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DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
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CHEMICAL BOMBS AND CLUSTERS

* This manual supersedes TM 3–400, 28 April 1953.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. General. This manual is published for the use of military personnel who are responsible for handling chemical bombs and bomb clusters in the field. It contains a detailed description of chemical bombs and bomb clusters, as well as information on the assembly, functioning, marking, packing, shipping, and storage of these munitions. Some fuzes and certain other components of chemical bombs, which are the responsibility of the Ordnance Corps, are described briefly and reference is made to the technical manual where detailed descriptions can be found. All components which are the responsibility of the Chemical Corps are described fully.

b. Appendixes. A list of reference publications is given in appendix I. Appendix II contains seven tables which list data on the incendiary bombs, gas bombs, smoke bombs, chemical bomb clusters, fuzes, bursters, and igniters included in this manual.

2. Extent of Revision

In addition to general changes in the text which bring this manual up-to-date, this revision differs from TM 3–400, 28 April 1953, in the following respects:

a. Deletions of Obsolete Items.

(1) AN–M50A2 4-pound TH3 incendiary bomb.
(2) AN–M50T–A2 4-pound incendiary bomb.
(3) AN–M50T–X–A3 4-pound incendiary bomb.
(4) AN–M50X–A3 4-pound incendiary bomb.
(5) M69X 6-pound IM and NP oil incendiary bomb.
(6) M47 100-pound IM and NP incendiary bomb.
(7) M47A1 100-pound IM and NP incendiary bomb.
(8) AN–M47A2 100-pound IM and NP incendiary bomb.
(9) AN–M47A3 100-pound IM incendiary bomb.
(10) AN–M47A4 100-pound IM and NP incendiary bomb.
(11) M113 125-pound HD persistent gas bomb.
(12) AN–M47A1 100-pound WP smoke bomb.
(13) AN–M47A2 100-pound WP smoke bomb.
(14) M7 500-pound quick-opening cluster adapter.
(15) M10 500-pound aimable cluster adapter.
(16) M10A1 500-pound aimable cluster adapter.
(17) M13 500-pound incendiary bomb cluster.
(18) AN–M14 500-pound incendiary bomb aimable cluster.
(19) AN–M14A1 500-pound incendiary bomb aimable cluster.
(20) M17 500-pound incendiary bomb aimable cluster.
(21) AN–M17A1 500-pound incendiary bomb aimable cluster.
(22) M20 500-pound PT1 incendiary bomb cluster.
(23) M20A1 500-pound PT1 incendiary bomb cluster.
(24) M21 500-pound IM and NP incendiary bomb cluster.
(25) M22 500-pound TH3 incendiary bomb cluster.

(26) M22A1 500-pound TH3 incendiary bomb cluster.
(27) AN–M13 burster.
(28) M25 burster.
(29) AN–M9 igniter.
(30) M15 Na bomb igniter.
(31) C3 adapter fin.

b. Additions.

(1) M126 4-pound TH3 incendiary bomb.
(2) AN–M69A1 6-pound IM and NP oil incendiary bomb.
(3) M74A1 10-pound PT1 incendiary bomb.
(4) M116 750-pound fire bomb.
(5) M116A1 750-pound fire bomb.
(6) M125 10-pound GB nonpersistent gas bomb.
(7) M125A1 10-pound GB nonpersistent gas bomb.
(8) M29 1,000-pound cluster adapter.
(9) M30 750-pound cluster adapter.
(10) M19A2 500-pound IM and NP incendiary bomb cluster.
(11) M35 750-pound PT1 incendiary bomb cluster.
(12) M36 750-pound TH3 incendiary bomb cluster.
(13) M34 1,000-pound GB nonpersistent gas bomb cluster.
(14) M34A1 1,000-pound GB nonpersistent gas bomb cluster.
(15) M1 bomb fuze.
(16) M2 bomb fuze.
(17) AN–M126A1 nose bomb fuze.
(18) M142A1 bomb fuze.
(19) M150A1 bomb fuze.
(20) M157 bomb fuze.
(21) AN–M159 nose bomb fuze.
(22) M173 bomb igniter fuze.
(23) AN–M173A1 bomb igniter fuze.
(24) M196 bomb fuze.
(25) M197 bomb fuze.

3. Definitions

a. Chemical Bomb. A chemical bomb is a missile which contains a chemical filling and is designed to be dropped from an aircraft. The chemical filling may be toxic gas, screening smoke, or incendiary.

b. Chemical Bomb Cluster. A chemical bomb cluster is a group of small chemical bombs (bomblets) which are fastened together in such a manner that the group can be carried in and released from an aircraft in the same way as a single large bomb. After release from the aircraft, the cluster separates and the chemical bombs fall individually to the target.

4. Reports

Malfunctions and accidents involving chemical bombs and bomb clusters must be reported as required by SR 700–45–6.

Section II. CHARACTERISTICS OF CHEMICAL BOMBS AND BOMB CLUSTERS

5. Complete Round

A complete round is composed of all the component parts required to drop and function a bomb or cluster. The design of each bomb or cluster determines what component parts constitute a complete round. A typical complete bomb is composed of a bomb body (par. 6), a chemical filling (par. 7), a tail fin (par. 8), burster or igniter (par. 10), one or more fuzes (par. 9), and arming wires (par. 11). A typical complete bomb cluster is composed of a cluster adapter (par. 12) filled with small bombs (bomblets), a tail fin, one or more fuzes, and arming wires. Complete rounds are grouped into 4-, 6-, 10-, 100-, 115-, 500-, 750-, and 1,000-pound nominal weight classifications. For purposes of description, bombs in the 4-, 6-, and 10-pound classes will be regarded as small; and bombs in the 100-pound and larger classes will be regarded as large. Small bombs are called bomblets when loaded into clusters. Large bombs are not loaded into clusters but are dropped individually. Bomb clusters are all in 100-, 500-, 750-, and 1,000-pound nominal weight classifications. The nominal weight classification does not necessarily indicate the exact weight of a complete round; for example, the average weight of the M35 750-pound incendiary

bomb cluster (par. 48) is 690 pounds. Complete round data are listed in tables II, III, IV, and V.

6. Bomb Bodies
(fig. 1)

a. Small Bombs. The bodies of small bombs are round or hexagonal in cross section. Some small incendiary bombs have bodies made of magnesium alloy, the body itself constituting the main charge of the bomb. Other small incendiary bombs have steel bodies which contain an incendiary filling.

b. Large Bombs. The bodies of large bombs are cylindrical in cross section and have rounded or ogival noses and tapered rear sections. Large bomb bodies which must withstand high internal pressure are forged or cast from steel; when internal pressures are not high, the bodies are made of thin sheet steel or aluminum. Large bomb bodies have suspension lugs for suspending the bombs from aircraft bomb stations. The lugs may be attached permanently to the bomb body or they may be removable.

7. Bomb Fillings

Detailed information on the chemical agents used to fill bombs is contained in TM 3–215 and FM 3–5.

a. Incendiary Fillings. Incendiary fillings used in chemical bombs are thickened fuels and metallic fillings. A third type of incendiary material, not properly classified as a filling, is the magnesium from which the bodies of some incendiary bombs are made.

(1) *Thickened fuels.* Thickened fuels are composed of flammable liquids, such as gasoline thickened to a jellylike consistency. IM, PT1, and NP are the thickened fuels which are used to fill incendiary and fire bombs. IM is gasoline thickened with isobutyl methacrylate; PT1 is essentially a mixture of magnesium with gasoline and other petroleum products thickened with isobutyl methacrylate; and NP is gasoline thickened with M1 or M2 thickener (napalm). IM and PT1 are prepared in manufacturing plants; NP is prepared either in manufacturing plants or in the field. All thickened fuels spatter like viscous liquids upon impact on a target and tend to adhere to the surface of the target. Information on preparing thickened fuels is contained in TM 3–366.

(2) *Metallic fillings.* The basic ingredient of metallic incendiary fillings is thermite. Thermite is a mixture of powdered aluminum and powdered iron oxide

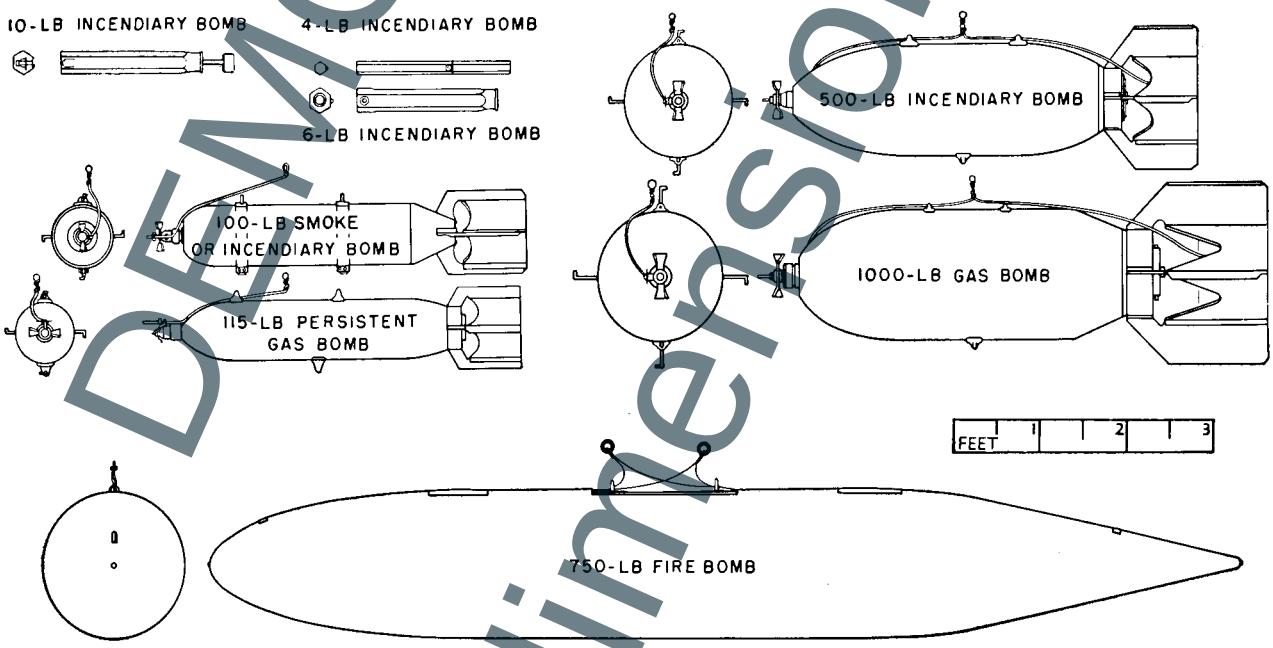


Figure 1. Bodies of typical chemical bombs.

