. The practice bomb also simulates closely the magnetic properties of the service bomb.

The after bulkhead of the hull has an opening near the top 2⅜ inches in diameter, and four tapped holes which provide mounting and attachment points for the weapon connector of the practice weapon. Two tapped holes near the perimeter of the same bulkhead provide attachment points for H–3106 lifting lugs used in vertical handling of the hull.

A grooved flange around the after edge of the hull fits against a similar flange around the forward edge of the afterbody. The hull and the afterbody are held together by means of a segmented clamp band which mates with these two grooved flanges. The clamp band, dwg 1476493–12, is made up of three segments secured with self-locking screws.

The hull and the afterbody are properly aligned on assembly by means of an aligning pin projecting from the upper edge of

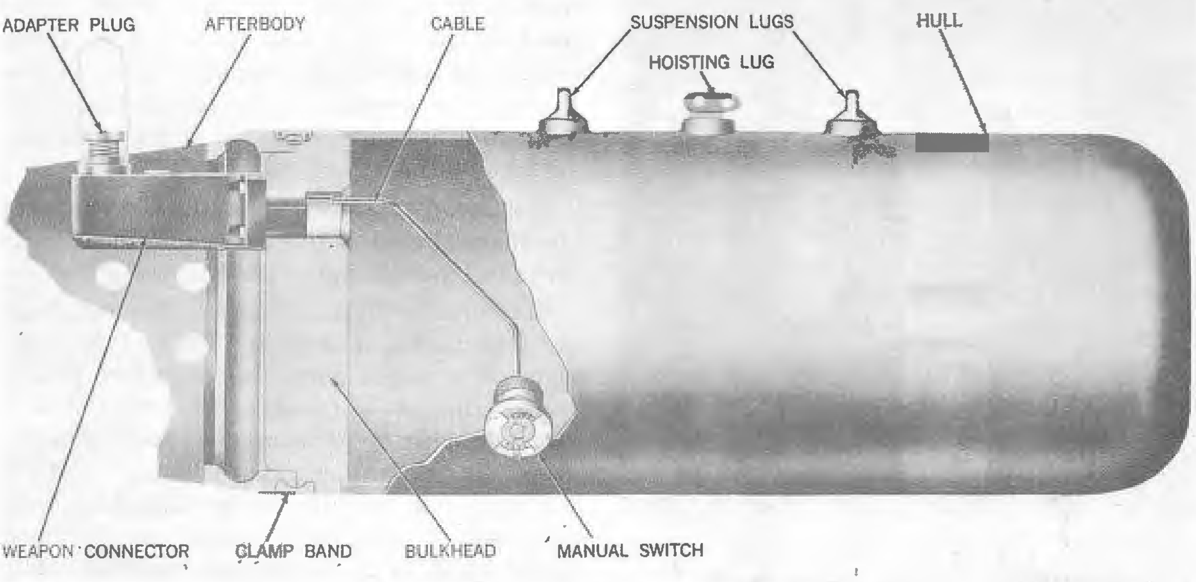

Figure 11–54.—Cutaway of Assembled Practice Bomb.

the hull and a mating hole in the forward edge of the afterbody.

Afterbody. Practice Weapon Afterbody, Mk 5 Mod 0 is a conical aluminum shell, 47 5/8 inches long, pierced with flooding and vent holes. Shrouded fins stabilize the air and underwater trajectory.

An oval opening in the top of the afterbody gives access to the weapon connector and the fault switch when the afterbody is installed on the hull. The forward edge of the afterbody has a grooved flange which mates with the clamp band, and an aligning hole which mates with the aligning pin of the hull on assembly.

Weapon Response Simulator Assembly.

GENERAL. The weapon response simulator assembly consists of two major components: a manual switch and a weapon connector, figure 11–54. Although the manual switch of the practice bomb is only a single component, it simulates the functions of two components of the service bomb: Manual Safety Switch Mk 45 Mod 0 and Rotary Switch Control Mk 11 Mod 0. Externally the manual switch of the practice bomb resembles the rotary switch control of the service bomb. The weapon connector in the practice bomb simulates the Weapon Connector Mk 21, the MC–725 switch and the monitor circuits of the service bomb.

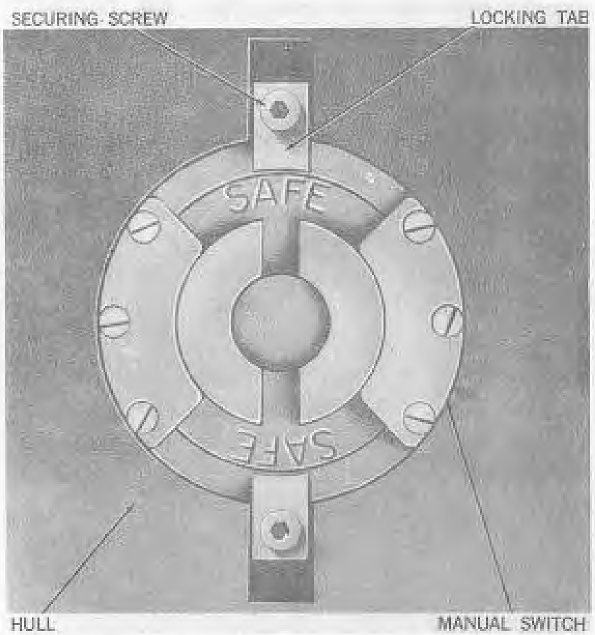

Figure 11–55.—Manual Switch Mk 52 Mod 0, Installed.


Figure 11–56.—Weapon Connector Mk 22 Mod 0, Installed.

The manual switch is mounted on the side of the hull, figure 11–55. The weapon connector is mounted on the after bulkhead of the hull, figure 11–56. The upper surface of the weapon connector is accessible through the opening in the top of the afterbody and is approximately flush with the surface of the afterbody.

A cable, dwg 1541079, electrically connects the manual switch to the weapon connector and fault switch, figure 11–54.

MANUAL SWITCH. Practice Weapon Manual Switch, Mk 52 Mod 0, figure 11–55, consists of a single pole, double throw rotary switch that is operated by an attached control mechanism. The manual switch is encased in an aluminum housing and is mounted in an opening in the side of the hull. It is held in place by two steel tabs fastened to the hull with self-locking screws, dwg 1476493–23. A notch in the side of the housing matches an alignment pin in the flanged mounting seat in the hull. The back of the housing is fitted with a male plug and threaded sleeve for making connection with the cable from the weapon connector. The entire unit is sealed with O-rings.

