DEPARTMENT OF THE ARMY TECHNICAL MANUAL **TM 9-1325-200**

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER **TO 11-1-28**

BOMBS AND BOMB COMPONENTS

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DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
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NAVWEPS OP 3530
TO 11-1-28

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
WASHINGTON, D.C., *29 April 1966*

BOMBS AND BOMB COMPONENTS

CHAPTER 1

GENERAL

Section I. INTRODUCTION

1-1. Scope

This manual provides general and technical information on bombs and bomb components presently used by the Army, and Air Force. Covered are general and specific characteristics, means of identification, and precautions in handling and use. Doctrines and policies governing the tactical use of the bombs and bomb components described herein are not considered to be within the scope of the manual. For training and field operating procedures, refer to the appropriate Department of the Army or Department of the Air Force publications.

a. General information on care and handling of explosives and their demolition to prevent enemy use is contained in TM 9-1300-206.

b. Technical information pertaining to all types of conventional ammunition and explosives is contained in TM 9-1300-200.

c. Supply information on bombs and bomb components listed in this manual is covered in SC 1305 / 30-IL and OD 12067-A.

d. General information on care and handling of chemical agents and hazardous chemicals is contained in TM 3-215 / AFM 355-7, TM 3-220, and TM 3-250.

1-2. Errors and Omissions

a. Army. Errors and omissions will be reported on DA Form 2028 and forwarded directly to the Commanding Officer, Picatinny Arsenal, Dover, New Jersey 07801, ATTN: SMUPA-DC5.

b. Air Force. Deficiencies in this manual will be submitted on AFTO Form 22 and forwarded through major commands for submission to OOAMA, Hill Air Force Base, Utah 84401, ATTN: OONST, in accordance with TO 00-5-1.

Section II. DESCRIPTION AND DATA

1-3. The Bomb

A bomb is a particular kind of ammunition which is designed to be dropped from an aircraft in flight. It usually consists of a metal container filled with explosives or chemicals, a device for stabilizing its flight so that it can be aimed accurately, a mechanism for exploding the bomb at the target, and such safety devices as may be necessary to make it reasonably safe to carry. The metal container, called the bomb body (para 1-5), is usually stream-lined with a rounded (ogival) nose and a tapered tail. The stabilizing device is attached to the tail end of the body and generally consists of a sheet-metal fin assembly. The mechanism for exploding the charge is called a fuze and is generally placed in the nose or in the tail end of the body. Two or more fuzes are occasionally used in the same bomb for different effects: for flexibility in use or to increase functioning reliability. Safety devices are provided in the fuze and are protected by sealing wires, cotter pins, etc. An arming wire is substituted for the sealing wire and / or cotter pin when the bomb is readied for use.

1-4. Components of a Complete Round

A complete round (fig. 1-1) consists of all the components and the accessories necessary for the ammunition to function in the manner intended. To facilitate safe handling of the bomb, sensitive or fragile components are packed separately and assembled to the bomb prior to its use. The components of a typical bomb round are as follows:

a. 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.

b. Fin Assembly. There are three types of fin assemblies commonly used with bombs: box, conical or streamlined, and retarding.

(1) The box type (fig. 1-1) consists of a fin sleeve which fits over the bomb tail, and sheet-metal blades which are joined to the fin sleeve or to each other to form a box-like assembly.

(2) The conical or steam lined type (fig 1-2) consists of a cone-shaped body with metal blades joined to the body to give a stream lined configuration.

(3) The retarding type (fig 1-3) consists of streamlined folded blades which can open in an umbrella-like fashion to impart high drag.

c. Fuzes. Fuzes are mechanical, electrical, or chemical devices used to initiate bombs under the circumstances desired.

d. Arming-Vane Assembly. An arming-vane assembly is a small propeller device with sheet metal blades, which is attached to certain mechanical fuzes. Arming vanes differ in pitch, shape and length of blade.

e. Arming-Wire Assembly. Arming-wire assemblies generally consist of one or two strands of wire attached to a swivel loop.

1-5. Functioning of a Complete Round

The bomb is carried either internally or externally on single or multiple racks, whichever is applicable to the particular aircraft. Hooks engage the suspension lugs attached to the bomb body. Arming

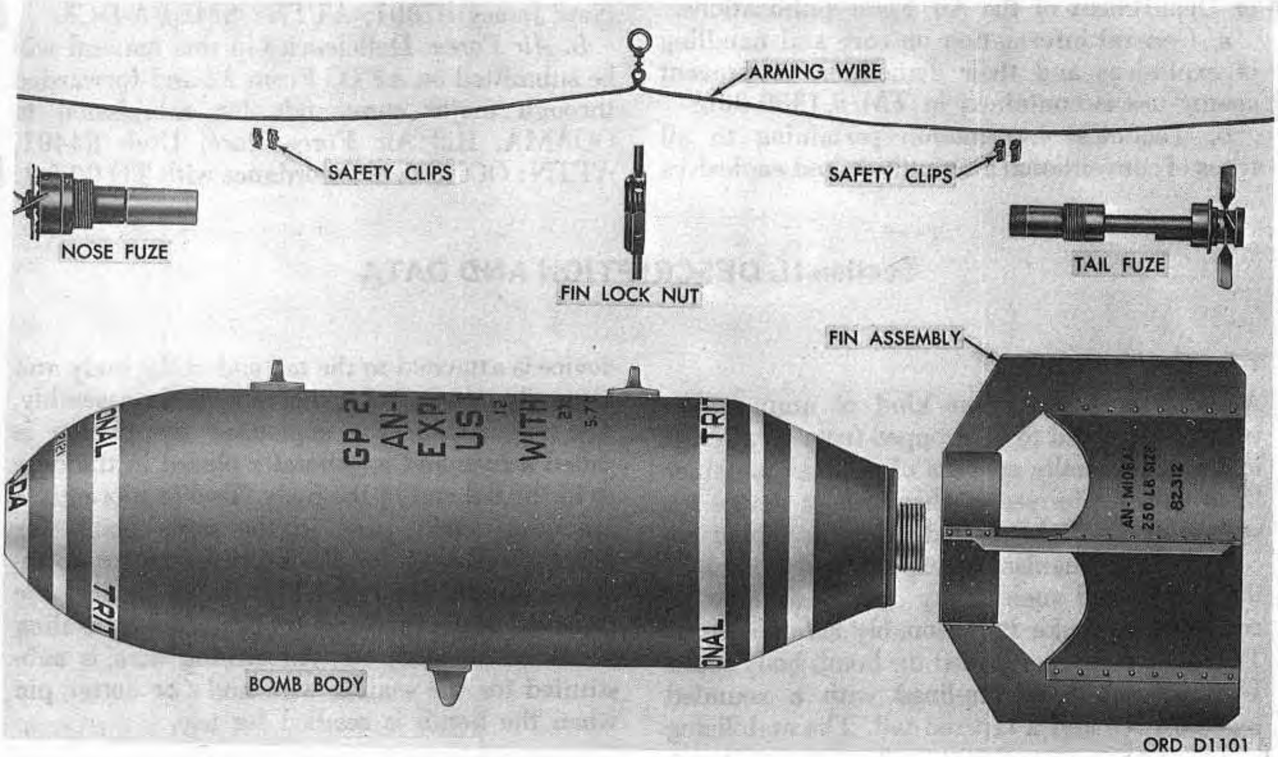

Figure 1-1. Components of a bomb complete round with box fin.

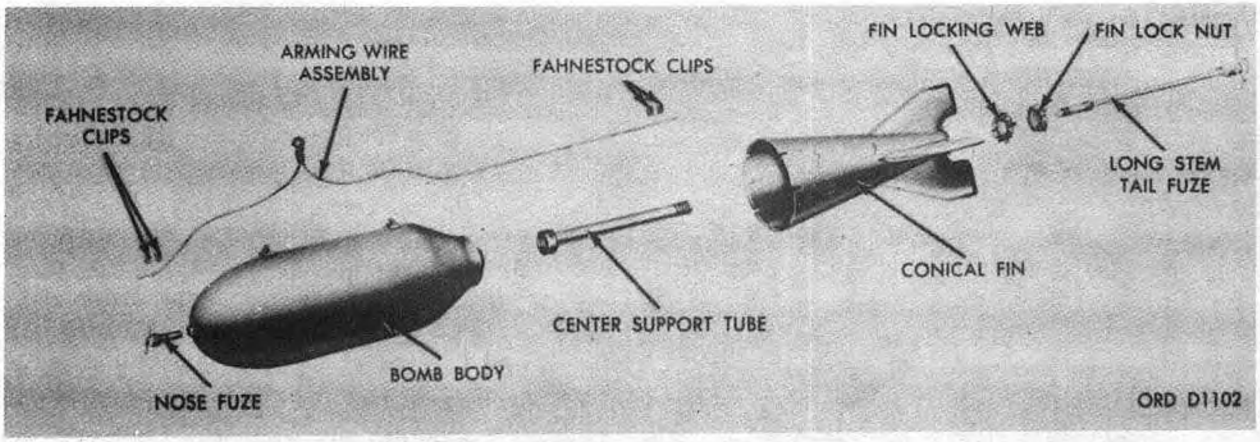

Figure 1–2. Components of a bomb complete round with conical or streamlined fin.

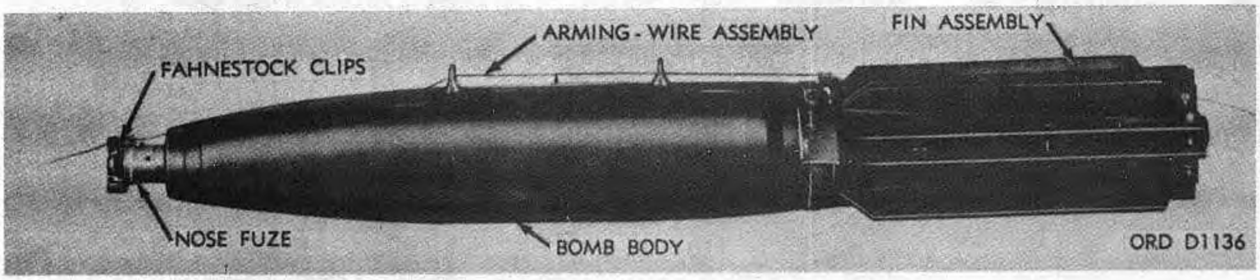

Figure 1–3. Components of a bomb complete round with retarding fin.

wires may be attached in several different ways, depending on the particular aircraft and method of carriage. These wires pass through eyelets in the fuze maintaining it in an unarmed condition until the bomb is dropped. Fahnestock (safety) clips are placed over the protruding ends of the arming wire to prevent it from slipping out of the safety devices prior to bomb release. If a bomb must be released over friendly territory, the arming wire, or the swivel loop of the arming wire, is released with the bomb and stays in place as the bomb falls, thus preventing the fuze from arming. When the bomb is to be released armed, the arming wire, or the arming-wire swivel loop (depending on configuration used), is retained with the aircraft. As the bomb drops, the wire is pulled from the fuze (fig. 1–4) which is then free to arm. The arming mechanism of the fuze operates as designed to arm the bomb. The armed bomb then detonates at the appropriate time to fulfill the mission requirements.

1–6. Classification and Identification of Bombs

a. Classification. Bombs are classified according to use as follows:

(1) *Semi-armor-piercing bombs.* SAP bombs, thick walled and normally tail fuzed, are used to penetrate armored and hard targets. A solid metal nose plug can be replaced with a nose fuze when penetration is not required. Approximately 30 percent of the complete weight of the bomb is explosive material.

(2) *General purpose bombs.* GP bombs are used in the majority of bombing operations against targets requiring some penetration. Their cases are relatively light and approximately 50 percent of their complete weight is explosive material. GP bombs may use both nose and tail fuzes. GP bombs are classified as old-series, new-series, or low-drag, according to their basic configuration.

(3) *Aircraft depth bombs.* AD bombs are used primarily against underwater targets. They may also be used as general purpose bombs. Approximately 70 percent of the bomb's complete weight is explosive material. A flat nose reduces ricochet when

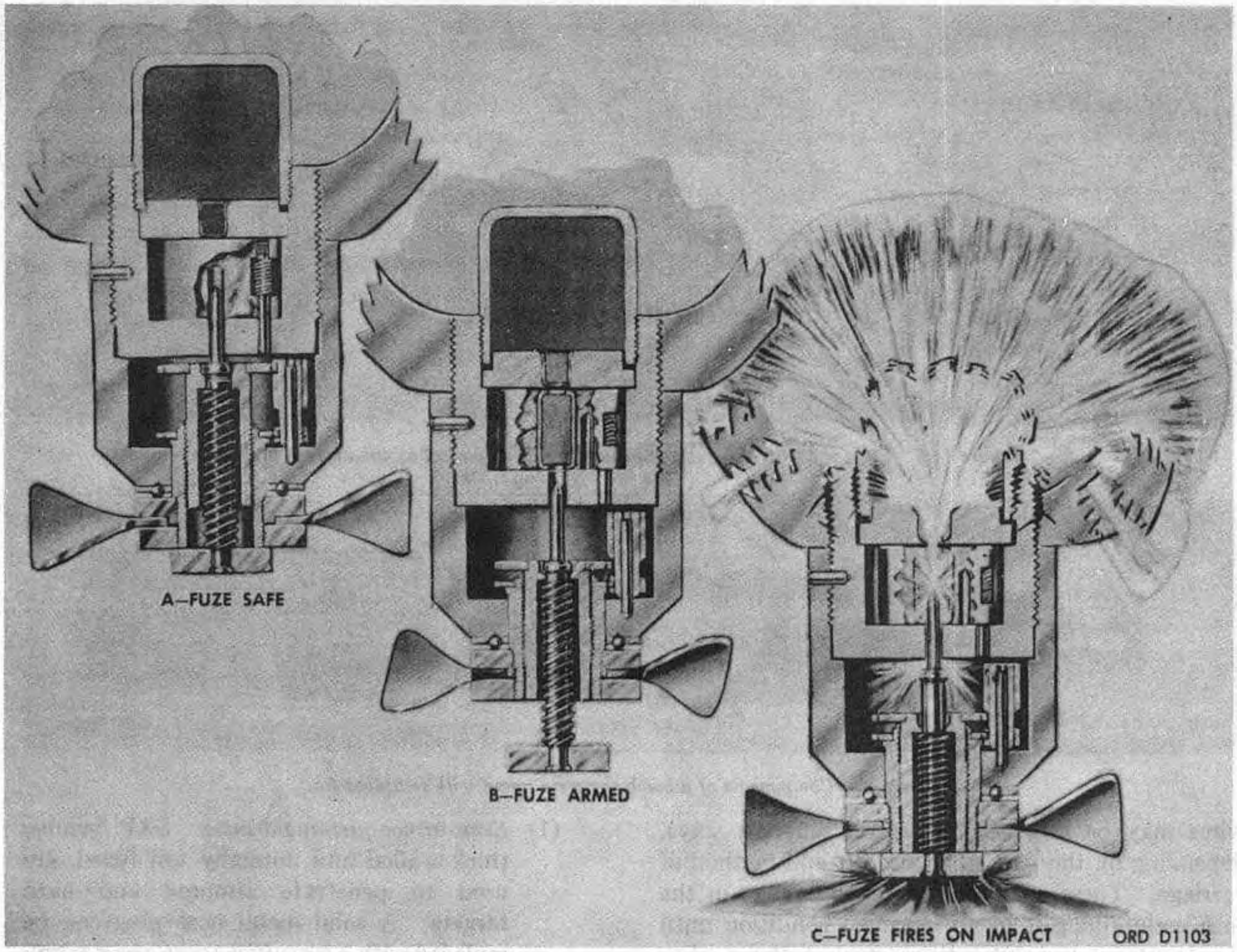

Figure 1-4. Functioning of bomb round.

the bomb is dropped into the water from low altitudes. 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 general purpose bomb.

(4) *Fragmentation bombs.* Frag bombs are used against personnel and materiel. 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. Small fragmentation bombs (23 pounds or less) are used against personnel and light materiel. However, larger frag bombs are used against materiel such as vehicles, machinery, and other equipment. All larger frag bombs have provisions for either a nose or a tail fuze, but the smaller bombs can accommodate only a nose fuze. The base thread of frag bombs is used for attachment of a fin assembly and may be used also for the attachment of a parachute unit for low altitude bombing.

(5) *Incendiary bombs.* These bombs are designed for use against combustible targets. There are two types: scatter and intensive. The scatter bomb contains a thickened fuel mix which is projected from the bomb

case upon impact and adheres to the target while it burns. The intensive bomb is composed of metallic fuels which burn at very high temperatures at the point of contact.

(6) *Smoke bombs.* Smoke bombs have a threefold purpose. They are used for screening the movement of troops and ships in combat areas; for antipersonnel effect on troops in the open or in dug-in positions; and for marking targets. They also have an incendiary effect in that they will set fire to materials which are easily ignited such as clothing, dry brush, canvas, etc. The bomb bodies are filled with plasticized white phosphorous (PWP) or white phosphorous (WP). Functioning of a fuze and burster shatters the bomb on impact, dispersing the filler over a wide area. Atmospheric oxygen ignites the particles which produce a dense white smoke.

(7) *Gas bombs.* Gas bombs are used to produce casualties among personnel and for purposes of area contamination. Gas bombs of the massive type resemble general purpose bombs in shape and size, while the smaller types are cylindrical in shape, weigh less than 10 pounds and are dispersed from aimable-cluster type munitions. These bombs contain a burster charge which splits the bomb case and disperses the filler over the area to be contaminated. Gas bombs are fuzed to function instantaneously upon impact.

(8) *Fire bombs.* Fire bombs are usually thin-skinned containers of gasoline gel designed for use against personnel and materiel in tactical situations. The bomb bursts to spread burning gel on surrounding objects. Fuzes and igniters are used to ignite the combustible filler.

(9) *Practice bombs.* These bombs, which are used for target practice, vary in type and weight to simulate the variety of service bombs. Some practice bombs may have a fuze and a spotting charge; others are completely inert. Some practice bombs are filled with sand or water in the field, while others are fabricated to the desired weight.

b. Identification of Bombs.

(1) *General.* Bombs and bomb components can be identified by the standard nomenclature and the ammunition lot number which are stenciled or stamped on all packings, and where size permits, on the item itself.

(2) *Standard nomenclature.* Standard nomenclature is established in order that each item supplied may be specifically identified by name. Standard nomenclature consists of an item name (a generic term), a colon, and additional item identification established in accordance with Federal item identification guides for supply cataloging. The use of standard nomenclature is mandatory. It should be noted that in the nomenclature of inert bombs, the descriptive adjective, indicating type, precedes the colon.

(3) *Ammunition lot number.* When ammunition is manufactured, a lot number is assigned in accordance with pertinent specifications. A "lot" consists of a number of items manufactured from similar materials under similar conditions, which may be expected to function alike. The lot number consists, in general, of the loader's initials or symbol and the number of the lot. The use of the appropriate lot number, for example, PA 9-55, is required in all references to specific items of ammunition in reports and records.

(4) *Model.*

(*a*) *Army.* To identify a particular design, a model designation is assigned at the time that the model is classified as an adopted type. This model designation becomes an essential part of the nomenclature and is included in the marking of the item. The present system of model designation consists of the letter M followed by an Arabic number; for example, M1. Modifications are indicated by adding the letter A and the appropriate Arabic number. Thus, M1A1 indicates the first modification of an item for which the original model designation was M1. Wherever a B suffix appears in a model designation it indicates an item of alternate (substitute) design, material, or manufacture. Certain items standardized for use by both

Army and Navy are designated by AN preceding the model number. Development items are indicated by the letter T or letters XM and an Arabic number, and modifications by the addition of E and an Arabic number.

(b) *Navy.* Model designation of items of Navy design consists of the letters MK, signifying the word Mark, followed by an Arabic number with a modification (Mod) number; for example, MK 6 Mod 2.

(c) *Air Force.* Model designation for items of Air Force design consists of a component or unit indicator (consisting of two letters of the alphabet) accompanied by a purpose indicator (consisting of one letter). This is followed by a dash, a model number, a slash and an equipment designator. Thus, BLU-10/B is an example of a complete round model number for the 250-pound fire bomb.

(5) *Painting.* Bombs are painted primarily to prevent rust. The secondary purpose is to provide, by the color, a ready means of identification (see MIL Standard 709) (refer to table 1-1). In addition, bombs are painted to prevent easy detection of stock piles from the air. Fuzes are marked to indicate differences in length of delay or arming time. Primer-detonators are marked to indicate the length of delay.

(6) *Marking.*

(a) *Bombs.* Bombs are marked with the following data: type, weight, model, filler, and ammunition lot number.

(b) *Fuzes.* Fuzes are marked either by stenciling or stamping the type, model, lot number, and delay time on the fuze body.

(c) *Primer detonators.* Primer-detonators are marked to indicate the type, model, and delay time.

(d) *Inert or empty bombs and bomb components.* Inert or empty bombs and bomb components in depots and in the hands of troops should be appropriately marked for positive identification.

c. Ammunition Data Card. A 5 x 8 card is prepared for each lot of accepted bombs and components with pertinent specifications. This card contains printed data concerning the item and its components. Information on the data card includes lot number, date packed, identity of components, Federal stock number and Department of Defense Ammunition Code, and other data as required.

d. Federal Stock Number and Department of Defense Ammunition Code. The Federal stock number (FSN), e.g., FSN 1325-028-5298, has replaced the ammunition identification code (AIC) and the Ordnance stock number. There is a different Federal stock number for each item of supply. The first four digits in a Federal stock number are always the Federal supply classification (FSC) class to which the item belongs. The next seven digits constitute the Federal item identification number (FIIN). The dash between the third and fourth digits in the FIIN serves to reduce errors in transmitting. There is a different FIIN for each item. A Department of Defense identification code (DODIC) is added as a suffix to the Federal stock number, e.g., 1325-028-5298 (E450). The DODIC must not be confused with the DOD ammunition code (DODAC), an eight-character representation consisting of the four-character FSC code number and a second part consisting of a letter and three digits. Thus, for example, 1325-E450, a typical DODAC, consists of FSC class 1325 and DODIC E450. The DODIC, when suffixed to more than one FSN, indicates items are interchangeable for issue and use.

1-7. Bomb Fuze

A bomb fuze is a device for igniting the explosive or initiation train of a bomb at the appropriate time to fulfill the mission requirements. Fuzes are placed either in the nose or tail of the bomb or both.

a. Nose Fuzes. The essential parts of a nose fuze are striker head, firing pin, safety block, arming mechanism, primer, detonator, and, usually, a delay element and booster, all assembled in the fuze body. In the arming-pin type, a spring-loaded arming pin is held in position by an arming wire. The wire also restrains a plate which holds a safety block in position. In the arming-vane type, the striker is retained by a safety block or a ring of safety discs which are released by the action of the arming vane. The arming vane is kept from rotating prematurely by the arming wire. In both cases, the striker is held in place, after arming, by a shear wire. In the newer-type nose fuzes, an arming vane is also used, but safety blocks or discs are not present. The vane drives a mechanical governor which rotates an arming-gear train at a constant speed. The arming time is preset and is independent of air speed.

b. Tail Fuzes. The essential parts of a tail fuze are the primer, detonator, inertial-type firing pin, and arming mechanism, all assembled in the fuze body. In the tail fuze, an arming stem is screwed into the firing pin to keep it from striking the primer until the action of the vane unscrews the arming stem. The firing pin is held in place, while the bomb is in flight, by an anti-creep spring. Dependent upon the degree of sensitivity to impact required, the firing pin may be of the simple inertial type or the cocked type. In the newer tail fuzes, a drive and cable assembly for side mounting is used instead of a direct-drive arming vane and stem. These fuzes also contain a mechanical governor which rotates an arming-gear train at a constant speed. The arming time is preset and is independent of air speed. In addition, long delay chemical-action fuzes contain a delay wad and a glass ampoule filled with solvent.

1-8. Classification of Fuzes

Fuzes are classified as follows:

a. Impact Nose Fuzes. Fuzes of this type are vane operated and delay armed. They function on contact with the target. Their action can be instantaneous or delayed.

b. Impact Tail Fuzes. Fuzes of this type are usually vane armed, delay armed, and inertia-fired. Tail fuzes are most often used in conjunction with nose fuzes to insure positive functioning of the bomb upon impact. They can also be used in instances where only one fuze is required, such as in semi-armor-piercing bombs.

c. Mechanical Time Fuzes. These fuzes are armed by vane action and fired at a time controlled by a clock mechanism which can be preset. If the time setting is greater than the time of flight, the bomb will be detonated upon impact.

d. Proximity (VT) Fuzes. Proximity (VT) fuzes are essentially radio receiving and transmitting units that function automatically upon approaching or passing any object.

e. Long-Delay Tail Fuzes. These fuzes require less than 100 feet of air travel to initiate the delayed action. They incorporate a "booby trap" feature in that any attempt to remove these fuzes after installation will trigger an antiwithdrawal mechanism, causing instantaneous detonation of the bomb. Long-delay fuzes function in delay times ranging from minutes to days after impact, depending on which delay is used. The delay time is accomplished by chemical action. Completion of the chemical action causes the release of the firing mechanism.

f. Hydrostatic Fuzes. 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 takes place is preset.

g. Multi-Position (All-Ways) Fuzes. The multi-position impact and inertia-firing fuzes are fully armed by anemometer vanes after completing the required amount of air travel. The fuze is armed by air resistance in tumbling flight. Impact forces from any direction will cause instantaneous detonation. These fuzes are principally used in unstabilized munitions such as fire bombs.

h. Electric Fuzes. The electric fuzes have an electric charging assembly that replaces the arming vanes used in other bomb fuzes. The development of electric fuzes has helped eliminate some of the problems created by increased speed and changed bombing tactics. When the bomb is released from the aircraft, the aircraft charging gear simultaneously energizes the arming and firing circuits. A series of delay elements prevents the fuze from arming or from detonating until the desired target or target area is reached.

1-9. Fuze Safety Features

Many fuzes incorporate the following types of safety features:

a. Detonator Safe. Fuzes that are detonator-safe have the elements of their firing train firmly fixed out of alignment in the fuze body while the fuze is unarmed. This increases safety during shipment, stowage, and handling. The arming action of the fuze aligns the firing train.

b. 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.

c. Delay Arming. This feature, whether it is mechanical or electrical, slows the arming of a fuze and keeps it in the safe condition until the bomb has fallen a sufficient distance away from the aircraft to minimize the effects of premature explosion. Delay arming helps to make dive bombing and carrier operations safer. A bomb accidentally released on landing or take-off will not have sufficient air travel time to arm the fuze.

1-10. Interchangeability of Fuzes

When it is desirable to use another model in place of the standard fuze because either the authorized fuze is not available or the special action of another fuze is desired, the following conditions must be fulfilled:

a. The Fuze Must Fit Mechanically. The fuze must physically fit into the fuze seat of the bomb or an adapter must be furnished to achieve the proper fit.

b. The Fuze Must Fit Functionally. The fuze must be able to arm and operate properly under normal conditions of use. For example, short tail fuzes will not arm if used on large bombs. Also the arming time of the selected fuze must meet requirements.

c. The Explosive Train Must Be Completed By Combination of Bomb and Fuze. All elements, detonator, booster and main charge, must be present. Some fuzes contain a detonator only, and if these are used on a fuze-seat liner without a booster, low-order detonation or a dud may result. Other fuzes have a black-powder igniter in place of the booster element, and, if these are used in high-explosive bombs, the igniter will not reliably initiate the booster or charge.

d. The Components of The Explosive Train Must Be In Proximity. The detonator, booster, and main charge must be sufficiently close so that the detonation wave is not weakened by passing from one element to the next. Some fuzes have short boosters, and if these are used in deep fuze seats, the space must be filled with an auxiliary booster or similar explosive charge, otherwise a low-order detonation or dud may result.

1-11. Tactical Use of Fuzes

There are various terms used to indicate the tactical use of fuzes. This terminology, which is applicable to the text in this chapter, is as follows:

a. Air Travel. The amount of air travel required to arm the fuze is measured in feet along the trajectory. This measurement is refered to as "value" The value for any particular fuze varies with the delivery attitude of the aircraft and with variations due to manufacturing tolerances. Figures of air travel used in this manual are average.

b. Minimum-Safe Air Travel (MinSAT). Minimum-safe air travel is the distance of air travel within which no fuze arms. This is the minimum-safe value of air travel for any normal fuze of a particular type.

c. Arming Zone. The arming zone represents the tolerance in air travel to arm the fuze. It is the zone in which some fuzes are armed and other fuzes are not yet armed. The length of the arming zone added to minimum-safe air travel gives maximum air travel, after which all fuzes are armed.

d. Safe Vertical Drop. Safe vertical drop is the vertical distance below the release altitude at which no fuze is armed. It is the vertical component of minimum-safe air travel. It should be noted that "safe" refers to the condition of the unarmed fuzes and not to the security of the releasing aircraft. Safe vertical drop varies not only with the speed of the aircraft, but with altitude of release, size, shape and weight of the bomb, and other factors which affect shape and direction of the trajectory.

e. Maximum Drop to Arm. Maximum drop to arm is the vertical distance below release altitude at which all fuzes are armed. It has the same value as the minimum arming altitude which is the lowest altitude at which bombs may be released with the possibility that the fuzes will become armed.

f. Safe Altitudes and Distances. Safe altitudes and distances are those at which the releasing aircraft incurs a specified minimum risk of damage from the bomb dropped. Prescription of safe altitudes and distances is a command function.

1-12. Shipping and Storing of Components of a Complete Round

a. General. Bombs and bomb components, for safety and for convenience in handling, are not shipped or stored as complete rounds. The breakdown of the round is governed by the size of the bombs, the frailty of the components and the explosive hazards involved. Typical packaging for the components that make up the bomb complete round are illustrated in figures 1-5 through 1-7, and described in table 1-2. Packing and marking data are given in Department of the Army SC 1305/30 IL; in the Air Force Stock List 1300, and in the Navy Stock List OD 12067-A. This data is also included under the specific item description in this manual. For additional information on packing and marking, refer to TM 9-1300-206 and TM 3-400. Most bombs and their components are shipped separately and are assembled in the field to form the complete round. The major components of a complete round

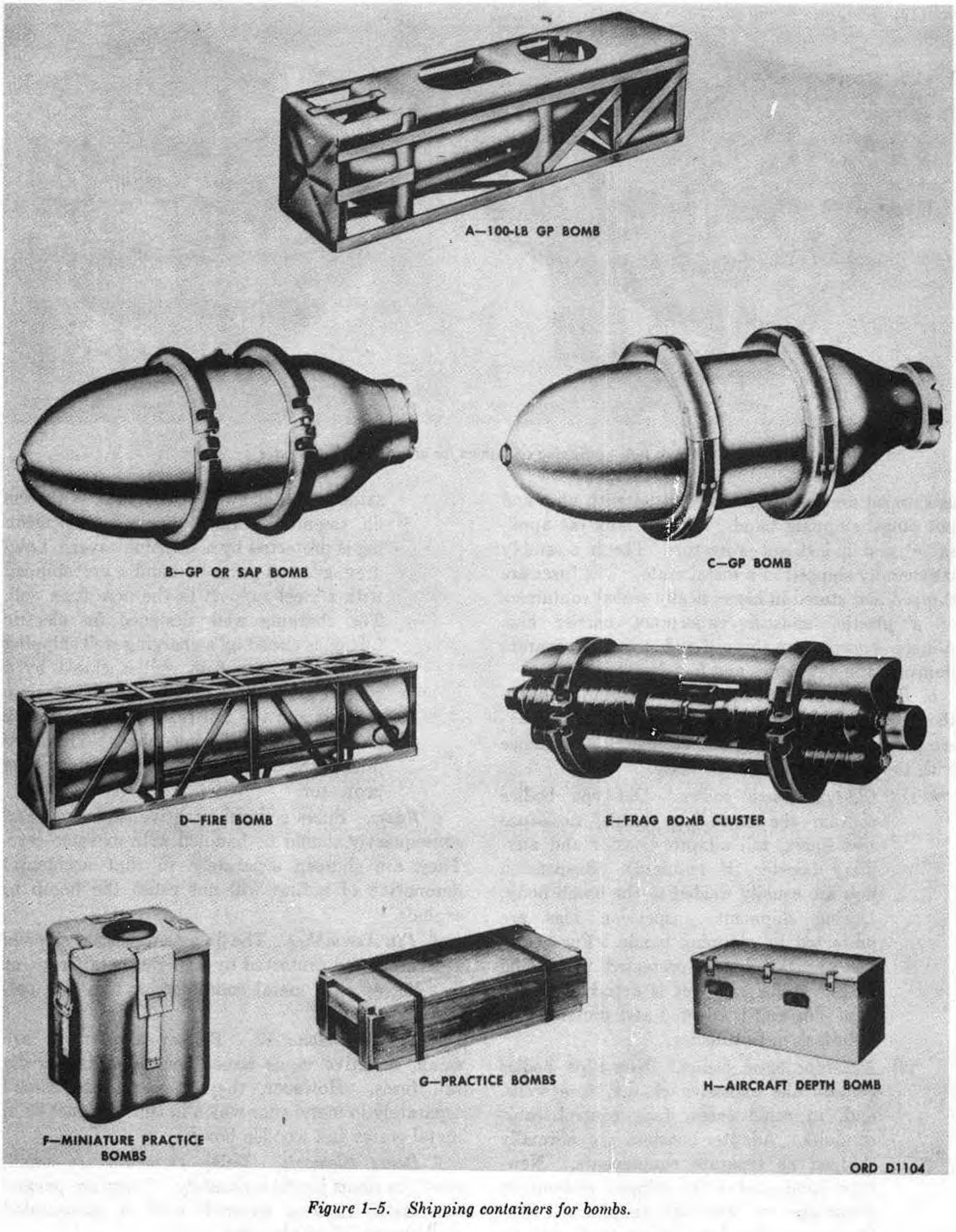

Figure 1-5. Shipping containers for bombs.

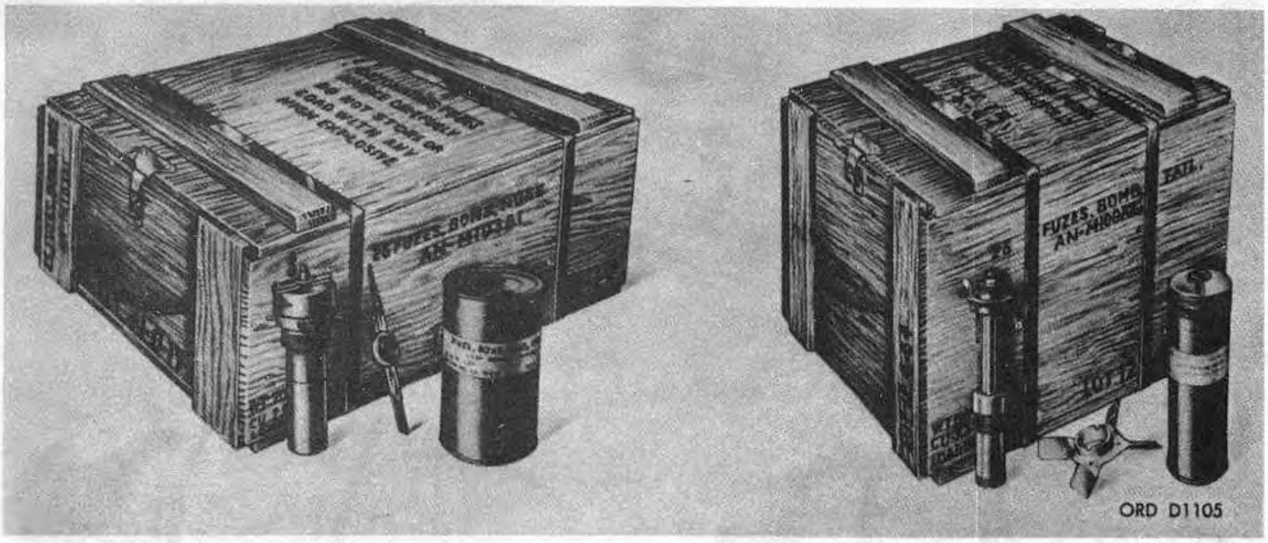

Figure 1-6. Shipping containers for arming vanes and fuzes

as shipped are the bomb body fitted with nose and tail plugs, shipping bands, fin lock nuts (as applicable), and fin lock nut protectors. The fin assembly is generally shipped in a metal crate. The fuzes are shipped and stored in hermetically-sealed containers or a plastic, moisture/vaporproof barrier bag. Adapter-boosters are shipped and stored as separate items for the new-series and low-drag bombs.

b. Bomb Body. The two types of bomb bodies—the old cylindrical and the new streamlined type—are prepared for shipping and storage in accordance with the configuration of the body.

(1) *Old-type bomb bodies.* Old-type bodies contain the explosive charge, nose-fuze seat liners, tail adapter-booster and auxiliary booster (if required). Suspension lugs are usually welded to the bomb body. During shipment, suspension lugs are protected by shipping bands. Fuze cavities are closed and protected by closing plugs. A fin lock nut is attached to the base plug and is covered and protected by a fin lock nut protector.

(2) *New-type bomb bodies.* New-type bodies contain the explosive charge, fuze wells, and, in some cases, fuze control cable conduits. Adapter-boosters are normally shipped as separate components. New-type bomb bodies are shipped without fin assemblies or external suspension lugs. The suspension lugs, lug screws, and fin attachment screws are shipped with the fin assembly. Each recessed suspension lug is protected by a shipping cover. Low-drag general purpose bombs are shipped with a steel support in the nose fuze well. The charging well, designed for electric fuzing, is closed by a charging-well shipping plug. The nose fuze well is closed by a conical plug which matches the bomb nose contour and the tail fuze well is closed by a conventional closing plug. The base plug of the bomb is protected by a shipping protector.

c. Fuzes. Fuzes contain sensitive explosives and consequently should be handled with extreme care. They are shipped separately so that accidental detonation of a fuze will not cause the bomb to explode.

d. Fin Assemblies. The fin assemblies are shipped separately and protected by either a metal crate, or in some cases, a metal container, or they are palletized.

e. Primer-Detonators. Primer-detonators are small, sensitive items issued for use with certain tail fuzes. However, they may also be issued separately in metal cans which in turn are packed in metal crates and wooden boxes.

f. Delay Elements. Delay elements are small, sensitive items issued separately. They are packed in plastic cartons covered with a heat-sealed moisture-proof barrier bag.

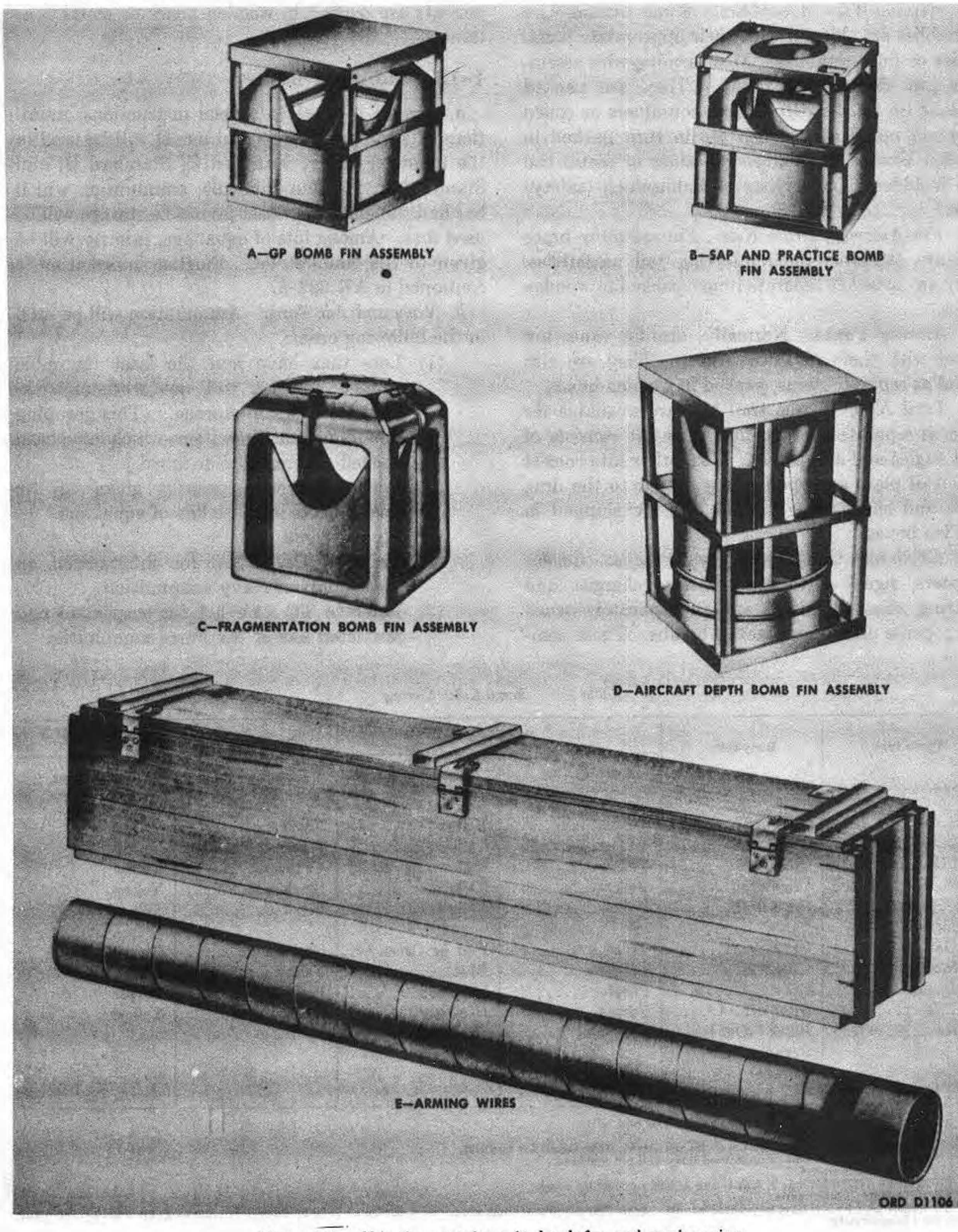

Figure 1–7. Shipping containers for bomb fins and arming wires.

g. Arming-Wire Assemblies. Some arming-wire assemblies are shipped with their appropriate bomb bodies or fin assemblies. Most arming-wire assemblies are shipped separately. They are packed straight (in full length) in fiber containers or coiled in round metal cans which are in turn packed in wooden boxes. Each fiber container or metal can also includes a box or bag of Fahnestock (safety) clips.

h. Fin-Assembly Brace Kits. Fin-assembly brace kits are available for reinforcing tail assemblies. They are issued as separate items, packed in wooden boxes.

i. Arming Vanes. Normally, arming vanes are issued with their respective fuzes. They are also issued as separate items, packed in wooden boxes.

j. Trail Kits. Three trail kits are available for issue as separate components. One kit consists of trail angles and accessories. Two other kits consist of a trail plate and spoiler ring similar to the drag plate and spoiler ring. Trail kits are shipped in wooden boxes.

k. Explosive Components for Practice Bombs. Bursters, signal cartridges, spotting charges, and spotting charge igniters are all separately-issued components used with practice bombs. These components are packed in wooden boxes or metal containers.

1-13. Priority of Issue

a. Army. Subject to special instructions, munitions of appropriate type and model will be used in the following order: Standard C, Standard B, and Standard A. Within this rule, ammunition which has had the longest or least favorable storage will be used first. Among lots of equal age, priority will be given to the smallest lot. Further information is contained in AR 622-5.

b. Navy and Air Force. Ammunition will be used in the following order:

(1) Lots that have had the least favorable storage or that will not withstand extended periods of storage. (This grouping should include those items which have been opened and resealed or taped.)
(2) Oldest lots with priority given to the smallest lots in those lots of equal age.
(3) All other lots.
(4) Refer to OD 17190 for information on specific lots of Navy ammunition.
(5) Refer to TO 11A-1-1 for suspended and restricted lots of Air Force ammunition.

Table 1-1. Bomb Color Coding

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

[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 MK77 Mod 0 and 1 have unpainted body and red marking.
[5] MPB MK5 is unpainted.
[6] PB MK106, MK76 Mod 1, 2, and 4, and MK89 have white bands.
[7] PB MK106 has white bands.
[8] All models used by AF have unpainted bodies. After filling, red markings are added if the bomb is to be stored. No markings are added if the bomb is to be used immediately.

Table 1-2. Packing

Bomb type	Bomb body	Fin assembly	Assembled bombs
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	Some GP 100-lb bombs are shipped as a unit in a metal container.
Fragmentation (Frag)	Metal shipping rings; fuze cavities plugged.	Metal containers	In clusters or wafers
Aircraft Depth Bomb (ADB)	Metal containers	Metal containers	
Miniature Practice Bombs (MPB)			Wood or metal containers
Practice Bombs (PB)	Fireboard containers	Metal containers	Wood or metal containers
Fire Bomb*	Wood or metal containers		
Smoke and Incendiary Bombs (100-lb size).	Wood containers		Wood containers
Incendiary Bombs (500-lb size)	Metal shipping ring; fuze cavities plugged.	Metal containers	

*The center section of fire bomb MK79 Mod 1 is used as a shipping container for the bomb's four sections: fins, filling-hole covers, lock pins and a fiber pounding block.

CHAPTER 2

BOMBS

Section I. SEMI-ARMOR-PIERCING BOMBS (SAP)

2-1. General

Semi-armor-piercing bombs have a heavy case and accommodations for both nose and tail fuzes. Since a nose fuze is rarely used, the nose seat is closed by an armor-piercing plug. The semi-armor-piercing bombs provide greater penetrative ability than that afforded by a comparable GP bomb; however, in some instances these bombs can be used as general purpose bombs by the addition of a nose fuze. The standard explosive charge contained in SAP bombs is picratol and represents approximately 30 percent of the total bomb weight. Bombs containing TNT or amatol may be encountered in earlier models. A box-type fin is attached to the aft end of the bomb body by a fin lock nut. Suspension lugs for either single- or dual-point suspension are welded to the bomb body.

2-2. Bomb, Semi-Armor-Piercing: 1,000 Pound, AN-M59A2

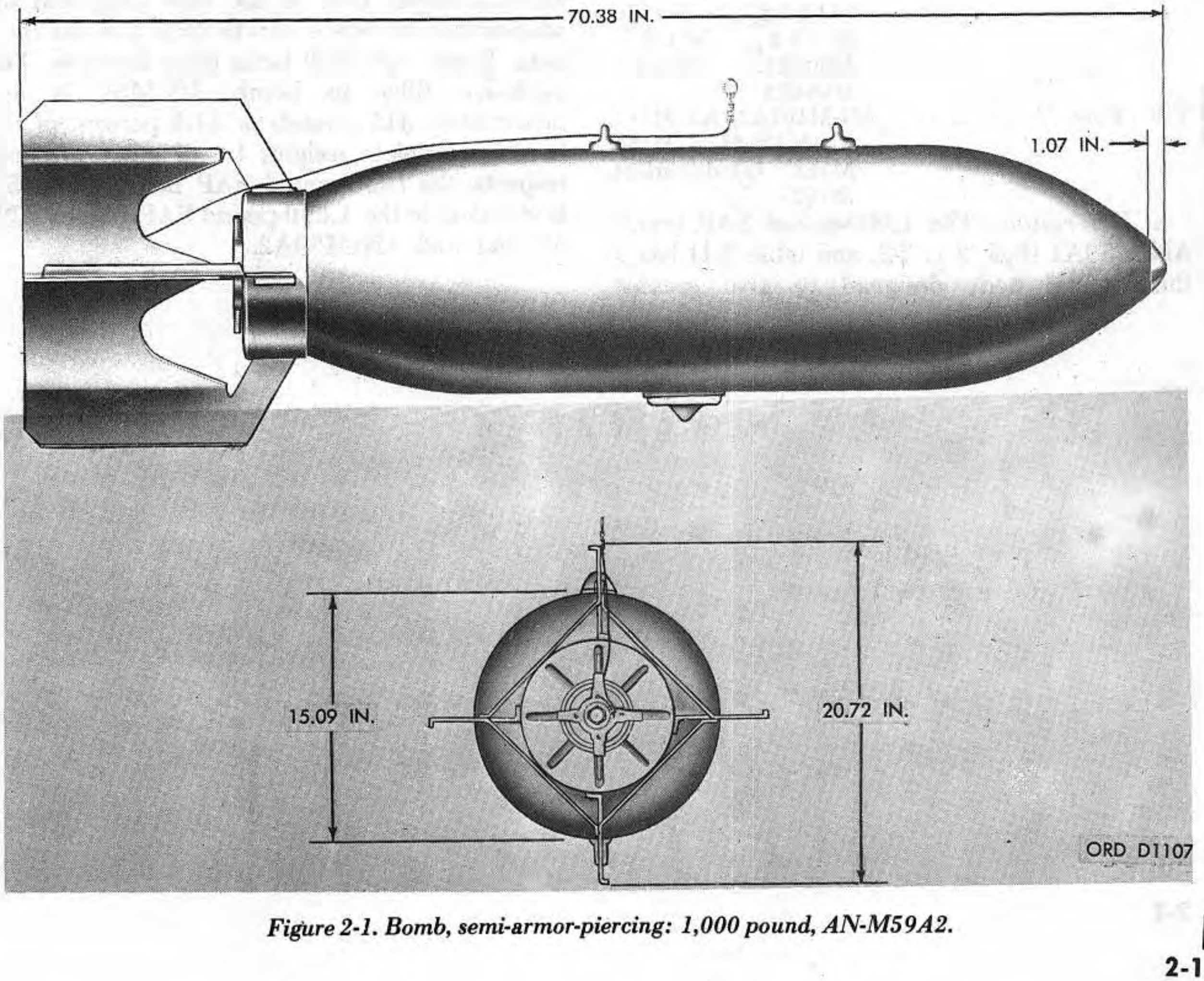

Figure 2-1. Bomb, semi-armor-piercing: 1,000 pound, AN-M59A2.

Table 2-1. Bomb, Semi-Armor-Piercing: 1,000-pound, AN-M59A2

Model	AN-M59A2
Length of Assembled Bomb (in.)	70.38
Body Diameter (in.)	15.09
Fin Span (in.)	20.72
Weight of Filler (lb):	
Amatol	292.25
TNT	310.0
Picratol	321.0
Weight of Fin Assembly (lb)	25.5
Weight of Assembled Bomb (lb):	
Loaded with Amatol	1,032.0
Loaded with TNT	1,050.0
Loaded with Picratol	1,061.0
Fin Assembly	AN-M114A1
Fin Lock Nut	Mkl Mod 0
Arming-Wire Assembly:	
Tail Fuze Only	Mkl or AN-M6A2
Nose and Tail Fuzing	AN-M7A1
Adapter-Booster	M102A1
Nose Fuze	AN-M103A1, AN-M139A1, AN-M140A1, M163, M164, M165, M904E1, M904E2, M904E3
Tail Fuze	AN-M102A2, AN-M117, AN-M125A1, M134, M161 (Modification), M162

a. Description. The 1,000-pound SAP bomb AN-M59A1 (figs. 2-1, 2-2, and table 2-1) 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 lock nut. 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 SAP bomb AN-M59A1 is explosive filler. Bombs filled with amatol 50-50 include a booster surround of cast TNT and 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.

b. Differences Between Bombs AN-M59A1, AN-M59A2, and AN-M59. The 1000-pound SAP bomb AN-M59A1 and AN-M59A2 have antiwithdrawal pins in the base plug and an adapter-booster which can be locked to the base plug. Bomb AN-M59 lacks these features. The explosive filler in bomb AN-M59 is approximately 315 pounds or 31.8 percent of the bomb's complete weight. In all other physical respects, the 1000-pound SAP bomb AN-M59 is identical to the 1,000-pound SAP bombs AN-M59A1 and AN-M59A2.

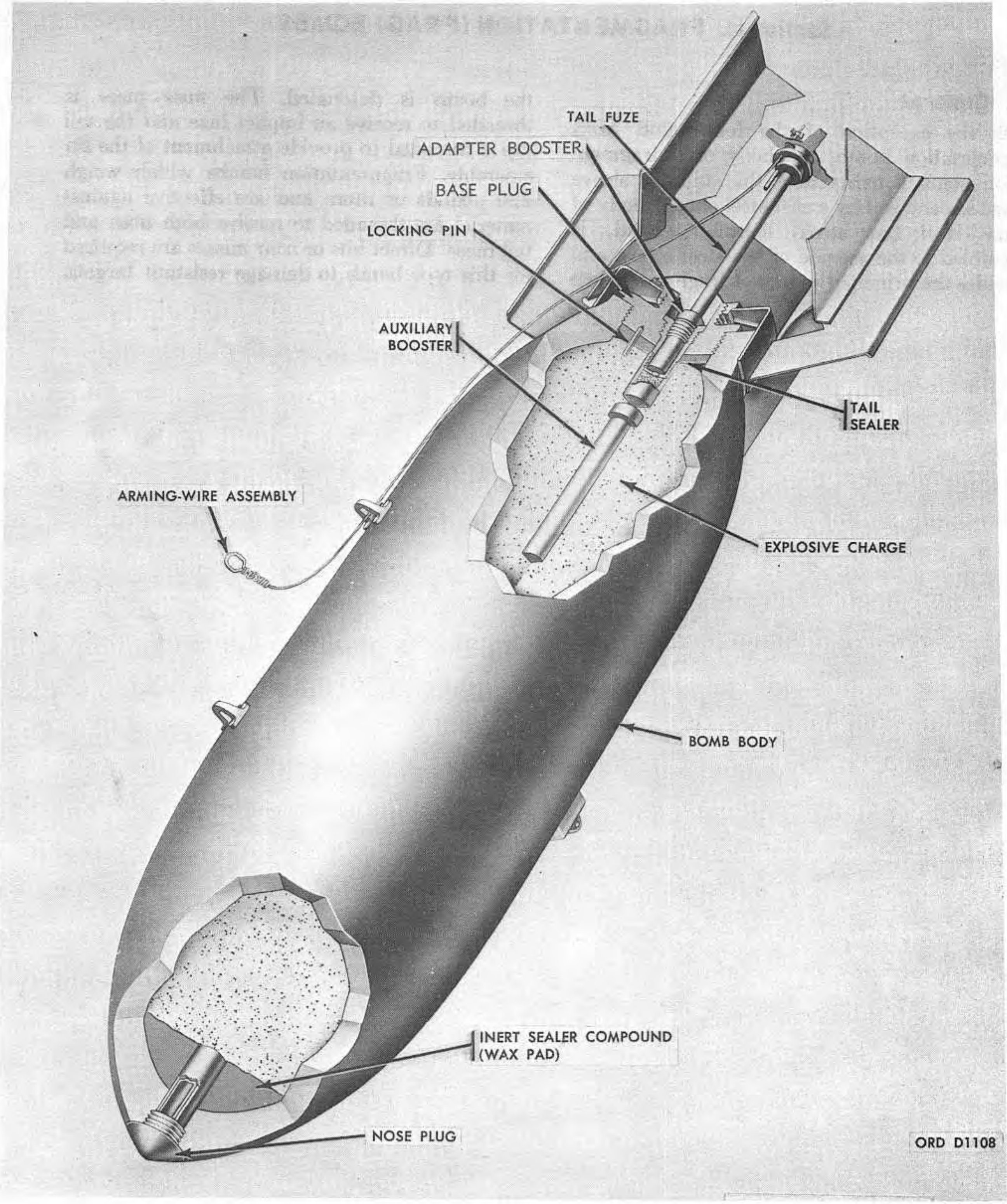

Figure 2-2. Bomb, semi-armor-piercing: 1,000 pound, AN-M59A2, cutaway view.

Section II. FRAGMENTATION (FRAG) BOMBS

2-3. General

With the exception of the four-pound M83 fragmentation bomb, the body of a fragmentation bomb consists of a thin tubular sleeve closed at each end by a cast-steel cup. A body of heavy steel bar stock, spirally wound, is assembled to the outside of the steel sleeve and provides the principal source of fragments when the bomb is detonated. The nose piece is threaded to receive an impact fuze and the tail cap is threaded to provide attachment of the fin assembly. Fragmentation bombs which weigh 220 pounds or more and are effective against materiel are threaded to receive both nose and tail fuzes. Direct hits or near misses are required for this type bomb to damage resistant targets.

2-4. Bomb, Fragmentation: 4-Pound, M83

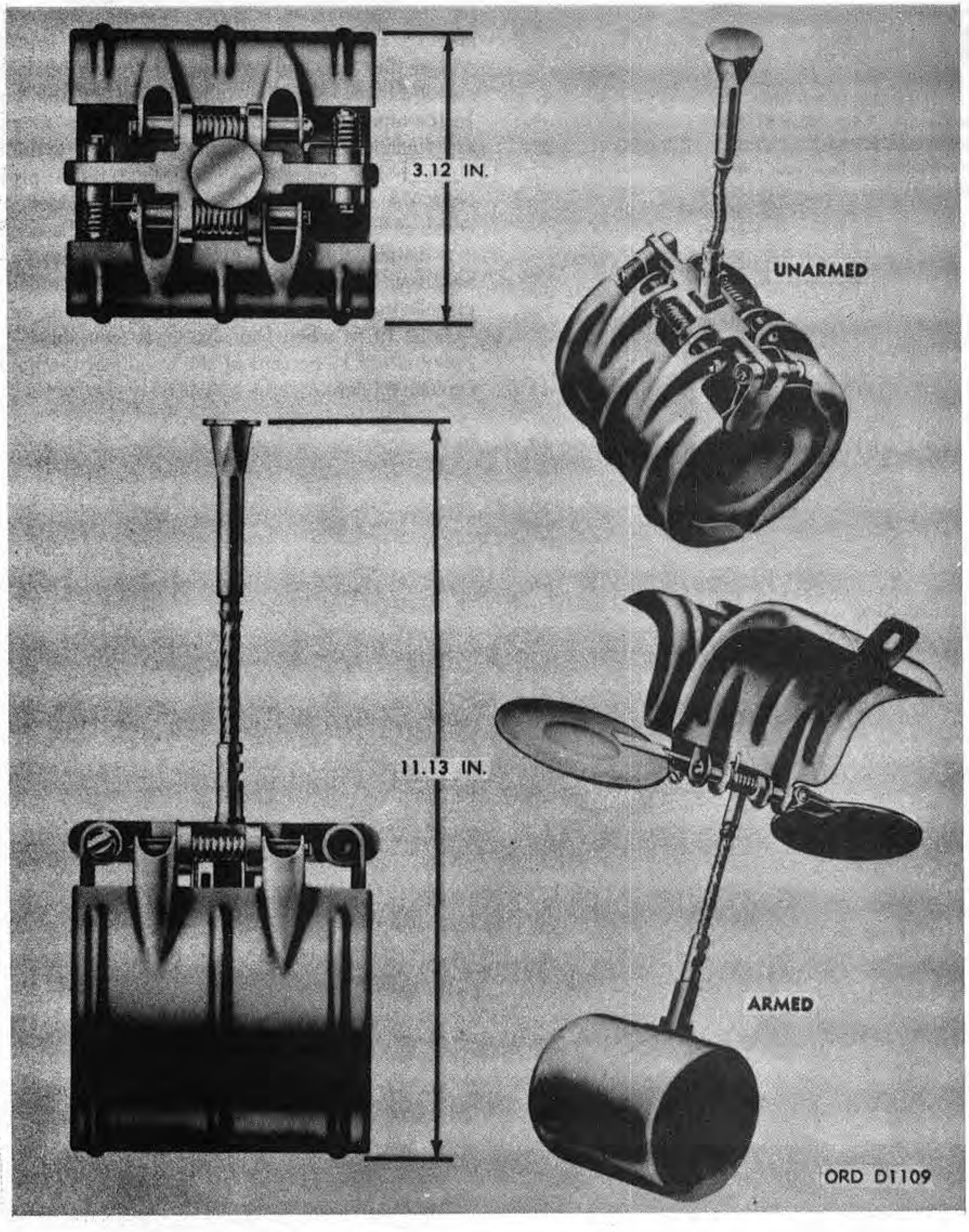

Figure 2-3. Bomb, fragmentation: 4-pound, M83.

Table 2-2. Bomb, Fragmentation: 4-Pound, M83

Model	M83
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 Filler (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
	M129A1
	M130
	M130A1
	M131
	M131A1
Bomb Cluster	M28A2
Cluster Adapter	M15A2

The 4-pound frag bomb M83 (fig. 2-3 and table 2-2) is a small barrel-shaped bomb. The fuze is assembled at the time of manufacture and is mounted on the bomb case midway between the cylinder ends. Two semicylindrical surfaces (butterfly wings) (fig. 2-4) and two discs (propeller blades) are spring-hinged together independent of the bomb. In the unarmed position, those four pieces, or vanes, are folded about the bomb forming a cylindrical outer bomb casing. A cable extension projects from the fuze (fig. 2-5) through the folded outer bomb casing. The M83 bombs are issued assembled in clusters. Impact, mechanical-time-delay, and antidisturbance firing actions are controlled by preselection of the proportion and setting of the various fuzes when the cluster is assembled. Approximately 12 percent of the weight of the bomb is explosive filler.

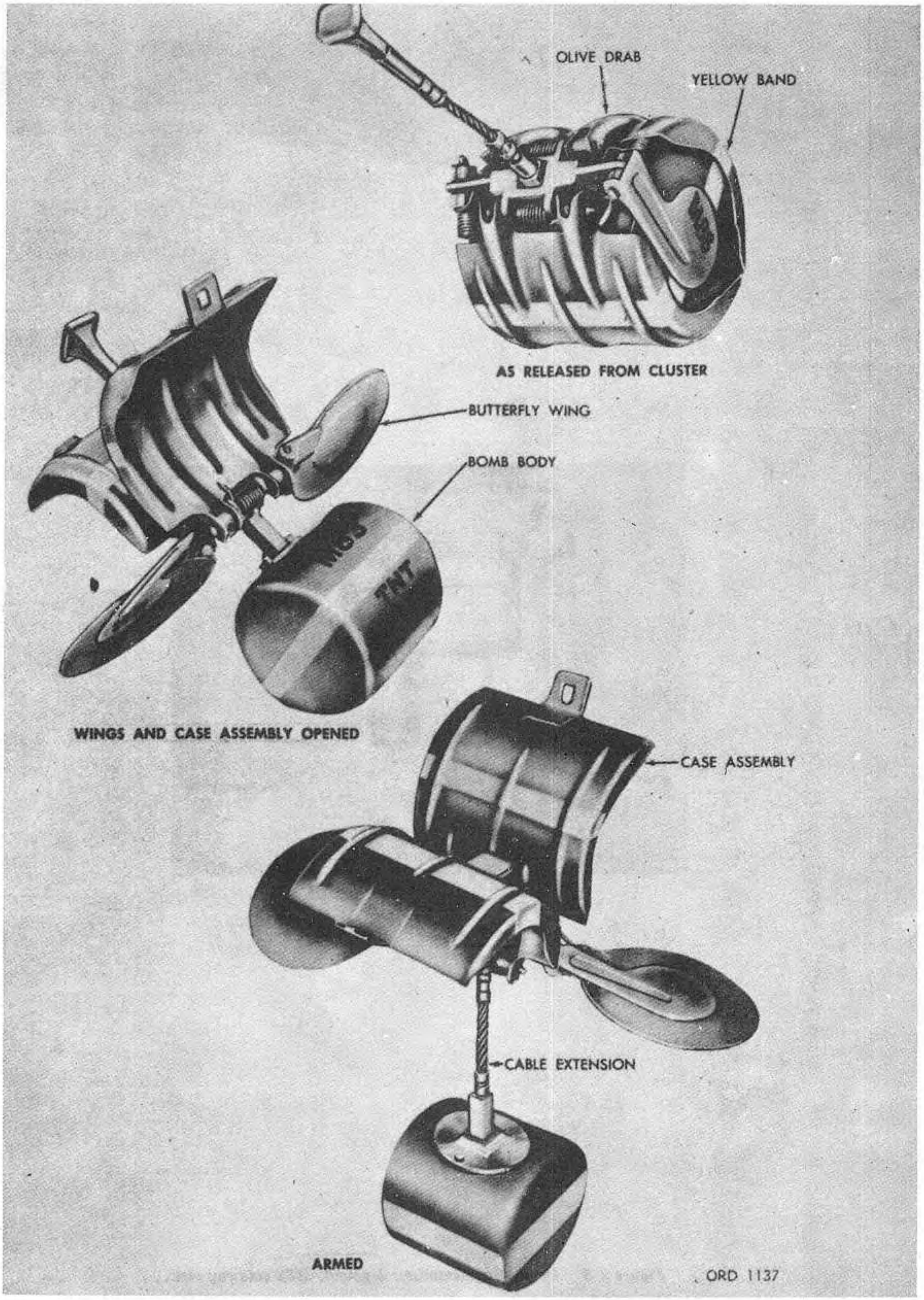

Figure 2-4. Bomb, fragmentation: 4-pound, M83, steps in operation.

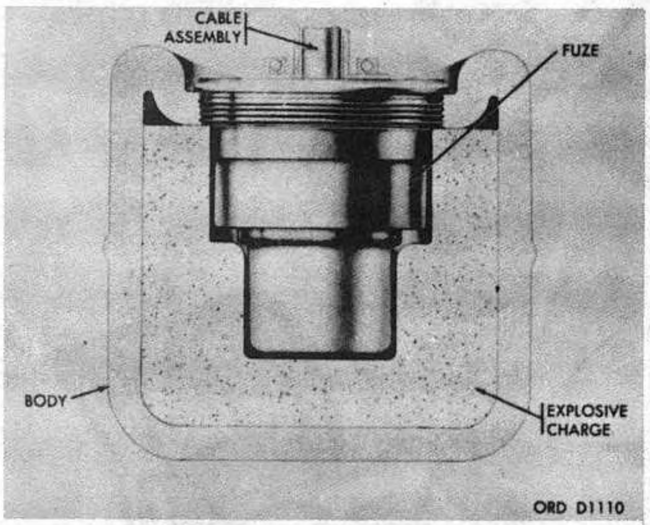

Figure 2-5. Bomb, fragmentation: 4-pound, M83 cutaway view.

2-5. Bomb, Fragmentation: 20-Pound, AN-M41A1

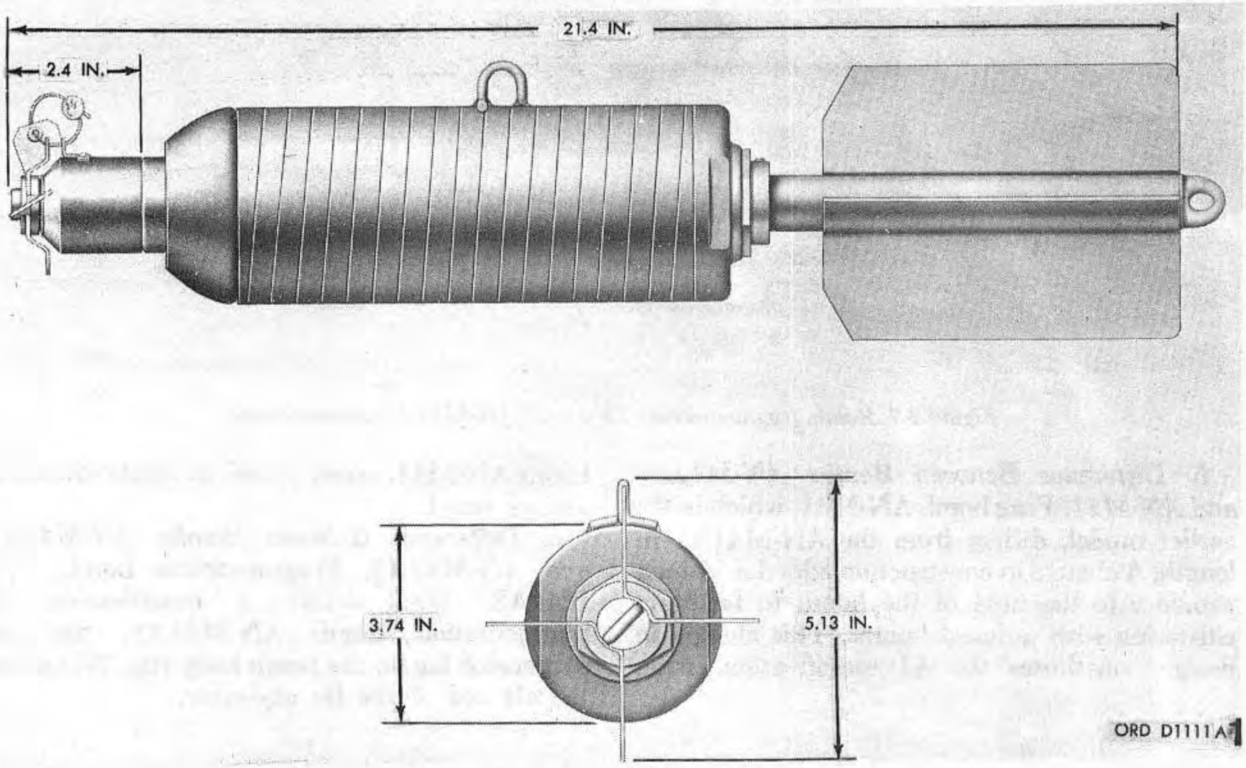

Figure 2-6. Bomb, fragmentation: 20-pound, AN-M41A1.

Table 2-3. Bomb, Fragmentation: 20-Pound, AN-M41A1

Model	AN - M41A1
Length of Assembled Bomb (in.)	21.4
Body Diameter (in.)	3.74
Fin Span (in.)	5.15
Weight of Filler (lb) :	
Composition B	2.8
TNT	2.7
Weight of Fin Assembly (lb) :	1.6
Weight of Assembled Bomb (lb) :	
Loaded with Composition B	19.93
Loaded with TNT	19.8
Nose Fuze	AN-M110A1 AN-M158 AN-M120A1
Bomb Cluster	AN-M1A2
Cluster Adapter	AN-M1A3

a. Description. The 20-pound frag bomb AN-M41A1 (figs. 2-6, 2-7, and table 2-3) is constructed of a thin tubular sleeve holding a steel fragmenting coil and a cast steel nose and tail pieces. The sleeve is threaded to the nose and tail pieces. The fin assembly is made of rectangular sheet-steel vanes welded to a 1-inch 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 weight of the bomb (complete) is explosive filler.

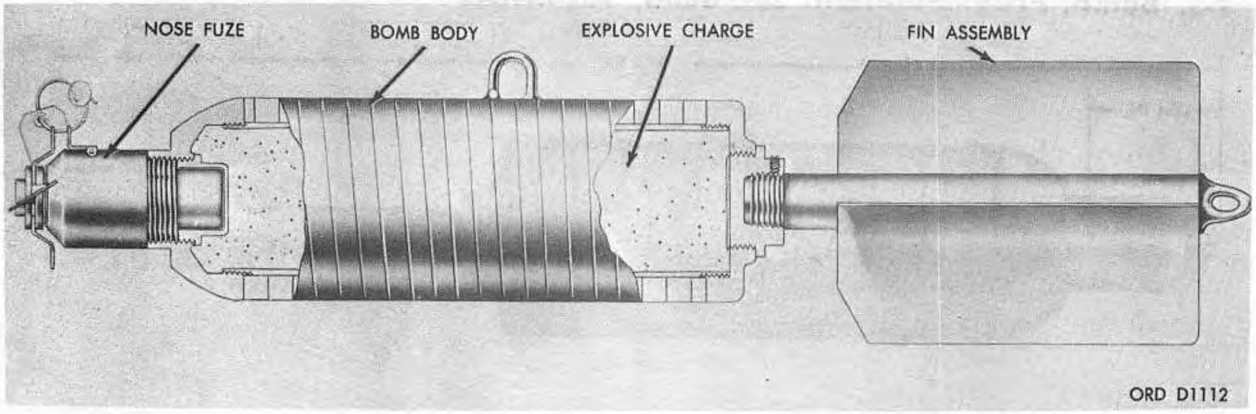

Figure 2-7. Bomb, fragmentation: 20-pound, AN-M41A1, cutaway view.

b. Difference Between Bombs AN-M41A1 and AN-M41. Frag bomb AN-M41, 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 constitutes the A1 modification. Frag bomb AN-M41, when issued in cluster form, is always fuzed.

c. Difference Between Bombs AN-M41A1 and AN-M41A2, Fragmentation bomb AN-M41A2, (fig. 2-7.1) a modification of fragmentation bomb AN-M41A1, has no suspension lug on the bomb body (fig. 2-7) or on the aft end of the fin assembly.

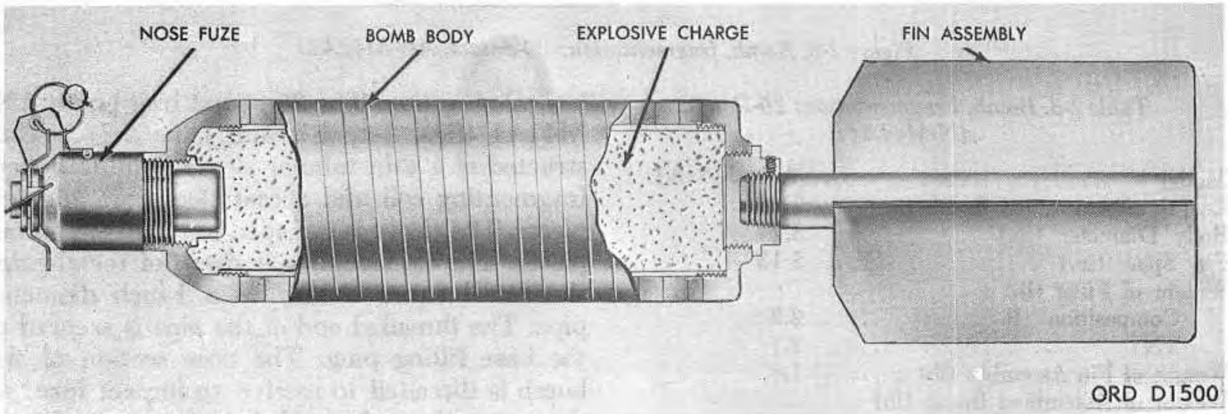

Figure 2-7.1. Bomb, fragmentation: 20-pound, AN-M41A2, cutaway view.

2-6. Bomb, Fragmentation: 23-Pound, M40A1

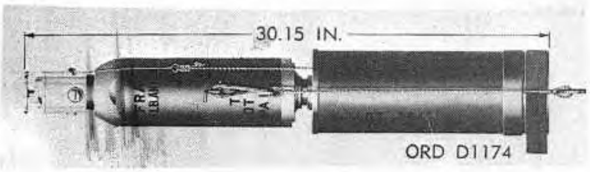

Figure 2-8. Bomb, fragmentation: 23-pound, M40A1.

Table 2-4. Bomb, Fragmentation: 23-Pound, M40A1

Model	M40A1
Length of Assembled Bomb (in.)	30.15
Bomb Diameter (in.)	4.37
Weight of Filler (lb) :	
Composition B	2.8
TNT (Grade I)	2.7
Weight of Assembled Bomb (lb) :	
Loaded with Composition B	24.9
Loaded with TNT	24.8

Nose Fuze	M170 (with detonator M18A2) AN-M120A1 AN-M120
Bomb Cluster	AN-M4A2
Cluster Adapter	M3A1

a. Description. Frag bomb M40A1 (fig. 2-8 and table 2-4) is a parachute-type bomb designed for assembly in clusters; however, it is also authorized for single suspension use. This bomb is used in fragmentation bomb cluster M4A2.

2-7. Bomb, Fragmentation: 90-Pound, M82

b. Differences. The M40 is ½-inch shorter than the M40A1 due to a change in design which added a shoulder to the nose of bomb M40A1; this change in design constitutes the "A1" modification. The M40 is used in forming the M4 cluster as well as the M4A2 cluster. The M40 and M40A1 utilize the same bodies as the M41 and M41A1. The weight difference is the difference between the parachute assembly used for the one and the fin assembly used for the other.

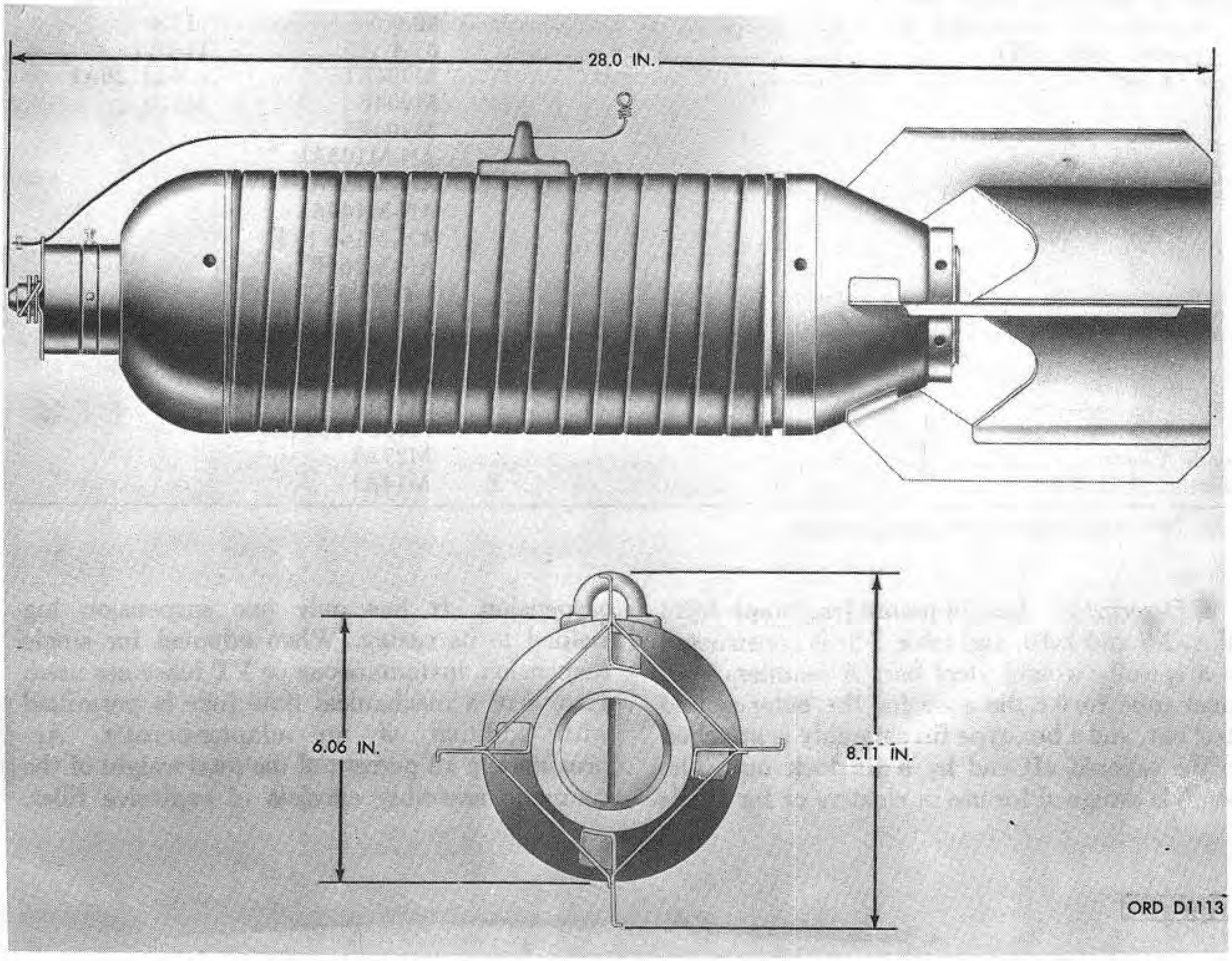

Figure 2-9. Bomb, fragmentation: 90-pound, M82.

Table 2-5. Bombs, Fragmentation: 90-Pound, M82 and 120-Pound, M86

	90-Pound, M82	120-Pound, M86
Model	M82	M86
Fin Assembly	M101	
Parachute Unit Assembly	—	M5
Length of Assembled Bomb (in.)	28.0	58.82
Body Diameter (in.)	6.06	6.06
Fin Span (in.)	8.11	
Diameter of Parachute Unit (in.)	—	7.88
Weight of Filler (lb):		
Composition B	11.5	11.5
TNT	10.9	10.9
Weight of Fin Assembly (lb)	2.46	
Weight of Parachute Unit Assembly	—	36.0
Weight of Adapter-Booster, M117 (lb)	—	1.19
Arming Wire Assembly	MK1 or AN-M6A2	Furnished w/Parachute Unit (or M31 Substitute)
Weight of Assembled Bomb (lb):		
Loaded with Composition B	88.0	117.4
Loaded with TNT	87.4	116.8
Nose Fuze*	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M163 M164 M165 M188 (VT)	AN-M120A1 M170
Bomb Cluster	M27A1	
Cluster Adapter	M14A1	

* For all fuzes other than VT, use nondelay only.

a. Description. The 90-pound frag bomb M82 (figs. 2-9 and 2-10, and table 2-5) is constructed of a spirally wound steel bar. A seamless steel inner tube forms the base for the outer-wound steel bar, and a box-type fin assembly is attached to the tapered aft end by a fin lock nut. The bomb is designed for use in clusters or for single suspension. It has only one suspension lug welded to its casing. When adapted for single suspension, instantaneous or VT fuzes are used. Fitting of a mechanical time fuze is permitted with addition of an adapter-booster. Approximately 13 percent of the total weight of the complete assembly consists of explosive filler.

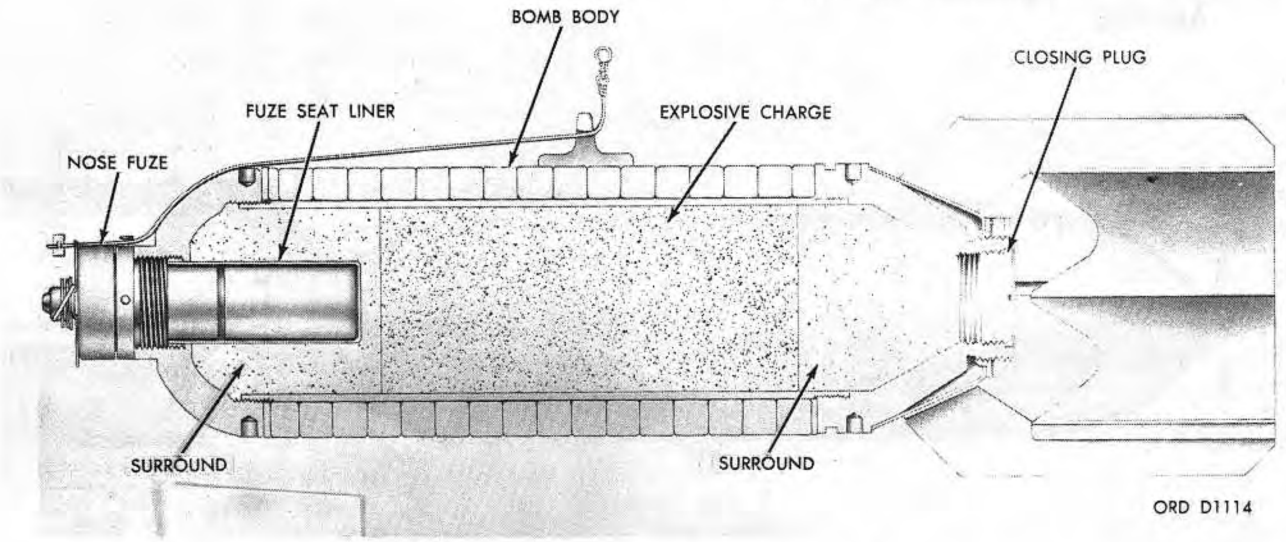

Figure 2-10. Bomb fragmentation: 90-pound, M82, cutaway view.

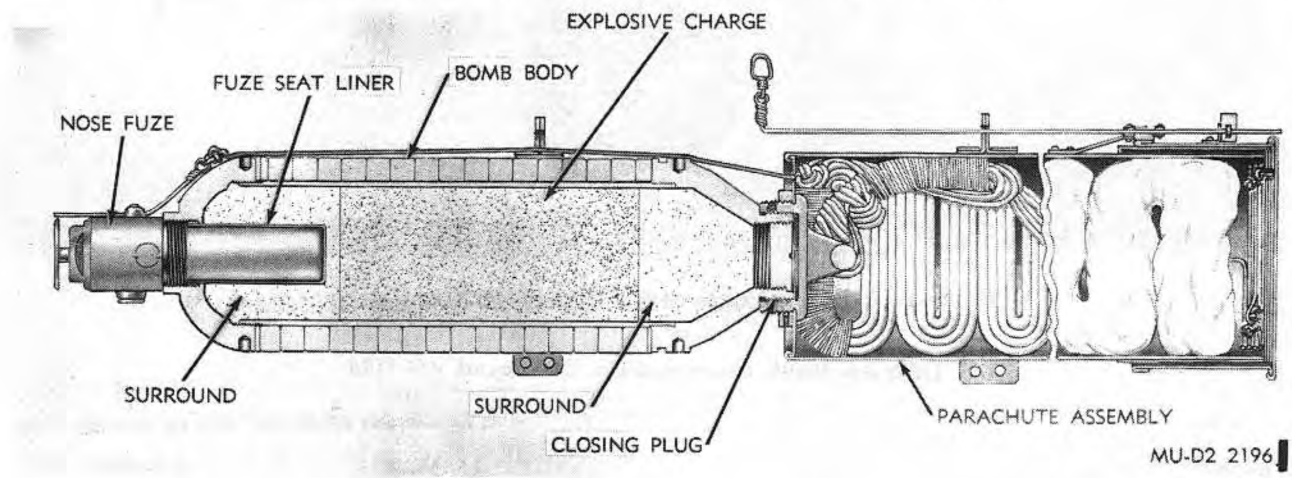

Figure 2-10.1 Bomb, fragmentation: 120-pound, M86, cutaway view.

b. Difference between Bombs M82 and M86. The bomb body, metal parts and filler for the 120-pound frag bomb M86 are identical to those of the M82 frag bomb. The difference is that the M86 has a parachute unit assembly instead of a fin assembly, and the bomb is fitted with a mechanical time fuze with the addition of an adapter-booster. The parachute unit retards the bomb during low-level attack bombing and provides a greater angle of impact.

2-8. Bomb, Fragmentation: 220-Pound, AN-M88

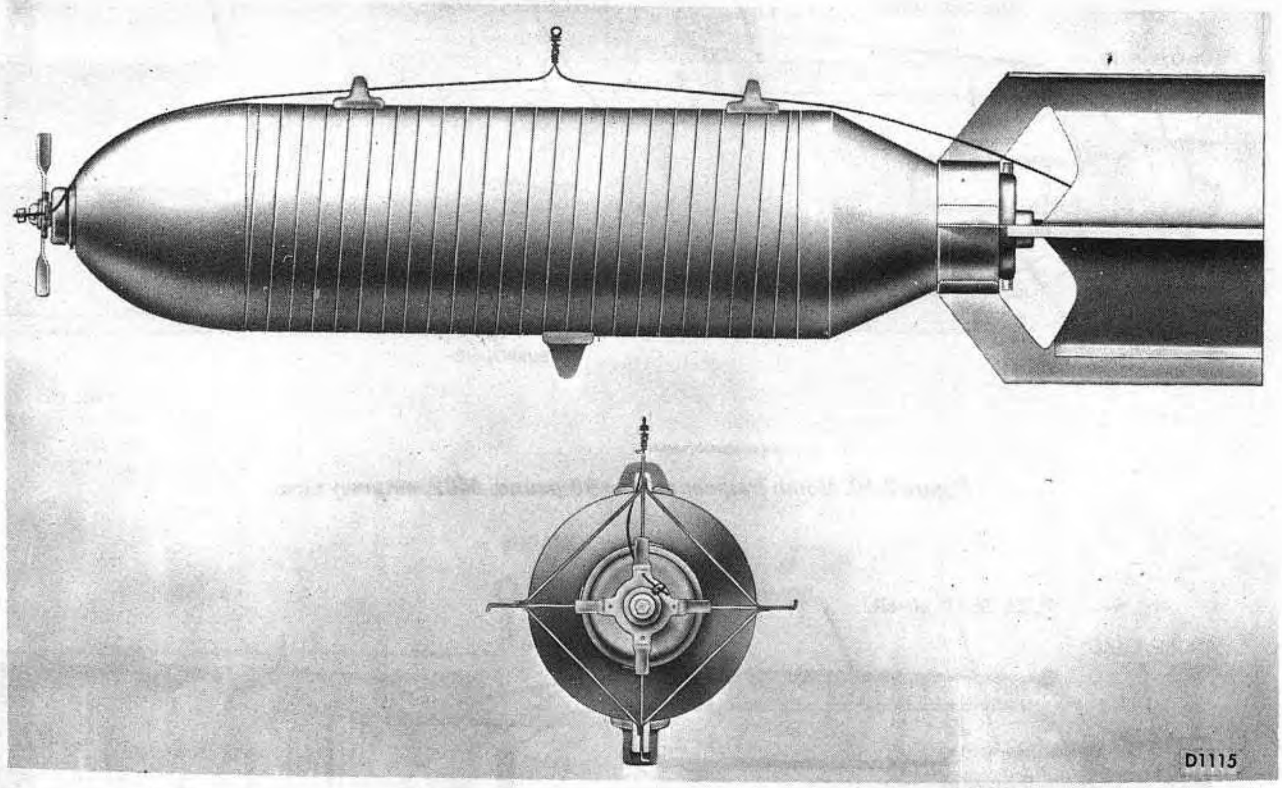

Figure 2-11. Bomb, fragmentation: typical AN-M88 and AN-M81.

Table 2-6. Bomb, Fragmentation: 220-Pound, AN-M88

	With fin assembly AN-M103A1	With fin assembly M135
Model	AN-M88	AN-M88
Length of Assembled Bomb (in.)	43.7	58.0
Bomb Diameter (in.)	8.12	8.12
Fin Span (in.)	11.0	11.19
Weight of Filler (lb):		
Composition B	41.3	41.3
TNT	39.4	39.4
Weight of Fin Assembly (lb)	4.1	17.5
Weight of Assembled Bomb (lb):		
Loaded with Composition B	217.1	232.3
Loaded with TNT	215.9	231.1
Fin Lock Nut	M1 or Mk 2 Mod 0	
Arming-Wire Assembly:		
Nose or Tail Fuze	Mk1 or AN-M6A2	Mk1 or AN-M6A2
Nose and Tail Fuzing	AN-M1A2	AN-M1A2 or M14

Table 2-6. Bomb, Fragmentation: 220-Pound, AN-M88—Continued

	With fin assembly AN-M103A1	With fin assembly M135
Nose Fuze*	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 AN-MK219 Mod 3 AN-MK219 Mod 4 AN-M166 (VT) AN-M166E (VT) AN-M168 (VT) M188 (VT) M163 M164 M165	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 AN-MK219 Mod 3 AN-MK219 Mod 4 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze*	AN-M100A2	M172 M175

* For all fuzes other than VT, use nondelay only.

a. Description. The 220-pound frag bomb AN-M88 (figs. 2-11, 2-12, and table 2-6) has a body constructed of spirally-wound 13 / 16 inch square steel bar over a seamless steel tube which forms the base for the wrapping. Solid nose and tail forgings complete the bomb assembly. A fin assembly, either box type or conical type, (fig. 2-13) is secured to the aft end. The conical type fin (M135) is standard for high-altitude and / or high-speed bombing. 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. Approximately 19 percent of the complete weight of the bomb comprises the explosive filler.

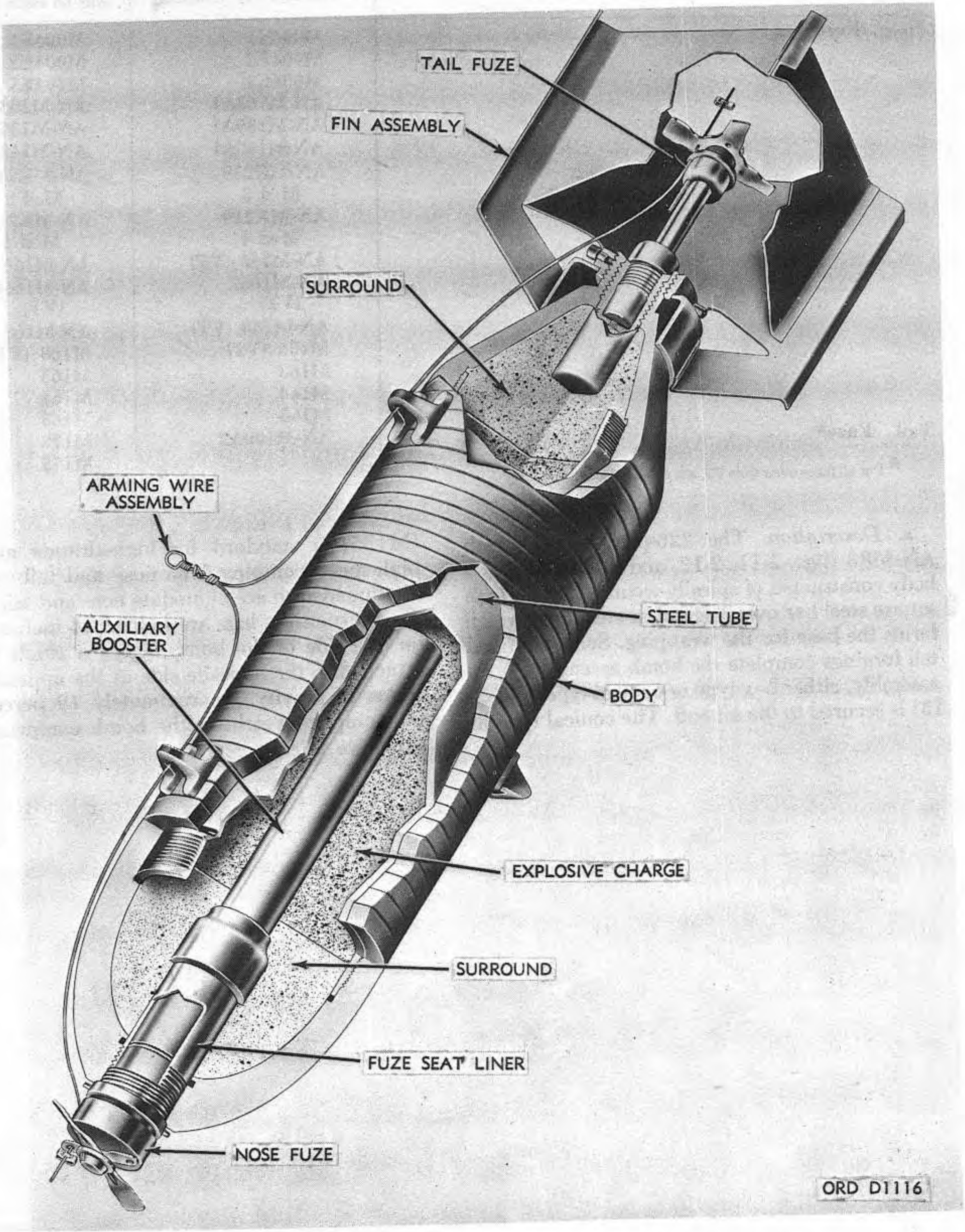

Figure 2-12. Bomb, fragmentation: typical AN-M88 and AN-M81 series, cutaway view.

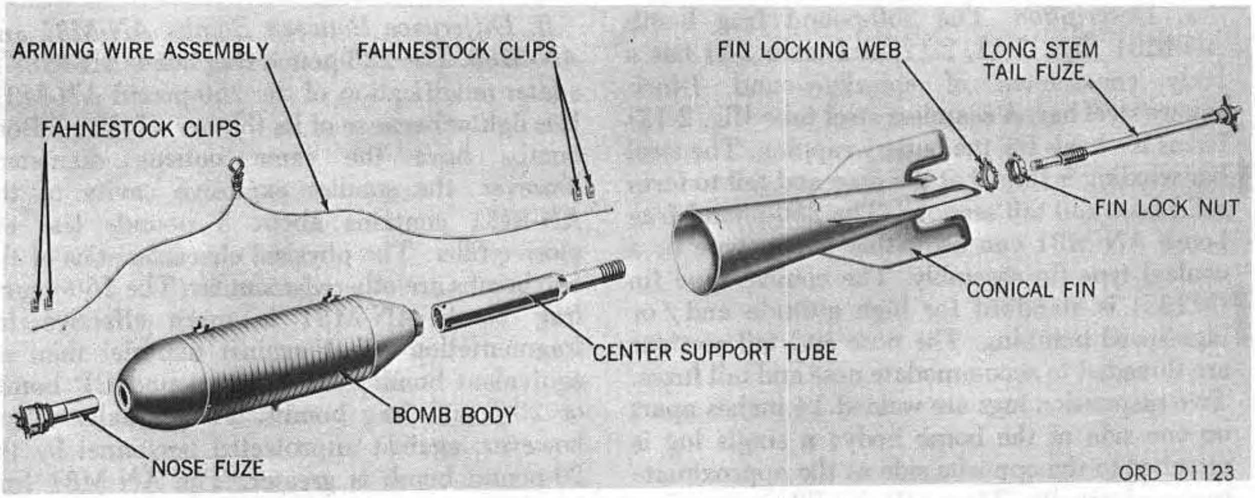

Figure 2-13. Bomb, fragmentation: typical AN-M88 and AN-M81 series, with fin assembly M135, exploded view.

b. Difference Between Bombs AN-M88 and AN-M81. Refer to paragraph 2-9*b*.

2-9. Bomb, Fragmentation: 260-Pound, AN-M81

Table 2-7. Bomb, Fragmentation: 260-Pound, AN-M81

	With fin assembly AN-M103A1	With fin assembly M135
Model	AN-M81	AN-M81
Length of Assembled Bomb (in.)	43.7	58.0
Body Diameter (in.)	8.13	8.13
Fin Span (in.)	11.0	11.19
Weight of Fin Assembly (lb)	4.1	17.5
Weight of Filler (lb):		
Composition B	35.4	35.4
TNT	33.9	33.9
Weight of Assembled Bomb (lb):		
Loaded with Composition B	263.0	276.5
Loaded with TNT	261.5	275.0
Fin Lock Nut	M1 or MK 2 Mod 0	
Fin Locking Web		
Arming-Wire Assembly:		
Nose or Tail Fuze	MK1 or M6A2	MK 1 or AN–M6A2
Nose and Tail Fuzing	AN-M1A2	AN-M1A2 or M14
Nose Fuze*	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 M166 (VT) M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze*	AN-M100A2	M175 M172

*For all fuzes other than VT, use nondelay only.

a. Description. The 260-pound frag bomb AN-M81 (figs. 2-11, 2-12, and table 2-7) has a body constructed of spirally-wound 1-inch square steel bar. A seamless steel tube (fig. 2-12) forms the basis for the outer wrapping. The steel bar winding is forged at the nose and tail to form solid nose and tail sections. The 260-pound frag bomb AN-M81 can use either a box type or a conical type fin assembly. The conical type fin (M135) is standard for high altitude and/or high-speed bombing. 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 filler comprises approximately 13 percent of the total weight of the bomb.

b. Difference Between Bombs AN-M81 and AN-M88. The 220-pound frag bomb AN-M88 is a later modification of the 260-pound 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-pound frag bomb AN-M81 is more effective for fragmentation effect against materiel than an equivalent bomb load of 500-pound GP bomb, or 20-pound frag bombs. The casualty effect, however, against unprotected personnel by the 20-pound bomb is greater. The AN-M81 frag bomb compares similarly in effectiveness with the AN-M88 frag bomb.

Section III. GENERAL PURPOSE BOMBS (GP)

2-10. General

General purpose bombs are divided into three distinct types: Old series GP bombs (figs. 2-14 and 2-15) which range in weight from 100 to 2,000 pounds; the streamlined new series GP bombs (fig. 2-16), which range in weight from 750 to 3,000 pounds, and low-drag GP bombs (figs. 2-17 and 2-18), which range in weight from 250 to 2,000 pounds.

a. Function. GP bombs will produce blast, fragmentation, and deep-mining effects. Their functions are determined by the action of the fuzes and fuze components with which they are armed. For example, when old series GP bombs are fuzed with long-delay tail fuzes, the chemical delay acts to detonate the bomb from 1 hour to 6 days from the time of release. Under these circumstances there is no nose fuze that can be used; therefore, the shipping plug is retained in the bomb nose. Normally, old series GP bombs use a nose fuze (which produces instantaneous or short-delay action) and a tail fuze to increase functioning reliability. GP bombs gain their principal effect from their high explosive content.

b. Explosive Filler. The explosive filler of GP bombs represents approximately 50 percent of the total weight. The bomb cavity is completely filled with explosive filler except for thin pads of inert wax (called sealers) at the nose and tail portions. The type of explosive filler used, as with fuzes, depends upon the use or function of the bomb. GP bombs can be loaded with tritonal, amatol, TNT, Comp B, H6 and, in some cases, HBX.

c. New Developments. The development of high-altitude bombing and high-speed aircraft made changes necessary in both external and internal design of GP bombs, plus the use of conical stream-lined fin assemblies. The new-series and low-drag type bombs and the fin assemblies used, (figs. 2-16 and 2-17) were designed to reduce air resistance and give better ballistic accuracy and aerodynamic performance in the transonic and supersonic ranges. A later model of the low-drag series (Snakeye I) (fig. 2-18) incorporates a retarding fin assembly which provides a high-speed low-altitude bombing capability. Some new-series GP bombs are designed for electric fuzing. However, other nose and tail fuze combinations are also authorized. Old-series GP bombs are shipped with adapter-boosters installed. New-series and low-drag bombs are shipped without adapter-boosters.

2-11. Bombs, General Purpose (GP) Old Series.

a. General. The old-series GP bomb is a relatively thin-cased bomb (fig 2-19) with an ogival nose, parallel side walls, and a tapered aft section. Both nose and tail fuzes are used for a majority of operations. Approximately .50 percent of the complete weight of the round is its explosive filler of amatol 50-50, TNT, tritonal or Composition B.

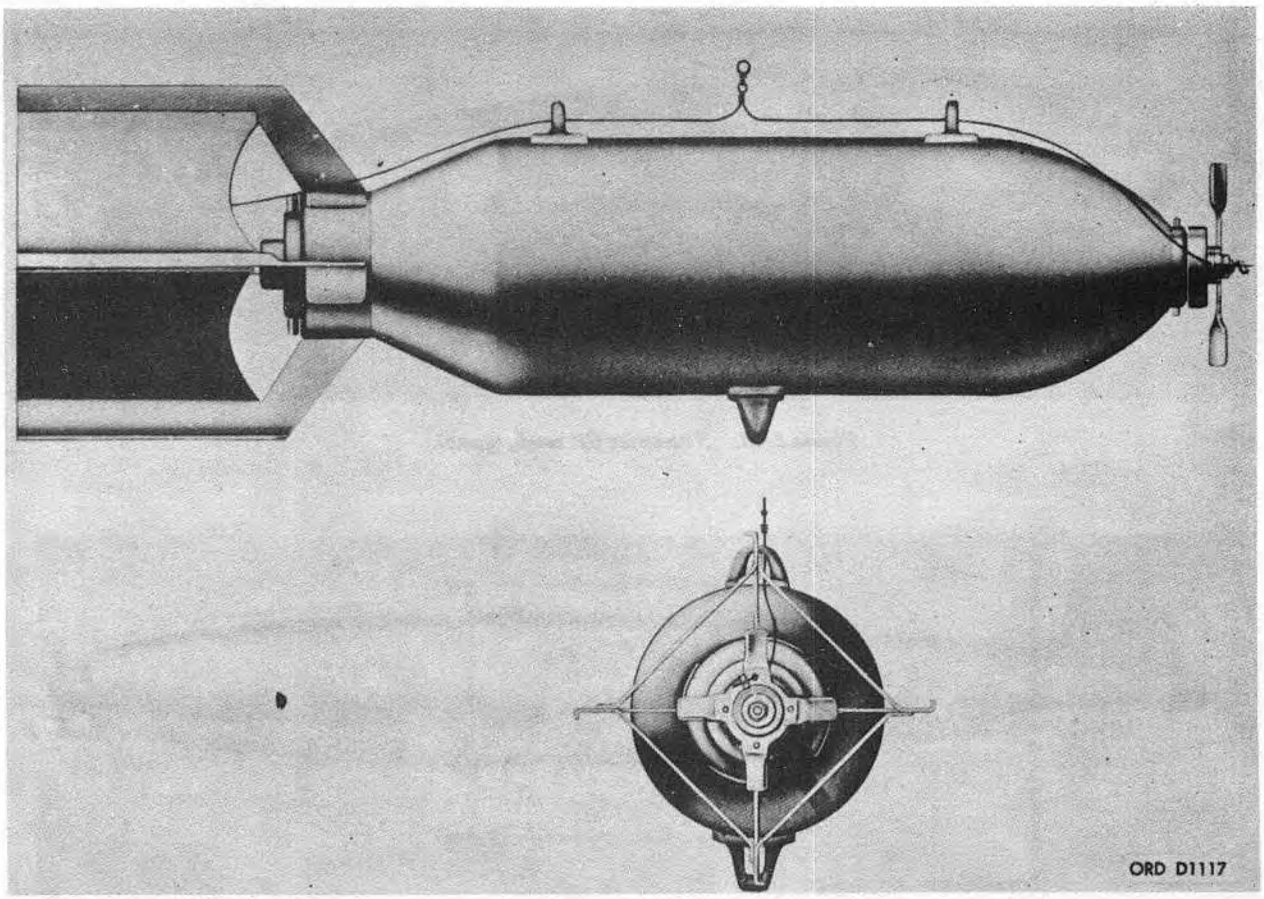

Figure 2-14. Old-series GP bomb with box fin assembly

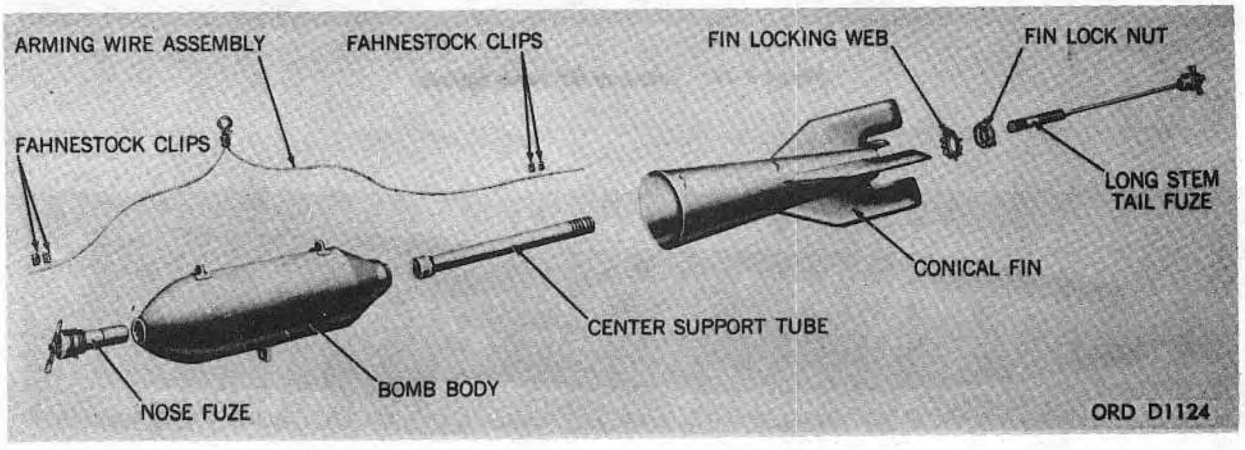

Figure 2-15. Old-series GP bomb with conical fin assembly, exploded view.

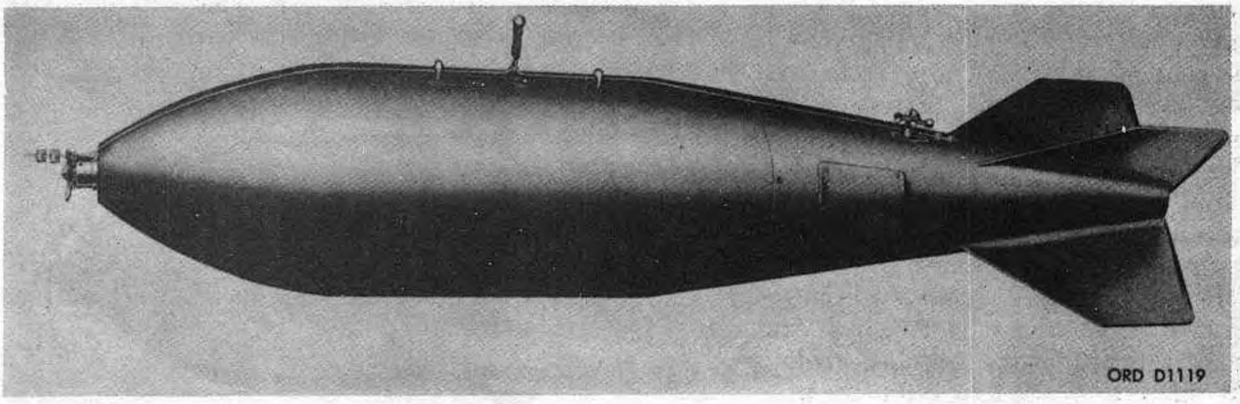

Figure 2-16. New-series GP bomb, typical.

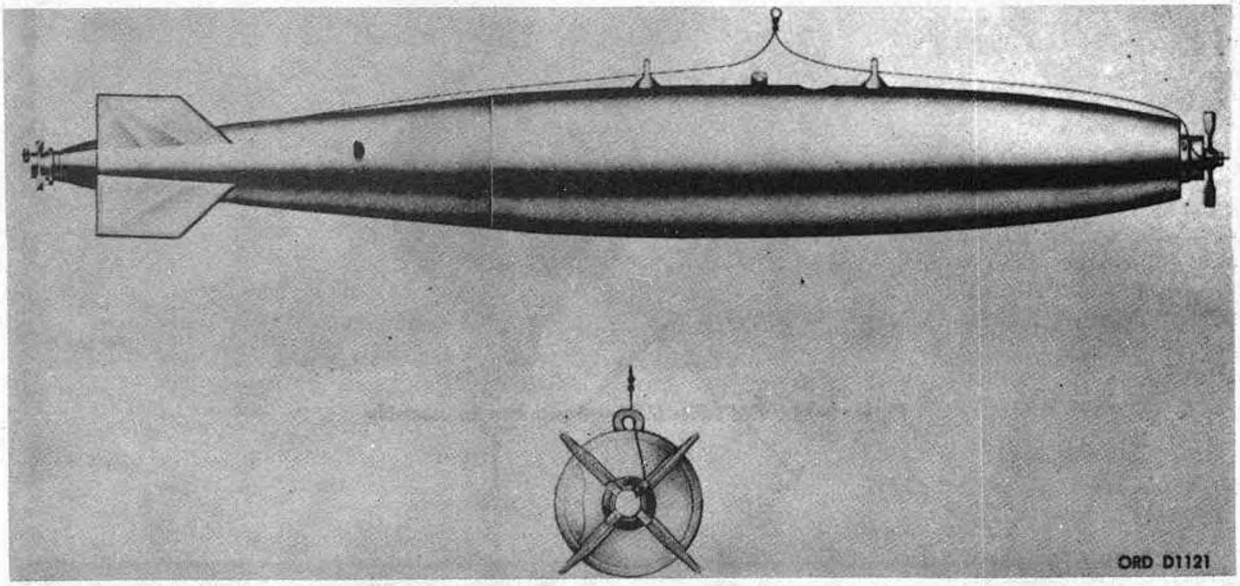

Figure 2-17. Low-drag GP bomb, typical.

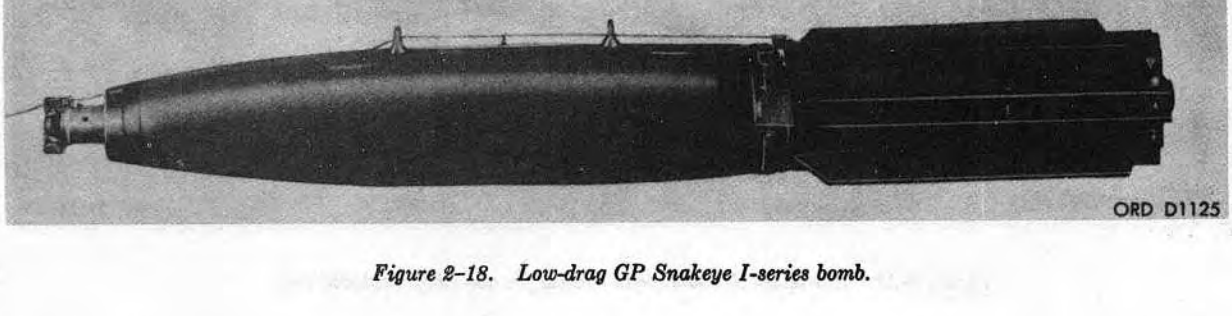

Figure 2-18. Low-drag GP Snakeye I-series bomb.

Two suspension lugs, 14 inches or 30 inches apart, are welded to one side of the bomb body, and a single lug is welded to the opposite side at the center-of-gravity. The old-series GP bomb uses both the box-type fin assembly and the conical-type fin assembly (figs 2-14 and 2-15). The box-type fin assembly is secured to the aft end of the bomb body with a fin locknut, while the conical-type fin assembly is secured by means of a support tube, a locking web and a locknut. 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 filler. The adapter-booster is locked to the base plug by a locking pin which is passed through a hole in the adapter-booster into a groove in the base plug. The above modifications were initiated to prevent removal of the base plug and adapter-booster when fuze antiwithdrawal devices are used. Bombs filled with amatol 50-50 include nose and tail surrounds of TNT, a body gasket, and an auxiliary booster. These features are not included with other explosive fillers.

b. Tabulated Data. Refer to tables 2-8 through 2-12, below, for tabulated data on old-series GP bombs. Refer to figures 2-14, 2-15, and 2-19 for illustrations of old-series GP bombs.

Table 2-8. Bomb, General Purpose: 100-Pound, AN-M30A1

	With fin assembly AN-M103A1	With fin assembly M135
Model	AN-M30A1	AN-M30A1
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 Filler (lb):		
Amatol	54.0	54.0
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 Amatol	116.5	128.5
Loaded with TNT	119.5	131.5
Loaded with Tritonal	124.5	136.5
Fin Lock Nut	M1 or MK2	
Arming-Wire Assembly:		
Nose or Tail Fuze	MK1 or AN-M6A2	MK1 or AN-M6A2
Nose and Tail Fuzing	AN-M1A2	M14 or AN-M1A2
Adapter-Booster	M102A1	M102A1
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 MK 243 Mod 0 MK 244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165	M904 E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 MK 243 Mod 0 MK 244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) AN-M188 (VT) M163 M164 M165
Tail Fuze	AN-M100A2 AN-M115 AN-M123A1 or M132 M160	M172 M175 M181

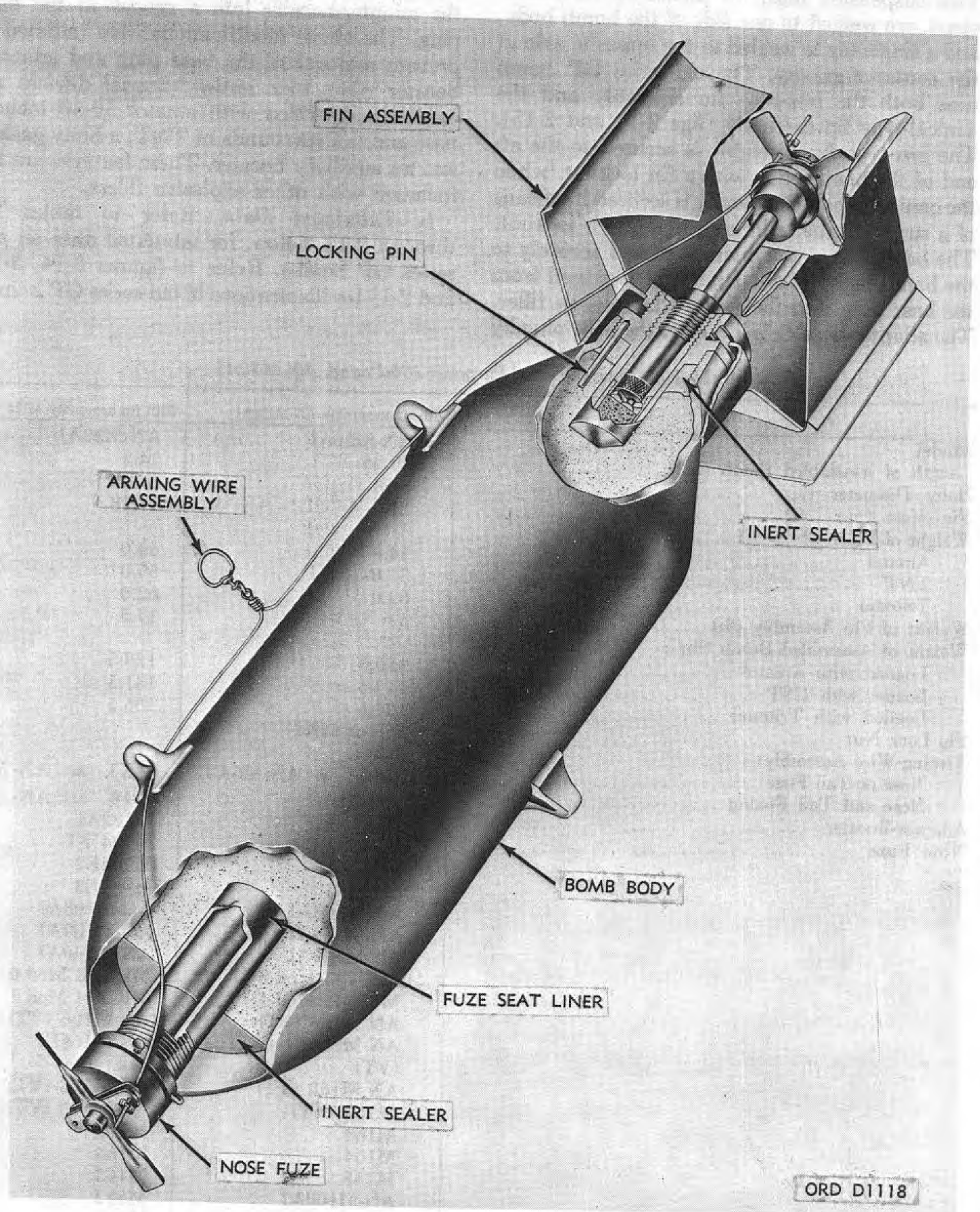

Figure 2-19. Old series GP bomb, cutaway view.

Table 2-9. Bomb, General Purpose: 250-Pound, AN-M57A1

	With fin assembly AN-M106A1	With fin assembly M126
Model	AN-M57A1	AN-M57A1
Length of Assembled Bomb (in.)	47.8	62.2
Body Diameter (in.)	10.9	10.9
Fin Span (in.)	15.0	15.0
Weight of Filler (lb):		
Amatol	98.4	98.4
TNT	125.0	125.0
Tritonal	136.0	136.0
Weight of Fin Assembly (lb)	8.0	25.0
Weight of Assembled Bomb (lb):		
Loaded with Amatol	256.63	273.63
Loaded with TNT	261.35	278.35
Loaded with Tritonal	272.35	289.35
Fin Lock Nut	M1 or Mk2 Mod 0	
Arming-Wire Assembly:		
Nose or Tail Fuze	Mk1 or AN-M6A2	Mk1 or AN-M6A2
Nose and Tail Fuzing	AN-M1A2	M14
Adapter-Booster	M102A1	M102A1
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk244 Mod 1 AN-M166 (VT) AN-M168 (VT) AN-M166E1 (VT) M188 (VT) M163 M164 M165	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk 244 Mod 1 AN-M166 (VT) AN-M168 (VT) AN-M166E1 (VT) M188 (VT) M163 M164 M165
Tail Fuze	AN-M100A2 AN-M115 M123A1 M132 M160	M172 M175 M181

Table 2-10. Bomb, General Purpose: 500-Pound AN-M64A1

	With fin assembly AN-M109A1	With fin assembly M128A1
Model	AN-M64A1	AN-M64A1
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 Filler (lb):		
Amatol	262.00	262.00
TNT	266.00	266.00
Comp B	273.00	273.00
Tritonal	283.0	283.0
Weight of Fin Assembly (lb)	18.6	41.0

Table 2-10. Bomb, General Purpose: 500-Pound AN-M64A1—Continued

	With fin assembly AN-M109A1	With fin assembly M128A1
Weight of Assembled Bomb (lb) :		
Loaded with Amatol	541.87	564.27
Loaded with TNT	548.69	571.09
Loaded with Comp B	555.39	577.79
Loaded with Tritonal	561.00	586.00
Fin Lock Nut	M2 or Mk3 Mod 0	
Arming-Wire Assembly:		
Nose or Tail Fuze	Mk1 or AN-M6A2	Mk1 or AN-M6A2
Nose and Tail Fuzing	AN-M7A1 or M13	M13
Adapter-Booster	M115A1	M115A1
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze	AN-M101A2 AN-Mk230 AN-M116 M124A1 M133 M161	M172 M175 M181

Table 2-11. Bomb, General Purpose: 1,000-Pound, AN-M65A1

	With fin assembly AN-M113A1	With fin assembly M129
Model	AN-M65A1	AN-M65A1
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 Filler (lb) :		
Amatol	530.0	530.0
TNT	555.0	555.0
Comp B	560.0	560.0
Tritonal	595.0	595.0
Weight of Fin Assembly (lb)	32.1	73.0
Weight of Assembled Bomb (lb) :		
Loaded with Amatol	1044.0	1085.0
Loaded with TNT	1064.0	1105.1
Loaded with Comp B	1069.0	1110.0
Loaded with Tritonal	1104.0	1145.0
Fin Lock Nut	M2 or Mk3 Mod 0	

Table 2-11. Bomb, General Purpose: 1,000-Pound, AN-M65A1—Continued

	With fin assembly AN-M113A1	With fin assembly M129
Arming-Wire Assembly:		
Nose or Tail Fuze	Mk1 or AN-M6A2	Mk1 or AN-M6A2
Nose and Tail Fuzing	Mk2 or AN-M7A1	Mk13
Adapter-Booster	M115A1	M115A1
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk 244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze	AN-M102A2 AN-Mk230 Mods 4, 5, 6 M162 AN-M117 M125A1 M134	M176 M182 M184

Table 2-12. Bomb, General Purpose: 2,000-Pound, AN-M66A2

	With fin assembly AN-M116A1	With fin assembly M130
Model	AN-M66A2	AN-M66A2
Length of Assembled Bomb (in.)	92.63	116.80
Body Diameter (in.)	23.29	23.29
Fin Span (in.)	31.6	32.32
Weight of Filler (lb):		
Amatol	1061.0	1061.0
TNT	1097.7	1097.7
Comp B	1146.0	1146.0
Tritonal	1181.0	1181.0
Weight of Fin Assembly (lb)	54.4	135.0
Weight of Assembled Bomb (lb):		
Loaded with Amatol	1977.0	2059.0
Loaded with TNT	2113.2	2194.5
	2162.0	2244.0
Loaded with Tritonal	2196.5	2277.5
Fin Lock Nut	M3 or Mk4 Mod 0	
Arming-Wire Assembly:		
Nose or Tail Fuze	Mk1 or AN-M6A2	Mk1 or AN-M6A2
Nose and Tail Fuzing	AN-M8A1 with Mk1 Extension	M16

Table 2-12. Bomb, General Purpose: 2,000-Pound, AN-M66A2—Continued

	With fin assembly AN-M116A1	With fin assembly M130
Adapter-Booster	M115A1	M115A1
Nose Fuze	M904E1	M904E1
	M904E2	M904E2
	M904E3	M904E3
	AN-M103A1	AN-M103A1
	AN-M139A1	AN-M139A1
	AN-M140A1	AN-M140A1
	Mk243 Mod 0	Mk243 Mod 0
	Mk244 Mod 1	Mk244 Mod 1
	AN-M166 (VT)	AN-M166 (VT)
	AN-M166E1 (VT)	AN-M166E1
	AN-M168 (VT)	AN-M168 (VT)
	M188 (VT)	M188 (VT)
	M163	M163
	M164	M164
	M165	M165
Tail Fuze	AN-M102A2	AN-M177
	AN-MK 230, Mods 4, 5 and 6	M183
	AN-M117	AN-M185
	M125A1	
	M134	
	M162	

c. Difference Between Bombs.

(1) *AN-M30A1 and AN-M30.* Bomb AN-M30A1 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 is lighter in weight than its modification, the AN-M30A1. The M30 is an earlier model of the AN-M30 which differs in that it does not have a lug for single suspension. It also employs a base plug having internal threads (instead of the present externally threaded plug) for assembly to the bomb.