which, when ignited by an igniter (such as black powder), burns at a temperature of about 4,000° F. White-hot molten iron is released when thermite burns, and acts as a heat reservoir to prolong and spread the incendiary effect of the thermite. When used as a filling for munitions, thermite is called Thermite, TH1. Thermate is a mixture of thermite, barium nitrate, and sulfur in an oil binder. Thermate, TH3, is the standard metallic filling used in incendiary bombs. Thermate, TH2, which has slightly different percentages of ingredients from TH3, is limited standard and will no longer be used as a bomb filling although some bombs currently on hand may be filled with it.

(3) *Magnesium.* Magnesium is a soft metal which, when heated to approximately 1,100° F. in the presence of air, ignites and burns vigorously at a temperature of about 3,600° F. Magnesium melts and flows as it burns, igniting all combustible material in its path. Bomb bodies made of magnesium comprise the bomb's main incendiary charge. The body of a magnesium bomb usually is made with an internal cavity which contains a thermate igniting charge. The AN–M50A3 4-pound incendiary bomb (par. 18) is an example of the use of magnesium in a bomb body.

b. Toxic Gas. The standard toxic gas fillings for chemical bombs are CG (phosgene), HD (distilled mustard), and GB. AC (hydrogen cyanide), CK (cyanogen chloride), and H (Levinstein mustard) are substitute standard and are used in some bombs. AC, CG, CK, and GB are classed as non persistent agents; H and HD as persistent agents.

c. Screening Smoke. The only standard smoke-producing filling used in standard smoke bombs is PWP (plasticized white phosphorus). WP (white phosphorus) is used as a substitute standard filling in some bombs. PWP does not flow in storage to the same extent as WP, hence bombs filled with PWP maintain their ballistic characteristics better than those filled with WP.

8. Tail Fins

a. Purpose. Tail fins stabilize falling bombs and clusters. Fins on small bombs are provided to insure that the bomb strikes nose first. Some small bombs have no tail fins but have weighted noses which cause them to fall nose first. On large bombs and on aimable clusters, fins aid in securing predictable ballistic characteristics, allowing the missiles to be aimed at a target from high altitudes. Tail fins are not used on M116 or M116A1 fire bombs nor on quick-opening clusters such as the M12 incendiary bomb cluster.

b. Types. Fins on small bombs are usually extensible and are retracted into the bomb body when the bomb is clustered. Some small bombs have fabric tail streamers (fig. 10); others have a tail parachute (fig. 24) instead of fins. Fins for large bombs and bomb clusters (fig. 2) usually

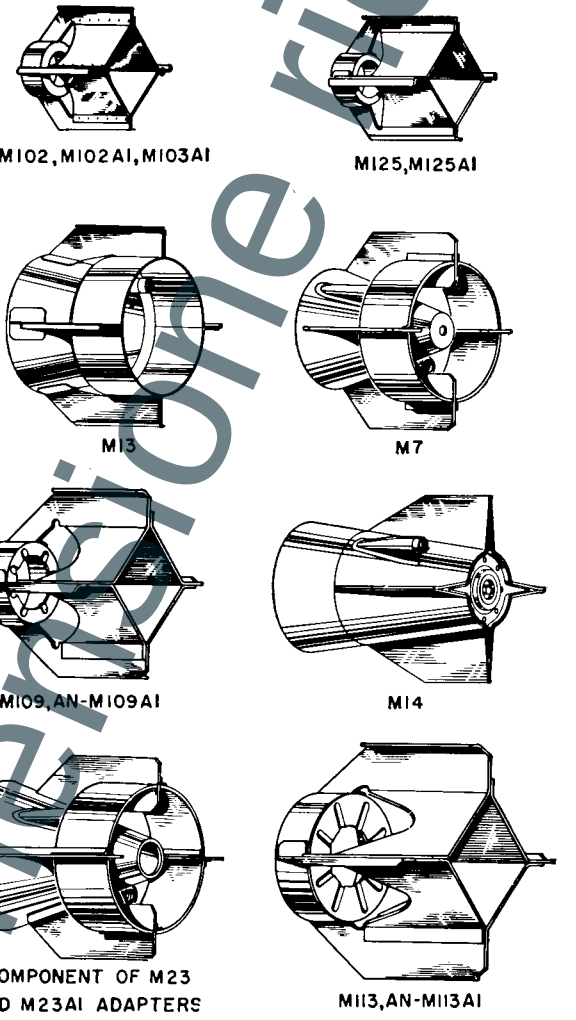


Figure 2. Tail fins for large bombs and bomb clusters.

consist of four metal vanes supported by a framework and are installed on the bomb or cluster immediately prior to loading the missile in an aircraft. Tail fins for the AN–M47 series incendiary and smoke bombs (pars. 24, 34, and 35) also consist of four vanes and a metal supporting framework but are welded to the bomb body during manufacture.

9. Fuzes

A fuze is a device used to initiate an explosive or igniting train. Fuzes used in chemical bombs and bomb clusters are discussed in detail in paragraphs 52 through 82. The location and installation of the fuze in each bomb or cluster is described in the paragraph devoted to the bomb or cluster.

10. Bursters and Igniters

a. Bursters. A burster is an explosive charge designed to be used in a bomb or cluster. Bursters are used in some chemical bombs to burst the bomb body and release the chemical filling. They are used in bomb clusters to open the cluster and allow the bomblets to fall free. Bursters are not used in bombs such as the M116A1 fire bomb (par. 27), the filling of which is released when the bomb ruptures on impact; nor in clusters such as the M34 1,000-pound cluster (par. 50), from which the bomblets are ejected by cluster-ejection cartridges. Bursters used in chemical bombs and bomb clusters are described in paragraphs 83 through 91.

b. Igniters. An igniter is an incendiary charge which is used to ignite the filling of an incendiary bomb. Igniters used in chemical bombs and bomb clusters are described in paragraphs 92 through 96.

11. Arming Wires

An arming wire is used to prevent a bomb or cluster from being armed while installed in an aircraft, and to provide a means for arming the munition upon its release from the aircraft. An arming wire consists of one or two brass wires fitted with a swivel loop, and includes one or more safety clips. Four types of arming wires (fig. 3) are in use. Each type is made to different dimensions depending upon the size of the bomb or cluster with which it is used. The type and designation of the arming wire used with each bomb or cluster are indicated in the paragraph devoted to the munition.

12. Cluster Adapters

A cluster adapter is a device which encases a number of small bombs (bomblets) to permit their being carried in an aircraft as a single unit. The adapter may be either quick-opening or aimable. A quick-opening adapter is designed to open immediately after release from the aircraft, allowing the bomblets to fall free. An aimable adapter is designed to have predictable ballistic characteristics and to open at a longer time after release from the aircraft than the quick-opening type. The aimable type can therefore be dropped

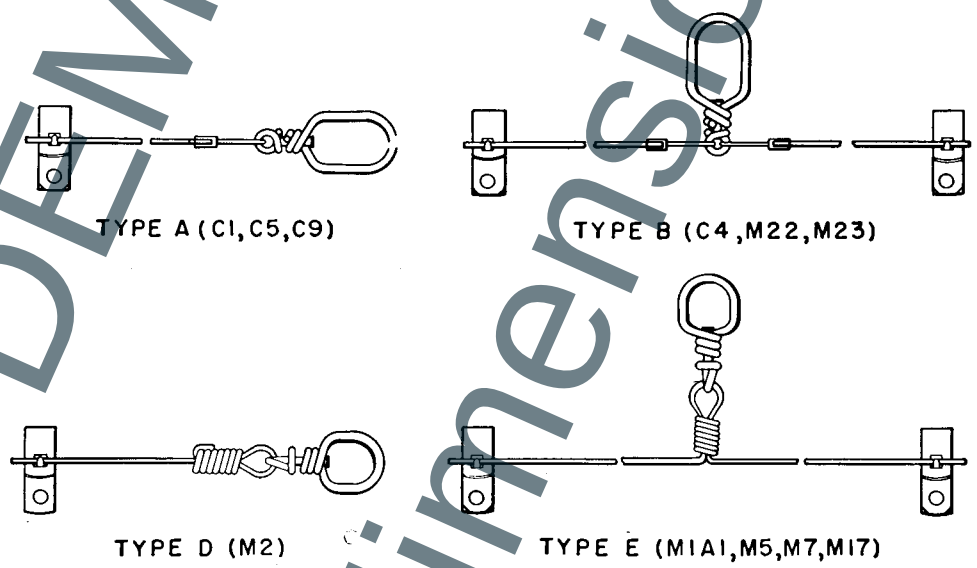


Figure 3. Arming wires.

from greater heights than can the quick-opening type, with the expectation that the dispersion pattern of the bomblets will not be undesirably large. Like large bomb bodies (par. 6), cluster adapters have suspension lugs which permit their suspension either by one or two lugs. Cluster adapters are described in detail in paragraphs 36 through 42.

