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OP 1280

AIRCRAFT BOMBS



A BUREAU OF ORDNANCE PUBLICATION

17 February 1945

AIRCRAFT BOMBS



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NAVY DEPARTMENT
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17 February 1945

ORDNANCE PAMPHLET 1280

AIRCRAFT BOMBS

1. Ordnance Pamphlet 1280 describes aircraft bombs and contains instructions for their flight preparation. It is also intended as a reference for personnel concerned with the tactical use of subject equipment.

2. This pamphlet supersedes the following publications, which should be destroyed: Ordnance Pamphlets 736 and 1019; Ordnance Circular Letters V89, V89A, V89B, V93, V24-42, V30-42, V47-42, A6-43, A9-43, AV41-43, and AV84-43; and Ordnance Technical Instructions A4-43 and AV6-43. Information to have been published in Ordnance Pamphlets 1020, 1021, 1022, and 1024 being included in this publication, those numbers are canceled.

3. It is not intended that this pamphlet be carried in aircraft for use therein.

4. This publication is RESTRICTED and shall be safeguarded in accordance with the security provisions of U. S. Navy Regulations, 1920, Article 76.



G. F. HUSSEY, JR.
Rear Admiral, U. S. Navy
Chief of the Bureau of Ordnance

REFERENCE TO EXISTING PUBLICATIONS

NAVORD OCL AV35-43

OP 818—Bombing Table—1600-Pound A.P. Bomb Mk 1

OP 934—Bombing Table—1600-Pound A.P. Bomb AN-Mk 1

OP 847—Bombing Table—1000-Pound S.A.P. Bomb AN-M59

OP 886—Bombing Table—1000-Pound A.P. Bomb AN-Mk 33

OP 988—Bomb Fuzes

**OP 878, 2nd Rev.—General Data on Navy, AN-Standard, Army,
and British Bombs**

OP 768—Bombing table for:

13-lb. Miniature Practice Bomb Mk 19 Mod 1

500-lb. Wet-Sand-Filled Practice Bomb Mk 21

**OP 801, 1st Rev.—Bombing table for 100-lb. Wet-sand-filled
Practice Bomb Mk 15 Mod 2**

**OP 957—Bombing table for 1000-lb. Wet-sand-filled Practice
Bomb Mk 22**

Chapter 1

ARMOR-PIERCING AND SEMI-ARMOR-PIERCING BOMBS

1,000-lb. A.P. Bomb AN-Mk 33.....	8
1,600-lb. A.P. Bomb AN-Mk 1 and Mk 1	15
1,000-lb. S.A.P. Bomb AN-M59.....	22

Chapter 2

GENERAL PURPOSE BOMBS

100-lb. G.P. Bomb AN-M30.....	35
250-lb. G.P. Bomb AN-M57.....	39
500-lb. G.P. Bomb AN-M43 and AN-M64	43
1,000-lb. G.P. Bomb AN-M44 and AN-M65	49
2,000-lb. G.P. Bomb AN-M34 and AN-M66	52
4,000-lb. Light-Case Bomb AN-M56A1	59
100-lb. G.P. Bomb Mk 4 Mod 4.....	63
500-lb. G.P. Bomb Mk 12 Mod 2.....	65
1,000-lb. G.P. Bomb Mk 13 Mod 2.....	69
1,000-lb. G.P. Bomb Mk 36.....	75

Chapter 3

DEPTH BOMBS

325-lb. Depth Bomb Mk 17 Mod 1.....	83
325-lb. Depth Bomb AN-Mk 17 Mod 2 and 350-lb. Depth Bomb AN-Mk 44	87
325-lb. Depth Bomb AN-Mk 41 and 350-lb. Depth Bomb AN-Mk 47.....	93
650-lb. Depth Bomb Mk 29 and 650-lb. Depth Bomb Mk 37.....	96
650-lb. Depth Bomb Mk 38 and 700-lb. Depth Bomb Mk 49.....	101
325-lb. Depth Bomb Mk 53 and 350-lb. Depth Bomb Mk 54.....	105
7.0-in. (100-lb.) Depth Bomb Mk 52...	110
Arming Wires	113

Chapter 4

FRAGMENTATION BOMBS

20-lb. Frag. Bomb M41 or AN-M41....	117
100-lb. Frag. Bomb Cluster M1.....	121
100-lb. Frag. Bomb Cluster M1A1...	122
100-lb. Frag. Bomb Cluster AN-M1A1	124

23-lb. Frag. Bomb AN-M40.....	129
100-lb. Frag. Bomb Cluster AN-M4	129
Nose Fuzes AN-M104 and AN-M120..	132
Arming Wire Assemblies.....	132
Special Precautions.....	133
260-lb. Frag. Bomb AN-M81.....	134

Chapter 5

PRACTICE BOMBS

3.0-lb. Miniature Practice Bomb AN-Mk 5 Mod 1.....	141
3.0-lb. Miniature Practice Bomb AN-Mk 23.....	142
4.5-lb. Miniature Practice Bomb AN-Mk 43.....	143
13.0-lb. Miniature Practice Bomb Mk 19 Mod 1.....	144
100-lb. Practice Bomb Mk 15 Mod 2...	149
500-lb. Practice Bomb Mk 21.....	150
1,000-lb. Practice Bomb Mk 22.....	151

Chapter 6

HOISTING SLINGS

Hoisting Slings Mk 15 Mod 1 and Mk 16 Mod 0.....	153
Hoisting Sling Mk 19 Mod 0.....	154

Chapter 7

BOMB FUZES

Tail Fuzes AN-M100A2, AN-M101A2, AN-M102A2	157
Noze Fuze AN-M103A1.....	159
Nose Fuze AN-M104.....	160
Nose Fuzes M110, AN-M110, AN-M110A1	161
Tail Fuzes M115, M116, M117.....	162
Nose Fuzes AN-M120, AN-M120A1...	163
Tail Fuzes M123, M124, M125.....	163
Nose Fuze Mk 140.....	166
Nose Fuze AN-Mk 219.....	168
Nose Fuze Mk 221.....	169
Tail Fuze Mk 223.....	170
Hydrostatic Fuze AN-Mk 224.....	172
Tail Fuze AN-Mk 228.....	176
Tail Fuze Mk 229 Mod 3.....	178
Tail Fuze AN-Mk 230 Mod 4.....	180
Hydrostatic Fuze AN-Mk 234.....	181
General Safety Precautions	183
Distribution	184

Chapter 1

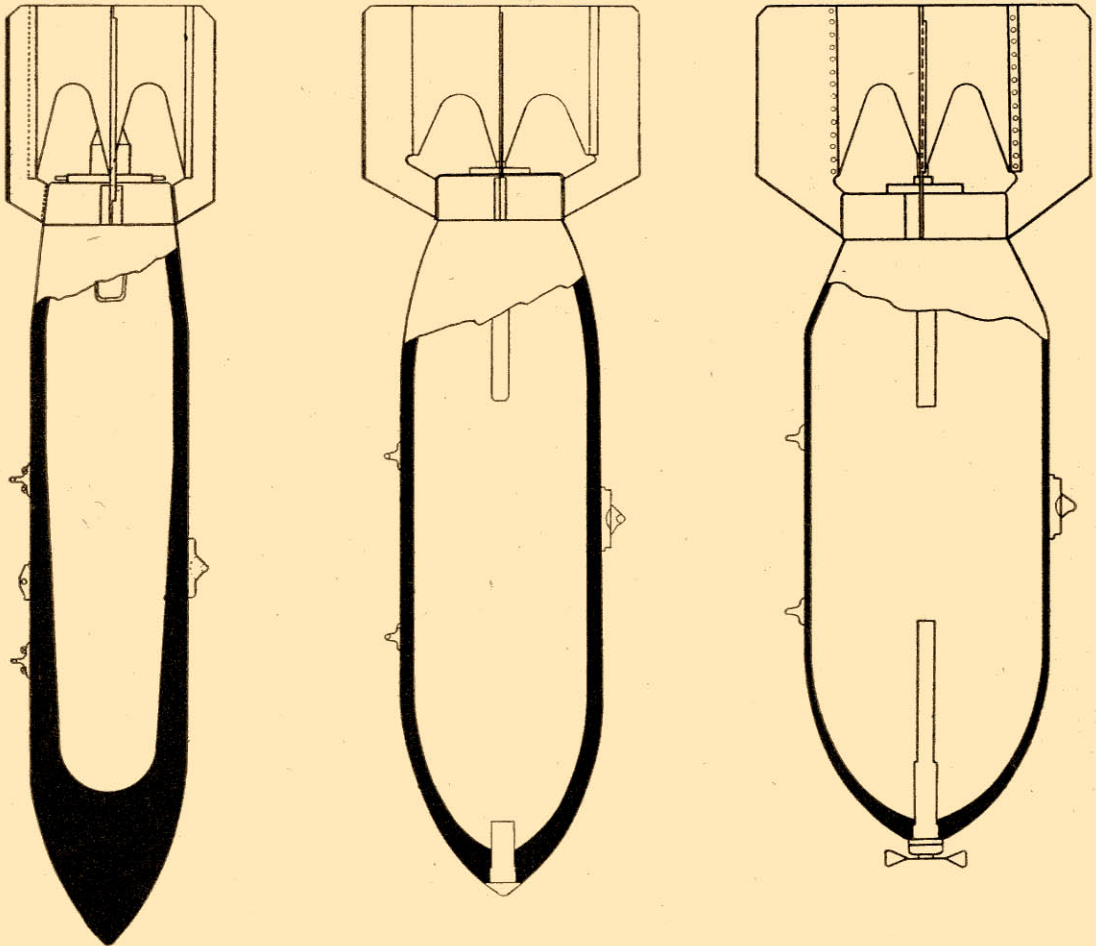
ARMOR-PIERCING BOMBS

What They Are

Armor-Piercing Bombs—Armor-piercing bombs are thick-walled bombs intended for penetrating armor. Because of their heavy walls, they contain only a small percentage of explosive charge, approximately 15 percent by weight. Tail fuzes with a short time

delay (0.08 second) are used with these bombs, so that the bomb may penetrate the armor of the target before detonating. Nose fuzes are not used with armor-piercing bombs.

Fig. 1 shows a comparison between armor-piercing, semi-armor-piercing and general-



(A) ARMOR-PIERCING

(B) SEMI-ARMOR-PIERCING

(C) GENERAL PURPOSE

Figure 1.—Comparison of Bombs

ARMOR-PIERCING BOMBS

purpose bombs. Note the heavy wall and nose section of the armor-piercing bomb and the absence of a nose fuze.

Semi-Armor-Piercing Bombs—Semi-armor-piercing bombs have only a limited armor-penetrating ability. When used against heavy armor, the case of semi-armor-piercing bombs may rupture before detonation. They contain about 30 percent, by weight, of high explosive.

In Fig. 1, note that the wall and nose section of the semi-armor-piercing bomb is lighter than in the armor-piercing bomb but heavier than in the general purpose bomb.

General Characteristics

Armor-piercing or semi-armor-piercing bombs may be used for either dive bombing or horizontal bombing. In addition, the Semi-Armor-Piercing Bomb AN-M59 may

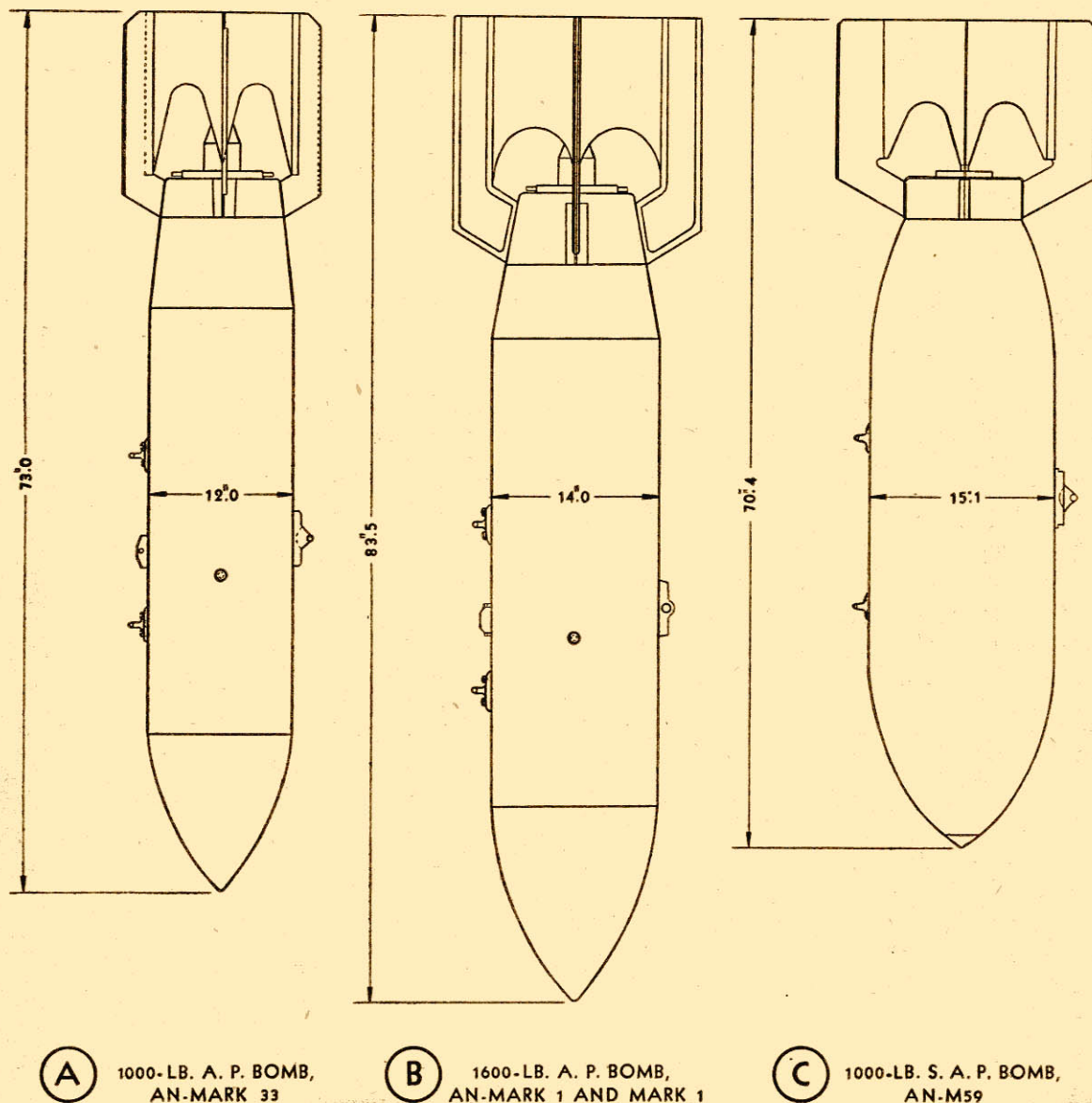


Figure 2.—Armor-Piercing and Semi-Armor-Piercing Bombs

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be used for "mast head" bombing when fitted with the tail fuze M117.

The 1,600-pound Armor-Piercing Bomb Mk 1 and AN-Mk 1 will penetrate the heaviest deck armor of combatant ships. The 1,000-pound Armor-Piercing Bomb AN-Mk 33 is smaller but similar to the 1,600-pound armor-piercing bomb and has effective armor-penetrating ability. The 1,000-pound Semi-Armor-Piercing Bomb AN-M59 has a much lighter case, but will penetrate approximately $3\frac{3}{4}$ inches of armor.

BuOrd Sketch No. 124400 (confidential) shows the penetration of armor that may be expected when using these bombs for both dive bombing and horizontal bombing.

Armor-Piercing Bombs Used by Navy

1,000-pound Armor-Piercing Bomb AN-Mk 33 (Fig. 2A).

1,600-pound Armor-Piercing Bomb AN-Mk 1 and Mk 1 (Fig. 2B).

Fuze: The tail fuze AN-Mk 228 is used with these bombs.

Note: Mods 1, 2, and 3 of both the 1,000-pound A.P. Bomb AN-Mk 33 and 1,600-pound A.P. Bomb AN-Mk 1 may be encountered. In this particular case the Mod numbers are used to represent different manufactures, rather than a design change.

Semi-Armor-Piercing Bomb Used by Navy

1,000-pound Semi-Armor-Piercing Bomb AN-M59 (Fig. 2C).

Fuzes: The Tail Fuze AN-M102A2 is generally used with this bomb. For "mast head" bombing the tail fuze M117 is used.

1,000-LB. A.P. BOMB AN-MK 33

Description

The 1,000-pound A.P. Bomb AN-Mk 33 is designed to provide, in this weight, a bomb of effective armor-piercing ability.

It is furnished with fittings to accommodate all types of Army, Navy, and British suspension.

It contains 140 pounds of explosive "D" and will penetrate any of the thicknesses of armor shown on BuOrd Sketch No. 124400 without premature rupturing of the case.

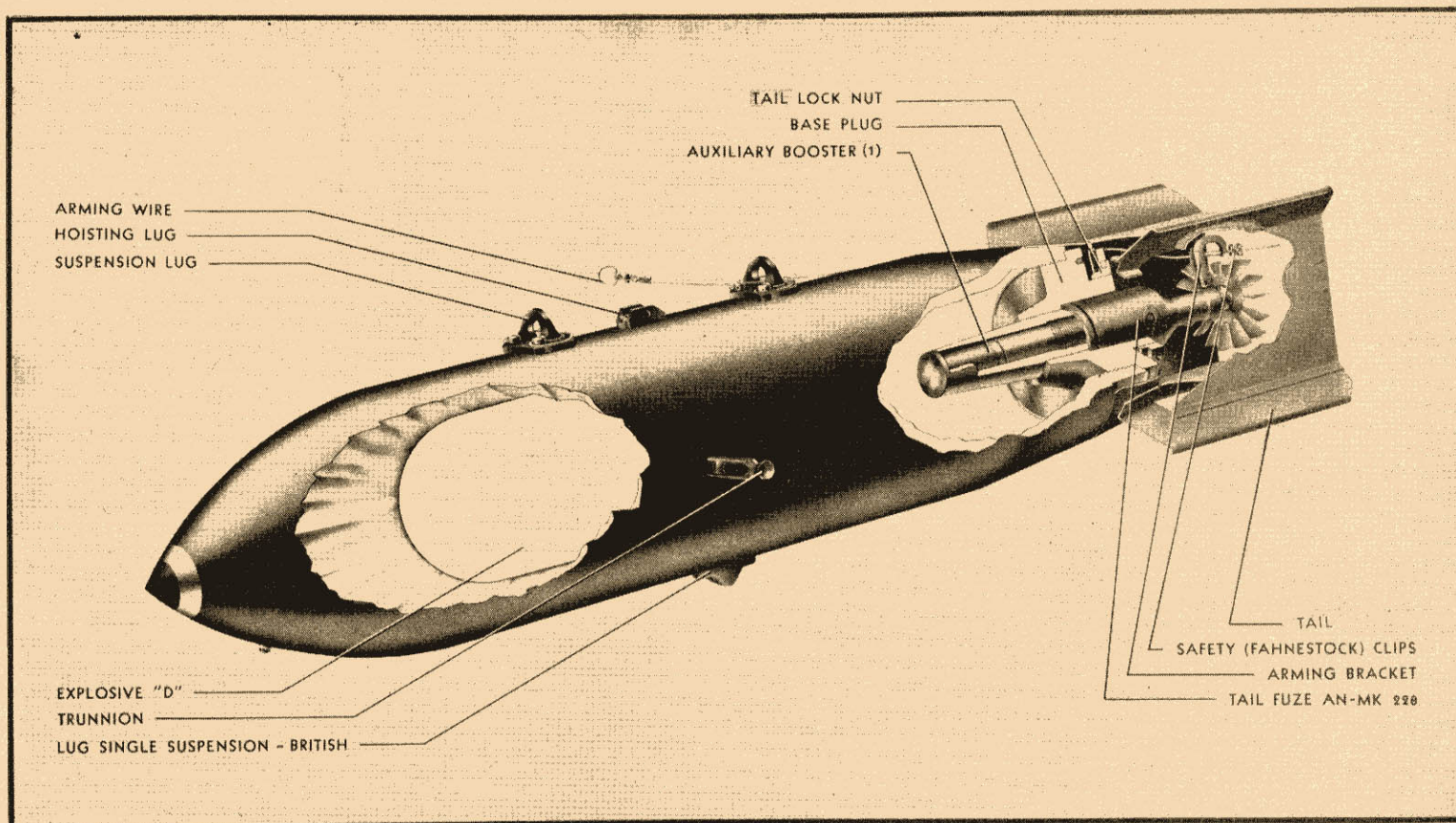
Use

The fixed delay (0.08 second) of the Fuze AN-Mk 228 used with this bomb will cause detonation to occur after the bomb has penetrated an armored deck. Therefore, when this bomb is dropped on an unarmored or rather lightly armored craft, it may pass completely through before detonating. On

account of its relatively small explosive capacity (14.1 percent filler), the effect of near misses will not be as great as it would be for a general-purpose, or demolition, bomb of the same weight. Hits with armor-piercing bombs, unless they reach magazines or boilers, do not give results which are immediately apparent outside the ship.

Minimum release altitudes for this bomb will be covered by instructions as issued by the Commander in Chief, United States Fleet. Ordnance Pamphlet 886 (under preparation) contains the necessary bombing tables for the 1,000-pound A.P. Bomb AN-Mk 33. Until OP 886 is issued, OP 818 should be used with this bomb.

This bomb and fuze combination, when the fuze is unarmed, is safe for dive bombing and for landing anywhere (including carriers).



DIMENSION AND WEIGHT TABLE

Total Wt. (Explosive "D" Loaded)	1008.0 lb.	Diameter of Bomb Body	12.0 in.
Weight of Explosive "D"	140.0 lb.	Fuze, Bomb, Tail	AN-Mk 228
Overall Length	73.0 in.		

Figure 3.—1,000-Pound A.P. Bomb AN-Mk 33

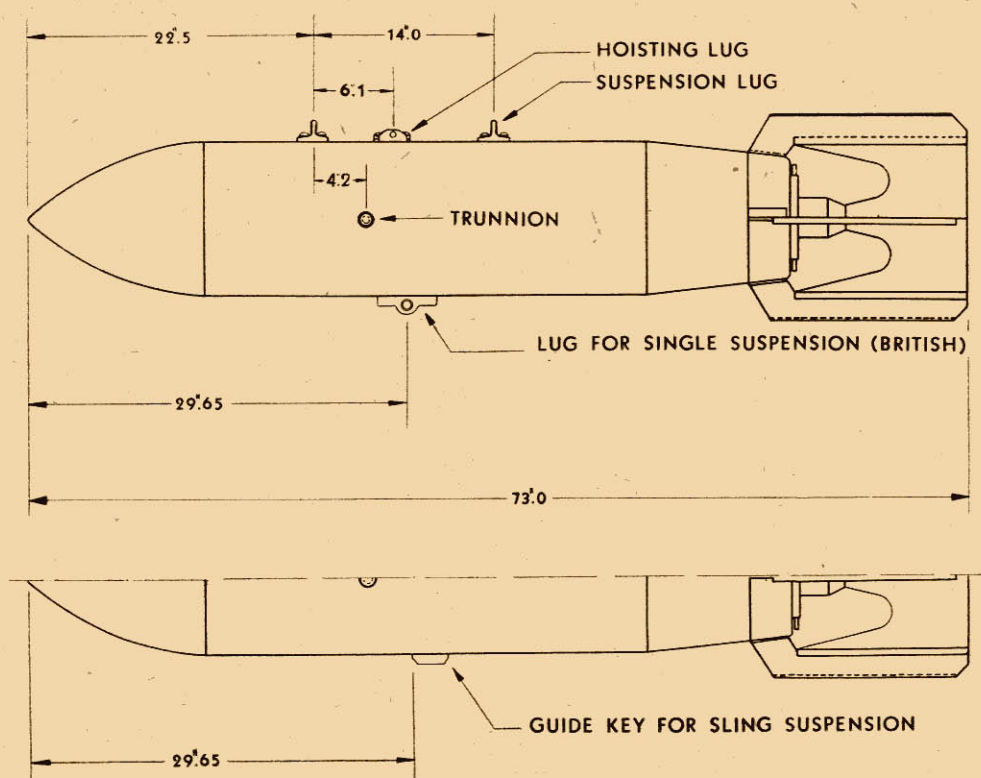


Figure 4.—1,000-Pound A.P. Bomb AN-Mk 33

Suspension of Bomb

As shown in Fig. 4, provision is made for the attachment of several different fittings at various locations on the bomb body, as follows:

Two suspension lugs spaced 14 inches center to center.

A single hoisting lug in line with the suspension lugs and 6.1 in. aft of forward suspension lug

A guide key for sling suspension

British-type lug for single suspension

Two trunnions

A complete set of these fittings is contained in the tail crate of each bomb, together with a supply of screws for installing any one, or a combination of the attachments as desired.

For hoisting into internal bomb bays where shackles are employed, the Universal Hoisting Band Mk 8 (Fig. 6) may be used.

The tail may be rotated to any position to clear airplane structure.

Components of a Complete Round

The 1,000-pound A.P. Bomb AN-Mk 33 is supplied to the service as follows:

1. Bomb body, uncrated but with tapped holes plugged with removable screws

a. One Auxiliary (180 gram) Booster Mk 1 in the tail fuze cavity. This booster is retained in the fuze cavity by means of a "snap-on" metal shipping plug or with a screw type plug.

2. Tail crate containing:

a. One tail

ARMOR-PIERCING BOMBS

b. Fittings in asbestos or glass bat as follows:

- (1) Two suspension lugs
- (2) One guide key
- (3) One British lug
- (4) Eleven screws
- (5) Two trunnions
- (6) Two shake-proof lock washers
- (7) One complete arming wire bracket assembly
- (8) 24-inch length of safety wire
- (9) Arming wire
- (10) Safety (Fahnestock) clips

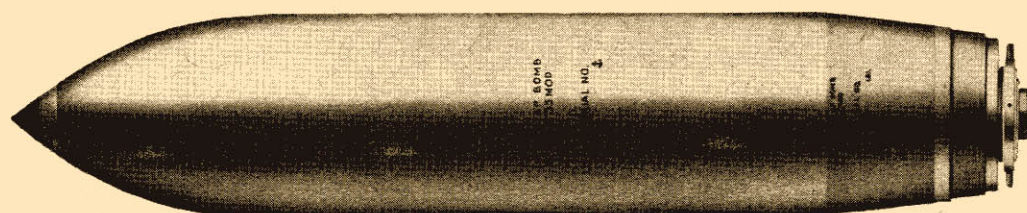
3. Tail Fuze AN-Mk 228 in a sealed container; four containers are packed in one crate.

Preparation of Bomb for Flight

1. Remove the tail and attachments from the tail crate.

2. Remove shipping plugs and clean the threaded holes in bomb body where it is desired to attach the fittings for suspension, hoisting or trunnions. Attach fittings with the cap screws provided. Use a screw driver of correct size and tighten securely. The proper procedure is to insert all four screws together and then tighten each a turn or two at a time, either in rotation or alternating between opposite pairs of screws. Screws holding suspension lugs to bomb body should be safety wired in pairs, fore and aft. The trunnions screw directly into the bomb body. Place a shake-proof lock washer under the base of each trunnion before installing.