(2) *AN-M57A1 and AN-M57.* Bomb AN-M57A1 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.

(3) *AN-M64A1 and AN-M64.* Bomb AN-M64A1 contains antiwithdrawal pins in the base plug and an adapter-booster and fuze adapter that can be locked in place. The earlier AN-M64 lacks these antiwithdrawal features.

(3.1) *AN-M64A1B1 and AN-M64A1.* Bomb AN-M64A1B1 is a 500 lb. gas bomb AN-M78 with the following modifications: two MAU 76-A lugs are used in place of welded lugs used on bomb AN-M64A1: burster tube and bomb base are removed; and a portion of the bomb base of bomb AN-M64 is then welded to the bomb body. The closing plug used with the bomb base above has no provisions for base fuzing. Bomb AN-M64A1 has none of the above features. The explosive weights of bomb AN-M64A1B1 and bomb AN-M64A1 are identical.

(4) *AN-M65A1 and AN-M65.* Bomb AN-M65A1 contains antiwithdrawal pins in the base plug and an adapter-booster and fuze adapter that can be locked in place. The earlier AN-M65 lacks these antiwithdrawal features. The released weight of the AN-M65 is greater than that of the AN-M65A1, the AN-M65 having an explosive filler of 53 percent as compared to the 50 percent ratio of bomb AN-M65A1.

(4.1) *AN-M65A1B1 and AN-M65A1.* Bomb AN-M65A1B1 is a 1000 lb. gas bomb AN-M79 with the following modifications: two MAU 76-A lugs are used in place of welded lugs used on bomb AN-M65A1; burster tube and bomb base are removed; and a portion of the bomb base of bomb AN-M65 is then welded to the bomb body. The closing plug used with the bomb base above has no provisions for base fuzing. Bomb AN-M65A1 has none of the above features. The explosive weights of bomb AN-M65A1B1 and bomb AN-M65A1 are identical.

(5) *AN-M66A2 and AN-M66A1.* Bombs AN-M66A2 and AN-M66A1 contain antiwithdrawal pins in the base plug and an adapter-booster and fuze adapter that can be locked in place. The earlier bomb AN-M66 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, the ratio of explosive filler to total weight is approximately 50 percent, as compared to an average weight ratio of 53 percent in the other two bombs.

2-12 Bombs, General Purpose, New Series

a. Description. The new-series general purpose bombs (fig. 2-16) are designed for a higher blast effect than general purpose bombs of earlier design. They are designed for improved aerodynamic performance and accuracy in flight when released from most altitudes and airspeeds. These bombs (fig 2-20) have a cigar-shaped body. A conical fin assembly is bolted to the rear. They are designed for either mechanical or electric fuzing. For electric fuzing they are equipped with two conduits (plumbing) for the fuze cable harness. These conduits connect the nose and tail fuze cavities with a charging receptacle located between the suspension lugs. These bombs are equipped for double suspension. Unlike the old-series general purpose bombs, the new-series bombs have adapter-boosters capable of receiving tail fuzes with a 2-inch tread instead of the usual 1½-inch thread. A fuze adapter is used on the inside of the adapter-booster to convert the fuze seat to accommodate fuzes with the smaller 1½-inch threads. Bomb M117 has a 14-inch span between lugs, while bomb M118 has a 30-inch span. In the latter bomb, a single hoisting lug may be attached at the center of gravity.

b. Tabulated Data. Refer to tables 2-13 and 2-14, below, for tabulated data on new-series bombs. Refer to figures 2-16 and 2-20 for illustrations of a typical new-series bomb.

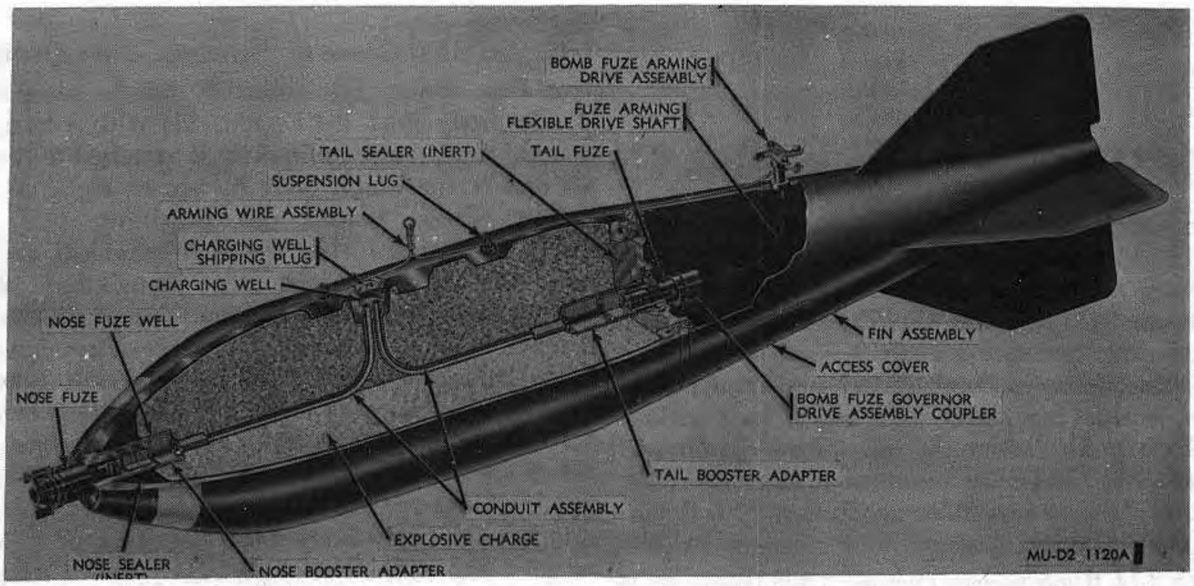

Figure 2-20. New-series general purpose bomb, cutaway view.

Table 2-13. Bomb, General Purpose: 750-Pound, M117

Model	M117
Length of Assembled Bomb (in.)	89.43
Body Diameter (in.)	16.1
Fin Assembly	M131A1
Weight of Filler (lb) : Tritonal	386.0
Weight of Assembled Bomb (lb)	823.0
Arming-Wire Assembly	M52 (or made from bulk stock, depending on air craft).
Adapter-Booster (For Mechanical Fuzing)	M148 (T45E7) (Nose) M149 (T46E5) (Tail) M147 (XM147) (Tail)
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 M166 (VT) M166E1 (VT) M188 (VT) M163 M164 M165
Tail Fuze	M190 M905 M906
Fuze Drive Assembly	ATU-35B (Must be used with M905, M906 Tail Fuzes.)

c. Difference Between Bombs. Bomb M117A1 is similar to bomb M117 in respect to design, ballistics, weight, etc. The differences between M117A1 and M117 are as follows: the center lug; two spring washers, used for holding electrical fuzes in bomb M117 nose and base; and a ring receptacle lock, used to position electric cable assembly have been removed. Bomb M117A1E2 is identical to the M117A1 except the explosive filler is Minol (377.0 lb) in lieu of Tritonal.

Table 2-14. Bomb, General Purpose: 3,000-Pound, M118

Model	M118
Length of Assembled Bomb (in.)	185.0
Body Diameter (in.)	24.13
Fin Assembly	M132*
Fin Span (in.)	33.60
Weight of Filler (lb) : Tritonal	1,975.0
Weight of Assembled Bomb (lb)	3,049.0
Arming-Wire Assembly	T12 (or made from bulk stock, depending on the aircraft).
Adapter Boosters (For mechanical fuzing)	M148 (T45E7) (Nose) M149 (T46E5) (Tail) M147 (XM147) (Tail)
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139 AN-M140A AN-M166E1 (VT) AN-M166 (VT) M188 (VT) M163 M164 M165 M187
Tail Fuze	M191 M905 M906
Fuze Drive Assembly	ATU-35B (Must be used with M905, M906 tail

* M132E1 Fin assembly available for use on the M118E1 Bomb, and may be used with or without the ATU-35B Fuze Drive Assembly.

2-13. Bombs, General Purpose, Low Drag

a. Description. Low-drag GP bombs have a slender body (figs. 2-17 and 2-21) with a long, pointed nose. A streamlined fin is attached to the aft end of the bomb body by six or eight setscrews. These bombs use proximity (VT), mechanical or electrical fuzes. Mechanical and proximity 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 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. As shipped, the bomb body has a nose fuze plug, a support cup in the nose fuze cavity and a base fuze plug. When the bomb is mechanically fuzed, these three parts are removed and the adapter-boosters and fuzes are inserted. Adapter-boosters and arming wires are not used with 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 either 14 inches or 30 inches apart, and a hoisting lug at the center of gravity are threaded into lug inserts on the bomb body at time of use.

b. Tabulated Data. Refer to tables 2-15 through 2-18, below, for tabulated data on low-drag bombs. Refer to figure 2-17 and figure 2-21 for illustration of a typical low-drag bomb.

Table 2-15. Bomb, Low-Drag, Mk81 Mod 1

Mark	81.0
Mod	1.0
Length of Assembled Bomb (in.)	74.1
Body Diameter (in.)	9.0
Fin Assembly	
Fin Span (in.)	12.62
Weight of Filler (lb):	
Tritonal or H6	100.0
Weight of Assembled Bomb (lb)	260.0
Arming-Wire Assembly	Mk1 or AN-M6A2 (for nose fuze) and M13 (for nose and tail fuze configuration)
Cable Assembly (for electric M71 fuzing).	M71
Adapter-Booster:	
Nose	M148 (T45E7)
Tail	M149 (T46E5)
Tail	M147 (XM147)
Nose Fuze	M904E1
	M904E2
	M904E3
	AN-M103A1
	AN-M139A1
	AN-M140A1
	Mk243 Mod 0
	Mk244 Mod 1
	AN-M166 (VT)
	AN-M166E1 (VT)
	AN-M168 (VT)
	M188 (VT)
	M163
	M164
	M165
Tail Fuze	MK255 Mod 0
	M990D
	M990D1
Nose Tail Fuze System	M913 (VT)

Table 2-16. Bomb, Low-Drag, Mk82 Mod 1

Mark	82.0
Mod	1.0
Length of Assembled Bomb (in.)	86.90

Table 2-16. Bomb, Low-Drag, Mk82 Mod 1—Continued

Body Diameter (in.)	10.75
Fin Assembly	
Fin Span (in.)	15.1
Weight of Filler (lb):	
Tritonal or H6	192.0
Weight of Assembled Bomb (lb)	531.0
Arming-Wire Assembly	Mk 1 or AN-M6A2 (for nose fuze) M13 (for nose and tail fuze configuration)
Cable Assembly (for electric fuzing).	M72
Adapter-Booster:	
Nose	M148 (T45E7)
Tail	M149 (T46E5)
Tail	M147 (XM147)
Nose Fuze	M904E1
	M904E2
	M904E3
	AN-M103A1
	AN-M139A1
	AN-M140A1
	Mk243 Mod 0
	Mk 244 Mod 1
	AN-M166 (VT)
	AN-M166E1 (VT)
	M188 (VT)
	M163
	M164
	M165
Tail Fuze	M990D
	M990D1
	Mk255 Mod 0
Nose-Tail Fuze System	M913 (VT)

Table 2-17. Bomb, Low-Drag, Mk 83 Mod 3

Mark	83.0
Mod	3.0
Length of Assembled Bomb (in.)	118.42
Body Diameter (in.)	14.0
Fin Assembly	
Fin Span (in.)	19.62
Weight of Filler (lb):	
Tritonal or H6	445.0
Weight of Assembled Bomb (lb)	985.0

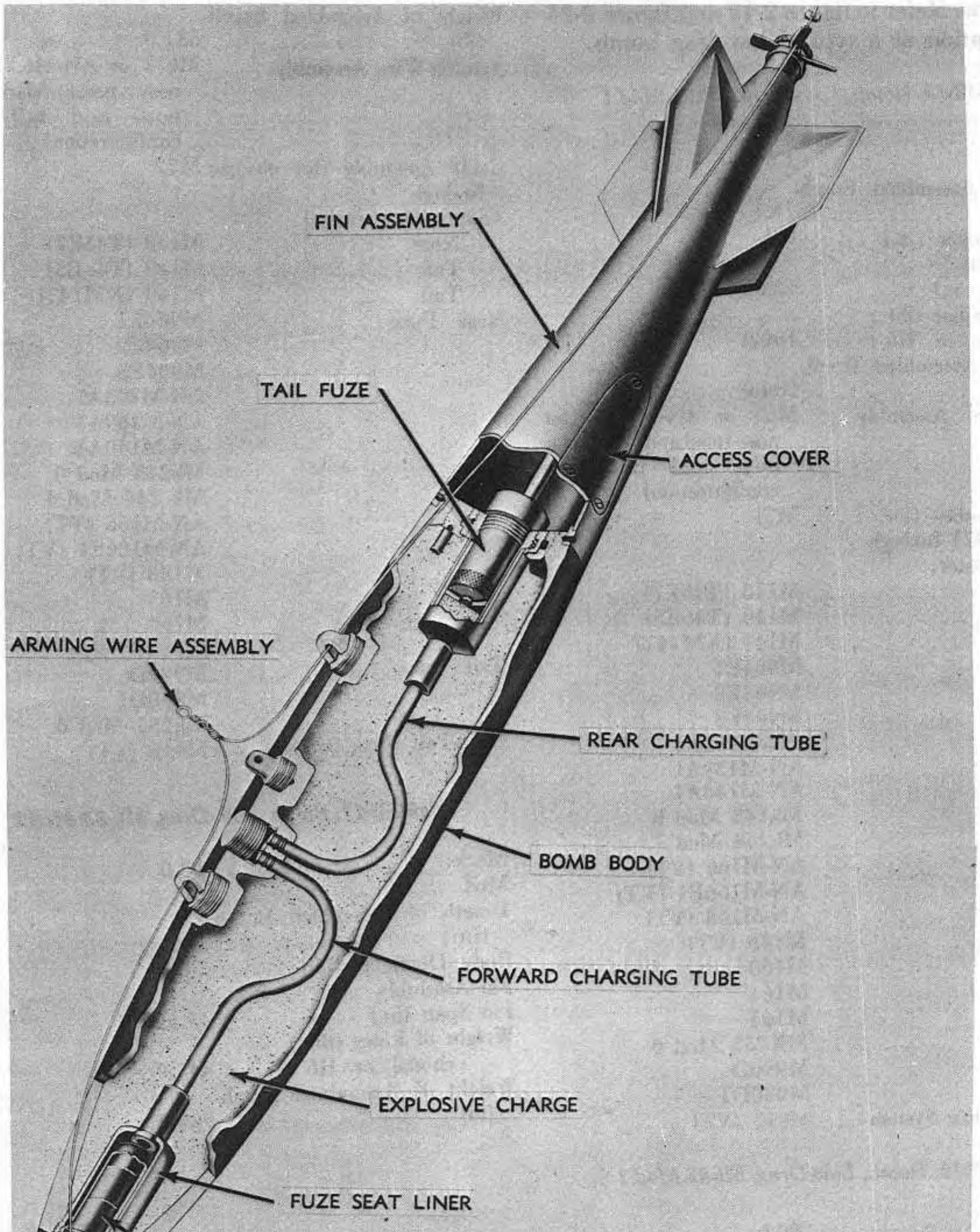

Figure 2-21. Low-drag general purpose bomb, cutaway view.

Table 2-17. Bomb, Low-Drag, Mk 83 Mod 3—Continued

Arming-Wire Assembly	Mk1 or AN-M6A2 (for nose fuze) M16 (for nose and tail fuze configuration).
Cable Assembly (for electric fuzing).	M73
Adapter-Booster:	
Nose	M148 (T45E7)
Tail	M149 (T46E5) or M147 (XM147)
Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 Mk243 Mod 0 Mk244 Mod 1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze	M177 M183 M185 M990D M990D1 MK255 Mod 0
Nose-Tail Fuze System	M913 (VT)

Table 2-18. Bomb, Low-Drag, Mk 84 Mod 1

Mark	84.0
Mod	1.0
Length of Assembled Bomb (in.)	151.50
Body Diameter (in.)	18.0
Fin Assembly	
Fin Span (in.)	25.31
Weight of Filler (lb) Tritonal or H6	945.0
Weight of Assembled Bomb (lb)	1,970.0
Arming-Wire Assembly	Mk 1 or AN-M6A2 (for nose or tail fuze configuration) M16 (nose and tail fuzing).
Cable Assembly (for electric fuzing).	M74
Adapter-Booster:	
Nose	M148 (T45E7)
Tail	M149 (T46E5) or M147 (XM147)

Table 2-18. Bomb, Low-Drag, Mk 84 Mod 1—Continued

Nose Fuze	M904E1 M904E2 M904E3 AN-M103A1 AN-M139A1 AN-M140A1 AN-M166 (VT) AN-M166E1 (VT) AN-M168 (VT) M188 (VT) M163 M164 M165
Tail Fuze	M190 M990D M990D1 Mk255 Mod 0
Nose-Tail Fuze System	M913 (VT)

c. *Difference Between Mods.*

(1) *Mk81 Mod 0 and Mk81 Mod 1.* Bomb Mk81 Mod 1 differs from bomb Mk81 Mod 0 in that the fin-locating pin is located on the fin assembly on the Mod 1 and on the bomb body on Mod 0.

(2) *Mk82 Mod 0 and Mk82 Mod 1.* Bomb Mk82 Mod 1 differs from bomb Mk82 Mod 0 only in the method used to construct the bomb bodies.

(3) *Mk83 Mod 2 and Mk83 Mod 3.* Bomb Mk83 Mod 3 differs from Mod 2 in the methods used in constructing the bomb bodies.

(4) *Mk84 Mod 1 and Mk84 Mod 0.* Bomb Mk84 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.

2-14. Bomb, General Purpose: Low Drag, Snakeye I

a. *Description.* The Mk82 Mod 1 Low Drag bombs are characterized by (table 2-20) a flight-retarding tail fin assembly (figs. 2-18 and 2-22) attached by a quick-attachment mechanism. The retarding fin provides the aircraft with a high-speed, low-altitude bombing capability. It replaces the standard fin assembly and presents a low-drag configuration when closed. When the retarding-fin release-band assembly is activated, the assembly expands into four blades which open like an umbrella and decelerate the bomb so that it impacts at larger angles with respect to the ground. The release mechanism is mechanical and is activated by the removal of the tail-release wire.

b. Tabulated Data. Refer to table 2-20, below, on low-drag bombs (Snakeye I). Refer to figures 2-18 and 2-22 for an illustration of a typical low-drag (Snakeye I) bomb.

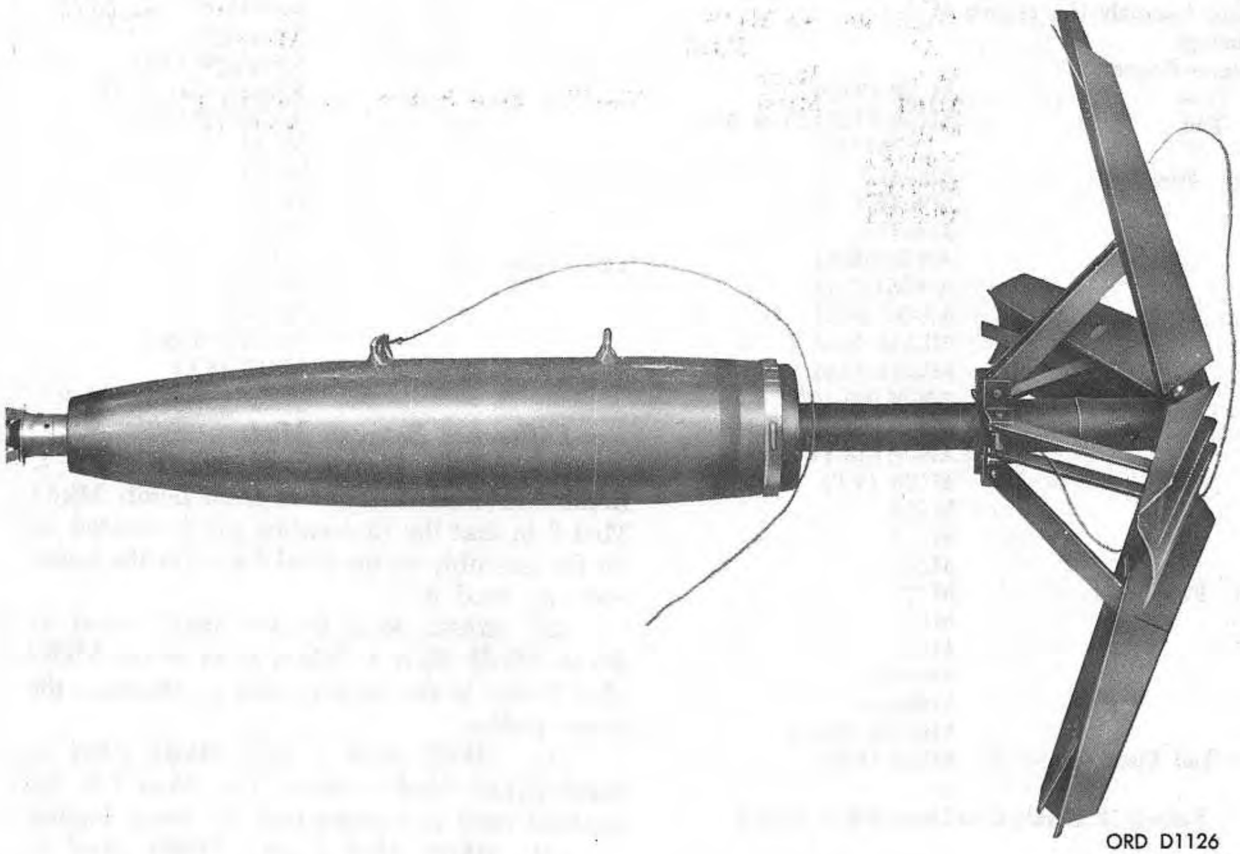

Figure 2-22. Low-drag, general purpose bomb with fin assembly (opened).

Table 2-19. Bomb, Low-Drag (GP), 250-Pound

Rescinded.

Table 2-20. Bomb, Low-Drag (GP), 500-Pound, Snakeye I

Model	Mk 82 Mod 1. Snakeye I
Length of Assembled Bomb (in.)	89.5
Body Diameter (in.)	10.8
Fin Assembly	Mk 15 Mod 1
Fin Span—Closed (in.)	15.1
Fin Span—Open (in.)	65.3
Weight of Filler (lb)	192.0
Weight of Assembled Bomb (lb)	560.0
Arming-Wire Assembly	MK1 Mod 0 (for tail fin release) made from bulk stock for nose fuze arming.
Cable Assembly (for electric fuzing—M990 series).	M72
Adapter-Booster:	
Nose	M148 (T45E7)
Tail	None

Table 2-20. Bomb, Low-Drag (GP), 500-Pound, Snakeye I— Continued

Nose Fuze	Unretarded: AN-M103-A1 AN-M139-A1 AN-M140-A1 M163 M164 M165 M904E1 M904E2 M904E3	Retarded: M904E2 M904E3 AN-M103-A1 AN-M139- M163 M164 M165	Tail Fuze	Unretarded: M990D M990D1 MK255 Mod 0 M990D2 M990E1 M990E2	Retarded: M990D M990D1 MK255 Mod 0 M990E2
			Nose-Tail Fuze System	Unretarded: M913 (VT)	

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Section IV. INCENDIARY BOMBS

2-15. General

Incendiary bombs are filled with burning agents such as thickened fuels and metallic fillings. A third type of incendiary material, not classified as a filling, is the magnesium from which the bodies of some incendiary bombs are made.

a. Thickened Fuels. Thickened fuels are composed of flammable liquids, such as gasoline, thickened to a jellylike consistency. IM, PTI, and NP are the thickened fuels which are used to fill incendiary bombs. IM is gasoline thickened with isobutyl methacrylate. PTI is essentially a mixture of magnesium with gasoline and other petroleum products thickened with isobutyl methacrylates and NP is gasoline thickened with M1 or M2 thickener (napalm). All thickened fuels spatter like viscous liquids upon impact on a target and adhere to the surface of the target.

b. Metallic Fillings. The basic ingredient of metallic incendiary fillings is thermite. Thermite is a mixture of powdered aluminum and powdered iron oxide which, when ignited by an igniter (such as black powder), burns at a temperature of about 4,000°F. White-hot molten iron is released when thermite burns, and acts as a heat reservoir to prolong and spread the incendiary effect. When used as a filling for munitions, thermite is called THI. Thermate is a mixture of THI, barium nitrate, and sulfur in an oil binder. Thermate, TH3, is the standard metallic filling used in incendiary bombs.

c. Magnesium. Magnesium is a soft metal which, when heated sufficiently in the presence of air, ignites and burns vigorously. Magnesium melts and flows as it burns, igniting all combustible material in its path. Bomb bodies made of magnesium comprise the bomb's main incendiary charge. The body of a magnesium bomb usually is made with an internal cavity which contains a thermate igniting filler. The 4-pound incendiary bomb AN-M50A3 is an example of a bomb with a magnesium body.

2-16. Bomb, Incendiary: 100-Pound, AN-M47A4

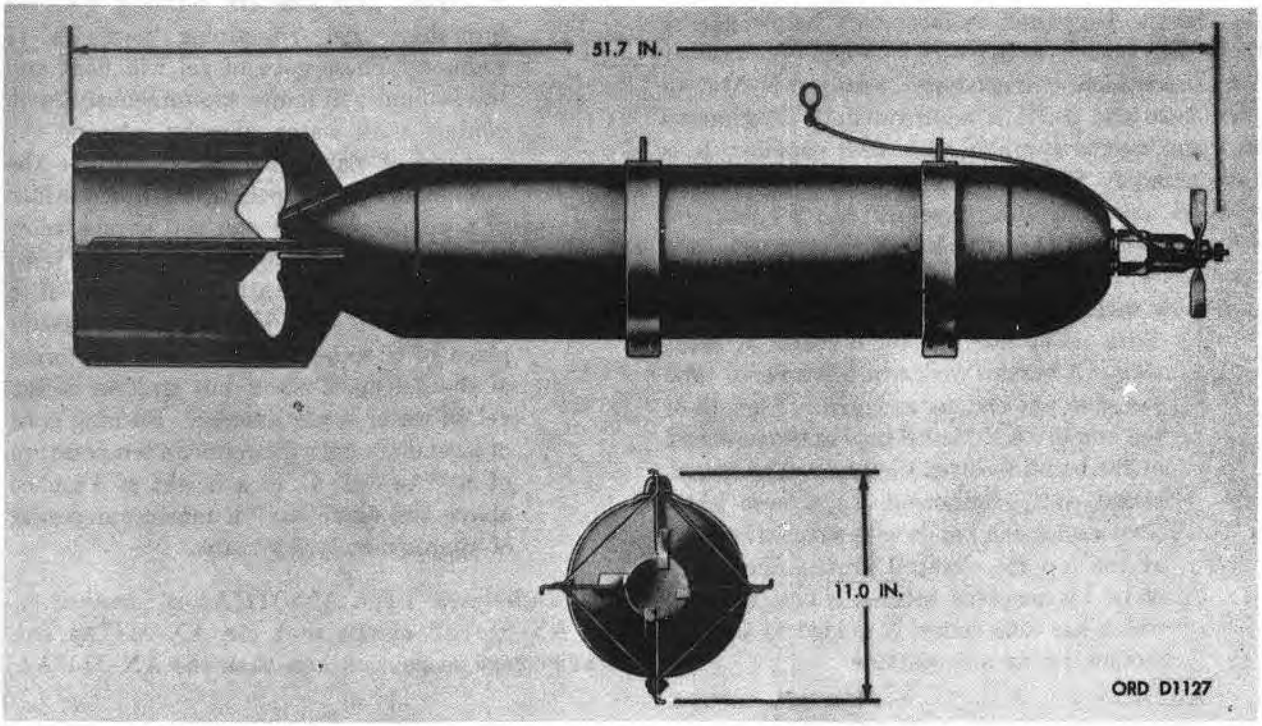


Figure 2-23. Bomb, incendiary: 100-pound, AN-M47A4.

Table 2-21. Bomb, Incendiary: 100-Pound, AN-M47A4

Model	AN-M47A4
Length of Assembled Bomb (in.)	51.7
Body Diameter (in.)	8.1
Fin Span (in.)	11.0
Weight of Empty Bomb (lb)	26.0
Weight of Assembled Bomb (lb)	68.0
Weight of Filler (lb):	
PT1, IM, or NP	42.0
Arming-Wire Assembly	M2 C5
Igniter	AN-M9 (used with burster AN-M13)
Burster	AN-M12 or AN-M13
Nose Fuze	AN-M159

a. General. The 100-lb incendiary bomb AN-M47A4 (figs. 2-23 and 2-24 and table 2-21) is designed for use against combustible land targets where large and numerous fires will cause serious damage and for use in igniting oil slicks on water. 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.

b. Description. Incendiary bomb AN-M47A4 (figs. 2-23 and 2-24) is approximately 52⁹⁄₁₆ inches long and weighs approximately 69.8 pounds. It is approximately 8½ inches in diameter and has a rounded nose, a truncated conical tail section, and a fixed tail fin. The complete round consists of a bomb body, incendiary filling, a burster, a fuze, and an arming wire.

(1) *Body.* The bomb body is made of sheet steel. A burster well, which is a metal tube closed at one end, extends the full length of the bomb. A threaded hole in the nose end of the bomb receives the fuze. The hole is closed during shipment by a nose plug. Two suspension bands with suspension lugs at the top are clamped around the bomb body by machine screws. The tail fin, which has four vanes, is welded to the tail section during manufacture.

(2) *Filling.* The filling consists of approximately 40 pounds of NP.

(3) *Burster.* Burster AN-M12 is shipped separately and is installed in the burster well during assembly of the bomb.

(4) *Fuze.* The preferred fuze is nose bomb fuze AN-M159. Nose bomb fuze AN-M126A1 is an authorized alternate. The fuze is shipped separately and is installed in the bomb nose during assembly of the bomb.

(5) *Arming wire.* Arming wire C5 is used with this bomb.

c. Functioning of Incendiary Bombs.

(1) When this incendiary bomb equipped with a white phosphorous (WP) igniter impacts on a structural target, it bursts and scatters gobs of incendiary gel which stick to surfaces contacted and continue to burn. The effective radius of burst is 10 to 15 yards.

(2) When the incendiary bomb equipped with a sodium igniter impacts on water targets, 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 still burn on contact with water. However, if a white phosphorous-filled igniter is used in place of a sodium igniter, the scattering 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 500° to 675° C. at a height of 3 inches above the flame over a maximum period of approximately 8 minutes.

d. Differences. The AN-M47A4 is identical to the AN-M47A3 except that the AN-M47A4 has heavier gage suspension lugs than the AN-M47A3.

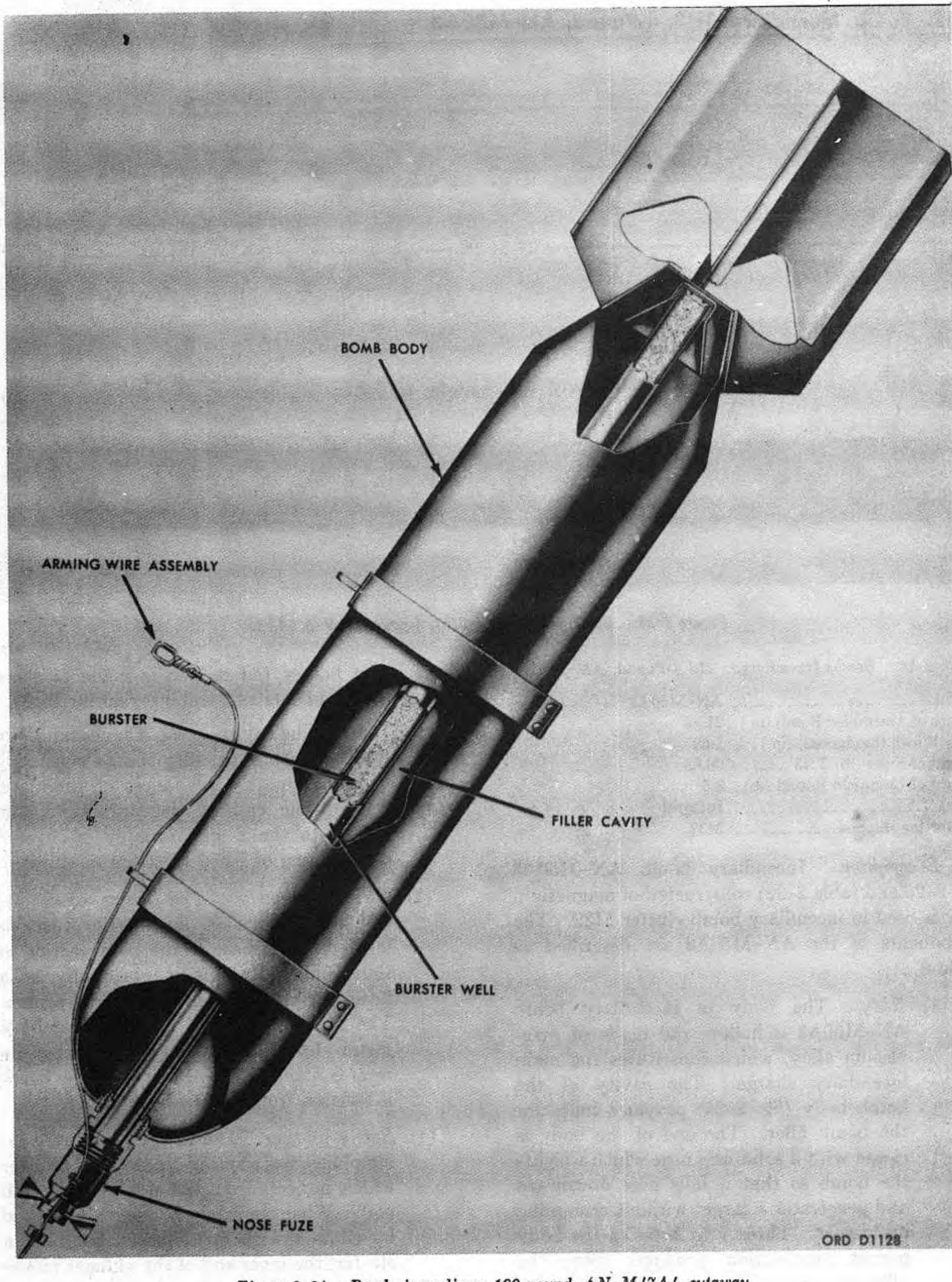


Figure 2-24. Bomb, incendiary: 100-pound, AN-M47A4, cutaway.

2-17. Bomb, Incendiary: TH3, 4-Pound, AN-M50A3

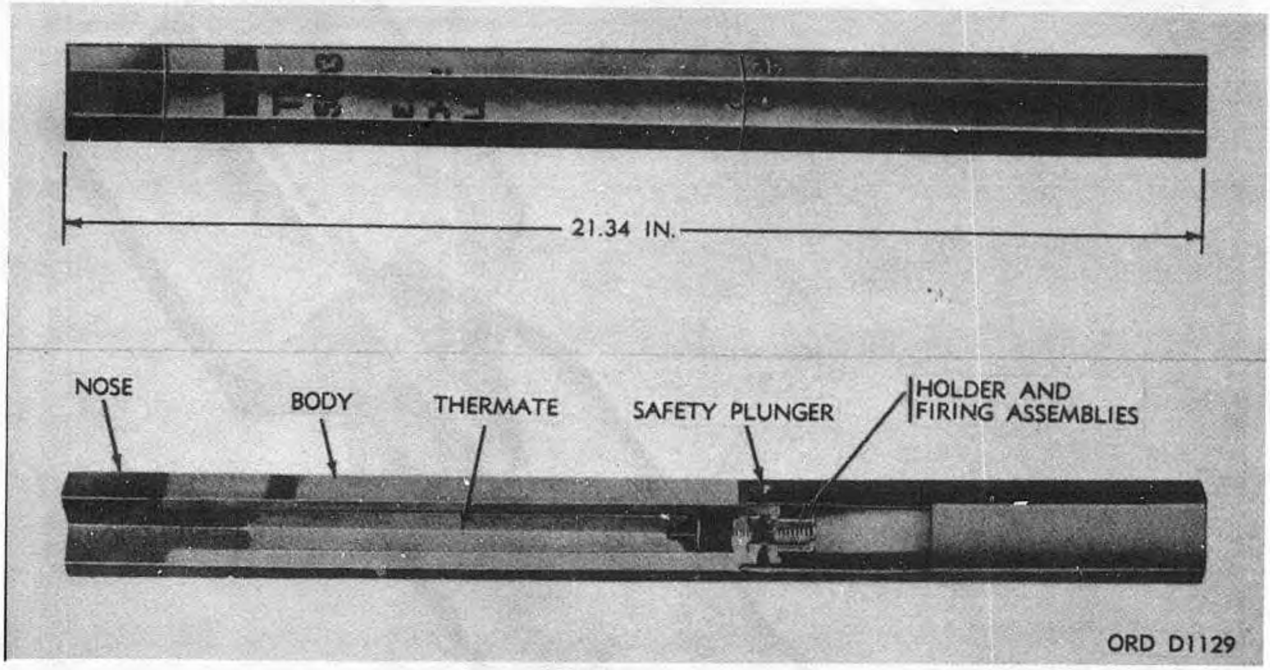


Figure 2-25. Bomb, incendiary: TH3, 4-pound, AN-M50A3.

Table 2-22. Bomb, Incendiary: TH3 4-Pound, AN-M50A3

Model	AN-M50A3
Length of Assembled Bomb (in.)	21.34
Body Width (hexagonal) (in.)	1.63
Weight of Filler (lb) TH3	00.63
Weight of Complete Round (lb)	3.5
Fuze	Integral
Cluster (as shipped)	M32

a. Description. Incendiary bomb AN-M50A3 (fig. 2-25 and table 2-22) constructed of magnesium alloy is used in incendiary bomb cluster M32. The components of the AN-M50A3 are described as follows:

(1) *Body.* The body of incendiary bomb AN-M50A3 is hollow and made of magnesium alloy, which constitutes the main incendiary charge. The cavity of the bomb body (fig. 2-25) provides space for the bomb filler. The end of the body is closed with a solid iron nose which weights the bomb so that it falls nose downward and penetrates a target without crumpling on impact. Three vent holes in the body permit combustion products from the filling to vent without bursting the body. The hollow tail section is made of sheet steel and acts as a stabilizer during flight.

(2) *Filler.* The cavity in the magnesium body is filled with a priming charge consisting of approximately 10 ounces of thermate, TH3. The end of the priming charge closest to the firing assembly is covered with a layer of FF31 (first-fire mixture).

(3) *Firing assembly.* The firing assembly, which functions as an inertial fuze, is located at the base of the body section of the bomb. It consists essentially of a firing pin in a firing-pin holder and a primer. The firing pin is held in the holder by a metal clip which prevents the firing pin from contacting the primer until the bomb is released from its cluster.

(4) *Safety plunger.* The safety plunger (arming plunger) is a spring-loaded steel plunger which projects from the side of the bomb body. When the safety plunger is depressed by contact with an adjacent bomb in a cluster, the inner end of the plunger moves into the space between the firing pin and

the primer so that the bomb is prevented from arming as long as it is clustered.

b. Functioning.

(1) *After release from cluster.* When the bomb is released from the cluster, pressure on the safety plunger is released and the plunger is forced outward by its spring, arming the bomb.

(2) *Upon impact.* When the bomb strikes the target, inertia causes the firing pin to move forward striking the primer. The primer ignites the first-fire mixture which ignites the thermate filler. The burning thermate then ignites the magnesium section of the body. The bomb burns for approximately 5 to 8 minutes.

2-18. Bomb, Incendiary: TH3, 4-Pound, M126

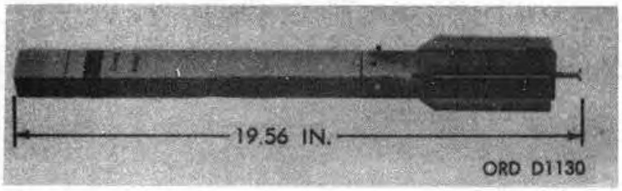
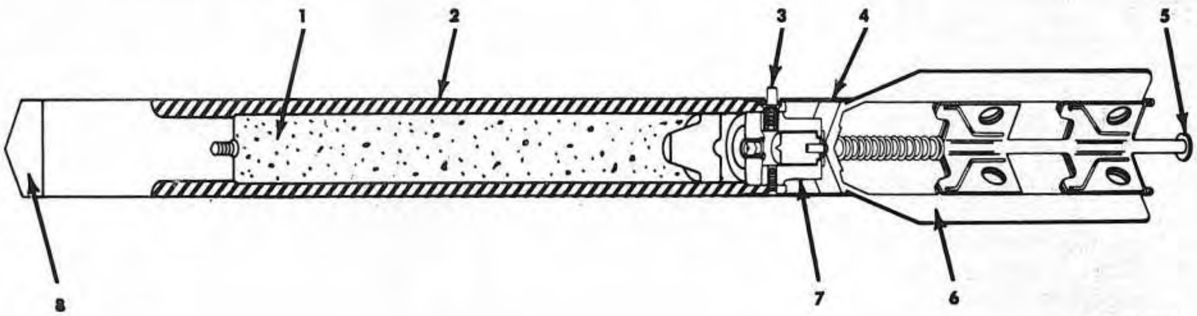


Figure 2-26. Bomb, incendiary: TH3, 4-pound, M126.

Table 2-23. Bomb, Incendiary: TH3, 4-Pound, M126

Model	M126
Length of Assembled Bomb (in.)	19.56
Body Width (hexagonal) (in.)	1.63
Weight of Filler (lb):	
TH3	0.63
Weight of Complete Round (lb)	3.6
Fin Assembly	M15 (Integral)
Fuze	Integral (Nose and Tail)
Cluster (as shipped)	M36

a. Description. Incendiary bomb M126 (fig. 2-26 and table 2-23) is identical to the bomb AN-M50A3 except that the M126 has fin assembly M15 in place of a hollow sheet-steel tail section. The M15 fin assembly consists of retractable fins (6, fig. 2-27) in a hollow sheet-steel fin body (4). The fins extend through longitudinal slots in the fin body by depression of a spring-loaded tail plunger (5) at the rear end of the bomb. The fins are secured to the bomb body (2) by the holder and firing assembly (7). The body (2) is filled with thermate (1). The front end of the bomb is closed with a solid iron nose (8) which weights the bomb so that it falls nose downward and penetrates a target without crumpling on impact. Bomb M126 is used in incendiary bomb cluster M36.



1 Thermate
2 Body
3 Safety plunger
4 Fin body
5 Tail plunger
6 Fin
7 Holder and firing assemblies
8 Nose (iron)

Figure 2-27. Bomb, incendiary: TH3, 4-pound, M126, cutaway view.

b. Functioning.

(1) *Before release from cluster.* Safety plunger (3) is depressed by contact with another bomb in the cluster. Depression of the tail plunger (5) retracts the fins (6) into the fin body (4) and holds them retracted as long as the tail plunger (5) is held in a depressed position.

(2) *After release from cluster.* When the bomb is released from the cluster, the tail fins (6) are extended by the force of the spring of the spring-loaded tail plunger (5) and the safety plunger (3) is forced downward by its spring, thus arming the bomb. The tail fins assist in keeping the bomb turned nose downward during its fall.

(3) *Upon impact.* When the bomb strikes the target it functions in the same way as bomb AN-M50A3.

2-19. Bomb Incendiary: PT1, 10-Pound, M74A1

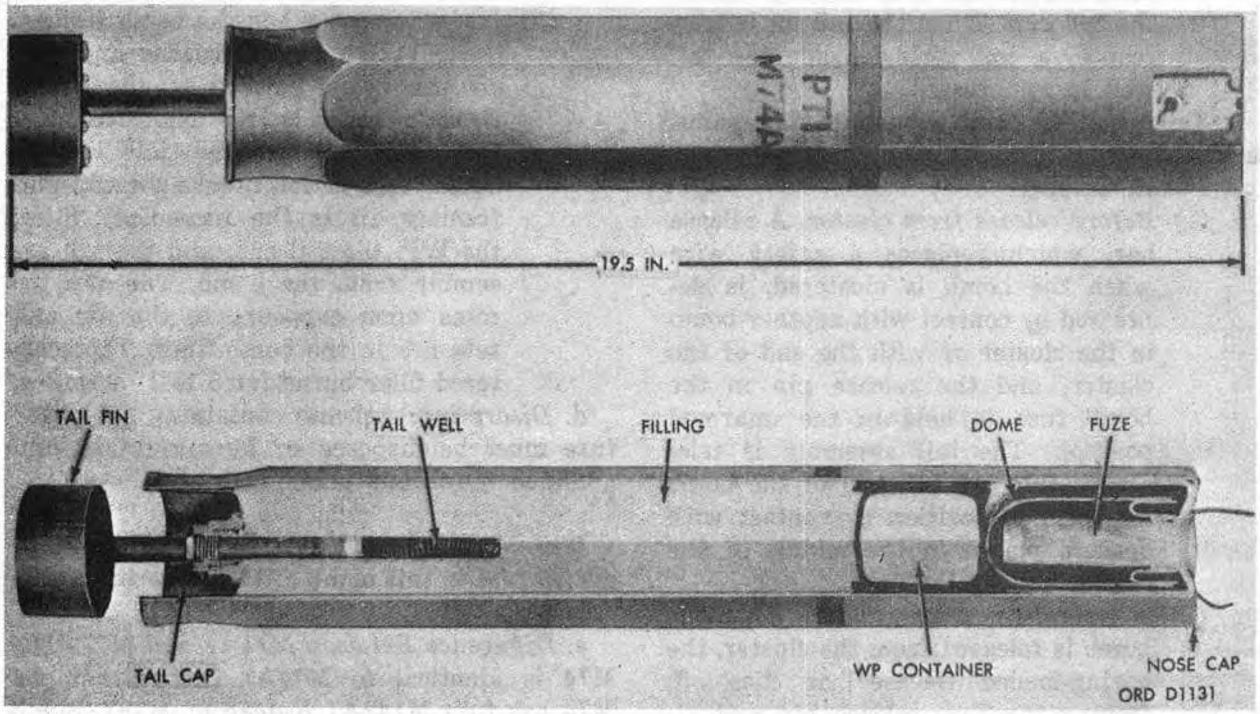


Figure 2-28. Bomb, incendiary: PT1, 10-pound M74A1.

Table 2-24. Bomb, incendiary: PT1, 10-pound, M74A1

Model	M74A1
Length of Assembled Bomb (in.)	19.5
Body Width (hexagonal) (in.)	2.8
Weight of Filler (lb):	
PT1	2.75
Weight of Complete Round (lb)	8.5
Fin Assembly	Integral
Fuze Type	M197
Cluster (as shipped)	M35

a. Description. Incendiary bomb M74A1 (fig. 2-28 and table 2-24) is used in incendiary bomb cluster M35. The components of the M74A1 are described as follows:

(1) *Body.* The body of the M74A1 is hexagonal except for the tail end, which is round. The nose end of the bomb is closed by a sheet-steel nose cup which provides a seat for the fuze. A spring-loaded release bar clips to the nose cup over a release pin in the M197 fuze. The tail end of the bomb is also closed by a sheet-steel cup. A well in the center of the tail cup provides a mounting for the fin assembly.

(2) *Dome.* The dome is located in the bomb nose behind the nose cup. It separates the fuze from the filling and forms a container for two small bags of magnesium-black powder mixture.

(3) *White phosphorous igniting charge.* Approximately 6 ounces of white phosphorous (WP) is contained in a plastic container which is installed in the bomb behind the dome and ahead of the filling.

(4) *Filling.* The filling consists of approximately 2.75 pounds of PT1.

(5) *Fuze.* The fuze is an M142A1 bomb fuze which is screwed into the nose cup. The booster end of the fuze is inside the dome and is adjacent to the bags of black powder.

(6) *Tail assembly.* The tail assembly consists essentially of a radial-type tail fin attached to a tail sleeve. The tail sleeve slides into the tail well in the tail end of the bomb.

The entire tail assembly can be telescoped into the tail end of the bomb until the tail fin is completely within the tail cup. When the tail fin is telescoped, a coil spring inside the tail well is compressed.

b. Assembly. The bomb is assembled in manufacture.

c. Functioning.

(1) *Before release from cluster.* A release bar, which replaces a safety wire when the bomb is clustered, is depressed by contact with another bomb in the cluster or with the end of the cluster, and the release pin in the bomb fuze is held in the unarmed position. The tail assembly is telescoped into the tail end of the bomb and held in position by contact with spacers placed in the middle of the cluster and at the ends.

(2) *After release from cluster.* When the bomb is released from the cluster, the spring-loaded release bar flies off, freeing the fuze release pin and allowing the fuze to arm. Simultaneously, the tail fin is moved to the extended position by the action of the coil spring inside the tail well. The extended tail fin keeps the bomb turned nose downward as it falls.

(3) *Upon impact.* When the bomb strikes, the M142A1 fuze functions and sets off the black powder in the dome. Gases released by the explosion blow the dome toward the tail of the bomb. This action breaks the cup and forcibly ejects the incendiary filler, the WP, the tail cup, and the tail assembly from the bomb. The WP ignites upon exposure to the air and sets fire to the bomb filler. The scattered filler burns for 5 to 10 minutes.

d. Disarming. A bomb containing an armed fuze must be disposed of by authorized and qualified munitions personnel only.

***Warning:* Do not attempt to disarm an armed fuze in this bomb or to defuze the bomb.**

e. Difference Between M74A1 and M74. The M74 is identical to M74A1 except that the M74 has fuze M142A1 instead of M197. Bomb M74A1 uses the incendiary bomb cluster M35 and the bomb M74 uses incendiary bomb cluster M31.

Section V. FIRE BOMBS

2-20. General

Fire bombs are usually thin-skinned containers of thickened fuel for use against such targets as dug-in troops, supply installations, wooden structures and land convoys. Most fire bombs rupture on impact (except when fuzed for air burst), spreading burning, thickened fuel on surrounding objects. Fuze igniter combinations are used to ignite the combustible filling.

2-21. Bomb, Fire: 750-Pound, M116A2

Table 2-25. Bomb, Fire: 750-Pound, M116A2

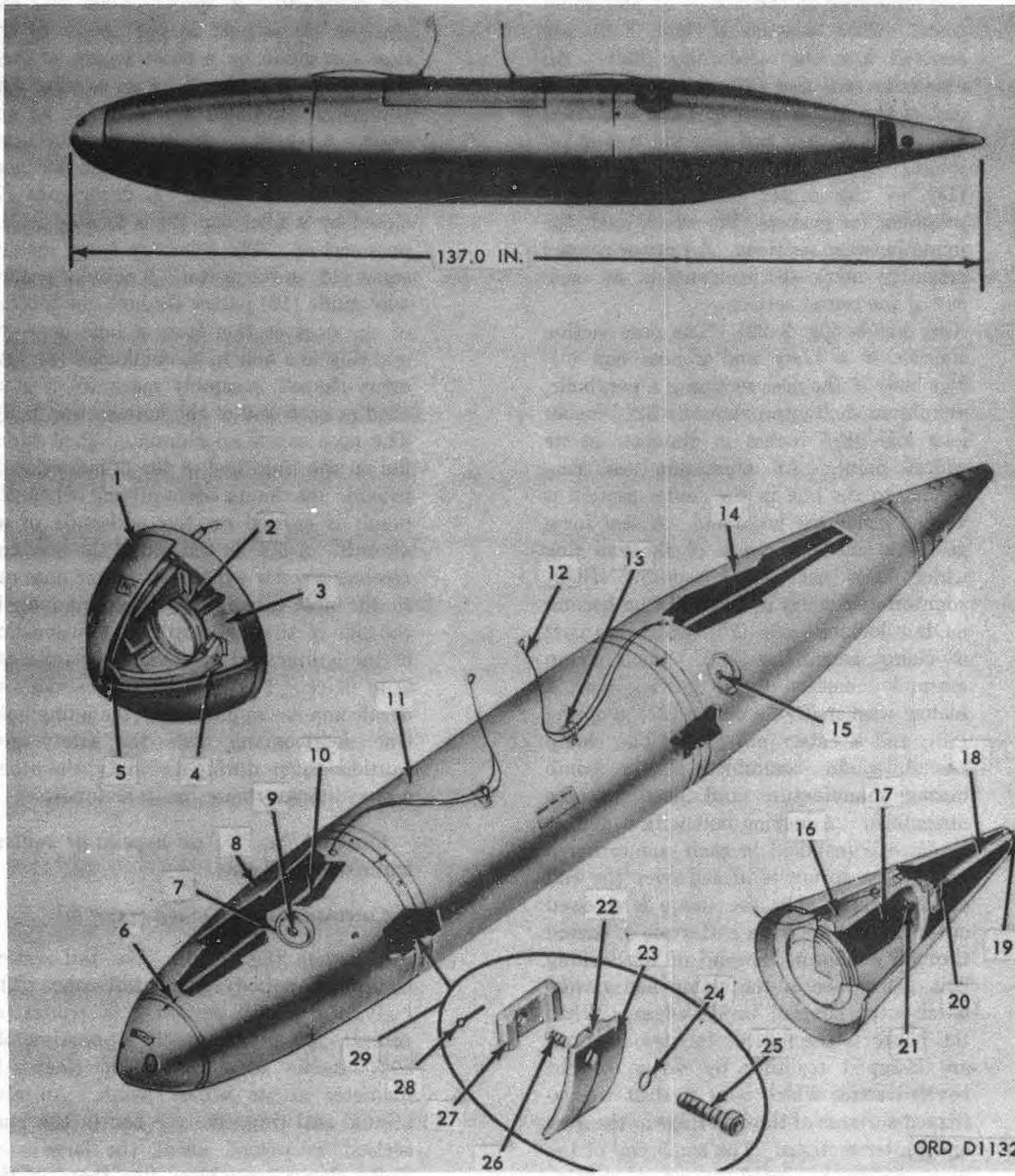
Model	M116A2
Length of Assembled Bomb (in.)	137.0
Body Diameter (in.)	18.63
Weight of Empty Bomb (lb)	70.0
Weight of Assembled Bomb (lb)	685.0
Filler Weight (lb)	615.0
Filler (gal.)	100.0
Fuze:	
Nose	AN-M173A1*, M173*
Tail	AN-M173A1*, M173*
Igniter	AN-M23A1*, M23* (2 required)
Arming Wire	M17 (2 required)

* *Note.* The AN-M23A1 igniter is compatible with the AN-M173A1 bomb fuze only. The igniter M23 is compatible with bomb fuze M173 only. An adapter is available to permit installation of fuze M173 in igniter AN-M23A1.

a. Description. The M116A2 fire bomb (fig. 2-29 and table 2-25) is designed to be filled with thickened fuel and carried externally on high-performance aircraft. A complete round contains the following components:

(1) *Body.* The bomb body is made of sheet aluminum in three sections. Two gaskets are provided for sealing the joints between the sections.

(2) *Center section* (fig. 2-29). The center section (11) is an aluminum cylinder, approximately 48⅝ inches long and 18⅝ inches in diameter, open at both ends. It is braced internally by aluminum girders



1	Nose cap	11	Center section	21	Fuze
2	Igniter cup	12	Arming wire	22	Gasket
3	Bulkhead	13	Suspension lug	23	Seal ring
4	Nose-cap guide	14	Tail section	24	Sealing washer
5	Nose-cap plunger	15	Locking screw	25	Locking bolt
6	Assembly mark	16	Tail-cone guide	26	Spring
7	Filling hole	17	Igniter	27	Clamp
8	Nose section	18	Tail-cone plunger	28	Cotter pin
9	Filler cap	19	Nut	29	Clamp assembly, exploded view
10	Arming-wire guide	20	Spring		

Figure 2-29. Bomb, fire: 750-pound, M116A2 cutaway view.

and reinforced on the side by an aluminum plate. Two suspension lugs (13) are screwed into the reinforcing plate. An aluminum seal ring (23) is welded to each end of the center section. The seal rings are wedge shaped and provide means for joining the nose section (8) and tail section (14) to the center section. Seats are provided for gaskets (22) which seal the joints between sections. An arrow-shaped assembly mark (6) is stenciled at each end of the center section.

(3) *Nose section* (fig. 2-29). The nose section consists of a body and a nose cap (1). The body of the nose section is a parabolic, aluminum shell approximately 32½ inches long and 18½ inches in diameter at its widest point. An aluminum seal ring similar to the one in the center section is welded inside the large end. A seat for a gasket is cut in the side of the seal ring which faces the center section. Eight counterbored holes in the seal ring accommodate locking bolts (25), which are part of clamp assemblies (29). Each clamp assembly consists of the locking bolt, a sealing washer (24), a clamp (27), a spring (26), and a cotter pin (28). The clamp assemblies are assembled in the bomb during manufacture and need not be dissembled. A locking bolt with a washer in place is installed in each counterbored hole. The spring is placed over the end of the locking bolt, the clamp is screwed onto the bolt, and the cotter pin is passed through a hole in the end of the locking bolt. One face of the clamp has a wide notch with beveled inside edges. When the bomb is assembled, the two sections are clamped together by virtue of the beveled edges which bear against wedge-shaped surfaces of the seal rings in the nose and center sections. The small end of the nose section is closed by an aluminum bulkhead (3) on which are mounted an igniter cup (2) and a nose-cap guide (4). The igniter cup is threaded to receive an M23 or an AN-M23A1 igniter. The nose-cap guide is a bracket attached to the bulkhead and provided with a spring which tends to make the guide lie flat against the bulkhead. A spring-loaded nose-cap plunger (5) is held in the center of the nose-cap guide by a short length of steel wire which is replaced by an arming wire (12) when the bomb is installed in an aircraft. A screw in the center of the nose-cap plunger (5) is used to fasten the nose cap (1) to the bomb. A filling hole (7) closed by a filler cap (9) is located in the nose section. The filler cap has a locking screw (15) in the center. A tubular arming wire guide (10) passes through the interior of the nose section from a hole near the seal ring to a hole in the bulkhead (3). An arrow-shaped, assembly mark (6) is stenciled at each end of the nose-section body. The nose cap is an aluminum shell which fits on the front end of the nose section to provide maximum streamlining when the bomb is carried on the underside of an aircraft. A hole in the end of the nose cap receives a screw which fastens the nose cap to the nose-cap guide. Two windows in the side of the nose cap permit inspection of the igniter and fuze when the nose cap is in place. The nose section carries two decalcomanias applied near the filling hole. One decalcomania lists the safety precautions taken during assembly; the other, a precautionary note, reads as follows:

Caution No. 1: **Use napalm or equivalent density fill only.**

Caution No. 2: **Do not water fill.**

(4) *Tail section* (fig. 2-29). The tail section consists of a body and a tail cone. The body of the tail section is a truncated, conical, aluminum shell approximately 39¼ inches long and 18⁹⁄₁₆ inches in diameter as its widest point. An aluminum seal ring, like the one in the nose section, is welded inside the large end. Eight clamp assemblies, like those in the nose section, are screwed to the seal ring. The small end of the body is closed by an aluminum bulkhead on which are mounted an igniter cup and a tail-cone guide (16). The tail-cone guide (16) is a fixed bracket to which a tail cone plunger (18), with a spring (20) and nut

(19), is fastened when the bomb is installed in an aircraft. A filling hole closed by a filler cap is located at the seal ring end. Another caution decalcomania is applied close to the tail-section filling hole. A tubular arming-wire guide, similar to the one in the nose section, passes through the interior of the tail section from a hole near the seal ring to a hole in the bulkhead (3). An arrow-shaped assembly mark is stenciled at each end of the tail-section body. The tail cone is a conical aluminum shell which streamlines the bomb tail for carriage on the underside of an aircraft. A hole in the rear end of the tail cone receives the end of the tail-cone plunger (18) when the tail cone is installed on a bomb. Two windows in the side of the cone permit inspection of the igniter (17) and fuze (21) when the tail cone is in place.

b. Filler. The M116A2 fire bomb is filled with 100 gallons (approximately 615 pounds) of thickened fuel.

c. Igniters and Fuzes.

(1) *Igniters.* One M23 or AN-M23A1 bomb igniter (17, fig. 2-29) is installed in the igniter cup in the bomb nose and one in the tail.

(2) *Fuzes.* An M173 bomb igniter fuze (21, fig. 2-29) is installed in each M23 bomb igniter, or an AN-M173A1 bomb igniter fuze in each AN-M23A1 igniter (see note, para 2-21, for exception).

d. Arming Wires. Two M17 type E arming wires are used with the M116A2 fire bomb. One arming wire is used to hold the nose cap in place and to prevent the nose fuze from arming; the other arming wire is used to hold the tail cone in place and to prevent the tail fuze from arming.

e. Gaskets. Two synthetic rubber gaskets (22, fig. 2-29) of the proper size to fit into recesses in the seal rings are furnished with the bomb.

f. Hardware and Accessories. Three short lengths of aluminum tubing are provided to space safety clips which hold the arming wires in the fuzes. A small can of grease is furnished with each bomb for greasing the gaskets and seal rings. Assembly and installation instructions are packed in the box in which the bomb is shipped.

g. Functioning. Upon release of the bomb from the aircraft bomb station, the arming wires are simultaneously withdrawn from the nose-cap plunger and both fuzes. The nose cap and tail cone are ejected by their respective springs. This exposes the nose and tail fuzes. The nose-cap guide is forced by its spring to lie flat against the bulkhead. The arming vanes in the fuzes are free to rotate in the airstream when the arming wires are withdrawn and the nose cap and tail cone are out of the way. Approximately 15 revolutions of the arming vanes arm the fuzes. Both fuzes function on impact and burst the igniters, scattering burning white phosphorous (WP). The force of impact bursts the bomb and causes the thickened fuel to splatter over the target area. The burning WP ignites the filler.

h. Difference Between M116A2 and M116A1. The bomb M116A2 is essentially an M116A1 except that two aluminum reinforcements have been added to the fore and aft bulkheads in the center section. These reinforcements enable the M116A2 to be force ejected from an aircraft. In addition, the cap screws present on the M116A1 have been replaced by locking bolts on the M116A2.

2-22. Bomb, Fire: 750-Pound, MK77 Mod 0

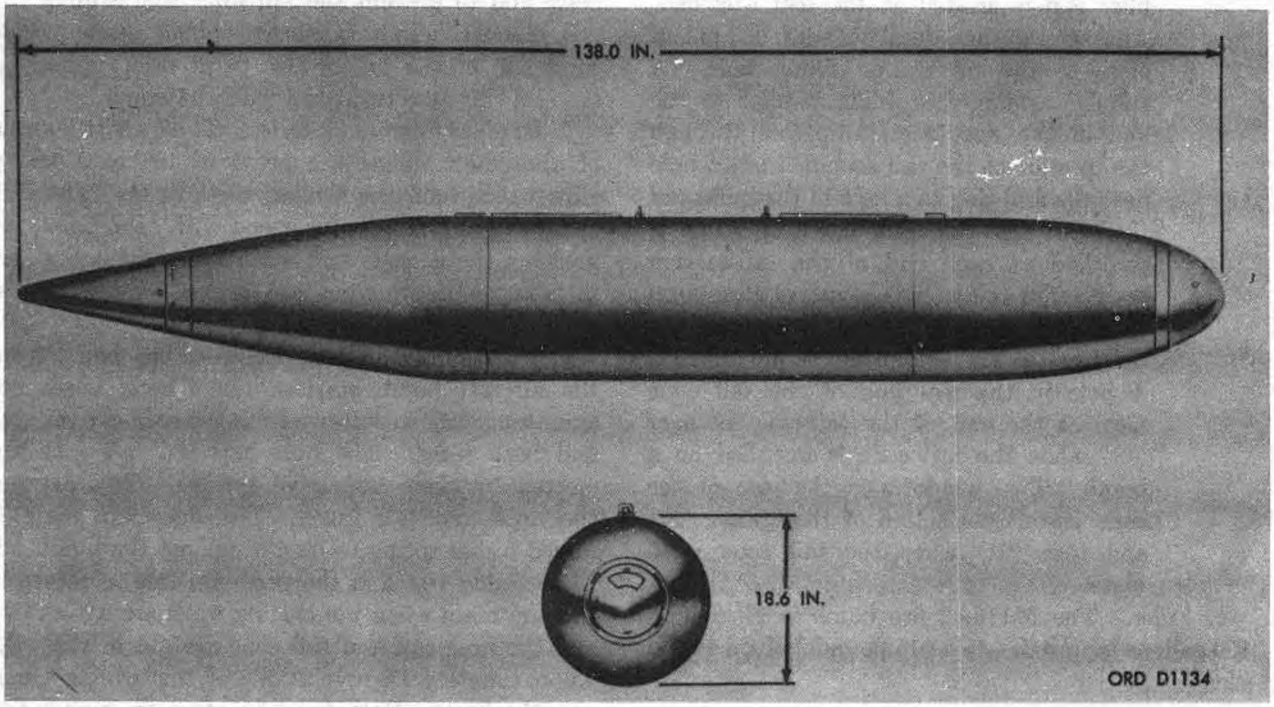


Figure 2-30. Bomb, fire: 750-pound, MK77 Mod 0.

Table 2-26. Bomb, Fire: 750-Pound, MK77 Mod 0

Model	MK77 Mod 0
Body Diameter (in.)	18.6
Length of Assembled Bomb (in.)	138.0
Filler	Gasoline Gel
Filler Capacity (gal)	110.0
Weight of Filler (lb)	668.0
Weight of Assembled Bomb (lb)	760.0
Weight of Empty Bomb (lb)	82.0
Weight of Igniters (lb)	10.0
Nose Igniter	M15 or M23
Tail Igniter	M15, M16 or M23
Fuzes	M157 (used with igniters M15 and M16) M173 (used with igniters M23 or igniter AN-M23A1 plus adapter ring) AN-M173A1 (used with igniter AN-M23A1)

a. Description. The 750-pound fire bomb MK77 Mod 0 (fig. 2-30 and table 2-26) is a nonstabilized, cigar-shaped bomb constructed of aluminum. It consists of the following.

(1) *Three main sections and two end cones.* (fig. 2-31) 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. Double suspension lugs are mounted on the body 14 inches apart. Two gasket sealer 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 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.

(2) *Filler*. The bomb is filled with 110 gallons of gasoline gel and uses two igniter and fuze combinations to ignite the gel upon impact.

(3) *Components*. Three igniters may be used with fire bomb MK77 Mod 0: the M15, the M16 or the M23. Adapters are furnished with the bomb so that igniter M15 may be used for either nose or tail fuzing. Igniter M16 normally is used for tail fuzing only. When the bomb is assembled, one igniter is attached to each end.

b. Functioning. 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.

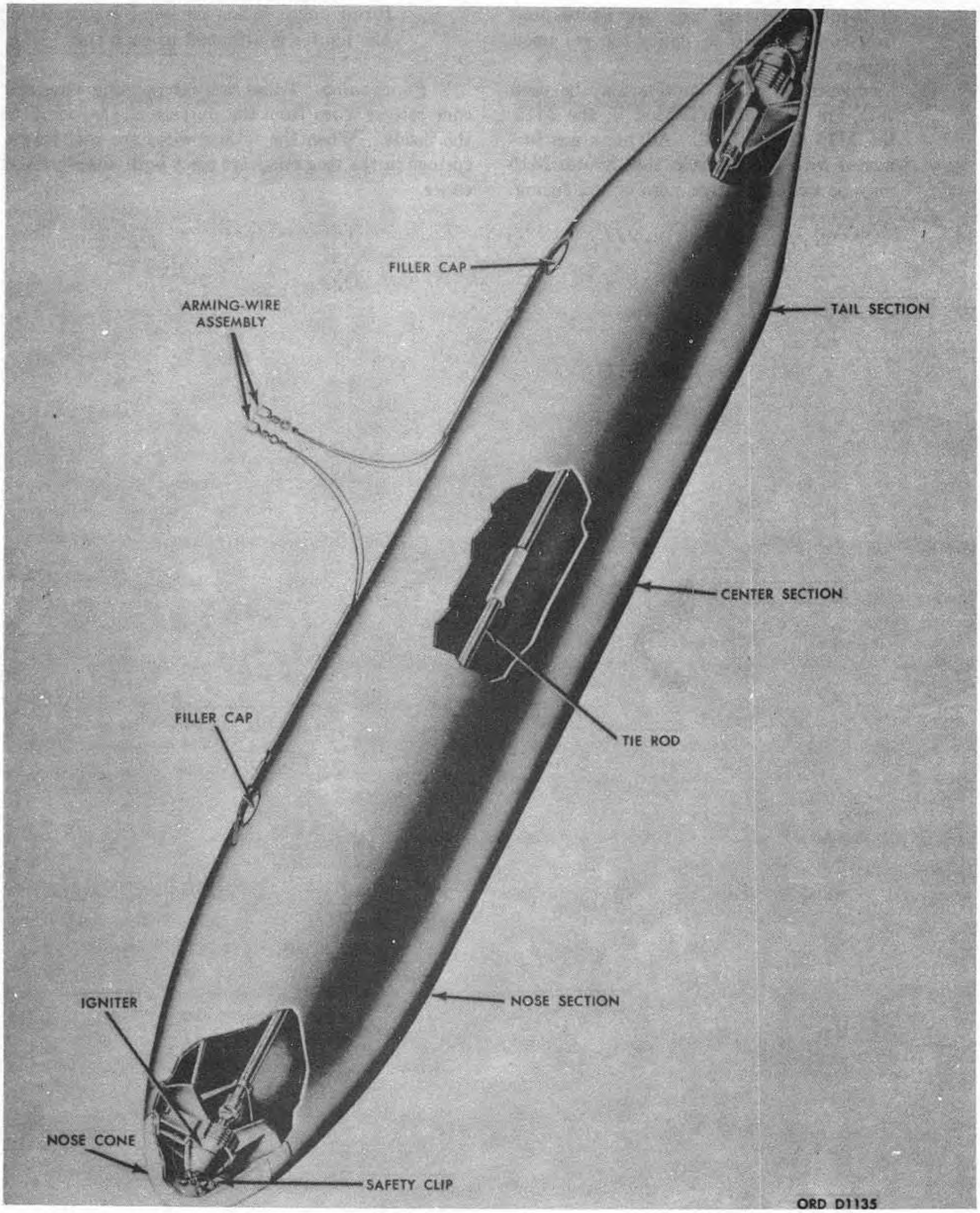


Figure 2–31. Bomb, fire: 750-pound, MK77 Mod O, cutaway view

2-23. Bomb, Fire: 500-Pound, MK77 Mod 1

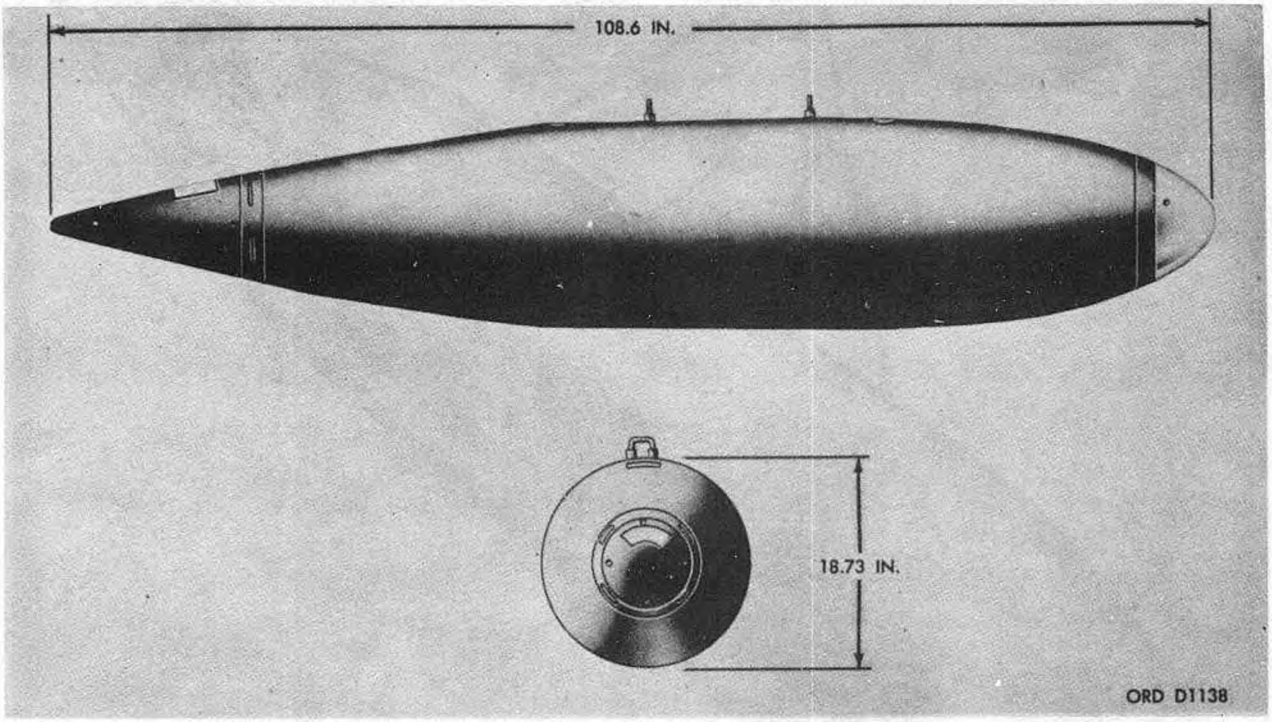


Figure 2-32. Bomb, fire: 500-pound, MK77 Mod 1.

Table 2-27. Bomb, Fire: 500-Pound, MK77 Mod 1

Model	MK77 Mod 1
Length of Assembled Bomb (in.)	108.6
Body Diameter (in.)	18.73
Filler	Gasoline Gel
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 M173 (used with igniter M23 or igniter AN-M23A1, plus adapter ring)

a. Description. The 500-pound fire bomb MK77 Mod 1 (fig. 2-32) is a 75-gallon capacity bomb obtained by modifying the 750-pound fire bomb MK77 Mod 0. The modification consists of cutting off approximately 2 inches from the nose and tail body sections (fig. 2-31) 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. 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 approximately 72 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.

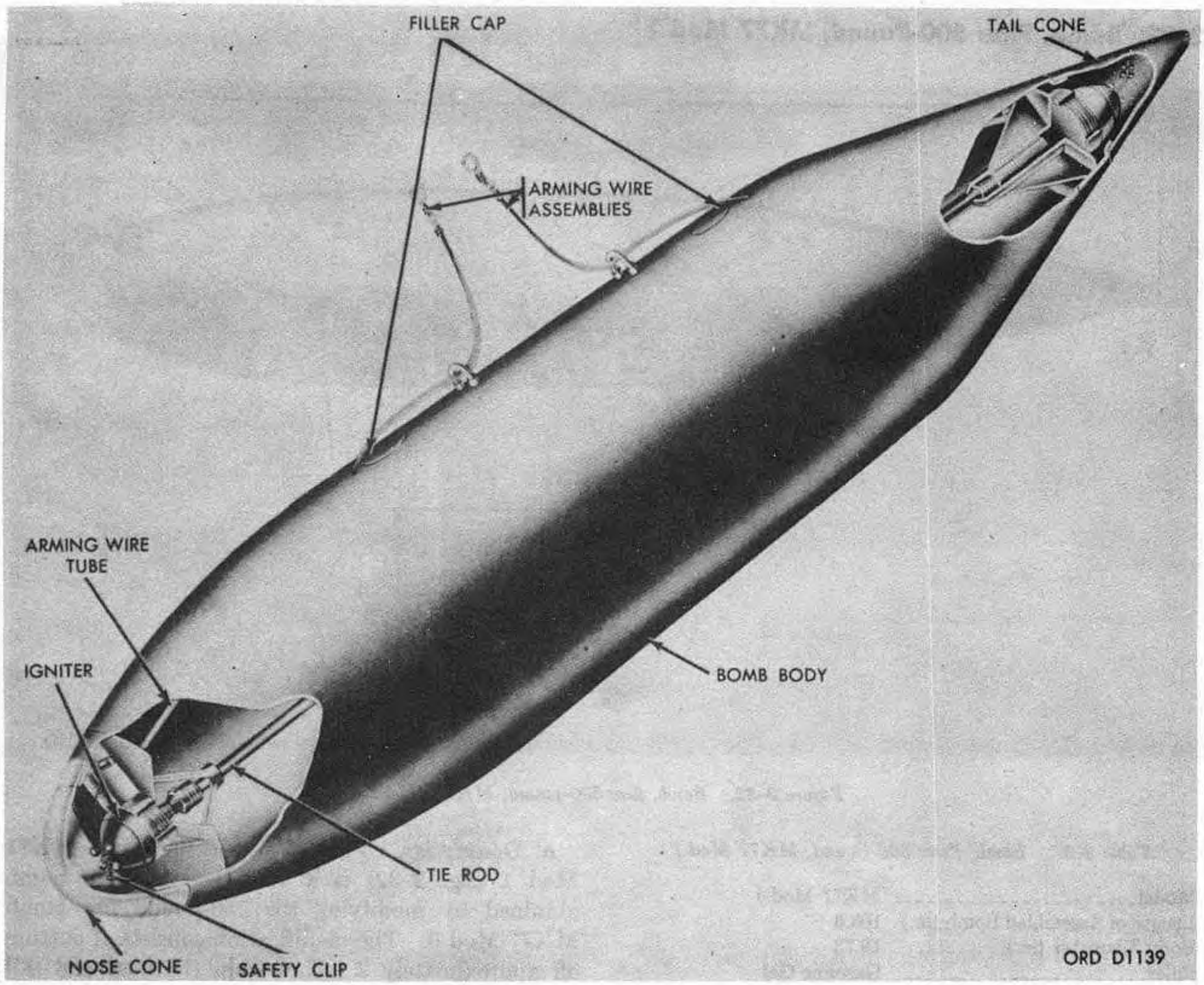


Figure 2-33. Bomb, fire: 500-pound, MK77 Mod 1, cutaway view.

b. Components. Igniters and fuzes are used in the nose and tail of fire bomb MK77 Mod 1. Three igniters may be used: the M15, the AN-M16 and the M23. The bomb is designed for primary use of igniter M23 with fuze AN-M173 in both the nose and the tail. Adapters are furnished with the bomb so that igniter M15 with fuze M157 can be used in either the nose or tail of the bomb. Igniter M15 with fuze M157 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, igniter M16 can be used in the nose.

c. Functioning. 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.

2-24. Bomb, Fire: 750-Pound, MK78 Mod 2

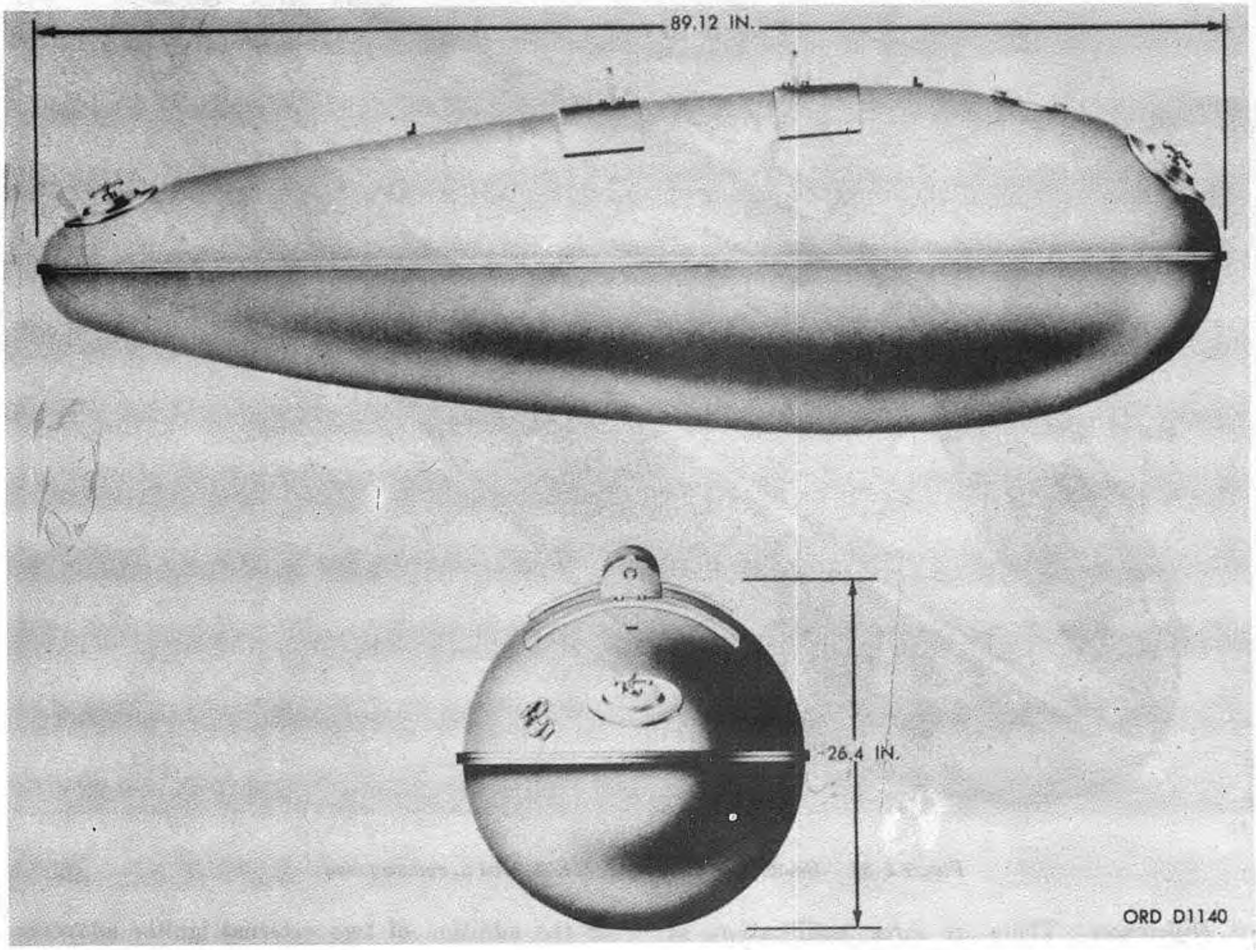


Figure 2-34. Bomb, fire: 750-pound, MK78 Mod 2.

Table 2-28. Bomb, Fire: 750-Pound, MK78 Mod 2

Model	MK78 Mod 2
Body Diameter (in.)	26.4
Body Length Assembled (in.)	89.12
Filler	Gasoline Gel
Filler Capacity (gal)	110.0
Weight of Filler (lb)	660.0
Weight of Empty Bomb (lb)	90.0
Weight of Assembled Bomb (lb)	760.0
Igniter	M15, M16, M23 or AN-M23A1
Fuzes	M157 (used with igniters M15 and M16) or M173 (used with igniter M23 or igniter AN-M23A1 plus adapter ring) or AN-M173A (used with igniter AN-M23A1)

a. Description. The 750-pound fire bomb MK78 Mod 2 (figs. 2-34, 2-35 and table 2-28) consists of two thin sheet-steel half-shells welded together. It is nonstabilized and has a 110-gallon capacity. The bomb has two wells located fore and aft on the upper surface. These wells house two igniters M23 which are secured in place with igniter caps. A filler opening for the gasoline gel and the suspension lugs is located on the upper surface. 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.

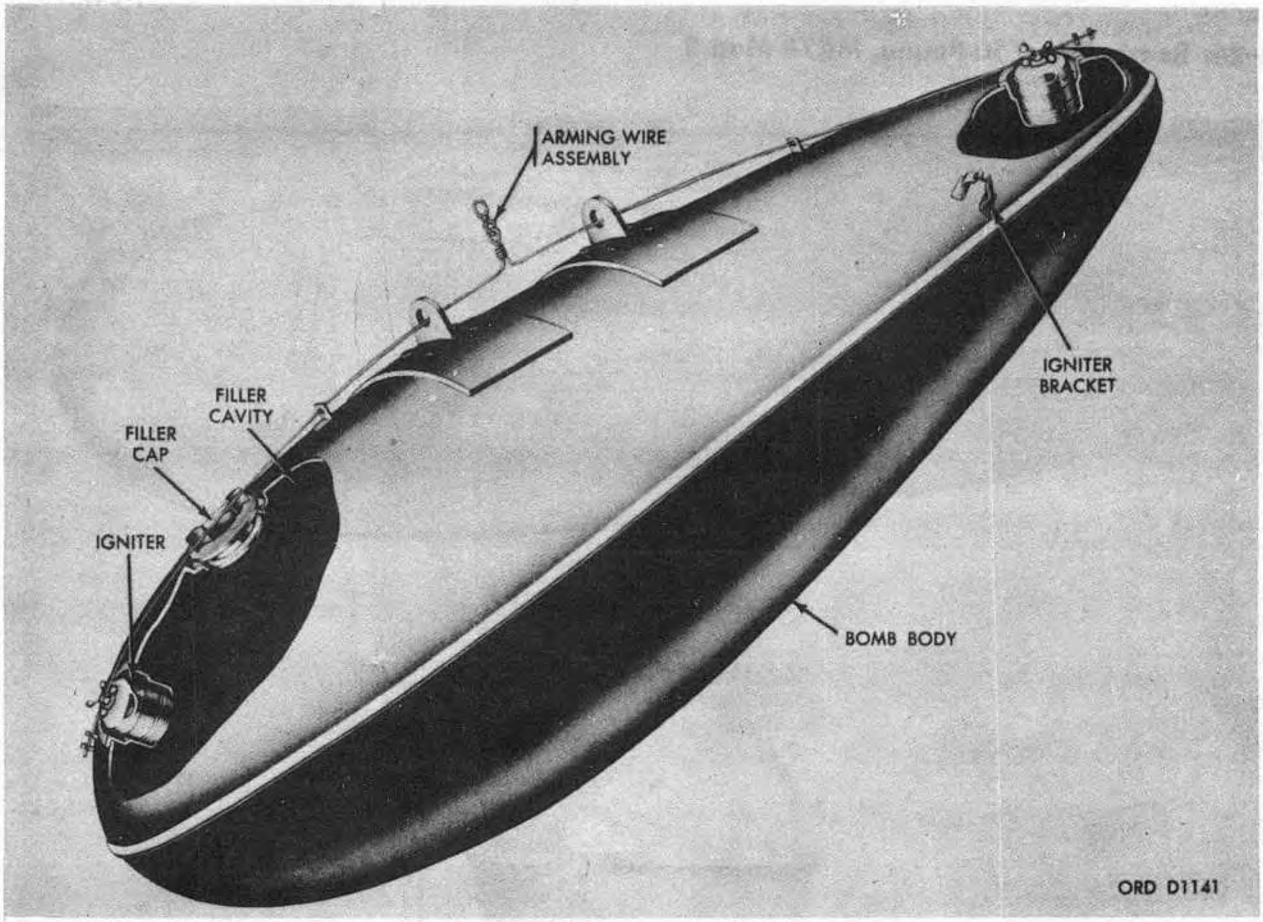


Figure 2-35. Bomb, fire: 750-pound, MK78 Mod 2, cutaway view.

b. Differences. There are three modifications of the 750-pound fire bomb MK78, Mods 0, 1, and 2. Differences exist in the construction and location of the wells, brackets, and adapters which accommodate the igniters. The Mod 0 bomb uses igniter M16 with fuze M157 installed in the filler hole of the bomb. Igniter M15 with fuze M157 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 adapters. The wells of the Mod 2 are located higher on the bomb body than the igniter adapters of the Mod 1. The M23 igniters set in the wells are secured by igniter caps.

2-25. Bomb, Fire: 1,000-Pound, MK79 Mod 1

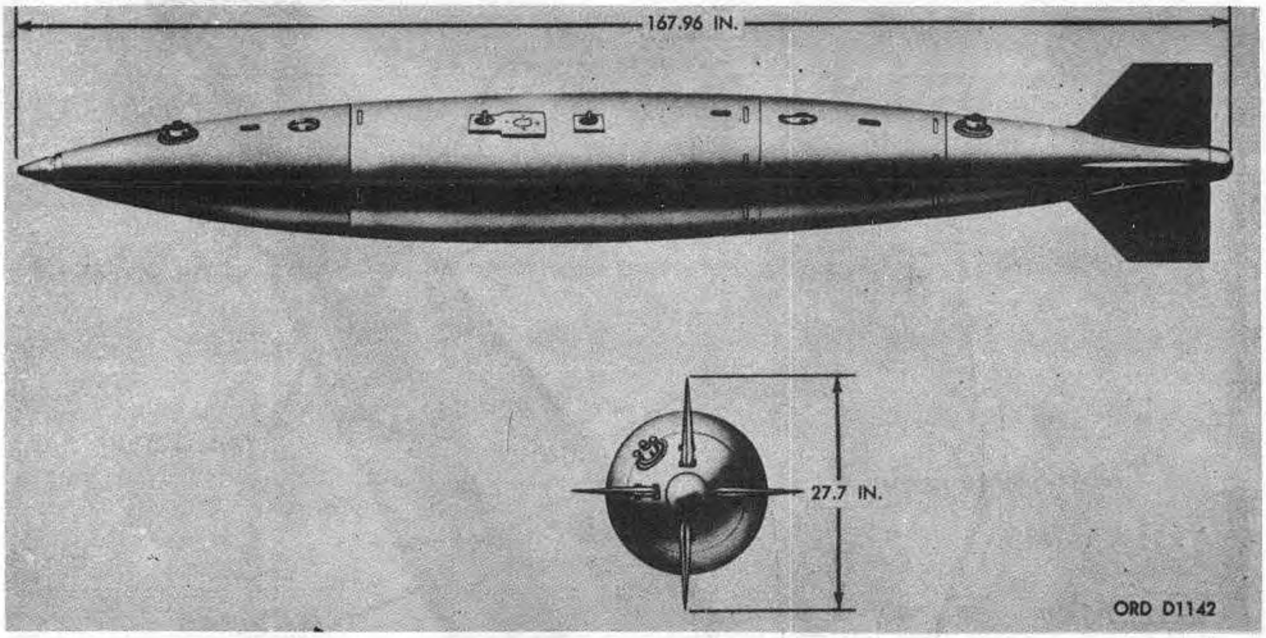


Figure 2-36. Bomb, fire: 1,000-pound, MK79 Mod 1.

Table 2-29. Bomb, Fire: 1,000-Pound, MK79 Mod 1

Model	MK79 Mod 1
Body Diameter (in.)	19.6
Body Length Assembled (in.)	167.96
Filler	Gasoline, Napalm
Filler Capacity (gal)	112.0
Weight of Filler (lb)	700.0
Weight of Assembled Bomb (empty) (lb).	212.0
Weight of Bomb as Shipped (lb)	275.0
Arming-Wire Assembly	
Igniter	M23, AN-M23A1
Fuzes	MK257 Mod 0 (used with proximity fuze sensing element M20), M173 (used with igniter M23 or igniter AN-M23A1 plus adapter ring) and AN-M173A1 (used with igniter AN-M23A1)

a. Description. The 1,000-pound fire bomb MK79 Mod 1 is a thin-skinned bomb of low-drag design. The bomb (figs. 2-36, 2-37, and table 2-29) is made up of four basic body sections. These four sections are designated Section I, the forward (or nose) section; Section II, the center (or main) section; Section III, the first aft section; and Section IV, the second aft (or tail) section. 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. One one end is a build-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 build-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.

b. Filler. The bomb, which has a capacity of approximately 112 gallons, is filled with gasoline mixed with napalm.

c. Components. This bomb can be fuzed with either standard mechanical fuzing utilizing fuze M173 with igniter M23 (in both the nose and the tail) for impact functioning or an electric fuzing system consisting of electric fuze MK257 Mod 0 with proximity fuze sensing element M20 for either airburst or impact functioning. Additional components not listed herein are furnished with each bomb for assembly purposes.

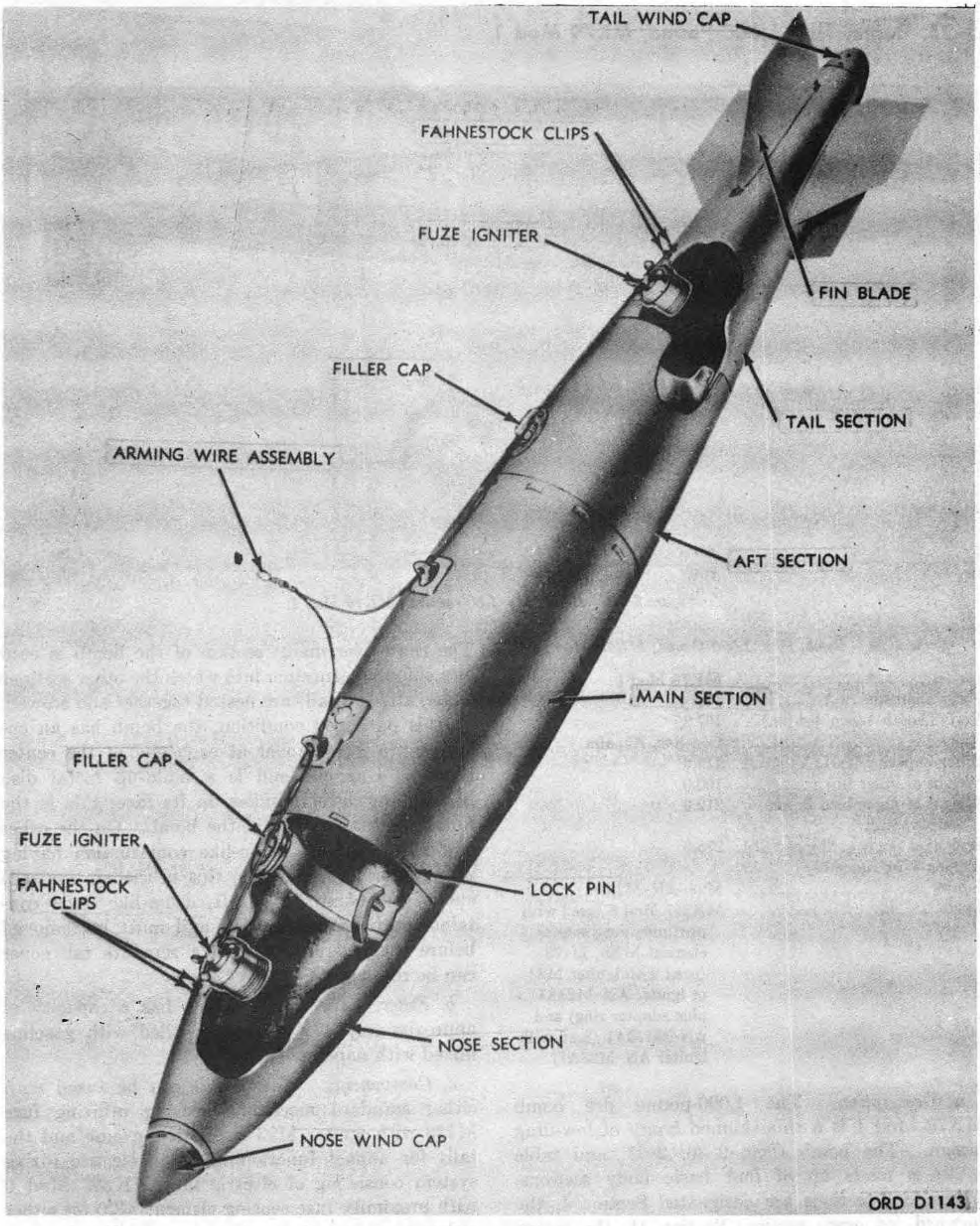


Figure 2-37. Bomb, fire: 1,000-pound, MK79 Mod 1, cutaway view.

2-26. Bomb, Fire: 750-Pound, BLU-1/B and BLU-1B/B

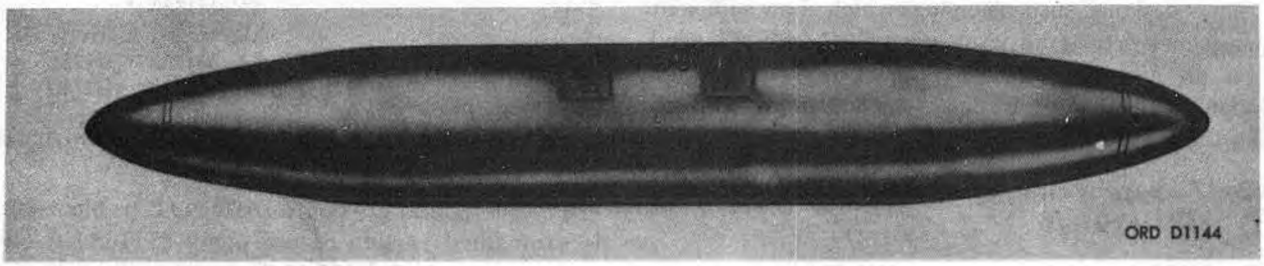


Figure 2-38. Bomb, fire: BLU series.

Table 2-30. Bomb, Fire: 750-Pound, BLU-1/B

Model	BLU-1/B
Length Assembled (in.)	130.0
Diameter Body (in.)	18.5
Weight of Assembled Bomb (lb)	697-873*
Filler Capacity (gal)	90-100*
Filler Weight (lb)	615-790* Napalm
Fuze	FMU-7/B or FMU-7 A/B (2 required)
Initiator	FMU-7/B or FMU-7 A/B
Cable Assembly	FMU-7/B or FMU-7 A/B
Igniter	AN-M23A1 (2 required)

*Actual figure depends on filler used.

a. Description. The BLU-1/B and BLU-1B/B 750-pound fire bombs (figs. 2-38, 2-39 and table 2-30) are designed for external carriage on high-performance aircraft with forced-ejection release systems. They are constructed of aluminum with reinforced areas for sway bracing and aircraft forced ejection. The bomb body consists of three major sections: the nose, center, and tail which are nested with the supplemental components to obtain a high density package. Metal components and special assembly tools for 14 individual bombs are packaged for shipment and storage in one hermetically-sealed, reusable, cylindrical metal container.

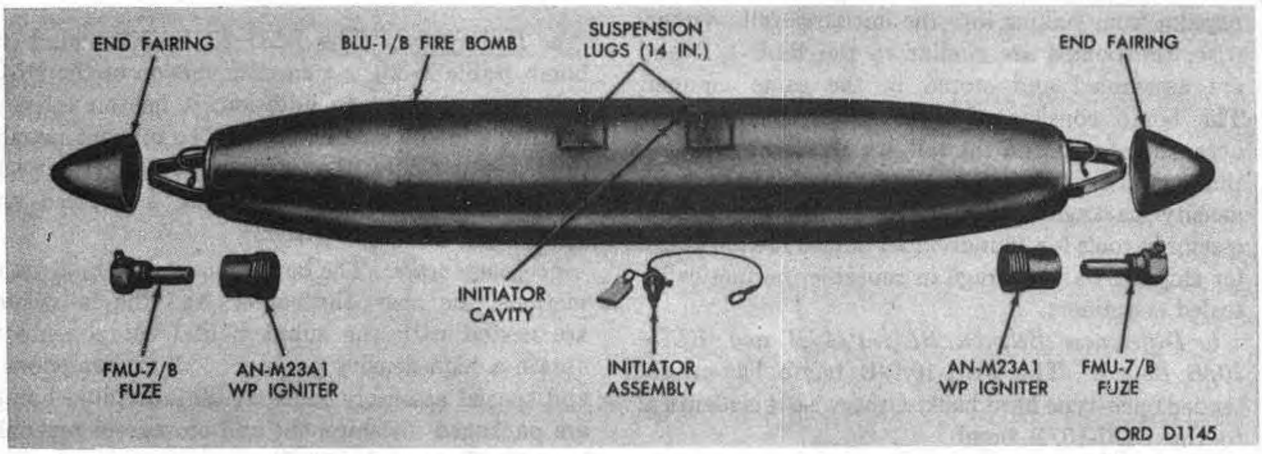


Figure 2-39. Bomb, fire: BLU series (components).

b. Differences Between the BLU-1/B and Earlier Type Fire Bombs. Unlike earlier types of fire bombs, the BLU-1/B utilizes electrically-armed impact fuzes which require a cable assembly to utilize power generated by a thermal battery in the initiator. End caps are used in the BLU-1/B instead of nose caps and tail cones and there are significant overall size and weight differences. In addition, the fuze system has an arming delay of .3 to 1.1 seconds.

c. Differences Between BLU 1B/B and BLU-1/B. The fire bomb BLU-1B/B differs from the BLU-1/B in that it has a beam assembly (hard back) which is extruded rather than cast, and an initiator adapter which is designed to prevent napalm from leaking into the initiator well. In addition, it has newly designed suspension lugs which allow sufficient clearance for the initiator when the bomb is loaded on an aircraft. Otherwise, the two bombs are identical and are packaged, stored, and assembled in the same manner.

2-27. Bomb, Fire: 250-Pound, BLU-10/B and BLU-10A/B

Table 2-31. Bomb, Fire: 250-Pound, BLU-10/B and BLU-10A/B

Model	BLU-10/B, BLU-10A/B
Length of Assembled Bomb (in.)	88.0
Diameter of Bomb (in.)	12.5
Filler	Napalm
Weight of Complete Round (lb)	250.0
Filler (gal)	33.0
Filler Weight (lb)	211.0
Fuze	FMU-7/B or FMU-7A/B (2 required)
Initiator	FMU-7/B or FMU-7A/B
Cable Assembly	FMU-7/B or FMU-7A/B
Igniter	AN-M23A1 (2 required)

a. Description. The BLU-10/B and the BLU-10A/B 250-pound anti-personnel and materiel bombs (table 2-31) are smaller versions of the BLU-1/B (para 2-26). In addition, they have an initiator adapter which is designed to prevent napalm from leaking into the initiator well. Otherwise, the bombs are similar to the BLU-1/B and are assembled and stored in the same manner. The bomb consists of three major sections: the nose, the center, and the tail, which are nested with the supplemental components to obtain a high density package. Metal components and special assembly tools for 16 individual bombs are packaged for shipment and storage in reusable, hermetically-sealed containers.

b. Differences Between BLU-10A/B and BLU-10/B Bombs. The BLU-10A/B bomb has an extended open-type hard back. Otherwise it is identical to the BLU-10/B bomb.

2-28. Bomb, Fire: 500-Pound, BLU-11/B

Table 2-32. Bomb, Fire: 500-Pound, BLU-11/B

Model	BLU-11/B
Length of Assembled Bomb (in.)	110.0
Diameter of Body (in.)	18.6
Weight of Complete Round (lb)	502.0
Filler	Napalm
Filler (gal)	65.0
Filler Weight (lb)	442.0
Nose	AN-M173A1* M173*
Tail	AN-M173A1* M173*
Igniter	AN-M23A1* M23* (2 required)

*Note. Igniter AN-M23A1 is compatible with bomb fuze AN-M173A1 only. Igniter M23 is compatible with bomb fuze M173 only.

The 500-pound fire bomb BLU-11/B (table 2-32), is a modified version of fire bomb M116A1. The center section of BLU-11/B is 25 inches shorter than the center section of M116A1. Otherwise, the bombs are similar and are assembled and stored in the same way.

2-29. Bomb, Fire: 500-Pound, BLU-23/B

Table 2-33. Bomb, Fire: 500-Pound, BLU-23/B

Model	BLU-23/B
Length of Assembled Bomb (in.)	119.0
Diameter of Body (in.)	15.75
Weight of Assembled Bomb (lb)	490.0
Filler	Napalm
Filler (gal)	67.0
Filler Weight (lb)	430.0
Fuze	FMU-7/B or FMU-7A/B (2 required)
Initiator	FMU-7B or FMU-7A/B
Cable Assembly	FMU-7B or FMU-7A/B
Igniter	AN-M23A1 (2 required)

a. Description. The BLU-23/B, 500-pound fire bomb (table 2-33) is a smaller version of the BLU-1/B (para 2-26). In addition, it has an initiator adapter added which is designed to prevent napalm from leaking into the initiator well. Otherwise, the bombs are identical and are assembled and stored in the same manner.

b. Components. The bomb consists of three major sections: the nose, the center, and the tail which are nested with the supplemental components to obtain a high-density package. Metal components and special assembly tools for 20 individual bombs are packaged for shipment and storage in reusable, hermetically-sealed containers.

2-30. Bomb, Fire: 750-Pound, BLU-27/B

Table 2-34. Bomb, Fire: 750-Pound, BLU-27/B

Model	BLU-27/B
Length of Assembled Bomb (in.)	130.0
Diameter of Body (in.)	18.5
Weight of Assembled Bomb (lb)	873.0
Filler (gal)	100.0

Table 2-34. Bomb, Fire: 750-Pound, BLU-27 / B —Continued

Filler	Napalm-B
Filler Weight (lb)	790.0
Fuze	FMU-7 / B or FMU-7A / B (2 required)
Initiator	FMU-7 / B or FMU-7A / B
Cable Assembly	FMU-7 / B or FMU-7A / B
Igniter	AN-M23A1 (2 required)

a. Description. The 750-pound fire bomb BLU-27 / B (table 2-34) is a welded version of fire bomb BLU-1B / B (para 2-26). The bomb is assembled, welded, filled, and packaged at the factory. Therefore, there are no applicable field assembly procedures as in the nested models of other fire bombs.

b. Filler. The standard filling for this bomb is napalm-B for which there is presently no field filling and transfer capability.

c. Differences Between BLU-27 / B and BLU-1B / B. The other principal differences between this bomb and the earlier BLU-1B / B are that the newer model has modified filler caps; the fuze cable is assembled to the bomb at the time of manufacture, and the aft bulkhead is reversed with the flange pointing rearward.

2-31. Bomb, Fire: 500-Pound, BLU-32 / B

Table 2-35. Bomb, Fire: 500-Pound, BLU-32 / B

Model	BLU-32 / B
Length of Assembled Bomb (in.)	119.0
Diameter of Body (in.)	15.75
Weight of Assembled Bomb (lb)	589.0
Filler	Napalm-B
Filler (gal)	67.0
Filler Weight (lb)	529.0
Fuze	FMU-7 / B or FMU-7A / B (2 required)
Initiator	FMU-7 / B or FMU-7A / B
Cable Assembly	FMU-7 / B or FMU-7A / B
Igniter	AN-M23A1 (2 required)

a. Description. The 500-pound fire bomb BLU-32 / B (table 2-35) is a welded version of fire bomb BLU-23 / B. The bomb is assembled, welded, filled, and packaged at the factory. Therefore, there are no applicable field assembly procedures as in the nested models of the other fire bombs.

b. Filler. The standard filling for this bomb is napalm-B for which there is presently no field filling and transfer capability.

c. Differences Between BLU-32 / B and BLU-23 / B. This bomb differs from the earlier BLU-23 / B in that the filler caps have been modified and the fuze cable is assembled to the bomb at time of manufacture.

Section VI. SMOKE BOMBS

2-32. General

Smoke bombs are generally used for screening purposes to conceal combat areas, the movement of troops and ships, for marking targets, and for anti-personnel effect. The standard filling for these bombs is plasticized white phosphorus (PWP), which is a smoke-producing agent. White phosphorus (WP) has a mild incendiary effect and will set fire to materials having a low kindling point, such as clothing, dry brush, paper, canvas, etc.

2-33. Bomb, Smoke: PWP or WP, 100-Pound, AN-M47A4

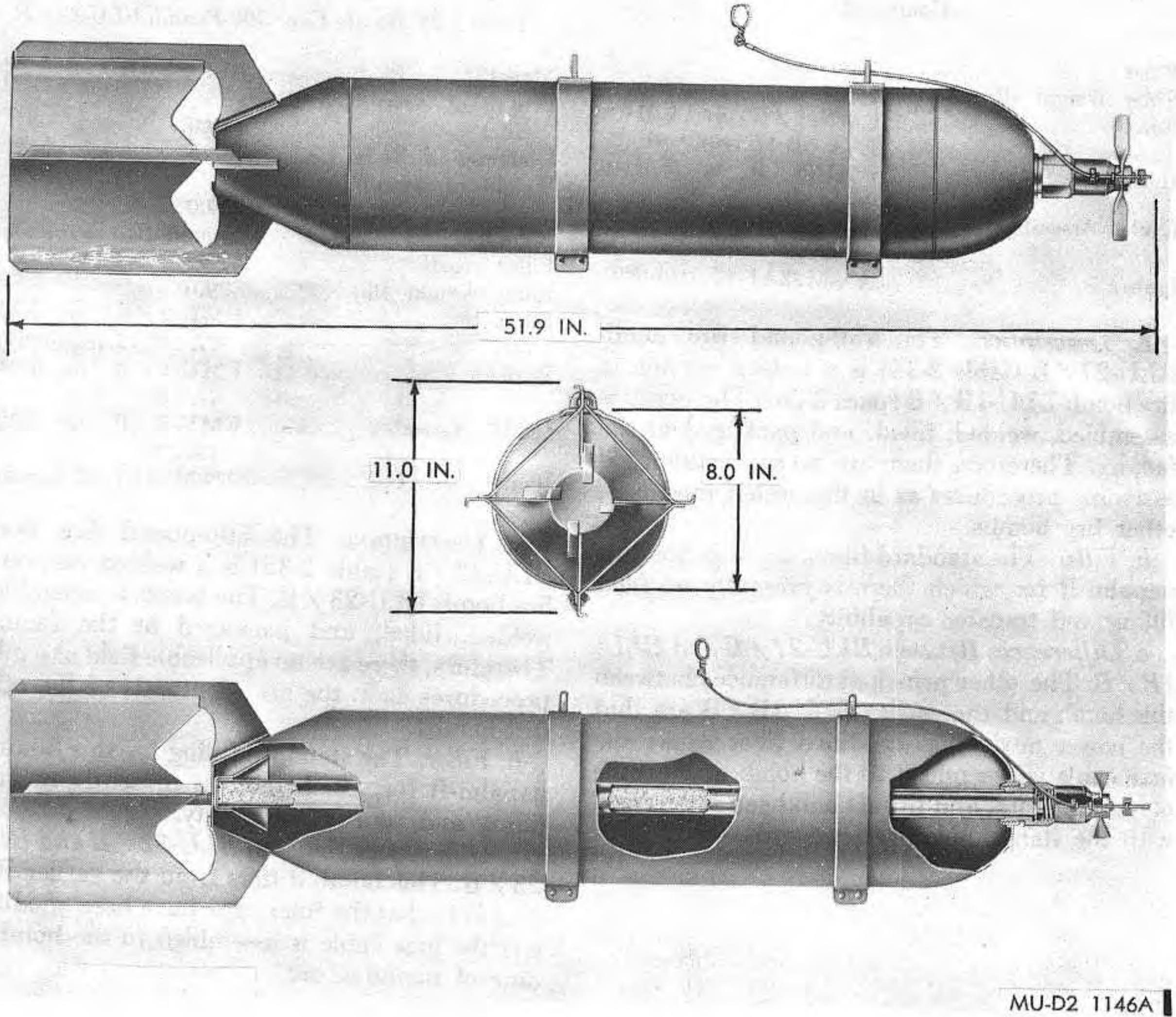


Figure 2-40. Bomb, Smoke: PWP or WP, 100-pound, AN-M47A4.

Table 2-36. Bomb, Smoke: PWP or WP, 100-Pound, AN-M47A4

Model	AN-M47A4
Length of Assembled Bomb (in.)	51.9
Diameter of Body (in.)	8.0
Weight of Assembled Bomb (lb):	
Filled with PWP	105.0
Filled with WP	131.0
Filler Weight (lb):	
PWP	74.0
WP	100.0
Fuze	AN-M159
	AN-M126A1
Burster:	
PWP	AN-M20
WP	M18
Arming-Wire Assembly	M2

a. Description. Smoke bomb AN-M47A4 (fig. 2-40 and table 2-36) is approximately 51.9 inches long and weighs approximately 105 pounds when filled with PWP and approximately 131 pounds when filled with WP. It is approximately 8.00 inches in diameter and has a rounded nose, a truncated conical tail section, and a fixed tail fin. The complete round consists of a bomb body, filler, a burster, a fuze, and an arming wire. Smoke bomb AN-M47A4 is essentially the same as incendiary bomb AN-M47A3 except for the filler, the burster, and the suspension lugs, which are of heavier construction in bomb AN-M47A4.

(1) *Body.* The bomb body is made of sheet steel. A burster well, which is a metal tube closed at one end, extends the full length of the bomb. It is installed in the bomb during manufacture. A threaded hole in the nose end of the bomb receives the fuze. During shipment, the hole is closed by a nose plug. Two suspension bands with suspension lugs at the top are clamped around the body by machine screws. The tail fin, which has four vanes, is welded to the tail section during manufacture.

(2) *Filler.* The bomb is filled during manufacture with either 74 pounds of PWP or 100 pounds of WP.

(3) *Burster.* A burster AN-M20 is used in a bomb filled with PWP; a burster M18 is used in a bomb filled with WP. The burster is installed in the bomb during assembly.

(4) *Fuze.* The preferred fuze is nose bomb fuze AN-M159. Nose bomb fuze AN-M126A1 is an authorized alternate. The fuze is shipped separately and is installed in the bomb during assembly.

(5) *Arming wire.* Arming wire M2 is used with this bomb.

b. Functioning. Functioning of a fuze and a burster shatters the bomb on impact, dispersing the agent in burning particles over a wide area. The particles are ignited spontaneously by atmospheric oxygen and produce a dense white smoke.

c. Differences. An earlier model of bomb AN-M47A4 was the AN-M47A3. The two bombs are identical except that the AN-M47A3 has more lightly-constructed suspension lugs and is authorized for filling with PWP only.

Section VII. GAS BOMBS

2-34. General

Gas bombs are used to produce casualties among personnel and for purposes of area denial. The standard toxic filler for gas bombs is GB, a nonpersistent chemical agent.

2-35. Bomb, Gas: Nonpersistent, GB, 10-Pound, M125A1

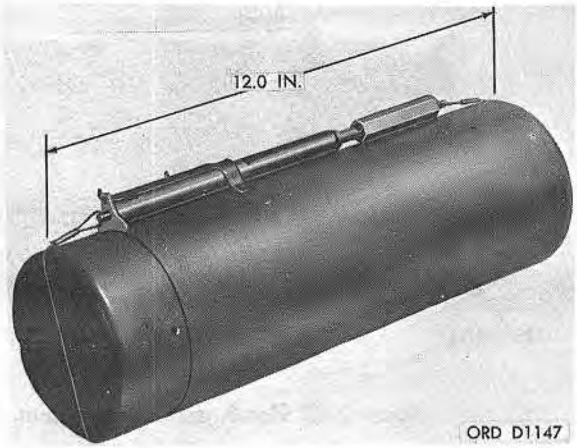


Figure 2-41. Bomb, gas: nonpersistent, GB, 10-pound, M125A1.

Table 2-37. Bomb, Gas: Nonpersistent, GB, 10-Pound, M125A1

Model	M125A1
Length of Assembled Bomb (in.)	12.0
Diameter of Body (in.)	3.63
Weight of Assembled Bomb (lb)	8.5
Filler	GB
Weight of Filler (lb)	2.6
Fin Assembly	Parachute
Fuze	M196
Burster	M31
Arming Assembly	M1A1 (parachute-opening delay)
Cluster (as shipped)	M34A1

a. Description.

(1) *Body.* The body of gas bomb M125A1 (figs. 2-41 and 2-42, and table 2-37) is a sheet-steel cylinder with a burster well and fuze at the front end and a parachute at the rear.

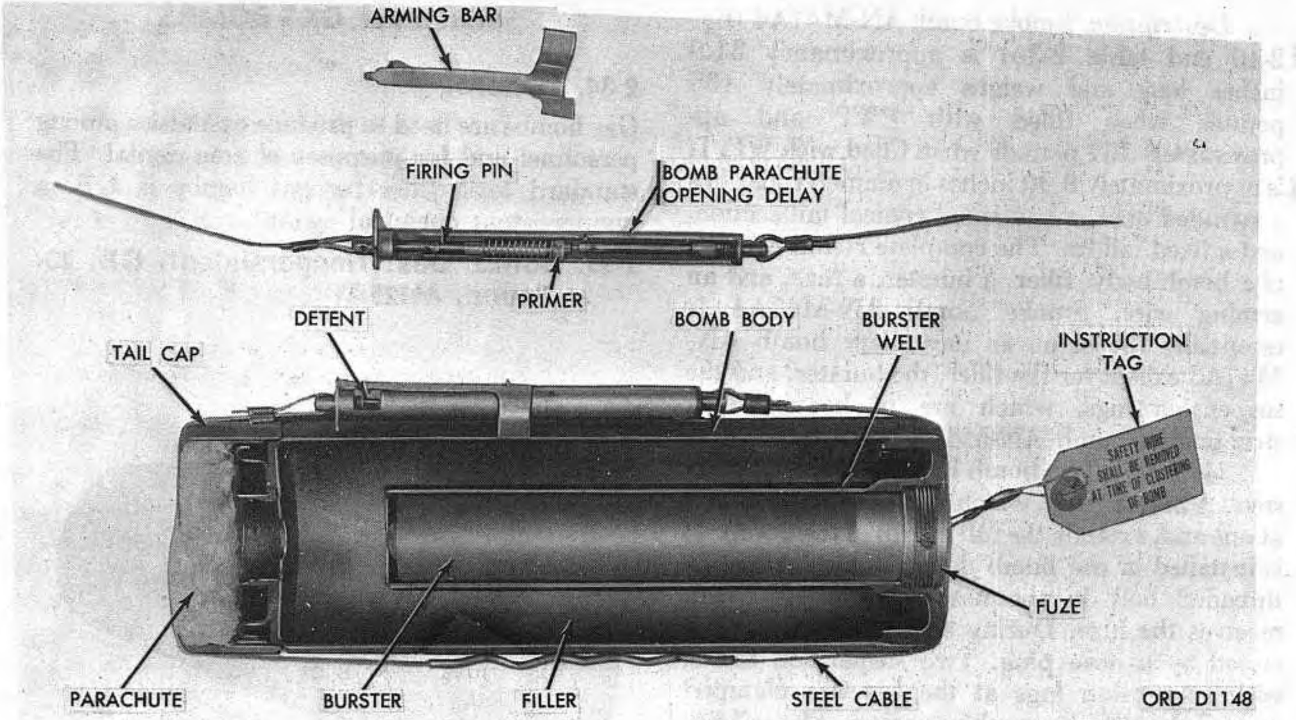


Figure 2-42. Bomb, gas: nonpersistent, GB, 10-pound, M125A1, cutaway view.

(2) *Filler.* The filler consists of 2.6 pounds of GB.

(3) *Parachute.* A cloth parachute which opens to a diameter of 14 inches is packed in the tail of the bomb. The parachute is packed under a metal tail cap which is held in place by a stranded steel cable attached to the bomb parachute-opening delay.

(4) *Bomb parachute-opening delay M1A1.* Parachute-opening delay M1A1 is fastened to the outside of the bomb. The delay is a metal tube ½ inch in diameter and 6¼ inches long containing a firing mechanism, a delay charge, and an explosive charge. The delay is held on the bomb by a stranded steel cable which is wrapped around the long axis of the bomb and fastened at each end of the delay. A detent, which is part of an external arming bar, restrains a firing pin in the delay while the bomb is clustered.

(5) *Burster.* A burster M31 is installed in the burster well.

(6) *Fuze.* A bomb fuze M196 is installed in the nose section at the time of manufacture.

b. Functioning.

(1) *Before release from cluster.* Bombs are arranged in the cluster so that the arming bars on all parachute-opening delays are depressed by contact with other bombs in the cluster.

(2) *After release from cluster.* When the bomb is released from the cluster, the arming bar springs away from the parachute-opening delay, and the firing pin in the delay fires the primer. The primer ignites the delay charge which burns for 3 to 7 seconds, then sets off the explosive charge in the parachute-opening delay. The explosion breaks the stranded steel cable, freeing the tail cup and removing restraint from the fuze arming ring. The parachute opens and abruptly slows the descent of the bomb. The rapid deceleration causes the arming ring to fall from the fuze, thus arming the fuze.

(3) *Upon impact.* When the bomb impacts, the fuze initiates the burster which ruptures the body and releases the bomb filler.

c. Differences. Gas bomb M125 is identical with the M125A1 except that the M125 uses the parachute-opening delay M1 instead of the M1A1. Delay M1 differs from the M1A1 in that a spring-loaded lockpin, which is restrained by the arming bar, holds the firing pin in the delay instead of a detent. The M125 bomb is used in M34 nonpersistent gas bomb clusters.

2-36. Bomb, Gas: Nonpersistent, GB, 500-Pound, MK94 Mod 0

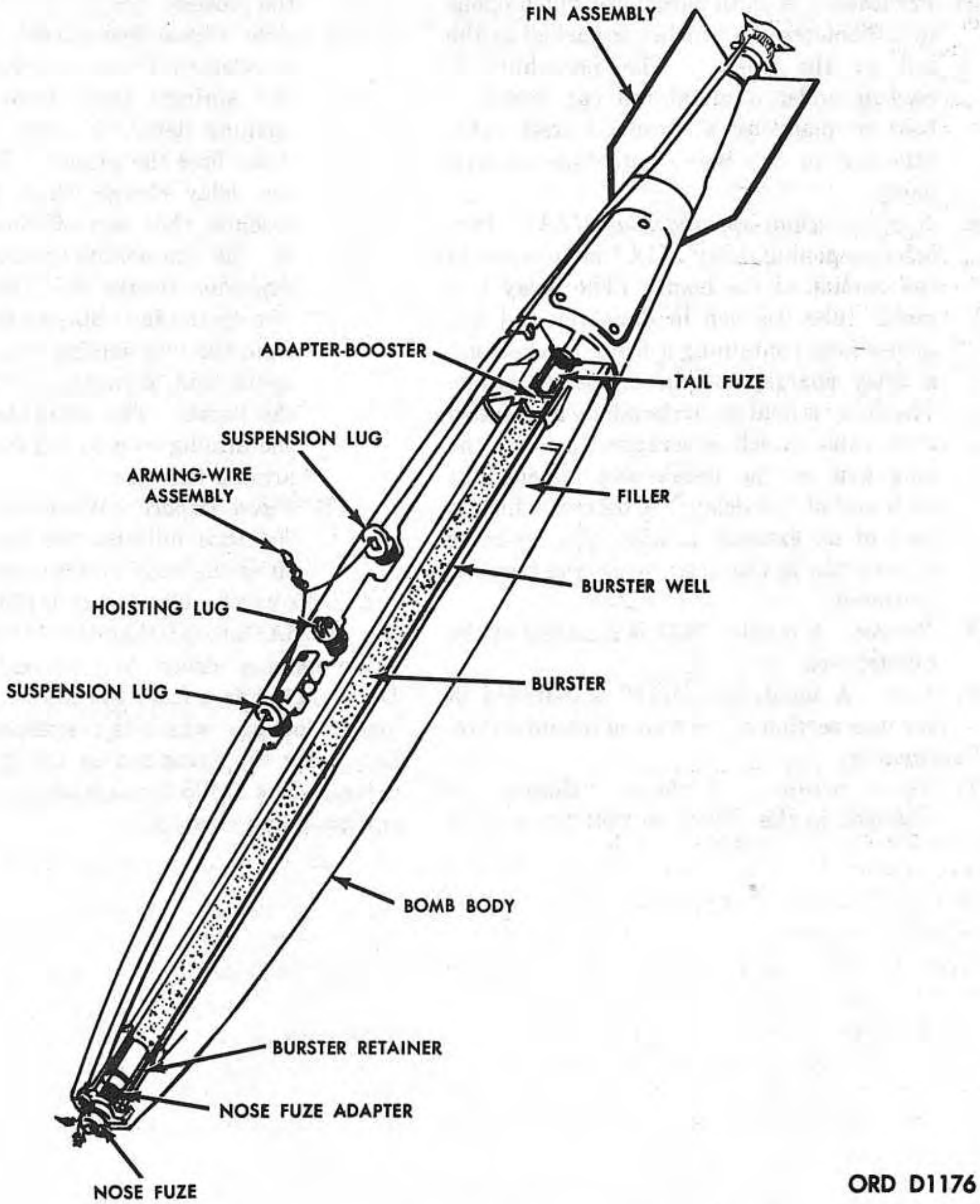


Figure 2-43. Bomb, gas: nonpersistent, GB, 500-pound MK94 Mod 0.

Table 2-38. Bomb, Gas: Nonpersistent, GB, 500-Pound, MK94 Mod 0

Model	MK94 Mod 0
Length of Assembled Bomb with fuze (in.)	88.8
Body Diameter (in.)	10.8
Fin Span (in.)	15.0
Weight of Empty Bomb Body (lb).	278.0
Filler	GB
Filler Weight (lb)	108.0
Weight of Assembled Bomb (lb)	441.0
Arming-Wire Assembly:	
Nose or Tail Fuze	MK 1 or AN-M6A2
Nose and Tail Fuzing	M13
Burster:	
Explosive	HBX-1
Weight (lb)	16.1
Adapter-Booster	M115A1
Nose Fuze*	M904E1 M904E2 AN-M139A1 AN-M140A1 AN-M103A1 AN-M168 (VT) AN-M166E1 (VT) M188 (VT) M163 M164 M165
Tail Fuze*	AN-M195*

*For all fuzes other than VT, use non-delay only.

a. Description. Gas bomb MK94 Mod 0 (fig. 2-43 and table 2-38) is essentially a MK82 Mod 1 general-purpose, low-drag bomb which has been modified for GB filling. The modification consists largely in the elimination of the electric cable conduits from the low-drag bomb, and the addition of a burster and filler hole.