13. Other Components

a. Fuze-Seat Liner. A fuze-seat liner is a metal cup with external threads. The thread permits the fuze-seat liner to be screwed into a fuze cavity in a bomb. The purpose of the fuze seat liner is to cover the burster well and to hold the burster in proper relationship to the fuze. The liner is normally assembled loosely in the bomb during manufacture and is tightened in the field when the burster and fuze are installed. Only the AN–M76 500-pound incendiary bomb (par. 25) and the AN–M78 500-pound and AN–M79 1,000-pound gas bombs (pars. 32 and 33) have fuze-seat liners.

b. Adapter-Booster. An adapter-booster is essentially an explosive charge (booster) and a reducing bushing (adapter) in one assembly. The explosive portion of the adapter-booster intensifies the explosive action of a fuze. The adapter portion has external threads which screw into the fuze well of a bomb, and internal threads which receive the appropriate fuze.

c. Cluster-Ejection Cartridge. A cluster-ejection cartridge is an explosive cartridge similar in size and shape to a shotgun shell. It contains a primer and a powder charge and is used in bomb clusters to supply gas pressure for ejecting clustered bombs from an adapter casing. Two types of cluster-ejection cartridges are in use. The first is the M2 ignition cartridge which is used in the M31 and M32 incendiary bomb clusters (pars. 46 and 47). The M2 ignition cartridge is an Ordnance Corps item which was designed for use with the 4.2-inch chemical mortar shell and was adopted as the standard cluster-ejection cartridge for the M31 and M32 bomb clusters. The second cartridge used for cluster-ejection is the M3 cluster-ejection cartridge. It is similiar in construction to the M2 ignition cartridge but is slightly larger, and was designed for use in the M34 and M34A1 bomb clusters (pars. 50 and 51).

Section III. NOMENCLATURE AND MARKING

14. Nomenclature

Bombs and clusters and their components are assigned names at the time they are made standard items of issue. The name then becomes the standard nomenclature by which the item is identified. The standard nomenclature of bombs and clusters includes the name of the type of item, the nature of the contents, the symbol for the filling, the weight classification, and the model number; for example: Bomb, Gas, Nonpersistent, GB, 10-lb., M125A1; Cluster, Incendiary Bomb, TH3, 750-lb., M36.

15. 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 adding the letter "A" and the appropriate Arabic numeral after the model designation. For example, M47A4 bomb 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 bomb indicates acceptance of the M47A4 bomb as a standard item by the Army and the Navy.

16. Lot Number

A lot number is a number assigned by the manufacturer to each group of bombs or clusters manufactured under the same manufacturing conditions. Bombs with the same lot number may be expected to have similar characteristics and similar faults (if any). The lot number always is used when reference is made to a specific bomb, as when reporting malfunctions or accidents, or condition in storage.

17. Markings

a. Body Color. Chemical bombs and clusters are painted gray in accordance with standard

munition marking procedure (TM 9–1900). Fire bombs are not painted and the magnesium portion of small incendiary bombs is unpainted but is naturally grayish in color. Munitions other than chemical are painted different colors; for example: high-explosive munitions are painted olive drab; practice munitions, blue.

b. Identification Bands. Colored bands are painted on bombs and clusters to indicate the type of filling. The bands on chemical bombs (fig. 4) are painted around the circumference of the bombs. Large bombs have bands at three locations, at the nose end, middle, and tail end; small bombs have bands only around the middle. The type and color of identification bands for each type of filling are as follows:

Type of filling	*Type of band*	*Color of band*
Nonpersistent war gas	Single	Green
Persistent war gas	Double	Green
Smoke	Single	Yellow
Incendiary	Single	Purple

c. Other Markings. The bomb nomenclature, lot number, symbol or initials of loader, date loaded, shipping weight, cubage, and other data are marked on bombs and clusters in the same color as the identification bands.

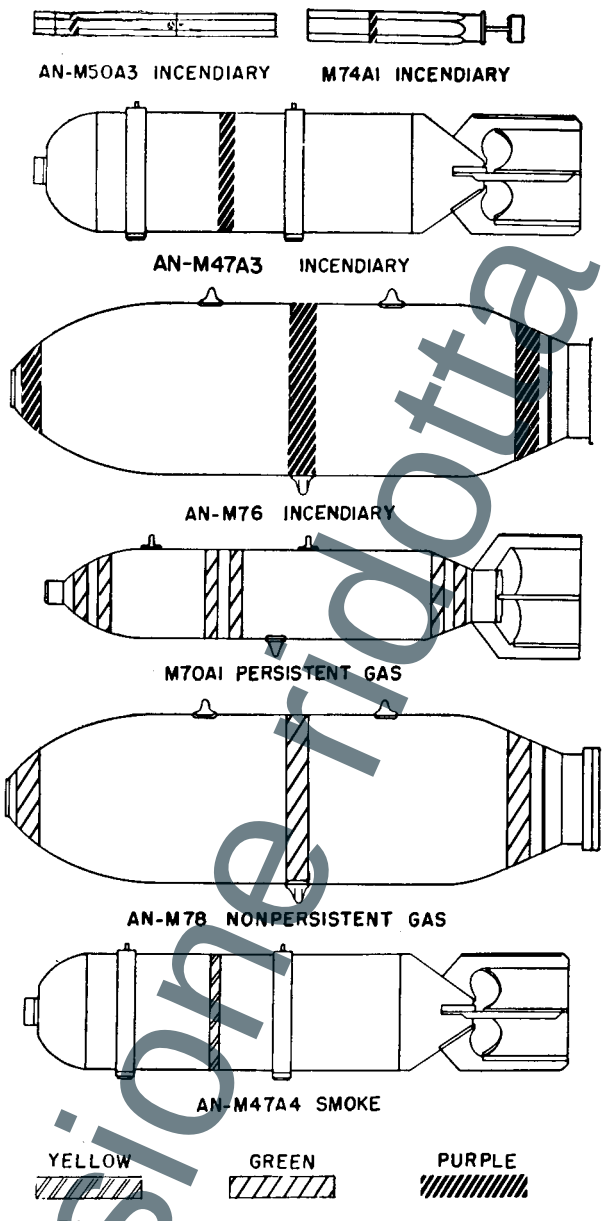


Figure 4. Color markings on chemical bombs.

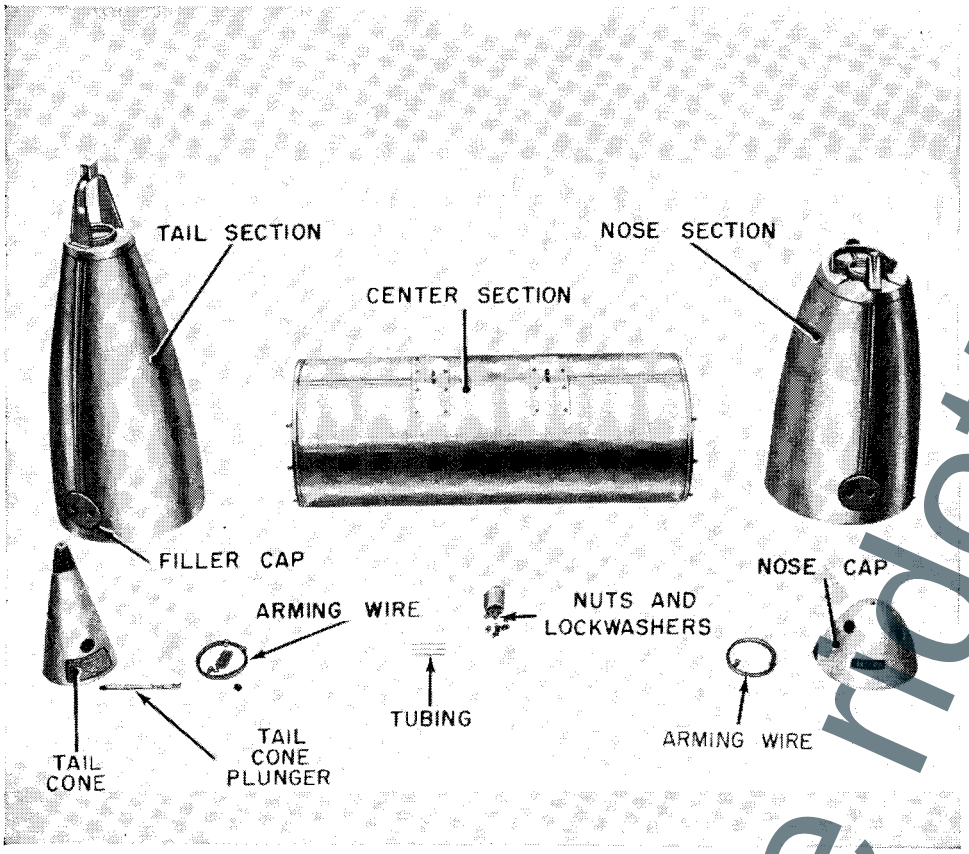


Figure 19. Components for M116 750-pound fire bomb.

of the center section, and push the nose section firmly against the center section so that the bolts in the center section enter the holes in the nose section. Make sure that the gasket which is cemented to the seal ring in the nose section is seated in the seal ring in the center section. Working through the filling hole, install a lockwasher and nut on each bolt and tighten all nuts equally.

