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DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TM 3-400
TO 39B-15C-1

S/S by 3-400 May 57

CHEMICAL BOMBS AND CLUSTERS

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CHEMICAL BOMBS AND CLUSTERS



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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This manual covers standard, substitute standard, and limited standard chemical bombs, clusters, and their components. It describes the supply, storage, surveillance, servicing, issue, handling, and preparation for use of all standard, substitute standard, and limited standard chemical bombs, clusters, and components procured, stored, and issued by the Chemical Corps and/or Air Force. Fuzes and certain other components of these bombs and clusters are the responsibility of the Ordnance Corps. Such ordnance items are included in data tables and are illustrated in this manual to facilitate reference, identification, and comparison.

2. Purpose

The purpose of this manual is to supply information of a technical nature and to provide comprehensive reference data on all standard, substitute standard, and limited standard chemical bombs, clusters, and their components. Chemical bombs, clusters, and components of experimental status have been excluded.

3. Appendixes

Four appendixes supplement this manual. Their contents and applications are described separately.

a. Appendix I. The first appendix lists pertinent references to manuals and other official publications directly applicable to the care, handling, and use of chemical bombs, clusters, and components discussed in this manual.

b. Appendix II. The second appendix describes the contents and use of the M13 Chemical Bomb Service Kit in the detection and repair of leaks in nonpersistent gas bombs.

c. *Appendix III.* The third appendix describes the tool requirements, procedure, and surveillance recommendations for venting persistent gas bombs.

d. *Appendix IV.* The fourth appendix consists of seven tables of pertinent data, one table each for the incendiary bombs, gas bombs, smoke bombs, incendiary bomb clusters, fuzes, bursters, and igniters included in this manual. These tables can be used for identification, round information, shipping information, or cross-reference to determine the use of a component.

4. Classification

Ammunition is classified according to use as service, practice, blank, or drill (or dummy). It may also be classified according to type of filling as chemical, explosive, training, or inert. Chemical bombs are classified according to type of filling as incendiary, gas, or smoke.

5. Accident and Malfunction Reports

Reporting of accidents and malfunctions is required in accordance with SR 385-310-1/AFR 50-13 and AFR 136-9. Leaking chemical ammunition must be reported by Army units in accordance with Ordnance Safety Manual (ORD M7-224). Air Force units will report direct to CG, ADF, WPAFB, Attn: MCMQXM, Dayton, Ohio. Air Force reports are to be by teletype and are exempt from reports control symbols.

6. Destruction

Destruction of chemical bombs, clusters, and components may be necessary because of retrograde movements, leaking bombs, or other conditions. Special precautions must always be observed when toxic chemical bombs are to be destroyed. Appropriate emphasis must be placed on safety precautions necessary to protect servicing troops.

a. *Retrograde Movement.* In a retrograde movement, bombs, clusters, and components which cannot be evacuated must be destroyed or rendered useless to prevent use or study by the enemy. The method used depends upon the type of bomb, cluster, or component to be destroyed or rendered useless, the particular tactical situation, and the facilities available for personnel protection.

- (1) *Gas bombs.* Field demolition of gas bombs presents numerous and varied problems. Under conditions where field destruction is not practicable, bombs may be rendered useless and abandoned. Bombs cannot be used by the enemy if the firing components, such as fuzes and bursters, are removed. Damaging fuze threads will also

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render bombs unusable. If gas warfare is initiated, abandoned bombs may be wired for delayed detonation and used against the enemy. Such action requires detailed meteorological and tactical intelligence and planning. Destruction or disposal of fillings of persistent and nonpersistent chemical bombs is covered by TB CW 22/TO 39B-15AJ-1, TB CW 33/TO 39C-30A-4, and TM 3-250/TO 39C-5-3.

- (2) *Other bombs and components.* Incendiary bombs, incendiary bomb clusters, and chemical bomb components may be destroyed by burning or by demolition. Fires in storage areas may be started with AN-M14 incendiary grenades. Demolition at strategic points may be accomplished by blocks of TNT. Destruction of ammunition in the Continental United States is covered by TM 9-1900/TO 39B-1-3. Destruction of bombs and components is covered by TM 9-1980/TO 39B-15-1. Safety regulations to observe when destroying chemical ammunition are covered by ORD M7-224.

b. Leaking Bombs. Leaking bombs that cannot be repaired (app. II) must be destroyed and reported as directed in the publications listed in *a*(1) and (2) above.

c. Unserviceable Items. Bombs, clusters, and components which are unserviceable must be destroyed as directed in the publications listed in *a*(1) and (2) above. Items unserviceable because of malfunctioning must be reported in accordance with SR 385-310-1/AFR 50-13.

Section II. BOMB IDENTIFICATION

7. General

Bombs, adapters, clusters, and their components are identified by standard nomenclature, model number, and ammunition lot number. These identifications are stenciled or stamped on all packings and, where size permits, on the item itself. The color of the bomb body and the bands around it are a means of identifying the classification and type of filling (par. 11).

8. Nomenclature

Standard nomenclature is established in order that each item stored and issued may be identified by name. The nomenclature consists of the name, type, filling, weight, and model designation

of the item. The use of standard nomenclature is mandatory for purposes of record. The following is an example of standard bomb nomenclature:

(Name)	(Type)	(Filling)	(Weight)	(Model)
Bomb,	smoke,	WP,	100-pound,	AN-M47A4

9. Model Number

To distinguish between different designs of the same type, a model number is assigned at the time a design is adopted as standard. The model designation consists of the letter "M" followed by an Arabic numeral. Modifications of the original design are indicated by suffixing the letter "A" and the appropriate Arabic numeral to the model designation. For example, M47A4 designates the fourth modification of the bomb originally adopted as M47. When both the Army and Navy have accepted the standardization of an item, the prefix "AN—" is placed before the model designation. Thus, AN-M47A4 indicates acceptance of the M47A4 as an Army-Navy standard. Items of Navy design are designated by Mark (Mk) instead of model and their modifications by Mod, for example: AN-Mk 24 Mod 2. No Navy design items are included in this manual.

10. Lot Number

A lot number is assigned, in accordance with pertinent directives, when ammunition is manufactured. The number designates a quantity of ammunition items which have been manufactured under conditions as nearly identical as possible and which may be expected to function uniformly. The lot number consists of a series of letters and numerals representing the loader's symbol or initials, the lot designation, and the date loaded. The lot number is required for purposes of record involving the particular ammunition, especially reports on condition, malfunctioning, or accidents. The following is an example of an ammunition lot number:

(Symbol or initials)	(Lot number)	(Date)
EA	Lot 345678	9-51

11. Color Markings

Color and contrasting color markings are used to designate bomb and cluster classification and filling type. The color of a bomb or cluster identifies its ammunition classification as chemical, explosive, training, or inert. The bodies of chemical bombs and clusters are painted gray. The magnesium alloy portion of

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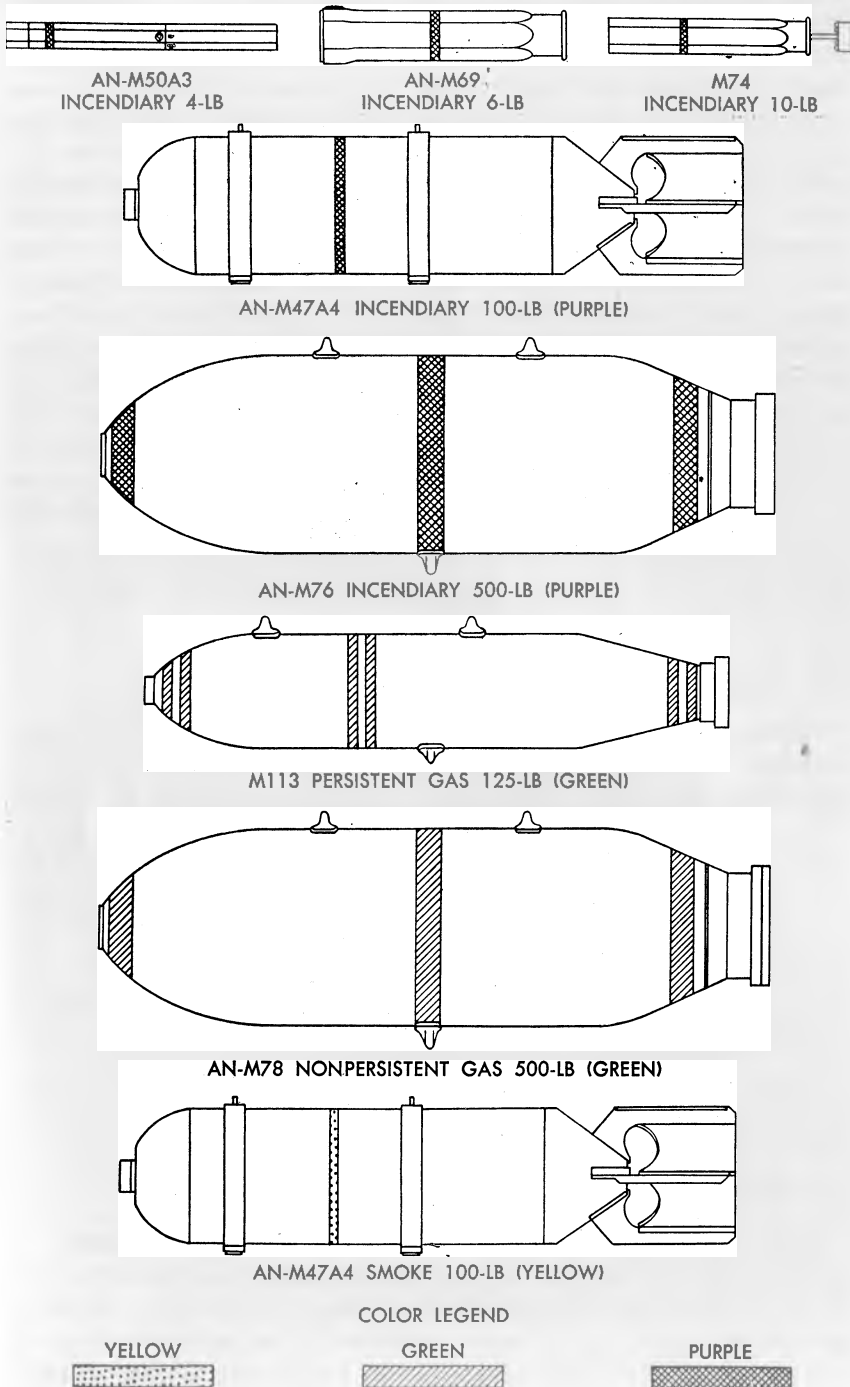


Figure 1. Color markings.

small incendiary bombs is left unpainted but is of a grayish color. The contrasting colors of the bands or stripes on the bomb or cluster designate the filling types. For chemical bombs and clusters the color markings are purple for incendiary, green for gas, and yellow for smoke. Those incendiary bombs containing an element such as an explosive charge to hinder defensive measures have a red band in addition to the other markings. Nonpersistent chemical bombs of the 115-pound nominal size and smaller have only one identification band around the middle of the bomb. Larger nonpersistent chemical bombs have three identification bands, one at the nose, middle, and tail cone. Persistent gas bombs have double identification bands, the smaller ones having a pair near the middle, and the larger ones having six bands, a pair at the nose, middle, and tail cone. A chemical cluster may be identified by the casing color and color of the bands around it or the stripes on its nose surface. If the cluster adapter does not completely cover its contents, the contained bombs and their identification bands are sufficiently exposed to be noted. Examples of identification bands are shown in figure 1.

12. Shipping Name

Interstate Commerce Commission (ICC) Freight Tariff and pertinent Armed Services regulations require that each item of ammunition offered for shipment by common carrier be labeled (par. 40) with the shipping name or dangerous commodity designation assigned by the Bureau of Explosives. Examples of such names are DANGEROUS, EXPLOSIVES, POISON GAS, and FIREWORKS. The regulations set forth in AR 55-155 and pertinent Armed Services publications are described in TM 3-250/TO 39C-5-3 and are listed for convenient reference in SB 3-24/TO 00-25-104.

Section III. BOMB CHARACTERISTICS

13. General

Chemical bombs are a specific kind of munitions designed to be dropped from aircraft. By chemical action, they may produce screening smokes, incendiary action, or toxic effects. A chemical bomb consists of a metal container (the bomb body) with incendiary, gas, and/or smoke filling; tail fins to stabilize flight; a fuze (or fuzes) for ignition or detonation; and other components required to make it function. Employment and characteristics of chemical bombs and clusters are discussed in FM 3-6.

The chemical bombs included in this manual are described in chapter 2.

14. Complete Round

A complete round consists of all the components necessary for the ammunition to function in the manner intended. Strictly speaking, a complete round includes only the required components. For purposes of supply, however, a round as issued may include alternate components to provide flexibility. Round data for the bombs and clusters described in this manual are given in tables II through V, appendix IV. These tables list the filling, fuze(s), burster, igniter, adapter-boosters, arming wire, tail fin assembly, and/or cluster adapter required per round.

15. Bomb Bodies

The bomb body is the metal container that holds the filling. Chemical bomb bodies may be divided into two categories, small and large. For purposes of description, the bodies of the 4-, 6-, and 10-pound bombs will be regarded as small, while all others will be regarded as large. Examples are shown in figure 2.

a. Small Bodies. Bodies of small bombs are usually hexagonal in cross section. The flat sides provide packaging stability when bundled in adapters for dropping in clusters. Small bomb bodies are made of magnesium alloy and/or steel. Magnesium alloy bomb bodies are incendiary, the body itself constituting the main charge of the bomb. Steel bomb bodies act only as containers for the filling and as supports for the components.

b. Large Bodies. Chemical bombs of the 100-pound nominal size and larger have cylindrical steel bodies with rounded or ogival noses and tapered rear sections. The body serves as the filling container and as the support for the components. For bombs in which internal pressures are not critical, the body is made from thin sheet steel. Other bomb bodies may be forged or cast. Internal pressures generated in gas bombs, for example, may prohibit the use of thin bodies. Bombs not normally clustered have suspension lugs attached to their bodies. Two lugs, attached by suspension bands, are provided on 100-pound nominal size bombs. Three lugs, welded to the body, are provided for the larger bombs. Two are on one side, properly spaced from the bomb center of gravity, and one on the opposite side, near the bomb center of gravity. The single lug is for use with some obsolescent U. S. Navy bomb racks and for use in British aircraft. Bomb shackles and racks on U. S. Air Force and latest U. S. Navy aircraft use the two lug arrangement. When 100-pound nominal size chemical

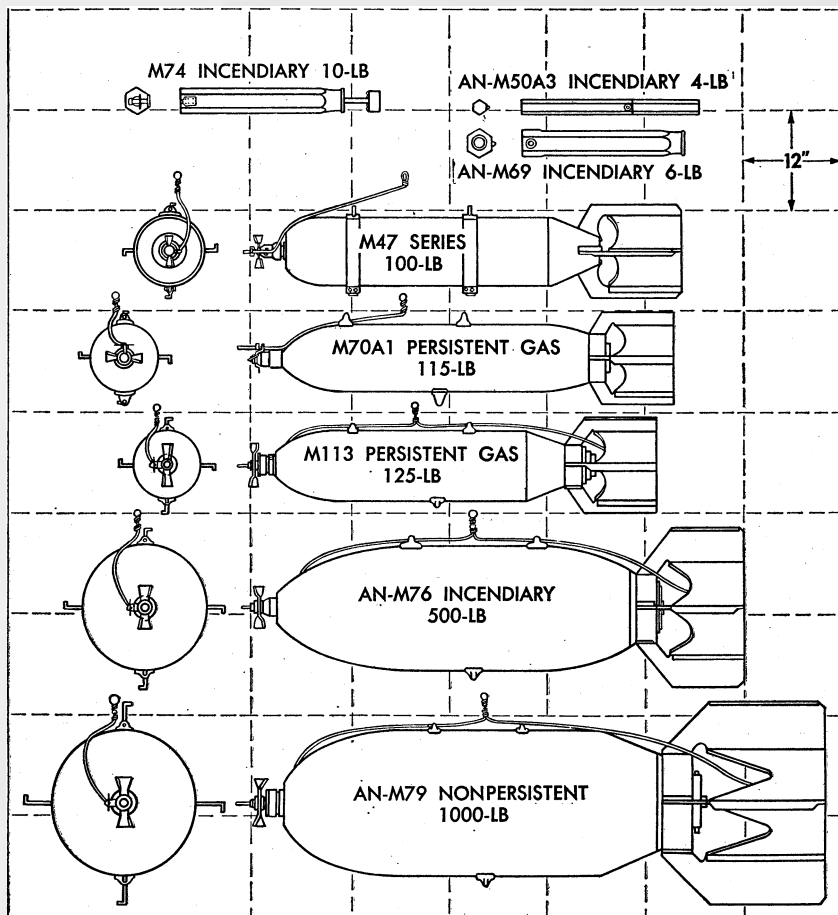


Figure 2. Bomb bodies.

bombs are to be carried by one lug it is necessary to move one suspension band to the bomb's center of gravity.

16. Filling

Chemical bombs for operational use are filled with incendiary, gas producing, or smoke type materials. Examples of fillings are—

Incendiary fillings:

IM (Isobutyl methacrylate)
NP (Napalm-incendiary oil)
PT1 (Incendiary mixture)
TH (Thermate)

Nonpersistent gas fillings:

AC (Hydrocyanic acid)
CG (Phosgene)
CK (Cyanogen chloride)
(G agent)

Smoke fillings:

PWP (Plasticized white phosphorus)
WP (White phosphorus)

Persistent gas fillings:

H (Mustard)
HD (Distilled mustard)

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A nonpersistent gas is one that is normally effective in the field at its dispersion point for 10 minutes or less. A persistent gas is one that is normally effective in the field at its point of dispersion for more than 10 minutes. Further divisions are moderately persistent, effective for 10 minutes to 12 hours and highly persistent, effective for more than 12 hours. For incendiary bombs having a magnesium alloy body, the chemical filling is TH (thermate 64C) igniting charge, while the magnesium alloy acts as the main incendiary charge. The fillings used in the bombs included in this manual are listed in tables II through IV, appendix IV. Characteristics of chemical bomb fillings are covered by TM 3-250/TO 39C-5-3.

17. Fin Assembly

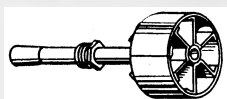
Tail fin assemblies are provided to develop stability in flight for bombs and clusters. Small chemical bombs either have no tail fin assemblies, have fabric tail streamers, or have retractable tail fin assemblies. Incendiary and smoke bombs of the 100-pound M47 series have tail fins permanently welded to their bodies. All other chemical bombs and all aimable clusters have detachable tail fin assemblies which are secured by a fin lock nut. Frame (quick-opening) and cable type clusters have no tail fin assemblies. The fin assemblies used on bombs and clusters included in this manual are listed in tables II through V, appendix IV. Examples are shown in figure 3. Fin assembly and lock nut data are given in TM 9-1980/TO 39B-15-1. Fin assemblies and lock nuts are cataloged in ORD 3 SNL S-3.

a. Description. Tail fin assemblies, except the detachable type, are described with their respective bombs. The detachable type fin assembly consists of a sleeve and four sheet metal vanes. The sleeve fits over the bomb rear section and is held in place by a lock nut. The vanes are riveted or spot welded to the sleeve and, with their supporting braces, form stabilizing surfaces.

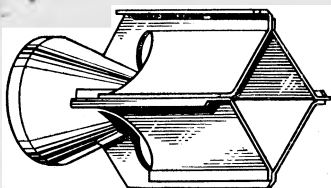
b. Precautions in Assembly. Tail fin assemblies must be handled and installed so as to avoid bending or damage that would cause erratic flight of bombs or clusters. Before installing fins all seating surfaces and threads must be cleaned. One vane must be lined up accurately with the suspension lugs. Lock nuts must be tightened securely, but not so that distortion in fin vanes and supports is developed.

18. Fuzes

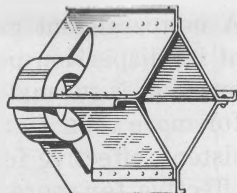
A fuze is a device that initiates detonation or ignition. Fuzes are classified according to location, arming, and action. Two



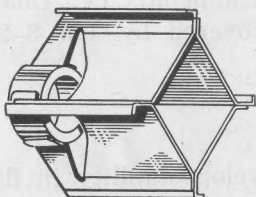
M74 BOMB



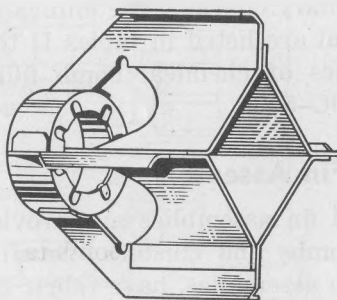
M47 BOMB



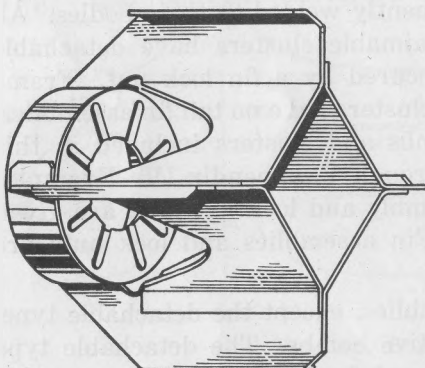
M70A1 AND M70 BOMBS



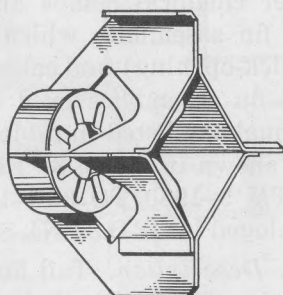
M113 BOMB



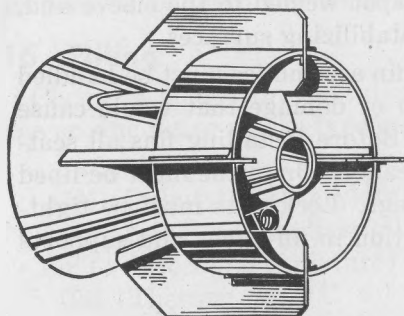
AN-M76 AND
AN-M78 BOMBS



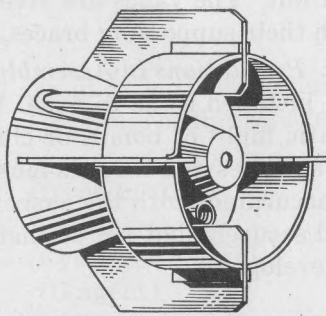
AN-M79 BOMB



M10A1 AND M10 ADAPTERS



M23A1 AND M23 ADAPTERS



M25 AND M26 ADAPTERS

Figure 3. Fin assemblies.

fuzes are sometimes used to provide flexibility in use or insurance in case one fuze fails to function. In addition to their markings, fuzes may be identified by visual inspection through noting differences in design as shown in figures 4 and 5. Table VI, appendix IV contains data on fuzes used with bombs and clusters included in this manual.

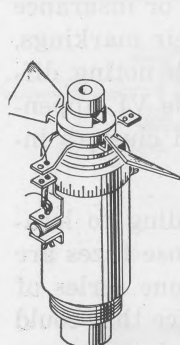
a. *Location.* Fuzes are primarily classified according to location on the bomb or cluster as nose, body, or tail. Nose fuzes are shown in figure 4 and tail fuzes in figure 5. Only one series of bombs included in this manual has an activating device that could be classified as a body fuze. This series has an arming plunger integral with the bomb body, a firing pin, and a primer, but has no separate fuze assembly that is procured, shipped, stored, or issued as an assembled unit. Hence, it is not individually illustrated. Its primer is listed in table VI, appendix IV under tail fuzes because it is located nearer the bomb tail than the nose.

b. *Arming.* Fuzes are also classified as arming pin type or arming vane type according to their method of arming. These categories are further classified, according to arming time intervals, as direct arming or delayed arming.

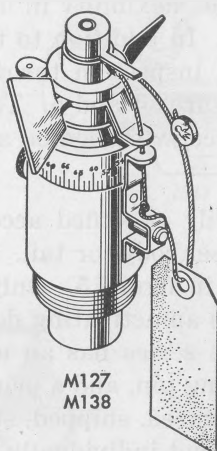
- (1) *Direct arming.* Direct arming is accomplished immediately upon arming pin ejection or by arming vane rotation.
- (2) *Delayed arming.* Delayed arming is accomplished when arming pin ejection initiates a powder train or clockwork mechanism which arms the fuze after a predetermined time, or when the arming vane actuates the arming stem through a reduction gear train.

c. *Action.* Fuzes are further classified according to type of action as time, impact, hydrostatic, or VT. A fuze in which the detonator is out of line with the firing pin and booster lead until armed is classed as a detonator safe fuze. The bombs included in this manual have impact fuzes, while the aimable clusters have time fuzes. One exception is an authorized alternate mechanical time fuze to provide an air burst for a large gas bomb. No hydrostatic or VT fuzes are used with the bombs and clusters included in this manual.

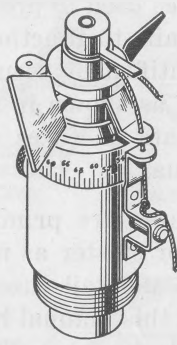
- (1) *Time fuzes.* Time fuzes function to detonate the bomb upon expiration of a selected number of seconds after release. The mechanism of a time fuze is similar to an alarm clock. A notched disk under the trigger is rotated by clockwork. When the time set has elapsed, the trigger drops into the notch and releases a spring-loaded firing



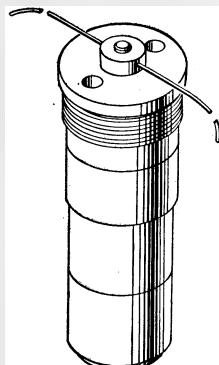
AN-M145



M127
M138

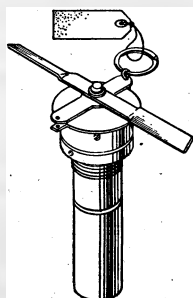


M155

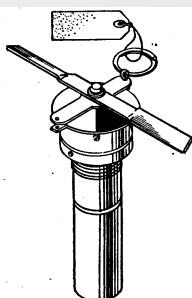


M142A1

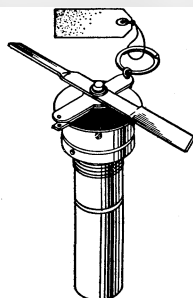
CLASSIFICATION DESIGNATED
RESTRICTED WAS ELIMINATED
BY AUTHORITY OF DA CIRCULAR 127,
DTD 23 DEC 1953, PARA # 3, SECT # 1.



AN-M103A1
AN-M103
M163



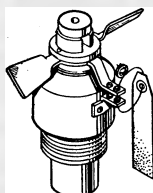
AN-M139A1
M164



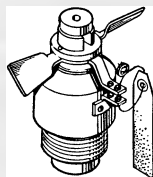
AN-M140A1
M165



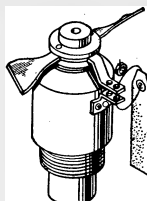
M1



AN-M110A1



AN-M126A1



AN-M158



AN-M159

Figure 4. Nose fuzes.

pin. The fuze is generally set for the interval desired when the round is assembled, but if the timing control is accessible its setting may be changed any time before the bomb is released.

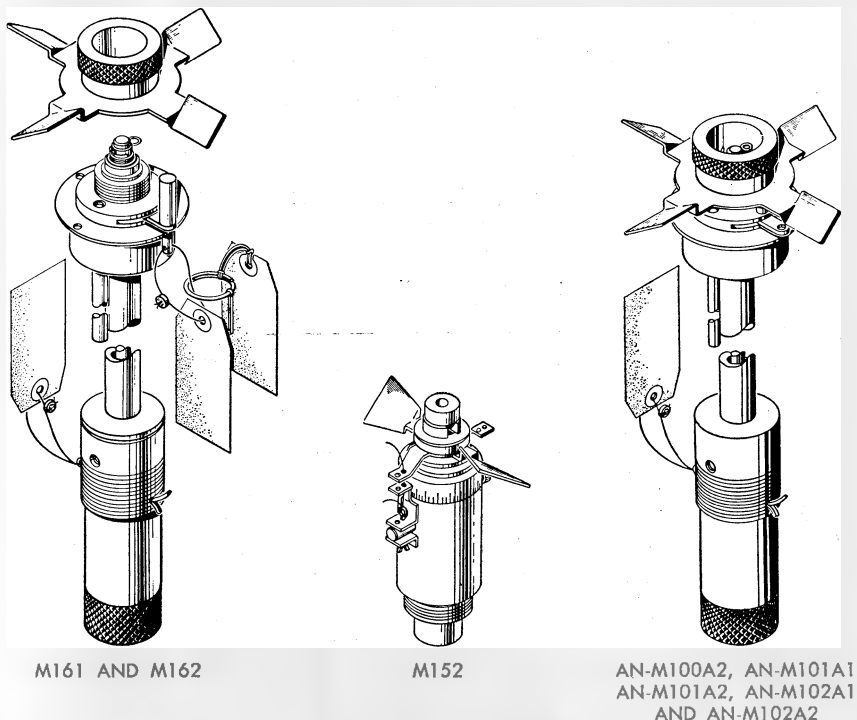


Figure 5. Tail fuzes.

- (2) *Impact fuzes.* Impact fuzes function when the bomb strikes a resistant material. Fuzes classed as instantaneous, superquick or nondelay explode the bomb immediately. Those classed as delay fuzes have an element which delays detonation until a definite time has elapsed. For chemical bombs this delay is generally very short. The delay gives the bomb time to penetrate the target or allows low-flying aircraft time to clear the area.

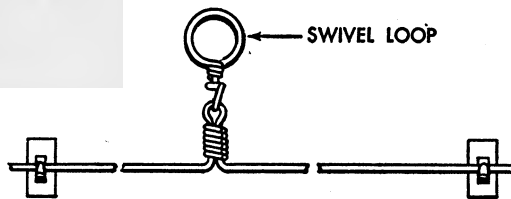
d. *References.* Detailed information on fuzes is presented in TM 9-1980/TO 39B-15-1. Fuzes are cataloged in ORD 3 SNL S-2.

19. Arming Wire Assembly

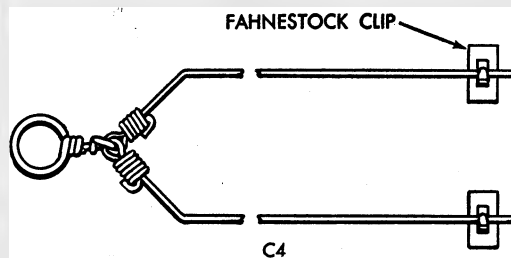
Arming wires prevent fuze arming while the bomb is being flown to the release point. An arming wire assembly consists of one or more lengths of brass wire attached to a swivel loop and has Fahnestock safety clips installed at the ends to prevent accidental removal. A bomb or cluster with only one fuze has a single wire assembly, with a swivel loop at one end and a safety clip at the other. Where two fuzes are used, the swivel loop is near the middle of a dual wire assembly and branch wires, with safety clips



M2, M3, C5, C1



M5, M7, M1A1



C4

Figure 6. Arming wires.

at the ends, extend to each fuze. Arming wire assemblies are listed in tables II through V, appendix IV. The three types are shown in figure 6. Arming wire data are given in TM 9-1980/TO 39B-15-1. Arming wires are cataloged in ORD 3 SNL S-3. For shipping and storage purposes, arming wire assemblies are normally packaged in an envelope attached to the lid of a bomb or cluster component shipping container.

20. Clusters

A bomb cluster is an assembly of several bombs. Various bomb combinations are often used to develop desired effects or to deny counteraction. A cluster adapter is used to hold the bombs together and to support the components required for a complete round. Bomb clusters are classified as quick-opening, aimable, or cable, according to the type of adapter used. Table V, appendix IV gives the cluster components included in this manual. The adapter bundles and/or encases the bombs into a unit which can be carried on aircraft at a station for one bomb. Clusters are the only instance in which it is permitted to ship and store fuze bombs. Consequently, exceptional precautions must be exercised in the care and handling of clusters. Clusters are described in chapter 4.

Section IV. BOMB CLUSTER ADAPTERS

21. General

A cluster adapter is a mechanical device by which several bombs are suspended from the aircraft station for one bomb. Adapters assemble bombs into a more effective missile and are of three types: quick-opening, aimable, and cable. Adapters are described in detail in chapter 3 and are listed in table V, appendix IV. Adapters are cataloged in ORD 3 SNL S-3.

22. Quick-Opening

The quick-opening (frame) type adapter consists of a frame in which several bombs are held together by steel straps, thus forming an assembly that may be suspended and released as a unit. The straps are secured with buckles which are unfastened by withdrawing the arming wire, allowing the cluster to open and free the bombs. Since adapter frames fall more slowly than the bombs, they constitute a menace to following (formation) aircraft.

23. Aimable

The aimable type adapter consists essentially of a streamlined metal body to contain bombs, a tail fin assembly to stabilize flight, an arming wire, and a time fuze to open the adapter casing. Because of its streamlining and tail fin assembly, this cluster has aimable characteristics; its flight is more predictable than that of the quick-opening type.

24. Cable

The cable type adapter consists of a set of hook and cable assemblies, by which several bombs may be suspended from the same aircraft bomb station. A hanger and yoke assembly is provided by which arming wires of the individual bombs may be withdrawn. This adapter is normally used for bombs of the 100-pound nominal size or larger. This system of clustering also applies to other than chemical bombs. Aside from figure 7, which shows an M24A1 cable type adapter, no cable type clusters or adapters are described in this manual. Illustrations, data, and detailed descriptions of other cable type bomb cluster adapters are given in TM 9-1980/TO 39B-15-1.