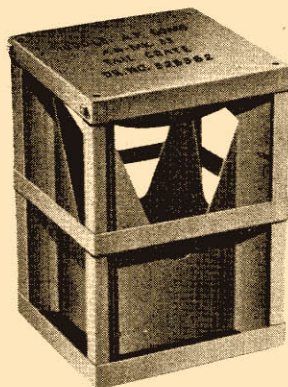
3. Remove the shipping plug or snap-on cover from the fuze cavity. Inspect the fuze cavity and threads and clean if nec-



BOMB BODY



TAIL FUZE MK 228



CRATED TAIL

Figure 5.—Components of a Complete Round

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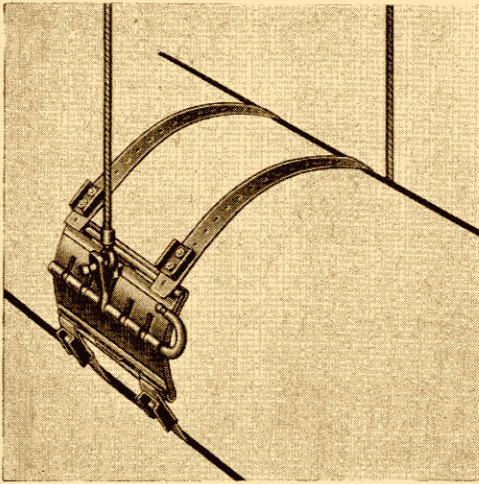


Figure 6.—Universal Hoisting Band Mk 8

essary. Make certain that the auxiliary booster is in place. Back off tail lock nut set screws (two), which are located in the outer periphery of the tail lock nut. Remove tail lock and fit tail to body. Reinstall tail lock nut and tighten by hand. Rotate tail until vanes are positioned so as to clear airplane structure when bomb is installed. Tighten tail lock nut securely, using pins on periphery of ring for necessary grip and leverage. A few taps of a hammer, using a wooden or nonferrous metal drift held against these pins, will insure tightening of the ring. Either one or both of the set screws in the periphery should then be set up tightly with a screw driver.

4. Remove fuze from the hermetically sealed container and inspect outward appearance for any defects in threads or bent vanes. If defects are found, do not use the fuze, but replace it in the container, seal the container with adhesive tape, attach tag listing defects, and turn in to the nearest depot.

5. Screw the selected fuze securely into place, hand-tight. If necessary, because of binding threads, a small spanner wrench may be used.

6. Attach the arming wire bracket, fur-

nished with the bomb, to the tail support of the fuze, so as to be vertically in line with the double suspension lugs. It will be necessary to remove the arming vanes before the arming wire bracket can be attached. Make certain the arming bracket is so positioned that it will completely clear the fuze impeller vanes, and then tighten bracket securely. This is important. Unless bracket is properly tightened, vibration and force of air may cause the bracket to slide on fuze and foul impeller arming vanes.

7. Place the arming vane on the shaft and fasten with the cotter pin provided. (The tail vane of the Fuze AN-Mk 228 is painted red to distinguish it from the tail vane of the Fuze Mk 223, which has a slightly different pitch.)

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

9. Thread the arming wire through the rear bomb suspension lug and then through the arming wire bracket. Be sure the arming wire tube (brass tube furnished with the bracket) covers the arming wire where it passes through the arming vanes.

10. Install Universal Hoisting Band Mk 8, if required; hoist the bomb into the aircraft; and insert the arming wire plate or swivel loop. If more convenient, the arming wire plate or swivel loop may be put in the bomb rack first and the bomb then hoisted into place. Pull the arming wire taut, but maintain sufficient freedom for the arming wire plate in the bomb rack. If shackle suspension is used, place the shackle on the bomb and then hoist to the side rail shackle suspension hooks. The arming wire may be put on either before or after hoisting the bomb.

11. Attach two safety (Fahnestock) clips on the end of the arming wire and slide them up to the arming wire bracket.

ARMOR-PIERCING BOMBS

12. Cut off surplus length of arming wire so that about six inches extends beyond the safety (Fahnestock) clips. Make sure the end of the wire is smooth and free of burrs.

13. Remove the Universal Hoisting Band Mk 8, if used.

Points to Check

When fuzeing and installing bombs, make the following check-ups:

1. Inspect the bomb fuze seat liner and threads and clean if necessary.

2. See that the auxiliary booster is in place in the bomb.

3. Inspect outward appearance of fuze for defective threads, bent vanes, etc.

4. See that the arming wire bracket is secure and properly located, so as not to foul the arming vanes.

5. Be sure the fuze safety cotter pin has been removed.

6. Rotate arming vane slightly in both directions to insure free rotation.

7. See that the arming wire plate or swivel loop is properly placed in the bomb rack.

8. See that the brass tube covers the arming wire where it passes between the propeller blades.

9. See that safety (Fahnestock) clips are attached and that the end of the arming wire is smooth and has about six inches extending.

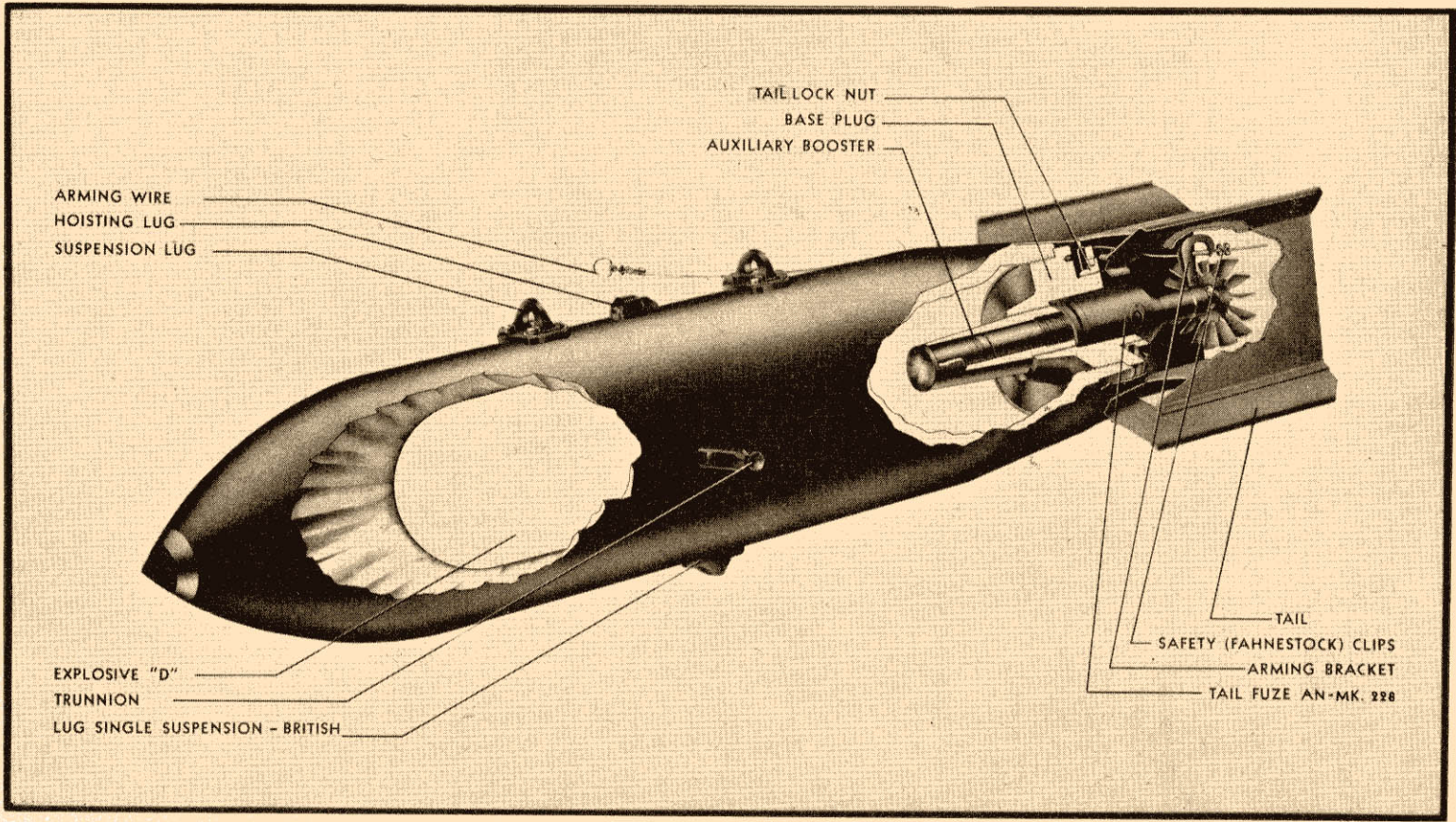


Figure 7.—1,600-Pound A.P. Bomb AN-Mk 1

ARMOR-PIERCING BOMBS

1,600-LB. A.P. BOMB, AN-MK 1 AND MK 1

Description

The 1,600-pound A.P. Bombs AN-Mk 1 and Mk 1 are designed primarily to provide a bomb which will penetrate the heaviest horizontal armor of combatant ships.

Both the Bomb AN-Mk 1 and the Bomb Mk 1 contain approximately 216 pounds of explosive "D."

The Bombs AN-Mk 1 and Mk 1 are similar in size, shape, and construction. They differ only in the method of attaching suspension lugs and other fittings to the bomb body.

Use

The fixed delay of the Tail Fuze AN-Mk 228 is such that the bomb will, on the average, detonate below the armored deck of the heaviest armored ships. Therefore, the use of this bomb should generally be confined to this type of objective, as the fuze delay may permit the bomb to pass completely through unarmored or lightly armored craft before detonating. Because of its relatively small explosive capacity, the effect of near misses will not be as great

as it would be for a general purpose bomb of approximately the same total weight.

Radical maneuvers should be avoided when carrying the ungrooved Bomb Mk 1 modified for 30-inch suspension. This modification is fully discussed in a subsequent paragraph.

Minimum release altitudes for this bomb are covered by instructions as issued by the Commander in Chief, United States Fleet. OP 818 and OP 934 contain the necessary bombing tables for the 1,600-pound Bombs Mk 1 and AN-Mk 1, respectively.

Development of 1,600-Pound A.P. Bomb AN-Mk 1

The 1,600-pound A.P. Bomb AN-Mk 1 was developed from the 1,600-pound A.P. Bomb Mk 1. The four stages in the development are shown in Fig. 9.

Summary of Development

A. Mk 1—For 14.0-in. Double-Hook Suspension

The fittings for the Bomb Mk 1 are designed for use only with two-hook racks and

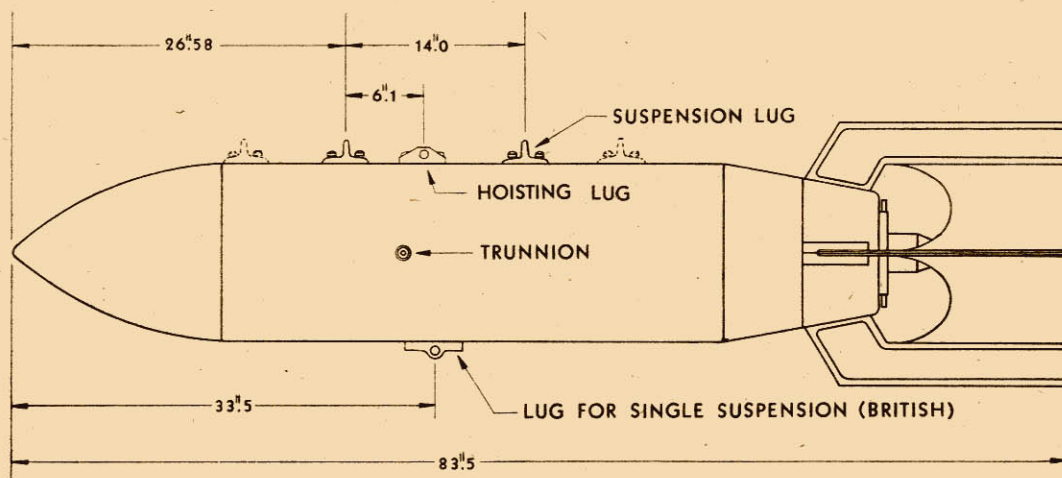


Figure 8.—1,600-Pound A.P. Bomb AN-Mk 1 (Present Issue)

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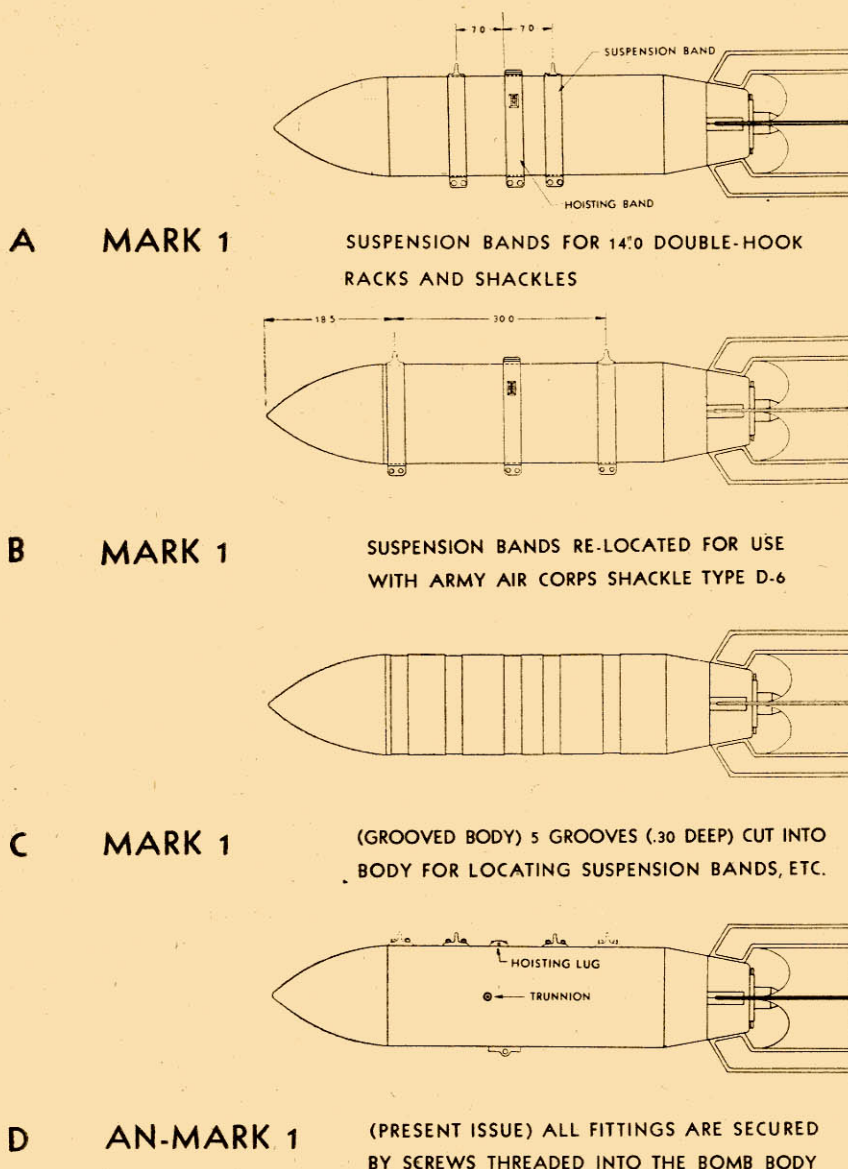


Figure 9.—Development of 1,600-Pound A.P. Bomb AN-Mk 1

shackles. The suspension lugs are mounted on suspension bands which are located 14.0 in. apart longitudinally.

B. Mk 1—Modified for Army Suspension

In order to use the Bomb Mk 1 on Army Air Corps Shackle Type D-6, it is necessary to modify and relocate the suspension bands so that they are 30.0 in. apart. This is described in detail in subsequent paragraphs.

C. Mk 1—(Grooved Body)

Five grooves, each 0.30 in. deep, were cut in the bomb body to locate the suspension bands fore and aft. No provision was made for British suspension.

D. AN-Mk 1—Present Issue

The present issue of Bombs AN-Mk 1 is designed for Army, Navy, or British suspension. Suspension and hoisting lugs are

secured by cap screws which thread into tapped holes in the bomb body. Trunnions screw directly into tapped holes in the bomb body.

1,600-Pound A.P. Bomb Mk 1

The 1,600-pound A.P. Bomb Mk 1 (Fig. 10A) is furnished with two suspension bands and one hoisting band. Each of these three bands is located both radially and longitudinally by means of studs, which engage locating holes in the bomb body. The two suspension bands with their lugs provide the means of suspending the bomb on Navy two-hook (14-inch spacing) racks and shackles, and when modified in the manner subsequently described, on the Army-type D-6 (30-inch spacing) shackle.

The hoisting band (Fig. 10A), located approximately at the center of gravity, has two hoisting lugs and a guide key. The latter prevents longitudinal movement of the bomb when it is suspended by slings. When sling suspension is employed, the two suspension bands should be removed in order to prevent interference with the slings and to decrease the overall parasitic drag.

For dive bombing, the combination hoisting and trunnion band (Fig. 10B) is furnished. If necessary, this band may also be used where a single hoisting lug is required. Trunnions and locating stud can be removed with a hacksaw, file, etc. The Universal Hoisting Band Mk 8 (Fig. 10C) may also be used for either single- or double-cable hoisting.

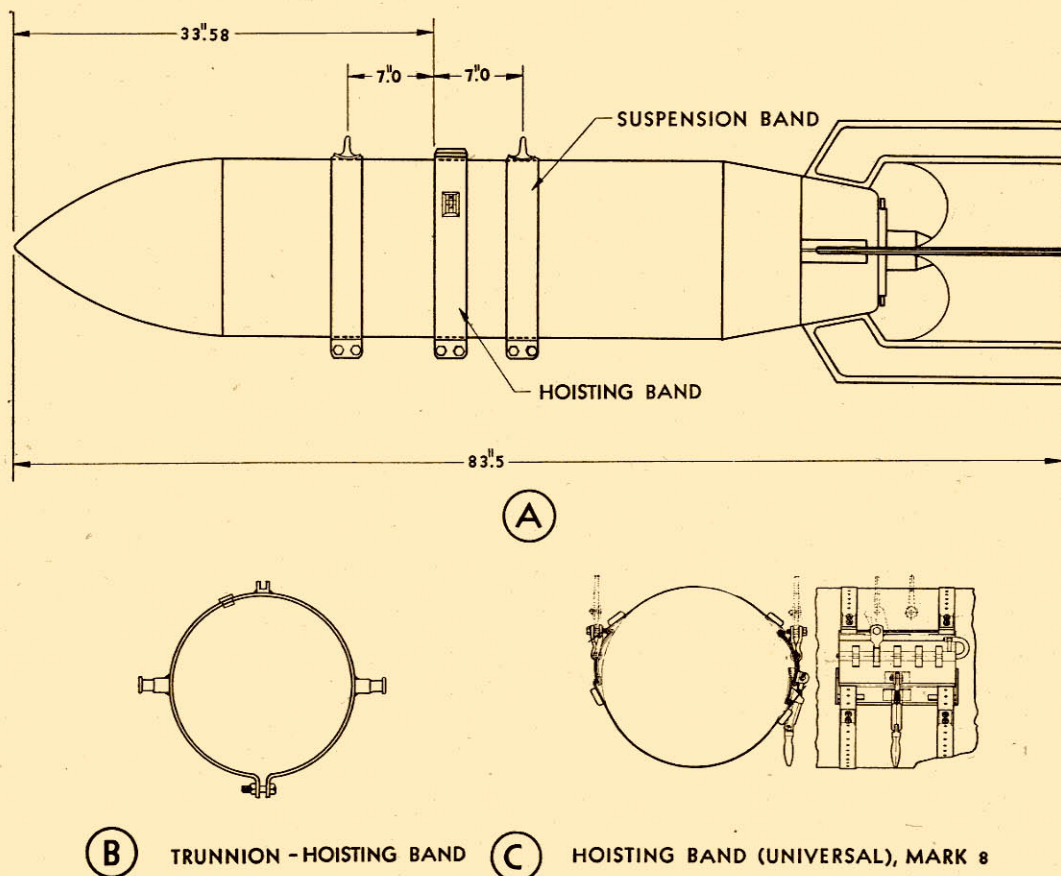


Figure 10.—1,600-Pound A.P. Bomb Mk 1

1,600-Pound A.P. Bomb Mk 1 Adapted for 30-Inch Suspension

To suspend the 1,600-pound A.P. Bomb Mk 1 on the Army Type D-6 (30-inch spacing) shackle, a few modifications of the suspension bands and the shackle hooks must be made. These modifications should be accomplished as follows:

1. The two suspension bands should be removed from the bomb and their locating studs removed by any readily available means. The bands should be then re-installed on the bomb in such locations that the center of the lug on the forward band is positioned 18.5 in. from the nose of the bomb, and the center of the lug of the rear band is 30.0 in. aft of the center of the lug of the forward band. Prior to final tightening, the suspension lugs should be aligned longitudinally with each other. This may be readily accomplished by sighting with the eye. Care should be taken that the bands thus installed are securely tightened, as the friction between the bands and the bomb body

provides the only restraining force against longitudinal movement.

2. The lugs of the suspension bands, discussed in subparagraph (1) above, are too small to receive the hooks of the Army D-6 shackle; therefore, in order to use these bands with the D-6 shackle, it is necessary to file off about one-fourth inch of material from the lower faces of the shackle hooks. This modification of the Army shackle has been approved by the Commanding General, Materiel Command, United States Army Air Forces. Care should be taken not to remove any more material from the hooks than is required to enable them to pass freely through the suspension band lugs; particular attention should be paid to the checking of this freedom of movement when the hooks are in their fully closed positions. The holes of the suspension band lugs should never be widened by filing to take the D-6 shackle hooks. Such a procedure would weaken the lugs beyond the safe value required to sustain operational loads.

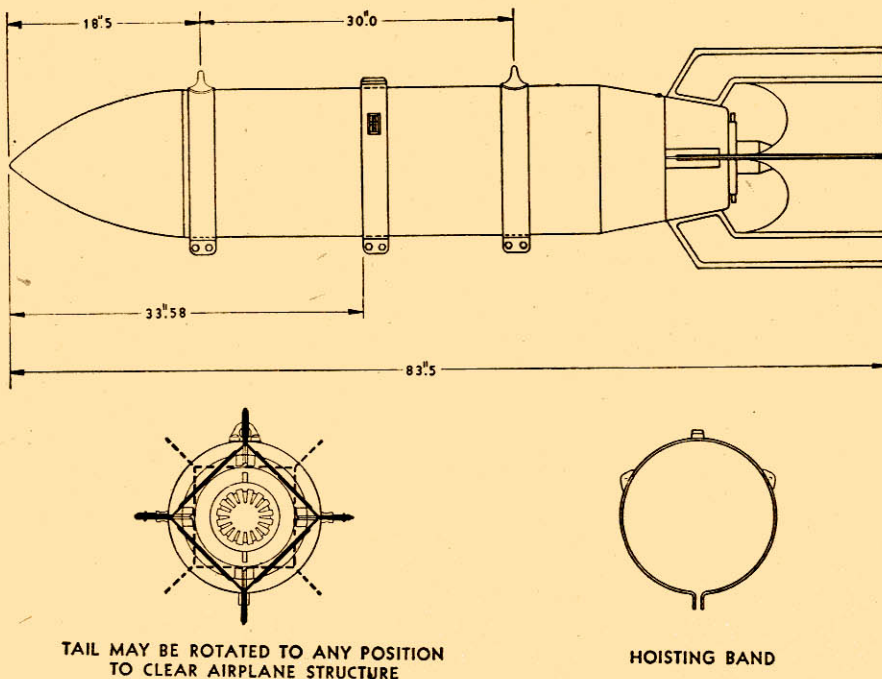


Figure 11.—1,600-Pound A.P. Bomb Mk 1 Adapted for 30.0-Inch Suspension

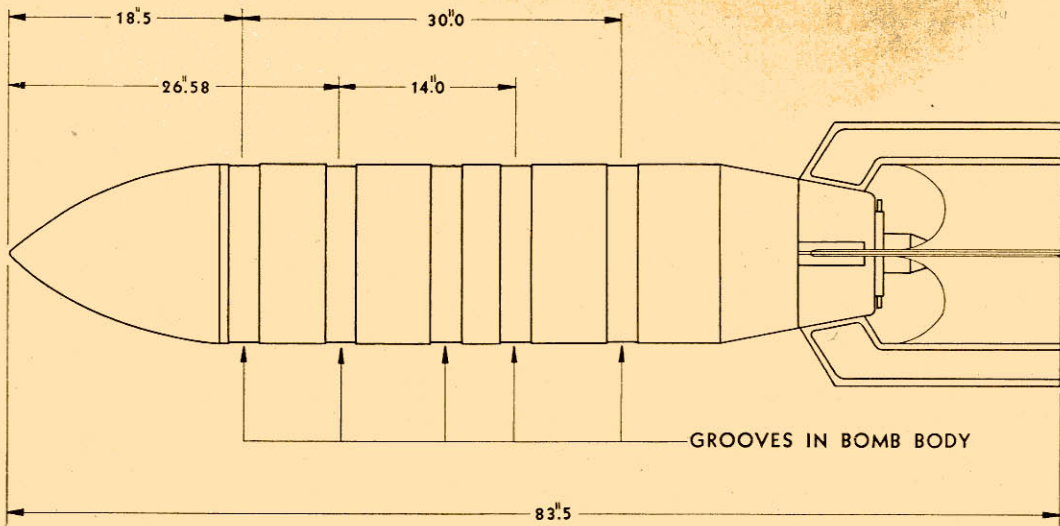


Figure 12.—1,600-Pound A.P. Bomb Mk 1 (Grooved Body)

1,600-Pound A.P. Bomb Mk 1 (Grooved Body)

The 1,600-pound A.P. Bomb Mk 1 (grooved body) differs from the Bomb Mk 1 described in the preceding paragraphs in that five circumferential grooves, 0.30 in. deep, are cut into the outer surface of the bomb body at the locations noted in Fig. 12. These grooves provide the means of locating longitudinally, the suspension and hoisting bands. These bombs are furnished with two suspension bands and one hoisting band, which are identical to those shown in Fig. 10, except that they have no locating studs and the lugs on the suspension bands are of adequate dimensions to receive the Army Type D-6 shackle hooks without modification. Thus, when it is desired to use the Army Type D-6 shackle, it is necessary merely to loosen the two suspension bands (they are normally located in the grooves which give a 14-inch spacing) and slide each band out to its respective groove for 30.0-in. spacing. Care should be taken that the bands are fully seated in their grooves; and, prior to final tightening, the lugs should be aligned (by eye) longitudinally with each other.

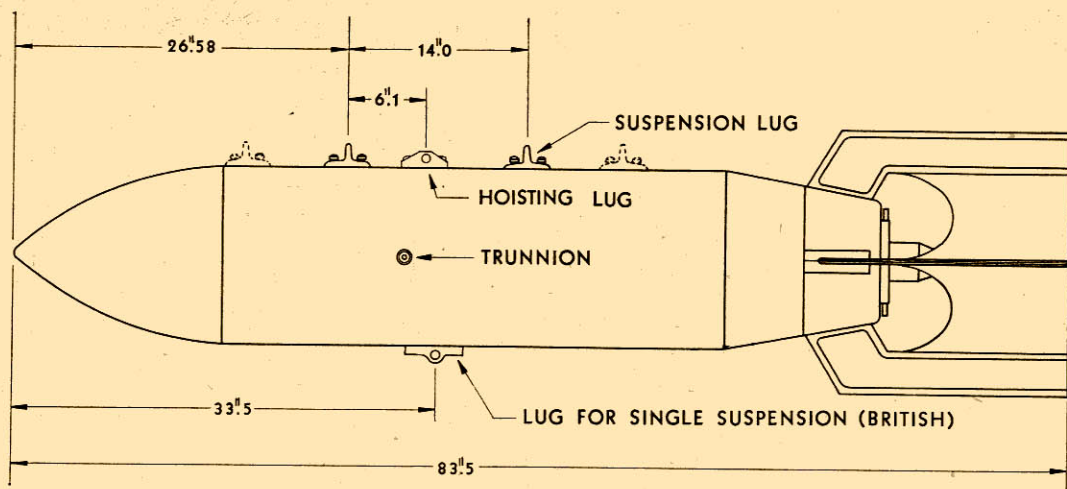
In cases of suspension from shackles

where it is desired to use one hoisting lug only, the hoisting band, as furnished, may be loosened and rotated to any desired radial position.