(4) Aline the arming-wire guide on the tail section with the guide on the remaining end of the center section, and fasten the tail section to the center section as in (3) above. Before tightening the nuts, be sure that the gasket in the tail section is seated in the seal ring in the center section.

c. Filling. The M116 bomb may be filled before it is installed on an aircraft, or after installation if the filling holes are accessible. Hoisting equipment must be available to install a filled bomb. To fill, pour or pump 100 gallons of incendiary filling through the filling holes. Either or both holes may be used as required to distribute the filling evenly in the bomb. Do not overfill, since 100 gallons in the bomb leaves the required 10-percent void. Reducing the void by filling with more than 100 gallons may cause leakage. After filling, replace both filler caps and lock them in place by tightening the locking screw in the center of each cap.

d. Installation.

Warning: Do not install the M116 bomb on aircraft equipped with apparatus that ejects the bomb explosively.

(1) *Installing bomb.*

(*a*) Thread one end of an M17 arming wire through the front suspension lug and through the arming-wire guide in the nose section. Thread the other end of the arming-wire through the rear suspension lug and through the arming-wire guide in the tail section. Install the second arming-wire in the same manner.

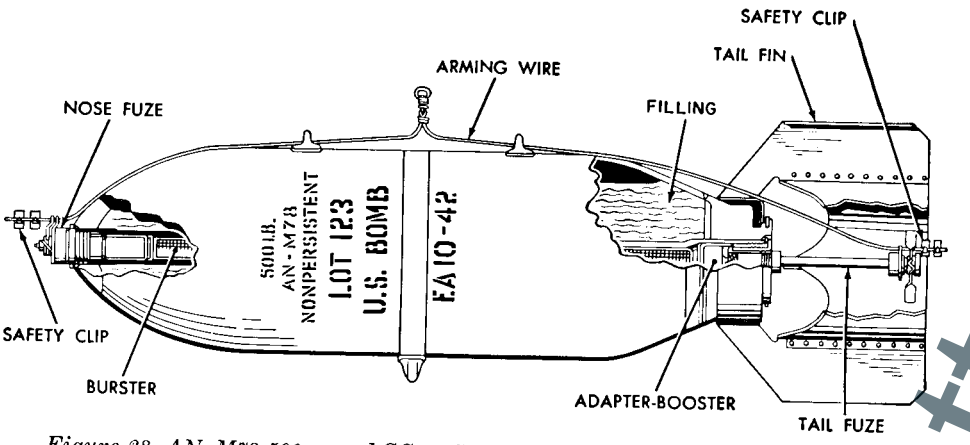


Figure 28. AN–M78 500-pound CG or CK nonpersistent gas bomb, cutaway view.

shipped separately from the bomb and is installed in the field (*b* below).

(4) *Burster.* An AN–M15 burster (par. 86) is installed in the burster well before the bomb is loaded in an aircraft. The burster is shipped separately from the bomb.

(5) *Adapter-booster.* An M115 or M115A1 adapter-booster (TM 9–1980) is screwed into the base plate before the bomb is loaded in an aircraft. The adapter-booster is shipped separately from the bomb.

(6) *Nose fuze.* The preferred nose fuze is an M163 nose bomb fuze (par. 76). Authorized alternate fuzes are the AN–M103, AN–M103A1, AN–M139A1, AN–M140A1, M164, and M165 nose bomb fuzes (pars. 61, 62, 65, 66, 77, and 78).

(7) *Tail fuze.* The preferred tail fuze is an M161 tail bomb fuze (par. 74). Authorized alternate fuzes are the M101A1 and AN–M101A2 tail bomb fuzes (pars. 57 and 58).

(8) *Arming wire.* An M5, M7, or AN–M7A1 type E arming wire (par. 11) is used with this bomb.

b. Assembly.

Warning: When handling the AN–M78 gas bomb, protect personnel against possible leaking CG or CK.

(1) *Before loading in aircraft.* Remove shipping bands and unscrew the nose and tail plugs. Remove the fin locknut, place the tail fin over the tail of the bomb with one vane in alinement with the suspension lugs, and install and tighten the fin locknut. Tighten the fuze-seat liner snugly in the threads in the bomb nose. Working from the tail end of the bomb, insert the AN–M15 burster in the burster well and screw the adapter-booster into the threaded hole in the base plate at the tail end of the burster well.

(2) *After loading in aircraft.* Adjust the nose and tail fuzes for instantaneous or delay action as desired. Remove the closure plug from the adapter-booster and screw the tail fuze handtight into the adapter-booster. Screw the nose fuze handtight into the fuze-seat liner. Install the arming wire with one branch to each fuze and place two safety clips on the end of each branch. Remove the fuze safety wires.

c. Functioning. When the bomb is released from an aircraft, the arming wire is withdrawn and the fuze arming vanes rotate in the airstream. After the required number of revolutions, as shown in table VI, the fuzes are armed. When the bomb strikes, the fuzes function, causing the burster to detonate. The detonation of the burster ruptures the bomb body and releases the filling.

d. Defuzing. To defuze an AN–M78 gas bomb, replace the safety wires in the fuzes, remove the arming wire, and unscrew the fuzes. Remove the

burster and return it and the fuzes to their original packing.

Warning: Do not attempt to disarm an armed fuze.

Turn the armed fuze over to bomb-disposal personnel for disposal.

e. Marking. A green band at the nose, one at the middle, and one at the tail end identify the bomb as a gas bomb. Bomb nomenclature and lot number are stenciled on the body in green.

f. Packing. The AN–M78 bomb is protected for shipping by shipping bands (par. 102). The bomb, with shipping bands installed, weighs 492 pounds when filled with CG and 463 pounds when filled with CK and displaces 10.1 cubic feet. The tail fin, burster, fuzes, and arming wire are packed separately.

g. Shipment and Storage. Shipping requirements are discussed in paragraphs 101 through 104. The AN–M78 bomb is in storage group B for chemical munitions. See paragraphs 97 through 104 for information on storing chemical bombs. See TB CW 22 for information on venting the bomb.

h. Tabulated Data. Data for this bomb are tabulated in table III.

33. Bomb, Gas, Nonpersistent, CG, AC, or CK, 1,000-Pound, AN–M79

a. Description. The AN–M79 nonpersistent gas bomb (figs. 29 and 30) is 69½ inches long and, when assembled into a complete round, weighs 948 pounds when filled with CG, 884 pounds when filled with CK, and 728 pounds when filled with AC. The bomb is 18¾ inches in diameter and has an ogival nose and truncated conical tail section. The complete round consists of a bomb body, filling, a tail fin, a burster, an adapter-booster, a nose fuze, a tail fuze, and an arming wire.

(1) *Body.* The bomb body is made of steel. A tubular burster well extends the length of the interior of the bomb from a threaded fuze adapter in the nose to a

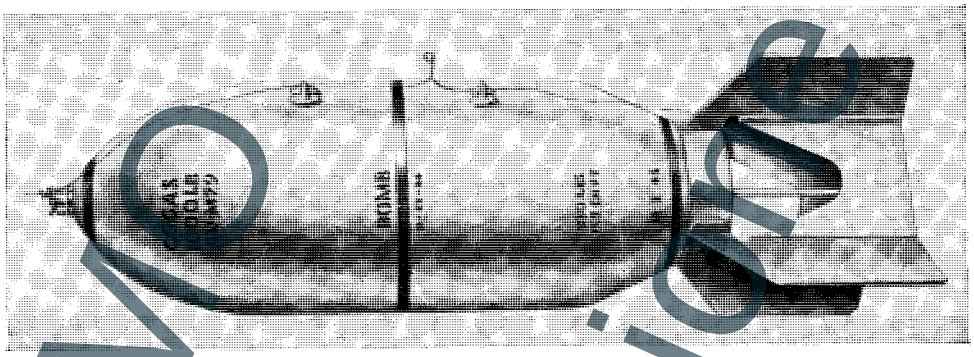


Figure 29. AN–M79 1,000-pound CG, AC, or CK nonpersistent gas bomb.