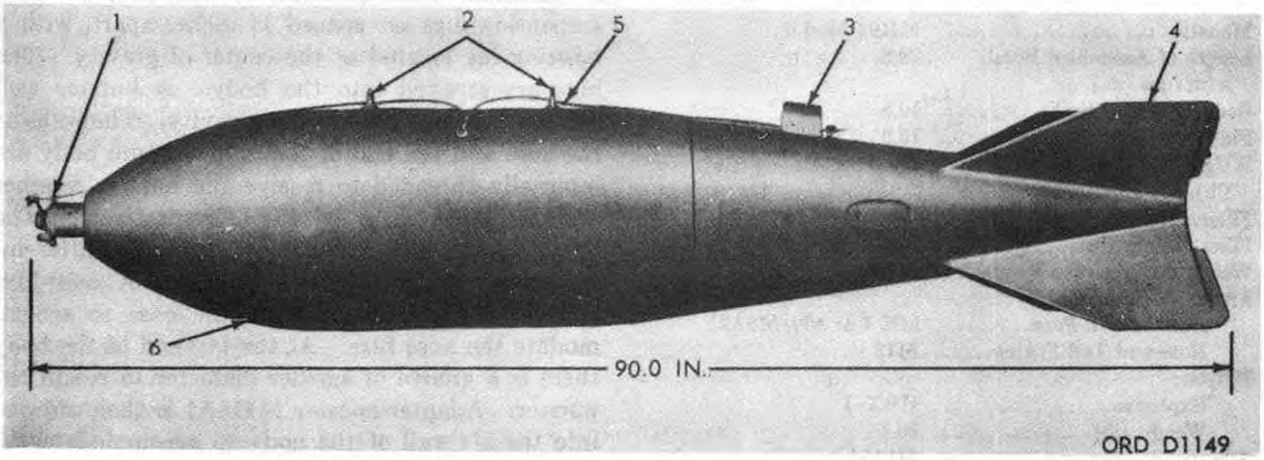
b. Components. The major components of the bomb (fig. 2-43) are the body section, fin assembly, arming wire assembly, nose fuze, long-stem tail fuze, burster tube with charge, and suspension and hoisting lugs. The body is of steel construction with a minimum wall thickness of 0.4 inches. Two suspension lugs are spaced 14 inches apart, with a hoisting lug located at the center of gravity. The lugs are screwed into the body. A burster well extends the length of the body cavity. The walls at the nose and tail end of the welded bomb body are internally threaded to receive the burster retainer and adapter-booster M115A1, respectively. The burster retainer is screwed into the nose after installation of the explosive burster. A nose-fuze adapter is then screwed into the nose to accommodate the nose fuze. At the tail end of the body there is a groove of smaller diameter to retain the burster. Adapter-booster M115A1 is then screwed into the aft wall of the body to accommodate the tail fuze.

c. Filler. When the bomb is filled with the chemical agent a void is left for expansion. Helium is injected into this void and is used to check the seal integrity. The filler hole is closed by installation of a steel ball as a primary seal, and a steel plate, resistance-welded to the body, as the secondary seal.

***Warning:* When handling nonpersistent gas bomb MK94 Mod 0, personnel should wear impermeable protective clothing, consisting of butyl rubber suit, hood, gloves, boots and foot covers, impregnated underwaer, socks and gloves, and protective masks to guard against leaking GB.**

d. Functioning. When the bomb is released from the aircraft, the arming wires are withdrawn, permitting both fuzes to arm. Both the nose fuze and the tail fuze detonate upon impact. The nose fuze sets off the adapter-booster and the burster which explodes the bomb and disperses the chemical agent. The tail fuze acts to assure the detonation of the adapter-booster.

2-37. Bomb, Gas: Nonpersistent, GB, 750-Pound, MC-1



1 Nose fuze
2 Suspension lugs
3 Tail-fuze drive assembly
4 Fin assembly
5 Arming-wire assembly
6 Bomb body

Figure 2-44. Bomb, gas: nonpersistent, GB, 750-pound, MC-1.

Table 2-39. Bomb, Gas: Nonpersistent, GB, 750-Pound, MC-1

Model	MC-1
Length of Assembled Bomb (in.)	90.0
Diameter of Body (in.)	16.0
Fin Assembly	M131
Fin Span	22.4
Weight of Explosive (lb)	15.0
Filler Weight (lb)	220.0
Filler	GB
Weight of Assembled Bomb (lb)	725.0
Burster	M32
Nose Fuze*	M904E1
	M904E2
	AN-M103A1
	AN-M139A1
	AN-M140A1
	M163
	M164
	M165
Tail Fuze*	M190
	M905
Arming-Wire Assembly	M52 (or made from bulk stock, depending on aircraft)
Adapter-Booster:	
Nose Fuze	M126A1 (T45E1)
Tail Fuze	T46E4

*For all fuzes use nondelay only.

a. Description. This bomb (fig. 2-44 and table 2-39) is designed for internal or external carriage on bomber and fighter-bomber aircraft utilizing single or double lug suspension for release at altitudes up to 60,000 feet, and air speeds up to 600 knots. It may be released at low altitudes by fighter-bomber aircraft using low-altitude bombing systems. Gas bomb MC-1 (fig. 2-45) is essentially a new-series, general-purpose bomb M117 modified to accommodate a liquid chemical filler and a burster. The complete round consists of the following:

(1) *Bomb body* (fig. 2-45). The bomb body is round in cross section. It has an ogival nose and truncated conical tail. A burster tube (15) is welded to the bomb body at the nose end and into a hole in a baseplate (10) which is welded to the tail end of the bomb body. The burster tube is internally threaded at each end and is fitted with fuze wells (11 and 16). The nose end of the burster tube is closed by a nose plug (1) which is fitted with a gasket (2), a retainer ring (8), a plug bushing (6), and a closing plug (7). These are used to close the tail end of the burster tube when the bomb is shipped. Three threaded suspension lug inserts (4) are welded into the bomb body. The suspension lug inserts are closed by shipping plugs during shipment. The rim of the baseplate is grooved to retain eight socket-head screws which hold the fin assembly to the bomb body. Two alignment pins (5) spaced 180° apart on the rim of the baseplate, fit into holes in the fin assembly. Four

threaded holes (9) in the baseplate are used for bolting a shipping guard over the tail of the bomb body during shipment.

(2) *Filler.* Gas bomb MC-1 is filled with 24 gallons (220-lb) of GB gas (3).

(3) *Fin assembly.* Fin assembly M131 is used with gas bomb MC-1. The fin is shipped separately and is installed on the bomb body in the field.

(4) *Burster.* The burster (13) is a tubular fiberboard container filled with 14½ pounds of composition B (14) and closed by metal end caps (12). It is installed in the burster tube when the complete round is assembled.

(5) *Adapter-boosters.* Adapters-booster M126-A1 (T45E1) is used with the nose fuze and adapter-booster T46E4 is used with the tail fuze.

(6) *Fuzes.* Gas bomb MC-1 uses nose fuze M904 Series and tail fuze M905. The tail fuze is armed by drive assembly M44 which fits into the modified access hole cover in the fin assembly.

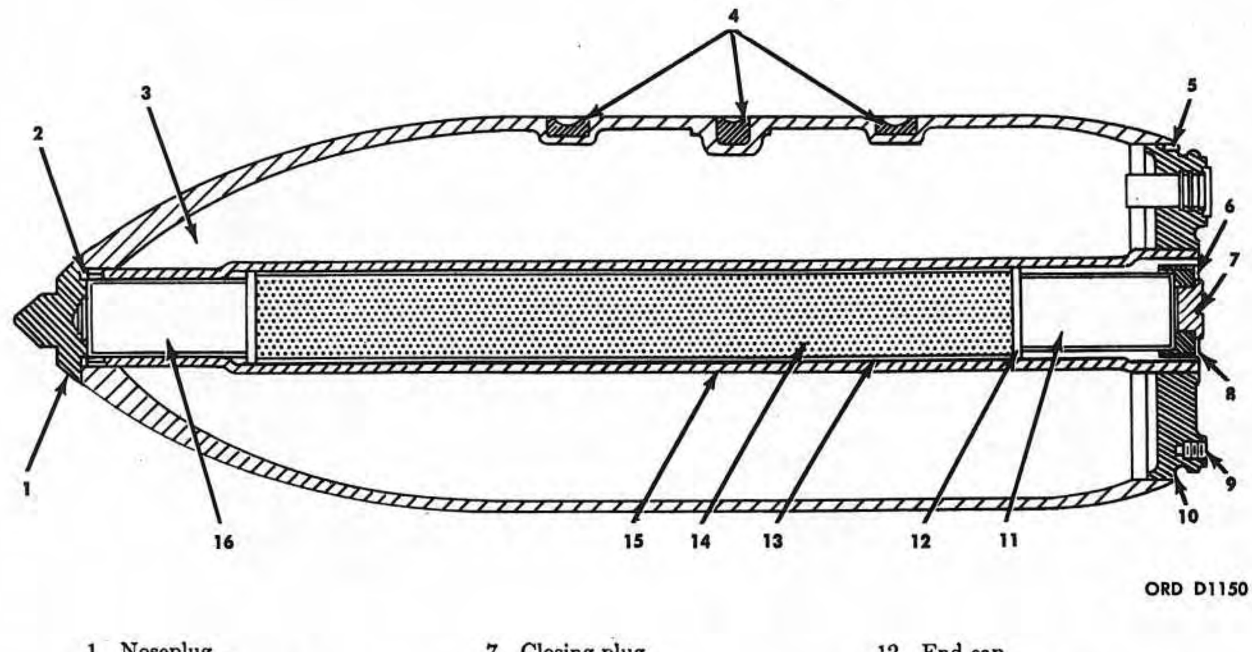
(7) *Coupling assembly.* Flexible coupling assembly M40 is used to couple the drive assembly M44 to the tail fuze M905.

(8) *Suspension lugs.* Suspension lugs shipped with the fin assembly M131 are used with gas bomb MC-1. The base of each suspension lug is threaded to fit the suspension lug inserts in the bomb body. Setscrews are furnished with some suspension lugs.

(9) *Arming-wire assembly.* Arming-wire assembly M52 is used with gas bomb MC-1. Arming-wire assembly M52 is a type E two-branch arming wire with a swivel-type loop. One branch of the arming wire is 37 inches long; the other is 40 inches long.

b. Functioning. The fuzes arm when the bomb is released from the aircraft. When the bomb impacts, the fuzes function and detonate the adapter-boosters which in turn detonate the burster. The burster ruptures the bomb body and disseminates the filler.

c. Downwind Vapor Dosages. The downwind vapor dosages (table 2-40) which can be expected when GB is released from a nonpersistent gas bomb are listed in table 2-40.



1	Noseplug	7	Closing plug	12	End cap
2	Gasket	8	Retainer ring	13	Burster
3	Filler (GB)	9	Threaded hole	14	Composition B explosive
4	Suspension lug inserts	10	Baseplate	15	Burster tube
5	Alignment pin	11	Fuze well	16	Fuze well
6	Plug bushing				

Figure 2-45. Bomb, gas: nonpersistent, GB, 750-pound, MC-1, cutaway view

Table 2-40. Downwind Vapor Dosages

Type of exposure	Wind (MPH)	Dosage (MG MIN/M^3)	Source pounds	Strength gallons	Temperature gradient (° F.)		Downwind distance from point of source (miles)
					Lapse	Inversion	
Threshold	5	2	10	1.2	−1		0.57
Mild Incapacitation	5	15	10	1.2	−1		0.2
Threshold	5	3	10	1.2		+1	3.1
Mild Incapacitance	5	15	10	1.2		+1	0.8
Mild Incapacitance	5	15	100	12.0		+2	8.0
Lethal	5	100	100	12.0		+2	1.7

Section VIII. MISCELLANEOUS BOMBS

2-38. General

Rescinded

2-39. Adapter, Cluster: Missile, Mk44

Rescinded

Figures 2-46 and 2-47 are rescinded.
Table 2-41 is rescinded.

2-40. Aircraft Depth Bombs (ADB)

The aircraft depth bomb, similar to a lightcase bomb, is designed for use against underwater targets, submarines in particular. The bomb case contains a bursting charge of HBX, HBX-1, or TNT which represents approximately 70 percent of the total weight. The cylindrical case has a flat nose which reduces ricochet upon impact. The bomb functions at a predetermined depth, dependent upon the setting of the hydrostatic fuze assembled to the bomb. Generally, depth bombs are fuzed with hydrostatic tail fuzes only, but provisions are also made for nose fuzing in the event that surface detonation may be desired for certain tactical conditions.

2-41. Bomb, Depth: 300-Pound, AN-MK54 Mod 1

This tail-fuzed depth bomb (fig. 2-48 and 2-49, and table 2-42) has a flat nose and thin walls and is generally used against underwater targets. The flat nose reduces ricochet upon water impact. The depth of detonation is determined by the setting of the hydrostatic tail fuze. It may also be nose fuzed for use against surfaced and land targets. 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. These holes are closed with special plugs. Approximately 70 percent of the weight of the bomb is high-explosive filler. 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.

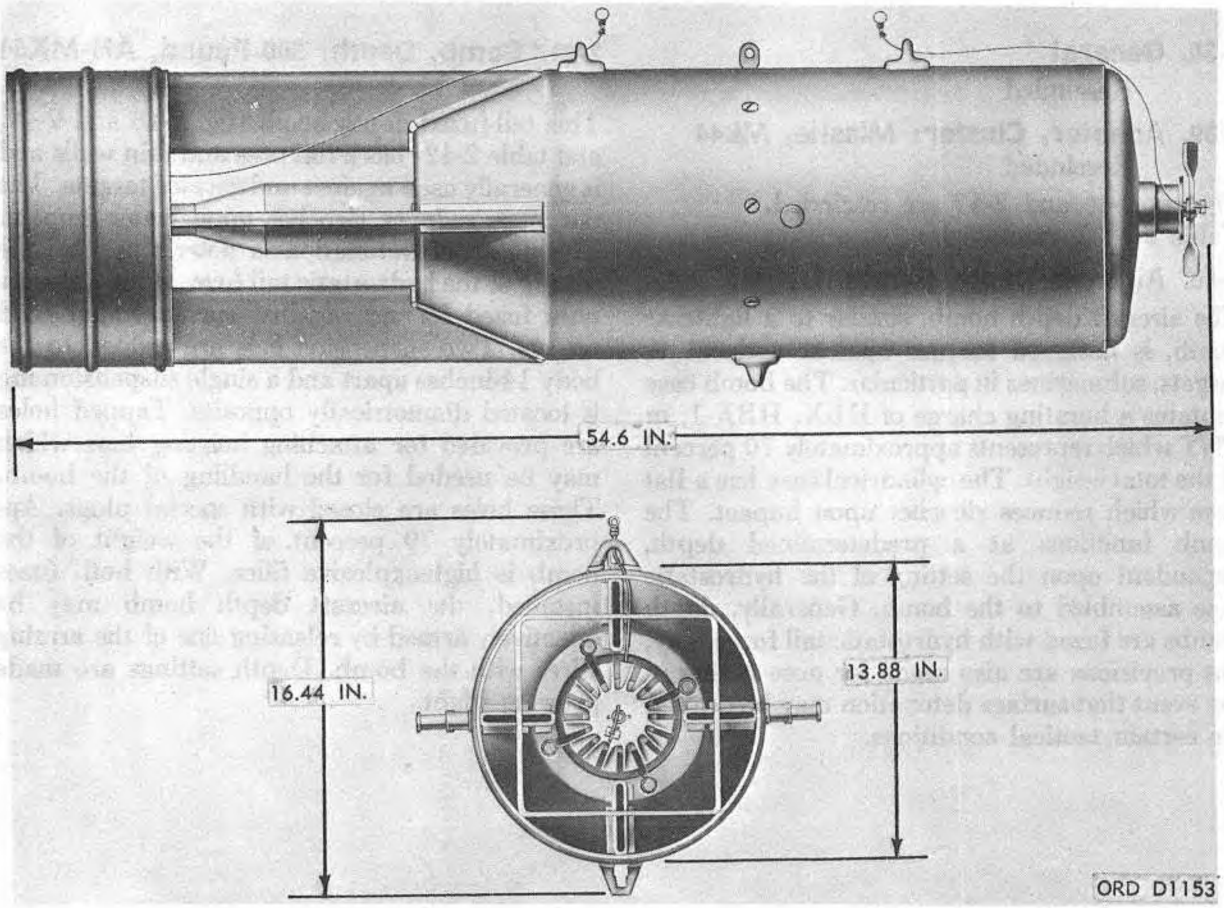


Figure 2-48. Bomb, depth: 300-pound, AN-MK 54 Mod 1.

Table 2-42. Bomb, Depth: 300-Pound, AN-MK 54 Mod 1

Model	AN-Mk54 Mod 1
Length of Assembled Bomb (in.)	54.6
Diameter of Body (in.)	13.5
Fin Span (in.)	13.88
Filler Weight (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	Mk1 or AN-M6A2
Arming Bracket	Mk1 Mod 0
Auxiliary Booster	Mk1 Mod 0 (2 required)
Nose Fuze	M904E1
	M904E2
	M904E3
	AN-M103A1
	AN-M139A1
	AN-M140A1
	M163
	M164
	M165
Tail Fuze	AN-Mk230 Mods 4, 5, 6

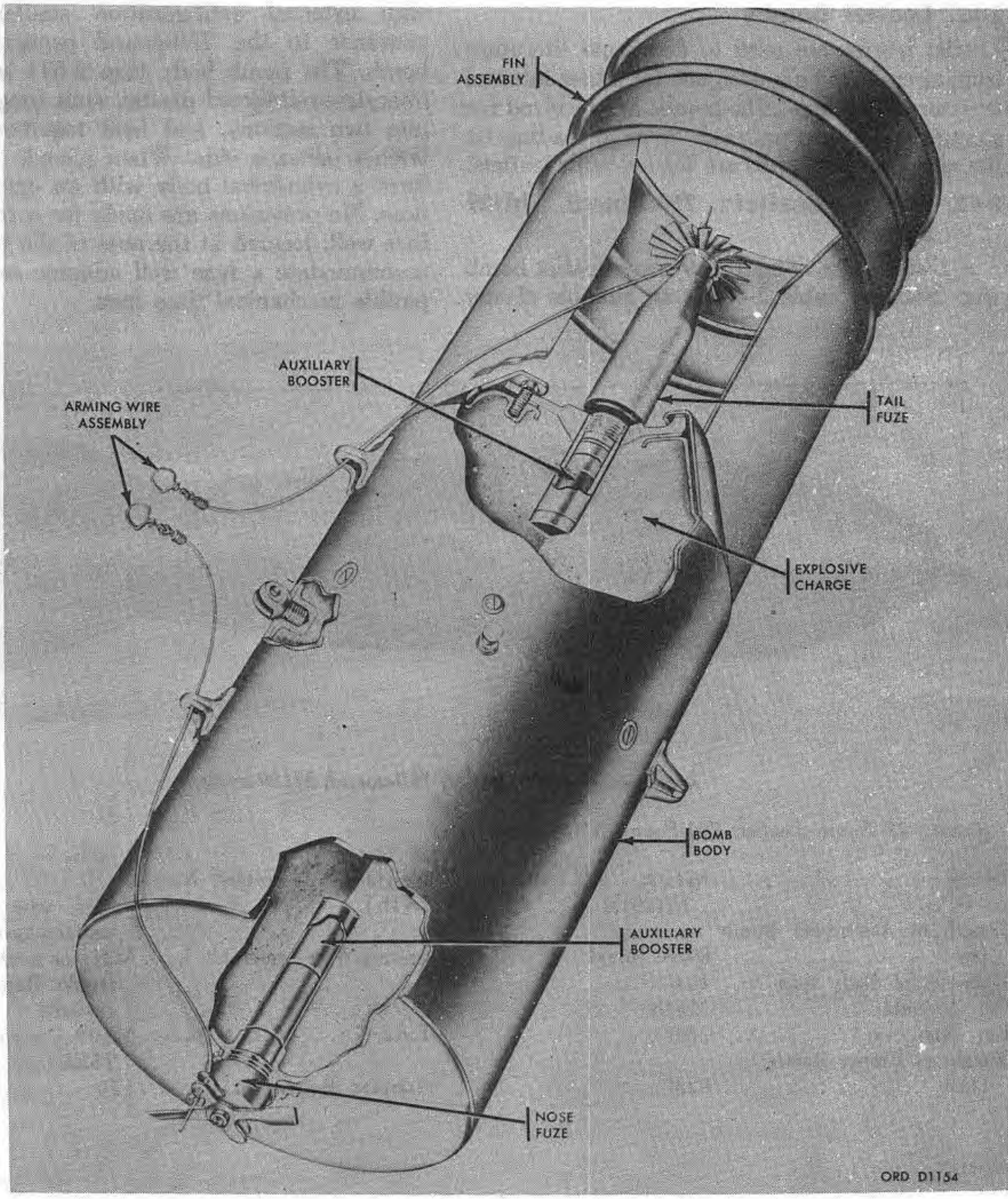


Figure 2-49. Bomb, depth: 300-pouhd AN-MK 54 Mod 1, cutaway view.

2-42. Leaflet Bombs

Leaflet bombs are used to distribute literature from aircraft and are designed for either internal or external carriage. The bombs are received for storage empty and unfuzed. Prior to loading on the aircraft, the bombs are loaded with leaflets.

2-43. Bomb, Leaflet: 750-Pound, M129 Series

a. Description. The M129 series leaflet bomb (fig. 2-50 and table 2-43) is an aimable cluster with external configuration similar in appearance to the 750-pound general purpose bomb. The bomb body (fig. 2-51) is made of fiberglass-reinforced plastic, split longitudinally into two sections, and held together by four latches on each side. When joined, the halves form a cylindrical body with an ogival-shaped nose. No provisions are made for a tail fuze. A fuze well, located in the nose of the bomb, will accommodate a fuze well adapter and a compatible mechanical time fuze.

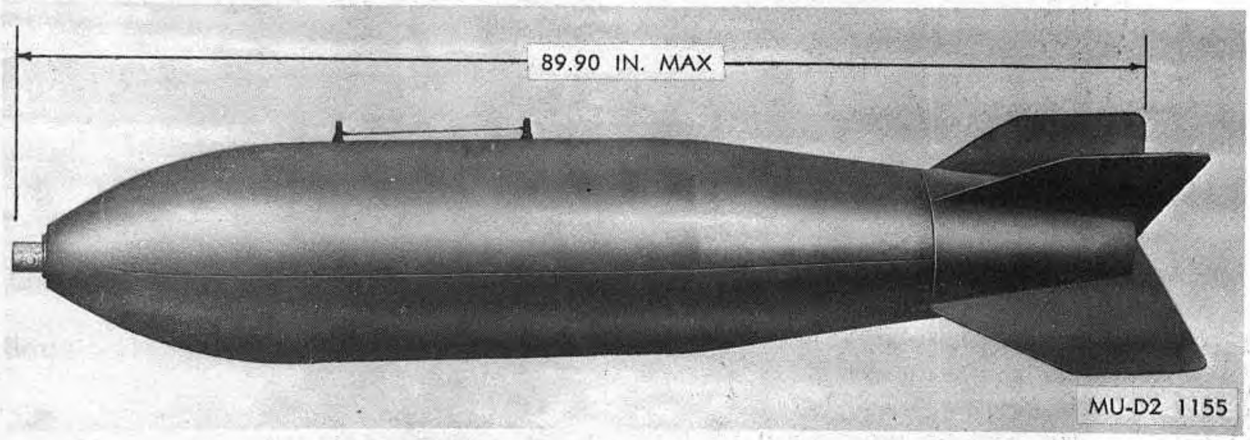


Figure 2-50. Bomb, leaflet: 750-pound, M129 series.

Table 2-43. Bomb, Leaflet: 750-Pound, M129 series

Model	M129, M129E1 or M129E2
Length of Assembled Bomb (in.)	89.90 (max)
Diameter of Body (in.)	16.0
Fin Assembly	M148
Fin Span (in.)	22.8
Weight of Empty Bomb (lb)	92.0
Weight of Assembled Bomb (lb)	Varies with weight of leaflet paper
Arming-Wire Assembly	M31 (or made from bulk stock depending on aircraft)
Fuze	M909 w/nose vane T5E2
Adapter Booster	T59

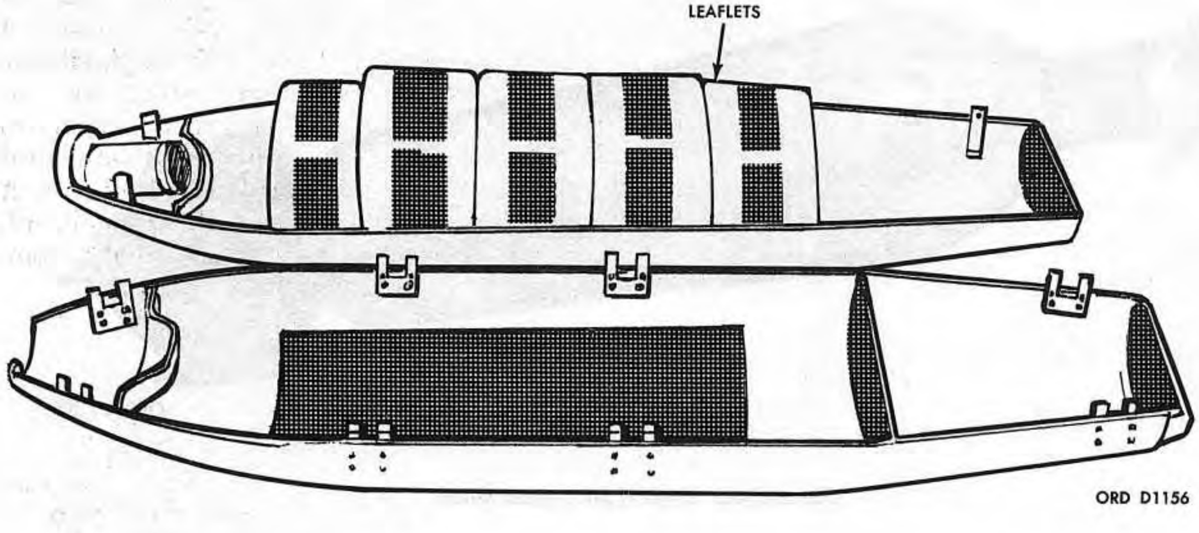


Figure 2-51. Bomb, leaflet: 750-pound, M129E1, w/ lid removed.

b. Differences. The M129, M129E1 and M129E2 leaflet bombs are identical except that the M129E1 and M129E2 have a larger reinforcing plate mounted inside the top half of the body to provide better reinforcement against ejection forces and to withstand pylon sway-brace pressure. In addition, the M129E2 is provided with only two suspension lug wells.

c. Functioning. When the bomb is released, the arming wire is withdrawn from the mechanical time fuze allowing a spring-loaded arming pin to be ejected and, in turn, permits the timing mechanism to function. Arming wire removal also allows the arming vane to rotate, causing the detonator to be positioned in the firing train. When the preset delay time has elapsed, the fuze functions, thereby detonating the T59 adapter booster. Detonation of the T59 adapter booster initiates the detonating cord. Detonation of the detonating cord separates the two bomb body sections and the leaflets are dispersed.

2-44. Photoflash Bombs

Rescinded

2-45. Bomb, Photoflash: 100-Pound, M122

Rescinded

Table 2-44 is rescinded.

2-46. Bombs, Photoflash: 150-Pound, M120 and M120A1

a. Description. The 150-pound photoflash bombs, M120 and M120A1, (fig. 2-52 and 2-53 and table 2-45) are cylindrical in shape with a short ogival nose and a box-type tail fin. The bomb is filled with photoflash powder, contains a booster charge for bursting the bomb, and uses a mechanical-time nose fuze. The M120 and M120A1 photoflash bombs are identical in external configuration. They differ in weight of filler: the M120, 69 pounds; the M120A1, 82 pounds. The M120 photoflash bomb develops a peak intensity of 3.4 billion candlepower with an average light output of 72 million candlepower-seconds. The M120A1 photoflash bomb develops a peak intensity of 4.1 billion candle power with an average light output of 92 million candlepower-seconds. A trail place and a trail angle kit are used when a trajectory angle other than that produced by the normal fin configuration is desired. Use of the kit is dependent on the desired altitude of release, speed of delivery aircraft, trail angle, and desired height of burst (fig. 2-54).

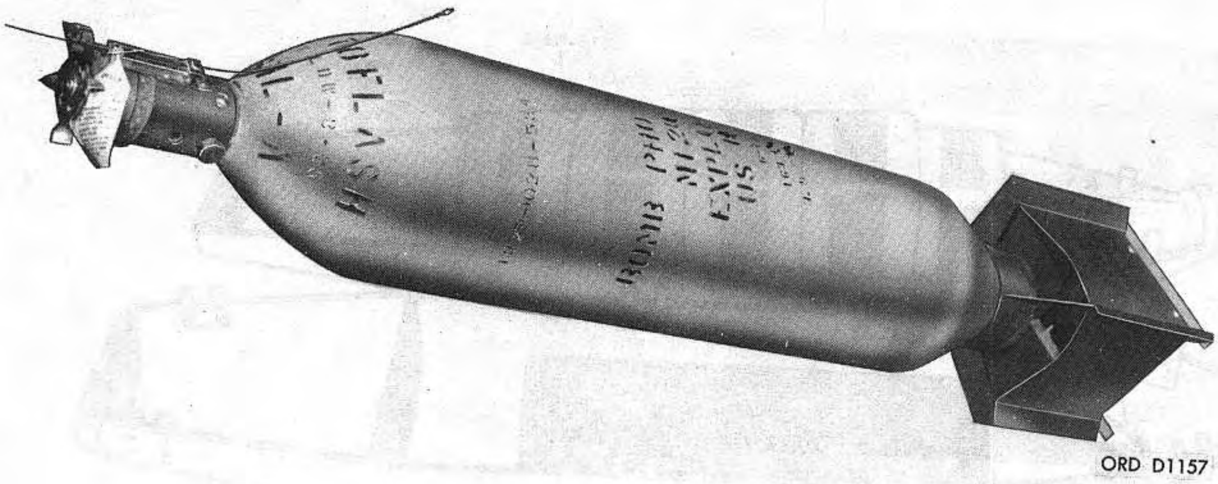


Figure 2-52. Typical photoflash bomb.

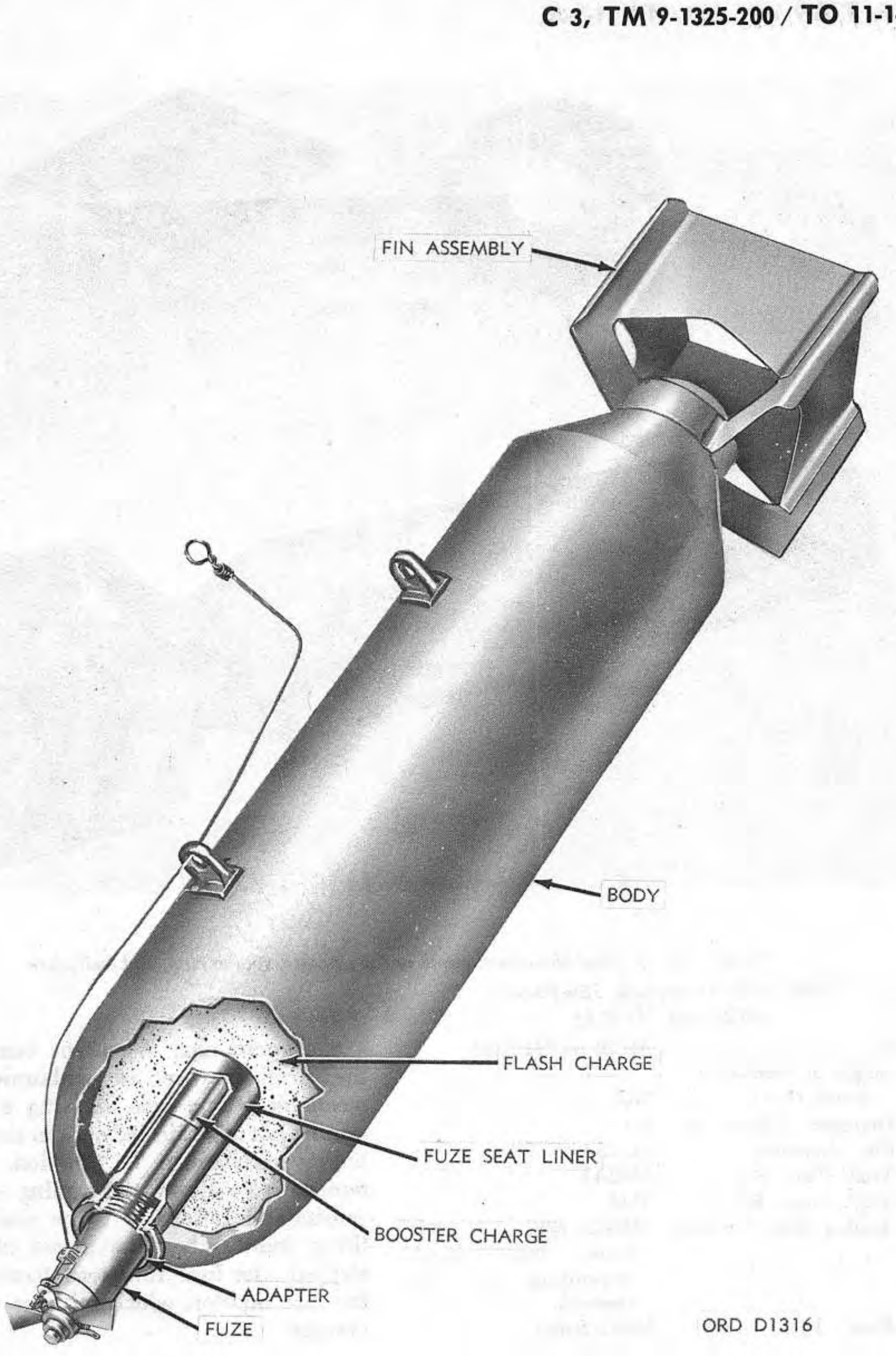


Figure 2-53. Typical photoflash bomb, cutaway view.

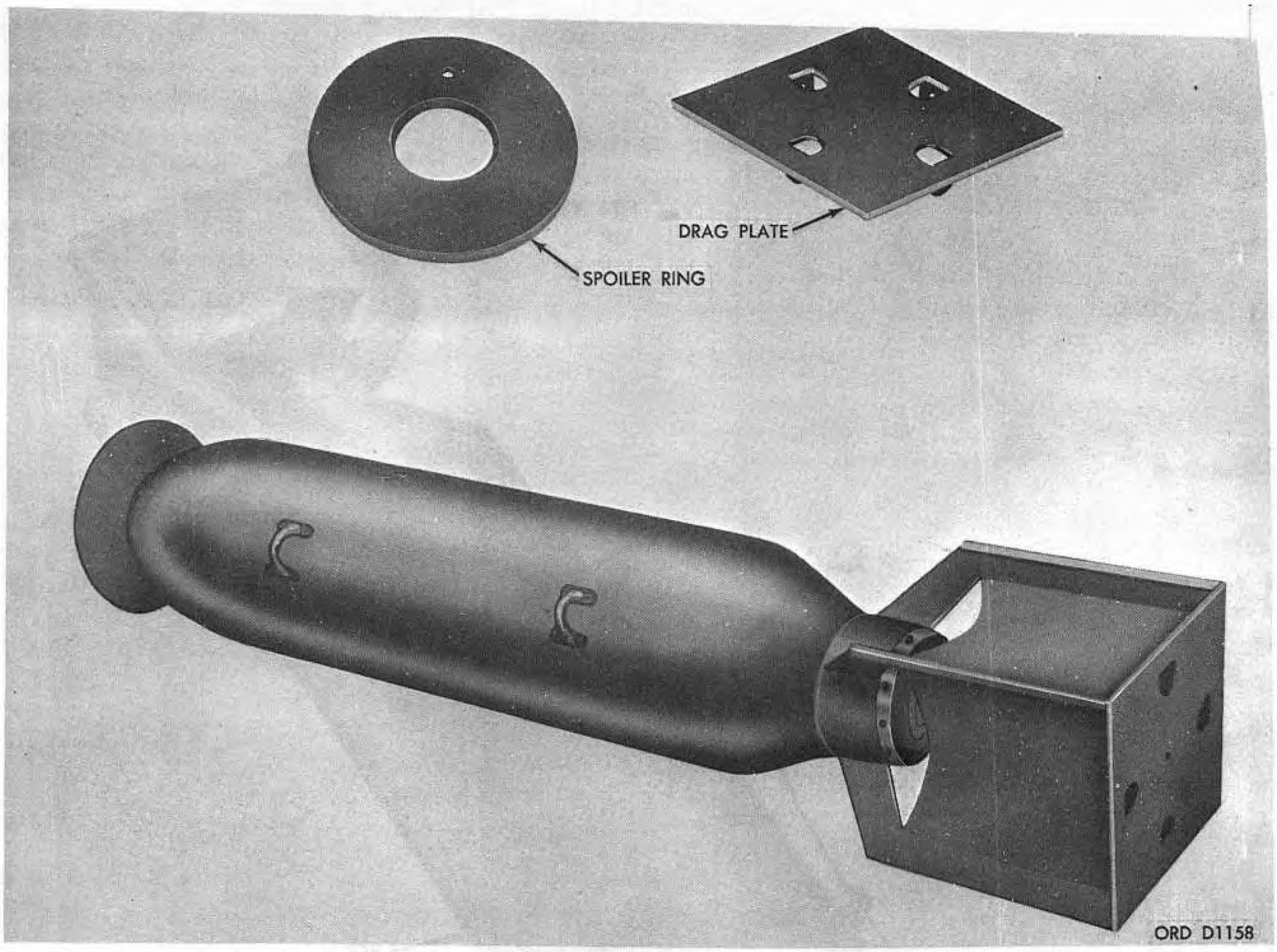


Figure 2-54. Typical photoflash bomb w / drag plate, spoiler ring, and trail plate.

Table 2-45. Photoflash, 150-Pound M120 and M120A1

Model	M120 or M120A1
Length of Assembled Bomb (in.)	50.0
Diameter of Bomb (in)	8.0
Fin Assembly	M125A1
Trail Plate Kit	M42A1
Trail Angle Kit	M43
Arming Wire Assembly	M6A2, Mk1 (or made from bulk stock depending on the aircraft)
Fuze	M907 Series

b. Functioning. When the bomb is released, the arming wire is withdrawn from the mechanical time fuze allowing a spring-loaded arming pin to be ejected and, in turn, permits the timing mechanism to function. Arming wire removal also allows the arming vane to rotate, causing the detonator to be positioned in the firing train. When the preset delay time has elapsed, the fuze functions thereby detonating the fuze booster, which initiates the photoflash powder.

Section IX. PRACTICE BOMBS

2-47. Practice Bombs

Practice bombs are used for target practice and the training of bombing crews, and are designed to simulate service bombs. Practice bombs have various methods of spotting their points of impact. One type provides a colored target on snow covered ranges. Others function so that the firing pin detonates a blank .38 caliber cartridge on impact, causing the signal to fire. The explosion of the signal produces a flash and a large puff of smoke, permitting observation of bombing accuracy. Under freezing conditions, practice bombs that are filled with water or with a mixture of water and sand, have antifreeze added to prevent bursting of the bomb case caused by freezing of the filler.

2-48. Bomb, Practice: Miniature, 3-Pound, MK5 Mods 2 and 3

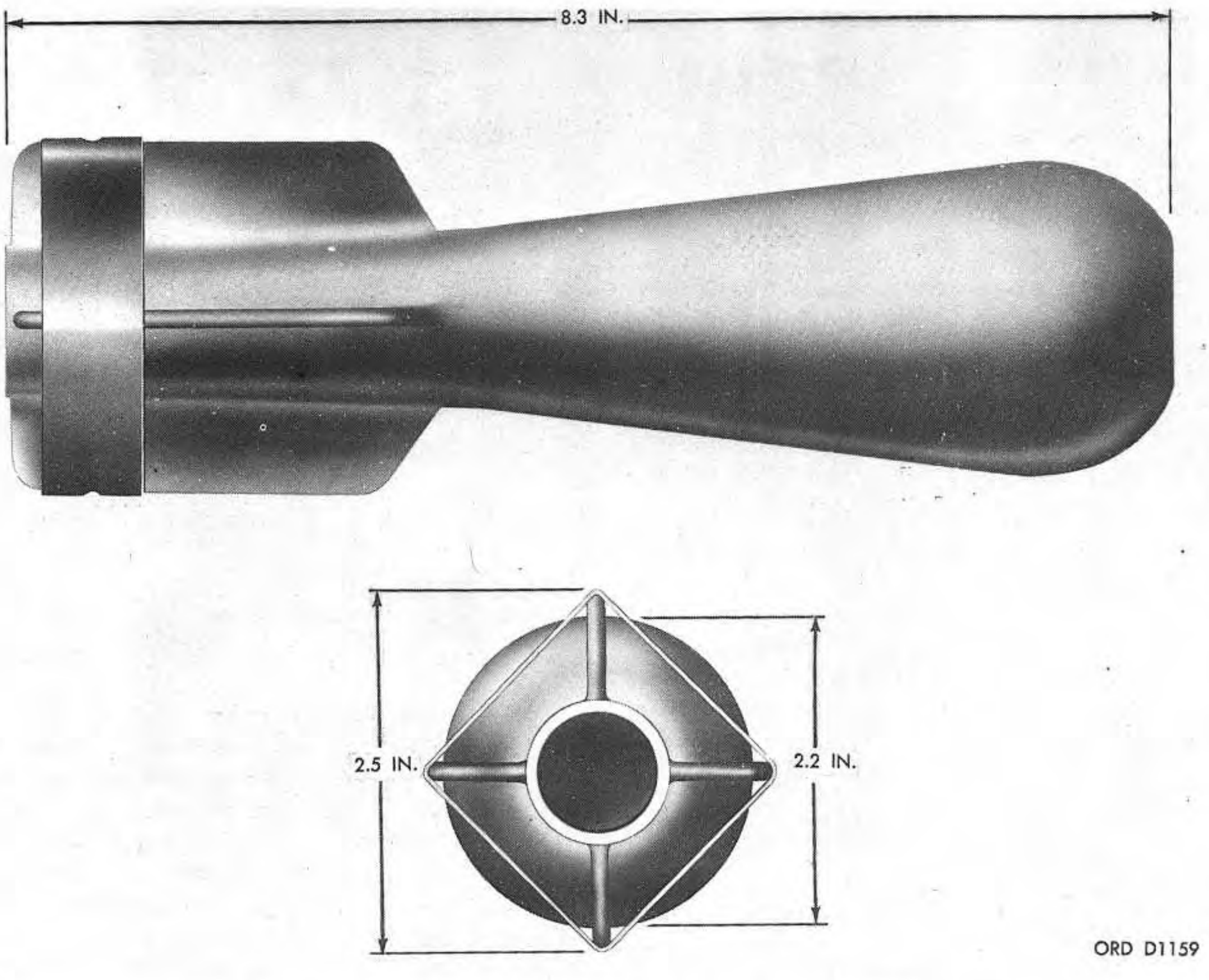


Figure 2-55. Bomb, practice: miniature, 3-pound, AN-MK 23, Mod 1.

Table 2-46. Bomb, Practice: Miniature, 3-lb, MK5 Mods 2 and 3; Bomb, Practice: Miniature, 3-lb, AN-MK23 Mod 1; Bomb, Practice: Miniature, 3-lb, MK43 Mod 1.

Mark Mod	MK 5 2 and 3	AN-MK 23 1	MK 43 1
Length of Assembled Bomb (in.)	8.3	8.3	8.3
Diameter of Body (in.)	2.2	2.2	2.2
Fin Span (in.)	2.5	2.5	2.5
Weight:			
Without Signal (lb)	2.56	2.87	4.31
With MK4 Signal (lb)	2.68	3.00	4.43
With MK5 Signal (lb)	2.62	2.94	4.37
Firing-Pin Assembly	MK1 Mod 0	MK1 Mod 0	MK1 Mod 0
Signal	MK4 Mods or MK5 Mod 0	MK4 Mods or MK5 Mod 0	MK4 Mods or MK5 Mod 0

a. Description. Miniature practice bombs (MPB) MK5 Mods 2 and 3 (figs. 2-55 and 2-56, and table 2-46), the MPB AN-MK23 Mod 1, and MPB MK43 Mod 1 are similar in physical appearance, but differ basically in the metal used to cast the body. Bomb MK5 is manufactured from zinc alloy and weighs the least of the three bombs. Bomb AN-MK23 is made of cast iron. Bomb MK43 is manufactured from cast lead and is 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.

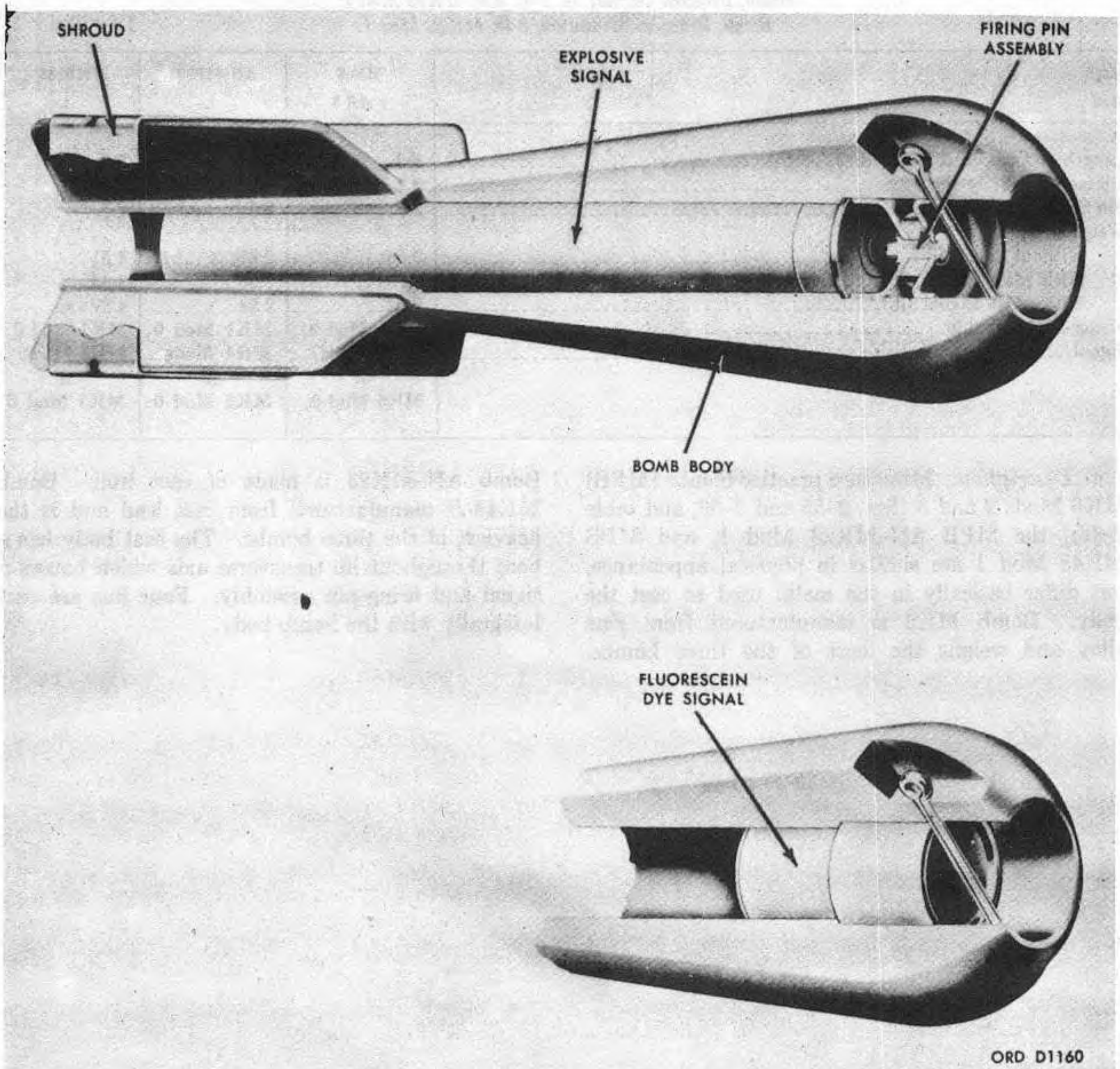


Figure 2-56. Bomb, practice: miniature, 3-pound, AN-MK23 Mod 1, cutaway view.

b. Use. Miniature practice bomb MK5 is used for bombing practice on armored-deck target boats. Bomb AN-MK23 is authorized for all bombing practice except that involving armored-deck target boats. MPB MK43 is used for low altitude, horizontal or dive bombing and on armored-deck target boats. Bombs MK5, AN-MK23, and MK43 are used with the MK4 signal. These bombs also are used with the MK5 signal which contains a fluorescein dye and is actuated by impact on water. When the MK5 signal is installed, the firing pin assembly is not used. Special containers are utilized by aircraft to carry and release these bombs.

c. Functioning. The firing pin assembly fires the signal which expels a large puff of smoke rearward through the base of the bomb.

2-49. Bomb, Practice, 5-Pound, MK106 Mod 0

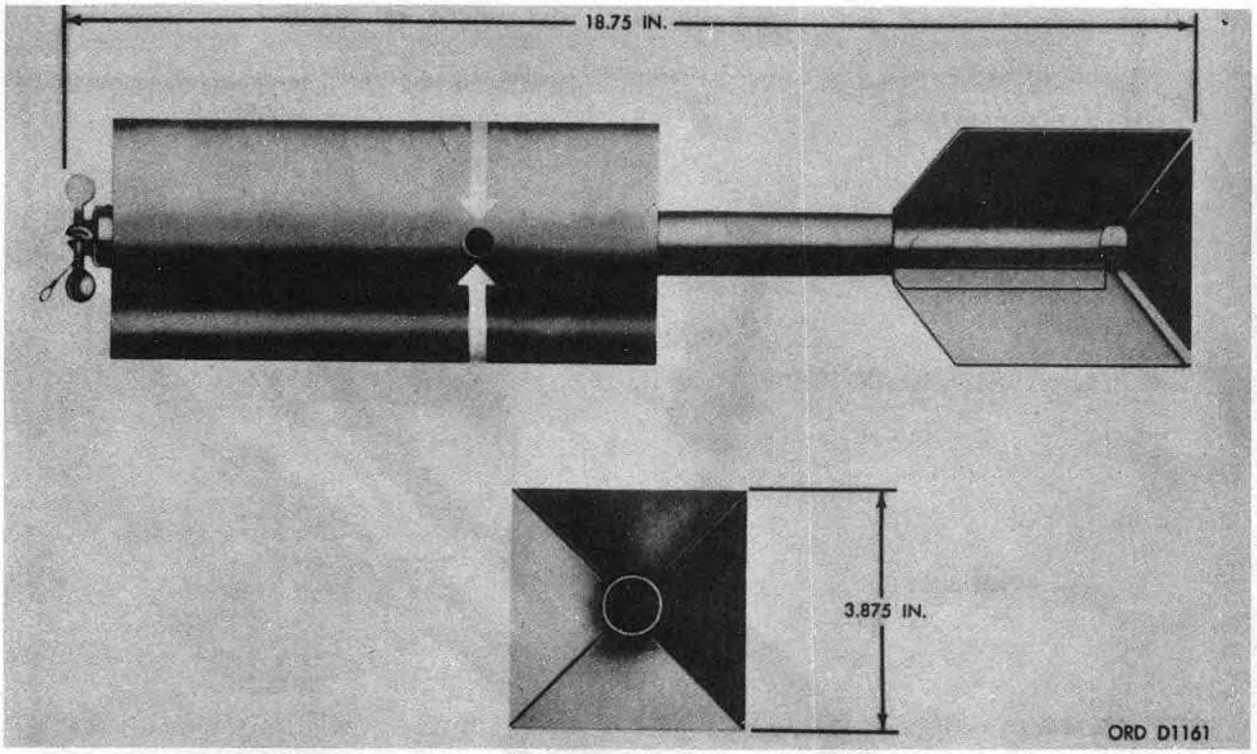


Figure 2-57. Bomb, practice: 5-pound, MK106 Mod 0.

Table 2-47. Bomb, Practice: 5-Pound, MK106 Mod 0

Mark	106
Mod	0
Length of Assembled Bomb (in.).	18.75
Diameter of Body (in.)	3.875
Fin Span (in.)	3.875
Weight of Assembled Bomb (lb)	4.56
Signal	MK4 Mod 3
Fuze	M173 (modified)

a. Description. Practice bomb MK106 Mod 0 (fig. 2-57 and table 2-47) is a thin-cased, cylindrical bomb. It is composed of a bomb body assembly, a practice bomb signal MK4 Mod 3, and a modified fuze assembly M173. The bomb body (fig. 2-58) is composed of an inner cylinder, and 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 fuze assembly M173. 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 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 dispenser aero 8A.

b. Use. This bomb is designed for low altitude drops. Modified fuze assembly M173, consisting of an adapter and the fuze M173 less booster, is installed in the nose of the bomb. The fuze is fully armed by anemometer 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. Practice bomb signal MK4 Mod 3 is seated in the inner cylinder of one bomb body.

c. Functioning. When the bomb impacts with the target, the fuze functions and causes detonation of the signal. Smoke produced from the detonated signal is discharged rearward through an inner cylinder in the bomb body.

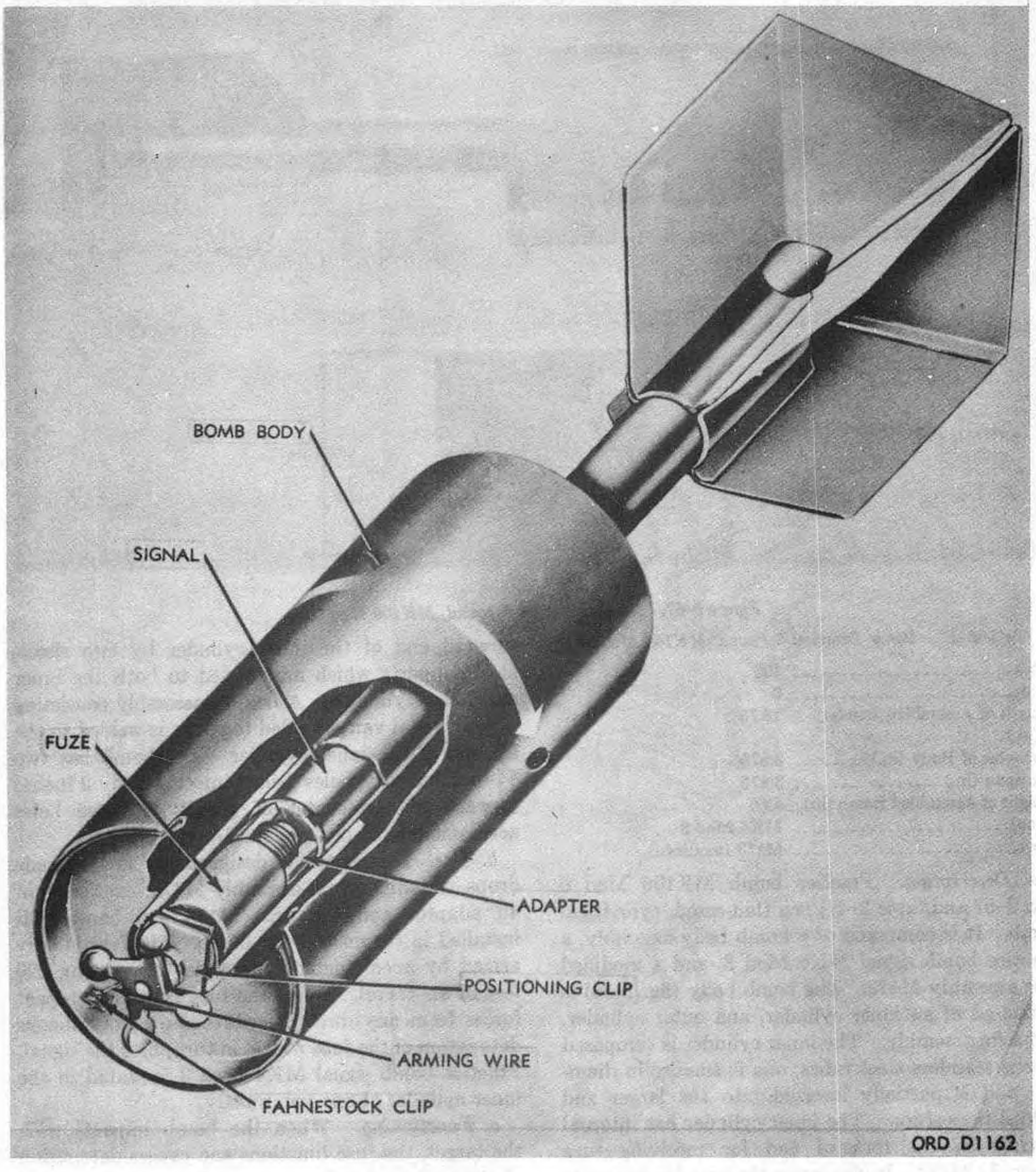


Figure 2-58. Bomb, practice: 5-pound MK106 Mod 0, cutaway view.

2-50. Bomb, Practice: 25-Pound, BDU-33 / B and BDU-33A / B

a. Description. The 25-pound practice bomb, BDU-33 / B or BDU-33A / B (fig. 2-59 and 2-59.1 and table 2-48), has a tear-drop-shaped, cast, metal body with a hollow, round cavity lengthwise through the center of the bomb. The conical afterbody is roll-crimped into two grooves in the aft end of the bomb body. The tail tube with fins is welded to the afterbody of the bomb. Both models have a lug well positioned just forward of the center of gravity of the assembled bomb. The BDU-33 / B is issued with a lug installed in the lug well. If the lug is required for the BDU-33A / B, it is issued separately.

b. Differences. The BDU-33 / B has shrouded fins while the BDU-33A / B has cruciform-type fins. The BDU-33 / B has the firing pin assembly and signal assembled into the nose cavity of the body and secured in place by a safety (cotter) pin. The BDU-33A / B contains an inertia tube in addition to the firing pin assembly and signal. These three components are assembled into the central cavity of the afterbody and tailtube and secured in place by a safety (cotter) pin.

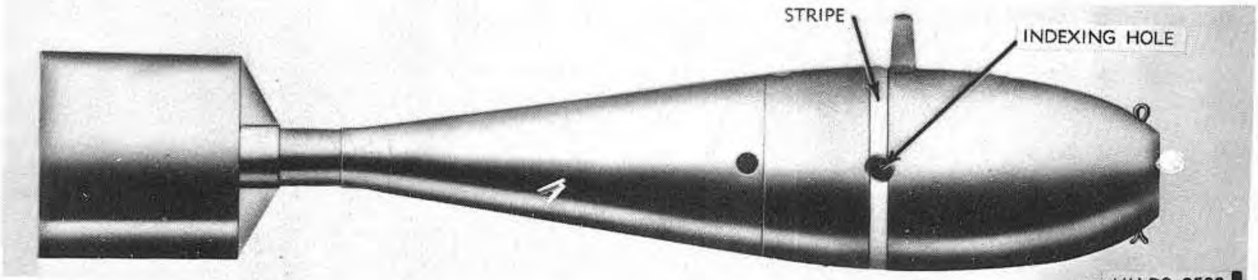


Figure 2-59. Bomb, practibe: 25-pound, BDU-33 / B.

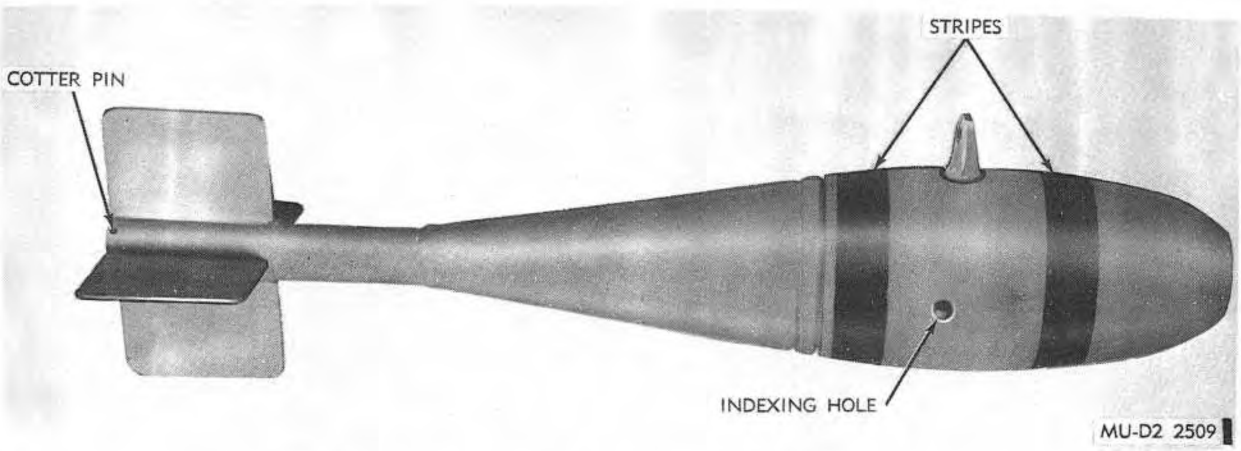


Figure 2-59.1 Bomb, practice: 25-pound, BDU-33A / B.

Table 2-48. Bomb, Practice, 25-Pound, BDU-33 Series

Model—BDU=33 / B or BDU 33A / B	
Length of Bomb (in.)	22.5
Diameter of Bomb (in.)	4.0
Weight of Empty Bomb (lb)	23.5
Weight of Assembled Bomb (lb)	23.7
Signal	Mk4 Mod 3
Firing Pin	Mkl Mod 0

c. Functioning. When the BDU-33 / B bomb impacts the target, the firing pin assembly fires the signal, discharging smoke rearward through the central cavity of the bomb. When the BDU-33A / B bomb impacts the target, the inertia tube forces the signal against the firing pin. The signal fires, discharging smoke rearward through the inertia and tail tubes.

2-51. Bomb, Practice, 56-Pound, MK89 Mods 0 and 1

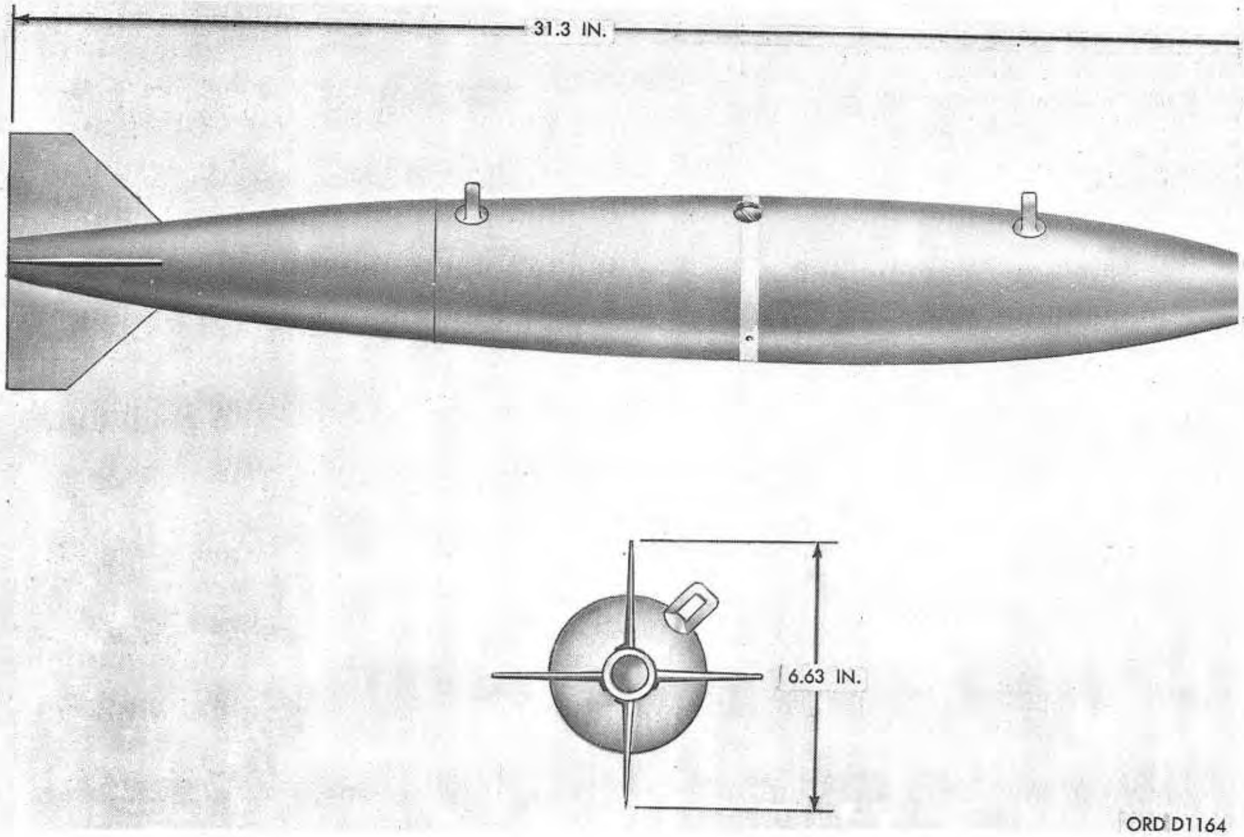
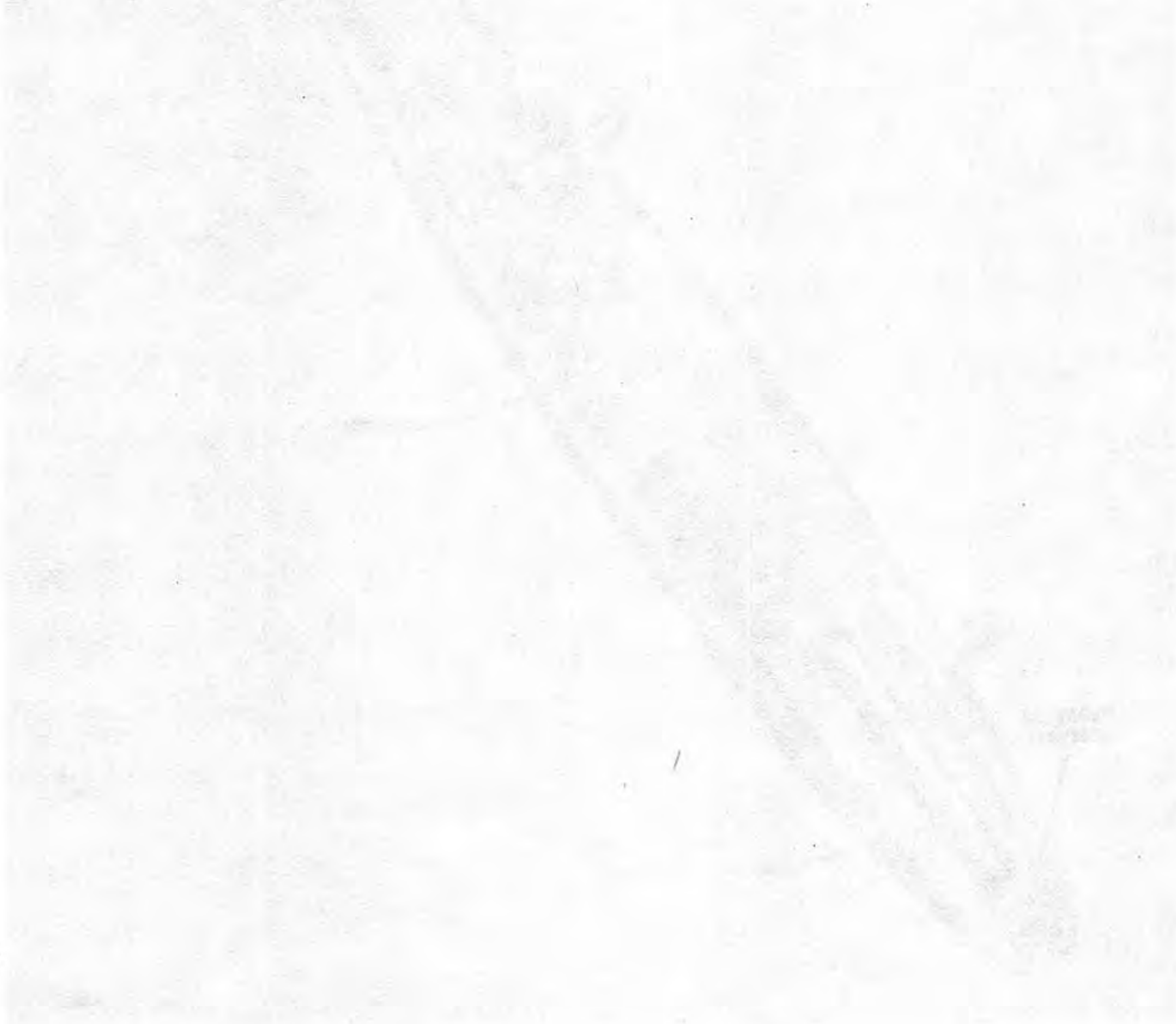


Figure 2-60. Bomb, practice: 56-pound, MK 89 Mods 0 and 1.

Table 2-49. Bomb, Practice: MK 89 Mods 0 and 1

Mark Mod	89 0	89 1
Length of Bomb (in.):		
Assembled with Firing Pin	31.3	31.3
Assembled with Fuze	None	32.9
Diameter of Body (in.)	4.0	4.0
Fin Span (in.)	6.63	6.63
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-M146A1, M907E2	None	57.3, 57.9
Practice Bomb Signal	Mk4 Mod 3	Mk4 Mod 3
Firing-Pin Assembly	Mk1 Mod 0	Mk1 Mod 0
Fuze		AN-M146A1 M907E2

a. Description. Practice bomb MK89 Mod 0 (fig. 2-60 and table 2-49) is a low-drag (subcaliber) practice bomb, similar in shape to the low-drag series of general purpose service bombs. The cast iron body is slender with a long, pointed nose. The conical fin assembly is of welded sheet metal or cast aluminum-magnesium 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 MK4 Mod 3 is installed in the forward end of the bomb (fig. 2-61). The smoke produced by the detonated signal is discharged rearward through the tail fin. Practice bomb MK89 Mod 0 is designed for impact firing. Firing pin MK1 Mod 0 detonates the signal on impact with land or water. Practice bomb MK89 Mod 1 is designed for impact or airburst firing, and the signal used 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 MK1 Mod 0 fits within the bushing and is held there by a safety (cotter) pin. Both Mods of practice bomb MK89 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 are installed in the two outer holes; in other applications, when the bomb is to be used in a dispenser, a suspension lug is installed in all three holes.



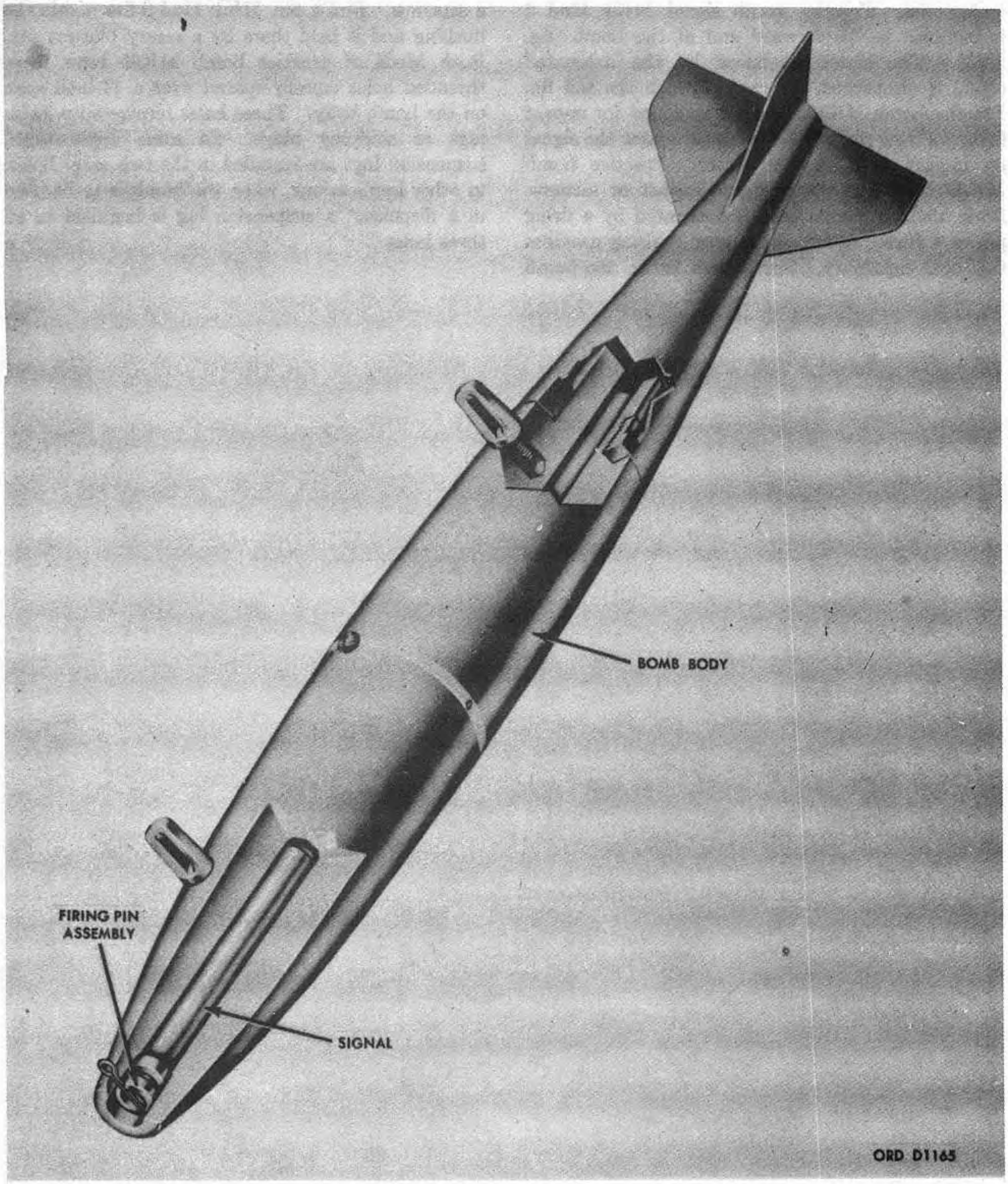


Figure 2-61. Bomb, practice: 56-pound, MK89 Mods 0 and 1, cutaway.

b. Functioning. The firing-pin assembly fires the signal in the Mod 0. The time fuze fires the signal in the Mod 1. Smoke from the signal is discharged rearward through the central tube.

2-52. Bomb, Practice: 100-Pound, MK15 Mods 2, 3 and 4

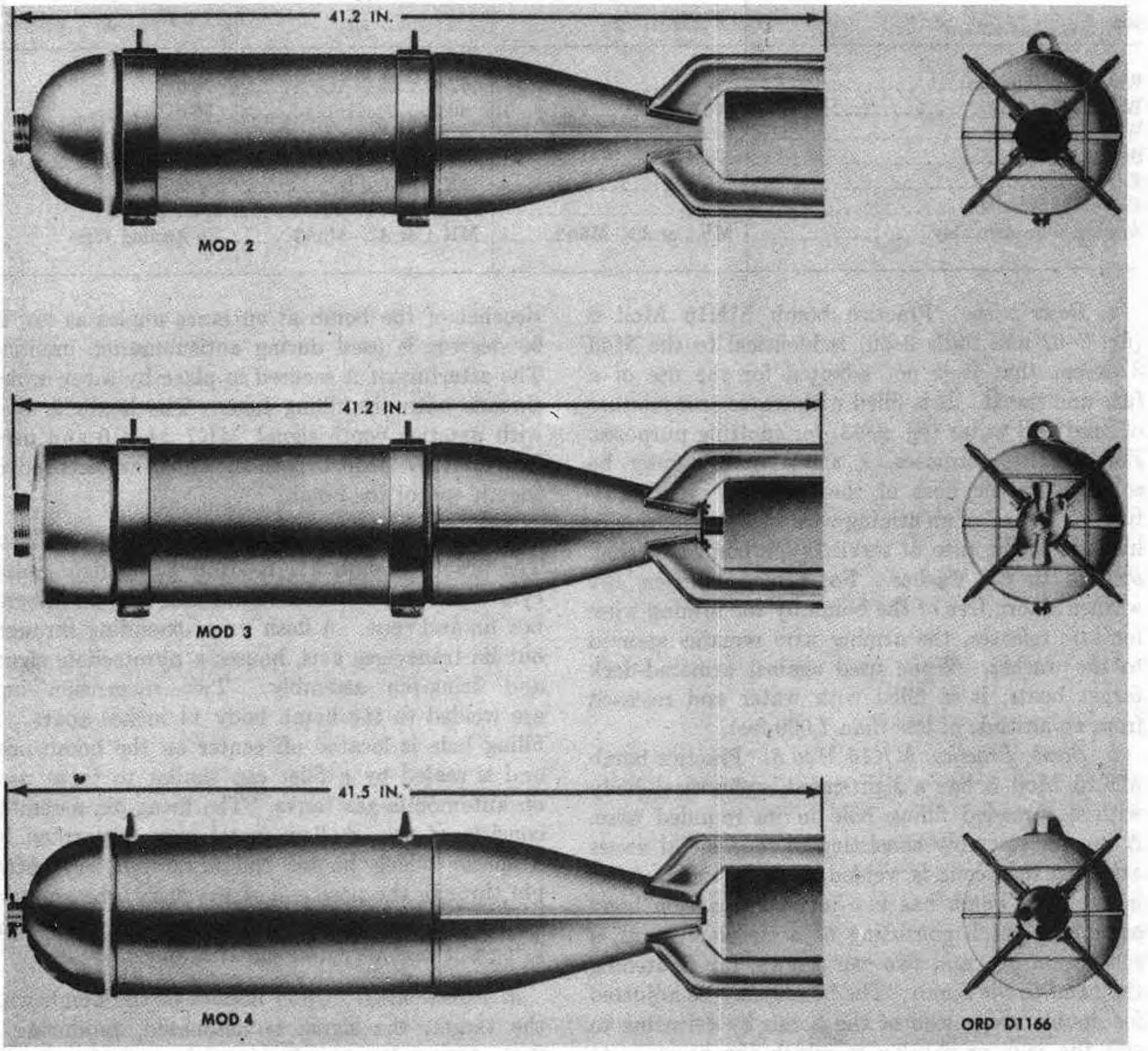


Figure 2-62. Bomb, practice: 100-pound, MK15 Mods 2, 3, and 4.

Table 2-50. Bomb, Practice: 100 Pound, MK15 Mods 2, 3, and 4

Mark Mod	15 2	15 3	15 4
Length of Assembled Bomb (in.)	41.2	41.2	41.5
Diameter of Body (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	100.0	100.0	97.0
Loaded with Water	56.0	67.0	60.0

Table 2-50. Bomb, Practice: 100 Pound MK15 Mods 2, 3, and 4—Continued

Mark	15	15	15
Mod	2	3	4
Wet Sand Filler (lb)	76.0	77.4	76.0
Water Filler (lb)	39.0	40.0	39.0
Water Filler (gal)	4.6	4.7	4.6
Signal	None	MK7 Mod 0	MK4 Mods 0, 1, 2, 3, 4
Fuze	None	MK247 Mod 0	None
Firing-Pin Assembly	None	None	MK1 Mod 0
Arming-Wire Assembly	MK1 or AN-M6A2	MK 1 or AN-M6A2	No Arming Wire

a. Description. Practice bomb MK15 Mod 2 (fig. 2-62 and table 2-50) 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 (fig. 2-63) 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 7,000 feet.

b. Bomb, Practice: MK15 Mod 3. Practice bomb MK15 Mod 3 has a light-cased, cylindrical body with a threaded filling hole in its rounded nose. A box-fin assembly consisting of four metal vanes attached to a cone is welded to the aft end of the body. 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 bands 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. A flat nose attachment that reduces ricochet of the bomb at entrance angles as low as 90 degrees is used during antisubmarine practice. The attachment is secured in place by a cap which threads onto the filling hose. The bomb is used with practice bomb signal MK7 Mod 0 and inert fuze MK247 Mod 0 both of which are secured to the aft end of the bomb.

c. Bomb, Practice, 100-Pound: MK15 Mod. 4. The practice bomb MK15 Mod 4 is a light-cased, cylindrical bomb with a round nose and an integral box 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.

d. Functioning. Upon impact of the bomb with the target, the signal is detonated, producing a flash and a large puff of smoke, which permits observation of the bombing accuracy.

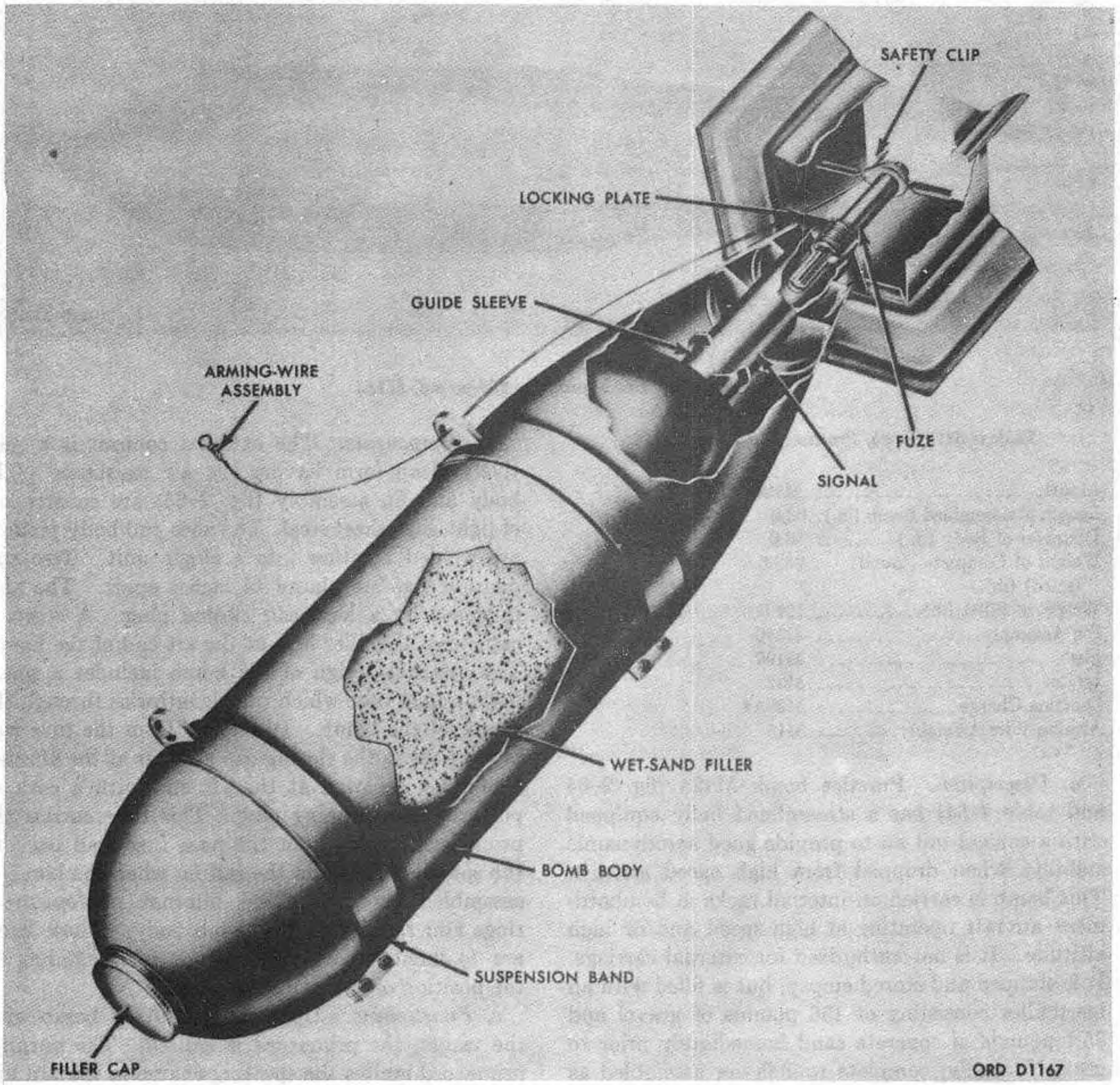


Figure 2-63. Bomb, practice: 100-pound, MK15, Mods 2, 3 and 4, cutaway.

2-53. Bomb, Practice: 250-Pound, M124

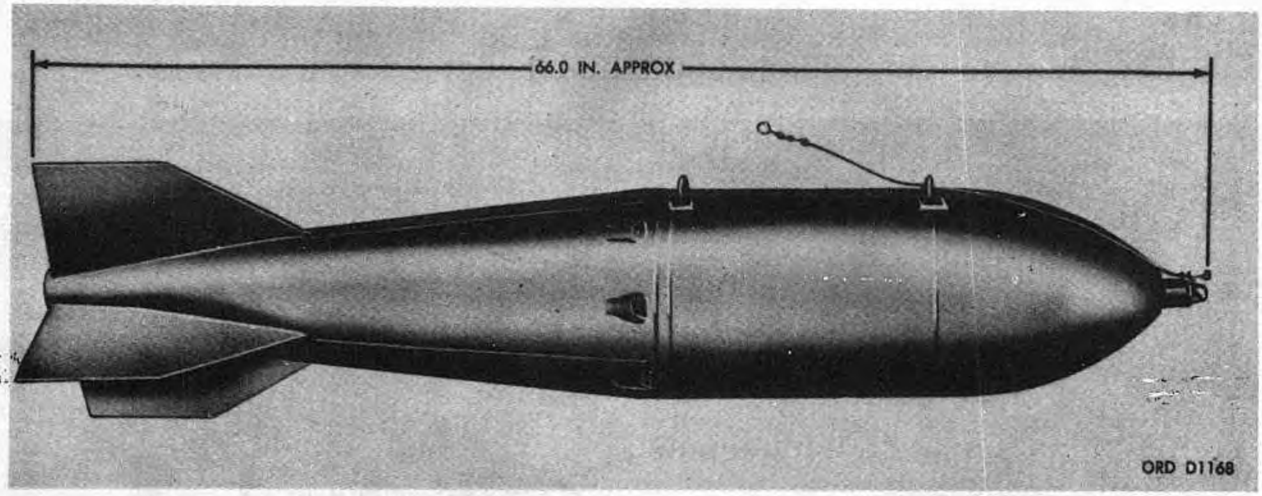


Figure 2-64. Bomb, practice: 250-pound, M124.

Table 2-51. Bomb, Practice: 250-Pound, M124

Model	M124
Length of Assembled Bomb (in.)	66.0
Diameter of Body (in.)	13.0
Weight of Complete Round (filled) (lb).	268.6
Weight of Filler (lb)	191.0
Fin Assembly	M140
Fuze	M193
Igniter	M32
Spotting Charge	M39A1
Arming-Wire Assembly	M19

a. Description. Practice bomb M124 (fig. 2-64 and table 2-51) has a streamlined body equipped with a conical tail fin to provide good aerodynamic stability when dropped from high speed aircraft. This bomb is carried on internal racks in bombardment aircraft operating at high speed and/or high altitude. It is not authorized for external carriage. It is shipped and stored empty, but is filled with an inert filler consisting of 156 pounds of gravel and 35.1 pounds of concrete sand immediately prior to use. Normally, complete rounds are assembled as they are used.

b. Components. The external contour is a relatively clean form having low air resistance. The body and fin assembly (fig. 2-65) are constructed of light-gage sheet steel. The nose and body sections are welded together into a single unit. Two suspension lugs are placed 14 inches apart. The nose is closed by a hex-head closing plug. A screw-in cap closes the filler hole at the aft end of the bomb. The internal design of the bomb includes a small, hollow steel tube which runs lengthwise through the center of the bomb. It extends from the fuze well in the nose to the closing-cap adapter at the aft end. The tube is closed at the aft end with a cork or polyethylene shipping plug. This tube carries the primacord igniter from the nose fuze well back to the spotting charge in the tail fin when the bomb is assembled for use. Two internal reinforcement rings add rigidity to the bomb body. These rings are 14 inches apart, in locations corresponding to the position of the suspension lugs.

c. Functioning. Upon impact of the bomb with the target, the primacord is ignited. The burning primacord ignites the spotting charge in the tail fin, permitting observation of the bombing accuracy.

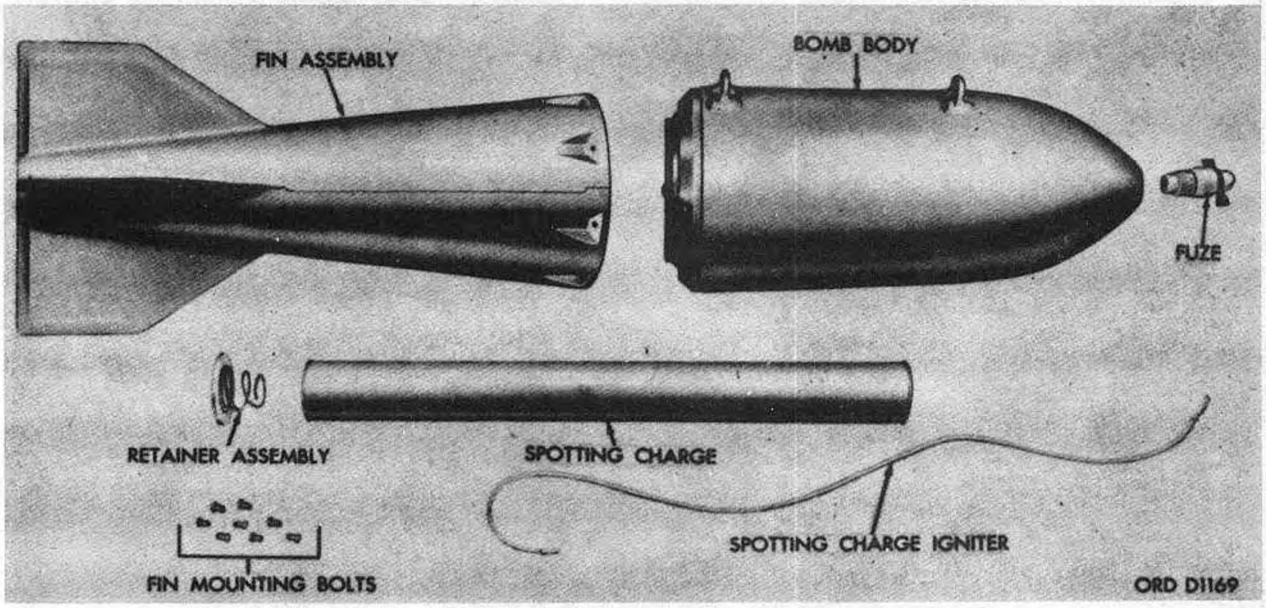


Figure 2-65. Bomb, practice: 250-pound, M124, components.

2-54. Bomb, Practice: 500-Pound, MK65 Mod 0

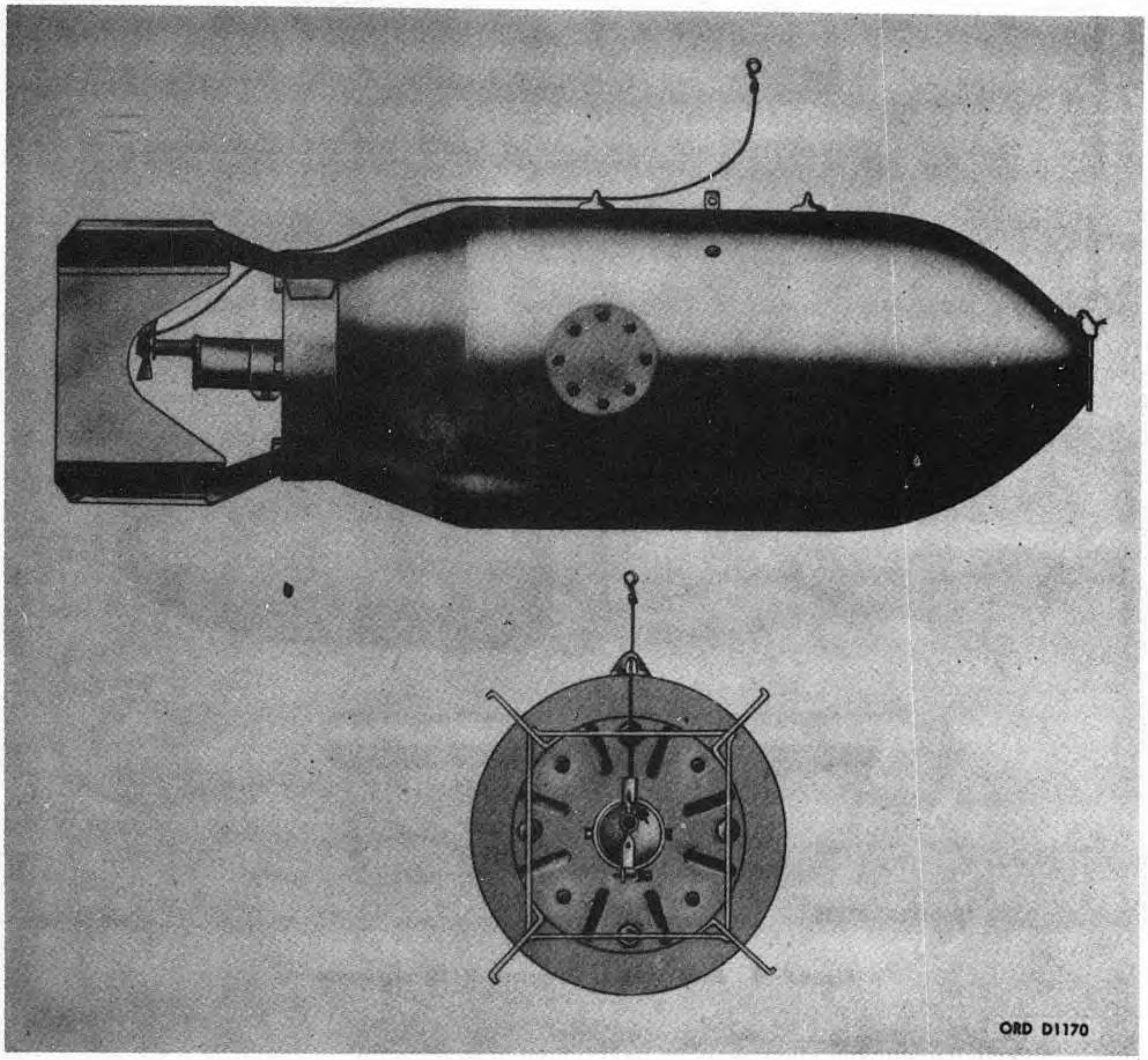


Figure 2-66. Typical practice bomb of MK65 series.

Table 2-52. Bomb, Practice: 500-Pound, MK65 Mod 0

Mark	65
Mod	0
Length of Assembled Bomb (in.)	56.61
Diameter of Body (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	MK6 Mod 0
Fuze	MK247 Mod 0
Arming-Wire Assembly	MK1, AN-M6A2

a. Description. Practice bomb MK65 Mod 0 (fig. 2-66 and table 2-52) has a light-cased, cylindrical body and is constructed of welded sheet-steel

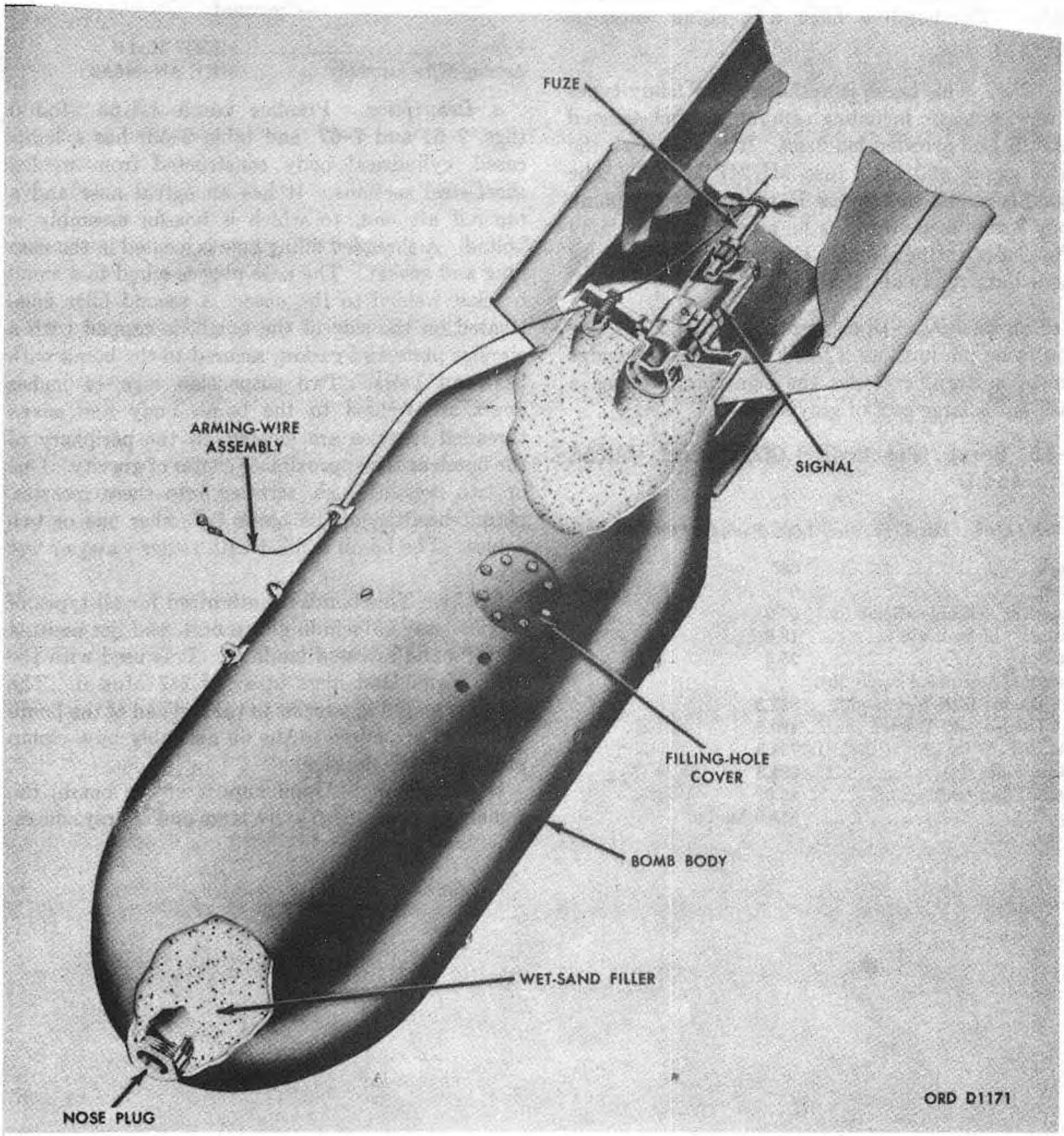


Figure 2-67. Typical practice bomb of MK65 series, cutaway.

sections. It has an ogival nose and a tapered aft end to which a box-fin assembly is bolted. A threaded filling hole (fig. 2-67) 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 with either water or wet sand.

b. Use. This bomb is authorized for many types of service usage, including catapult and jet-assisted takeoffs and arrested landings. It is used with the MK6 signal and inert fuze MK247 Mod 0. The signal is seated in a recess in the tail of the bomb body and is secured to the fin assembly by a clamp provided with the signal. The bomb should not be carried externally on jet aircraft.

c. 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.

2-55. Bomb, Practice: 1,000-Pound, MK66 Mod 0

Table 2-53. Bomb, Practice: 1,000-Pound, MK66 Mod 0

Mark	66
Mod	0
Length of Assembled Bomb (in.)	67.0
Diameter of Body (in.)	18.6
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	MK6 Mod 0
Fuze	MK247 Mod 0
Arming-Wire Assembly	MK1, AN-M6A2

a. Description. Practice bomb MK66 Mod 0 (figs. 2-64 and 2-67, and table 2-53) has a light-cased, cylindrical body constructed from welded sheet-steel sections. It has an ogival nose and a tapered aft end, to which a box-fin assembly is bolted. A threaded filling hole is located in the 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, 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 hositing of the bomb by either one or two cables. The bomb is filled with either water or wet sand.

b. 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 MK6 signal and inert fuze MK247 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.

c. Functioning. Upon impact of the bomb, the signal produces a flash and a large puff of gray smoke

2-56. Bomb, Practice: 250-Pound, MK86 Mods 0 and 1

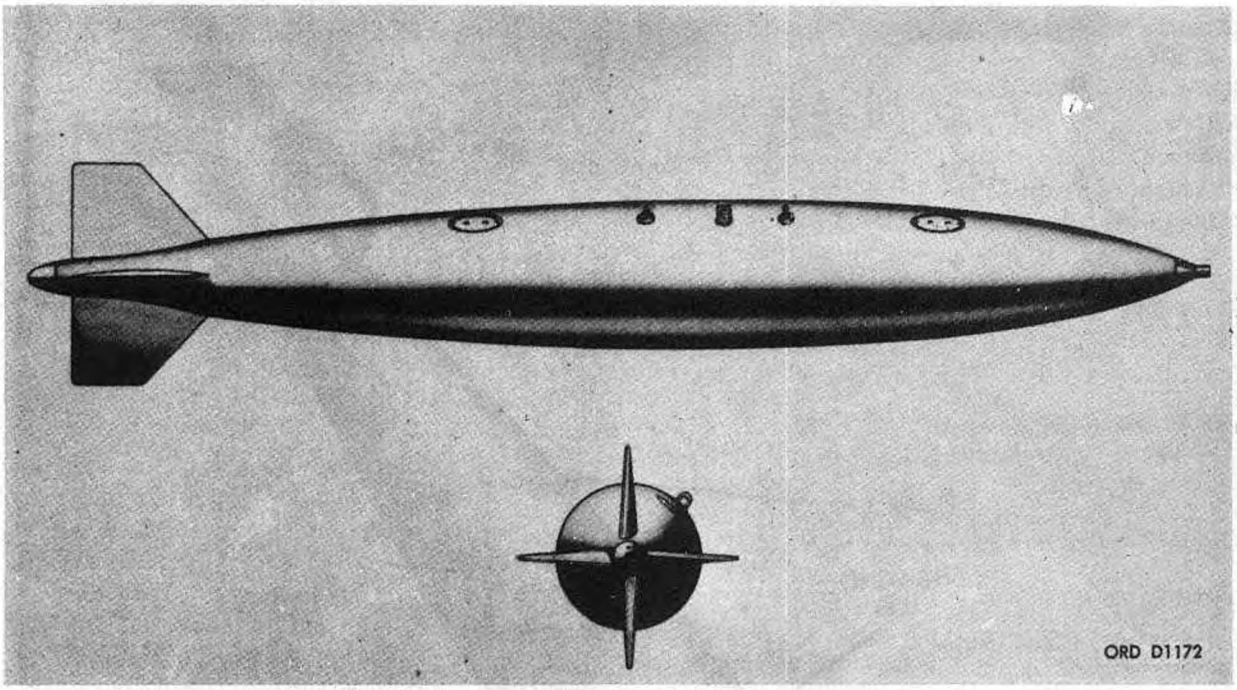


Figure 2-68. Typical practice bomb of MK86 series.

Table 2-54. Bomb, Practice: 250-Pound, MK86 Mods 0 and 1

Mark	86	86
Mod	0	1
Length of Assembled Bomb (in.)	76.0	76.0
Diameter of Body (in.)	9.0	9.0
Fin Span (in.)	12.6	12.6
Distance between Suspension Lugs (in.).	14.0	14.0
Weight of Assembled Bomb (lb):		
Empty Bomb	65.4	65.4
Loaded with Wet Sand	217.0	217.0
Loaded with Water	141.0	141.0
Practice Bomb Signal	MK4 Mod 3	MK4 Mod 3
Firing-Pin Assembly	MK1 Mod 0	MK1 Mod 0

a. Description. Practice bomb MK86 Mod 0 (fig. 2-68 and table 2-54) is a low-drag configuration, the same size and shape as the MK81 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 MK86 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. A blast tube (fig. 2-69) 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. Double suspension lugs are spaced 14 inches apart on the body of the MK86 Mod 0. Screw-in lugs are used with the low-drag general purpose bomb family. A hoisting lug is provided at the center of gravity of the bomb. Practice bomb signal MK4 Mod 3 is used with MK86 Mod 0. Practice bomb MK86 Mod 1 is similar to the MK86 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.

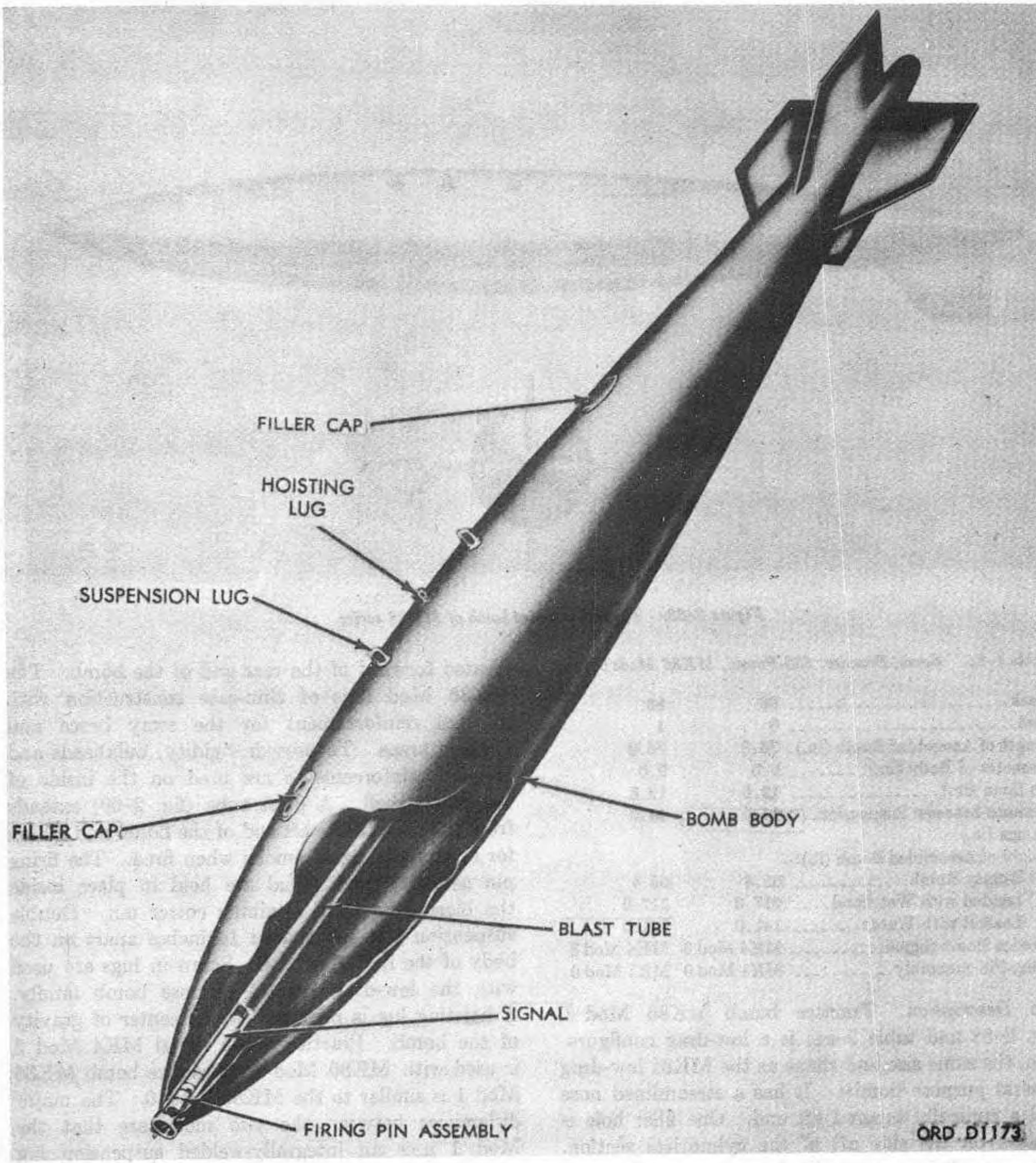


Figure 2-69. Typical practice bomb of MK86 series, cutaway.

b. Functioning. When the bomb strikes its target, the smoke produced from the detonated signal is discharged through the blast tube at the end of the bomb.

2-57. Bomb, Practice: 500-Pound, MK87 Mod 0

Table 2-55. Bomb, Practice: 500-Pound, MK87 Mod 0

Mark	87
Mod	0
Length of Assembled Bomb (in.)	91.0
Diameter of Body (in.)	10.75
Fin Span (in.)	15.06
Distance between Suspension Lugs, Center-to Center (in.).	14.0
Weight of Assembled Bomb (lb):	
Empty	98.0
Loaded with Wet Sand	333.0
Loaded with Water	221.0
Practice Bomb Signal	MK4 Mod 3
Firing Pin	MK1 Mod 0

a. Description. Practice bomb MK87 Mod 0 (figs. 2-68 and 2-69, and table 2-55) is a low-drag practice bomb, similar in size and shape to the MK82 general purpose bomb. It has a long, pointed nose and a conically-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 and to insure good flight stability. The MK87 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 MK1 Mod 0 and practice bomb signal MK4 Mod 3 are installed in the forward end of the bomb, secured by a cotter pin. The bomb is filled with 235 pounds of wet sand or 123 pounds of water. Two suspension lugs (MK6 Mod 0) are spaced 14 inches apart on the body. A hoisting lug is located midway between the suspension lugs.

b. Functioning. The firing-pin assembly fires the signal. The activated signal produces smoke which is discharged through the rear of the central tube.

2-58. Bomb, Practice: 1,000-Pound, MK88 Mod 0

Table 2-56. Bomb, Practice: 1,000-Pound, MK88 Mod 0

Mark	88
Mod	0
Length of Assembled Bomb (in.)	120.0
Diameter of Body (in.)	14.0
Fin Span (in.)	19.6
Weight of Assembled Bomb (lb):	
Loaded with Wet Sand	783.0
Loaded with Water	458.0
Wet Sand Filler (lb)	640.0
Water Filler (lb)	315.0
Water Filler (gal)	37.7
Signal	MK4 Mods 0, 1, 2, 3, 4

a. Description. Practice bomb MK88 Mod 0 (figs. 2-68 and 2-69, and table 2-56) 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 equally spaced, 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 hoisting 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.

b. Use. This bomb is similar in size and shape to the general purpose MK83 series and is authorized for all types of service use. It is used with firing-pin assembly MK1 Mod 0 and signal MK4 Mod 3, both of which are seated in the forward end of the flash tube and locked in place by a cotter pin.

c. 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.

2-59. Empty and Inert-Filled Bombs

Empty and inert-filled bombs are provided for training of ground crews in assembling, fuzing, and other handling of bombs. These bombs and their components are completely inert and are usually constructed from the inert metal parts of service bombs which they are intended to simulate. They differ from inert practice bombs in that practice bombs are expendable.

CHAPTER 3
CLUSTER BOMBS AND CLUSTER ADAPTERS

Section I. INTRODUCTION

3-1. General

A cluster bomb is an assembly of small bombs which may be suspended as a unit in a bomb station designed for a single large bomb. The small bombs are assembled into a single unit by means of a cluster adapter. The cluster is released as a unit for area bombing. After release from the aircraft, the individual bombs are released from the cluster to arm and fall individually.

3-2. Types

a. General. The cluster bombs and adapters described in this chapter are of two general types, quick-opening and aimable.

b. Quick-Opening (Frame) Fragmentation Bomb Clusters and Adapters. This type of cluster consists of a frame to which several bombs are attached by means of straps, forming an assembly which may be suspended and released as a unit. The straps are fastened with clamps which may be released by withdrawing the arming wire. The frame is also equipped with a fuze lock which prevents arming of the bomb fuzes until after they are released from the cluster.

c. Aimable Fragmentation Bombs and Cluster Adapters. This type cluster consists essentially of a streamlined metal body which holds the clustered bombs, a fin assembly or other such means of stabilization, and a time fuze to open the body and release the individual bombs at the time desired.

3-3. Precautions

a. Cluster bombs are shipped in wooden boxes or steel drums as assembled complete rounds. Since cluster bombs represent the only instance in which it is permissible to store and ship fuzed bombs, they present a unique problem in care and handling and involve exceptional precautions.

b. Boxed clusters should be handled carefully. They should be picked up to be moved from one location to another and set down in place horizontally. They should not be pushed, tumbled, struck, or "walked" on the corners.

c. When a box or drum is opened, the cluster should be inspected to insure that fuze safety devices are in place where applicable. For pin-type fuzes, the fuze arming wire and safety cotter pin should both be in place. For vane-type fuzes, the safety block should be taped in place. If pin-type fuzes show evidence of having armed, the cluster will not be removed from the box or drum but will be taken with the utmost care to a safe place and there destroyed with explosive by qualified personnel. If the safety blocks of vane-type fuzes have fallen out, they will be replaced and taped in place, the cluster broken down, and such fuzes removed from the bomb and destroyed. Binding wires or straps which hold the bombs in place should be tight and unbroken.

***Warning:* Authorized munitions personnel should be advised immediately upon discovery of clusters which have armed or partially armed fuzes. Only authorized munitions personnel are permitted to handle such clusters.**

Section II. FRAGMENTATION BOMB CLUSTERS, CHEMICAL BOMB CLUSTERS AND CLUSTER ADAPTERS

3-4. Cluster, Fragmentation Bomb: 100-Pound, AN-M1A2

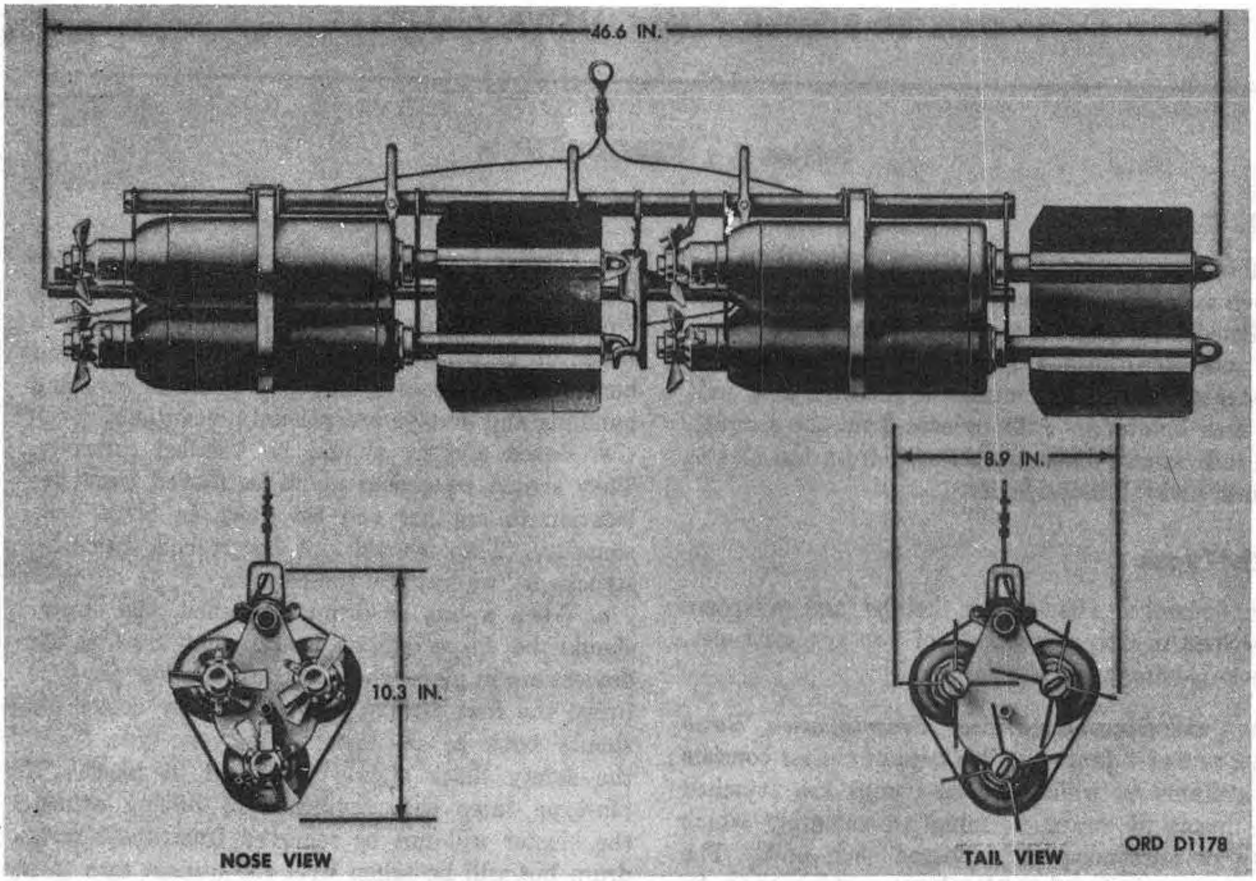


Figure 3-1. Cluster, fragmentation bomb: 100-pound, AN-M1A2.

Table 3-1. Cluster, Fragmentation Bomb: 100-Pound, AN-M1A2

Model	AN-M1A2
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 (6 required)
Fuze	AN-M158
Weight of Each Bomb (lb)	20.0
Weight of Cluster (lb)	128.0

a. Description. The 100-pound frag bomb cluster AN-M1A2 (fig. 3-1 and table 3-1) consists of six 20-pound frag bombs AN-M41A1 assembled in cluster adapter AN-M1A3 (fig. 3-2). The cluster adapter AN-M1A3 is a "quick-opening frame," a 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. Cluster adapter AN-M1A3 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 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.

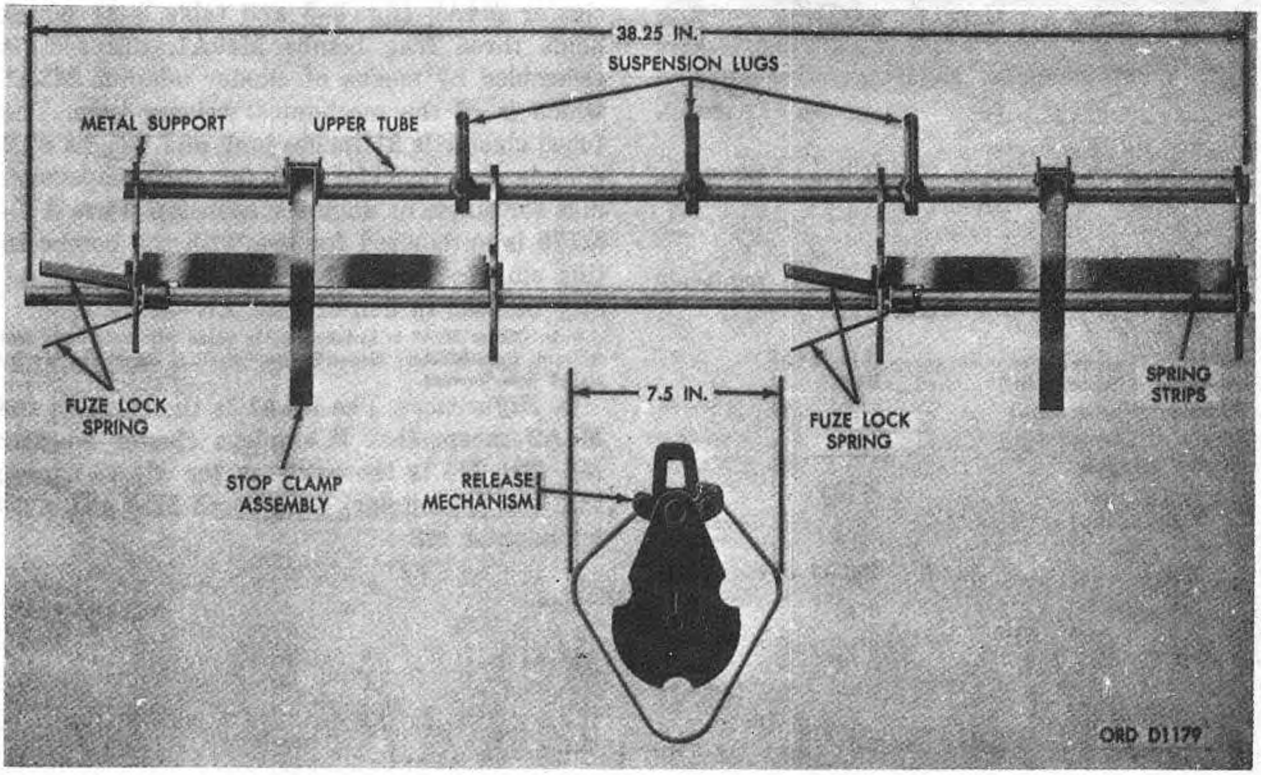


Figure 3-2. Adapter, cluster: AN-M1A3.

b. Differences. The difference between frag bomb clusters AN-M1A1 and AN-M1A2 lies in the cluster adapters. The AN-M1A1 uses the cluster adapters M1A2 or M1A1 (instead of the M1A3) which has narrow U-type suspension lugs; with these lugs, the complete weight of the cluster is only 125 pounds.

3-5. Cluster, Fragmentation Bomb: 100-Pound, AN-M4A2

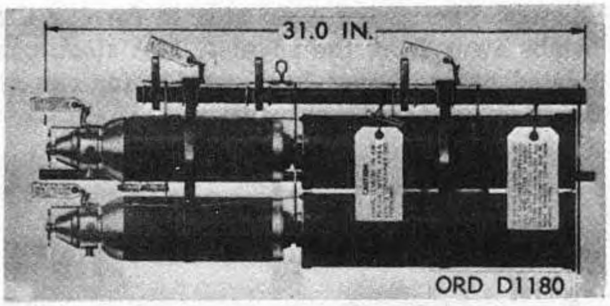


Figure 3-3. Cluster, fragmentation bomb: 100-Pound, AN-M4A2.

Table 3-2. Cluster, Fragmentation Bomb: 100-Pound, AN-M4A2

Model	AN-M4A2
Length of Cluster (in.)	31.0
Width of Cluster (in.)	
Height of Cluster (in.)	
Cluster Adapter:	
Model	M3A1
Length (in.)	
Frag Bombs:	
Model	M40A1 (3 required)
Fuzes	AN-M170 AN-M120A1 AN-M120
Weight of Each Bomb (lb)	24.5
Weight of Cluster (lb)	87.2

a. Description. The 100-pound frag bomb cluster M4A2 (fig. 3-3 and table 3-2) which holds three frag bombs M40A1, unfuzed, is assembled by means of cluster adapter M3A1 which is of the mechanical release type. The fuzed cluster is 31 inches long and weighs 87.2 pounds. It is provided with flat steel suspension lugs for single or double suspension. Fuze AN-M170 is authorized for use with the bombs in this cluster. Fuze AN-M120 or AN-M120A1 may be used in lieu of fuze AN-M170.

Note. Cluster M4A2 is installed in the plane with parachute case forward. Unsatisfactory dispersion may result if the bombs are installed nose forward.

b. Differences. The M4A1 is the same as the M4A2 except that it employs cluster adapter M3. The M4 is the same as the M4A2 except that the M4 employs frag bomb M40 and cluster adapter M3.