The switch has two positions, SAFE and ARMED, indicated by engraved lettering on the outside of the control mechanism. When the control mechanism is rotated to either the SAFE or ARMED position, it is locked in place by spring loaded balls inside the mechanism.

To operate the control mechanism, Arming Wrench H–3113 is inserted against a spring-loaded piston in the center of the control mechanism, figure 11–57. This releases the locking balls and the mechanism can be rotated by turning the wrench. Turning the wrench clockwise arms the switch and counterclockwise safes the switch. When the new position is reached, the wrench is forced out of the piston and the spring-loaded balls again lock the mechanism in place.

As an added safety factor, when the control mechanism is not locked in either of its two positions, the arming wrench cannot be pulled out.

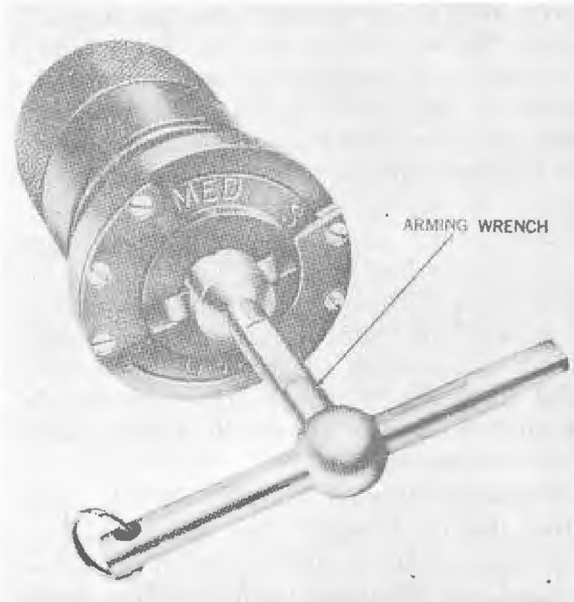

Figure 11–57.—Manual Switch Mk 52 Mod 0 and Arming Wrench.

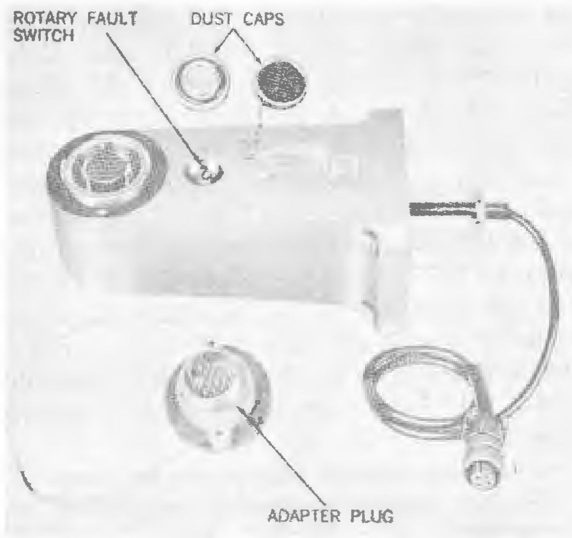

Figure 11–58.—Weapon Connector Mk 22 Mod 0 and Adapter Plug.

WEAPON CONNECTOR. Practice Weapon Connector Mk 22 Mod 0, figure 11–58, provides access to the electrical circuits in the practice bomb.

The connector assembly consists of an aluminum housing, adapter plug, and Motor Driven Switch Mk 53. A rotary fault switch is mounted in the same housing for convenience of access but does not function as part of the connector. The fault switch is described separately.

The connector housing is mounted in an opening in the after bulkhead and is secured by four self-locking screws, dwg 1476404–19.

One end of the adapter plug mates with the receptacle in the weapon connector, and the other end mates with a cable from the aircraft. In operation, a wire bail on the adapter plug is attached to the aircraft. If the weapon is released from the aircraft, the adapter plug is pulled out of the connector receptacle and remains with the aircraft.

The connector receptacle consists essentially of two parts: a female receptacle and three steel retainer balls. The female receptacle mates with its male counterpart in the adapter plug. The outside surface of the adapter plug sleeve has three L-shaped grooves which engage the retainer balls in the connector receptacle. The adapter plug has two positions, LOCKED and UNLOCKED as engraved on top of the plug, figure 11–58, which are determined by the position of the stop pin in the slot between these indicated positions. The adapter plug must be in the UNLOCKED position before it can be installed in the weapon connector. Turning the adapter plug clockwise locks the weapon connector by means of the retaining balls. The stop pin halts the rotation of the sleeve when it is in the LOCKED position and a set screw secures the sleeve in that position.

When the adapter plug must be removed from the weapon connector for testing or other purposes, the set screw must be loosened and the sleeve turned to the UNLOCKED position. However, if the bomb is dropped from an aircraft, the weight of the bomb will pull the locked adapter plug from the connector.

A rubber boot on the adapter plug seals the joint between plug and receptacle. A protective dust cover is installed on the exposed threads of the adapter plug when the bomb is in storage or shipment. When the dust cover is removed from the adapter plug, it is secured under a spring clip located on top of the weapon connector; to prevent loss it is attached to the clip by a short chain.

Motor Driven Switch Mk 53 simulates the MC–725 switch in the service bomb. Mounted in the forward part of the connector housing, it consists of a rotary wafer switch and a small electric motor. When the motor operates, the switch is rotated to either of two positions. In one position it closes a simulated ARMED circuit and in the other a simulated SAFE circuit. The switch has two sets of contacts, one for monitoring the armed and safe position and one for operation of the motor.

A 32-inch cable electrically connects the manual switch with the weapon connector. The cable is clamped to the forward end of the weapon connector housing and passed into the housing where it is permanently connected to various terminals. The other end of the cable is fitted with a standard female AN connector, which mates with the plug in the back of the manual switch.

FAULT SWITCH. The fault switch is located in the connector housing, figure 11–58, and is protected by a dust cap when the switch is not in use. It is a rotary, five-position switch, operated by turning the slotted rotor with a screwdriver. The fault switch simulates defects in the service bomb by opening certain circuits in the practice bomb.

Dummy Bomb

Depth Dummy Bomb, Mk 108 Mod 0 is an expendable dummy form of the Mk 102 bomb and is used for fit tests on aircraft prototypes and for nonrecoverable drops from aircraft. It is a duplicate of the Mk 102 with the following exceptions:

1. It does not contain any of the switches or associated wiring.
2. It contains a Weapon Dummy Connector, Mk 23 Mod 0 which is unwired but is capable of receiving an adapter plug.
3. The hull has no opening for a manual switch or a weapon connector.