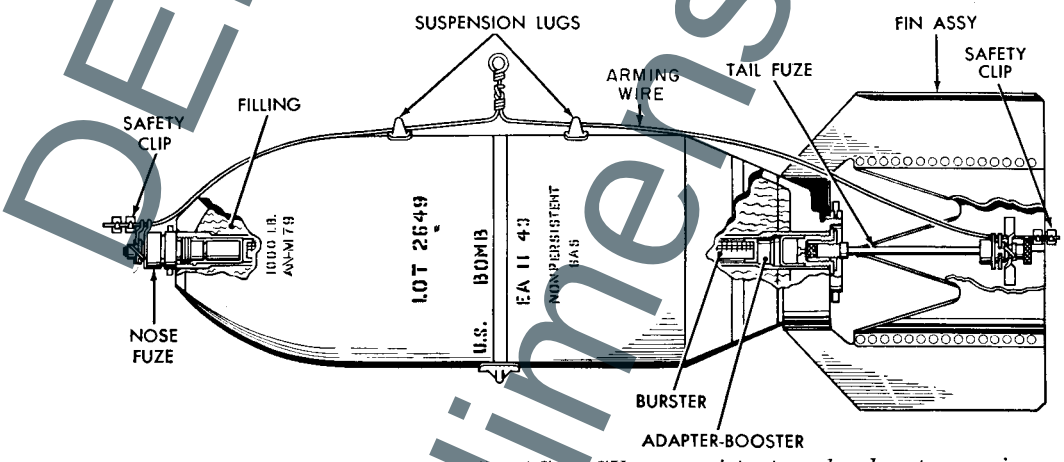


Figure 30. AN–M79 1,000-pound CG, AC, or CK nonpersistent gas bomb, cutaway view.

filled with CK, 719 pounds when filled with AC, and displaces 17.5 cubic feet. The tail fin, burster, fuzes, and arming wire are packed separately.

g. Shipping and Storage. Shipping requirements are discussed in paragraphs 101 through 104. The AN–M79 bomb is in storage group B for chemical munitions. See paragraphs 97 through 100 for information on storing chemical bombs. See TB CW 22 for information on venting the bombs.

h. Tabulated Data. Data for this bomb are tabulated in table III.

Section III. SMOKE BOMBS

34. Bomb, Smoke, PWP or WP, 100-Pound, AN–M47A4

a. Description. The AN–M47A4 smoke bomb (figs. 31 and 32) is approximately 52 9/16 inches long and weighs approximately 105 pounds when filled with PWP and approximately 131 pounds when filled with WP. It is approximately 8½ inches in diameter and has a rounded nose, a truncated conical tail section, and a fixed tail fin. The complete round consists of a bomb body, filling, a burster, a fuze, and an arming wire. The AN–M47A4 smoke bomb is essentially the same as the AN–M47A3 incendiary bomb (par. 24) except for the filling, the burster, and the suspension lugs, which are of heavier construction in the AN–M47A4 bomb.

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

(2) *Filling.* The bomb is filled during manufacture with either 74 pounds of PWP or 100 pounds of WP (par. 7).

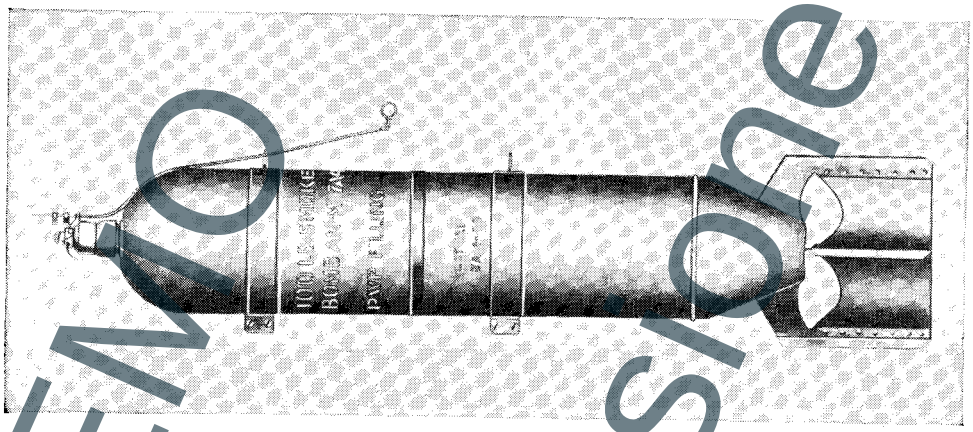


Figure 31. AN–M47A4 100-pound PWP or WP smoke bomb.

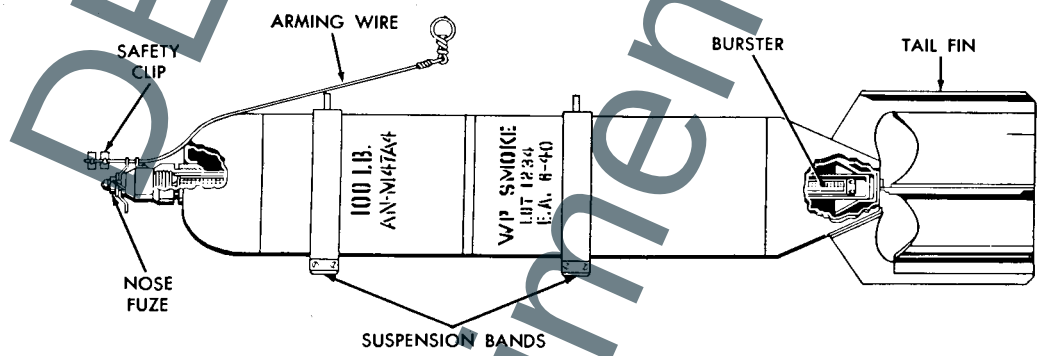


Figure 32. AN–M47A4 100-pound PWP or WP smoke bomb, cutaway view.

CHAPTER 3
CHEMICAL BOMB CLUSTERS

Section I. CLUSTER ADAPTERS

36. Adapter, Cluster, M4

The M4 cluster adapter (fig. 33) is a component of the M12 NP incendiary bomb cluster (par. 43). The adapter is approximately 39 11/16 inches long, 8 3/4 inches wide, and 10 1/16 inches high. It consists of a suspension-bar assembly, a bar, and two end plates. The front and rear end plates have projections which fit into slots in the ends of the bar and the suspension-bar assembly. The suspension-bar assembly, the bar, and the two end plates are bound in the assembled position by four strapping bands. Half of a cluster buckle is attached to each end of a strapping band, and is held in the assembled position by one branch of a four-branch arming wire which is installed in the adapter during manufacture. A straight safety wire passes through holes in each cluster buckle, preventing the adapter from opening in case the arming wire is removed accidentally. Three suspension lugs in the suspension-bar assembly are held in position by cotter pins. A crutching pad (reinforcing plate) at each suspension-lug position adds support to the suspension-bar assembly.

37. Adapter, Cluster, M23

a. General. The M23 cluster adapter (figs. 34 and 35) is a component of the M19 incendiary bomb cluster (par. 44). It is approximately 59 1/2 inches long and 14 3/4 inches in diameter. It consists of a framework, a casing, a nose fairing, a tail ballast, a fin assembly, and two bursters.

b. Framework. The framework consists of a suspension-bar assembly, a burster-bar assembly, four side bars, a front end plate, and a rear end plate.

(1) *Suspension-bar assembly.* The suspension-bar assembly is a steel bar which

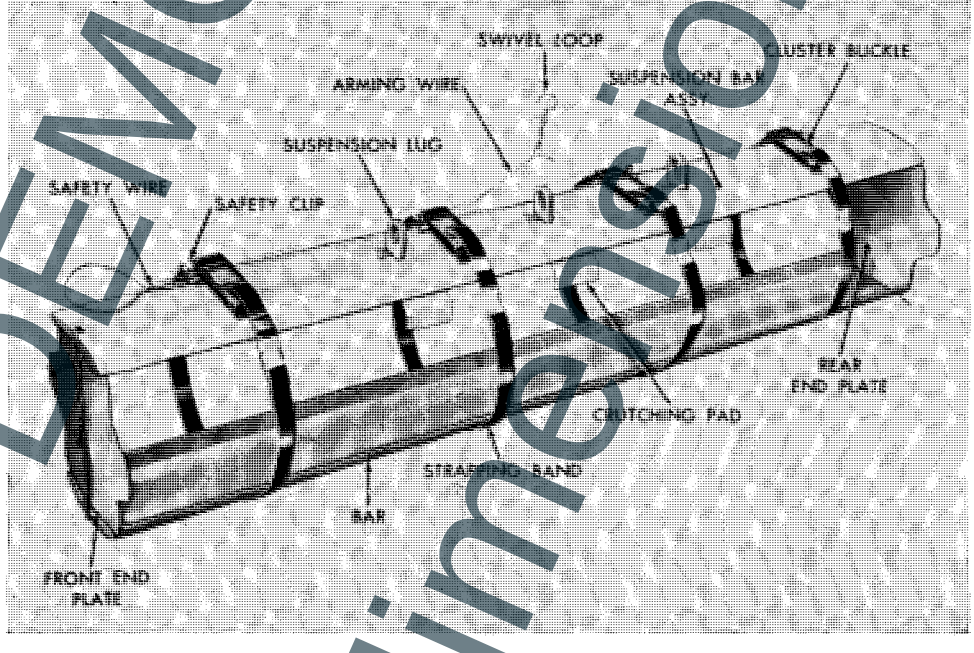


Figure 33. M4 cluster adapter.