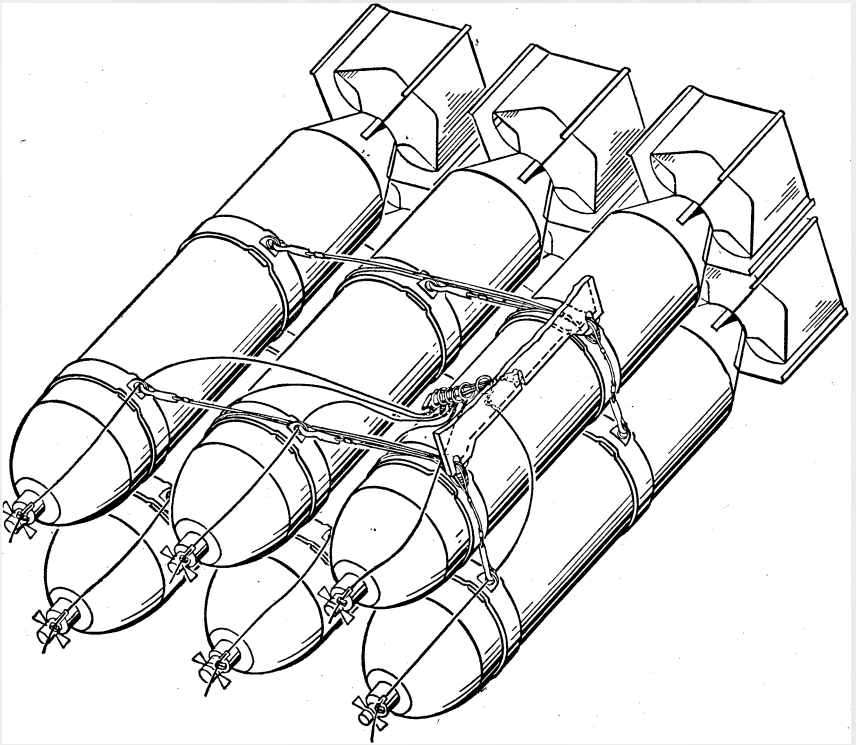


Figure 7. Cable type cluster adapter M24A1.

Section V. OTHER BOMB COMPONENTS

25. General

Other components of chemical bombs and clusters included in this manual are adapter-boosters, fuze seat liners, bursters, and igniters.

26. Adapter-Booster

An adapter-booster is a device by which smaller fuzes can be mounted in larger fuze cavities. It is essentially a reducing bushing, threaded on the outside for assembly in the bomb body and on the inside for receiving the fuze, and an auxiliary explosive charge. The adapter-boosters included in this manual are listed in tables II and III, appendix IV. Adapter-boosters are cataloged in ORD 3 SNL S-2 and are described and illustrated in TM 9-1980/TO 39B-15-1. Shipments of adapter-boosters are labeled EXPLOSIVES.

RESTRICTED—Security Information

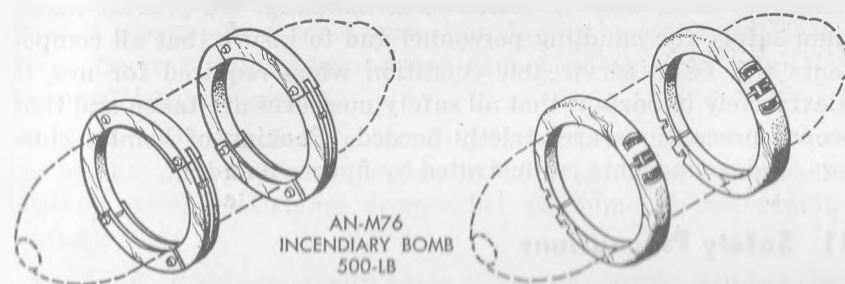
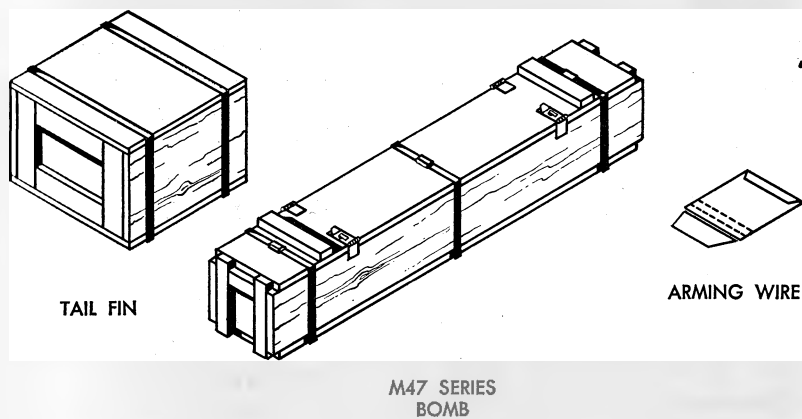
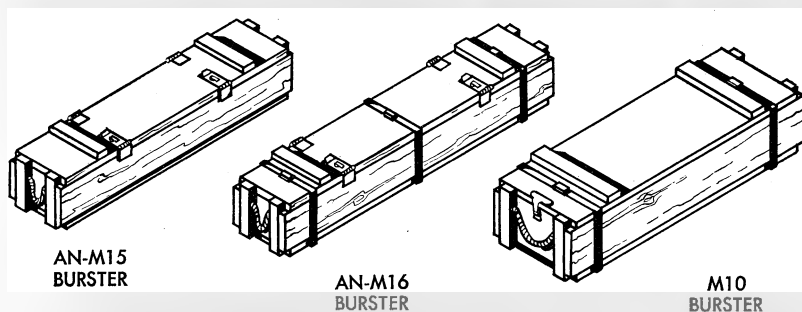
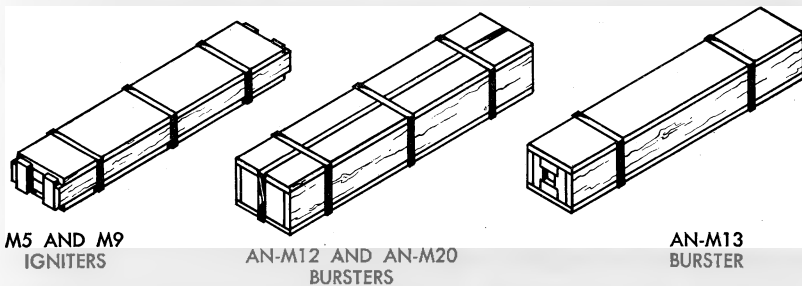


Figure 8. Packing of bombs and components.

27. Fuze Seat Liner

A fuze seat liner is a metal cup used inside the bomb nose or tail to keep the cavity clear for installing a fuze. Fuze seat liners should be rotated in their receiving cavities until fully seated. Of the chemical bombs included herein, only the 500- and 1,000-pound sizes have nose fuze seat liners. Descriptions, illustrations, and data on fuze seat liners are given in TM 9-1980/TO 39B-15-1. Liners are cataloged in ORD 3 SNL S-3.

28. Burster

A burster is an explosive charge used to open a bomb and spread its filling. It fits into either the burster well or igniter cavity. The bursters for bombs included in this manual are described in paragraphs 89 through 97 and are listed in tables II, III, IV, and VII, appendix IV. Bursters are cataloged in ORD 3 SNL S-2. Shipments of bursters are labeled EXPLOSIVES.

29. Igniter

An igniter is a charge for igniting incendiary bomb fillings. For incendiary bombs the igniters used are cylinders of annular cross section, which fit around the burster in the burster well. On fire bombs the igniters are mounted externally or in the filler neck. Igniters are described in paragraphs 98 through 102 and are listed in tables II and VIII, appendix IV. Shipments of igniters are labeled either EXPLOSIVES or DANGEROUS.

Section VI. BOMB HANDLING

30. General

Bombs, clusters, and their components are packed to withstand conditions ordinarily encountered in handling. To provide maximum safety for handling personnel and to insure that all components will be in serviceable condition when required for use, it is extremely important that all safety measures are taken and that proper precautions are strictly heeded. Packing of bombs, clusters, and components is illustrated by figures 8 and 9.

31. Safety Precautions

In addition to the specific safety precautions given under the discussion of each bomb, cluster, or component, the following general rules and precautions should be practiced at all times:

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a. Storage. Store bombs, clusters, and components as shipped and only with items of like classification (par. 32).

b. Unpacking. Do not unpack bombs, clusters, or components until they are required for use, inspection, or surveillance.

c. Assembly. Do not assemble complete rounds of bombs or clusters in advance of requirements.

d. Disassembly. Disassemble and return to storage all rounds prepared for use but not used. Disassemble the items in reverse order of the assembly procedure. Replace safety cotter pins, striker stops, and/or sealing wires in fuzes before removal. Apply a light coat of grease to all threads. Replace nose plugs, shipping plates, covers, and all protective items. Repack and return components to storage.

e. Arming Wire. Keep arming wire assembly in place until bomb or cluster is released. If round is disassembled, keep arming wire in place until fuze safety devices are replaced.

f. Fuze Safety Device. Keep fuze safety cotter pins, sealing wires, and striker stops in place and safety wires in cluster buckles until bomb or cluster has been loaded on aircraft bomb station.

g. Care. Handle bombs, clusters, and components as little as possible. Do not drop or subject them to bumps, shocks, or blows. Do not use hooks in handling.

h. Misuse. Do not use bombs, clusters, or components for any unauthorized purpose. Do not use bombs for rollers or any other mechanical application.

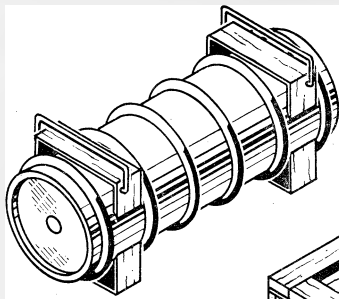
i. Lifting. Do not lift bombs, clusters, or components with electromagnets.

j. Broken Clusters. Destroy broken bomb clusters. If cluster bands or containers break in handling, disarm fuzes (if instructions state such action is permissible), remove bombs to a disposal area, and destroy. Do not attempt to reassemble clusters.

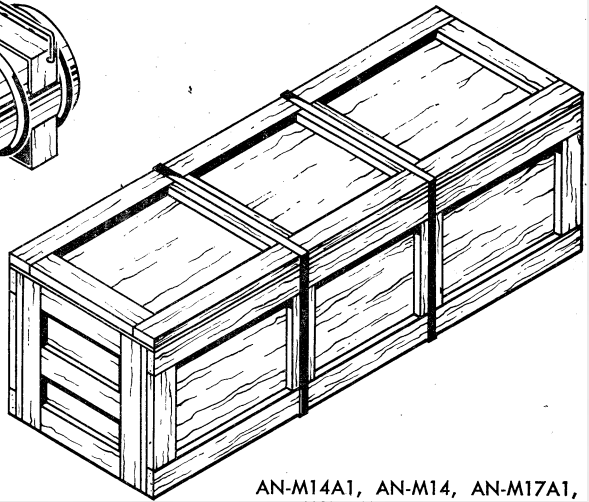
k. Leakers. Inspect gas bombs at frequent intervals for leakers. Provide adequate personnel protection during inspection and handling. Destroy leaking bombs that cannot be repaired (app II). Report all leakers (par. 5).

l. Toxic Gas Bombs. In handling operations involving toxic gas bombs, do not permit anyone to work alone, or to work in locations where assistance from other personnel is not readily available.

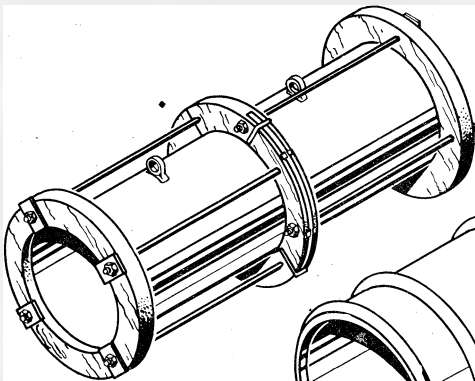
m. Wind Direction. Equip areas where gas bombs are handled or stored with wind direction indicators. Direct personnel to work on the upwind side whenever possible.



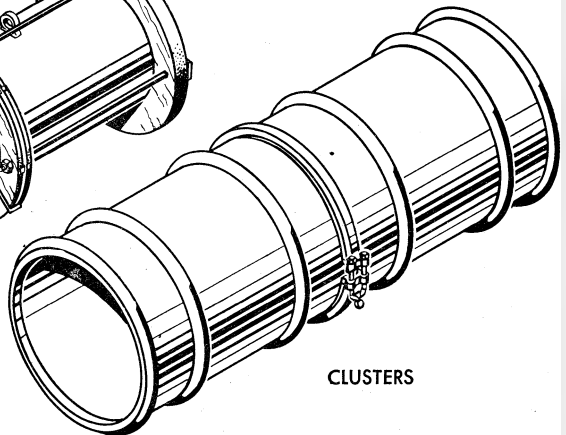
M12
QUICK-OPENING
CLUSTER



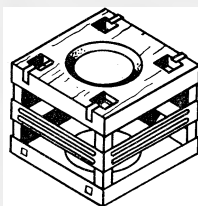
AN-M14A1, AN-M14, AN-M17A1,
M17, M22A1 AND M22
AIMABLE CLUSTERS



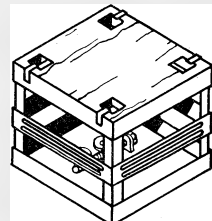
M31 AND M32
AIMABLE CLUSTERS



CLUSTERS



C3
TAIL FIN



M7
TAIL FIN

Figure 9. Packing of clusters and components.

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n. Protective Measures. Provide adequate supplies of protective equipment whenever gas bombs are to be handled. Supplies should include such items as protective masks, gloves, protective clothing, test papers, detector kits, first aid kits, proper tools, and decontaminating agents. Decontaminants that should always be made available are water, earth, lye, bleaching material, washing soda, and DANC solution. Consult TM 3-220/TO 39C-10B-1 and TM 3-250/TO 39C-5-3 for other proper decontaminants to be used.

o. Personnel Experience. Do not permit inexperienced personnel to handle gas bombs, except under the direct supervision of trained toxic gas handlers.

p. Accidents. If accident occurs when handling chemical bombs or clusters, sound warning to all nearby personnel.

q. Destroying Armed Fuzes. Accidentally armed fuzes should be destroyed at a position remote from other activities. An armed fuze is one which is in a condition to function. If the vanes of a vane arming fuze have not turned, it may be considered relatively safe.

Section VII. BOMB STORAGE

32. General

For storage purposes chemical ammunition is classified according to filling characteristics in four groups: A, B, C, and D. The groups are discussed below and, in greater detail, in TM 3-250/TO 39C-5-3, TM 9-1900/TO 39B-1-3, and ORD M7-224. Chemical ammunition is stored in an area set aside for chemical ammunition only. No other type of ammunition is stored in that area. Bombs, clusters, and components are stored as shipped, and only with items of like classification. Items shipped separately are stored separately. Storage groups and safety classifications for chemical munitions are listed in SB 3-24/TO 00-25-104. The storage of chemical agents and bulk chemicals is covered by TM 3-250/TO 39C-5-3. The four storage group classifications are—

a. Group A. Group A consists of persistent casualty agents, such as mustard (H) and distilled mustard (HD).

b. Group B. Group B consists of special purpose, nonpersistent casualty and smoke-producing agents (except WP), such as hydrocyanic acid (AC), phosgene (CG), cyanogen chloride (CK), and G agents.

c. Group C. Group C consists of spontaneously flammable chemicals, such as white phosphorus and plasticized white phosphorus (WP and PWP).

d. Group D. Group D consists of the incendiary and readily flammable agents, such as hexachloroethane-zinc oxide mixture (HC), isobutyl methacrylate (IM), napalm-incendiary oil or gasoline (NP), incendiary mixture (PT1), and thermate (TH).

33. Storehouse Types

Bombs should be stored in well ventilated buildings and should be kept as cool as possible. Dunnage should always be used. Tiers of bombs should be no higher than dictated by space limitations. An aisle at least 18 inches wide should be kept between rows. When stored in the open, chemical bombs and clusters should be protected from sun and rain. Storehouse requirements and descriptions for chemical ammunition storage groups are covered by TM 3-250/TO 39C-5-3 and ORD M7-224. Standard and igloo type warehouses and magazines are described in TM 9-1900/TO 39B-1-3. Open-sided shed and tree-shelter storage of nonpersistent gas bombs are described in TB CW 22/TO 39B-15AJ-1.

34. Storehouse Distances

Bomb storage areas and storehouses must be removed from each other and from operating areas, inhabited areas, public roads, utilities, and the like, in accordance with the regulations set forth in TM 9-1900/TO 39B-1-3 and ORD M7-224.

35. Dispersal

Chemical bombs, clusters, and components should be stored in a dispersed way that will provide optimum conservation of material in case of flood, fire, explosion, radiation, and attack. Storage distances are given in TM 9-1900/TO 39B-1-3 and ORD M7-224.

36. Surveillance

Surveillance may be defined as the observation, inspection, study investigation, test, and classification of ammunition, ammunition components, and explosives in storage, movement, and use with respect to degree of serviceability and rate of deterioration. To minimize loss and danger, stores of chemical bombs, clusters, and components should be inspected at frequent intervals. The references in table I should be consulted for surveillance recommendations and instructions.

37. References

Personnel responsible for storage of chemical bombs, clusters, and components must be familiar with the pertinent portions of the publications referred to in paragraphs 32 through 36, especially those listed in table I.

Table I. Surveillance Requirements Summary

Group	Filling	Routine inspection period	Monthly surveillance interval			Reference
			Pressure testing	Sampling	Venting	
A	H, HD	Monthly	None	None	Tropic 6 Temp 12	Appendix III
	AC	60 days	6	Tropical 2½ Temperature	6	TB CW 22/TO 39B-15AJ-1
	CG	60 days	Trop 2-3 Temp 6	6	Trop 2½ Temp 6	TB CW 22/TO 39B-15AJ-1
B	CK	60 days	6	6	6	TB CW 22/TO 39B-15AJ-1
	WP, PWP	Daily	Inspect for evidence of smoke			TM 3-250/TO 39C-5-3
		Annually	Leak tests by water immersion			
D	HC	Annually	None	Under 70° F. 16 70-90° F. 12 Over 90° F. 8	None	TM 3-250/TO 39C-5-3
	IM, NP	Under 70° F. 16 70-90° F. 12 Over 90° F. 8 (Months)	None	Under 70° F. 16 70-90° F. 12 Over 90° F. 8 (Months)	None	TB CW 29S13/ TO 39B-15E-3 TM 3-250/TO 39C-5-3
	PT1, TH	Annually	None	None	None	TM 3-250/TO 39C-5-3

Section VIII. BOMB SHIPPING**38. General**

Bombs, clusters, and components are shipped in accordance with shipping regulations set forth in AR 55-155, with safety regulations set forth in ORD M7-224, and in accordance with Interstate Commerce Commission (ICC) and pertinent Armed Services regulations. Persistent and nonpersistent toxic bombs are shipped under supervision of a guard detail as directed by AR 55-155 and/or TB CW 22/TO 39B-15AJ-1. Shipping containers and protectors for bombs, clusters, and components are shown in figures 8 and 9.

39. Classes

Safety classifications for ammunition are set forth in ICC Freight Tariff regulations and described in TM 9-1900/TO 39B-1-3, ORD M7-224, and other pertinent Armed Services regulations. Those classifications which are applicable to chemical munitions and which influence shipping of such items are listed in SB 3-24/TO 00-25-104. Classification of dangerous chemicals is discussed in TM 3-250/TO 39C-5-3.

40. Labels

Shipping labels for containers and warning placards for railroad cars are required in accordance with ICC Freight Tariff and pertinent Armed Services regulations. Those required for chemical munitions are listed in SB 3-24/TO 00-25-104. Those required for dangerous chemicals are discussed in TM 3-250/TO 39C-5-3.

41. Escort

Regulations establishing requirements for shipping escorts and guard details are covered by AR 380-5/AFR 205-1 and AR 55-155. Guard detail requirements and duties in connection with nonpersistent gas bomb shipments are covered by TB CW 22/TO 39B-15AJ-1.

42. Decontamination

Decontamination is covered in TM 3-220/TO 39C-10B-1 and TM 3-250/TO 39C-5-3. Common decontaminating agents that should be kept available are listed in paragraph 31*n*. The shipping guard detail is responsible for the decontamination of any spillage occurring during the transportation of gas bombs.

43. References

Personnel responsible for transportation of chemical bombs, clusters, and components must be familiar with the pertinent portions of the publications referred to in paragraphs 38 through 42. In addition, the shipping regulations and precautions set forth or outlined in TM 9-1900/TO 39B-1-3 should be followed. Shipping of chemical agents and bulk chemicals is covered by TM 3-250/TO 39C-5-3.

CHAPTER 2

CHEMICAL BOMBS

Section I. INCENDIARY BOMBS

44. AN-M50A3, 4-Pound

Data for this bomb are listed on line 44 of table II, appendix IV. The bomb is illustrated in figures 10 and 11.



Figure 10. Bomb, incendiary, 4-pound, AN-M50A3.

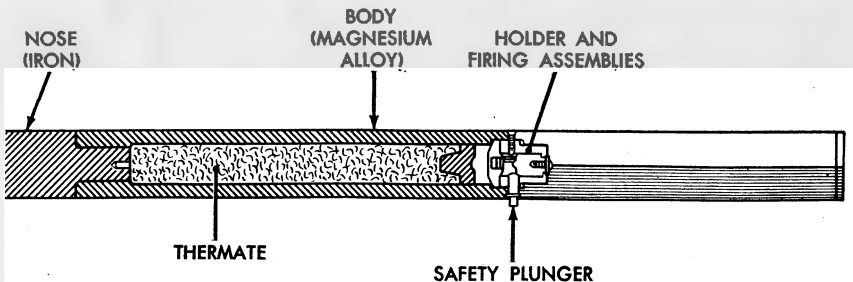


Figure 11. Bomb, incendiary, 4-pound, AN-M50A3.

a. Description. The AN-M50A3 bomb is hexagonal, with flat ends. It is $1\frac{5}{8}$ inches in diameter across the flat sides and $21\frac{11}{32}$ inches long. Actual weight is 3.7 pounds. The main components are—

- (1) *Body.* The bomb body main portion is magnesium alloy, with a cavity for holding the filling. A hollow sheet steel rear section and a solid steel nose give the bomb stability in flight and penetrating power.
- (2) *Filling.* The filling consists of approximately 9 ounces of thermate (TH) and a layer of FF-31 first fire charge, both contained in the hollow core of the magnesium alloy section. It is nonexplosive.

- (3) *Primer.* The primer is mixture 209B and is located in a gilding metal cup back of the first fire charge.
- (4) *Firing pin.* The steel firing pin, located back of the primer, is held in position by a firing pin holder.
- (5) *Safety plunger.* The steel safety plunger is mounted in the firing pin holder. When depressed it prevents firing pin forward motion. When external pressure is removed, a spring forces plunger outward, arming bomb.

b. Assembly. This bomb is completely assembled in manufacture and packed in clusters. Chapter 4 covers composition of clusters. Bombs are arranged so that all safety plungers are depressed by contact with other bombs in the cluster.

c. Functioning. Upon release from the cluster, safety plunger springs outward, arming the bomb. Upon impact, the firing pin is thrown forward, striking the primer. The primer flash ignites the first fire charge. The bomb body vent holes release ignition gases, thereby preventing an undesired explosion. The first fire charge ignites thermate filling. Thermate burns at approximately 4300° F. for about 2 minutes before igniting the magnesium alloy body, which burns more slowly. From time of ignition, bomb burns for approximately 10 minutes.

d. Safety Precautions. Safety precautions for clusters are given in chapter 4.

e. Marking. One purple band is painted near the bomb nose. Filling, model number, and lot number are stenciled in purple on the bomb body. Since markings are not required when bombs are clustered within 72 hours after filling, some may be unmarked.

f. Packing. This bomb is normally packed in clusters. Those used for training ammunition are packed in drums or wooden boxes.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations, and normally in clusters.

h. Storage. The M50 series incendiary bombs are normally stored in clusters in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

45. AN-M50A2, 4-Pound

Data for this bomb are listed on line 45 of table II, appendix IV. The AN-M50A2 bomb is the same as the AN-M50A3 (par. 44) except that it has FF-20 first fire charge instead of FF-31.

46. AN-M50T-A2, 4-Pound

Data for this bomb are listed on line 46 of table II, appendix IV. The AN-M50T-A2 bomb and its functioning are identical with the AN-M50A2 (par. 45) except for the toxic fire fighting deterrent added. In addition to the purple marking band, the AN-M50T-A2 has also a green band to indicate its toxic characteristics.

47. M50T-X-A3, 4-Pound

Data for this bomb are listed on line 47 of table II, appendix IV. The M50T-X-A3 bomb and its functioning are essentially the same as the AN-M50T-A2 (par. 46) except that, in addition to the toxic fire fighting deterrent, an explosive charge in the nose acts to deter fire fighting. This bomb is, therefore, of the explosive type and contains approximately an ounce less of thermate (64C) filling. It has one green, one purple, and one red identification band.

48. AN-M50X-A3, 4-Pound

Data for this bomb are listed on line 48 of table II, appendix IV. The bomb is illustrated in figure 12.

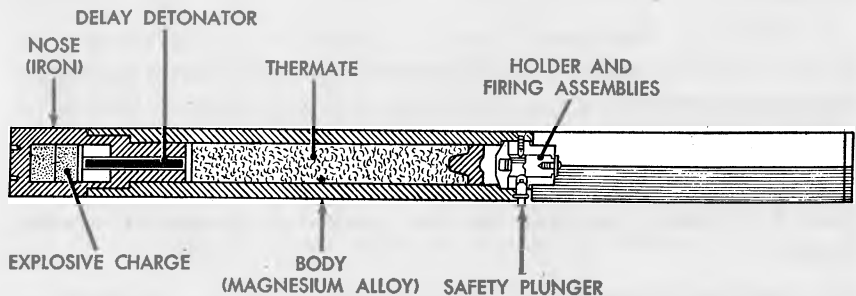


Figure 12. Bomb, incendiary, 4-pound, AN-M50X-A3.

a. Description. The AN-M50X-A3 bomb is the same as the AN-M50A2 (par. 45) except for the addition of an antipersonnel explosive element. This makes it an explosive type bomb. It contains approximately an ounce less of thermate (64C) filling. The explosive assembly is held in the nose of the bomb by a threaded plug and consists of a special delay detonator and an explosive charge of tetryl pellets held in a brass tube. The delay time is from 1½ to 5 minutes. All other components are identical with those of the AN-M50A2 bomb (par. 45).

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b. Assembly. This bomb is completely assembled in manufacture and packed in clusters. Chapter 4 covers composition of clusters. Bombs are arranged so that all safety plungers are depressed by contact with other bombs in the cluster.

c. Functioning. Functioning of the AN-M50X-A3 bomb is the same as AN-M50A3 (par. 44) with addition of the explosive action. In 1½ to 5 minutes after the bomb starts burning, the explosive element detonates. Effective radius of the HE element is approximately 50 feet, but harmful fragments may be thrown considerably farther.

d. Safety Precautions. The explosive characteristic of the AN-M50X-A3 bomb gives it a potentially greater hazard rating than nonexplosive incendiary bombs. If a cluster is broken, all bombs from the cluster should be handled alike. Safety precautions for clusters containing explosive incendiary bombs are given in chapter 4.

e. Markings. Markings for the AN-M50X-A3 bomb are one purple and one red identification band. The only *positive* way of distinguishing these explosive type bombs from the nonexplosive types, AN-M50A3 and AN-M50A2 (pars. 44 and 45), is *the presence of a steel screw cap in the nose* of the AN-M50X-A3 which indicates the insertion of the explosive element.

f. Packing. This bomb is normally packed in clusters.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations and normally in clusters.

h. Storage. This bomb is normally stored in clusters in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

49. AN-M69, 6-Pound, Oil

Data for this bomb are listed on line 49 of table II, appendix IV. The bomb is illustrated in figures 13 and 14.

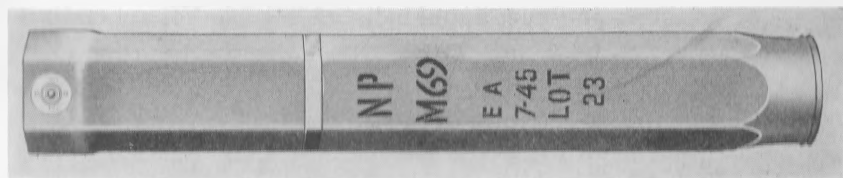


Figure 13. Bomb, incendiary, oil, 6-pound, AN-M69.

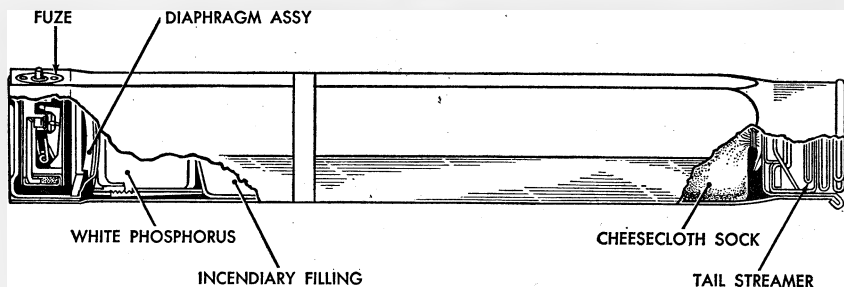


Figure 14. Bomb, incendiary, oil, 6-pound, AN-M69.

a. *Description.* The AN-M69 bomb is a tail ejection type, its contents being ejected through a tail opening. It is hexagonal with blunt ends. Bomb dimensions are $27\frac{3}{8}$ inches diameter across flat sides and $19\frac{1}{2}$ inches overall length. Actual weight is 6.1 pounds. The main components are—

- (1) *Body.* The bomb body is sheet steel, extending the entire bomb length and providing a leakproof filling container. The aft $11\frac{1}{2}$ inches of the body are drawn into a circular section.
- (2) *Nose cup.* A sheet steel nose cup forms a blunt nose and holds the fuze and two ejection powder containers.
- (3) *Diaphragm.* A sheet steel diaphragm, with a disk-shaped plug, forms a partition between the nose and WP cups.
- (4) *WP Cup.* A plastic WP cup fits between the diaphragm and bomb filling. It contains approximately 6 ounces of white phosphorus (WP).
- (5) *Tail cup.* A circular sheet steel tail cup fits into the circular rear section and is crimped on to form a leakproof seal.
- (6) *Filling.* The filling is held in a cheesecloth sack and consists of approximately 2.2 pounds of NP-thickened gasoline.
- (7) *Fuze.* The fuze is an M1 black powder impact arming pin nose type with a 3- to 5-second delay. Fuze components are safety plunger, striker pin, primer, and booster. They are assembled in the nose cup at manufacture. The fuze is shown in figure 4 and is listed in table VI, appendix IV.
- (8) *Ejection-ignition charge.* The ejection-ignition charge consists of a mixture of black powder and powdered magnesium contained in two cellulose nitrate bags fitted into the nose cup and located beside the fuze.
- (9) *Tail streamers.* The tail streamers consist of four lengths of muslin 3 inches wide by 7 feet long. They are held in

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the tail cup by a retainer and disk. The streamers stabilize bomb flight and regulate terminal velocity.

b. Assembly. This bomb is completely assembled in manufacture and packed in clusters. Chapter 4 covers composition of clusters. Bombs are arranged so that all safety plungers are depressed by contact with other bombs in the cluster.

c. Functioning. Upon release from the cluster, safety plunger springs outward, arming the bomb. Air stream causes tail streamers to extend, stabilizing bomb flight and regulating terminal velocity. Upon impact, the striker pin hits the primer and primer flash ignites the delay fuze. The delay fuze sets off the booster charge after a delay of 3 to 5 seconds. The two powder containers are detonated by booster charge and drive diaphragm plug through the diaphragm. Internal pressure developed shatters the WP cup and ejects it, the filling, the tail cup, and the streamers. Ejection-ignition charge ignites the filling and flaming chunks of gelled gasoline are thrown forcefully through the air. The flaming chunks break up when they strike objects and flaming pieces adhere to anything they contact. The pieces continue to burn from 8 to 20 minutes, depending upon size. The WP aids in the ignition of the filling and produces a smoke screen which deters fire fighting.

d. Safety Precautions. Safety precautions for clusters are given in chapter 4.

e. Marking. One purple band is painted near the bomb middle. Filling, model number, and lot number are stenciled in purple on the bomb body.

f. Packing. This bomb is normally packed in M19 clusters.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations and normally in clusters.

h. Storage. M69 series incendiary bombs are normally stored in clusters in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

50. M69X, 6-Pound, Oil

Data for this bomb are listed in line 50 of table II, appendix IV. The bomb is illustrated in figure 15.

a. Description. This bomb is a modified AN-M69 (par. 49) tail ejection type with a special antipersonnel explosive charge added. The explosive charge is activated by a delay element with a 1½- to 6-minute time range. Bomb dimensions are the same as

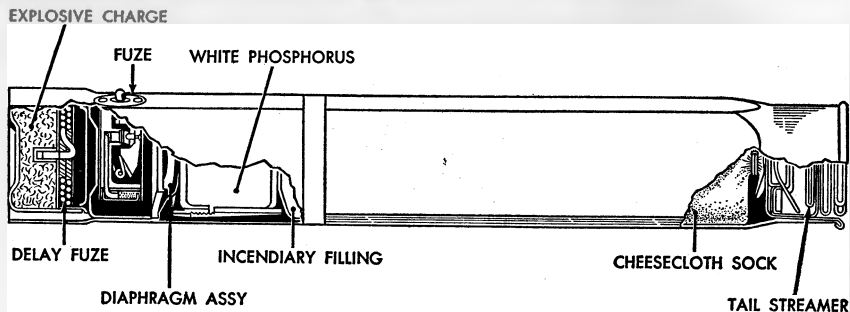


Figure 15. Bomb, incendiary, oil, 6-pound, M69X.

those for the AN-M69. Actual weight is 7.2 pounds. The main components are the same as those of the AN-M69 except as follows:

- (1) *HE nose cup.* A sheet steel HE nose cup is press-fitted to the cup containing the fuze. It holds the explosive charge and forms the bomb's blunt nose. The high explosive charge consists of 120 grams of pressed tetryl and is held in place by a delay fuze cup. A delay fuze is spirally wound between the delay fuze cup and the cup containing the fuze. To one end of the delay fuze is spliced a piece of quick-match, which is located just inside a $\frac{3}{32}$ -inch hole in the fuze retaining cup. A detonator is crimped to the HE cup end of the delay fuze and extends through a hole in the delay fuze cup and into the high explosive charge.
- (2) *Fuze cup.* The fuze cup is the same as the nose cup for the AN-M69 bomb (par. 49) except that it is just behind the HE cup instead of at the bomb nose.
- (3) *WP cup.* A plastic WP cup fits between the diaphragm and the bomb filling. It contains approximately 9½ ounces of white phosphorus (WP).
- (4) *Filling.* The filling is held in a cheesecloth sack and consists of approximately 2 pounds of NP-thickened gasoline.

b. Assembly. This bomb is completely assembled in manufacture and packed in clusters. Chapter 4 covers composition of clusters. Bombs are arranged so that all safety plungers are depressed by contact with other bombs in the cluster.

c. Functioning. Except for the HE charge action, this bomb functions the same as the AN-M69 (par. 49). Upon impact, part of the ejection-ignition charge flash passes through the small hole in nose cup and ignites quick-match which is spliced to delay fuze.