3-5.1. Cluster, Fragmentation Bomb: 100-Pound, AN-M1A3

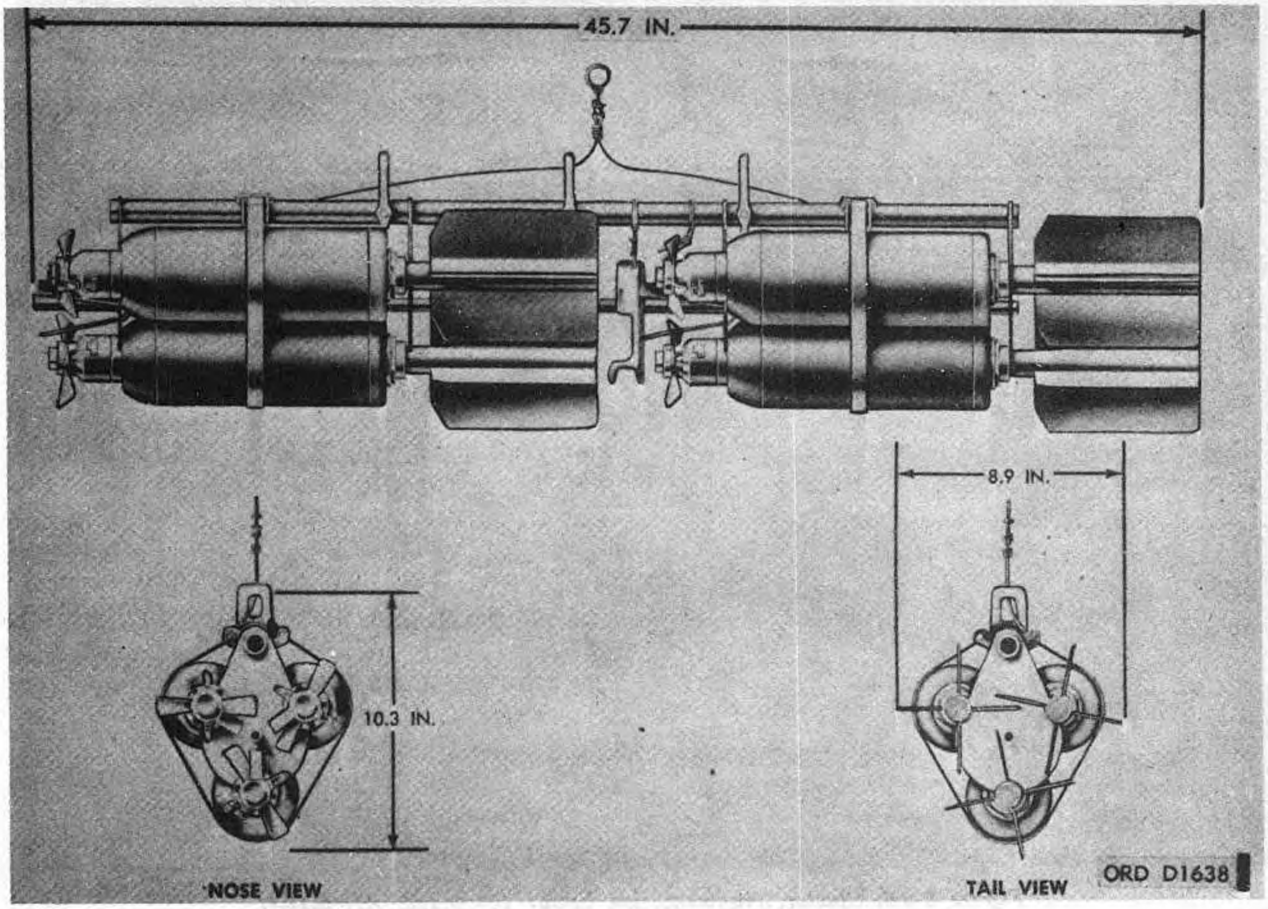


Figure 3-3.1. Cluster, fragmentation bomb: 100-Pound, AN-M1A3.

Table 3-2.1. Cluster, fragmentation bomb: 100-Pound, AN-M1A3.

Model	**AN-M1A3**
Length of Cluster (in.)	**45.7**
Width of Cluster (in.)	**8.9 Max**
Height of Cluster (in.)	**10.3**
Cluster Adapter:	
Model	**AN-M1A3**
Length (in.)	**38.25**
Frag Bombs:	
Model	**AN-M41A2 (6 required)**
Fuze	**AN-M158**
Weight of Each Bomb (lb)	**20.0**
Weight of Cluster (lb)	**127.0**

a. ***Description.*** **The 100-pound frag bomb cluster AN-M1A3 (fig. 3-3.1 and table 3-2.1) consists of six 20-pound frag bombs AN-M41A2 assembled in cluster adapter AN-M1A3 (fig. 3-2).**

b. ***Differences.*** **The difference between frag bomb cluster AN-M1A3 and frag bomb cluster AN-M1A2 lies in the fragmentation bombs used. Frag bomb cluster AN-M1A3 uses frag bombs AN-M41A2, while frag bomb cluster AN-M1A2 uses frag bombs AN-M41A1.**

3–5.2. Cluster, Fragmentation Bomb: 100-Pound, AN–M1A4

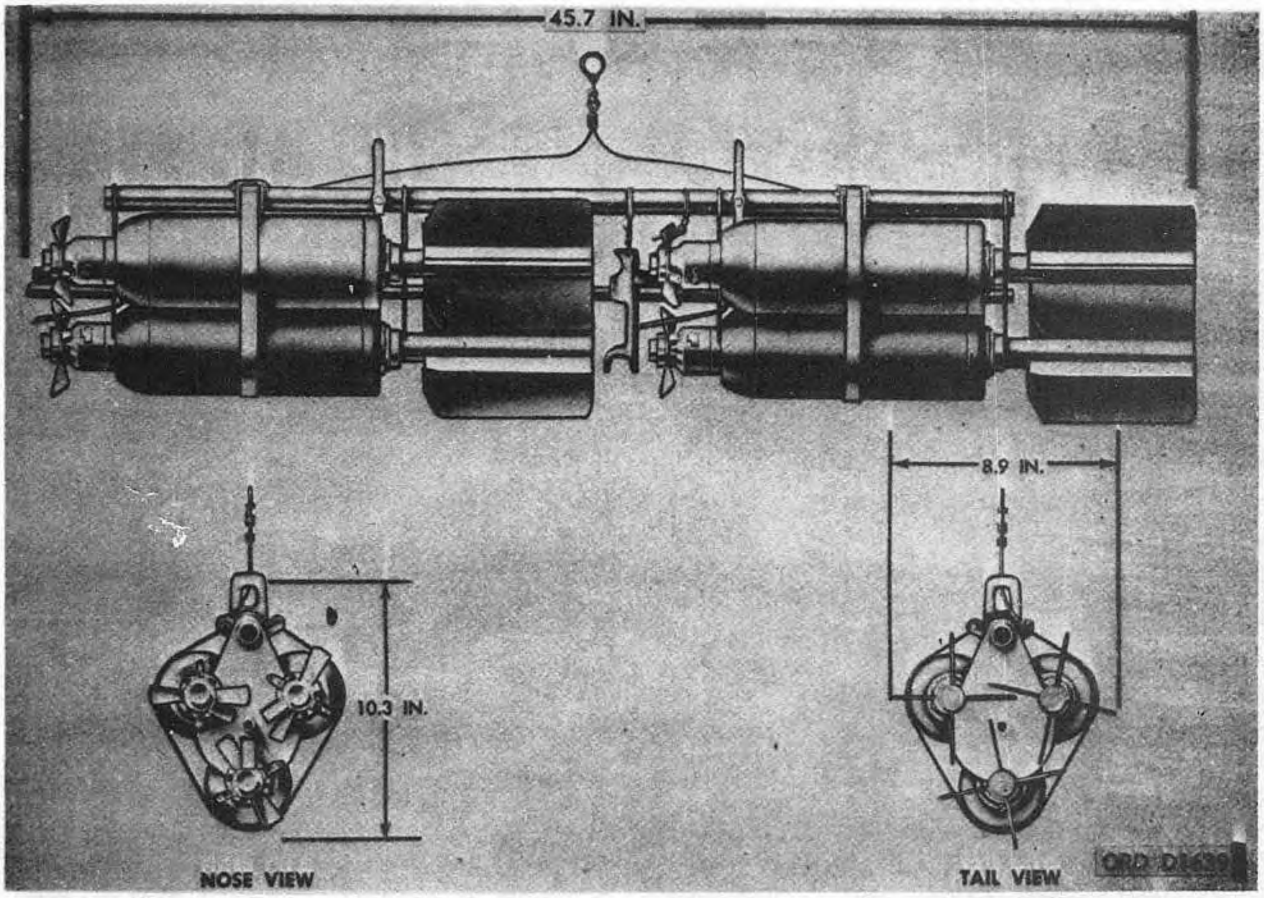


Figure 3–3.2. Cluster, fragmentation bomb: 100-pound, AN–M1A4.

Table 3–2.2. Cluster, Fragmentation Bomb: 100-Pound, AN–M1A4

Model	AN–M1A4
Length of Cluster (in.)	45.7
Width of Cluster (in.)	8.9 Max
Height of Cluster (in.)	10.3
Cluster Adapter:	
Model	AN–M1A4
Length	38.25
Frag Bombs:	
Model	AN–M41A2 (6 required)
Fuze	AN–M158
Weight of Each Bomb (lb)	20.0
Weight of Cluster (lb)	127.0

a. Description. The 100-pound frag bomb cluster AN–M1A4 (fig. 3–3.2 and table 3–2.2) consists of six 20-pound frag bombs assembled in cluster adapter AN–M1A4 (fig. 3–3.3). Cluster adapter AN–M1A4, like cluster adapter AN–M1A3, is a mechanical release type adapter which holds the bombs in two banks of three bombs each and releases them upon withdrawal of the arming wires. Cluster adapter AN–M1A4 is identical to cluster adapter AN–M1A3 in all respects but the following: cluster adapter AN–M1A4 has two suspension lugs, the middle suspension lug has been removed, while cluster adapter AN–M1A3 has three suspension lugs.

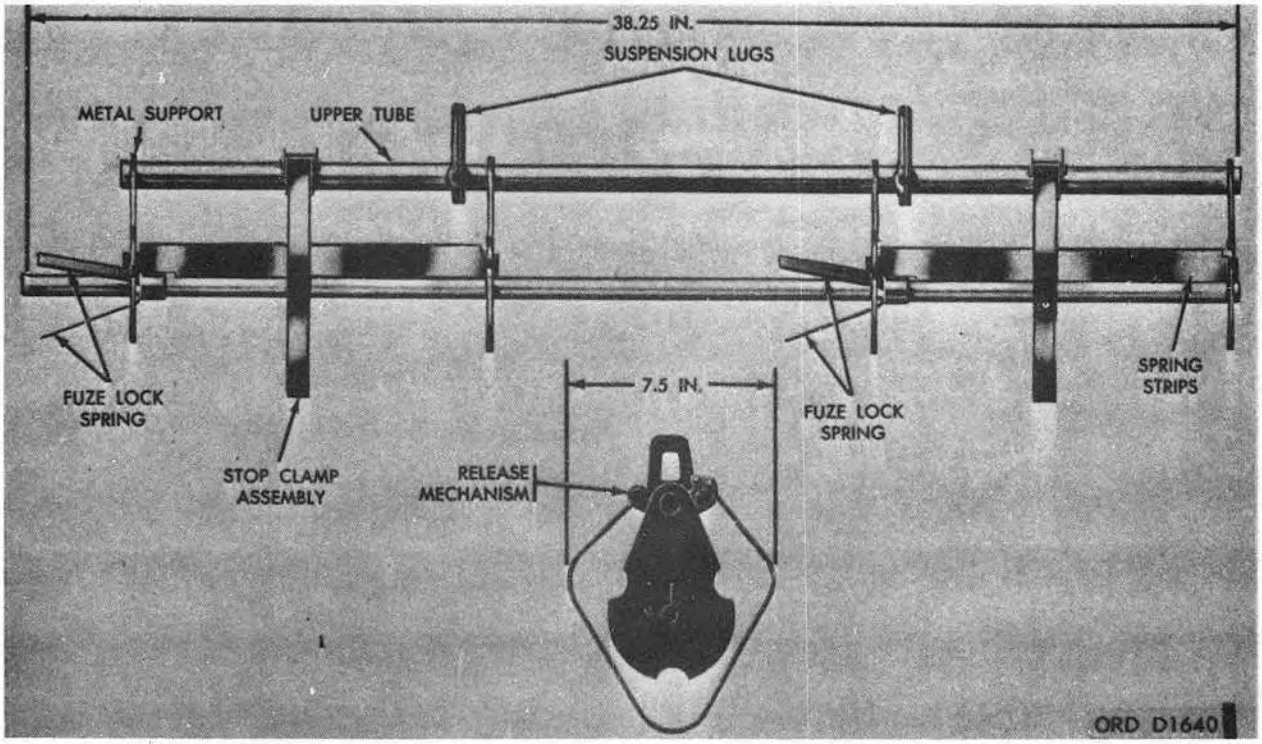


Figure 3–3.3. Adapter, cluster: AN–M1A4.

b. Differences. The difference between frag bomb cluster AN–M1A4 and frag bomb cluster AN–M1A3 lies in the cluster adapters used. Frag bomb cluster AN–M1A3 uses cluster adapter AN–M1A3, while frag bomb cluster AN–M1A4 uses adapter cluster AN–M1A4.

3-6. Cluster, Fragmentation Bomb: 100-Pound, M28A2

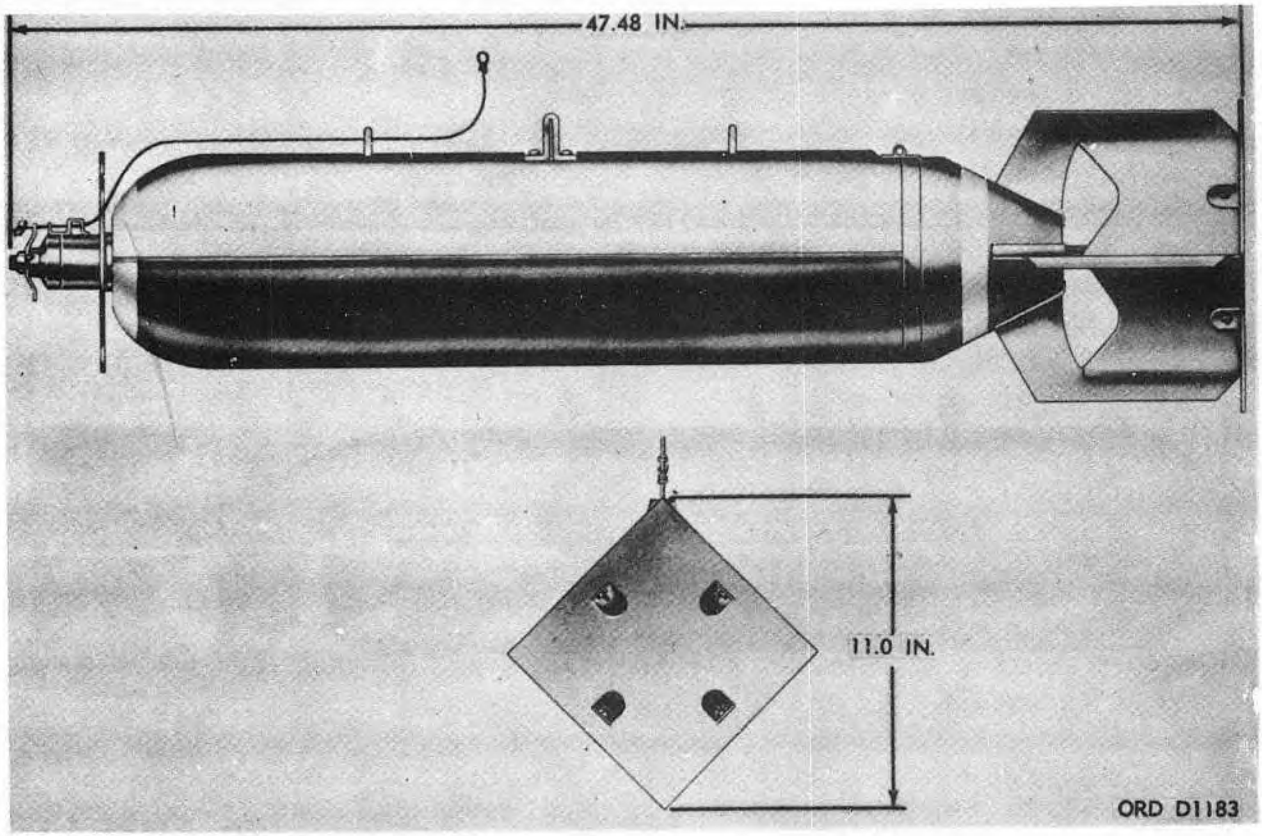


Figure 3-4. Cluster, fragmentation bomb: 100-pound, M28A2.

Table 3-3. Cluster, Fragmentation Bomb: 100-Pound, M28A2

Model	M28A2
Length of Cluster (in.)	47.48
Diameter of Body (in.)	8.0
Cluster Adapter:	
Model	M15A2
Length (in.)	43.67
Fin Span (in.)	11.0
Frag Bombs:	
Model	M83 (24 required)
Weight of Each Bomb (lb)	3.81
Weight of Cluster (lb)	115.7
Fuzes (Cluster-Opening)	AN-M146A1 M907

a. Description. The 100-pound frag bomb cluster M28A2 (fig. 3-4 and table 3-3) consists of 24 four-pound frag bombs M83 assembled in a cluster adapter M15A2 (fig. 3-5). The M15A2, an aimable-type adapter, is bomb-like in appearance and has a standard fin. It holds the frag bombs (fig. 3-6) 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.

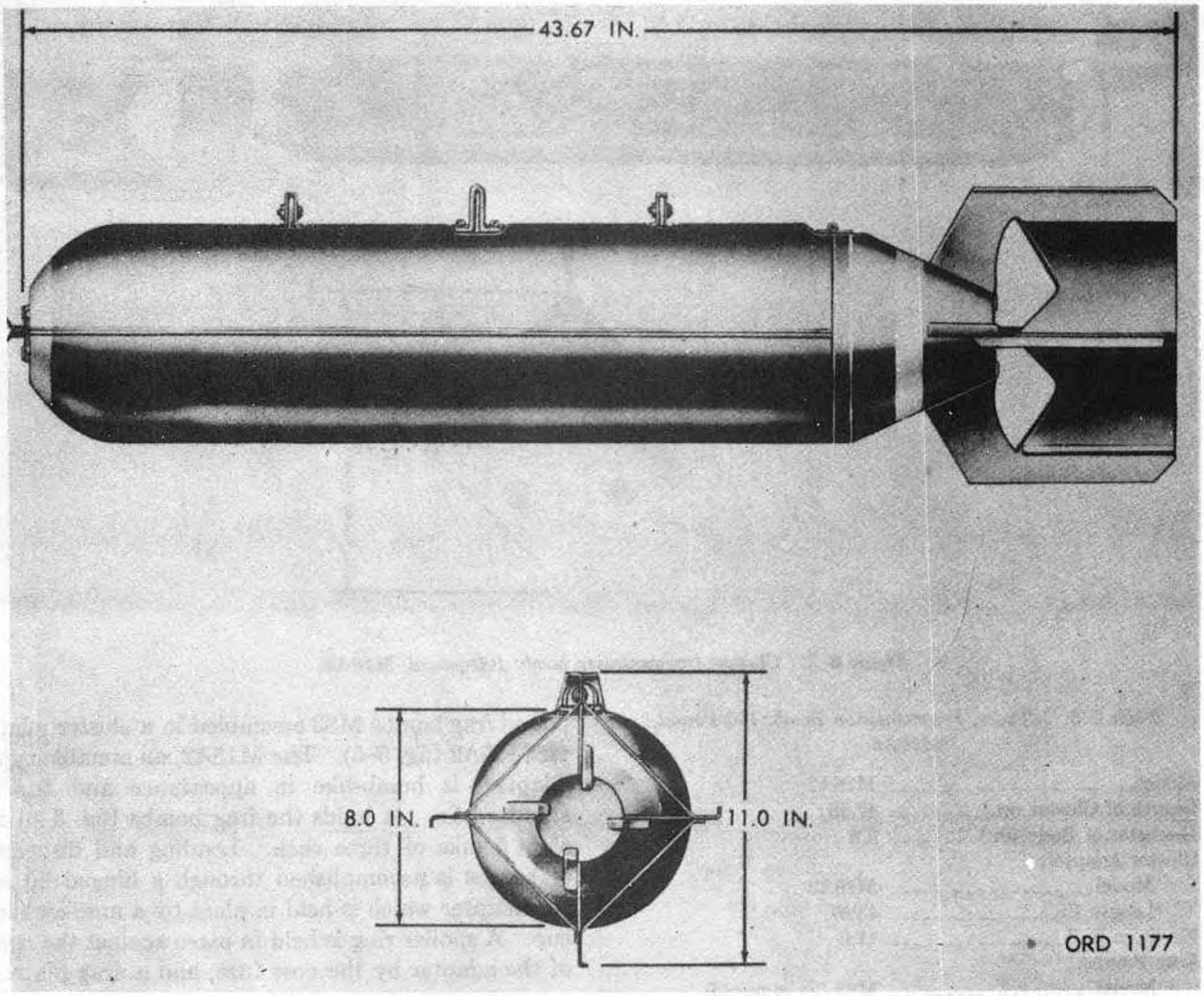


Figure 3-5. Adapter, cluster: M15A2.

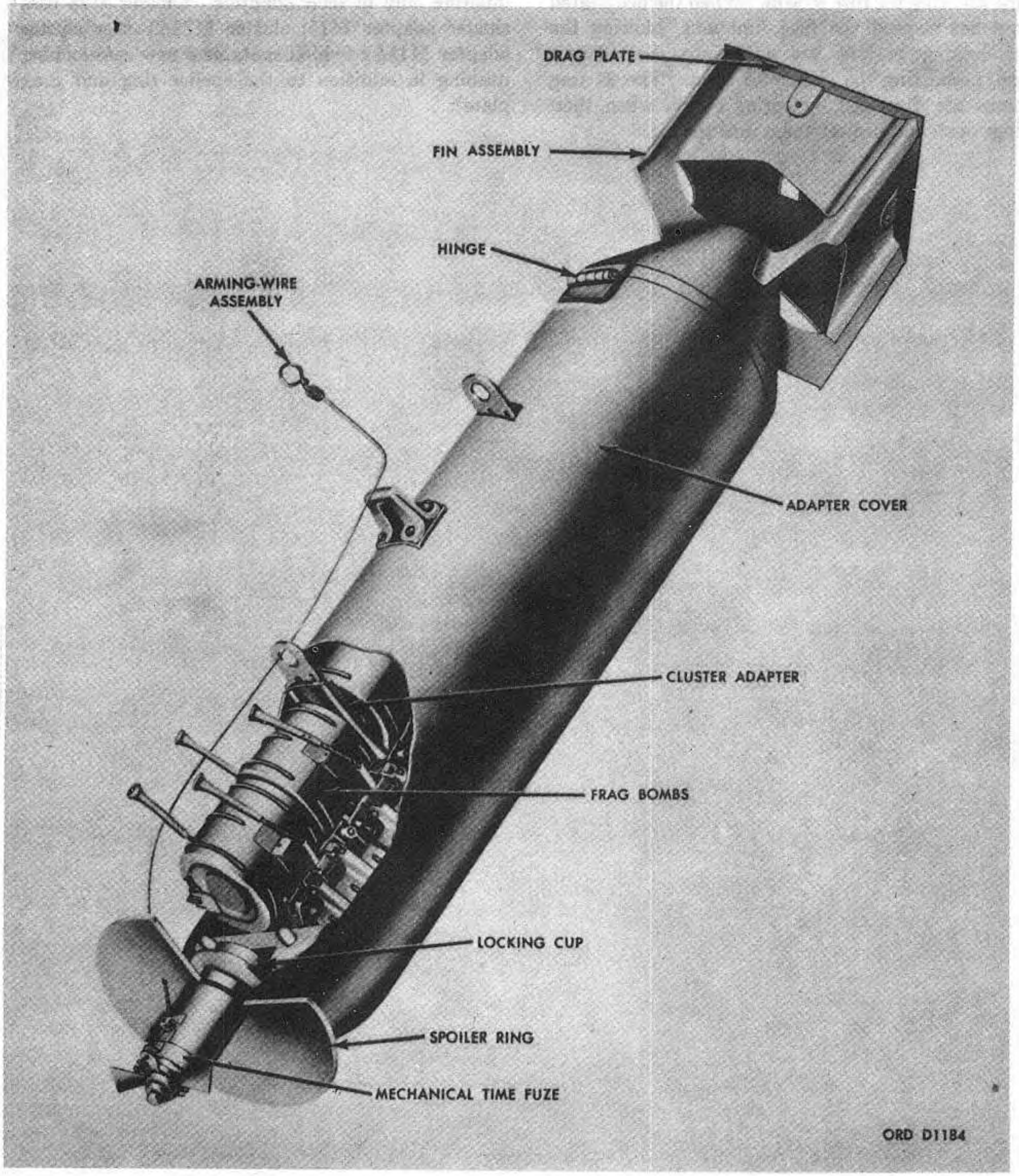


Figure 3-6. Cluster, fragmentation bomb: 100-pound, M28A2, cutaway.

b. Functioning. 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, permitting the cluster to open. The 24 frag bombs are dispersed by spring action when their wings open and project them into the air.

c. Differences. The frag bomb clusters in the M28 series are similar to each other in appearance, differing only in their adapters. Cluster M28 uses cluster adapter M15; cluster M28A1 uses cluster adapter M15A2 (which contains a new case-locking bushing in addition to the spoiler ring and drag plate).

3-7. Cluster, Incendiary Bomb: PT1, 500 Pound, M31

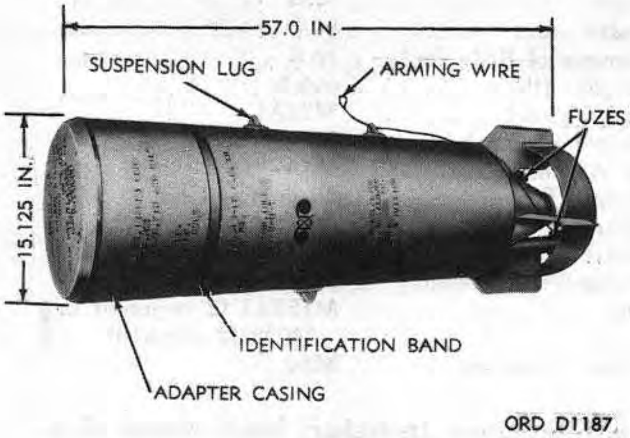


Figure 3-7. Cluster, incendiary bomb: PT1, 500-pound, M31.

Table 3-4. Cluster, Incendiary Bomb: PT1, 500-Pound, M31

Model	M31
Length of Assembly	57.0
Diameter of Body (in.)	15.125
Weight of Assembly	562.0
Bomb Model	M74
Number of Bombs	38
Fin Assembly	M7
Burster	Integral Components of Cluster Adapter (installed in tail fin)
Ejection Cartridges	M2 (3 required)
Arming-Wire Assembly	C4
Tail Fuze	M152A1 (2 required) or M908 (2 required)
Cluster Adapter	M25

a. Description. Incendiary bomb cluster M31 (fig. 3-7 and table 3-4) consists of cluster adapter M25 filled with 38 incendiary bombs M74 and fitted with three cluster-ejection cartridges, two fuzes, and an arming wire. The cluster is approximately 57-inches long, 15⅛ inches in diameter, and weighs approximately 562 pounds.

(1) *Bombs.* Incendiary bombs M74 are loaded into the cluster adapter M25 in 2 bundles of 19 bombs each. The bombs are arranged in the bundles in such a way that the release bar on each bomb is depressed by an adjacent bomb.

(2) *Tail fin.* Tail fin M7 is a component of cluster adapter M25 but is shipped in a crate separate from the filled adapter.

(3) *Burster.* The burster is a component of cluster adapter M25 and is installed in the tail fin.

(4) *Cluster-ejection cartridges.* Three ignition cartridges M2 are installed in the cartridge containers in the cluster adapter.

(5) *Fuzes.* Two mechanical time tail bomb fuzes M152A1 or M908 are installed in the fuze adapters in the tail fin. The fuzes are shipped separately from the cluster.

(6) *Arming wire.* A C4 arming wire is used with the cluster adapter M31.

b. Functioning. When the cluster is released from an aircraft, the arming wire is withdrawn, the fuze arming vanes rotate in the airstream, and the fuzes arm. After the preset time has elapsed, one or both fuzes function and detonate the burster. Concussion from the explosion of the burster depresses the diaphragm in the striker assemblies, driving the points of the strikers into the primers in the cluster-ejection cartridges, exploding the cartridges. Gases released by the cartridges pass through the gas chamber, through vent-holes in the chamber, and into the space between the adapter casing base and the pressure plate. Pressure developed by the gases forces the pressure plate toward the nose of the cluster and causes the stud attached to the pressure plate to pull out of the split nut which is screwed to the casing base. Continued expansion of the gases frees the nose assembly and forces the framework out of the casing. As each cluster buckle clears the casing, the buckle opens. After all buckles have opened, the adapter framework falls apart, allowing the bombs to fall individually to the target.

3-8. Cluster, Incendiary Bomb: TH3, 500-Pound, M32

Table 3-5. Cluster, Incendiary Bomb: TH3, 500-Pound, M32

Model	M32
Length of Assembly (in.)	60.0
Diameter of Body (in.)	14.9
Weight of Assembly (lb)	617.0
Bomb Model	AN-M50A3
Number of Bombs	108

Table 3-5. Cluster, Incendiary Bomb: TH3, 500-Pound, M32—Continued

Fin Assembly	M7
Burster	Integral component of cluster adapter installed in tail fin
Ejection Cartridges	M2 (3 required)
Arming-Wire Assembly	C4
Fuse	M152A1 or M908 (2 required)
Cluster Adapter	M26

a. Description. Incendiary bomb cluster M32 consists of cluster adapter M26 (fig. 3-7 and table 3-5) filled with 108 incendiary bombs AN-M50A3 which are fitted with three cluster-ejection cartridges, two fuzes and an arming wire. The cluster is approximately 60 inches long, 14 7 / 8 inches in diameter, and weighs approximately 617 pounds. Bomb cluster M32 is identical with the M31 (para 3-7) except for slight differences in the cluster adapter and the type and number of bombs used.

(1) *Bombs.* Incendiary bomb AN-M50A3 is loaded into cluster adapter M26 in 2 bundles of 54 bombs each. The bombs are arranged in the bundles in such a way that the safety plunger on each bomb is depressed by an adjacent bomb.

(2) *Other components.* The tail fin, burster, cluster-ejection cartridges, fuzes, and arming wire are the same as those used in bomb cluster M31.

b. Functioning. The functioning of the bomb cluster M32 is identical to the functioning of bomb cluster M31.

3-9. Cluster, Incendiary Bomb: PT1, 750-Pound, M35

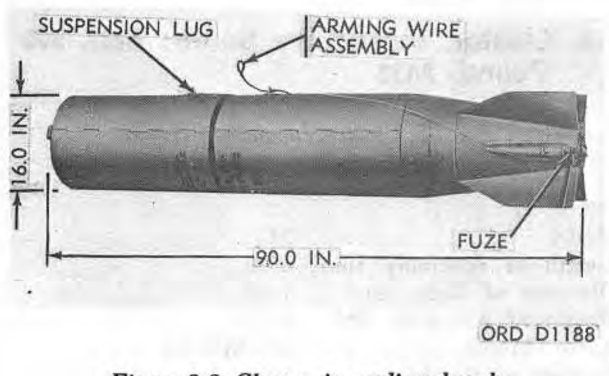


Figure 3-8. Cluster, incendiary bomb: PT1, 750-pound, M35

Table 3-6. Cluster, Incendiary Bomb: PT1, 750-Pound, M35

Model	M35
Length (in.)	90.0
Diameter of Body (in.)	16.0
Weight (lb)	690.0
Bomb Model	M74A1
Number of Bombs	57
Fin Assembly	M14
Burster Type	Detonating Cord
Explosive	PETN
Length (ft)	19.0
Arming-Wire Assembly	M23
Fuze	M152A1 (2 required) or M908 (2 required)
Cluster Adapter	M30

a. Description. Incendiary bomb cluster M35 (fig. 3-8 and table 3-6) consists of cluster adapter M30 filled with 57 incendiary bombs M74A1 (fig. 3-9) and fitted with a burster, a fin assembly, two fuzes, and an arming wire. The cluster is approximately 90 inches long, 16 inches in diameter, and weighs approximately 690 pounds.

(1) *Bombs.* Incendiary bombs M74A1 are loaded into cluster adapter M30 in 3 bundles of 19 bombs each. The bombs are arranged in the bundles in such a way that the release bar on each bomb is depressed by an adjacent bomb.

(2) *Burster.* The burster consists of 19 feet of detonating cord, which is threaded through the hinge tube in the adapter when the cluster is manufactured. When the cluster is manufactured. When the cluster is shipped, the ends of the detonating cord are waterproofed and crossed over the tail end of the adapter and inserted in channels which parallel the hinge tube at the sides of the adapter.

(3) *Fin assembly.* Tail fin M14 is a component of bomb cluster M35. It consists of a fin-blade assembly and a tie-rod assembly.

(a) *Fin-blade assembly.* The fin-blade assembly is made of sheet steel. It is in the shape of a truncated cone and has four fin blades welded to it. The tail of the assembly has a circular hole through which the tie-rod assembly is bolted. A sheet-steel cone welded to the front end of the fin blade assembly fits over the tail end of the cluster. The forward edge of the cone is marked with six numbered stripes which are used as assembly marks when assembling the tail fin to a cluster. Two fuze holders in fairings are welded to the fin-blade assembly. Fuze adapters are installed in the fuze holders, and guide tubes lead from each fuze adapter to the interior of the tail fin.

(b) Tie-rod assembly. The tie-rod assembly consists of a tubular steel body approximately 18 inches long and 3 inches in diameter, with threads at one end. Two legs are fastened by spring steel connectors to the other end. The threaded end of the tie-rod has a locking ring screwed to it for use when fastening the fin-blade assembly in place. Two pairs of clips for the burster are welded to the outside of the body. A tie-rod foot, made of 7 / 16 inch steel tubing, is welded at right angles to the end of each leg. The feet are designed to engage the hooks at the tail end of the cluster adapter. A fuze receptacle for an electric fuze is located in the threaded end of the body, and a plug receptacle, covered by a plastic plug, is located at the opposite end.

(4) *Fuzes.* Two mechanical time tail bomb Fuzes M152A1 or M908 are installed in the tail fin. The fuzes are shipped separately from the cluster.

(5) *Arming wire.* Arming wire M23 is used with cluster M35.

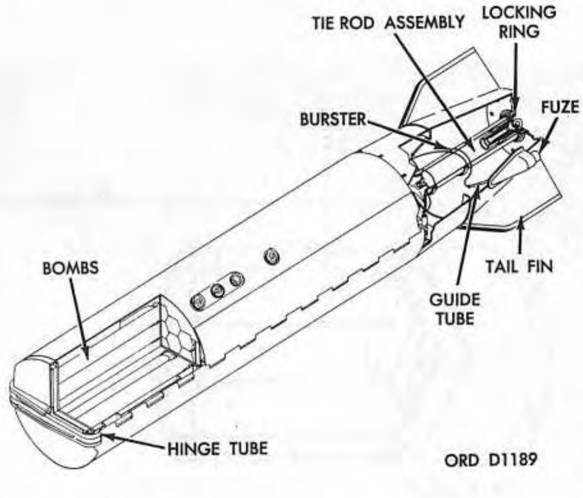
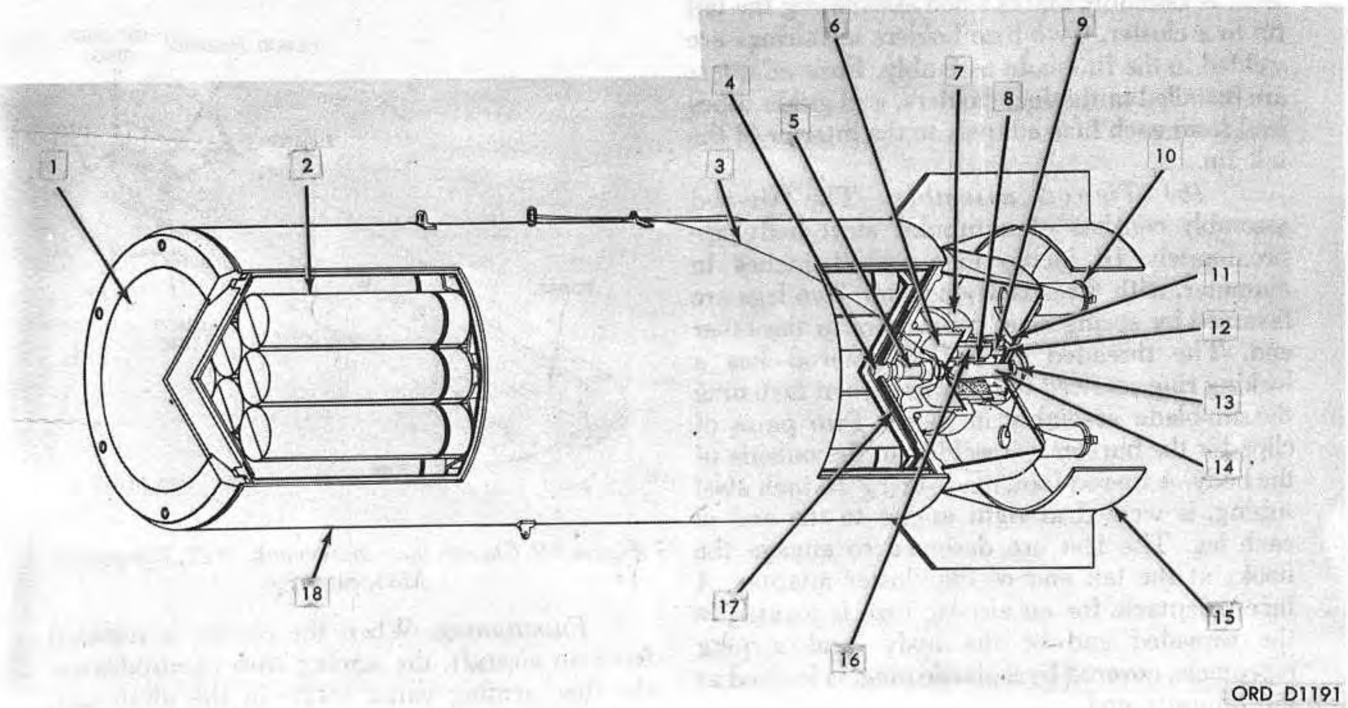


Figure 3-9. Cluster, incendiary bomb: PT1, 750-pound, M35, cutaway.

b. Functioning. When the cluster is released from an aircraft, the arming wire is withdrawn, the fuze arming vanes rotate in the airstream, and the fuzes arm. After the preset time has elapsed, one or both fuzes function and detonate the burster, which breaks the hinges holding the cluster together and breaks the feet and body of the tie-rod assembly. The cluster falls apart, allowing the bomblets to fall individually to the target.



1 Nose assembly	10 Fuze
2 Bombs	11 Burster
3 Arming wire	12 Disc
4 Stud	13 Fin nut
5 Split nut	14 Tail fin stud
6 Gas chamber	15 Tail fin
7 Chamber closure cap	16 Cluster ejection cartridge
8 Cartridge holder	17 Pressure plate
9 Striker assembly	18 Casing

Figure 3-10. Cluster, gas bomb: nonpersistent, GB, 1,000-pound, M34A1 and M34, cutaway.

3-10. Cluster, Incendiary Bomb: TH3, 750-Pound, M36

Table 3-7. Cluster, Incendiary Bomb: TH3, 750-Pound, M36

Model	M36
Length (in.)	90.0
Diameter of Body (in.)	16.0
Weight (lb)	900.0
Bomb Model	M126 (182 required)
Fin Assembly	M14
Burster	Detonating Cord
Explosive	PETN
Length (ft.)	19.0
Arming-Wire Assembly	M23
Tail Fuze	M152A1 (2 required) M908 (2 required)
Cluster Adapter	M30

a. Description. Incendiary bomb cluster M36 (fig. 3-8 and table 3-7) consists of a cluster adapter M30 filled with 182 incendiary bombs M126, and is fitted with a burster, a fin assembly, two fuzes, and an arming wire. The cluster is approximately 90 inches long, 16 inches in diameter, and weighs approximately 900 pounds. Bomb cluster M36 is identical with bomb cluster M35 (fig. 3-8) (para 3-9) except for the type and number of bomblets used.

(1) *Bombs.* Incendiary bombs M126 are loaded into cluster adapter M30 in 3 bundles of 61, 60, and 61 bombs each. The bombs are arranged in the bundles in such a way that the safety plunger on each bomb is depressed by an adjacent bomb.

(2) *Other components.* The burster, fin assembly, fuzes, and arming wires are the same as those used in bomb cluster M35.

b. Functioning. The functioning of the bomb cluster M36 is identical to the functioning of bomb cluster M35.

3-11. Cluster, Gas Bomb: Nonpersistent, GB, 1,000-Pound, M34A1 and M34

Table 3-8. Cluster, Gas Bomb, Nonpersistent: GB, 1,000-Pound, M34A1, M34

Model	M34A1, M34
Length (in.)	68.5
Diameter of Body (in.)	19.13
Weight (lb)	1130.0
Bomb Model	M125-A1-M34A1 (76 required) M125-M34 (76 required)
Fin Assembly	M13
Burster	Integral component o cluster adapter installed in tail fin.
Ejection Cartridges	M3 (4 required)
Arming-Wire Assembly	M22
Fuze	M152A1 (2 required) M908 (2 required)
Cluster Adapter	M29

a. Description. Gas bomb cluster M34A1 (fig. 3-10 and table 3-8) consists of cluster adapter M29 filled with 76 nonpersistent gas bombs M125A1 and fitted with four cluster-ejection cartridges, two fuzes, and an arming wire. The cluster is approximately 68½ inches long, 19⅛ inches in diameter and weighs approximately 1,130 pounds. Components of gas bomb M134A1 are listed as follows:

(1) *Bombs.* Nonpersistent gas bombs M125A1 are loaded into cluster adapter M29 in four bundles of 19 bombs each. The bombs are arranged in the bundles in such a way that the arming bar on each bomb is depressed by an adjacent bomb.

(2) *Tail fin.* Tail fin M13 is a component of cluster adapter M29, but is shipped in a crate separate from the filled adapter.

(3) *Burster.* The burster is a component of cluster adapter M29 and is installed in the tail fin.

(4) *Cluster-ejection cartridges.* Four cluster-ejection cartridges M3 are installed in the cartridge containers in the cluster adapter.

(5) *Fuzes.* Two mechanical time tail bomb fuzes M152A1 or M908 are installed in the fuze adapters in the tail fin. The fuzes are shipped separately from the cluster.

(6) *Arming-wire assembly.* Arming-wire assembly M22 is used with cluster M34A1 and M34.

b. Functioning. When the cluster is released from an aircraft, the arming wire is withdrawn, the fuze arming vanes rotate in the airstream, and the fuzes arm. After the preset time has elapsed, one or both fuzes function and detonate the burster. Concussion from the explosion of the burster depresses the diaphragm in the striker assemblies, driving the points of the strikers into the primers in the cluster-ejection cartridges, exploding the cartridges. Gases released by the cartridges pass through the gas chamber, through ventholes in the chamber, and into the space between the adapter casing base and the pressure plate. Pressure developed by the gases forces the pressure plate toward the nose of the cluster and causes the stud attached to the pressure plate to pull out of the split nut, which is screwed to the casing base. Continued expansion of the gases frees the nose assembly and forces the framework out of the casing. As each cluster buckle clears the casing, the buckle opens. After all buckles have opened, the adapter framework falls apart, allowing the bombs to fall individually to the target.

c. External Stowage. Streamlined gas bomb cluster M34 or M34A1 utilizing external cluster-stowage conversion set M16 may be carried beneath the wing of a bomber without seriously impairing the flight characteristics of the aircraft.

d. Differences. Gas bomb cluster M34 is identical with the M34A1 except that the M34 uses M125 bombs.

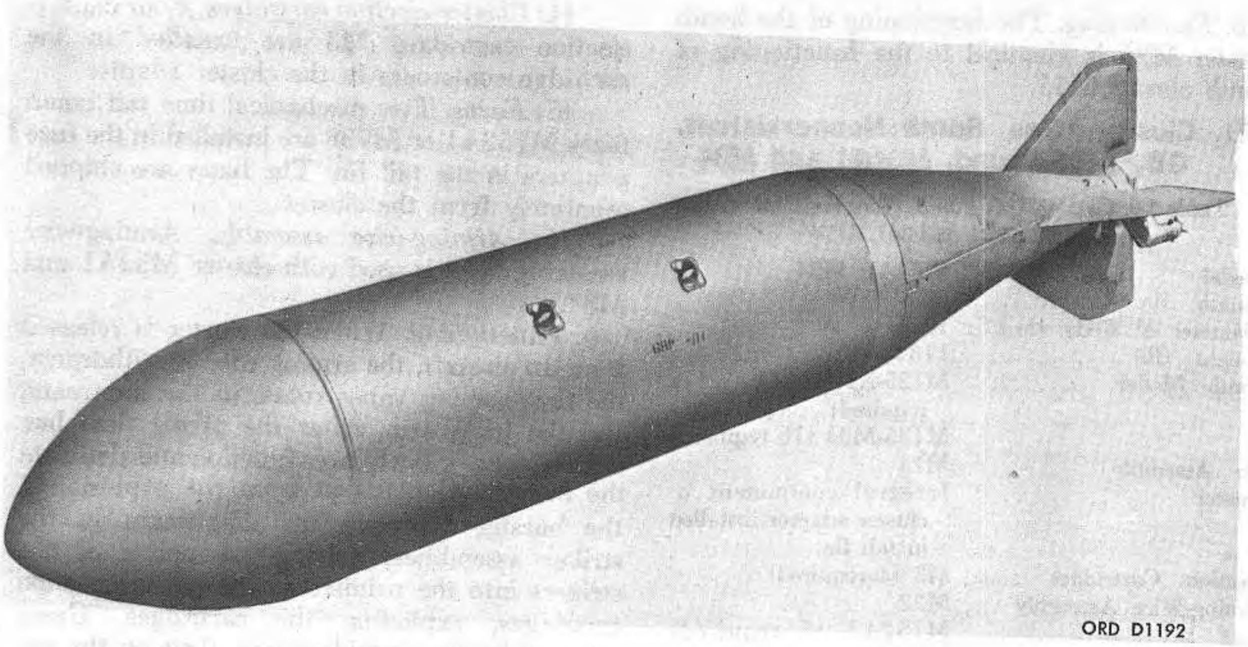
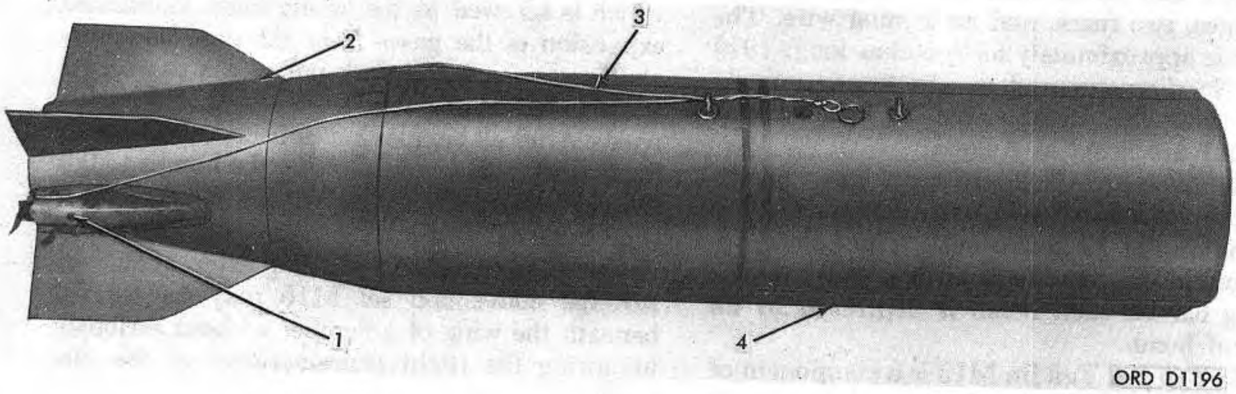


Figure 3-11. Cluster, gas bomb: M34 or M34A1, converted for external stowage on aircraft.

3-12. Cluster, Bomb: Incapacitating, BZ, 750-Pound, M43



1 Fuze M152A1 or M908
2 Fin Assembly M14
3 Arming-wire assembly M23
4 Cluster adapter M30

Figure 3-12. Cluster, bomb: incapacitating, BZ, 750-pound, M43.

Table 3-9. Cluster, Bomb: Incapacitating, BZ, 750-Pound, M43

Model	M43	Burster	Detonating Cord
Length (in.)	90.0	Length (in.)	22.0
Diameter of Body (in.)	16.0	Arming-Wire Assembly	M23
Weight (lb)	800.0	Fuzes, Tail	M152A1 (2 required) or M908 (2 required)
Bomb Model	M138	Cluster Adapter	M30
Number of Bombs	57		
Tail-Fin Assembly	M14 or E12R2		

a. *Description.* The incapacitating BZ bomb cluster M43 (fig. 3-12 and table 3-9) contains cluster adapter M30 clustered with 10-pound incapacitating BZ bombs M138, fin assembly M14, fuze M152A1 or M908, and arming wire assembly M23. Nineteen bombs are clustered in each of three longitudinal compartments inside the casing of the cluster adapter.

(1) *Incapacitating 10-pound, BZ bomb, M138.* This bomb (fig. 3-13) is a thermal generation munition consisting of four canisters nested in a tubular steel bomb casing, which has been crimped to hold the canisters in place. The canisters containing the BZ agent are aligned within the casing. Each bomb is fuzed with bomb fuze M150A2, a direct arming pin type, which is screwed into one end of the bomb. The arming pin is depressed and the safety wire is withdrawn during the assembly. The arming pin is held in the depressed position by spacers within the adapter.

(2) *Burster.* The burster consists of 22 feet of detonating cord which is threaded through the hinge tube of the cluster adapter during assembly. The ends of the detonating cord are crossed over the tail end of the cluster adapter and then inserted in the channels on the tail end of the adapter.

(3) *Fin assembly M14.* This fin assembly consists of both a fin-blade and a tie-rod assembly.

(a) The fin-blade assembly is made of sheet steel. It is a truncated cone with four fin-blades welded to it. A 3-inch central circular hole in the cone is provided to accommodate the tie-rod assembly. A sheet-steel cone welded to the forward end of the fin assembly fits over the tail of the cluster adapter. The forward edge of this cone is painted with numbered stripes for use during the assembly of the fin assembly to the adapter. Two fuze holders are welded to the fin-blade assembly. Fuze adapters with guide tubes are installed in each fuze holder.

(b) The tie-rod assembly is made of steel tubing, 18 inches long and 3 inches in diameter, with threads above end. A tubular steel tie-rod foot is welded at right angles to each leg of the tie-rod assembly. The tie-rod feet are used to engage hooks at the tail end of the cluster adapter. The threaded end of the tie-rod has a locking ring screwed on it; this ring is used when the fin assembly is fastened to the cluster adapter.

NOTE

Fin assembly E12R2 may be issued in place of fin assembly M14. Both assemblies are identical except that the central circular hole in the fin-blade assembly of the E12R2 is about 1 inch in diameter and the tie-rod assembly is made of steel bar stock fitted at the threaded end with a lockwasher and nut rather than a locking ring.

(4) *Fuze, MT, tail M152A1, or M908.* Two MT, tail fuzes M152A1 or M908 are used with bomb cluster M43. Either fuze, a combination mechanical-time and impact fuze, is a delayed-arming time fuze with both an arming pin and an arming vane.

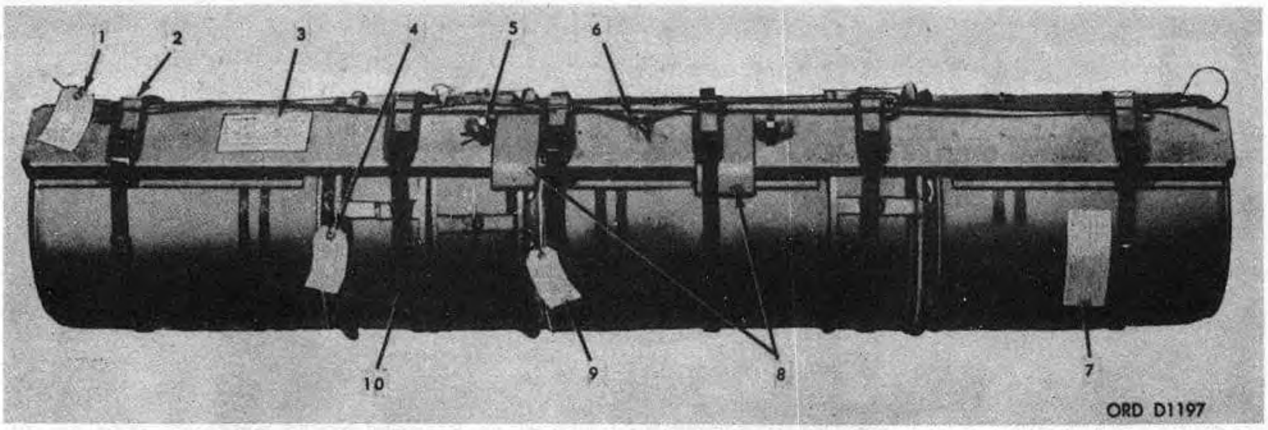
(5) *Arming-wire assembly M23.* The arming wire assembly M23 is a type-B, two branch, single-swivel loop brass wire. The branches of each length are fitted with clips.

(6) *Cluster adapter M30.* Cluster adapter M30 (fig. 3-13) is a component of both BZ bomb clusters M43, and M35 and M36 (paras 3-9 and 3-10). Descriptive information is contained in paragraph 3-17.

Figure 3-13. Cluster M43, upper casing removed.

b. Functioning. When cluster M43 is released from the aircraft, arming wire assembly M23 is withdrawn, the arming vanes of fuze M152A1 rotate in the airstream, and the fuzes are armed. After the preset time one or both fuzes function detonating the burster which breaks the straps holding the cluster together. When the cluster opens the bomblets fall individually to the target.

3-13. Cluster, Generator: Incapacitating, BZ, 175-Pound, M44



1 Tag No. 1
2 Buckle
3 Instruction decal
4 Tag No. 2
5 Suspension lug
6 Arming-wire assembly
7 Instruction decal
8 Sway-brace pad
9 Tag No. 3
10 Steel strapping

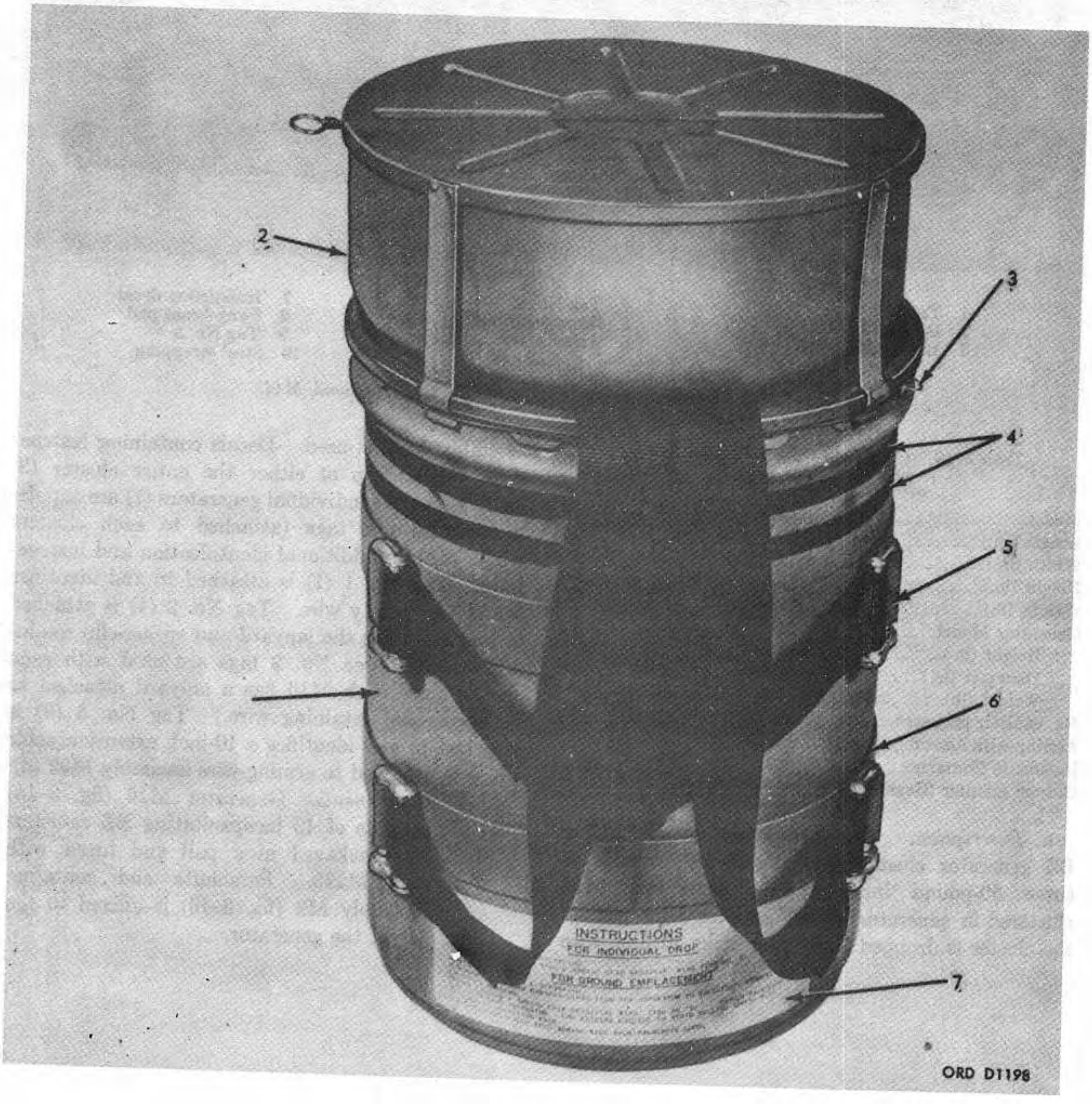
Figure 3-14. Cluster, generator: incapacitating, BZ, 175-pound, M44.

Table 3-10. Cluster, Generator: Incapacitating, BZ, 175-Pound, M44

Model	M44
Length (in.)	60.0
Width (in.)	15.0
Height (in.)	15.0
Weight (lb)	175.0
Generator Model	M16 (3 required)
Height (in.)	15.0
Diameter (in.)	12.0
Weight (lb)	50.0
No. canister packages	42
Arming-wire Assembly	M92
Parachute Container	M9
Cluster Adapter (Generator)	M39

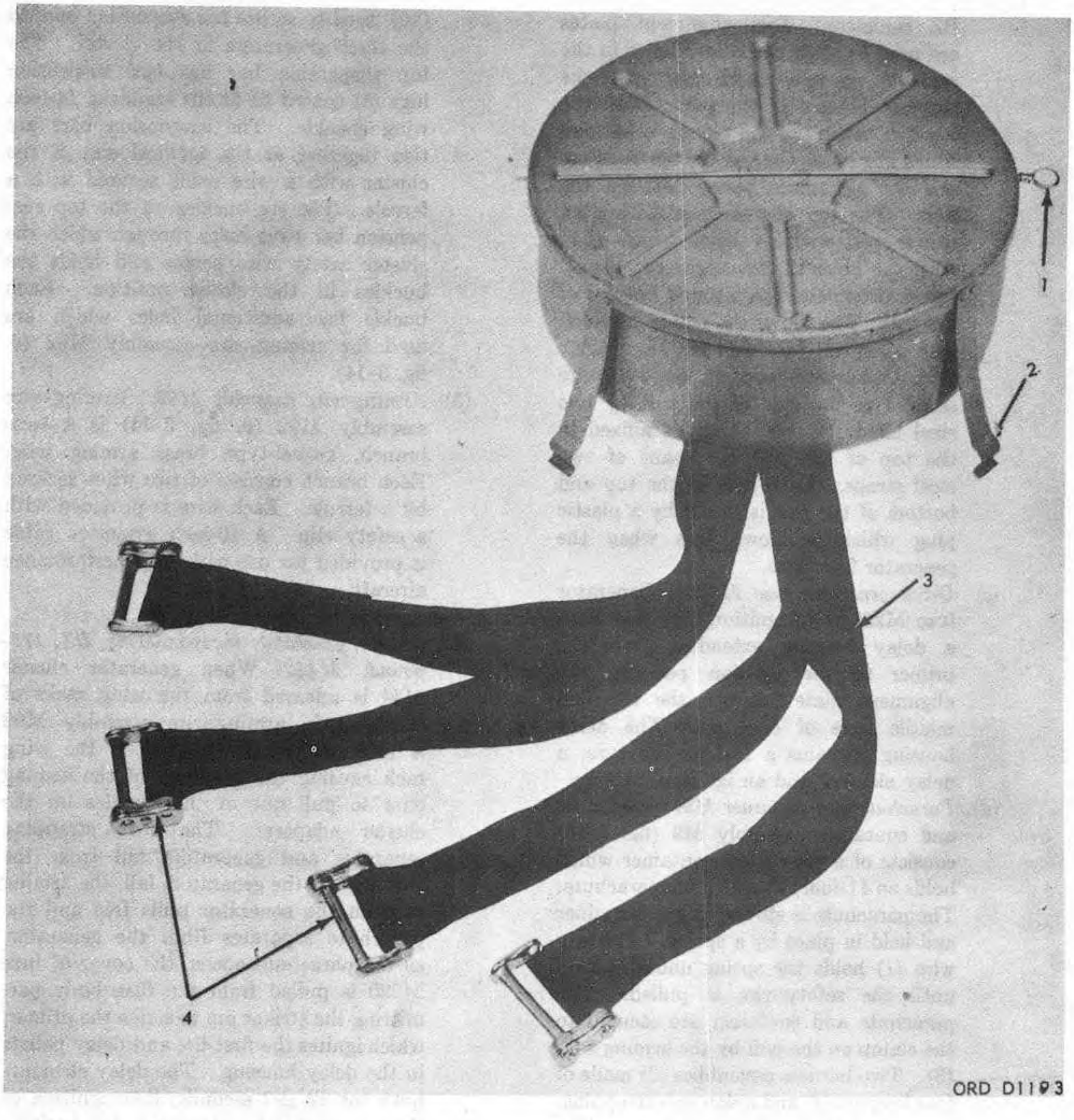
a. Description. The 175-pound incapacitating BZ generator cluster M44 (fig. 3-14) consists of three 50-pound incapacitating generators M16 clustered in generator cluster adapter M39. When the cluster is dropped from wing racks, arming-wire assembly M92 is used. Decals containing instructions for airdrop of either the entire cluster (3, fig. 3-14) or the individual generators (7) are supplemented by five tags (attached to each cluster) which contain additional identification and instructions. Tag No. 1 (1) is attached to and identifies the cluster safety wire. Tag No. 2 (4) is attached to and identifies the lanyard and spring-clip retaining wire. (Three No. 2 tags are used with each cluster since each M16 has a lanyard attached to its spring-clip retaining wire.) Tag No. 3 (9) is attached to and identifies a 10-inch extension cable which is attached to arming-wire assembly M92 (6)

(1) *Components.* Generator M16 (fig. 3-15) consists of 42 incapacitating BZ canisters M6 packaged in a pail and fuzed with fuze M220. Parachute and container assembly M9 (fig. 3-16) is affixed to the top of the generator.



1 Pail
2 Parachute-and-container assembly
3 Arming wire
4 Two red bands
5 Loop
6 Steel band
7 Instruction decal

Figure 3-15. Generator, incapacitating, BZ, 50-pound, M16 with parachute and container assembly M9 installed.



1 Safety wire
2 Spring tab
3 Harness assembly
4 Keeper

Figure 3-16. Parachute and container assembly M9.

(a) *Canister M6.* Canister M6 is a cylindrical sheet-metal container approximately 2½ inches in diameter and 4½ inches high. The canister is filled with a solid mixture of incapacitating BZ. A central cylindrical hole in the mixture is coated with a starter mixture.

(b) *Pail.* The steel pail, approximately 12 inches in diameter and 15 inches high, contains three tiers of 14 incapacitating

BZ canisters. Two alignment plates are used to align the center holes in the canisters between each tier and the top and bottom of the pail. Both the top and bottom of the pail have 14 holes which align with the holes in the canisters and the alignment plates between the tiers. The top alignment plate has an igniter pad with 14 holes which align with the holes in the alignment plates, the canister, and the top and bottom of the pail. The top of the pail is provided with a central fuze well for fuze M220. Four attachment loops (5, fig. 3–15) are secured to the side of the pail by two steel bands (6). A handle is affixed to the top of the pail by means of two steel straps. Each hole in the top and bottom of the pail is closed by a plastic plug which is blown free when the generator functions.

(c) *Delay generator fuze M220.* Generator fuze M220 is an ignition-type fuze with a delay housing extending from the primer to the ignition pad on the alignment plate between the top and middle tiers of canisters. The delay housing contains a first-fire mixture, a delay element and an ignition mixture.

(d) *Parachute and container M9.* Parachute and container assembly M9 (fig. 3–16) consists of a sheet-steel container which holds an 11-foot, 12-gore glide parachute. The parachute is stowed in the container and held in place by a spring. A safety wire (1) holds the spring under tension until the safety-wire is pulled. The parachute and container are secured to the clamp on the pail by the arming wire (3). Two harness assemblies (3) made of four keepers (4) and nylon web strapping, are attached to the parachute. The keepers are secured to the four loops (5) on the pail.

(2) *Generator cluster adapter M39.* The generator cluster adapter M39 consists of two suspension bars fitted with six buckles (2, fig. 3–14) which retain the steel strapping (10), used to secure the suspension bars to the three generators in the cluster. The top suspension bar has two suspension lugs (5) spaced to fit the standard 14-inch wing shackle. The suspension bars are tied together at the forward end of the cluster with a wire cable secured with a ferrule. The six buckles on the top suspension bar have holes through which the cluster safety wire passes and holds the buckles in the closed position. Each buckle has additional holes which are used for arming-wire assembly M92 (6, fig. 3–14).

(3) *Arming-wire assembly M92.* Arming-wire assembly M92 (6, fig. 3–14) is a two-branch, swivel-type brass arming wire. Each branch consists of two wires secured by a ferrule. Each wire is provided with a safety clip. A 10-inch extension cable is provided for use with high performance aircraft.

b. Functioning.

(1) *Cluster, generator: incapacitating, BZ, 175-pound, M44.* When generator cluster M44 is released from the wing racks of the aircraft, arming-wire assembly M92 is retained by the fixture on the wing rack causing the branches of the arming wire to pull out of the buckles on the cluster adapters. The steel strapping separates and generators fall from the cluster. As the generators fall, the arming wire on the generator pulls free and the parachute separates from the generator. as the parachute opens, the cover of fuze M220 is pulled from the fuze body permitting the striker pin to strike the primer, which ignites the first-fire and delay pellets in the delay housing. The delay elements burn for 12 ± 2 seconds; then ignition of the generator is activated by ignition mixtures igniting the igniter pads.

(2) *Cluster, generator: incapacitating, BZ, 50-pound, M16.* The initiating source for activating the fuze is a 40-pound pull on a lanyard or tripwire which causes the sequence just described.

3-14. Adapter, Cluster: 500-Pound, M25

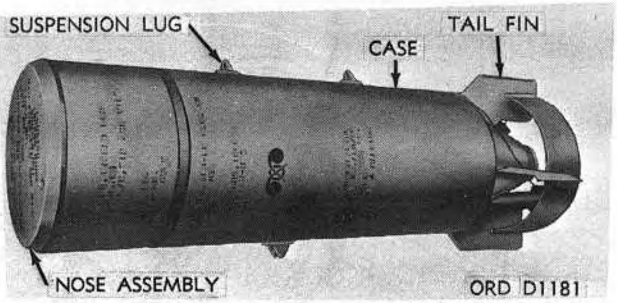


Figure 3-17. Adapter, cluster: 500-pound, M25.

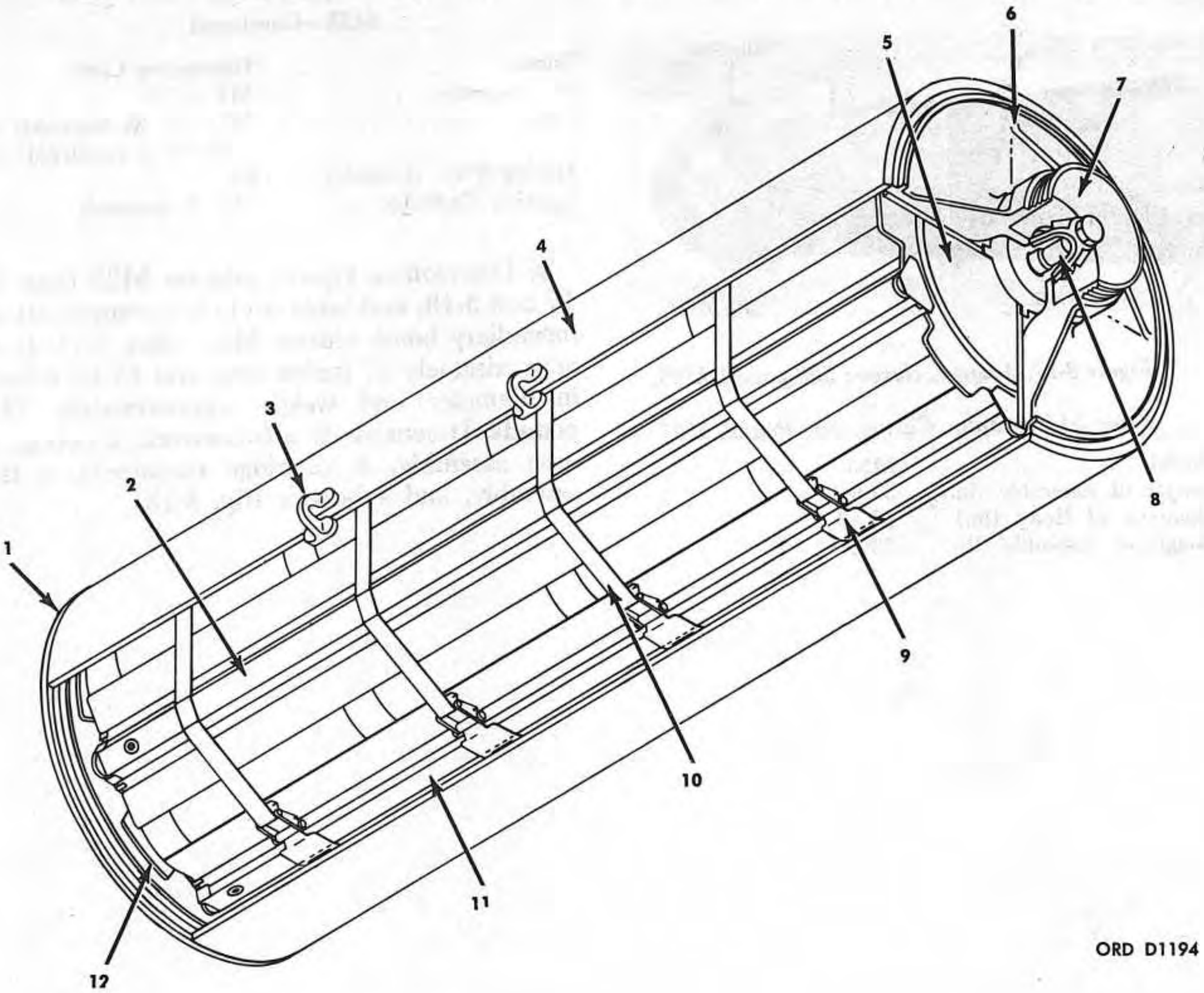
Table 3-11. Adapter, Cluster: 500-Pound, M25

Model	M25
Length of Assembly (in.)	57.0
Diameter of Body (in.)	15.13
Weight of Assembly (lb)	239.0

Table 3-11. Adapter, Cluster: 500-Pound, M25—Continued

Burster	Detonating Cord
Fin Assembly	M7
Fuze	M152A1 (2 required) or M908 (2 required)
Arming-Wire Assembly	C4
Ignition Cartridge	M2 (3 required)

a. Description. Cluster adapter M25 (figs. 3-17 and 3-18, and table 3-11) is a component of incendiary bomb cluster M31 (para 3-7). It is approximately 57 inches long and 15.13 inches in diameter and weighs approximately 239 pounds. It consists of a framework, a casing, a nose assembly, 3 cartridge containers, a fin assembly, and a burster (fig. 3-18).



1 Nose assembly
2 Cluster bar
3 Suspension lug
4 Casing
5 Pressure plate
6 Casing base
7 Gas chamber
8 Split nut
9 Buckle
10 Strapping band
11 Buckle-bar assembly
12 Front-end plate

Figure 3-18. Adapter, cluster: M25, M26 or M29 cutaway (gas chamber closure cap and fin assembly removed).

(1) *Framework.* The framework is installed inside the casing. It consists of a buckle-bar assembly (11, fig. 3-18) four cluster bars (2), a connector-bar assembly, a front end plate (12), and a rear end plate. When the adapter is assembled in a cluster, the framework is assembled and loaded with bomblets and held together by four strapping bands (10). The resulting bundle is then fastened inside the casing.

(a) Buckle-bar assembly. The buckle-bar assembly is a steel bar which extends the full length of the top of the framework. Four quick-release type buckles (9) are spaced along the buckle-bar assembly. The buckles hold the ends of the strapping bands, which fasten the parts of the framework together. The buckles are held closed by contact with the casing (4) when the adapter is assembled.

(b) Cluster bars. The four cluster bars are steel bars which form the sides of the framework.

(c) Connector-bar assembly. The connector-bar assembly is similar in construction to the cluster bars but is provided with four long slots which accommodate strap connectors. The strap connectors are crimped to the strapping bands when the framework is filled with bomblets during assembly of the adapter into a cluster. At that time the buckles are held closed by safety wires while the strapping bands are tightened and fastened by the connectors. The safety wires are removed when the filled framework is inserted in the casing.

(d) Front end plate. The front end plate is a steel plate which closes the front end of the framework. It has projecting surfaces to which the buckle-bar assembly is fastened. The nose assembly (1) is bolted to the front end plate.

(e) Rear end plate. The rear end plate is similar in construction to the front end plate but has a pressure plate (5) fastened to it. A stud in the center of the pressure plate is used to fasten the framework in the casing by means of a split nut (8).

(2) *Casing.* The casing provides the exterior covering for the adapter. Two suspension lugs (3) are attached to the top of the casing and one to the bottom. A casing base (6) is welded to the tail end of the casing. A gas chamber (7) in the center of the casing base provides a mounting for a bolt which screws to the split nut and holds the framework in the casing. Vent holes in the gas chamber provide access to the interior of the cluster from the chamber. A gas chamber closure cap is screwed into the tail end of the adapter. A threaded hole in the center of the cap receives a tail fin stud which fastens the tail fin to the adapter.

(3) *Nose assembly.* The nose assembly (1) covers the nose end of the cluster and is bolted to the front end plate of the adapter framework. The junction between the nose assembly and the casing is sealed by a gasket.

(4) *Cartridge containers.* Three cylindrical cartridge containers are screwed into holes in the gas chamber closure cap. Each cartridge container is covered by a striker assembly. The striker assembly is essentially a metal cap which houses a diaphragm, to a pointed striker is fastened.

(5) *Fin assembly.* Fin assembly M7 (fig. 3-17) is a component of adapter M25. It has a cone-shaped base which fits against the casing base. The tail fin is fastened to the adapter by the tail-fin stud, which is fitted with a washer and lockwasher and bolted to the gas-chamber closure cap. Two fuze-adapter housings at the rear end of the tail fin hold fuze adapters. When not in use, the fuze adapters are closed by fuze-adapter covers. A metal disc is welded inside the small end of the cone-shaped base at the place where the tail-fin stud enters the tail fin. The disc is designed to hold a detonating cord burster.

(6) *Burster.* The detonating cord is installed in the fin assembly between the two fuze adapter assemblies. The burster is wrapped once around a disc which is located inside the small end of the fin.

b. Functioning. When the cluster is released from an aircraft, the arming wire is withdrawn, the fuze arming vanes rotate in the airstream, and the fuzes arm. After the preset time has elapsed, one or both fuzes function and detonate the burster. Concussion from the explosion of the burster depresses the diaphragm in the striker assemblies driving the points of the strikers into the primers in the cluster-ejection cartridges, exploding the cartridges. Gases released by the cartridges pass through the gas chamber, through ventholes in the chamber, and into the space between the adapter casing base and the pressure plate. Pressure developed by the gases forces the pressure plate toward the nose of the cluster and causes the tud attached to the pressure plate to pull out of the split nut which is screwed to the casing base. Continued expansion of the gases frees the nose assembly and forces the framework out of the casing. As each cluster buckle clears the casing, the buckle opens. After all buckles have opened, the adapter framework falls apart, allowing the bombs to fall individually to the target.

3-15. Adapter, Cluster: 500-Pound, M26

Table 3-12. Adapter, Cluster: 500-Pound, M26

Model	M26
Length of Assembly (in.)	60.0
Diameter of Body (in.)	14.88
Weight of Assembly (lb)	239.0
Burster	Detonating Cord
Fin Assembly	M7
Fuze	M152A1 (2 required) or M908 (2 required)
Arming-Wire Assembly	C4
Ignition Cartridge	M2 (3 required)

a. Description. Cluster adapter M26 (fig. 3-18 and table 3-12) is a component of incendiary bomb cluster M32 (para 3-8). It is approximately 60 inches long and 14.88 inches in diameter and is similar to cluster adapter M25. It consists of a framework, a casing, a nose assembly, three cartridge containers, a fin assembly, and a burster.

(1) *Framework.* The framework is installed inside the casing. It consists of a buckle-bar assembly, five cluster bars, a front end plate, a rear end plate, and a steel pipe. When the adapter is assembled in a cluster, the framework is assembled and loaded with bomblets and held together by four strapping bands. The resulting bundle is then fastened inside the casing. The buckle bar, the five cluster bars, and the steel strapping are of the sme construction as those in cluster adapter M25. The front and rear end plates are the same as those in cluster adapter M25 except that they have threaded holes in the centers for connection to a hollow steel pipe, which strengthens the assembled framework. The steel pipe transmits to the front end plate some of the force of the cluster-ejection cartridges, relieving the pressure which otherwise would bear on the component bomblets when the framework is ejected from the casing.

(2) *Casing, hose assembly, and cartridge containers.* The casing, the nose assembly, and the cartridge containers are of the same construction as those in cluster adapter M25.

(3) *Fin assembly.* Fin assembly M7 is a component of the cluster adapter M26. This is the same fin used in adapter M25.

(4) *Burster.* A detonating cord burster like the one in the adapter M25 is installed in the fin assembly.

b. Functioning. Functioning of cluster adapter M26 is similar to the functioning of cluster adapter M25 (para 3-14).

3-16. Adapter, Cluster: 1,000-Pound, M29

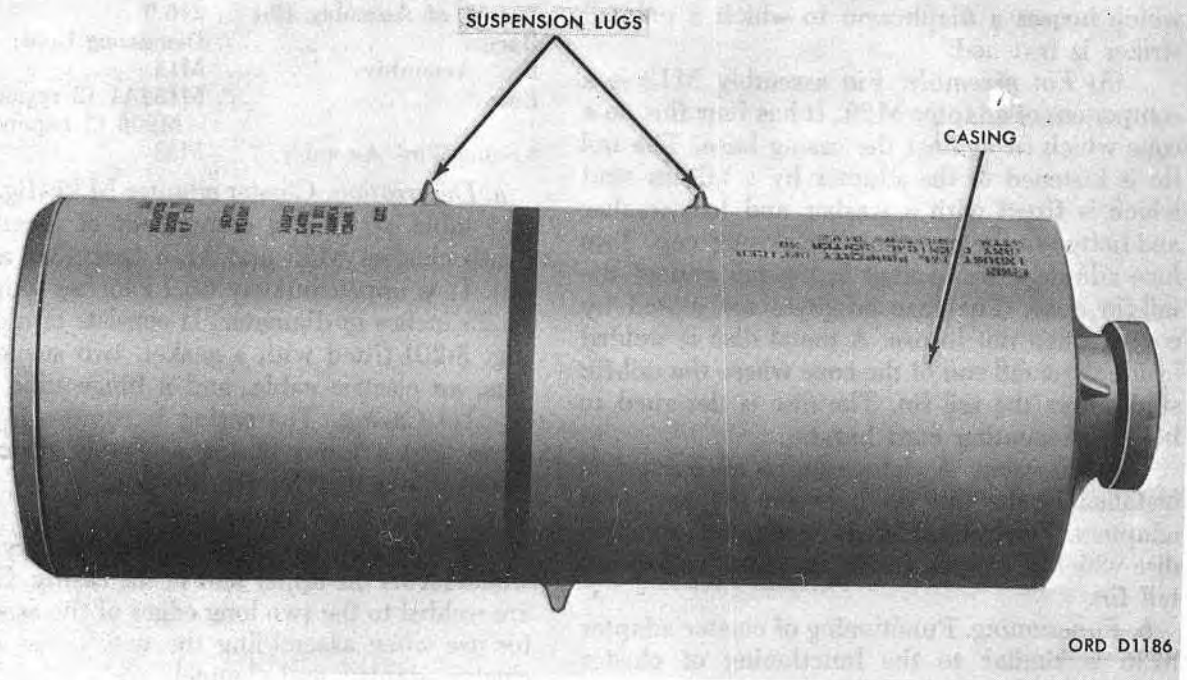


Figure 3-19 Adapter, cluster: 1,000-pound, M29.

Table 3-13. Adapter, Cluster: 1,000-Pound, M29

Model	M29
Length of Assembly (in.)	68.50
Diameter of Body (in.)	19.13
Weight of Assembly (lb.)	484.0
Burster	Detonating Cord
Fin Assembly	M7
Fuze	M152A1 (2 required) or M908 (2 required)
Arming-Wire Assembly	M22
Ignition Cartridge	M3 (4 required)

a. Description. Cluster adapter M29 (fig. 3-19 and table 3-13) is a component of nonpersistent GB gas bomb clusters M34 and M34A1 (para 3-11). It is approximately 68.50 inches long and 19.13 inches in diameter and is similar to, but larger than, cluster adapter M25. It consists of a framework, a casing, a nose assembly, four cartridge containers, a fin assembly, and a burster.

(1) *Framework.* The framework is installed inside the casing. It consists of a buckle-bar assembly (11, fig. 3-18), five cluster bars (2), a front end plate (12), and a rear end plate. When the adapter is assembled in a cluster, the framework is assembled and loaded with bomblets and held together by four strapping bands (10). The resulting bundle is then fastened inside the casing. The buckle-bar assembly, the cluster bars, the front end plate, and the rear end plate are similar in construction to those in cluster adapter M25 except that they are larger.

(2) *Casing.* The casing (4) of adapter M29 differs in construction from that of cluster adapter M25 in that the gas chamber closure cap has four holes which accommodate four cylindrical cartridge containers. The casing is similar in construction to the casing of cluster adapter M25 but is larger in order to accommodate the larger framework.

(3) *Nose assembly.* The nose assembly (1) covers the nose end of the cluster and is bolted to the front end plate of the adapter framework. The junction between the nose assembly and the casing is sealed by a gasket.

(4) *Cartridge containers.* The cartridge containers, which are larger than those in cluster adapter M25, are covered by striker assemblies. The striker assembly is essentially a metal cap which houses a diaphragm to which a pointed striker is fastened.

(5) *Fin assembly.* Fin assembly M13 is a component of adapter M29. It has four fins on a cone which fit against the casing base. The tail fin is fastened to the adapter by a tail-fin stud which is fitted with a washer and lock-washer and bolted to the gas chamber closure cap. Two fuze adapters are located in the tail end of the tail-fin cone. The fuze adapters are closed by covers when not in use. A metal disc is welded inside the small end of the cone where the tail-fin stud enters the tail fin. The disc is designed to hold a detonating cord burster.

(6) *Burster.* A detonating cord burster is installed in the tail fin between the two fuze adapters. The burster is wrapped once around a disc which is located inside the small end of the tail fin.

b. Functioning. Functioning of cluster adapter M26 is similar to the functioning of cluster adapter M25 (para 3-14).

3-17. Adapter, Cluster: 750-Pound, M30

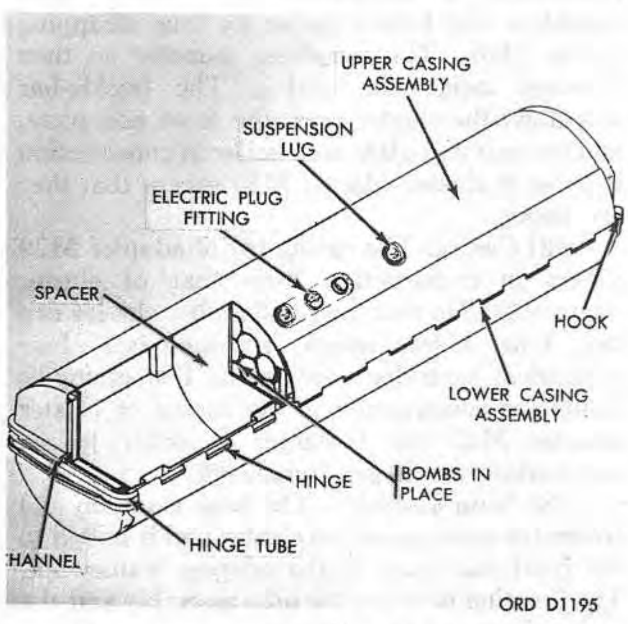


Figure 3-20. Adapter, cluster: 750-pound, M30.

Table 3-14. Adapter, Cluster: 750-Pound, M30

Model	M30
Length of Assembly (in.)	65.75
Diameter of Body (in.)	16.25
Weight of Assembly (lb)	210.0
Burster	Detonating Cord
Fin Assembly	M13
Fuze	M152A1 (2 required) or M908 (2 required)
Arming-Wire Assembly	M23

a. Description. Cluster adapter M30 (fig. 3-20 and table 3-14) is a component of incendiary bomb clusters M35 and M36 (para 3-9 and 3-10). It is approximately 65.75 inches long and 16.25 inches in diameter. It consists of a casing (fig. 3-20) fitted with a gasket, two suspension lugs, an electric cable, and a hinge tube.

(1) *Casing.* The casing is composed of an upper and a lower casing assembly which are fastened together by the hinge tube.

(a) Upper casing assembly. The upper casing assembly is a sheet-steel half cylinder which forms the upper half of the casing. Hinges are welded to the two long edges of the assembly for use when assembling the two halves of the cluster adapter, and channels are welded to the nose and tail ends to form guards for the hinge tube. Hooks welded to the ends of the channel at the tail end of the assembly provide mountings for attaching tail fin M14, which is a component of the bomb cluster. Four threaded holes are located in the side of the upper casing assembly. The center hole and two outer holes hold suspension lugs; on some adapters a fourth hole houses an electric plug fitting which is designed to be used with an electric cluster fuze. A threaded hole in the bottom of the center suspension-lug hole provides access to the interior of the cluster. It is used when testing for leakage. The hole is closed by a ⅛-inch pipe plug. When not in use, electrical plug fitting is closed by a threaded shipping plug. On those adapters having a fourth, the covered hole in the tail end of the upper casing assembly houses a receptacle for a connection to an electric cluster fuze. An insulated cable runs through the interior of the assembly between the receptacle in the tail and the electric plug fitting.

(b) Lower casing assembly. The lower casing assembly is similar to the upper casing assembly but has no holes for suspension lugs or

fittings, and no receptacles for electric plugs. It has hinges welded to the long edges, channels welded to the short edges, and hooks corresponding to those in the upper casing assembly welded to the channel at the tail end of the casing.

(c) Gasket. A rubber gasket between the upper and lower casing assemblies seals the assembled adapter against leakage.

(2) *Suspension lugs.* Two suspension lugs with threaded bases are screwed into the threaded holes in the upper casing assembly. The lugs can be used either in the two outer holes or in the center hole, depending upon the type of bomb suspension used.

(3) *Hinge tube.* The hinge tube is a U-shaped steel tube which pins the upper and lower casing assemblies together. The hinge tube is installed from the front of the adapter with one leg through the hinges at each side of the adapter, and the center portion in the channel at the adapter nose.

b. Functioning. When the cluster is released from the aircraft, the arming wire is withdrawn, the fuze arming vanes rotate in the airstream, and the fuzes are armed. After the preset time, one or both fuzes function, detonating the burster which breaks the hinges holding the cluster together. The cluster opens, allowing the bomblets to fall individually to the target.

CHAPTER 4
FUZES

Section I. IMPACT FUZES

4-1. General

An impact fuze is one that functions when it or the bomb strikes a resistant material or object. Some impact fuzes contain both instantaneous and delay capabilities. Instantaneous and nondelay are terms used to describe the fuze which explodes immediately upon impact. Delay fuzes contain an element which delays detonation until after impact, allowing time for the bomb to penetrate a target or until a low-flying aircraft which carried the bomb leaves the zone of immediate impact.

4-2. Fuze, Bomb: Nose, AN-M103A1, AN-M139A1, AN-M140A1, M164 and M165

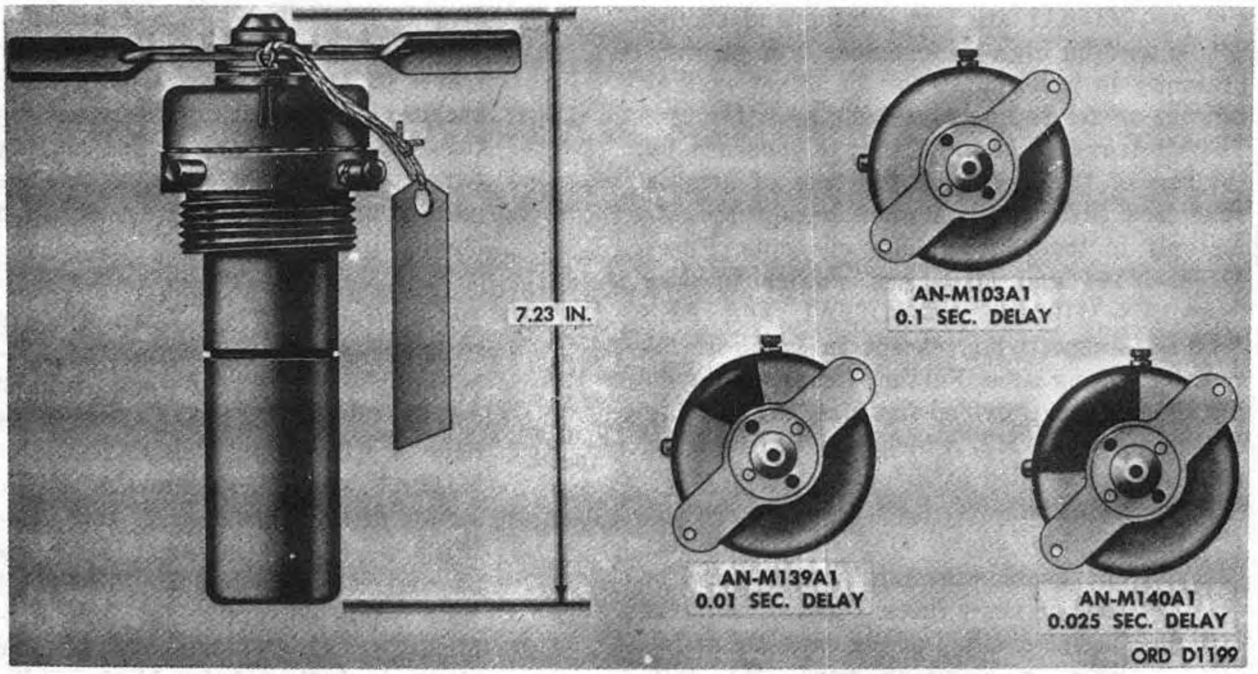


Figure 4-1. Nose fuzes AN-M103A1, AN-M139A1, and AN-M140A1.

Table 4-1. Nose Fuzes AN-M103A1, AN-M139A1, AN-M140A1, M163, M164 and M165

	AN-M103A1	AN-M139A1	AN-M140A1	M163	M164	M165
Firing Action	Impact	Impact	Impact	Impact	Impact	Impact
Firing Delay (sec)	0.1	0.01	0.025	0.1	0.01	0.025
Arming Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed
Instantaneous Setting (rev)	308	308	308	690	690	690

Table 4-1. Nose Fuzes AN-M103A1, AN-M139A1, AN-M140A1, M163, M164 and M165—Continued

	AN-M103A1	AN-M139A1	AN-M140A1	M163	M164	M165
Delay Setting (rev)	175	175	175	410	410	410
Air Travel to Arm (ft)	*	*	*	*	*	*
Vane M1	510 to 1080	510 to 1080	510 to 1080	1140 to 2420	1140 to 2420	1140 to 2420
Vane M2**	2950 to 5425	2950 to 5425	2950 to 5425			
Vane M3	------------	------------	------------	2690 to 5200	2690 to 5200	2690 to 5200
Overall Length (in.)	7.23	7.23	7.23	7.23	7.23	7.23
Protrusion from Bomb (in.)	2	2	2	2	2	2
Vane Span (in.)	6	6	6	6	6	6
Weight (lb)	3.7	3.7	3.7	3.7	3.7	3.7
Number of Vane Blades	2	2	2	2	2	2
Booster Charge: Type	Tetryl	Tetryl	Tetryl	Tetryl	Tetryl	Tetryl
Weight (oz)	1.9	1.9	1.9	1.9	1.9	1.9

* Actual air travel to arm distance within the scope of figures given above is determined by weight and size of the bomb used.
** Vane M2 works erratically on some bombs.

a. General. Nose fuzes of this type (figs. 4-1 and 4-2, and table 4-1) are vane operated and delay armed. Fuzes AN-M103A1, AN-M139A1, and AN-M140A1 are fast arming and should not be used on high-performance type aircraft presently in use. Action can be either instantaneous or delayed by presetting a setting pin. The air travel to arm distance is governed by the size of the bomb and the type of arming vane used. Structurally similar, these fuzes differ only in their firing delay elements. Fuzes M163, M164 and M165 are similar to nose fuzes AN-M103A1, AN-M139A1, and AN-M140A1, respectively, except in point of increased arming time. Further increase in arming time can be provided for fuze M163 by use of arming vane M3, which has its angle of vane surface twisted to 75°.

b. Components.

(1) *Arming vanes.* One of four interchangeable arming vanes may be used on these fuzes. Differences in the degree of pitch of the vane are as follows; a standard vane, M1 (60° pitch): vane M2 (60° pitch at the ends and 90° pitch at the center); vane M3 (75° pitch); and a flat vane (30° pitch). The bomb in which the fuze is installed and the required arming distance will determine the vane to use. For general-purpose bombs, the standard vane M1 (60° pitch) is used for a short arming distance. At present, only vane M1 is shipped with these fuzes. Separate action is necessary to requisition other vanes. 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° pitch). These fuzes also are used with certain fragmentation bombs in clusters.

(2) *Delay elements.* These fuzes differ in their firing delay elements. The AN-M103A1 and M163 have a 0.1-second delay; the AN-M139A1 and M164 have a 0.01-second delay; the AN-M140A1 and M165 have a 0.025-second delay. Vane cups of fuze AN-M103A1 (fig. 4-1) and M163 are painted yellow to indicate fuze delay time, while delay time of fuze AN-M139A1, AN-M140A1, M164 and M165 is indicated by black wedge markings on the vane cup. Approximately one-eighth of the vane cups of fuze AN-M139A1 and M164, and one-quarter of the vane cups of fuze AN-M140A1 and M165 are covered by black wedge markings, lines 6 through 13.

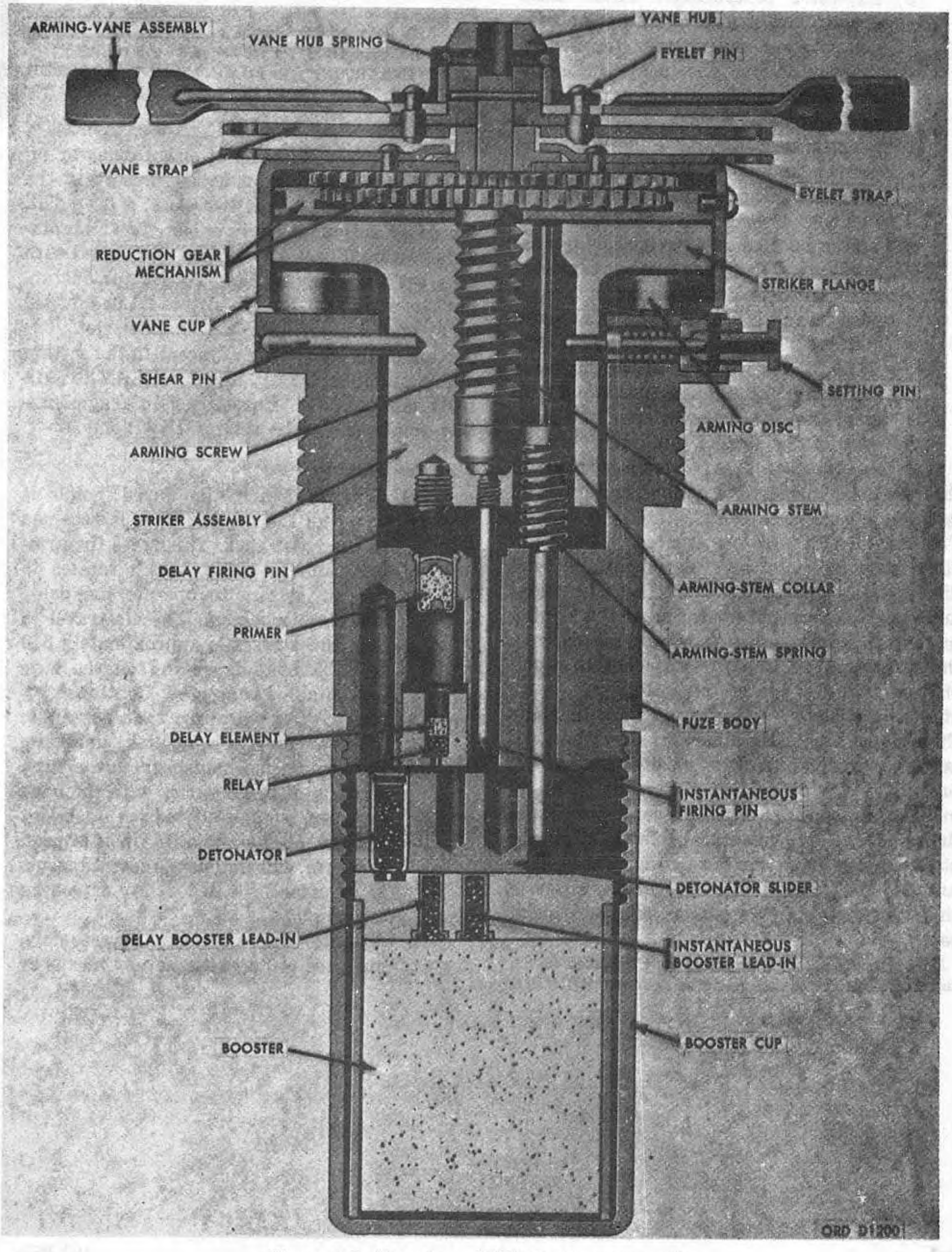


Figure 4–2. Nose fuze AN–M103A1—cross section.

(3) *Explosive components.* These fuzes contain two explosive trains: one for delay action and another 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 aligned with one of the explosive trains during arming operations; its final position depends upon the position of the setting pin.

c. Safety Features. A safety wire is threaded through holes in the vane hub, vane strap, and eyelet strap of fuzes being shipped or stored. The ends of this wire are 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 to a wire attached to a pull ring through the eye of the cotter pin. As installed in a bomb, with arming wire in place, these fuzes are in the unarmed condition; delay and instantaneous explosive trains are broken by the detonators being out of alignment. The arming discs prevent premature firing of the explosive train by holding the striker away from the fuze body. These discs are not ejected until the fuze arms. Fuzes of this type are both detonator safe and shear safe.

Note. There are two instruction tags attached to the fuze as shipped. One tag reads as follows: REMOVE THIS SEAL BEFORE ASSEMBLING VANE TO FUZE; the other, attached to the safety pin, reads: TO BE REMOVED AFTER BOMB HAS BEEN PLACED IN DROPPING GEAR AND ARMING WIRE INSERTED. IF BOMB IS NOT DROPPED, REPLACE PIN BEFORE REMOVING ARMING WIRE.

d. Presetting. Selection of either delay or instantaneous action is made by presetting the setting pin. The pin has two slots: a deep slot, for delay action; a shallow slot, for instantaneous action. Fuzes are shipped and stored with pins set for delay action. 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. Fuzes used in fragmentation bombs should be set for INST only.

e. Functioning.

(1) *General.* When the fuzed bomb is dropped, 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, depending on the fuze and pitch of vane used. 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 and with delivery altitude of the aircraft. Upon impact, the fuze will detonate instantaneously or after its rated delay, exploding the bomb.

(2) *Arming.* The arming vane assembly, mounted on the vane hub by means of

the vane hub spring and positioned on the vane strap by pins, 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 alignment 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 alignment 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. Through the reduction gear mechanism, the arming vane assembly unscrews the arming screw from the striker assembly. This carries the vane cup and the reduction gear outward until 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 delay action), it is in the way of the advancing arming stem collar. 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 aligns 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 align with the firing pin for the instantaneous explosive train.

(3) *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 firing pin for the delay explosive train 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 which passes through the fuze body and into a slot in the striker, prevents the striker from moving outward but does not prevent the striker's motion inward.

(4) *Detonation.* If the fuze has been set for delay action, the detonator is aligned 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 aligned detonator, setting it off. The detonator relays the explosion to the booster lead-in. This explodes the booster.

f. Accidental Arming. 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 partially armed.

***Warning:* No attempt should be made to disassemble this fuze. Armed or partially armed fuzes should be disposed of by authorized and qualified munitions personnel.**

4-3. Fuze, Bomb: Nose, AN-M126A1 (or AN-M126), AN-M158, AN-M159, M193

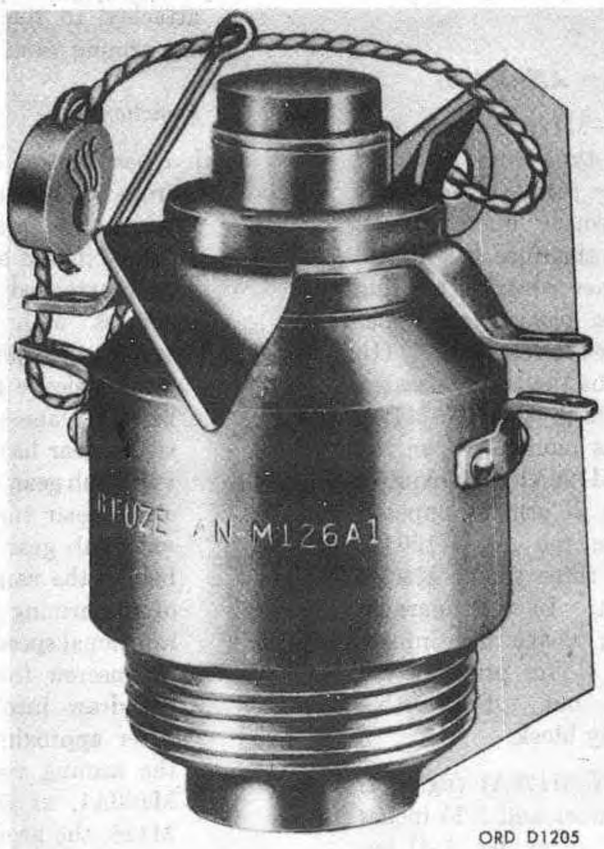


Figure 4-3. Nose fuze AN-M126A1.

Table 4-2. Nose Fuzes AN-M126A1, AN-M126, AN-M158, AN-M159 and M193

	AN-M126	AN-M126A1	AN-M158	AN-M159	M193
Firing Action	Impact	Impact	Impact	Impact	Impact
Firing Delay	Instantaneous	Instantaneous	Instantaneous	Instantaneous	Instantaneous
Arming:					
Type	Delayed	Delayed	Delayed	Delayed	Delayed
Revolutions to Arm	570	325	375 to 512	414 to 512	528
Air Travel to Arm (ft)	1200	725	1200	1200	
Overall Length (in.)	3.12	3.25	3.76	3.28	4.40
Protrusion from Bomb (in.)	2.28	2.4	2.4	2.4	3.04
Vane Span (in.)	3.9	3.0	3.0	3.0	3.0
Weight (lb)	.68 (alum.) 1.16 (steel)	1.10	1.02	0.65	1.04
Number of Vane Blades	2	2	2	2	2
Booster Charge: Type	Detonator M28	Detonator M28	Tetryl Pellet	Small Tetryl Column.	Tetryl Pellet

a. General. Nose fuzes of this type (fig. 4-3 and table 4-2) are vane operated and delay armed. They detonate the bomb instantaneously upon impact.

b. Nose Fuze AN-M126A1 (or AN-M126).

(1) *General.* Fuze AN-M126A1 (or AN-M126) is an impact-type vane operated and delay armed nose fuze. It detonates the bomb instantaneously upon impact. Instead of a booster, this fuze has a steel cylinder. The cylinder contains a firing train consisting of a primer, an upper detonator and a lower detonator. (In certain chemical bombs the train is seated against the tetryl burster.) The AN-M126, the earlier model, has more teeth on the gears than the AN-M126A1 and requires 570 vane revolutions to arm as opposed to 325 revolutions in the AN-M126A1. Fuze AN-M126 has three safety blocks, each a 120° segment. In the unarmed position, the arming sleeve fits into a groove in the blocks. This prevents the blocks from falling out. Fuze AN-M126A1 has one safety block.

(2) *Description.* Fuze AN-M126A1 (fig. 4-4) is 1.75 inches in diameter and 3.25 inches long. A cylindrical case (4, fig. 4-4) encloses the working parts. An arming-vane hub (1) with an arming vane (14) attached, a striker (15) fastened to the head of a firing pin (4) and a C-shaped safety block (2) are located at the nose end of the fuze. A detonator holder (9) containing the detonator (8) is located at tail end. The safety block is held in the unarmed fuze by an arming sleeve (13) screwed into the arming-vane hub. A 33-tooth vane-hub gear (12) is fastened to the inner end of the arming-vane hub and meshes with a pinion (11). A 34-tooth arming-sleeve gear (5) is fastened to the inner gear of the arming sleeve and meshes with the pinion. The firing pin and firing-pin spring (6) extend from the nose of the fuze through the arming sleeve and the two gears into the opening above the detonator. A retaining pin (7) holds the firing pin in the fuze. The arming vane is prevented from turning by a safety wire which is threaded through holes in two arming-wire guides (3). One of the guides is attached to the fuze case; the other, to the arming vane.

(3) *Functioning.*

(*a*) *Upon release.* Release of the fuzed bomb from the aircraft withdraws the arming wire and frees the arming vane to rotate in the airstream. The vane-hub gear attached to the arming-vane hub rotates with the arming vane and turns the pinion, which turns the arming-sleeve gear in the same direction as the vane-hub gear. The arming-sleeve gear has one more tooth than the vane-hub gear; consequently, the arming-sleeve gear turns more slowly than the vane-hub gear and lags one gear tooth behind the vane hub for each revolution of the arming vane. This difference in rotational speed causes the arming sleeve to unscrew from the vane hub and to withdraw into the body of the fuze. After approximately 325 revolutions of the arming vane, in the case of AN-M126A1, or 570 in the case of AN-M126, the arming sleeve is clear of the safety block. The safety block falls away, arming the fuze.

(*b*) *Upon impact.* When the striker hits a solid object, the firing pin is driven into the detonator. The detonator explodes, completing fuze action.

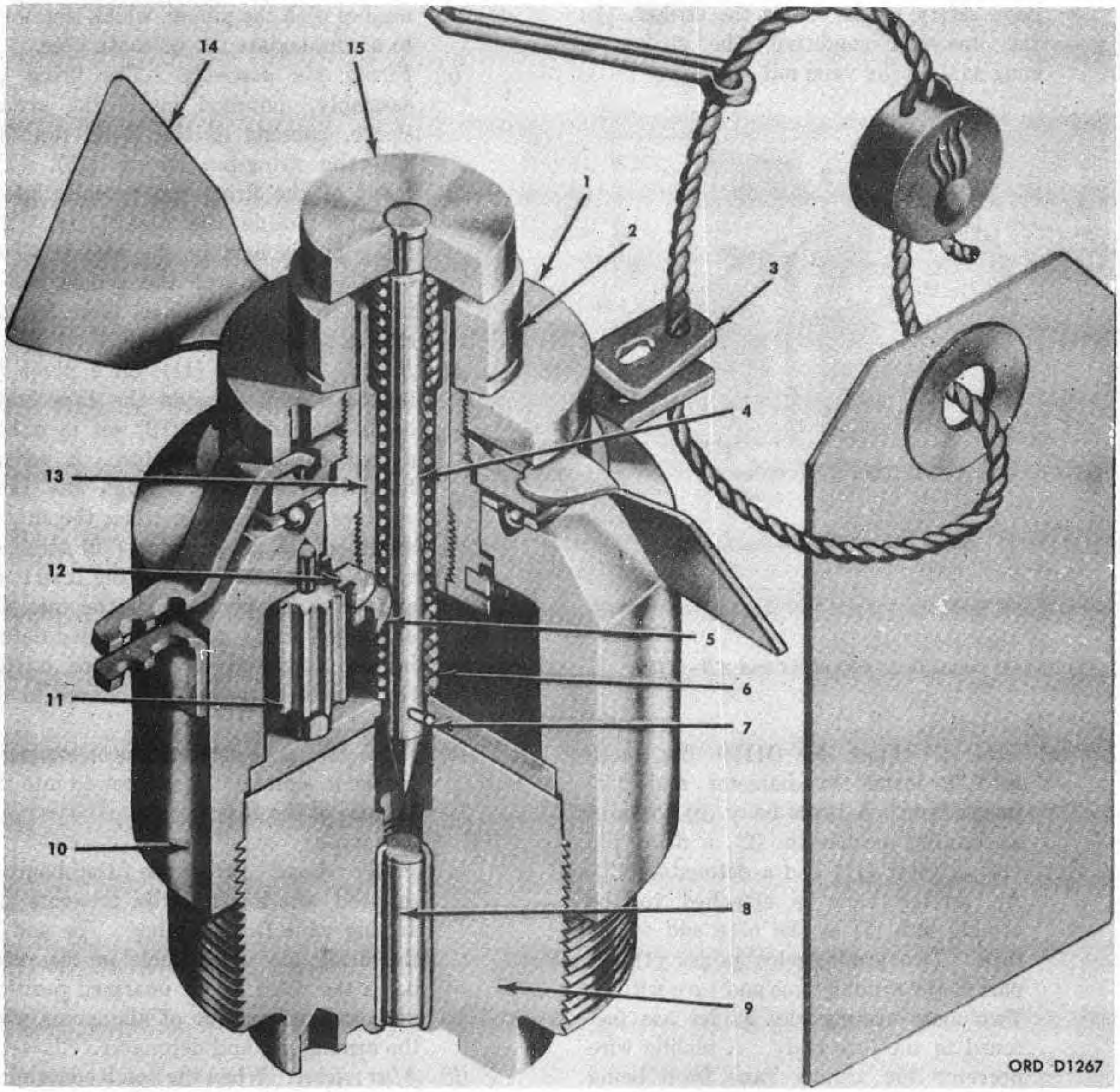
(4) *Released safe.* If it is necessary to release fuzed bombs over friendly territory, the aircraft arming controls are set in the SAFE position before the bombs are jettisoned. In this position, the arming wire is released from the bomb rack with the bomb, preventing the arming vane assembly from rotating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

(5) *Accidental arming.* The fuze is armed when the safety block is not in position between the striker and the vane hub, whether the arming vane has or has not turned.

Warning: **Never attempt to disarm a fuze 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 munitions personnel.**

c. Nose Fuzes AN–M158 and AN–M159.

(1) *General.* Fuzes AN–M158 and AN–M159 (fig. 4–5) are vane operated and delay armed. They detonate the bomb instantaneously upon impact. The air travel (1,200 feet) necessary to arm fuzes AN–M158 and AN–M159 makes them



1	Arming-vane hub	6	Firing-pin spring	11	Pinion
2	Safety block	7	Retaining pin	12	Vane-hub gear
3	Arming-wire guides	8	Detonator	13	Arming sleeve
4	Firing pin	9	Detonator holder	14	Arming vane
5	Arming-sleeve gear	10	Cylindrical case	15	Striker

Figure 4–4. Nose fuze AN–M126A1—cross section.

suitable for use with land-based and and carrier aircraft. Fuzes AN-M158 and AN-M159 differ only in that the former has a booster containing 0.6 ounce of tetryl, whereas the latter has a smaller metal holder containing a column of tetryl. This difference in booster volume has resulted in a variance in fuze length. Fuzes AN-M158 and AN-M159 do not have safety blocks under the striker. In the unarmed condition, the striker is snug against the vane nut.

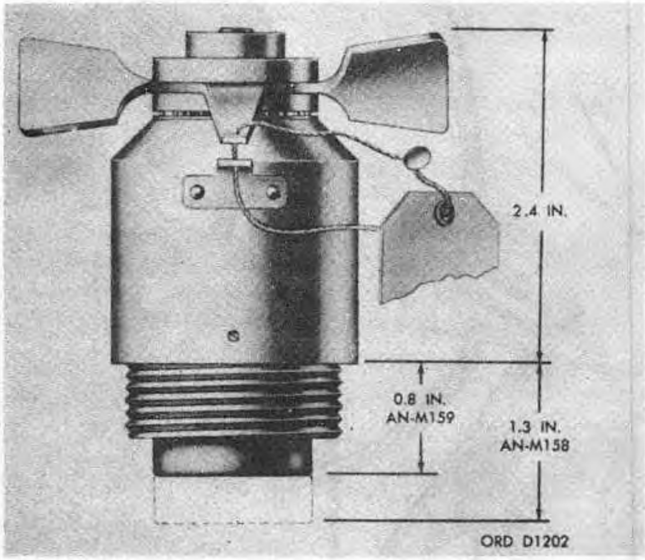


Figure 4-5. Nose fuzes AN-M158 and AN-M159.

(2) *Description.*

(*a*) *General.* Fuze AN-M159 (fig. 4-6) is 1.75 inches in diameter and 3.25 inches long. A brass body (9) contains an arming mechanism (2), a firing pin (14), a rotor (11) and a detonator (12). An arming vane is attached to the arming hub (3) at the nose end of the fuze. Two arming-wire guides (1) are part of the arming vane and turn with it. Two more arming-wire guides are fastened to the fuze body. A sealing wire prevents the arming vane from being rotated accidentally.

(*b*) *Arming mechanism.* The arming mechanism (2) consists of an arming hub (3), a pinion (6), an arming sleeve (4), a 39-tooth gear (5), and a 40-tooth gear (7). The arming hub and arming vane rotate freely on ball bearings in the nose of the fuze. The 39-tooth gear or the inner end of the arming hub meshes with the pinion. The arming sleeve with a firing pin assembly mounted in it is screwed part way into the interior of the arming hub. The 40-tooth gear on the inner end of the arming sleeve meshes with the pinion, which is grooved to accommodate the 40-tooth gear.

(*c*) *Firing pin assembly.* The firing pin assembly, mounted inside the arming sleeve, consists of the firing pin (14) and the firing-pin spring (15). The point of the firing pin extends into a chamber inside the fuze body. The firing pin is held in the arming sleeve by a shoulder near the center and is forced toward the fuze nose by the spring.

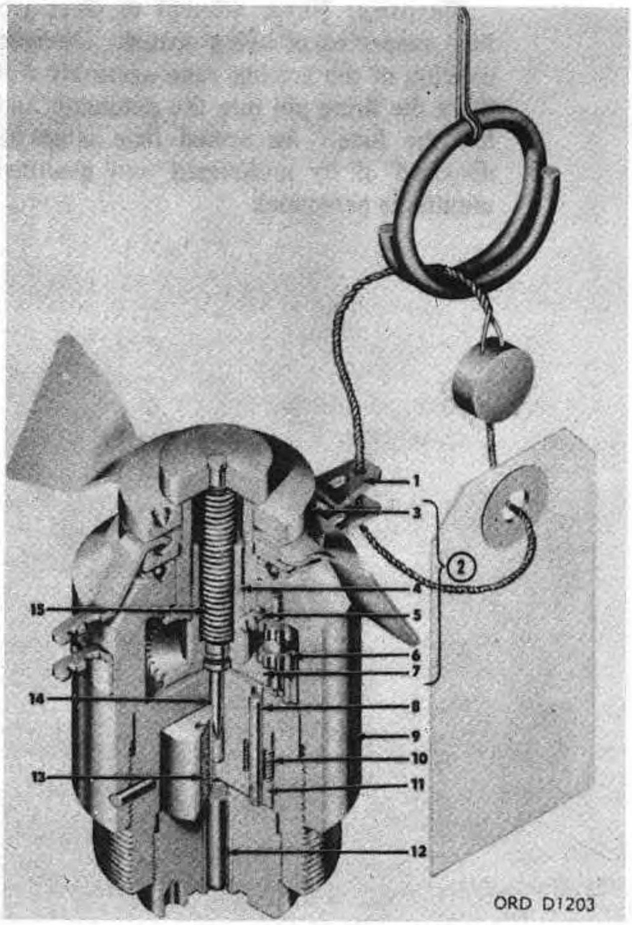
(*d*) *Rotor.* The rotor (11), on a pivot (8) in the chamber inside the fuze body, holds detonator M20(13) set in a hole drilled through the rotor. A second hole drilled partly through the rotor receives the firing pin when the fuze is unarmed. A rotor spring (10) attached to the rotor bears against the fuze body and tends to pivot the rotor into the armed position. A spring-loaded detent in the nose end of the rotor latches the rotor in place when it moves to the armed position.

(*e*) *Detonator.* The detonator is an explosive charge in a metal holder screwed into the bottom of the fuze.

(3) *Functioning.*

(*a*) *Before release.* Before the fuzed bomb is released, the arming wire prevents the arming vane from turning. The end of the firing pin in the hole in the rotor holds the rotor in the unarmed position with the primer out of alignment with the arming pin and detonator.

(*b*) *After release.* When the bomb containing the fuze is released, the arming wire is withdrawn. This frees the arming vane to rotate in the airstream, thereby turning the arming hub. The 39-tooth gear attached to the arming hub turns



1	Arming-wire guides	9	Body
2	Arming mechanism	10	Rotor spring
3	Arming hub	11	Rotor
4	Arming sleeve	12	Detonator
5	Gear	13	Detonator M20
6	Pinion	14	Firing pin
7	Gear	15	Firing-pin spring
8	Pivot		

Figure 4-6. Nose fuze AN-M159—cross section.

the pinion, which turns the 40-tooth gear attached to the arming sleeve. The gear on the arming sleeve lags one tooth behind the gear on the arming hub for each revolution of the arming vane. Lag causes the arming sleeve to screw forward into the arming hub, one revolution for every 40 revolutions of the arming vane carrying the firing pin assembly forward with it. When the firing pin assembly has advanced far enough to withdraw the point of the firing pin from the hole in the rotor (after 400 to 500 revolutions of the arming vane), the rotor spring forces the rotor to pivot until the primer is in line with the firing pin and the detonator, and the fuze is armed. As the firing pin assembly moves forward, the head of the firing pin progresses out of the fuze body. When the fuze arms, the head is approximately one-quarter of an inch forward of its original position. After arming is completed, the arming sleeve continues to move forward until the 40-tooth gear enters the groove in the pinion and disengages from the teeth, at which time the arming sleeve ceases to advance.

(c) *Upon impact.* When the head of the firing pin hits a solid object, the point is forced into detonator M20 which functions and explodes the lower detonator, completing the fuze action.

(4) *Accidental arming.* When the head of the firing pin has advanced more than one-eighth of an inch, the fuze should be considered armed and dangerous.

***Warning:* Never attempt to disarm a fuze suspected of being armed, as reserve rotation of the arming vane will force the fiiring pin into the dentonator and fire the fuze. An armed fuze must be disposed of by authorized and qualified munitions personnel only.**

d. Fuze, Bomb: Nose, M193.

(1) *General.* Nose fuze M193, a modification of fuze AN–M158 (*c* above), is authorized for use in practice bomb M124. Nose fuze M193 differs in that it has a modified arming vane and a nose shield. The arming vane has a blade angle of 85°, instead of 60°, which enables the vane to withstand higher air speeds than the conventional vane. The nose shield, a domeshaped, aluminum shell which protects the striker from excessive air pressure at high speeds, is attached by drive screws to the vane nut. Pressure on the striker would prevent it from advancing relative to the fuze body and thus prevent the fuze from arming. The shield is provided with two inspection holes through which the position of the vane hub can be observed.

(2) *Functioning.* Fuze M193 functions like fuze AN-M158.

(3) *Accidental arming.* If the striker has risen more than ¼ inch above the vane nut, the fuze must be considered armed and dangerous.

Warning: **Never attempt to disarm a fuze 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 munitions personnel.**

4-4. Fuze, Bomb: Nose, AN-MK219 Mods 3 and 4

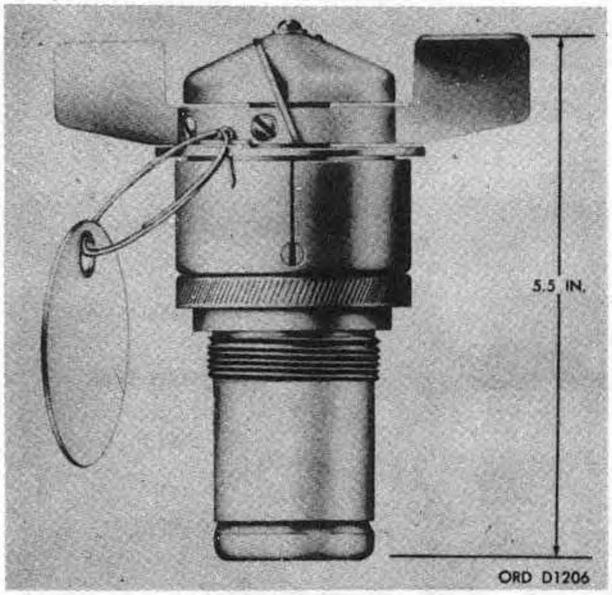


Figure 4-7. Nose fuze AN-MK219.

Table 4-3. Nose Fuze AN-MK219

Mark	AN-MK219
Mods	3 and 4
Firing Action	Impact
Firing Delay	Instantaneous
Arming:	
Type	Delayed
Revolutions to Arm	175
Air Travel to Arm (ft)	1,000
Overall Length (in.)	5.5
Protrusion from Bomb (in.)	2.9
Vane Span (in.)	4.8
Weight (lb)	4.0
Number of Vane Blades	4
Detonator Designation	MK21 Mod 0
Booster Charge:	
Type	Tetryl
Weight (oz)	0.9

a. General. This detonator-safe, vane-operated nose fuze (figs. 4-7, 4-8 and 4-9, and table 4-3) fires instantaneously upon impact. Air travel of approximately 1,000 feet is required for the delay-arming mechanism to arm the fuze. Mod 3 and Mod 4 are the same mechanicallly. Mod numbers merely indicate different manufacturers.