For dive bombing, the combination hoisting and trunnion band (Fig. 10B), without the locating stud, is furnished. It will be noted that this combination band is wider than the groove in the bomb body where the band would normally be located. However, the width of the band is such that it will adequately straddle the groove and, therefore, the band may be located in its proper position without regard to the groove in the bomb body. Only a few bombs of this type have been issued to the service.

1,600-Pound A.P. Bomb AN-Mk 1 (Present Issue)

The body of the 1,600-pound A.P. Bomb AN-Mk 1 is drilled and tapped at the various required points for the attachment of suspension and hoisting lugs, guide key, trunnions, and the British single-suspension lug. There are no bands, locating holes, or grooves on these bombs. In the tail crate for each bomb, there is a compartment containing two suspension lugs (these will also fit Army Type D-6 shackle), one guide key,



**Figure 13.—1,600-Pound A.P. Bomb AN-Mk 1
(Present Issue)**

two trunnions (these screw into bomb body), one British single-suspension lug, and one hoisting lug, together with the necessary screws for attaching any or all of these fittings. It is merely necessary to select the proper fittings for the type of suspension, hoisting, or trunnion provisions desired, and attach them by screws furnished.

Components of a Complete Round (AN-Mk 1)

The 1,600-pound A.P. Bomb AN-Mk 1 is supplied to the service as follows:

1. Bomb body, uncased but with tapped holes plugged with removable screws

a. One Auxiliary (180 gram) Booster Mk 1 in the tail fuze cavity. This booster is retained in the fuze cavity by means of a "snap-on" metal shipping plug or with a screw-type plug.

2. Tail crate containing:

a. One tail

b. Fittings in asbestos or glass bat as follows:

(1) Two suspension lugs

(2) One guide key

(3) One British lug

(4) Two trunnions

(5) Two shake-proof lock washers

(6) One hoisting lug

(7) Thirteen cap screws

(8) One complete arming wire bracket assembly

(9) Twenty-four-inch length of safety wire

(10) Safety (Fahnestock) clips

3. Tail Fuze AN-Mk 228 in a sealed container; four containers are packed in one crate.

Components of a Complete Round (Mk 1)

The 1,600-pound A.P. Bomb Mk 1 is supplied to the Service as follows:

1. Bomb body, uncased, but with tapped holes, plugged with removable screws, suspension bands, hoisting bands, and lug protective guards

ARMOR-PIERCING BOMBS

a. One Auxiliary (180-gram) Booster Mk 1 in the tail fuze cavity. This booster is retained in the cavity by means of a shipping plug.

2. Tail crate containing:

a. One tail

b. The various attachments, arming wire bracket assembly, safety (Fahnestock) clips, etc.

3. Tail Fuze AN-Mk 228 in a sealed container; four containers are packed in one crate.

4. A combination trunnion and hoisting band is furnished for dive bombing.

Preparation of Bomb for Flight

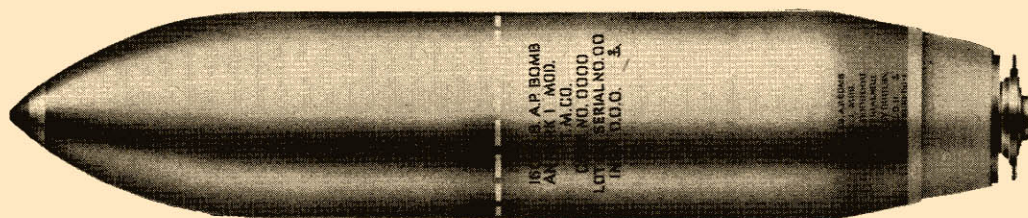
1. Remove lug guards from bomb (Mk 1).

2. Remove tail and all fittings (where furnished) from crate.

3. Position bands or attach fittings for hoisting, suspension, or trunnions, carrying out the various required steps as previously described. The 1,600-pound Bomb AN-Mk 1 is assembled in exactly the same manner as the 1,000-pound Bomb AN-Mk 33. See pages 11 and 12 of this pamphlet.

4. Fit tail to body and tighten tail lock nut.

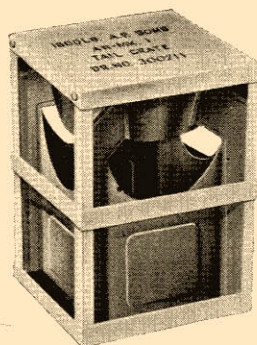
5. Follow detailed instructions in OP 988 for assembly of fuze in bomb, safety precautions, etc.



BOMB BODY



TAIL FUZE MK 228



CRATED FIN ASSEMBLY

Figure 14.—Components of a Complete Round

1,000-LB. S.A.P. BOMB AN-M59

Description

The 1,000-pound S.A.P. Bomb AN-M59 is designed to provide a bomb of greater penetrative ability than general-purpose bombs of comparable weight.

It contains either 318 pounds of TNT or 308 pounds of 50-50 Amatol, approximately 30 percent of the total weight. Therefore, the underwater effect of near misses is considerably less than with the general purpose bombs of the 1,000-pound weight class.

The penetrative ability of this bomb in horizontal bombing and dive bombing is given in BuOrd Sketch 124400 (confidential).

Suspension of Bomb

The principal design features of this bomb are shown in Figs. 15 and 16. There are two suspension lugs spaced 14 inches center to center on top of the bomb body, and a single suspension lug (British) on the bottom. The

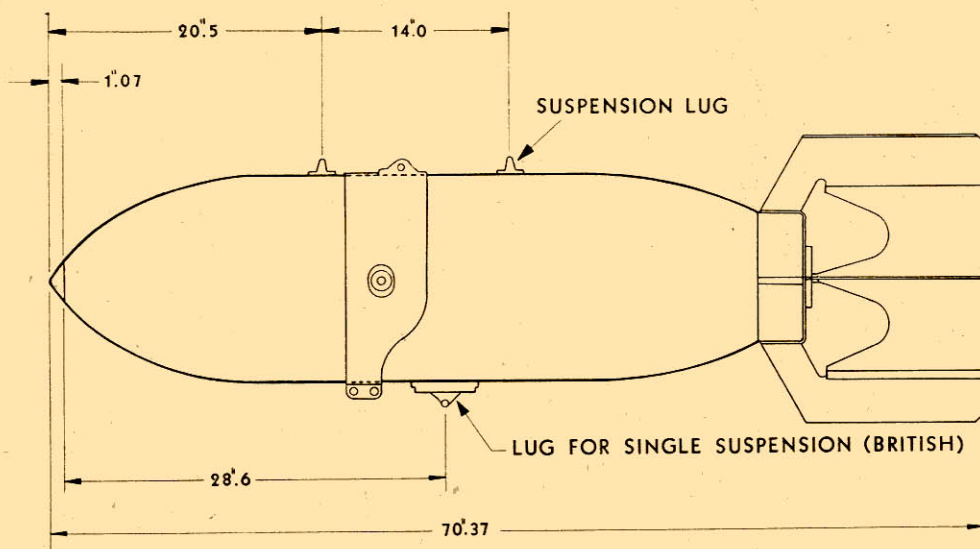
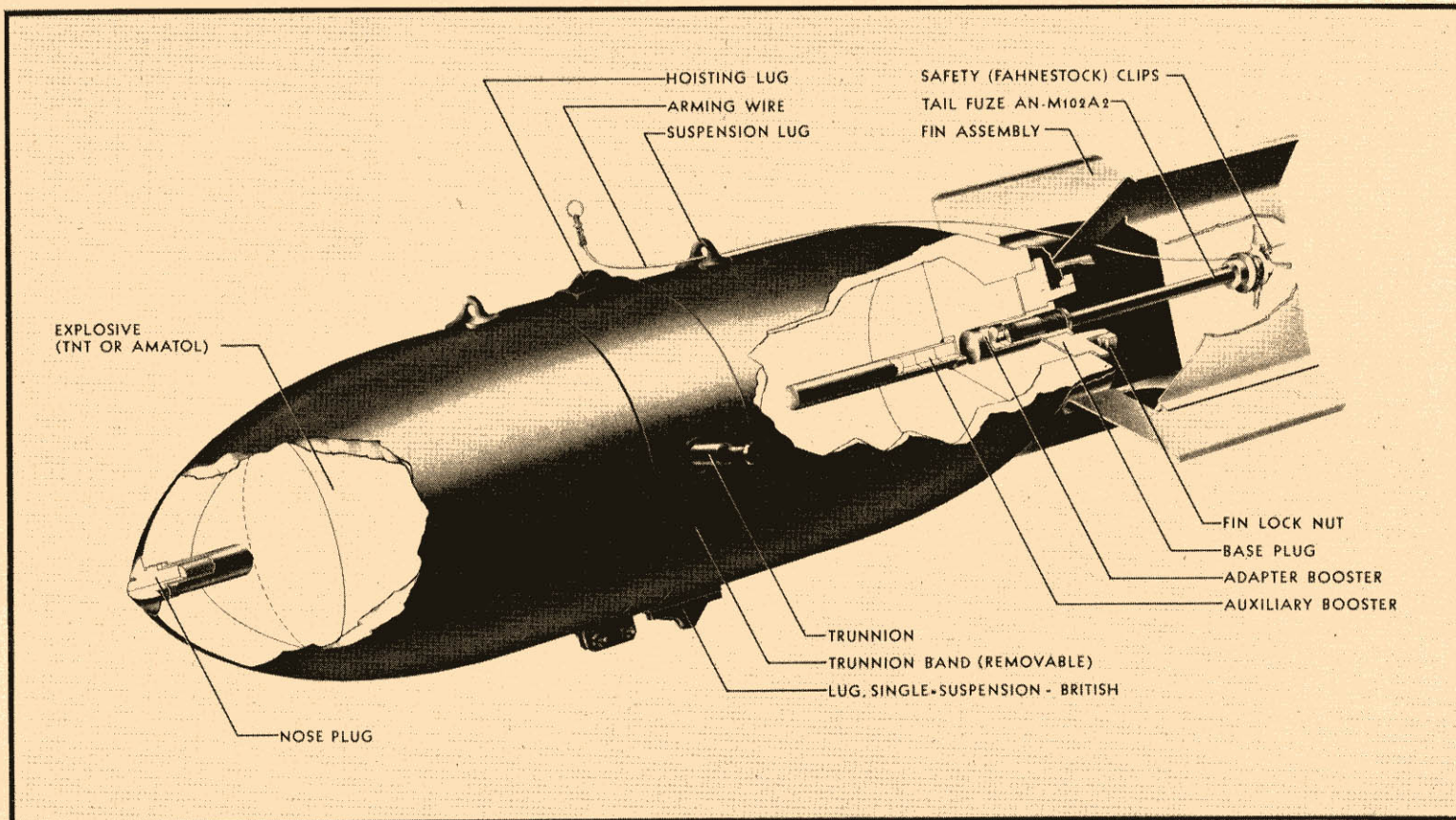


Figure 15.—1,000-Pound S.A.P. Bomb AN-M59

The loading arrangement used with initial lots of the Bomb AN-M59 was such that the bomb would often deflagrate (low- or high-order detonation prior to fuze initiation) when the bomb was used against armor 2.5 in. or greater in thickness. However, recent improvements in design and loading have considerably reduced the possibility of premature rupture of the case, and penetration of armor thicknesses up to 3.7 in. can be expected. Bombs loaded by the new process may be identified by the words "with pad" added below the loading data stencilled on the bomb body.

latter lug is intended, primarily, for use in suspending the bomb from British bomb carriers.

No hoisting lugs are provided on the body of the Bomb AN-M59; however, a Trunnion-Hoisting Band M5 is available. The Band M5 has a single hoisting lug on top of the band and a trunnion on each side. This band can be used for hoisting to Racks Mk 35 and Mk 51 Type and also for single-cable hoisting with shackles if the trunnion next to the bomb bay side rails is sawed off and the band rotated to the proper position. In addition, the Universal Hoisting Band Mk 8

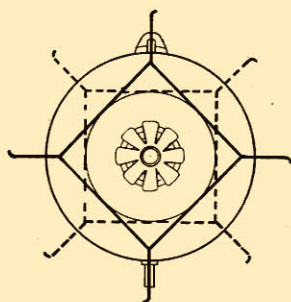


DIMENSION AND WEIGHT TABLE

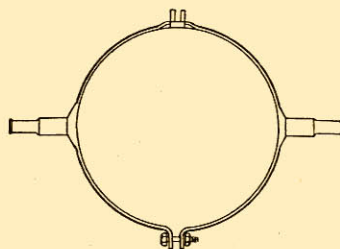
Total Wt. (50.50 Amatol-Loaded) .990.0 lb.	Wt. of Explosive (TNT)318.0 lb.
Total Wt. (TNT-Loaded)1000.3 lb.	Overall Length70.3 in.
Wt. of Explosive (50.50 AM. Incl.	Diameter of Bomb Body15.1 in.
Aux. Booster and Surrounds) .307.7 lb.	Fuze, Bomb, TailAN-M102A2

Note: In emergencies when no general purpose bombs are available, a nose fuze AN-M103A1 may be used.

Figure 16.—1,000-Pound S.A.P. Bomb AN-M59



TAIL MAY BE ROTATED TO ANY POSITION
TO CLEAR AIRPLANE STRUCTURE



TRUNNION BAND, M5

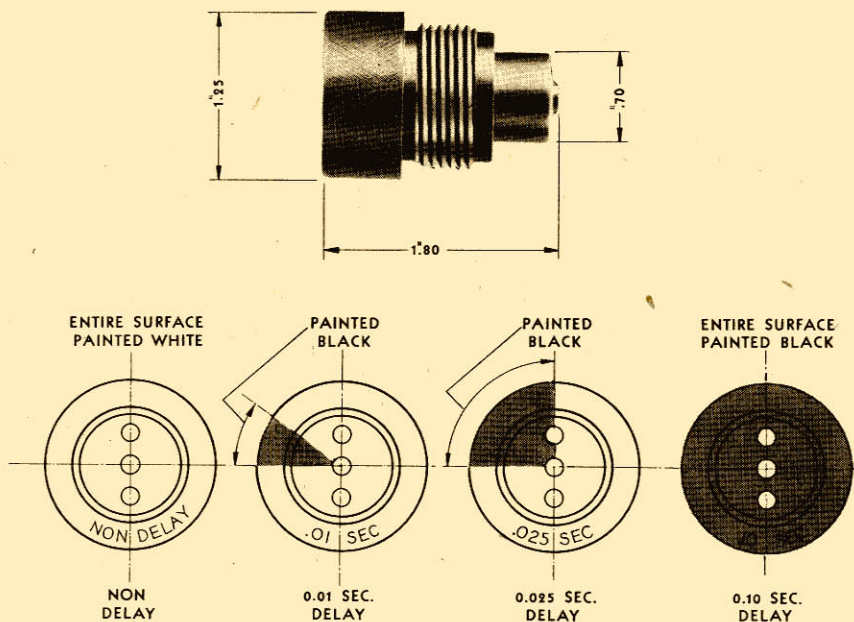
Figure 17.—Tail Positioning and Trunnion Band M5

may be used for either single- or double-cable hoisting of the Bomb AN-M59.

As shown in Fig. 17, the tail may be rotated to any position to clear the airplane structure.

Setting Fuze Delay

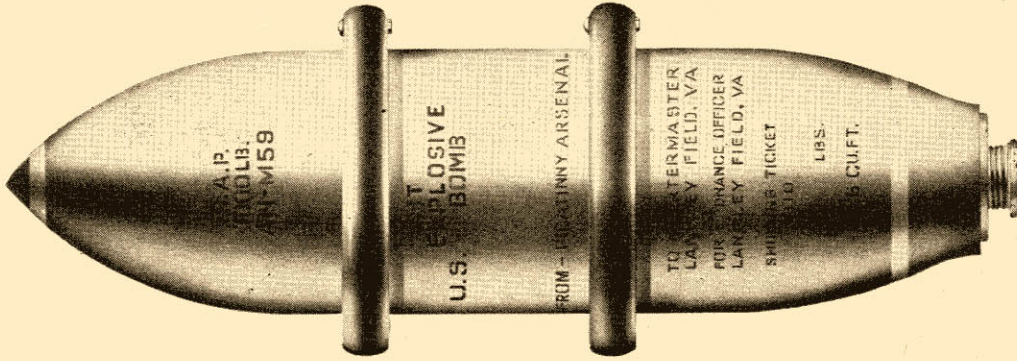
The Primer Detonators M14 which screw into the base of the fuzes are supplied with the following delays: 0.01-, 0.025-, 0.1-second, and non-delay.



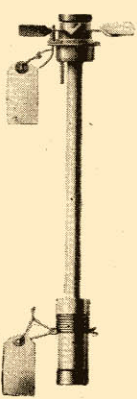
METHOD OF MARKING FOR VARIOUS DELAYS

Figure 18.—Primer Detonators M14

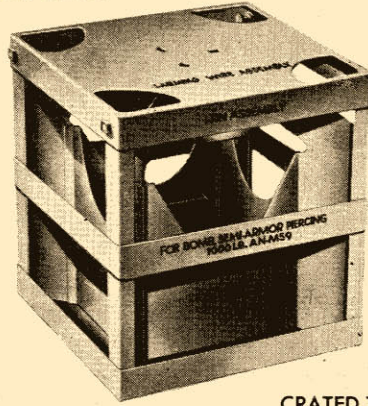
ARMOR-PIERCING BOMBS



BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



TAIL FUZE AN-M102A2



CRATED TAIL

Figure 19.—Components of a Complete Round

The primer detonators can be readily interchanged on the ground.

Components of a Complete Round

The 1,000-pound S.A.P. Bomb AN-M59 is furnished to the Service in two units:

1. Bomb body in protecting lug guards, with an Adapter Booster M102 installed, tail shipping plug in place, and fin lock nut in place and fastened with a wire.

2. Fin assembly, crated. An arming wire assembly plus safety (Fahnestock) clips is also packed in the tail crate.

Tail Fuze AN-M102A2, equipped with 0.025-second delay Primer Detonator M14 but without the arming vane, is packed in a black cylindrical metal container. Twenty-five fuzes in containers and 25 arming vanes are packed in a wood packing box.

Alternate Primer Detonators M14 for the above fuze with 0.01-second delay, 0.10-second delay and non-delay are also furnished. One Primer Detonator M14 is packed in a black cylindrical metal container, and 25 containers are packed in a metal packing crate.

Alternate Tail Fuze M117, for "mast-head" bombing, with Primer Detonator M16A1, 4- to 5-second delay assembled but without the arming vane, is packed in a black cylindrical metal container. Twenty-five fuzes and 25 arming vanes are packed in a wood packing box.

Alternate Primer Detonators M16A1, 8- to 15-second delay, are also furnished. One Primer Detonator M16A1 is packed in a black cylindrical metal container, and 25 containers are packed in a metal packing crate.

A Trunnion-Hoisting Band M5 is furnished for each bomb aboard ship, and one for each two bombs ashore.

Preparation of Bomb for Flight

1. Remove the lug guards from bomb. Remove the fin assembly from the tail crate.

2. Remove the securing wires and unscrew tail lock nut from base plug of bomb. Loosen, but do not remove, the tail fuze cavity shipping plug. (See step 4 below.)

3. Put tail on bomb and install tail lock nut. Before tightening the latter, rotate tail so that fins will be in proper position to clear airplane structure. Tighten tail lock nut securely, using appropriate spanner wrench or piece of drill rod.

4. Remove tail fuze cavity shipping plug and check fuze cavity for absence of foreign matter and condition of threads. Remove fuze from sealed metal container. If necessary, remove primer detonator and install one having the desired delay. Withdraw cotter pin from fuze body, complying with instructions on tag, and then proceed as follows:

a. Screw fuze, less arming propeller, into the tail of the bomb until it seats—hand-tighten only; do not use tools.

b. Thread the free end of the arming wire assembly through the rear suspension lug of the bomb and the nearer pair of

eyelets on the fuze; should the nearer pair of eyelets be occupied by the safety pin and sealing wire with tag, place a second pin through the pair of eyelets diametrically opposite, before removing the original safety pin.

c. Cut sealing wire and remove safety pin, complying with instructions on tag.

d. Thread end of arming wire through appropriate eyelet in arming propeller. At the same time, slip arming propeller over end of fuze so that the slots in its hub fit over the heads of the two projecting pins on the bearing cup.

e. Screw the arming propeller nut on the threaded end of the bearing cup and tighten by hand.

f. Adjust arming wire to protrude beyond arming propeller from two to three inches; remove any kinks or burrs; and slip two safety (Fahnestock) clips over end of arming wire and slide up to a position where they just bear on the face of the arming propeller.

5. Use Band M5 or Mk 8 and hoist bomb into airplane.

6. Should the bomb not be dropped and its removal from the airplane be desired, the steps for installing should be carried out in reverse order and the various parts restored to their original condition and packings.

Chapter 2

GENERAL PURPOSE BOMBS

100-lb. G.P. Bomb AN-M30

250-lb. G.P. Bomb AN-M57

500-lb. G.P. Bomb AN-M43 and
AN-M64

1000-lb. G.P. Bomb AN-M44 and
AN-M65

2000-lb. G.P. Bomb AN-M34 and
AN-M66

4000-lb. Light-Case Bomb
AN-M56A1

100-lb. G.P. Bomb Mk 4 Mod 4

500-lb. G.P. Bomb Mk 12 Mod 2

1000-lb. G.P. Bomb Mk 13 Mod 2

1000-lb. G.P. Bomb Mk 36

What They Are

General purpose bombs are bombs having cases of medium thickness and containing about 50 percent by weight of explosive filler. Certain general purpose bombs were formerly called demolition bombs.

Their Use

General purpose bombs are suitable for attacks on upper works and weather decks of armored vessels, on unarmored vessels of all kinds, on submarines (500-, 1000-, and 2000-pound bombs), and on most ground targets such as buildings (except massive masonry); also on aircraft, gun emplacements, and personnel.

General purpose bombs are not suitable for penetration of heavy armor nor attack on very strong shore targets such as massive masonry, bridge abutments, drydocks, etc., as the case may rupture before detonation occurs. In the 100-pound, 500-pound,

1000-pound, and 2000-pound sizes, this premature rupture of the case will probably occur on armor heavier than approximately one inch in thickness. The 4000-pound light-case bomb has a body much thinner than the general purpose bombs and is not suitable for penetration of any type of target. Therefore, only "instantaneous" and "non-delay" settings are used with the fuzes installed in this bomb.

Minimum Release Altitudes

Minimum release altitudes for general purpose bombs will be governed by instructions issued by the Commander in Chief, U. S. Fleet.

General Description

All the general purpose bombs described herein are cylindrical in shape and have box-type fin assemblies. With one exception (the 100-lb. G.P. Bomb Mk 4 Mod 4), they may all be equipped with both a nose fuze and a tail fuze.