Delay fuze burns from 1½ to 6 minutes, depending upon its length, and then initiates detonator which sets off tetryl charge in III cup. The explosion shatters the nose and about half of the bomb body, breaking it into 800 to 1,000 fragments. The fragments are casualty producing to a distance of 50 yards and may be dangerous at 400 yards.

d. Safety Precautions. The explosive characteristics of this bomb give it a potentially greater hazard rating than nonexplosive incendiary bombs. Safety precautions for clusters are given in chapter 4.

e. Marking. One purple and one red band are painted near the bomb middle. Filling, model number, and lot number are stenciled in purple on the bomb body.

f. Packing. This bomb is normally packed in M21 clusters.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations and normally in clusters.

h. Storage. This bomb is normally stored in clusters in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

51. M74, 10-Pound

Data for this bomb are listed on line 51 of table II, appendix IV. The bomb is illustrated in figures 16 and 17.

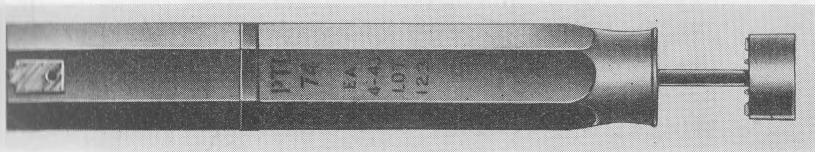


Figure 16. Bomb, incendiary, 10-pound, M74.

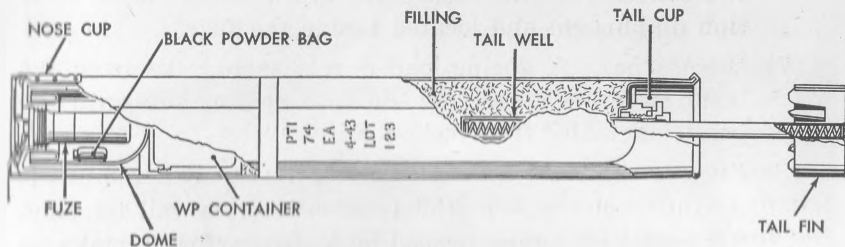


Figure 17. Bomb, incendiary, 10-pound, M74.

a. Description. This bomb is a tail ejection type, its contents being ejected through a tail opening. It is hexagonal with blunt ends. Bomb dimensions are $2\frac{7}{8}$ inches diameter across flat sides and $19\frac{1}{2}$ inches overall length. Actual weight is 8.5 pounds when PT1-filled and 7.5 pounds when NP-filled. The main components are—

- (1) *Body.* The bomb body is sheet steel, extending the entire bomb length and providing a leakproof filling container. The aft $1\frac{1}{2}$ inches of the body are drawn into a circular section.
- (2) *WP cup.* A plastic WP cup fits between the ejection diaphragm and bomb filling. It contains approximately 6 ounces of white phosphorus (WP).
- (3) *Tail cup.* A sheet steel tail cup fits into and is crimped onto the rear section. A tail plug tube adapter in the cup center receives the fin assembly.
- (4) *Filling.* The filling consists of either 2.75 pounds of PT1 incendiary mixture or 1.75 pounds of NP-thickened gasoline.
- (5) *Fuze.* The fuze is an M142A1 impact instantaneous all ways arming pin nose type, which functions at any impact angle. It is assembled in the bomb nose at manufacture in a dome-shaped steel ejection diaphragm. Some M74 bombs may be equipped with an M142 fuze which is more dangerous to handle. REINSERTING THE M142 RELEASE PIN WILL DETONATE BOMB. In outward appearance the M142A1 fuze differs from the M142 by a $1\frac{3}{16}$ -inch flange forward of its mounting threads. Thus the M142 fuze can be detected by the absence of this flange and a slight gap around the fuze head. The M142A1 fuze is shown in figure 4 and is listed in table VI, appendix IV.
- (6) *Ejection-ignition charge.* The ejection-ignition charge consists of black and magnesium powders contained in two cellulose nitrate bags fitted in the dome-shaped ejection diaphragm and located beside the fuze.
- (7) *Release bar.* A spring-loaded release bar fits over the bomb nose and depresses the fuze arming pin until the bomb is released from a cluster.
- (8) *Fin assembly.* A radial type steel tail fin assembly is mounted on a sleeve which slides into the tail fin plug. Six radial rib vanes, braced by a circular band, make up the tail assembly. The tail extends about 5 inches beyond

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the bomb casing when released, but in clustering is telescoped into the tail cup.

b. Assembly. This bomb is completely assembled in manufacture and packed in clusters. Chapter 4 covers composition of clusters. Bombs are arranged so that all release bars are in contact with other bombs in the cluster and hold the fuze arming pins in the engaged depressed (unarmed) position.

c. Functioning. Upon release from the cluster, release bar springs off bomb. The arming pin slides out or disengages, arming the bomb. Upon impact at any angle, the fuze firing pin strikes primer. Primer flash ignites booster-main ejection charge in zinc cup attached to fuze. The main charge ignites auxiliary ejection-ignition charge. Gas pressures developed rupture the dome-shaped ejection diaphragm at a scored point, ejecting bomb contents out through tail with considerable force. Auxiliary ejection-ignition charge and scattered WP ignite expelled filling. Burning time is 5 to 10 minutes. Smoke produced by WP and danger from its scattered particles deter fire fighting.

d. Safety Precautions. Safety precautions for clusters are given in chapter 4.

e. Marking. One purple band is painted near the bomb middle. Filling, model number, and lot number are stenciled in purple on the bomb.

f. Packing. This bomb is normally packed in clusters.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations and normally in clusters.

h. Storage. This bomb is normally stored in clusters in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

52. AN-M47A4, 100-Pound

Data for this bomb are listed on line 52 of table II, appendix IV. The bomb is illustrated in figures 18 and 19.

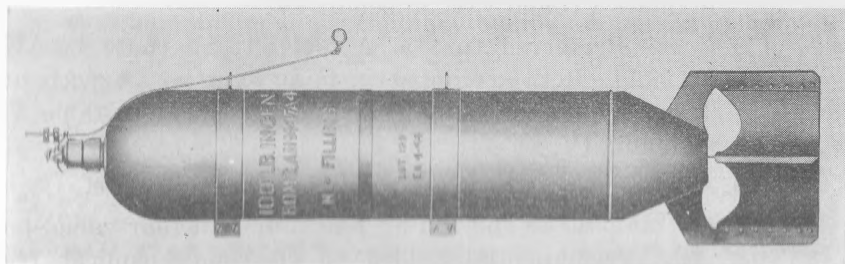


Figure 18. Bomb, incendiary, 100-pound, AN-M47A4.

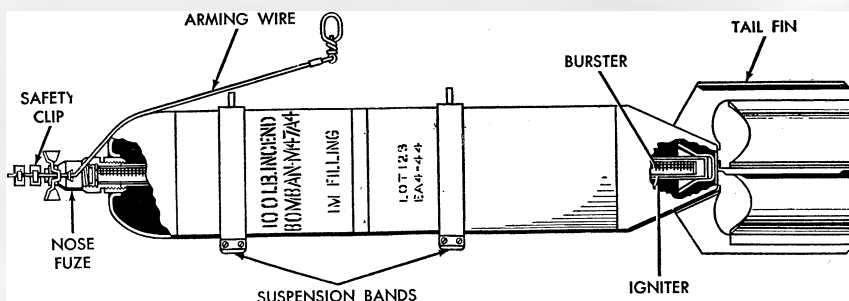


Figure 19. Bomb, incendiary, 100-pound, AN-M47A4.

a. Description. This bomb is round, with rounded nose and truncated conical rear section. A box type tail fin is welded to the tail cone. Bomb dimensions are approximately $8\frac{1}{8}$ inches diameter and 52 inches overall length. Actual weight is about 70 pounds. The main components are—

- (1) *Body.* The bomb body is thin sheet steel. Two steel suspension bands, each having a heavy gage suspension lug, are secured with machine screws. One of the suspension bands must be moved to the center of gravity when this bomb is carried on U.S. Navy aircraft. A burster well extends the axial length of the bomb. A threaded adapter is brazed at the bomb nose for securing the burster well assembly and for mounting the fuze. Interior coating is oil.
- (2) *Filling.* The filling consists of 40 pounds of either IM- or NP-thickened gasoline.
- (3) *Burster.* An AN-M12 burster (par. 89) is installed in the burster well. An authorized alternate installation consists of an AN-M13 burster (par. 90) in combination with an AN-M9 igniter (par. 99). In this arrangement the igniter fits into the burster well and the burster is inserted in the igniter axial cavity. These items are listed in tables VII and VIII, appendix IV.
- (4) *Fuze.* Preferred fuze is AN-M159; alternate is AN-M123A1. Both are impact arming vane nose type fuzes. They are shown in figure 4 and are listed in table VI, appendix IV.
- (5) *Arming wire.* The arming wire is a C5 single type.
- (6) *Fin assembly.* The tail fin assembly is a four-vaned box type, permanently welded to the bomb conical rear section.

b. Assembly. Remove nose closure plug and adapter sleeve if present. Inspect and clean all cavities, threads, and mating parts. Insert burster in well and screw to a hand-tight seat in adapter. If the burster-igniter combination is used, insert burster into igniter cavity AFTER igniter has been placed in burster well. Install fuze and arming wire, inserting arming wire through fuze guide inner holes and arming vane. Place two safety clips over arming wire end. DO NOT REMOVE SAFETY SEAL WIRE FROM FUZE UNTIL AFTER LOADING BOMB IN AIRCRAFT.

c. Functioning. Upon bomb release from aircraft bomb station, arming wire is withdrawn from fuze, freeing arming vane to rotate. Vane rotation in air stream arms fuze. Revolutions required for arming depend upon which fuze is used and can be determined from table VI, appendix IV. Fuze functions upon impact and detonates burster. Burster shatters bomb and ignites and scatters incendiary gel filling. Effective bursting radius is 10 to 15 yards.

d. Safety Precautions. Although this incendiary bomb is not particularly dangerous, it is always a fire hazard. Care should be exercised in handling and storage. Stored bombs should be frequently inspected so that leakers will be detected and properly processed. Theater of operations surveillance procedure for M47 series incendiary bombs is covered by SR 742-507-9 and TO 39B-15E-3.

e. Marking. One purple band is painted near the bomb middle. Weight, type, filling, model number, and lot number are stenciled in purple on the bomb.

f. Packing. These bombs are packed in wooden boxes. Shipping weight and cubage are approximately 110 pounds and 3.7 cubic feet. Burster, (igniter), fuze, and arming wire are packed separately. Packaging data are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. M47 series incendiary bombs are stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

53. AN-M47A3, 100-Pound

Data for this bomb are listed on line 53 of table II, appendix IV. The AN-M47A3 bomb is identical with the AN-M47A4 (par. 52) except that suspension lugs of a lighter gage are used.

54. AN-M47A2, 100-Pound

Data for this bomb are listed on line 54 of table II, appendix IV. The AN-M47A2 bomb is identical with the AN-M47A3 (par. 53) except that the tail fin is 3 inches shorter. This makes its overall length 3 inches shorter and its shipping weight and cubage slightly less than that of the AN-M47A3 bomb.

55. M47A1, 100-Pound

Data for this bomb are listed on line 55 of table II, appendix IV. The M47A1 bomb is identical with the AN-M47A2 (par. 54) except for welding requirements and interior finish. The M47A1 bomb has less stringent welding requirements. The M47A1 has an interior coating of acidproof paint, while the AN-M47A2 has an interior coating of oil.

56. M47, 100-Pound

Data for this bomb are listed on line 56 of table II, appendix IV. The M47 bomb, the earliest of this series, is identical with the M47A1 (par. 55) except that its body is thinner. The M47 is made from .030-inch thickness steel sheet, while the M47A1 and all later bombs of this series are made from .036-inch thickness steel sheet. This makes the M47 bomb slightly less in weight than the M47A1.

57. AN-M76, 500-Pound

Data for this bomb are listed on line 57 of table II, appendix IV. The bomb is illustrated in figures 20 and 21.

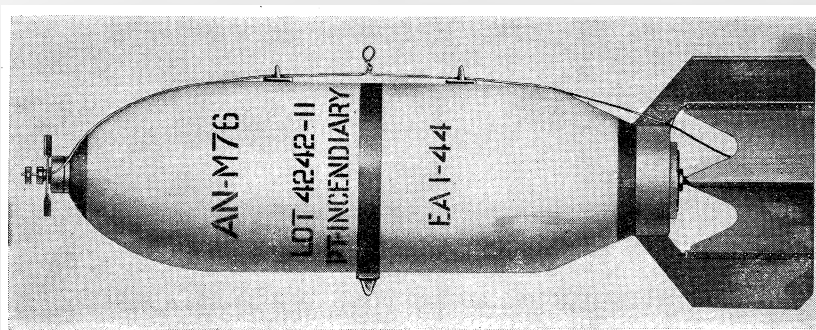


Figure 20. Bomb, incendiary, 500-pound, AN-M76.

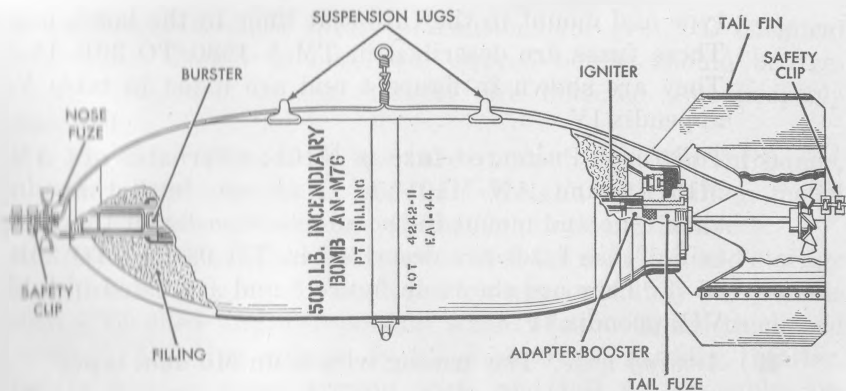


Figure 21. Bomb, incendiary, 500-pound, AN-M76.

a. Description. This bomb resembles the 500-pound AN-M64 general purpose bomb in outward appearance. It is round, with an ogival nose and truncated conical rear section. Bomb dimensions are approximately $14\frac{3}{16}$ inches diameter and 59 inches overall length. Actual weight is about 467 pounds. The main components are—

- (1) *Body.* The bomb body is deep-drawn or forged steel. Both double and single suspension lugs are welded to the bomb body. The rear section tapers down to about 8 inches diameter where a base plate is welded on. The base plate has two filling holes and a threaded center hole for an adapter-booster holder. A burster well is welded to the base plate and extends for the bomb axial length to a threaded adapter in the nose.
- (2) *Filling.* The filling consists of 175 pounds of PT1 incendiary mixture.
- (3) *Burster.* An M14 burster fits into the axial cavity of the igniter tube. The burster is described in paragraph 96 and is listed in table VII, appendix IV.
- (4) *Igniter.* An AN-M5 igniter is installed in the burster well. The igniter is described in paragraph 98 and is listed in table VIII, appendix IV.
- (5) *Adapter-booster.* An M115A1 or M115 adapter-booster is mounted in the base plate threaded holder. The M115A1 adapter-booster is described in TM-9-1980/TO 39B-15-1.
- (6) *Fuze seat liner.* The fuze seat liner is in the bomb nose. It aids in positioning the burster.
- (7) *Nose fuze.* Preferred fuze is M163; alternates are AN-M103A1 and AN-M103. They are impact arming vane

type and mount in the fuze seat liner in the bomb nose. These fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 4 and are listed in table VI, appendix IV.

- (8) *Tail fuze.* Preferred fuze is M161; alternates are AN-M101A2 and AN-M101A1. They are impact arming vane type and mount in the adapter-booster at the bomb tail. These fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 5 and are listed in table VI, appendix IV.
- (9) *Arming wire.* The arming wire is an M5 dual type.
- (10) *Fin assembly.* The tail fin assembly is either an AN-M109A1 or M109. It is secured to the bomb body by a fin lock nut installed on the external threads of the adapter-booster holder.

b. Assembly. This bomb is assembled in two stages, before and after loading on the aircraft bomb station.

- (1) *Before loading.* Remove shipping bands, nose plug, and the shipping plate which is attached to the base plate by four screws. Inspect and clean all threads, cavities, and mating parts. Install fuze seat liner in bomb nose. Insert igniter, with pipe plugs aft, in burster well from the rear. Insert burster in igniter cavity. Install adapter-booster holder in base plate and remove fin lock nut. Slip tail fin over bomb rear and align vane with suspension lugs. Install and tighten fin lock nut.
- (2) *After loading.* Remove plug from adapter-booster and install tail fuze. Make sure nose fuze seat liner is properly seated, then install fuze. Install arming wire on nose and tail fuzes, placing two safety clips at both ends.

c. Functioning. Upon bomb release from aircraft bomb station, arming wires are withdrawn from both fuzes, freeing arming vanes to rotate. Vane rotation in air stream arms fuzes. Revolutions required for arming depend upon fuzes used and can be determined from table VI, appendix IV. Both fuzes normally function on impact, the nose fuze acting faster. The nose fuze normally detonates the burster, but if the nose fuze should fail, the tail fuze, through the adapter booster charge, sets off the burster. Burster shatters igniter and bomb body. WP in igniter tube burns on contact with air, igniting incendiary filling.

d. Safety Precautions. The pipe plugs in the igniter or the filling plugs in the bomb body should not be removed under any

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circumstance. General safety precautions for group D chemical ammunition should be observed. Stored bombs should be frequently inspected so that leakers are detected and properly processed.

e. Marking. This bomb has three purple identification bands, one near the nose, middle, and tail. Weight, type, filling, model number, and lot number are stenciled in purple on the bomb.

f. Packing. These bombs are protected for shipping and storage by shipping bands. Shipping weight is approximately 447 pounds when P-T1-filled and 397 pounds when filled with IM-thickened gasoline. Shipping cubage is 5.5 cubic feet. Burster, igniter, adapter-booster, fuzes arming wire, and tail fin assembly are packed separately. Packaging data are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This bomb is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

Section II. GAS BOMBS

58. M70A1, 115-Pound, Persistent

Data for this bomb are listed on line 58 of table III, appendix IV. The bomb is illustrated in figures 22 and 23.

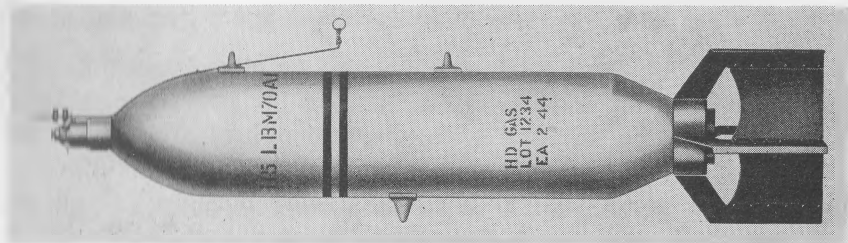


Figure 22. Bomb, gas, persistent, 115-pound, M70A1.

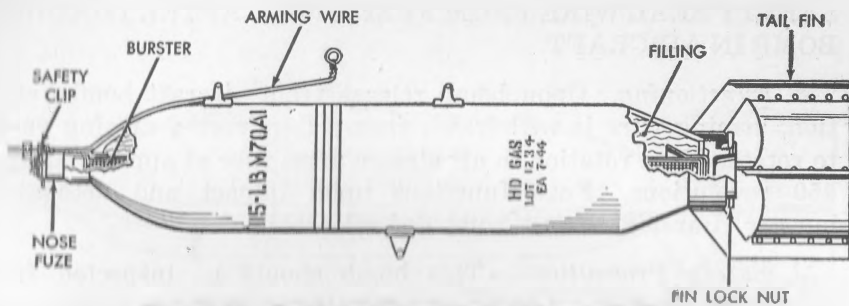


Figure 23. Bomb, gas, persistent, 115-pound, M70A1.

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a. Description. This bomb is round, with an ogival nose and truncated conical rear section. Its dimensions are approximately $8\frac{3}{32}$ inches diameter and $51\frac{1}{2}$ inches overall length. Actual weight is about 128 pounds. The main components are—

- (1) *Body.* The bomb body is cast or forged steel. Both double and single suspension lugs are welded to the body. The rear section tapers down to about 4 inches where a threaded extension closes the rear and provides support for the tail fin. A force-fitted burster well extends the axial length of the bomb. It fits into a cup brazed inside the bomb rear section, and its nose end has a threaded fuze adapter. Interior coating is phenolic varnish.
- (2) *Filling.* The filling consists of either 60 pounds of distilled mustard (HD) or 61 pounds of mustard (H).
- (3) *Burster.* An M10 burster fits into the burster well. The burster is described in paragraph 95 and is listed in table VII, appendix IV.
- (4) *Fuze.* The fuze is either an AN-M158 or AN-M110A1. Both are impact arming vane nose type fuzes with M20 detonators. The fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 4 and are listed in table VI, appendix IV.
- (5) *Arming wire.* The arming wire is an M2 single type.
- (6) *Fin assembly.* The tail fin assembly is either an AN-M103A1, M102A1, or M102. It is secured to the bomb by a fin lock nut installed on the external threads of the rear closure extension.

b. Assembly. Remove lug protectors or shipping bands. Remove fin lock nut and place tail fin assembly over rear threaded extension. Align fin vane with suspension lugs and install and tighten lock nut. Remove nose closure plug and adapter sleeve. Inspect and clean adapter threads. Insert burster in well and replace adapter sleeve. Install nose fuze in adapter. Insert arming wire and place two safety clips at end. **DO NOT REMOVE SAFETY SEAL WIRE FROM FUZE UNTIL AFTER LOADING BOMB IN AIRCRAFT.**

c. Functioning. Upon bomb release from aircraft bombs station, arming wire is withdrawn from fuze, freeing arming vane to rotate. Vane rotation in air stream arms fuze at approximately 450 revolutions. Fuze functions upon impact and detonates burster. Burster shatters bomb and releases gas.

d. Safety Precautions. This bomb should be inspected frequently for leakage. Leaks are normally detected by odor or by

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blanch which smokes on contact with mustard gas. Leakage is most likely to occur in the burster well and may not be apparent until nose closure plug is removed. Protective measures outlined in paragraph 31*n* should be provided for inspecting and handling personnel. Leaking bombs must be destroyed and affected areas decontaminated. Venting of these bombs is covered by appendix III.

e. Marking. This bomb has two green identification bands near its middle. Weight, type, filling, model number and lot number are stenciled in green on the bomb body.

f. Packing. These bombs are protected for shipping and storage by either lug protectors or shipping bands. With lug protectors, shipping weight and cubage are approximately 122 pounds and 9.1 cubic feet. With shipping bands, shipping weight and cubage are approximately 135 pounds and 3.9 cubic feet. Burster, fuze, arming wire, and tail fin assembly are packed separately. Packaging data are given in ORD 3 SNL S-2, and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This bomb is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group A chemical ammunition.

59. M70, 115-Pound, Persistent

Data for this bomb are listed on line 59 of table III, appendix IV. This bomb is identical with the M70A1 (par. 58) except that the body of the M70 has no interior phenolic varnish coating.

60. M113, 125-Pound, Persistent

Data for this bomb are listed on line 60 of table III, appendix IV. This bomb is illustrated in figures 24 and 25.

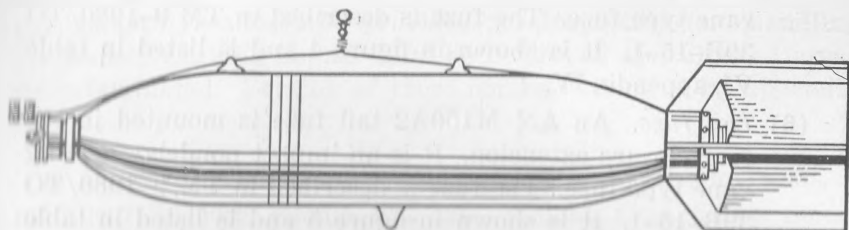


Figure 24. Bomb, gas, persistent, 125-pound, M113.

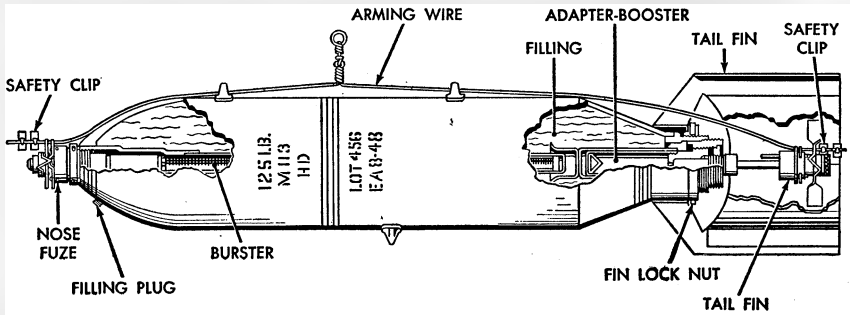


Figure 25. Bomb, gas, persistent, 125-pound, M113.

a. Description. This bomb is round with an ogival nose and truncated conical rear section. Its dimensions are approximately $8\frac{3}{2}$ inches diameter and $49\frac{1}{2}$ inches overall length. Actual weight is about 141 pounds. The main components are—

- (1) *Body.* The bomb body is cast or forged steel. Both double and single suspension lugs are welded to the body. The rear section tapers down to about 4 inches where a threaded extension is welded on to close the rear and provide mountings for both the tail fin and adapter-booster. A nose fuze seating cavity is welded in the nose. An adapter-booster seating cavity is press-fitted to the rear closure extension. A burster well extends approximately two-thirds of body axial length between the nose fuze and adapter-booster cavities. Interior coating is phenolic varnish.
- (2) *Filling.* The filling consists of approximately 59 pounds of distilled mustard (HD).
- (3) *Burster.* An M25 burster fits into the burster well. The burster is described in paragraph 97 and is listed in table VII, appendix IV.
- (4) *Adapter-booster.* An M119 adapter-booster is mounted in the internal threads of the rear closure extension.
- (5) *Nose fuze.* An AN-M103A1 fuze is mounted in the nose seating cavity. It is an impact instantaneous arming vane type fuze. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.
- (6) *Tail fuze.* An AN-M100A2 tail fuze is mounted in the rear closure extension. It is an impact nondelay arming vane type fuze. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.

- (7) *Arming wire.* The arming wire is an M1A1 dual type.
- (8) *Fin assembly.* The tail fin assembly is an M125A1 or M125. It is secured to the bomb by a fin lock nut installed on the external threads of the rear closure extension.

b. Assembly. This bomb is assembled in two stages, before and after loading on the aircraft bomb station. It is sometimes clustered in cable type cluster adapters (par. 24).

- (1) *Before loading.* Remove shipping bands and nose and tail closure plugs. Inspect and clean all cavities, threads, and mating parts. Install adapter-booster in rear cavity. Slip tail fin assembly over bomb rear closure extension and align vane with suspension lugs. Secure tail fin with lock nut. Install burster through nose cavity.
- (2) *After loading.* Make certain tail fuze has a nondelay primer-detonator. Remove adapter-booster closure plug and install tail fuze. Set nose fuze selector pin for instantaneous action and install. Install arming wire on nose and tail fuzes, placing two safety clips at both ends.

c. Functioning. Upon bomb release from aircraft bomb station, arming wires are withdrawn from both fuzes, freeing arming vanes to rotate. Vane rotation in air stream arms fuzes. Tail fuze is armed at approximately 158 vane revolutions. Nose fuze is armed at approximately 325 vane revolutions. Both fuzes normally function on impact, the nose fuze acting faster. The nose fuze normally detonates the burster, but if the nose fuze should fail, the tail fuze, through the adapter booster charge, sets off the burster. Burster shatters bomb and releases gas.

d. Safety Precautions. This bomb should be inspected frequently for leakage. Leaks are normally detected by odor or by blench which smokes on contact with mustard gas. Leakage is most likely to occur in the burster well in the cavities for the nose fuze and adapter-booster. Such leakages may not be apparent until closure plugs are removed. Protective measures outlined in paragraph 31*n* should be provided for inspecting and handling personnel. Leaking bombs must be destroyed and affected areas decontaminated. Venting of these bombs is covered by appendix III.

e. Marking. This bomb has six green identification bands, a pair near its nose, middle, and tail. Weight, type, filling, model number, and lot number are stenciled in green on the bomb body.

f. Packing. These bombs are protected for shipping and storage by shipping bands. Shipping weight and cubage are approximately 148 pounds and 3.9 cubic feet. Burster, adapter-booster, fuzes, arming wire, and tail fin assembly are packed separately. Packaging data are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This bomb is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group A chemical ammunition.

61. AN-M78, 500-Pound, Nonpersistent

Data for this bomb are listed on line 61 of table III, appendix IV. The bomb is illustrated in figures 26 and 27. Further detailed information on nonpersistent gas bombs is contained in TB CW 22/TO 39B-15AJ-1.

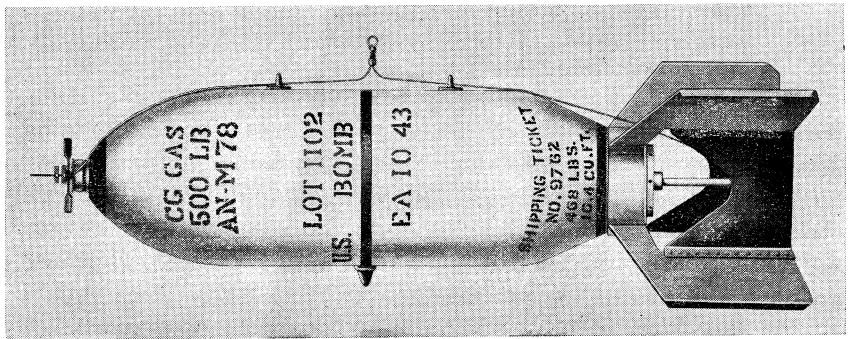


Figure 26. Bomb, gas, nonpersistent, 500-pound, AN-M78.