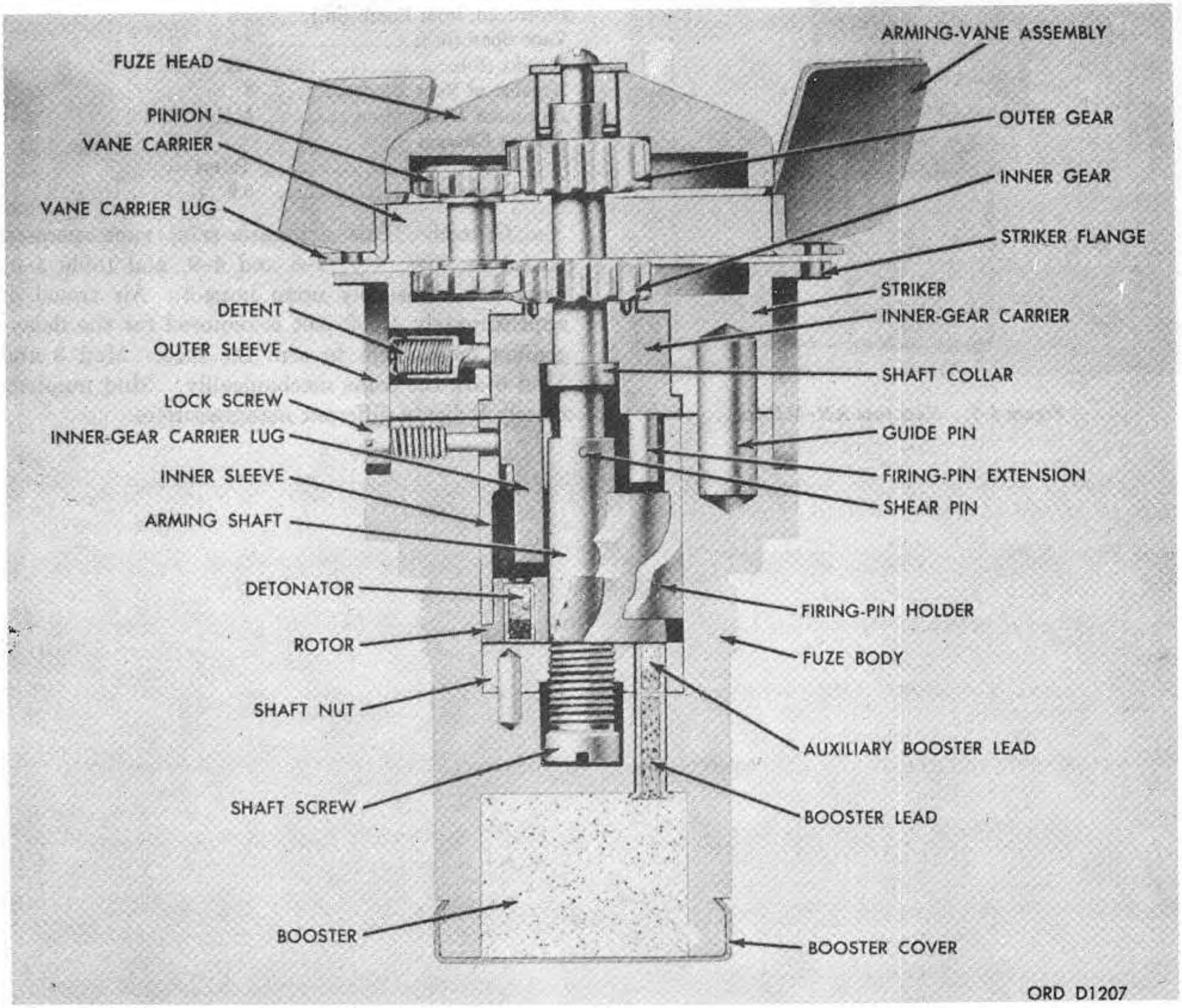


Figure 4-8. Nose fuze AN-MK 219—cross section.

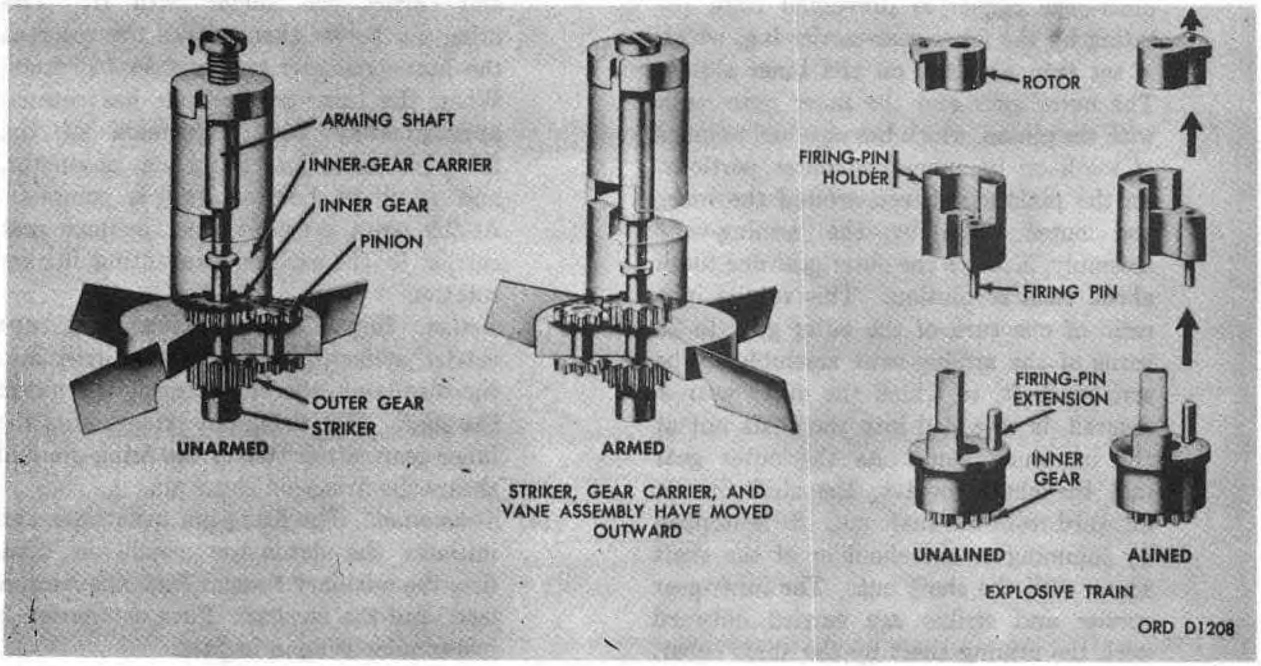


Figure 4-9. Nose fuze AN-MK219—details of operation.

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

c. Safety Features. A safety (cotter) pin through the vane-carrier lug and the flange of the striker, which locks the delay arming mechanism, safes the fuze during shipping and storage. 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 the fuze is unarmed, the explosive train is broken. The explosive components cannot become aligned until the arming mechanism is fully armed. As installed in a bomb, the fuze is unarmed. 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 unarmed, the gases would expand in the space above, and no further action would take place. The delay arming mechanism provides maximum safety for dive bombing as well as protection against detonation when the bomb is accidentally released from an aircraft flying at low altitudes.

d. Functioning.

(1) *General.* When the fuzed bomb is released free to arm, the vane carrier is unlocked from the striker flange by withdrawal of the arming wire. The vane carrier then rotates by action of the airstream 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 1,000 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.

(2) *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 inner-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. 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 the innermost end. As the outer gear and the shaft revolve, the shaft moves outward from the shaft nut. It is stopped by jamming of the shoulder of the shaft screw with the shaft nut. The inner-gear carrier and striker are carried outward with the arming shaft by the shaft collar. Jamming of the shaft screw disengages the inner-gear-carrier lug from the slot in the inner sleeve, freeing the inner-gear carrier. The outer gear is prevented from rotating by the jammed shaft screw. Thus, 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, which houses the firing-pin extension. Below the inner gear carrier, within the inner sleeve, is the firing-pin holder, a partial cylinder fitting around the arming shaft. This holder contains the firing pin secured in position by a shear pin. The inner-gear-carrier lug is located in the upper portion of the cylinder. The rotor pivots about the arming shaft, at the inner end above the shaft nut. This unit contains the fuze detonator. 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 rotated approximately 345°, alignment of the firing-pin extension, firing pin, detonator, and auxiliary booster lead is complete. At this point, a detent locks the inner-gear carrier to the striker, preventing further rotation.

(3) *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.

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

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

f. Accidental Arming. This fuze will be regarded as armed if the striker flange has advanced 5/16-inch from the outer sleeve. Outward appearances provide no definite indication as to whether or not the fuze is partially or fully armed. When the fuze is fully armed, the flange of the striker is separated from the outer sleeve by 5/16-inch and the inner-gear carrier has rotated 345°, bringing the firing-pin extension, the firing pin, and the detonator into alignment.

***Warning:* Armed and partially armed fuzes should be removed from bombs by authorized and qualified munitions personnel only.**

4-5. Fuze, Bomb: Nose, MK243 Mod 0 and MK244 Mod 1

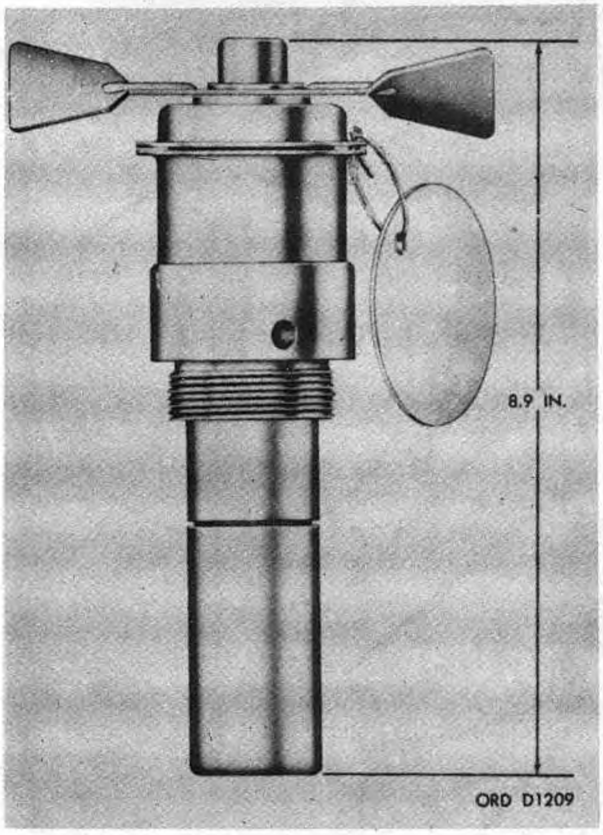


Figure 4-10. Nose fuze MK243 Mod 0 or MK244 Mod 1.

Table 4-4. Nose Fuze MK243 Mod 0 and MK244 Mod 1

Mark	243	244
Mod	0	1
Firing Action	Impact	Impact
Firing Delay (sec)	0.025	4.0
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.)	6.0	6.0
Weight (lb)	4.4	4.4
Number of Vane Blades	2	2
Detonator Designation	MK22 Mod 0	MK22 Mod 0
Booster Charge:		
Type	Tetryl	Tetryl
Weight (oz)	1.9	1.9

a. General. These vane-type, delay-armed, impact nose fuzes (figs. 4-10 and 4-11, and table 4-4) either are or are not water-discriminating, depending upon the design of the striker plate and the shear threads supporting the striker. Air travel of approximately 450 feet is necessary to arm these fuzes for action. Nose fuze MK243 Mod 0 differs from nose fuze MK244 Mod 1 in external markings and in the delay element. Water-discriminating nose fuze MK243 Mod 0 functions after a 0.025-second delay, while nose fuze MK244 Mod 1, which is not water discriminating, has a delay of 4 seconds. When nose fuze MK243 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. Use of this nose fuze with certain inertia-firing tail fuzes having a 0.24-second primer-detonator M14 effects a dual purpose: nose fuze MK243 Mod 0 will detonate the bomb after a 0.025-second delay in case of a direct hit; in case of a near miss, the tail fuze will detonate the bomb at an optimum penetration of about 25 feet to produce a mining effect. Nose fuze MK244 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 MK243 Mod 0. Nose fuze MK244 Mod 1 will function when dropped on soft ground from an altitude of 1,000 feet, or when dropped on water from an altitude of 3,000 feet. This fuze body is labeled 4 SEC. DELAY.

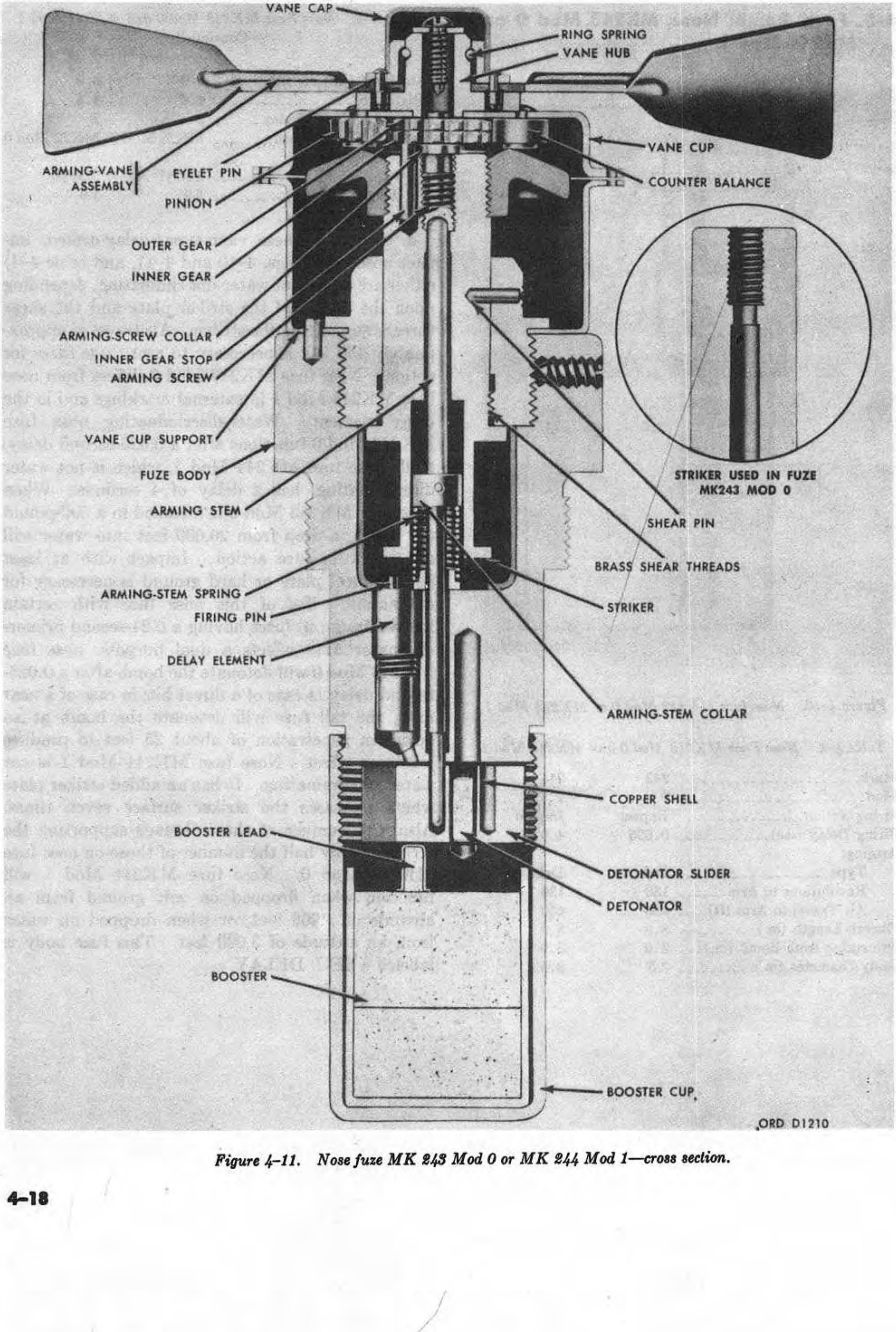


Figure 4-11. Nose fuze MK 243 Mod 0 or MK 244 Mod 1—cross section.

b. Explosive Components. The explosive components consist of a delay element, a detonator, a booster lead, and a booster charge. The booster consists of 1.9 ounces of tetryl.

c. Safety Features. Each fuze is individually packed in a sealed container. A safety (cotter) pin, with a tag attached, which passes through holes in the flange of the vane cup and in the flange of the vane-cup support, 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.

d. Functioning.

(1) *General.* When the fuzed bomb is dropped, 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 (approximately 450 feet of air travel along the trajectory of the bomb), the fuzes become armed and the arming mechanism is released into the airstream. These fuzes will detonate upon impact with a sufficiently dense substance.

(2) *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 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, a metal cube containing the detonator. The detonator slider 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 aligned with the explosive train. Raising of the arming stem during arming allows the slider springs to move the slider sideways. When the detonator is properly aligned with the delay element and the booster lead, the slider is locked in position by a spring-loaded detent and a lock pin. Continued rotation of the arming vane unscrews the arming screw from the striker, freeing the reduction gears, the vane cup, and the arming-vane assembly to the airstream. The fuze is then armed.

(3) *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.

(4) *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.

e. Released Safe. If it is necessary to release fuzed bombs over friendly territory, aircraft arming controls should be 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.

f. Accidental Arming. 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 determined by measuring the distance between the flange of the vane cup and the flange of the vane-cup support. When this distance measures ¼-inch or more, the fuze is fully armed; less than ¼-inch, the fuze is partially armed.

Warning: **Armed and partially armed fuzes should be removed from bombs by authorized and qualified munitions personnel only.**

4-6. Fuze, Bomb: Nose, M904E1, M904E2 or M904E3

a. General. These fuzes (fig. 4-12 and table 4-5) are designed for use with fragmentation bombs, old-series, new-series, low-drag GP bombs, and massive-type gas bombs. These fuzes, in that they provide for a wider range of selective arming, and impact firing delays, are superior to older fuzes. A minimum airstream speed of approximately 150 knots is required for arming the fuze. Fuzes M904E2 and E3 delay time is marked off in 2-second intervals to 18 seconds, while fuze M904E1 has an arming delay time of 4 to 20 seconds (4, 6, 8, 12, 16 and 20-second settings). Fuzes M904E1, E2 or E3 can be used instead of fuzes AN-M103A1, AN-M139A1, AN-M140A1, M163, M164 and M165. Impact-firing delay time is provided by delay element M9(T2). Adapter booster M148 (T45E7) is required in all but the older GP bombs in order to use fuzes of the M904 series since the fuze thread diameter is two inches, while threads of fuze wells of the newer GP bombs are three inches in diameter. Fuzes M904E1, E2 or E3 may be used for impact and impact-delay application in conjunction with tail fuze M905, and form the nose complement of the fuzing system. Fuzes M904E1, E2 and E3 are structurally similar. The E1 and E2 differ in their arming delay settings. M904E3 differs from M904E1 and E2 as follows: the window in the fuze body is relocated for increased visibility of the striker body with improved markings, the striker pin is hollow, and the nose housing shear lugs are reduced in cross-sectional area.

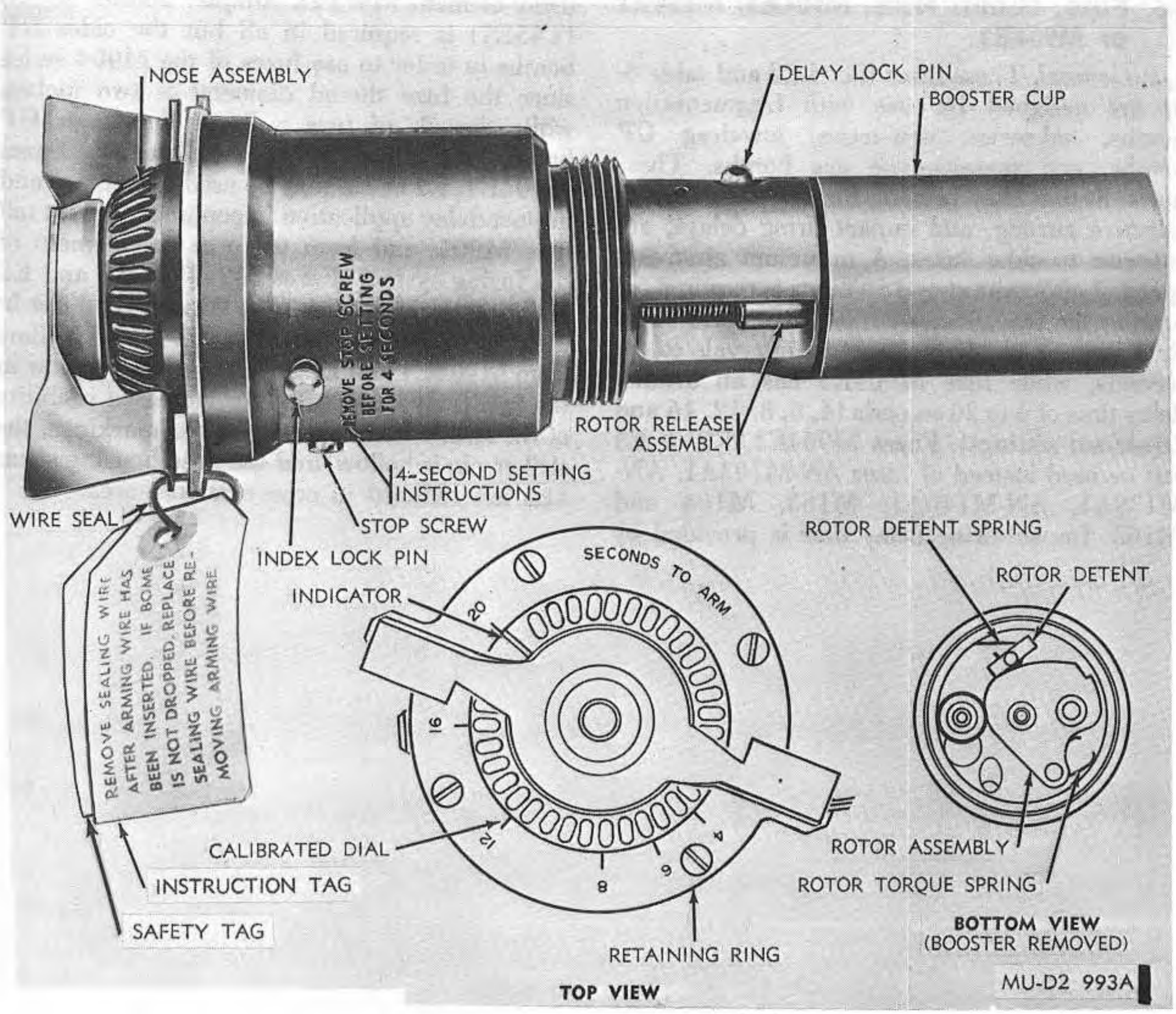


Figure 4-12. Nose fuze M904 series.

Table 4-5. Nose Fuze M904 Series

Model	M904E1, M904E2, M904E3
Arming Delay (sec):	
M904E1	4 to 20 (selective)
M904E2, M904E3	2 to 18 (selective)
Firing Delay (sec)	0.01, 0.025, 0.05, 0.10, 0.25, or (instantaneous) non-delay
Overall Length (in.)	9.38
Protrusion from Bomb (in.)	4.25
Vane Span (in.)	3.75
Weight (lb)	2.10
Booster:	Tetryl
Weight (oz)	2.63

b. Components (fig. 4-13).

(1) *Nose assembly.* This assembly contains the following: housing and vane assembly, gear train and governor assembly, index ring, and arming stop. The vane assembly is secured to a spindle and drum assembly, thereby allowing the two assemblies to turn as one unit. The nose retainer ring, when secured to the upper portion of the fuze body, holds the knurled nose assembly in place in the fuze body. An indicator on the nose assembly is used in conjunction with a calibrated dial stamped on the retainer ring for selecting arming delay time for the fuze. The vane is prevented from rotating by the wire seal

until the fuze is prepared for use. The gear train and governor assembly, mechanically connected to the governor drum, is secured to the gear train which, in turn, is attached to the arming stop. The two drive pins of the arming stop are mechanically connected to the striker body assembly.

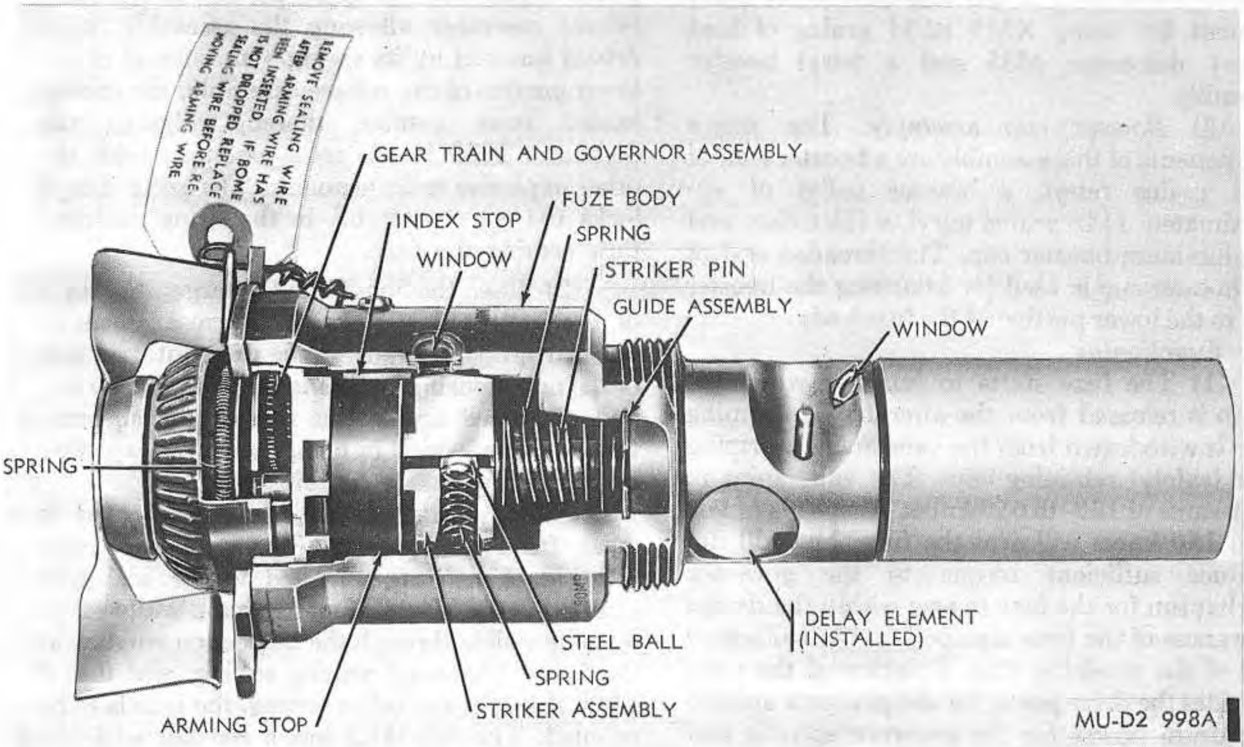


Figure 4-13. Fuze M904 series—cross section.

(2) Fuze body assembly. This assembly contains the following major components: index lock pin, stop screw, index stop, striker body assembly, striker pin and guide assembly, rotor release assembly, delay lock pin relay XM9, rotor assembly containing detonator M35, and the fuze body. When the indicator is rotated to a new arming delay mark of time, the index lock pin must be pushed inward in order to release the index ring. For fuzes M904E1, E2 or E3 the stop screw must be removed to select an arming delay time of less than six seconds. The striker body assembly, containing a steel ball, spring, and striker pin guide, is held in place by the index stop, which is secured to the fuze body. The striker pin is fastened to the guide assembly with a shear pin. The guide assembly is held in place in the fuze body with a retaining ring. Relay element XM9 is located in the lower portion of the fuze body. Delay element M9, when installed in the cavity in the fuze body, is held in place by a spring loaded lock pin. The lower portion of the rotor release assembly holds the rotor assembly (containing detonator M35) in an out-of-line position with other explosive train elements. The window in the middle of the fuze body is used to view the position of the striker body. When the fuze is in the unarmed condition, either white stripes on the top of the striker body (M904E1 or E2), or green stripes on the periphery of the striker body (M904E3) will be visible when the arming delay time setting is at 6 or 18 seconds (20 seconds on M904E1). If the stripes appear in the window at any other delay time setting, the fuze must be considered partially armed. In all three models if the fuze is

completely armed, the window will show fully red. The window in the lower portion of the fuze body is used for viewing the upper edge of the rotor assembly; full red indicates that the rotor assembly has been released and detonator M35 is in line with the other explosive train elements. The explosive train of the fuze consists of delay element M9 relay XM9 (2.31 grains of lead azide), detonator M35 and a tetryl booster assembly.

(3) *Booster cup assembly.* The major components of this assembly are a booster lead of 1.55 grains tetryl, a booster pellet of approximately 1146 grains tetryl, a filler disc, and an aluminum booster cup. The threaded end of the booster cup is used for attaching the booster cup to the lower portion of the fuze body.

c. Functioning.

(1) The fuze starts to function when the bomb is released from the aircraft. The arming wire is withdrawn from the vane and the arming wire (safety) retaining clips. The vane spins in airstreams of 150- to 650-knots. Airspeeds of less than 150 knots will arm the fuze, but will not produce sufficient torque to the governor mechanism for the fuze to arm within the design tolerances of the time stamped on the calibrated dial of the retaining ring. Rotation of the vane provides the drive power for the governor spindle and drum power for the governor spindle and drum assembly. The centrifugal-type clutch maintains the output speed from the governor at a constant 1800 (plus or minus 100) revolutions per minute. The governor output is transmitted through the gear train. This causes the arming stop to rotate through an angle corresponding to the selected arming time of approximately 11 degrees-per-second of arming delay. While the arming stop is rotating to the armed position, three other parts rotate with it: the striker body, the striker pin, and the striker pin guide, driven by the drive pins and keyed to the arming stop. When the arming stop has moved to the armed position, a slot in the striker body aligns with a slot in the index stop. The helical spring forces the striker body forward until it rests against the index stop of the arming stop. Immediately, a helical spring forces the steel ball into the void above the firing pin. A cut-out in the striker pin guide aligns with the upper portion of the rotor release assembly allowing the assembly to be driven forward by its spring. On removal of the lower portion of the release assembly, the spring-loaded rotor rotates, thereby aligning the detonator M35 in the rotor assembly with the other explosive train elements. The rotor detent locks the rotor assembly in the firing position, thus arming the fuze.

(2) When the bomb hits the target, the force of the impact drives the entire nose assembly rearward, thereby causing the three integral lugs of the nose housing to be sheared off. The striker body is forced against the striker pin, shearing the shear pin, which in turn, causes the explosive train components to be initiated.

d. Safety Features. A seal wire inserted in these fuzes prevents the arming vane from rotating. A red tag attached to the seal wire inserted in the M904E1 states that a white stripe must be visible through the inspection window at the 6 and 20-second arming setting, and that if white shows at any other setting, the fuze is to be rejected. The M904E2 has a red tag with the same notation for the 6 and 18 second=arming setting. The M904E3 has a red tag with the same notation for the 6 and 18 second arming setting except that green stripes must be visible in lieu of white stripes. A small window in the thumb grip just above the rotor cavity shows the rotor after it moves in line and is locked in place by the rotor detent. The window in the body will show red if the striker body has moved into firing position. Either condition indicates an armed fuze. In the unarmed condition, the rotor is out of line with the rest of the explosive train.

4-7. Fuze, Bomb: Nose, M142A1

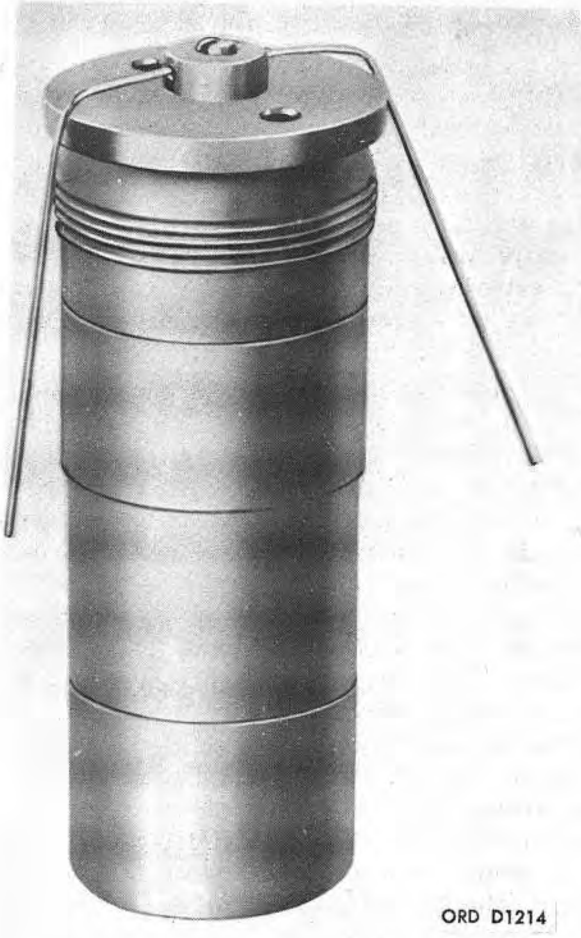
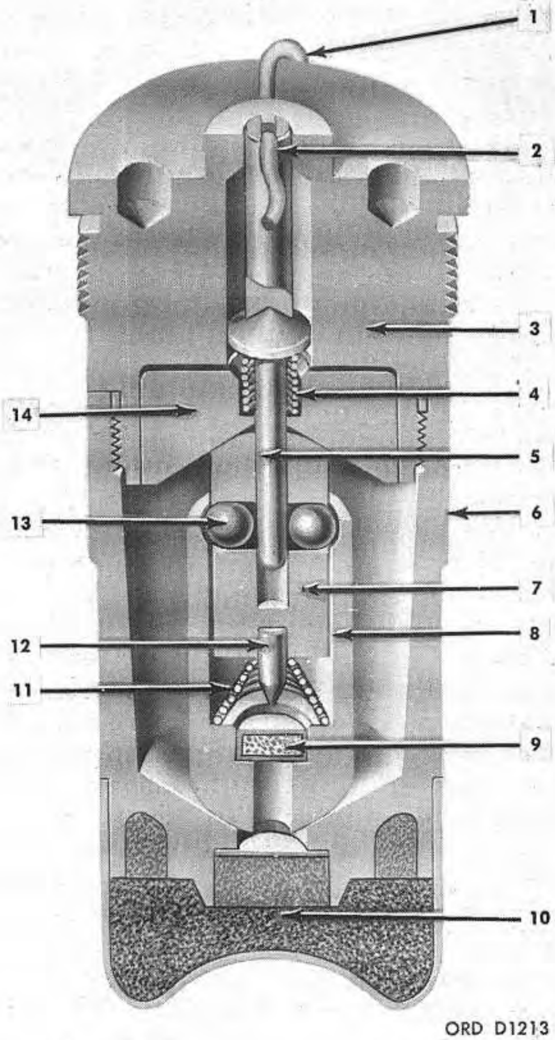


Figure 4-14. Nose fuze M142A1.

a. General. Nose fuze M142A1 (fig. 4-14) is an impact fuze of the direct-arming arming-pin type. It is used in the 10-pound incendiary bomb M74.

b. Description. Fuze M142A1 is 1.17 inches in diameter and 3.38 inches long. A case (6, fig. 4-15) encloses a striker (7), a sleeve (8) containing a primer (9), and a booster (10). A head assembly (3), containing an arming pin (5), an arming-pin spring (4), and a release pin (2), is screwed into the open end of the case. An arming pin retainer (14) pressed into the head of the fuze holds the arming pin and arming-pin spring in place. A safety-wire (1), removed when the bomb containing the fuze is clustered, holds the release pin in the fuze.



1 Safety wire
2 Release pin
3 Head assembly
4 Arming-pin spring
5 Arming pin
6 Case
7 Striker
8 Sleeve
9 Primer
10 Booster
11 Striker spring
12 Firing pin
13 Steel ball
14 Arming-pin retainer

Figure 4-15. Nose fuze M142A1—cross section.

c. Installation. The fuze is installed in the bomb nose during manufacture. Removal of the fuze in the field is not authorized.

d. Functioning.

(1) *Before release from cluster.* When a bomb containing fuze M142A1 is clustered, the safety wire is withdrawn, and the release pin is depressed by a release bar held down by contact with other bombs in the cluster. The release pin holds down the arming pin against the force of the arming-pin spring. The striker and sleeve are locked together by two steel balls (13) located in two holes in the striker. Each ball is held outward in a recess in the sleeve by the arming pin. This prevents the firing pin (12), which is part of the striker, from striking the primer.

(2) *After release from cluster.* Release of the bomb from the cluster removes pressure from the release pin. The release pin is ejected from the fuze by the arming pin which is driven outward by the arming-pin spring. Withdrawal of the arming pin frees the two steel balls to move toward the center of the fuze, unlocking the striker from the sleeve. The striker and sleeve are then free to move in either direction. The firing pin is held away from the primer only by the striker spring (11), and the fuze is armed.

(3) *Upon impact.* If the bomb strikes nose first, inertia causes the sleeve to move toward the striker, compressing the striker spring. The primer hits the firing pin and is activated. Flame from the primer ignites the booster, completing the fuze action. If the bomb strikes tail first, inertia causes the striker to move toward the sleeve, compressing the striker spring and allowing the firing pin to strike the primer. Flame from the primer ignites the booster, completing the fuze action. If the bomb strikes with the side of the fuze turned toward the point of impact, inertia causes the striker and the sleeve to move toward the side of the fuze, and the striker is forced into the sleeve by the sloping surfaces of the arming-pin retainer and the fuze case. The firing pin strikes the primer and the fuze action is completed as described above.

e. Accidental Arming. If the fuze is armed accidentally, the bomb containing it must be disposed of by authorized and qualified munitions personnel.

***Warning:* Do not attempt to disarm an armed fuze M142A1. The assembled fuze cannot be disarmed, and any attempt to replace the release pin or to depress the arming pin will activate the fuze.**

4-8. Fuze, Bomb: M157

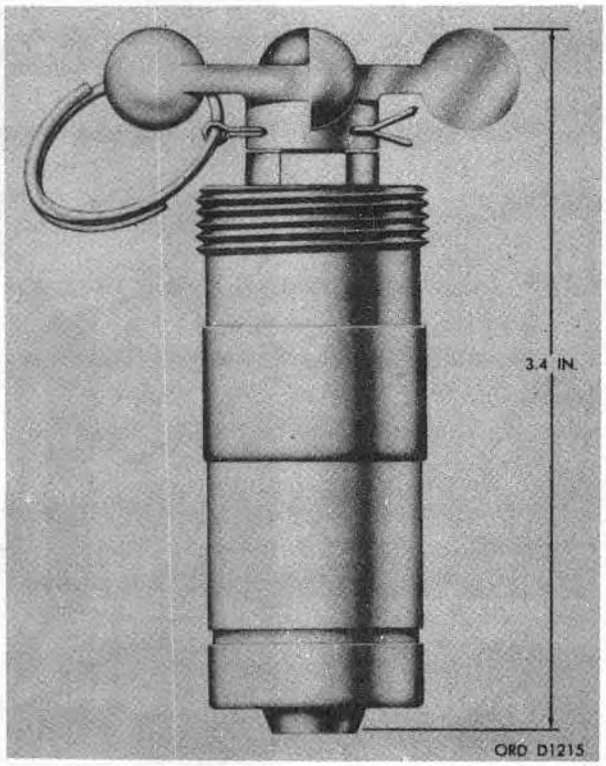
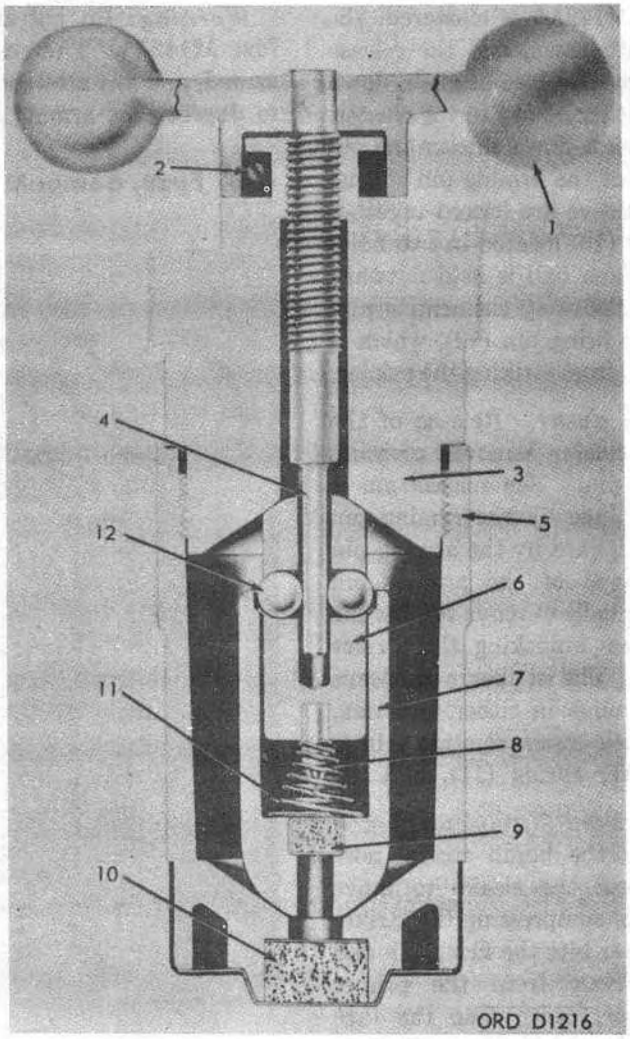


Figure 4-16. Bomb fuze M157.

a. General. Bomb fuze M157 (figs. 4-16 and 4-17) is an impact fuze of the direct-arming vane type which functions at any angle of impact. It is used with bomb igniter M15 or M16 (fig. 4-18) to allow a jettisonable aircraft fuel tank to be used as a fire bomb.



1	Arming vane	7	Sleeve
2	Safety pin	8	Firing pin
3	Head assembly	9	Primer
4	Arming pin	10	Ignition mixture
5	Case	11	Striker spring
6	Striker	12	Steel ball

Figure 4-17. Fuze M157—cross section.

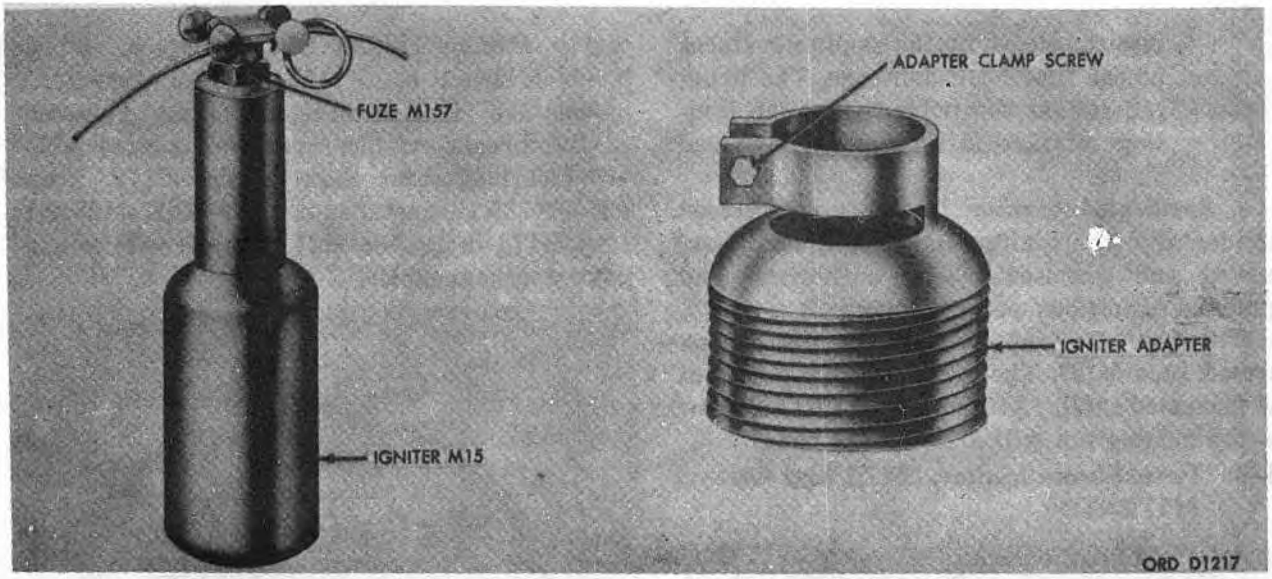


Figure 4–18. Fuze M157 installed in Igniter M15.

b. Description. Fuze M157 is 1.13 inches in diameter and 3.38 inches long. A case (5, fig. 4–17) incloses a striker (6), a sleeve (7) containing a primer (9), and a ¾-grain black powder ignition mixture (10). A head assembly (3), containing an arming vane (1) and a threaded arming pin (4) is screwed into the open end of the case. A safety (cotter) pin (2) with a pull ring is inserted through a pair of holes in the arming vane and prevents the arming vane from turning. A short wire with a safety clip attached is inserted through a second pair of holes in the arming vane.

c. Functioning.

(1) *Installed in aircraft.* An arming wire, which replaces the short wire with safety clip (*b* above), prevents the arming vane from turning. The arming pin, which is attached to the arming vane, extends into the center of the fuze through the striker and sleeve. The striker and the sleeve are locked together by two steel balls (12) located in two holes in the striker. Each ball is held outward in a recess in the sleeve by the stem of the arming pin. This prevents the firing pin (8), which is part of the striker, from striking the primer.

(2) *Released from aircraft.* When the fuel tank is jettisoned, the arming wire is withdrawn, freeing the arming vane to rotate in the airstream. After approximately 20 revolutions of the arming vane, the end of the arming pin withdraws from the striker and frees the two steel balls to move toward the center of the fuze, unlocking the striker from the sleeve. The striker and sleeve are then free to move in either direction. The firing pin is held away from the primer only by the striker spring (11), and the fuze is armed.

(3) *Upon impact.* If the fuel tank strikes with the head of the fuze forward, inertia causes the sleeve to move toward the striker, compressing the striker spring. The primer hits the firing pin and is activated. Flame from the primer ignites the ignition mixture, completing the fuze action. If the fuel tank strikes with the bottom of the fuze forward, inertia causes the striker to move toward the sleeve, compressing the striker spring and allowing the firing pin to strike the primer. Flame from the primer ignites the ignition mixture, completing the fuze action. If the fuel tank strikes with the side of the fuze forward, inertia causes the striker and the sleeve to move toward the side of the fuze, and the striker is forced

into the sleeve by the sloping surfaces of the fuze head and case. The firing pin strikes the primer, and the ignition mixture is ignited as described above.

d. Accidental Arming. If the fuze is armed accidentally, the igniter and fuze must be removed and disposed of by authorized and qualified munitions personnel only.

***Warning:* Do not attempt to disarm an armed fuze M157. The assembled fuze cannot be disarmed safely. Attempts to insert or screw in the arming pin will activate the fuze.**

4-9. Fuze, Bomb: Igniter, M173 and AN-M173A1

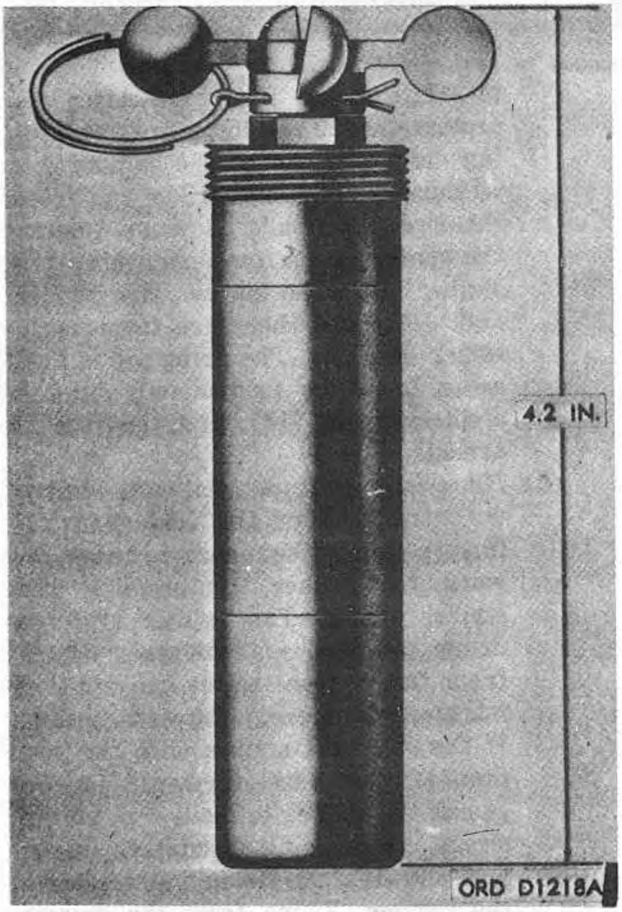


Figure 4-19. Fuze, bomb: igniter, M173.

a. General. Igniter bomb fuzes M173 (fig. 4-19) and AN-M173A1 are impact fuzes of the direct-arming, arming-vane type. They function at any angle of impact, therefore can be used as nose and tail fuzes. They are used in igniter M23 or M23A1 (fig. 4-20) and in fire bomb M116A1 or M116A2. These two fuze models are identical except that the diameter of the threads on the fuze head of fuze AN-M173A1 is greater than on the M173. Fuze AN-M173A1 is installed in igniter AN-M23A1; fuze M173 in igniter M23. The assemblies are not interchangeable.

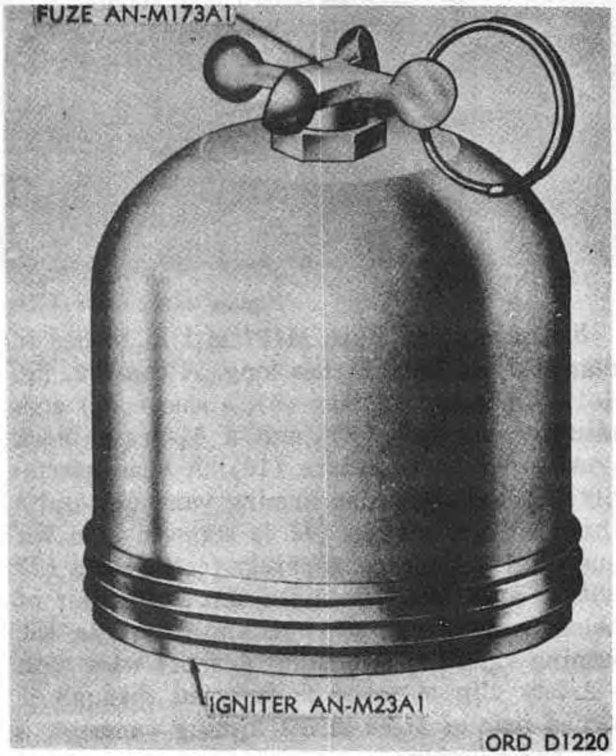


Figure 4-20. Fuze AN-M173A1 installed in igniter AN-M23A1.

b. Description. Fuze M173 (fig. 4-19) has a 2 inch body diameter and is approximately 4.2 inches long. A case (14, fig. 4-22) incloses a striker (12), and a primer holder (11) containing a primer (7). A booster cup (9) containing a detonator (8) and a booster (10) is assembled to the bottom of the case. A head assembly (3) is screwed to the top of the case. An arming pin (4) with an arming vane (1) at its outer end is screwed into the head assembly. A safety pin (2) with a pull ring is inserted through a hole in the hub of the arming vane. A second hole in the hub of the arming vane receives an arming wire.

***Warning:* Do not remove the safety pin before bomb is placed in aircraft and arming wire is installed.**

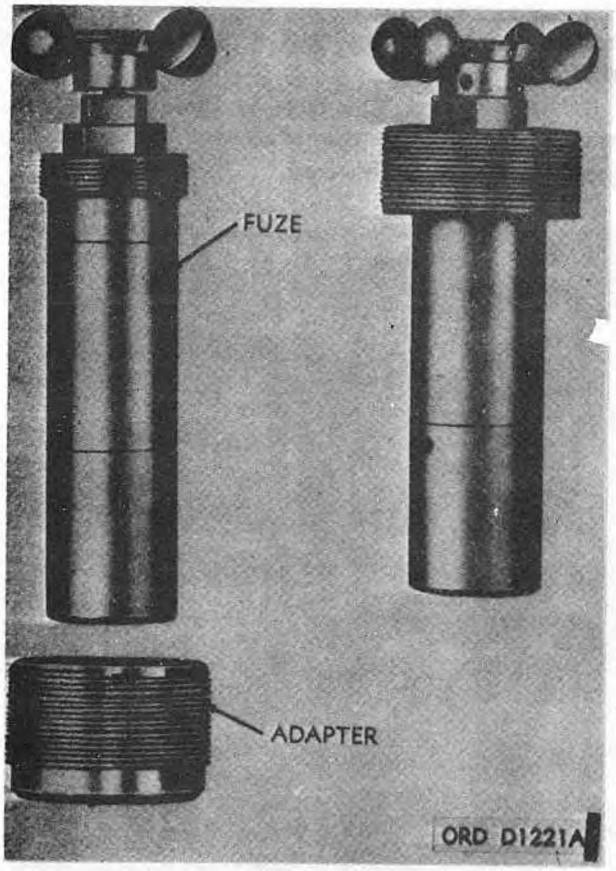


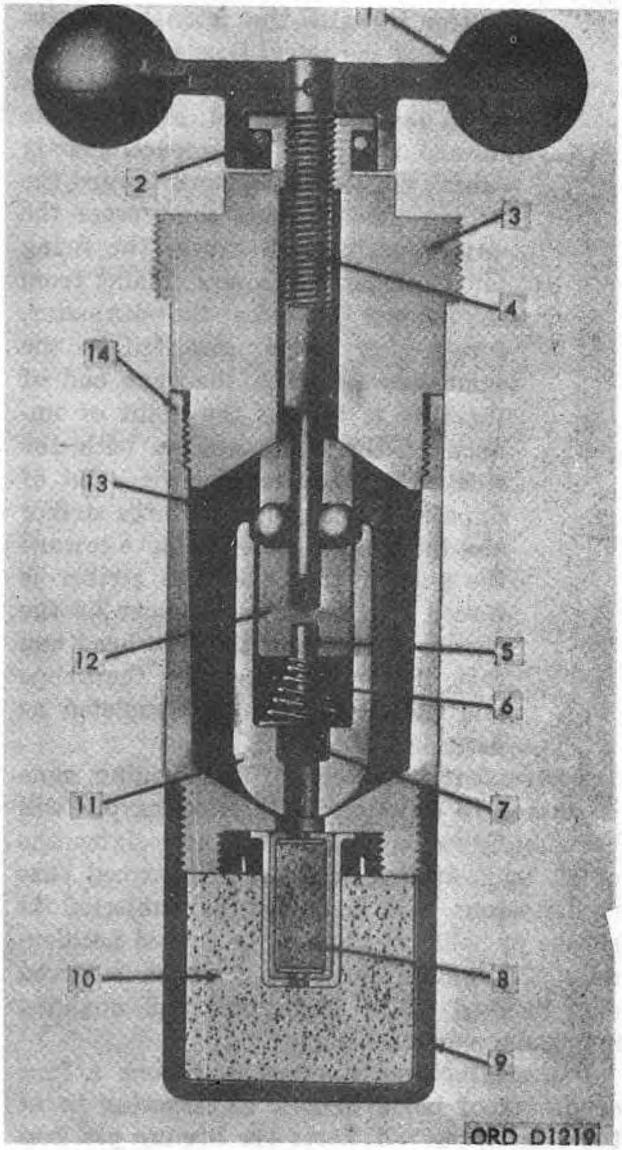
Figure 4-21. Fuze M173, adapter and fuze AN-173A1.

Note. An adapter (fig. 4-21) is available to permit installation of fuze M173 in igniter AN-M23A1.

c. Functioning.

(1) *Before release from aircraft.* The arming wire, which is inserted through one of the holes in the hub of the arming vane, prevents the arming vane from turning. The striker and primer holder are locked together by two steel balls (13) located in two holes in the striker. Each ball is held outward in a recess in the primer holder by the stem of the arming pin. This prevents the firing pin (5), which is part of the striker, from striking the primer.

(2) *After release from aircraft.* When the fuzed bomb falls from the aircraft, the arming wire is withdrawn. This frees the arming vane to rotate in the airstream. After approximately 15 to 20 revolutions of the arming vane, the arming pin unscrews approximately three-sixteenths of an inch and frees the two steel balls to move toward the center of the fuze, unlocking the striker from the primer holder. The striker and primer holder are then free to move in either direction. The firing pin is held away from



1	Arming vane	8	Detonator
2	Safety pin	9	Booster cup
3	Head assembly	10	Booster
4	Arming pin	11	Primer holder
5	Firing pin	12	Striker
6	Striker spring	13	Steel balls
7	Primer	14	Case

Figure 4-22. Fuze M173—cross section.

the primer only by the striker spring (6), and the fuze is armed.

(3) *Upon impact.* If the bomb strikes with the vane end of the fuze toward the point of impact, inertia causes the primer holder to move toward the striker, compressing the striker spring. The primer hits the firing pin and is activated. Flame from the primer initiates the detonator. Detonation of the tetryl booster completes the fuze action. If the bomb strikes with the booster end of the fuze toward the point of impact, inertia causes the striker to move toward the primer holder. This compresses the striker spring and causes the firing pin to strike the primer. Flame from the primer initiates the detonator, fuze action being completed in the same way as when the vane end of the fuze is toward the point of impact. If the bomb strikes with the side of the fuze toward the point of impact, inertia causes both the striker and the primer holder to move toward the side of the fuze. The striker is forced into the primer holder by the sloping surfaces of the fuze head and case, the firing pin strikes the prime and the fuze action is completed as described above.

d. Accidental Arming. If the arming vane is rotated 15 to 20 turns, the arming pin will have unscrewed approximately three-sixteenths of an inch, arming the fuze. An armed fuze is dangerous and must not be subjected to shocks or jolts. If the fuze is armed accidentally, the igniter and fuze must be removed and disposed of by authorized and qualified munitions personnel only.

***Warning:* Never attempt to disarm a fuze suspected of being armed, as screwing in of the arming pin will force the arming pin into the primer and fire the fuze.**

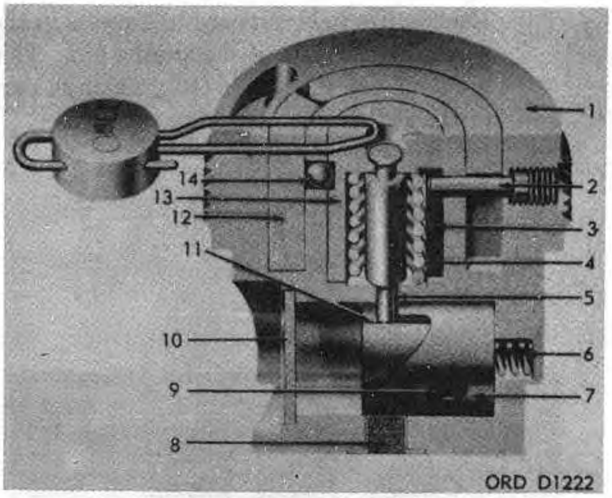
4–10. Fuze, Bomb: Nose, M196

a. General. Fuze M196 (fig. 4–23) is a detonator-safe, impact nose fuze of the direct-arming, inertia-arming type. It is used in 10-pound, nonpersistent gas bombs M125 and M125A1.

b. Installation. The fuze is installed in the bomb nose during manufacture. Removal in the field is not authorized.

Figure 4–23. Fuze, bomb, nose, M196.

c. Description. Fuze M196 (fig. 4–24) is 1.75 inches in diameter and 1.75 inches long. The body (1, fig. 4–24) incloses the working parts of the fuze and a tetryl charge (8). A cylindrical rotor (7) containing a detonator (9) is installed in a rotor cavity in the body. The rotor has a spiral groove in the side, in which a rotor stop pin rides, and a hole (11) which receives a firing pin (5) when the fuze is not armed. A rotor spring (6) is located between the end of the rotor and the side of the body. The rotor cavity is closed by a rotor plug (10). A firing pin assembly (13), to which the firing pin is attached, and a firing pin spring (4) are installed in the center of the body. Two grooves in the side of the firing pin assembly and corresponding holes in the body receive two steel balls (14) which hold the firing pin assembly in the depressed (unarmed) position. A cylindrical arming ring (12) is held in the nose end of the fuze by a safety wire which is installed when the fuze is manufactured. When the fuze is installed in a bomb, the arming ring is held in the fuze by a stranded steel cable, which is part of a parachute-opening delay M1 or M1A1, and the safety wire is removed. A firing-pin retainer (2), screwed into a hole in the side of the body, terminates in a slot (3) in the firing pin assembly.



1	Body	8	Tetryl charge
2	Firing-pin retainer	9	Detonator
3	Slot	10	Rotor plug
4	Firing-pin spring	11	Hole
5	Firing pin	12	Arming ring
6	Rotor spring	13	Firing pin assembly
7	Rotor	14	Steel ball

Figure 4-24. Fuze M196—cross section.

Note. The fuze is installed in the bomb nose during manufacture. Removal or replacement of the fuze in the field is not authorized.

d. Functioning.

(1) *Before release from cluster.* When fuze M196 is installed in a bomb, the steel cable from the parachute-opening delay passes across the end of the fuze and holds the arming ring. The point of the firing pin in the hole in the rotor locks the rotor in the unarmed position, with the detonator perpendicular to the firing pin and completely out of line with it. The firing pin is held in the depressed position by the two steel balls held by the arming ring in the grooves in the firing pin assembly.

(2) *After release from cluster.* When the bomb containing the fuze is released from the cluster, the parachute-opening delay functions and breaks the stranded steel cable holding the arming ring in the fuze. The ring is then held in the fuze only by friction, until the bomb parachute opens and the descent of the bomb is checked abruptly. Inertia causes the arming ring to fly out of the fuze, freeing the two steel balls to fall out of the fuze. This allows the firing-pin spring to force the firing pin assembly toward the nose of the fuze. The firing pin assembly is prevented from separating from the fuze by the end of the firing pin retainer riding in the firing pin assembly. As the firing pin assembly moves forward, the point of the firing pin withdraws from the hole in the rotor, unlocking the rotor. The rotor spring forces the rotor toward the center of the fuze, and the rotor is made to revolve through 90 degrees by a fixed rotor stop pin which rides along a sprial groove in the rotor. When the end of the spiral groove reaches the rotor stop pin, further movement of the rotor is prevented, and a lockpin, driven by a lock spring, drops into a notch in the rotor and drops the rotor in the armed position. When the rotor is in this position, the detonator is in line with the firing pin and with the tetryl charge in the fuze base.

(3) *Upon impact.* When the head of the firing pin assembly strikes a solid object, the point of the firing pin is driven into the detonator. The detonator fires and explodes the tetryl charge, completing the fuze action.

e. Accidental Arming. If the head of the firing pin assembly protrudes beyond the head of the fuze, indicating that the fuze is armed, the bomb containing it must be disposed of by authorized and qualified mutitions personnel. It should be noted that even if the parachute-opening delay should function accidentally and release the cable which restrains the arming ring, the fuze is not armed as long as the arming ring remains in place. The arming ring can be fastened in the fuze by inserting a safety wire through safety wire holes in the end of the fuze.

***Warning:* Do not attempt to disarm an armed fuze M196. The assembled fuze cannot be disarmed, and disturbing the firing pin or reinserting the arming ring will activate the fuze.**

4-11. Fuze, Bomb: Nose, M197

a. General. Nose fuze M197 (fig. 4-25), an improved version of fuze M142A1, is an impact nose fuze of the direct-arming, arming-pin type, which functions at any angle of impact. It is used in the 10-pound M74A1 incendiary bomb.

b. Fuze Installation. The fuze is installed in the bomb nose during manufacture. Removal or replacement of the fuze in the field is not authorized.

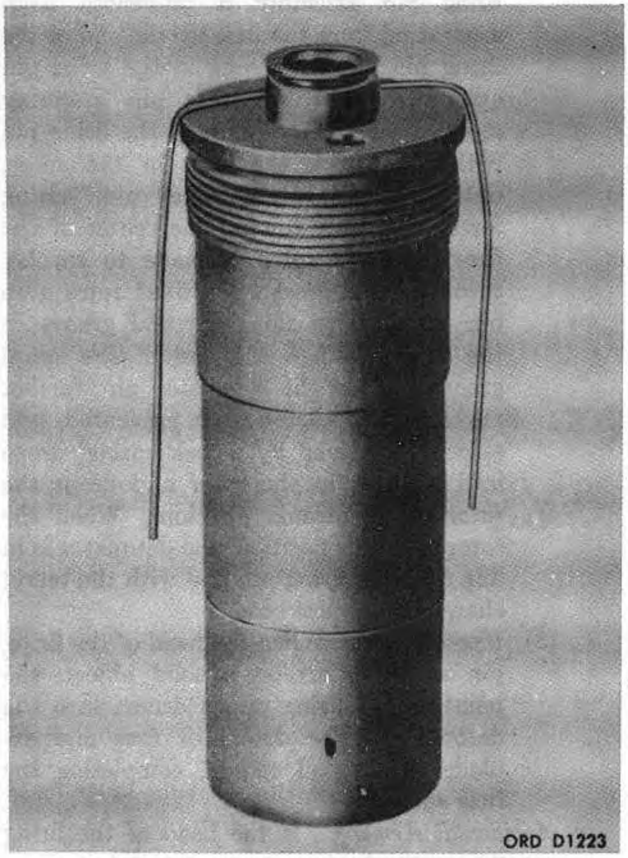
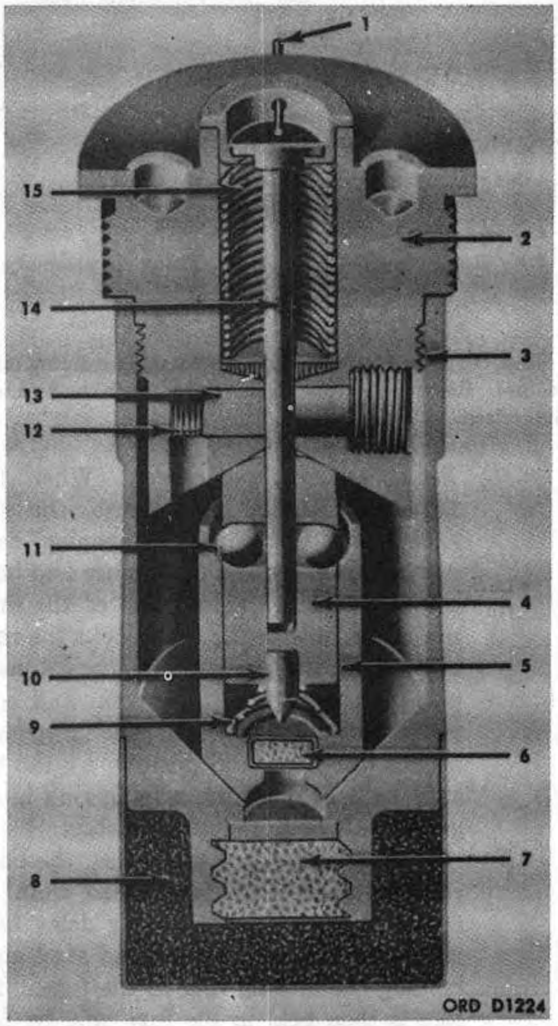


Figure 4-25. Fuze M197.

c. Description. Fuze M197 (fig. 4-26) is 1.19 inches in diameter and 3.19 inches long. A case (3) incloses a striker (4), a sleeve (5) containing a primer (6), and a delay mixture (7). A head assembly (2) containing an arming pin (14) and a slide bar (13) is screwed into the open end of the case. A booster cup containing a booster (8) is assembled to the end of the case that contains the delay mixture. A safety wire (1), which is removed when the bomb is clustered, holds the arming pin in the fuze.

d. Functioning.

(1) *Before release from cluster.* When a bomb containing fuze M197 is clustered, the safety wire is withdrawn. The arming pin is held in the fuze by contact with the release bar which is held in place by contact with other bombs in the cluster. The stem of the arming pin holds the slide bar in the retracted position, and the slide-bar spring (12) is compressed. The striker and sleeve are locked together by two steel balls (11) located in two holes in the striker. Each ball is held outward in a recess in the sleeve by the stem of the arming pin. This prevents the firing pin (10), which is part of the striker, from striking the primer.



1	Safety wire	9	Striker spring
2	Head assembly	10	Firing pin
3	Case	11	Steel ball
4	Striker	12	Slide-bar spring
5	Sleeve	13	Slide bar
6	Primer	14	Arming pin
7	Delay mixture	15	Arming-pin spring
8	Booster		

Figure 4-26. Fuze M197—cross section.

(2) *After release from cluster.* Release of the bomb from the cluster moves pressure from the arming pin, which is ejected from the fuze by the arming-pin spring (15). Withdrawal of the stem of the arming pin frees the two steel balls to move toward the center of the fuze, unlocking the striker from the sleeve. The striker and sleeve are then free to move in either direction. The firing pin is held away from the primer only by the striker spring (9), and the fuze is armed. Withdrawal of the arming pin also frees the slide bar, which is forced by the slide-bar spring toward the center of the fuze. The slide bar then covers the hole in the center of the fuze and prevents fire from the igniting components of the fuze from venting forward.

(3) *Upon impact.* If the bomb strikes nose end first, inertia causes the sleeve to move toward the striker, compressing the striker spring. The primer hits the firing pin and is activated. Flame from the primer ignites the delay mixture, which burns from 1.5-to-3 seconds, and then ignites the booster, completing the fuze action. If the bomb strikes tail end first, inertia causes the striker to move toward the sleeve, compressing the striker spring and allowing the firing pin to strike the primer. The delay mixture and booster are then ignited as described above. If the bomb strikes with the side of the fuze turned toward the point of impact, inertia causes both the striker and the sleeve to move toward the side of the fuze, and the striker is forced into the sleeve by the sloping surfaces of the fuze head and case. The firing pin strikes the primer, which ignites the delay mixture and booster, as described above.

e. Accidental Arming. If the fuze is armed accidentally, the bomb containing it must be disposed of by authorized and qualified munitions personnel. The assembled fuze cannot be disarmed; an attempt to replace or depress the arming pin will activate the fuze.

***Warning:* Do not attempt to disarm an armed or partially armed fuze.**

4-12. Fuze, Bomb: Tail, AN-M100A2, AN-M101A2, AN-M102A2, M160, M161, M162, M172, M175, M176, AN-M177, M184, M185, M194 and M195

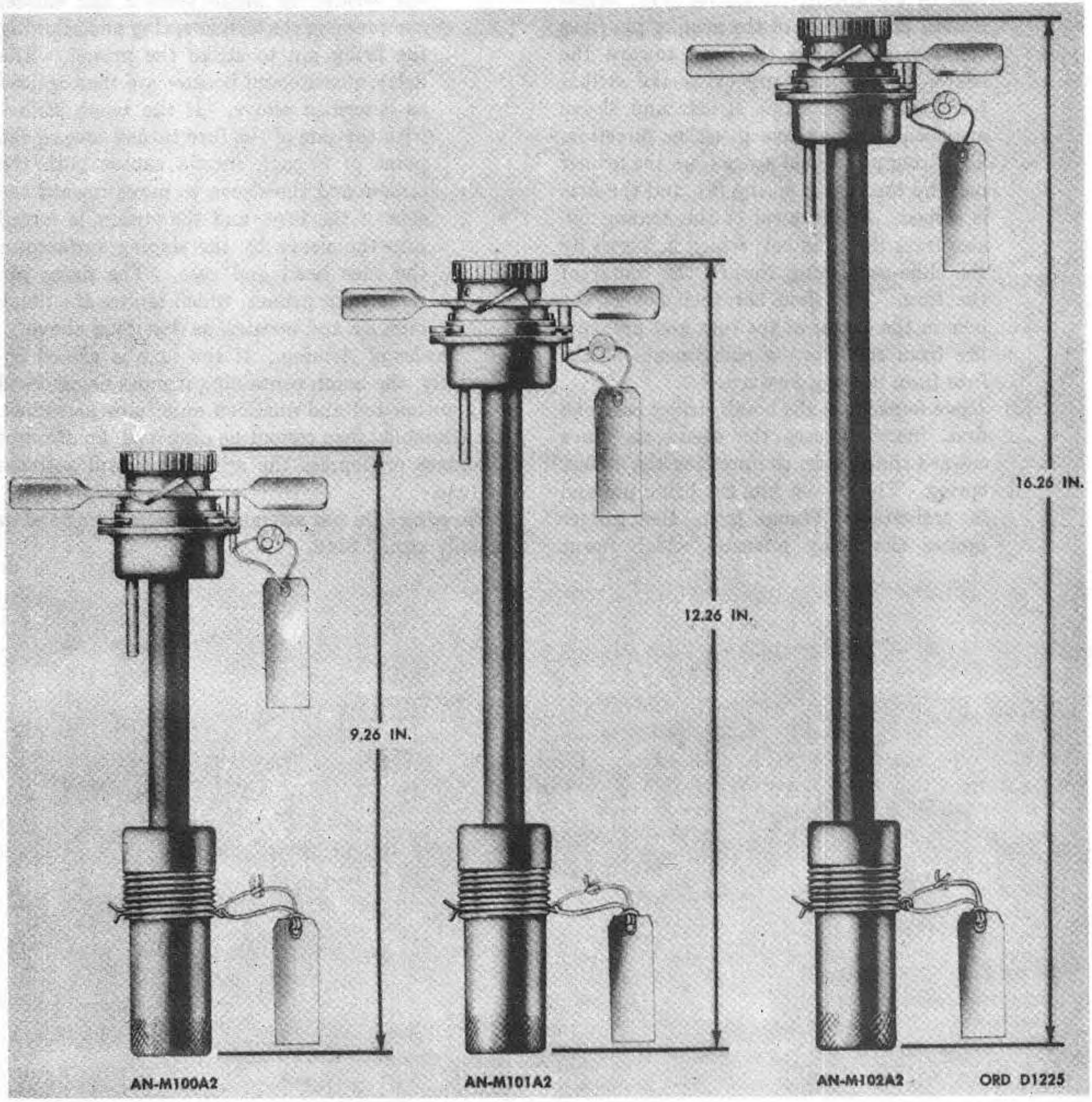


Figure 4-27. Tail fuzes AN-M100A2, AN-M101A2 and AN-M102A2.

Table 4-6. Tail Fuzes

	AN-M100A2	AN-M101A2	AN-M102A2	M160	M161	M162	M172
Firing Action	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial
Firing Delay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay
Arming:							
Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed
Revolutions to Arm	150 to 170	150 to 170	150 to 170				
Air Travel to Arm (ft):							
Vane M4	445—650	445—650	445—650	1780—2680	1780—2680	1780—2680	445—550
Vane M5	1225—1420	1225—1420	1225—1420	4900—5850	4900—5850	4900—5850	1225—1510
Overall Length (in.)	9.26	12.26	16.26	9.26	12.26	16.26	25.29
Protrusion from Bomb (in.)	6.26	9.26	13.26	6.31	9.31	13.31	22.29
Body Diameter (in.)	1.5	1.5	1.5	1.44	1.44	1.44	1.5
Vane Span (in.)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Weight (lb)	2.7	2.9	3.2	2.7	2.9	3.2	3.65
No. of Blades on Vane	4	4	4	4	4	4	4
Vane Types							

	M175	M176	AN-M177	M184	M185	M194	M195
Firing Action	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial	Impact-Inertial
Firing Delay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay	Delay or Nondelay
Arming:							
Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed
Revolutions to Arm	150 to 170	150 to 170	150 to 170				
Air Travel to Arm (ft):							
Vane M4	1150—1935	1150—1935	1150—1935	550	450—460	500	500
Vane M5	3200—5225	3200—5225	3200—5225				
Overall Length (in.)	25.29	37.05	45.12	37.05	45.12	31.035	28.972
Protrusion from Bomb (in.)	22.29	34.05	42.12	34.05	42.12	28.035	25.972
Body Diameter (in.)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Vane Span (in.)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Weight (lb)	3.65	4.4	5.0	4.4	5.0	4.1	3.9
No. of Blades on Vane	4	4	4	4	4	4	4
Vane Types							

a. General. Tail fuzes of this type (figs. 4-27 and 4-28, and table 4-6) are vane armed and inertia fired. Arming is mechanically delayed by reduction gearing. When issued, the fuzes are equipped with either a nondelay or a 0.025-second delay primer detonator M14, which can be interchanged with other primer detonators M14 to give a selection of time delays. Air travel to arm these fuzes ranges from 445-to-650 feet with vane M4, and 1225-to-1420 feet with vane M5. Overall length of the fuzes varies because of differences in the length of the arming-stem tube; these differences are necessary to locate the arming-vane assembly in the airstream so that the same type 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, M175, M176, AN-M177, M184 and M185 are used with conical fin assemblies. Tail fuzes M185, M194 and M195 are used only in low-drag bombs. Fuzes AN-M100A1, AN-M101A1 and AN-M102A1, which are earlier models of the AN-M100A2 series, differ from fuzes of this series in the following respects: arming stems have 24 single threads; vanes have eight blades with less pitch than the A2 modification and fuzes require about 720 vane revolutions-to-arm. Each fuze incorporates the interchangeable primer detonator M14. Fuzes M160, M161 and M162 are similar to those of the AN-M100A2 series except that the arming stem has finer threads (28 single threads to the inch against 20 double threads in AN-M100 series fuzes) and a longer engagement with the firing plunger (0.75-inch against 0.50-inch), thereby requiring a longer arming time. Fuzes M160 series are distinguished from those in the AN-M100 series by a 3-inch yellow band painted around the arming-stem case. Fuzes AN-M100A2, AN-M101-A2 and AN-M102A2, the earliest of the slower-arming tail fuzes, have the same number of threads-per-inch as fuzes of the M160 series, but a shorter engagement than that of AN-M100 series fuzes. The yellow band is painted on, as in the fuze M160 series. Fuzes M175, M176, AN-M177, M184, M185, M194, and M195 are long-length fuzes developed for use with specific, conical bomb fin assemblies. They are externally similar to tail fuzes in the AN-M100A2 series. The arming stem of the M175 series, however, has finer threads than that of the AN-M100A2 series, increasing the air travel to arm.

b. Arming Vanes. Two types of interchangeable arming-vane assemblies are used on these fuzes. The difference between the two is the degree of pitch of the vanes with respect to the plane of rotation. This difference is necessary in order to vary the arming distance of the fuzes as required by operating conditions. For shorter arming distances, standard vane M4, which has a 45° pitch, is used. When longer air travel to arm is desired, a vane M5, which has a 75 degree pitch, is used.

c. Safety Features. During shipment and storage, the fuze is made safe by insertion of a safety (cotter) pin (with tag attached) that extends through the fuze body and firing plunger. This prevents movement of the firing plunger, which fires the detonator. Through a set of holes in the bearing-cup eyelet and arming-stem cup, a safety (cotter) pin locks the gear mechanism. A sealed safety wire (with instruction tag attached) is threaded through a hole in the lower end of the safety (cotter) pin to prevent its removal. The fuze cannot be installed without first removing the safety (cotter) pin from 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 remains 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; however, the 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 to the fuze body cap. This prevents accidental blows on the arming-vane assembly from being transmitted to the firing plunger.

d. Functioning.

(1) *General.* When the fuzed bomb is dropped, the arming wire is retained in the bomb rack and withdrawn from the fuze. This frees the arming-vane assembly which rotates in the airstream and arms the fuze. After the arming vanes have made from 150 to 170 revolutions, the fuze is fully armed. After approximately 200 more revolutions, the arming stem unscrews from the fuze body cap and the entire assembly (arming vanes, reduction gears, and arming stem) is released into the airstream. Air travel necessary to arm these fuzes varies with the bomb and arming vane used. Upon impact, inertia drives the firing plunger into the primer to fire the fuze and detonate the bomb.

(2) *Arming.* The arming-vane assembly is assembled to the bearing cup by the vane nut, and is locked in place by eyelet pins. 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 (idler) gear, a movable gear, and a stationary gear. The movable gear has 30 teeth; the stationary gear has 29 teeth. The pinion gear is driven around the stationary and movable gears by the bearing cup and arming-vane assembly. Since the movable gear contains one more tooth than the stationary gear, it is forced one tooth ahead with each complete revolution of the pinion around the stationary gear. When

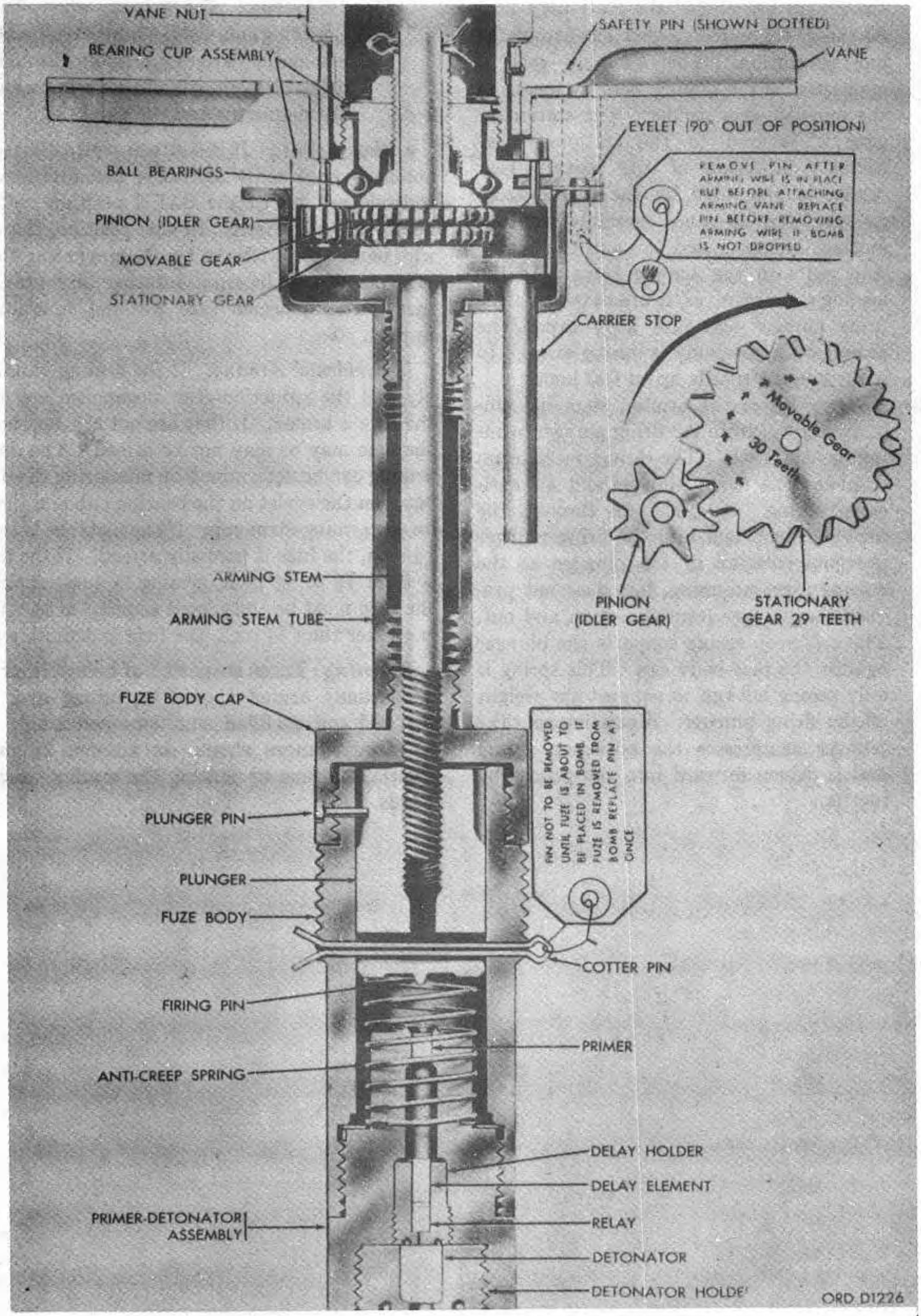


Figure 4-28. Tail fuze AN-M100A2—cross section.

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.

(3) *Action.* When the arming stem has unscrewed itself from the firing plunger, arming is complete. 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.

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

e. Safe Release. 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 with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

f. Accidental Arming. If the arming-vane assembly and the reduction-gear mechanism are missing, the fuze is armed. If they are not missing, however, the fuze may or may not be armed. 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 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.

***Warning:* Fuzes suspected of being either armed or partially armed should be turned over to authorized and qualified munitions personnel. Under no circumstances should an attempt be made to disarm the fuze by turning the arming vane backwards.**

4-13. Fuze, Bomb: Tail M112, M112A1, M113, M113A1, M114, M114A1, M115, M116, M117, M178, M179, M180, M181, M182 and M183

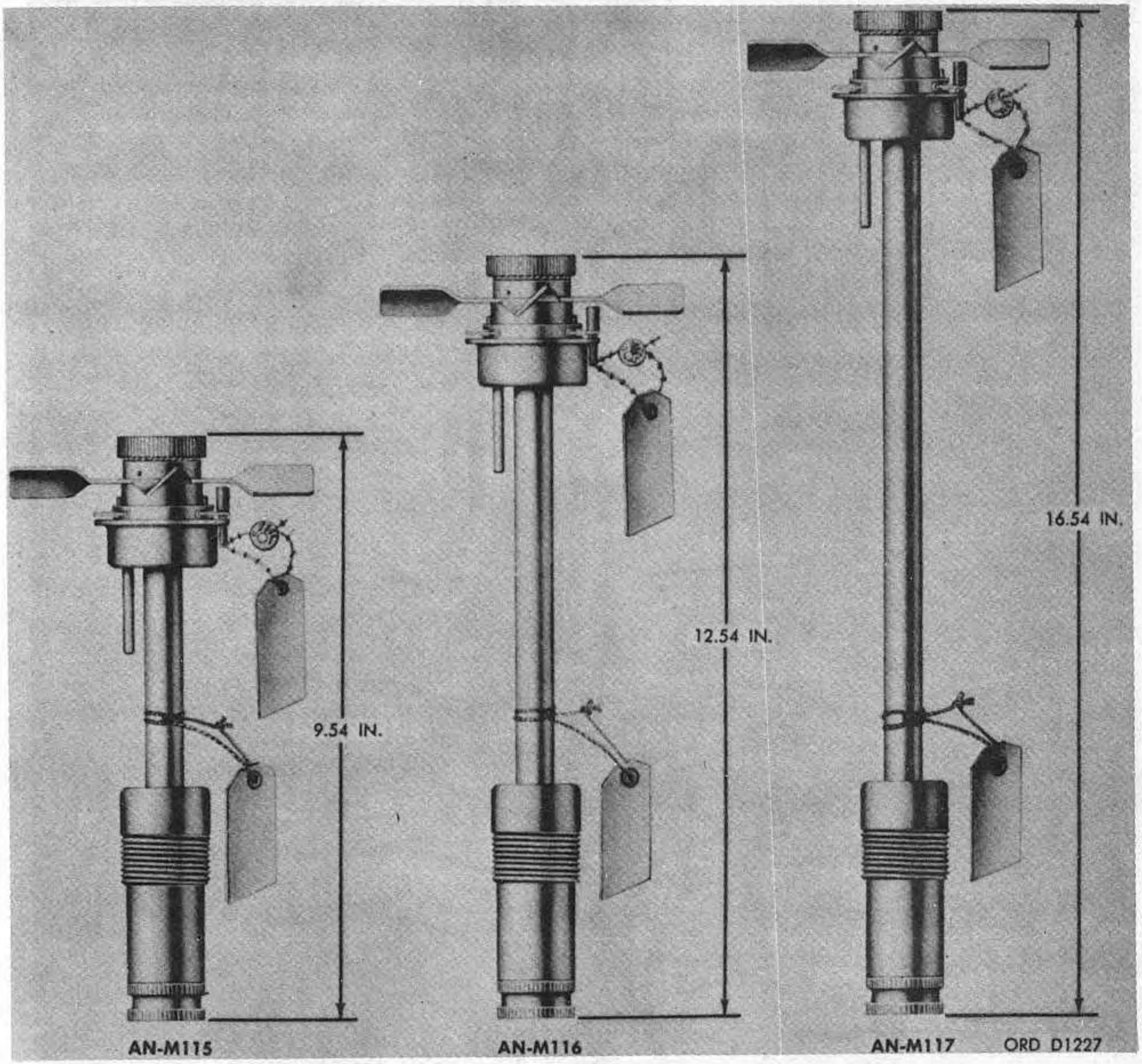


Figure 4-29. Tail fuzes M115, M116 and M117.

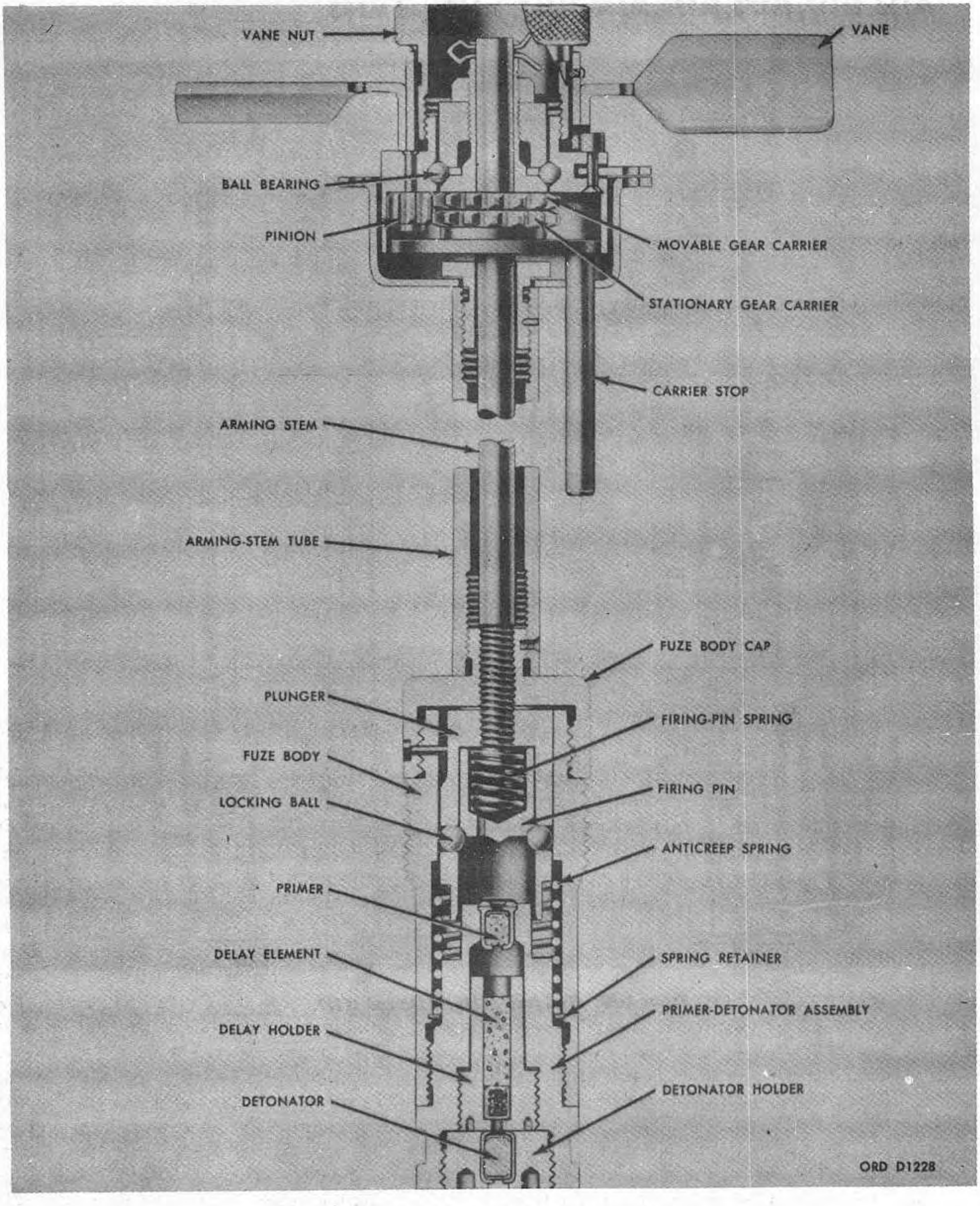


Figure 4-30. Tail fuze M115—cross section.

Table 4-7. Tail Fuzes M112A1, M113A1, M114A1, M115, M116, M117, M178, M179, M180, M181, M182, and M183

	M112A1	M113A1	M114A1	M115	M116	M117
Firing Action	Inertial	Inertial	Inertial	Inertial	Inertial	Inertial
Firing Delay (sec)	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5
Arming Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed
Air Travel to Arm (ft):						
Vane M4	80.0	90.0	90.0	445-650	445-650	445-650
Vane M5	----------	----------	----------	1225-1420	1225-1420	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	1.43	1.43	1.5	1.5	1.5
Vane Span (in.)	5.0	5.0	5.0	5.0	5.0	5.0
Weight (lb)	2.3	2.5	2.8	2.7	2.9	3.2
Number of Vane Blades	4	4	4	4	4	4

	M178	M179	M180	M181	M182	M183
Firing Action	Inertial	Inertial	Inertial	Inertial	Inertial	Inertial
Firing Delay (sec)	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5	8-15 or 4-5
Arming Type	Delayed	Delayed	Delayed	Delayed	Delayed	Delayed
Air Travel to Arm (ft):						
Vane M4	80	90	110	485	555	465-665
Vane M5						
Overall Length (in.)	24.85	36.65	44.71	24.6	36.97	45.03
Protrusion from Bomb (in.)	21.85	33.65	41.71	21.6	33.97	42.03
Body Diameter (in.)	1.5	1.5	1.5	1.5	1.5	1.5
Vane Span (in.)	5.0	5.0	5.0	5.0	5.0	5.0
Weight (lb)	3.4	4.1	4.6	3.65	4.4	5.0
Number of Vane Blades	4	4	4	4	4	4

a. Description.

(1) *Tail fuzes M112, M113, and M114 series with A1 modifications.* These fuzes differ from the M115 series in that they do not have reduction gears in the vane assembly and therefore arm more quickly. The fuzes in this family are for use with box fins and differ from each other only in length. After 18 to 21 revolutions of the vanes, the arming stem, secured to the vane nut by a safety (cotter) pin, is unthreaded from the plunger. The air travel to arm is 100 feet. These fuzes 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 M112, M113, and M114 series of fuzes used primer-detonator M16. This primer detonator was modified to the M16A1, which has a higher shoulder. Series M112 was modified to the M112A1 in order to accommodate primer detonator M16A1.

(2) *Tail fuzes M115, M116, and M117.* Tail fuzes of this type (figs. 4-29 and 4-30, and table 4-7) 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-detonator with different delay elements, the delay time between impact and detonation can be varied. The fuzes in this series differ in overall length so that they can be used in various size bombs. The differences in length are necessary to locate the arming-vane assemblies properly in the airstream. Arming-vane assemblies M4 and M5 are used with these fuzes. Standard vane M4 (45° pitch) is used for shorter arming distances; vane M5 (75° pitch) is used for longer arming distances.

(3) *Tail fuzes M178, M179, and M180.* These fuzes have the same operating characteristics as the M112A1 series (no reduction gear, fast arming) but incorporate the longer arming stem necessary for use with a conical fin assembly.

(4) *Tail fuzes M181, M182, and M183.* These fuzes have the same operating characteristics as the M115 series (reduction gear in the arming-vane assembly), and they also incorporate the longer arming stem necessary for use with conical fin assemblies.

b. Safety Features. During shipping and storage, the fuze is in the unarmed condition. A safety (cotter) 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, which remains in the safe condition until the bomb has been released and travels 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.

c. Functioning.

(1) *General.* When the fuzed bomb is dropped, 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 airstream and arm the fuze. After the required number of 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 airstream. As the bomb size increases, greater air travel is required for arming, ranging from 80 to 1420 feet depending on which fuze, bomb, and arming vane are being used. Upon impact, inertia drives the firing pin into the primer to fire the fuze and detonate the bomb.

(2) *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 located between the arming-vane assembly and the arming stem, 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; 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 which houses a cocked firing-pin spring. The firing pin and spring are assembled inside the plunger with the compressed firing-pin spring located 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. A pin which passes through the fuze-body cap and into the vertical groove in the plunger prevents the plunger from revolving with the arming stem. However, this pin does not prevent the plunger from sliding in and out.

(3) *Action.* When arming is complete, the arming stem has unscrewed itself from the firing plunger and the plunger is held back by the anticreep spring. This spring is only strong enough 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.

(4) *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.

d. Safe Release. 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 with the bomb, preventing the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

e. Accidental Arming. If the arming-vane assembly and reduction-gear mechanism are missing, the fuze is armed. If they are not missing, however, the fuze may or may not be safe. 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 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.

***Warning:* Fuzes suspected of being either armed or partially armed should be turned over to authorized and qualified munitions personnel. Under no circumstances should an attempt be made to disarm the fuze by turning the arming vane backwards.**

4-14. Fuze, Bomb: Tail, AN-MK228

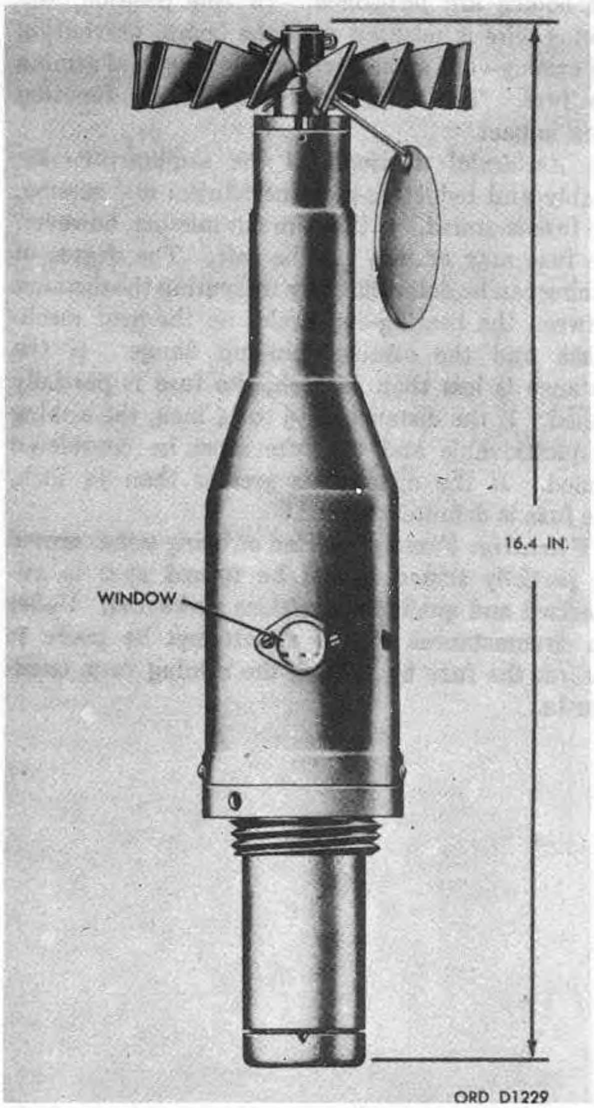


Figure 4-31. Tail fuze AN-MK228.

Table 4-8. Tail Fuze AN-MK228

Model	AN-MK228
Firing Action	Impact-Inertial
Firing Delay (sec)	0.08
Arming:	
Type	Delayed
Air Travel to Arm (ft)	1,100
Overall Length (in.)	16.4
Protrusion from Bomb (in.)	12.4
Vane Span (in.)	5.3
Weight (lb)	10.5
Number of Blades on Vane	16
Booster Charge:	
Type	Tetryl
Weight (grams)	38.2

a. Description. The detonator-safe, delay-armed tail fuze of this type (figs. 4-31 and 4-32, and table 4-8) is vane operated and arms after 1,100 feet of air travel. It functions upon impact through two independent trains of 0.08-second delay. This fuze is used in conjunction with armor-piercing bombs to allow 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 are not necessarily interchangeable with parts of the same fuze made by another manufacturer.

b. 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.

c. Safety Features. 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 the arming bracket on the fuze, preventing rotation of the arming-vane assembly. A small glass window (fig. 4-33) in the side of the fuze permits visual examination of the unarmed or armed condition of the fuze mechanism. When the fuze is unarmed, the upper surface of the striker and the lower edge of the gear cover are approximately flush with the top edge of the outer sleeve. When the fuze is armed, the striker is located approximately $11/32$ inch away from the outer sleeve.

d. Functioning.

(1) *General.* When the fuzed bomb is dropped, 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 which arms the fuze. After 150 to 160 revolutions of the

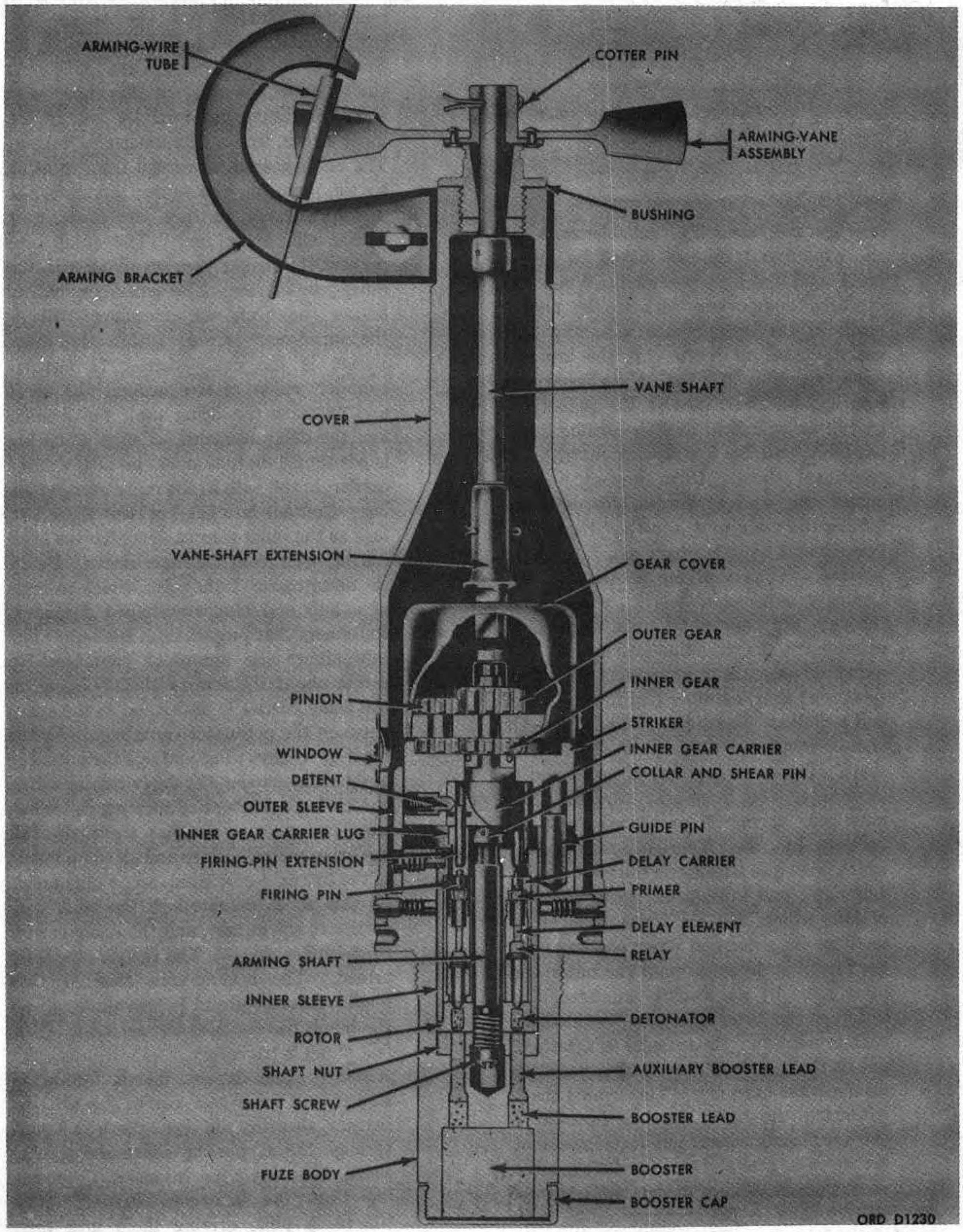


Figure 4-32. Tail fuze AN-MK228—cross section.

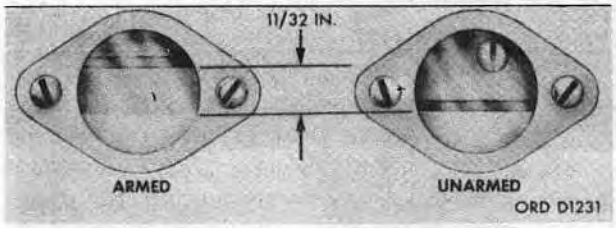


Figure 4-33. Indication of armed condition.

arming-vane assembly, all elements of the explosive train are locked in alignment, 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 no additional effect. Upon impact, inertia drives the striker toward the booster, forcing the firing pins into their respective primers and firing the fuze.

(2) *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 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 wingshaped 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°, the firing-pin extensions and all components of the two explosive trains are in alignment. At this point, detents lock the inner gear carrier to the striker, and 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 1,100 feet along it trajectory.

(3) *Action.* Upon impact, inertia 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.

(4) *Detonation.* The firing pins cause the primers to ignite, 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.

e. Safe Release. 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 with the bomb. This prevents the arming-vane assembly from rotating and arming the fuze. The unarmed fuze will not function upon impact.

f. Accidental Arming. 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 $\frac{3}{16}$ inch away from the outer sleeve, the fuze can be considered only partially armed. However, if the striker has moved away from the outer sleeve about $\frac{11}{32}$ inch, the fuze should be considered fully armed.

***Warning:* If a fuze is armed or partially armed, tape the vane blades to prevent further arming. Turn the fuze over to authorized and qualified munitions personnel.**

4-15. Fuze, Bomb: Tail, AN-MK247 Mod 0

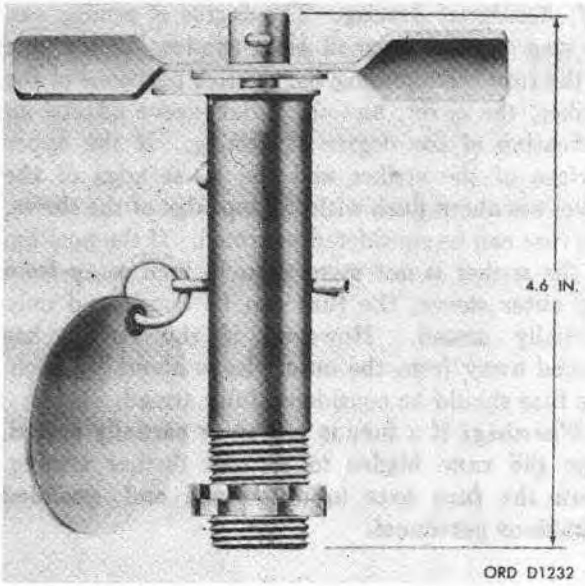


Figure 4-34. Tail fuze AN-MK247.

Table 4-9. Tail Fuze AN-MK247 Mod 0

Mark	247
Mod	0
Firing Action	Impact-Inertial
Firing Delay (sec)	None
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)	10.0
Number of Vane Blades	2

a. Description. This type of tail fuze (figs. 4-34 and 4-35, and table 4-9) is vane operated and inertia fired, and requires from 60 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.

b. 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 .38-caliber blank cartridge, both of which are shipped in the same container with the fuze. Upon impact, the fuze firing pin strikes the blank cartridge and the exploding cartridge fires the signal.

c. Safety Features. A safety (cotter) pin, with pull ring and instruction tag attached, extends through the fuze body. This safety (cotter) pin locks the arming mechanism and firing mechanism so that the fuze will not accidentally detonate the signal during fuzing. The safety (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, except for the blank cartridge which is installed at the time of fuzing. When the fuze is properly installed in the signal, and the signal is in place in the 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.

d. Functioning.

(1) *General.* When the fuzed bomb is dropped, the arming wire is withdrawn from the fuze and retained in the bomb rack. This frees the arming-vane assembly which rotates in the airstream. The arming-vane assembly arms the fuze after approximately 13 revolutions, which require from 60 to 240 feet of air travel, depending upon launching conditions. When the arming-vane assembly completes approximately 25 revolutions, it is freed into the airstream. Upon impact, the fuze firing pin is driven into the blank cartridge, igniting the signal.

(2) *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, and is prevented from rotating by a pin which passes through the fuze body into a vertical groove in the plunger. The anticreep spring supports the weight of the plunger, the arming screw, and the arming-vane assembly. The spring is only strong enough 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

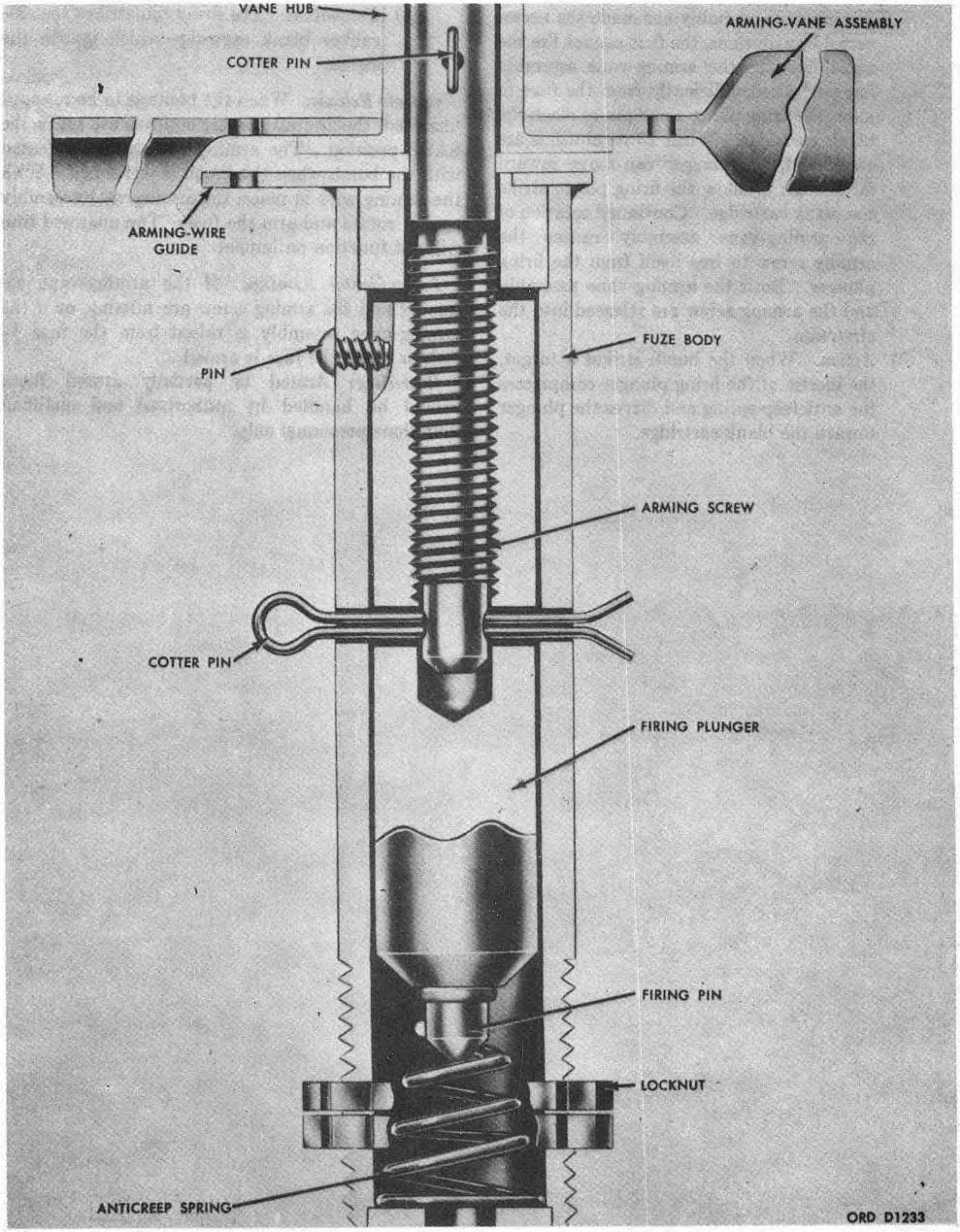


Figure 4-35. Tail fuze AN-MK247—cross section.

arming-vane assembly has made the necessary 13 revolutions, the fuze cannot fire the signal 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.

(3) *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.

(4) *Detonation.* The firing pin strikes the .38-caliber blank cartridge which ignites the signal.

e. Safe Release. When the bomb is to be released unarmed, 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.

f. Accidental Arming. 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.

***Warning:* Armed or partially armed fuzes should be handled by authorized and qualified munitions personnel only.**

4-16. Fuze, Bomb: Tail, M123A1, M124A1, and M125A1

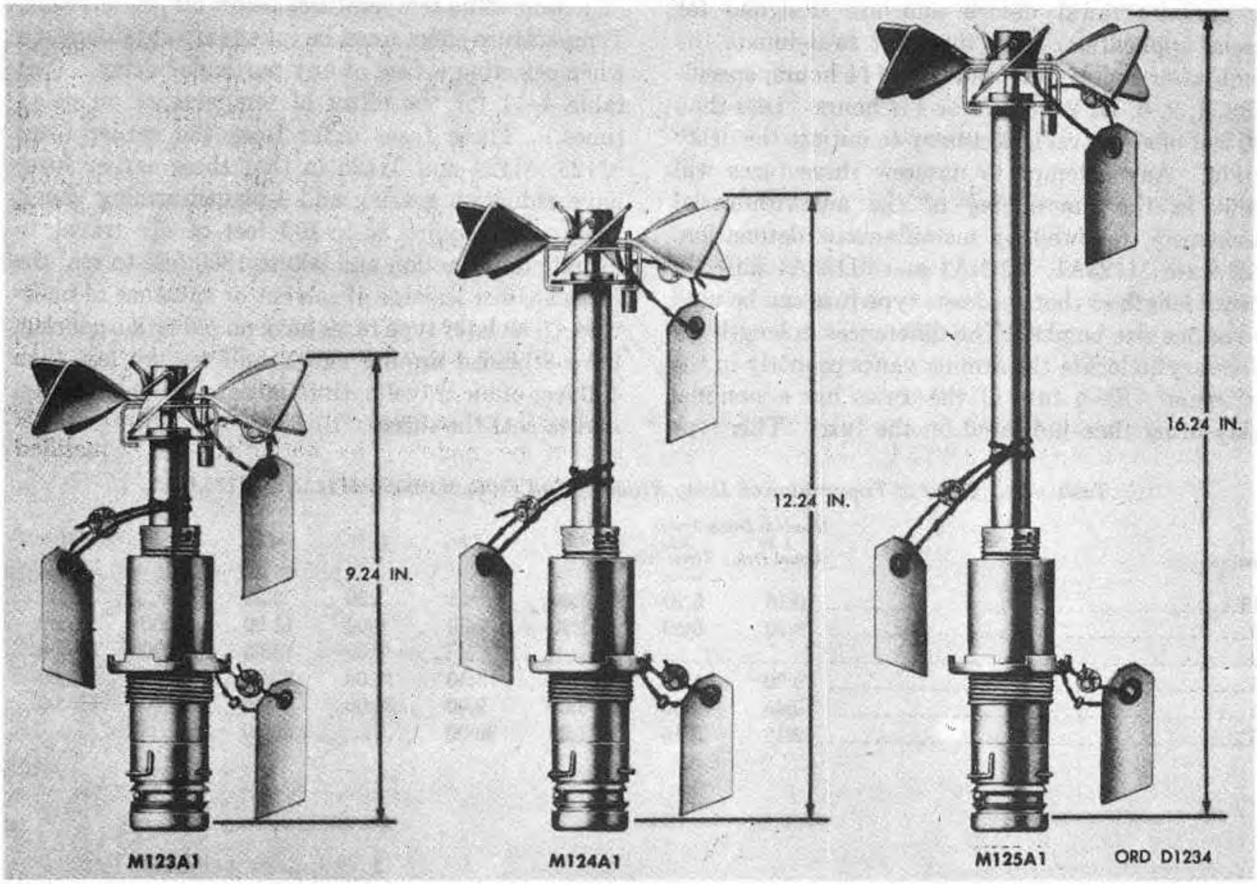


Figure 4-36. Tail fuzes M123A1, M124A1, and M125A1.

Table 4-10. Tail Fuzes M123A1, M124A1, and M125A1

	M123A1	M124A1	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)	1-144 (Depending on which delay is required)	1-144	1-144
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 Vane Blades	8	8	8
Detonator Assembly	M19A2	M19A2	M19A2

a. Description. Vane-operated tail fuzes of this type (figs. 4-36 and 4-37, and table 4-10) incorporate an antiwithdrawal device and are designed for special application. The fuzes act to detonate the bomb after a delay of from 1 to 144 hours; specifically, 1, 2, 6, 12, 24, 36, 72 or 144 hours. Less than 100 feet of air travel is necessary to initiate the delay action. Any attempt to unscrew these fuzes will result in the functioning of the antiwithdrawal mechanism, followed by instantaneous detonation. Tail fuzes M123A1, M124A1 and M125A1 differ in overall length so that the same type fuze can be used in various size bombs. The differences in length are necessary to locate the arming vanes properly in the airstream. Each fuze of the series has a nominal delay-firing time indicated on the fuze. This type of fuze is particularly responsive to changes in temperature. Temperatures above 50° F. accelerate its action while temperatures below 50° F. retard it. Temperature effect must be taken into consideration when selecting a fuze of any particular delay. (See table 4-11 for the effect of temperature on delay times.) These fuzes differ from the earlier fuzes M123, M124 and M125 in that these earlier fuzes have reduction gearing and 4-bladed arming vanes. They also require 80-to-100 feet of air travel to initiate delay action and 900 to 1800 feet to seal the fuzes against leakage of solvent or entrance of moisture. The later type fuzes have no reduction gearing, have 8-bladed arming vanes, and require less than 100 feet of air travel both to initiate the delay action and to seal the fuzes.

Table 4-11. Effect of Temperature on Delay Action of Tail Fuzes M123A1, M124A1, M125A1

Temperature: (°F.)	Nominal Delay Time: 1 hr	2 hr	6 hr	12 hr	24 hr	36 hr	72 hr	144 hr
	Actual Delay Time: (Hrs:mins)							
115	0:15	0:20	1:00	1:15	1:30	2:30		
90	0:20	0:50	1:30	2:30	6:00	11:00	37:00	52:00
80					8:00	15:00	38:00	70:00
75	0:30	1:00	2:00	3:50	12:00	20:00	53:00	90:00
55	0:45	1:30	3:00	9:00	24:00	37:30	96:00	135:00
25	2:10	3:15	11:20	30:00		62:30		

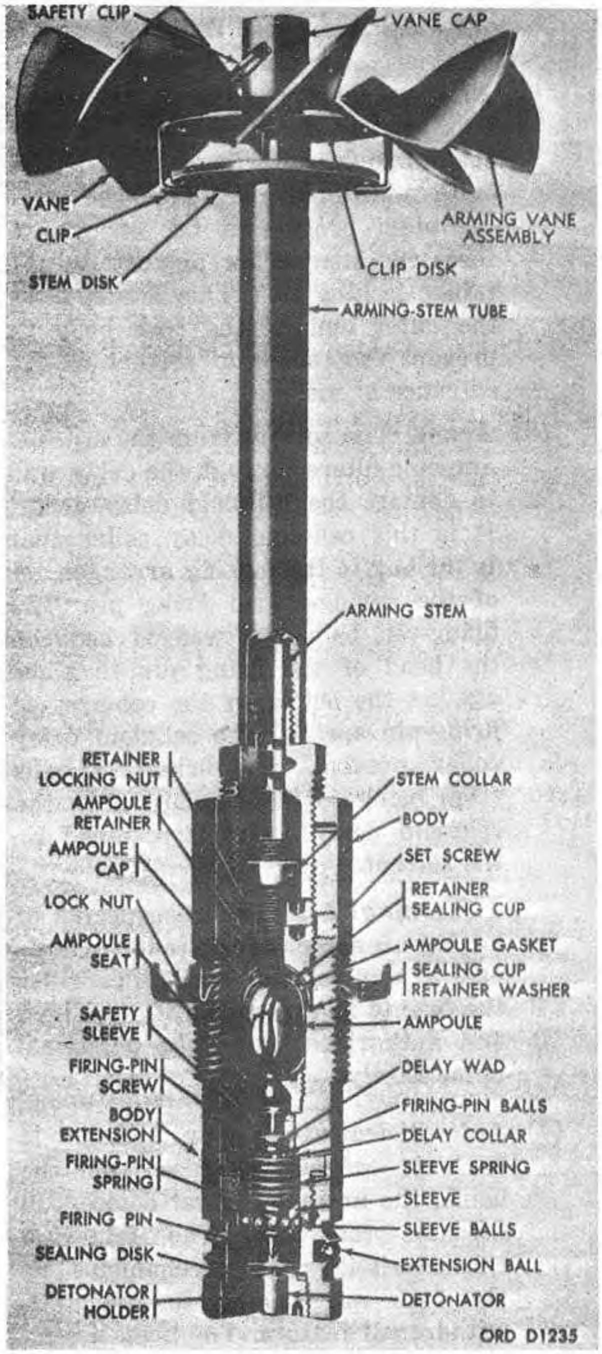


Figure 4-37. Tail fuze M123A1—cross section.

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

c. Safety Features. The detonator holder containing the detonator is not assembled in the fuze until immediately prior to assembling the fuze to the bomb. 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 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 and stem 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 which show the various temperature ranges to which the fuzes have been subjected during shipping and storage. This system prevents the use of fuzes which have experienced temperatures rendering them dangerous to handle. When the fuze is installed in the 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 an installed fuze 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.

Note. The tag for the cotter pin and pull ring assembly is marked in black as follows: FOR USE IF SAFETY PINS ARE TO BE PULLED AFTER THE PLANE IS AIRBORNE. The second, a warning tag, is marked in red as follows: DANGER NEVER REMOVE THIS TAG. THIS FUZE CONTAINS A BOOBY TRAP. NEVER ATTEMPT TO REMOVE THIS FUZE FROM THE BOMB. A third tag, for the adapter-booster lock pin, has the following marked in black: THIS PIN IS FOR USE ON THE ADAPTER-BOOSTER of the following BOMBS: GP 100-lb, AN-M30A1 and GP 250-lb, AN-M57A1 (instructions for assembling this pin to the adapter-booster are marked in black on the reverse side of the tag). The fourth, an instruction tag attached to the safety pin, is marked in black as follows: REMOVE THIS PIN AFTER ARMING WIRE HAS BEEN INSERTED BUT BEFORE ARMING VANE IS ATTACHED. DO NOT UNSCREW FUZE DURING OR AFTER ASSEMBLY TO BOMB.

d. Safety Precautions. The following precautions must be observed in handling these fuzes:

(1) Do not assemble the fuze to the detonator holder nor to the bomb in anticipation of future needs.

(2) Take particular care to protect fuzes from extreme 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.

***Warning:* When engaging threads of mating parts in assembling the fuze to the 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.**

e. Functioning.

(1) *General.* When the fuzed bomb is dropped, the arming wire is withdrawn from the arming-vane assembly, stem disc, and clip. The freed arming-vane assembly rotates in the airstream. 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 or until someone attempts to defuze the bomb.

Note. A steel nose plug or an inert nose fuze must be used to reduce the possibility of the bomb detonating on impact.

(2) *Arming.* The arming-vane assembly (fig. 4–38) is connected directly to the arming stem by means of the safety catch. At its lower end, the arming stem passes through the retainer locking nut and is threaded into the 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 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.

(3) *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 in place against the action of the compressed firing-pin spring. The celluloid delay collar prevents the firing-pin balls from being forced outward until the celluloid delay collar is softened by the solvent.

***Warning:* If a fuze is suspected of having an acetone leak (odor or wetness at any joint or cavity), consider the fuze to be armed. Notify qualified and authorized munitions personnel immediately.**

(4) *Antiwithdrawal.* If any attempt is made to remove the fuze from the bomb, 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-center circumferential groove is machined into the outer surface of

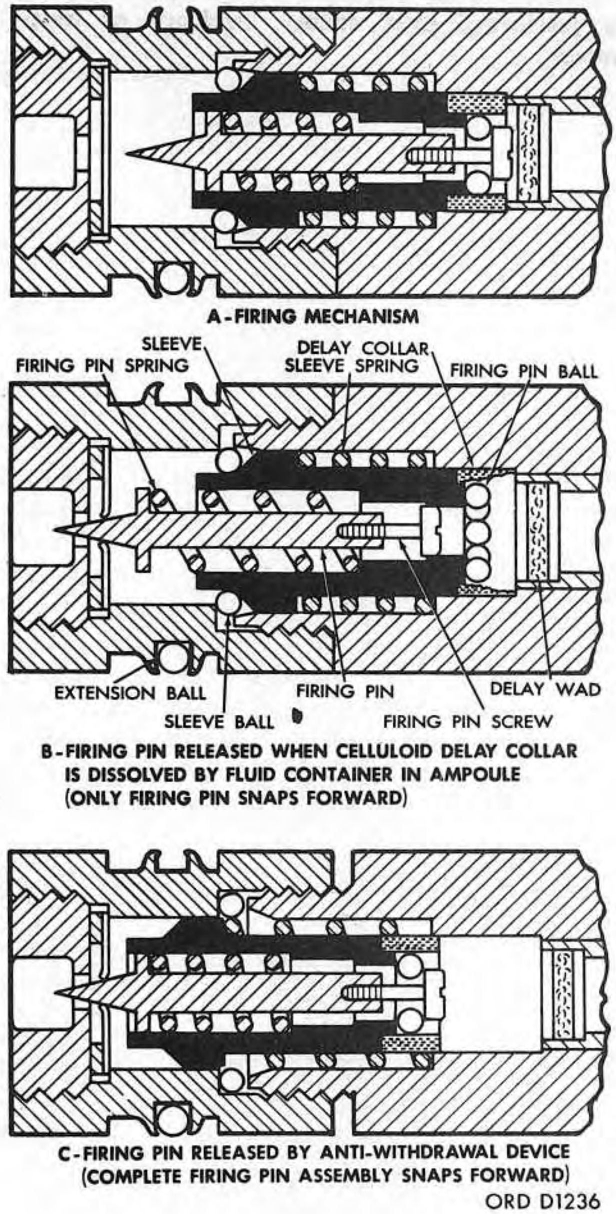


Figure 4-38. Tail fuze M123A1, operation.