Functioning

The practice bomb simulates the manual switch, the MC–725 switch, the series monitor circuit, and the pressure monitor switch circuit of the service bomb. The practice bomb also incorporates a fault switch that can simulate various faults which might appear in the service bomb. Operation of the practice bomb consists of applying voltage to its circuits and operating its switches in conjunction with either a monitor test set or an aircraft control box. A schematic wiring diagram of the practice bomb appears in figure 11–59. In this section, all the pins referred to are on the weapon connector receptacle.

Simulated Manual Safety Switch and Series Monitor Circuit. The manual safety switch and rotary switch control of the service bomb are simulated in the practice bomb by Manual Switch Mk 52, previously described. This switch simulates the SAFE and

ARMED conditions of its service counterpart. The associated wiring in the practice bomb simulates the rest of the series monitor circuit in the service bomb. Operation of the manual switch consists of rotating it to the SAFE or ARMED position, thus changing the circuit configuration of the practice bomb.

MANUAL SWITCH IN SAFE POSITION. When the manual switch is rotated to the SAFE position and the fault switch is in position 1, a circuit is completed from pin G and pin M to pin T through the fault switch and the manual switch. The circuit from pin G to pin T simulates the series monitor circuit with the high-voltage power supply installed in the weapon, and the circuit from pin M to pin T simulates the series monitor circuit when the high-voltage power supply is not installed.

If the fault switch is in position 4 both simulated circuits are open. This simulates a fault in the service weapon as indicated in the following table.

MANUAL SWITCH IN ARMED POSITION. When the manual switch is rotated to the ARMED position and the fault switch is in position 1, a circuit is completed from pin V to pin T through the fault switch and the manual switch. This simulates that part of the monitor circuit seen by the aircraft control box: the manual safety switch ARMED monitor and the pull-up switch monitor contacts closed.

If the fault switch is in position 5, the circuit is open. This simulates a fault in the service weapon as indicated in the preceding table.

MOTOR DRIVEN SWITCH. Motor Driven Switch Mk 53, described previously is located in the housing of the weapon connector for the practice weapon. The switch has two sets of contacts which operate simultaneously: the power contacts which act as limit switches controlling the power to the motor, and the monitor contacts which indicate the ARMED and SAFE positions of the switch. The motor driven switch simulates the MC–725 switch (in-flight safety switch) of the service weapon.

Fault Switch Simulations

Position of Switch	Simulated Service Weapon Fault
1	None—does not interfere with circuits.
2	MC–725 switch unable to move to ARMED position because: a. Timer not in home position. b. Low voltage power supply has been initiated. c. MC–725 switch motor or wiring is faulty. d. Connector Cable CF–3011 or MC–725 Switch is faulty.
3	MC–725 Switch unable to return from ARMED to SAFE position because motor or wiring is defective.
4	Open series monitor circuit because: a. Pull-up switch has operated or is faulty. b. Manual safety switch is not in SAFE position or is faulty. c. X-unit connector is not connected or is faulty. d. Weapon connector cable CF–3011 is faulty.
5	Open monitor circuit seen by control box (pull-up switch and ARMED Manual Safety Switch) because: a. Pull-up switch has operated or is faulty. b. Manual safety switch is not in ARMED position or is faulty. c. Weapon connector cable CF–3011 is faulty.

ARMING THE SWITCH. To move the switch to the ARMED position voltage is applied to the motor circuit through pin K or J. Since a ground on pin S is applied to the motor through the fault switch and the power contacts of the motor-driven switch, the motor operates and drives the switch toward the ARMED position indicated by the dotted lines in figure 11–59. After four to seven seconds of operation the power contacts open and the ground is removed from the motor. The motor stops and the switch remains in the ARMED position.