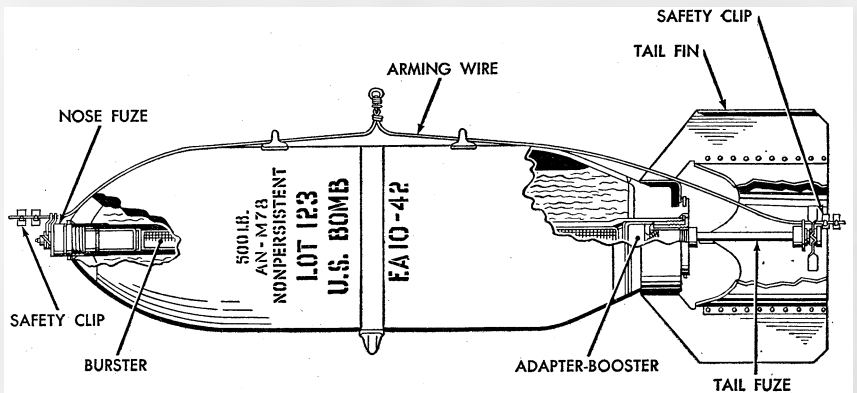


Figure 27. Bomb, gas, nonpersistent, 500-pound, AN-M78.

a. *Description.* This bomb is an adaptation of the 500-pound AN-M64 general purpose bomb. It is round, with an ogival nose and truncated conical rear section. Bomb dimensions are approximately $14\frac{1}{16}$ inches diameter and $59\frac{1}{4}$ inches overall length. Actual weight is about 495 pounds when CG-filled and 466 pounds when CK-filled. The main components are—

- (1) *Body.* The bomb body is deep drawn or forged steel. Both double and single suspension lugs are welded to the body. The rear section tapers down to about 8 inches diameter where a base plate is welded to close the body. The base plate has a filling hole, a hole for a venting and sampling M1 needle valve, and a threaded center hole for an adapter-boosters. A burster well is welded inside the base plate and extends for the bomb axial length to the nose, where it is threaded to receive a nose fuze seat liner.
- (2) *Filling.* The filling consists of either 205 pounds of phosgene (CG) or 176 pounds of cyanogen chloride (CK).
- (3) *Burster.* An AN-M15 burster fits into the burster well. The burster is described in paragraph 91 and listed in table VII, appendix IV.
- (4) *Adapter-boosters.* An M115A1 or M115 adapter-boosters is mounted in the base plate threaded holder. The M115A1 adapter-boosters is described in TM 9-1980/TO 39B-15-1.
- (5) *Fuze seat liner.* A fuze seat liner in the bomb nose provides a seat for the nose fuze.
- (6) *Nose fuze.* Preferred fuze is M163; alternates are AN-M103A1, AN-M103, AN-M139A1, AN-M140A1, M164, and M165. They are impact instantaneous arming vane type and mount in the fuze seat liner in the bomb nose. The fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 4 and are listed in table VI, appendix IV.
- (7) *Tail fuze.* Preferred fuze is M161; alternates are AN-M101A2 and AN-M101A1. They are impact nondelay arming vane type and mount in the adapter-boosters at the bomb tail. These fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 5 and are listed in table VI, appendix IV.
- (8) *Arming wire.* The arming wire is an M5 dual type.
- (9) *Fin assembly.* The tail fin assembly is either AN-M109A1 or M109. It is secured to the bomb by a fin lock

nut installed on the external threads of the rear closure base plate.

b. Assembly. This bomb is assembled in two stages, before and after loading on the aircraft bomb station.

- (1) *Before loading.* Remove shipping bands and protective items. Inspect and clean all threads, cavities and mating parts. Slip tail fin assembly over bomb rear, align vane with suspension lugs, and install fin lock nut. Turn fuze seat liner in nose until fully seated. Insert burster in burster well from the rear. Install adapter-booster in rear cavity.
- (2) *After loading.* Make certain that tail fuze has a nondelay primer-detonator. Remove adapter-booster closure plug and install tail fuze. Set nose fuze selector pin for instantaneous action and install. Install arming wire on nose and tail fuzes, placing two safety clips at both ends.

c. Functioning. Upon bomb release from aircraft bomb station, arming wires are withdrawn from both fuzes, freeing arming vanes to rotate. Vane rotation in air stream arms fuzes. Revolutions required for arming depend upon fuzes used and can be determined from table VI, appendix IV. Both fuzes normally function on impact, the nose fuze acting faster. The nose fuze normally detonates the burster, but if the nose fuze should fail, the tail fuze, through the adapter booster charge, sets off the burster. Burster shatters body and releases gas.

d. Safety Precautions. Relatively high internal gas pressures in nonpersistent gas bombs require special handling precautions. This bomb should be handled by trained personnel only and as little as possible. This is especially true in warm climates since gas pressures increase with temperature. It should never be dropped, subjected to shock or blows, lifted with an electromagnet, used as a roller, or for any other unauthorized purpose. The bomb should be inspected frequently for leakage. It can be vented through its venting valve. Protective equipment and supplies, including such items as protective masks, first aid kits, and tools, should be immediately available to all personnel engaged in handling nonpersistent chemical bombs. The protective mask M9A1 with M11 canister gives ample protection for a limited time against anticipated concentrations of CG or CK. Servicing of this bomb is covered in appendix II.

e. Marking. This bomb has three green identification bands, one near the nose, middle, and tail. Weight, type, filling, model number, and lot number are stenciled in green on the bomb.

f. Packing. These bombs are protected for shipping and storage by shipping bands. Shipping weight is approximately 472 pounds when CG-filled and 442 pounds when CK-filled. Shipping cubage is 10.4 cubic feet. Burster, adapter-booster, fuzes, arming wire, and tail fin assembly are packed separately. Packaging data are given in TB CW 22/TO 39B-15AJ-1, ORD 3 SNL S-2, and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations. A guard detail is required with nonpersistent gas bomb shipments, as outlined in TB CW 22/TO 39B-15AJ-1.

h. Storage. This bomb is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group B chemical ammunition. Nonpersistent gas bombs should be stored in well ventilated buildings and should be kept as cool as possible. When stored in the open, they must be given protection from sun and rain. Dunnage should always be used. Tiers of bombs should be no higher than dictated by space limitations. An aisle at least 18 inches wide should be maintained between bombs. No other materiel should be stored with nonpersistent gas bombs.

62. AN-M79, 1,000-Pound, Nonpersistent

Data for this bomb are listed on line 62 of table III, appendix IV. The bomb is illustrated in figures 28 and 29. Further detailed information on nonpersistent gas bombs is contained in TB CW 22/TO 39B-15AJ-1.

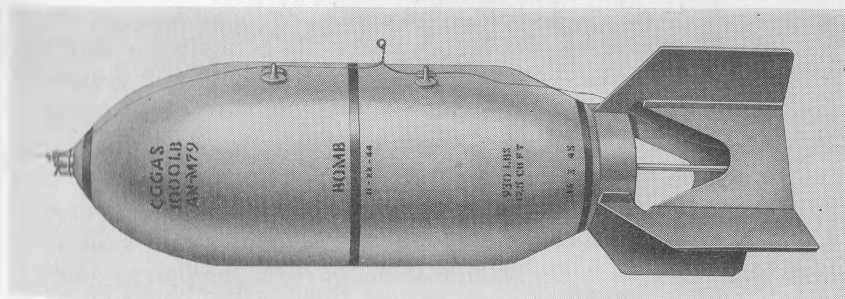


Figure 28. Bomb, gas, nonpersistent, 1,000-pound, AN-M79.

a. Description. This bomb is an adaptation of the 1,000-pound AN-M65 general purpose bomb. It is round, with an ogival nose and truncated conical rear section. Bomb dimensions are approximately 18 $\frac{3}{4}$ inches diameter and 69 $\frac{1}{4}$ inches overall length. Ac-

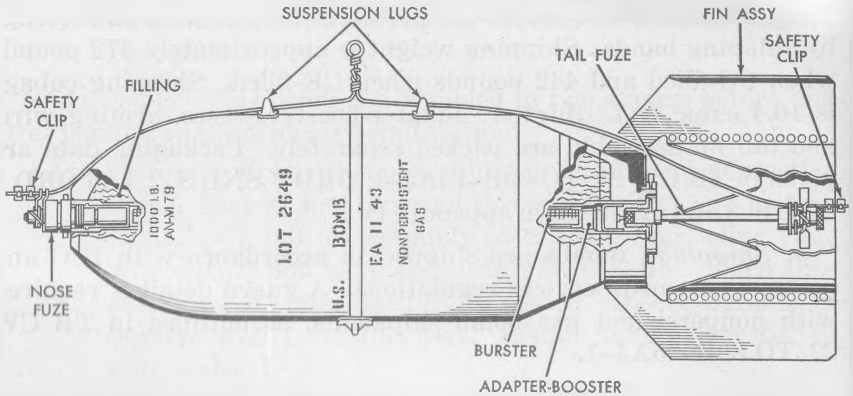


Figure 29. Bomb, gas, nonpersistent, 1,000-pound, AN-M79.

tual weight is about 937 pounds when CG-filled, 873 pounds when CK-filled, and 717 pounds when AC-filled. The main components are—

- (1) *Body.* The bomb body is forged steel. Both double and single suspension lugs are welded to the body. The rear section tapers down to about 13 inches diameter where a base plate is welded to close the body. The base plate has a filling hole, a hole for a venting and sampling M1 needle valve, and a threaded center hole for an adapter-booster. A burster well is welded inside the base plate and extends to the bomb nose, where it is threaded to receive a fuze seat liner.
- (2) *Filling.* The filling consists of either 415 pounds of phosphene (CG), 351 pounds of cyanogen chloride (CK), or 195 pounds of hydrocyanic acid (AC).
- (3) *Burster.* An AN-M16 burster fits into the burster well. The burster is described in paragraph 92 and is listed in table VII, appendix IV.
- (4) *Adapter-booster.* An M115A1 or M115 adapter-booster is mounted in the base plate threaded holder. The M115A1 adapter-booster is described in TM 9-1980/TO 39B-15-1.
- (5) *Fuze seat liner.* A fuze seat liner in the bomb nose provides a seat for the fuze.
- (6) *Nose fuze.* Preferred fuze is M163; alternates are AN-M103A1, AN-M103, AN-M139A1, AN-M140A1, M164 and M165. They are impact instantaneous arming vane type and mount in the fuze seat liner in the bomb nose. The fuzes are described in TM 9-1980/TO 39B-15-1.

They are shown in figure 4 and are listed in table VI, appendix IV.

(7) *Tail fuze.* Preferred fuze is M162; alternates are AN-M102A2 and AN-M102A1. They are impact nondelay arming vane type and mount in the adapter-booster at the bomb tail. The fuzes are described in TM 9-1980/TO 39B-15-1. They are shown in figure 5 and are listed in table VI, appendix IV.

(8) *Arming wire.* The arming wire is an M7 dual type.

(9) *Fin assembly.* The tail fin assembly is either AN-M113A1 or M113. It is secured to the bomb body by a fin lock nut installed on the external threads of the rear closure base plate.

b. Assembly. This bomb is assembled in two stages, before and after loading on the aircraft bomb station.

(1) *Before loading.* Remove shipping bands and protective items. Inspect and clean all threads, cavities, and mating parts. Slip tail fin assembly over bomb rear and line up vane with suspension lugs. Turn fuze seat liner in nose until fully seated. Insert burster in burster well from the rear. Install adapter-booster in rear cavity.

(2) *After loading.* Make certain that tail fuze has a nondelay primer-detonator. Remove adapter-booster closure plug and install tail fuze. Set nose fuze selector pin for instantaneous action and install. Install arming wire on nose and tail fuzes, placing two safety clips at both ends. When an air burst is desired, install M117 adapter-booster and M127 time fuze in lieu of impact nose fuze. M127 FUZE ADJUSTMENT AND INSTALLATION ARE AVIATION PERSONNEL RESPONSIBILITIES.

c. Functioning. Upon bomb release from aircraft bomb station, arming wires are withdrawn from both fuzes, freeing arming vanes to rotate. Vane rotation in air stream arms fuzes. Revolutions required for arming depend upon fuzes used and can be determined from table VI, appendix IV. Both fuzes normally function on impact, the nose fuze acting faster. The nose fuze normally detonates the burster, but if the nose fuze should fail, the tail fuze, through the adapter-booster charge, sets off the burster. Burster shatters bomb and releases gas. When M127 mechanical time fuze is used for air burst, approximately 255 vane revolutions arm fuze. When time setting expires, fuze sets off adapter-booster charge which detonates burster. Should M127 fuze fail to function, tail fuze should function upon impact.

d. Safety Precautions. Relatively high internal gas pressures in nonpersistent gas bombs require special handling precautions. This bomb should be handled by trained personnel only and as little as possible. This is especially true in warm climates since internal gas pressures increase with temperature. It should never be dropped, subjected to shock or blows, lifted with an electromagnet, used as a roller, or for any other unauthorized purpose. The bomb should be inspected frequently for leakage. It can be vented through its venting valve. Protective equipment and supplies, including such items as protective masks, first aid kits, and tools, should be immediately available to all personnel engaged in handling nonpersistent chemical bombs. The protective mask M9A1 with M11 canister gives ample protection for a limited time against anticipated concentrations of the fillings used in this bomb. Servicing of this bomb is covered in appendix II.

e. Marking. This bomb has three green identification bands, one near the nose, middle, and tail. Weight, type, filling, model number, and lot number are stenciled in green on the bomb.

f. Packing. These bombs are protected for shipping and storage by shipping bands. Shipping weight is approximately 930 pounds when CG-filled, 866 pounds when CK-filled, and 710 pounds when AC-filled. Shipping cubage is 17.5 cubic feet. Burster, adapter-booster(s), fuzes, arming wire, and tail fin assembly are packed separately. Packaging data are given in TB CW 22/TO 39B-15AJ-1, ORD 3 SNL S-2, and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations. A guard detail is required with nonpersistent gas bomb shipments, as outlined in TB CW 22/TO 39B-15AJ-1.

h. Storage. This bomb is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group B chemical ammunition. Nonpersistent gas bombs should be stored in well ventilated buildings and kept as cool as possible. When stored in the open, they should be given protection from sun and rain. Dunnage should always be used. Tiers of bombs should be no higher than dictated by space limitations. An aisle at least 18 inches wide should be maintained between bombs. No other materiel should be stored with nonpersistent gas bombs.

Section III. SMOKE BOMBS

6B. AN-M47A4, 100-Pound

Data for this bomb are listed on line 63 of table IV, appendix IV. The bomb is illustrated in figures 30 and 31.

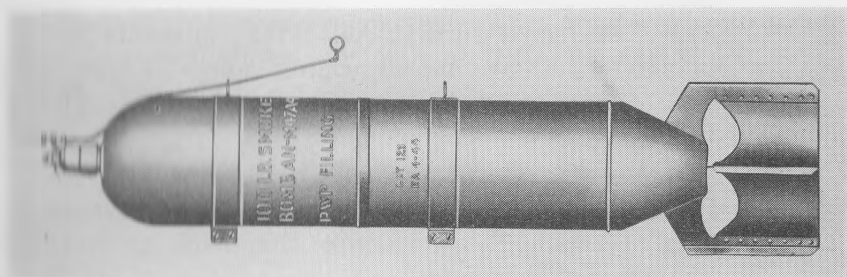


Figure 30. Bomb, smoke, 100-pound, AN-M47A4.

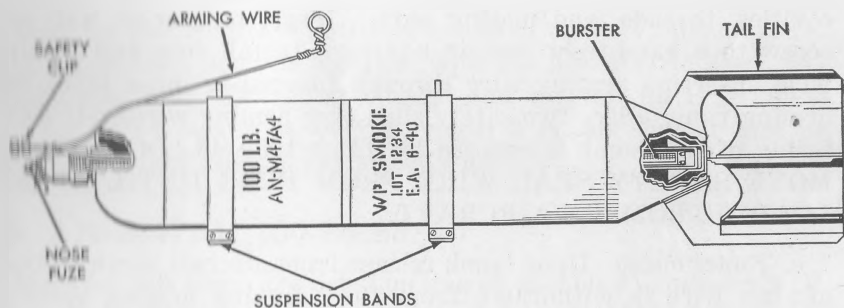


Figure 31. Bomb, smoke, 100-pound, AN-M47A4.

a. Description. In outward appearance and many details this bomb is like the AN-M47A4 100-pound incendiary bomb (par. 62). The chief differences are the chemical filling, functioning, and purpose. This bomb is round, with rounded nose and truncated conical rear section. A box type tail fin is welded to the tail cone. Dimensions are approximately $8\frac{1}{8}$ inches diameter and 52 inches overall length. Actual weight is about 100 pounds when PWP-filled and 128 pounds when WP-filled. The main components are—

- (1) *Body.* The bomb body is thin sheet steel. Two steel suspension bands, each having a heavy gage suspension lug, are secured with machine screws. A burster well extends the axial length of the bomb. A threaded adapter is brazed at the bomb nose for securing the burster well assembly and for mounting the fuze. Interior coating is oil.

- (2) *Filling.* The filling consists of either 74 pounds of plasticized white phosphorus (PWP) or 100 pounds of white phosphorus (WP).
- (3) *Burster.* An AN-M20 burster is used with PWP filling, and an AN-M18 burster is used with WP filling. They are described in paragraphs 93 and 94 and are listed in table VII, appendix IV.
- (4) *Fuze.* Preferred fuze is AN-M159; alternate is AN-M126A1. Both are impact arming vane nose type. They are shown in figure 4 and are listed in table VI, appendix IV.
- (5) *Arming wire.* The arming wire is an M3 single type.
- (6) *Fin assembly.* The tail fin assembly is a four-vaned box type, permanently welded to the bomb conical rear section.

b. Assembly. Remove nose closure plug and inspect bomb for leaks or other evidence of unserviceability. Inspect and clean all cavities, threads, and mating parts. Insert burster in well and screw to a hand-tight seat in adapter. Install fuze and arming wire, inserting arming wire through fuze guide inner holes and arming vane. Place two safety clips over arming wire end. Clustering of this bomb is covered by TB 9-1980-46. DO NOT REMOVE SAFETY SEAL WIRE FROM FUZE UNTIL AFTER LOADING BOMB IN AIRCRAFT.

c. Functioning. Upon bomb release from aircraft bomb station, arming wire is withdrawn from fuze, freeing arming vane to rotate. Vane rotation in air stream arms fuze. Revolutions required for arming depend upon fuze used and can be determined from table VI, appendix IV. Upon impact, fuze functions and detonates burster. Burster shatters bomb and exposes filling to atmosphere. Atmospheric oxygen ignites filling which burns and produces smoke.

d. Safety Precautions. This bomb contains no explosive element but is a serious fire hazard. PWP and WP are spontaneously flammable upon exposure to air. There is some danger of the bomb splitting and exposing the filling to the atmosphere. Care in shipping and storage minimizes the chances for such accidents.

e. Marking. One yellow band is painted near the bomb middle. Weight, type, filling, model number, and lot number are stenciled in yellow on the bomb.

f. Packing. These bombs are packed in wooden boxes. Shipping weight is approximately 127 pounds when PWP-filled and 155

rounds when WP-filled. Shipping cubage is 3.7 cubic feet. Burster, fuse, and arming wire are packed separately. Packaging data are given in ORD 3 SNL S-2 and ORD SNL S-3 and are listed in appendix IV.

g. Shipping. Bombs are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. M47 series smoke bombs are stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1000 TO RPB-1-3 for group C chemical ammunition.

64. AN-M47A3, 100-Pound

Data for this bomb are listed on line 64 of table IV, appendix IV. The AN-M47A3 bomb is identical with the AN-M47A4 (par. 63) except that suspension lugs of a lighter gage are used.

65. AN-M47A2, 100-Pound

Data for this bomb are listed on line 65 of table IV, appendix IV. The AN-M47A2 bomb is identical with the AN-M47A3 (par. 64) except that only WP filling is used and the tail fin is 3 inches shorter. This makes its overall length 3 inches shorter and its shipping weight and cubage slightly less.

66. AN-M47A1, 100-Pound

Data for this bomb are listed on line 66 of table IV, appendix IV. The AN-M47A1 bomb is identical with the AN-M47A2 (par. 65) except for welding requirements and interior finish. The AN-M47A1 bomb has less stringent welding requirements. The AN-M47A1 has an interior coating of acidproof paint, while the AN-M47A2 bomb has an interior coating of oil.

CHAPTER 3

CLUSTER ADAPTERS

Section I. QUICK-OPENING ADAPTERS

67. M4, 100-Pound

This adapter is used for the M12 quick-opening (frame) incendiary bomb cluster described in paragraph 75. The adapter is illustrated in figure 32.

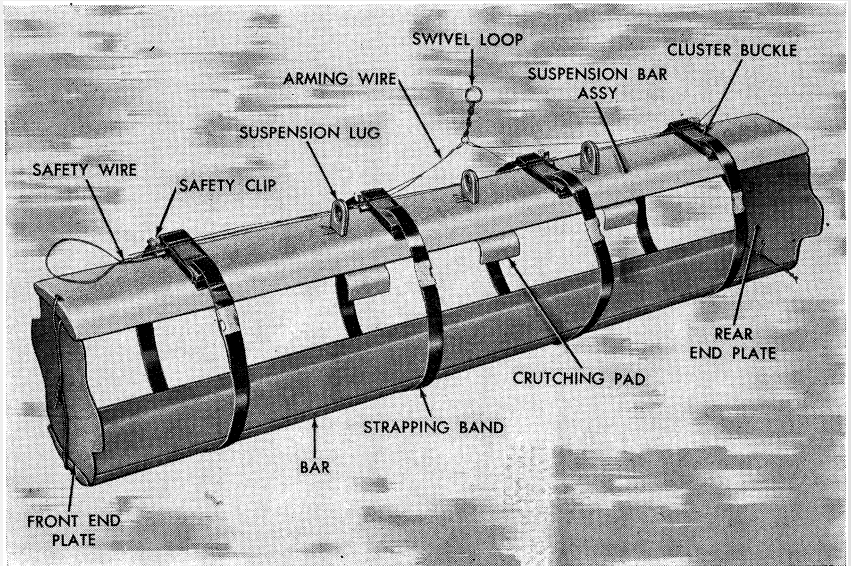


Figure 32. Adapter, cluster, M4.

a. General. This frame type adapter has a nominal capacity of 100 pounds but actually holds 14 (approximately 85 pounds) six-pound AN-M69 incendiary bombs (par. 49). Its shape is irregularly hexagonal. Approximate overall dimensions are $8\frac{3}{4}$ inches width, $10\frac{1}{16}$ inches height, and $39\frac{1}{16}$ inches length. Actual weight of the adapter is about 12 pounds.

b. Framework. The adapter framework is steel and consists of a full-length suspension bar assembly which forms its top, a full-length bar which forms its bottom, and end plates. The rear

end plate has a tongue which fits into a slot in the lower bar. The front end plate has both upper and lower tongues which fit into slots in both bars. Both end plates rest against end flanges on both bars, making an arrangement whereby the top bar can be lifted slightly, the rear end plate opened, and bombs inserted from the rear. Bombs are retained within the adapter by the end plates, the top and bottom bars, and four steel strapping bands. Each strapping band is cut into two unequal lengths. The eight resulting lengths are joined by buckles and connectors. The strap buckles are at the adapter top and have retaining tongues to hold them in suspension bar slots. The other ends of the bands are pulled tightly together around the contained bombs and fastened by connectors located on the left side at approximately two-thirds adapter height.

c. Suspension. Three suspension lugs on the upper bar provide for attaching the cluster to the aircraft bomb shackle. The two outer lugs are used for U.S. Air Force aircraft double suspension. The center lug is used for U.S. Navy aircraft single suspension. The suspension lugs are held in attachable position by cotter pins. Cotter pin removal permits the lug to drop into a lower position so that it is partially recessed in the suspension bar and out of the way.

d. Arming Wire. The arming wire assembly is a factory installed quadruple type that keeps the strap buckles closed until the cluster is released from the aircraft. Each of the four arming wire branches is inserted in a different buckle release latch and each end is safetied with a clip to forestall accidental removal. A safety wire is installed through all buckles to keep them closed in case the arming wire is accidentally displaced during shipping or handling.

68. M7, 500-Pound

This adapter is used for the M13 quick-opening (frame) incendiary bomb cluster described in paragraph 76. The adapter is illustrated in figure 33.

a. General. This frame type adapter has a nominal capacity of 600 pounds but actually holds 60 (approximately 366 pounds) six-pound AN-M69 incendiary bombs (par. 49). Its shape is irregularly dodecagonal (twelve-sided). Approximate overall dimensions are 14 inches height, $17\frac{7}{16}$ inches width, and $58\frac{1}{8}$ inches length. Actual weight of the adapter is about 55 pounds.

b. Framework. The adapter framework is steel and consists of a full-length suspension bar which forms its top, three full-

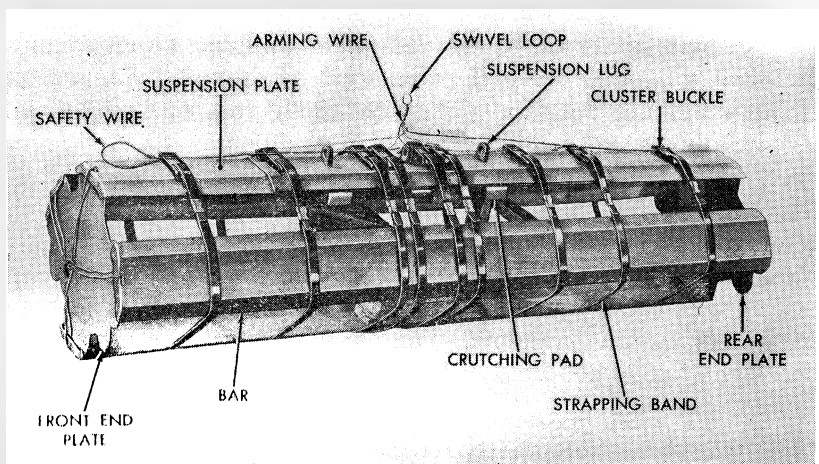


Figure 33. Adapter, cluster, M7.

length bars which form its sides and bottom, two partial-length reinforcing bars which help distribute suspension lug loads, and end plates. The rear end plate has a tongue which fits into a slot in the lower bar. The front end plate has four tongues which fit into slots in each of the full-length bars. Both end plates rest against end flanges on all full-length bars, making an arrangement whereby the top and side bars can be lifted slightly, the rear end plate opened, and bombs inserted from the rear. Bombs are retained within the adapter by the end plates, the four full-length bars, and nine steel strapping bands. Each strapping band is cut into two unequal lengths. The eighteen resulting lengths are joined by buckles and connectors. The strap buckles are at the adapter top and have retaining tongues to hold them in suspension bar slots. The other ends of the bands are pulled tightly together around the contained bombs and fastened by connectors located on the right side at approximately three-fourths adapter height.

c. Suspension. Three suspension lugs on the upper bar provide for attaching the cluster to the aircraft bomb shackle. The two outer lugs are used for U.S. Air Force aircraft double suspension. The center lug is used for U.S. Navy aircraft single suspension. The suspension lugs are held in attachable position by cotter pins. Cotter pin removal permits the lug to drop into a lower position so that it is partially recessed in the suspension bar and out of the way.

d. Arming Wire. The arming wire assembly is a factory installed sextuple type that keeps the strap buckles closed until the cluster is released from the aircraft. Each of the six arming wire branches is inserted in a different buckle release latch and each

and is unfetied with a clip to forestall accidental removal. A safety wire is installed through all buckles to keep them closed in case the arming wire is accidentally displaced during shipping or handling.

Section II. AIMABLE ADAPTERS

69. M10A1, 500-Pound

This adapter is used for the AN-M14A1, AN-M14, AN-M17A1, M28A1, and M22 aimable incendiary bomb clusters described in paragraphs 77, 78, 79, 85, and 86, respectively. The adapter is illustrated in figure 34.

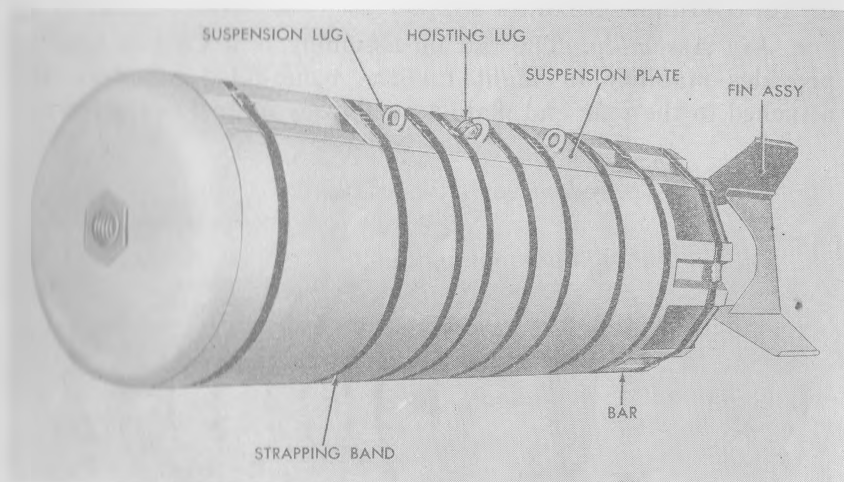


Figure 34. Adapter, aimable cluster, M10A1.

a. General. This aimable type adapter has a nominal capacity of 500 pounds but actually holds 110 (approximately 407 pounds) M50 series incendiary bombs. Its shape is cylindrical. Approximate overall dimensions are 14 inches diameter and 56 inches length, including tail fin. Actual weight of the adapter is about 70 pounds.

b. Framework. The adapter framework is steel and consists of a suspension bar assembly which forms its top, a bottom bar assembly which houses the burster, four side bars, a front end plate assembly with a fuze adapter, and a rear end plate assembly with tail fin mounting provisions. Bombs are inserted from the rear, before the casing is put on, by lifting the bars slightly and opening the rear end plate assembly. The suspension bar has a hoisting lug and both double and single suspension lugs. The two

outer suspension lugs are used on U.S. Air Force aircraft and are held in attachable position by cotter pins. The middle suspension lug is used on U.S. Navy aircraft and is threaded.

c. Casing. The adapter casing consists of two semicylindrical sheet steel walls covering the forward 36 inches only. The two-piece casing holds the framework around the contained bombs and gives the adapter a smooth cylindrical shape. Steel strapping bands, with ends held firmly together by connectors, hold the casing in place. A smooth nose fairing adds aerodynamic cleanliness.

d. Burster. The burster consists of a length of PETN detonating cord. It extends from the fuze adapter in the front end plate assembly through the burster tube in the bottom bar assembly for the full length of the adapter.

e. Fin Assembly. The tail fin assembly is a C3 box type and provides stability in flight for the bomb-filled adapter. It is attached to the rear end plate assembly by a steel cap screw.

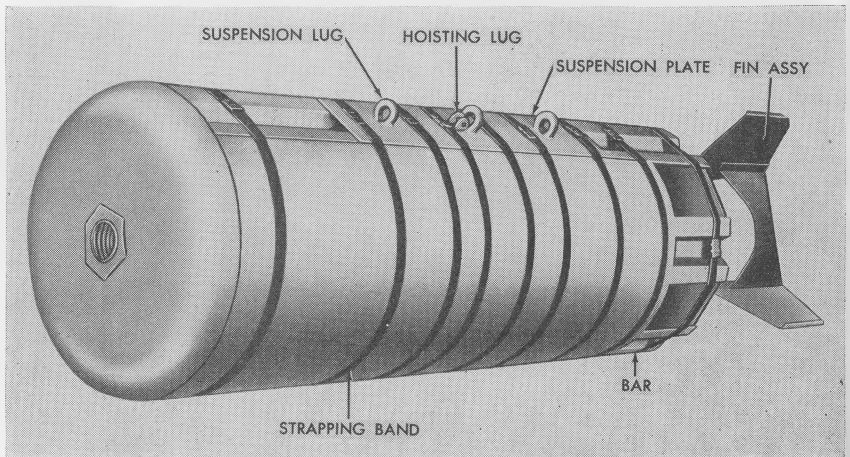


Figure 35. Adapter, aimable cluster, M10.

70. M10, 500-Pound

This adapter is used for the M17 aimable incendiary bomb cluster described in paragraph 80. The adapter is illustrated in figure 35. The M10 aimable cluster adapter is identical with the M10A1 adapter (par. 69) except that the M10 has no casing longitudinal crutching pads is approximately 7 pounds lighter and has longer U.S. Air Force suspension lugs. The actual weight of the M10 adapter is approximately 63 pounds. The M10 adapter has U.S. Air Force suspension lugs of $1\frac{3}{8}$ inches height, while those of the M10A1 are $\frac{7}{8}$ inch in height.

71, M23A1, 500-Pound

This adapter is used for the M20A1 aimable incendiary bomb cluster described in paragraph 82. The adapter is illustrated in figures 36 and 37.

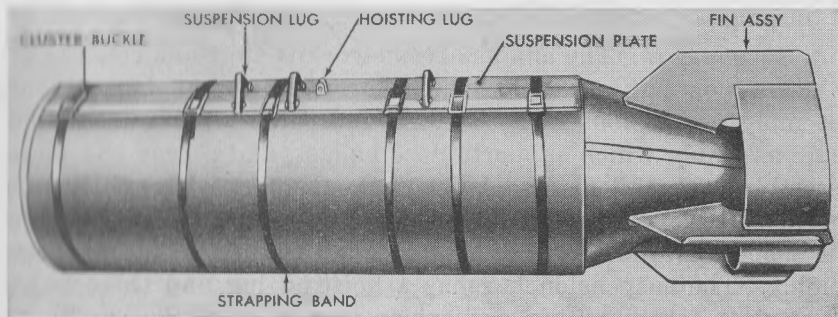


Figure 36. Adapter, aimable cluster, M23A1.