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 extension is unscrewed $^{3}/_{64}$ 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. For insurance against countermeasures, 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.

(5) *Detonation.* When the firing pin punctures the sealing disc and the detonator, the detonator explodes, setting off the adapter-booster and the bomb.

f. Accidental Arming. 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 any suspected fuze as being armed. 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 qualified and authorized munitions personnel.

Warning No. 1: **If the red-stoppered indicator vial in the fuze packing box shows that the fuzes have been subjected to temperatures over 170° F., notify qualified and authorized personnel immediately.**

Warning No. 2: **No attempt must be made to remove a fuze after it has been partially or completely installed in a bomb.**

Warning No. 3: **Return of bombs to airfields or carriers is prohibited. Bombs fuzed with**

fuzes M123A1, M124A1 or M125A1 cannot be released SAFE. Impact will cause the 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.

4-17. Fuze, Bomb: Tail, M132, M133, and M134

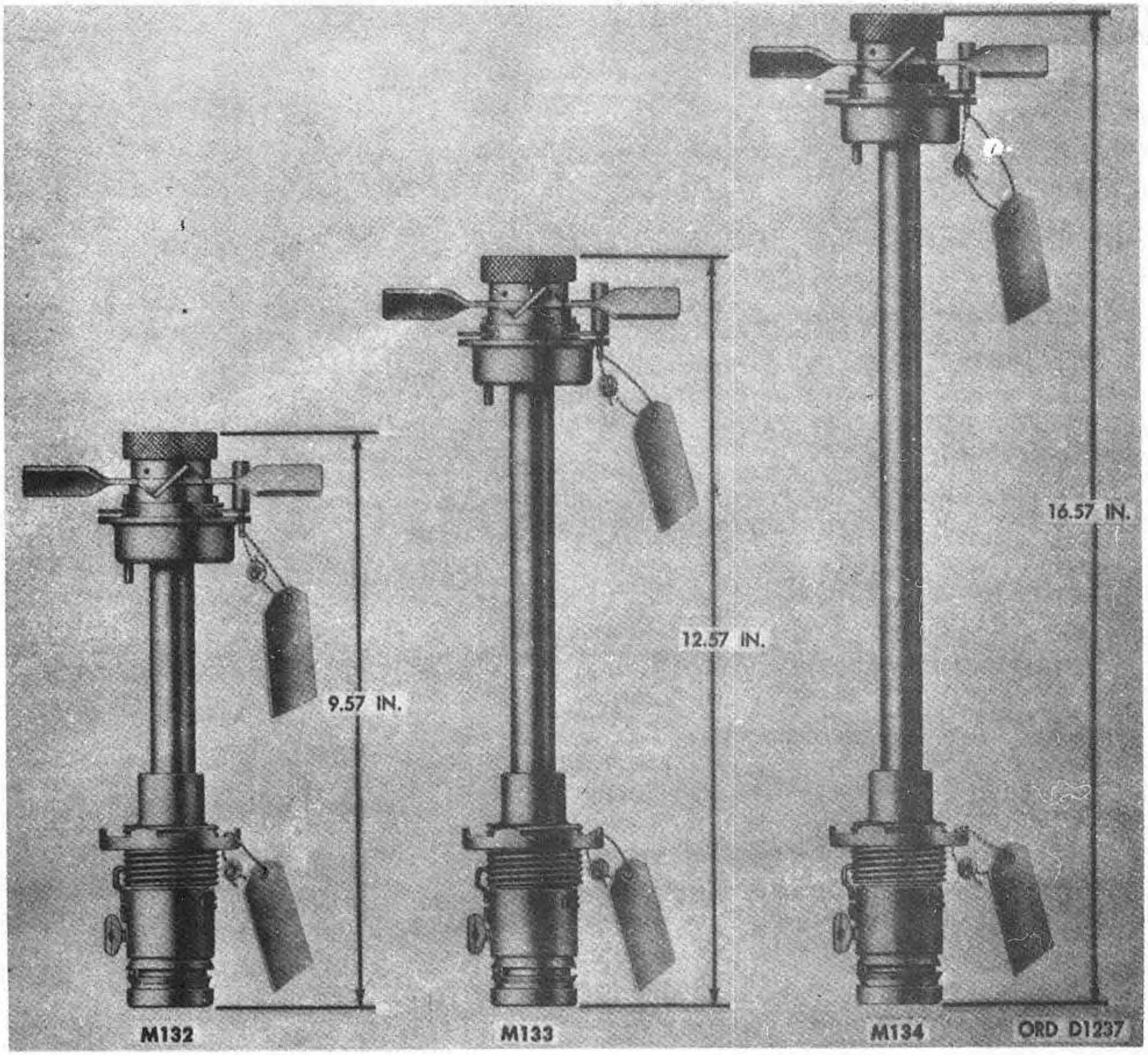


Figure 4-39. Tail fuzes M132, M133, and M134.

Table 4-12. Tail Fuzes M132, M133, and M134

	M132	M133	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) at 80° F.	16	16	16
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

Table 4-12. Tail Fuzes M132, M133, and M134—Continued

	M132	*M133*	*M134*
Vane Span (in.)	5.0	5.0	5.0
Weight (lb)	2.1	2.3	2.6
Number of Vane Blades	4	4	4
Detonator Designation	M19A2	M19A2	M19A2

Table 4-13. Effect of Temperature on Delay Action of Tail Fuze M134

Fuze Temperature (Degrees Fahrenheit)	*Average Delay (Minutes)*
120	6
100	10
80	16
60	26
40	40
20	59
10	80

a. Description. Vane-operated tail fuzes of this type (figs. 4-39 and 4-40, and table 4-12) are delay armed and incorporate an antiwithdrawal feature. Approximately 100 feet of air travel is necessary for arming. 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; higher temperatures will accelerate it and lower temperatures will retard it (table 4-13). Tail fuzes M132, M133, and 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 airstream. Arming-vane assemblies M4 and M5 are used with these fuzes. For shorter arming distances, the standard vane M4 (45° pitch) is used; for longer arming distances, vane M5 (75° pitch) is used.

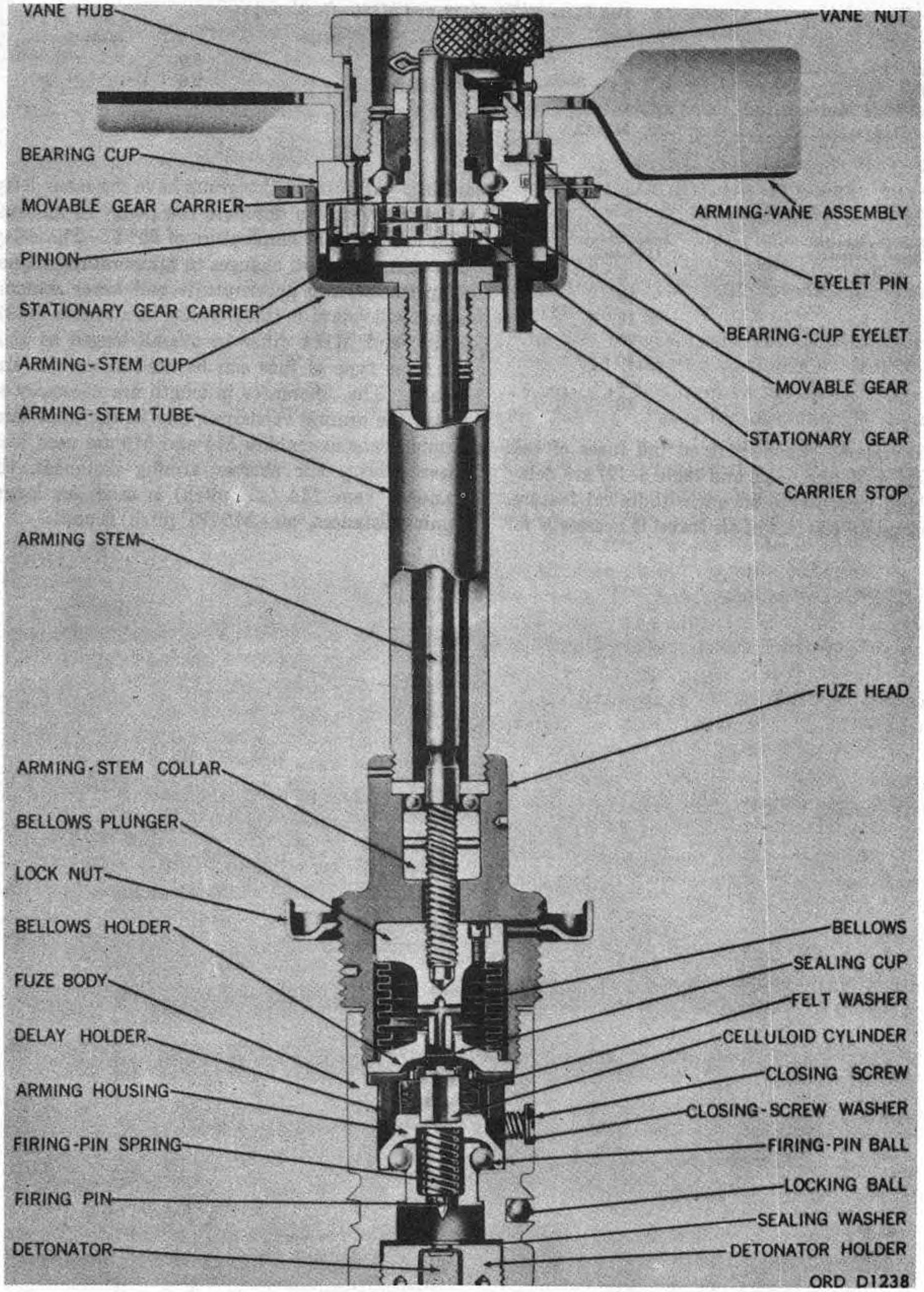


Figure 4-40. Tail fuze M132—cross section.

b. 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 holder are not assembled in the fuze as issued and must be installed prior to the bomb fuzing operation.

c. Safety Features. 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 (fig. 4-41). Leakage of the solvent prior to fuzing will leave a red stain on the cotton, indicating fuzes that are unserviceable. This leaves the fuze inert at all times during shipping and storage. During shipping and storage, these fuzes are equipped with a safety clip having two studs. One stud engages a hole in the fuze head to prevent rotation between the fuze 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 if dangerously high temperature ranges have been experienced during shipping and storage. This prevents the use of those fuzes which have experienced temperatures rendering them dangerous to handle. When the fuze is installed in the bomb, the arming wire prevents the arming stem from rotating and arming the fuze. This is the only safety feature afforded these fuzes after they are installed. Attempted withdrawal or tampering will cause the fuze to detonate the bomb.

d. Safety Precautions. The following precautions must be observed in handling these fuzes:

(1) Do not assemble the detonator holder to the fuze nor the fuze to the bomb 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.

***Warning:* 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.**

(4) Do not remove the warning tag attached to this fuze when the fuze is assembled to the bomb.

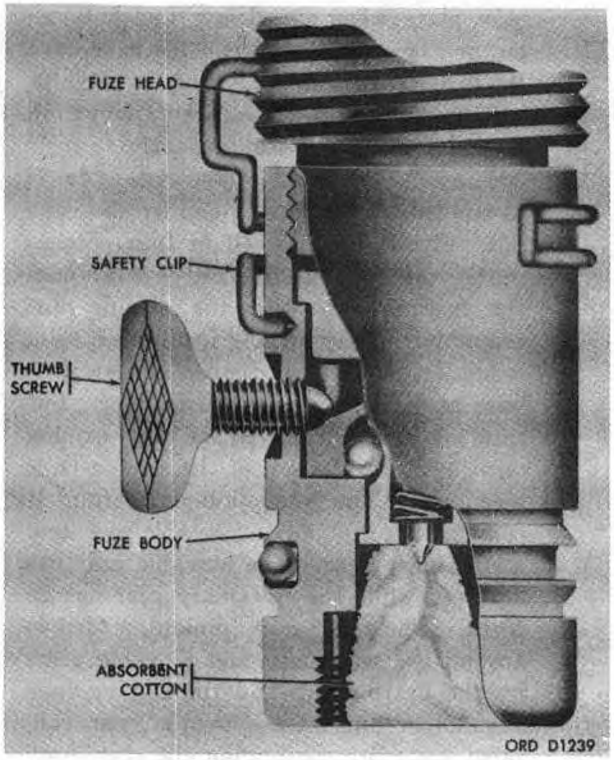


Figure 4-41. Tail fuze M132, as shipped.

e. Functioning.

(1) *General.* When the fuzed bomb is dropped, the arming wire is retained in the bomb rack and withdrawn from the fuze. This frees the arming-vane assembly which rotates in the airstream. 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.

(2) *Arming.* The arming-vane assembly is assembled to the bearing cup by the vane nut. Eyelet pins, which fit into notches in 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 teeth. 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, and the fuze is armed.

(3) *Delayed Action.* The delay element consists of a celluloid cylinder seated within three felt washers. The solvent filters through openings in the delay holder and is then absorbed by the felt washers, which act as a wick, feeding the solvent gradually to the celluloid. The celluloid cylinder serves as a lock for the firing mechanism. The firing mechanism (fig. 4–42) consists of a firing pin, an arming housing, a compressed firing-pin spring, and firing-pin balls. The firing-pin balls (fig. 4–40) 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 compressed 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 ambient temperature, the cylinder is softened sufficiently so that the firing-pin spring can force the arming housing upward to release the firing-pin balls. This frees the firing pin which is then driven into the detonator by the firing-pin spring.

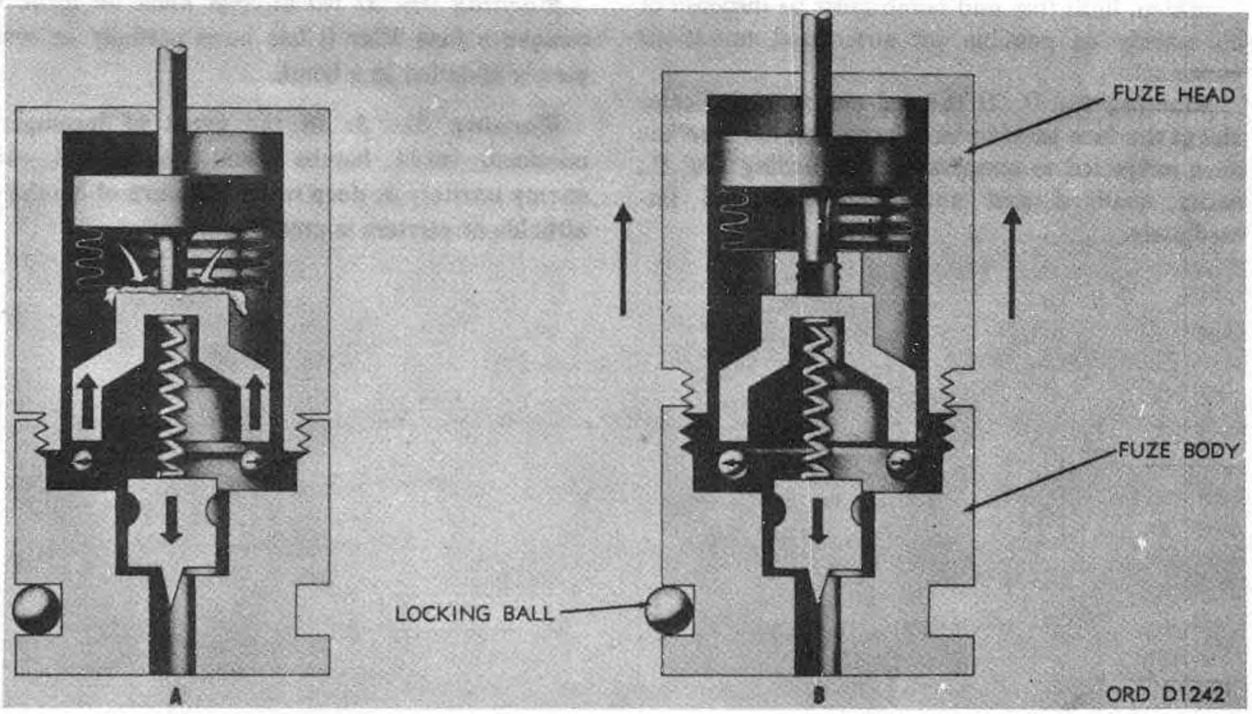


Figure 4-42. Tail fuze M132, operation.

(4) *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-center, 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 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 insurance against countermeasures, 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.

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

f. Safe Release. Bombs fuzed with this type of antiwithdrawal fuze cannot be presumed to be released SAFE. In the event of incomplete missions, 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.

g. Accidental Arming. 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 its being in an armed ndition, both fuze and bomb must be disposed of as quickly as possible by authorized munitions personnel.

***Warning No. 1:* If the red-stoppered indicator vial in the fuze packing box shows that the fuze has been subjected to temperatures exceeding 170° F., notify qualified and authorized personnel immediately.**

***Warning No. 2:* No attempt must be made to remove a fuze after it has been partially or completely installed in a bomb.**

***Warning No. 3:* In the event of incomplete missions, fuzed bombs must be relased over enemy territory or deep water. Return of bombs to airfields or carriers is prohibited.**

4-18. Fuze, Bomb: Tail, M190

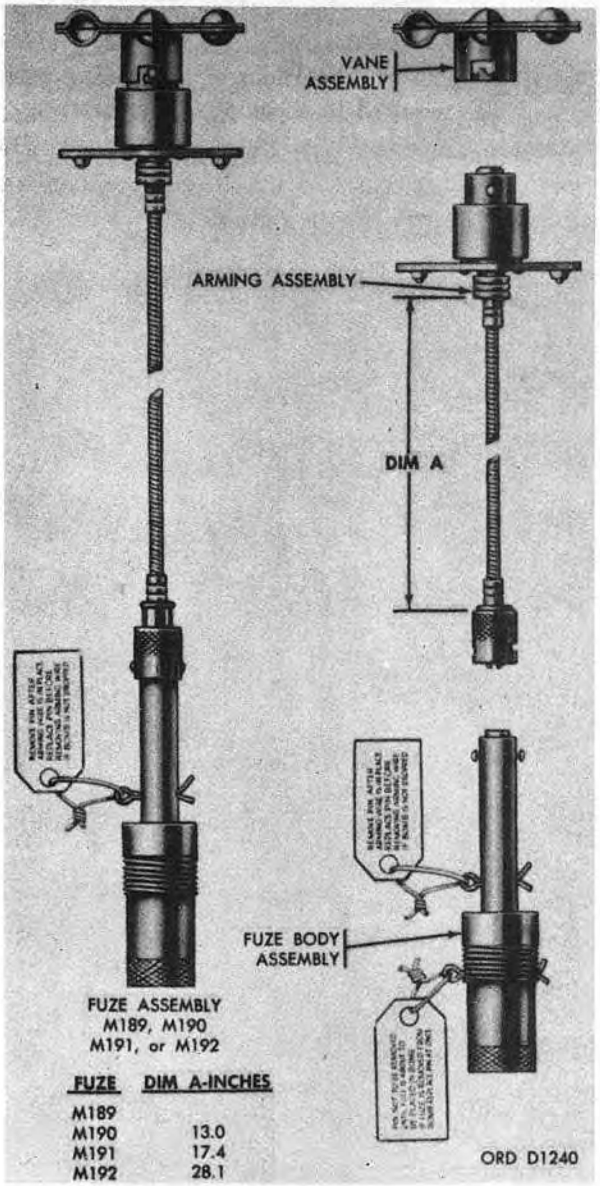


Figure 4-43. Bomb, tail fuze M190.

Table 4-14. Tail, Fuze, M190

Model	M190
Firing Action	Impact Inertial
Firing Delay	0.01, 0.025, 0.10, 0.24 or Nondelay (Instantaneous)
Arming Type	Vane Delayed
Revolutions to Arm	691 to 794
Air Travel to Arm (ft)	------------------------
Body Diameter (in.)	1.5
Body Length (in.)	6.89

Table 4-14. Tail, Fuze, M190—Continued

Shaft and Arming Assembly Length (in.).	13.0
Vane Type	Anemometer Cup
No. of Cups	4

a. Description. This tail fuze (fig. 4-43 and table 4-14) is an inertial type consisting of a fuze body assembly, arming assembly, flexible shaft, and arming-vane assembly. The cylindircal fuze body is threaded externally for assembly to the fuze adapter of GP bomb M117. The end of the fuze body which enters the adapter is threaded internally to receive primer-detonator M14. An arming-stem tube extends from the opposite end of the fuze body and is assembled to form a part of the fuze body assembly. The M190 is similar to fuzes M905 and M906 in that it utilizes a flexible drive shaft which connects the arming mechanism to the arming stem. The arming mechanism is mounted on the side of the fin cone of tail fin M131 on GP bomb M117. An anemometer-cup arming vane is attached to the arming mechanism by a bayonet-type fastener. The fuze body, flexible shaft, arming mechanism, and arming vane are packaged and shipped as a complete assembly. As shipped, the fuze is inert. Primer-detonator M14 with the required delay is inserted when preparing the fuze for use.

b. Safety Features. During shipment and storage, the fuze is made safe by the presence of a safety (cotter) pin, with attached tag, that extends through the fuze body and firing plunger. The safety (cotter) pin, which locks the gear mechanism, is also inserted through a set of holes in the arming stem about one inch from the fuze head. The fuze cannot be installed without first removing the safety (cotter) pin from the fuze body. When a fuze is properly installed in a bomb, with the arming wire in place, the anemometer-cup arming-vane assembly is prevented from rotating and arming the fuze. The safety (cotter) pin inserted through the arming stem is removed after the arming wire is installed. 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 components 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 and flexible shaft.

c. Functioning.

(1) When the fuzed bomb is dropped, the

arming wire is retained in the bomb rack and withdrawn from the fuze. This frees the arming vane which rotates in the airstream turning the flexible shaft, which turns the arming stem and arms the fuze.

(2) The arming action, detonation, and safe release of this fuze is the same as with fuzes of the M160 series except that a greater number of revolutions of the arming vane are required to accomplish fuze arming.

4-19. Fuze, Bomb: Tail, M905

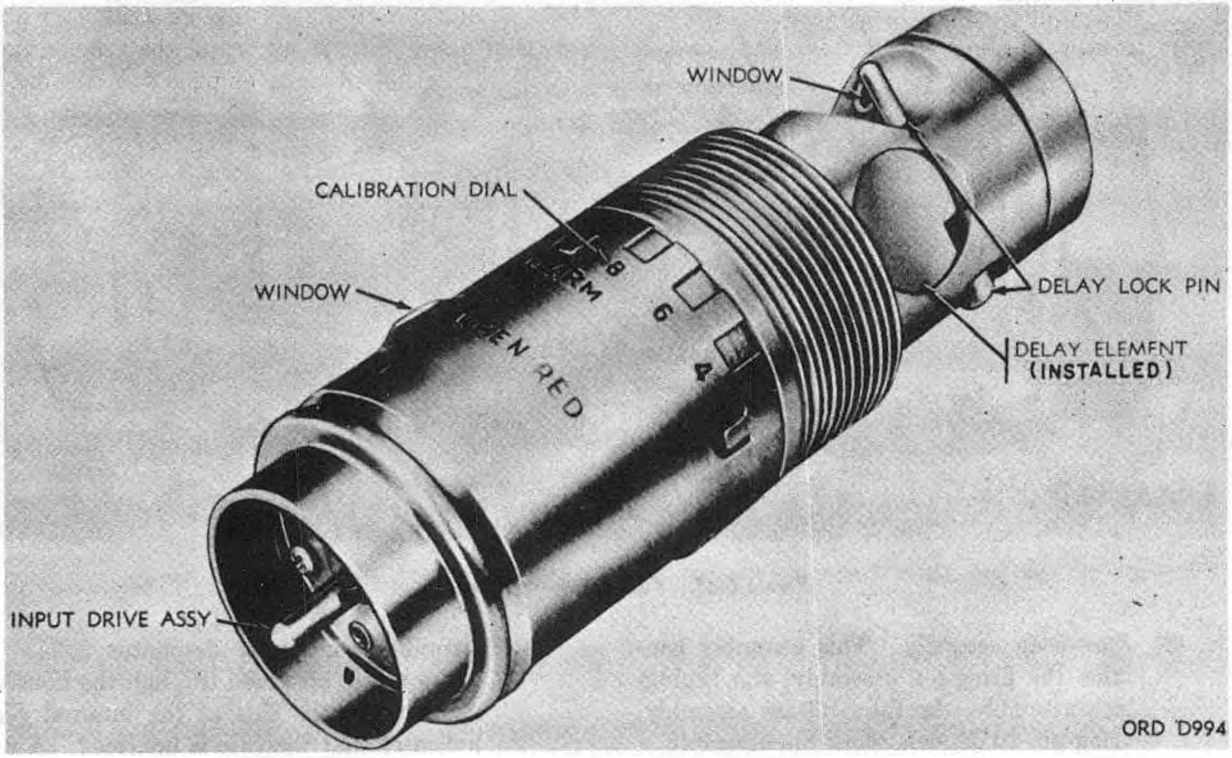


Figure 4-44. Tail fuze M905.

Table 4-15. Tail Fuze M905

Model	M905
Arming Delay (sec)	4 to 20
Firing Delay (sec)	0.01, 0.05, 0.025, 0.10, 0.25 or Nondelay (instantaneous).
Firing Action	Impact Inertia
Overall Length (in.)	6.38
Weight (lb)	1.1

a. Description. This fuze (fig. 4-44 and table 4-15) is used in conjunction with nose fuze M904 series. When assembled in the new-series or low-drag general purpose bombs, it requires the use of adapter booster T46E4. The arming of fuze M905 is accomplished by arming-drive assembly M44 (T25) through the rotation action of flexible shaft M40 (T40) instead of the arming vane. The fuze has a selective arming time delay of 4 to 20 seconds, which is marked in 2-second intervals from 4 to 8 seconds and in 4-second intervals from 12 to 20 seconds. The firing pin is actuated by inertia instead of by impact as does fuze M904.

b. Components. Fuze M905 has similar components to fuze M904 but the operation of the fuzes differs. The major assemblies of fuze M905 (fig. 4-45) are—

(1) *Input drive-housing assembly.* This assembly consists of the input-drive assembly, reduction-gear and pinion assembly, gear-train cup, and housing assembly. The output speed of flexible shaft M40 is transmitted to the fuze through the input-drive assembly. The input-drive assembly is coupled to the reduction-gear and pinion assembly which is coupled to the internal gear. The internal gear is mechanically coupled to the firing pin. The reduction-gear and pinion assembly is secured to the gear-train cup, which is secured to the input-drive housing by three screws. The input-drive assembly is coupled to the fuze body with seven tabs.

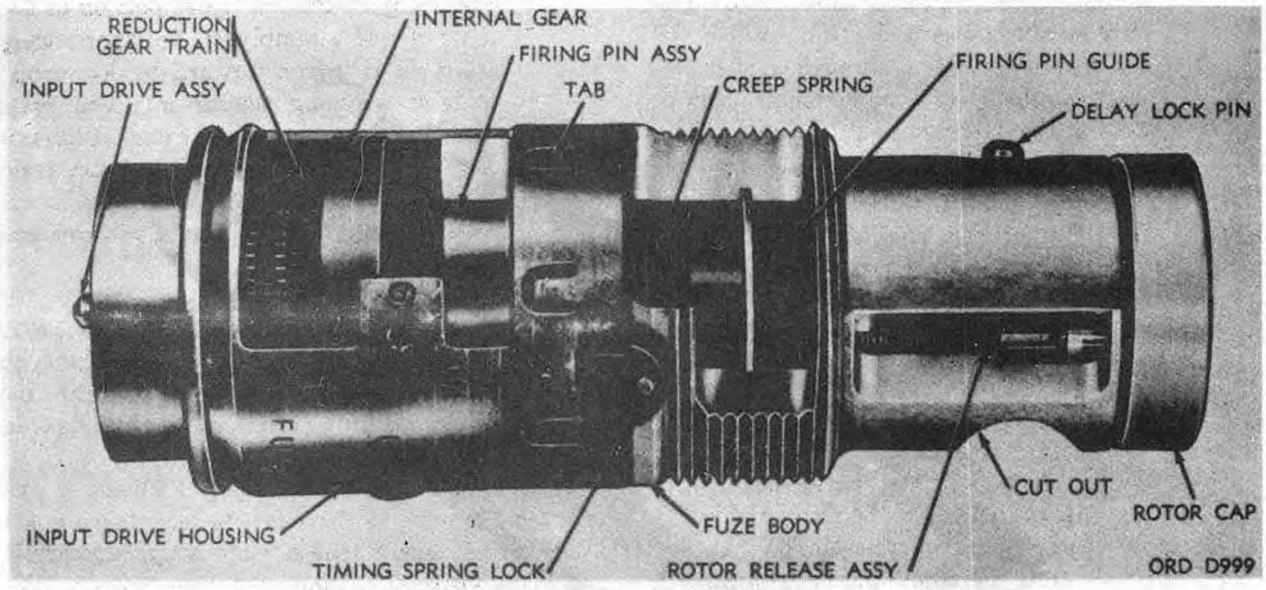


Figure 4-45. Fuze M905—cross section.

(2) *Fuze body assembly.* This assembly contains the firing-pin assembly, the timing-lock assembly, the rotor-release assembly, firing-pin guide, delay-lock pin assembly, a window, and the rotor assembly. The firing-pin assembly contains a firing pin and creep spring. The upper portion of the firing pin has a projection which rides on the shoulder of the fuze body until the fuze becomes armed. The firing pin is held in place, after the fuze is armed, by the action of the creep spring. The key in the firing pin rides in the key way of the firing-pin guide. The firing-pin guide is held in position in the fuze body by a retaining ring. The timing-lock spring holds the input-drive housing assembly in place after the required or desired arming-delay time is selected. The timing lock is pushed in to change the arming-delay time. Seven tabs on the lower portion of the input-drive housing hold it and the fuze body together. The lower portion of the rotor-release plunger holds the rotor assembly in the unarmed position. The window in the input-drive housing is used for inspecting the armed or unarmed fuze to determine the condition, while the window in the lower portion of the body is used for sighting the position of the rotor assembly containing detonator M35. A white mark, observed through the housing window, on the side of the internal gear indicates that the fuze is unarmed. A red mark on the side of the internal gear on the edge of the rotor assembly indicates that the fuze is armed or partially armed. Relay XM9, as in fuze M904, is located in the lower portion of the fuze body. The rotor cap, threaded onto the lower portion of the fuze body, has a dual function: it protects the components (rotor assembly, rotor detent, etc.) located in the lower portion of the fuze body from foreign material, and it also prevents high-order detonation of the bomb booster should detonator M35 be accidentally initiated in the out-of-line firing position. The out-of-line firing position thickness of the rotor-cap outer surface is approximately 0.050 inch, while the in-line firing position thickness of the rotor cap outer surface is 0.012–.002 inch.

c. Functioning.

(1) Fuze functioning is initiated when the bomb drops from the aircraft, thereby removing the arming wire and Fahnestock (safety) clips from the vane tab of the arming-drive assembly. Rotation of the arming vane is transmitted through gearing

similar to the gearing of fuze M904. The 1800 revolutions-per-minute output of the governor is passed on through the flexible-shaft coupling to the reduction-gear train, causing the internal gear to rotate. The internal gear, firing pin, and firing-pin guide are keyed to rotate as a unit. Arming time is determined by the arc through which the internal gear must rotate before a projection on the gear reaches a step on the fuze body. Simultaneously, a projection on the firing pin assembly aligns with a slot in the fuze body. The firing pin is then free, upon sufficient deceleration of the fuze, to move in the direction of flight. During free fall, the anti-creep spring prevents movement of the firing pin due to velocity changes of the bomb. At approximately the same time as the firing pin arms, the axial groove in the firing-pin guide aligns with the upper portion of the rotor-release assembly. The rotor-release assembly is driven forward by its spring, thereby releasing the rotor. The rotor turns by spring action and brings detonator M35 in line with the other explosive train components. The rotor detent locks the rotor assembly in the armed position and the fuze is armed.

(2) When the bomb hits the target, the inertial force generated by deceleration of the bomb causes the firing-pin assembly to move forward, and strike the primer of the delay element M9, thus initiating the explosive train.

d. Safety Features. The safety features of this fuze are the same as those for the nose fuzes in the M904 series, except that a white stripe appears in the large inspection window at all arming delay settings.

4-20. Fuze, Bomb: Tail M906

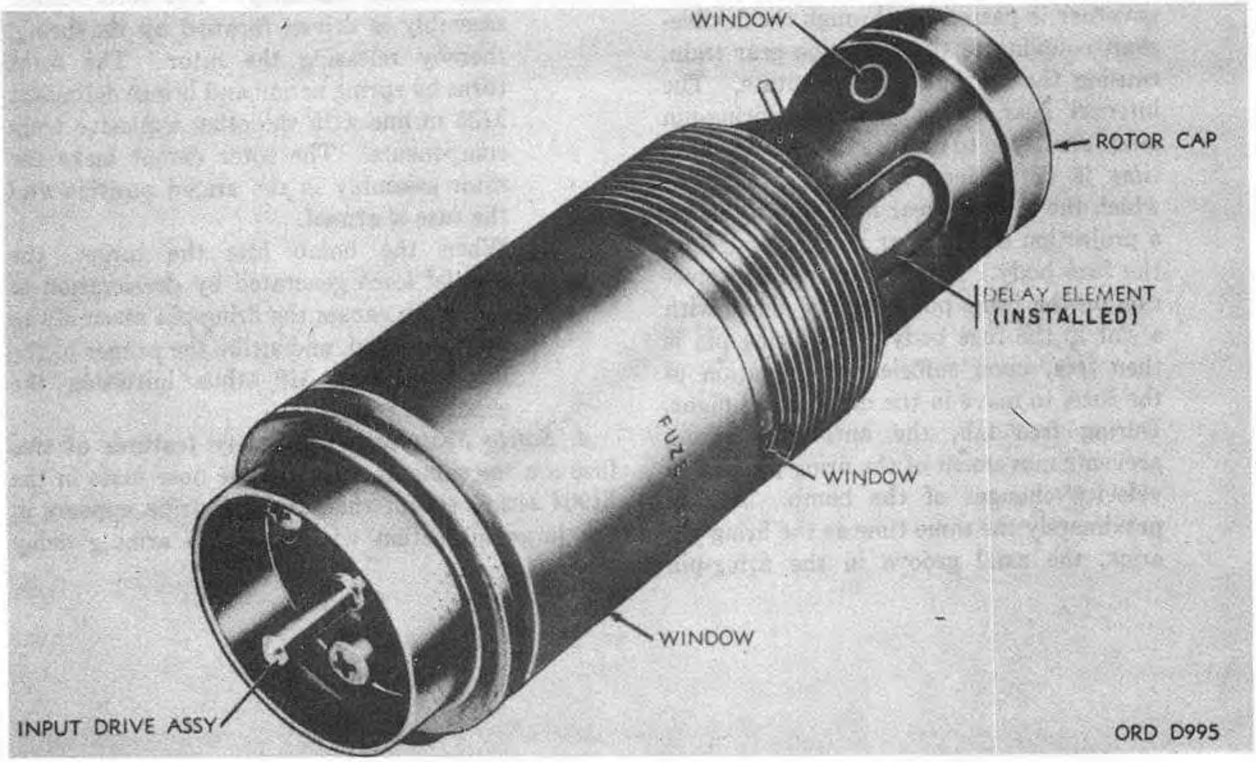


Figure 4-46. Tail fuze M906.

Table 4-16. Tail Fuze M906

Model	M906
Arming Delay (sec)	2.0
Firing Delay (sec)	5.0 or 12.5
Firing Action	Impact Inertial
Overall Length (in.)	6.50
Weight (lb)	1.1

a. Description. This fuze (fig. 4-46 and table 4-16) is used for low-level tactical bombing when a longer firing-time delay is needed to assure that the releasing aircraft will be safe from the explosive envelope of the bomb prior to its initiation. Fuse M906 is used with the 750-pound general purpose bomb M117 and low-drag general purpose bombs. Arming-drive assembly M44 (T25) is used with fuze M906. This fuze has no selective-arming time-delay provisions. The arming time delay of 1.97± 0.4 seconds is predetermined by design requirements. Delay elements T5E3 and T6E4 provide fuze M906 with desired impact firing delay. Adapter booster T46E4 is used with this fuze.

b. Components. The major components of fuze M906 (fig. 4-47) are the input-drive housing assembly, the fuze body assembly, and the rotor assembly. The input-drive housing assembly, secured to the fuze body assembly with three screws, consists of the input-drive assembly and the housing assembly. The input-drive assembly is used for transmitting circular motion to the fuze for release and freeing of the plunger-release screw, which is mechanically connected to the rotor-release screw. The teeth of the gear on the upper portion of the input assembly shaft mesh with teeth of the gear of the plunger-release screw. The fuze body assembly contains a spring-loaded firing pin and a plunger-release screw. The oval opening in the side of the fuze is used for the insertion of delay element T5E3 or T6E4. The armed and unarmed condition of the fuze can be observed through transparent windows. An unarmed fuze is indicated by the appearance of the gears in the plunger-release assembly between the two marks or lines on the window in the input-drive housing. When the upper edge of the rotor assembly does not show red, detonator M35 is not in line with the other firing train elements. Any conditions other than those noted above, indicate that the fuze is partially armed or armed. The rotor cap provides the same function for fuze M906 as it does for fuze M905 (para 4-19). Fuze M906 has no selective time-delay provisions. The arming-time delay is approximately two seconds. Delay element T5E3 and T6E4, oval in shape, provides fuze M906 with impact firing delays of 5.0 and 12.5 seconds, respectively. The delay selection depends on the fuze requirements for a particular bomb and target. Arming assembly M44 (T25) and flexible shaft assembly M40 (T40) are used with fuze M906 for imparting arming action.

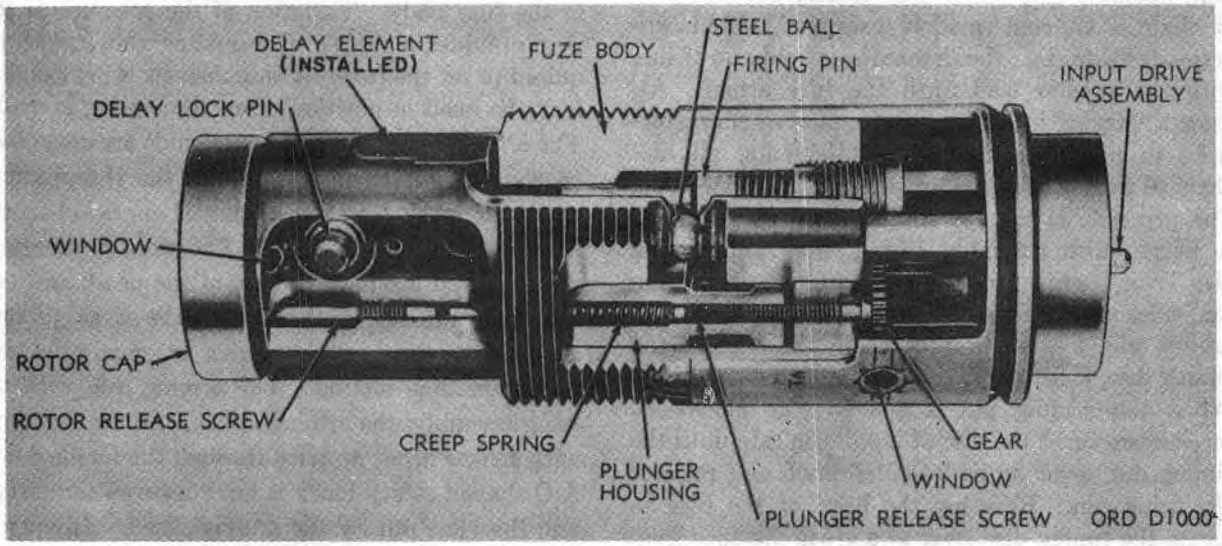


Figure 4-47. Fuze M906—cross section.

c. Functioning.

(1) Fuze functioning is initiated when the arming wire is pulled out of the vane tab and Fahnestock (safety) clips in the arming-drive assembly. The 1800 revolutions-perminute output of the arming-drive assembly is transmitted through a flexible shaft coupling to the input-drive assembly and reduction-gear train which drives the plunger-release screw. Rotation of the plunger-release screw causes it to be withdrawn from the plunger assembly. After withdrawal, the plunger is free to move longitudinally upon sufficient deceleration of the fuze. The creep spring prevents the plunger from moving when velocity changes occur during free fall of the bomb. As the plunger-release screw rotates, the rotor-release screw assembly, which is mechanically keyed to it, withdraws from the rotor-assembly cavity, allowing the rotor to move by spring action and bring detonator M35 in line with the rest of the explosive train elements. The rotor detent locks the rotor in the armed position. The fuze is completely armed within approximately 2 seconds.

(2) When the bomb hits the target, inertial force generated by the bomb deceleration causes the plunger assembly to move forward. When an annular groove in the plunger aligns with the steel ball that detents the firing pin, the ball is forced into the plunger groove; the firing pin, thus freed, is propelled into the primer of the delay element by the firing-pin spring, thus initiating the explosive train elements. The explosive train is identical to that in fuze M905, except delay element T5E3 or T6E4 is used in place of delay element M9.

d. Safety Features. An inspection window on the side of the fuze permits observation of a small gear which indicates the armed or unarmed condition of the fuze. When the gear appears between the index marks, the fuze is safe. There is also a small inspection window immediately above the rotor cavity through which it can be visually determined if the rotor is in the out-of-line safe position.

Section II. MECHANICAL TIME FUZES

4-21. General

a. Functioning. Nose and tail mechanical-time bomb fuzes are combination vane and arming pin, and time or impact functioning. The impact feature, for insurance rather than deliberate selection, operates only when time setting exceeds time of flight. Current models except M155A1 are detonator-safe (i.e., the detonator is held out of line with the booster lead until the fuze arms). Although varying in arming and explosive characteristics to meet specific use requirements, all mechanical time bomb fuzes are essentially of one type. The principle is that of the common alarm clock. A trigger arm assembly (firing lever and timing disc lever), which restrains a spring-loaded firing pin, rides on the edge of a circular timing disc. An arming pin, located in a notch in the edge of the timing disc, locks the disc in the unarmed condition. When the arming pin is ejected, the clockwork mechanism turns the disc at a uniform rate until the timing disc lever drops into the notch and releases the firing pin. Rotating the head of the fuze to locate the timing disc lever at a given distance from the arming pin gives the time setting desired. In the new mechanical time fuzes M907, M908 and M909, the arming mechanism consists of an arming assembly to which the arming vane is attached by a bayonet-type locking arrangement, a governor drum and a governor plate assembly, and a set of reduction gears and shafts which terminate in a large arming gear. A cutout on the arming gear allows the arming stem to move forward when the gear has rotated into the armed position and a spring-loaded slider, containing a primer, is released to the armed position. The timing mechanism consists of a spring-driven clock movement which terminates in a timing disc. A cutout in the timing disc triggers the firing mechanism.

b. Description. Nose and tail mechanical time bomb fuzes consist of a body, which contains the time element and the explosive train, and a head, which contains the mechanical arming and firing system. Head and body are held together by a spring steel ring which is positioned by three screws in the fuze body. Variation of the pressure of the ring provides a means of adjusting the torque required to set the fuze. A thumbscrew is provided to lock the head in position when the setting is made. The arming pin and arming wire guide are assembled on the side of the body opposite the thumbscrew. An index mark for time setting is engraved in the body just below the head. The time graduations are engraved around the base of the head, and two stop pins are set in the time scale so as to butt against the arming wire guide at maximum and minimum time setting. The arming hub with the vane assembly, the arming sleeve, and the firing pin with striker head, projects through the forward end. A C-shaped safety block is held between the striker and the vane nut by the arming sleeve. In current models, the safety block has a collar which bears on pins in the vane nut. This assures that the block will spin with the arming vane and develop sufficient centrifugal force to throw the block clear when the arming sleeve is withdrawn. As the fuze is issued, there is a forked striker stop in place between the striker and the safety block and a cotter pin through the inner of a pair of eyelets in the arming pin. These are connected by a sealing wire which also passes through the inner of a pair of eyelets in the arming-wire guide and vane tab. The new mechanical time fuze M907 does not utilize an arming sleeve or a safety block as stated above for other models.

4-22. Fuze, Bomb: Nose, Mechanical Time, AN-M145A1, AN-M146A1 and AN-M147A1

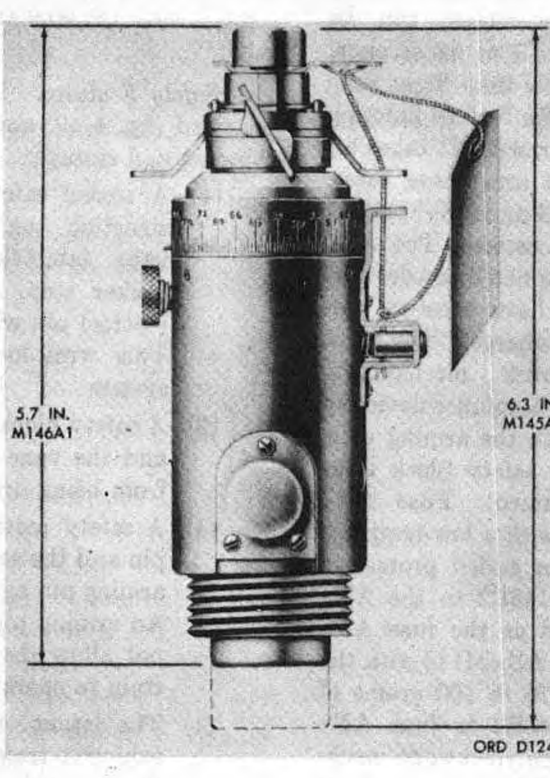


Figure 4-48. Mechanical time nose fuzes AN-M145A1 and AN-M146A1.

Table 4-17. Mechanical Time Nose Fuzes AN-M145A1, AN-M146A1 and AN-M147A1

	AN-M145A1	*AN-M146A1*	*AN-M147A1*
Firing Action	Mechanical Time	Mechanical Time	Mechanical Time
Firing Delay	Aerial Burst 5-92 seconds or instantaneous on Impact	Aerial Burst 5-92 seconds or instantaneous on Impact	Aerial Burst 5-92 seconds or instantaneous on Impact
Arming:			
Type	Vane and time	Vane and time	Vane and time
Revolutions to Arm	260-350	260-350	260-350
Time to Arm (sec)	4.5	4.5	4.5
Air Travel to Arm (ft)	1000-1300	1000-1300	1000-1300
Overall Length (in.)	6.3	5.7	5.7
Protrusion from Bomb (in.)	4.9	4.9	4.9
Body Diameter (in.)	1.93	1.93	1.93
Vane Span (in.)	3	3	3
Weight (lb)	1.6	1.6	1.6
Time Setting Range (sec)	5-92	5-92	5-92
Number of Vane Blades	2	2	2
Detonator	M19A2	M19A2	M19A2
Lead Charge:			
Type	Tetryl		Tetryl
Weight (grains)	5.6 grains		5.6 grains
Booster Charge:			
Type	Tetryl	Black Powder	Tetryl
Weight (grains)	125	110	7.6

a. Description. Nose fuzes of this type (fig. 4-48 and table 4-17) are armed by mechanical time mechanisms. Detonation after release can be preset; time settings range from 5 to 92 seconds. Should the time setting be greater than flight time of the bomb, impact will cause the fuze to function instantaneously, provided it is armed. It takes air travel of 1000 to 1300 feet to arm these fuzes. Fuzes AN-M145A1, AN-M146A1 and AN-M147A1 are identical except for their boosters. The AN-M146A1 has a booster containing black powder; the AN-M145A1 and AN-M147A1 have boosters containing tetryl and a tetryl lead charge. The fuzes have low-temperature clockwork mechanisms. These fuzes are detonator safe. A spinner device to force safety blocks to rotate with the arming vane assures positive ejection of the safety block after the arming sleeve has withdrawn. Fuze AN-M145E2 is the fuze AN-M145 with a low-temperature clockwork mechanism. An added protective finish changes the fuze AN-M145E2 to the AN-M145E3, which is standardized as the fuze AN-M145A1. Fuze M146E1 is fuze AN-M146 with the booster charge increased from 70 to 100 grains of black powder. Fuze AN-M146E2 is fuze AN-M146E1 with a low temperature clockwork mechanism. Fuze AN-M146E3, which is standardized to become the fuze AN-M146A1, is fuze AN-M146A2 with an added protective finish.

b. Explosive Components. A detonator, a booster lead-in and a booster constitute the explosive components of this type fuze. The detonator is held out of alignment until arming occurs.

Note. Fuze AN-M146A1 has a detonator and a booster only.

c. Safety Features. Four features keep the fuze unarmed (fig. 4-49) and prevent detonation during shipping and storage:

(1) 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 safety (cotter) pin which secures the arming pin. This wire locks the mechanical arming system.

(2) A safety block, located between the striker and the vane nut, prevents the firing pin from being driven inward prematurely.

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

(4) The detonator is out of alignment with the explosive train until the fuze arms. When the fuze is installed in a bomb, the arming wire prevents the arming pin from being ejected and the arming vane assembly from rotating. Thus, the fuze is kept unarmed.

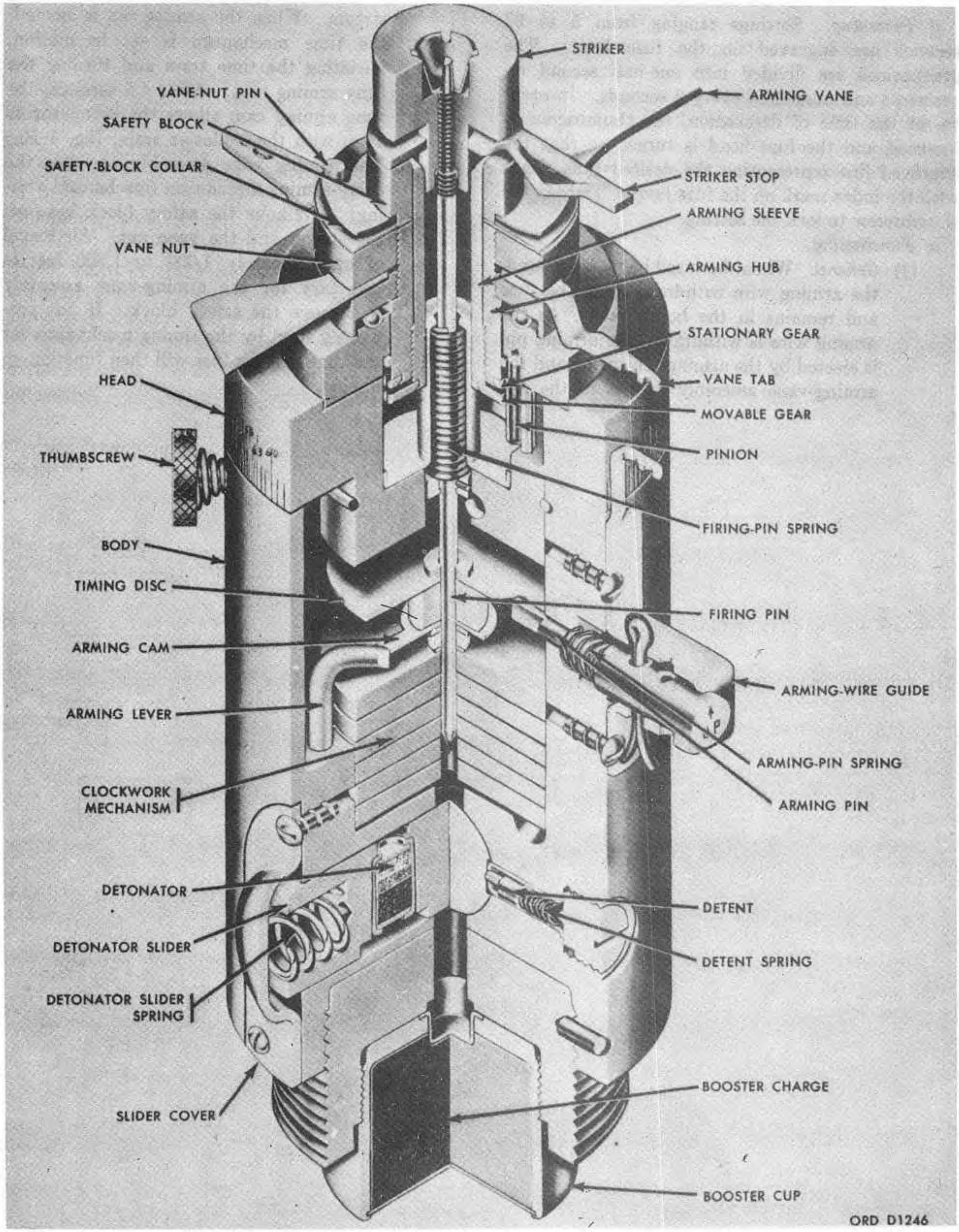


Figure 4-49. Mechanical time nose fuze AN-M146A1—unarmed, cutaway view.

d. Presetting. Settings ranging from 5 to 92 seconds are engraved on the fuze head. The graduations are divided into one-half second increments and numbered every 3 seconds. In order to set the time of detonation, the thumbscrew is loosened and the fuze head is turned so that the engraved line representing the desired time aligns with the index mark on the fuze body. Tighten the thumbscrew to lock the setting.

e. Functioning.

(1) *General.* When the fuzed bomb is released, 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 airstream. 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 allows the detonator to align with the explosive train, (fig. 4–50). The arming vane assembly operates the delay-arming mechanism (mechanical arming) to remove the safety block between the striker and the vane nut. Air travel of approximately 1,000 to 1,300 feet is necessary for the arming-vane assembly to remove the safety block. If not previously fired by the timing mechanism for the time set, the fuze will then function on impact.

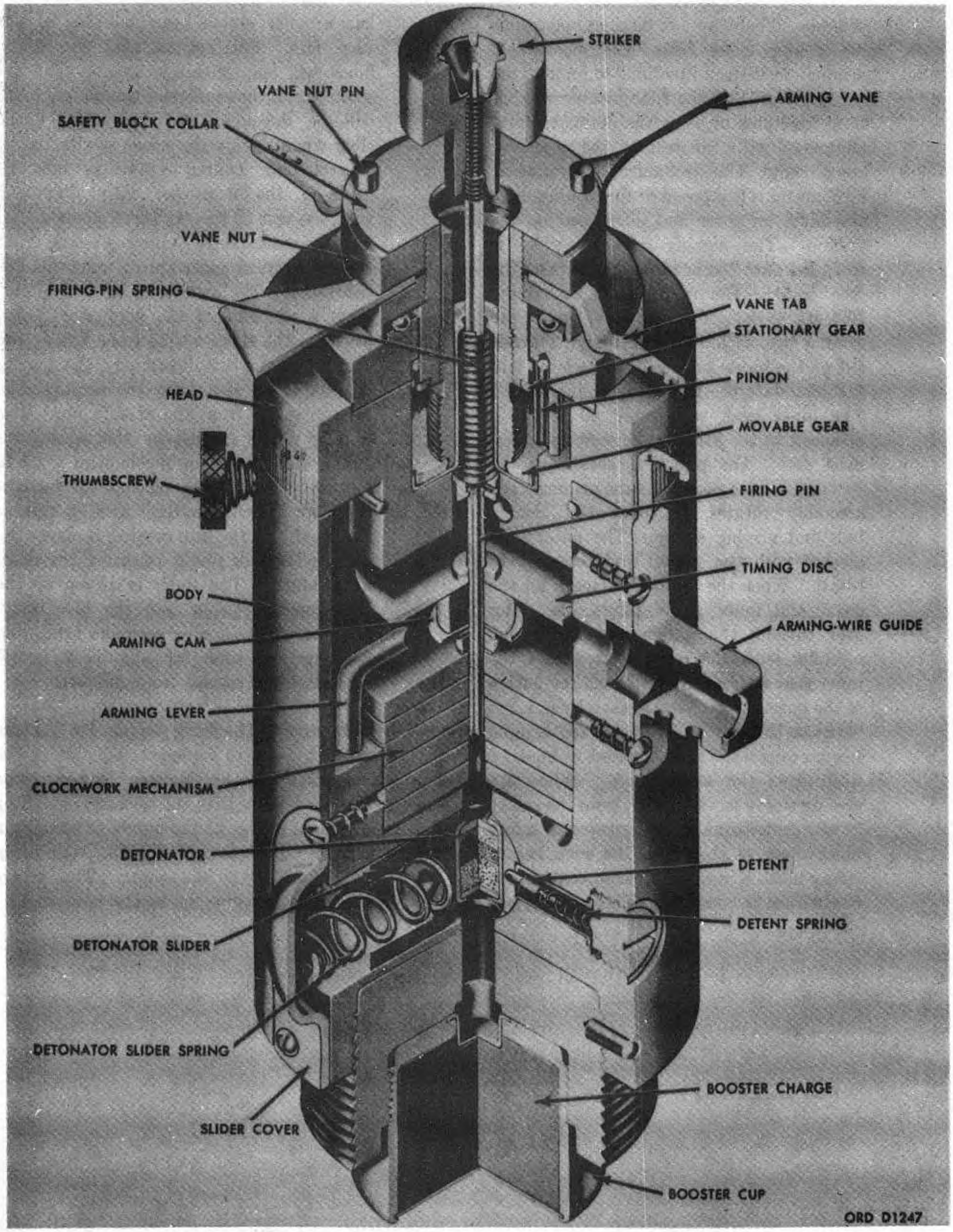


Figure 4–50. Mechanical time nose fuze AN–M146A1—armed—cutaway view.

(2) *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 alignment 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 at the other end of the arming hub, within the fuze body. Threads cut on the inside surface of the arming hub 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 differs, 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 thereby induced between the arming hub and the arming sleeves causes 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, mechanical arming of the fuze is complete. The safety block has a collar which bears on pins in the vane nut. This assures that the safety block will spin with the arming-vane assembly, and that sufficient centrifugal force will be developed to throw the block clear when the arming sleeve is withdrawn. The second arming operation involves bringing the detonator into alignment with the rest of the explosive components. The detonator slider, under pressure from the compressed slider spring, contains the detonator. The arming lever, which contacts a shoulder of the detonator slider, prevents the slider spring from forcing the slider inward. Simultaneously, the arming wire is withdrawn from the arming-vane assembly and 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 allows the arming lever to pivot, releasing the detonator slider. The slider is driven by the slider spring deeper into the fuze body, aligning the detonator with the firing pin. The elapsed time for alignment is 4.5 seconds after release from aircraft.

(3) *Detonation.* The firing pin (fig. 4-51) causes the detonator to explode. This relays the explosion to the booster lead-in. The booster lead-in fires the booster, exploding the main charge of the bomb, or opening a cluster. In fuze AN-M146A1, the firing pin explodes the detonator. This relays the explosion directly to the booster.

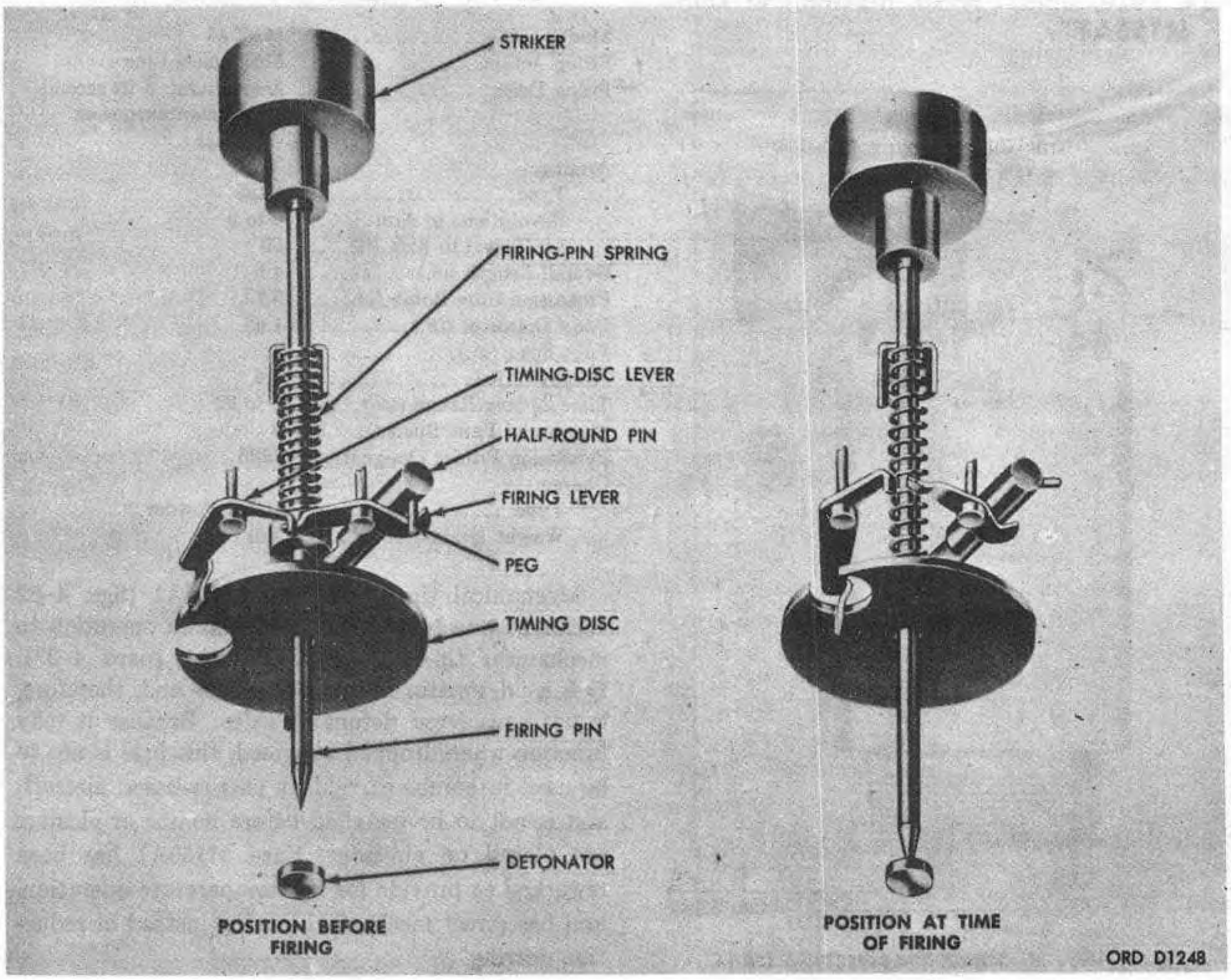


Figure 4-51. Mechanical time fuze AN-M146A1—details of firing-pin operation.

f. 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.

g. Accidental Arming. The fuze is considered armed if the safety block is missing or there has been complete or partial ejection of the arming pin. the fuze is also considered armed if the trigger-arm assembly fails to support the striker, as evidenced by the striker bearing down tightly against the safety block.

Warning: **Armed and partially armed fuzes should be removed from bombs by authorized and qualified munitions personnel only.**

4-23. Fuze, Bomb: Tail, Mechanical Time, M152A1

This is a mechanical time tail fuze used in clusters only. Except that the body is reinforced, the arming hub bearings are modified to accommodate the reversed direction of thrust, the pitch of the vanes is reversed, and the vanes are painted red, fuze M152A1 is the same as the AN-M145A1 (para 4-22). On impact, after arming, inertia of the striker will develop enough force to shear the trigger and fire the fuze.

4-24. Fuze, Bomb: Nose, Mechanical Time, M155A1

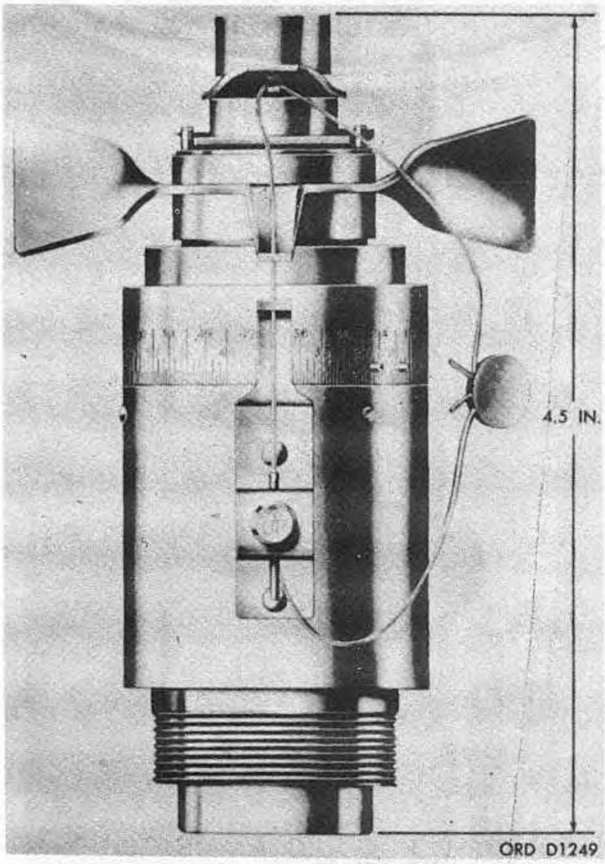


Figure 4-52. Mechanical time nose fuze M155A1.

Table 4-18. Mechanical Time Nose Fuze M155A1

Model	M155A1
Firing Action	Mechanical time
Firing Delay	Aerial burst, 5-92 seconds or instantaneous on impact
Arming:	
Type	Vane
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 to 92
Number of Vane Blades	2
Percussion Primer Designation	M26
Charge:	
Type	Black Powder
Weight (grains)	120

Mechanical time nose fuze M155A1 (figs. 4-52 and 4-53 and table 4-18) is similar in operation to mechanical time fuze AN-M146A1 (para 4-22). It is a "detonator-in line" type fuze and, therefore, is not considered detonator safe. Because it may function when dropped unarmed, this fuze is not to be used in bombs carried by carrier-based aircraft, and is not to be installed before bombs or clusters are placed on aircraft. Fuze M155A1 has been reworked to provide for low-temperature operation, and has direct mechanical arming instead of reduction gearing.

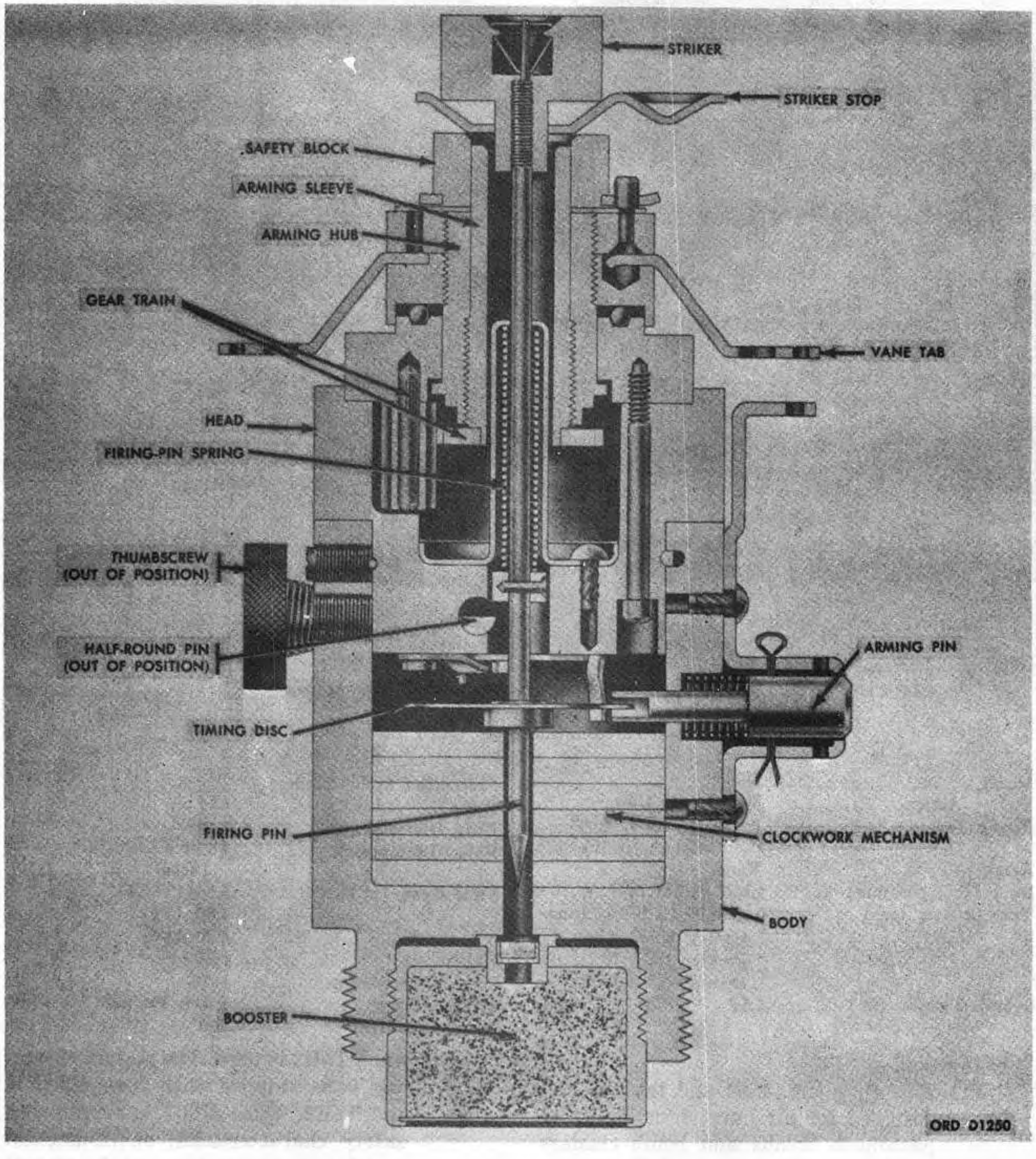


Figure 4-53. Mechanical time nose fuze M155A1—cross section.

4-25. Fuze, Bomb: Mechanical Time, M907

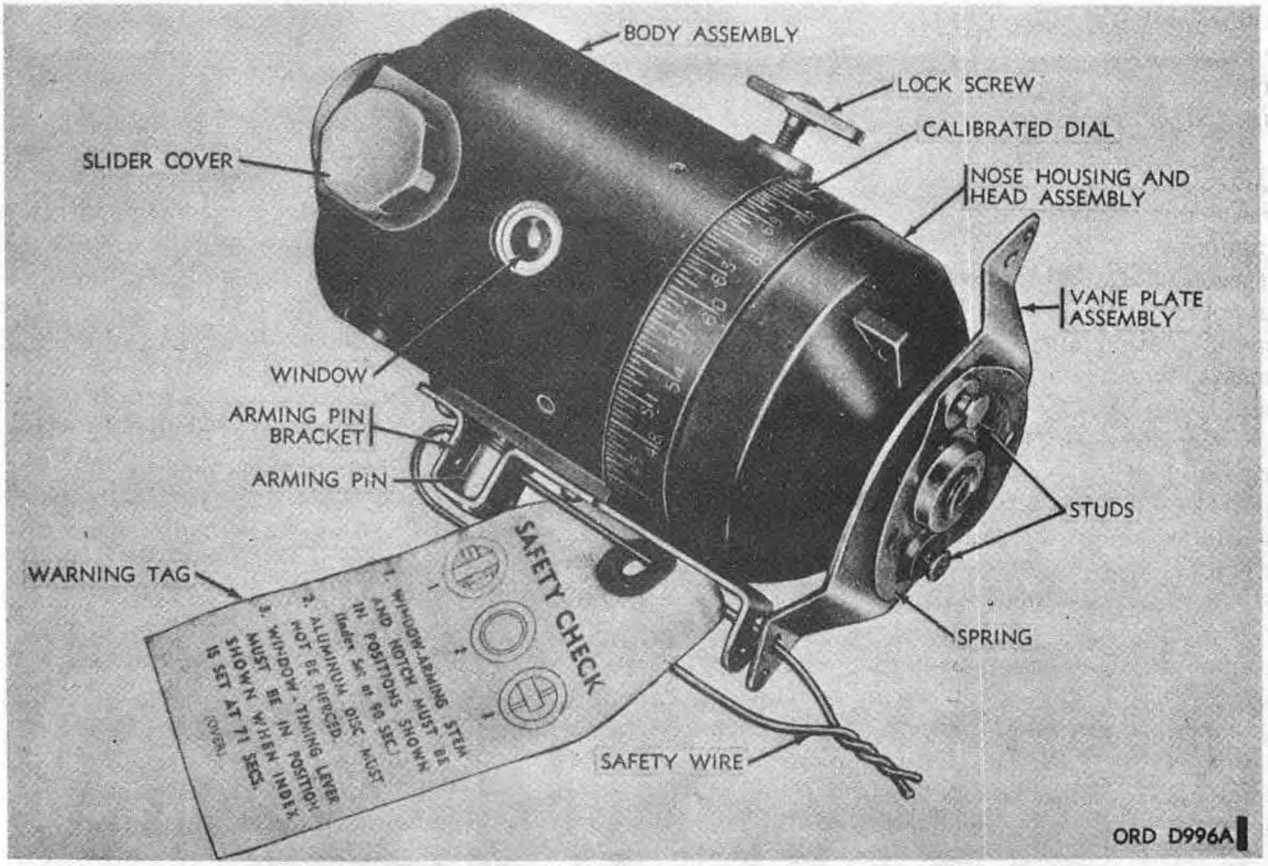


Figure 4-54. Mechanical time (MT) fuze M907.

Table 4-19. Mechanical Time (MT) fuze M907

Model	M907
Firing Action	Mechanical time
Firing Delay	Aerial burst 4 to 92 seconds
Arming Type	Vane
Rate (Rev per min)	1,500 minimum
Time to Arm (sec)	One-half the preset functioning time, when greater than 10 seconds
Overall Length (in.)	5.54
Protrusion from Bomb (in.)	4.74
Body Diameter (in.)	2.75
Vane Designation	T3 or T4 (tail) or T5E2 (nose)
Vane Span (in.)	3.50 (T5E2) 5.00 (T4) 4.00 (T3)
Weight (lb)	2.20
Primer Designation	M72
Booster Charge	Black Powder
Weight (grains)	100

a. General.

(1) This fuze (fig. 4-54 and table 4-19), designed for air burst functioning of photoflash bombs and bomb clusters can be used for nose or tail applications. For tail application, arming vanes T3 and T4 (fig. 5-31) are used, while for nose application, arming vane T5E2 is used. The standard arming vane shipped with fuze M907 is the T5E2. Fuze M907 has improved safety characteristics, environmental resistance, versatility, and functional reliability and replaces mechanical time nose fuze AN-M155A1 or AN-M146A1. There is an airburst func-

tioning accuracy of plus or minus one second over a temperature range of -65° F. to +160° F. Arming of this fuze requires a minimum of 1,500 revolutions per minute of the arming vane. Release speed of the aircraft should be between 170 and 600 knots.

(2) A calibrated scale on the fuze body, marked off in 0.5-second intervals, and ranging from 4 to 92 seconds, provides for presetting of functioning time. For presettings between 6 to 10 seconds, arming will occur before functioning but not earlier than one-half the set time. Arming time is approximately 60 percent of the preset function time when the function time is greater than 10 seconds.

b. Components. The major components of fuze M907 (fig. 4-55) are as follows:

(1) *Nose housing and head assembly.* This assembly consists, basically of three individual assemblies held together with five screws.

(a) Nose housing and vane plate assembly. This assembly consists of a vane plate assembly, a nose housing assembly, a firing pin assembly and a vane spindle assembly. The vane plate, spring, and studs, components of the vane plate assembly, are used for attaching arming vanes T3, T4, or T5E2 to the fuze. The vane plate is prevented from moving by the safety wire or an arming wire. The vane plate assembly is attached to the upper portion of the vane spindle. The governor drum of the head assembly is coupled to the lower portion of the vane spindle.

(b) Gear train and governor assembly. This assembly contains a governor assembly and a reduction-gear train assembly. The governor maintains a constant 1,500 rpm to the reduction-gear train, regardless of vane rpm.

(c) Head assembly. This assembly includes an arming gear, timing graduations ranging from 4 to 92 seconds, firing lever, timing lever, and cocking pin assembly. The gear train is coupled to the head assembly. The firing pin is held by the cocking pin until it is released by the firing lever, which is, in turn, released by the timing lever.

(2) *Body assembly.* This assembly contains the MT movement unit, the slider cover, slider spring, slider assembly containing a stab primer M72, arming pin, arming pin bracket, arming stem, lock screw assembly, slider disc seal and two windows. The arming pin is held in place in the arming pin bracket by the safety wire which also retains the vane plate. A warning instruction tag is attached to the safety wire. All components listed above, other than those attached to the exterior of the fuze body, are contained in the body assembly. The movement assembly controls the timing lever, thereby protecting the fuze from premature firing, should the slider assembly accidentally place primer M72 in the firing train position. The arming pin locks the timing disc in place until the safety wire is removed. When the 90-second mark on the calibrated dial is alined with the timing index on the fuze body, the internal index mark on the head assembly, the notch in the arming gear, and the head of the arming stem become visible through the window under the index mark on the fuze body. Indications noted above are one way of visually noting proper setting of the fuze. When the 71 second mark on the calibrated dial is alined with the timing index, the timing lever visible through the window over the slider cover should be on the periphery of the timing disc. Indications noted above are used as a second means of visually checking the fuze for proper setting. The arming stem holds the slider assembly in an out-of-line firing position until the cut-out in the arming gear turns to a position where the arming stem is free to move upward. An additional safety, prior to release of the bomb, is provided by the firing pin which, held down by the arming pin, prevents the slider assembly from moving. When the arming pin withdraws, the firing pin retracts out of the way of the slider assembly. Movement of the slider assembly to the armed position is indicated by the punctured disc (cover).

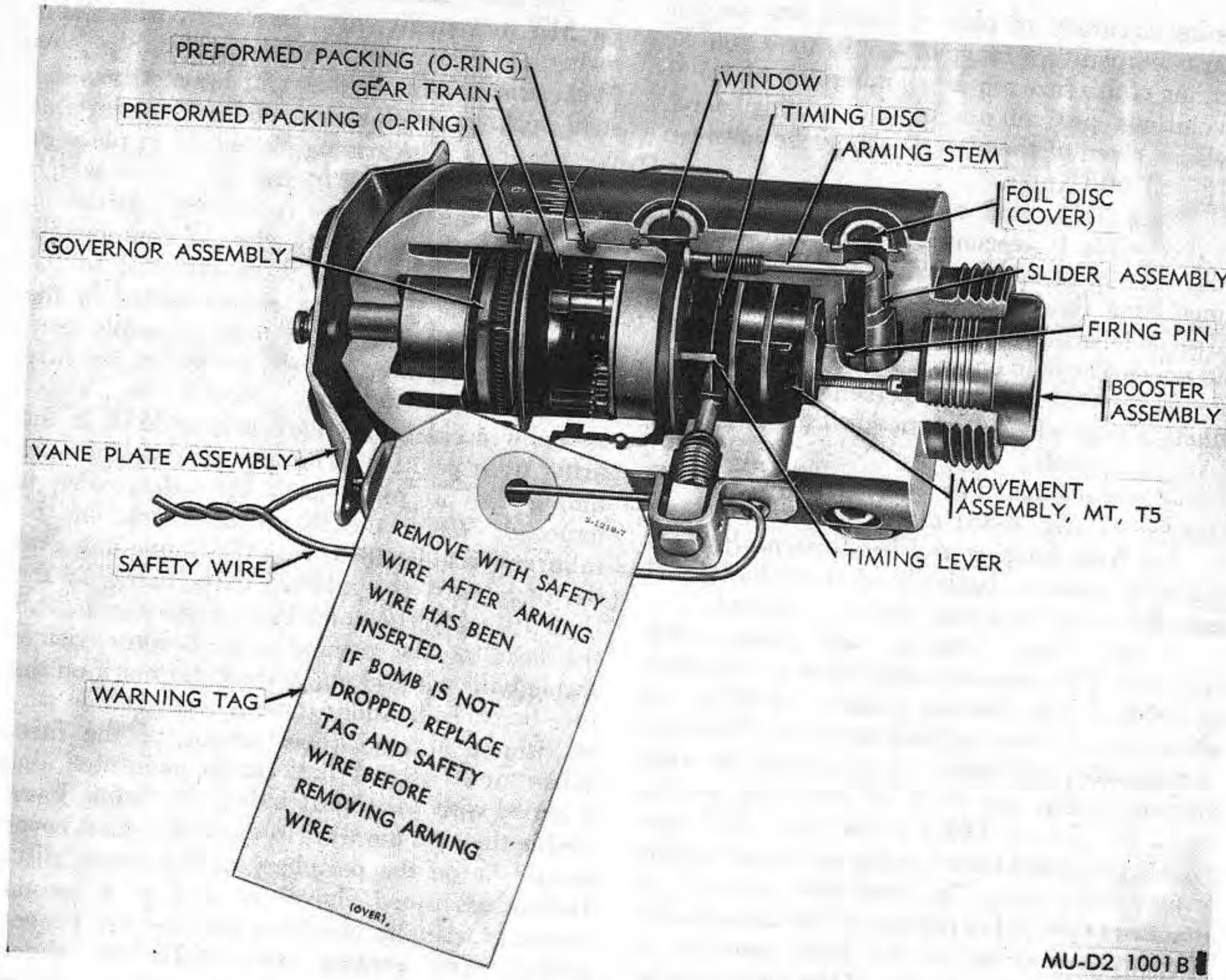


Figure 4-55. Fuze M907—cross section.

(3) *Booster assembly.* This assembly threads to the bottom of the body assembly. Fuze threads are used to assemble the fuze to the bomb. The explosive train of fuze M907 consists of primer M72, containing 5.4 grains of explosive filler, and a booster cup containing 100 grains of black powder (grd A-4).

(4) *Lockwasher.* A beryllium-copper lockwasher is attached to each fuze for use in assembly to munition.

c. *Functioning.*

(1) The fuze starts to operate when the bomb is released from the aircraft and the arming wire is withdrawn from the arming vane and the arming pin bracket. The arming pin is ejected from the fuze body, thereby allowing the timing disc of the movement assembly to rotate. The firing pin then retracts to the firing position. Rotation of the arming vane (T3, T4 or T5E2) drives the centrifugal governor which limits input speed to the gear train to approximately 1500 rpm. This makes the vane drum lose contact with the governor weights. Arming time is determined by the angle through which the arming gear must rotate in order for the slot in the arming gear to line up with the top of the arming stem. Rotation of the arming gear accomplished by rotation of the reduction gears of the gear train. When the slot in the arming gear alines with the head of the arming stem, the arming stem moves upward through the arming gear slot. The slider, containing stab primer

M72, moves to the firing train position; primer M72 is then in line with the firing pin and booster. The slider is held in the armed position by a spring-loaded slider lock.

(2) Ejection of the arming pin from the slot in the timing disc allows the clockwork of movement assembly T5 to start. Starting of the movement assembly is assured by a spring-loaded starter, which sweeps across an excape wheel, and imparts motion to it. The timing lever rides on the edge of the timing disc until it rotates into the slot of the timing disc from which the arming pin was ejected. Rotation of the timing lever causes release of the firing lever which, in turn, releases the cocking pin. Release of the cocking pin releases the spring-loaded firing pin. The firing pin strikes the stab primer, thus firing the fuze. Selection of arming time and firing time is accomplished with one setting of the indicating dial (4 to 92 seconds).

d. Safety Features. Fuze M907 is safe to handle since it has an out-of-line explosive train. Accidental initiation of the primer when the fuze is in the unarmed condition will not initiate the booster. In addition, the fuze has two visual arming indicators: an aluminum foil disc located in the lower part of the fuze body; a transparent window located above the foil disc in the fuze body. If the arming stem is straddling the arming gear (visible through window) or the slider has punctured the foil disc, the fuze is armed and care must be taken in handling.

e. Accidental Arming. If fuze M907 is in the armed condition, extreme care must be taken in handling and disposal. Only technically qualified personnel will handle and dispose of a fuze in this condition. If the arming stem is straddling the arming gear, but the aluminum foil disc is not punctured and the firing pin is blocking the slider and holding it in the safe position, the fuze is safe to handle but is not safe to use. The aluminum foil disc may be punctured accidentally during handling. In this case, if the arming stem is not straddling the arming gear and the slider does not project through the foil disc, the fuze is safe to handle. Functioning reliability of the fuze has been impaired, however, and the fuze should not be used.

4-25.1 Fuze, Bomb: Mechanical Time, M907E1

Fuze M907E1 is similar to fuze M907 (para 4-25) in respect to operational and functional features, physical dimensions and weight. The differences between fuze M907E1 and fuze M907 are as follows:

a. Vane plate assembly (fig. 4-55) has been advanced 20 turns so that fuze M907E1 will arm approximately 0.8 seconds faster, thus assuring arming at preset functioning times below six seconds. At preset time of 4 seconds, arming will occur before functioning but not earlier than 1.5 seconds.

b. Each fuze M907E1 has been marked with a red dot under the timing index to assure that the personnel assembling the fuze to the munition will know that it is not an M907 fuze, when performing the safety checks.

c. A yellow notice tag has been added. This tag describes the shorter arming time, and it states that as a result of advancing the arming time, the notch in the arming gear may not be in alinement.

4-25.2 Fuze, Bomb: Mechanical Time, M907E2

Fuze M907E2 is similar to fuze M907 (para 4-25) with respect to operation and function, physical dimensions and weight. The differences between fuze M907E2 and fuze M907 follow:

a. Function time setting ranges from 3 to 92 seconds, instead of 4 to 92 seconds. At preset time of 3 seconds, arming will occur before functioning but not earlier than 1 second.

b. Proper arming time requires a minimum of 1,400 revolutions per minute of the arming vane, instead of 1,500 revolutions per minute.

c. Numbers corresponding to the safety checks in the warning tag have been added to the fuze to aid in locating where safety checks are made.

4-26. Fuze, Bomb: Mechanical Time, M908

Fuze M908 is approximately 6.08 inches long with the booster assembly and weighs approximately 2.2 pounds. This fuze with arming vane T5E2 replaces mechanical time nose fuze AN-M145A1, and with arming vane T3 replaces mechanical time tail fuze M152A1 in aimable clusters. Operation and functional features of fuze M908 and fuze 907 are the same (para 4-25). Fuze M908 differs from fuze M907 as follows:

a. Fuze M908 uses a booster assembly containing a tetryl lead and a tetryl booster, while fuze M907 has a black powder booster.

b. Detonator M19A2 is used in the slider assembly of fuze M908, while stab primer M72 is used in fuze M907.

c. The standard arming vane shipped with fuze M908 is arming vane T3.

4-27. Fuze, Bomb: Mechanical Time, M909

a. Fuze M909 is approximately 5.06 inches long with the lead holder assembly and weighs approximately 2.2 pounds. This fuze with arming vane T5E2 replaces mechanical time fuze AN-M147A1 for use in aircraft parachute flares, aimable fragmentation clusters and leaflet bombs. Operation and functioning features of fuze M909 and fuze M907 are the same (para 4-25). Fuze M909 differs from fuze M907 in that the former uses a tetryl lead holder assembly containing a tetryl lead. Detonator M19A2 is used in the slider assembly, while stab primer M72 is used in fuze M907.

b. The standard arming vane shipped with fuze M909 is arming vane T5E2 or T4 depending upon which vane is requested by the user.

Section III. PROXIMITY (VT) FUZES

4-28. General

a. Use. Proximity (VT) fuzes are automatic time fuzes which, without setting or adjustment, detonate the bomb on approach to the target at the most effective point on its trajectory. Proximity (VT) fuzes are essentially radio transmitting and receiving units. In flight, the fuze transmits a radio signal which is continuous. When this signal is reflected from any object to the armed fuze, it interacts with the transmitted signal to produce ripples or beats. When the beat reaches a predetermined intensity, it trips an electronic switch which permits an electric charge to flow through an electric detonator. Proximity fuzes may profitably be employed in any operation in which air burst at heights between 10 and 250 feet will increase the effectiveness of the bomb in which it is used. Proximity fuzes are similar to time fuzes in production of air burst, but the time fuze is governed by distance from the origin and the proximity fuze by its proximity to the target.

b. Description. There are two types of proximity (VT) fuzes, the bar type and the ring type (fig. 4-56). The bar-type fuze can be used effectively in any bomb with a fuze well that will accommodate nose fuze M163, while the ring type, although it fits the same fuze well, can be used only in the bomb sizes for which it is specified. In both types, the external part of the fuze body is a cylinder 3 to 4 inches in diameter and 5 inches long, with a vane at the nose. The ring type has a metal ring surrounding the vane with a vane stop pin sealed in the ring. The bar type has two 4-inch antenna bars (dipoles) extending radially from the head, and a vane-locking arm mounted on a bracket on the side. In both types, the part of the body which is assembled within the bomb conforms in size and shape to nose fuze M163, except that there is a safety pin clipped around the base and extending into the end of the fuze. This safety pin is never removed until just before assembling the fuze to the bomb.

c. Functioning. The arming vane drives a high speed (coupling) shaft and, through a reduction gear train, a slow speed shaft. An electric generator is mounted on the high speed shaft which furnishes power to charge a firing capacitor and to operate the transmitting and receiving unit which controls the electronic switch between the firing capacitor and shaft by a spring-loaded pin. The rotor controls both mechanical and electrical arming; it keeps the

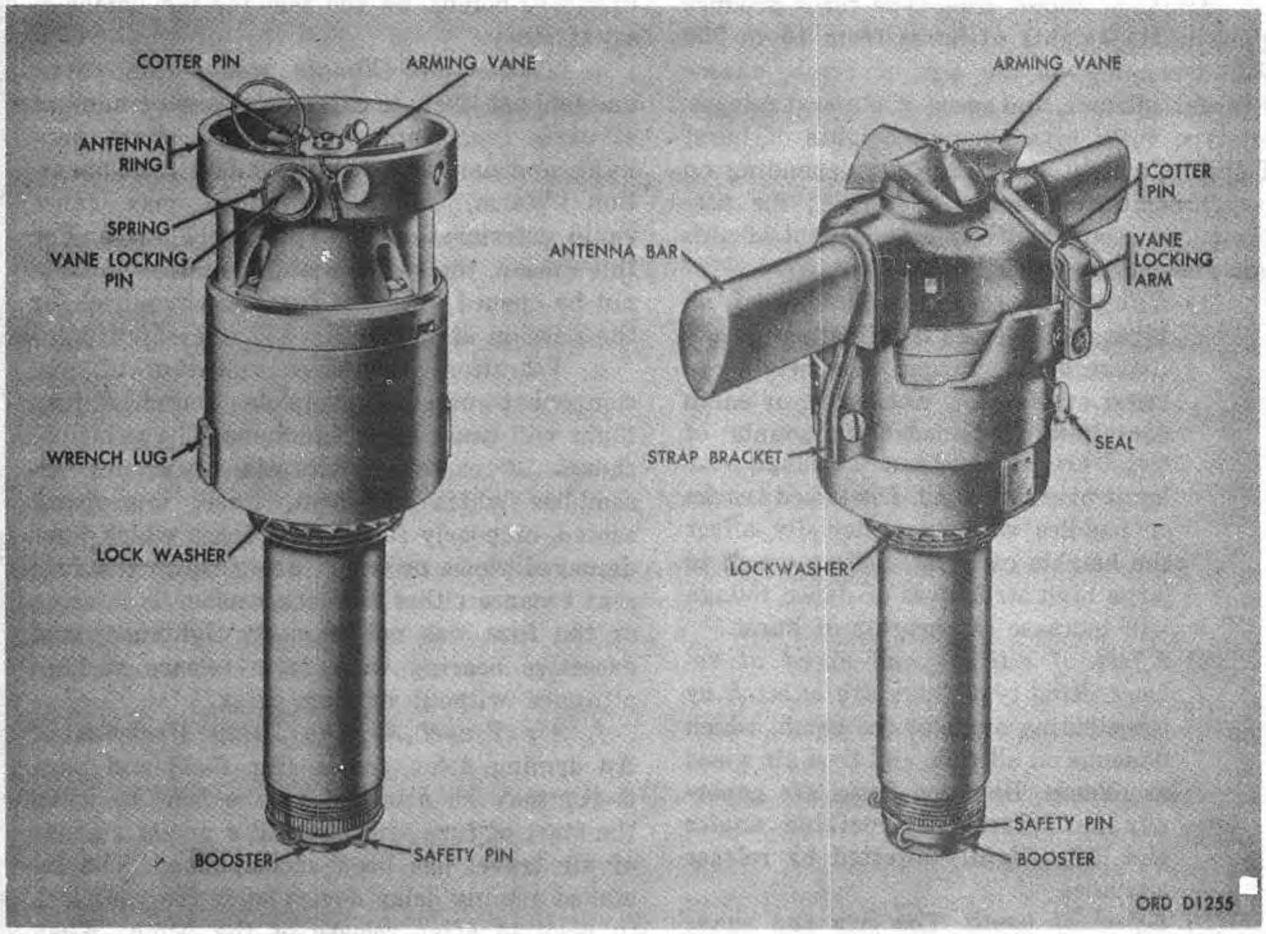


Figure 4–56. Proximity nose fuzes.

detonator out of line with the booster lead, and it keeps the detonator out of contact with the firing circuit, until arming is complete. As the rotor is turned to the armed position, the outer end of the key pin is driven by its spring into a recess in the rotor housing while the inner end withdraws from the keyway in the shaft. When a material object enters the zone of influence of the fuze, the reflected wave causes the firing switch to operate, passing the charge of the firing capacitor through the electric detonator, thus initiating the explosive train. Since these fuzes operate on any object, airborne minimum-safe air travel (MinSAT) is carefully calibrated for the protection of friendly planes. The MinSAT is measured for representative samples of each lot of proximity fuzes and is marked on every fuze of the lot. Mechanical arming-delay devices, by means of which MinSAT can be increased by as much as 20,000 feet, must be used with these fuzes. Air travel arming-delay device M1A1 (or M1) is used for this purpose.

4–29. Characteristics Peculiar to Proximity (VT) Fuzes

a. General. VT fuzes (fig. 4–56) function automatically on approach to or passing any material target, causing an air burst at an effective height or distance. Several models of each type (ring-type and bar-type) have been standardized, and additional experimental models have also been issued. These differ from the standard and among themselves in height of burst and MinSAT.

b. Height of Burst. Ring-type fuzes produce approximate heights of burst from 10 to 250 feet, depending on the size of bomb, nature of target, altitude, and speed of plane at release. Bar-type fuzes give average heights of burst of approximately 25 to 125 feet, depending on size of bomb and nature of target; the performance is comparatively independent of altitude and speed of release.

(1) *Effect of target.* Functioning of all types of VT fuzes is influenced by the nature of the target. The heights of burst over water, wet earth, or earth containing considerable amounts of metal are higher than the heights of burst over dry sand. Dispersed trucks or puddles will not materially affect the heights of burst, but approach to large high structures or dense foliage will increase the heights of burst.

(2) *Effect of altitude and speed at release.* Ring-type fuzes are affected by the striking angle of the bomb, which depends on altitude and true air speed at release. Bar-type fuzes are generally not affected by striking angles and only slightly affected by release altitudes.

(3) *Effect of bomb.* The size and shape of the bomb affect the burst height of all types of VT fuzes.

(4) *Dispersion.* Variation and tolerance in manufacture of fuzes and components lead to variation in height of burst of fuzes of any one type, under conditions which are otherwise identical.

c. Train Spacing. Since VT fuzes are designed to respond to a sudden change in their surroundings, minimum train spacing is restricted. The detonation of a nearby bomb may cause an armed fuze to function. Armed Salvo and Minimum Train releases may also cause early functionings. An intervalometer spacing of 50 feet or more for 100 to 260-pound high-explosive bombs, or 100 feet for GP bombs is satisfactory.

d. Weather and Climate. Heavy rain, snow, and hail are likely to cause an excessive number of early functionings. Light rain, haze, sunlight, and darkness will not affect fuze operation. Warm, humid conditions may cause rapid deterioration of exposed VT fuzes. For this reason, the sealed metal containers should not be opened until the fuzes are required for the mission at hand.

e. Vibration. Excessive vibration of any component of the complete round during flight will cause early functions. The principal causes of excessive vibration are: fin assemblies which are bent, loose, improperly seated, or poorly fabricated; fuzes which have damaged vanes or which are loose in the fuze seat because either the lock washer is missing or the fuze was not properly tightened; and excessive bearing wear from release at high altitudes without arming delay.

f. Air Travel Arming Delay Mechanisms. An arming delay device (fig. 5-32 and para 5-41) may be attached to the fuze to delay the start of fuze arming until a preset amount of air travel has been accomplished. The installed arming delay device holds the vane lock in position after release of the bomb. When the desired air travel has been completed, the arming delay device releases itself and is forced away from the fuze by the spring of the vane lock which is ejected, thus permitting the fuze to start to arm.

4-30. Interchangeability

Proximity fuzes are not functionally interchangeable with impact fuzes: however, there is more latitude among the various models of proximity fuzes. Selection should be made of the particular model of fuze which will produce the desired height of burst and appropriate MinSAT with the bomb used. (See table 4-20.) Proximity fuzes are ballistically interchangeable with the M163 or M904 series fuzes. Special bombing tables are not required.

Table 4-20. Fuze (Proximity) Application Data

Fuse	Type	Minimum Safe Air Travel (MinSAT) (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 750-lb GP M117 3000-lb GP M118 250-lb GP MK81 MOD 1 500-lb GP MK82 MOD 1 1000-lb GP MK83 MOD 3 2000-lb GP MK84 MOD 1
M166E1	Bar	2000	Same as AN-M166
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 750-lb GP M117 3000-lb GP M118 250-lb GP MK81 MOD 1 500-lb GP MK82 MOD 1 1000-lb GP MK83 MOD 3 2000-lb GP MK84 MOD 1
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 220-lb Frag AN-M88 250-lb MK81 MOD 1 500-lb MK82 MOD 1 1000-lb MK83 MOD 3 2000-lb MK84 MOD 1
M188	Bar	3600	Same as AN-M166
M914 (XM914E1)	Bar	3200	100-lb GP AN-M30A1 220-lb Frag AN-M88 250-lb GP AN-M57A1 250-lb GP MK81 MODS 260-lb Frag AN-M81 500-lb GP AN-M64A1 500-lb GP AN-M64A1B1 750-lb GP M117 750-lb GP M117A1 1000-lb GP AN-M65A1 1000-lb GP AN-M65A1B1 1000-lb MK83 MODS 2000-lb GP AN-M66A2 2000-lb MK84 MODS 3000-lb GP M118
T50E1	Ring	3600	Same as AN-M168
T50E4	Ring	3600	500-lb GP AN-M64A1 1000-lb GP AN-M65A1

Table 4-20. Fuze (Proximity) Application Data—Continued

Fuze	*Type*	*Minimum Safe Air Travel (MinSAT) (Feet)*	*Application*
T51E1	Bar	3600	Same as AN-M166
T91	Ring	2000	Same as AN-M168
T93	Ring	2000	Same as M168E1

4-31. Safety Features

a. Requirements for Operation. Proximity fuzes are detonator-safe and are armed by vane action with mechanical delay. In order for the fuzes to operate, the following conditions must be met:

(1) The fuze cannot be seated in the bomb and the detonator rotor of the fuze cannot turn until the safety pin is removed.

(2) The vane-lock pin (ring type) or vane-lock arm (bar type) must be removed or ejected so that the vane can rotate.

(3) The vane must rotate at high speed, 2,000 rpm or more, in order to drive the generator at sufficient speed to charge the firing capacitor and furnish power to operate the transmitting and receiving unit.

(4) The vane must rotate a substantial number of times in order to turn the detonator rotor sufficiently to bring the detonator into line in the explosive train and to bring the electric leads of the detonator into contact with the firing circuit. The nominal MinSAT ranges from 2,000 feet to 3,600 feet.

(5) A material change within the sensitivity field of the fuze is required to cause a ripple effect of sufficient amplitude to activate the electronic switch in the firing circuit.

(6) Normal functioning requires fulfillment of all the above conditions. It should be noted however that, due to the inherent nature of this type of fuze, some "early bursts" may be expected. With any one of the above conditions not fulfilled, the fuze will not fire except under conditions of external violence which would fire any similar amount of high explosive without fuze elements present.

b. External Indications of Safe Conditions. External evidence of safe condition is furnished by—

(1) *Safety pin check.* The safety pin consists of a straight portion, at least 1.9-inches long, and a curved portion which clips around the booster end of the fuze. If the safety pin is in place or can be inserted to its full length into the base of the fuze, the detonator rotor has not moved from its original unarmed position.

***Warning:* If the safety pin cannot be inserted to its full depth, it does not necessarily mean that the fuze is completely armed, but the fuze must be regarded as completely armed and liable to fire if the vane is spun rapidly in either direction.**

(2) *Seal wire.* When the vane-lock pin or vane-lock arm is assembled during manufacture of the fuze, it is sealed in place with a steel wire and a lead seal. If the wire and seal are in place and unbroken, the vane has not turned either to charge the electrical elements or to turn the detonator rotor, and the fuze is safe.

c. Duds. In handling proximity fuze duds, it must be remembered that the fuze may be armed and charged. In such condition, the fuze is likely to function at any disturbance or approach of personnel or materiel. A sufficient time, usually 24 hours, must be allowed for the firing charge to dissipate. After that time, proximity bomb fuze duds may be handled with comparative safety if the vane is locked, since they contain no impact firing elements. It should be remembered, however, that there is a complete explosive train present which may function on external violence, especially if the fuze has been deformed. When observed from the releasing aircraft, a proximity dud may be identified by a characteristically circular burst, producing a crater (if a tail fuze is used).

d. Dropped Safe. Proximity (VT) fuzes are tested for drop safety. If dropped safe, they will not function on impact under circumstances that are safe for an unfuzed GP bomb; that is, they will not function when dropped 50 feet onto armor plate or 8,000 feet onto normal soil.

4–31.1. Safety Precautions

a. Safe Vertical Drop (SVD) and Minimum Release Altitude (MRA). It is vitally important that SVD be adequate to provide clearance for the releasing plane and for friendly planes at lower altitude. On the other hand, it is equally important that the MRA be such that all fuzes will be armed on approach to the target. Another important consideration is that the armed portion of the trajectory should not be so long as to risk wear which would cause vibration and the possibility of early functionings. The arming delay should be used whenever indicated by these considerations.

b. Speed at Release. VT fuzed bombs should be released at a true air speed of at least 150 mph (130 knots) and preferably 200 mph (174 knots) or over. Slow speed at release may cause excessive increase in SAT at high altitudes or failure to operate at low altitudes.

c. Damaged Fuzes.

(1) *Unarmed fuzes.* Dropping an unarmed VT fuze in its original packing, generally, will not damage it. Dropping an unpacked fuze or a fuzed bomb may damage the fuze but it will not make the fuze unsafe to handle. Damaged fuzes should be destroyed. Since unarmed VT fuzes cannot fire, they are safe to handle and can be removed from a bomb.

(2) *Armed fuzes.* An undamaged VT fuze will not fire, even if armed, unless the vane has been turning rapidly (2,000 rpm or more). If the fuze is intact and the vane prevented from turning, it is safe to handle. An armed VT fuze whose vane has been turning rapidly is sensitive to shock and approach. Such a fuze, whether damaged or intact, should not be approached until sufficient time has elapsed for the charge to dissipate. Such time may safely be taken to be a minimum of 24 hours.

(3) *Deteriorated fuzes.* Fuzes which have deteriorated from exposure or rough handling will give an increased percentage of malfunctions but are safe to handle and use. Such fuzes, however, should be used only in cases of extreme urgency.

4–32. Fuze, Bomb: Nose, Proximity (VT), AN–M166 (T51E1)

Nose fuze AN–M166 (T51E1) (fig. 4–57) is of the bar-type configuration. It can be used effectively in any bomb that contains a fuze well that will accommodate a selective action nose fuze in the M163 or M904 series. This nose fuze can also be employed with any GP, fragmentation, or chemical bomb weighing 100 pounds or more which takes nose fuze AN–M103A1 or M163. This fuze is extremely sensitive and its tactical use is independent of height or release, speed of aircraft or type of terrain. It has a nominal MinSAT of 3600 feet.

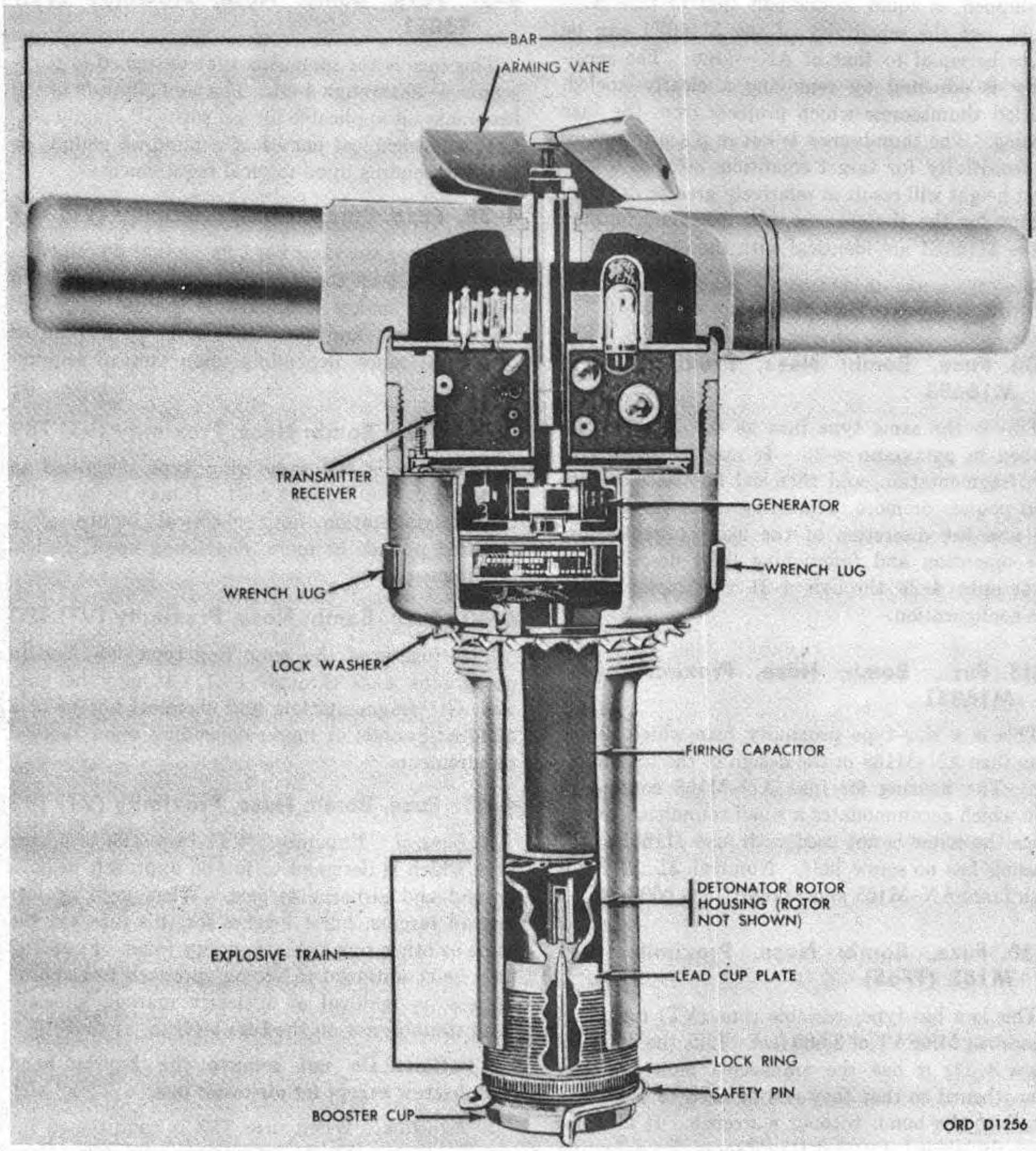


Figure 4-57. Proximity nose fuze M166—cross section.

4-33. Fuze, Bomb: Nose, Proximity (VT), M166E1

This is a bar-type fuze which differs from fuze AN-M166 (para 4-32) in that the nominal MinSAT is 2,000 feet, and the transverse dipoles (bars) have been strengthened so that they can be used to screw the fuze into the bomb without a wrench, if necessary (use of a wrench is desirable, however, since the fuze must be tight in the bomb). The sensitivity, as shipped, is equal to one-half that of fuze AN-M166, but the sensitivity of the M166E1 can be set to be equal to that of AN-M166. The sensitivity is adjusted by removing a clearly-labeled, knurled thumbscrew which projects from the fuze housing. The thumbscrew is left in place to reduce the sensitivity for target conditions so that a low-burst height will result in relatively greater damage. Except for the thumbscrew, the external contours of the M166E1 are identical with the AN-M166.

Note. When the thumbscrew is removed for normal sensitivity, it cannot be replaced to reduce sensitivity.

4-34. Fuze, Bomb: Nose, Proximity (VT) M166E3

This is the same type fuze as the M166E1 described in paragraph 4-33. It may be used with GP, fragmentation, and chemical bombs of a hundred pounds or more, depending upon the tactical use and the discretion of the using organization. The operation and functioning data described in paragraphs 4-29 through 4-31 are applicable to this configuration.

4-35. Fuze, Bomb: Nose, Proximity (VT) M168E1

This is a ring-type proximity fuze which differs from fuze AN-M168 in the design of the fuze housing. The housing for fuze AN-M168 contains a hole which accommodates a small roundhead screw. Since the screw is not used with fuze M168E1, the housing has no screw hole. Nominal MinSAT for both fuzes AN-M168 and M168E1 is 2,000 feet.

4-36. Fuze, Bomb: Nose, Proximity (VT) M188 (T765)

This is a bar-type, variable time (VT) fuze with a nominal MinSAT of 3,600 feet. Like the M166E1 (para 4-33) it has the transverse bars (dipoles) strengthened so that they can be used to screw the fuze into the bomb without a wrench. It also has a clearly-labeled, knurled thumbscrew for adjusting the sensitivity of the fuze. The thumbscrew is left in place to reduce sensitivity to target conditions so that a low burst height will result in relatively greater damage. It is removed to obtain normal sensitivity and a higher burst height.

Note. When the thumbscrew is removed to obtain normal sensitivity, it cannot be replaced to reduce sensitivity.

4-37. Fuze, Bomb: Nose, Proximity (VT), T50E1

This fuze is the same ring-type described in paragraphs 4-29 through 4-31. The configuration of the fuze makes it applicable for use with GP, fragmentation, and chemical bombs of a hundred pounds or more, depending upon tactical requirements.

4-38. Fuze, Bomb: Nose, Proximity (VT) T51

This fuze is the same bar type as that described in paragraphs 4-29 through 4-31. The configuration of the fuze makes it applicable for use with GP, fragmentation, and chemical bombs of a hundred pounds or more, depending upon tactical requirements.

4-39. Fuze, Bomb: Nose, Proximity (VT) T89

This fuze is the same ring type described in paragraphs 4-29 through 4-31. It may be used with GP, fragmentation, and chemical bombs of a hundred pounds or more, depending upon tactical requirements.

4-40. Fuze, Bomb: Nose, Proximity (VT) T90

This fuze is of the same ring type described in paragraphs 4-29 through 4-31. It may be used with GP, fragmentation, and chemical bombs of a hundred pounds or more, depending upon tactical requirements.

4-41. Fuze, Bomb: Nose, Proximity (VT) T93

a. General. Proximity (VT) fuze T93 is a ring type which is designed to fire on approach to both ground and airborne targets. When used against ground targets, burst heights for this fuze are the same as other ring type proximity fuzes. Fuze T93 may be conditioned to fire on approach to airborne targets by removal of a clearly marked knurled-head thumbscrew on the fuze body.

***Caution:* Do not remove the knurled-head thumbscrew except for air-to-air use.**

b. Function. When fuze T93 is conditioned for air to air use, bomb detonations will take place after about 7,500 feet of vertical fall from horizontal release, if the fuze has not been activated by passing within the influence range of an aircraft target during the drop. In this respect, the fuze has self-destruction action. The fall of 7,500 feet will apply after arming-delay M1 or M1A1 has functioned and separated from the fuze.

c. Arming. After the thumbscrew has been removed, it cannot be replaced without possible impairment of the fuze circuit.

***Warning:* Fuzes T93 from which knurled-head screws have become detached accidentally or fuzes with knurled-head screws missing, shall be considered damaged and disposed of by authorized and qualified personnel.**

4-41.1. Fuze, Bomb: Nose, Proximity M914 (XM914E1)

a. General. Proximity fuze M914 (fig. 4-57.1 and table 4-20.1) is tailored for use over dense

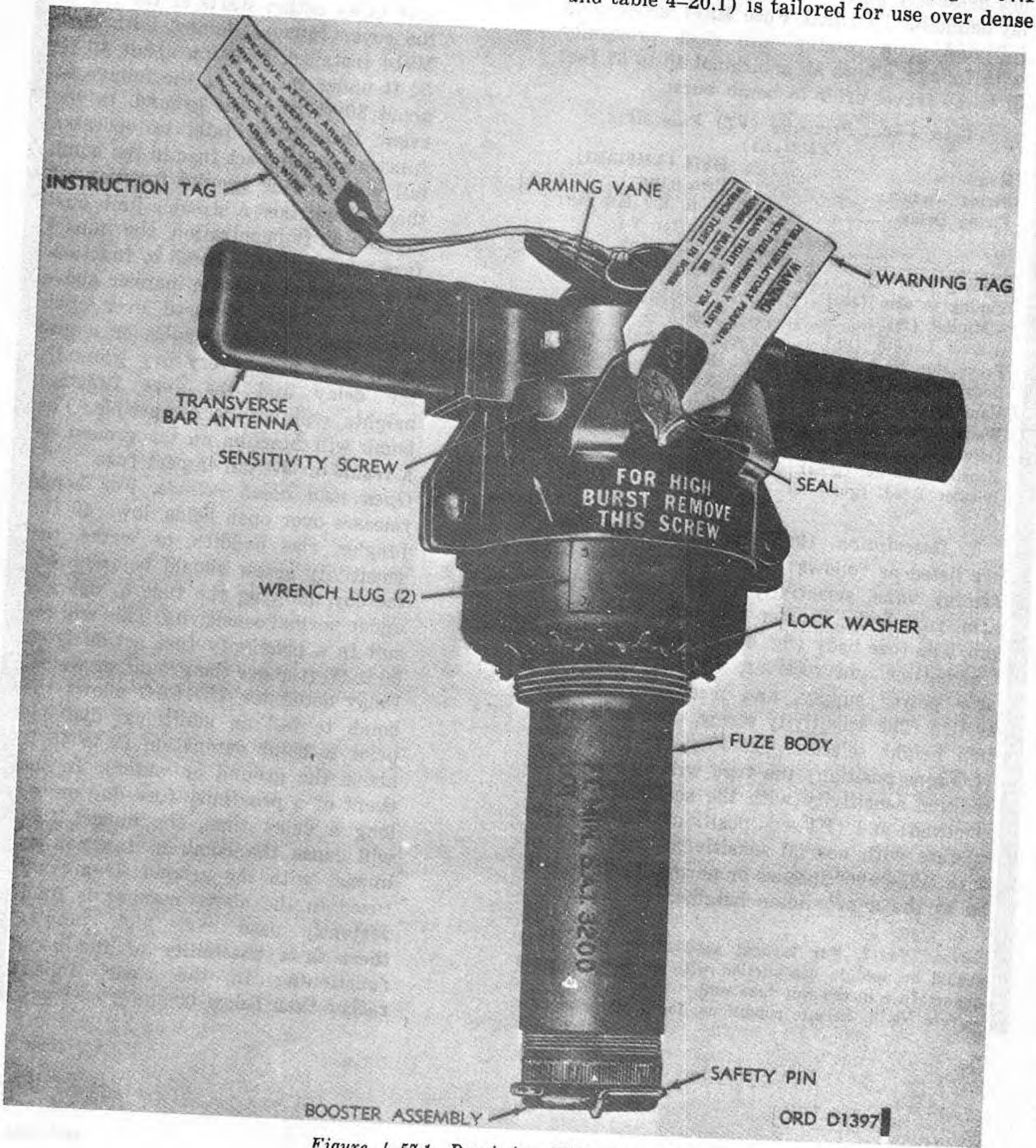


Figure 4-57.1. Proximity (VT) fuze M914 (XM914E1).

jungles where bomb burst is desired under the ungle canopy rather than in or above it. This bar type proximity fuze differs from proximity fuze M188 (para 4-36) in that the nominal MinSAT is 3200 feet, and instantaneous detonator M36A1 has been replaced by delay detonator DD16AO. Fuze M914, electrically initiated upon coming into close proximity with foliage, allows an additional 46 to 67 feet of bomb travel prior to bomb burst.

Table 4-20.1. Proximity (VT) Fuze M914 (XM914E1)

Model	M914 (XM914E1)
Firing Action	Proximity
Firing Delay	75 to 137 Mil Sec (after VT initiation)
Arming Type	Vane
Timing to arm (sec)	
MinSat (ft)	3200
Overall Length (in.)	10.4
Protrusion from Bomb (in.)	5.0
Body Diameter (in.)	3.4
Vane Span (in.)	2.48
Weight (lb)	5.0
Detonator	DD16AO
Booster Charge (gms)	40.0
Booster Lead (gms)	0.16

b. Description. Components of fuze M914 are listed as follows: transverse bar antenna, arming vane, sensitivity screw, vane locking arm, fuze body, booster assembly, and safety pin. The fuze body (fig. 4-57) contains a radio transmitter and receiver, wind-driven generator power supply, and mechanical arming system. The sensitivity screw, used as a function height selector, provides the following: (LO-sens position) the fuze will operate with reduced sensitivity with the sensitivity screw removed; and (HI-sens position) the fuze will operate with normal sensitivity. Initiation of fuze M914 over jungles or normal terrain, will be at the approximate heights.

c. Use.

Note No. 1. For tactical application, fuze M914 should be used in conjunction with an instantaneous impact fuze in the tail fuze well.

Note No. 2. Release conditions, for bomb with fuze M914 installed, are found in applicable Air Force manuals.

(1) *Tall dense jungle bomb release.* For bomb releases over tall (75-100 ft) dense jungles the sensitivity screw in side of the fuze should be left in place, thereby desensitizing the fuze to assure delay action starts at the top of the cover foliage. Bombs, with fuze M914 installed, function about 40 to 50 ft under the top of the foliage or about 30 ft from the ground. In the event fuze M914 fails to operate/function, the impact fuze in the bomb tail will provide ground function. If the bomb strikes a sizeable limb during the 50-ft penetration, the impact fuze may cause the bomb to function. If a bomb-fuzed in the manner above is inadvertently released over open fields, low (40 ft) jungles or a low reflectivity area (very dry ground), the delay and the fuze function heights will not be compatible. The bomb will function on the ground as a result of the tail impact fuze.

(2) *Open field bomb release.* For bomb releases over open fields, low (40 ft) jungles, rice paddies, or water, the sensitivity screw should be removed, thereby allowing the fuze to operate under normal sensitivity. This will result in a proximity fuze action from 50 to 90 ft above the ground or water. Delay detonator DD16AO allows the bomb to fall an additional distance prior to bomb detonation (0 to 45 ft above the ground or water). In the event of a proximity fuze dud or too long a delay time, the impact fuze will cause the bomb to function on impact with the ground. If a bomb fuzed in the above manner is inadvertently used over high jungles, there is a possibility of the bomb functioning in the cover foliage rather than below it.

Section IV. HYDROSTATIC FUZES

4-42. General

Hydrostatic fuzes act under the influence of water pressure to explode a bomb at a predetermined depth. They are used in depth bombs for antisubmarine warfare. The fuze is bottle shaped with the booster assembled to the base and a 16-blade arming vane assembled to the opposite end. An arming-vane lock flange is assembled at the neck, and the depth-setting disc and lock are assembled to the side. Depth settings (in feet) are engraved in the disc with the lock serving as an index. As issued, a safety (cotter) pin, with pull ring and instruction tag, is positioned in the arming-vane lock and a safety bar is held in place through the fuze threads by a safety (cotter) pin. This bar keeps the detonator assembly from moving toward the firing pin.

4-43. Fuze, Bomb: Tail, Hydrostatic, AN-MK230 Mods 4, 5, and 6

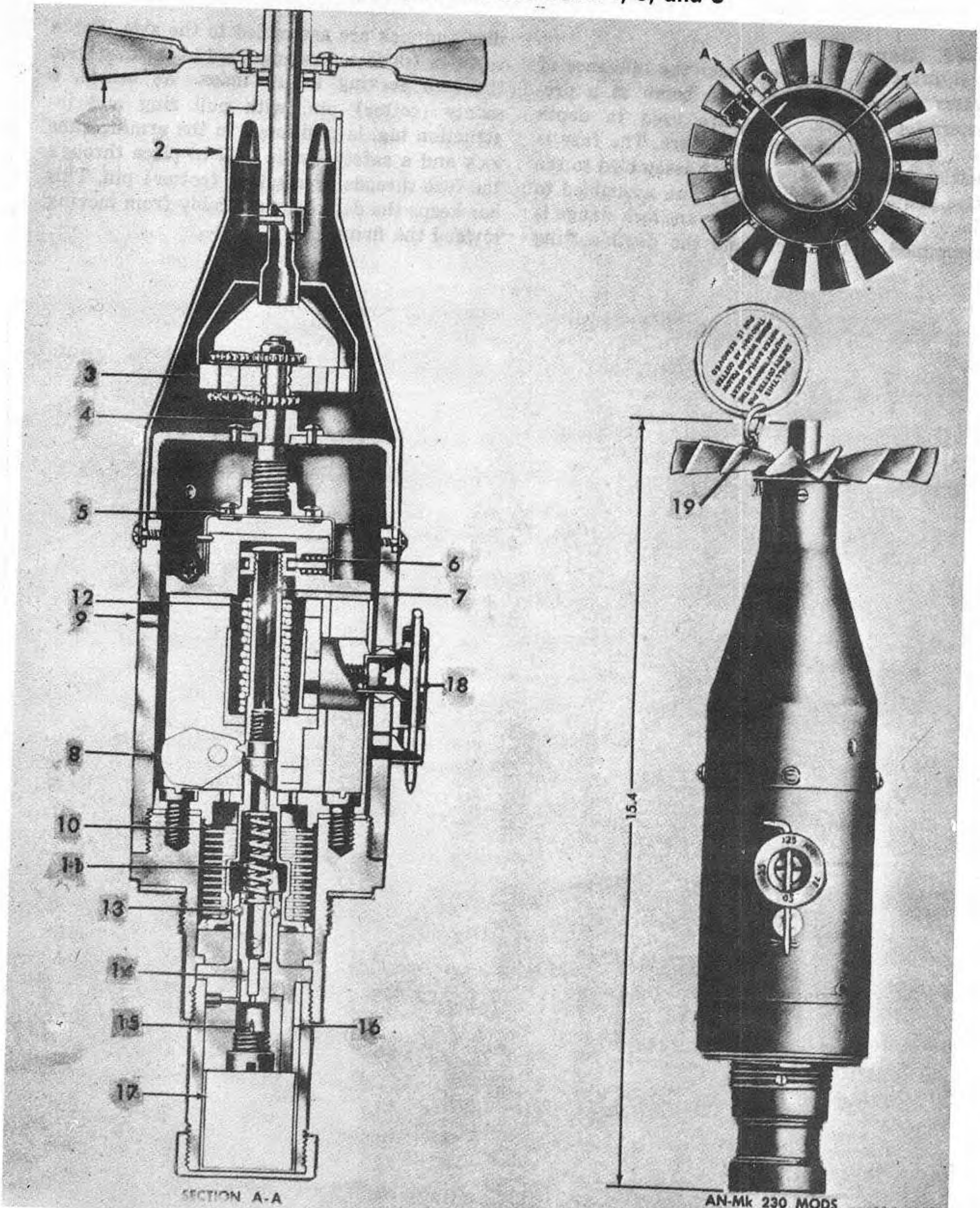


Figure 4-58. Hydrostatic tail fuze AN-MK230.