At the outset of the arming operation, a

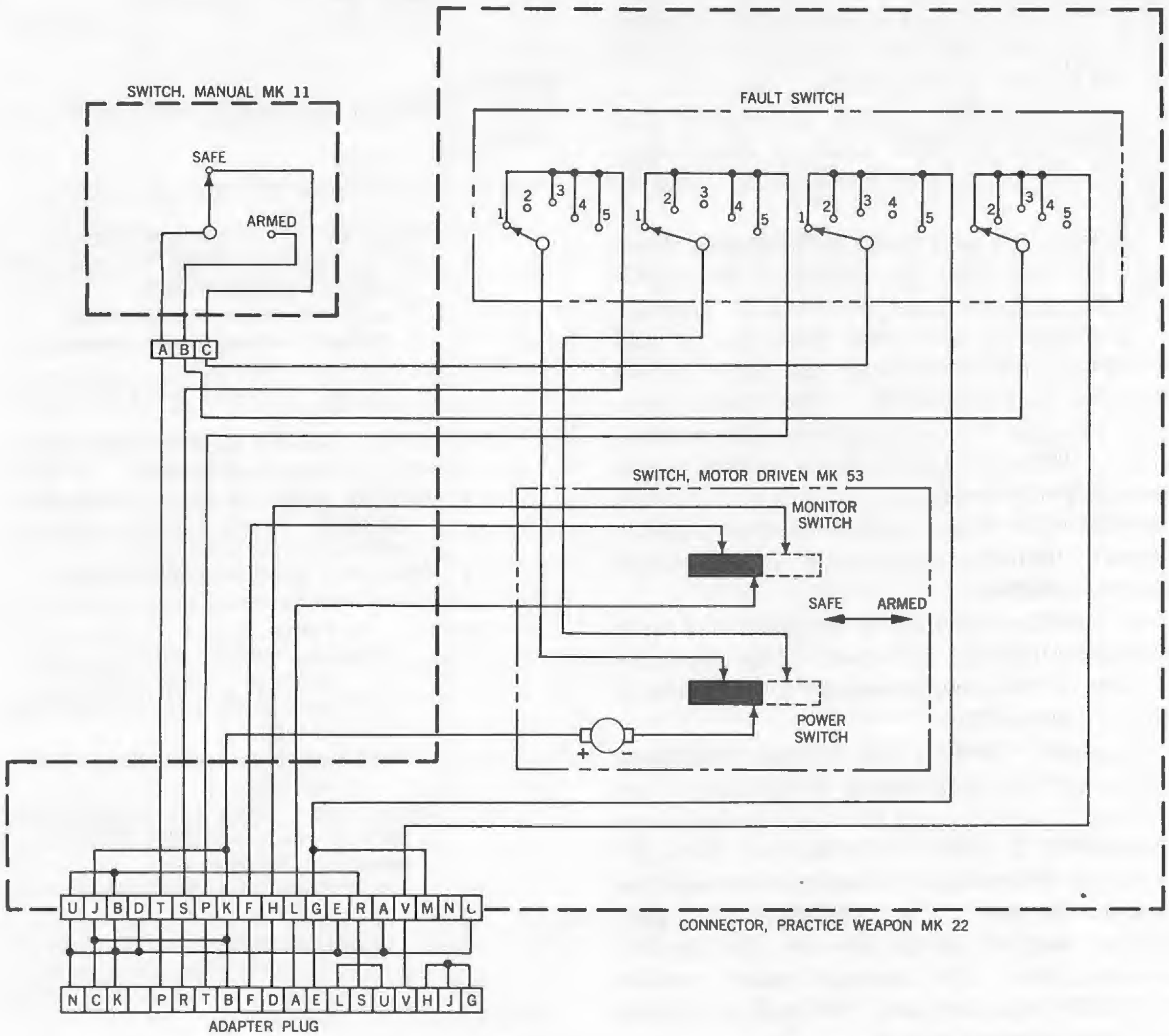

Figure 11–59.—Schematic Wiring Digram Practice Depth Bomb Mk 102 Mod 0.

circuit is complete from pin L to pin F through the monitor contacts. As the switch moves toward the armed position, the circuit from pin L to pin F is opened by the changing position of the monitor contacts and a circuit from pin L to pin H is completed. For a brief interval during the travel of the switch the circuit from pin L is completed to both pin F and pin H.

If the fault switch is in position 2 before beginning the arming operation, the circuit from pin S to the motor is open and the motor will not operate. This simulates the faults indicated in the preceding table.

SAFING THE SWITCH. To move the switch from the ARMED to the SAFE position, voltage is applied to the motor circuit through pin P, the fault switch, and the power contacts of the motor driven switch. Since a ground on pin K is applied to the motor, the motor operates but in the opposite direction because of the reversed polarity of the applied voltage. The switch is driven toward the SAFE position. After four to seven seconds of operation, the circuit from pin P to the motor is broken and the motor stops. The switch remains in the SAFE position.

At the outset of the safing operation a closed circuit exists from pin L to pin H through the monitor contacts. As the switch moves toward the SAFE position, the circuit from pin L to pin H is opened by the changed position of the monitor contacts and the circuit from pin L to pin F is completed. For a brief interval during the travel of the switch the circuit from pin L is completed to both pin F and pin H.

If the fault switch is in position 3 before beginning the safing operation, the circuit from pin P to the motor is open and the motor will not operate. This simulates a fault in the service weapon as indicated in the simulations table.

Simulated Pressure Monitor Switch. The pressure monitor switch of the service weapon is simulated in the practice weapon by a jumper from pin R to pin B of the weapon connector. This simulates the normal closed condition of the pressure monitor switch in the service weapon. The practice weapon does not simulate an open condition of the pressure monitor switch.

Unpackaging and Testing

The procedures to be followed in preparing the practice bomb for use consist of two major steps: removing the bomb from its packaging, and testing the electrical circuits and switches in the bomb. When defective components are discovered follow the replacement procedures described later.

Unpackaging the Bomb. The bomb is shipped completely assembled. No spare components or accessories are packaged with the bomb.

The practice bomb is shipped on a wooden skid secured by three metal bands. Unpackaging the bomb consists of removing the bomb from the skid and placing it on a truck dolly:

1. Cut the three metal bands with metal cutting shears.

2. Attach an H-3102 sling to the bomb suspension lugs and to a hoist (2000-pound minimum capacity).

3. Lift the bomb from the skid and place it on an H-3103 truck dolly with the nose of the bomb resting against the pillow block.

4. Remove the sling.
   NOTE: All inspecting, testing, and parts replacement may be done with the weapon on the H-3103 dolly.

Unpackaging Spare Components. If testing shows that a component of the bomb is defective it is replaced by a spare component. Spare components are individually packaged in reusable aluminum containers. The containers are lined with foam plastic to cushion the component during shipment. Four latches secure the cover of each container and, during shipment, two of the latches are secured by lead car seals. Desiccant is included in each container.

The container may be shipped individually or in quantity. When shipped in quantity they will normally be overpacked in wooden boxes.

A spare component is unpacked as follows:

1. Remove the wooden overpacking, if present.

2. Remove the lead car seals from the container latches, open the latches and remove the container cover.

3. Inspect the humidity indicator card. If excessive humidity is indicated, inspect the component with particular care to insure that it has not been adversely affected. In addition examine the container to determine if the humid condition resulted from container failure. Defective containers should not be reused unless the cause of their failure is readily correctable.

4. Lift out any loose cushioning and remove the component.

5. Replace the cushioning and the cover. Set the container aside for future use or return it to the issue point.

A rejected component may be packed in the container from which its replacement was removed, and the container appropriately tagged.

Testing. The components to be tested in the bomb are the manual switch, weapon connector, adapter plug, motor driven switch, fault switch, and their associated wiring. The receiving activity will test the training weapon using aircraft power along with the appropriate aircraft check sheets, in order to assure that the training weapon is reliable. The monitor Test Set T-3024 will be used during assembly/ disassembly procedures to train personnel in its use. One position of the fault switch is tested with an ohmmeter.

CAUTION: Do not attempt to apply voltage to the practice bomb from any sources other than those mentioned in this publication. The correct voltage and polarity is supplied only by the monitor test set or the aircraft control box.

The test sets indicate by lights that continuity exists in the weapon circuits. Each test set can be self-checked for possible defects. Procedures for the self-check and for the weapon tests are described in the following paragraphs.

PREPARATION OF THE MONITOR TEST SET. Initial preparation of the monitor test set is the same for the self-check and the weapon test.

NOTE: This test set is self-powered and therefore needs no external source of power. The test set is prepared as follows:

1. Remove the top case and open the hinged lid inside the top case.
2. Remove the cables and ground strap.
3. Connect the lug end of the ground strap to the GROUND post on the test set panel.
4. Connect the clip end of the ground strap to a good earth ground.

All these connections are maintained for both the self-check and the weapon test.

SELF-CHECK OF MONITOR TEST SET. For the purpose of self-checking, the T-3024 is provided with two connectors mounted on the hinged panel in the top half of the container. Two cables are provided with the test set: CT-3057 and CT-3058. If the set is to be fully checked tests must be conducted with both cables as indicated in the following paragraphs.