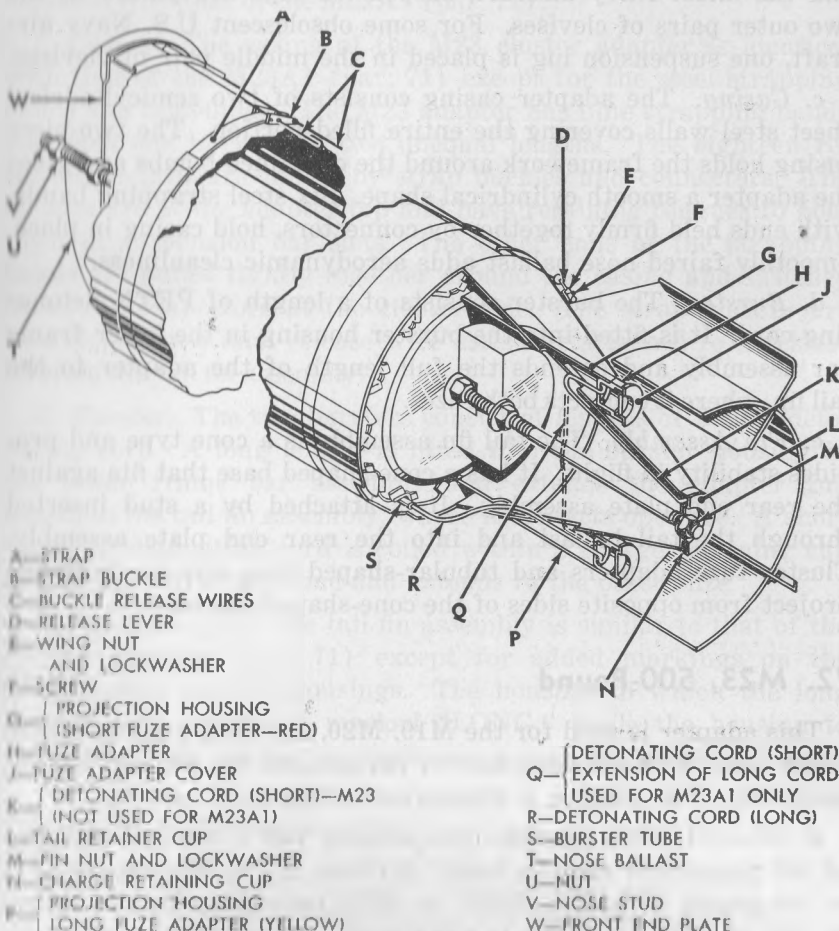


Figure 37. Assembly of M23A1 and M23 adapters.

a. General. This aimable type adapter has a nominal capacity of 500 pounds but actually holds 38 (approximately 323 pounds) ten-pound PT1-filled M74 incendiary bombs (par. 51). Its shape is cylindrical. Approximate overall dimensions are $14\frac{3}{4}$ inches diameter and $59\frac{1}{2}$ inches length, including tail fin. Actual weight of the adapter is about 190 pounds.

b. Framework. The adapter framework is steel and consists of a suspension bar assembly which forms its top, a bottom bar assembly which houses the burster, four side bars, a front end plate assembly which supports nose ballast, and a rear end plate assembly with tail fin and ballast mounting provisions. Bombs are inserted from the front, before the casing is put on, by lifting the suspension bar assembly and opening the front end plate assembly. The suspension bar has a hoisting lug and three pairs of clevises for attaching suspension lugs. For U.S. Air Force and the latest Navy aircraft, suspension lugs are placed in the two outer pairs of clevises. For some obsolescent U.S. Navy aircraft, one suspension lug is placed in the middle pair of clevises.

c. Casing. The adapter casing consists of two semicylindrical sheet steel walls covering the entire filled portion. The two-piece casing holds the framework around the contained bombs and gives the adapter a smooth cylindrical shape. Six steel strapping bands, with ends held firmly together by connectors, hold casing in place. Smoothly faired nose ballast adds aerodynamic cleanliness.

d. Burster. The burster consists of a length of PETN detonating cord. It is fitted into the burster housing in the lower frame bar assembly and extends the full length of the adapter to the tail fin, where it contacts both fuzes.

e. Fin Assembly. The tail fin assembly is a cone type and provides stability in flight. It has a cone-shaped base that fits against the rear end plate assembly. It is attached by a stud inserted through the tail ballast and into the rear end plate assembly. Cluster fuze adapters and tubular-shaped fuze adapter housings project from opposite sides of the cone-shaped tail base.

72. M23, 500-Pound

This adapter is used for the M19, M20, and M21 aimable incendiary bomb clusters described in paragraphs 81, 83, and 84, respectively. The adapter is illustrated in figures 37 and 38.

a. General. This aimable type adapter has a nominal capacity of 500 pounds but actually holds 38 (from 232 to 323 pounds) six- or ten-pound AN-M69, M69X, or M74 incendiary bombs (pars. 49, 50, or 51). Its shape is cylindrical. Approximate overall di-

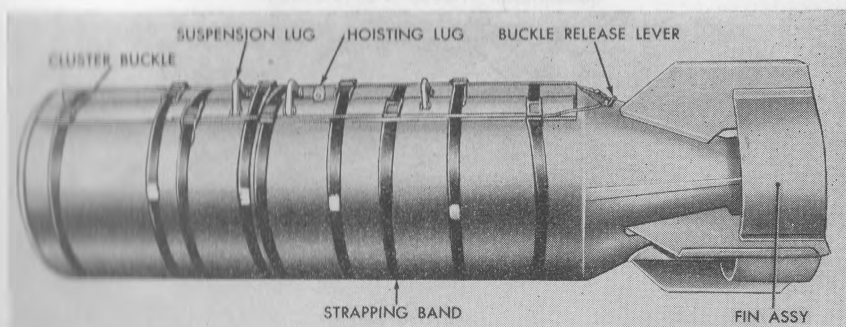


Figure 38. Adapter, aimable cluster, M23.

mentations are $14\frac{3}{4}$ inches diameter and $59\frac{1}{2}$ inches length, including tail fin. Actual weight of the adapter is about 190 pounds.

b. Framework. The framework of the M23 cluster adapter is identical with that of the M23A1 (par. 71).

c. Casing. The casing of the M23 cluster adapter is identical with that of the M23A1 (par. 71) except for the steel strapping bands and fastenings. The M23 adapter has nine strapping bands and each one is cut into two unequal lengths. The eighteen resulting lengths are joined by strap buckles and connectors. The buckles are at the adapter top and have retaining tongues to hold them in suspension bar slots. The other ends of the strapping bands are pulled tightly together around the casing and fastened firmly by connectors at the cluster side. The strap buckles are held closed by a dual release wire assembly attached to a release lever on the tail fin assembly.

d. Burst. The two bursters consist of lengths of PETN detonating cord. A long length is fitted into the burster housing in the lower frame bar assembly and extends the adapter full length to the tail fin assembly, where it contacts one fuze. A short length of detonating cord is coiled within a charge retaining cup in the rear of the tail cone and extends to the other fuze.

e. Fin Assembly. The tail fin assembly is similar to that of the M23A1 adapter (par. 71) except for added markings on the tubular fuze adapter housings. The housing to which the long burster cord extends is marked "LONG," while the housing to which the short burster cord extends is marked "SHORT."

73. M25, 500-Pound

This adapter is used for the M31 aimable incendiary bomb cluster described in paragraph 87. The adapter is illustrated in figure 39.

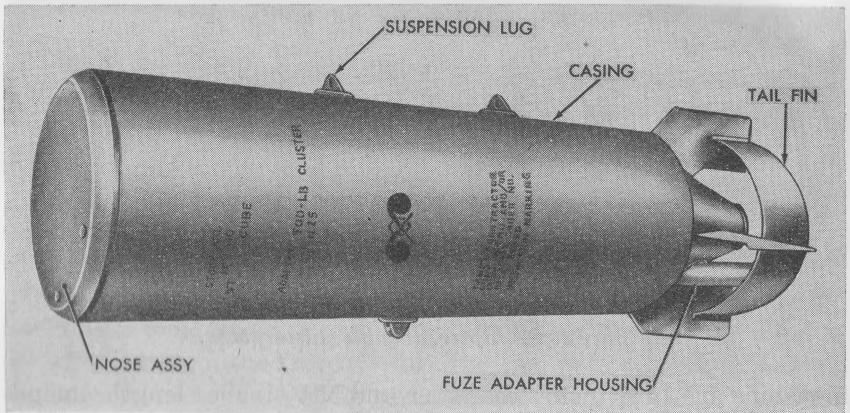


Figure 39. Adapter, 500-pound cluster, M25.

a. General. This aimable type adapter has a nominal capacity of 500 pounds but actually holds 38 (approximately 323 pounds) ten-pound PT1-filled M74 incendiary bombs (par. 51). Its shape is cylindrical. Approximate overall dimensions are $15\frac{1}{4}$ inches diameter and $57\frac{1}{8}$ inches length, including tail fin. Actual weight of the adapter is about 140 pounds.

b. Framework. The adapter framework is steel and consists of a buckle bar assembly at its top, a connector bar assembly, four spacer bars, two end plate assemblies, and four strapping bands. The strapping bands are closed by toggle buckles which are forced open by compression springs when not held snugly by the adapter casing. The bands are fastened firmly by connectors. Bombs are inserted through front before the casing is put on.

c. Casing. The adapter casing is a steel cylinder covering the entire filled portion. The front end is open and the rear end is closed by a steel casting or forging which is shaped to provide a gas chamber. Three suspension lugs are welded to the casing. Two of the lugs, for use on U.S. Air Force and the latest Navy aircraft, are on one side of the casing. The other lug, for use on some obsolescent U.S. Navy aircraft, is on the opposite side.

d. Strikers. Three strikers for setting off gas expansion cartridges are mounted on three cartridge holders. The cartridge holders are installed in the closure cap which forms the rear wall of the gas chamber.

e. Fin Assembly. The tail fin assembly is an M7 cone and band type. It is secured to the adapter by a lock nut installed on a tail fin stud. The stud mounts in the gas chamber closure cap. Cluster fuze adapters and tubular-shaped fuze adapter housings project from opposite sides of the cone-shaped tail base.

74. M26, 500-Pound

This adapter is used for the M32 aimable incendiary bomb cluster described in paragraph 88. The adapter is illustrated in figure 40.

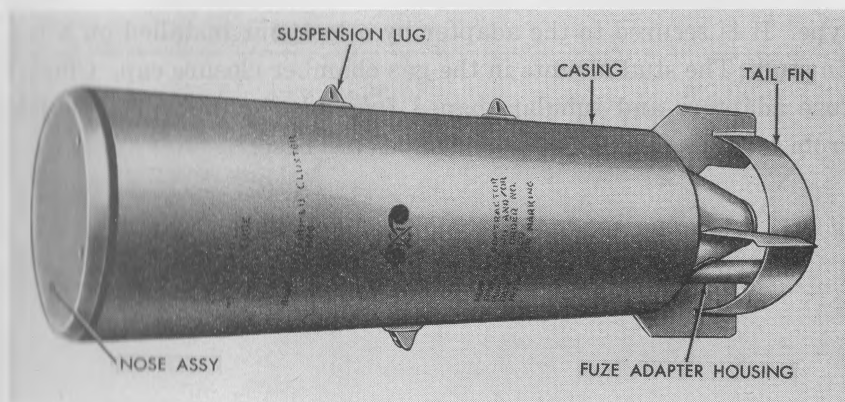


Figure 40. Adapter, 500-pound cluster, M26.

a. General. This aimable type adapter has a nominal capacity of 500 pounds but actually holds 108 (approximately 400 pounds) four-pound AN-M50A3 incendiary bombs (par. 44). Its shape is cylindrical. Approximate overall dimensions are 15 inches diameter and $60\frac{3}{8}$ inches length including tail fin. Actual weight of the adapter is about 200 pounds.

b. Framework. The adapter framework is steel and consists of a buckle bar assembly at its top, five spacer bars, two end plate assemblies, and four strapping bands. The strapping bands are closed by toggle buckles which are forced open by compression springs when not held snugly by the adapter casing. The bands are each fastened firmly by connectors. Bombs are inserted through the front before the casing is put on.

c. Casing. The adapter casing is a steel cylinder covering the entire filled portion. The front end is open and the rear end is closed by a steel casting or forging which is shaped to provide a gun chamber. Three suspension lugs are welded to the casing. Two of the lugs, for use on U.S. Air Force and the latest Navy aircraft, are on one side of the casing. The other lug, for use on some obsolescent U.S. Navy aircraft, is on the opposite side.

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d. Strikers. Three strikers for setting off gas expansion cartridges are mounted on three cartridge holders. The cartridge holders are installed in the closure cap which forms the gas chamber rear wall.

e. Fin Assembly. The tail fin assembly is an M7 cone and band type. It is secured to the adapter by a lock nut installed on a tail fin stud. The stud mounts in the gas chamber closure cap. Cluster fuze adapters and tubular-shaped fuze adapter housings project from opposite sides of the cone-shaped tail base.

CHAPTER 4

INCENDIARY BOMB CLUSTERS

Section I. QUICK-OPENING CLUSTERS

75. M12, 100-Pound

Data for this cluster are listed on line 75 of table V, appendix IV. The cluster is illustrated in figure 41.

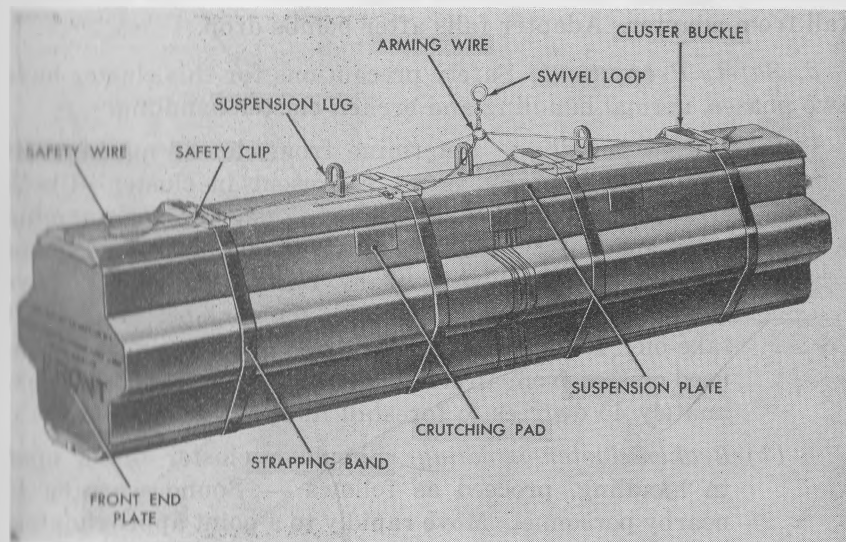


Figure 41. Cluster, incendiary bomb, M12.

a. Description. This quick-opening (frame) incendiary bomb cluster is irregularly hexagonal in shape. Approximate overall dimensions are $8\frac{3}{4}$ inches width, $10\frac{1}{16}$ inches height, and $10\frac{1}{16}$ inches length. Actual weight is about 98 pounds. It is the only 100-pound nominal size cluster included in this manual; all others are 500-pound nominal size. The main components are—

- (1) *Bombs.* Each cluster contains 14 NP-filled 6-pound AN-M69 incendiary bombs (par. 49). They are arranged in two bundles of seven bombs each.

- (2) *Adapter*. The adapter is an M4 quick-opening (frame) type (par. 67).
- (3) *Arming wire*. The arming wire is a factory installed four-branch type (par. 67d).

b. Preparation for Use. Check safety wire and arming wire for proper installation. Raise required suspension lugs and install cotter pins. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle. Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Remove cluster buckle safety wire. If cluster is not dropped, thread safety wire through holes provided in buckle release latches before removing cluster from aircraft bomb station.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn from buckles. Buckles open and release strapping bands. Cluster adapter opens at rear and bombs fall from adapter. Adapter falls after bombs drop.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling*. Determine from cluster markings if M69X bombs (par. 50) are present in cluster. Check strapping bands for breaks or damage. Check arming wire and safety wire for proper installation. Do not remove arming wire for any reason. Do not remove safety wire until latest possible moment before aircraft take-off. Replace safety wire before removing any unused cluster from aircraft. Bend safety wire end approximately 45 degrees to forestall its accidental removal.
- (2) *Broken-cluster handling*. Should a cluster break open in handling, proceed as follows — Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least five minutes. Lie flat on the ground if cluster contains M69X bombs (par. 50). When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; the word "FRONT"; cluster actual weight; and lot number are marked in black on the front end.

f. Packing. This cluster is packed in a moistureproof steel drum. A purple band around drum identifies its contents as incendiary. Cotter pins are removed from suspension lugs, allowing lugs to drop into slightly lower positions. Suspension lug cotter pins are attached to the center lug. A desiccant bag is attached to another lug. Shipping weight and cubage are approximately 133 pounds and 3.2 cubic feet.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

76. M13, 500-Pound

Data for this cluster are listed on line 76 of table V, appendix IV. The cluster is illustrated in figure 42.

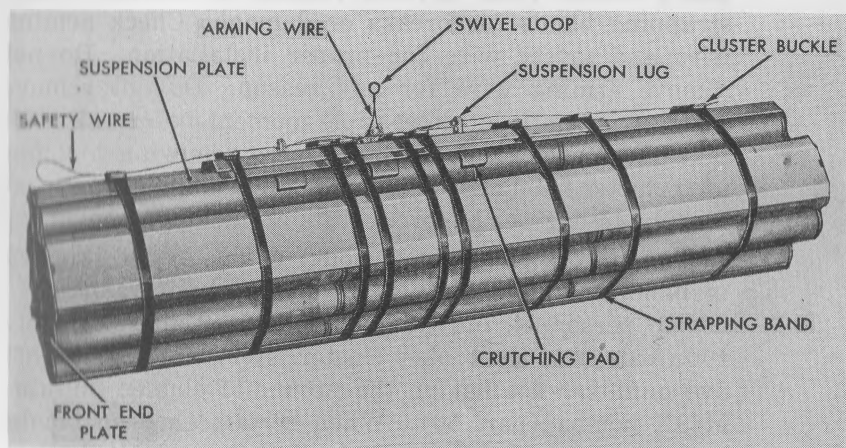


Figure 42. Cluster, incendiary bomb, M13.

a. Description. This quick-opening (frame) incendiary bomb cluster is irregularly dodecagonal (twelve-sided) in shape. Approximate overall dimensions are $14\frac{15}{16}$ inches height, $17\frac{7}{16}$ inches width, and $59\frac{1}{8}$ inches length. Actual weight is about 427 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 60 NP-filled 6-pound AN-M69 incendiary bombs (par. 49). They are arranged in three bundles of 20 bombs each.
- (2) *Adapter.* The adapter is an M7 quick-opening (frame) type (par. 68).
- (3) *Arming wire.* The arming wire is a factory installed six-branch type (par. 68d).

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b. Preparation for Use. Check safety wire and arming wire for proper installation. Raise required suspension lugs and install cotter pins. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle. Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Remove cluster buckle safety wire. If cluster is not dropped, thread safety wire through holes provided in buckle release latches before removing cluster from aircraft bomb station.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn from buckles. Buckles open and release strapping bands. Cluster adapter opens at rear and bombs fall from adapter. Adapter falls after bombs drop.

d. Safety precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Determine from cluster markings if M69X bombs (par. 50) are present in cluster. Check strapping bands for breaks or damage. Check arming wire and safety wire for proper installation. Do not remove arming wire for any reason. Do not remove safety wire until latest possible moment before aircraft take-off. Replace safety wire before removing any unused cluster from aircraft. Bend safety wire end approximately 45 degrees to forestall its accidental removal.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows — Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least five minutes. Lie flat on the ground if cluster contains M69X bombs (par. 50). When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; the word "FRONT"; cluster actual weight; and lot number are marked in black on the front end.

f. Packing. This cluster is packed in either a steel drum or a plywood box. Both containers are moistureproof and are equipped with a desiccant bag. When the cluster is packed in either container, cotter pins are removed from suspension lugs, allowing the lugs to drop into slightly lower positions. The removed cotter pins

are wired to the center lug. When the cluster is packed in a steel drum, shipping weight and cubage are approximately 550 pounds and 12.5 cubic feet. When packed in a plywood box, shipping weight and cubage are approximately 525 pounds and 12.7 cubic feet.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

Section II. AIMABLE CLUSTERS

77. AN-M14A1, 500-Pound

Data for this cluster are listed on line 77 of table V, appendix IV. The cluster is illustrated in figure 43.

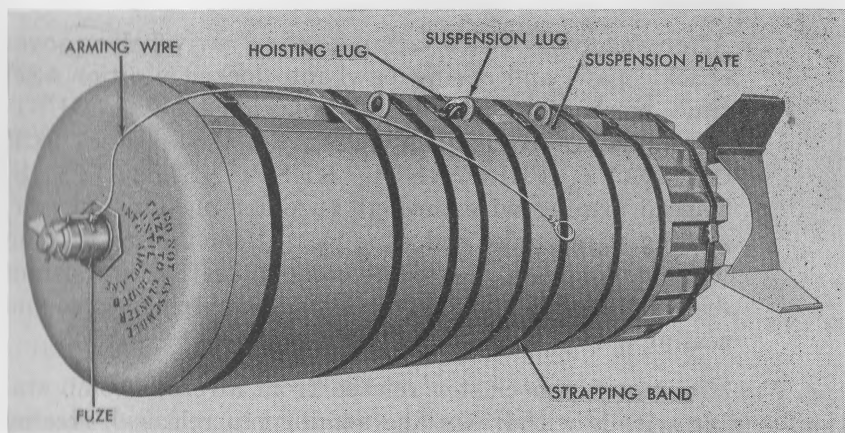


Figure 43. Cluster, aimable, incendiary bomb, AN-M14A1.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 470 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 110 four-pound incendiary bombs. They are arranged in two bundles, each bundle containing 44 of AN-M50T-A2 (par. 46) and 11 of M50T-X-A3 (par. 47). The M50T-X-A3 bombs are located near the center of each bundle.
- (2) *Adapter.* The adapter is an M10A1 aimable type (par. 69).

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- (3) *Fuze.* An M155 mechanical time arming vane nose type fuze is installed in the adapter nose assembly. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C1 single type.
- (5) *Fin assembly.* The tail fin assembly is a C3 box type (par. 69e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Fit tail fin assembly against adapter rear end plate with one vane in guide notch, and place retaining plate against fin sleeve. With lock washer under screw head, secure fin assembly to adapter with cap screw. For U.S. Air Force aircraft, raise two outer suspension lugs and install cotter pins. For U.S. Navy aircraft, install threaded center suspension lug. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism and install fuze. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wire through fuze arming pin top hole, arming wire guide, and vane lock. Remove fuze sealing wire, striker stop, and safety cotter pin. If cluster is not dropped, replace fuze safety cotter pin, striker stop, and sealing wire before removing arming wire.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream arms fuze at approximately six revolutions. Burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin (TM 9-1980). Do not remove safety cotter pin until arming wire has been placed in arming

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pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before aircraft take-off. Replace safety cotter pin, striker stop, and sealing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.

- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows — Sound warning to nearby personnel. Move rapidly upwind to a point approximately 100 yards from the broken cluster. Lie flat on the ground and adjust protective mask. Remain down, with protective mask adjusted, for at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy. Do not destroy bombs within $\frac{1}{2}$ mile of any troop-occupied area. Keep protective mask adjusted and remain upwind at all times when burning the bombs.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning "DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE"; cluster actual weight; and lot number are marked in black on nose fairing. Purple and green identification stripes are also painted on the nose fairing.

f. Packing. This cluster is packed in either a wooden box or a rolling crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. When packed in the wooden box, the tail fin assembly is included in it, and shipping weight and cubage are approximately 630 pounds and 18 cubic feet. When packed in the rolling crate, the tail fin assembly is packed separately, and shipping weight and cubage are approximately 515 pounds and 11.8 cubic feet. Arming wire and fuze are packed separately. Packaging data on separate items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

78. AN-M14, 500-Pound

Data for this cluster are listed on line 78 of table V, appendix IV. The cluster is illustrated in figure 44.

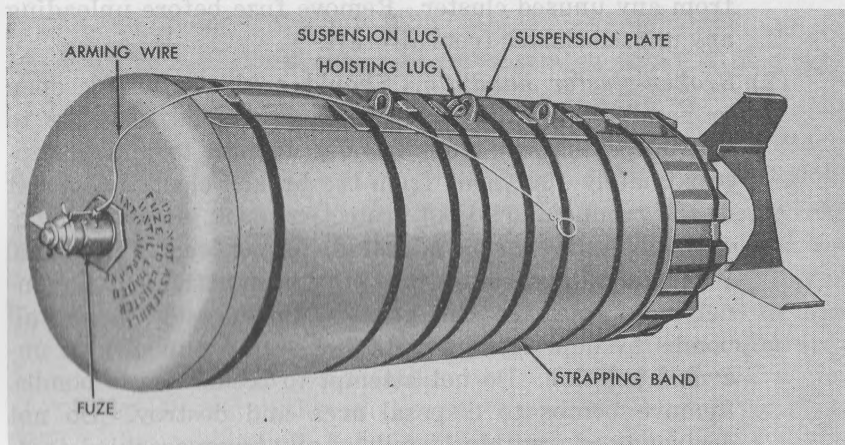


Figure 44. Cluster, aimable, incendiary bomb, AN-M14.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 465 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 110 four-pound incendiary bombs. They are arranged in two bundles, each bundle containing 52 of AN-M50T-A2 (par. 46) and 3 of AN-M50X-A3 (par. 48). The AN-M50X-A3 bombs are located near the center of each bundle.
- (2) *Adapter.* The adapter is an M10A1 aimable type (par. 69).
- (3) *Fuze.* An AN-M145 mechanical time arming vane nose type fuze is installed in the adapter nose assembly. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C1 single type.
- (5) *Fin assembly.* The tail fin assembly is a C3 box type (par. 69e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Fit tail fin assembly against adapter rear end plate with one vane in guide notch, and place retaining plate against fin sleeve. With lock washer

under screw head, secure fin assembly to adapter with cap screw. For U.S. Air Force and the latest Navy aircraft, raise two outer suspension lugs and install cotter pins. For other obsolescent U.S. Navy aircraft, install threaded center suspension lug. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.

- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position, set time mechanism and install fuze. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wire through fuze arming pin top hole, arming wire guide, and vane lock. Remove fuze sealing wire, striker stop, and safety cotter pin. If cluster is not dropped, replace fuze safety cotter pin, striker stop, and sealing wire before removing arming wire.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. Burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin TM 9-1980/TO 39B-15-1. Do not remove safety cotter pin until arming wire has been placed in arming pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before aircraft take-off. Replace safety cotter pin, striker stop, and sealing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly upwind to a point approximately 100 yards from the broken cluster. Lie flat on the ground and adjust protective mask. Remain down, with protective mask adjusted, for at least 5 minutes. When certain

that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy. Do not destroy bombs within $\frac{1}{2}$ mile of any troop-occupied area. Keep protective mask adjusted and remain upwind at all times when burning the bombs.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning "DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE"; cluster actual weight; and lot number are marked in black on nose fairing. Purple and green identification stripes are also painted on the nose fairing.

f. Packing. This cluster is packed in either a wooden box or a rolling crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. When packed in the wooden box, shipping weight and cubage are approximately 625 pounds and 18 cubic feet. When packed in the rolling crate, shipping weight and cubage are approximately 565 pounds and 15 cubic feet. Arming wire and fuze are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

79. AN-M17A1, 500-Pound

Data for this cluster are listed on line 79 of table V, appendix IV. The cluster is illustrated in figure 45.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 465 pounds. The main components are—

- (1) *Bombs.* The cluster contains 110 four-pound incendiary bombs. They are arranged in two bundles, each bundle containing 44 of AN-M50A2 (par. 45) and 11 of AN-M50X-A3 (par. 48). The AN-M50X-A3 are located near the center of each bundle.
- (2) *Adapter.* The adapter is an M10A1 aimable type (par. 69).

c. *Functioning.* Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. The burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. *Safety Precautions.* Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pin until arming wire has been placed in arming pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before aircraft take-off. Replace safety cotter pin, striker stop, and sealing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster and lie flat on the ground. Remain down for at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. *Marking.* Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning "DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE"; cluster actual weight; and lot number are marked in black on nose fairing. Purple identification stripes are also painted on the nose fairing.

f. *Packing.* This cluster is packed in either a wooden box or a rolling crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. When packed in the wooden box, shipping weight and cubage are approximately 625 pounds and 18 cubic feet. When packed in the rolling crate, shipping weight and cubage are approximately 562 pounds and 15.1 cubic feet. Arming

wire and fuze are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

80. M17, 500-Pound

Data for this cluster are listed on line 80 of table V, appendix IV. The cluster is illustrated in figure 46.

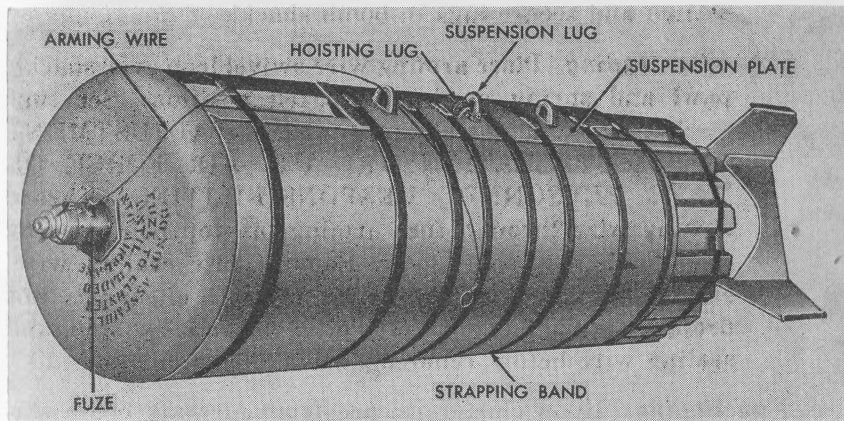


Figure 46. Cluster, aimable, incendiary bomb, M17.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 458 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 110 four-pound incendiary bombs. They are arranged in two bundles, each bundle containing 44 of AN-M50A2 (par. 45) and 11 of AN-M50X-A3 (par. 48). The AN-M50X-A3 bombs are located near the center of each bundle.
- (2) *Adapter.* The adapter is an M10 aimable type (par. 70).
- (3) *Fuze.* An M138 mechanical time arming vane nose type fuze is installed in the adapter nose assembly. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.

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- (4) *Arming wire.* The arming wire is a C1 single type.
- (5) *Fin assembly.* The tail fin assembly is a C3 box type (pars. 69e and 70).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Fit tail fin assembly against adapter rear end plate with one vane in guide notch, and place retaining plate against fin sleeve. With lock washer under screw head, secure fin assembly to adapter with cap screw. For U.S. Air Force and the latest Navy aircraft, raise two outer suspension lugs and install cotter pins. For other obsolescent U.S. Navy aircraft, install threaded center suspension lug. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism and install fuze. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wire through fuze arming pin top hole, arming wire guide, and vane lock. Remove fuze sealing wire, striker stop, and safety cotter pin. If cluster is not dropped, replace fuze safety cotter pin, striker stop, and sealing wire before removing wire.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream arms fuze in approximately 260 revolutions. Burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin (TM 9-1980). Do not remove safety cotter pin until arming wire has been placed in arming pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before aircraft take-off. Replace safety cotter pin, striker stop, and seal-

ing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.

- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster and lie flat on the ground. Remain down for at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning “DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE”; cluster actual weight; and lot number are marked in black on nose fairing. Purple identification stripes are also painted on the nose fairing.

f. Packing. This cluster is packed in either a wooden or plywood crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. The shipping weight is approximately 625 pounds for either packing. The shipping cubage is approximately 17.5 cubic feet when packed in the wooden crate and 12.9 cubic feet when packed in the plywood crate. Arming wire and fuze are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

81. M19, 500-Pound

Data for this cluster are listed on line 81 of table V, appendix IV. The cluster is illustrated in figure 47.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{11}{16}$ inches diameter and $59\frac{1}{2}$ inches length. Actual weight is about 435 pounds. The main components are—

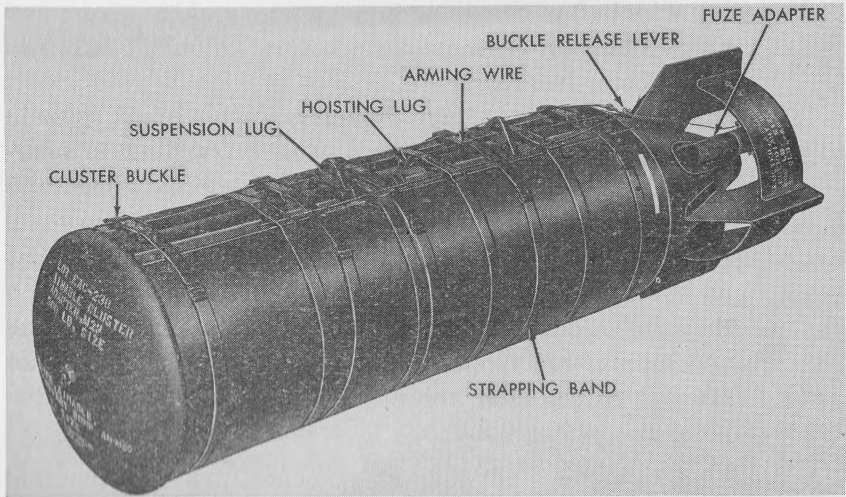


Figure 47. Cluster, aimable, incendiary bomb, M19.