1 Arming vane assembly
2 Bushing
3 Reduction gear assembly
4 Arming shaft
5 Arming spider assembly
6 Safety detents
7 Firing spindle
8 Inertia counterbalance weights
9 Ports
10 Bellows assembly
11 Firing spring assembly
12 Depth spring assembly
13 Locking balls
14 Detonator
15 Firing pin
16 Firing train leads
17 Booster
18 Depth setting control
19 Safety cotter pin

Figure 4-58.—Continued

a. General. Hydrostatic tail fuze AN-Mk230 (figs. 4-58 and 4-59 and table 4-21) is vane operated and requires from 300 to 400 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, located on the side of the fuze, is marked with five possible depth settings: 25, 50, 75, 100, and 125 feet. 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 smaller.

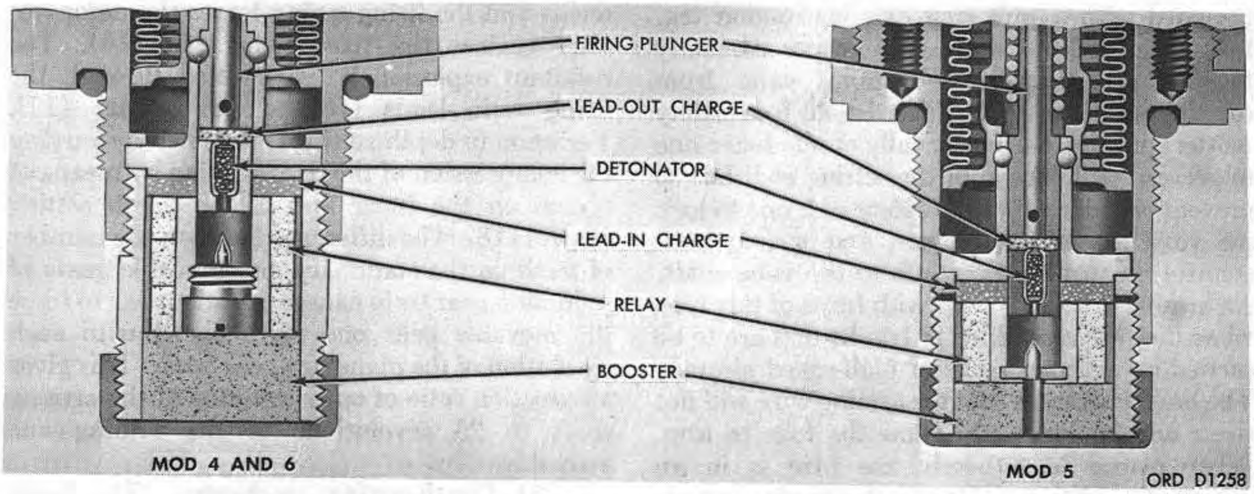


Figure 4-59. Hydrostatic tail fuze AN-MK 230, comparison of booster.

Table 4-21. Hydrostatic Tail Fuzes AN-MK 230 Mods 4, 5, and 6

Mark	AN-Mk230	AN-Mk230	AN-Mk230
Mod	4	5	6
Firing Action	Water Pressure	Water P. ssure	Water Pressure
Firing Delay (ft) (Determined by Depth Setting)	25, 50, 75, 100, 125	25, 50, 75, 100, 125	25, 50, 75, 100, 125
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	3.38
Vane Span (in.)	5.25	5.25	5.25
Weight (lb)	15	15	15
Number of Vane Blades	16	16	16
Detonator Designation:			
Booster Charge	Mk20 Mod 0	Mk20 Mod 0	Mk20 Mod 0
Type	Tetryl	Tetryl	Tetryl
Weight (gm)	22	13	22

b. 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.

c. 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 safety (cotter) pin (19, fig. 4-58) 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 safety (cotter) pins are used externally on the 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 assures that the arming wire will not shear and inadvertently allow the fuze to arm. When placed in a bomb, the fuze is in an unarmed condition as long as the arming wire is in position. It will not begin to function until the bomb is dropped and the arming wire is withdrawn from the arming-vane assembly and bushing. The fuze is detonator safe as well as shear safe.

d. Functioning.

(1) *General.* When the bomb is dropped, 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 alignment of the explosive elements and detonation of the fuze.

(2) *Arming.* When the arming wire is withdrawn, the air stream rotates the arming vane (1) and bushing (2). The rotation is transmitted through a reduction gear train (3) to the arming shaft (4) which is threaded into the arming spider assembly (5). The arming spider assembly progresses upward and, after 110 revolutions of the vane, clears the safety detents (6) which are ejected by their springs from the groove in the head of the firing spindle (7). Upon impact with the water, the inertia counterbalance weights (8) prevent function by set-forward. As the bomb sinks, the water enters the ports (9) in the body of the fuze and builds up hydrostatic pressure in the bellows (10). When sufficient pressure is built up to compress the firing spring (11) and depth spring (12), the firing spindle is forced downward so that the locking balls (13) fly into a recess and the firing spring forces the detonator (14) against the fixed firing pin (15). The resultant explosion is transmitted through the firing train leads (16) to the booster (17). Variation in depth setting is obtained by varying the compression of the depth spring by means of a cam on the inner end of the depth setting control (18). The difference between the number of teeth on the stationary and movable gears of reduction gear train causes the idler gear 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.

(3) *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, 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 bellows-actuated piston, greater depths are necessary to produce sufficient pressure to overcome the compressive strength of the spring.

(4) *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. As the fuze submerges, water pressure is built up and the bellows expands. The expanding bellows draws the hydrostatic piston downward, compressing the firing spring and depth spring. As the piston moves downward, 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 downwards about $\frac{3}{8}$ inch (this distance is the same for all settings), the balls which lock 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 alignment of the lead-out and lead-in charges and the fuze is detonated.

(5) *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.

(6) *Inertial counterbalancing.* Two inertial 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.

e. Safe Release. 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.

f. Accidental Arming.

(1) *Recognition.* There is no way of determining from the visual appearance of the fuze whether or not it is armed. Only qualified and authorized munitions personnel should attempt to disarm or remove fuzes which are suspected of being armed.

(2) *Disarming.* The safety rod that locks the firing plunger to the plunger housing should be inserted immediately. 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.

Section V. MISCELLANEOUS FUZES

4-44. General

This section pertains to fuzes with physical and functional characteristics and specialized application which prohibits their being classified as a standard series or type.

4-45. Fuze, Bomb: FMU-7/B or FMU-7A/B

a. General. These fuzes are designed for use on later model fire bombs. Electrically armed and impact fired, they are used in conjunction with FMU-7 series initiators and cable assemblies. Fuzes FMU-7/B and FMU-7A/B are interchangeable and similar except that the FMU-7A/B (fig. 4-60) has a round head with metal tape under a hole in the center of the head. Two identical fuzes are used in each bomb in the nose and tail.

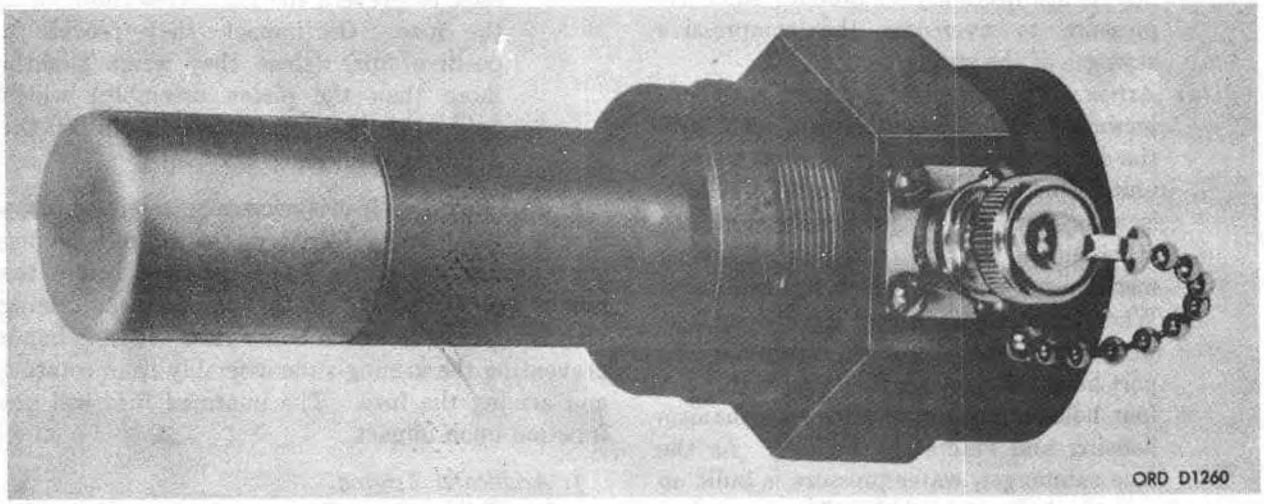


Figure 4-60. Fuze FMU-7A/B.

b. Functioning. After release of the bomb from the aircraft an electrical pulse from the FMU series initiator in the bomb operates a motor bellows in each fuze which results in their arming. Upon ground impact of the munition, an all ways-functioning striker assembly initiates a primer and a primer-detonator, in sequence, which in turn causes detonation of the high explosive booster. This detonation fragments igniter AN-M23A1 or AN-M23, thus causing ignition of the incendiary filler.

4-46. Fuze, Bomb: M129

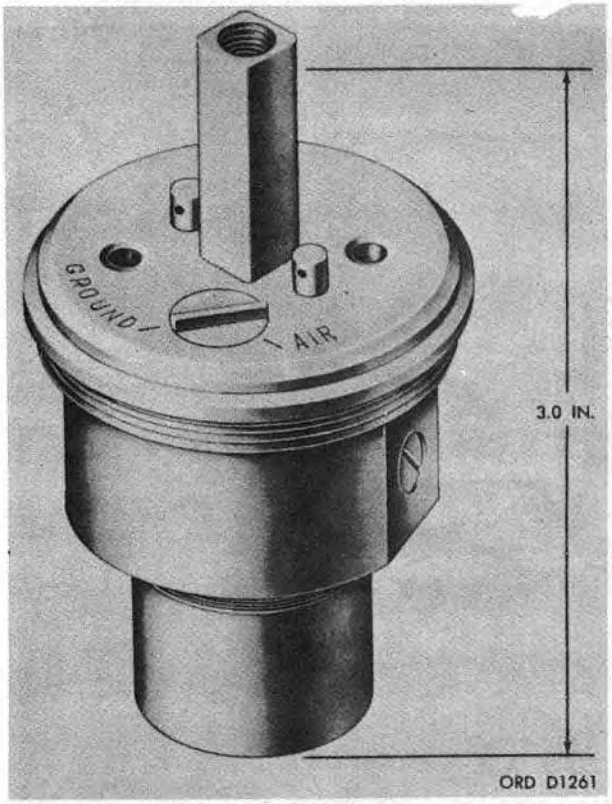


Figure 4-61. Bomb fuze M129.

Table 4-22. Bomb Fuze M129

Model	M129
Firing Action	Aerial Burst or Impact
Firing Delay:	
Air	215-seconds after Arming
Impact	Instantaneous
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	M31
Primer	M41A1
Booster	Tetryl Pellet

a. General. Fuze M129 (fig. 4-61 and table 4-22) is used only with the fragmentation (butterfly) bomb. It is armed by the butterfly wings of the bomb and can be preset to detonate either in the air or instantaneously upon impact. Fragmentation bombs are assembled into clusters which require mechanical time fuzes for cluster opening. Approximately 50 feet of air travel is required to arm the 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.

Note. Only fuzes set for ground burst are supplied to the Navy.

b. Description. Fuze M129 (fig. 4-62) consists of three main assemblies held together by three studs.

(1) The cap assembly consists of the cap (marked AIR and GROUND) which contains the arming stem, the setting plug, and the setting pin with spring.

(2) The movement assembly consists of the arming mechanism, the firing-pin assembly, and the primer. The arming mechanism includes the segment gear (regulated by gear train or movement assembly), segment-gear stop, segment-gear cam shaft, and the safety-pellet assembly (includes pellet, shell, and spring).

(3) The booster assembly consists of a tetryl pellet, which is housed in a metal cup protruding from the fuze base, and a detonator assembly. The 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 aligned with the firing pin at all times. When the fuze is in the unarmed condition, the arming stem tip is interposed between these components.

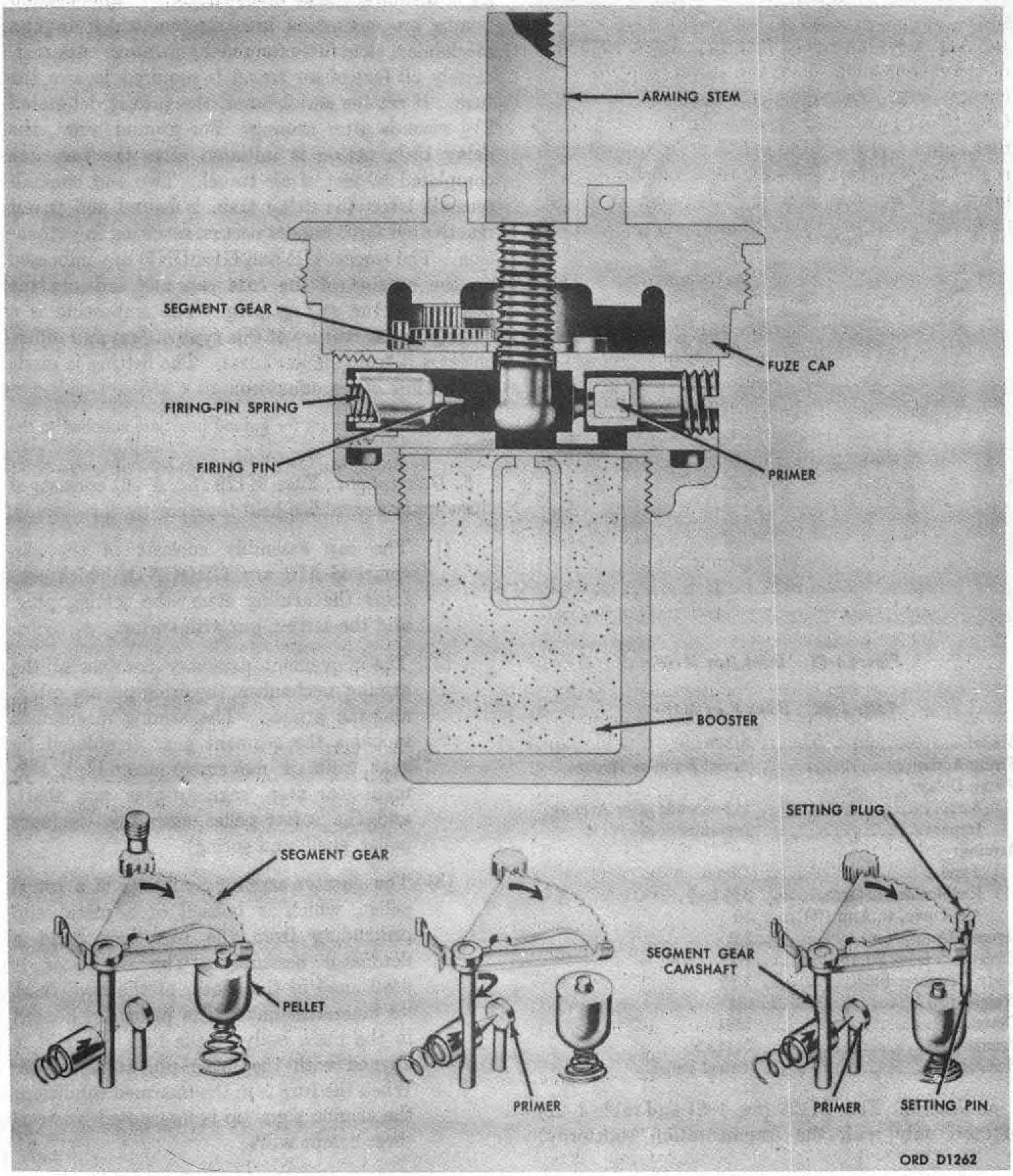


Figure 4-62. Fuze, M129—cross section and details of operation.

c. *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. This fuze is installed in the bomb by the manufacturer. Removal or replacement of the fuze in the field is not recommended.

d. *Functioning.*

(1) *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.

(2) *Arming.* As the butterfly wings rotate in the airstream, the arming stem is unscrewed from its centrally-threaded hole in the fuze cap. When the arming stem has completed between 3½ to 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 consitutes 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 2¼ seconds after it is freed.

(3) *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 half-round notch cut in the camshaft has aligned with the firing pin. This frees the firing pin, which is driven into the primer.

(4) *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 aligns with the firing pin. The firing pin then is freed and driven into the primer by the compressed firing-pin spring. The primer is initiated 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.

e. *Safe Release.* 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.

f. Accidental Arming. 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. A 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 shock may free the segment gear and fire the fuze.

***Warning:* No attempt should be made to change the setting or to remove the fuze from a bomb. In the event of an armed fuze or a fuze suspected of being armed, notify authorized and qualified munition personnel for destruction.**

4-47. Fuze, Bomb: M130A1 (or M130)

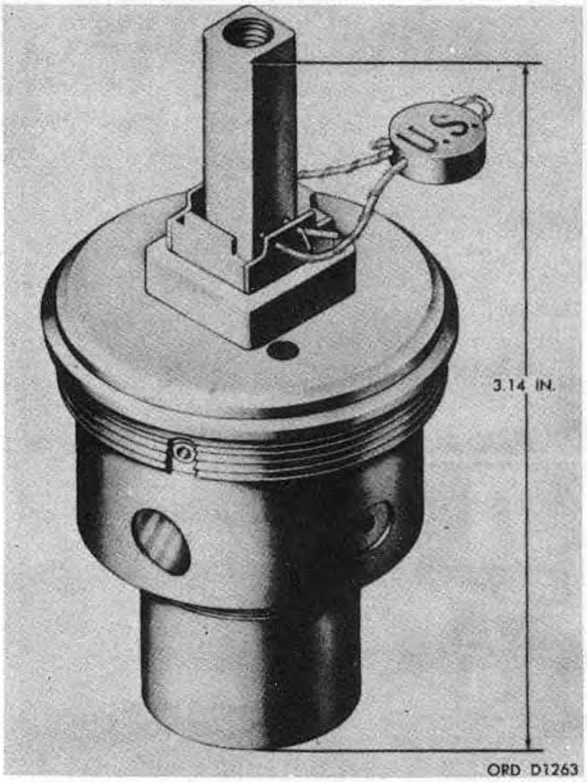


Figure 4-63. Bomb fuze M130A1.

Table 4-23. Bomb Fuze M130A1

Model	M130A1 (or M130)
Firing Action	Mechanical Time
Firing Delay (min)	10, 20, 30, 40, 50, or 60
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

Table 4-23. Bomb Fuze M130A1—Continued

Detonator	M31
Primer	M41A1
Booster	Tetryl Pellets

a. General. This fuze (fig. 4-63) is used with the fragmentation (butterfly) bomb only. It is armed by the butterfly wings of the bomb. The fuze time train is initiated after 50 feet of air travel has 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.

b. Bomb Clusters and Adapters. Fuzes M130 and M130A1 are identical in operation and appearance except that fuze 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 fuze M129 (which is distinguished by the words AIR and GROUND embossed on its cap). These fuzes are installed in bombs by the manufacturer, and the fuzed bombs are issued in wafer or complete cluster assemblies. Removal or replacement of the fuze in the field is not authorized.

c. Description. Fuze M130A1 (or M130) (fig. 4-64) consists of three parts.

(1) The cap assembly contains the arming stem.

(2) The body assembly contains the fuze mechanism, the firing pin assembly, and the primer.

(3) The booster assembly consists of tetryl pellets housed in a metal cup which protrudes from the fuze base and a detonating assembly. A primer completes the explosive components of the fuze.

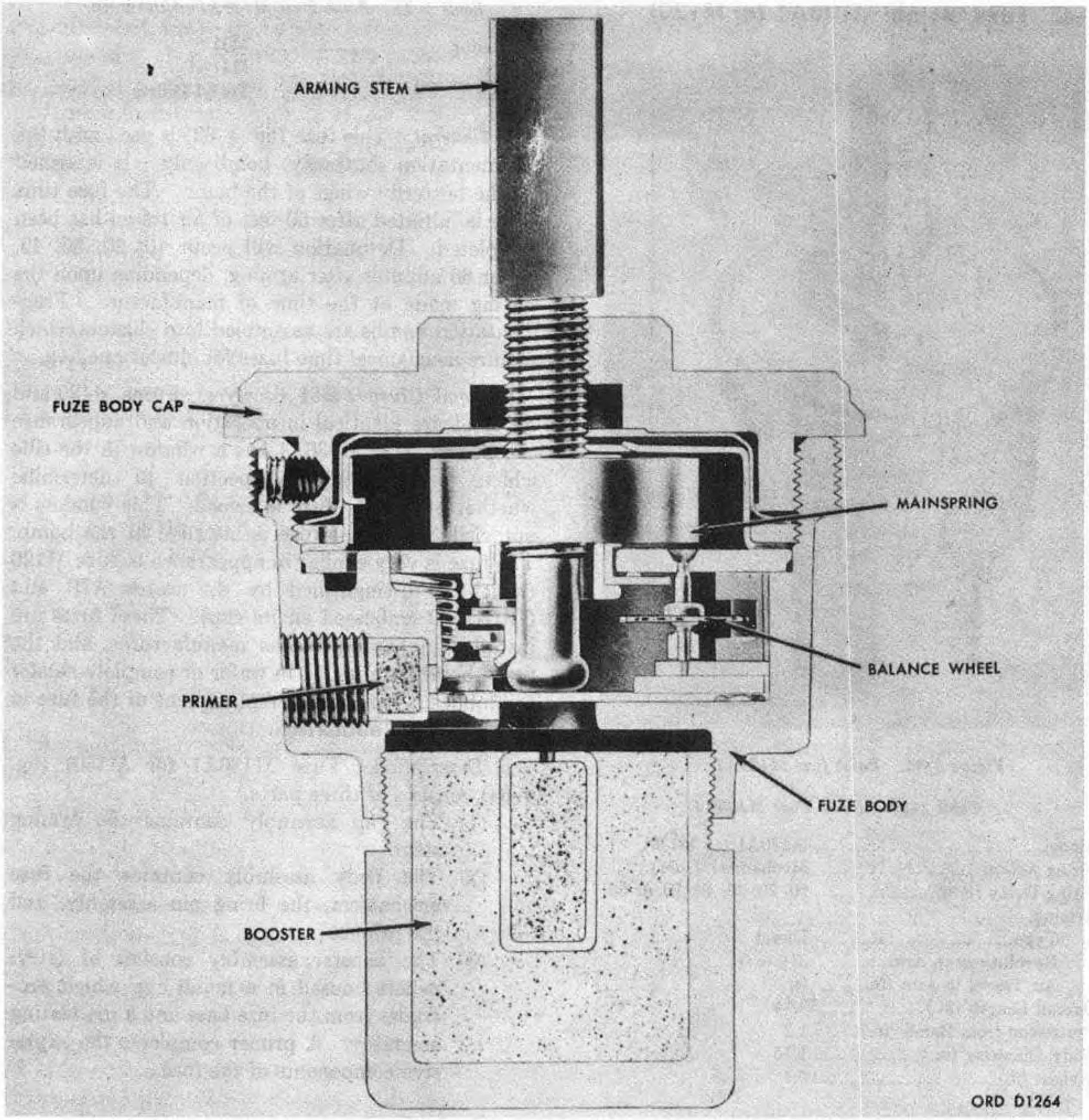


Figure 4-64. Fuze M130A1—cross section.

d. *Functioning.*

(1) *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. When the arming stem is withdrawn approximately ¼ 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.

(2) *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 airstream, 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 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.

(3) *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 in a clockwise direction for a limited distance. 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 after 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 holds 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 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. The primer is fired by the striker and sets off the detonator. The detonator ignites the booster, which sets off the bomb.

(4) *Safe release.* 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 fuze is released with the cluster when the cluster is jettisoned. This prevents the fuze from functioning and opening the cluster. Bombs in the unopened cluster will not function upon impact since the individual fuzes are unarmed.

(5) *Accidental arming.* 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 ⅛ 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.

Warning: **No attempt should be made to remove an armed or unarmed fuze or a fuze suspected of being armed from a bomb. In the event of an armed or a fuze suspected of being armed, notify authorized and qualified munitions personnel for disposal.**

4-48. Fuze, Bomb: M131A1 (or M131)

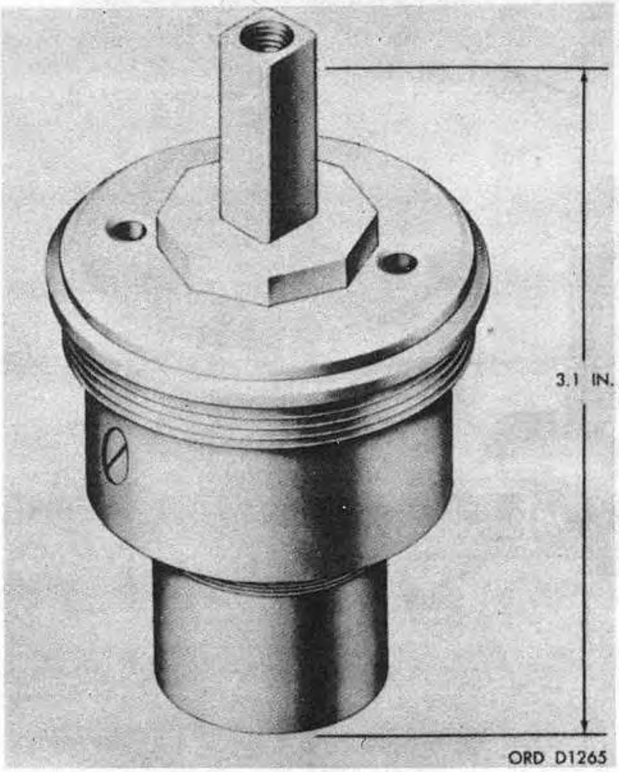


Figure 4-65. Fuze M131A1.

Table 4-24. Bomb Fuze M131A1

Model	M131A1
Firing Action	Fired by Any Disturbance after Initial Impact.
Firing Delay	None
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

Table 4-24. Bomb Fuze M131A1—Continued

Protrusion from Bomb (in.)	1.3
Body Diameter (in.)	1.75
Weight (lb)	0.4
Detonator	M31
Primer	M41A1
Booster	Tetryl Pellets

a. General. Fuze M131A1 (fig. 4-65) is used only with fragmentation (butterfly) bombs. It is a time fuze armed by butterfly wings of the bomb 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. (Cluster assemblies are described in ch. 3.) Fuze M131A1 (or M131) is very similar in appearance to the M129, which is distinguished by the words AIR and GROUND embossed on its cap. Fuze M131A1 (or M131) is identical to fuze M130A1 (or M130) when assembled in a bomb. Both fuzes are installed in bombs by the manufacturer. In addition, the fuzed bombs are issued in wafer or complete cluster assemblies.

b. Description. The fuze (fig. 4-66) consists of three parts:

(1) The cap assembly contains the arming stem.

(2) The body assembly contains the fuze mechanism, the firing pin assembly, and the primer.

(3) The booster assembly consists of a tetryl-loaded aluminum cup and detonator assembly. The booster is screwed directly to the base of the fuze body. A primer completes the explosive components of the fuze.

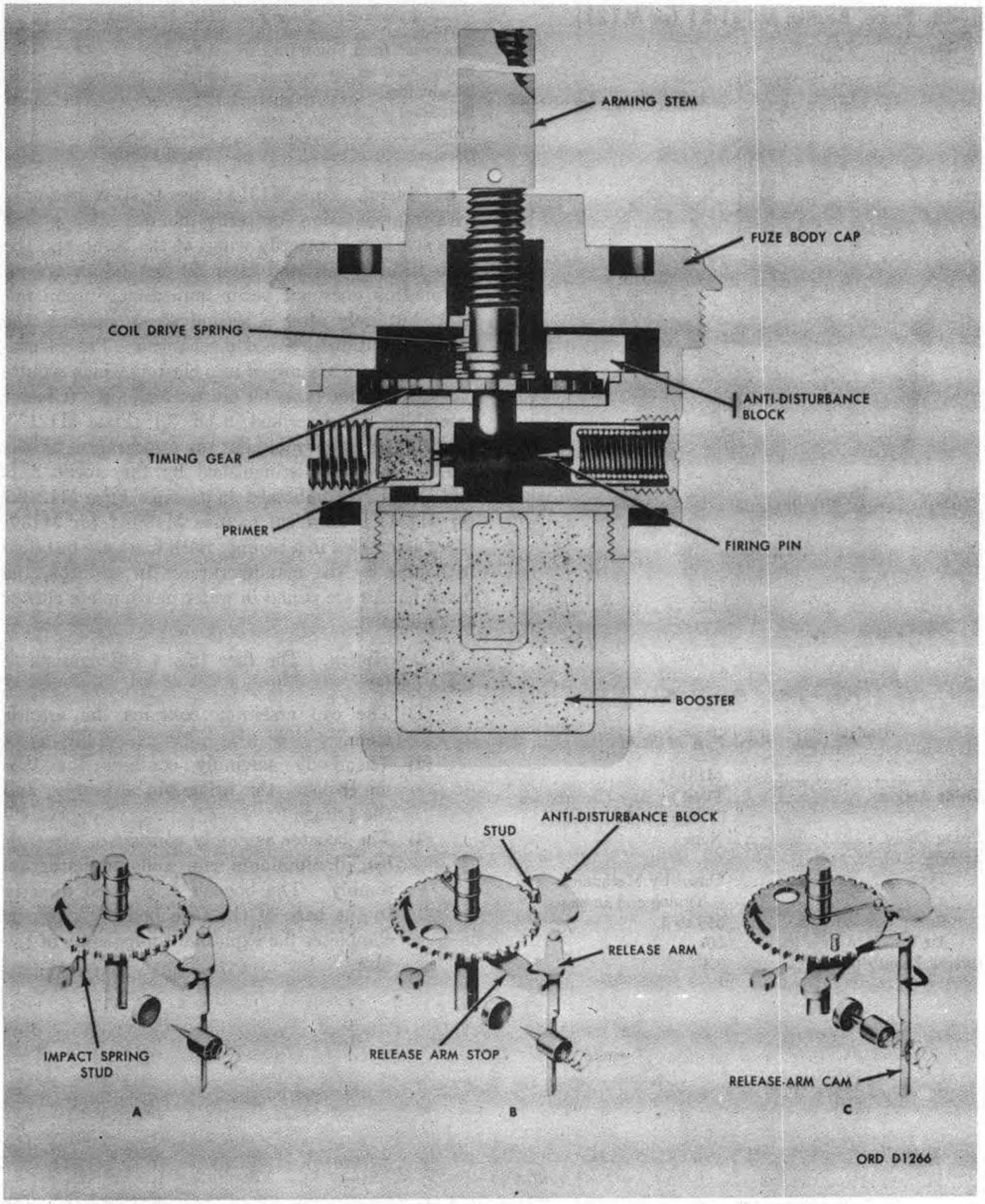


Figure 4-66. Fuze, M131A1—cross section and details of operation.

c. *Functioning.*

(1) *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 risen about 1/4 inch. This allows the first release in the arming 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 and the fuze will detonate.

(2) *Arming.* When the arming stem has risen 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.

(3) *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 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. Here the timing mechanism is once more brought to a halt and the fuze is prepared for its antidisturbance 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.

(4) *Detonation.* The firing pin sets off the primer which relays the explosion to the detonator. The detonator explodes the booster which, in turn, fires the bomb.

d. *Safe Release.* 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.

e. *Accidental Arming.* 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.

***Warning No. 1:* 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 a fuze suspected of being armed. It should be destroyed with the bomb by authorized and qualified munitions personnel.**

***Warning No. 2:* Do not attempt to disarm or to remove the fuze from the bomb. In the event of an armed or a fuze suspected of being armed, do not disturb either the fuze or the bomb since the delicate antidisturbance mechanism may detonate both. Notify authorized and qualified munitions personnel for disposal of both bomb and fuze.**

4-49. Inert Fuzes

Inert fuzes are provided for training of ground crews in assembling, fuzing, and handling of bombs. They are also used for classroom instruction for munitions and other armament personnel. These fuzes are standard items with all explosive components (boosters, detonators, delay elements, etc.) removed. They are not expendable.

CHAPTER 5

EXPLOSIVE AND NON-EXPLOSIVE BOMB COMPONENTS

Section I. EXPLOSIVE COMPONENTS

5-1. Adapter-Booster

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

5-2. Adapter-Booster, Bomb-Tail: M102A1

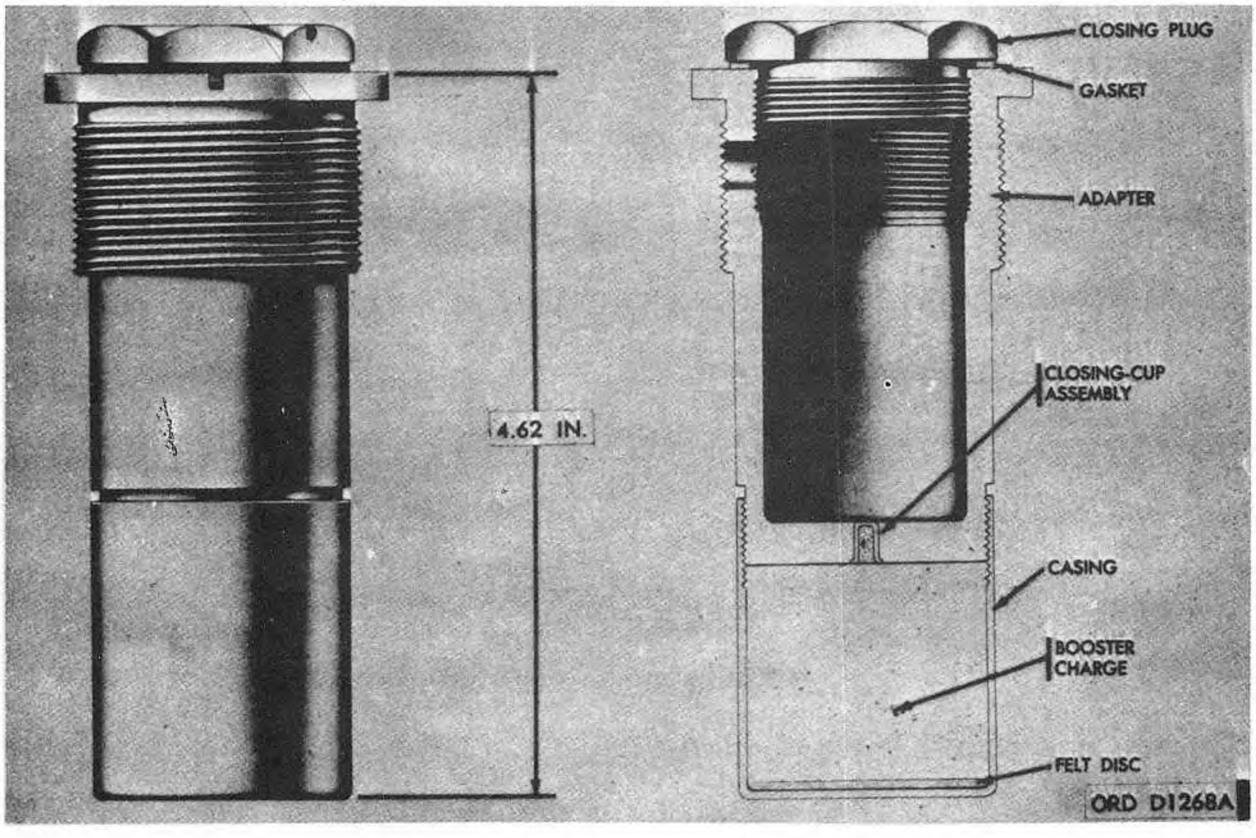


Figure 5-1. Adapter-booster, bomb-tail: M102A1.

Table 5-1. Adapter-Booster, Bomb-Tail: M102A1

Model	M102A1
Length (in.)	4.64
Closing-Cup Assembly	
Charge:	
Type	Tetryl
Weight (lb)	.00022
Booster Charge	Tetryl
Weight (lb)	.13

a. Description. Adapter-booster M102A1 (fig. 5-1 and table 5-1) 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 and a lock pin instruction card are wired to the fuze. The M102A1 has an inner diameter of 1.5 inches and its cavity is 2.86 inches deep.

b. Differences Between Adapter-Booster M-102A1 and Adapter-Booster M102. The M102A1 differs from the earlier model of M102 in its provision for locking pins.

5-3. Adapter-Booster, Bomb: M115A1

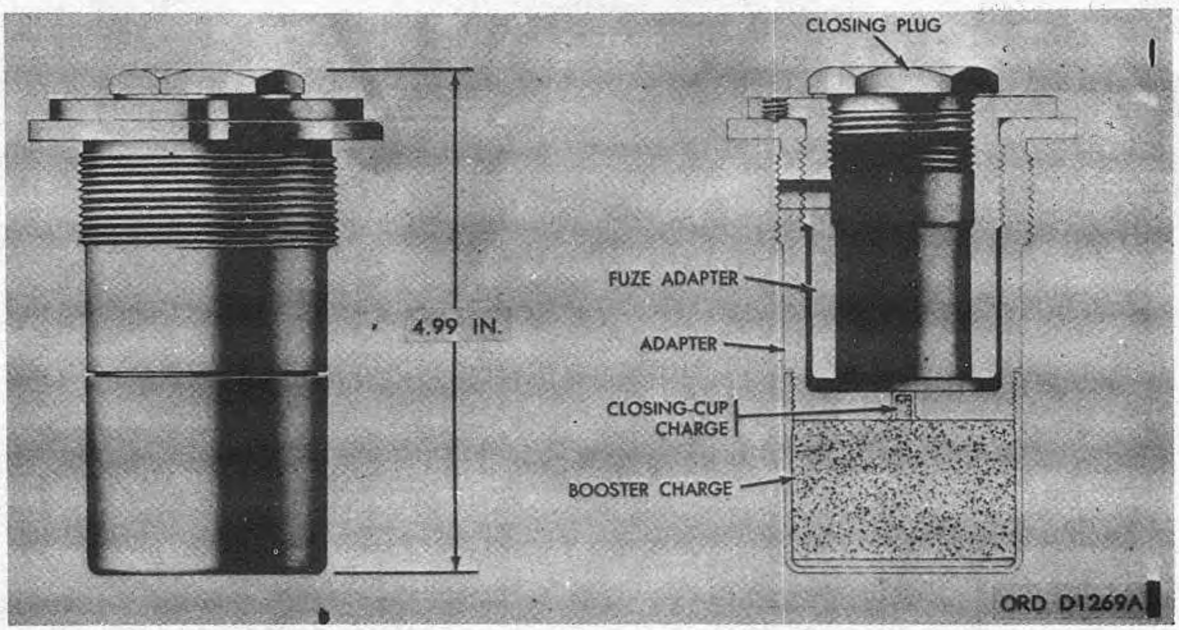


Figure 5-2. Adapter-booster, bomb: M115A1.

Table 5-2. Adapter-Booster, Bomb: M115A1

Model	M115A1
Length (in.)	4.45
Closing-Cup Assembly Charge:	
Type	Tetryl
Weight (lb)	.00022
Booster Charge	Tetryl
Weight (lb)	.27

a. Description. Adapter-booster M115A1 (fig. 5-2 and table 5-2) provides a tail fuze seat for some general purpose bombs. The adapter-booster requires a lock pin to prevent its removal after an antiwithdrawal fuze is inserted in the bomb. The required lock pin and the lock pin instruction card are wired to the fuze. This adapter-booster has an inner sleeve with an inside diameter of 1.5 inches to accomodate Army-designed fuzes. If the sleeve is removed, the adapter-booster will accommodate Navy fuzes, which have inner diameters of 2.0 inches. The cavity provided by the adapter-booster is 2.68 inches deep.

b. Differences Between Adapter-Booster M-115A1 and M115. The M115A1 differs from the earlier model M115 in its provision for the locking pin.

5-4. Adapter-Booster, Bomb: M117

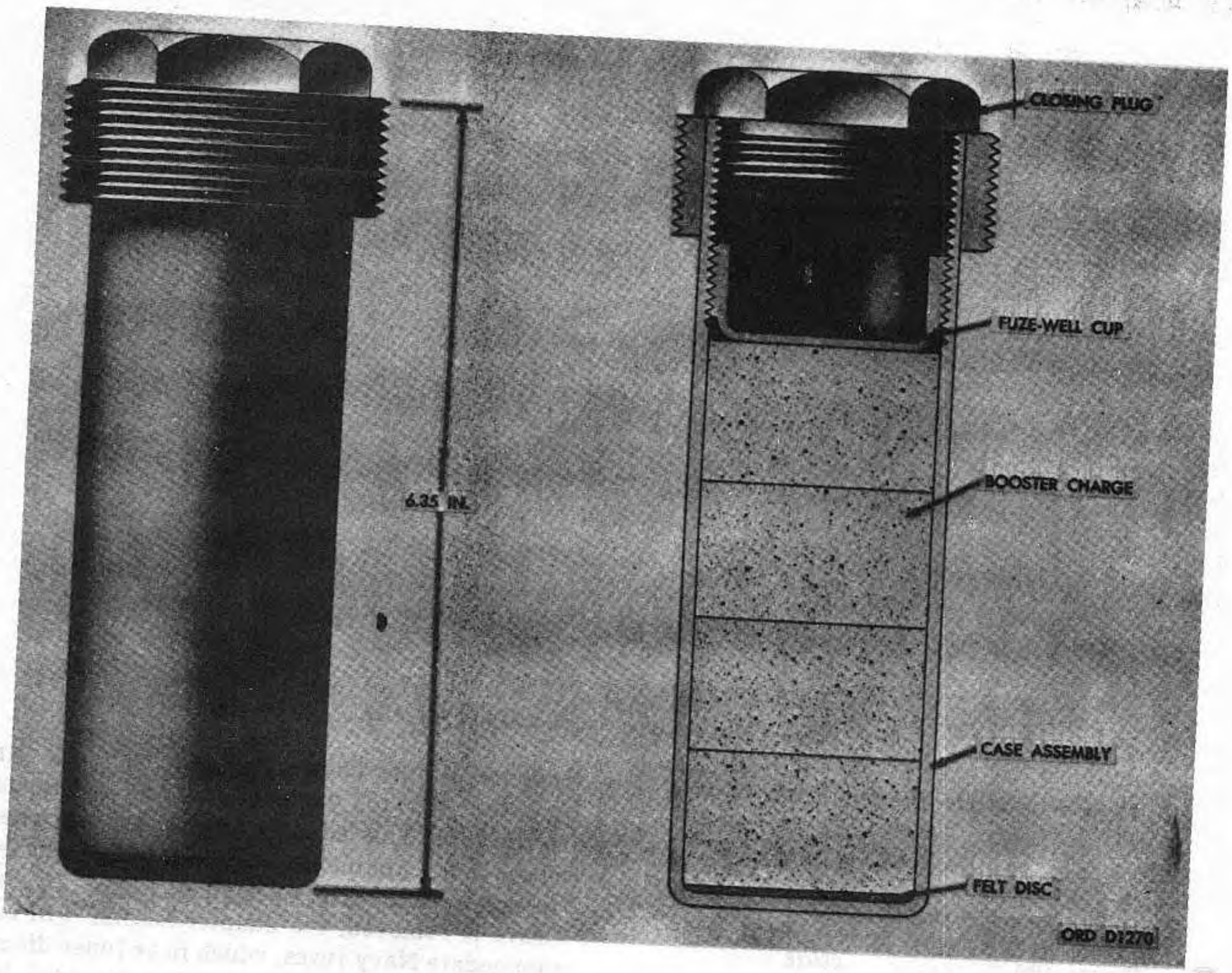


Figure 5-3. Adapter-booster, bomb: M117.

Table 5-3. Adapter-Booster, Bomb: M117

Model	M117
Length (in.)	6.35
Booster Charge	Tetryl
Weight (lb)	0.29

Adapter-booster M117 (fig. 5-3 and table 5-3) adapts general purpose bombs with large fuze seats to accommodate small fragmentation-type fuzes.

5-5. Adapter-Booster, Bomb: T45E3

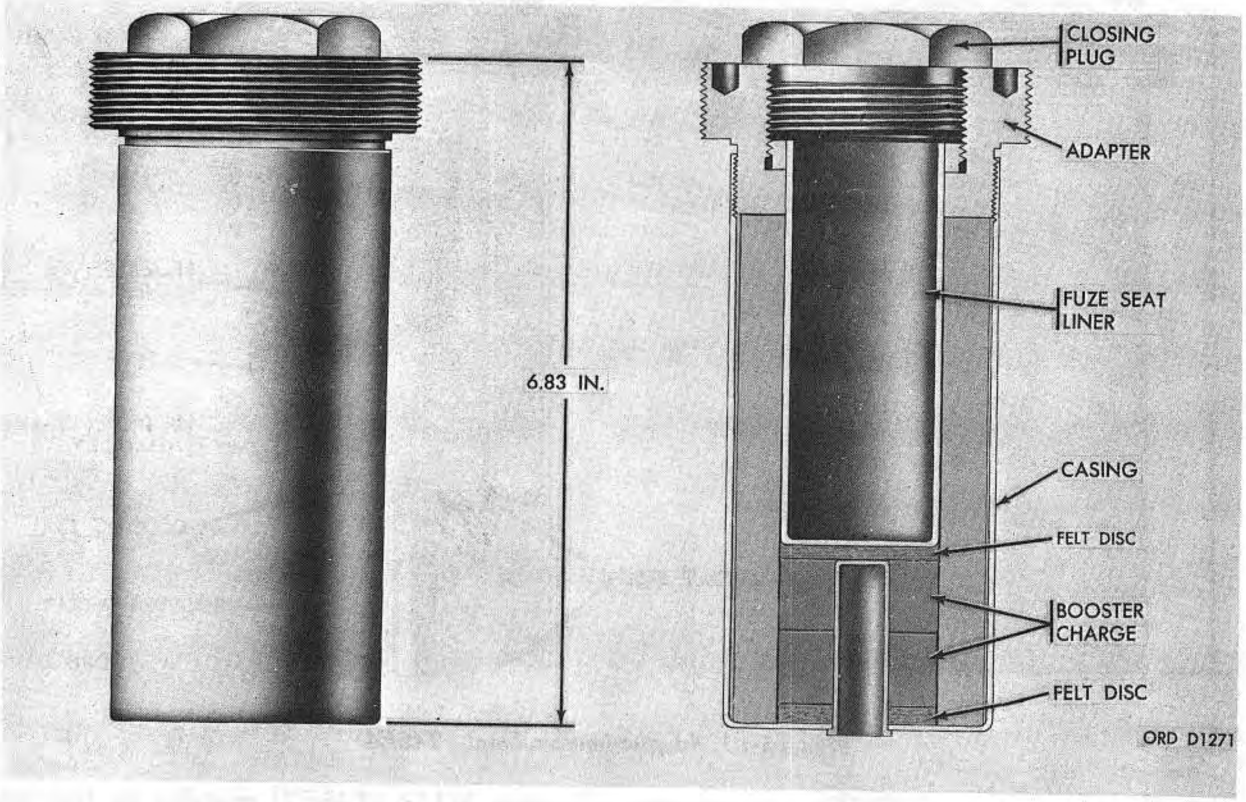


Figure 5-4. Adapter-booster, bomb: T45E3

Table 5-4. Adapter-booster, Bomb: T45E3

Model	T45E3
Length (in.)	6.83
Booster charge	Tetryl
Weight (lb)	0.16

a. Description. Adapter-booster T45E3 (fig. 5-4 and table 5-4) permits the use of a 2-inch thread size for mechanical or proximity fuzes in the new series and the low-drag GP bombs, including Snakeye I.

b. Difference Between Adapter-Boosters.

(1) *Adapter-booster T45E3 and adapter-booster T45E4.* Adapter-booster T45E4 (fig. 5-4.1) differs from adapter-booster T45E3 in the following respects: The aluminum sleeve in the T45E3 extends the length of the booster casing assembly, while the aluminum sleeve in the T45E4 extends only to the surface of the booster charge. The T45E4 also contains a metal closing cup between the fuze well and the booster pellet. With the exception of the above differences, the two adapter boosters contain the same components.

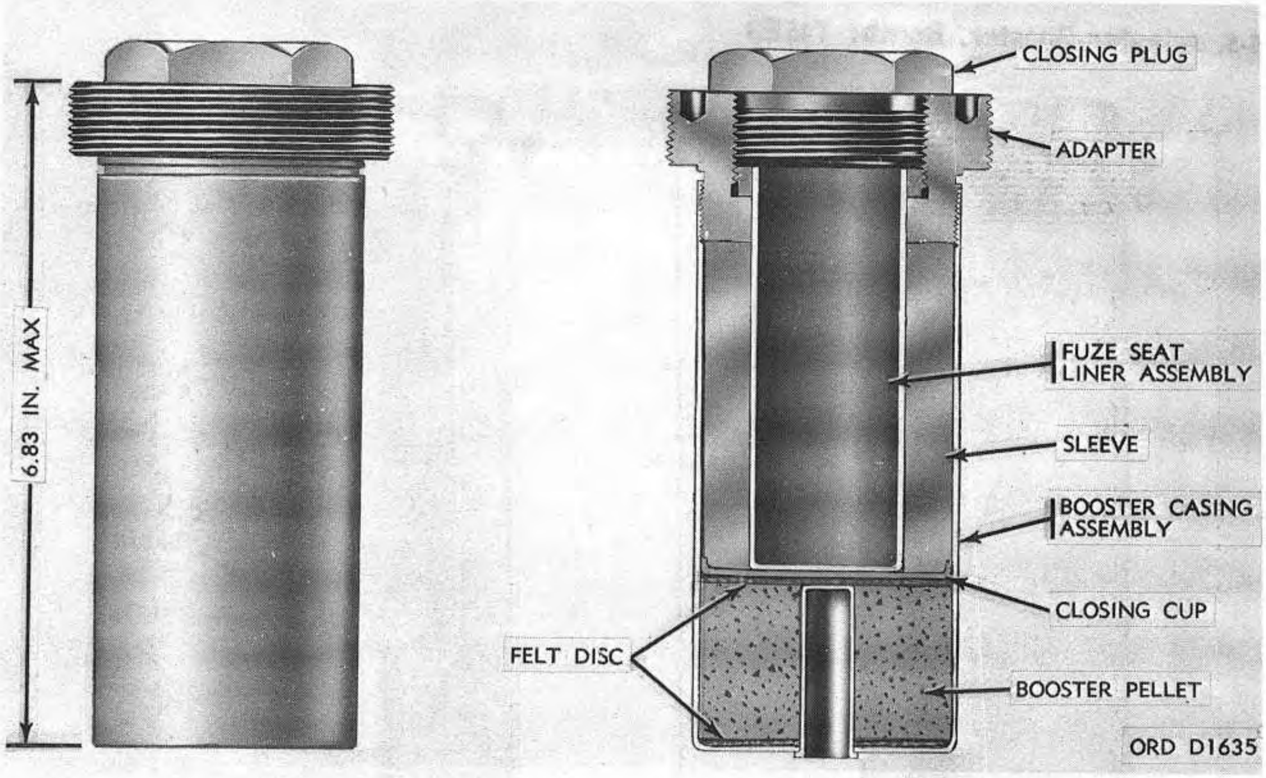


Figure 5-4.1. Adapter-booster, bomb: T45E4.

(2) *Adapter-booster T45E4 and adapter-booster M148 (T45E7).* Adapter-booster M148 (T45E7 (fig. 5-4.2) differs from adapter-booster T45E4 in the following respects: Adapter-booster M148 (T45E7) contains no fuze seat liner and a steel spacer has been added between the closing cup and the felt disc.

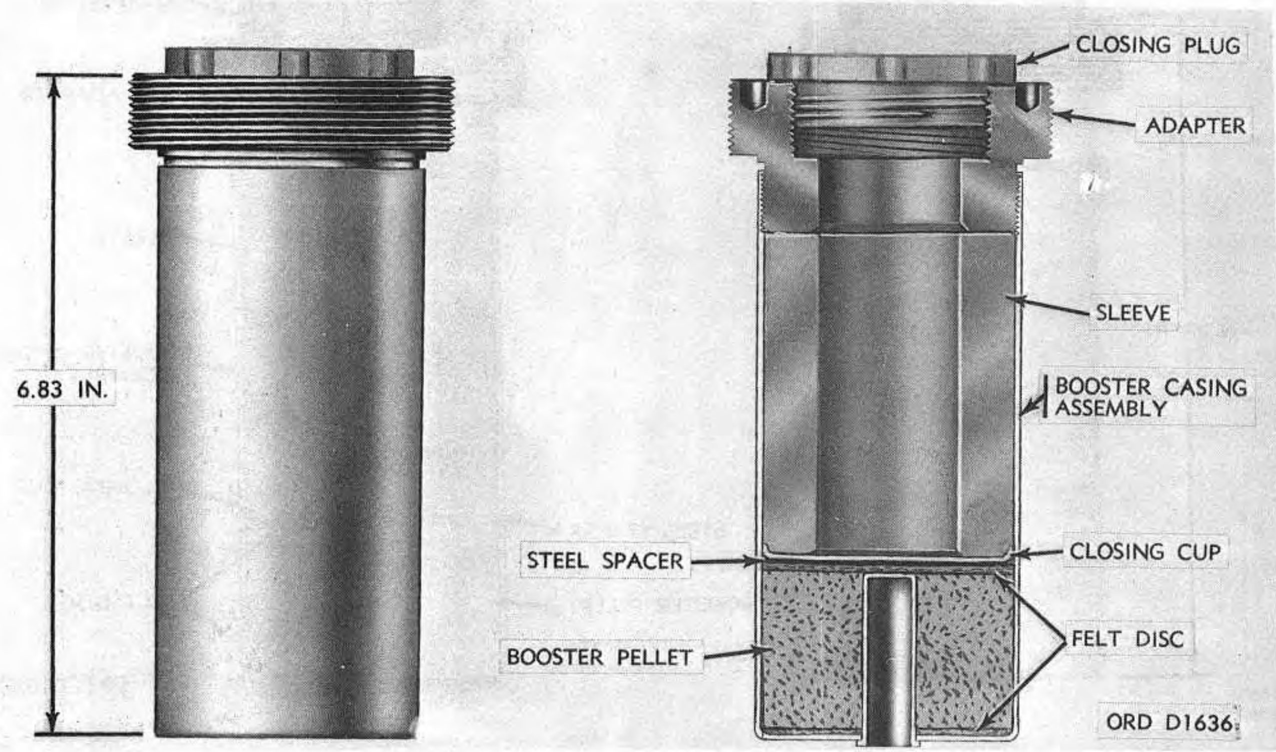


Figure 5-4.2. Adapter-booster, bomb: M148 (T45E7).

(3) *Adapter-booster M148 (T45E7) and adapter-booster T45E9.* Adapter-booster T45E9 (fig. 5-4.3) differs from adapter-booster M148 (T45E7) in the following respect: Adapter-booster T45E9 contains a solid booster pellet while adapter-booster M148 (T45E7) contains a booster pellet with a hole through the center and a booster well in the burster well to allow for electrical fuzing.

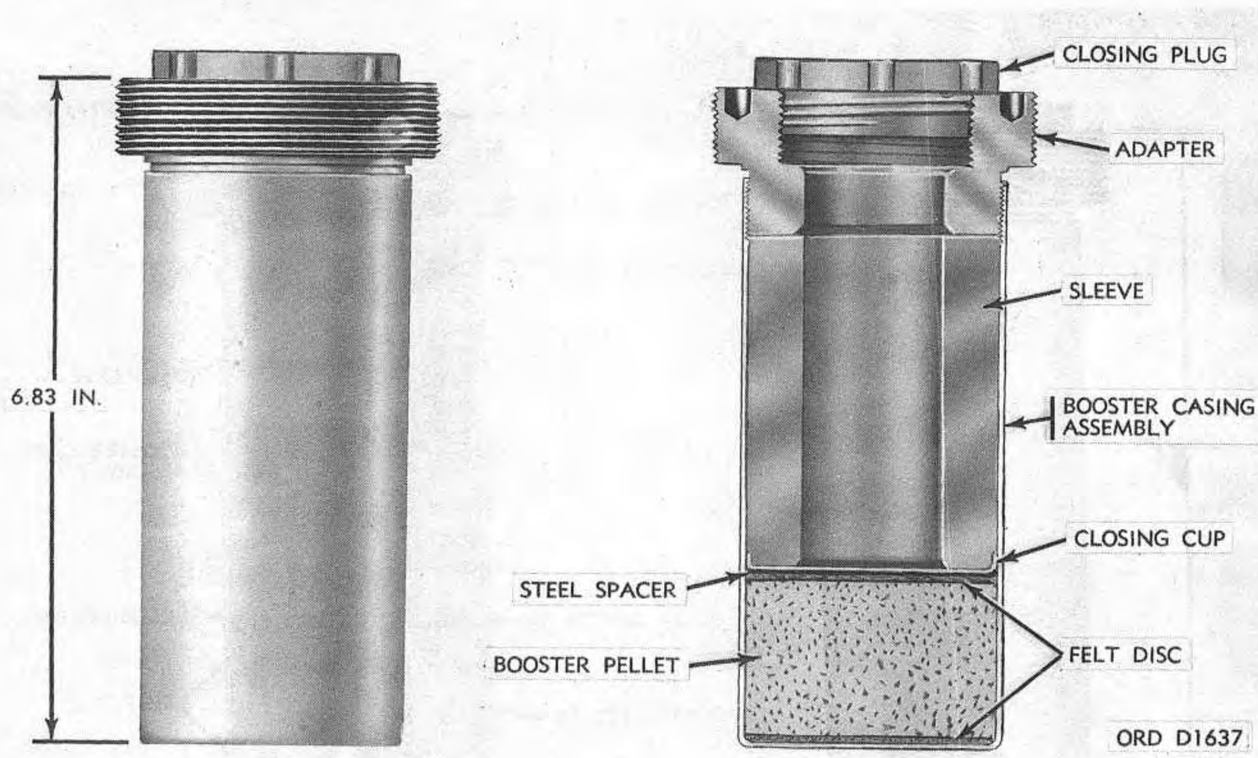


Figure 5-4.3. Adapter-booster, bomb: T45E9.

5-6. Adapter-Booster, Bomb: T46E4

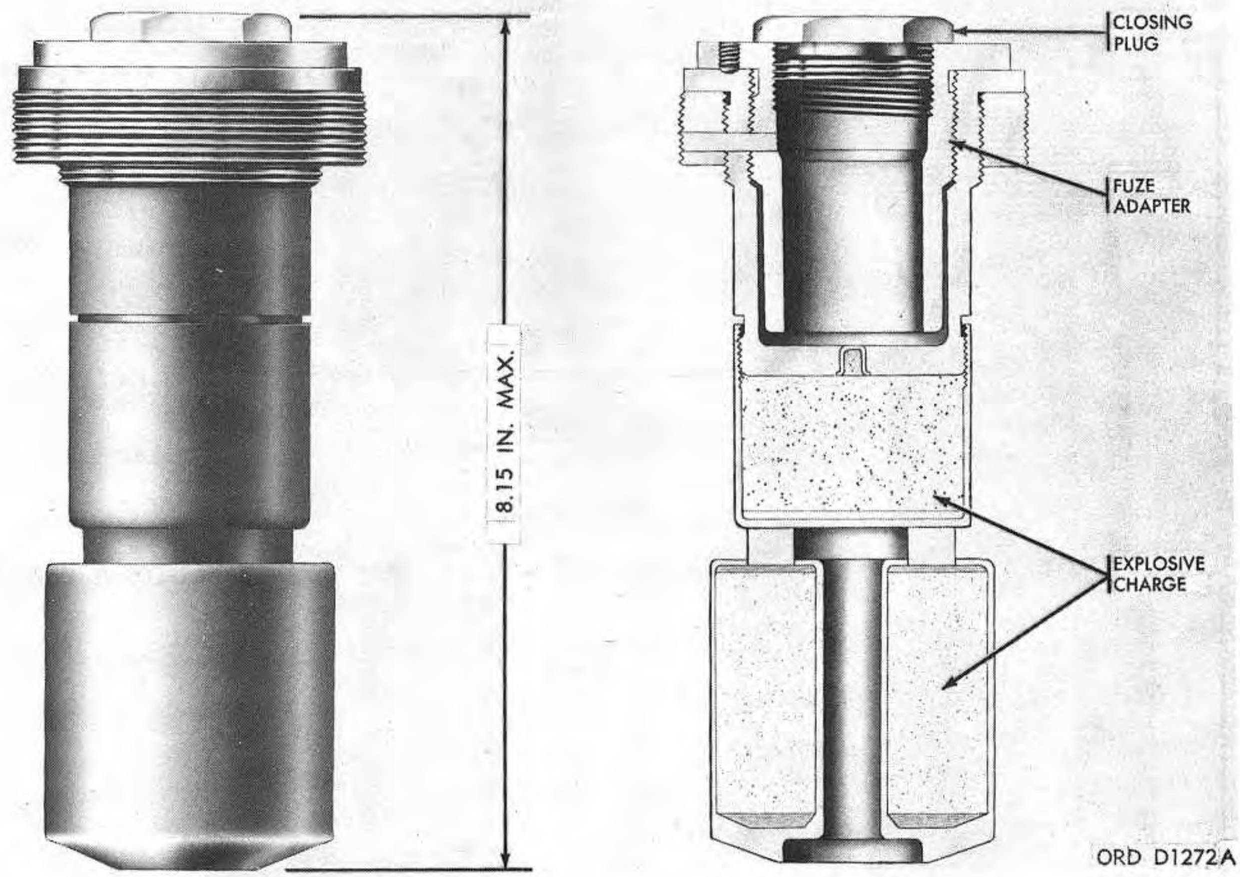


Figure 5-5. Adapter-booster, bomb: T46E4.

Table 5-5. Adapter-Booster, Bomb: T46E4

Model	T46E4
Length (in.)	8.15
Booster charge	Tetryl
Weight (lb)	0.26

a. Description. Adapter-booster T46E4 (fig. 5-5 and table 5-5) permits the use of a 1.5-inch thread size mechanical tail fuze in new-series, low-drag GP bombs and MC-1 gas bombs. Because of a two-inch adapter ring the metal closing plug (fig. 5-5) has been replaced with a plastic plug. The maximum length of adapter-booster T46E4 with the plastic plug is 7.96 inches.

b. Difference Between Adapter-Boosters.

(1) *Adapter-booster T46E3 and adapter-booster T46E4.* Adapter-booster T46E3 is identical to adapter-booster T46E4 except that it has no locking pin hole in the adapter assembly. This locking pin hole serves to lock adapter-booster T46E4 in place when assembled in the bomb. Adapter-booster T46E3 also contains a tag marked DO NOT USE WITH LONG DELAY FUZES.

(2) *Adapter-booster T46E4 and Adapter-Booster M149 (T46E5).* Adapter-booster M149 (T46E5) (fig. 5-5.1) contains the following changes made for ease of manufacturer: These consist of making the adapter in two pieces with smaller diameter flanges, the use of a plastic closing plug, and as an alternative, the ring adapter and adapter may be made in one piece. The M149 (T46E5) is identical to the T46E4 in all other respects.

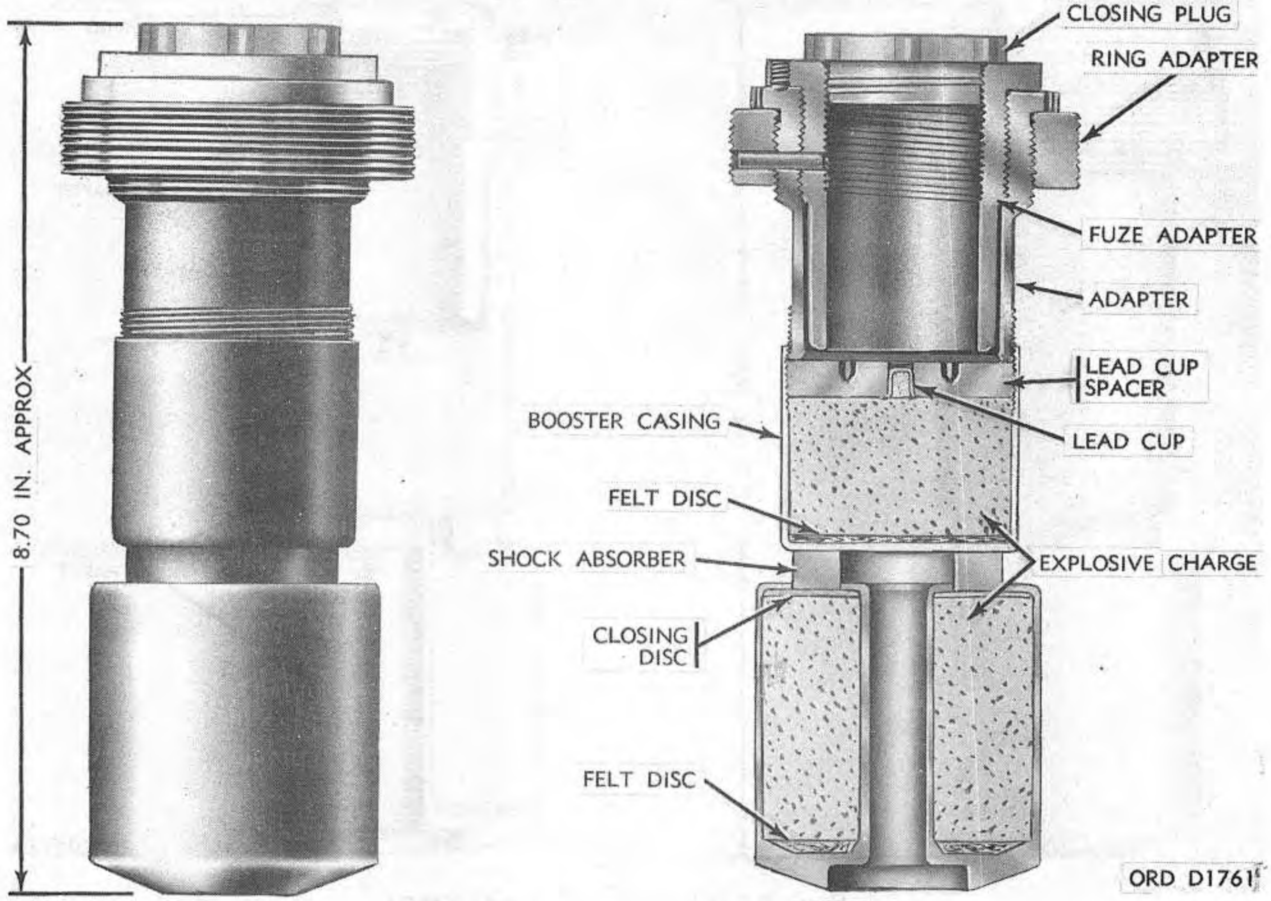


Figure 5-5.1. Adapter-booster, bomb: M149 (T46E5).

5-7. Adapter-Booster, Bomb: T59

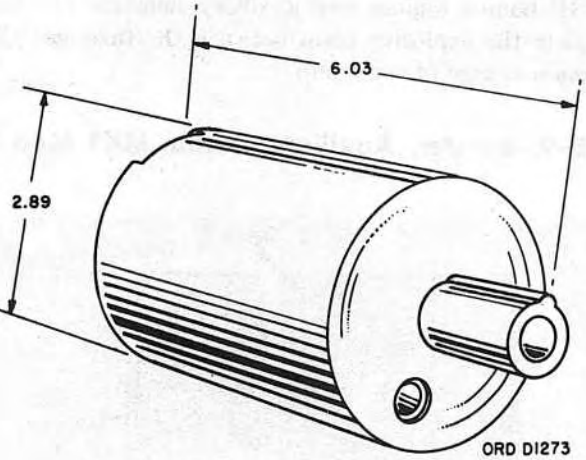


Figure 5-6. Adapter-booster, bomb: T59.

Table 5-6. Adapter-Booster, Bomb: T59

Model	T59
Length (in.)	6.03
Booster Charge (grams)	6(A5)
Weight (lb)	2.12

Adapter-booster T59 (fig. 5-6 and table 5-6) is used to ignite the detonating cord which opens leaflet bomb M139.

5-8. Auxiliary Boosters

Auxiliary boosters, which consist of a column of tetryl pellets in a suitable container, relay and amplify detonating 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. Auxiliary boosters may be issued separately for installation in fuze-seat liners. Some of the large GP bombs require two auxiliary boosters to complete the explosive train between the fuze and the main charge of the bomb.

5-9. Booster, Auxiliary, Bomb: MK1 Mod 0

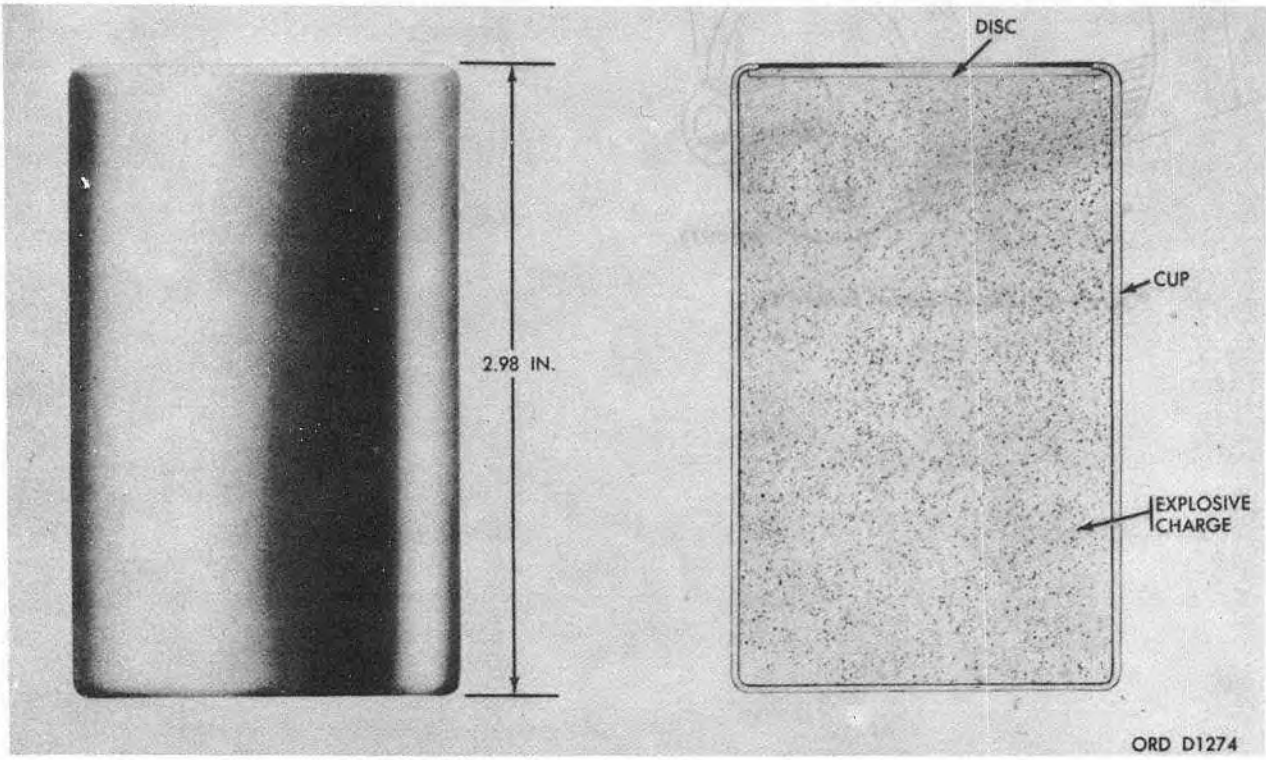


Figure 5-7. Booster, auxiliary, bomb: MK1 Mod 0.

Table 5-7. Booster, Auxiliary, Bomb: MK1 Mod 0

Mark	1
Mod	0
Diameter (in.)	1.85
Height (in.)	2.98
Explosive Filler	TNT
Weight (grams)	180.0

Auxiliary booster MK1 Mod 0 (fig. 5-7 and table 5-7) is a standard booster shipped in either the nose or the tail-fuze seat liner (or both) of some types of GP and frag bombs weighing over 100 pounds.

5-10. Booster, Auxiliary, Bomb: MK4 Mod 0

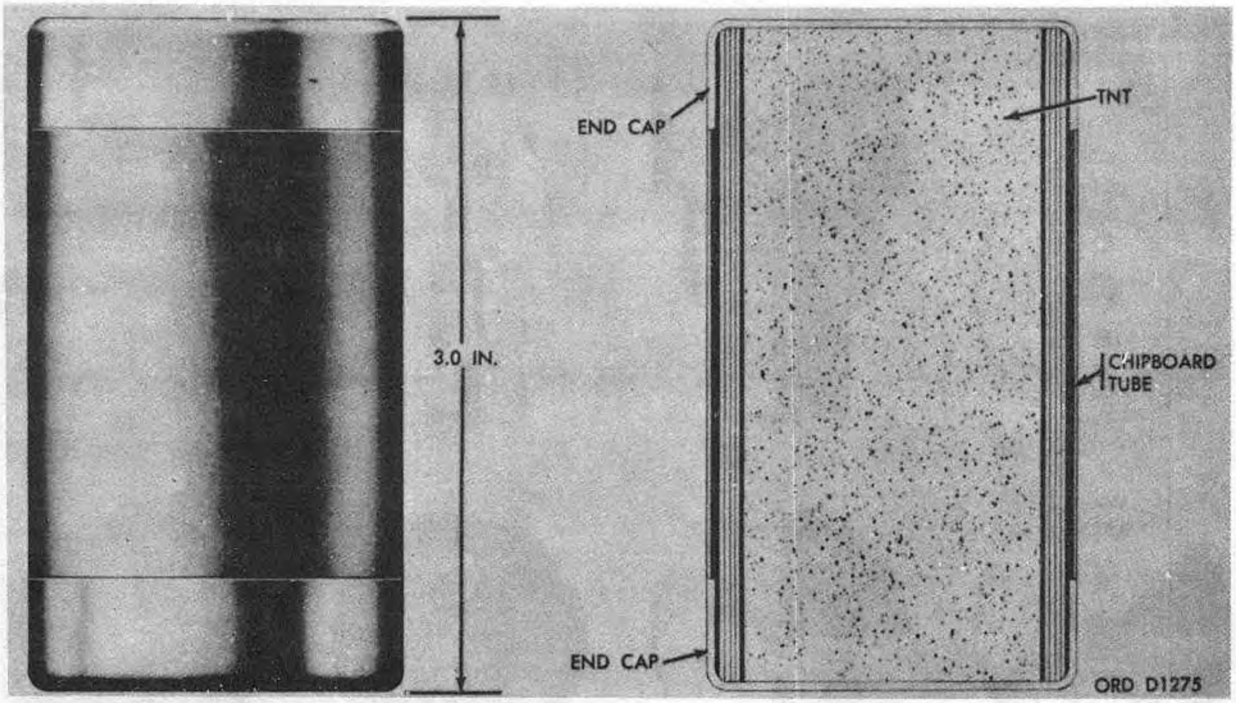


Figure 5-8. Booster, auxiliary, bomb: MK4 Mod 0.

Table 5-8. Booster, Auxiliary, Bomb: MK4 Mod 0

Mark	4
Mod	0
Diameter (in.)	1.6
Height (in.)	3.0
Explosive Filler	TNT
Weight (grams)	63.0

Auxiliary booster MK4 Mod 0 (fig. 5-8 and table 5-8) is an explosive contained in a chipboard tube which is closed at both ends by metal caps cemented to the tube. White bomb 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 using nose fuze MK219.

5-11. Primer-Detonators

A primer-detonator is an interchangeable unit (composed of a primer delay element and a detonator) which is designed to provide delay in the action of older models of tail fuzes. Primer-detonators of various delay times are available, with the exact delay time of each painted on the detonator head. Before installing a primer-detonator in a fuze assembly, check the cavity in the fuze body to insure that no foreign matter is present. Anything which prevents an easy assembly of a primer-detonator into its cavity may cause a premature explosion or cause the bomb to be a dud. Primer-detonators which have loose primers or show signs of corrosion or other visible defects should be replaced.

5-12. Primer-Detonator: M14

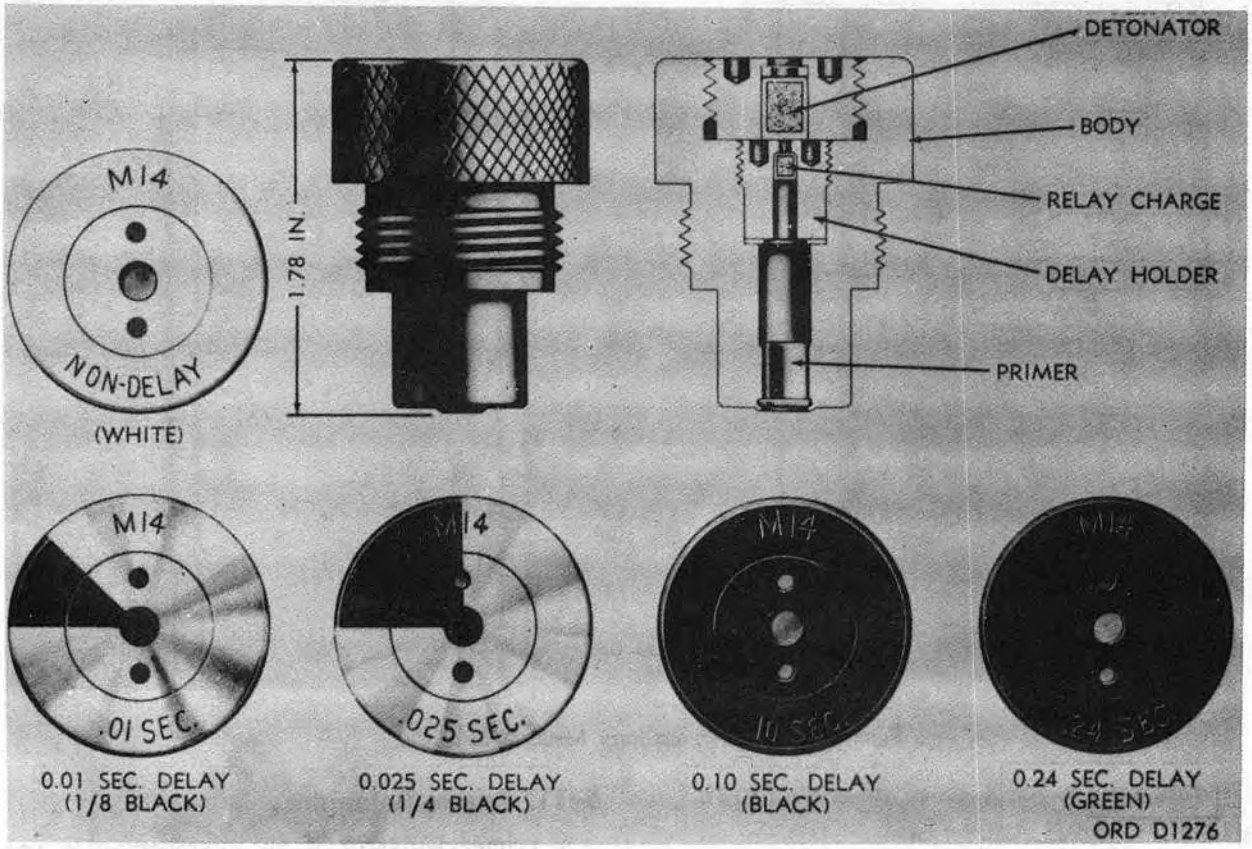


Figure 5-9. Primer-Detonator: M14.

Table 5-9. Primer-Detonator: M14

Model	M14
Diameter of Body (in.)	1.25
Length of Assembly (in.)	1.77
Explosive Weight (grams)	0.095
Weight of Assembly (lb)	0.5

Primer-detonator M14 (fig. 5-9 and table 5-9) is available with delays of 0.01, 0.025, 0.10, and 0.24 second. A nondelay primer-detonator also is available. The length of the delay 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; 0.01-⅛, black; 0.025-¼, black; 0.10, black, and 0.24, green. The M14 has a knurled head and is threaded 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.

***Caution:* Do not attempt to assemble the wrong primer-detonator into a fuze; this will damage both the fuze and the primer-detonator.**

5-13. Primer-Detonator: M16 and M16A1

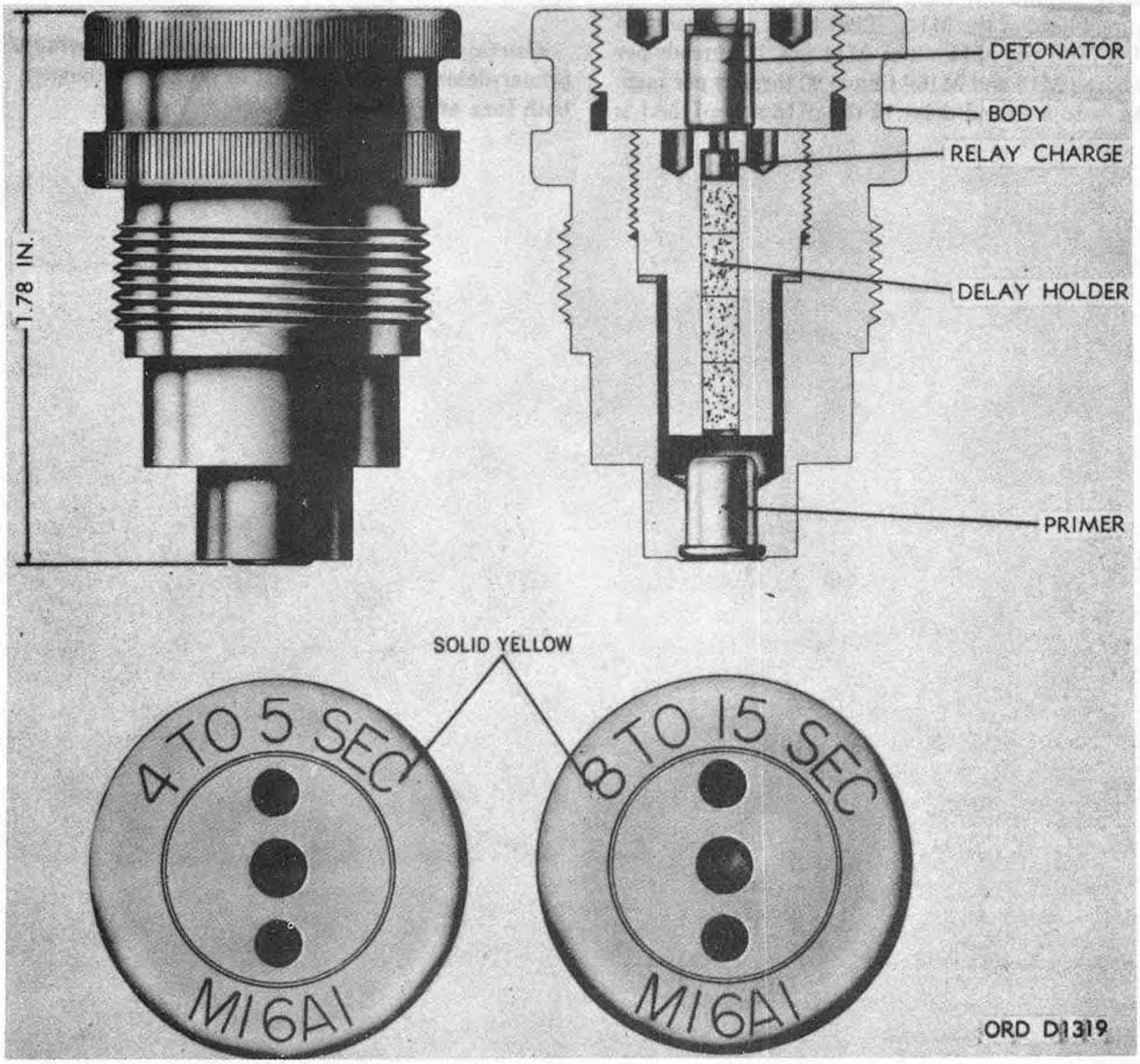


Figure 5-10. Primer-Detonator: M16.

Table 5-10. Primer-Detonator: M16

Model	M16
Diameter of Body (in.)	1.25
Length of Assembly (in.)	1.78
Explosive Weight (grams)	1.4
Weight of Assembly (lb)	0.5

a. Description. Primer-detonators M16 and M16-A1 (fig. 5-10 and table 5-10) 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.

b. Differences. The M16 differs from the M16A1 only in that the M16A1 has a high shoulder and the end of the detonator is painted yellow. The shoulder was added so that upon severe impact, the fuze plunger is arrested by the shoulder so that the blow on the primer has the force of the firing pin spring, thus avoiding a malfunction due to a pierced primer. The M16 is for use only on tail fuzes M112, M113, and M114. Both the M16 and M16A1 have a groove around the head as distinguished from the 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. 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.

***Caution:* Do not attempt to assemble wrong primer-detonator into a fuze; to do so will damage both fuze and primer-detonator.**

5-14. Delay Elements: T5E3 and T6E4

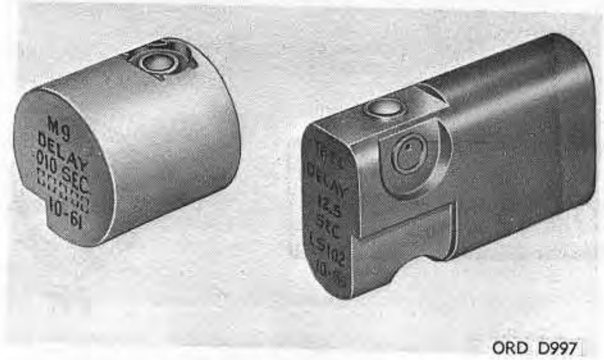


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Figure 5-11. Delay elements: M9 and T6E4.

Table 5-11. Delay Elements: T5E3 and T6E4

Model	T5E3 and T6E4
Diameter of Body (in.)	0.97
Length of Assembly (in.)	1.55
Explosive Weight (grams):	
T5E3	7.64
T6E4	7.25
Weight of Assembly (lb)	0.07

These oval-shaped delay elements (fig. 5-11 and table 5-11) contain approximately 7.64 grams and 7.25 grams, respectively, of explosive material. The T5E3 and T6E4 delay elements measure 1.55 inches long, 0.97 inch wide, 0.49 inch high, and weigh approximately 0.07 pound. These delay elements provide fuze M906 with impact firing delays of 5.0 seconds or 12.5 seconds. The delay selection depends on the fuze requirements for a particular bomb and target.

5-15. Delay Element: M9

Table 5-12. Delay Element: M9

Model	M9
Diameter of Body (in.)	0.75
Length of Assembly (in.)	0.875
Explosive Weight (lb)	0.14
Weight of Assembly (lb)	0.06

This delay element (fig. 5-11 and table 5-12), containing 0.14 gram of explosive filler, has a cylindrical configuration. It measures 7/8 inch long, 3/4 inch in diameter, and weighs approximately 0.06 pound. The delay element is available in 5 firing delay times (0.01, 0.025, 0.05 0.10 and 0.25 second) and one nondelay (0.0 second). The interchangeable delay assemblies are used to complete the firing trains of fuzes M904 (E1 or E2) and M905. The delay time is marked on one of the flat surfaces of the delay-element body.

5-15.1 Extension, Fuze, Bomb: M1A1 (M1E1)

a. Description. Bomb fuze extension M1A1 (M1E1) (fig. 5-11.1 and table 5-12.1) is designed to provide bombs with an above ground burst capability. It consists of a steel tube with a plastic closing plug in one end and a plastic cap on the other end. It contains a Composition B-filled burster assembly and two or three felt pads as required to assure snug packing. A shake-proof type lock washer was supplied with World War II production items. Washer was intentionally omitted from the first 1967/1968 Air Force procurement of M1A1 fuze extensions and included in second 1968 and later Air Force procurement. The aluminum arming wire guide tube is provided separately and installation hardware consists of two loop clamps, two bolts, four washers and two hex nuts. Procurement delivered in 1969 includes arming wire guide tube kit with fuze extension.

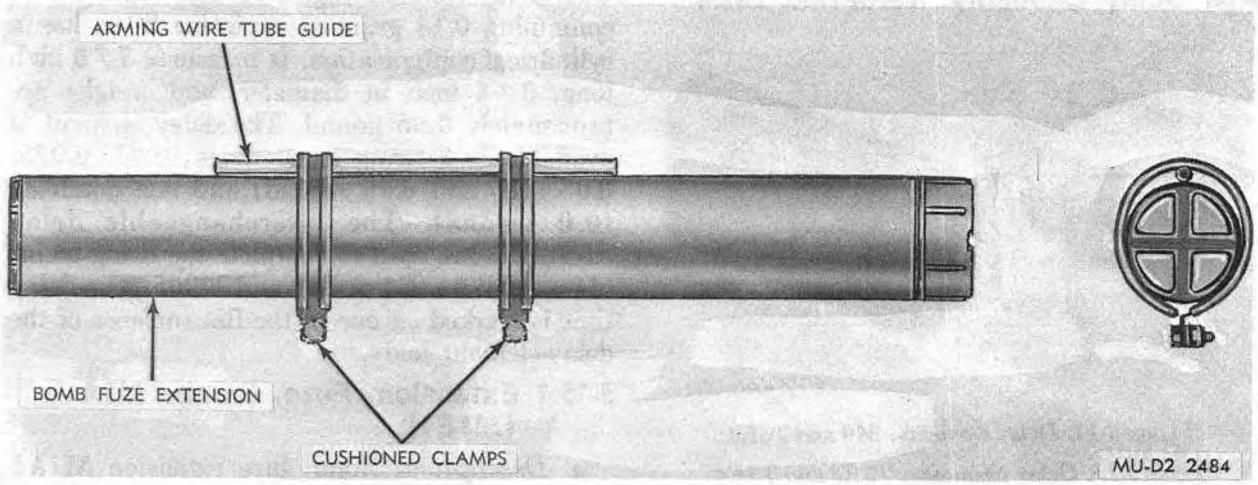

Figure 5-11.1 Extension, fuze, bomb: M1A1 (M1E1).

Table 5-12.1 Extension, Fuze, Bomb M1A1 (M1E1)

Model	M1A1 (M1E1)	M1A1 (M1E1)
Diameter of Body (in.)	2.410 (max)	2.410 (max)
Length of Assembly (in.)	19.28	37.28
Weight of Assembly (lb)	7.0	13.0
Explosive Filler	Comp B	Comp B
Weight (lb)	1.0	2.0

b. Functioning. When a bomb assembled with this fuze extension is released from an aircraft, the arming wire is withdrawn from the fuze and the arming vane rotates, arming the fuze. On impact, the fuze initiates the burster of the extension and, in turn, the explosive charge of the bomb. The bomb explodes above ground providing an increased range of blast and fragmentation delivery.

c. Application. Extension, Fuze, Bomb: M1A1 (M1E1) is used with Fuze, Bomb, Nose: M904E2, and requires Adapter-Booster, Bomb: M148 in the bomb nose.

5-16. Bursters

a. Description. A burster is an explosive charge designed to be used in a bomb or a bomb cluster. Bursters are used in some bombs to burst the bomb body to release the filler. They are used in bomb clusters to open the clusters and to allow the bomblets to fall free.

b. Components. The burster consists of a long plastic, paper, or chipboard tube closed at both ends. The burster is filled with TNT, black powder and magnesium, tetryl pellets, or other explosive and nonexplosive material. When the burster is installed in the bomb, it fits into either the burster well or the igniter cavity.

5-17. Burster, Bomb: AN-M12

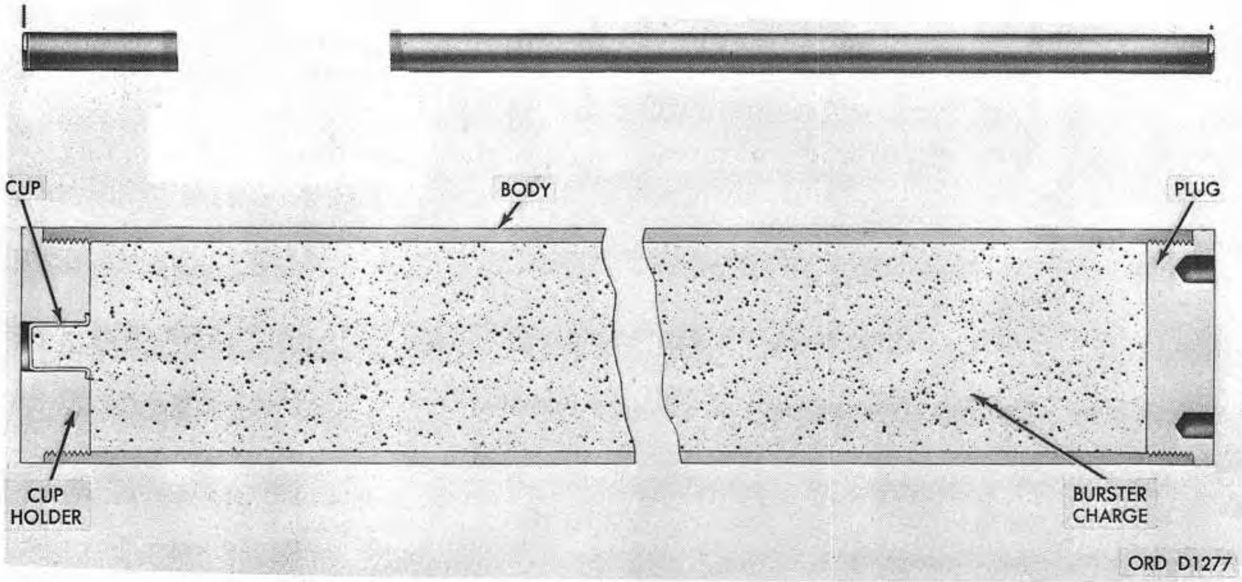

Figure 5-12. Burster, bomb: AN-M12.

Table 5-13. Burster, Bomb: AN-M12

Model	AN-M12
Diameter of Body (in.)	1.3
Length of Assembly (in.)	37.88
Type of Tube	Plastic or Aluminum
Explosive Filler	Black Powder and Magnesium
Weight (grams)	435.0

Burster AN-M12 (fig. 5-12 and table 5-13) is essentially a cylindrical plastic or aluminum body filled with an explosive charge consisting of 435 grams of a mixture of oil-coated magnesium and black powder. One end of the body is closed by a metal or plastic plug; the other end, by a plug assembly which consists of a thin-walled metal cup inserted in a steel cup holder. The end of the cup holder is hexagonal and forms a shoulder by which the burster is held in position in the bomb. Burster AN-M12 is used in incendiary bomb AN-M47A3.

5-18. Burster, Bomb: AN-M13

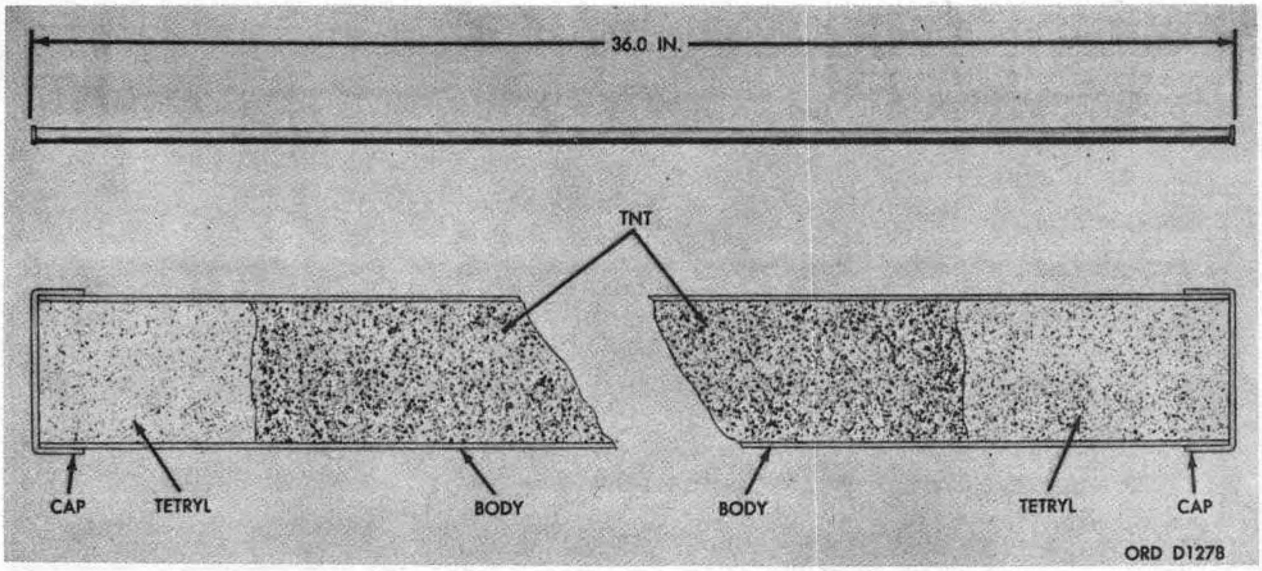

Figure 5-13. Burster, bomb: AN-M13.

Table 5-14. Burster, Bomb: AN-M13

Model	AN-M13
Diameter of Body (in.)	0.45
Length of Assembly (in.)	36.0
Type of Tube	Plastic
Explosive Filler	TNT and Tetryl pellets
Weight (grams)	60-70

Burster AN-M13 (fig. 5-13 and table 5-14) 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 tetryl pellet at each end. This burster is used with igniter AN-M9 in incendiary bomb AN-M47A4.

5-19. Burster, Bomb: AN-M18

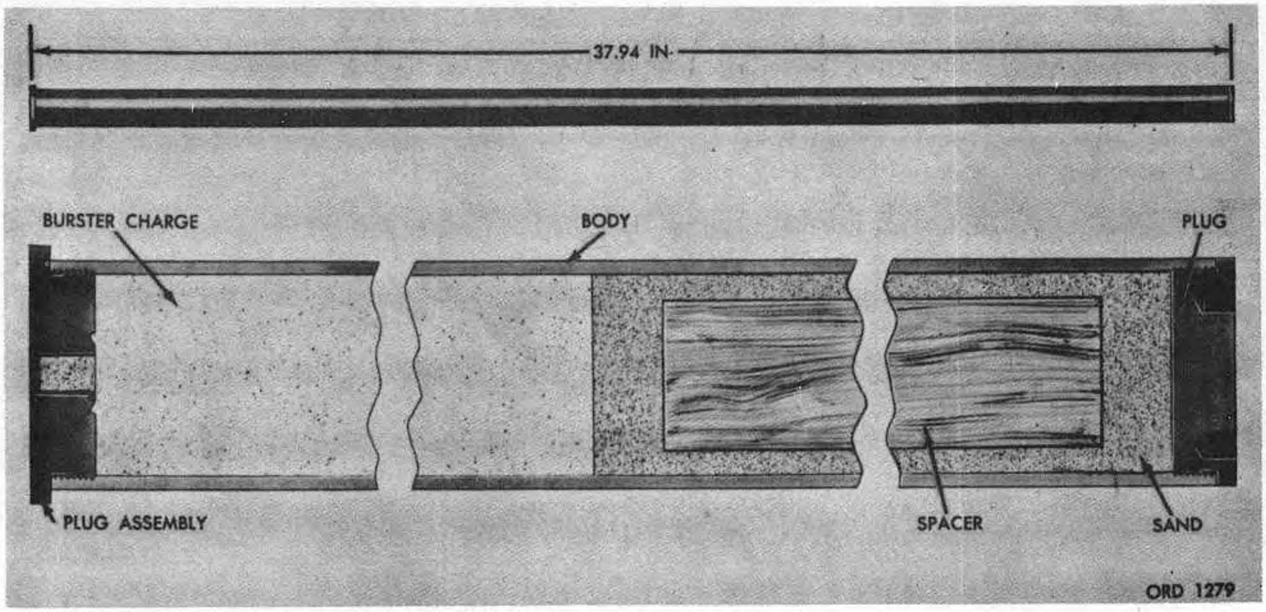

Figure 5-14. Burster, bomb: AN-M18.

Table 5-15. Burster, Bomb: AN-M18

Model	AN-M18
Diameter of Body (in.)	1.13
Length of Assembly (in.)	37.94
Type of Tube	Plastic
Explosive Filler	Black Powder
Weight (grams)	250.0

Burster AN-M18 (fig. 5-14 and table 5-15) is essentially a cylindrical plastic body filled with an explosive filler, consisting of 250 grams of black powder. One end of the body is closed by a metal or plastic plug; the other end, by a plug assembly which consists of a thin-walled metal cup inserted in a metal cup holder. The end of the cup holder is hexagonal and forms a shoulder by which the burster is held in position in the bomb. Burster M18 is used in smoke bombs AN-M47A3 and AN-M47A4 when these bombs are filled with WP.

5-20. Burster, Bomb: AN-M20

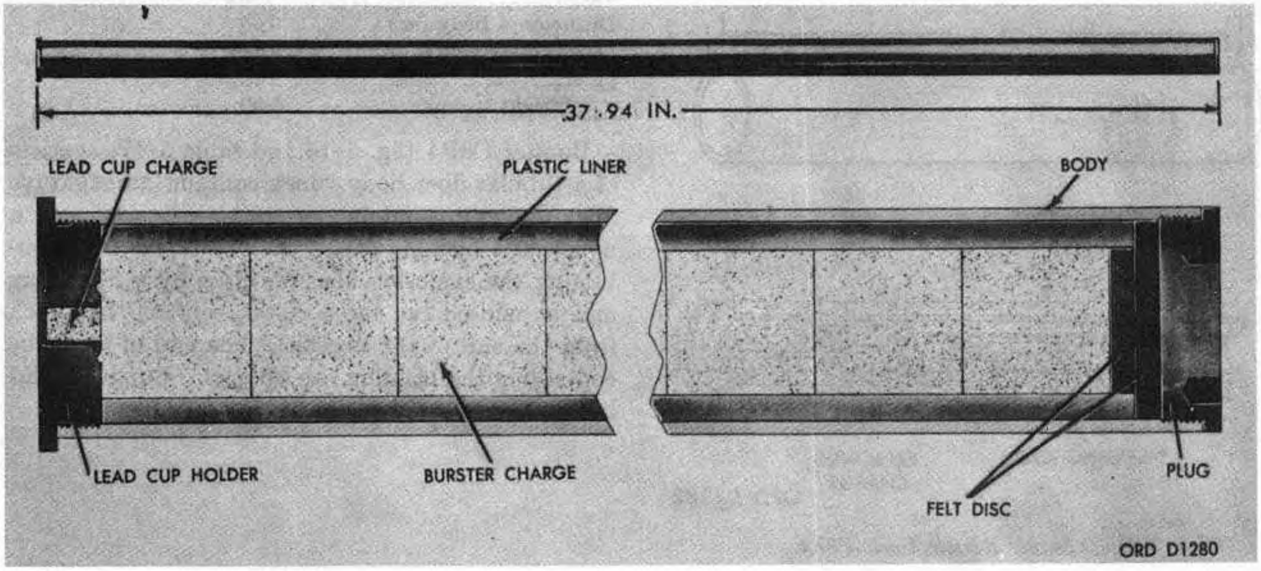

Figure 5-15. Burster, bomb: AN-M20.

Table 5-16. Burster, Bomb: AN-M20

Model	AN-M20
Diameter of Body (in.)	1.13
Length of Assembly (in.)	37.94
Type of Tube	Paper
Explosive Filler	Tetryl pellets
Weight (grams)	250.0

Burster AN-M20 (fig. 5-15 and table 5-16) is essentially a cylindrical paper body filled with 242 grams of tetryl. One end of the body is closed by a metal or plastic plug; the other end, by a plug assembly which consists of a thin-walled metal cup containing a small tetryl priming charge and a round metal cup holder. The end of the cup holder is hexagonal and forms a shoulder by which the burster is held in position in a bomb. Burster AN-M20 is used in smoke bomb AN-M47A3 and AN-M47A4 when the bomb is filled with PWP.

5-21. Burster, Bomb: C8R1

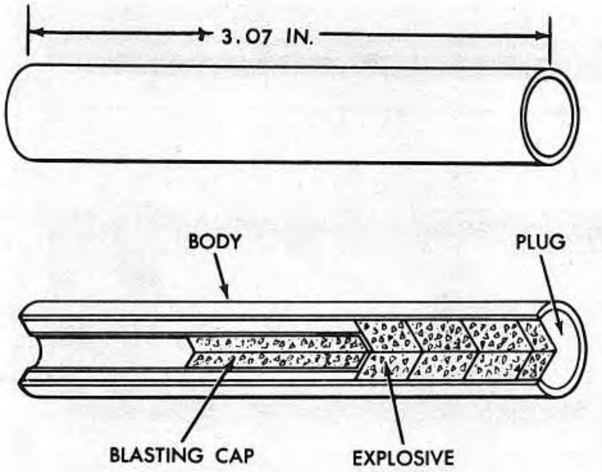

Figure 5-16. Burster, bomb: C8R1.

Table 5-17. Burster Bomb: C8R1

Model	C8R1
Diameter of Body (in.)	0.47
Length of Assembly (in.)	3.07
Filler	Tetryl
Weight (grams)	2.50

Burster C8R1 (fig. 5-16 and table 5-17) consists of a tubular fiber body which contains an explosive filler of approximately 2½ grams of tetryl and a nonelectric blasting cap. The end of the tube containing the explosive filler is closed by a fiber plug and is painted red for a distance of one-half inch from the end of the burster. The end of the tube containing the blasting cap is open. Burster C8R1 is a component of igniters M15 and M16.

5-22. Burster, Bomb: M31

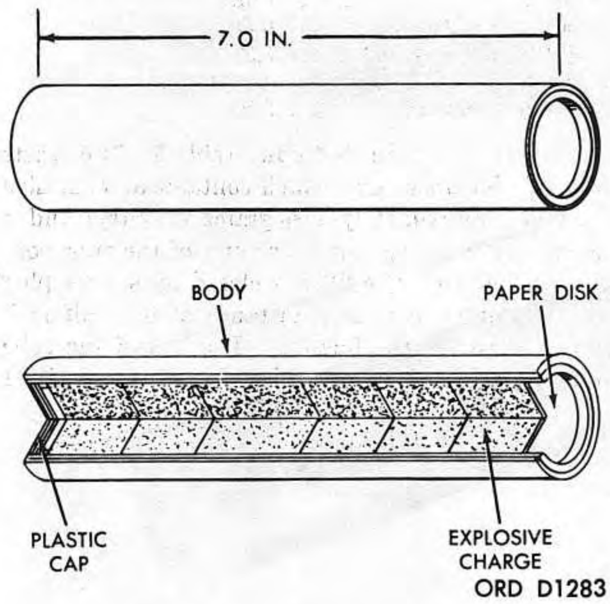

Figure 5-17. Burster, bomb: M31.

Table 5-18. Burster, Bomb: M31

Model	M31
Diameter of Body (in.)	1.44
Length of Assembly (in.)	7.0
Type of Tube	Fiber
Explosive Charge	Tetryl
Weight (grams)	250.0

Burster M31 (fig. 5-17 and table 5-18) is essentially a cylindrical fiber body filled with an explosive charge consisting of 250 grams of tetryl. One end of the body is closed by a plastic cap; the other end, by a paper disc. Burster M31 is an integral part of nonpersistent gas bombs M125 and M125A1, and it is installed in the bombs during manufacture.

5-23. Burster, Bomb: M32

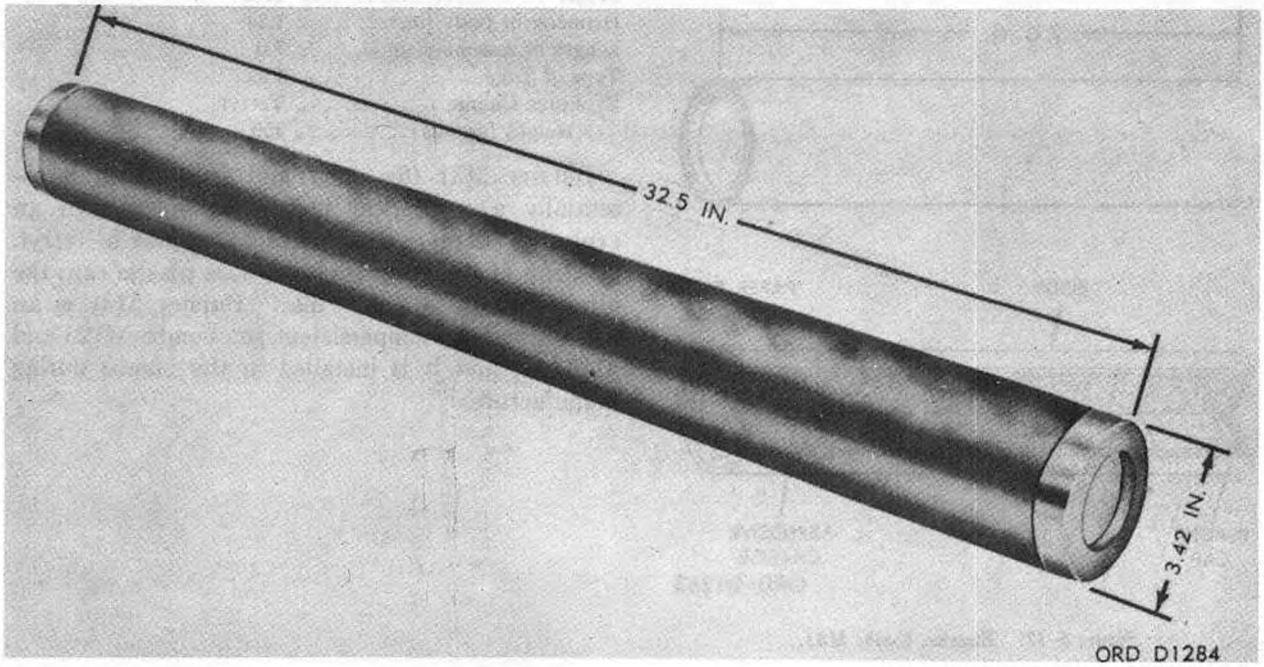

Figure 5-18. Burster, bomb: M32.

Table 5-19. Burster, Bomb: M32

Model	M32
Diameter of Body (in.)	3.42
Length of Assembly (in.)	32.5
Type of Tube	Fiber
Explosive Filler	Composition B
Weight (lb)	15.0

Burster M32 (fig. 5-18 and table 5-19) consists of an impregnated moisture-vaporproof fiber cylinder with metallic end caps. Shock absorbent material is cemented to the metal ends. The explosive filler is installed in the burster when the complete round is assembled. Burster M32 is designed for use with 750-pound nonpersistent gas bomb MC-1. It is used to burst the body and disperse the filler.

5-24. Igniters

An igniter is an explosive charge for setting fire to the filler of incendiary and fire bombs. Igniters vary considerably in their shape and method of operation.

5-25. Igniter, Bomb: AN-M9

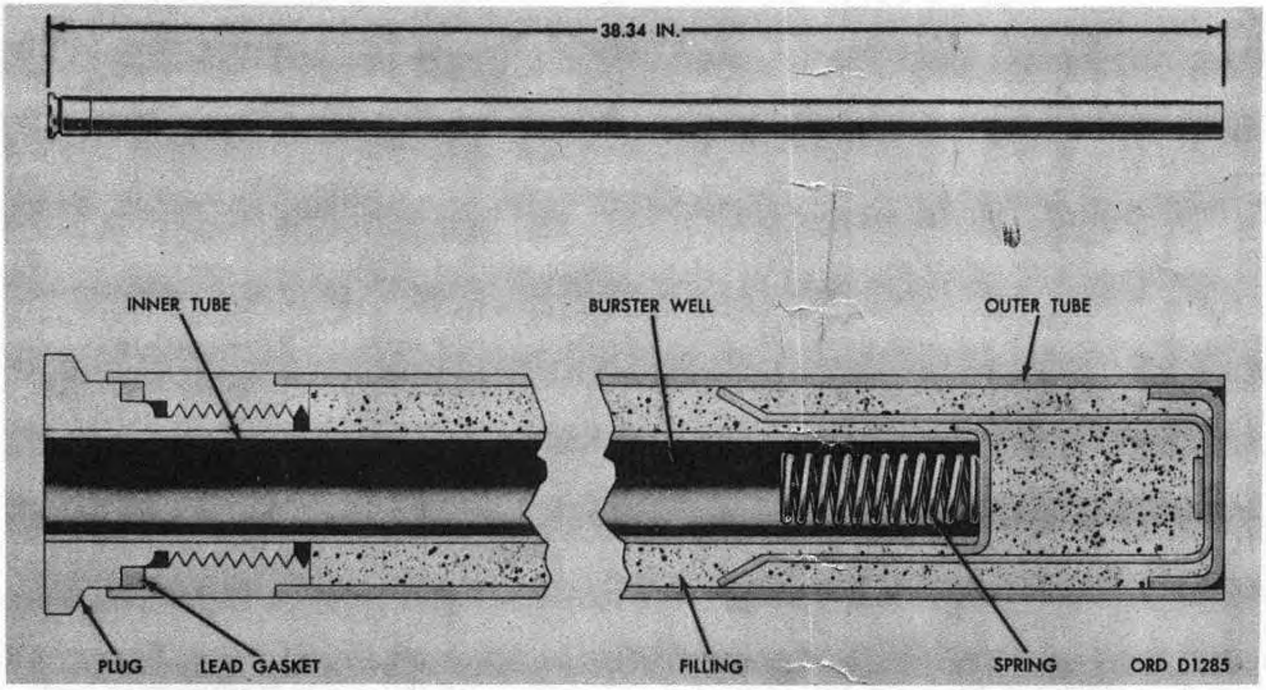

Figure 5-19. Igniter, bomb: AN-M9.

Table 5-20. Igniter, Bomb: AN-M9

Model	AN-M9
Outside Diameter (in.)	1.25
Inside Diameter (in.)	.88
Length (in.)	38.34
Filler	WP or Na
Weight (lb)	1.6

Igniter AN-M9 (fig. 5-19 and table 5-20) 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 approximately 1.25 inches shorter than the outer tube, contains a small coil spring for snubbing inserted burster M13.

5-26. Igniter, Bomb: WP or Na, M15

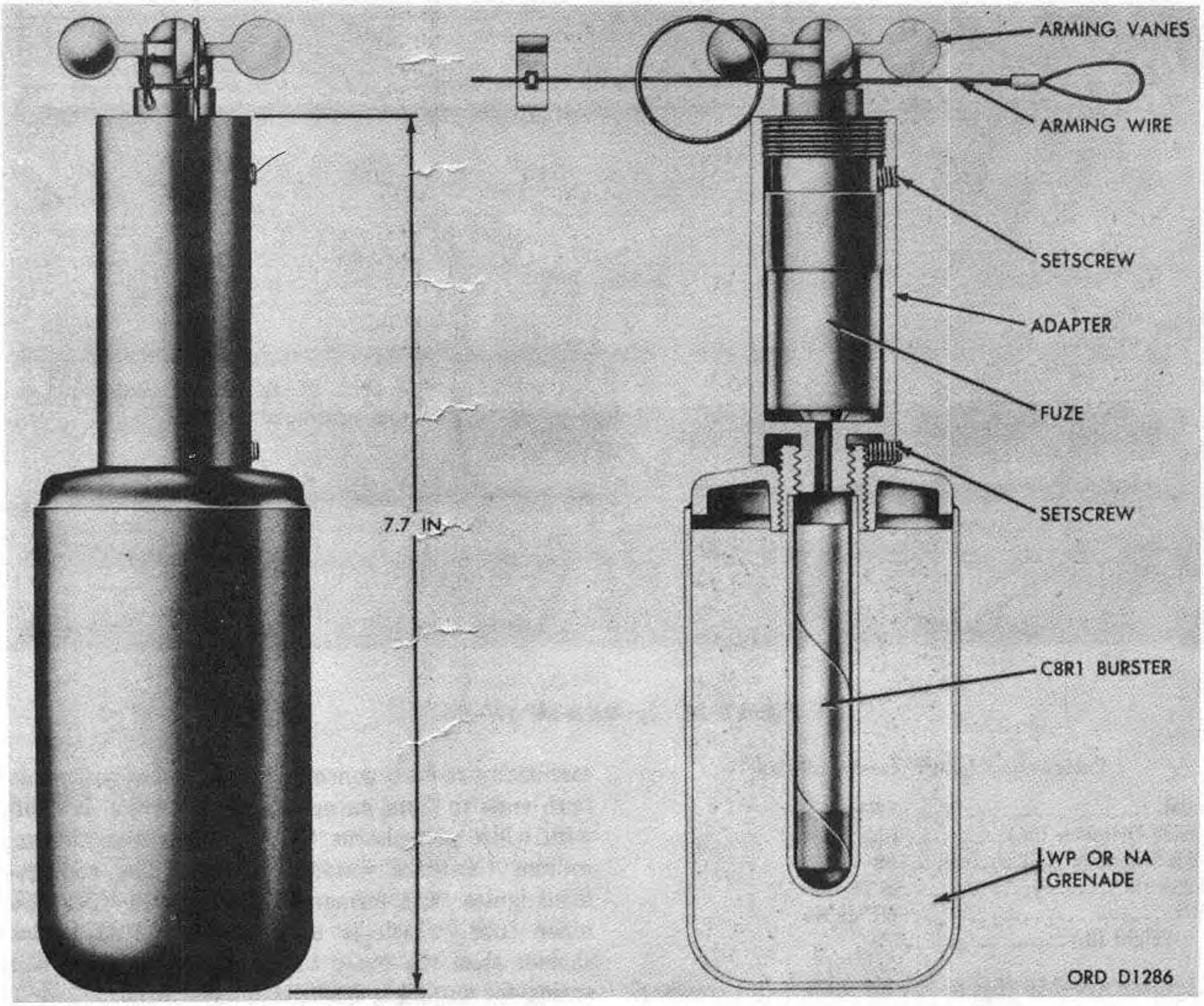

Figure 5-20. Igniter, bomb: WP or Na, M15.

Table 5-21. Igniter, Bomb: WP or Na, M15

Model	M15
Length of Assembly (in.)	7.7
Diameter of Body (in.)	2.38
Weight of Assembly (lb)	2.98
Filler Weight (lb):	
WP	0.9
Na	0.5

a. Description. Igniter M15 (fig. 5-20 and table 5-21) is attached to a jettison-type aircraft fuel tank to adapt the tank for use as a fire bomb. This igniter consists of an igniter body, filler (WP or Na grenade), adapter, burster, and fuze.

(1) *Igniter body.* The igniter body is an 18-gauge steel cylinder approximately 2.38 inches in diameter and 4.50 inches long. A burster well in the center of the body receives the burster and provides a seat for the adapter.

(2) *Filler.* The body of the igniter is filled with 15 ounces of white phosphorous (WP) for land bombing or with 8 ounces of sodium (Na) for water bombing.

(3) *Adapter.* The adapter is a metal cylinder with internal threads at one end and an

externally-threaded fitting at the other end. The internal threads receive the fuze, and the externally-threaded fitting screws into the burster well in the igniter body. A setscrew is located in the top of the adapter; a second setscrew is located in the bottom of the adapter. The bottom of adapter is closed by a cork stopper when the igniter is shipped.

(4) *Burster.* Burster C8R1 is a component of igniter M15.

(5) *Fuze.* Fuze M157 is a component of igniter M15.

b. Functioning. When a bomb assembled with this igniter is released from an aircraft, the arming wire is withdrawn from the fuze and the arming vane rotates, arming the fuze. On impact of the bomb, the fuze ignites, thereby detonating the burster, which breaks the grenade case allowing WP or Na to ignite the incendiary mixture scattered by the bursting tank.

Note. Even if the igniter is released SAFE and the fuze does not function, impact may break open the grenade case and scatter the filler.

***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° on itself.**

5-27. Igniter, Bomb: WP or Na, AN-M16

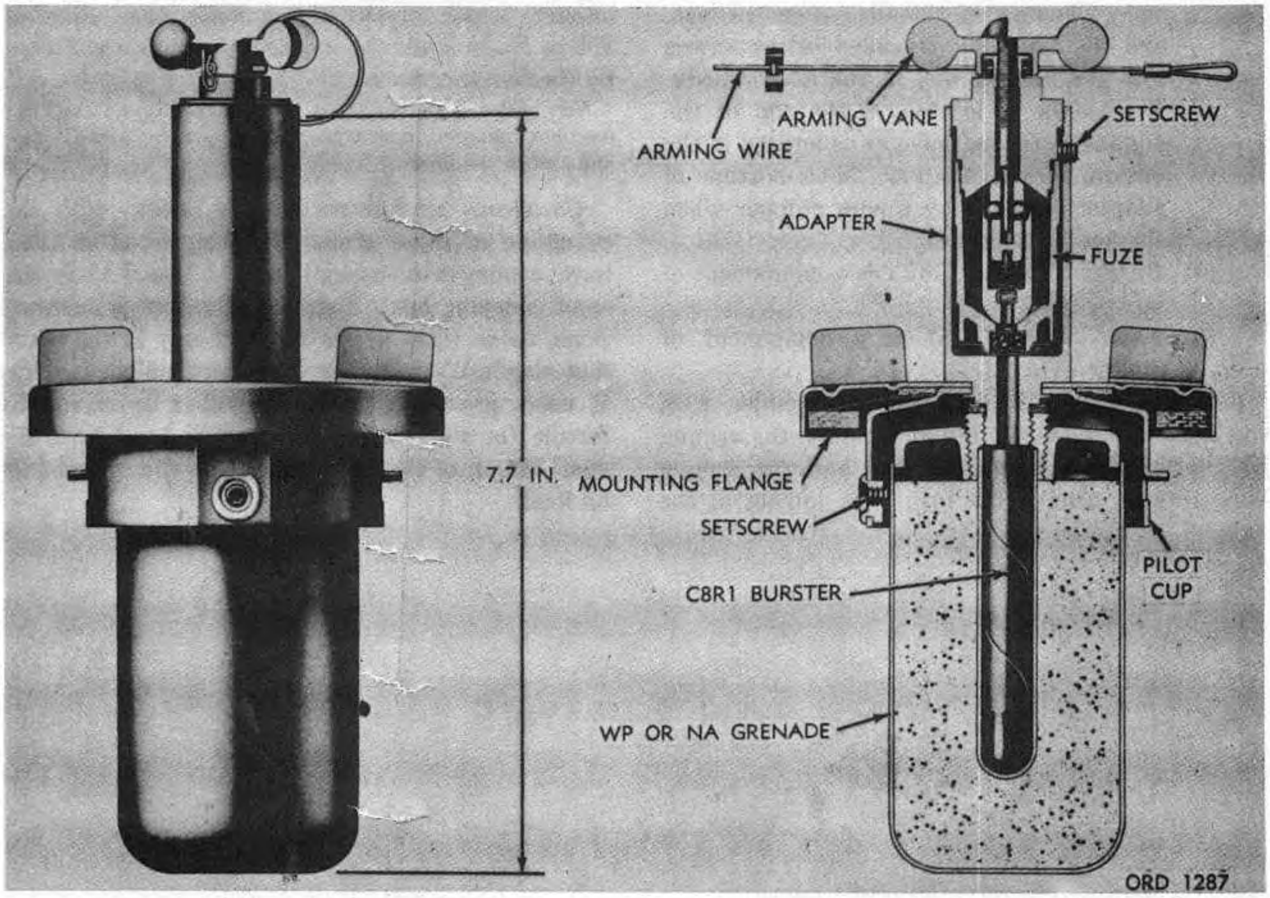

Figure 5-21. Igniter, bomb: WP or Na, AN-M16.

Table 5-22. Igniter, Bomb: WP or Na, AN-M16

Model	M16
Length of Assembly (in.)	7.7
Diameter of Body (in.)	2.38
Weight of Assembly (lb):	
W/WP	3.68
W/Na	3.26
Weight of Filler (lb):	
WP	0.95
Na	0.5

a. Description. Igniter M16 (fig. 5-21 and table 5-22) is an incendiary explosive igniter used in some earlier models of fire bombs. It consists essentially of hand grenade M15 with the Bouchon fuze replaced by impact fuze M157, an anemometer-type, nose-operated fuze. A gasoline tank cap assembly attached to the igniter body is used when assembling the igniter to the bomb. A pilot cup attached to the gasoline-tank cap attaches the assembly to the body of the grenade with set screws. Two protrusions on either side of the pilot cup attach the igniter to the bomb. The fuze seats above burster C8R1 in the grenade burster well. A threaded igniter adapter is installed in the grenade to accommodate the fuze. The adapter is similar in construction to the adapter in the igniter M15. It is provided with a setscrew, which fastens the fuze in the adapter, and an externally-threaded fitting which screws into the burster well in the igniter body. The igniter is filled with white phosphorus (WP) for land bombing and sodium (Na) for water bombing.

b. Functioning. The functioning of igniter M16 is similar to the functioning of igniter M15. 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 which, in turn, breaks the grenade body.