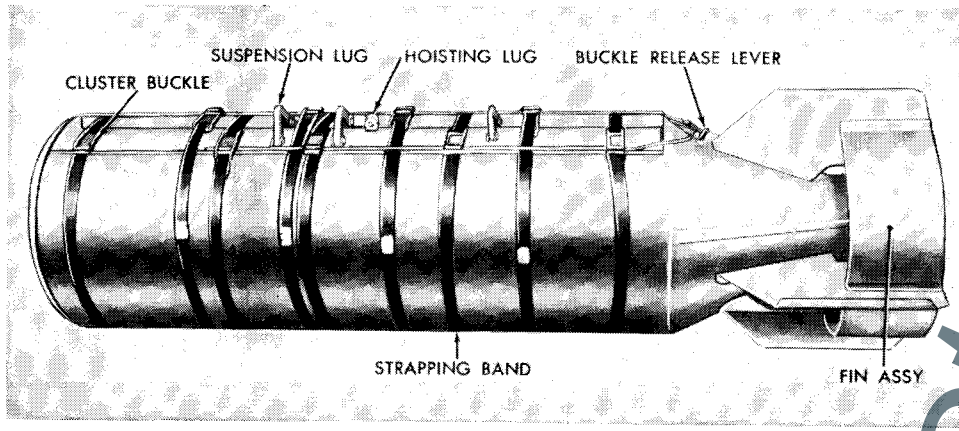
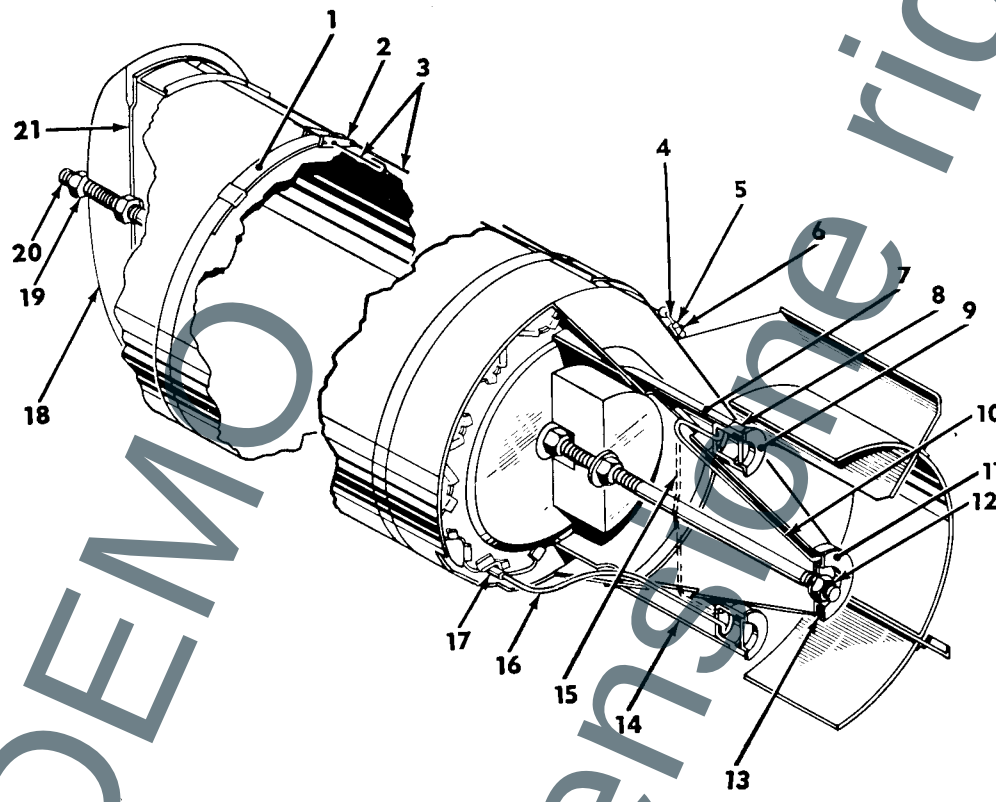
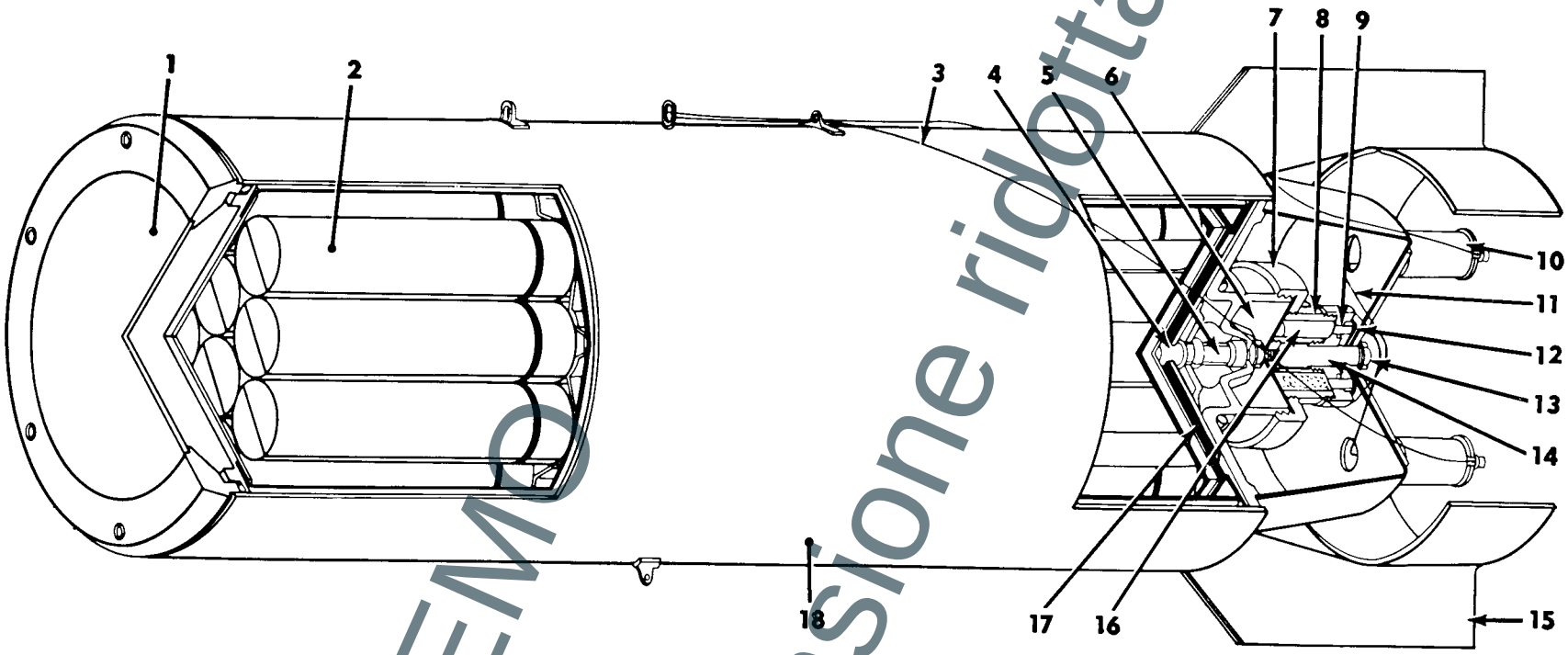


Figure 34. M23 cluster adapter.



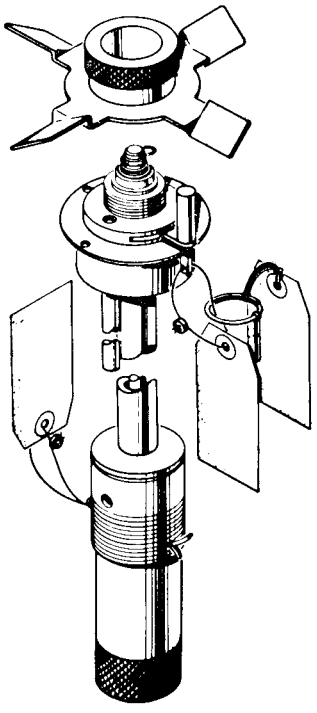
1 Strap
2 Strap buckle
3 Buckle release wires
4 Release lever
5 Wingnut and lockwasher
6 Screw
7 Short fuze-adapter housing
8 Fuze adapter
9 Fuze-adapter cover
10 Short burster (M23 adapter only)
11 Tail retainer cup
12 Fin nut and lockwasher
13 Charge retaining cup
14 Long fuze-adapter housing
15 Prolongation of burster (M23A1) adapter only)
16 Long burster
17 Burster tube
18 Nose fairing
19 Nut
20 Nose stud
21 Front end plate

Figure 35. M23 or M23A1 cluster adapter, cutaway view.

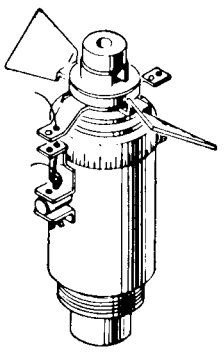


1	Nose assembly	7	Gas chamber closure cap	13	Fin nut
2	Bombs	8	Cartridge holder	14	Tail-fin stud
3	Arming wire	9	Striker assembly	15	Tail fin
4	Stud	10	Fuze	16	Cluster-ejection cartridge
5	Split nut	11	Burster	17	Pressure plate
6	Gas chamber	12	Disk	18	Casing

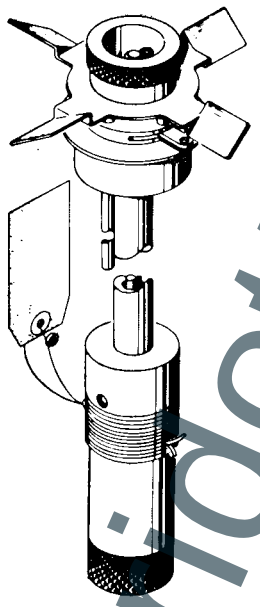
Figure 48. M34 1,000-pound GB nonpersistent gas bomb cluster, cutaway view.