If the lights do not come on or go off as specified during the self-check, the test set is defective. For trouble shooting procedures, refer to NAVY SWOP T3024-2. The self-check is performed as follows:

USING CABLE CT-3057.

1. Plug the standard male AN connector on CT-3057 into the connector on the front panel of the test set. Plug the female connector on the other end of the cable into the CT-3057 TEST connector on the hinged lid in the top case of the test set.
2. Operate the POWER switch to the ON position. The W/H SAFE, BATTERY-ON, and PRESSURE lights should come on. If all three lights do not come on, there is a defect in the test set.

USING CABLE CT-3058.

1. Plug the standard male AN connector on CT-3058 into the connector on the front panel of the test set. Plug the special connector on the other end of the cable into the CT-3058 TEST connector on the hinged lid in the top half of the container.
2. Operate the POWER switch to the ON position. All four lights on the panel should come on. If all four lights do not come on, there is a defect in the test set.

TESTING PRACTICE WEAPON WITH MONITOR TEST SET. The T-3024 checks the continuity of the simulated series monitor circuit, and the operation of the manual switch. The test set is powered by its own 6-volt battery. Cable CT-3057 is used when testing through the adapter plug and cable CT-3058 is used when testing directly through the weapon connector. Tests must be performed with both cables. The procedures followed in testing the weapon are described in the following paragraphs.

USING CABLE CT-3057.

1. Plug the standard male AN connector on cable CT-3057 into the connector on the front panel of the test set. Plug the female connector on the other end of the cable into the adapter plug on the weapon. Rotate the manual switch to the SAFE position. Rotate the fault switch to position 1. The weapon now is ready to be tested.

2. Operate the test set POWER switch to the ON position. The BATTERY-ON, W/H SAFE, and PRESSURE lights should come on.

3. Rotate the manual switch to the ARMED position. The test set BATTERY-ON light should go out.

4. Rotate the manual switch to the SAFE position. The test set BATTERY-ON light should come on. Rotate the fault switch to position 4. The BATTERY-ON light should go out.

TESTING POSITION 5 OF FAULT SWITCH. Position 5 of the Fault Switch does not enter into any of the circuits checked by the aircraft power or the monitor Test Set T-3024 and must be tested with an ohmmeter as follows:

1. Insert the adapter plug into the weapon connector.

2. Rotate the manual switch to the ARMED position. Rotate the fault switch to position 5.

3. Connect an ohmmeter across pins P and V of the adapter plug. The meter should indicate an open circuit.

4. Rotate the fault switch to any other position. The meter should indicate a closed circuit.

Troubleshooting. Users of this publication must not repair defective components but must replace them with new ones. Therefore troubleshooting consists simply of localizing an indicated trouble to one of three replaceable components: the adapter plug, the manual switch, or the weapon connector. (The fault switch and the motor driven switch are included in the weapon connector.) Procedures for removing and replacing components follow under Disassembly and Assembly.

The following steps should localize any trouble.

1. Replace the adapter plug with a new one and re-run that part of the test which indicated trouble. If trouble is still indicated, reinstall the original adapter plug and proceed to step 2.

2. Replace the manual switch with a new one. With the manual switch connected to the cable but not mounted, re-run that part of the test which indicated trouble. If trouble is still indicated, proceed to step 3.

3. Connect a new weapon connector to the original manual switch, without mounting either component on the hull. Re-run that part of the test that indicated trouble. If the trouble has been corrected, mount the original manual switch and the new weapon connector on the hull.

4. If, after these three steps, trouble is still indicated, it is possible that more than one component of the bomb is defective. In such a case, replace all the components with new ones and then substitute all the old components one at a time until the trouble reappears. This will identify the defective components.

Assembly. It is assumed that all assembly is taking place on the H-3103 dolly. Assembly procedure consists of three steps in this order: the weapon connector is mounted on the after bulkhead of the hull; the manual switch is joined to the weapon connector cable and mounted in the side of the hull; the afterbody is fastened to the hull.

WEAPON CONNECTOR INSTALLATION. Installation of the weapon connector requires a piece of stiff wire at least 32 inches long for fishing the cable through the hull to the manual switch opening. The weapon connector is installed as follows:

1. Insert the guide wire through the manual switch opening in the hull and bring the end of it out through the weapon connector opening in the after bulkhead.

2. Attach the guide wire to the end of the weapon connector cable.

3. Draw the cable through the weapon connector opening and insert the weapon connector housing in the opening.

4. Fasten the weapon connector housing to the after bulkhead with four self-locking screws, dwg 1476493–19, tightening them with a torque of 42 to 50 foot-pounds.

MANUAL SWITCH INSTALLATION. Install the manual switch as follows:

1. With the weapon connector installed, draw the cable through the manual switch

opening in the side of the hull with the guide wire.

2. Install the cable connector on the manual switch and secure it with the threaded sleeve on the cable connector.

3. Orient the manual switch in the opening in the hull by matching the aligning pin in the flanged seat with the notch in the switch housing and install the switch.

4. Locate the two locking tabs with the crescent ends toward the switch, figure 11-55, and secure the assembly with self-locking screws, dwg 1476493-23. Tighten the screws with a torque of 15 to 20 inch-pounds.

AFTERBODY INSTALLATION. Three men are needed to attach the afterbody to the hull. Two men lift the afterbody and a third man installs the clamp band. The afterbody is attached as follows:

1. Lift the afterbody into position against the after bulkhead of the hull. An alignment pin on the hull fits into a corresponding hole in the afterbody.

2. Secure the afterbody to the hull by installing the three clamp band segments on the grooved flanges. Use assembly wrench H-3115, and self-locking screws, dwg 1476493-12, tightening all screws with a torque of 12-15 foot-pounds.

Disassembly. Replacement of components may require some disassembly of the bomb. Disassembly is carried out only as far as is necessary for replacing the defective component.

The order of disassembly is as follows: detach the afterbody from the hull: remove the manual switch; remove the weapon connector. If the manual switch alone is defective, it can be replaced without removing the afterbody.

All disassembly may be conveniently done with the weapon on an H-3103 dolly.

AFTERBODY REMOVAL. Three men are needed to detach the afterbody from the hull. Two men support the afterbody while a third man removes the clamp band. The afterbody is detached as follows:

1. Using assembly wrench H-3115 remove the screws from the clamp band segments and remove the segments from the weapon.

2. Remove the afterbody from the hull. Raise the afterbody slightly as it is moved away from the hull in order to clear the weapon connector.