5-28. Igniter, Bomb: WP, M23 and AN-M23A1

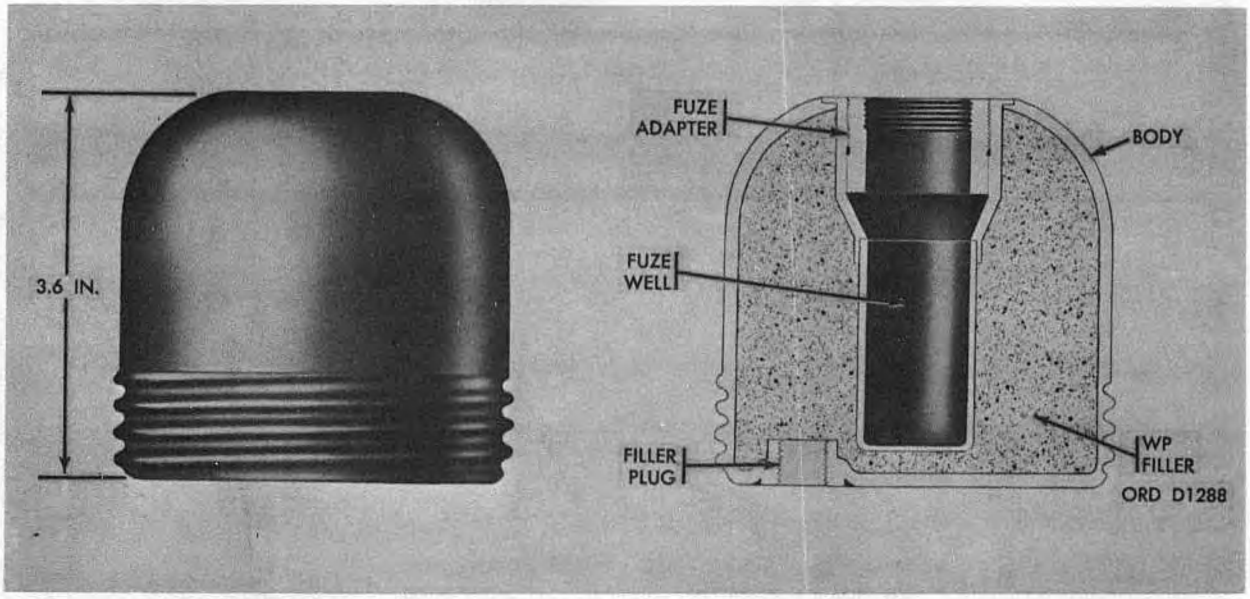

Figure 5-22. Igniter, bomb: WP, M23.

Table 5-23. Igniter, Bomb: WP, M23 and AN-M23A1

Model	M23
Length of Assembly (in.)	3.6
Diameter of Body (in.)	3.85
Weight of Assembly (lb)	3.25
Filler Weight (lb):	
WP	1.25

a. Description. Igniter M23 (fig. 5-22 and table 5-23) is used with fire bomb M116A1 and M116A2. It is cylindrical in shape, rounded at one end and externally threaded at the other. A fuze well is located in the rounded end of the igniter. A fuze adapter, threaded internally to receive bomb fuze igniter M173, is threaded externally for attachment to the igniter. The igniter body is filled with white phosphorus (WP) and a filler plug is inserted in the filler hole when the igniter is loaded.

b. Functioning. When the fire bomb strikes the target, the fuze functions, exploding the booster which bursts the igniter. When the igniter bursts, the WP filler scatters, igniting spontaneously upon exposure to the air. The burning WP in turn ignites the scattered filler of the bomb.

c. Differences Between Igniters M23 and AN-M23A1. Igniter AN-M23A1 is identical to igniter M23 except that the M23 has a fuse adapter. The fuze well of igniter AN-M23A1 is threaded to receive bomb fuze AN-M173A1. The well of igniter M23 is threaded to receive bomb fuze M173.

5-29. Signal Cartridges

a. General. Signal cartridges are used for spotting purposes during practice missions. A signal cartridge consists of a small charge which produces a visible signal when initiated by fuze action.

b. Safety Precautions. Rough handling may cause immediate functioning of the signal or may damage it so that it will not function properly. Do not unpack signals unless they are to be used immediately. If unpacked and not used, return signals to original packing. In order for the signal to function properly, the primer must be flush with or slightly below the base of the signal. Swollen or deformed signals are not to be used. Defective signals will be turned over to authorized munitions personnel. Under no circumstances should a signal case be opened or tampered with.

5-30. Signal, Practice Bomb: Mk4 Mods 3 and 4

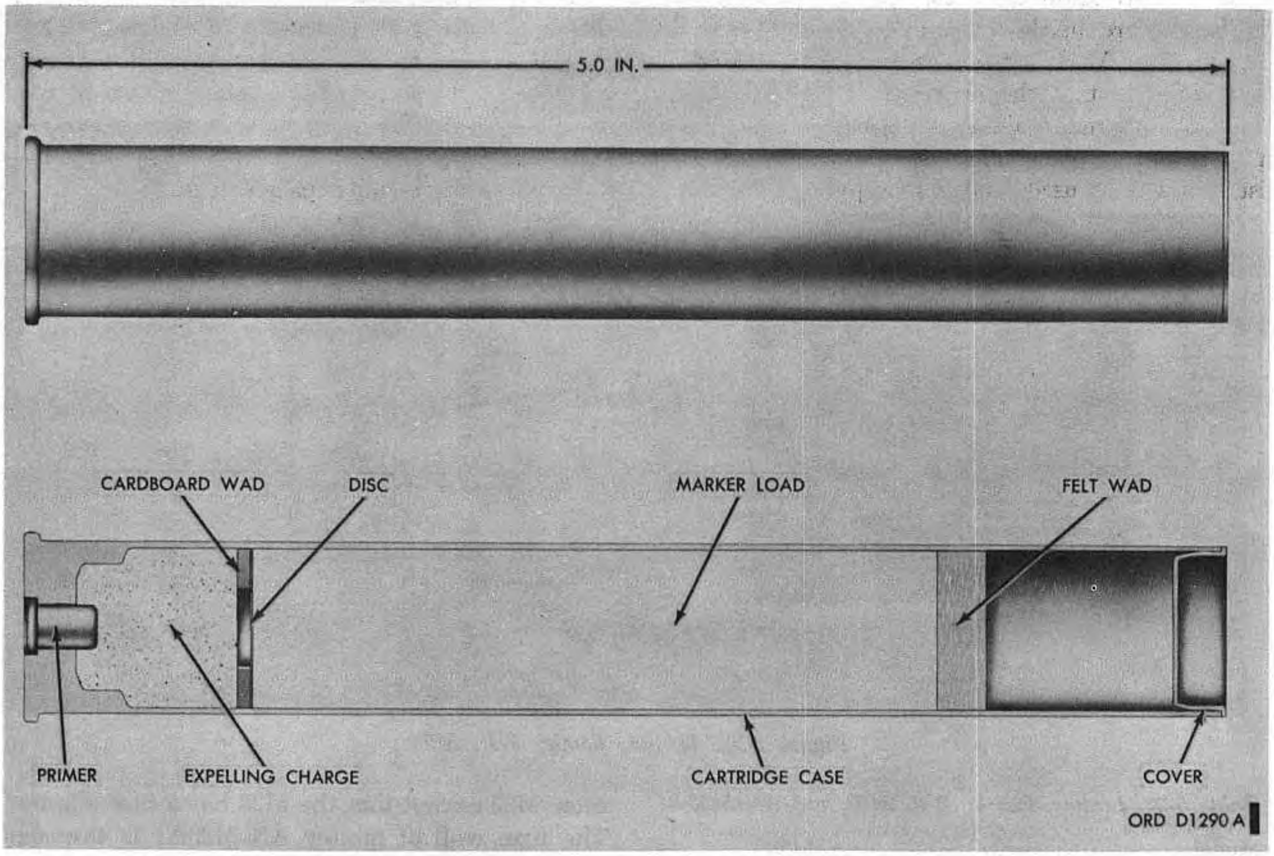

Figure 5-23. Signal, practice bomb: Mk4 Mods 3 and 4.

Table 5-24. Signal, Practice Bomb: Mk4 Mods 3 and 4

Mark	4	4
Mod	3	4
Length of Assembly (in.)	5.0	5.0
Diameter of Body (in.)	0.85	0.85
Weight of Assembly (lb)	0.16	0.16
Case Material	Aluminum	Aluminum
Expelling Charge	Smokeless Powder.	Smokeless Powder.
Marker Load	Stabilized Red Phosphorous.	Zinc Oxide

a. Description. Practice bomb signals Mk4 Mods 3 and 4 (fig. 5-23 and table 5-24) are essentially 10-gauge shotgun shells. 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 cemented to the cover.

b. Use. The signals are used in either the miniature or the larger practice bombs. However, installed in the miniature practice bombs, the signals do not consistently produce a visible signal when dropped from an altitude of 10,000 feet or higher. Released from that height, the bomb enters the water or earth so quickly that the signal frequently does not have time to function.

c. 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 of bombing accuracy.

d. Differences Between Mods. Signal Mk4 Mod 0 was the first of this type developed. Mods 1 and 2 were procured later 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 are markedly inferior to the Mod 0. Signal MK4 Mod 3 is similar to the MK4 Mod 0 but differs in that the cartridge case of the MK4 Mod 3 is extruded aluminum instead of paper; a primer mixture with improved storage characteristics has been used, and a new pyrotechnic load (which produces about the same flash, but with a superior smoke puff) has been incorporated. The MK4 Mod 4 signal is similar to the MK4 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.

5-31, Signal, Practice Bomb: MK5 Mod 0

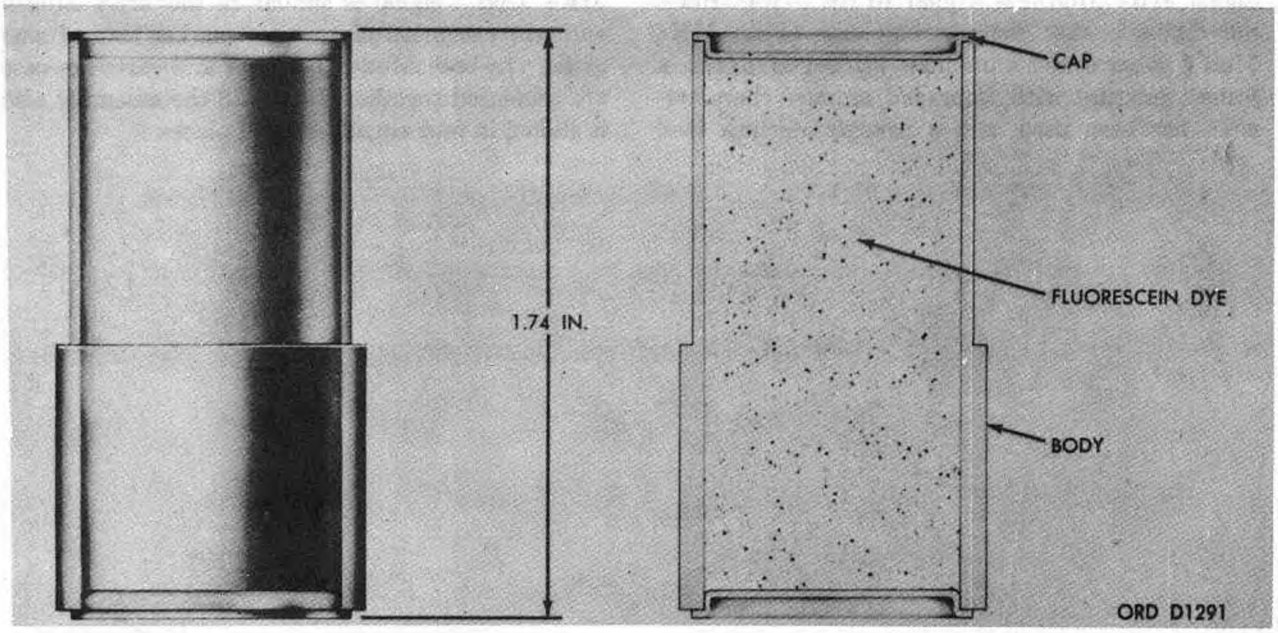

Figure 5-24. Signal, practice bomb: MK5 Mod 0.

Table 5-25. Signal, Practice Bomb: MK5 Mod 0

Mark	5
Mod	0
Length of Assembly (in.)	1.74
Diameter of Body (in.)	0.93
Weight (oz)	0.5
Cylinder Material	Plastic
Dye Filler	Flourescein
Dye Color:	
Dry	Brick Red
Dissolved in Water	Bright Green

a. Description. Practice bomb signal MK5 Mod 0 (fig. 5-24 and table 5-25) is approximately the size of a 10-gauge shotgun shell. A shoulder, which increases the diameter of one end, serves to locate the signal in the bomb. The signal consists of a plastic cylinder containing 10 grams of fluorescein dye, a highly-soluble salt, brick red in color, which turns bright green when dissolved in water.

b. Use. The signal, for use in dive-bombing practice, can be used in any miniature practice tice bomb in which signal MK4 can be used. It is dropped only on water targets during daylight. When a wind is blowing, the smoke from the MK4 signal often blows away before the pilot can get into position to view the results of his attack. The slick from the MK5 signal can be seen from an altitude of 15,000 feet.

c. Functioning. Upon impact, water enters the nose of the bomb, breaks the weak ends of the plastic container, and forces the dye out through the tail of the bomb.

5-32. Signal, Practice Bomb: MK6 Mod 0

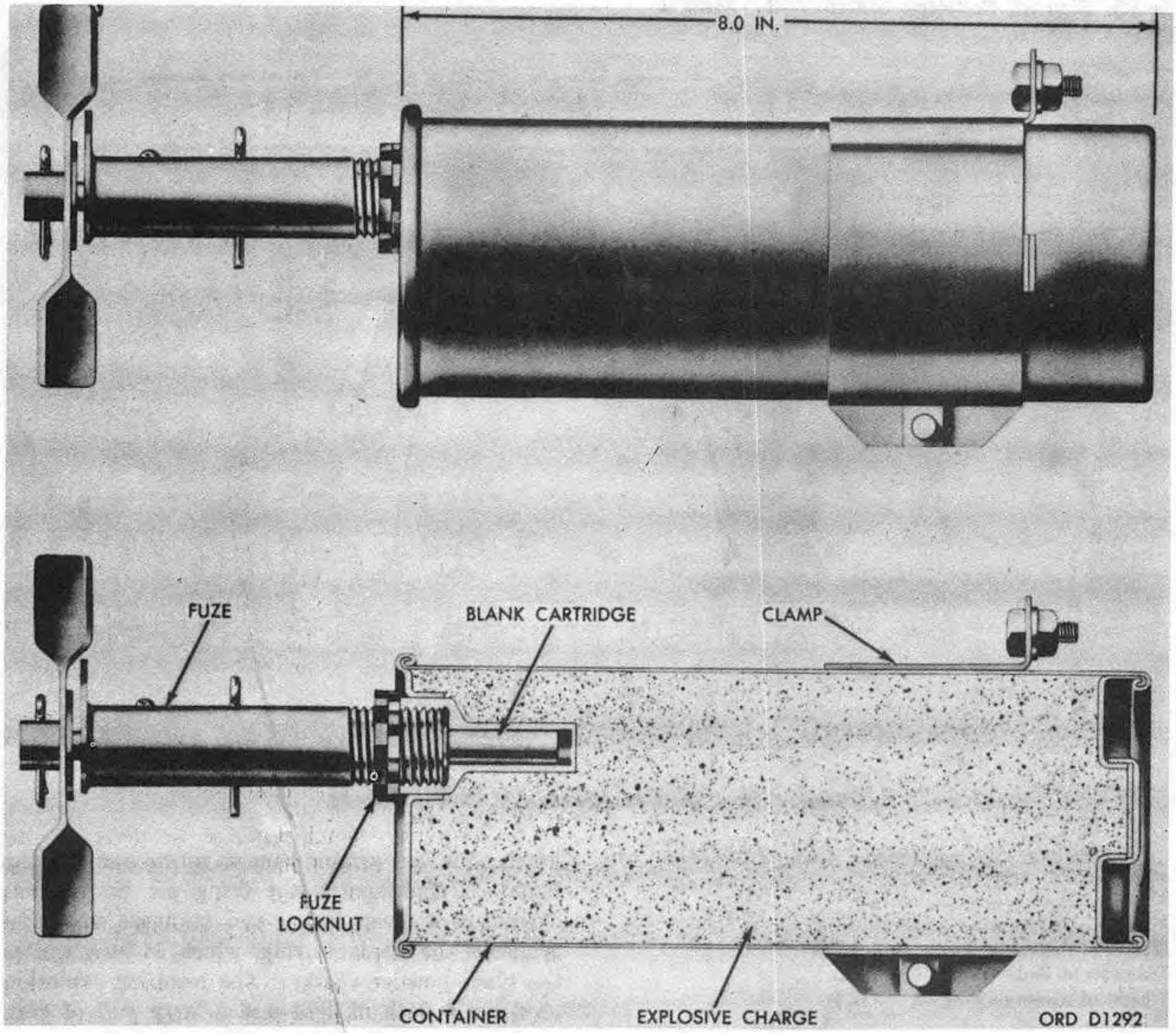

Figure 5-25. Signal, practice bomb, MK6 Mod 0 w/fuze.

Table 5-26. Signal, Practice Bomb: MK6 Mod 0

Mark	6
Mod	0
Length of Assembly (in.)	8.0
Diameter of Body (in.)	3.0
Weight of Assembled Signal (lb).	3.7
Container Material	Steel
Explosive Charge	Black Powder
Weight (lb)	2.0

a. Description. Practice bomb signal MK6 Mod 0 (fig. 5-25 and table 5-26) consists of a can of black powder fitted with inert fuze AN-MK247 Mod 0 and a blank .38-caliber cartridge used as a detonator. Signal MK6 is used with practice bombs for observation of bombng accuracy.

b. Functioning. Upon release of the bomb from the aircraft, the arming wire is withdrawn, permitting the fuze arming vane to rotate and arm the signal. Upon impact, 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 of puff gray smoke.

c. Differences Between MK6 and MK7. Refer to paragraph 5-33.

5-33. Signal, Practice Bomb: MK7 Mod 0

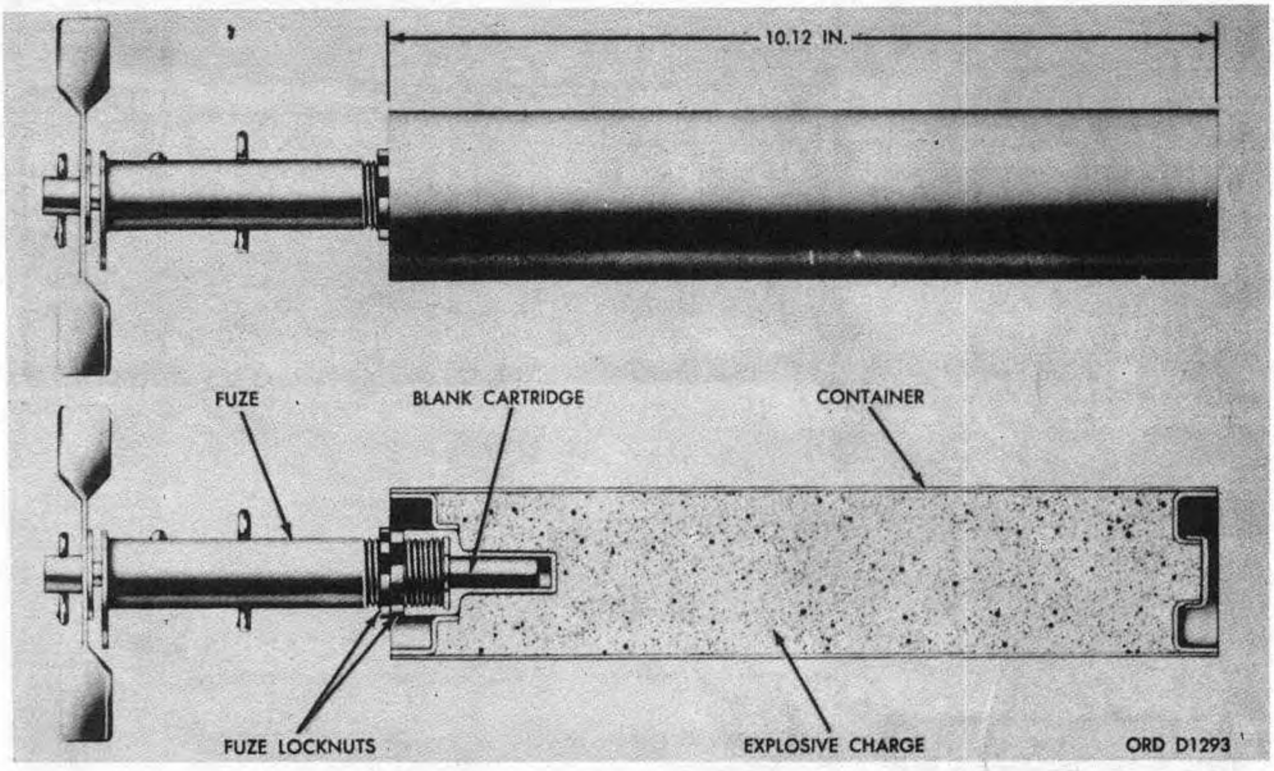

Figure 5-26. Signal, practice bomb: MK7 Mod 0 w/fuze.

Table 5-27. Signal, Practice Bomb: MK7 Mod 0

Mark	7
Mod	0
Length of Assembly (in.)	10.12
Diameter of Body (in.)	2.0
Weight of Assembled Signal (lb).	2.5
Container Material	Steel
Explosive Charge	Black Powder
Weight (lb)	1.0

a. Description. Practice bomb signal MK7 Mod 0 (fig. 5-26 and table 5-27) consists of a can of black powder fitted with inert fuze AN-MK247 Mod 0 and a blank .38-caliber cartridge which is used as a detonator. Signal MK7 is used with practice bombs for observation of bombing accuracy.

b. Functioning. Upon release of the bomb from the aircraft, the arming wire is withdrawn, permitting the fuze arming vane to rotate and arm the signal. Upon impact, 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.

c. Differences. The MK7 is generally the same as the MK6 except that the fuze is mounted off-center in the MK6 and its black-powder filling weighs about 1 pound more.

5-34. Spotting Charges

Spotting charges function in the same manner and for the same purpose as the signal cartridges; however, they consist of relatively larger amounts of filler.

5-35. Charge, Spotting: M39A1

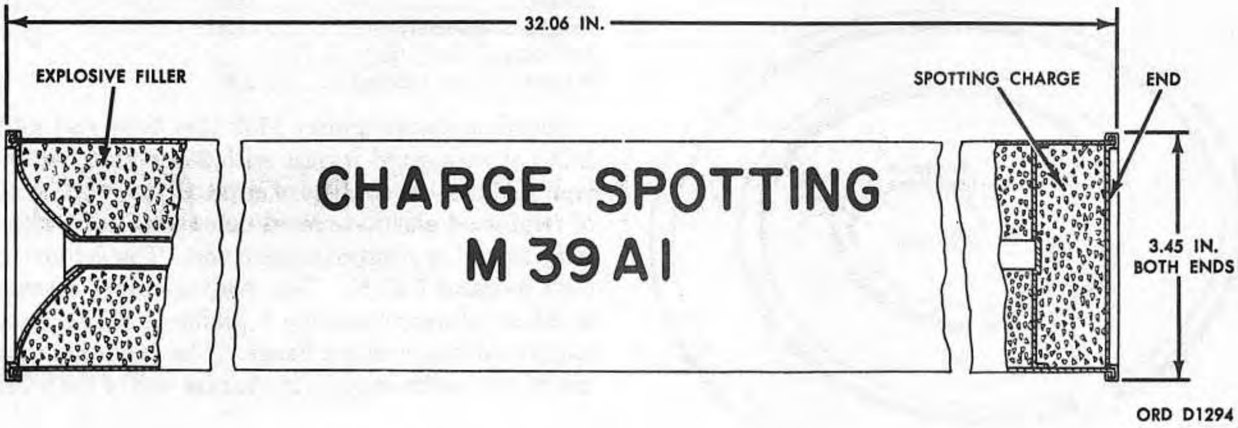

Figure 5-27. Charge, spotting: M39A1.

Table 5-28. Charge, Spotting: M39A1

Model	M39A1
Length of Assembly (in.)	32.06
Diameter of Body (in.)	3.45
Weight of Filler (lb)	10.2

The M39A1 (fig. 5-27 and table 5-28) is authorized for use with the 250-pound practice bomb, M124. It contains a charge of approximately 10.20 pounds of 80-percent black powder and 20-percent flaked aluminum powder in a cylindrical terne-plate casing. A cover assembly consists of a funnel-shaped front cover (closing the forward end of the casing), a tube extending nearly through the center of the charge, and a tube guide which supports the tube. The container is closed at the rear by a felt pad and rear cover.

5-36. Spotting Charge Igniters

Spotting charge igniters act as relays between the fuze and spotting charge. They consist of a detonating-cord assembly containing high-explosive PETN. Fuze action detonates the PETN which, in turn, initiates the spotting charge.

5-37. Igniter, Spotting Charge, Bomb: M32

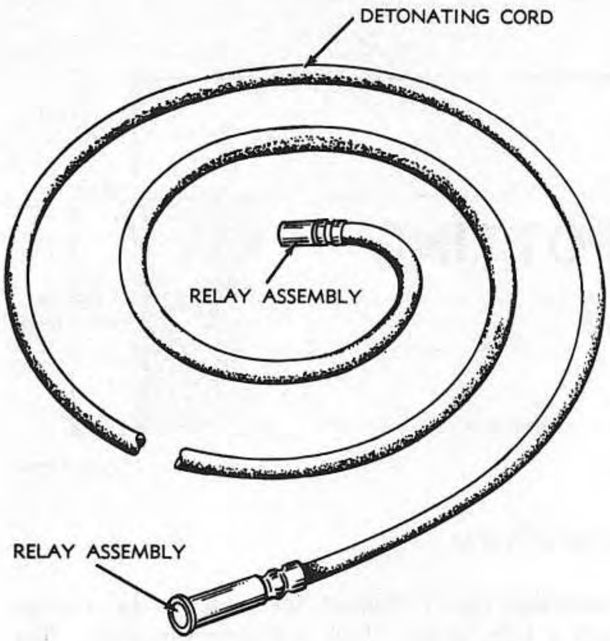

Figure 5-28. Igniter, spotting charge, bomb: M32 (Approx. 59.2 in. long).

Table 5-29. Igniter, Spotting Charge: Bomb: M32

Model	M32
Length of Assembly (in.)	58.0
Diameter of Body (in.)	
Weight of Filler (grains)	6.0

Spotting charge igniter M32 (fig. 5-28 and table 5-29) is authorized for use with 250-pound practice bomb, M124. It consists of approximately 58 inches of reinforced plastic-covered detonating cord with a relay assembly crimped to each end. The detonating cord contains PETN. The relay assembly contains a charge of approximately 6 grains of PETN in an aluminum sleeve with a flange. The flange holds the end of the igniter in place in the fuze well of the bomb.

Section II. NON-EXPLOSIVE COMPONENTS

5-38. Arming-Wire Assemblies

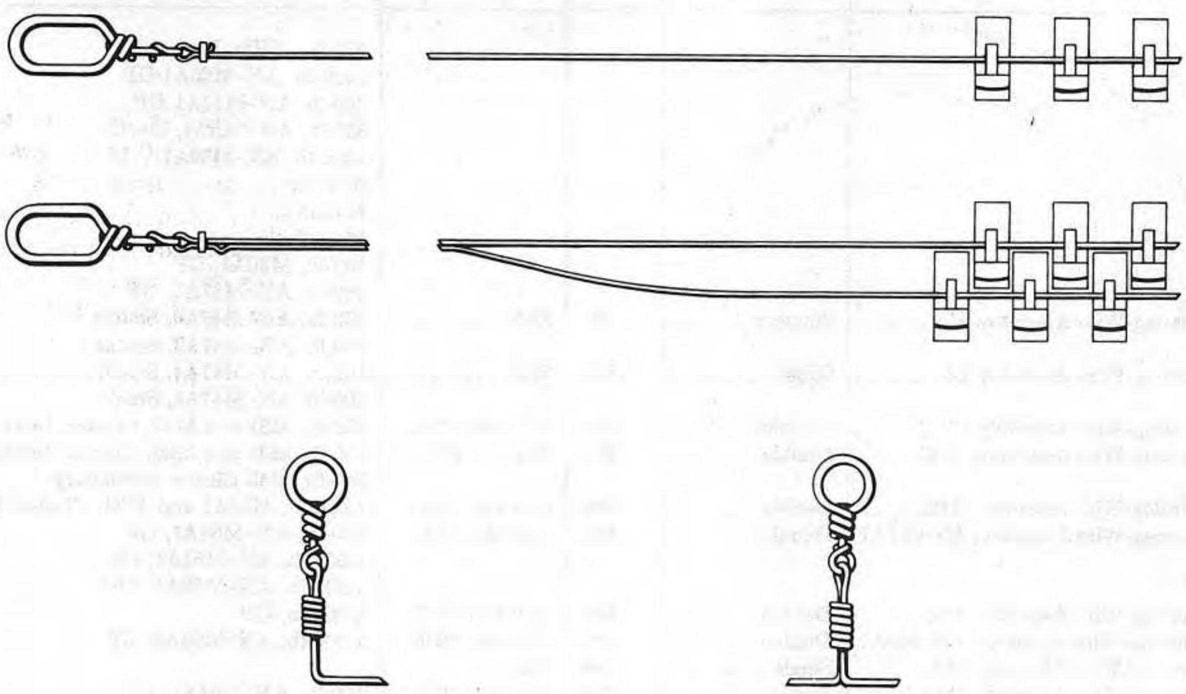

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Figure 5-29. Arming-wire assemblies, typical.

Table 5-30. Arming-Wire Assemblies, Typical

Nomenclature	Type	Diameter of wire (in.)	Branch length (in.)	Used on
Arming-Wire Assembly M1 (PC MK82-3-234BA).	Double	.064	24.0 and 36.0	100-lb GP
Arming-Wire Assembly M1 (PC MK82-3-234U).	Double	.064	22.0 and 30.0	100-lb GP
Arming-Wire Assembly M1 (PC MK82-3-234WA).	Double	.064	24.0 and 33.0	100-lb GP
Arming-Wire Assembly M1A1				
Arming-Wire Assembly AN-M1A2.	Double	.064	27.0 and 33.0	100-lb GP AN-M30A1, GP 220-lb, AN-M88, Frag 260-lb, AN-M81, Frag 250-lb, AN-M57A1, GP
Arming-Wire Assembly M3	Single	.064	26.0	
Arming-Wire Assembly AN-M6A2.	Single	.064	57.0	500-lb, MK82 Mod 2 250-lb, MK81 Mod 1 1000-lb, MK83 Mod 3 2000-lb, MK84 Mod 1 220-lb, AN-M88, Frag 500-lb, MK82 Mod 2

Table 5-30. Arming-Wire Assemblies, Typical—Continued

Nomenclature	Type	Diameter of wire (in.)	Branch length (in.)	Used on
				250-lb, MK81 Mod 1
				1000-lb, AN-M65A1 GP
				250-lb, AN-M57A1 GP
				350-lb, AN-MK54, Depth
				1000-lb, AN-M59A1
				SAP
				M120A1
				Photoflash
				100-lb, M30A1, GP
				250-lb, AN-M57A1, GP
Arming-Wire Assembly M2	Single	.035	28.0	100-lb, AN-M47A4, Smoke
				100-lb, AN-M47A3, Smoke
Arming-Wire Assembly C5	Single	.035	28.0	100-lb, AN-M47A4, Smoke
				100-lb, AN-M47A3, Smoke
Arming-Wire Assembly C4	Double	.035	42.0 and 42.0	500-lb, M31 and M32, Cluster, Incendiary
Arming-Wire Assembly, M23	Double	.064	60.0 and 60.0	750-lb, M35 and M36, Cluster, Incendiary
				750-lb, M43 Cluster Incendiary
Arming-Wire Assembly, M22	Double	.035	55.0 and 55.0	1,000-lb, M34A1 and M34, Cluster, GB
Arming-Wire Assembly, AN-M7A1	Double	.064	45.0 and 36.5	500-lb, AN-M64A1, GP
				1,000-lb, AN-M65A1, GP
				1,000-lb, AN-M59A1, SAP
Arming-Wire Assembly M8	Double	.064	49.0 and 60.0	2,000-lb, GP
Aeming-Wire Assembly AN-M8A1	Double	.064	57.0 and 60.0	2,000-lb, AN-M66A2, GP
Arming-Wire Assembly M9	Single	.064	54.0	
Arming-Wire Assembly M13	Double	.064	36.0 and 70.0	500-lb, AN-M64A1, GP
				1,000-lb, AN-M165A1, GP
				250-lb, MK81 Mod 1
				500-lb, MK82 Mod 1
Arming-Wire Assembly M14	Double	.064	27.0 and 51.0	100-lb, AN-M30A1 GP
				220-lb, AN-M88 Frag
				250-lb, AN-M57A1 GP
				2260-lb, AN-M81. Frag
Arming-Wire Assembly M16	Double	.064	56.0 and 90.0	2,000-lb, AN-M66A2, GP
				1,000-lb, MK83 Mod 3
				2,000-lb, MK84 Mod 1
Arming-Wire Assembly M19	Single	.064	36.5	250-lb, M124, Practice
Arming-Wire Assembly M31	Single	.064	46.0	M129E1, Leaflet Bombs
Arming-Wire Assembly M52	Double	.064	37.0 and 40.0	750-lb M117, GP
				750-lb MC-1, Gas
Arming-Wire Assembly T12	Double	.064	62.0 and 86.0	3,000-lb, M118, GP
Arming-Wire Assembly MK1 Mod 0	Single	.064	57.0	2,000-lb, AN-M66A2, GP
				1,000-lb, AN-M59 A1 SAP
				100-lb, MB0A16P
				250-lb, AN-M57A1 GP
				500-lb, AN-M64A1 GP
				1,000-lb, AN-M65A1 GP
				250-lb, MK81 Mod 1
				500-lb, MK82 Mod 1
				1,000-lb, MK83, Mod 3
				2,000-lb, MK84 Mod 1
Arming-Wire Assembly MK2 Mod 0	Double	.064	57.0 and 57.0	220-lb, AN-M88 Frag
				260-lb, AN-M81 Frag
Arming-Wire Assembly MK3 Mod 0	Single	.033	57.0	

Table 5-30. Arming-Wire Assemblies, Typical—Continued

Nomenclature	Type	Diameter of wire (in.)	Branch length (in.)	Used on
Arming-Wire Assembly, M17	Double	.064	78 and 78 = 156 in.	750-lb, Fire, M116A1, M116A2
Arming-Wire Assembly, M92	4 Branches	.036	4 Branches 30 = 120 − 10	175-lb, M44 Cluster Incap.
Arming-Wire Assembly, M47	Single used as double by bending	.064	130 and 196	1,000-lb M34A1 and M34 Cluster, GB with M16 Conversion Set.

a. Description. Arming-wire assemblies (fig. 5-29 and table 5-30) usually consist of either one or two strands (branches) of wire attached to a swivel loop. They are used to lock the fuze-arming mechanism in the unarmed position. Fahnestock (safety) 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 from the rack armed, the wire is pulled from the fuze head, which allows the fuze vanes to rotate, arming 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 from vibration; when reused, they must be inspected before each flight. Standard arming-wire assemblies will fit any bomb currently in use. 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 either metal or fiber containers holding 50, 100, or 400 assemblies. Fahnestock (safety) clips are packed with the wires. Some fragmentation bomb clusters are supplied with their own arming-wire assemblies installed.

b. Arming-Wire Assemblies, Bulk Stock. When arming-wire assemblies of the correct size are not available they may be fabricated from bulk supplies of the components. The data necessary for the fabrication of arming-wire assemblies are given in table 5-30. The dimensions indicated are the minimum dimensions to be used when preparing arming-wire assemblies. Excess wire can be cut off when the arming wire is installed. Complete arming-wire assemblies are constructed by one of the two procedures listed below:

(1) *Cross-over configuration.*

(*a*) Cut two lengths of wire sufficiently long for the bomb.

(*b*) With one end of one wire, make a loop around one leg of the rear lug of the bomb. Place ferrule on wire so that a tight loop is formed. Bend ½ inch of the wire back against ferrule.

(*c*) Pass the wire through the smaller eye of the swivel loop assembly so that the latter will move freely on the wire. Place one Fahnestock clip on wire to prevent swivel loop assembly from sliding off.

(*d*) Pass end of wire through forward lug. (This wire is for use with the nose fuze.)

(*e*) With one end of the second wire, make a loop around one leg of the forward lug of the bomb (should be leg of lug opposite to that used on rear lug for the nose fuze wire). Place ferrule on wire so that a tight loop is formed. Bend ½ inch of the wire back against ferrule.

(*f*) Pass the wire through the smaller eye of the swivel loop assembly so that the latter will move freely on the wire. Place one Fahnestock clip on wire to prevent swivel loop assembly from sliding off.

(*g*) Pass end of wire through rear lug. (This wire is for use with the tail fuze.)

(*h*) Remove all kinks and burrs from wires.

Note. Do not use arming wires with twists or kinks.

(2) *Non-cross-over configuration.*

(*a*) Cut the length of wire from the coil.

(*b*) With round-nose pliers or an equivalent tool, form a 3/8-inch open loop in the wire.

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

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

(e) Remove all kinks and burrs from arming wires.

(f) If the arming wire is not for immediate use, place two (Navy) or three (Air Force) safety clips on each end and pack the assembly at full length in a suitable container tagged for identification.

***Caution:* Arming wires should not protrude more than 3 inches nor less than 2 inches (Navy), or more than 4½-inches nor less than 4 inches (Air Force) beyond the fuze or fuzes when the bomb is installed in the rack or shackle.**

***Note.* Do not use arming wires with twists or kinks.**

5-39. Arming-Vane Assemblies

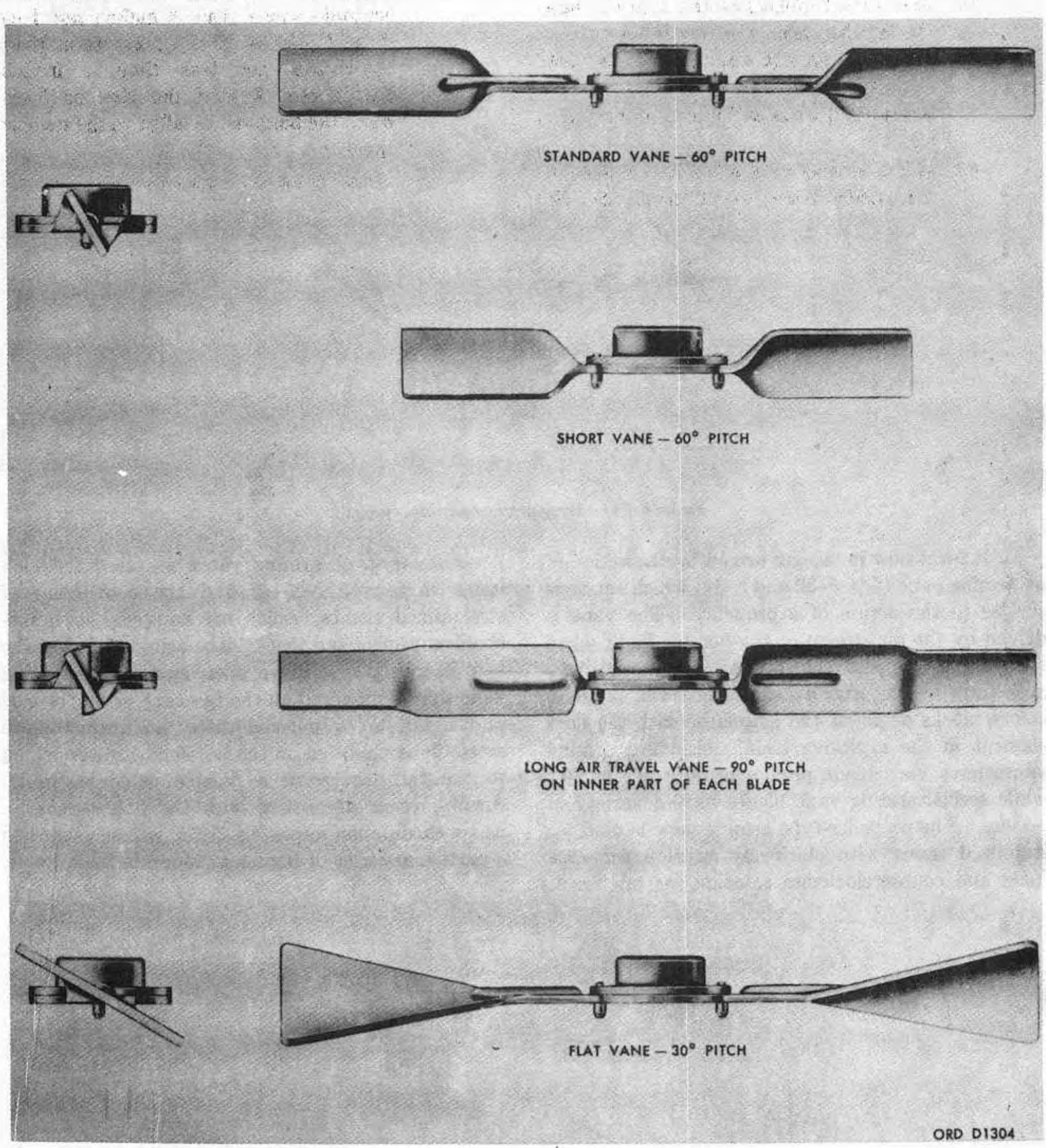


Figure 5-30. Arming-vane assembly, typical.

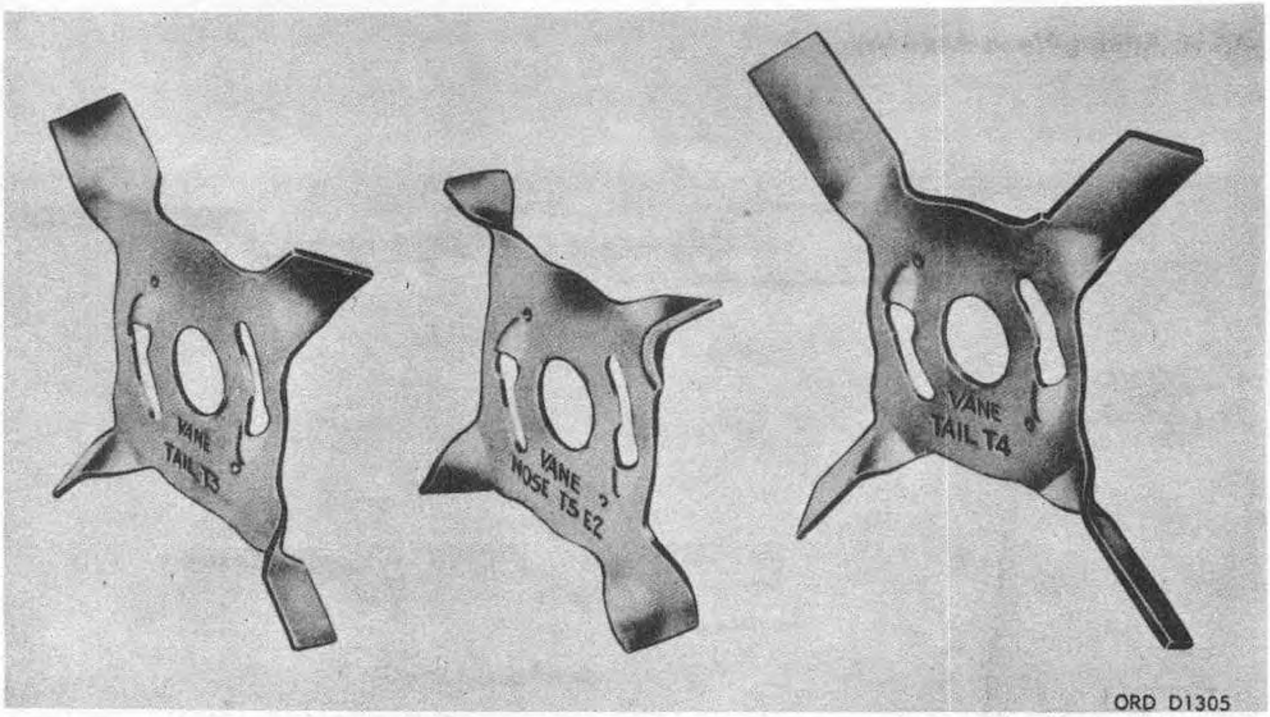


Figure 5-31. Arming-vane assembly, special.

Most fuzes now in use are armed by the action of an arming vane (figs. 5-30 and 5-31) which action is similar to the action of a propeller. The vane is driven by the air stream of the bomb's flight when the bomb is dropped. The arming vane may drive a gear train which, after a definite interval, removes safety blocks or aligns the detonator with the next element in the explosive train. Standard arming vanes have vane blade pitches of 30°, 60°, or 90°, while special arming vane blades have a variety of pitches. The propeller-type arming vane is used for stabilized items with clockwise rotation for nose fuzes and counterclockwise rotation for tail fuzes. Anemometer-type arming vanes are used for such items as fuze AN-M173 and the new series of streamlined bombs, which are equipped with mechanical impact tail fuzes. The arming head of the fuze is equipped with an anemometer-type arming vane that is mounted on the tail cone or on the side of the tail fin. In some cases, an arming drive assembly is mounted on the tail cone and connected to the tail fuze with a flexible cable assembly. Arming vanes are issued with the fuze assembly. At times, different vanes (fig. 5-31) will be used with a particular series of bombs as separate issue items.

5-40. Arming Delay Mechanism

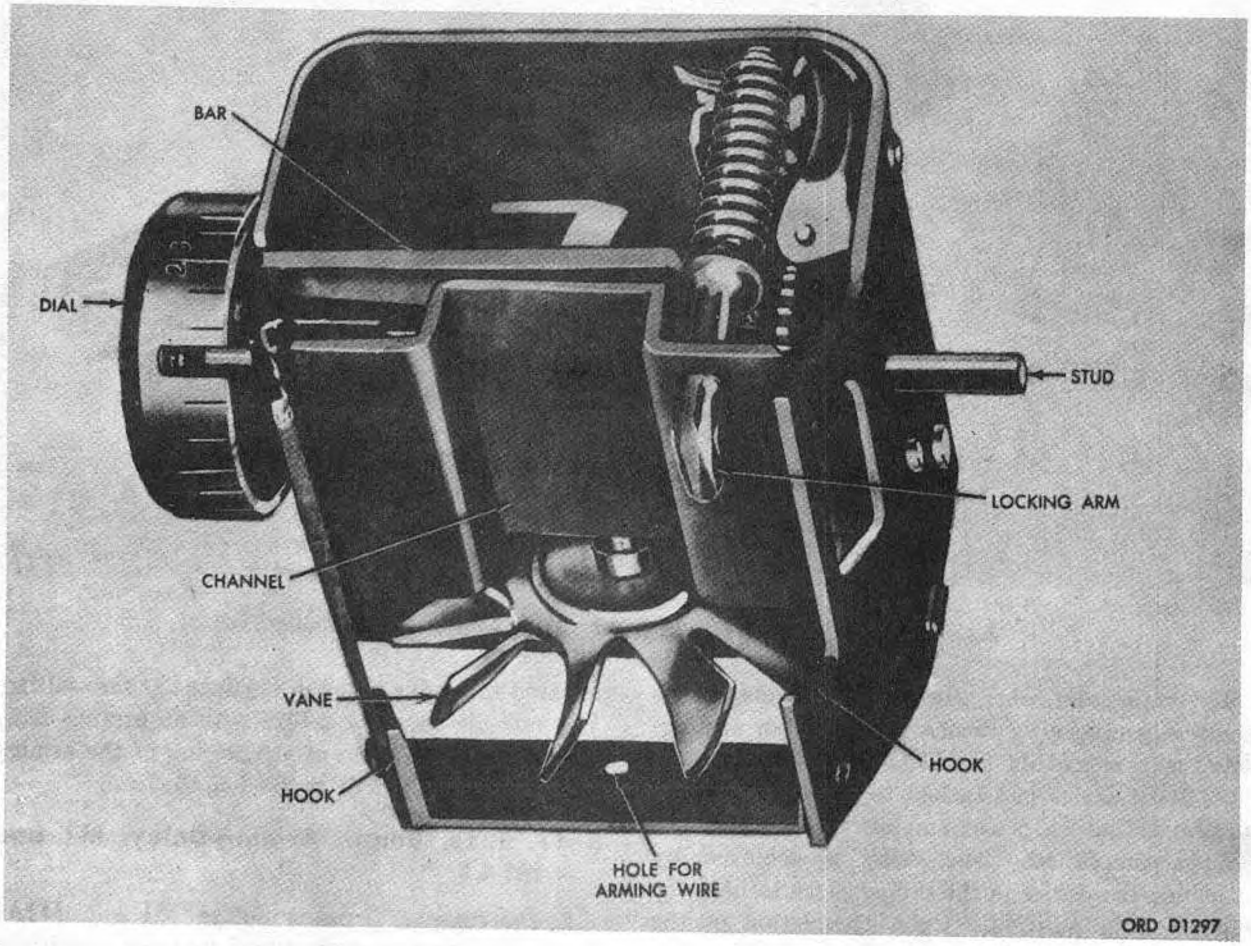


Figure 5-32. Fuze, bomb, arming delay: M1 and M1A1.

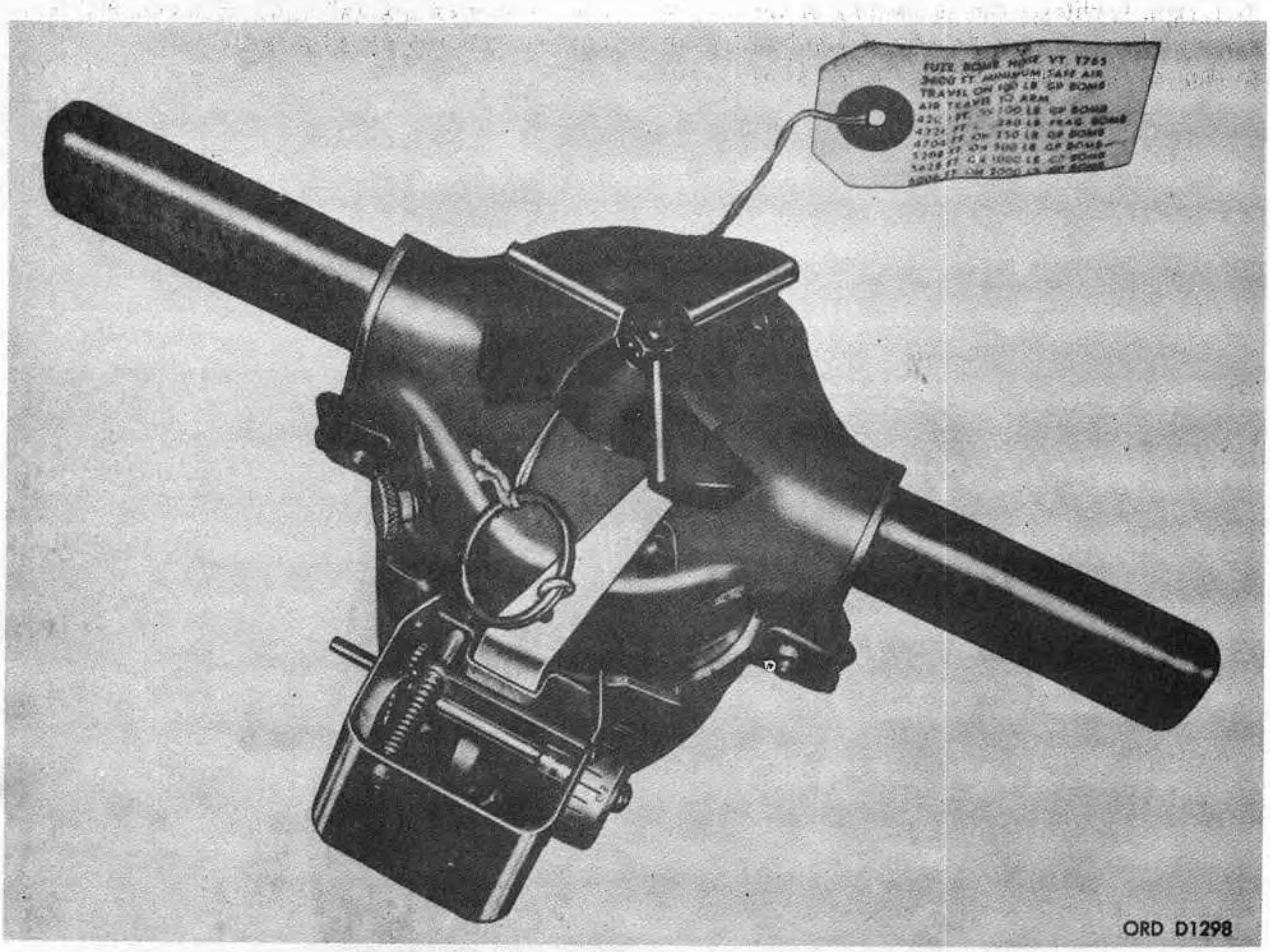


Figure 5-33. Fuze, bomb, proximity (VT): M188 w/arming-delay installed.

In certain cases, when a delay of the arming of the bomb is necessary, a device known as an arming-delay mechanism M1 or M1A1 (fig. 5-32) is used. This delay device is attached to the fuze to delay its arming until a preset amount of air travel has been accomplished. The delay is achieved by attaching the device in the proper place to hold the vane lock in position. Upon completion of the preset time, the arming delay releases itself and is forced away from the fuze by the spring of the vane lock which is ejected, thus starting the arming of the fuze. The arming delay consists mainly of a wind vane, a reduction gear train, a setting dial, and a lock which attaches it to the ring or bracket of the fuze. The lock consists of fixed hooks and a movable locking hook. The movable hook is attached to a spring-powered release bar which is held in the locked position (movable hook pointing down toward vane assembly) by the flange of the setting dial and released through a notch in the flange at zero setting. The safe air travel of a fuze with an arming-delay mechanism is the sum of the setting of the arming delay plus the MinSAT marked on the fuze.

5-41. Fuze, Bomb, Arming-Delay: M1 and M1A1

a. Description. Arming delays M1 and M1A1 (fig. 5-32) were manufactured in large quantities during World War II and are being issued with proximity fuzes manufactured since that period. The setting dial is mounted on one end of a geared shaft which is held in place with the gear train by a spring. The opposite end of the shaft extends through a slot in the housing and forms a stud which may be depressed to disengage the shaft and permit the rotation of the setting dial.

b. Differences. The difference between the M1A1 and the M1 is that the M1A1, in accordance with its design, facilitates the assembling of the arming delay to the fuze. Additionally, it is only necessary to depress the setting dial of the M1A1 to permit rotation and setting of the dial. The two models are otherwise the same in all respects.

5-42. Fin Assemblies

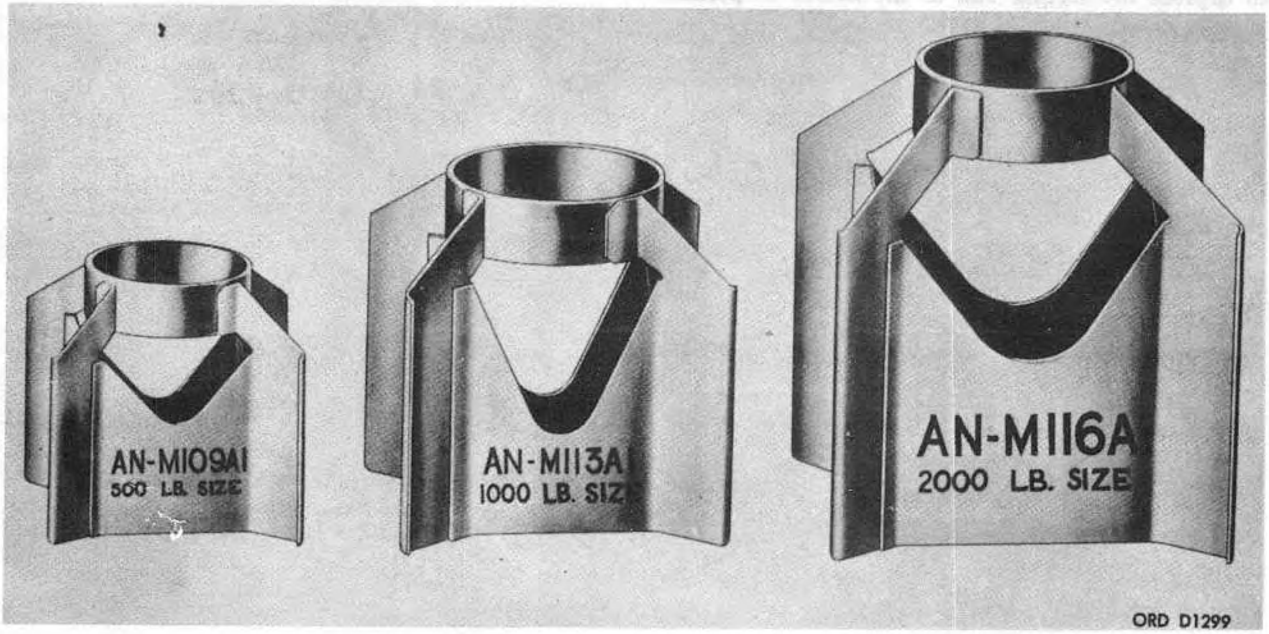


Figure 5-34. Fin assembly: box.

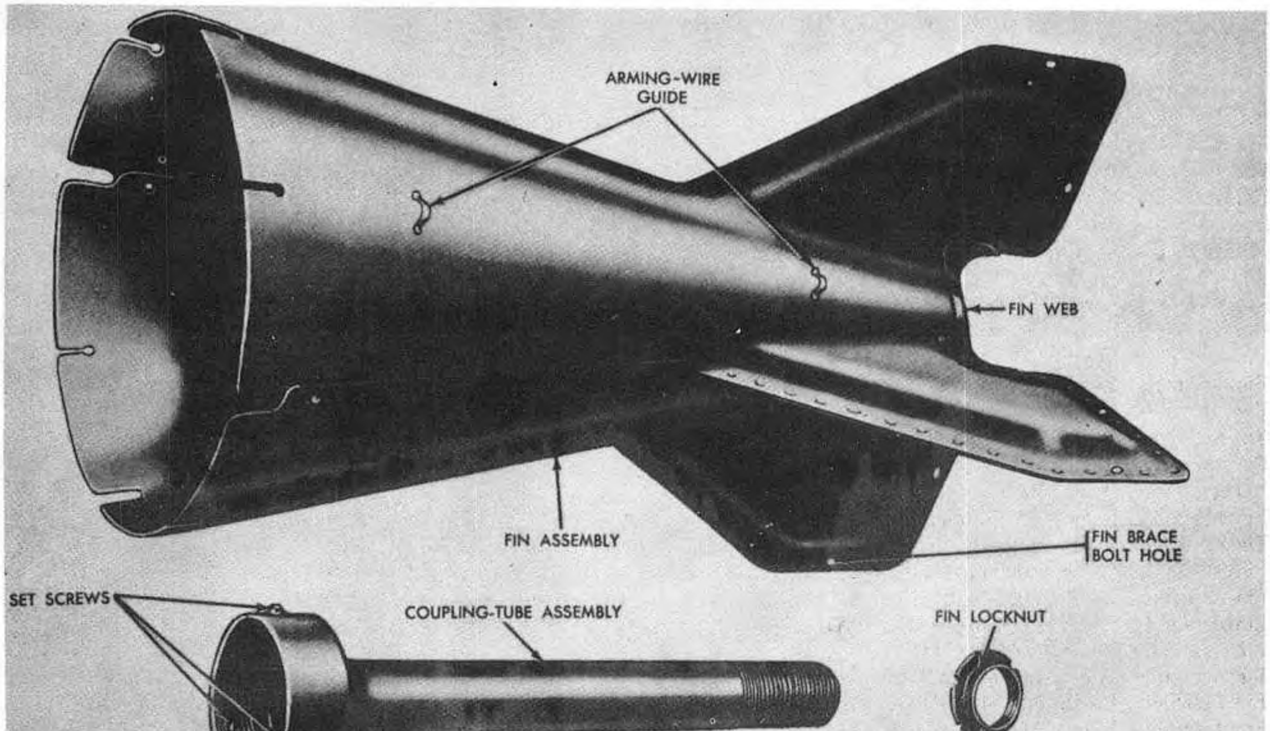


Figure 5-35. Fin assembly: conical.

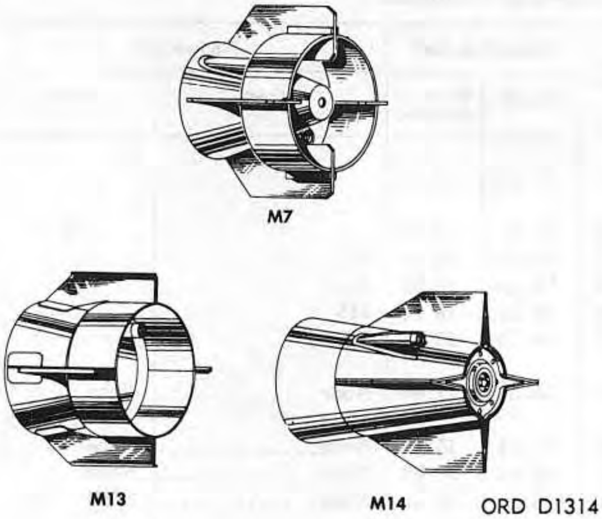


Figure 5-36. Fin assembly: for chemical clusters.

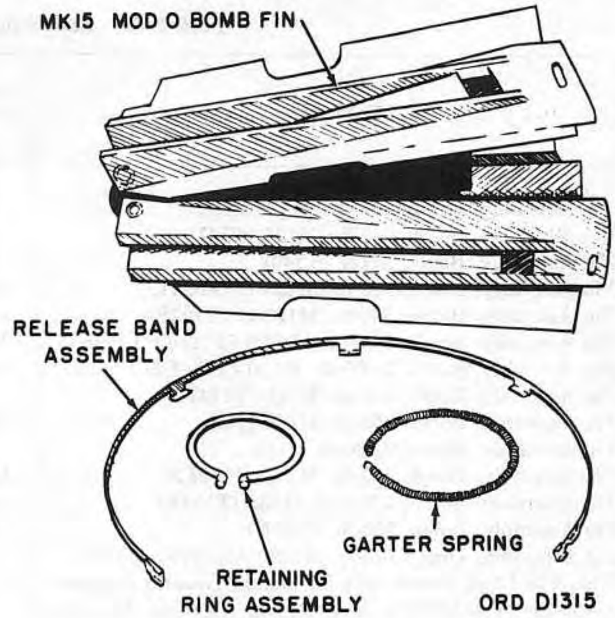


Figure 5-37. Fin assembly: retarding.

Table 5-31. Stabilizing Components

Nomenclature	Sleeve opening	Dimensions (in.)		Fin lock nut	
		Length	Width or diameter	Model	Thread
Fin Assembly, Bomb, 90-lb, Frag: M101	3.0	9.5	6.0		2.625-12NS-1
Fin Assembly, Bomb, 100-lb: M103	3.0	9.50	8.0	M1	2.625-12NS-1
Fin Assembly, Bomb, 100-lb: M103A1	3.0	11.47	8.0	M1 or MK2 Mod 0	2.625-12NS-1
Fin Assembly, Bomb, 500-lb: M7, (Cluster Fin)	0.75	13.84	19.13		
Fin Assembly, Bomb, 1,000-lb: M13 (Cluster Fin)	0.88	16.75	25.5		
Fin Assembly, Bomb, 750-lb: M14 (Cluster Fin)	4.00	25.72	22.6		
Fin Assembly, Bomb, 250-lb: MK14 Mod 1.					
Fin Assembly, Bomb, 500-lb: MK15 Mod 0.					
Fin Assembly, Bomb, 250-lb: M106	3.0	12.08	10.76	M1 or MK2 Mod 0	2.625-12NS-1
Fin Assembly, Bomb, 250-lb: AN-M106A1	3.0	12.08	10.76	M1 or MK2 Mod 0	2.625-12NS-1
Fin Assembly, Bomb, 250-lb: M107	None	15.70	10.76	None	None
Fin Assembly, Bomb, 250-lb: M107A1	None	15.70	10.76	None	None
Fin Assembly, Bomb, 500-lb: M108	4.03	13.9	13.65	See note	3.5-12NS-1
Fin Assembly, Bomb, 500-lb: M109	5.23	13.9	13.65	M2 or MK3 Mod 0	4.7-12NS-1
Fin Assembly, Bomb, 500-lb: AN-M109A1	5.23	13.9	13.65	M2 or MK3 Mod 0	4.7-12NS-1
Fin Assembly, Bomb, 500-lb: M110	4.03	15.05	11.75	See note	3.5-12NS-1
Fin Assembly, Bomb, 500-lb: AN-M110A1	4.03	15.05	11.75	See note	3.5-12NS-1
Fin Assembly, Bomb, 1,000-lb: M112	4.03	18.52	18.27	See note	2.5-12NS-1
Fin Assembly, Bomb, 1,000-lb: M113	5.23	18.52	18.27	M2 or MK3 Mod 0	4.7-12NS-1
Fin Assembly, Bomb, 1,000-lb: AN-M113A1	5.23	18.52	18.27	M2 or MK3 Mod 0	4.7-12NS-1
Fin Assembly, Bomb, 1,000-lb: M114	4.03	16.8	15.0	See note	3.5-12NS-1
Fin Assembly, Bomb, 1,000-lb: AN-M114A1	4.03	16.8	15.0	See note	3.5-12NS-1
Fin Assembly, Bomb, 2,000-lb: M116	6.53	25.0	22.67	M3 or MK4 Mod 0	6.-12NS-1
Fin Assembly, Bomb, 2,000-lb: AN-M116A1	6.53	25.0	22.67	M3 or MK4 Mod 0	6.-12NS-1
Fin Assembly, Bomb, 2,000-lb: M117A1	5.23	25.68	18.63	See note	4.7-12NS-1
Fin Assembly, Bomb, 500-lb: M123	5.75	13.9	13.65		
Fin Assembly, Bomb, 1,000-lb: M124.					
Fin Assembly, Bomb, 100-lb: M125.					

Table 5-31. Stabilizing Components—Continued

Nomenclature	Sleeve opening	Dimensions (in.)		Fin lock nut	
		Length	Width or diameter	Model	Thread
Fin Assembly, Bomb, 150-lb: M125A1	4.44	11.47	8.0		
Fin Assembly, Bomb, 250-lb: M126 (T147).					
Fin Assembly, Bomb, M127 (T146)	7.76	33.0	7.90		
Fin Assembly, Bomb, 500-lb: M128 (T127E1)	13.56	32.65	13.65	M5	
Fin Assembly, Bomb, 500-lb: M128A1 (T127E4)	13.56	32.65	13.65	M5	
Fin Assembly, Bomb, 1,000-lb: M129 (T142 or T142E1)	18.00	46.52	18.20	M5	
Fin Assembly, Bomb, 2,000-lb: M130 (T143E2)	22.27	59.79	23.10	M5	
Fin Assembly, Bomb, 100-lb: M135 (T144E1).					
Fin Assembly, Bomb, 250-lb: M140 (T68)	11.83	34.31	11.97	None	None
Fin Assembly, Bomb, 2,000-lb: T143.					
Fin Assembly, Bomb, 750-lb: M131 (T152E2)	12.81	38.44	15.91	None	None
Fin Assembly, Bomb, 3,000-lb: M132 (T153E3)	21.63	90.13	23.89	None	None
Fin-Assembly, Bomb, 250-lb: T155E1	9.98	40.4	10.01	None	None
Fin Assembly, Depth Bomb, 350-lb: AN-MK54 Mod 1.					
Nut, Fin Lock, Bomb: M1 for Bomb, General Purpose, 100-lb, AN-M30A1, and Bomb, General Purpose, 250-lb, AN-M57A1.	--------	0.87	4.52	M1 or MK2 Mod 0	2.625-12NS-1
Nut, Fin Lock, Bomb: M2 for Bomb, General Purpose, 500-lb, AN-M64A1, and Bomb, General Purpose, 1,000-lb, AN-M65A1.	--------	0.87	6.72	M2 or MK3 Mod 0	4.7-12NS-1
Nut, Fin Lock, Bomb: M3, for Bomb, General Purpose, 2,000-lb, AN-M66A1.	--------	1.25	7.77	M3 or MK4 Mod 0	6.12NS-1
Nut, Fin Lock, Bomb: for Bomb, Fragmentation, 90-lb, M82; Bomb, Fragmentation, 22^ lb, AN-M88; Bomb, Fragmentation, 260-lb, AN-.81; Bomb, General Purpose, 100-lb, AN-M30A1, and Bomb. General Purpose, 250-lb, AN-M57.					
Nut, Fin Lock, Bomb, Semi-Armor-Piercing, 1,000-lb, AN-M59A1.					

Note. Fin lock nuts of older design (without setscrews) which are not assigned M designations are also available.

A fin assembly (figs. 5-34, 5-35, 5-36, and 5-37, and table 5-31) is usually employed to stabilize a bomb or aimable cluster in flight. There are two basic types, the box-fin and the conical-fin, and two variations of these types for specialized use, the retarding-fin and the fin used with chemical clusters. Both the box-fin and the conical-fin assemblies are fabricated of sheet metal.

a. Box and Conical-Fin Assemblies. The box-fin assembly (fig. 5-34) consists of a fin sleeve that fits over the tail of the bomb and is secured by a fin lock nut (fig. 5-38). Fin blades fabricated to the sleeve form a square, box-like assembly. Although more recent designs require the use of heavier gauge steel to strengthen the assembly, box-type fins are not strong enough for use on bombs dropped from high altitudes or carried externally on high-speed aircraft. The conical fin assembly consists of an elongated fin cone (fin sleeve) and four streamlined blades assembled perpendicular to the cone. When a conical fin assembly is assembled to an old-type bomb body, a coupling-tube assembly and fin lock nut are used to secure the assembly to the bomb. Conical fin assemblies are attached to new-type bomb bodies by means of radial screws or by bolts. For some 100-pound bombs and all larger bombs, the fin assembly is packed and shipped separately from the bomb body. The fin assembly is then attached to the bomb body when the complete round is assembled.

b. Special Fin Assemblies. A special type of conical-fin assembly (fig. 5-36) has been developed for use with chemical clusters. A second special configuration, a retarding-fin assembly (fig. 5-37), is umbrella-like in appearance and consists of four blades individually attached to a support column. When the fin assembly is assembled to the bomb body, a release band assembly, a garter spring, and a retaining ring assembly (fig. 1-3) are used to secure the fin blades in the closed position. The threaded end of the fin support is threaded to the rear of the bomb body when securing the fin assembly to the bomb. The retarding-fin assemblies are used with both unretarded (low-drag) configurations and retarded (high-drag) configurations. For low-drag configuration, the bombs are dropped from aircraft with the fin blades in the closed position, and the arming wire (which releases the release-band assembly) is replaced by a cotter pin.

5-43. Fin Locknuts

The fin locknut (fig. 5-38 and table 5-31) is a bushing which is threaded onto a base plug or coupling tube to secure the fin assembly to the bomb. Three types of lock nuts are currently in use: the regular type, the new type, and the conical-fin lock nut.

a. Regular-Type Locknut. This type of lock nut is shipped assembled to the base plug of the bomb and is used in bombs with box-type fins assembled in the field. 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 regular locknut provides no other means for secure 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.

b. New-Type Locknut. The new-type locknut differs from the regular in that it does incorporate a means of locking itself to the base plug by setscrews. It is 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 in bomb bays subject to air currents that cause rotation of fins with the regular locknut installed. When the new-type locknut is not available, the regular type may be used. The new locknut is installed in essentially the same manner as the regular. However, after screwing the 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.

c. Conical-Fin Locknut and Locking Web. The conical-fin locknut and locking web (fig. 5-38) secure the conical fin assembly to the coupling tube on the bomb. During assembly, the regular lock nut found on the bomb for use with box-type fin assemblies and that 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 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 the two slots in the lock nut are located directly over the two tabs on the fin locking web. The two tabs are bent back to engage the slots of the lock nut securely, and the three setscrews in the locknut are tightened.

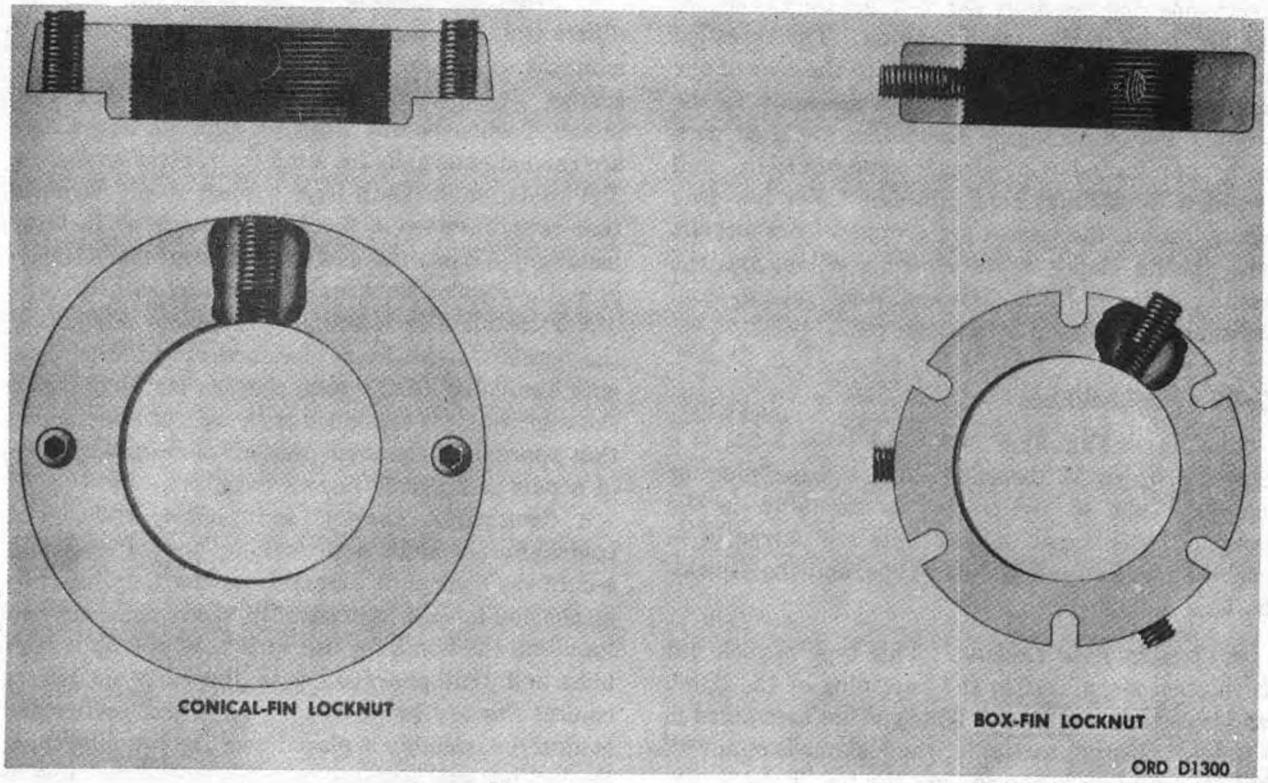


Figure 5-38. Fin locknuts.

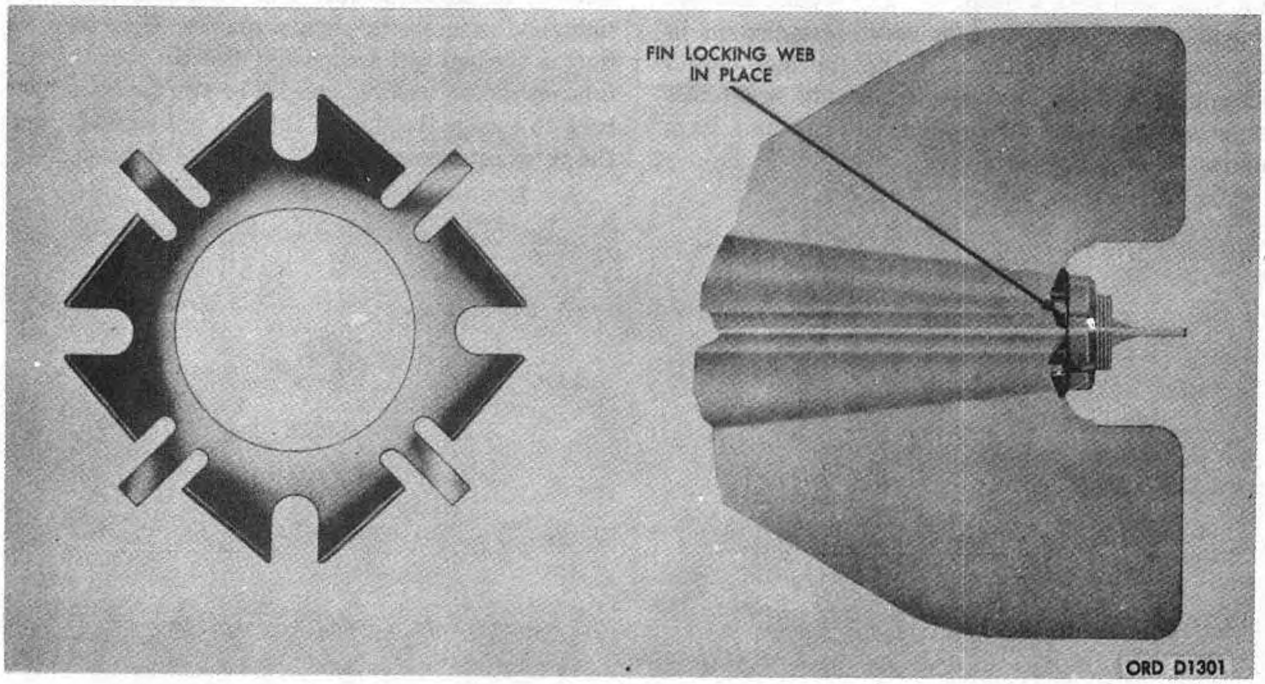


Figure 5-39. Fin locking web.

5-44. Fin Assembly Brace Kit

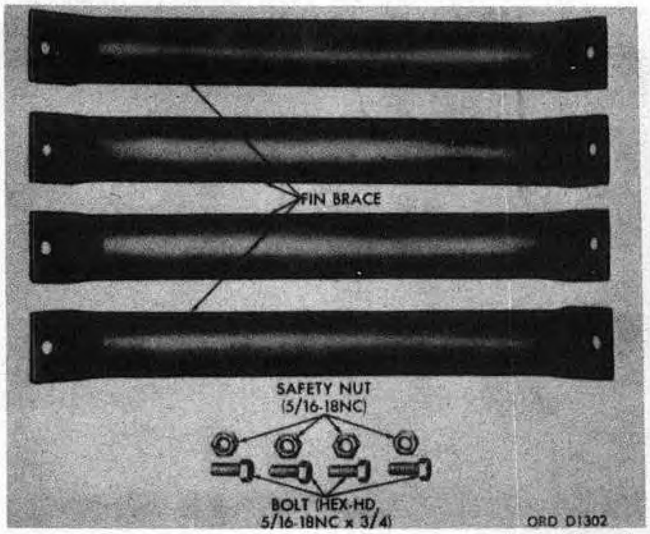


Figure 5-40. Brace kit, fin assembly, bomb: M41 (T40).

Table 5-32. Auxiliary Components of Fin Assemblies

Nomenclature	Components
Brace Kit, Fin Assembly, Bomb: M41 (T40)	4 bolts 4 braces 4 safety nuts
Brace Kit, Fin Assembly, Bomb, 1,000-lb: M65A1	40 angles, fin reinforcing 40 plates, fin reinforcing 1 envelope, drills/ctn, nuts, screws and lock washers/ctn.
Plate, Drag and and Ring, Spoiler for Cluster Fragmentation, Bomb: M28A1 and for photoflash bomb M120A1.	
Trail Kit, Bomb: Angle, M43	2 angles, trail ¼-in. 2 angles, trail ½-in. 2 angles, trail 1-in. 12 nuts, square 12 screws, trail angle 12 washers, lock
Trail Kit, Bomb: Plate, M42A1	1 plate, trail 1 ring, spoiler 2 bolts, ¼-in. 3 washers, lock 3 nuts, hexagon
Trail, Kit, Bomb: Plate, M42A1	1 plate, trail 1 ring, spoiler 4 screws, trail plate

Fin assemblies on bombs carried externally on high-speed aircraft may be reinforced to prevent cracking in flight. Two fin brace kits are available for reinforcing fin assemblies.

a. Brace Kit, Fin Assembly, Bomb: M41 (T40). Fin brace kit M41 (figs. 5-40 and 5-41, and table 5-32) may be used when a 500-pound bomb of the AN-M64 series fitted with fin assembly M128 or M128A1 is to be car d externally on high-speed aircraft. The fin bra will prevent cracking of the fin assembly at the juncture of the blades and the fin cone.

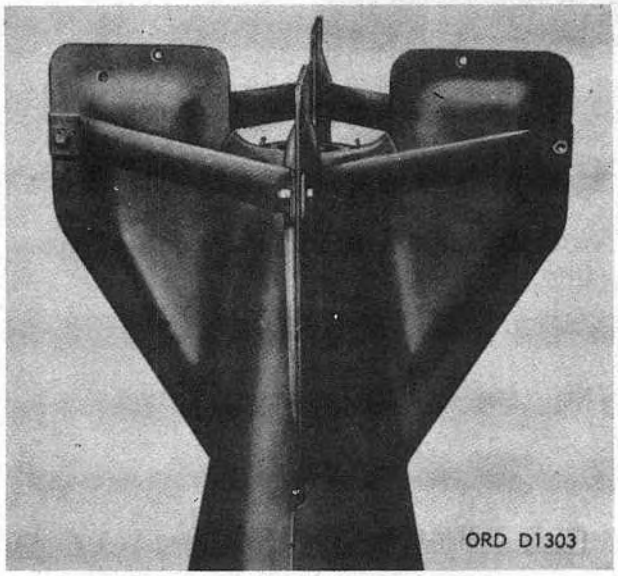


Figure 5-41. Brace kit, fin assembly, bomb, M41 assembled to fin assembly.

b. Brace Kit, Fin Assembly, Bomb, 1,000-pound: AN-M65A1. This fin brace kit is supplied to reinforce fin assemblies for 1,000-pound bombs AN-M65A1. Components of the kit are listed in table 5-32.

5-45. Drag Plates and Spoiler Rings

a. Drag Plate. A drag plate (fig. 5-42) is an 8-inch square of sheet metal with four protruding tabs, each containing a tapped hole which accommodates a screw. When the drag plate is placed over the rear end of the fin assembly, each tab aligns with a hole in the fin box, and it is secured with four screws.

b. Spoiler Ring. The spoiler ring is a circular piece of sheet metal (7.875 inches in diameter) containing one central hole large enough to accommodate the threaded end of a nose fuze, and a small hole through which the arming wire is passed.

5-46. Trail Kit, Plate, Bomb: M42A1 and M42A2

These kits (fig. 2-54 and table 5-32) are drag plate-spoiler ring kits, similar to those described above, which are used with photoflash bombs M120, M120A1 and M122. In the M42A1 kit, the drag plate is attached to the fin assembly by a screw in each of the four tabs. In the M42A2 kit, the drag plate is attached by two 6⅝-inch bolts. Each bolt passes through two tabs on the drag plate and is secured with a lockwasher and hex nut.

5-47. Trail Kit, Angle, Bomb: M43

This kit is used with photoflash bomb M120A1 and M122 with fin assembly M125A1, and with photoflash bomb M122. All the angles are 8 inches long. Each angle is 1 inch wide and has two 0.26-inch holes drilled 4 inches apart.

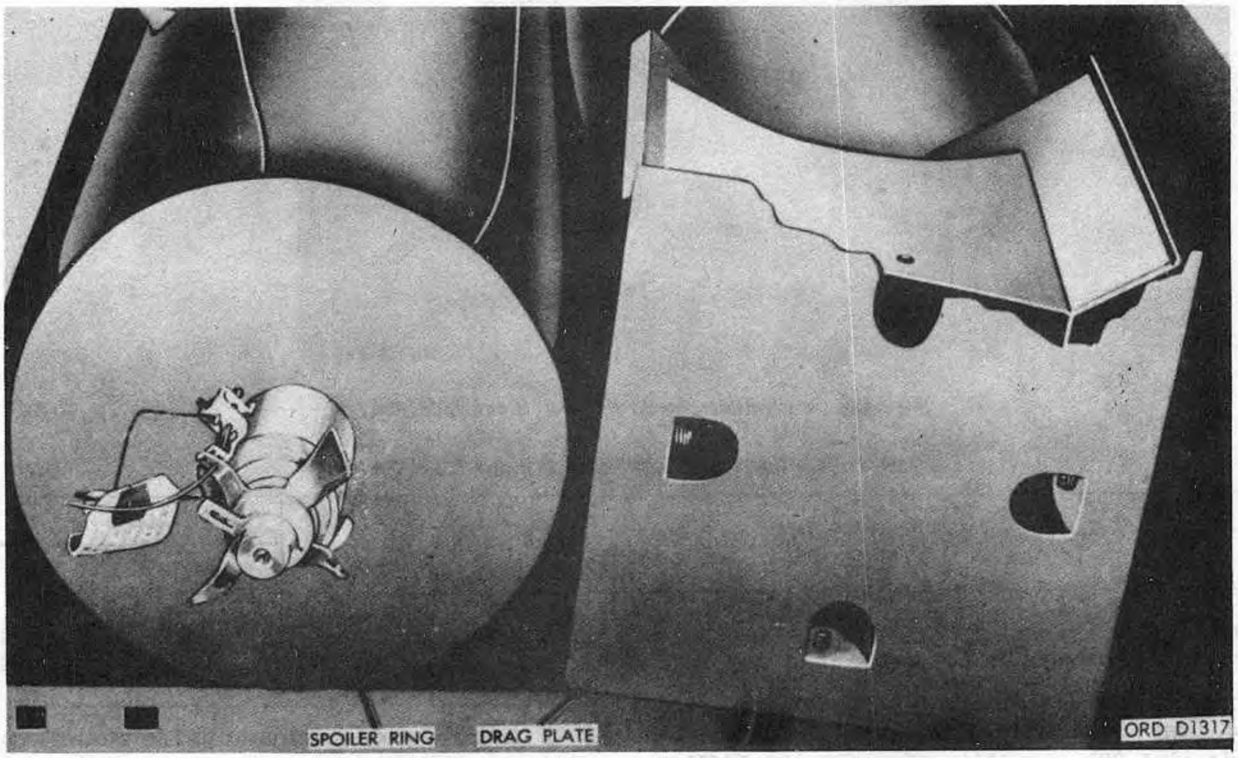


Figure 5-42. Spoiler ring and drag plate installed.

5-48. Initiator, Bomb: FMU-7/B and FMU-7A/B

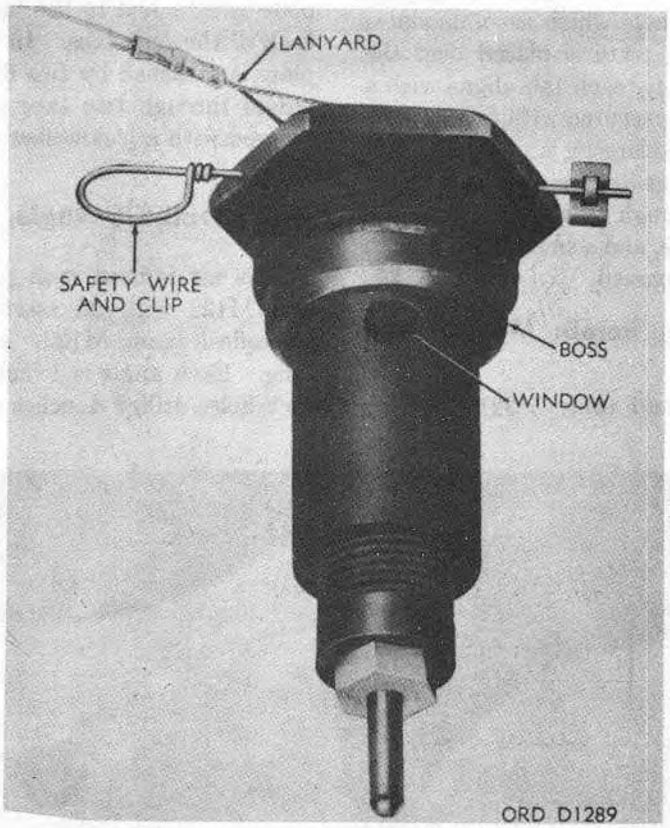


Figure 5-43. Initiator, bomb: FMU-7/B and FMU-7A/B.

Table 5-33. Initiator, Bomb: FMU-7/B and FMU-7A/B

	Model	
	FMU-7/B	FMU-7A/B
Length of Assembly (in.)	3.79	3.79
Weight of Assembly (lb)	0.37	0.68

a. General. These initiator assemblies (fig. 5-43 and table 5-33) are used in conjunction with FMU-7 series fuzes and cable assemblies in the later model (BLU series) fire bombs. Initiators FMU-7/B and FMU-7A/B are interchangeable and similar, except for the following differences. The FMU-7/B has a center post which extends above the top of the initiator head. A safety wire is installed through the initiator head and cap, and an arming lanyard is attached to the center post. A Fahnestock (safety) clip is installed on the safety wire. On the FMU-7A/B, the surface of the initiator has no protrusions and the arming lanyard is attached to a plug instead of the center post.

b. Functioning. Upon release of the bomb from the aircraft, withdrawal of a cap on the top of the initiator (by a lanyard attached to the bomb shackle) results in actuation of a thermal battery, which after a 0.5 to 0.9 second delay, produces an electrical pulse which is transmitted to both fuzes FMU-7/B (or FMU-7A/B) through the cable assembly FMU-7/B (or FMU-7A/B).

5-49. Cable Assemblies: FMU-7/B and FMU-7A/B

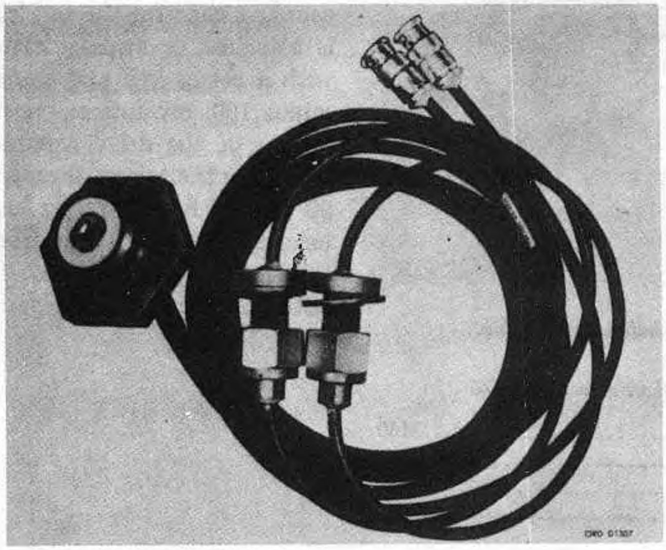


Figure 5-44. Cable assemblies: FMU-7/B and FMU-7A/B.

Table 5-34. Cable Assemblies: FMU-7/B and FMU-7A/B

	Model FMU-7/B, FMU-7A/B
Length of Assembly (in.)	76.0
Diameter of Cable (in.)	0.19
Weight of Assembly (lb)	0.87

These assemblies (fig. 5-44 and table 5-34) are electrical cables used to interconnect the FMU-7 series fuzes with the FMU-7 series initiators on later model (BLU series) fire bombs. The cable assemblies are interchangeable and are similar except for the following differences: On the FMU-7/B, the large connector is made of plastic. The top has a rubber diaphragm and a metal contact ring, and a grounding ring is also required. On the FMU-7A/B, the large connector is metal and there is no visible contact ring. The igniter hole is covered by metal tape instead of a rubber diaphragm, and a grounding ring is not required.

5-50. Flexible Shaft Assembly: M40

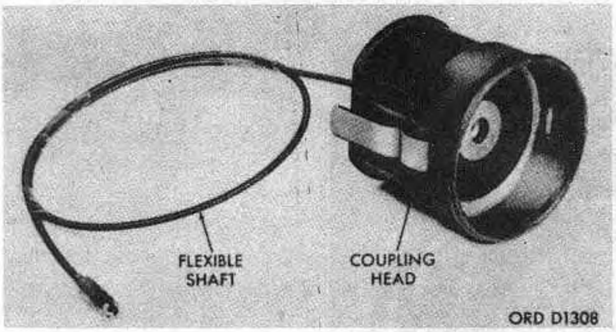


Figure 5-45. Flexible shaft assembly: M40.

Table 5-35. Flexible Shaft Assembly: M40

Model	M40
Length of Assembly (in.)	7.45
Diameter of Body (in.)	2.50
Weight of Assembly (lb)	0.32

Flexible shaft assembly M40 (T25) (fig. 5-45 and table 5-35) consists of a coupling head for arming-drive assembly M44 (T25), a flexible shaft, and a coupling head for the tail fuze. The coupling head is attached to arming-drive assembly M44 (T25) with a cotter key and transmits the 1800, plus or minus 100, revolutions-per-minute torque from the output of the drive assembly. The flexible shaft transmits the torque through an approximate arc of 90° to the fuze coupling head. The fuze coupling head accepts the torque from the flexible shaft and transmits it to a tail fuze. It is fastened to the fuze with fast-connect springloaded connecting clamp.

5-50.1. Drive Assemblies, Coupler: MAU-88/B and MAU-87/B

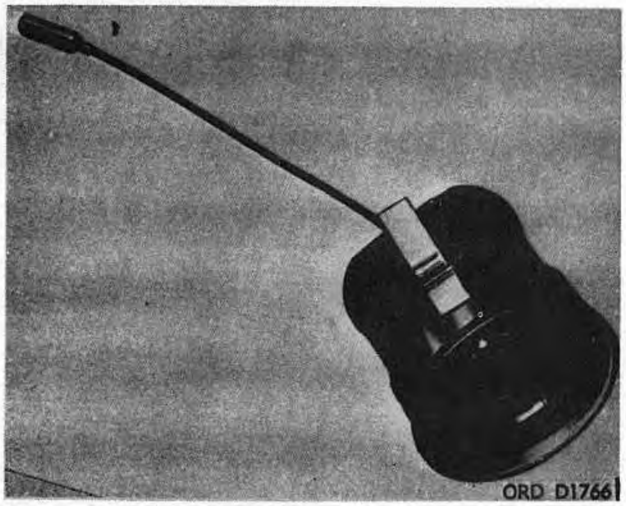


Figure 5-45.1. Drive assembly coupler: MAU88/B.

Table 5-35.1. Drive Assembly, Coupler MAU-88/B and MAU-87/B

Model	MAU-88/B	MAU-87/B
Length of Assembly (in.)		2.25
Diameter of Body (in.)		2.38
Weight of Assembly (grams)		249

a. Drive Assembly Coupler MAU-88/B. This coupler (fig. 5-45.1 and table 5-35.1) an aluminum coupling head (ungoverned direct drive), is attached to the fuze with fast connect, spring-loaded connecting clamps. This coupler accepts the torque from flexible drive shaft MAU-86/B series, and transmits it to the attached tail fuze.

b. Drive Assembly Coupler MAU-87/B. This coupler (fig. 5-45.2) consists of an aluminum coupling head and a spring loaded centrifugal governor. This coupler, designed to reduce the high revolutions per minute input (18,000 RPM maximum) to a constant speed output of 1,800, plus or minus 100 revolutions per minute, is attached to the fuze with a single U-shaped latch spring. This coupler assembly accepts the torque from one of the flexible drive shafts of the MAU-86/B series, and transmits it to the attached tail fuze.

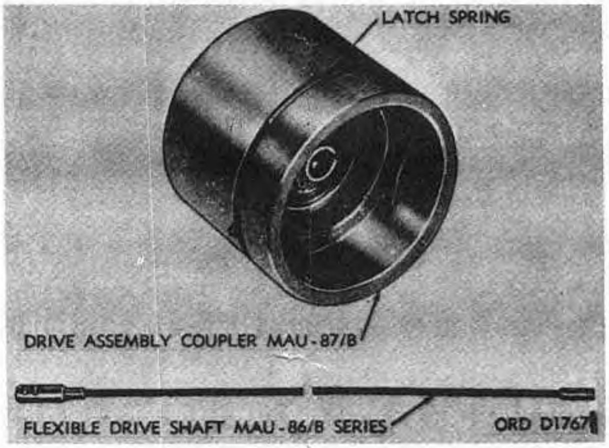


Figure 5-45.2 Drive assembly coupler: MAU-87/B and flexible shaft, drive: MAU-86/B series.

5-50.2. Flexible Shaft, Drive: MAU-86/B Series

Table 3-35.2. Flexible Drive Shaft MAU-86/B Series

Model	MAU-86/B-1	MAU-86/B-2	MAU-86/B-3	MAU-86/B-4
Length of assembly (in.)	4	6	7	10
Diameter of body (in.)	.25	.25	.25	.25
Weight of assembly		8.50		11.25

Drive shafts of the MAU-86/B series (fig. 5-45.2 and table 5-35.2) are fabricated of 0.25 inch diameter twisted steel cable which vary in length. The cable ends have clip-on fasteners which are made of either metal or plastic. These drive shafts provide a flexible connection between drive assembly ATU-35/B (para 5-51.1) and drive assembly coupler MAU-87B/B or MAU-88/B (para 5-50.1). Rotational torque from the drive assembly is transferred to the drive coupler for arming of the attached fuze.

5-51. Drive Assembly, Fuze Arming: M44

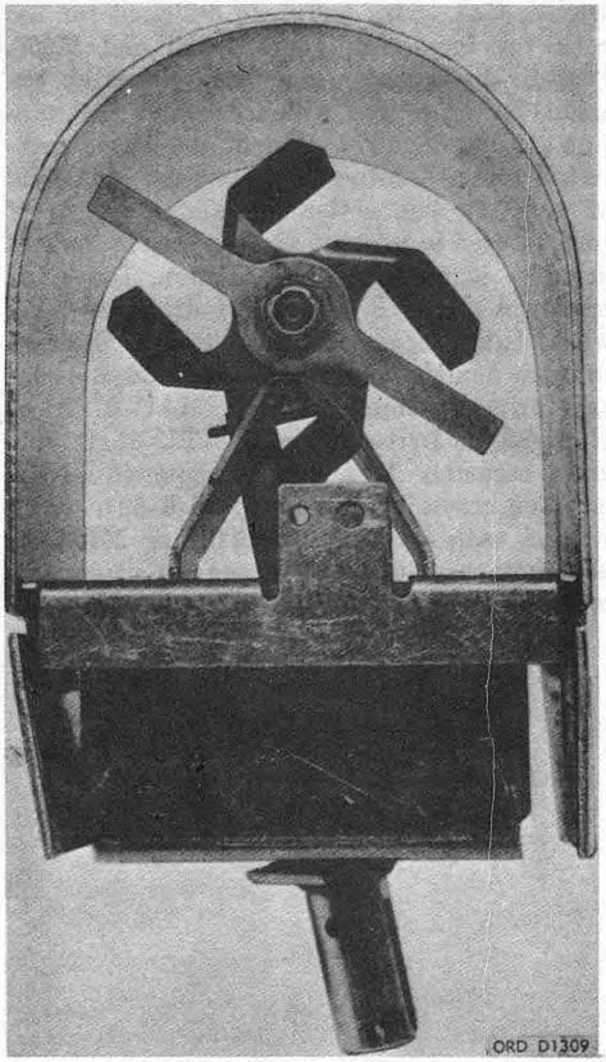


Figure 5-46. Drive assembly, fuze arming: M44.

Table 5-36. Drive Assembly, Fuze Arming: M44

Model	M44
Height (in.)	4.16
Length (in.)	2.00
Width (in.)	3.00

Drive assembly M44 (fig. 5-46 and table 5-37) was designed for use with the impact tail fuzes M905 and M906. It is used in conjunction with flexible shaft assembly M40 and a modified access hole cover plate thus making it adaptable for side arming when mounted on the fin assembly M131 on GP bomb M117. The drive assembly is air driven, by utilizing a small axial-flow, spoiler vane, worm-gear reduction, and a spring-loaded centrifugal governor. The assembly is designed to reduce the approximately 30,000 revolutions-per-minute vane input to a constant speed output of 1800± 100 revolutions-per-minute when operated in an airstream in excess of 150 knots.

5-51.1. Drive Assembly, Fuze Arming: ATU-35/B

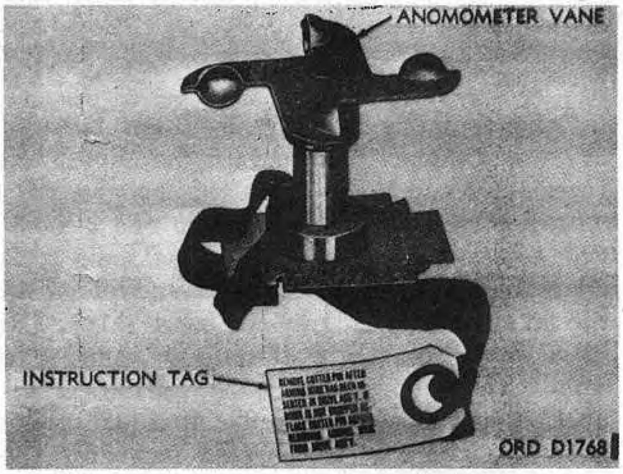


Figure 5-46.1. Drive assembly, fuze arming: ATU-35/B

Table 5-36.1. Drive Assembly, fuze arming: ATU-35/B

Model	ATU-35/B
Height (in.)	3.50
Length (in.)	3.50
Width (in.)	2.75
Weight of assembly (gms)	366.0
Fin assemblies used with	MK 83
	MK 84
	MK 81
	MK 82
	M131
	M132

Drive assembly ATU-35/B (fig. 5-46.1 and table 5-36.1), which is similar to drive assembly M44 (para 5-51), is designed for use with the impact tail fuze M905 and M906. This air-driven drive assembly utilizes an anemometer type vane which provides the rotation motion required to arm the above mentioned fuzes. A cotter pin assembly, consisting of a safety tag, cotter pin and a length of cord, is used to prevent anemometer movement prior to arming wire installation. Drive assembly ATU-35/B is a direct drive assembly whose output speed is transmitted to the fuze through flexible drive shaft MAU-86/B series and drive assembly coupler MAU-87/B or MAU-88/B. Drive assembly ATU-35/B, like drive assembly M44, can be mounted in the modified access hole cover (para 5-52), which is used with fin assembly M131 or M132, or in a hole provided in various fin assemblies procured after 1965.

5-52. Cover, Modified Access Hole, For Fin Assembly M131

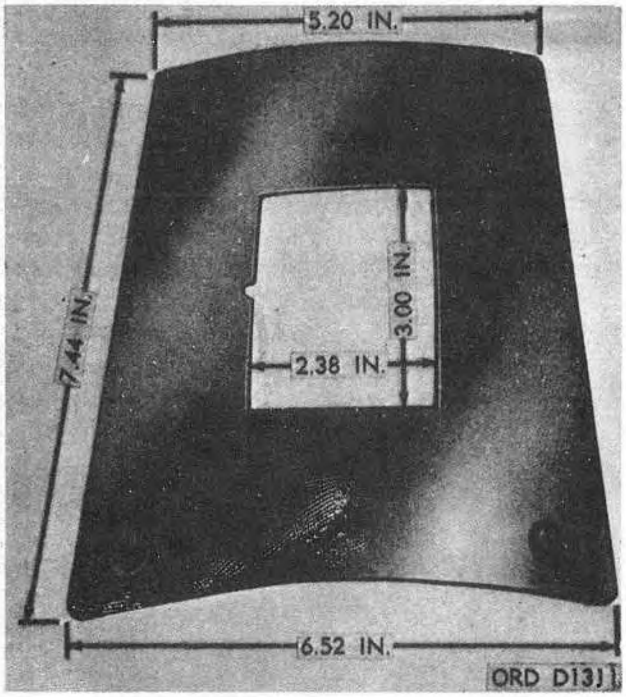


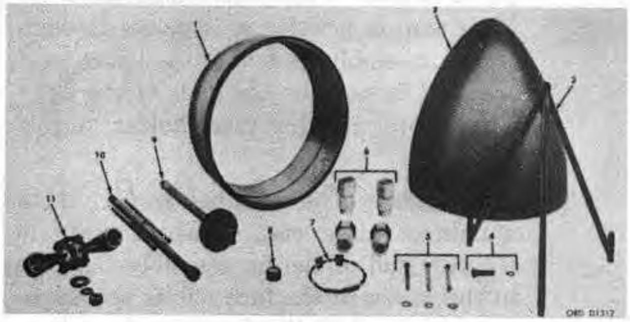
Figure 5-47. Modified access hole cover for fin assembly M131.

Table 5-37. Cover, Modified Access Hole, for Fin Assembly M131

Length of Cover (in.)	7.44
Width of Cover (in.)	5.86 (approx)
Thickness of Cover (in.)	0.025
Modified hole size	3 x 2.38

This item (fig. 5-47 and table 5-37) is a modified access-hole cover plate of the same dimensions and contour as the two large access-hole cover plates attached to fin assembly M131 on GP bomb M117. A portion has been cut from the center of the plate to receive and index drive assembly. M44, thus adapting the fin assembly to a side-arming capability required for use of mechanical impact tail fuzes M905 and M906.

5-53. Conversion Set, External Cluster Stowage: M16



1	Transition section	7	Arming-wire assembly, M47 w/clips
2	Nose fairing	8	Adhesive tape
3	Nose-fairing support	9	Fin connector, front
4	Cap screw and lock washer	10	Fin connector, back
5	Cap screw and washer	11	Fuze holder, washer, lockwasher and nut
6	Cartridge container		

Figure 5-48. Components of external cluster stowage conversion set M16.

Table 5-38. Conversion Set, External Cluster Stowage: M16, Components

Nomenclature	*Quantity*
Transition Section	1
Nose Fairing	1
Nose-Fairing Support	1
Cap Screw (1½-in.) and Lockwasher	1 each
Cap Screw (⅜-in.) and Washer	3 each
Cartridge Container w/Striker Assembly	4
Arming-Wire Assembly M47, w/Clips	1
Adhesive Tape	1 roll
Fin Connector, Front	1
Fin Connector, Back	1
Fuze Holder, Washer, Lockwasher, and Nut	1 each
Additional items required	
Cluster, Gas Bomb, Nonpersistent GB, 1,000-lb, M34 or M34A1 (w/o Fuze, Fin, and Wire)	1
Fin Assembly M129	1
Cartridge, Cluster Ejection M3	4
Detonating Cord (PETN)	1 (9 ft)
Tail Fuze M152A1	2

a. General. External cluster stowage conversion set M16 is used to streamline the 1,000-pound GB nonpersistent gas bomb cluster M34 or the M34A1 (figs 3-11 and 5-48), so that it may be carried beneath the wing of fighter-bomber aircraft with minimum impairment of the flight characteristics of the aircraft.

b. Description. External cluster stowage conversion set M16 (fig. 5-48) consists of the components listed in table 5-38. In addition to these components, fin assembly M129, also used for converting the cluster for external stowage, is furnished separately.

(1) *Nose fairing.* The nose fairing (2, fig. 5-48) is a sheet-steel ogive-shaped component. The base diameter is 19$\frac{1}{16}$ inches, approximately the same as the diameter of clusters M34 and M34A1. The nose end of the fairing is strengthned by a steel reinforcement on the inside. A hole is provided in the nose fairing for a ½-inch cap screw (4), which fastens the nose fairing to the nose-fairing support (3). Three sheet metal clips (feet), each approximately 2 inches wide, are welded to the inside of the base of the nose fairing. These feet provide firm contact between the nose fairing and the forward end of the cluster and insure that the fairing will maintain its position relative to the cluster when the streamlined cluster is carried and released at high speed.

(2) *Nose-fairing support.* The nose-fairing support (3) is an assembly of steel tubing welded together to form a tripod. A tube on each foot of the tripod accommodates a ⅜-inch cap screw (5), which is used to fasten the support to the front end plate of the cluster. An internally-threaded fitting at the apex of the fairing support accommodates a ½-inch cap screw (4) which passes through the front end of the nose fairing to hold the fairing in place.

(3) *Transition section.* The transition section (1) is a tapered adapter of sheet steel designed to permit fin assembly M129 to be attached to the rear end of the cluster, which has a diameter somewhat greater than that of the base of the fin assembly. An inner sleeve is welded inside the smaller end of the transition section. This sleeve fits inside the tapered base of the fin. A stop ring is welded around the inner circumference of the transition section at its larger end. The stop ring fits tight against a tapered ridge cast in the rear end plate of the cluster.

(4) *Cartridge containers.* Four cartidge containers (6) for cluster-ejection cartridges screw into the gas-chamber closure cap of the cluster. The upper portion of each cartridge container, which may be unscrewed from its base, contains a striker

assembly consisting of a striker body and a striker point. The striker point in each cartridge container is located immediately above the detonator of the cartridge which is loaded into the cartridge container.

(5) *Fin connector.* The fin connector (9 and 10) is made of steel bar stock and is fabricated in two pieces for convenience in shipping. For use, the rear end of the front fin connector (9) is screwed into a coupling attached to the front end of the back fin connector (10). The front end of the front fin connector is screwed into a hole in the center of the gas-chamber closure cap on the rear end plate of the cluster. A detonating cord disc is welded to the shaft of the front fin connector at a point where it will closely cover the striker assemblies in the four cartridge containers (6) when the streamlined cluster is completely assembled. The front end of the back fin connector terminates in a threaded coupling equipped with a setscrew. The rear end of the back fin connector is threaded to fit the nut which secures the fuze holder (11) and the fin assembly to the cluster. Two cord tubes are welded to a tube spacer which has limited freedom of movement along the shaft of the back fin connector. These tubes hold the detonator cord in position as it passes through the fin assembly from the fuze holder and are used to position the ends of the detonator cord in the fuze holder during assembly.

(6) *Fuze holder.* The fuze holder (11) is an aluminum alloy casting which seats in the rear end of the fin assembly. A hole in the center of the fuze holder accommodates the end of the fin connector. Two smaller holes are also provided through the middle section of the fuze holder for the ends of the cord tubes.

(7) *Other components.* An M47 arming wire (7) and a roll of adhesive tape (8) are the remaining components of the conversion set.

(8) *Additional components required.* In addition to the M16 conversion set, the items listed in table 5-38 are required for the conversion of a complete round of nonpersistent gas bomb cluster M34 or M34A1 for external stowage.

5-54. Conversion Kit, Bomb: MK19 Mod 0

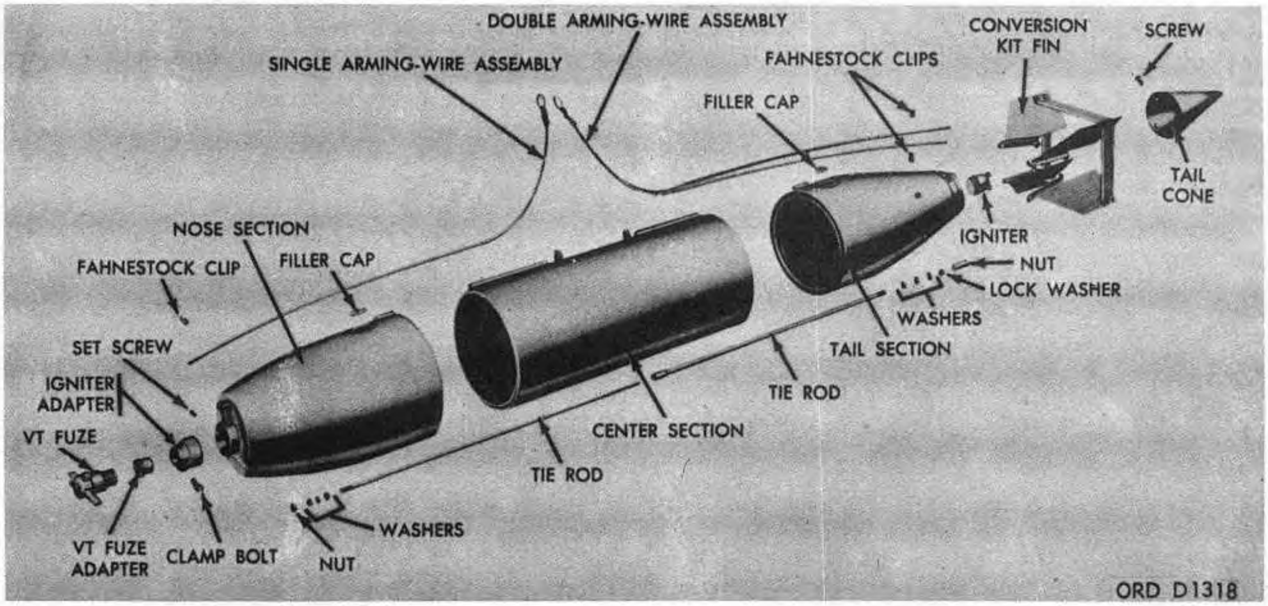


Figure 5-49. Bomb, fire, 750-lb: MK77 Mod 0, w/bomb conversion kit MK19 Mod 0.

Table 5-39. Bomb, Fin, 750-Pound: MK77 Mod 0, w/Bomb Conversion Kit MK19 Mod 0

Mark	77
Mod	9
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)	777.0
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)

a. Description. Bomb conversion kit MK19 Mod 0 (fig. 5-49 and table 5-39) consists of a shrouded fin assembly, an adapter for the AN-M166E1 VT fuze, two setscrews to lock in place the igniter clamp which holds the VT fuze adapter, and additional components (table 5-40). The conversion kit was developed to convert 750-lb fire bomb MK77 Mod 0 into a weapon that could be used in normal dive-bombing tactics. Modified with the MK19 Mod 0 conversion kit, the bomb is stabilized during flight by a shrouded fin assembly. Fuze AN-M166E1 (VT), 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 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.

b. Functioning. The bomb sections separate upon impact of the bomb, and the gasoline gel is distributed over a greater area and a smaller crater is created than when all the sections remain attached on impact.

Table 5-40. Components of Bomb Conversion Kit: MK19 Mod 0

Item	*Quantity*
Fin Blade	4
Fin Base	4
Fin Support	4
Headless Setscrew	2
Instruction Card	1
O-Ring Seal	4
Safety Wire	1
Self-Locking Nut	8
Shroud	4
VT Fuze Adapter	1
Washer AN 960-10	8
Washer AN 960-516	4
Washer Head Screw	8

APPENDIX I
REFERENCES

Index of Administrative Publications	DA Pam 310-1
Index of Blank Forms	DA Pam 310-2
Index of Supply Catalogs and Supply Manuals	DA Pam 310-6
Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.	DA Pam 310-4
Index of Ordnance Publications (Navy)	OPO
Ammunition and Explosives: Bombs and Grenades	SC 1305/30-IL
Ammunition Condition Report	DA Form 2415
Report of Damaged or Improper Shipment	DD Form 6
Army Equipment Record Procedures	TM 38-750
Ammunition: Restricted or Suspended	TB 9-AMM-2
Explosives: Responsibilities and Procedures for Explosive Ordnance Disposal	AR 75-15
Safety: Identification of Inert Ammunition and Ammunition Components	AR 385-65
Treatment of Chemical Warfare Casualties	TM 8-285
Camouflage, Basic Principles and Field Camouflage	FM 5-20
Battlefield Illumination	FM 20-60
Chemical, Biological, and Radiological (CBR)—Decontamination	TM 3-220
Small Unit Procedures in Chemical, Biological and Radiological (CBR) Operations.	FM 21-40
Demolition Materials	TM 9-1375-200
Chemical Corps Reference Handbook	FM 3-8
Department of Defense Ammunition Code	SB 708-30
Logistics (General): Malfunctions Involving Ammunition and Explosives	AR 700-1300-8
Military Security: Safeguarding Defense Information	AR 380-5
Safety: Accident Reporting and Records	AR 385-40
Fire Report	AR 385-12
Logistics (General): Report of Damaged or Improper Shipment	AR 700-58
Targets, Target Material, And Training Course Layouts	TM 9-6920-210-14
Ordnance General and Depot Support Service	FM 9-4
Requisitioning, Receipt, and Issue System	AR 725-50
Serviceability Standards for Chemical Corps Materiel	SB 3-30
Chemical, Biological, and Radiological (CBR) Operations	FM 3-5
Explosives and Demolitions	FM 5-25
Ordnance Ammunition Service	FM 9-6
Military Chemistry and Chemical Agents	TM 3-215
Storage and Shipment and Handling of Chemical Agents and Hazardous Chemicals.	TM 3-250
Ground Chemical Munitions	TM 3-300
Flame Thrower and Fire Bomb Fuels	TM 3-366
Care, Handling, Preservation, and Destruction of Ammunition	TM 9-1300-206
Safety Manual [1]	AMCR 385-224

[1] Copies may be obtained from C.O., Letterkenny Army Depot, ATTN: SSMLE, Chambersburg, Pa. 17201

List of Current Issue Items, Ammunition	CML 3-2
Aircraft Bombs, Bomb Fuzes, Miscellaneous Explosive and Inert Components, and Instruction Material.	SC 1305/30-IL
Operational Procedure for Use in Storage, Handling, Movement, Decontamination, and Disposal of GB-Filled Shell. [2]	CML C MATCOM INSTRUCTIONS NO. 9.2-14(B)
Chemical Bombs and Clusters	TM 3-400
Cluster, Generator Incapacitating BZ, 175-lb: M44	TB CML 117
Bomb, Gas, Nonpersistent, 750-lb, MC-1	TB 3-400-2
Cluster, Bomb, Incapacitating BZ, 750-lb, M43	TB CML 116
Bomb, Fire: 750-lb, M116A2	TB 3-400-9
Conversion Set External Cluster Stowage M16	TB 3-400-1
FSC Group 13 Ammunition and Explosives	SC 1340/98-IL
Ammunition and Explosives: Bombs and Grenades	SC 1305/30-IL
Numerical Index of Standard Air Force Publications	AFR 0-2
Numerical and Functional Indexes of Departmental Forms	AFR 0-9
Numerical Index and Requirements Table—Armament, Fire Control Guidance, Hazard Detecting, Personnel Ejection Systems, and Associated Equipment.	T.O. 0-1-11
USAF Supply Manual	AFM 67-1, Vol 1
USAF Stock List—Ammunition and Explosives	FSC 1300
Materiel Deficiency Reporting on Air Force Equipment Materiel	T.O. 00-350-54
General Instructions for Disposal of Ammunition	T.O. 11A-1-42
Routine Unsatisfactory Report	AFTO Form 29
Ammunition Disposition Report	AF Form 191
Ammunition and Explosive Materiel Serviceability Record	AFTO Form 15
Investigating and Reporting USAF Accidents/Incidental IAS	AFR 127-44
Safeguarding Classified Information	AFR 205-1
Explosives Safety Manual	AFM 127-100
Report of Damaged or Improper Shipment	AFR 71-4
Preservation, Packaging, Packing, and Marking Policy	AFR 71-6
Packaging and Handling of Dangerous Materials for Transportation of Military Aircraft.	AFM 71-4
Demolition Materials	FSC 1375

[2] Copies may be obtained from C.O., U.S. Army Edgewood Arsenal, Edgewood, Md. 21010.

APPENDIX II

LIST OF BOMBS AND BOMB COMPONENTS IN THE VARIOUS SERVICES INVENTORIES BUT NOT COVERED IN THIS MANUAL

Listing of bombs and bomb components which are not programed for present usage, or stocks are depleted with no present plan for replenishment. Commands or Agencies requiring technical data on the items listed below should contact the appropriate branch (Picatinny Arsenal and Edgewood Arsenal for Army, and OOAMA / OONST, Hill Air Force Base, Utah 84401 for Air Force) of the Service concerned.

Bomb, Armor Piercing: 1,000-lb, MK33, Mods 1, 2, and 3
Bomb, Armor Piercing: 1,600-lb, AN-MK1 Mods 1, 2 and 3
Bomb, Semi-Armor Piercing: 500-lb, AN-M58A2
Bomb, Semi-Armour Piercing: 2,000-lb, M103
Bomb, Light Case: 4,000-lb, AN-M56A2
Bomb, General Purpose: 10,000-lb, M121
Bomb, General Purpose: 12,000-lb, M109
Bomb, General Purpose: 22,000-lb, M110
Bomb, General Purpose: 44,000-lb, T12
Bomb, Incendiary: TH3, 4-lb, AN-M50A2
Bomb, Incendiary: TH3, 4-lb, AN-M50T-A2
Bomb, Incendiary: 4-lb, AN-M50T-X-A3
Bomb, Incendiary: 4-lb, AN-50X-A3
Bomb, Incendiary: IM and NP, 6-lb, AN-M69A1
Bomb, Incendiary: IM and NP, 6-lb M69X
Bomb, Incendiary: IM and NP, 100-lb, M47
Bomb, Incendiary: IM and NP, 100-lb, M47A1
Bomb, Incendiary: IM and NP, 100-lb AN-M47A2
Bomb, Incendiary: PT1, 500-lb, AN-M76
Bomb, Gas, Persistent: H, 115-lb, M70
Bomb, Gas Persistent: HD, 115-lb, M70A1
Bomb, Gas, Persistent: HD, 125-lb, M113
Bomb, Gas, Nonpersistent: CG or CK, 500-lb, AN-M78
Bomb, Gas, Nonpersistent: CG, AC, and CK, 1,000-lb, AN-M79
Bomb, Fire External, 750-lb, M116
Bomb, Smoke, WP, 100-lb, AN-M47A1
Bomb, Smoke, WP, 100-lb, AN-47A2
Bomb, Photoflash: 100-lb, AN-M46
Bomb, Target Identification, 100-lb, M84A1
Bomb, Target Identification, 250-lb, all models
Bomb, Leaflet, Empty: 100-lb, M104
Bomb, Leaflet, Empty: 500-lb, M105
Bomb, Practice, 23-lb,
Bomb, Practice, 100-lb, M38A2

Cluster, Fragmentation Bomb: 500-lb, M26A1
Cluster, Incendiary Bomb: NP, 100-lb, M12
Cluster, Incendiary Bomb: NP, 500-lb, M13
Cluster, Incendiary Bomb: IM or NP, 500-lb, M19
Cluster, Incendiary Bomb: IM or NP, 500-lb, M19A2
Cluster, Incendiary Bomb: PT1, 500-lb, M20
Cluster, Incendiary Bomb: PT1, 500-lb, M20A1
Cluster, Incendiary Bomb: IM and NP, 500-lb, M21
Cluster, Incendiary Bomb: TH3, 500-lb, M22
Cluster, Incendiary Bomb: TH3, 500-lb, M22A1
Cluster, Practice Bomb: M5

Fuze, Bomb Nose, M2
Fuze, Bomb Nose, M103 (modified for instantaneous action only)

Fuze, Bomb, Nose, AN-M103
Fuze, Bomb, Nose, AN-M103A1 (modified for instantaneous action only)
Fuze, Bomb, Nose, M108
Fuze, Bomb, Nose, M110A1
Fuze, Bomb, Nose, M164, M165
Fuze, Bomb, Nose, M171
Fuze, Bomb, Nose, Mechanical Time, M111A2
Fuze, Bomb, Nose, Mechanical Time, M138
Fuze, Bomb, Nose, Mechanical Time, M144
Fuze, Bomb, Tail, M151 and Device, Antiricochet, M16 and M17
Fuze, Bomb, Tail M167
Fuze, Bomb, Tail M169

Adapter-Booster, Bomb, Tail, T46E1, T46E2, T46E3
Burster, Bomb, AN-M14
Burster, Bomb, M26A1
Igniter, Fuze: AN-M5
Primer-Detonator, Fuze, Bomb, M40

Adapter, Cluster, M4
Adapter, Cluster, M7
Adapter, Cluster, M10
Adapter, Cluster, M10A1
Adapter, Cluster, M12
Adapter, Cluster, M17
Adapter, Cluster, M18
Adapter, Cluster, M23
Adapter, Cluster, M23A1
Adapter, Cluster, M24A1
Fin Adapter C3
Fin Assembly, Bomb, M102, M102A1
Fin Assembly, Bomb, M118, M118A1
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Fin Assembly, Bomb, T135E7
Fin Assembly, Bomb, M133 (T154E3)
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Fire Bomb Repair Parts Kit M19

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3-500 (KA, LA) (2)
5-5 (2)
5-500 (2)
9-500 (KA, KB, KC, LA) (2)

NG: State AG (3); units—same as active Army except allowance is one copy each.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

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