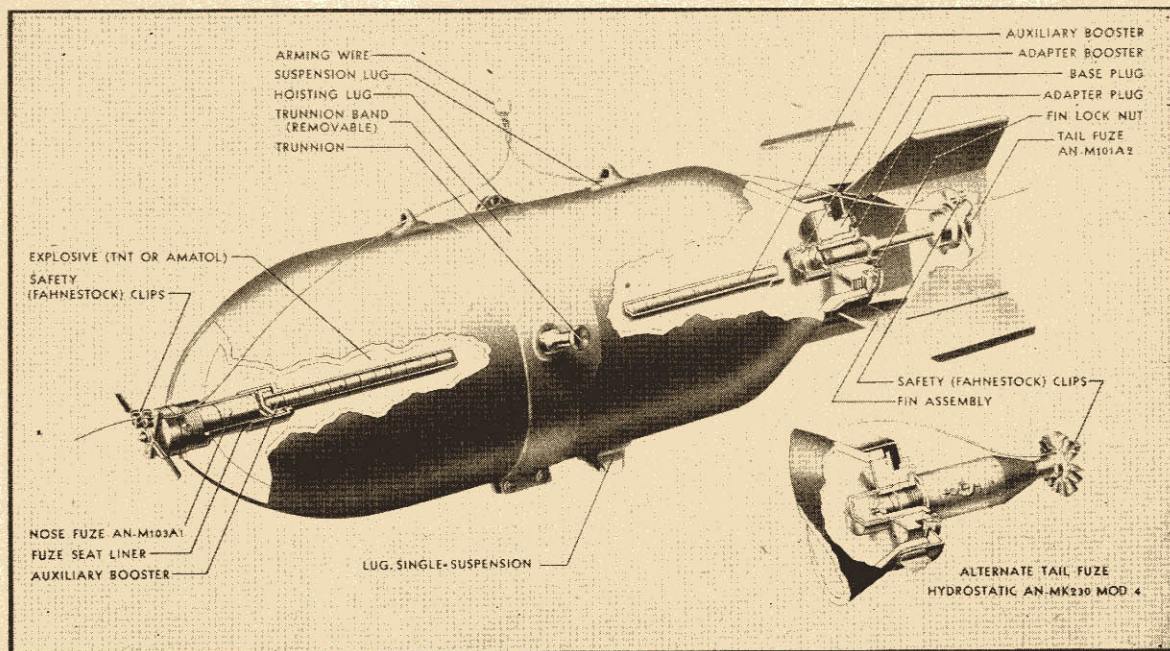


Figure 20.—500-Lb. General Purpose Bomb AN-M64

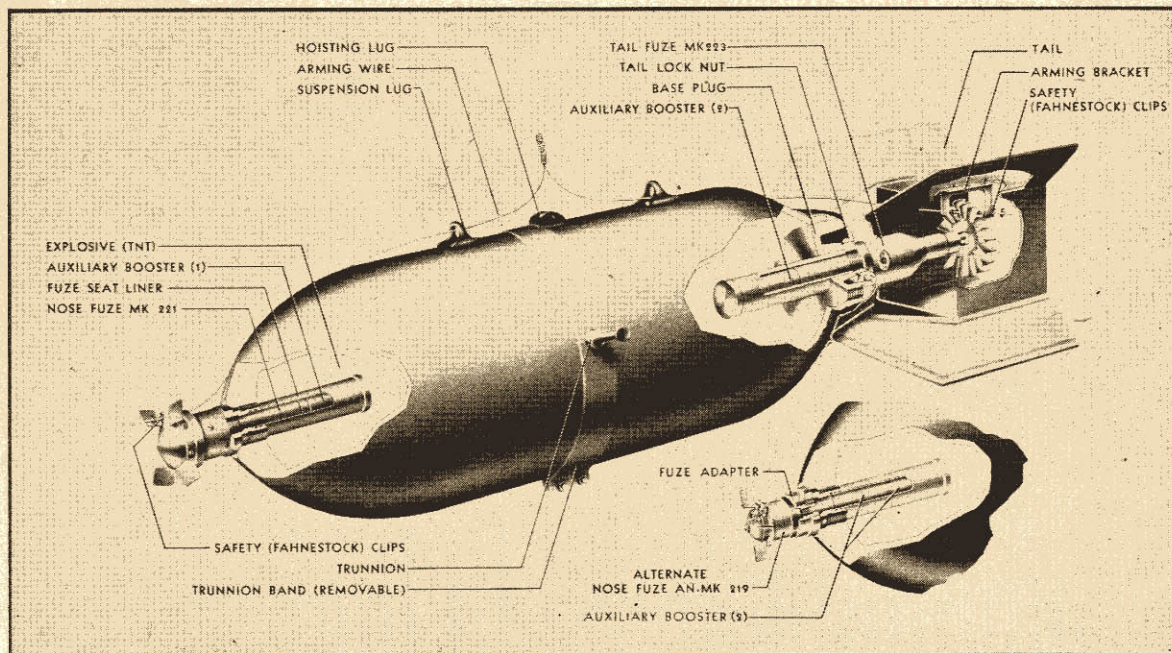
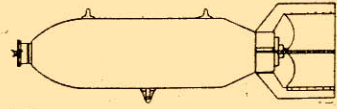


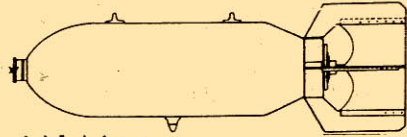
Figure 21.—500-Lb. General Purpose Bomb Mk 12 Mod 2

GENERAL PURPOSE BOMBS

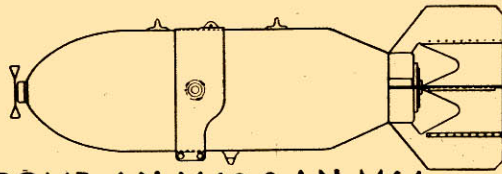
100-LB. GENERAL PURPOSE BOMB AN-M30



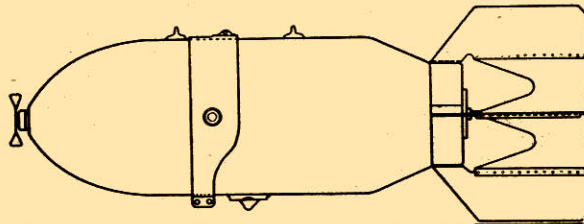
250-LB. GENERAL PURPOSE BOMB AN-M57



500-LB. GENERAL PURPOSE BOMB AN-M43 & AN-M64



1000-LB. GENERAL PURPOSE BOMB AN-M44 & AN-M65



2000-LB. GENERAL PURPOSE BOMB AN-M34 & AN-M66

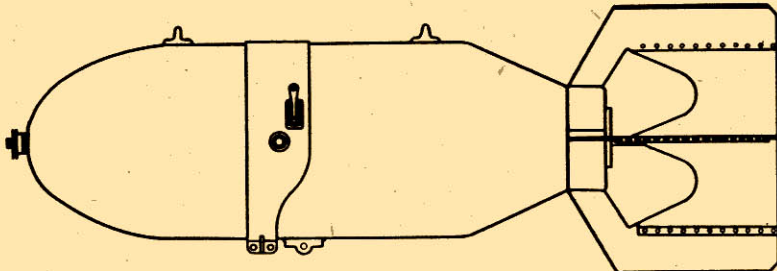


Figure 22.—Comparison of Bombs

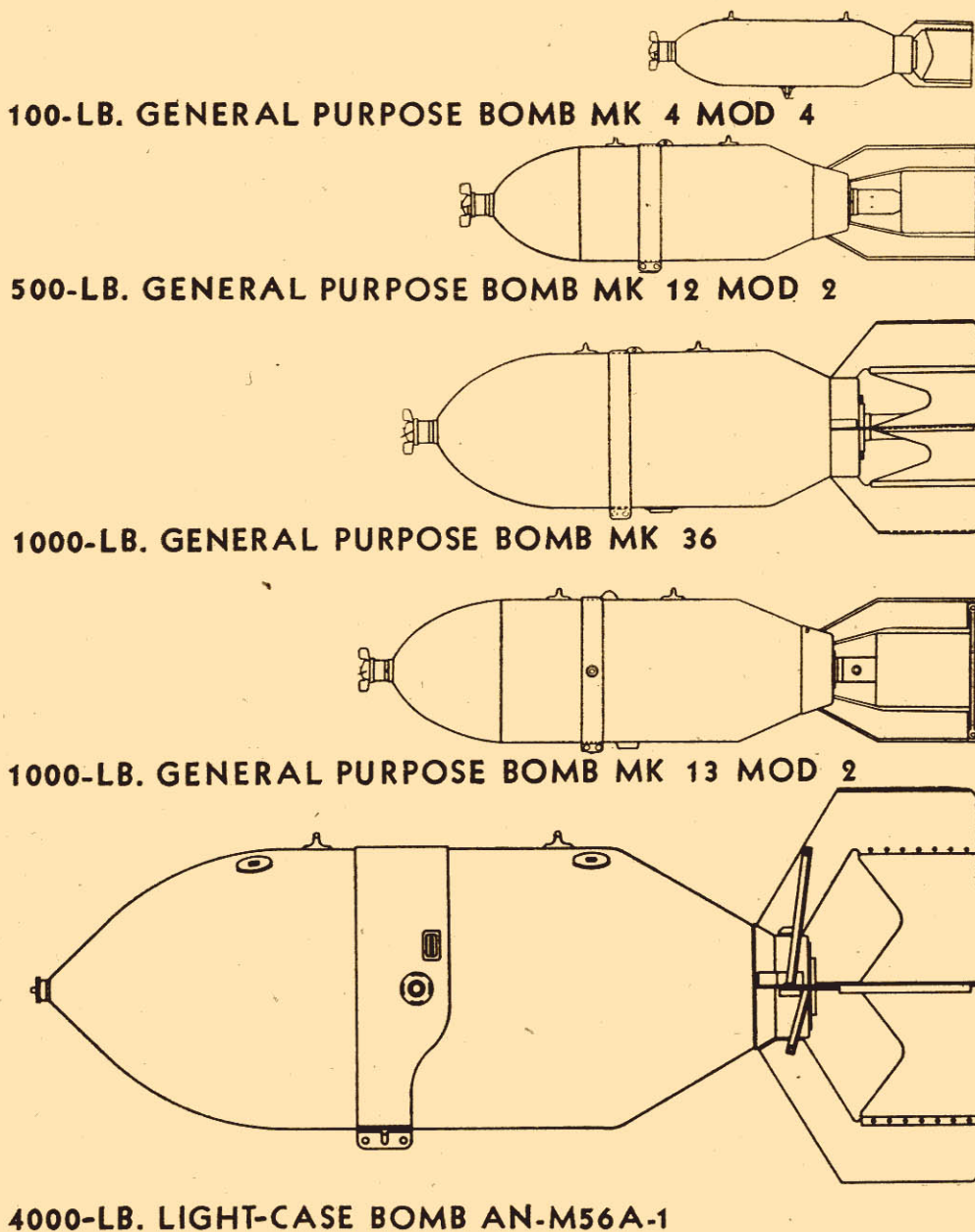


Figure 23.—Comparison of Bombs

GENERAL PURPOSE BOMBS

The fuzes used with general purpose bombs are generally of the arming-vane type with mechanical delay arming. An arming wire is inserted through the vane of each fuze to prevent the fuze from arming until after the bomb has been released from the airplane. If the bomb is to be dropped "armed," the arming wire, at release, is retained in the release mechanism of the airplane, while if the bomb is to be dropped "safe," the arming wire is released with the bomb.

Trunnion bands are available for the 500-pound, 1000-pound, 2000-pound, and 4000-pound bombs for dive bombing.

Safety Precautions

When bombs are being assembled and handled, due care must be exercised to prevent any shocks or blows which might cause accidental functioning.

Primer detonators and detonators must be handled with the greatest care at all times. They are especially sensitive to heat and shock. Under no circumstances shall components such as fuzes be disassembled.

Prior to assembly of a complete round, all mating parts such as fuzes and fuze cavities in bomb bodies must be examined. Threads must be clean and free of foreign matter, so that fuzes will screw properly into the bomb. For those fuzes requiring the attachment of a primer detonator, special care is required to insure that there is no foreign matter in either the fuze or the primer detonator cavities, as anything which resists the free entrance of the primer detonator into its socket might result in a premature explosion or a dud.

Fuzes should be examined for any deterioration such as heavy rust or corrosion, which might impair proper functioning. Only serviceable fuzes will be used.

Suspension lugs should be examined for any damage which might weaken the lug or its attachment to the bomb body.

The fin assembly should be examined for security of attachment to the bomb body.

Fuzes for AN-Standard G.P. Bombs

All AN-standard general purpose bombs carry both a nose fuze and a tail fuze. A brief description of each fuze and instructions for installing it in a bomb are given in Chapter 6 of this pamphlet.

Nose Fuze

The Nose Fuze AN-M103A1 is used with all AN-standard general purpose bombs. This fuze can be readily set on the ground for either instantaneous or 0.1-second delay.

Also, the Nose Fuze AN-Mk 219 may be installed in any AN-standard general purpose bomb by using an Auxiliary Booster Mk 4 and an adapter.

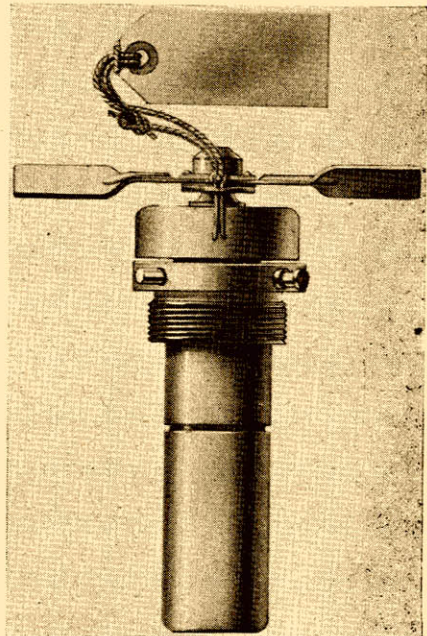


Figure 24.—Nose Fuze AN-M103A1

Tail Fuzes

The tail fuzes generally used with AN-standard general purpose bombs are as follows:

100-lb. and 250-lb. bombs Fuze AN-M100A2

500-lb. bombs Fuze AN-M101A2

1000-lb., 2000-lb., and
4000-lb. bombs Fuze AN-M102A2

These fuzes are alike except for the length of their fuze stem tubes. The length of this tube varies to suit the different lengths of fin assemblies.

These fuzes can be readily set on the ground for the following alternate settings by the use of alternate Primer Detonators M14:

1. Non-Delay (No delay element is introduced, but tail fuzes are a few thousandths of a second slower than instantaneous nose fuzes).
2. 0.01-Second Delay
3. 0.025-Second Delay
4. 0.10-Second Delay

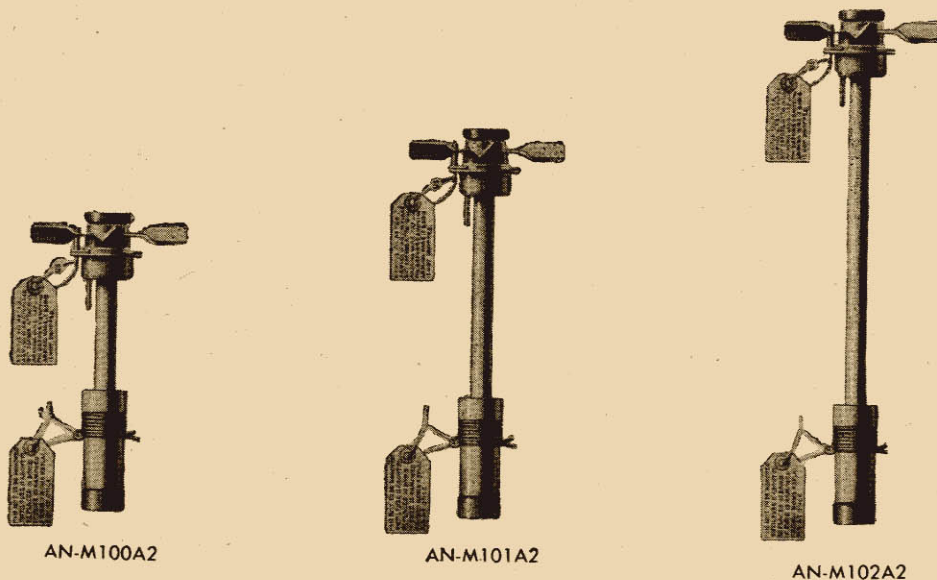


Figure 25.—Tail Fuzes for AN—Standard General Purpose Bombs

GENERAL PURPOSE BOMBS

Alternate Tail Fuzes for AN-Standard G.P. Bombs

For "mast-head" bombing, the Tail Fuzes M115, M116, and M117 are used with AN-standard general purpose bombs as follows:

100-lb. and 250-lb. bombs	Fuze M115
500-lb. bombs	Fuze M116
1000-lb. and 2000-lb. bombs	Fuze M117

These fuzes are alike except for the length of their fuze stem tubes. The length of this tube varies to suit the different lengths of fin assemblies.

These fuzes can be readily set on the ground for either of the two following de-

lays by the use of alternate Primer Detonators M16A1:

1. 4- to 5-Second Delay
2. 8- to 15-Second Delay

For Depth Bombing, the alternate hydrostatic Tail Fuze AN-Mk 230 Mod 4 may be used in the following general purpose bombs:

1. 500-lb. G.P. Bomb AN-M64
2. 1000-lb. G.P. Bomb AN-M65
3. 2000-lb. G.P. Bomb AN-M66

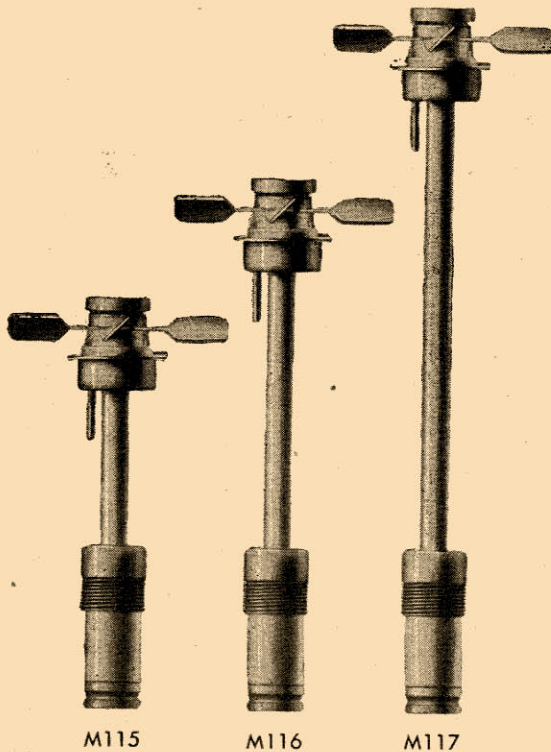


Figure 26.—Alternate Tail Fuzes

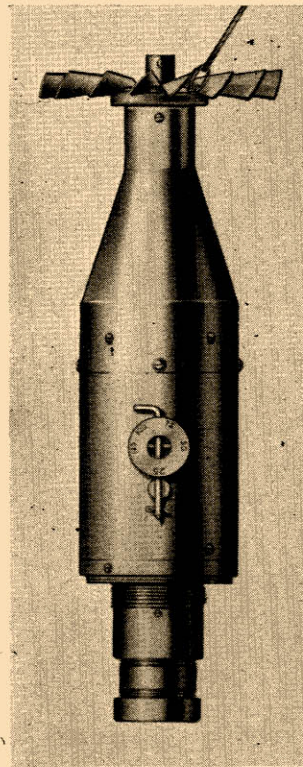


Figure 27.—Hydrostatic Tail Fuze AN-Mk 230 Mod 4

Fuzes for Navy G.P. Bombs

All Navy G.P. bombs, with one exception, carry the Nose Fuze Mk 221 (or the alternate Nose Fuze AN-Mk 219) and the Tail Fuze Mk 223 (or an alternate Hydrostatic Tail Fuze Mk 229 Mod 3).

The single exception is the 100-lb. G.P. Bomb Mk 4 Mod 4, which carries the Nose

Fuze AN-Mk 219 only and carries no tail fuze.

A brief description of each fuze used in general purpose bombs, as well as instructions for installing each fuze in a bomb, will be given in Chapter 7 of this pamphlet.

All the above fuzes are safe for take-offs and landings anywhere, including decks of carriers.

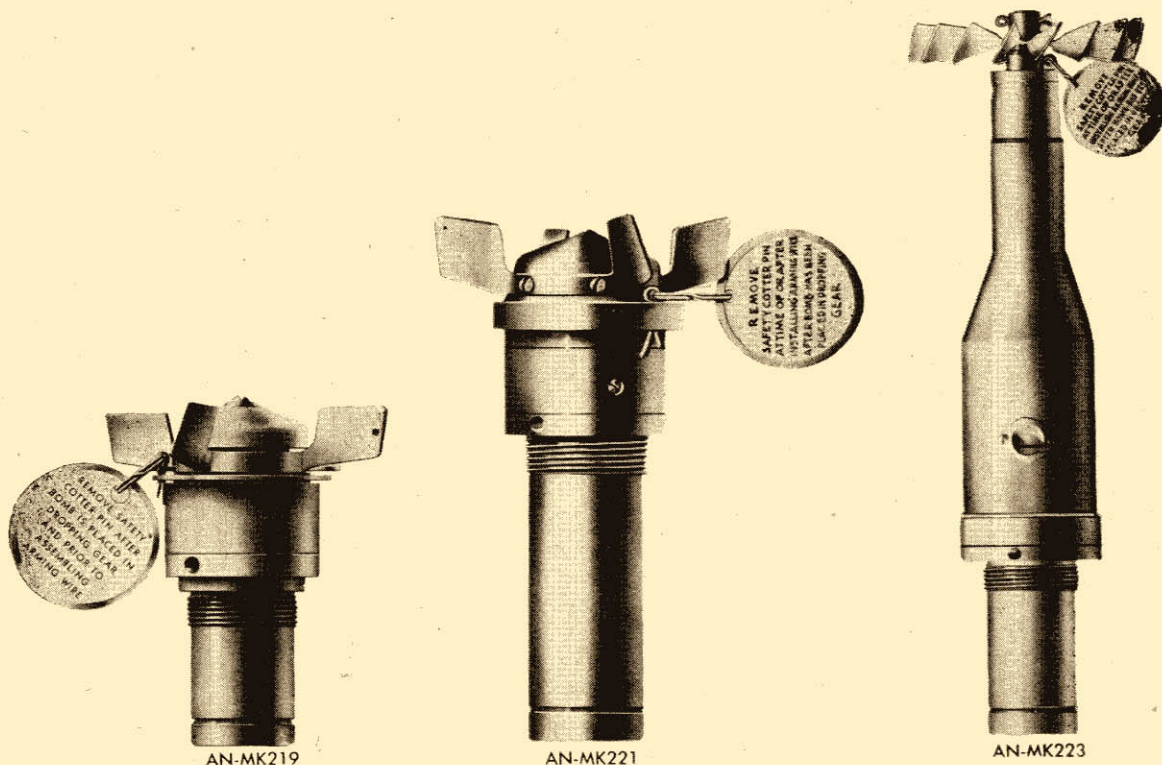


Figure 28.—Fuzes for Navy General Purpose Bombs

GENERAL PURPOSE BOMBS

AN-STANDARD GENERAL PURPOSE BOMBS 100-LB. GENERAL PURPOSE BOMB AN-M30

General Description

The 100-lb. G.P. Bomb AN-M30 is a cylindrical bomb having a box-type fin assembly. It is filled with either 50-50 Amatol or TNT. It is equipped regularly with the following fuzes:

1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M100A2

The alternate tail fuze issued is:

3. Tail Fuze M115 (for "mast-head" bombing)

The "long delay" Tail Fuze M123 may be used in the 100-lb. G.P. Bomb AN-M30. Adapter Boosters M102 have recently been modified with a lock pin assembly to prevent circumvention of the anti-withdrawal device of this fuze. Modified Adapter Boosters M102 will be marked M102A1.

In conjunction with the Adapter Boosters M102A1, a method of preventing the removal of the base plug of this bomb by imbedding special base plug studs into the bomb explosive has also been adopted.

100-lb. G.P. Bombs AN-M30 assembled with both modified adapter boosters and modified base plugs will be marked AN-M30A1.

Aircraft loaded with modified bombs that have fuzes with anti-withdrawal devices must jettison these bombs before landing.

Modified bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped in deep water, or otherwise disposed of.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are provided for suspension of this bomb.

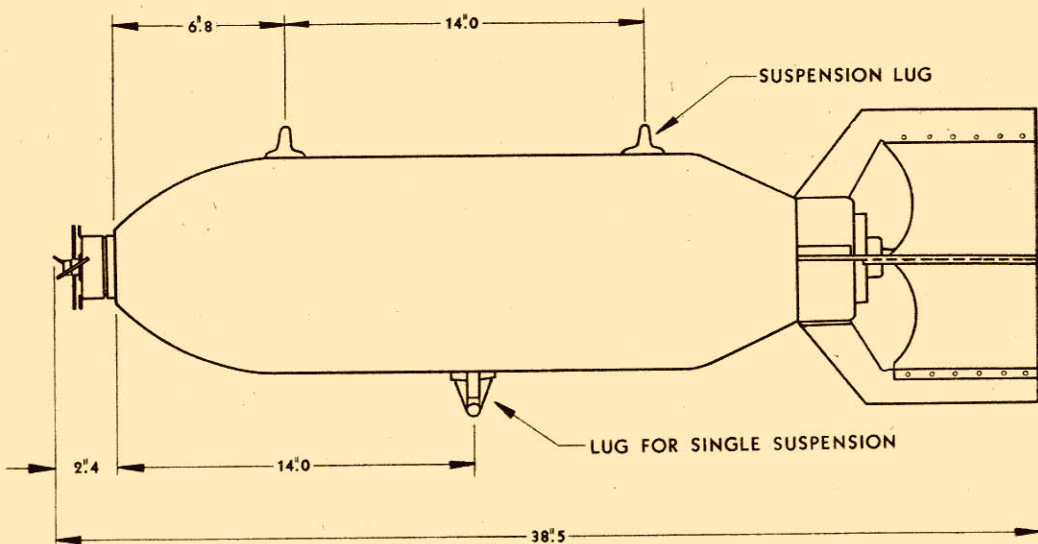
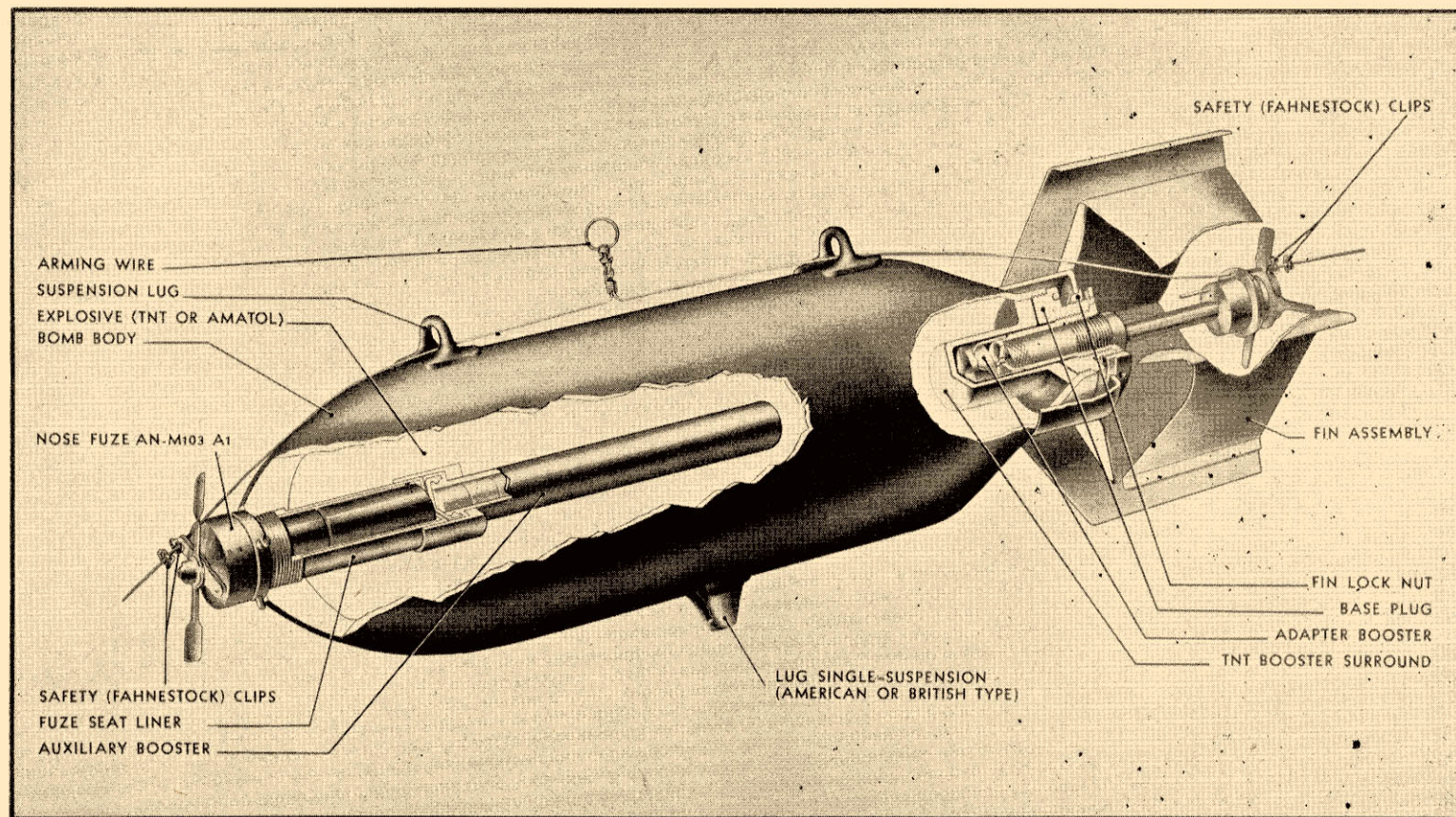


Figure 29.—100-Lb. General Purpose Bomb AN-M30



DIMENSION AND WEIGHT TABLE

Total Weight (50-50 Amatol-Loaded)	107.8 lb.	Surrounds)	54.2 lb.
Total Weight (TNT-Loaded)	110.2 lb.	Weight of Explosive (TNT)	56.6 lb.
Weight of Explosive (50-50 Amatol, including Auxiliary Booster and		Overall Length	38.4 in.
		Diameter of Bomb Body	8.1 in.

Figure 30.—100-Lb. G.P. Bomb AN-M30

GENERAL PURPOSE BOMBS

A single suspension lug is provided on the opposite side of the bomb for suspension from single-hook racks and shackles.

Hoisting of Bomb

No provisions are made for hoisting (neither lugs nor bands), as the bomb can be hoisted more quickly by hand.

Trunnions

Trunnions are not used with this bomb.