MANUAL SWITCH REMOVAL. The manual switch is removed as follows:

1. Insert an arming wrench into the switch and rotate it to a point midway between the ARMED and SAFE, positions.

2. Remove the two mounting screws that fasten the tabs to the hull.

3. Pull the switch out of the hull by means of the arming wrench.

4. Disconnect cable from switch.

WEAPON CONNECTOR REMOVAL. The weapon connector cannot be removed from the hull until the afterbody has been taken off and the manual switch has been disconnected from the cable. The weapon connector is removed as follows:

1. Remove the four socket-head screws that secure the weapon connector to the after bulkhead of the hull.

2. Withdraw the connector and attached cable from the opening in the bulkhead. Avoid scraping the cable on the edge of the opening.

Chapter 12

SAFETY PRECAUTIONS

General Safety Precautions

Under no circumstances should any Naval activity attempt to render inert live-loaded bombs and fuzes to fill an order for inert material. Under no circumstances shall ammunition be modified or changed without specific authority from the Bureau of Naval Weapons.

It must be assumed that fuzes may function at some indeterminate time after the dumping of bombs, regardless of the method of disposal. Lower the bombs over the side to the water surface. Keep them off the hull to the fullest extent practicable. Release bombs into the water with the least amount of fall that circumstances permit.

Fuzes, bombs, igniters, and bursters are not to be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

Do not use a fin assembly if it cannot be properly secured to the bomb. If the fin assembly is loose and turns while on the bomb, it will pull the arming wire from the tail fuze and the fuze may arm before the bomb is dropped.

Never use an arming wire that is twisted, kinked, or burred. These conditions are caused by mishandling. Burrs may result when cutting the arming wire to its required length or at any other point in the operation. File or recut to remedy the condition.

Safety Precautions for Fuzes

The use of certain World War II fuzes is restricted; refer to NAVWEPS INST 8024.1. Under no condition will any attempt be made to unarm an impact nose fuze of the AN–M158 type which is suspected of being armed.

No attempt should be made to unarm impact tail fuzes of the AN–M100A2 type by turning the arming vane backwards. If the threads on the arming stem fail to engage the threads on the firing plunger, the firing plunger will be pushed into the primer with probable initiation of the explosive components.

Prevent the arming-vane assembly of impact tail fuzes of the AN–M115 type from rotating by inserting a cotter pin or wire through the holes in the arming-stem cup and the bearing-cup eyelet. This will not make the fuze any safer if it is fully armed, but will prevent partially armed fuzes from becoming completely armed.

Once installed, no attempt shall be made to remove long-delay tail fuzes of the AN–M123 type from bombs.

The following precautions must be observed at all times when handling long-delay tail fuzes of the AN–M123 and AN–M132 type.

1. Do not assemble the detonator holder to fuzes or fuzes to bombs in anticipation of future needs.
2. Take particular care to protect these fuzes from heat and shock.
3. Examine the indicator vials when the fuze packing box is opened. If all fuzes in the box are not used, leave the vials in the box with the remaining fuzes and reinspect them when the box is reopened.
4. When engaging threads of mating parts in assembling these fuzes to a bomb, do not turn one part back and forth until the threads engage. Use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Bombs fuzed with AN-M132, AN-M133 or AN-M134 anti-withdrawal fuzes cannot be presumed to be released SAFE. In the event of incomplete missions, therefore, these fuzed bombs must be released over enemy territory or dropped in deep water. Once installed, no attempt shall be made to remove these fuzes from bombs.

Once installed, no attempt shall be made to remove long-delay tail fuzes of the AN–M132 type from bombs. Any attempt to remove them will cause the antiwithdrawal device to detonate the fuze instantaneously. Do not remove the warning tag attached to these fuzes when the fuze is assembled to the bomb.

When fully armed, the antidisturbance side fuze (M131 or M131A1) is extremely sensitive and very dangerous. Only a slight vibration is needed to initiate the antidisturbance mechanism and explode the bomb. DO NOT HANDLE armed or questionably armed fuzes of this type; they are to be destroyed by authorized personnel, together with the bomb.

With Nose Fuzes AN–M103A1, AN–M139A1, and AN–M140A1, do not remove the cotter pin that locks the vane strap and eyelet strap until the bomb is installed in the bomb rack.

Before attempting to remove any fuze from a bomb, be sure it is in the unarmed condition or safe to handle. The following conditions apply to the individual fuzes designated.

1. Nose Fuzes AN–M158 and AN–M159 must be considered armed if the striker has risen more than 1/4 inch above the vane nut.

2. Nose Fuze AN–Mk 219 Mods 3 and 4 will be regarded as armed if the striker flange has advanced 3/16 inch from the outer sleeve. From outward appearances it is practically impossible to obtain a definite indication as to whether the fuze is partially or fully armed.

3. Nose Fuzes Mk 243 Mod 0 and Mk 244 Mod 1 are armed if the arming assembly (arming vanes, vane cup, and reduction gears) is missing. If the arming assembly is not missing, measure the distance between the flange of the vane cup and the flange of the vane cup support. If this distance is 1/4 inch or more, the fuze is fully armed. If less than 1/4 inch, the fuze is partially armed.

4. Check Mechanical Time Nose Fuzes AN–M145A1 and AN–M146A1 and Mechanical Time Fuze M155A1 for clearance between the striker and safety block. If the striker should snap down or tightly against the safety block, or if the safety block should fall out, replace the block, secure it with tape, remove the fuze from the bomb or cluster, and set it aside for disposal by authorized and qualified personnel.

5. Impact Tail Fuzes AN–M100A2, AN–M101A2, AN–M102A2, M172, AN–M184, AN–M185, AN–M194, AN–M195, and the AN–M115 series are armed if the arming-vane assembly and reduction-gear mechanism are missing. If these are not missing, the fuze is not necessarily in the unarmed or SAFE condition. Measure the distance between the eyelet and the bearing cup and the flange on the arming-stem cup. If the distance is less than 1/2 inch, the fuze is partially armed; if 1/2 to 3/4 inch, arming is questionable; if more than 3/4 inch, the fuze is definitely armed.

6. The degree of arming of Impact Tail Fuze AN-Mk 228 Mods 0 and 1 can be determined through a small glass window in the side of the fuze by examining the relative positions of the striker, cover, and outer sleeve. If the upper surface of the striker and the lower edge of the cover are about flush with the top edge of the sleeve, the fuze can be considered unarmed. If the position of the striker is not more than 3/16 inch away from the outer sleeve, the fuze can be considered only partially armed. If the striker has moved away from the outer sleeve about 11/32 inch, the fuze is to be considered fully armed.