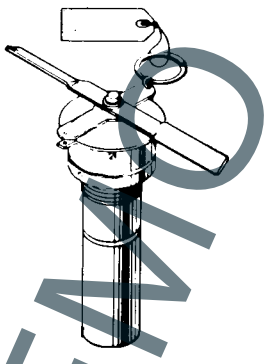
M161 AND M162



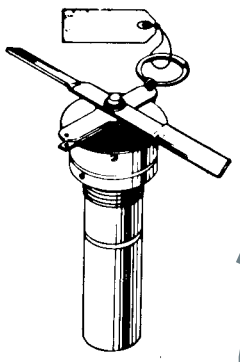
M152



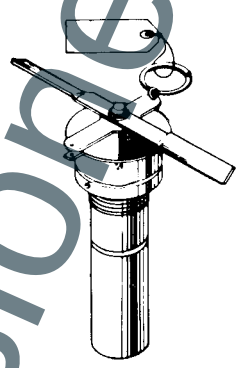
AN-M100A2, M101A1
AN-M101A2, AN-M102A1
AND AN-M102A2



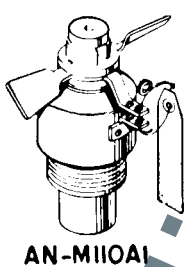
AN-M103A1
AN-M103
M163



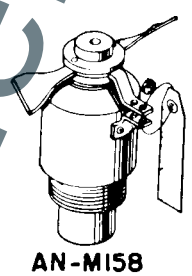
AN-M140A1
M165



AN-M139A1
M164

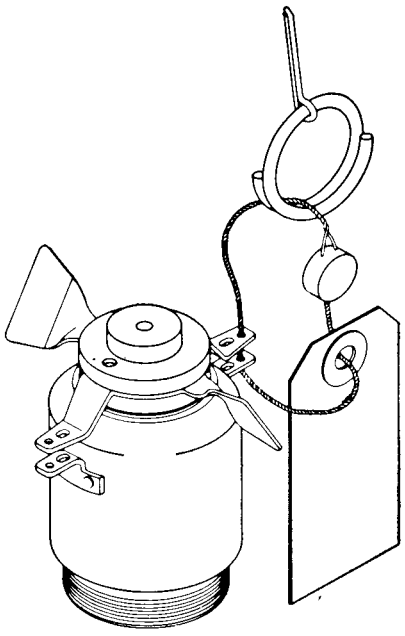


AN-M110A1

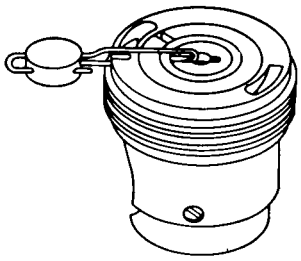


AN-M158

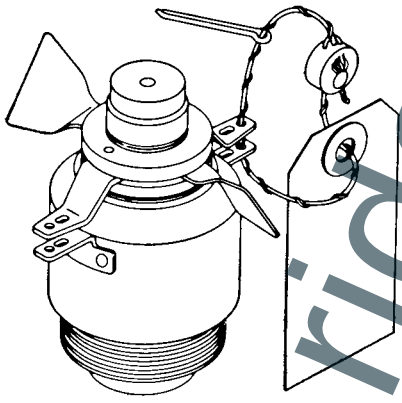
Figure 49. Ordnance Corps fuzes used in chemical bombs and bomb clusters.



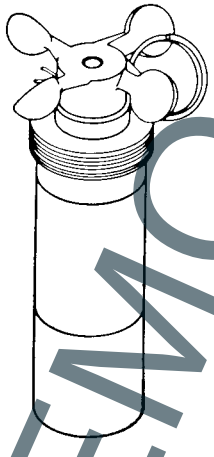
AN-M159



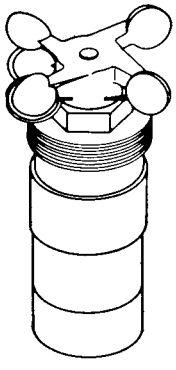
M196



AN-M126A1

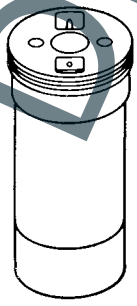


M173

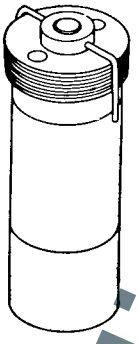


M157

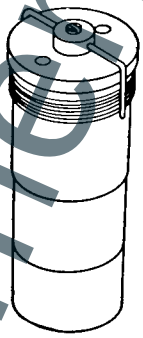
M1



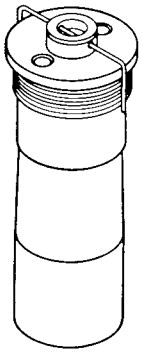
M2



M150A1

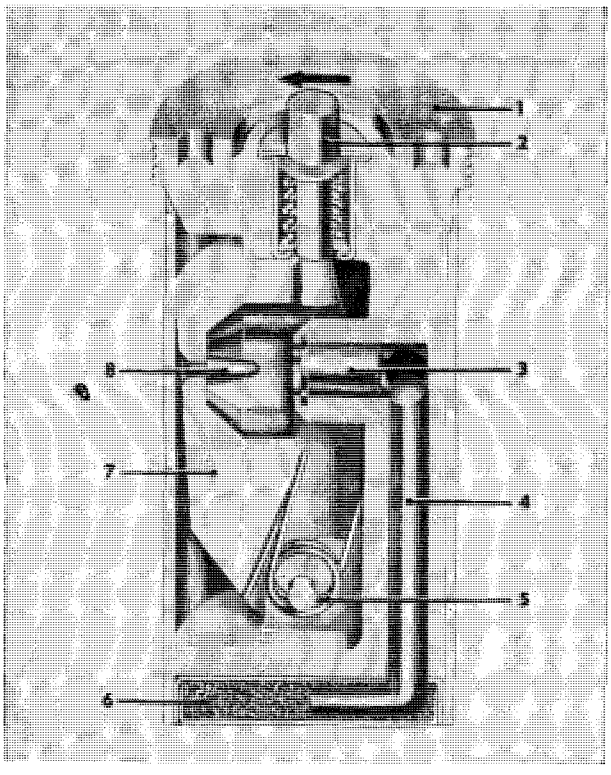


M142A1



M197

Figure 50. Chemical Corps fuzes used in chemical bombs and bomb clusters.



1 Fuze nose
2 Arming plunger
3 Primer
4 Time fuze
5 Hinge pin
6 First-fire mixture
7 Striker
8 Striker pin

Figure 51. M1 bomb fuze, sectional view.

bomb, and the inner end of the plunger locks the striker in the safe position.

(2) *After release from cluster.* Release of the bomb from the cluster removes pressure from the arming plunger, allowing the plunger spring to move the plunger into the armed position as shown in figure 51. The striker is held away from the primer by a striker spring.

(3) *Upon impact.* When the nose of the bomb strikes a solid object, inertia causes the striker to move toward the primer, compressing the striker spring. The striker pin strikes the primer which initiates the time fuze. The time fuze burns from 3 to 5 seconds, then ignites the first-fire mixture, completing the fuze action.

e. Accidental Arming. If the fuze is armed accidentally, it can be made safe by depressing and holding down the arming plunger.

f. Packing and Marking. The M1 fuse is shipped to the field assembled in clustered bombs and is not marked.

56. Fuze, Bomb, M2

a. General. The M2 bomb fuze (figs 52 and 53) is an impact nose fuze of the direct-arming arming-pin type with a 1.7- to 3-second delay. The fuze functions at any angle of impact. It is used in the AN–M69A1 6-pound oil incendiary bomb (par. 21). Data for this fuze are listed in table VI.

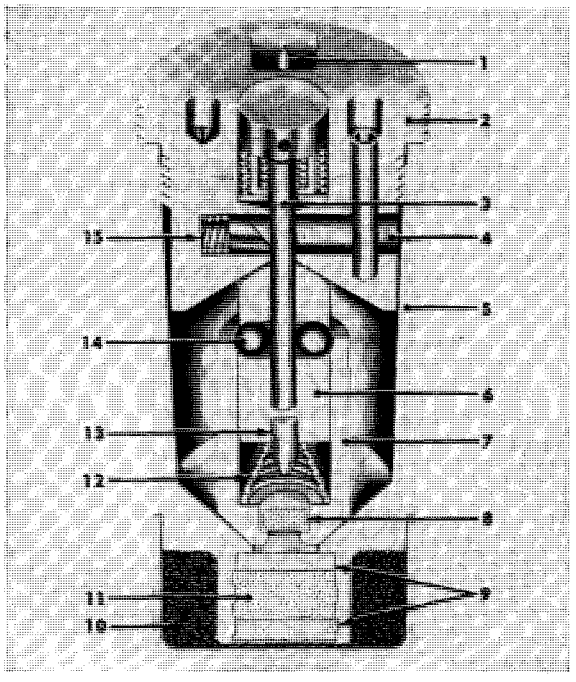
Figure 52. M2 bomb fuze.

b. Description. The M2 fuze (fig. 53) is 1¼ inches in diameter and 2⅝ inches long. A case (5) encloses a striker (6), a sleeve (7) containing a primer (8), inner and outer first-fire mixtures (9), a delay mixture (11), and a booster (10). A head assembly (2) containing an arming pin (3) and a slide bar (4) is screwed into the open end of the case. A safety wire (1), which is removed when the bomb containing the fuze is clustered, holds the arming pin in the fuze.

c. Installation. The fuze is installed in the bomb nose during manufacture. Removal or replacement of the fuze in the field is not authorized.

d. Functioning.