Components of a Complete Round

The 100-lb. G.P. Bomb AN-M30 is issued to the service as follows:

1. Steel bomb crate containing:
 - a. Bomb body with fin assembly attached, nose and tail shipping plugs in place, and an Adapter Booster M102 installed
 - b. Arming wire assembly
2. Nose Fuze AN-M103A1
3. Tail Fuze AN-M100A2 with Primer Detonator M14 Non-Delay assembled
4. Alternate Primer Detonators M14:
 - a. 0.025-Second Delay
 - b. 0.01-Second Delay
 - c. 0.10-Second Delay
5. Alternate Tail Fuze M115 (for "mast-head" bombing) with Primer Detonator M16A1, 4- to 5-Second Delay assembled

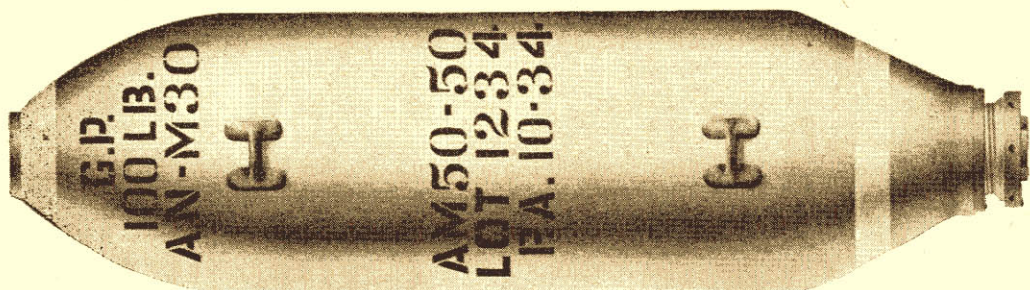
6. Alternate Primer Detonators M16A1, 8- to 15-Second Delay

Preparation of Bomb for Flight

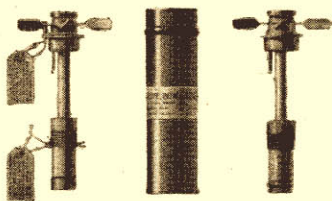
1. Remove bomb from shipping crate and tighten fin lock nut if necessary.
2. Remove the tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.
3. Remove the tail fuze from its container and install in the bomb.
 - a. Tail Fuze AN-M100A2: See page 157.
 - b. Tail Fuze M115: See page 162.
4. Remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.
5. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159.

The bomb now constitutes an assembled complete round.

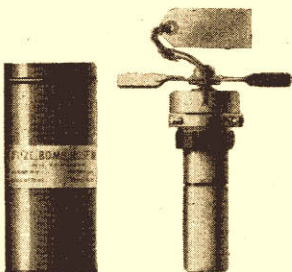
Note: After the bomb has been installed in the aircraft, the cotter pins are to be removed from the fuzes in accordance with instructions on the tags attached thereto. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore the components to their original condition and packings.



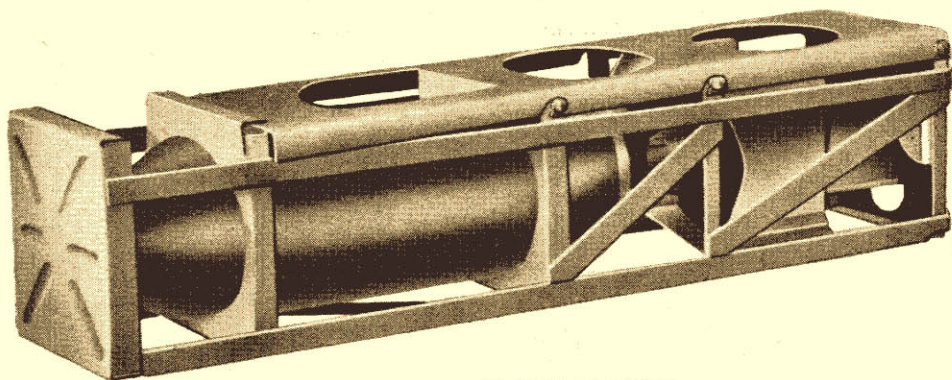
BOMB BODY AND SHIPPING PLUGS



TAIL FUZE AN-M100A2
ALTERNATE TAIL FUZE M115



NOSE FUZE AN-M103A1



STEEL BOMB CRATE

Figure 31.—Components of a Complete Round

GENERAL PURPOSE BOMBS

250-LB. GENERAL PURPOSE BOMB AN-M57

General Description

The 250-lb. G.P. Bomb AN-M57 is a cylindrical bomb having a box-type fin assembly. It is filled with either 50-50 Amatol or TNT. It is issued with the following fuzes:

1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M100A2

The alternate tail fuze issued is:

3. Tail Fuze M115 (for "mast-head" bombing)

The "long-delay" Tail Fuze M123 may be used in the 250-lb. G.P. Bomb AN-M57. Adapter Boosters M102 have recently been modified with a lock pin assembly to prevent circumvention of the anti-withdrawal device of this fuze. Modified Adapter Boosters M102 will be marked M102A1.

In conjunction with the Adapter Boosters M102A1, a method of preventing the removal of the base plug of this bomb by im-

bedding special base plug studs in the bomb explosive has also been adopted.

250-lb. G.P. Bombs AN-M57 assembled with both modified adapter boosters and modified base plugs will be marked AN-M57A1.

Aircraft loaded with modified bombs that have fuzes with anti-withdrawal devices must jettison these bombs before landing.

Modified bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped in deep water, or otherwise disposed of.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are provided for suspension in this bomb. This bomb was originally intended to be carried in double-hook American racks only, but later lots are equipped with a pressed steel type of British single-suspension lug

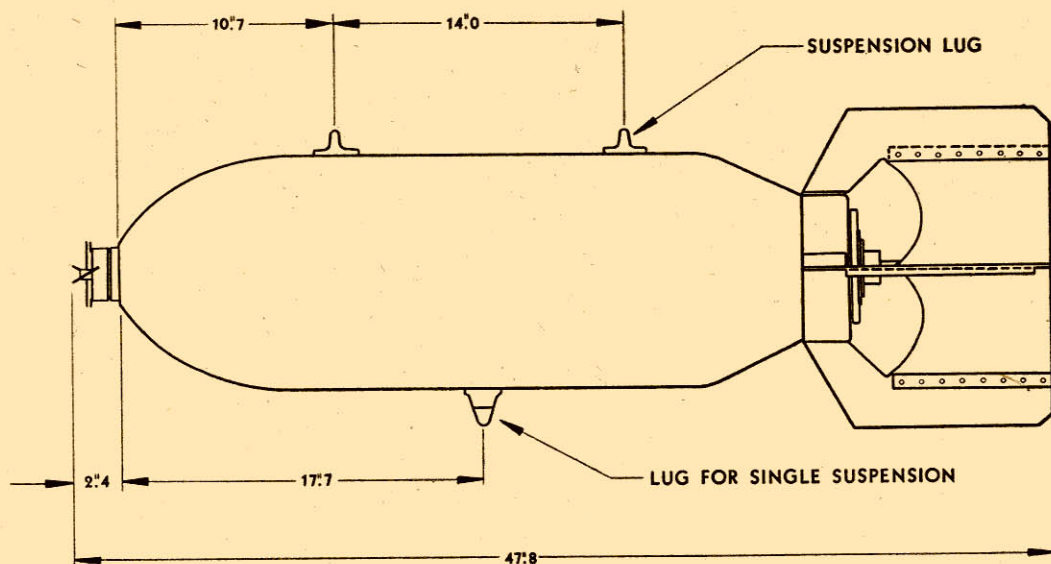
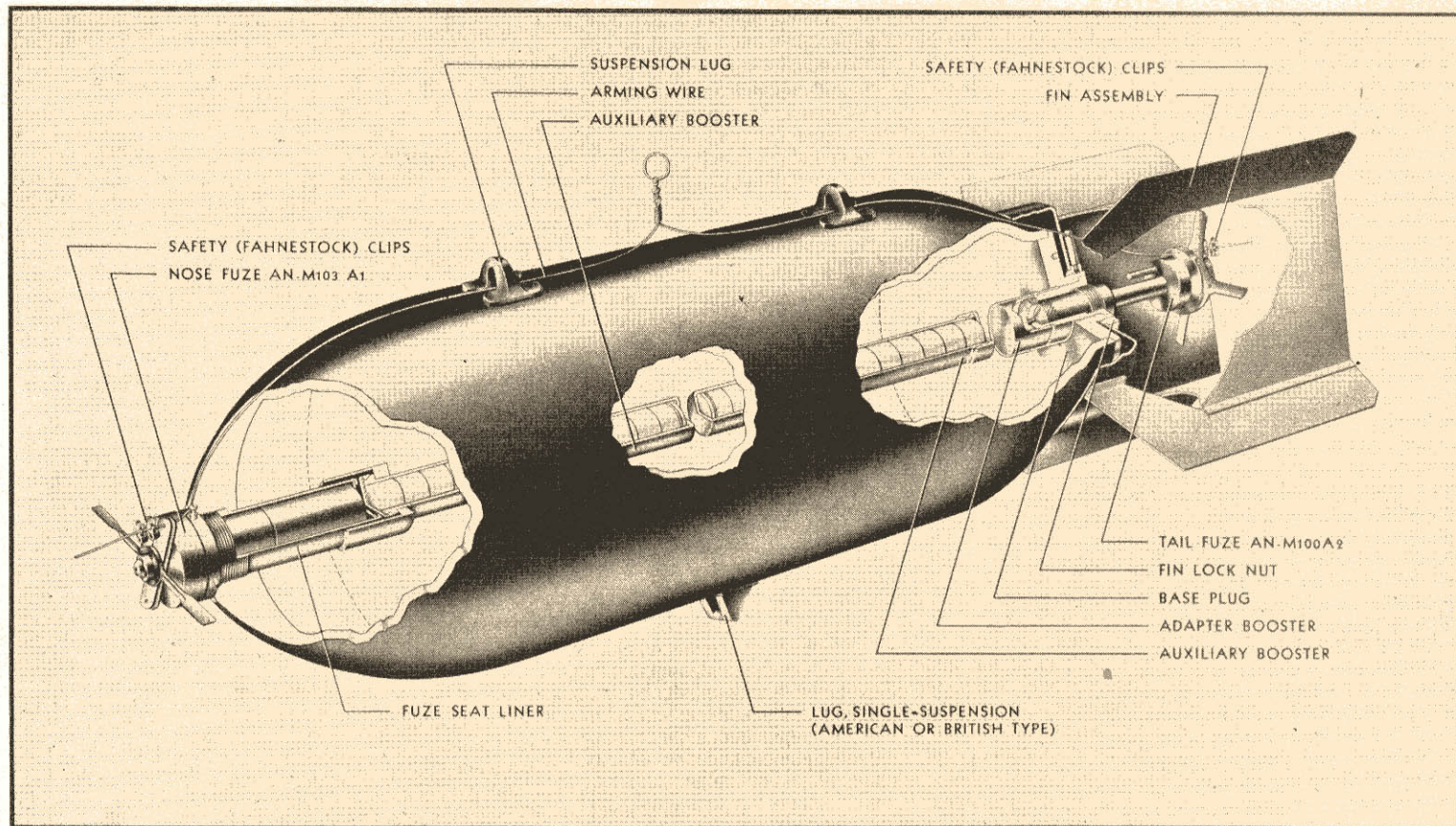


Figure 32.—250-Lb. General Purpose Bomb AN-M57

RESTRICTED



DIMENSION AND WEIGHT TABLE

Total Weight (50-50 Amatol-Loaded)	252.0 lb.	Surrounds)	120.9 lb.
Total Weight (TNT-Loaded)	261.9 lb.	Weight of Explosive (TNT)	129.0 lb.
Weight of Explosive (50-50 Amatol, including Auxiliary Booster and		Overall Length	47.8 in.
		Diameter of Bomb Body	10.9 in.

Figure 33.—250-Lb. General Purpose Bomb AN-M57

GENERAL PURPOSE BOMBS

which will fit Single-Hook Racks Mk 41 and Mk 50.

Hoisting of Bomb

Normally no provisions are made for hoisting bombs weighing 250 pounds or less, as bombs of these weights can usually be hoisted more quickly by hand. In particularly difficult situations, such as hoisting 250-pound bombs to patrol planes, the Universal Hoisting Band Mk 8 may be used.

Trunnions

Trunnion bands are not issued for use with this bomb.

Components of a Complete Round

The 250-lb. G.P. Bomb AN-M57 is made up of the following:

1. Bomb body in protecting lug guards with an Adapter Booster M102 installed, nose and tail shipping plugs in place, and fin lock nut in place and lock-wired

2. Tail crate containing:

a. Fin assembly

b. Arming wire assembly, Type B

3. Nose Fuze AN-M103A1

4. Tail Fuze AN-M100A2 with Primer Detonator M14 Non-Delay assembled

5. Alternate Primer Detonators M14:

a. 0.025-Second Delay

b. 0.01-Second Delay

c. 0.10-Second Delay

6. Alternate Tail Fuze M115 (for "mast-head" bombing) with Primer Detonator M16A1, 4- to 5-Second Delay assembled

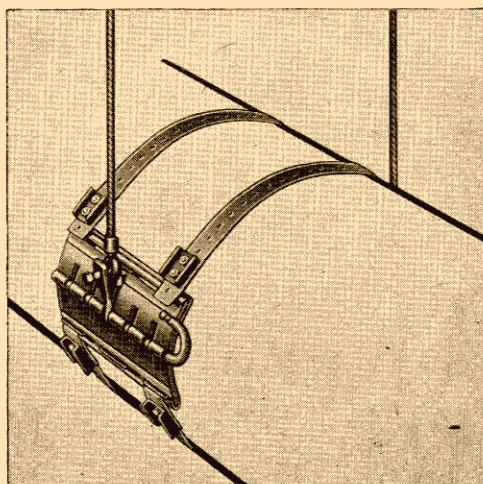


Fig. 34.—Universal Hoisting Band Mk 8

7. Alternate Primer Detonators M16A1, 8- to 15-Second Delay

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using spanner wrench if necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip fin assembly over tail end of bomb, rotating it to the angle required by the aircraft installation.

3. With fin assembly in desired position thread on and **tighten** fin lock nut, using spanner wrench provided.

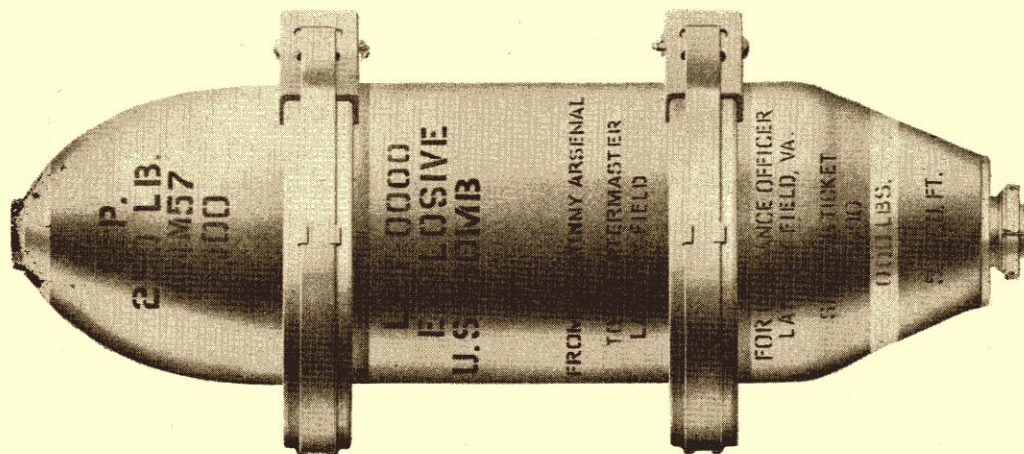
4. Remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

5. Remove tail fuze from its container and install in bomb.

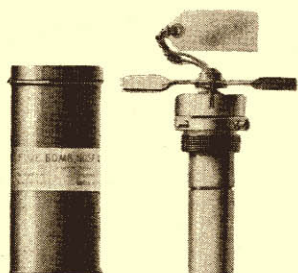
a. Tail Fuze AN-M100A2: See page 157.

b. Tail Fuze M115: See page 162.

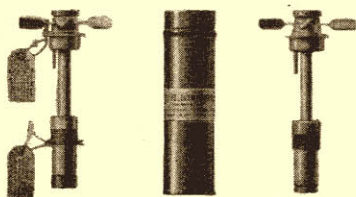
6. Remove nose shipping plug and inspect



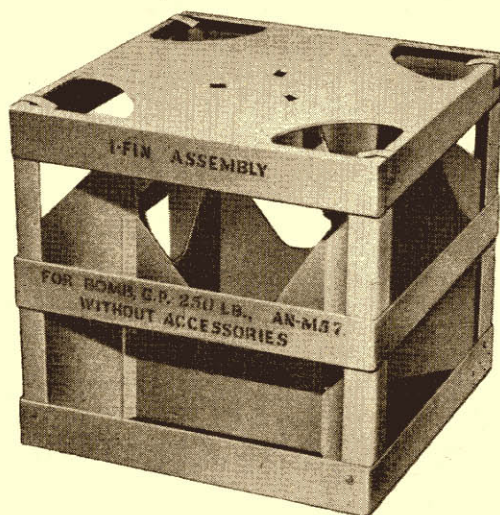
BOMB BODY AND SHIPPING PLUGS



NOSE FUZE AN-M103A1



TAIL FUZE AN-M100A2
ALTERNATE TAIL FUZE M115



CRATED FIN ASSEMBLY

Figure 35.—Components of a Complete Round

GENERAL PURPOSE BOMBS

fuze seat liner and threads. Clean if necessary.

7. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packing.

500-LB. GENERAL PURPOSE BOMBS AN-M43 AND AN-M64

General Description

The 500-lb. G.P. Bomb AN-M64 supersedes the earlier 500-lb. G.P. Bomb AN-M43. The two bombs are identical, except that the AN-M64 is fitted with an adapter in the base plug to accommodate the Tail Fuze AN-M101A2. When this adapter is removed, the bomb may be fitted with the alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4. The earlier 500-lb. Bomb AN-M43 can not carry this alternate hydrostatic tail fuze.

The 500-lb. G.P. Bomb AN-M64 is filled with either 50-50 Amatol or TNT and may be fitted with the following fuzes:

1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M101A2
3. Alternate Tail Fuze M116 (for "mast-head" bombing)
4. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4

The "long-delay" Tail Fuze M124 may be used in the 500-lb. G.P. Bombs AN-M43 and AN-M64. Adapter Boosters M115 have recently been modified with a lock pin assembly to prevent circumvention of the anti-withdrawal device of this fuze. Modified Adapter Boosters M115 will be marked M115A1.

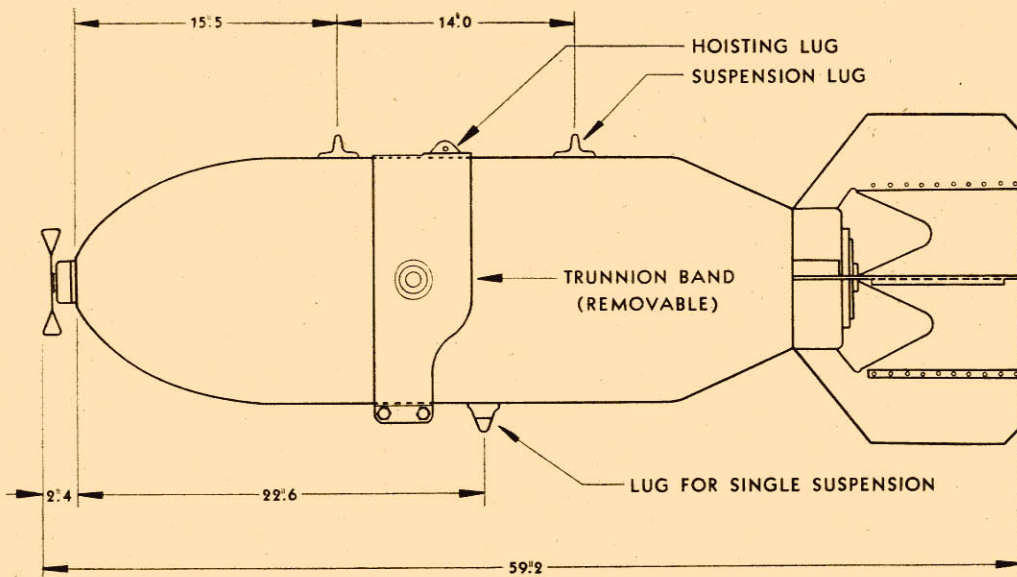
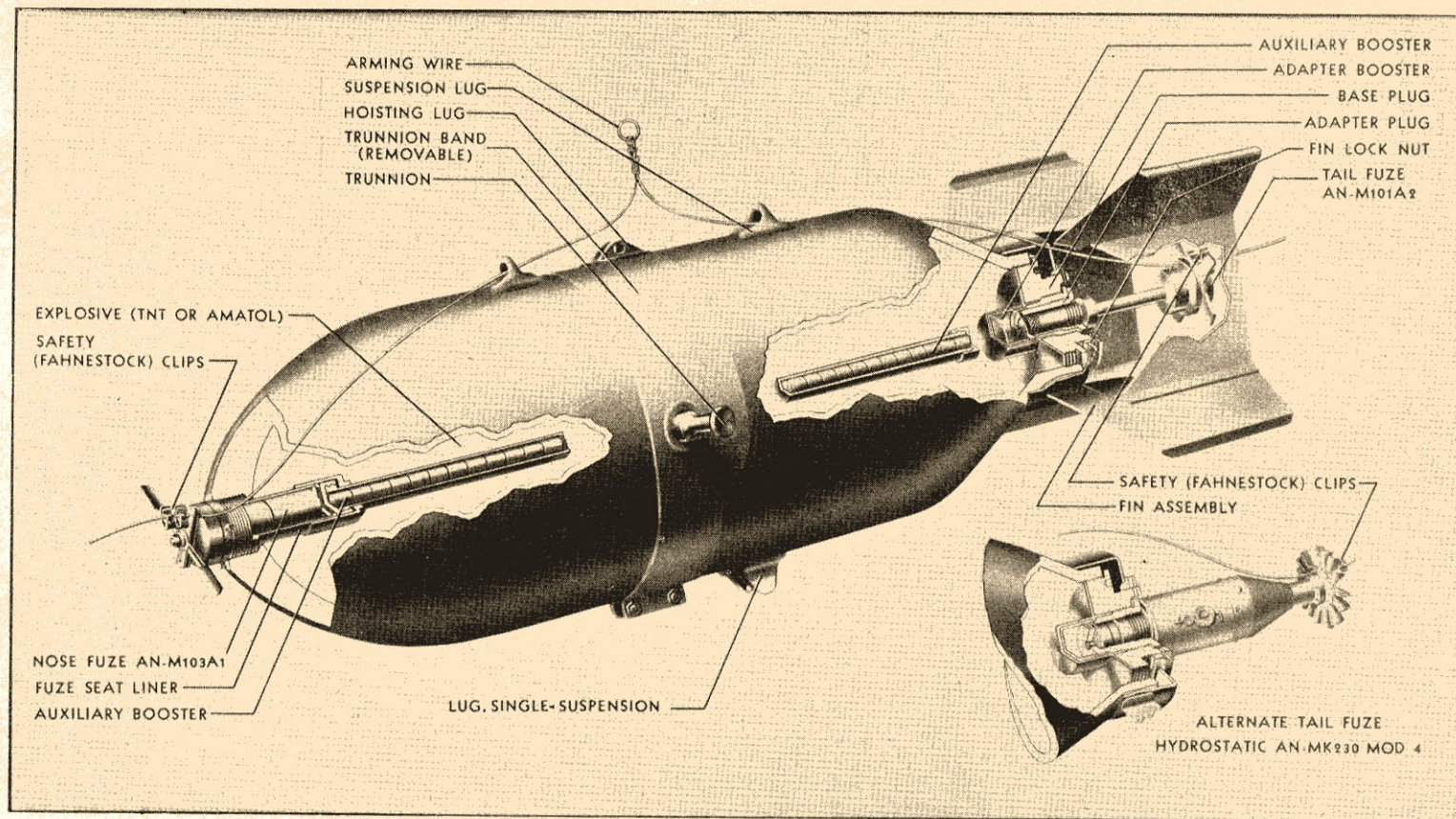


Figure 36.—500-Lb. General Purpose Bombs AN-M43 and AN-M64



DIMENSION AND WEIGHT TABLE—AN-M64

Total Weight (50-50 Amatol-Loaded)	512.0 lb.	Surrounds)	262.0 lb.
Total Weight (TNT-Loaded)	517.0 lb.	Weight of Explosive (TNT)	267.0 lb.
Weight of Explosive (50-50 Amatol, including Auxiliary Booster and		Overall Length	59.1 in.
		Diameter of Bomb Body	14.1 in.

Figure 37.—500-Lb. General Purpose Bomb AN-M64

GENERAL PURPOSE BOMBS

In conjunction with the Adapter Boosters M115A1, a method of preventing the removal of the base plug of the Bomb AN-M64 by imbedding special base plug studs into the bomb explosive has also been adopted. No Bombs AN-M43 will contain these modified base plugs. The 500-lb. G.P. Bombs AN-M64 assembled with **both** modified adapter boosters and modified base plugs will be marked AN-M64A1.

Aircraft loaded with bombs that have fuzes with anti-withdrawal devices must jettison these bombs before landing. See page 163.

Modified bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped into deep water, or otherwise disposed of.

Suspension of Bombs

Two suspension lugs spaced 14.0 in. apart are provided for suspension of this bomb from double-hook racks or shackles. A single lug is provided on the opposite side of the bomb at the center of gravity for suspension from single-hook racks or shackles.

Hoisting of Bomb

The Universal Hoisting Band Mk 8 may be used for single- or double-cable hoisting of this bomb. The Bomb Hoisting Sling Mk 19 Mod 0 may be used for single-cable hoisting to shackles.

The combination Trunnion-Hoisting Band M1A1 may be used for single-cable hoisting to double-hook bomb racks. This band should be removed, when possible, for high-altitude bombing, so as to retain the ballistic characteristics which were originally determined without the trunnion-hoisting band installed.