7. If the arming-vane assembly and the arming screw of Tail Fuze AN–Mk 247 Mod 0 are missing, or if the arming-vane assembly is raised from the fuze 1/2 inch or more, the fuze is armed.

8. There is no way of telling from visual inspection of Hydrostatic Tail Fuze AN-Mk 230 Mods 4, 5, and 6 whether or not it is armed. DO NOT ROTATE VANES.

9. If the anemometer hub of Multi-Position Fuze M157 or AN–M173A1 has separated from the fuze head by 1/8 inch or more, or if the anemometer vanes are completely removed from the fuze, the fuze is armed.

Do not attempt to remove an armed, unarmed, or questionably armed Side Impact Fuze M129 from a bomb.

Do not attempt to remove an armed, unarmed, or questionably armed Side Time Fuze M130 or M130A1 from a bomb. Fuze M131, which is very similar in appearance to the M130 and M130A1 fuzes, has an antidisturbance feature which will detonate an armed bomb when slightly vibrated.

Do not attempt to remove an armed, unarmed, or questionably armed Side Antidisturbance Fuze M131 from a bomb. The antidisturbance mechanism in the fuze will detonate the bomb if the fuze is armed.

Use extreme care in handling Impact Tail Fuze AN–Mk 228 Mods 0 and 1; some lots are dangerously sensitive.

Do not remove the safety cotter pin that locks the arming mechanism of AN–Mk 228 fuzes.

Make no attempt to install detonators in Long-Delay Tail Fuzes AN-M123A1, AN-M124A1, AN-M125A1, AN-M132, AN-M133 or AN-M134 when fuzes have been exposed to temperatures above 170°F. Such fuzes must be disposed of by authorized personnel.

Long-Delay Tail Fuzes AN–M123A1, AN–M124A1, or AN–M125A1 will detonate if their extensions are unscrewed by any amount.

Once an AN–M123A1, AN–M124A1, AN–M125A1, AN–M132, AN–M133, or AN–M134 fuze is inserted in the adapter-booster, the fuze must not be turned backward (counterclockwise) by any amount, however slight. Engage the threads by a screwing-in motion only. Do not attempt to unscrew the fuze; screwing-out motion will cause the locking ball to become wedged against the wall of the adapter-booster and any further turning will detonate both the fuze and the bomb.

If any thing interferes with the completion of a fuzing operation involving an AN–M123A1, AN–M124A1, AN–M125A1, AN–M132, AN–M133, or AN–M134 fuze, no attempt shall be made to defuze the bomb. The bomb, with the fuze in place, shall be disposed of by authorized and qualified personnel.

Do not partially pre-arm Hydrostatic Tail Fuze AN–Mk 230 to insure arming at low altitudes. The extent of arming cannot be determined by visual examination. If the fuze is already in a state of partial arming, additional rotation of the vanes may complete arming and render the fuze dangerous since fluid pressure (air or water) applied through parts in the body may build up sufficiently to detonate the fuze.

If an AN–M166E1 VT fuze container (used with the Mk 77 Mod 0 fire bomb) is damaged or if the seal is broken in any way, the fuze is to be considered unserviceable.

Safety Precautions for Bomb Components Other Than Fuzes

All M15 and AN–M16 igniters now in stock, with the exception of those procured during or after 1950, have Arming-Wire Assemblies C–10 packed in the same shipping box. Because of reported malfunctions, these wires are to be used only in the event that standard arming wires are not readily available. If used, precautions must be taken to crimp the ferrule, or slide, with pliers and to bend back the short length of the loop attached to the swivel 180 degrees on itself.

Rough handling of Practice Bomb Signal Mk 4 Mods 3 and 4, Mk 6 Mod 0, or Mk 7 Mod 0 may cause immediate functioning, or may damage the signal so that it will not function properly. Avoid dropping or jarring these signals at all times.

Practice Bomb Signals Mk 4 Mods 3 and 4, Mk 6 Mod 0, and Mk 7 Mod 0 must not be unpacked in advance of requirements. If unpacked and not used, return them to their original packings.

Swollen or deformed practice bomb signals are not to be used. The primer must be flush with or slightly below the base of the signal. Defective signals will be turned over to a bomb disposal officer.

Under no circumstances should a signal case containing Practice Bomb Signals Mk 4 Mods 3 and 4 be opened or tampered with.

If cartons containing Practice Bomb Signals Mk 6 Mod 0 or Mk 7 Mod 0 are punctured, split, or badly damaged, or if the seals are broken, the contents are considered unserviceable. This does not apply to signals repacked in the field and sealed with adhesive tape for temporary protection. These assemblies must be examined carefully for serviceability by qualified personnel.

Stow Practice Bomb Signals Mk 6 Mod 0 and Mk 7 Mod 0 in a dry, ventilated location, out of the direct rays of the sun.

If necessary to disassemble Practice Bomb Signal Mk 6 Mod 0 or Mk 7 Mod 0, the safety cotter pin must be installed in the body of the fuze before the arming wire is removed.

Safety Precautions for Armor-Piercing and Semi-Armor-Piercing Bomb Assemblies

Use only fin assemblies that are in good condition. Reject fin assemblies that are rusted, dented, bent, or have loose fins.

Inspect suspension and hoisting lugs for damage or defects before securing them to the bomb body. Replace if necessary.

If fuze containers are found to be punctured, split, or if the seal is broken in any way, the fuzes contained therein are considered unserviceable. This does not apply to fuzes replaced in the field and resealed with adhesive tape for temporary protection. Such fuzes should be examined carefully for serviceability.