- (1) *Bombs.* Each cluster contains 38 NP-filled 6-pound AN-M69 incendiary bombs (par. 49). They are arranged in two bundles of 19 bombs each.
- (2) *Adapter.* The adapter is an M23 aimable type (par. 72).
- (3) *Fuses.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C4 dual type.
- (5) *Fin assembly.* The tail fin assembly is a cone type (par. 72e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* For U.S. Air Force and the latest Navy aircraft install suspension lugs in two outer pairs of clevises. For other obsolescent U.S. Navy aircraft install one suspension lug in the middle pair of clevises. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of fuze activating shorter burster cord 2 to 3 seconds longer than time set for fuze activating longer burster cord. Install fuzes. FUZE ADJUSTMENT AND AND INSTALLATION ARE U.S. AIR FORCE OR

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NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pins, striker stops, and sealing wires before removing arming wires.

c. Functioning. Upon cluster release from aircraft bombs station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. When time settings expire, fuzes set off respective burster cords. Longer detonating cord is set off first, splitting cluster along bottom, freeing bombs to drop separately. Shorter detonating cord is set off 2 to 3 seconds later, breaking tail fin attaching stud. Air stream force removes tail fin, withdrawing buckle release wires with it. If first fuze fails to function, second fuze opens strapping bands and cluster falls apart.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Determine from cluster markings if M69X bombs (par. 50) are present in cluster. Check strapping bands for breaks or damage. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wires, striker stops, and safety cotter pins (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops, and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. Lie flat on the ground if cluster contains M69X bombs (par. 50). When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plung-

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ers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster actual weight; and lot number are marked in black on the nose ballast. The fuze adapter housing to which the shorter burster detonating cord extends is marked "SHORT" against a yellow background. The fuze adapter housing to which the longer burster detonating cord extends is marked "LONG" against a red background.

f. Packing. This cluster is packed in a steel drum having rolling hoops and a purple identification band. It is first encased in a moistureproof strawboard container with desiccants. Shipping weight and cubage are approximately 605 pounds and 20.5 cubic feet. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

82. M20A1, 500-Pound

Data for this cluster are listed on line 82 of table V, appendix IV. The cluster is illustrated in figure 48.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{11}{16}$ inches diameter and $59\frac{1}{2}$ inches length. Actual weight is about 525 pounds. The main components are—

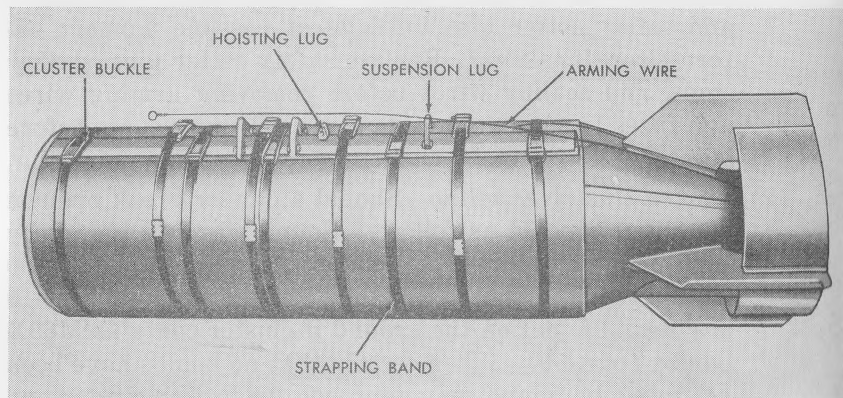


Figure 48. Cluster, aimable, incendiary bomb, PT1, M20A1.

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- (1) *Bombs.* Each cluster contains 38 PT1-filled 10-pound M74 incendiary bombs (par. 51). They are arranged in two bundles of 19 bombs each.
- (2) *Adapter.* The adapter is an M23A1 aimable type (par. 71).
- (3) *Fuzes.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C4 dual type.
- (5) *Fin assembly.* The tail fin assembly is a cone type (par. 71e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* For U.S. Air Force and the latest Navy aircraft install suspension lugs in two outer pairs of clevises. For other obsolescent U.S. Navy aircraft install one suspension lug in middle pair of clevises. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of both fuzes for same delay and install. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pins, striker stops, and sealing wires before removing arming wires.

c. Functioning. Upon cluster release from aircraft bomb station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. When time setting expires, fuzes set off burster cord. Burster splits cluster along bottom and frees bombs to drop separately. Two fuzes are used to insure cluster opening in case one fails to function.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken cluster handling.

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- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wires, striker stops, and safety cotter pins (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops, and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster. DO NOT ATTEMPT TO DISARM THE BOMBS because any one might have an M142 fuze (par. 51a(5)) which will detonate the bomb if its arming pin is depressed. Do not attempt to recluster the bombs. Carry the bombs to disposal area and destroy. Use every precaution to avoid jarring the bombs while handling. Do not attempt to identify and disarm M142A1 fuzes (par. 51a(5)).

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster actual weight; and lot number are marked in black on the nose ballast.

f. Packing. This cluster is packed in a steel drum having rolling hoops and a purple identification band. It is first encased in a moistureproof strawboard container with desiccants. Shipping weight and cubage are approximately 692 pounds and 20.5 cubic feet. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

83. M20, 500-Pound

Data for this cluster are listed on line 83 of table V, appendix IV. The cluster is illustrated in figure 49.

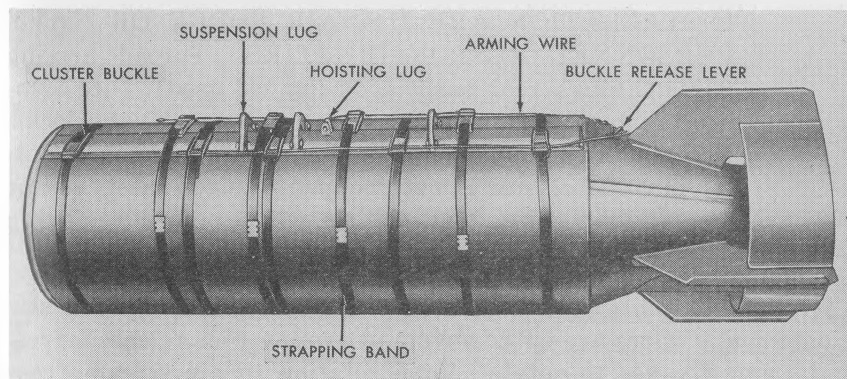


Figure 49. Cluster, aimable, incendiary bomb, PT1, M20.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{1}{4}$ inches diameter and $59\frac{1}{2}$ inches length. Actual weight is about 525 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 38 PT1- or NP-filled 10-pound M74 incendiary bombs (par. 51). They are arranged in two bundles of 19 bombs each.
- (2) *Adapter.* The adapter is an M23 aimable type (par. 72).
- (3) *Fuzes.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C4 duel type.
- (5) *Fin assembly.* The tail fin assembly is a cone type (par. 72e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* For U.S. Air Force and the latest Navy aircraft install suspension lugs in two outer pairs of clevises. For other obsolescent U.S. Navy aircraft install one suspension lug in middle pair of clevises. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.

- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of fuze activating shorter burster cord 2 to 3 seconds longer than time set for fuze activating longer burster cord. Install fuzes. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pin, striker stops, and sealing wires before removing arming wires.

c. Functioning. Upon cluster release from aircraft bomb station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. When time settings expire, fuzes set off respective burster cords. Longer detonating cord is set off first, splitting cluster along bottom, freeing bombs to drop separately. Shorter detonating cord is set off 2 to 3 seconds later, breaking tail fin attaching stud. Air stream force removes tail fin, withdrawing buckle release wires with it. If first fuze fails to function, second fuze opens strapping bands and cluster falls apart.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wires, striker stops, and safety cotter pins (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops, and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100

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yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster. DO NOT ATTEMPT TO DISARM THE BOMBS because any one may have an M142 fuze (par. 51a(5)) which will detonate the bomb if its arming pin is depressed. Do not attempt to recluster the bombs. Carry the bombs to disposal area and destroy. Use every precaution to avoid jarring the bombs while handling. Do not attempt to identify and disarm M142A1 fuzes (par. 51a(5)).

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster actual weight; and lot number are marked in black on the nose ballast. The fuze adapter housing to which the shorter burster detonating cord extends is marked "SHORT" against a yellow background. The fuze adapter housing to which the longer burster detonating cord extends is marked "LONG" against a red background.

f. Packing. This cluster is packed in a steel drum having rolling hoops and a purple identification band. It is first encased in a moistureproof strawboard container with desiccants. Shipping weight and cubage are approximately 690 pounds and 20.5 cubic feet. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

84. M21, 500-Pound

Data for this cluster are listed on line 84 of table V, appendix IV. The cluster is illustrated in figure 50.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{11}{16}$ inches diameter and $59\frac{1}{2}$ inches length. Actual weight is about 481 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 38 NP-filled 6-pound M69X incendiary bombs (par. 50). They are arranged in two bundles of 19 bombs each.
- (2) *Adapter.* The adapter is an M23 aimable type (par. 72).

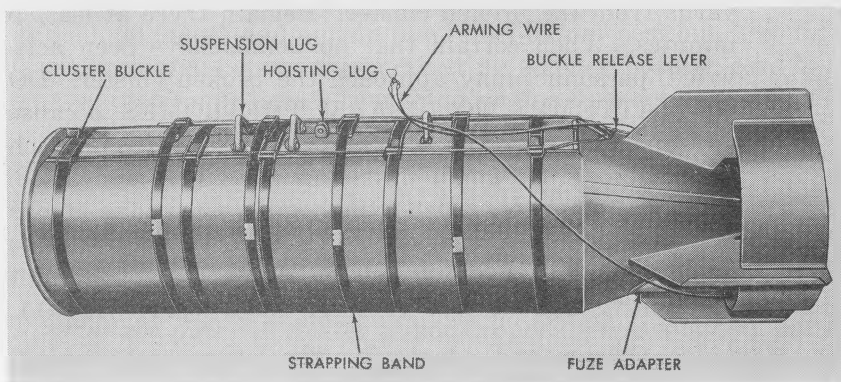


Figure 50. Cluster, aimable, incendiary bomb, M21.

- (3) *Fuzes.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C4 dual type.
- (5) *Fin assembly.* The tail fin assembly is a cone type (par. 72e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* For U.S. Air Force and the latest Navy aircraft install suspension lugs in two outer pairs of clevises. For other obsolescent U.S. Navy aircraft install one suspension lug in middle pair of clevises. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of fuze activating shorter burster cord 2 to 3 seconds longer than time set for fuze activating longer burster cord. Install fuzes. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pins, striker stops, and sealing wires before removing arming wires.

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c. *Functioning.* Upon cluster release from aircraft bomb station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. When time settings expire, fuzes set off respective burster cords. Longer detonating cord is set off first, splitting cluster along bottom, freeing bombs to fall separately. Shorter detonating cord is set off 2 to 3 seconds later, breaking tail fin attaching stud. Air stream force removes tail fin, withdrawing buckle release wires with it. If first fuze fails to function, second fuze opens strapping bands and cluster falls apart.

d. *Safety Precautions.* Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wires, striker stops, and safety cotter pins (TM 9-1980). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops, and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster and lie flat on the ground. Remain down for at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to recluster the bombs. Remove bombs to disposal area and destroy.

e. *Marking.* Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster actual weight; and lot number are marked in black on the nose ballast. The fuze adapter housing to which the shorter burster detonating cord extends is marked "SHORT" against a yellow background. The fuze adapter housing to which the longer burster detonating cord extends is marked "LONG" against a red background.

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f. Packing. This cluster is packed in a steel drum having rolling hoops and a purple identification band. It is first encased in a moistureproof strawboard container with desiccants. Shipping weight and cubage are approximately 635 pounds and 20.5 cubic feet. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

85. M22A1, 500-Pound

Data for this cluster are listed on line 85 of table V, appendix IV. The cluster is illustrated in figure 51.

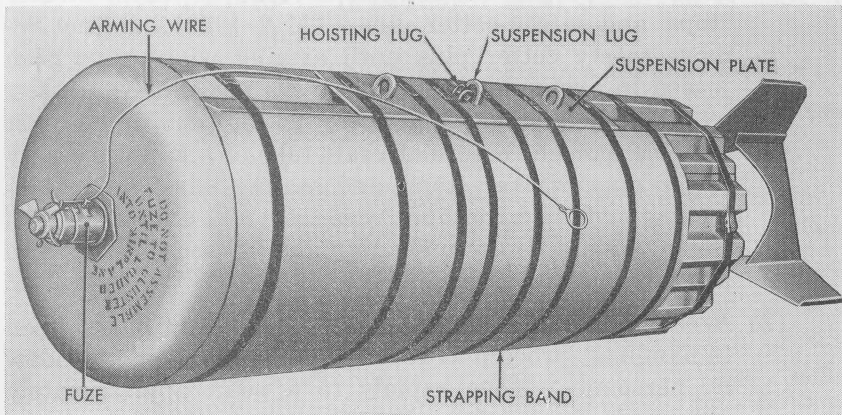


Figure 51. Cluster, aimable, incendiary bomb, M22A1.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 465 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 110 four-pound AN-M50A3 incendiary bombs (par. 44). They are arranged in two bundles of 55 bombs each.
- (2) *Adapter.* The adapter is an M10A1 aimable type (par. 69).
- (3) *Fuze.* An AN-M145 mechanical time arming vane nose type fuze is installed in the adapter nose assembly. The

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fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.

- (4) *Arming wire.* The arming wire is a C1 single type.
- (5) *Fin assembly.* The tail fin assembly is a C3 box type (par. 69e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Fit tail fin assembly against adapter rear end plate with one vane in guide notch, and place retaining plate against fin sleeve. With lock washer under screw head, secure fin assembly to adapter with cap screw. For U.S. Air Force and the latest Navy aircraft, raise two outer suspension lugs and install cotter pins. For other obsolescent U.S. Navy aircraft, install threaded center suspension lug. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism and install fuze. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wire through fuze arming pin top hole, arming wire guide, and vane lock. Remove fuze sealing wire, striker stop, and safety cotter pin. If cluster is not dropped, replace fuze safety cotter pin, striker stop, and sealing wire before removing arming wire.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. Burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pin until arming wire has been placed in arming pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before

aircraft take-off. Replace safety cotter pin, striker stop, and sealing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.

- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to re-cluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning "DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE"; cluster actual weight; and lot number are marked in black on nose fairing. Purple identification stripes are also painted on the nose fairing.

f. Packing. This cluster is packed in either a wooden box or a rolling crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. When packed in the wooden box, the tail fin assembly is included in it, and shipping weight and cubage are approximately 625 pounds and 18 cubic feet. When packed in the rolling crate, the tail fin assembly is packed separately, and shipping weight and cubage are approximately 515 pounds and 11.8 cubic feet. Arming wire and fuze are packed separately. Packaging data on separate items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

86. M22, 500-Pound

Data for this cluster are listed on line 86 of table V, appendix IV. The cluster is illustrated in figure 52.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are $14\frac{3}{8}$ inches diameter and $60\frac{7}{8}$ inches length. Actual weight is about 465 pounds. The main components are—

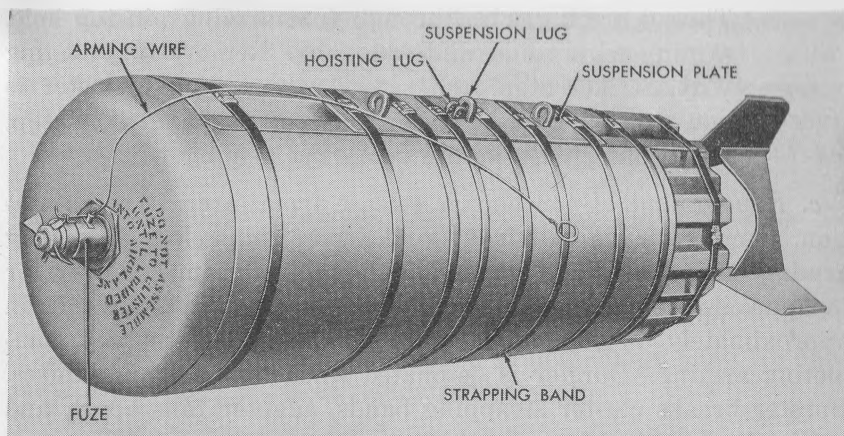


Figure 52. Cluster, aimable, incendiary bomb, M22.

- (1) *Bombs.* Each cluster contains 110 four-pound AN-M50A2 incendiary bombs (par. 45). They are arranged in two bundles of 55 bombs each.
- (2) *Adapter.* The adapter is an M10A1 aimable type (par. 69).
- (3) *Fuze.* An AN-M145 mechanical time arming vane nose type fuze is installed in the adapter nose assembly. The fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 4 and is listed in table VI, appendix IV.
- (4) *Arming wire.* The arming wire is a C1 angle type.
- (5) *Fin assembly.* The tail fin assembly is a CB box type (par. 69e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Fit tail fin assembly against adapter rear end plate with one vane in guide notch, and place retaining plate against fin sleeve. With lock washer under screw head, secure fin assembly to adapter with cap screw. For U.S. Air Force and the latest Navy aircraft, raise two outer suspension lugs and install cotter pins. For other obsolescent U.S. Navy aircraft, install threaded center suspension lug. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set fuze time mechanism and install fuze. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES.

Thread arming wire through fuze arming pin top hole, arming wire guide, and vane lock. Remove fuze sealing wire, striker stop, and safety cotter pin. If cluster is not dropped, replace fuze safety cotter pin, striker stop, and sealing wire before removing arming wire.

c. Functioning. Upon cluster release from aircraft bomb station, arming wire is withdrawn and arming pin released, freeing arming vane to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. Burster is detonated when time setting expires. Burster breaks cluster strapping bands, adapter falls apart, and bombs drop separately.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

(1) *Normal handling.* Check strapping bands for breaks or damage. Do not install fuze until cluster is loaded on aircraft bomb station. Before installing fuze, check it for proper installation of sealing wire, striker stop, and safety cotter pin (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pin until arming wire has been placed in arming pin top hole. Do not remove sealing wire, striker stop, and safety cotter pin until latest possible moment before aircraft take-off. Replace safety cotter pin, striker stop, and sealing wire before removing arming wire and fuze from any unused cluster. Remove fuze before unloading any unused cluster from aircraft.

(2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to re-cluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, and model number; the warning "DO NOT ASSEMBLE FUZE TO CLUSTER UNTIL LOADED INTO AIRPLANE"; cluster actual weight; and lot number are marked in black on nose fairing. Purple identification stripes are also painted on the nose fairing.

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f. Packing. This cluster is packed in either a wooden box or a rolling crate. For either packaging the cluster is first encased in a moistureproof strawboard drum. When packed in the wooden box, the tail fin assembly is included in it, and shipping weight and cubage are approximately 625 pounds and 18 cubic feet. When packed in the rolling crate, the tail fin assembly is packed separately, and shipping weight and cubage are approximately 515 pounds and 11.8 cubic feet. Arming wire and fuze are packed separately. Packaging data on separate items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulation set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

87. M31, 500-Pound, PT1

Data for this cluster are listed on line 87 of table V, appendix IV. The cluster is illustrated in figure 53.

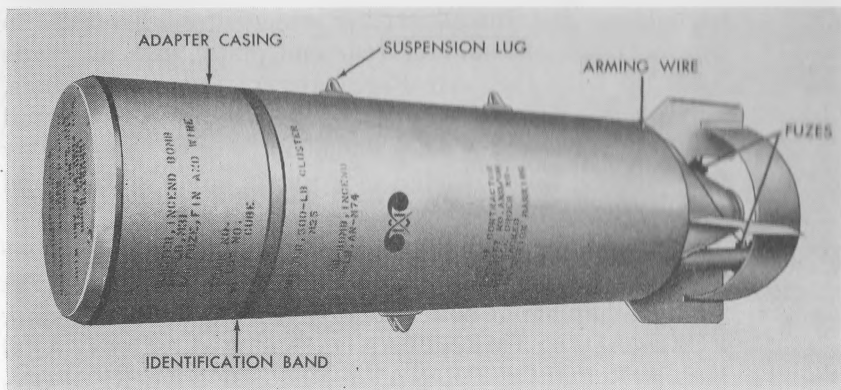


Figure 53. Cluster, incendiary bomb, PT1, 500-pound, M31.

a. *Description.* This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are 15 inches diameter and 57 $\frac{1}{8}$ inches length. Actual weight is about 562 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 38 PT1-filled 10-pound M74 incendiary bombs (par. 51). They are arranged in two bundles of 19 bombs each.
- (2) *Adapter.* The adapter is an M25 aimable type (par. 73).

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- (3) *Fuzes.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Burster.* The burster consists of a length of PETN detonating cord connecting the two fuzes. It is wound once around a retainer back of the cartridge strikers in the adapter tail assembly.
- (5) *Cartridges.* Three M2 ignition type cartridges are installed in the cartridge holders mounted on the gas chamber closure cap.
- (6) *Arming wire.* The arming wire is a C4 dual type.
- (7) *Fin assembly.* The tail fin assembly is an M7 cone and band type (par. 73e).

b. *Preparation for Use.* Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Unpack cluster components and remove shipping protective items. Inspect components and clean threads and mating parts. Install cartridge holders and tail fin stud in gas chamber closure cap. Insert cartridges in holders and install striker assemblies. Fit tail fin assembly against adapter rear end plate, with one vane lined up with U.S. Air Force aircraft suspension lugs, and place retaining washer on protruding end of tail fin stud. With lock washer under nut, secure fin assembly to adapter. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of both fuzes for same delay and install. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pins, striker stops, and sealing wires before removing arming wires.

c. *Functioning.* Upon cluster release from aircraft bomb station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately 4½ seconds from time of release, thereby

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completing arming. When time setting expires, fuzes set off burster cord. Burster drives cartridge strikers into cartridge caps. Strikers detonate cartridges. Cartridge explosions develop violent expansion in gas chamber. Gas expansion force breaks split nut securing cluster rear pressure plate. Gas expansion pressure against pressure plate forces bundled bombs out through cluster casing front. Strapping bands open when out of casing, adapter framework falls apart, and bombs drop separately. Two fuzes are used to insure cluster opening in case one fails to function.

d. *Safety Precautions.* Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Avoid impacts against striker buttons. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wires, striker stops, and safety cotter pins (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops, and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster. DO NOT ATTEMPT TO DISARM THE BOMBS because any one may have an M142 fuze (par. 51a(5)) which will detonate the bomb if its arming pin is depressed. Do not attempt to recluster the bombs. Carry the bombs to disposal area and destroy. Use every precaution to avoid jarring the bombs while handling. Do not attempt to identify and disarm M142A1 fuzes (par. 51a(5)).

e. *Marking.* Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster stock number; lot number; shipping weight; and shipping cubage are marked in purple on both the nose plate and casing. One purple identification band is painted around the casing. Contractual, packing, and inspection data are stenciled on the casing.

f. *Packing.* This cluster is packed in a rolling crate. Shipping weight and cubage are 562 pounds and 9.1 cubic feet. Its tail fin

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assembly; tail fin stud, nut, and washers; cartridge holders; and striker assemblies are packed in a separate steel crate. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

88. M32, 500-Pound

Data for this cluster are listed on line 88 of table V, appendix IV. The cluster is illustrated in figure 54.

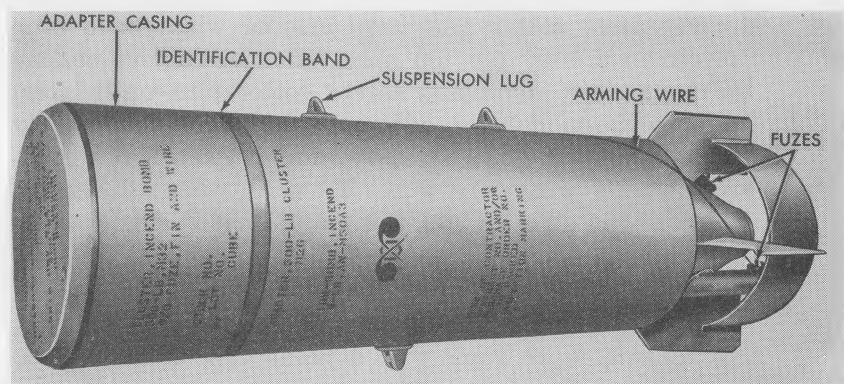


Figure 54. Cluster, incendiary bomb, 500-pound, M32.

a. Description. This aimable incendiary bomb cluster is cylindrical in shape. Approximate overall dimensions are 15 inches diameter and 60 $\frac{3}{8}$ inches length. Actual weight is about 617 pounds. The main components are—

- (1) *Bombs.* Each cluster contains 108 four-pound AN-M50A3 incendiary bombs (par. 44). They are arranged in two bundles of 54 bombs each.
- (2) *Adapter.* The adapter is an M26 aimable type (par. 74).
- (3) *Fuzes.* Two M152 mechanical time arming vane tail type fuzes are installed in the fuze adapters on the cluster adapter tail. The M152 fuze is described in TM 9-1980/TO 39B-15-1. It is shown in figure 5 and is listed in table VI, appendix IV.
- (4) *Burster.* The burster consists of a length of PETN detonating cord connecting the two fuzes. It is wound once

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around a retainer back of the cartridge strikers in the adapter tail assembly.

- (5) *Cartridges.* Three M2 ignition type cartridges are installed in the cartridge holders mounted on the gas chamber closure cap.
- (6) *Arming wire.* The arming wire is a C4 dual type.
- (7) *Fin assembly.* The tail fin assembly is an M7 cone and band type (par. 74e).

b. Preparation for Use. Preparation of this cluster for use is in two stages, before and after loading on aircraft bomb station.

- (1) *Before loading.* Unpack cluster components and remove shipping protective items. Inspect components and clean threads and mating parts. Install cartridge holders and tail fin stud in gas chamber closure cap. Insert cartridges in holders and install striker assemblies. Fit tail fin assembly against adapter rear end plate, with one vane lined up with U.S. Air Force aircraft suspension lugs, and place retaining washer on protruding end of tail fin stud. With lock washer under nut, secure fin assembly to adapter. Hoist cluster to aircraft bomb station and secure lugs in bomb shackle.
- (2) *After loading.* Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Set time mechanism of both fuzes for same delay and install. FUZE ADJUSTMENT AND INSTALLATION ARE U.S. AIR FORCE OR NAVY PERSONNEL RESPONSIBILITIES. Thread arming wires through rear suspension lug (if used), fuze arming pin top holes, arming wire guides, and vane locks. Remove fuze sealing wires, striker stops, and safety cotter pins. If cluster is not dropped, replace safety cotter pins, striker stops, and sealing wires before removing arming wires.

c. Functioning. Upon cluster release from aircraft bomb station, arming wires are withdrawn and arming pins released, freeing arming vanes to rotate. Vane rotation in air stream frees striker in approximately 260 revolutions. Slider moves into position in approximately $4\frac{1}{2}$ seconds from time of release, thereby completing arming. When time setting expires, fuzes set off burster cord. Burster drives cartridge strikers into cartridge caps. Strikers detonate cartridges. Cartridge explosions develop violent expansion in gas chamber. Gas expansion force breaks split nut securing cluster rear pressure plate. Gas expansion pressure against pressure plate forces bundled bombs out through cluster casing front. Strapping bands open when out of casing, adapter

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framework falls apart, and bombs drop separately. Two fuzes are used to insure cluster opening in case one fails to function.

d. Safety Precautions. Safety precautions for this cluster have two phases, normal handling and broken-cluster handling.

- (1) *Normal handling.* Avoid impacts against striker buttons. Do not install fuzes until cluster is loaded on aircraft bomb station. Before installing fuzes, check them for proper installation of sealing wire, striker stops, and safety cotter pins (TM 9-1980/TO 39B-15-1). Do not remove safety cotter pins until arming wires have been placed in arming pin top holes. Do not remove sealing wires, striker stops, and safety cotter pins until latest possible moment before aircraft take-off. Replace safety cotter pins, striker stops and sealing wires before removing arming wires and fuzes from any unused cluster. Remove fuzes before unloading any unused cluster from aircraft.
- (2) *Broken-cluster handling.* Should a cluster break open in handling, proceed as follows—Sound warning to nearby personnel. Move rapidly to a point approximately 100 yards from the broken cluster. Remain there at least 5 minutes. When certain that no bombs have been activated, personnel may approach the broken cluster and disarm all bombs by depressing and taping safety plungers in unarmed position. Do not attempt to re-cluster the bombs. Remove bombs to disposal area and destroy.

e. Marking. Cluster and adapter nomenclature and nominal size; bomb quantity, size, filling, and model number; cluster stock number; lot numbers; shipping weight; and shipping cubage are marked in purple on both the nose plate and casing. One purple identification band is painted around the casing. Contractual, packing, and inspection data are stenciled on the casing.

f. Packing. This cluster is packed in a rolling crate. Shipping weight and cubage are 617 pounds and 9.7 cubic feet. Its tail fin assembly; tail fin stud, nut, and washers; cartridge holders; and striker assemblies are packed in a separate steel crate. Arming wire assembly and fuzes are packed separately. Packaging data on these items are given in ORD 3 SNL S-2 and ORD 3 SNL S-3 and are listed in appendix IV.

g. Shipping. Clusters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This cluster is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group D chemical ammunition.

CHAPTER 5

BURSTERS AND IGNITERS

Section I. BURSTERS

89. AN-M12

Data for this burster are listed on line 89 of table VII, appendix IV. The burster is illustrated in figure 55. Its body is either a plastic or aluminum tube with maximum dimensions of 1.13 inches outside diameter and 37.88 inches length. A threaded plastic or steel round plug closes one end. The other end is closed by a threaded plug assembly consisting of an aluminum cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the body. The

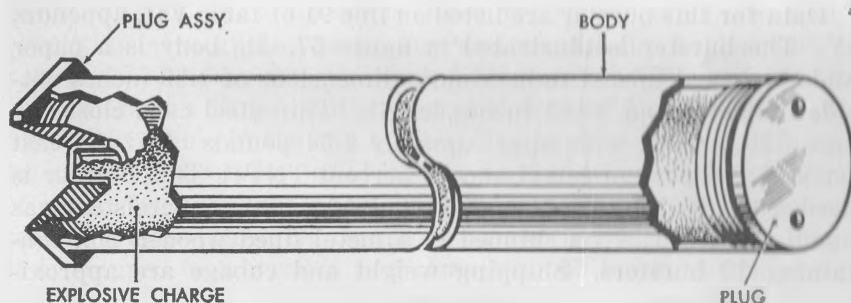


Figure 55. Burster, AN-M12.

burster is filled with approximately 435 grams of oil-coated black powder and magnesium mixture. This burster is used with all fillings of the M47 series 100-pound incendiary bombs (pars. 52 through 56). It is shipped in a wooden box containing 50 bursters. Shipping weight and cubage are approximately 113 pounds and 2.6 cubic feet. An alternate shipping container is a box of 20 bursters. Its shipping weight and cubage are approximately 54 pounds and 1.4 cubic feet.

90. AN-M13

Data for this burster are listed on line 90 of table VII, appendix IV. The burster is illustrated in figure 56. Its body is a plastic tube with approximate dimensions of 0.4 inches outside diameter

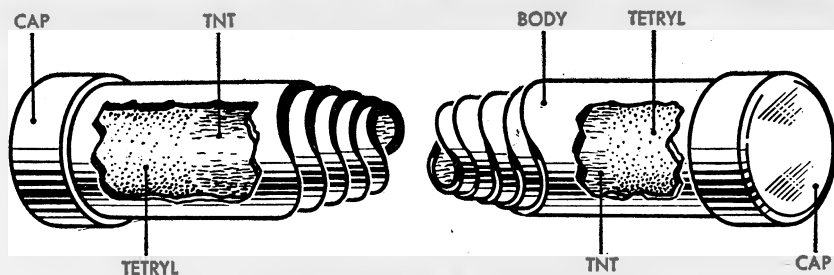


Figure 56. Burster, AN-M13.

and 36 inches length. Soft brass caps close the ends. The main portion of the burster is filled with approximately 65 grams of TNT and 0.41-gram tetryl pellets are at each end. This burster is used, in combination with an AN-M9 igniter, with all fillings of the M47 series 100-pound incendiary bombs (pars. 52 through 56). It is shipped in a wooden box containing 100 bursters. Shipping weight and cubage are approximately 85 pounds and 0.9 cubic feet.

91. AN-M15

Data for this burster are listed on line 91 of table VII, appendix IV. The burster is illustrated in figure 57. Its body is a paper and chipboard tube with maximum dimensions of 1.69 inches outside diameter and 35.83 inches length. Thin steel caps close the ends. It is filled with approximately 2.54 pounds of 75-25 cast tetrytol (75 percent tetryl and 25 percent TNT). This burster is used with all fillings of the 500-pound AN-M78 nonpersistent gas bomb (par. 61). It is shipped in a metal lined wooden box containing 12 bursters. Shipping weight and cubage are approximately 70 pounds and 1.7 cubic feet.

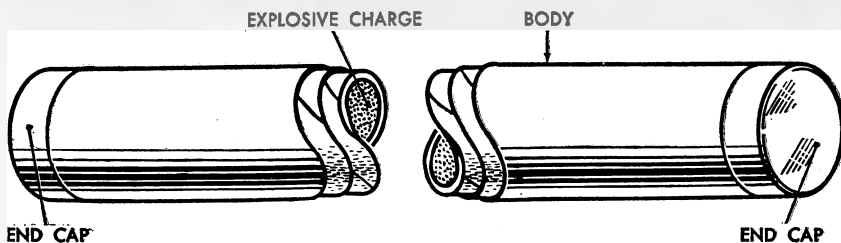


Figure 57. Burster, AN-M15.

92. AN-M16

Data for this burster are listed on line 92 of table VII, appendix IV. The burster is illustrated in figure 58. Its body is a paper and chipboard tube with maximum dimensions of 1.69 inches outside

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diameter and 41.97 inches length. Thin steel caps close the ends. It is filled with approximately 4.29 pounds of 75-25 cast tetrytol (75 percent tetryl and 25 percent TNT). This burster is used with all fillings of the 1000-pound AN-M79 nonpersistent gas bomb (par. 62). It is shipped in a metal-lined wooden box containing eight bursters. Shipping weight and cubage are approximately 65 pounds and 1.5 cubic feet.

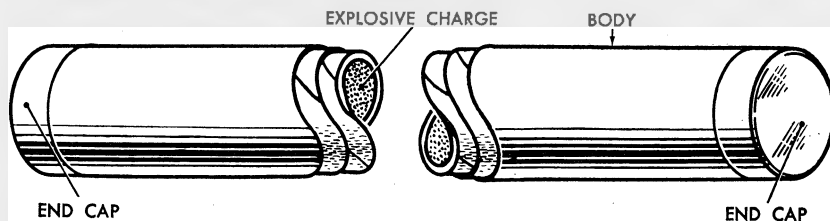


Figure 58. Burster, AN-M16.