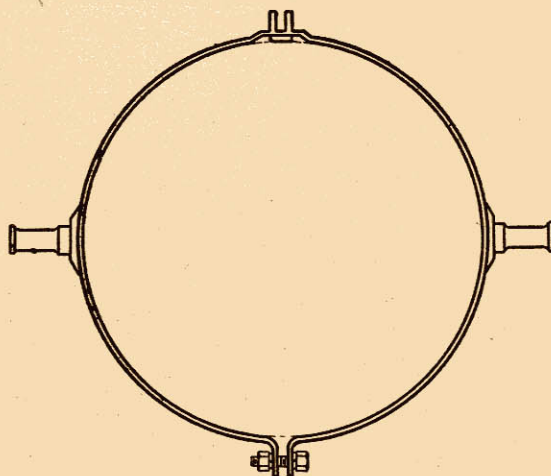


Figure 38.—Trunnion-Hoisting Band M1A1

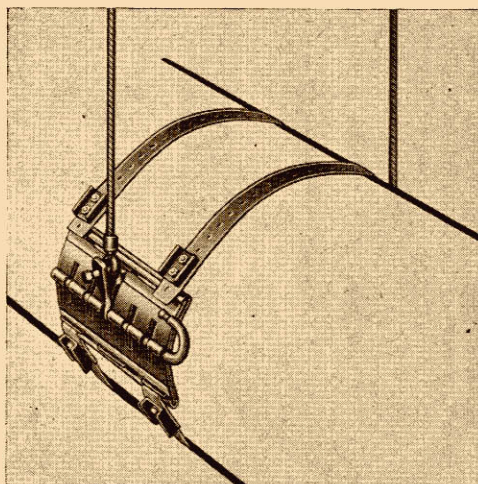


Figure 39.—Universal Hoisting Band Mk 8

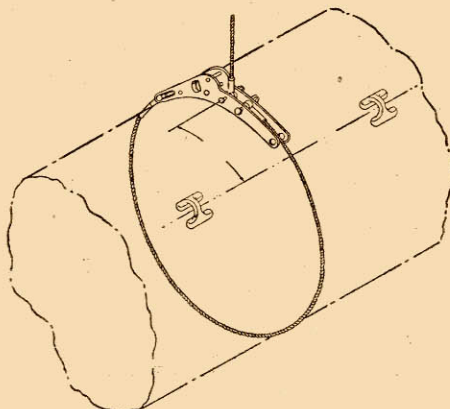
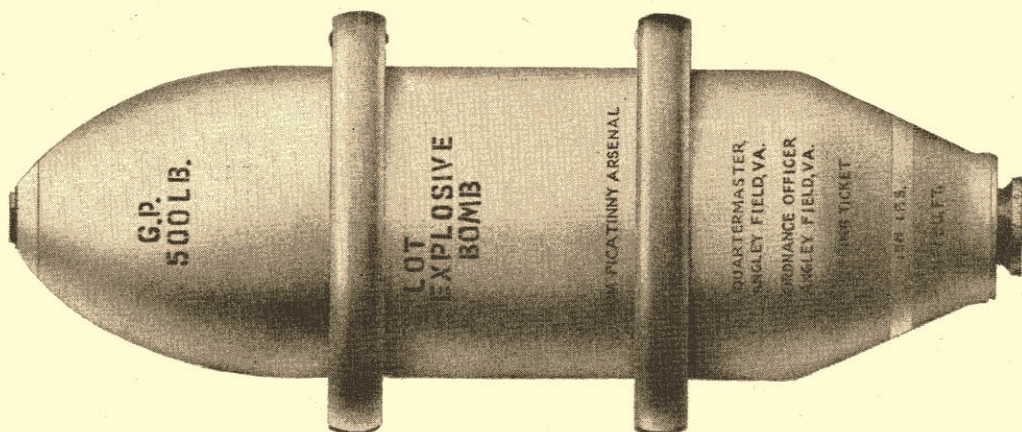
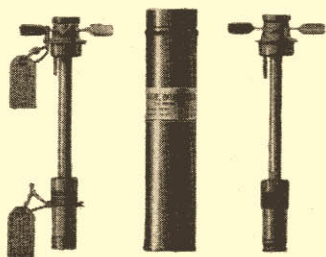


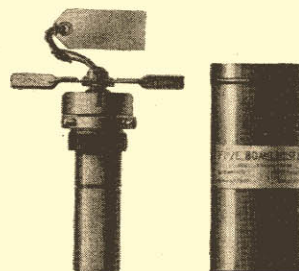
Figure 40.—Sling Mk 19 Mod 0



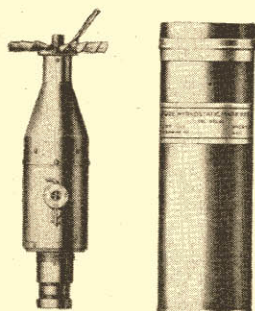
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



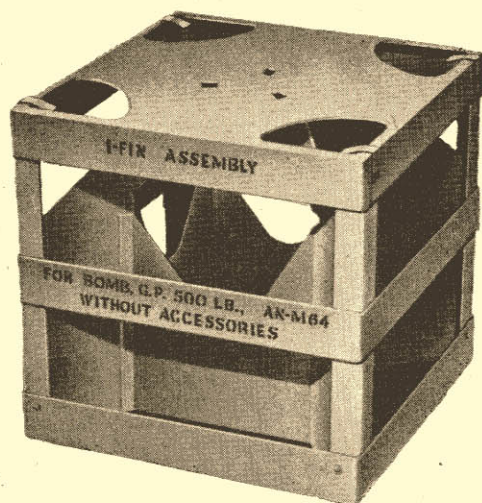
TAIL FUZE AN-M101A2
ALTERNATE TAIL FUZE M116



NOSE FUZE AN-M103A1



ALTERNATE TAIL FUZE
AN-MK230 MOD 4



CRATED FIN ASSEMBLY

Figure 41.—Components of a Complete Round

Trunnions

Trunnions for dive-bombing are provided by means of the combination Trunnion-Hoisting Band M1A1.

Components of a Complete Round

The 500-lb. G.P. Bomb AN-M43 or AN-M64 is supplied to the service as follows:

1. Bomb body in protecting lug guards, with an Adapter Booster M115 and fuze adapter installed (AN-M43 has Adapter Booster M102 and no fuze adapter), nose and tail shipping plugs in place, and fin lock nut in place and fastened with wire

2. Tail crate containing:

a. Fin assembly

b. Arming wire assembly, Type B

3. Nose Fuze AN-M103A1

4. Tail Fuze AN-M101A2 with Primer Detonator M-14, 0.025-Second Delay assembled

5. Alternate Primer Detonators M14:

a. Non-Delay

b. 0.01-Second Delay

c. 0.10-Second Delay

6. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4

7. Alternate Tail Fuze M116 (for "mast-head" bombing) with Primer Detonator M16A1, 4- to 5-Second Delay assembled

8. Alternate Primer Detonators M16A1, 8- to 15-Second Delay

9. Trunnion-Hoisting Band M1A1

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using spanner wrench if necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip fin assembly over tail end of bomb, rotating it to the angle required by the aircraft installation.

3. With fin assembly in desired position, thread on and **tighten** fin lock nut, using appropriate wrench.

4. Remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

5. Remove tail fuze from its container and install in bomb.

a. Tail Fuze AN-M101A2: See page 157.

b. Tail Fuze M116: See page 162.

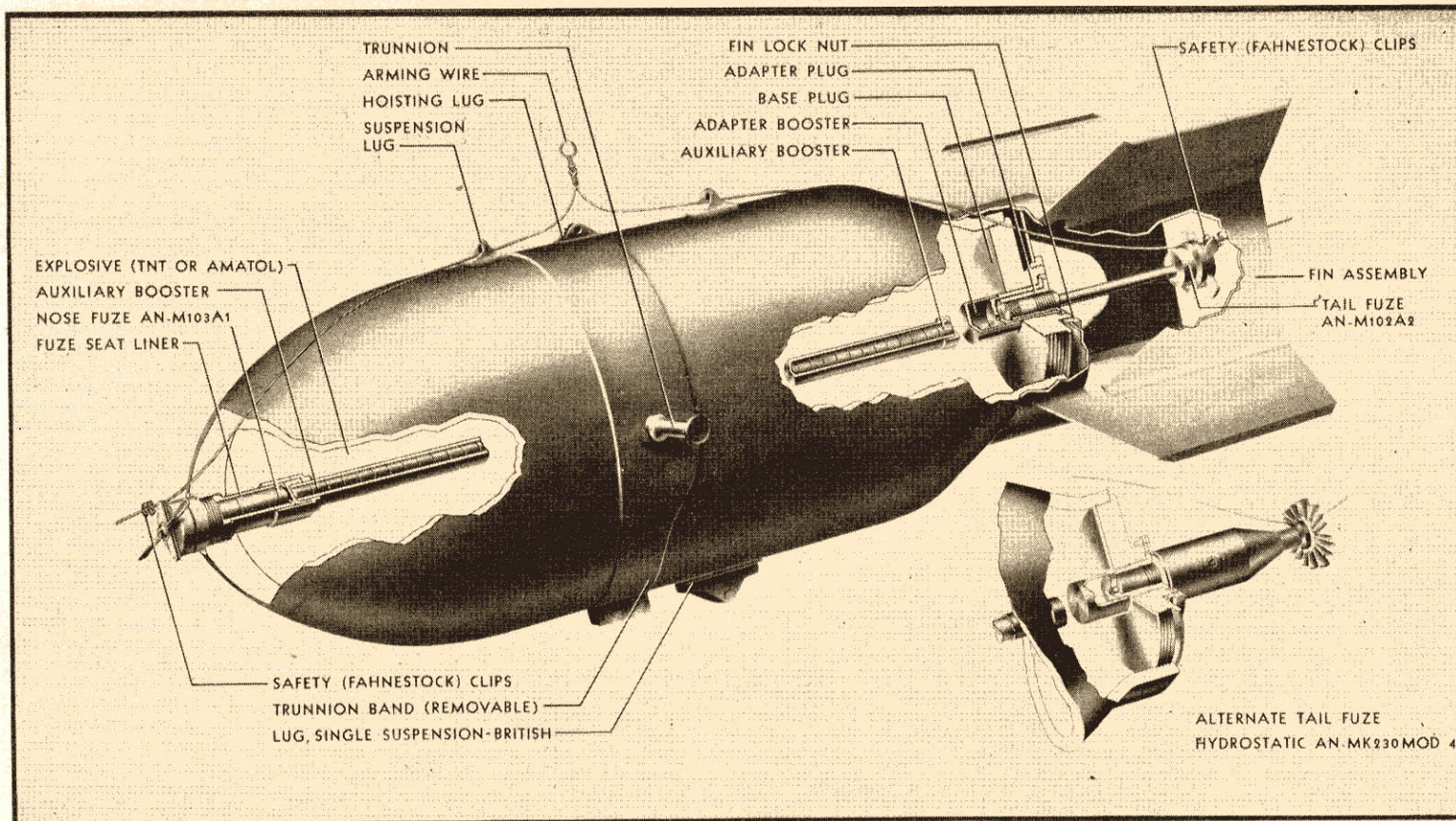
c. Tail Fuze AN-Mk 230 Mod 4: See page 180.

6. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Remove the Hoisting Band Mk 8 or Sling Mk 19 Mod 0, if used. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original packing.



DIMENSION AND WEIGHT TABLE—AN-M65

Total Weight (50-50 Amatol-Loaded)	997.0 lb.	Surrounds)	530.0 lb.
Total Weight (TNT-Loaded)	1025.3 lb.	Weight of Explosive (TNT)	558.3 lb.
Weight of Explosive (50-50 Amatol, including Auxiliary Booster and		Overall Length	69.5 in.
		Diameter of Bomb Body	18.8 in.

Figure 42.—1,000-Lb. General Purpose Bomb AN-M65

GENERAL PURPOSE BOMBS

1,000-LB. GENERAL PURPOSE BOMBS AN-M44 AND AN-M65

General Description

The 1000-lb. G.P. Bomb AN-M65 supersedes the earlier 1000-lb. G.P. Bomb AN-M44. The two bombs are identical except that the G.P. Bomb AN-M65 is fitted with an adapter in the base plug to accommodate the Tail Fuze AN-M102A2. When this adapter is removed, the bomb may be fitted with the alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4

The 1000-lb. G.P. Bombs AN-M44 and AN-M65 are filled with either 50-50 Amatol or TNT and may be fitted with the following fuzes:

1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M102A2
3. Alternate Tail Fuze M117 (for "mast-head" bombing)
4. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4 may be installed in the Bomb

AN-M65. This fuze cannot be installed in the G.P. Bomb AN-M44.

The "long-delay" Tail Fuze M125 may be used in the 1000-lb. G.P. Bombs AN-M44 and AN-M65. Adapter Boosters M102 and M115 have recently been modified with a lock pin assembly to prevent circumvention of the anti-withdrawal device of this fuze. Modified Adapter Boosters M102 and M115 will be marked M102A1 and M115A1.

In conjunction with the Adapter Boosters M115A1, a method of preventing the removal of the base plug from the G.P. Bomb AN-M65 by imbedding special base plug studs into the bomb explosive has also been adopted. No Bombs AN-M44 will contain these modified base plugs.

1000-lb. G.P. Bombs AN-M65 assembled with both modified adapter boosters and modified base plugs will be marked AN-M65A1.

Aircraft loaded with bombs that have

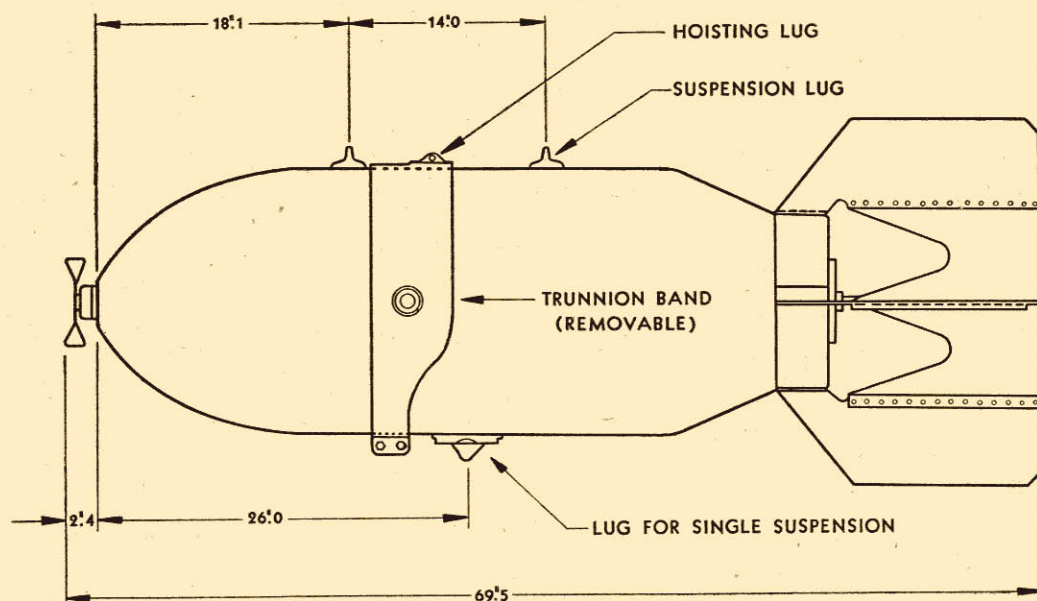
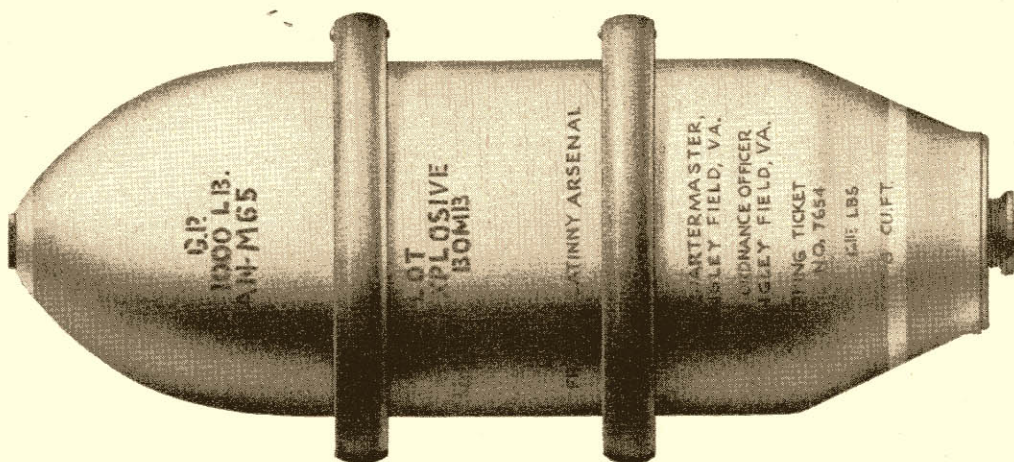
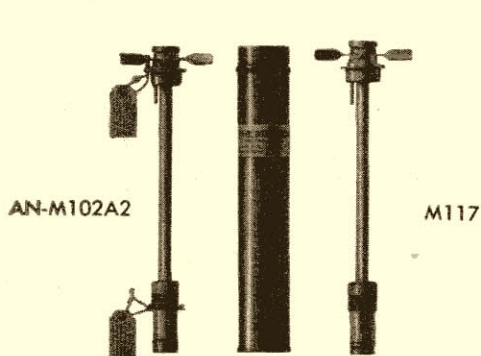


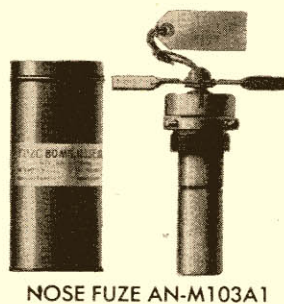
Figure 43.—1,000-Lb. General Purpose Bomb AN-M44 and AN-M65



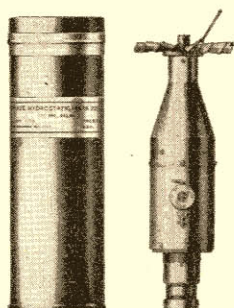
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



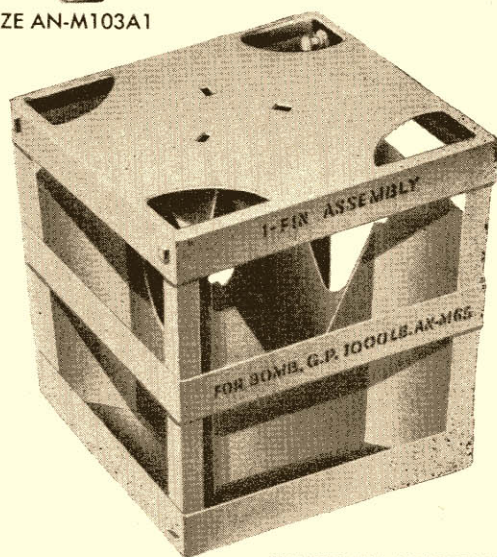
TAIL FUZE AND ALTERNATE TAIL FUZE



NOSE FUZE AN-M103A1



ALTERNATE TAIL FUZE AN-MK 230 MOD 4



CRATED FIN ASSEMBLY

Figure 44.—Components of a Complete Round

GENERAL PURPOSE BOMBS

fuzes with anti-withdrawal devices must jettison these bombs before landing. See page 163.

Modified bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped into deep water, or otherwise disposed of.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are welded to the bomb body for suspension from double-hook racks and shackles. A single suspension lug is provided on the opposite side of the bomb for suspension from British bomb carriers.

Hoisting of Bomb

A Universal Hoisting Band Mk 8 may be used for hoisting this bomb by single or double cable. The combination Trunnion-Hoisting Band M2A1 may be used for single-cable hoisting to double-hook bomb racks. This band should be removed, when possible, for high-altitude bombing, so as to retain the ballistic characteristics, which were originally determined without the trunnion-hoisting band installed.

Trunnions

The combination Trunnion-Hoisting Band M2A1 is used with this bomb.

Components of a Complete Round

1000-lb. G.P. Bombs AN-M44 and AN-M65 are supplied to the service as follows:

1(a). **Bomb AN-M44**—Bomb body in protecting lug guards, with an Adapter Booster M102 installed, nose and tail shipping plugs in place, and fin lock nut in place and lock-wired.

1(b). **Bomb AN-M65**—Bomb body in protecting lug guards, with an Adapter Booster

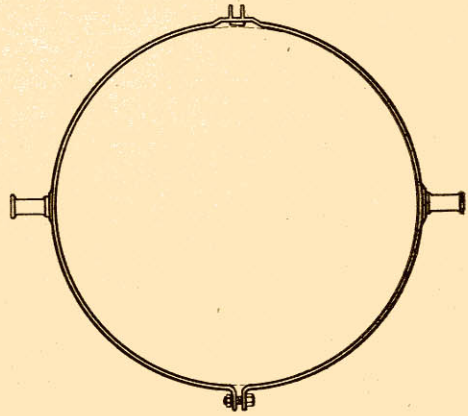


Figure 45.—Trunnion-Hoisting Bands M2A1

M115 and fuze adapter installed, nose and tail shipping plugs in place, and fin lock nut in place and lock-wired.

2. Tail crate containing:

a. Fin assembly for 1000-lb. G.P. Bomb AN-M44 or AN-M65

b. Arming wire assembly, Type B

3. Nose Fuze AN-M103A1

4. Tail Fuze AN-M102A2 with Primer Detonator M14, 0.025-Second Delay assembled

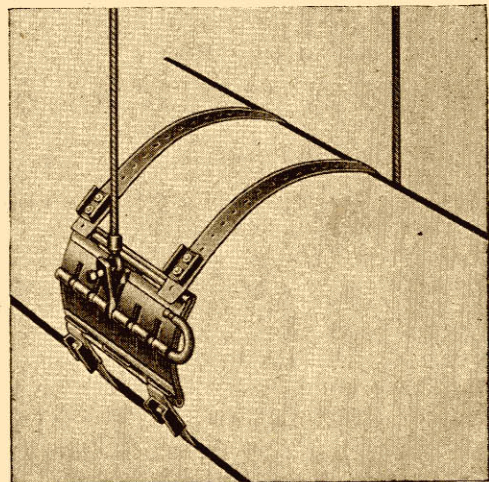


Figure 46.—Universal Hoisting Band Mk 8

5. Alternate Primer Detonators M14:
 - a. Non-Delay
 - b. 0.01-Second Delay
 - c. 0.10-Second Delay
6. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4 for Bomb AN-M65 only
7. Alternate Tail Fuze M117 (for "mast-head" bombing) with Primer Detonator M16A1, 4- to 5-Second Delay, assembled
8. Alternate Primer Detonators M16A1, 8- to 15-Second Delay
9. Trunnion-Hoisting Band M2A1

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using spanner wrench if necessary. Loosen, but do not remove, the tail shipping plug.
2. Slip fin assembly over tail end of bomb, rotating it to the angle demanded by the aircraft installation.
3. With fin assembly in desired position, thread on and **tighten** fin lock nut, using appropriate wrench.
4. Remove tail shipping plug and inspect

fuze seat liner and threads. Clean if necessary.

5. Remove tail fuze from its container and install in bomb.

a. Tail Fuze AN-M102A2: See page 157.

b. Tail Fuze M117: See page 162.

c. Tail Fuze AN-Mk 230 Mod 4: See page 180.

6. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Remove the Hoisting Band Mk 8, if used. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packing.

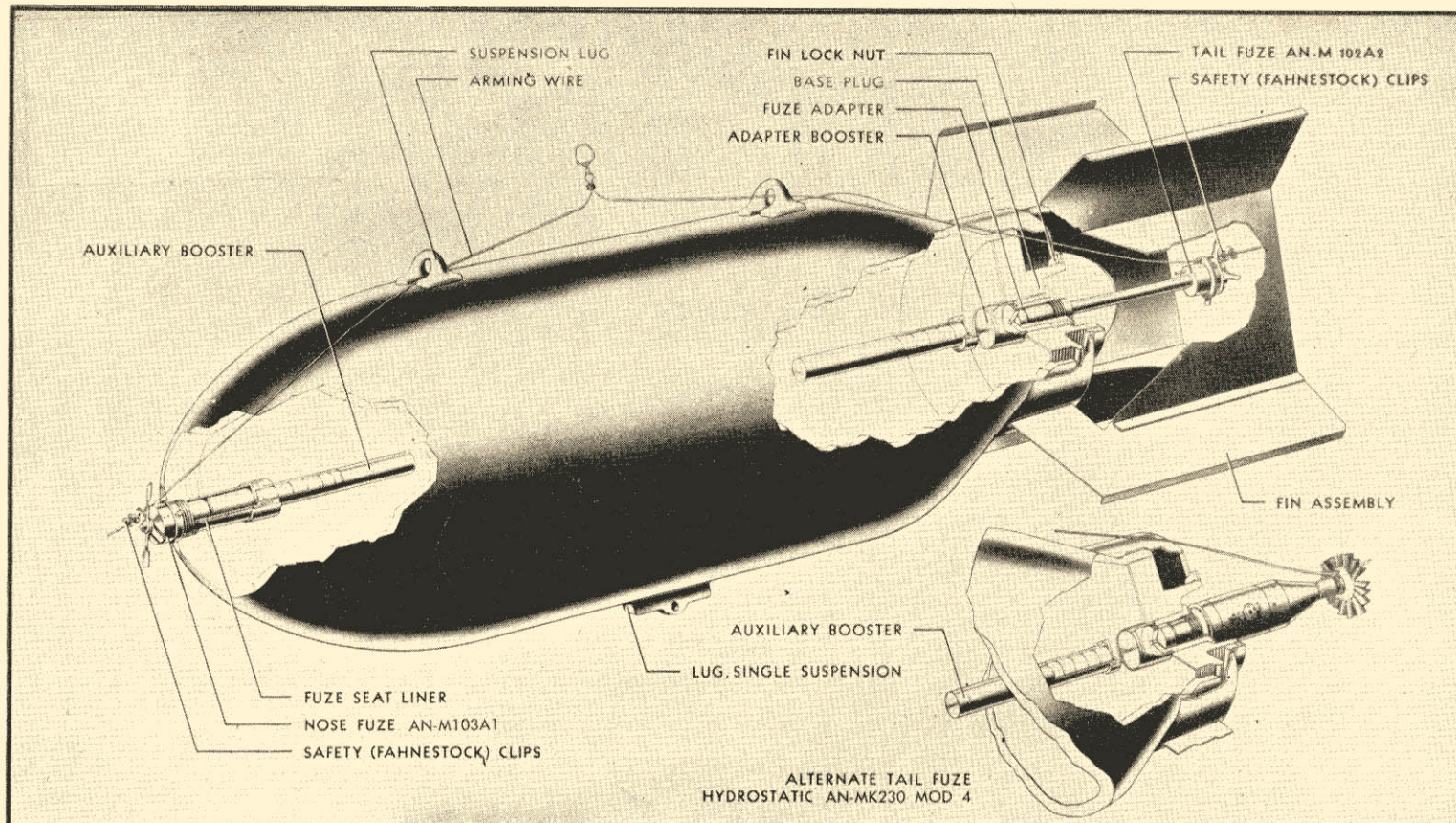
2,000-LB. GENERAL PURPOSE BOMBS AN-M34 AND AN-M66

General Description

The 2000-lb. G.P. Bomb AN-M66 supersedes the earlier 2000-lb. G.P. Bomb AN-M34. The two bombs are identical except that the AN-M66 is fitted with an adapter in the base plug to accommodate the Tail Fuze AN-M102A2. When this adapter is removed, the bomb may be fitted with the alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4. The earlier 2000-lb. G.P. Bomb AN-M34 could not carry this alternate hydrostatic fuze.

The 2000-lb. G.P. Bomb AN-M34 and AN-M66 are filled with either 50-50 Amatol or TNT and may be fitted with the following fuzes:

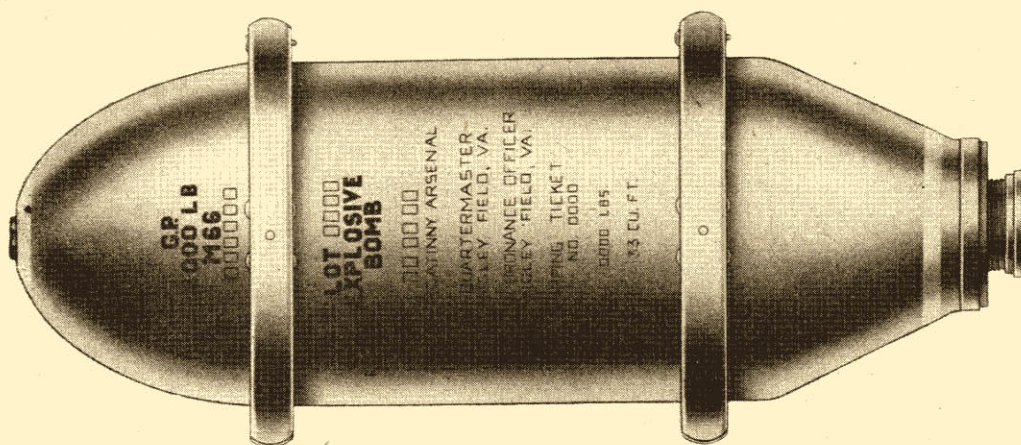
1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M102A2
3. Alternate Tail Fuze M117 (for "mast-head" bombing)
4. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4 may be installed only in the Bomb AN-M66.