One of the fuzes used with the 500-lb SAP Bomb AN–M58A2 is the AN–M124A1 tail fuze which incorporates the use of an antiwithdrawal device. The 1000-lb SAP Bomb AN–M59A1 and the 2000-lb SAP Bomb M103 use the AN–M125A1 and the AN–M134 tail fuzes which also have an antiwithdrawal device. Nondetonation of bombs using these fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may be broken upon impact of the bomb. Once one of these fuzes is installed, no attempt should be made either to remove the fuze from the bomb or to return the bomb to an airfield or aircraft carrier upon an incomplete mission. Do not turn the fuze back and forth to engage threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and the bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Safety Precautions for General Purpose Bomb Assemblies

The 100-lb GP Bomb AN–M30A1 and the 250-lb GP Bomb AN–M57A1 use the AN–M123A1 and the AN–M132 tail fuzes which incorporate the use of an antiwithdrawal device. The 500-lb GP Bomb AN–M64A1 uses the AN–M124A1 and the AN–M133 tail fuzes, and the 1000-lb GP Bomb AN–M65A1 and the 2000-lb GP Bomb AN–M66A2 use the AN–M125A1 and the AN–M134 tail fuzes, all of which also have antiwithdrawal devices. Nondetonation of bombs using these fuzes cannot be relied upon when released SAFE because the glass solvent ampoule in the fuze may break upon impact of the bomb. Once one of these fuzes is installed, no attempt should be made to remove the fuze or to return the bomb to an airfield or aircraft carrier upon an incomplete mission. Do not turn the fuzes back and forth to engage the threads; use a screwing-in motion only. The antiwithdrawal device will cause the fuze and bomb to detonate if the fuze is rotated counterclockwise while in the adapter-booster, even before the threads are engaged.

Safety Precautions for Aircraft Depth Bomb Assemblies

The body of the 350-lb ADB AN–Mk 54 Mod 1 is damaged easily because of its light construction. Inspect it for damage.

Safety Precautions for Fragmentation Bomb Assemblies

No attempt should be made to remove the fuzes of 4-lb Frag Bomb M83, to change the setting, or to work on them in any way.

No attempt should be made to reservice AN–M145A1 or AN–M145 mechanical time fuzes which are used, respectively, with the 90-lb Frag Bomb M82 and the 220-lb Frag

Bomb AN–M88. The AN–M145A1 fuze is considered armed when one or more of the following conditions exist: absence of the safety block; complete or partial ejection of the firing pin; and failure of the trigger arm assembly to support the striker and prevent it from snapping down tightly against the safety block.

Safety Precautions for Fragmentation Bomb Clusters and Adapters

Boxed frag bomb clusters should be handled carefully. When set down, place them in a horizontal position. Do not slide, tumble, or strike the packings.

Upon unpacking, inspect clusters to be sure that the fuze safety devices are in place. If a fuze is armed, the cluster will be destroyed by authorized personnel. Binding straps which hold the bombs in place should be tight and unbroken. Broken straps may be replaced and the cluster used.

Do not disassemble the 100-lb Frag Bomb Cluster M28A2 or any of its components.

The locking cup screws of bombs in the M28A2 cluster must be tight before the nose cup retainers are removed.

Protect unpacked clusters from moisture.

Inspect the 500-lb Frag Bomb Cluster M26A2 for serviceability. Be sure that the cotter pins and shear wires are secure in the band clamps. Bands which hold the bombs in place should be tight and unbroken.

When using the 500-lb Frag Bomb Cluster M29A1, do not handle wafers by the strapping.

When the adapter is closed, its cover may cut some of the strings with which the wafers of the M29A1 cluster are tied. The cover must not be opened or the untied bombs will spring out. A case locking bushing shall be used with all M29 clusters.

If adapters do not gage properly and cannot be adjusted, they should not be used on frag bomb clusters.

Store loaded M29A1 clusters off the ground and under a tarpaulin. Store for as short a period as possible, since this material is susceptible to damage by atmospheric moisture. When once loaded, the cluster adapter will not be reopened. The locking cups must be in a fully locked position before the time fuze is inserted.

Safety Precautions for Chemical (Gas), Smoke, and Incendiary Bomb Assemblies

As WP (white phosphorus) munitions ignite spontaneously upon contact with the air, they should not be handled roughly. If a fire does occur, personnel should wear gloves and keep both gloves and shoes wet. WP smoke is toxic on prolonged and repeated inhalation, but is not likely to be harmful in the concentrations found in smoke screens in the open air. Gas masks afford complete protection from concentrated WP smoke, but they tend to become clogged and therefore should not be worn except where serious exposure in enclosed spaces is involved.

WP in contact with the skin will cause severe and lingering burns. Places of contact should be washed immediately and kept wet until the phosphorus has been removed. Washing the affected area with a soda solution, followed by a 5 percent copper sulphate solution, is very effective. Greasy ointments should never be used since they merely spread the contamination.

Incendiary bombs and components have satisfactorily withstood tests simulating the normal handling expected to be received during loading, shipment, unloading, and stowage. However, they can easily be damaged by unnecessarily rough treatment and should be handled with care at all times. Sodium-loaded igniters should be handled very carefully to prevent leakage of the sodium, which ignites spontaneously and with great violence when it comes into contact with moistures. Sodium-loaded (Na) igniters shall be stowed only with other water-activated munitions and in accordance with OP 5, Ammunition Ashore, or OP 4, Ammunition Afloat, whichever is appropriate, and OP 1631, Ammunition Hazard Classification List. WP-loaded igniters should be handled very carefully to prevent leakage of the white phosphorous, which ignites spontaneously when it comes into contact with the atmosphere.

Water *must* never be used on burning sodium or on burning buildings or equipment in which sodium is stored or used. Dry soda ash, dry graphite, or dry sand will quickly smother sodium fires. Chemical solution type, vaporizing liquid type, or carbondioxide extinguishers are not effective, and their use will add to the hazard instead of reducing it. The chemical solution type of extinguisher (soda acid) contains water, while the vaporizing liquid type (carbon tetrachloride) and carbondioxide both react violently with sodium. The fumes of burning sodium are essentially caustic and therefore irritating. An approved type of respirator should always be available, and personnel should always put on the respirator before attempting to fight a sodium fire.

The pipe plugs in the igniter and the filling plugs in the body of the 500-lb incendiary bomb AN–M76 should not be removed under any circumstances.

Bombs and components must be handled as little as possible. Do not drop them or subject them to bumps, shocks, or blows. Protect them from rain, spray, and the direct rays of the sun. Stored bombs should be inspected frequently so that leakers may be detected and properly processed.

Safety Precautions for Fire Bomb Assemblies

Once a fire bomb is filled, it must be used or destroyed. All fire bombs not expended shall be jettisoned prior to landing afloat or ashore.

Safety Precautions for Practice Bomb Assemblies

Do not apply pressure to force the firing-pin assembly into the bomb. The assembly may collapse and fire the signal.

Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

Do not remove the safety cotter pin from the body of the fuze before the bomb is secured in the aircraft and the arming wire is completely installed.

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AIRCRAFT BOMBS, FUZES
AND ASSOCIATED COMPONENTS