(1) *Before release from cluster.* When a bomb containing the M2 fuze is clus-



1 Safety wire
2 Head assembly
3 Arming pin
4 Slide bar
5 Case
6 Striker
7 Sleeve
8 Primer
9 First-fire mixture
10 Booster
11 Delay mixture
12 Striker spring
13 Firing pin
14 Steel ball
15 Slide-bar spring

Figure 53. M2 bomb fuze, sectional view.

tered, the arming pin is held in the fuze by contact with other bombs in the cluster. The slide bar is held in the retracted position by the stem of the arming pin, and the slide-bar spring (15) is compressed. The striker and the sleeve are locked together by two steel balls (14), which are located in two holes in the striker. Each ball is held outward in a recess in the sleeve by the stem of the arming pin. This prevents the firing pin (13), which is part of the striker, from striking the primer.

(2) *After release from cluster.* Release of the bomb from the cluster removes pressure from the arming pin, which is ejected from the fuze by springs located under the head of the arming pin. Withdrawal of the arming-pin stem frees the two steel balls which move toward the center of the fuze, unlocking the striker from the sleeve. The striker and sleeve are then free to move in either direction, the firing pin is held away from the primer only by the striker spring (12), and the fuze is armed. Withdrawal of the arming-pin stem also frees the slide bar, which is forced by the slide-bar spring toward the center of the fuze. The slide bar then covers the hole left by the arming pin and prevents fire from the igniting components of the fuze from venting forward.

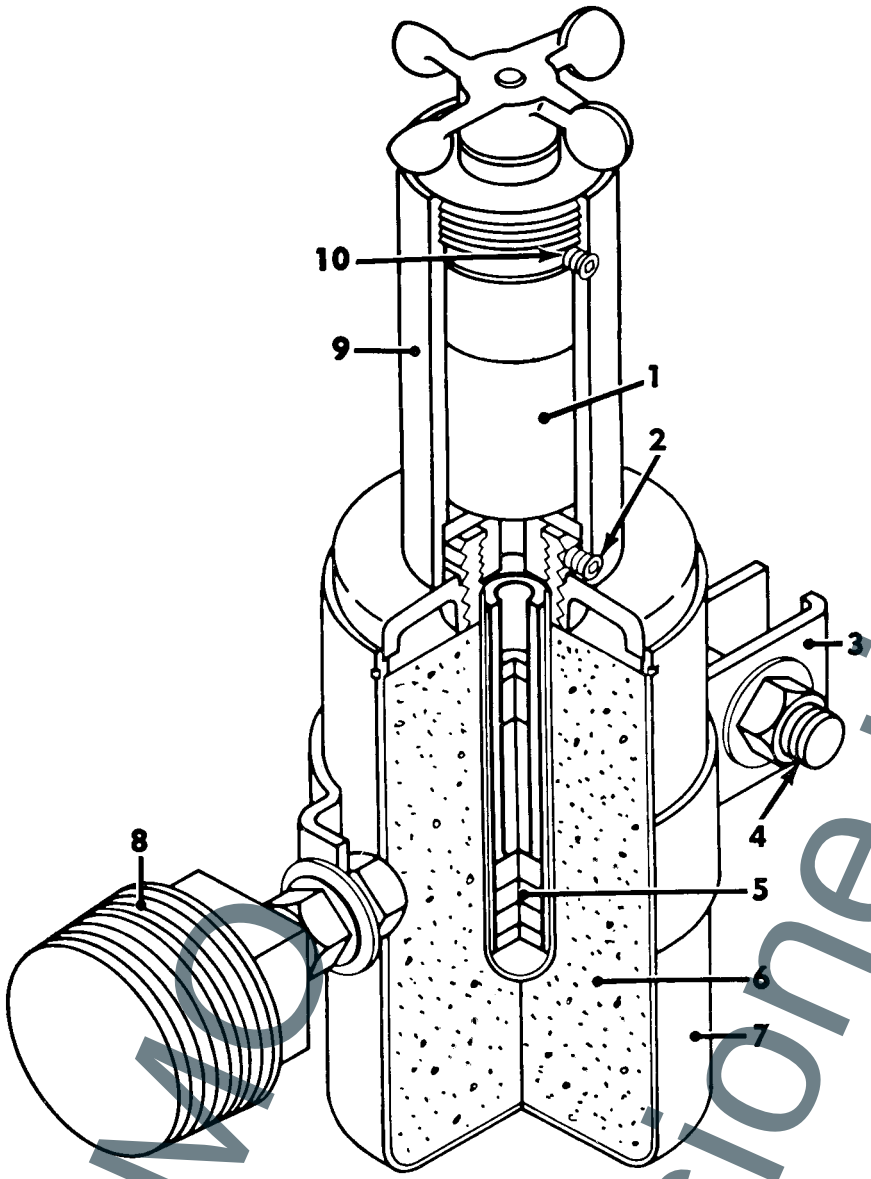
(3) *Upon impact.* If the bomb strikes nose first, inertia causes the sleeve to move toward the striker, compressing the striker spring. The primer hits the firing pin and is activated. Flame from the primer progresses in turn to the inner first-fire mixture, the delay mixture, the outer first-fire mixture, and the booster, completing the fuze action. From 1.7 to 3 seconds elapse between impact and functioning of the booster. If the bomb strikes tail first, inertia causes the striker to move toward the sleeve, compressing the striker spring and allowing the firing pin to strike the primer. The action of the first-fire mixtures, the delay mixture, and the booster are the same as when the bomb strikes nose first. If the bomb strikes with the side of the fuze turned toward the point of impact, inertia causes both the striker and the sleeve to move toward the side of the fuze, and the striker is forced into the sleeve by the sloping surfaces of the fuze head and case. The firing pin strikes the primer, and the fuze action is completed as described above.

e. Accidental Arming. If the fuze is armed accidentally, the bomb containing it must be disposed of by bomb-disposal personnel.

Warning: Do not attempt to disarm an armed M2 fuze.

The assembled fuze cannot be disarmed safely and attempting to replace or depress the arming pin will activate the fuze.

f. Packing and Marking. The M2 fuze is shipped to the field assembled in clustered bombs and is not marked.



1 Fuze
2 Setscrew
3 Clamp
4 Bolt
5 Burster
6 Filling
7 Igniter body
8 Plug
9 Adapter
10 Setscrew

Figure 72. M15 WP bomb igniter.

clip from the fuze, install the end of the arming wire in the fuze, and place the safety clip on the end of the arming wire. After the arming wire and safety clip are in place, remove the safety pin from the fuze.

c. Functioning. When the fuel tank is released from an aircraft, the arming wire is withdrawn from the fuze and the arming vane rotates in the airstream, arming the fuze. When the fuel tank strikes, it splits, and the fuel is scattered. The fuze functions and detonates the burster, which breaks the body of the igniter and scatters the igniter filling. The WP ignites spontaneously upon exposure to the air and ignites the contents of the fuel tank.

d. Removal and Defuzing. To remove an M15 igniter from a fuel tank, first replace the safety pin in the fuze. Remove the safety clip, withdraw the arming wire, and reinstall the short safety wire and safety clip. Loosen the clamp and remove the igniter from the clamp. Loosen both setscrews, unscrew the adapter from the igniter body, carefully remove the burster from the burster well, and unscrew the fuze from the adapter. Unscrew the clamp from the airplane

Table V. Bomb Clusters

A. Incendiary Bomb Clusters

Model	Nominal size (lb.)	Weight of complete round (lb.)	Adapter	Bomblets		Fuzes [1]		Arming wire	Tail fin assembly	How shipped	Shipping weight (lb.)	Cubage (cu. ft.)
				Model	No.	Nose	Tail					
M12	100	98	M4	AN–M69 or AN–M69A1	14	None [2]	None [2]	4-branch factory assembled	None	Steel drum	133	3.2
M19	500	435	M23	AN–M69	38	None	AN–M152A1 M152 (2 rqr)	C4	Component of cluster adapter.	Steel drum	605	20.8
M19A2	500	435	M23A1	AN–M69A1	38	None	AN–M152A1 M152 (2 rqr)	C4	Component of cluster adapter.	Steel drum	605	20.8
M31	500	562	M25	M74	38	None	AN–M152A1 M152 (2 rqr) [3]	C4	M7 Component of cluster adapter.	Shipping guard	537	10.9
M32	500	617	M26	AN–M50A3	108	None	AN–M152A1 M152 (2 rqr)	C4	M7 Component of cluster adapter.	Shipping guard	592	11.6
M35	750	690	M30	M74A1	57	None	AN–M152A1 M152 (2 rqr)	M23	M14 Component of cluster adapter.	Shipping guard	835	17.5
M36	750	900	M30	M126	182	None	AN–M152A1 M152 (2 rqr)	M23	M14 Component of cluster adapter.	Shipping guard	1,045	17.5

B. Gas Bomb Clusters

M34	1,000	1,130	M29	M125	76	None	AN–M152A1 or M152 (2 rqr) [4]	M22	M13 Component of cluster adapter.	Shipping guard	1,300	20.1
M34A1	1,000	1,130	M29	M125A1	76	None	AN–M152A1 or M152 (2 rqr) [4]	M22	M13 Component of cluster adapter.	Shipping guard	1,300	20.1

[1] Preferred fuze listed first.
[2] Cluster opened by arming wire.
[3] Three M2 ignition cartridges used for cluster ejection.
[4] Four M3 cluster-ejection cartridges used for cluster ejection.