93. AN-M18

Data for this burster are listed on line 93 of table VII, appendix IV. The burster is illustrated in figure 59. Its body is a plastic tube with maximum dimensions of 1.13 inches outside diameter and 37.94 inches length. A threaded plastic or steel round plug closes one end. The other end is closed by a threaded plug assembly consisting of a gilding metal cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the cup holder. The burster is filled with approximately 250 grams of black powder and a separated quantity of sand. This burster is used in WP-filled M47 series 100-pound smoke bombs (pars. 63 through 66) for low altitude bombing. It is shipped in a wooden box containing 50 bursters. Shipping weight and cubage are approximately 120 pounds and 3 cubic feet.

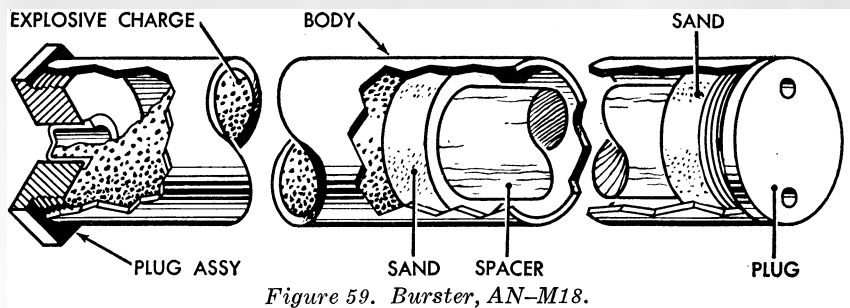


Figure 59. Burster, AN-M18.

94. AN-M20

Data for this burster are listed on line 94 of table VII, appendix IV. The burster is illustrated in figure 60. Its body is a plastic

tube with maximum dimensions of 1.13 inches outside diameter and 37.94 inches length. A threaded plastic or steel round plug closes one end. The other end is closed by a threaded plug assembly consisting of a gilding metal cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the cup holder and contains a small charge of tetryl. The burster is filled with approximately 242 grams of tetryl pellets. This burster is used in PWP-filled M47 series 100-pound smoke bombs (pars. 63 and 64). It is shipped in a wooden box containing 50 bursters. Shipping weight and cubage are approximately 155 pounds and 3 cubic feet.

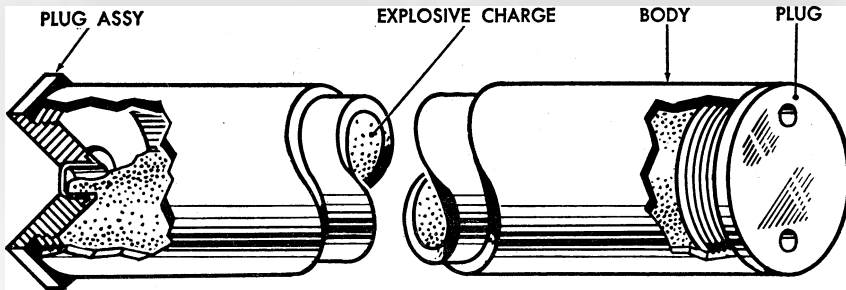


Figure 60. Burster, AN-M20.

95. M10

Data for this burster are listed on line 95 of table VII, appendix IV. The burster is illustrated in figure 61. Its body is either a plastic or paper tube with maximum dimensions of 1.13 inches outside diameter and 36 inches length. A threaded plastic or steel round plug closes one end. The other end is closed by a threaded plug assembly consisting of a gilding metal cup and a steel or lead cup holder with a hexagonal or round shoulder for positioning the burster. The cup, which is thin enough to be ruptured by the fuze detonator, is fitted into a hole in the cup holder and contains a small charge of tetryl. The burster is filled with approximately 230 grams of tetryl pellets. This burster is used with all fillings of the M70 series 115-pound persistent gas bombs (pars. 58 and 59). It is shipped in a wooden box containing 50 bursters. Shipping weight and cubage are approximately 150 pounds and 2.7 cubic feet.

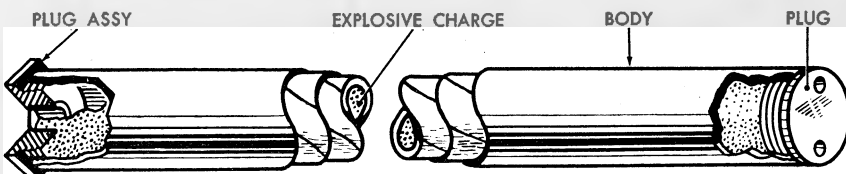


Figure 61. Burster, M10.

96. M14

Data for this burster are listed on line 96 of table VII, appendix IV. The burster is illustrated in figure 62. Its body is a paper and chipboard tube with maximum dimensions of 1.33 inches outside diameter and 35.83 inches length. Thin steel caps close the ends. It is filled with approximately 1.23 pounds of 75-25 cast tetrytol (75 percent tetryl and 25 percent TNT). This burster is used with all fillings of the 500-pound AN-M76 incendiary bomb (par. 57). It is shipped in a metal-lined wooden box containing 50 bursters. Shipping weight and cubage are approximately 70 pounds and 1.6 cubic feet.

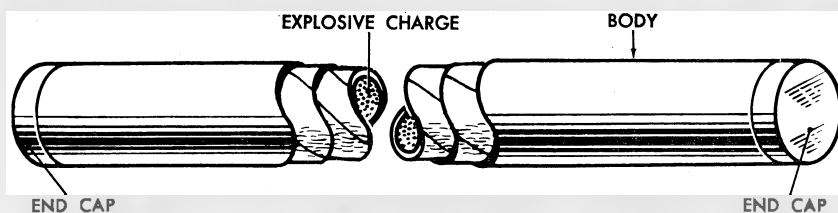


Figure 62. Burster, M14.

97. M25

Data for this burster are listed on line 97 of table VII, appendix IV. The burster is illustrated in figure 63. Its body is a plastic tube with maximum dimensions of 1.13 inches outside diameter and 24.75 inches length. A threaded plastic or steel round plug closes one end. The other end is closed by a threaded plug assembly consisting of a gilding metal cup and a steel cup holder with a hexagonal shoulder for positioning the burster. The cup, which is thin enough to be readily ruptured by the fuze detonator, is fitted into a hole in the cup holder and contains a small charge of tetryl. The burster is filled with approximately 454 grams of tetryl pellets. This burster is used in the 125-pound M115 persistent gas bomb (par. 60). It is shipped in a wooden box containing 50 bursters. Shipping weight and cubage are approximately 85 pounds and 1.9 cubic feet.

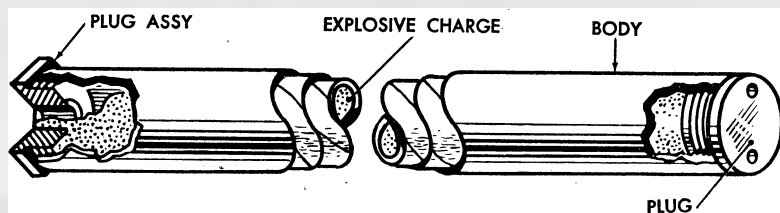


Figure 63. Burster, M25.

Section II. IGNITERS

98. AN-M5, WP

Data for this igniter are listed on line 98 of table VIII, appendix IV. The igniter is illustrated in figure 64. Its body is steel and consists of two concentric tubes welded to annular ends. Approximate dimensions are 3 inches outside diameter, $1\frac{1}{2}$ inches inside diameter, and $35\frac{5}{16}$ inches length. One end ring has two filling holes which are closed with pipe plugs. These pipe plugs must not be tampered with or removed. The body is filled with approximately 9 pounds of white phosphorus (WP). This igniter is used with all fittings of the 500-pound AN-M76 incendiary bomb (par. 57). It is shipped in a wooden box containing five igniters. Shipping weight and cubage are approximately 70 pounds and 1.8 cubic feet. An alternate shipping container is a box of two igniters. Its shipping weight and cubage are approximately 28 pounds and 0.7 cubic feet.

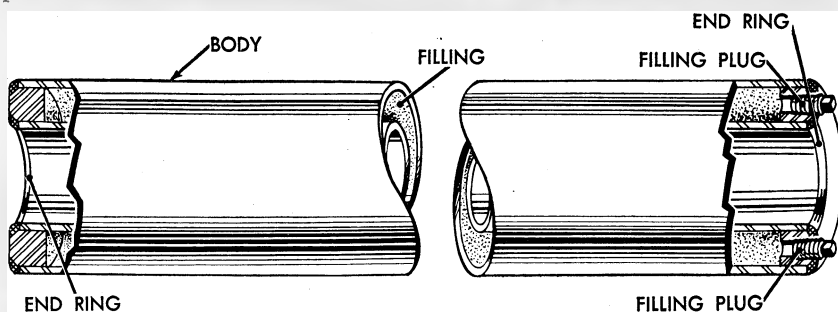


Figure 64. Igniter, AN-M5.

99. AN-M9, WP OR NA

Data for this igniter are listed on line 99 of table VIII, appendix IV. The igniter is illustrated in figure 65. Its body is steel and consists of two concentric tubes, a cupped end, and a threaded bushing end. The bushing has a hexagonal shoulder for positioning the igniter. Approximate body dimensions are $1\frac{1}{4}$ inches outside diameter, $\frac{7}{8}$ inch inside diameter, and $38\frac{1}{32}$ inches length. The inner tube is about $1\frac{1}{4}$ inches shorter than the outer tube, contains a compression spring for snubbing an inserted burster, and is welded to the threaded bushing end. The body is filled with approximately 1.6 pounds of white phosphorus (WP) for land bombing, or 1.6 pounds of sodium (Na) for water bombing. This igniter is used with all fillings of the M47 series 100-pound incendiary bombs (pars. 52 through 56) as an alternate installation with the AN-M13 burster. It is shipped in a wooden box containing 20 igniters. Shipping weight and cubage are approximately 80 pounds and 2.4 cubic feet.

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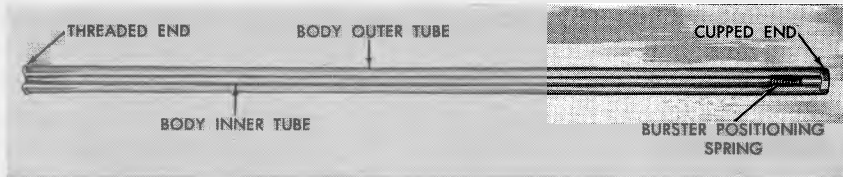


Figure 65. Igniter, AN-M9.

100. M15, WP OR NA

Data for this igniter are listed on line 100 of table VIII, appendix IV. The igniter is illustrated in figure 66. This igniter and its applications are covered by TB 3-300-5/TO 39B-15E-6.



Figure 66. Igniter, M15.

a. Description. This incendiary explosive type igniter is used at the rear of jettisonable fuel tanks. It is an M15 hand grenade with the Bouchon fuze replaced by an M157 impact all ways anemometer type. A threaded igniter adapter is installed in the grenade for mounting the fuze. The fuze seats above a burster in the grenade burster well. The igniter is filled either with approximately 0.95 pounds of white phosphorus (WP) for land bombing, or 0.52 pounds of sodium (Na) for water bombing.

b. Assembly. Check igniter set screws for tightness. Place igniter in strap clamp welded to tank rear plug. With about $\frac{3}{4}$ inch of igniter butt below clamp, tighten clamp closing nut. Replace short C7 arming wire with long C9 arming wire. Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Draw arming wire tight and install safety clip near igniter. Remove fuze safety pin.

c. Functioning. Upon tank release from aircraft bomb station, arming wire is withdrawn, freeing arming vane to rotate. Fuze is armed at approximately 100 feet of air travel. Upon impact, fuze functions and burster is detonated. Burster splits igniter body. Scattered filling burns upon atmospheric contact and ignites incendiary fuel from jettisoned tank.

d. Safety Precautions. Do not remove fuze safety pin until latest possible moment before aircraft take-off. If fuze becomes armed, remove entire igniter with fuze and destroy at a position remote from other activities.

e. Marking. Nomenclature, filling, and lot number are stenciled in purple on igniter.

f. Packing. Explosive type igniters are first packaged in vacuum type metal cans. Sixteen packaged igniters, clamps, and arming wires are packed in a wooden box. Shipping weight is approximately 75 pounds if WP-filled and 69 pounds if Na-filled. Shipping cubage is 2 cubic feet. Burstern and fuzes are packaged together. Their shipping weight and cubage for a wooden box containing 50 cans are approximately 46 pounds and 1.3 cubic feet.

g. Shipping. Igniters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This igniter is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group C chemical ammunition.

101. M16, WP OR NA

Data for this igniter are listed on line 101 of table VIII, appendix IV. The igniter is illustrated in figure 67. This igniter and its applications are covered by TB 3-300-5/TO 39B-15E-6.

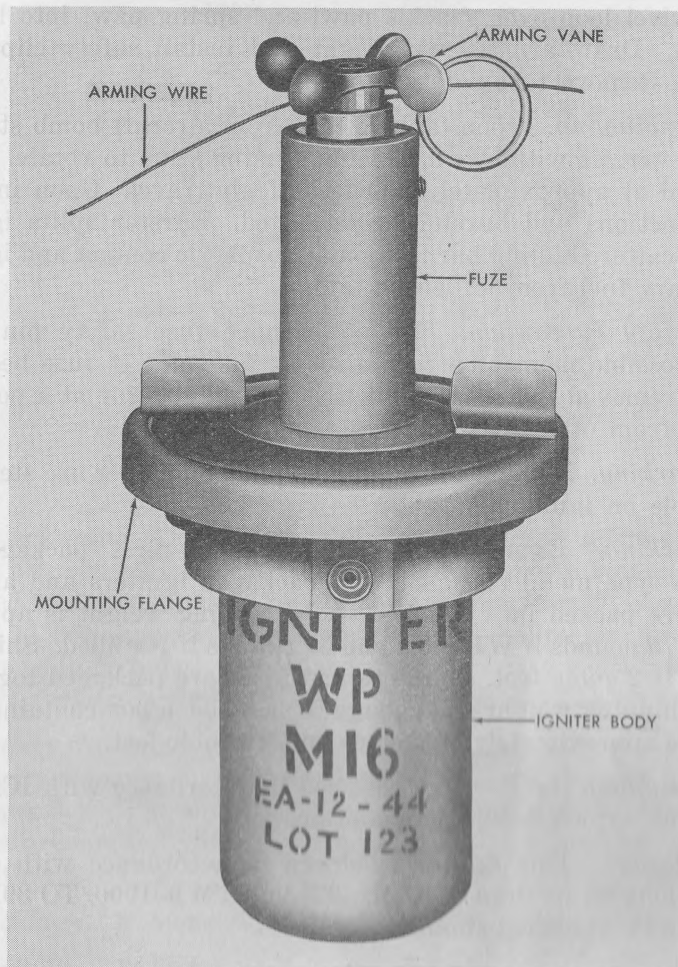


Figure 67. Igniter, M16.

a. Description. This incendiary explosive type igniter is used in filler necks of jettisonable fuel tanks. It is an M15 hand grenade with the Bouchon fuze replaced by an M157 impact all ways anemometer type. A threaded igniter adapter is installed in the grenade for mounting the fuze. The fuze seats above a burster in the grenade burster well. A crimped locking flange for mounting in the fuel tank filler neck is attached to the igniter body with set screws. The igniter is filled with approximately 0.95 pounds of white phosphorus (WP) for land bombing, or 0.52 pounds of sodium (Na) for water bombing.

b. Assembly. Check igniter set screws for tightness. Place igniter in tank filler neck and turn to locked position. Replace short C7 arming wire with long C9 arming wire. Place arming

wire swivel loop over shackle pawl and spring pawl into locked position. Draw arming wire tight and install safety clip near igniter. Remove fuze safety pin.

c. Functioning. Upon tank release from aircraft bomb station, arming wire is withdrawn, freeing arming vane to rotate. Fuze is armed at approximately 100 feet of air travel. Upon impact, fuze functions and burster is detonated. Burster splits igniter body. Scattered filling burns upon atmospheric contact and ignites incendiary fuel from jettisoned tank.

d. Safety Precautions. Do not remove fuze safety pin until latest possible moment before aircraft take-off. If fuze becomes armed, removed entire igniter with fuze and destroy at a position remote from other activities.

e. Marking. Nomenclature, filling, and lot number are stenciled in purple on igniter.

f. Packing. Explosive type igniters are first packaged in vacuum type metal cans. Sixteen packaged igniters and arming wires are packed in a wooden box. Shipping weight is approximately 75 pounds if WP-filled and 69 pounds if Na-filled. Shipping cubage is 2 cubic feet. Burstern and fuzes are packaged together. Their shipping weight and cubage for a wooden box containing 50 cans are approximately 46 pounds and 1.3 cubic feet.

g. Shipping. Igniters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This igniter is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group C chemical ammunition.

102. M23, WP

Data for this igniter are listed on line 102 of table VIII, appendix IV. The igniter is illustrated in figure 68.

a. Description. This incendiary explosive type igniter is designed for use on new fire bombs currently under development. Its steel body has external threads for mounting in the tank flange and internal threads for mounting a fuze. The body is filled with approximately $1\frac{1}{4}$ pounds of white phosphorus (WP). The fuze used with this igniter is an M173 impact all-ways anemometer type. Fuze and arming wire are procured and issued separately.

b. Assembly. Install fuze in igniter and insert in tank flange. Place arming wire swivel loop over shackle pawl and spring pawl into locked position. Draw arming wire tight and install safety clip near igniter. Remove fuze safety pin.

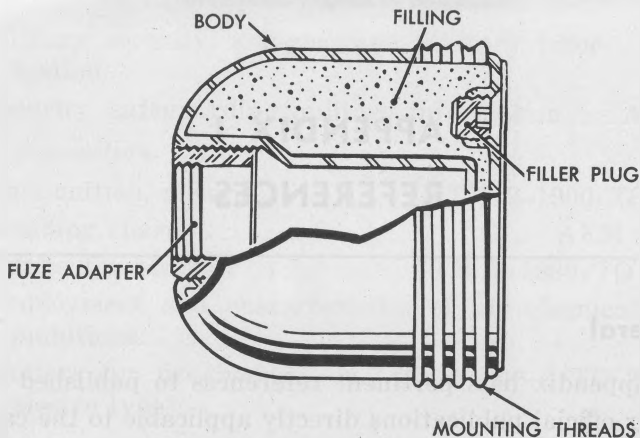


Figure 68. Igniter, fire bomb, M23.

c. Functioning. Upon tank release from aircraft bomb station, arming wire is withdrawn, freeing arming vane to rotate. Fuze is armed at approximately 8.6 feet of air travel or 17 vane revolutions. Upon impact, fuze functions and splits igniter body. Scattered filling burns upon atmospheric contact and ignites incendiary fuel from tank.

d. Safety Precautions. Do not remove fuze safety pin until latest possible moment before aircraft take-off. Do not remove or tamper with igniter filling plug. If fuze becomes armed, remove entire igniter with fuze and destroy at a position remote from other activities.

e. Marking. Nomenclature is stenciled in purple on igniter.

f. Packing. Explosive type igniters are first packaged in vacuum type metal cans. Twenty-five packaged igniters are packed in a wooden box. Shipping weight and cubage are approximately 125 pounds and 2.1 cubic feet. Fuzes and arming wires are packaged in a separate wooden box containing 50 of each. Shipping weight and cubage are approximately 60 pounds and 1.8 cubic feet.

g. Shipping. Igniters are shipped in accordance with ICC and pertinent Armed Services regulations.

h. Storage. This igniter is stored in accordance with safety regulations set forth in ORD M7-224 and TM 9-1900/TO 39B-1-3 for group C chemical ammunition.

APPENDIX I

REFERENCES

1. General

This appendix lists pertinent references to published manuals and other official publications directly applicable to the care, handling, and use of the bombs, clusters, and components discussed in this manual.

2. Supply Publications

The following supply publications pertain to chemical bombs and clusters:

- a. Group S—Ammunition, bombs, aircraft, ORD 3 SNL S-1 all types.
- b. Chemical Corps supply manuals.
- c. Group S—Ammunition, fin assemblies ORD 3 SNL S-3 and miscellaneous inert components for aircraft bombs.
- d. Group S—Ammunition, fuzes and miscellaneous explosive components for aircraft bombs. ORD 3 SNL S-2
- e. Storage and shipping chart for SB 3-24/TO 00-25-104 Chemical Warfare Service ammunition.

3. Explanatory Publications

The following explanatory publications contain information pertinent to chemical bombs and clusters and associated equipment:

- a. *Administration and Operations.*

Chemical warfare service supply and field service FM 3-15
Logistics and operational planning manual AFM 400-5

RESTRICTED—Security Information

Military security, safeguarding military information. AR 380-5

Security, safeguarding military information. AFR 50-13

b. Ammunition.

Ammunition, general. TM 9-1900/TO 39B-1-3

Bombing charts. AFM 125-126-6

Bombs for aircraft. TM 9-1980/TO 39B-15-1

Employment and characteristics of air chemical munitions. FM 3-6

Igniters for fire bombs (explosive type). TB 3-300-5/TO 39B-15E-6

c. Safety.

Civil aeronautics regulations

Decontamination. TM 3-220/TO 39C-10B-1

Fire protection in areas where chemical warfare agents, ammunition, and explosives are stored, handled, processed or manufactured. CMLWS (SD-1)

Ordnance safety manual (regulations). ORD M7-224

Safety, regulations for firing ammunition for training, target, practice, and combat. SR 385-310-1/AFR 50-13

Service kit, chemical bomb (AN-M78 and AN-M79), E6. TB CW 33 TO 39C-30A-1

Theater of operations surveillance procedure for 100-pound incendiary bombs, M47 type. SR 742-507-9 and TO 39B-15E-3

Explosive Ordnance reconnaissance and disposal. FM 9-40

d. Shipping and Storage.

Storage and shipment of dangerous chemicals. TM 3-250/TO 39C-5-3

Chemical handling and loading equipment. TM 3-255/TO 39C-15-1

Motor Carriers' Explosives and Dangerous Articles
Tariff No. 7 publishing
ICC Regulations for Transportation of Explosives and
Other Dangerous Articles
by Motor, Rail and Water.

RESTRICTED—Security Information

Agent H. A. Campbell's Tariff No. 8 publishing ICC Regulations for transportation of Explosives and Other Dangerous Articles by Land and Water in Rail Freight Service and by Motor Vehicle (Highway) and Water.

Nonpersistent gas bombs, TB CW 22/TO 39B-15JA-1 handling, shipping, and storage.

Shipping regulations for chemical warfare agents, chemical ammunition, poisons, and other dangerous articles. CMLWS (SD-2)

Transportation corps, transportation of public property (except animals and remains). AR 55-155

APPENDIX II

M-13 CHEMICAL BOMB SERVICE KIT

1. General

The M13 chemical bomb service kit is CMLC stock number 635104 and is manufactured, inspected, preserved, and packaged in accordance with the specification listed in the procurement instructions. Procurement documents for this kit should specify the following: KIT, SERVICE, CHEMICAL BOMB (AN-M78 and AN-M79), M13; Military Specification MIL-K-10335(CmlC) 31 May 1950; CMLC Bill of Material drawing C14-28-2. The kit is assembled as shown on CMLC drawing C14-28-3. When available, this kit is to be used in place of the E6 kit described in TB CW 33/TO 39C-30A-4. The M13 kit and its contents are illustrated in figures 69 through 73. Further detailed information on nonpersistent gas bombs is contained in TM 3-250/TO 39C-5-3.

2. Purpose

The M13 chemical bomb service kit is to be used in the detection and repair of leaks in AN-M78 and AN-M79 nonpersistent gas bombs (pars. 61 and 62).

3. Contents

The contents of the M13 chemical bomb service kit are illustrated in figures 71 through 73 and are as follows—

a. Leakage Detection Items (fig. 71).

Beaker, Griffin, 250-ml (1)	Funnel, glass, 50-mm diameter (1)
Bottle, detector paper, assy (1)	Glycerine, assembly (1)
Bottle, dropper, assembly (4)	Solvent, acetone, assembly (1)
Chemicals, assembly (1)	Solvent, benzene, assembly (1)
Cylinder, graduated, 25-ml (1)	Stirring rods, 5- x 150-mm (2)
Dish, porcelain (1)	Strip, filter paper (1000)
Filter, paper, folded (10)	Water, distilled, assembly (1)

RESTRICTED—Security Information

b. Pressure Testing and Sampling Items (fig. 71).

Adapter, pipe (1)	Nipple, pipe, $\frac{1}{8}$ - x 2-inch (1)
Extension, wrench handle (1)	Nipple, pipe, close, $\frac{1}{8}$ -inch (1)
Gauge, pressure (1)	Test tube, 25-mm x 100-mm (2)

c. Leak Sealing Apparatus (fig. 72).

Cover, nose sealing plug gasket (1)	Plug, sealing, nose (1)
Gasket, compression ring, 500-lb (1)	Plug, sealing, tail (1)
Gasket, compression ring, 1000-lb (1)	Ring, compression, 500-lb (1)
Gasket, sealing plug, nose (2)	Ring, compression, 1000-lb (1)
Gasket, sealing plug, tail (2)	Screw, supporting plate (8)
Plate, supporting, assembly (1)	Tubing, copper, $\frac{1}{4}$ OD x 6 in.
	Tubing, rubber, $\frac{1}{4}$ OD x 6 in.
	Wrench, combination, No. 1 (1)
	Wrench, combination, No. 2 (1)

d. Spare Parts (fig. 73).

Gasket, filling closure (10)	Plug, gasket (5)
Gasket, valve (10)	Plug, pipe, $\frac{1}{8}$ -inch (20)
Guard, valve (5)	Sleeve, valve (3)
Plug, filler (5)	Valve, needle, AN-M1 (1)

e. Extra Tools (fig. 73).

Pliers, combination, 6-inch (1)	Wrench, crescent, 6-inch (1)
Socket, hexagon (1)	Wrench, monkey, 15-inch (1)
Socket, square (1)	Wrench, Stillson, 8-inch (1)

f. Miscellaneous Items (fig. 73).

Packing list (2)	Publication, TB CW 33 (1)
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4. Preparation for Use

Only those items whose use is anticipated should be removed from the kit and/or unpacked. Bottles of chemicals should not be opened until required. Testing, repair, and tool items should be arranged in a convenient location and order to facilitate the servicing of bombs. A suitable support for holding the bombs in an upright position should be improvised. Adequate personnel protection should be provided (pars. 31*n*, 61*d*, and 62*d*). Detailed instructions for the mixing of chemicals, the assembly of apparatus, and other preparations involving kit items are contained in TM 3-250/TO 39C-5-3 and TB CW 33/TO 39C-30A-4.

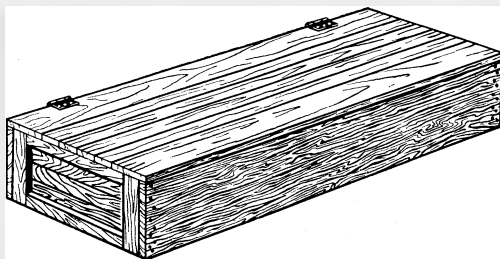


Figure 69. Kit, service, chemical bomb, M13.

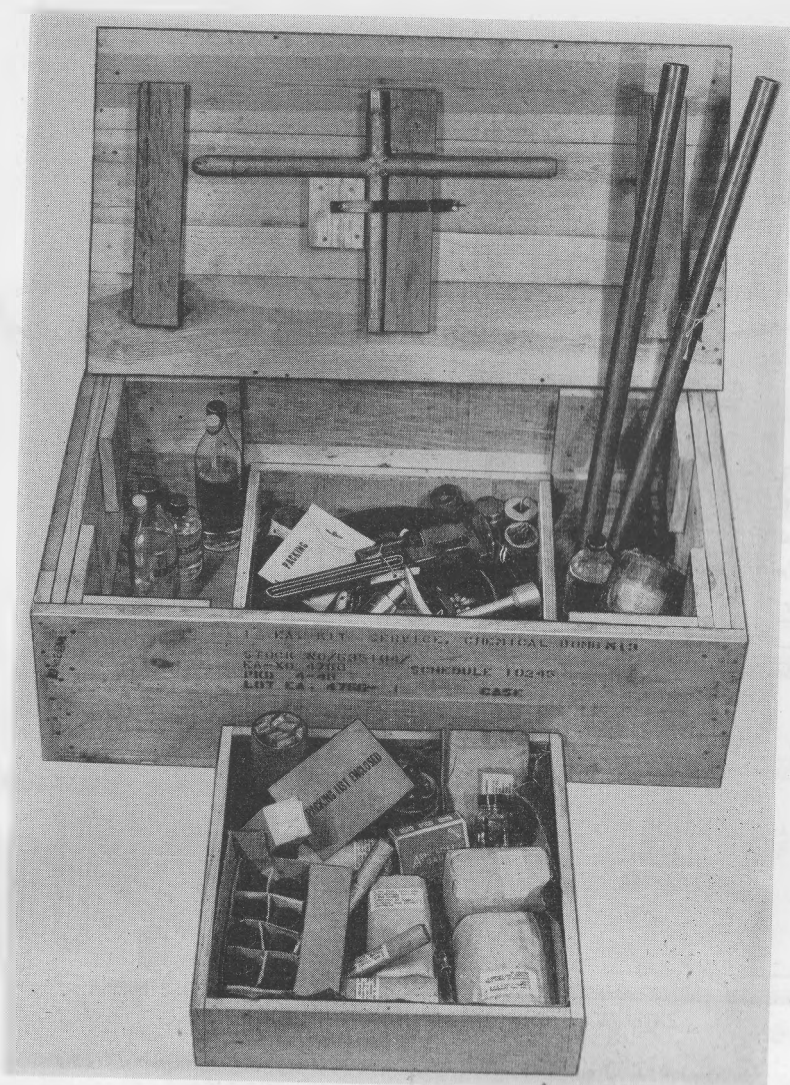
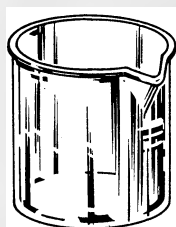


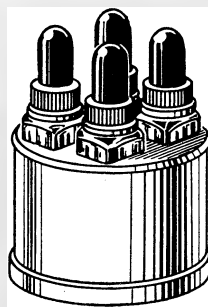
Figure 70. Kit, service, chemical bomb, M13.



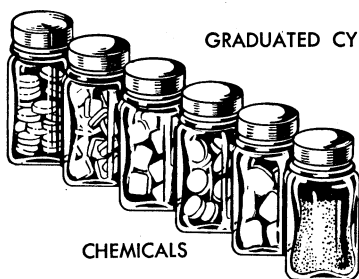
BEAKER



DETECTION ITEMS

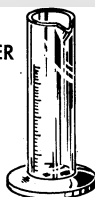


DROPPERS



CHEMICALS

GRADUATED CYLINDER



PORCELAIN DISH



FOLDED FILTER PAPER

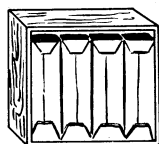


GLYCERINE SOLVENTS

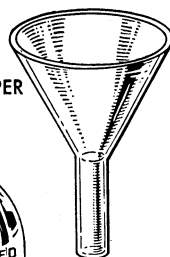


STIRRING RODS

FILTER PAPER STRIPS



DISTILLED WATER



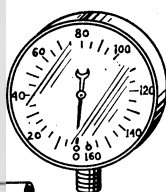
FUNNEL



ADAPTER



EXTENSION



PRESSURE GAGE



NIPPLE



CLOSE NIPPLE

TEST TUBES



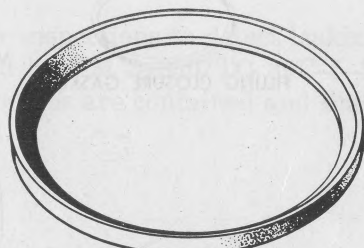
Figure 71. Leak detection, pressure testing, and sampling items from M13 chemical bomb service kit.



GASKET COVER



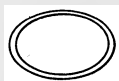
500-lb COMPRESSION GASKET



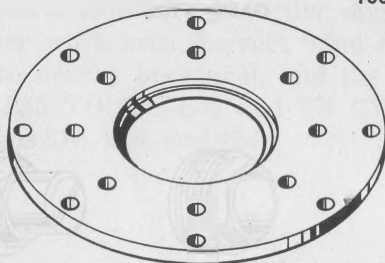
1000-lb COMPRESSION GASKET



NOSE SEALING PLUG GASKET



TAIL SEALING PLUG GASKET



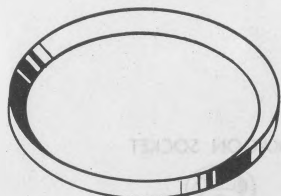
SUPPORTING PLATE



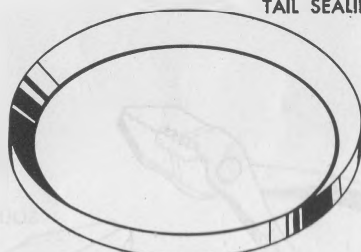
NOSE SEALING PLUG



TAIL SEALING PLUG



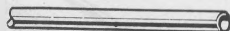
500-lb COMPRESSION RING



1000-lb COMPRESSION RING



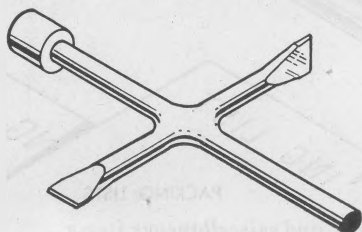
SUPPORTING PLATE SCREWS



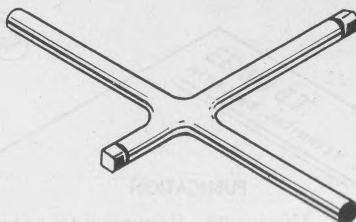
COPPER TUBING



RUBBER TUBING



NO. 1 COMBINATION WRENCH



NO. 2 COMBINATION WRENCH

Figure 72. Leak sealing apparatus from M13 chemical bomb service kit.



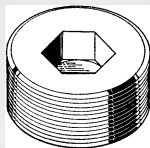
FILLING CLOSURE GASKET



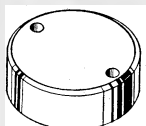
VALVE GASKET



VALVE GUARD



FILLER PLUG



GASKET PLUG



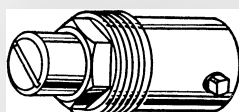
VALVE ASSY



PIPE PLUGS



VALVE SLEEVE



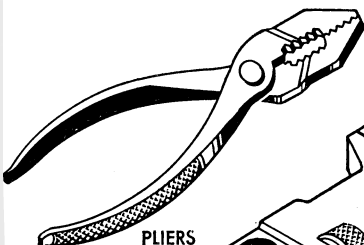
HEXAGON SOCKET



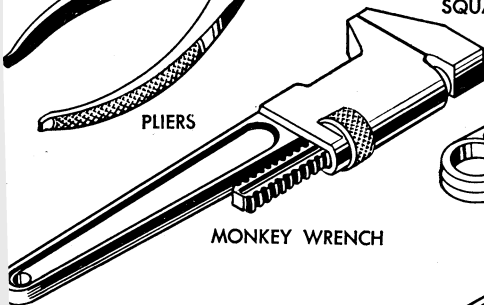
SQUARE SOCKET



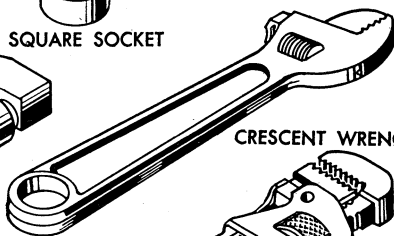
PLIERS



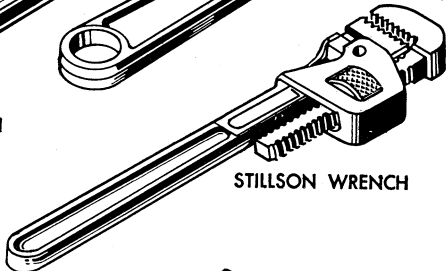
MONKEY WRENCH



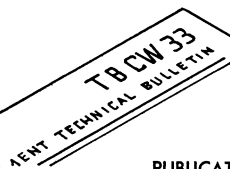
CRESCENT WRENCH



STILLSON WRENCH



PUBLICATION



PACKING LISTS

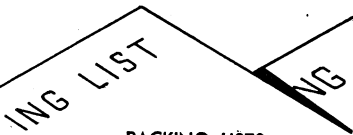


Figure 73. Spare parts, extra tools, and miscellaneous items from M13 chemical bomb service kit.

5. Procedure

Surveillance and the procedure for inspections to detect leaking nonpersistent gas bombs are covered by TM 3-250/TO 39C-5-3. Repair operations for servicing the bombs are contained and illustrated in TB CW 33/TO 39C-30A-4.

6. Safety Precautions

Safety precautions for handling nonpersistent gas bombs include providing protective clothing, protective masks, decontaminating materials, proper work area, correct wind direction and indication, warning to nearby personnel, and the like. They are outlined in TM 3-250/TO 39C-5-3 and TB CW 33/TO 39C-30A-4 and in paragraphs 31*n*, 61*d*, and 62*d*.

APPENDIX III

GAS BOMB VENTING

1. General

The development of excessive pressures during storage of H- and HD-filled bombs (pars. 58 through 60) contributes to leakage through burster well, filling closure, and welded joints. The E1 bomb venting tool kit is not adequate for venting the persistent bombs included in this manual. This appendix describes the tools required and technique to be used in venting to relieve internal gas pressures.

2. Tool Requirements

A stand, as illustrated in figure 75, should be improvised for holding bombs. If possible, an electric drill should be provided. A hand drill can be used satisfactorily if only a few bombs are to be vented. The tools illustrated in figure 74 and listed below are needed to vent persistent bombs.

Adjustable open end wrench	Improvised bomb holding stand
Can of luting compound	1/8-inch pipe plug
Center punch	1/4-inch pipe plug
2 1/64-inch drill	1/8-inch pipe tap
7/16-inch drill	1/4-inch pipe tap
Electric or hand drill	Protection board and skirt

3. Safety Precautions

The safety precautions listed below should be practiced in venting persistent gas bombs.

a. Conditions. The bombs should be vented in the open, and at atmospheric temperatures of between 50° and 70° F., if possible.

b. Protection. The following protection should be provided for venting personnel impermeable protective clothing, impermeable gloves, shoes treated with impregnate, protective mask, and decontaminating agents (par. 31*n*).

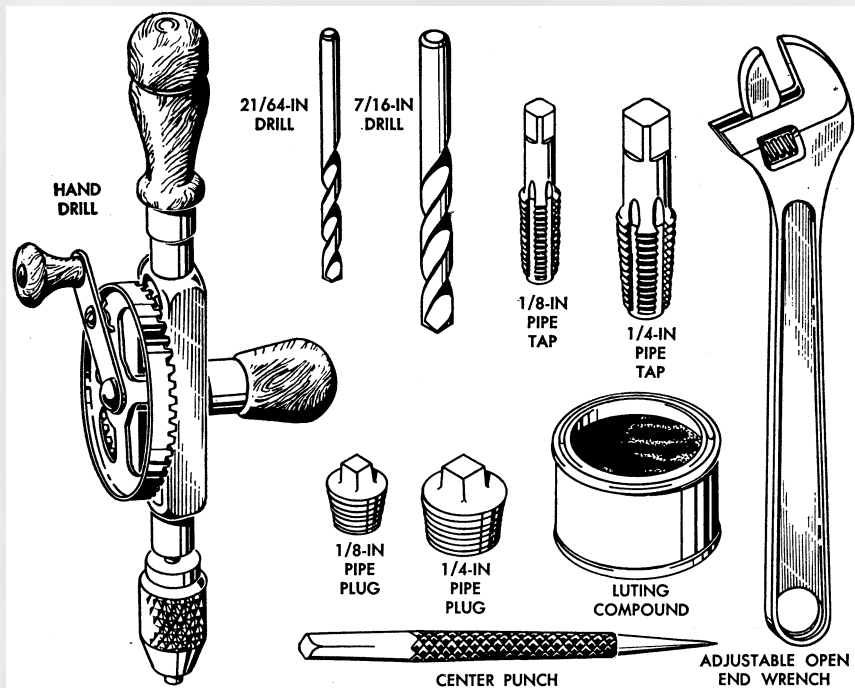


Figure 74. Tools for venting gas bombs.

c. *Bomb Position.* During venting operations the nose end of the bomb should be kept approximately 2 feet above the tail end.

d. *Drilling.* A piece of plywood and a heavy cloth skirt, as illustrated in figure 76, should be used as a protection shield during bomb drilling operations.

e. *Tool Care.* After a venting operation the tools used should be decontaminated with DANC solution and properly oiled before storing.

4. Preparation for Venting

The preparation for venting operational steps are as follows—

a. *Drill Location.* Mark a spot with a center punch on bomb top surface, at its nose end, about 3 inches from where burster well enters bomb, and in line with double suspension lugs.

b. *Drilling Protection Board.* Drill $2\frac{1}{64}$ -inch hole in plywood protection board.

c. *Use of Protection Board.* Cover protection board with a heavy cloth skirt and place drill through hole in board and in punch mark on bomb.

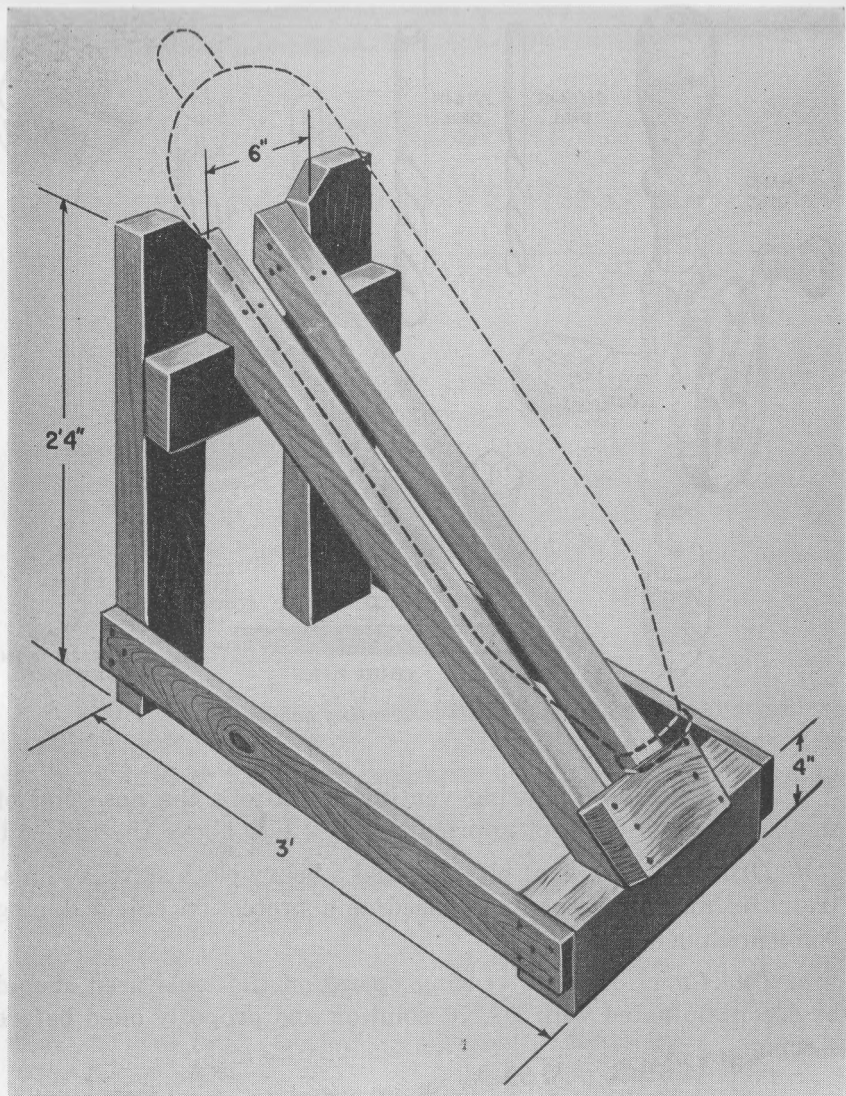


Figure 75. Improvised bomb holding stand.

d. *Drilling Bomb.* Drill $2\frac{1}{4}$ -inch hole in bomb at punch mark.

e. *Drilling Stages.* When hiss of escaping gas is heard, stop drilling until hissing sound ceases, then complete drilling.

f. *Hole Tapping.* Thread hole with $\frac{1}{8}$ -inch pipe tap, keeping the tap as straight as possible while threading.

g. *Plug Insertion.* Coat a $\frac{1}{8}$ -inch pipe plug with luting compound, insert into the tapped hole, and install tightly with an adjustable open end wrench.

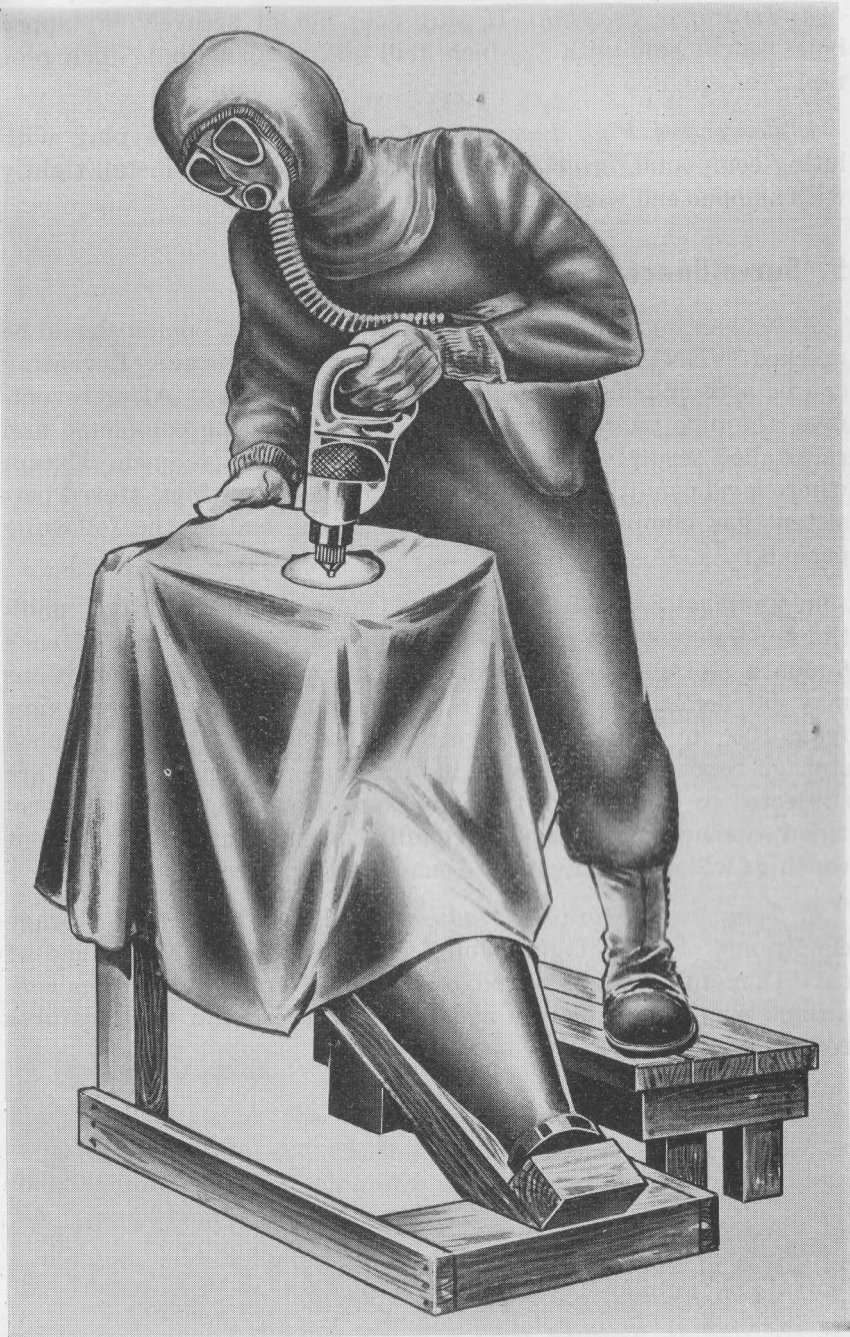


Figure 76. Venting chemical bombs.

h. Improper Tapping. If plug does not fit securely in tapped hole, redrill hole with $\frac{7}{16}$ -inch drill and retap with $\frac{1}{4}$ -inch pipe tap.

i. Corrective Plug Insertion. Coat a $\frac{1}{4}$ -inch pipe plug with luting compound, insert into the retapped hole, and install tightly with an open end wrench.

5. Surveillance

After venting and after subsequent reventings, bombs should be marked "VENTED (DATE)" and returned to storage. Reventing can be accomplished by backing out the pipe plug. After reventings, the pipe plug should be recoated with luting compound and reinstalled securely with an adjustable open end wrench. Except where local conditions require more frequent ventings, stored persistent gas bombs should be vented at the end of the following periods:

a. Tropical Storage Conditions. Under tropical storage conditions, persistent gas bombs should be vented at the end of each 6-month storage period, or oftener. Tropical storage conditions may be defined as conditions where bomb temperatures vary from 100° to 150° F. for protracted periods of time. Tropical storage conditions may exist in temperate regions if bombs are subjected to direct rays from the sun. Covering should be provided whenever possible. If tarpaulin coverings are used, frequent wettings will materially reduce bomb temperatures.

b. Temperate Storage Conditions. Under temperate storage conditions, persistent gas bombs should be vented at the end of each 12-month storage period, or oftener. Temperate storage conditions may be defined as conditions where bomb temperatures remain under 100° F.

APPENDIX IV

BOMB DATA TABLES

1. General

This appendix consists of seven reference tables which provide data pertaining to incendiary bombs, gas bombs, smoke bombs, incendiary bomb clusters, fuzes, bursters, and igniters. The tables can be used for identification, round information, shipping information, or cross-reference. In each table the first column gives the manual paragraph in which the item is described and the second column contains the model designation of the particular item.

2. Incendiary Bombs

Table II shows the nominal size, filling type and amount, fuzes, bursters, igniter, adapter-booster, arming wire, tail fin assembly, bombing table number, shipping method, shipping weight, and shipping cubage for each incendiary bomb included in this manual.

3. Gas Bombs

Table III shows the nominal size, filling type and amount, fuzes, burster, adapter-booster, arming wire, tail fin assembly, bombing table number, shipping method, shipping weight, and shipping cubage for each gas bomb included in this manual.

4. Smoke Bombs

Table IV shows the nominal size, filling type and amount, fuze, burster, arming wire, tail fin assembly, bombing table number, shipping method, shipping weight, and shipping cubage for each smoke bomb included in this manual.

5. Incendiary Bomb Clusters

Table V shows the nominal size, type, average weight, adapter, bomb model designation and quantity, fuzes, arming wire, tail fin assembly, bombing table number, shipping method, shipping weight, and shipping cubage for each incendiary bomb cluster included in this manual.

6. Fuzes

Table VI shows the location, use, arming data, action data, and logistical data on the fuzes used with the bombs and clusters included in this manual.

7. Bursters

Table VII shows the tube type, dimensions, explosive charge type and amount, use, logistical data, and pertinent remarks on the bursters used with the bombs included in this manual.

8. Igniters

Table VIII shows the igniter type, filling type and amount, use, fuze, arming wire, logistical data, and pertinent remarks on five standard igniters.

TABLE II. INCENDIARY BOMB DATA

Manual Para Ref	Model Designation	Nominal Size (Pounds)	Filling		*Fuzes		Burst	Igniter	*Adapter-booster	Arming Wire	*Tail Fin Assembly	Bombing Table Number	How Shipped or Clustered	Shipping Data			
			Type (Symbol)	Amount (Pounds)	Nose	Tail								Weight (Pounds)	Cubage (Cu Ft)		
44	AN-M50A3	4	Therm 64C	0.71	None	209B primer	None	None	None	None	None	See clusters	M22A1 M32	See clusters	See clusters		
45	AN-M50A2	4	Therm 64C	0.71	None	209B primer	None	None	None	None	None	See clusters	AN-M17A1 M17 M22	See clusters	See clusters		
46	AN-M50T-A2	4	Therm 64C	0.66	None	209B primer	None	None	None	None	None	See clusters	AN-M14 AN-M14A1	See clusters	See clusters		
47	M50T-X-A3	4	Therm 64C	0.66	None	209B primer	None	None	None	None	None	See clusters	AN-M14A1	See clusters	See clusters		
48	AN-50X-A3	4	Therm 64C	0.53	None	209B primer	None	None	None	None	None	See clusters	AN-M14 AN-M17A1 M17	See clusters	See clusters		
49	AN-M69, OIL	6	NP	2.2	M1	None	None	None	None	None	Streamers	See clusters	M12* M13* M19*	See clusters	See clusters		
50	M69X, OIL	6	NP	2.0	M1	None	None	None	None	None	Streamers	See clusters	M21	See clusters	See clusters		
51	M74	10	PT1 NP	2.8 1.8	M142A1 M142	None	None	None	None	None	Integral	See clusters	M31 M20* M20A1*	See clusters	See clusters		
52	AN-M47A4	100	NP, IM or PT1	40	AN-M159**	None	AN-M12***	None***	None	Welded to bomb	100-G-3	110	Wood box	3.7	3.7		
53	AN-M47A3				AN-M126A1									109		3.5	3.5
54	AN-M47A2				M108									108		3.5	3.5
55	M47A1													106		3.5	3.5
56	M47																
57	AN-M76	500	PT1	175	M163** AN-M103A1 AN-M103	M161** AN-M101A2 AN-M101A1	M14	AN-M5	M115A1 M115	M5	AN-M109A1 M109	500-F-2	Bands	447	5.5		

*Alternates listed are authorized for all fillings

**Preferred fuze - authorized for all fillings

***Burst AN-M13 with igniter AN-M9 authorized as alternate assembly

TABLE III. GAS BOMB DATA

Manual Par Ref	Model Designation	Nominal Size (Pounds)	Filling		*Fuzes		Burster	*Adapter- booster	Arming Wire	*Tail Fin Assembly	Bombing Table Number	*How Shipped	Shipping Data	
			Type (Symbol)	Amount (Pounds)	Nose	Tail							Weight (Pounds)	Cubage (Cu Ft)
58	M70A1	115	HD H	60 61	AN-M158 AN-M110A1	None	M10	None	M2	AN-M103A1 M102A1 M102	100-J-2 100-L-2	Lug protectors Bands	122 135	2.1 3.9
59	M70	115	HD H	60 61	AN-M158 AN-M110A1	None	M10	None	M2	AN-M103A1 M102A1 M102	100-J-2 100-L-2	Lug protectors Bands	122 135	2.1 3.9
60	M113	125	HD	59	AN-M103A1	AN-M100A2	M25	M119	M1A1	M125A1 M125	100-S-1	Bands	148	3.9
61	AN-M78	500	CG CK	205 176	M163** AN-M103A1 AN-M103 AN-M139A1 AN-M140A1 M164 M165	M161** AN-M101A2 AN-M101A1	AN-M15	M115 M115A1	M5	AN-M109A1 M109	500-O-2 500-P-2	Bands	472 442	10.4
62	AN-M79	1000	CG CK AC	415 351 195	M163** AN-M103A1 AN-M103 AN-M139A1 AN-M140A1 M127 M164 M165	M162** AN-M102A2 AN-M102A1	AN-M16	M115A1 M115 M117	M7	AN-M113A1 M113	1000-H-2 1000-I-2 1000-J-2	Bands	930 866 710	17.5

*Alternates listed are authorized for all fillings

**Preferred fuze - authorized for all fillings

TABLE IV. SMOKE BOMB DATA

Manual Par Ref	Model Designation	Nominal Size (Pounds)	Filling		*Fuzes		Burster	Arming Wire	Tail Fin Assembly	Bombing Table Number	How Shipped	Shipping Data	
			Type (Symbol)	Amount (Pounds)	Nose	Tail						Weight (Pounds)	Cubage (Cu Ft)
63	AN-M47A4	100	PWP WP	74 100	AN-M159** AN-M126A1	None	AN-M20 AN-M18	M3	Welded to bomb	100-H-2 100-I-3	Wood box	127 155	3.7
64	AN-M47A3	100	PWP WP	74 100	AN-M159** AN-M126A1	None	AN-M20 AN-M18	M3	Welded to bomb	100-H-2 100-I-3	Wood box	126 154	3.7
65	AN-M47A2	100	WP	100	AN-M159** AN-M126A1	None	AN-M18	M3	Welded to bomb	100-I-3	Wood box	153	3.5
66	AN-M47A1	100	WP	100	AN-M159** AN-M126A1	None	AN-M18	M3	Welded to bomb	100-I-3	Wood box	153	3.5

*Alternates listed are authorized for all fillings

**Preferred fuze - authorized for all fillings

TABLE V. INCENDIARY BOMB CLUSTER DATA

Manual Para Ref	Model Designation	Nominal Size (Pounds)	Type	Average Weight (Pounds)	Adapter	Bombs Used		Fuzes		Arming Wire	Tail Fin Assembly	Bombing Table Number	How Shipped	Shipping Data	
						Designation	Quantity	Nose	Tail					Weight (Pounds)	Cubage (Cu Ft)
75	M12	100	Quick-opening	98	M4	AN-M69	14	None	None	Factory assembled	None	6-A-2	Steel drums	133	3.2
76	M13	500	Quick-opening	427	M7	AN-M69	60	None	None	Factory assembled	None	6-A-2	Steel drum Plywood box	550 525	12.5 12.7
77	AN-M14A1	500	Aimable	470	M10A1	AN-M50T-A2 M50T-X-A3	88 22	M155	None	C1	C3	500-J-4	Wood box Rolling crate	630 515**	18.0 11.8
78	AN-M14	500	Aimable	465	M10A1	AN-M50T-A2 AN-M50X-A3	104 6	AN-M145	None	C1	C3	500-J-4	Wood box Rolling crate	625 565	18.0 15.0
79	AN-M17A1	500	Aimable	465	M10A1	AN-M50A2 AN-M50X-A3	88 22	AN-M145	None	C1	C3	500-J-4	Wood box Rolling crate	625 562	18.0 15.1
80	M17	500	Aimable	458	M10	AN-M50A2 AN-M50X-A3	88 22	M138	None	C1	C3	500-J-4	Wood or Plywood crate	625	17.5 12.9
81	M19	500	Aimable	435	M23	AN-M69	38	None	M152 (2)	C4	B14-23-1187 B14-23-1190	500-Q-1	Steel drums	605	20.5
82	M20A1	500	Aimable	525	M23A1	M74	38	None	M152 (2)	C4	B14-23-378 B14-23-421	500-T-1	Steel drums	692	20.5
83	M20	500	Aimable	525	M23	M74	38	None	M152 (2)	C4	B14-23-1187 B14-23-1190	500-T-1	Steel drums	690	20.5
84	M21	500	Aimable	481	M23	M69X	38	None	M152 (2)	C4	B14-23-1187 B14-23-1190	500-Q-1	Steel drums	635	20.5
85	M22A1	500	Aimable	465	M10A1	AN-M50A3	110	AN-M145	None	C1	C3	500-J-4	Wood box Rolling crate	625 515**	18.0 11.8
86	M22	500	Aimable	465	M10A1	AN-M50A2	110	AN-M145	None	C1	C3	500-J-4	Wood box Rolling crate	625 515**	18.0 11.8
87	M31	500	Aimable	562	M25	M74 (PT1)	38	None	M152 (2)	C4	M7	500-J-4	Rolling crate	562**	9.1
88	M32	500	Aimable	617	M26	AN-M50A3	106	None	M152 (2)	C4	M7	500-T-1	Rolling crate	617**	9.7

*Fuzes and arming wires shipped separately on all aimable clusters

**Tail fin assembly shipped separately

TABLE VI. FUZE DATA

Manual Para Ref	Model Designation	Location	Used on		Arming Data			Action		Data per Package		
			Bomb	Cluster	Type	Delay (revolutions)	Minimum Altitude @ 200 mph	Type	Delay (Seconds)	Fuzes (Quant)	Weight (Pounds)	Cubage (Cu Ft)
57 61 62 60	AN-M103A1	Nose	AN-M76 AN-M78 AN-M79 M113		Vane	180D or 302I	510D or 765I	Impact	0.1 or 0	25	138	2.2
57 61 62	AN-M103	Nose	AN-M76 AN-M78 AN-M79		Vane	180D or 302I	510D or 765I	Impact	0.1 or 0	25	138	2.2
58 59	AN-M110A1	Nose	M70A1 M70		Vane	325	725	Impact	None	48	77	1.6
52, 63 53, 64 54, 65 66 55 56	AN-M126A1	Nose	AN-M47A4 AN-M47A3 AN-M47A2 AN-M47A1 M47A1 M47		Vane	325	725	Impact	None	48	80	1.4
61 62	AN-M139A1	Nose	AN-M78 AN-M79		Vane	180D or 302I	510D or 765I	Impact	0.1 or 0	25	133	2.2
61 62	AN-M140A1	Nose	AN-M78 AN-M79		Vane	180D or 302I	510D or 765I	Impact	.025 or 0	25	138	2.2
78 79 85 86	AN-M145	Nose		AN-M14 AN-M17A1 M22A1 M22	Vane	260 and 4.5 sec	185	Time	5 to 92	15	48	1.3
58 59	AN-M158	Nose	M70A1 M70		Vane	300 to 500	700	Impact	None	30	59	1.6
52, 63 64 65 66	AN-M159	Nose	AN-M47A4 AN-M47A3 AN-M47A2 AN-M47A1		Vane	440	700	Impact	None	30	57	1.5
49 50	M1	Nose	AN-M69 M69X		Plunger	None	None	Impact	3 to 5	Assembled in bombs		
62	M127	Nose	AN-M79		Vane	255	700	Time	0 or 5 to 92	25	59	1.8
80	M138	Nose		M17	Vane	325	700	Time	5 to 90	25	52	1.8

D=Delay I=Instantaneous

TABLE VI. FUZE DATA (Concluded)

Manual Para Ref	Model Designation	Location	Used on		Arming Data			Action		Data per Package		
			Bomb	Cluster	Type	Delay (revolutions)	Minimum Altitude @ 200 mph	Type	Delay (Seconds)	Fuzes (Quant)	Weight (Pounds)	Cubage (Cu Ft)
51	M142A1	Nose	M74		Plunger	None	None	Impact	None	Assembled in bombs		
77	M155	Nose		AN-M14A1	Vane	6	25	Time	5 to 92	25	58	1.7
57 61 62	M163	Nose	AN-M76 AN-M78 AN-M79		Vane	409D or 692I	1140D or 1710I	Impact	0.1 or 0	25	138	2.2
61 62	M164	Nose	AN-M78 AN-M79		Vane	409D or 692I	1140D or 1710I	Impact	.01 or 0	25	138	2.2
61 62	M165	Nose	AN-M78 AN-M79		Vane	409D or 692I	1140D or 1710I	Impact	.025 or 0	25	138	2.2
60	AN-M100A2	Tail	M113		Vane	158	445 to 485	Impact	.025 or 0	25	132	2.9
57 61	AN-M101A1	Tail	AN-M76 AN-M78		Vane	675	2000	Impact	.025 or 0	25	129	3.5
57 61	AN-M101A2	Tail	AN-M76 AN-M78		Vane	158	555	Impact	.025 or 0	25	132	2.9
62	AN-M102A1	Tail	AN-M79		Vane	675	2000	Impact	.025 or 0	25	145	4.0
62	AN-M102A2	Tail	AN-M79		Vane	158	465 to 665	Impact	.025 or 0	25	149	3.5
81 82 83 84 87 88	M152	Tail		M19 M20A1 M20 M21 M31 M32	Vane	260 and 4.5 sec	185	Time	5 to 92	15	48	1.3
57 61	M161	Tail	AN-M76 AN-M78		Vane	657	1710 to 2680	Impact	.025 or 0	25	132	2.9
62	M162	Tail	AN-M79		Vane	657	1710 to 2680	Impact	.025 or 0	25	149	3.5

D=Delay I=Instantaneous

TABLE VII. BURSTER DATA

Manual Paragraph Reference	Model Designation	Type of Tube	Dimensions (Inches)		Explosive Charge		Bombs Used In	Data per Package			Remarks
			Diameter	Length	Type	Amount		Bursters (Quantity)	Weight (Pounds)	Cubage (Cu Ft)	
89	AN-M12	Plastic or aluminum	1.13	37.88	Black powder and Magnesium	1.1 pounds	M47 incendiary	50	113	2.6	Substitute standard
90	AN-M13	Plastic	0.45	36.00	TNT and tetryl pellets	60 - 70 grams	M47 incendiary	100	85	0.9	Used when AN-M9 igniter is used
91	AN-M15	Paper and chipboard	1.69	35.83	TNT 25% and cast tetryl 75%	2.54 pounds	AN-M78	12	70	1.7	Used with all fillings
92	AN-M16	Paper and chipboard	1.69	41.97	TNT 25% and cast tetryl 75%	4.29 pounds	AN-M79	8	65	1.5	Used with all fillings
93	AN-M18	Plastic	1.13	37.94	Black powder	0.6 pounds	M47 smoke	50	120	3.0	WP filled bombs at low altitudes (contains sand)
94	AN-M20	Plastic	1.13	37.94	Tetryl pellets	0.87 pounds	M47 smoke	50	155	3.0	PWP filled bombs
95	M10	Paper or plastic	1.13	36.00	Tetryl pellets	1.48 pounds	M70A1 and M70	50	150	2.7	Used with all fillings
96	M14	Paper and chipboard	1.33	35.83	TNT 25% and cast tetryl 75%	1.23 pounds	AN-M76	50	70	1.6	Used with all fillings
97	M25	Plastic	1.13	24.75	Tetryl pellets	1.0 pounds	M113	50	85	1.9	Used with all fillings

TABLE VIII. IGNITER DATA

Manual Paragraph Reference	Model Designation	Type	Filling		Bombs Used in	Fuze	Arming Wire	Data per Package			Remarks
			Type (Symbol)	Amount (Pounds)				Igniters (Quantity)	Weight (Pounds)	Cubage (Cu Ft)	
98	AN-M5	Metal cylinder	WP	9.0	AN-M76	None	None	5	70	1.8	Do not disturb vent plugs
99	AN-M9	Metal cylinder	WP Na	1.6	M47 incendiary	None	None	20	80	2.4	Land bombing Water bombing
100	M15	Hand grenade	WP Na	0.95 0.52	Fire bomb	M157	C9	16	75 69	2.0	Land bombing Water bombing
101	M16	Hand grenade	WP Na	0.95 0.52	Fire bomb	M157	C9	16	75 69	2.0	Land bombing Water bombing
102	M23	Metal cup	WP	1.25	Fire bomb	M173	C9	25	125	2.1	Land bombing

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