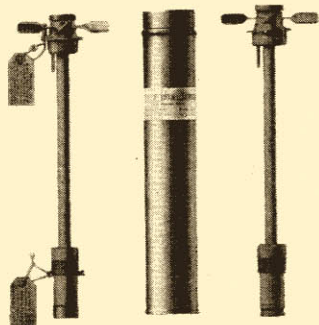
DIMENSION AND WEIGHT TABLE

Total Weights: AN-M34 (50-50 Amadol Loading)	2,049.0 lb.	including Auxiliary Booster and Surrounds)	1,061.0 lb.
AN-M66 (50-50 Amadol Loading)	2,052.0 lb.	Weight of Explosive (TNT, including Auxiliary Booster and Surrounds)	1,061.0 lb.
Weight of Explosive (50-50 Amadol,		Overall Length	92.8 in.
		Diameter of Bomb Body	23.3 in.

Figure 47.—2,000-Lb. General Purpose Bomb AN-M66

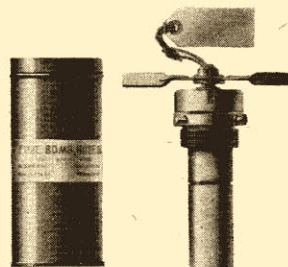


BOMB BODY, LUG GUARDS AND SHIPPING PLUGS

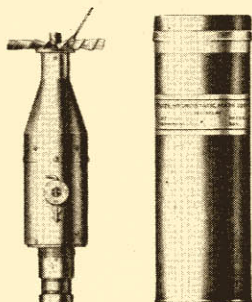


TAIL FUZE
AN-M102A2

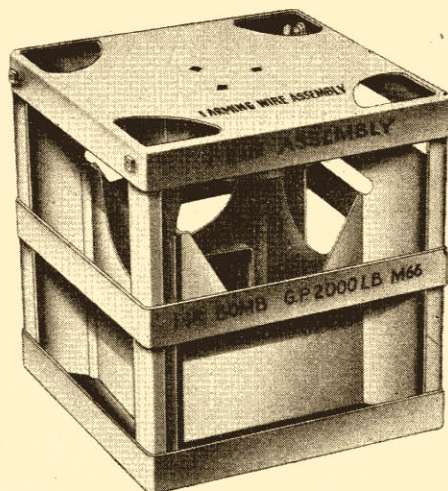
ALTERNATE
TAIL FUZE M117



NOSE FUZE AN-M103A1



ALTERNATE TAIL FUZE AN-MK 230 MOD 4



CRATED FIN ASSEMBLY

Figure 48.—Components of a Complete Round

GENERAL PURPOSE BOMBS

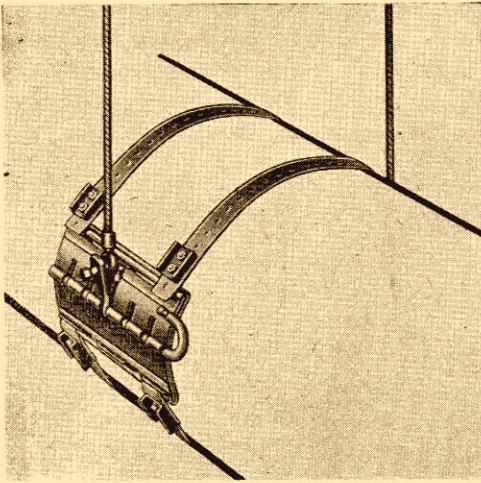


Figure 49.—Universal Hoisting Band Mk 8

The “long-delay” Tail Fuze M125 may be used in the 2000-lb. G.P. Bombs AN-M34 and AN-M66. Adapter Boosters M115 and M102 have recently been modified with a lock pin assembly to prevent circumvention of the anti-withdrawal device of this fuze. Modified Adapter Boosters M115 and M102 will be marked M115A1 and M102A1.

In conjunction with the Adapter Boosters M115A1, a method of preventing the removal of the base plug from the Bomb AN-

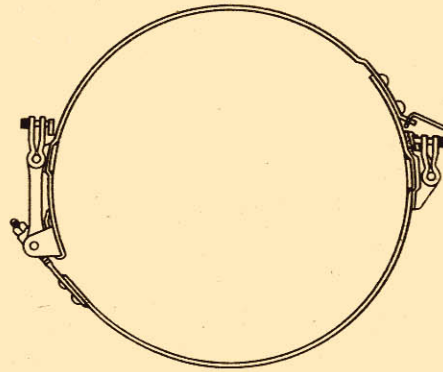


Figure 50.—Hoisting Band Mk 1 or Mk 1 Mod 2

M66 by imbedding special base plug studs into the bomb explosive has been adopted. No Bombs AN-M34 contain the modified base plugs. 2000-lb. G.P. Bombs AN-M66 assembled with both modified adapter boosters and modified base plugs will be marked AN-M66A1.

Aircraft loaded with bombs that have fuzes with anti-withdrawal devices must jettison these bombs before landing. See page 163.

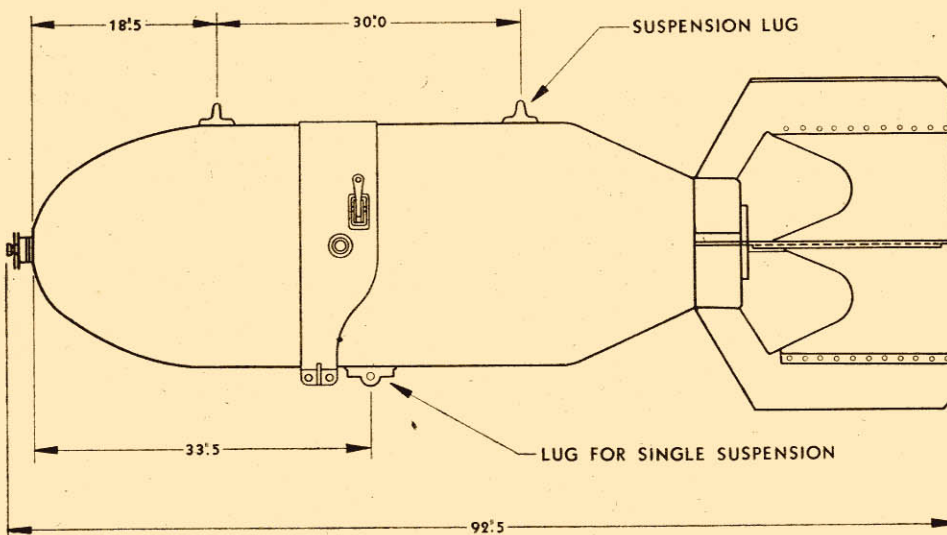


Figure 51.—2,000-Lb. General Purpose Bomb AN-M34 and AN-M66

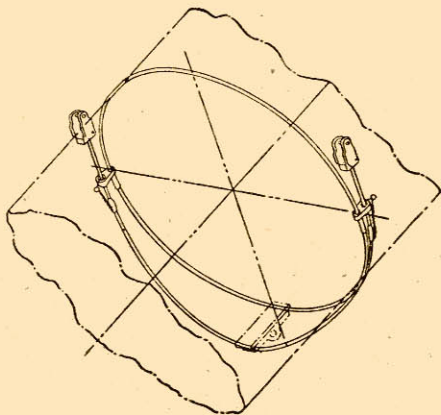


Figure 52.—Hoisting Sling Mk 15 Mod 1

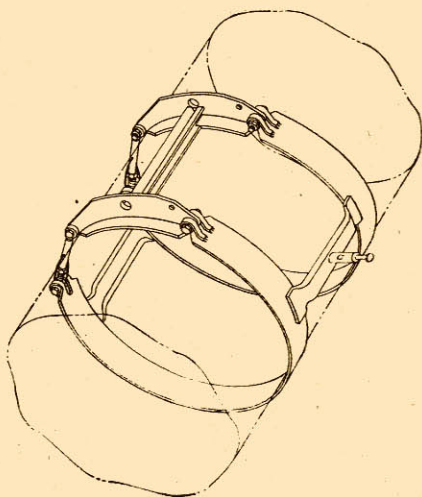


Figure 53.—Suspension Band Mk 10

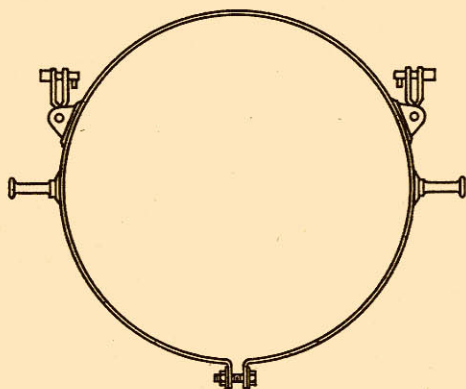


Figure 54.—Trunnion-Hoisting Band AN-M7

Modified bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped into deep water, or otherwise disposed of.

Suspension of Bomb

Two suspension lugs spaced 30.0 in. apart are welded to the bomb body for suspension from appropriate double-hook racks and shackles. A lug is provided for single suspension (British). Sling suspension may be used if a suitable plate is provided in the plane to accept the British suspension lug acting as a guide key. Certain aircraft can carry these bombs in slings by using the regular double-suspension lugs as guide keys. The rear lugs, in these cases, fit into a specially designed fixture in the airplane. The combination Suspension, Hoisting, Trunnion Band Mk 10 is used for suspending this bomb from bomb racks with 14-in. spacing hooks.

Hoisting of Bomb

A Universal Hoisting Band Mk 8 may be used for hoisting this bomb. The Torpedo Hoisting Band Mk 1 or Mk 1 Mod 2 may be used in an emergency by welding on a strip of sufficient length to enable the band to encircle the bomb. The recently developed Hoisting Sling Mk 15 Mod 1 may be used for hoisting this bomb, and the Suspension Band Mk 10, which contains hoisting provisions, may also be employed where required.

Trunnions

The combination Trunnion-Hoisting Band AN-M7 or the Suspension Band Mk 10 is used with the 2000-lb. bombs for the provision of trunnions.

Components of a Complete Round

1. 2000-lb. G.P. Bombs AN-M34 and AN-M66 are supplied to the service as follows:

GENERAL PURPOSE BOMBS

a. **Bomb AN-M34**—Bomb body in protecting lug guards with an Adapter Booster M102 installed, nose and tail shipping plugs in place and fin lock nut in place and lock-wired

b. **Bomb AN-M66**—Bomb body in protecting lug guards, with an Adapter Booster M115 and fuze adapter installed, nose and tail shipping lugs in place, and fin lock nut in place and lock-wired

2. Tail crate containing:

a. Fin assembly for 2000-lb. Bomb AN-M34 or AN-M66

b. Arming wire assembly, Type B

3. Nose Fuze AN-M103A1

4. Tail Fuze AN-M102A2 with Primer Detonator M14, 0.025-Second Delay assembled

5. Alternate Primer Detonators M14:

a. Non-Delay

b. 0.01-Second Delay

c. 0.10-Second Delay

6. Alternate Hydrostatic Tail Fuze AN-Mk 230 Mod 4 (for Bomb AN-M66 only)

7. Alternate Tail Fuze M117 (for "mast-head" bombing) with Primer Detonator M16A1, 4- to 5-Second Delay assembled

8. Alternate Primer Detonators M16A1, 8- to 15-Second Delay

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using appropriate wrench if

necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip fin assembly over tail end of bomb, rotating it to the angle required by the aircraft installation.

3. With fin assembly in desired position, thread on and **tighten** fin lock nut, using appropriate wrench. Install Suspension Band Mk 10, Trunnion-Hoisting Band AN-M7, or Hoisting Sling Mk 15 Mod 1, as required.

4. Remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

5. Remove tail fuze from its container and install in bomb.

a. Tail Fuze AN-M102A2: See page 157.

b. Tail Fuze M117: See page 162.

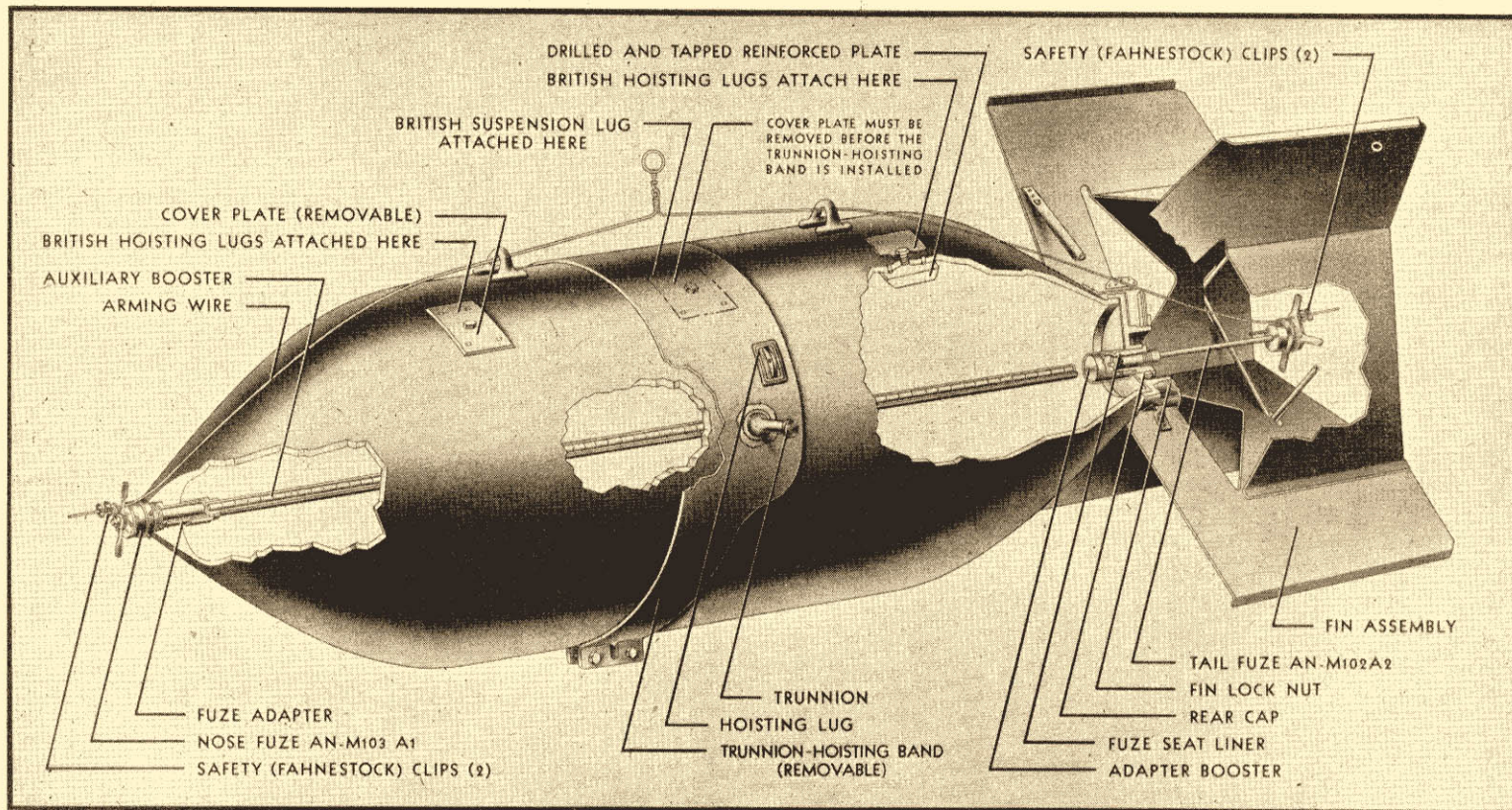
c. Tail Fuze AN-Mk 230 Mod 4: See page 180.

6. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packing.



DIMENSION AND WEIGHT TABLE

Total Weight	4,232.0 lb.	Overall Length	117.2 in.
Weight of Explosive (50-50 Amatol, including Auxiliary Boosters and Surrounds)	3,238.0 lb.	Diameter of Bomb Body	34.2 in.

Figure 55.—4,000-Lb. Light-Case Bomb AN-M56A1

GENERAL PURPOSE BOMBS

4,000-LB. LIGHT-CASE BOMB AN-M56A1

General Description

The 4000-lb. Light-Case Bomb AN-M56A1 is a cylindrical bomb having a box-type fin assembly. It contains 76.5% of explosive by weight. It is equipped with the following fuzes:

1. Nose Fuze AN-M103A1
2. Tail Fuze AN-M102A2

Suspension of Bomb

Two suspension lugs spaced 30.0 in. apart are provided for suspension from double-hook type racks and shackles. A pad containing four tapped holes is located 48 in. aft of the forward end of the bomb for attaching a single British suspension lug. The cover for this pad must be removed before attaching the Trunnion Band AN-M8.

Hoisting and Trunnions

A combination Trunnion-Hoisting Band AN-M8 is used for hoisting and the pro-

vision of trunnions for this bomb. The Bomb Hoisting Sling Mk 16 Mod 0 may also be used for hoisting.

Two pads each containing four tapped holes are located approximately 25 in. and approximately 67 in. aft of the forward end of the bomb for attaching two British hoisting lugs.

Components of a Complete Round

The 4000-lb. Light-Case Bomb AN-M56A1 is supplied to the service as follows:

1. Bomb body in protecting lug guards with an Adapter Booster M102 assembled, nose and tail shipping plugs in place, and fin lock nut in place and lock-wired
2. Tail crate containing:
 - a. Fin assembly
 - b. Arming wire assembly (BuOrd Dwg. 297113)

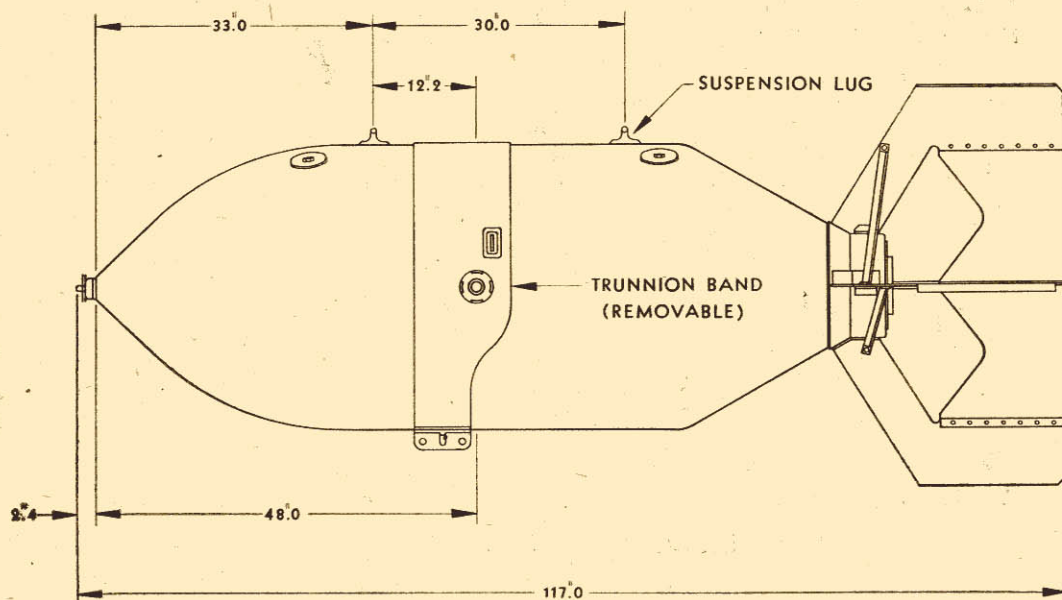
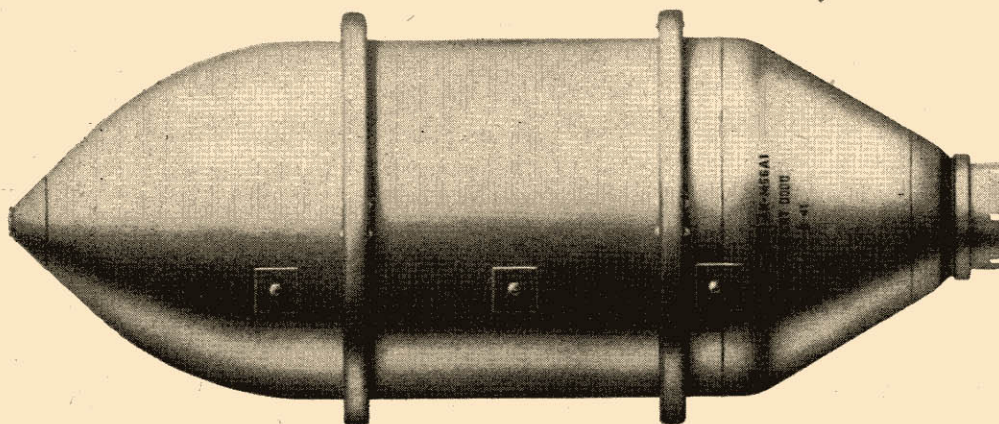
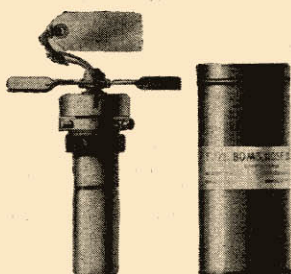


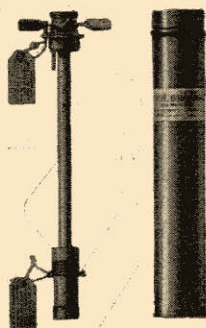
Figure 56.—4,000-Lb. Light-Case Bomb AN-M56A1



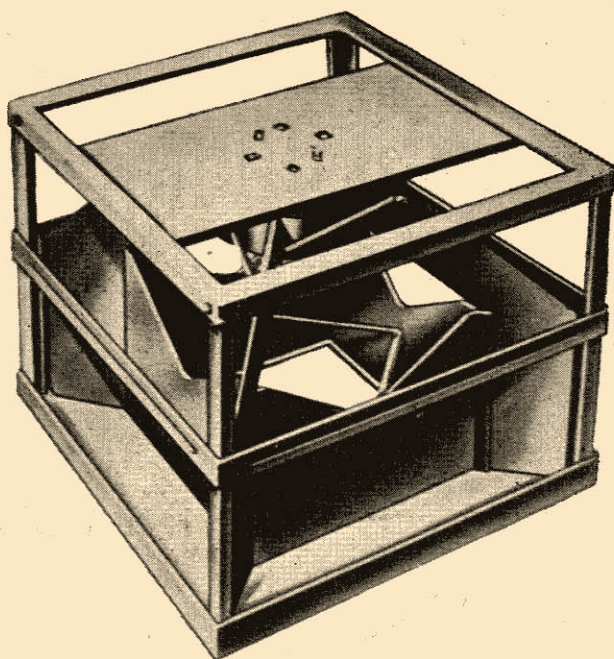
4000 LB. BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



NOSE FUZE AN-M103A1



TAIL FUZE AN-M102A2



TAIL CRATE

Figure 57.—Components of a Complete Round

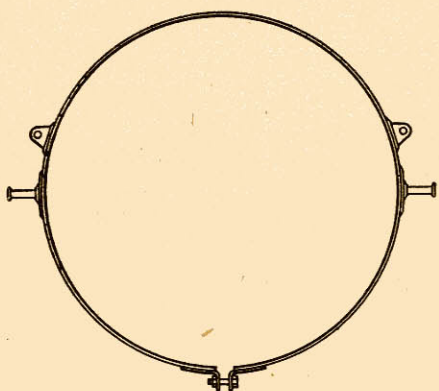


Figure 58.—Trunnion-Hoisting Band AN-M8

3. Nose Fuze AN-M103A1
4. Tail Fuze AN-M102A2
5. Trunnion Band AN-M8

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using appropriate wrench if necessary. Loosen, but do not remove, the tail shipping plug.
2. Slip fin assembly over tail end of bomb, rotating it to the angle required by the aircraft installation.
3. With the fin assembly in desired position, thread on and **tighten** the fin lock nut, using an appropriate wrench. Install Trunnion-Hoisting Band AN-M8 if required.
4. Remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.
5. Remove Tail Fuze AN-M102A2 from its container and install in bomb as de-

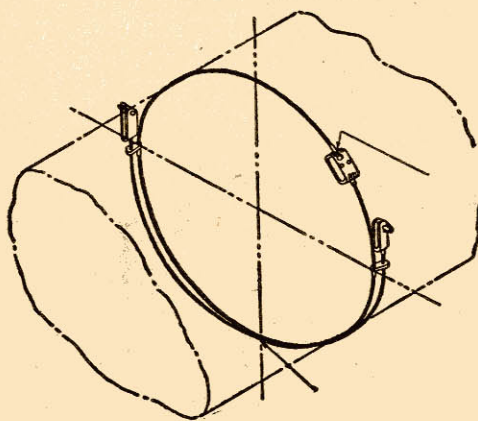


Figure 59.—Hoisting Sling Mk 16 Mod 0

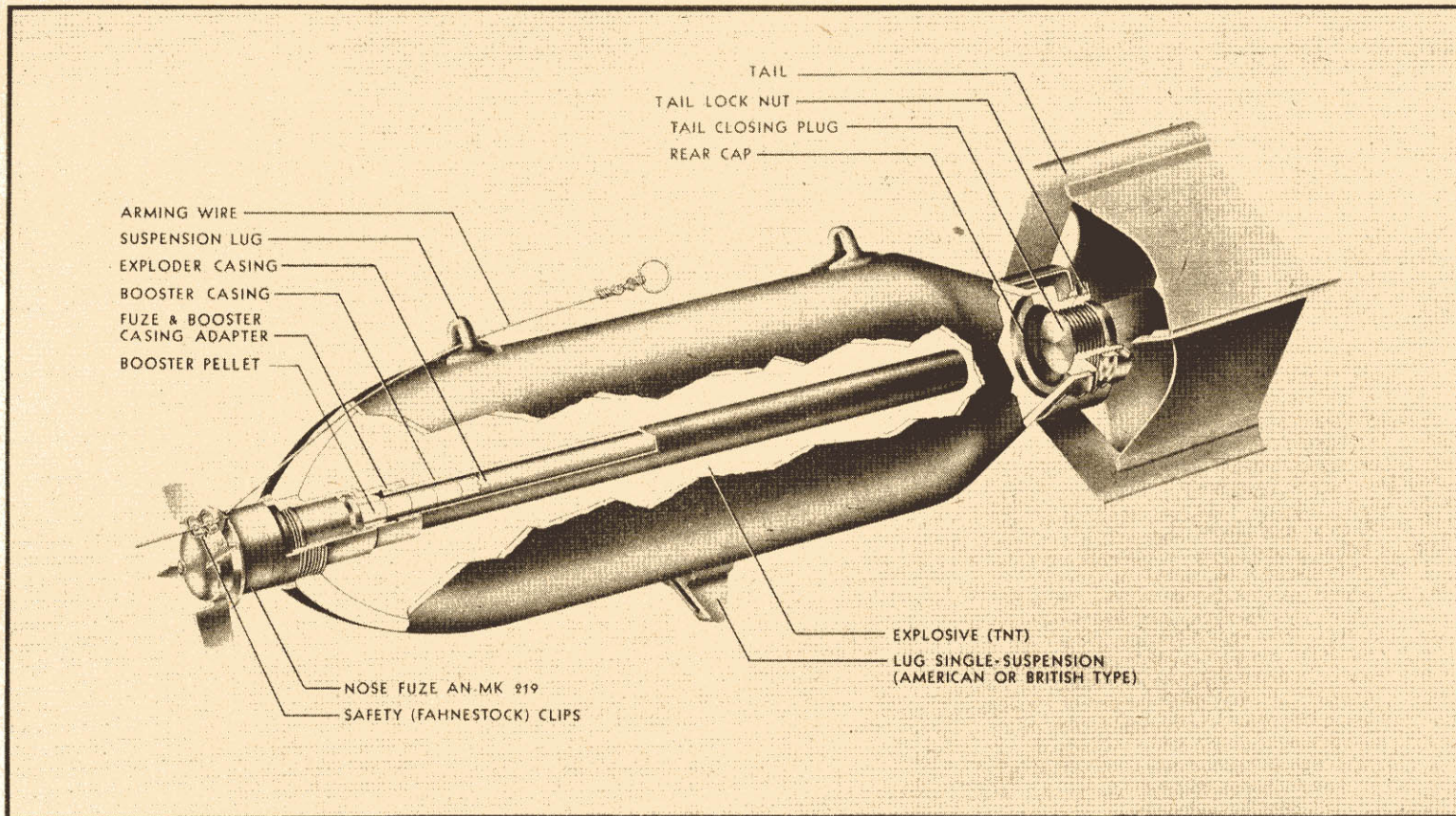
scribed on page 157. Use only non-delay primer-detonator in tail fuze when installed in this bomb.

6. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.
7. Remove Nose Fuze AN-M103A1 from its container and install in bomb as described on page 159. Set nose fuze for "instantaneous." Do not use "delay" setting when fuze is installed in this bomb.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin.

Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore rounds to their original condition and packing.



DIMENSION AND WEIGHT TABLE

Total Weight	105.0 lb.	Overall Length	38.6 in.
Weight of Explosive (TNT)	54.0 lb.	Diameter of Bomb Body	8.0 in.

Figure 60.—100-Lb. General Purpose Mk 4 Mod 4

GENERAL PURPOSE BOMBS

NAVY GENERAL PURPOSE BOMBS

100-LB. GENERAL PURPOSE BOMB MK 4 MOD 4

General Description

The 100-lb. G.P. Bomb Mk 4 Mod 4 is a cylindrical bomb having a box-type fin assembly. It carries the Nose Fuze AN-Mk 219 only.

No alternate fuzes are issued for use with this bomb. This bomb is being superseded by 100-lb. G.P. Bomb AN-M30, but Bombs Mk 4 Mod 4 are still in service.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are provided for suspension of this bomb. A single suspension lug is provided on the opposite side of the bomb for single suspension.

Hoisting of Bomb

No provisions are made for hoisting (neither lugs nor bands), as the bomb can be hoisted more quickly by hand.

Trunnions

Trunnions are not used with this bomb.

Components of a Complete Round

The bomb is supplied to the service as follows:

1. Bomb body in protecting lug guards (or in crate), nose shipping plug in place, and fin lock nut in place and lock-wired.

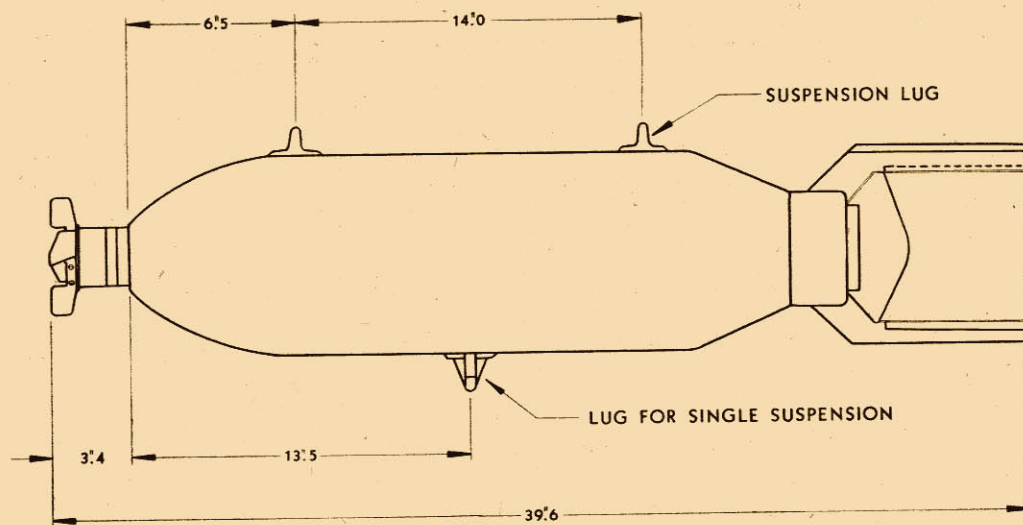
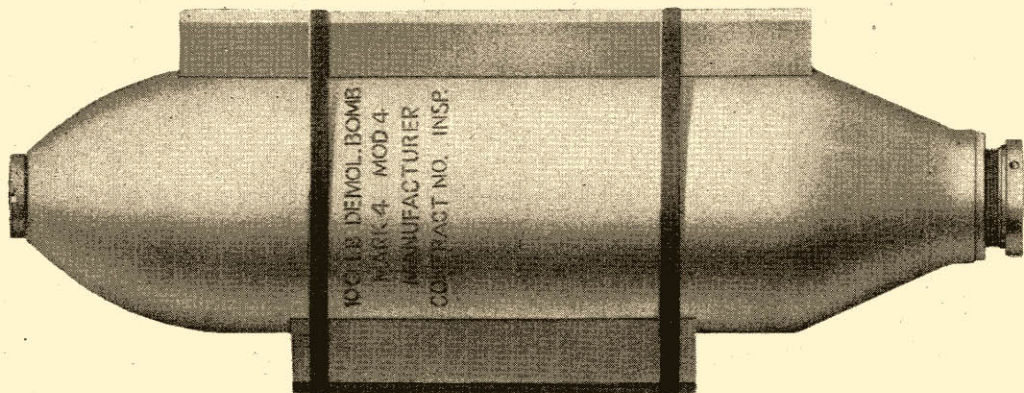


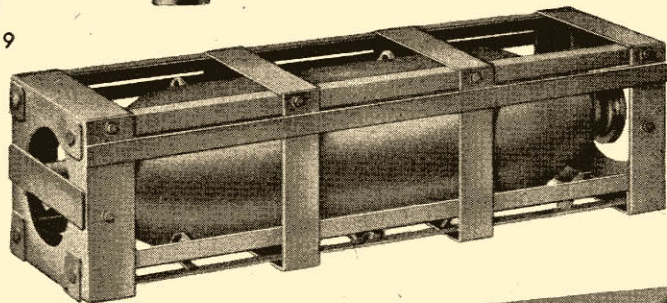
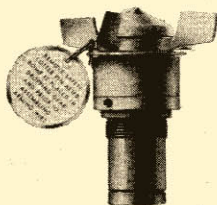
Figure 61.—100-Lb. General Purpose Bomb Mk 4 Mod 4



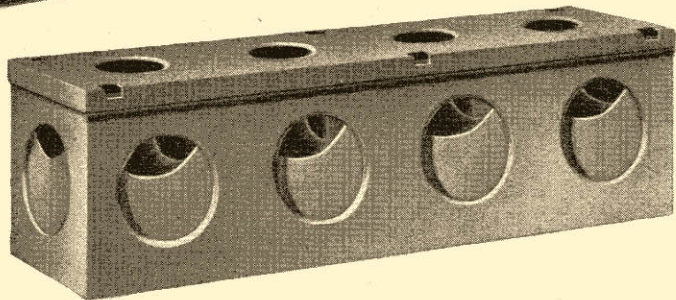
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



NOSE FUZE AN-MARK 219



CRATED BOMB



CRATED TAILS

Figure 62.—Components of a Complete Round

GENERAL PURPOSE BOMBS

- a. Navy exploder assembly
2. Tail crate containing:
 - a. Tails for 100-lb. Bombs Mk 4 Mod 4
3. Nose Fuze AN-Mk 219

Preparation of Bomb for Flight

1. Cut lock-wires of fin lock nut and remove the nut.
2. Slip tail over rear end of bomb, rotating it to angle required by the aircraft installation.
3. With tail in desired position, thread on and tighten tail lock nut, using appropriate wrench.

4. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

5. Remove Nose Fuze AN-Mk 219 from its container and install in bomb as described on page 168.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuze as instructed by the tag attached to each cotter pin. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packing.

500-LB. GENERAL PURPOSE BOMB MK 12 MOD 2

General Description

The 500-lb. G.P. Bomb Mk 12 Mod 2 is a cylindrical bomb having a box-type fin assembly. It is issued regularly with the following fuzes:

1. Nose Fuze Mk 221

2. Tail Fuze Mk 223

The alternate nose fuze issued is:

3. Nose Fuze AN-Mk 219
4. Nose Fuze AN-M103A1

This fuze is fitted into the bomb nose by means of an adapter for the Fuze AN-Mk

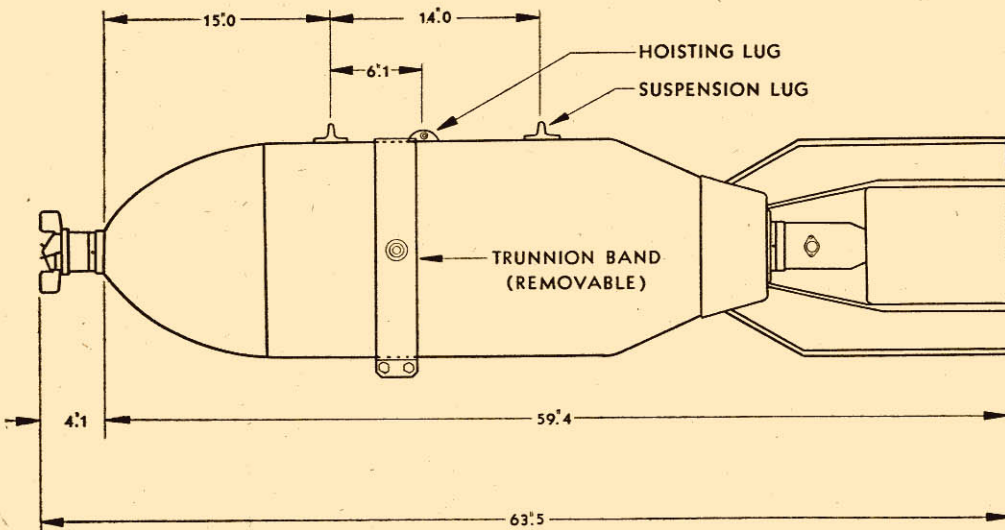
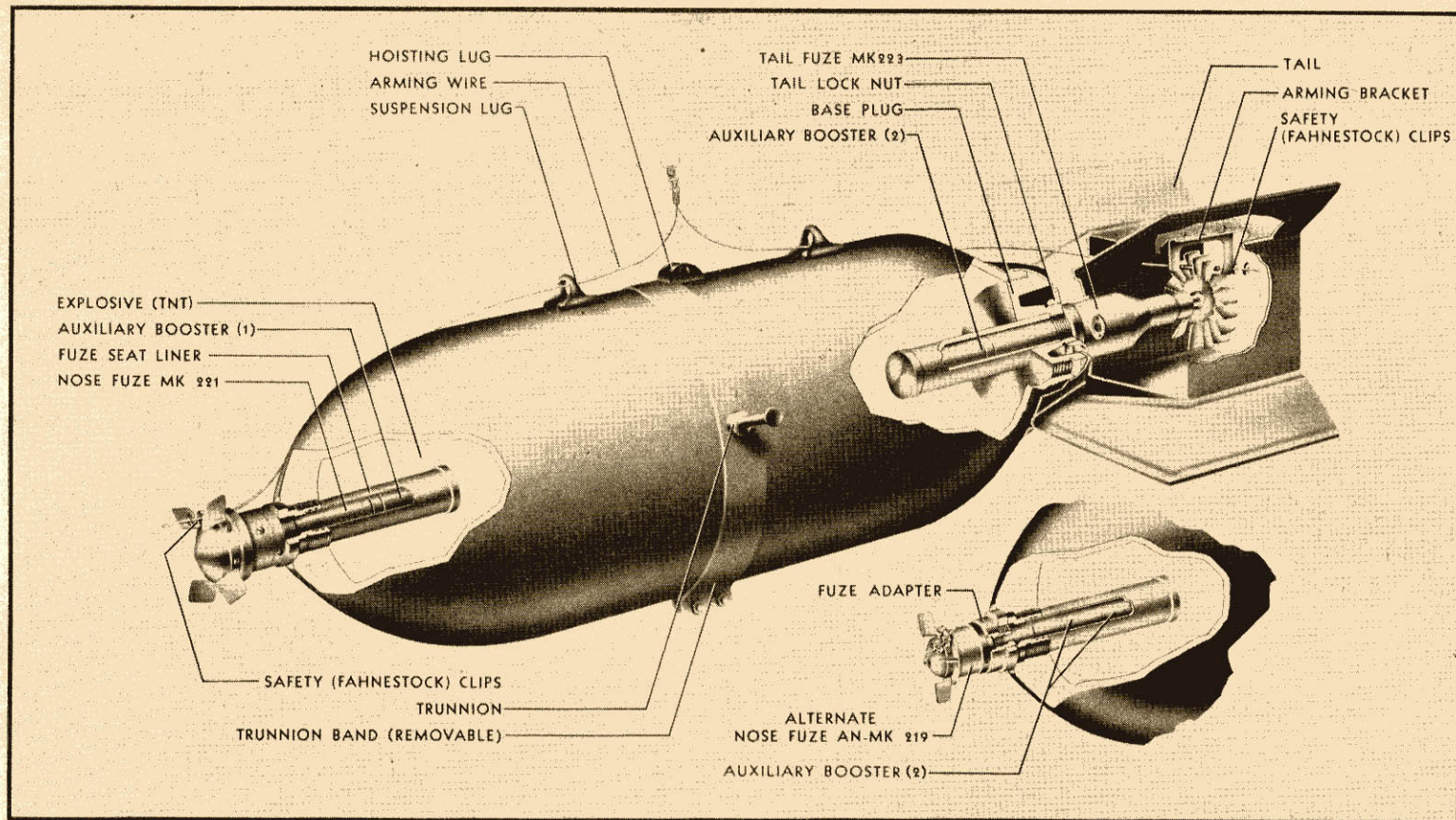


Figure 63.—500-Lb. General Purpose Bomb Mk 12 Mod 2



DIMENSION AND WEIGHT TABLE

Total Weight	504.3 lb.	Overall Length	63.5 in.
Weight of Explosive Filler (TNT) ..	255.5 lb.	Diameter of Bomb Body	14.0 in.

Figure 64.—500-Lb. General Purpose Bomb Mk 12 Mod 2

GENERAL PURPOSE BOMBS

219. Two auxiliary boosters are required in the fuze seat liner when the Fuze AN-Mk 219 is installed. A Hydrostatic Tail Fuze Mk 229 Mod 3 may be installed in this bomb in lieu of the Tail Fuze Mk 223.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are welded to the bomb body for suspension from double-hook racks and shackles.

Hoisting of Bomb

A lug is provided for single-cable hoisting to double-hook racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

Trunnions

Trunnions are provided for dive bombing by means of a 14.0-in. diameter trunnion band, BuOrd Dwg. 294244.

Components of a Complete Round

The bomb is supplied to the service as follows:

1. Bomb body in protecting lug guards with nose and tail shipping plugs in place and with tail lock nut in place and lock-wired

a. Two auxiliary (180-gram) boosters (one in nose and one in tail fuze seat liners)

2. Tail crate containing:

a. Tail for 500-lb. G.P. Bomb Mk 12 Mod 2

b. Arming wire tube

c. Arming wire assembly

3. Nose Fuze Mk 221

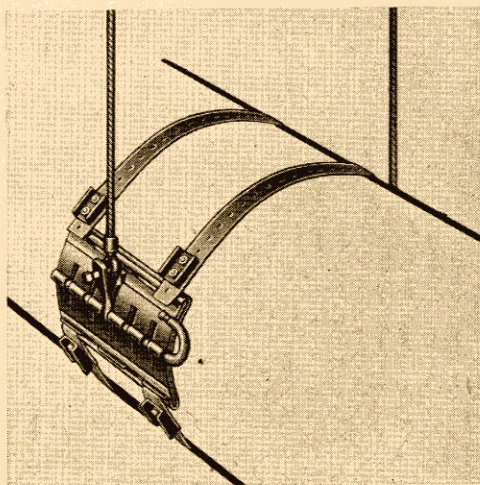


Figure 65.—Universal Hoisting Band Mk 8

4. Tail Fuze Mk 223

5. 14.0-in. diameter trunnion band for Bomb Mk 12 Mod 2

Preparation of Bomb for Flight

1. Cut lock-wire of tail lock nut and remove the nut, using wrench, if necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip the tail over the rear end of the bomb, rotating it to the angle required by the aircraft installation.

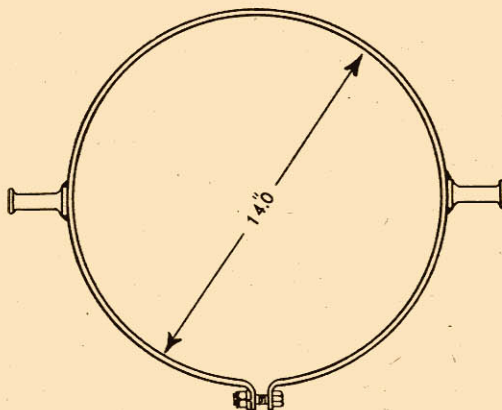
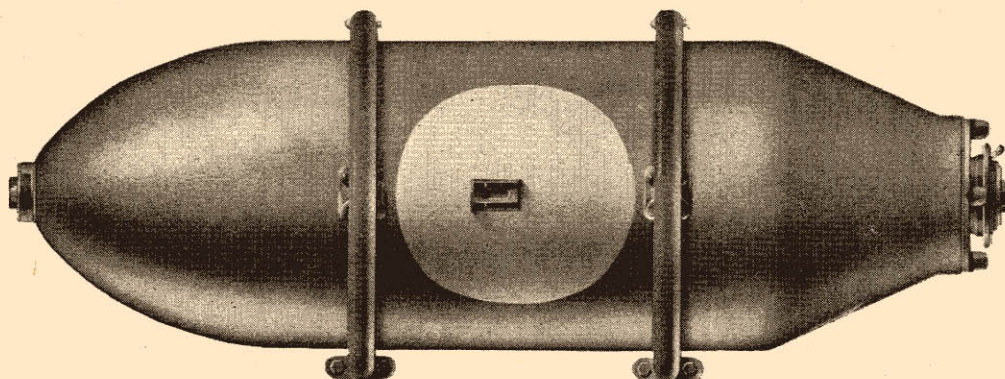
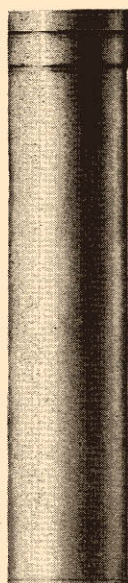


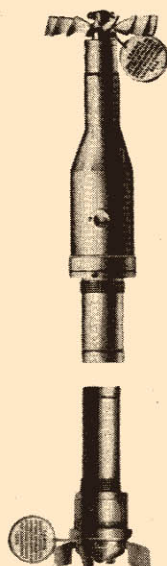
Figure 66.—Trunnion Band



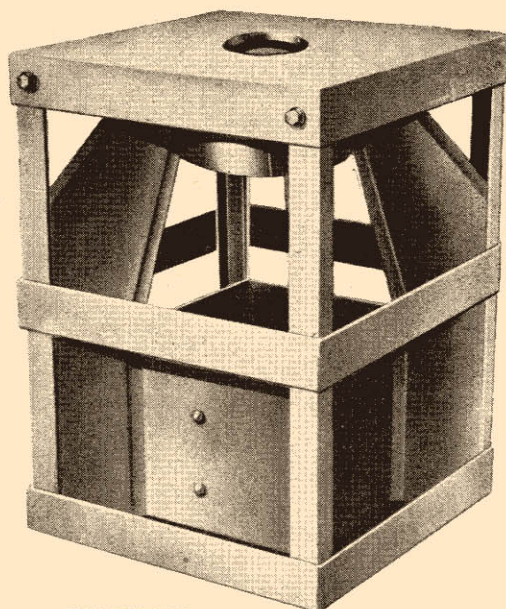
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



NOSE FUZE
MK 221



TAIL FUZE
MK 223



CRATED TAIL

Figure 67.—Components of a Complete Round

GENERAL PURPOSE BOMBS

Note: In certain lots of G.P. Bombs Mk 12 Mod 2, it was found that the tail locating pin was placed far enough aft of its correct position (toward the base plug) to prevent the tail cone from seating flat on the base plug. While corrected in later lots, this condition may be met in service and is remedied as follows: When it is known which particular tail cone slot must straddle the locating pin, that slot should be deepened with a round file until the tail cone can seat on the rear face of the base plug without having to be forced by pressure of the fin lock nut. Approximately $\frac{3}{8}$ in. is the maximum which it has been found necessary to deepen slots.

3. With tail in desired position, thread on and **tighten** the tail lock nut, using appropriate wrench.

4. Install trunnion or hoisting band as required.

5. Remove the tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

6. Remove Tail Fuze Mk 223 (or alternate Hydrostatic Tail Fuze Mk 229 Mod 3) from

its container and install as described on page 171 or page 178.

7. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

8. Remove the Nose Fuze Mk 221 from its container and install as described on page 169.

Note: If the alternate Nose Fuze AN-Mk 219 is to be installed in the bomb instead of the Fuze Mk 221, follow the procedure outlined on page 168.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Remove Hoisting Band Mk 8, if used. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packings.

1,000-LB. GENERAL PURPOSE BOMB MK 13 MOD 2

General Description

The 1000-lb. Bomb Mk 13 Mod 2 is a cylindrical bomb having a box-type tail assembly. It is issued regularly with the following fuzes:

1. Nose Fuze Mk 221
2. Tail Fuze Mk 223

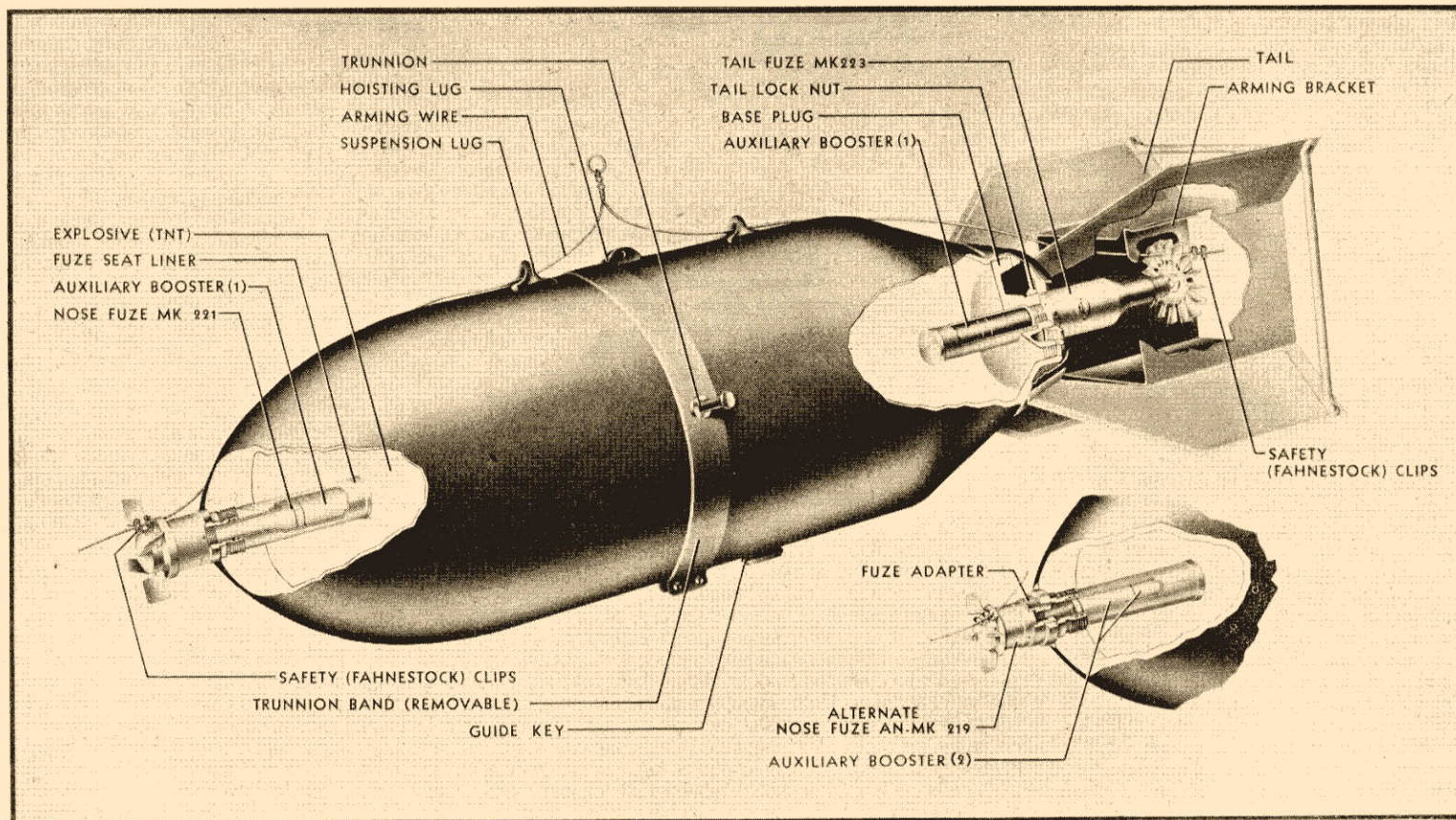
The alternate nose fuze issued is:

3. Nose Fuze AN-Mk 219

This fuze is fitted to the bomb by means of the adapter for the Fuze AN-Mk 219. Two auxiliary boosters are required in the fuze seat liner when the Fuze AN-Mk 219 is installed. The Hydrostatic Tail Fuze Mk 229 Mod 3 may be installed in this bomb in lieu of the Tail Fuze Mk 223.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are welded on the bomb body for suspension from double-hook racks and shackles. A guide key is provided on the opposite side of the bomb for sling suspension.



DIMENSION AND WEIGHT TABLE

Total Weight	1,005.0 lb.	Overall Length	76.7 in.
Weight of Explosive Filler (TNT) ..	510.8 lb.	Diameter of Bomb Body	17.7 in.

Figure 68.—1,000-Lb. General Purpose Bomb Mk 13 Mod 2

GENERAL PURPOSE BOMBS

Hoisting of Bomb

A hoisting lug is welded to the bomb for single-cable hoisting to double-hook bomb racks. For other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

Trunnions

A 17.7-in. diameter trunnion band, BuOrd Dwg. 294242, is used with this bomb.

Components of a Complete Round

The bomb is supplied to the service as follows:

1. Bomb body in protecting lug guards with nose and tail shipping plugs in place and tail lock nut in place and lock-wired

a. Two auxiliary (180-gram) boosters

2. Tail crate containing:

a. Tail for 1000-lb. Bomb Mk 13 Mod 2

b. Arming wire tube

c. Arming wire assembly

3. Nose Fuze Mk 221

4. Tail Fuze Mk 223

5. Trunnion band, 17.7-in. diameter, BuOrd Dwg. 294242, for Bomb Mk 13 Mod 2

Preparation of Bomb for Flight

1. Cut lock-wire of tail lock nut and remove the nut, using an appropriate wrench if necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip tail over rear end of bomb, rotating it to the angle required by the aircraft installation.

Note: In certain lots of 1000-lb. G.P. Bombs Mk 13 Mod 2, it was found that the tail locating pin was placed far enough aft

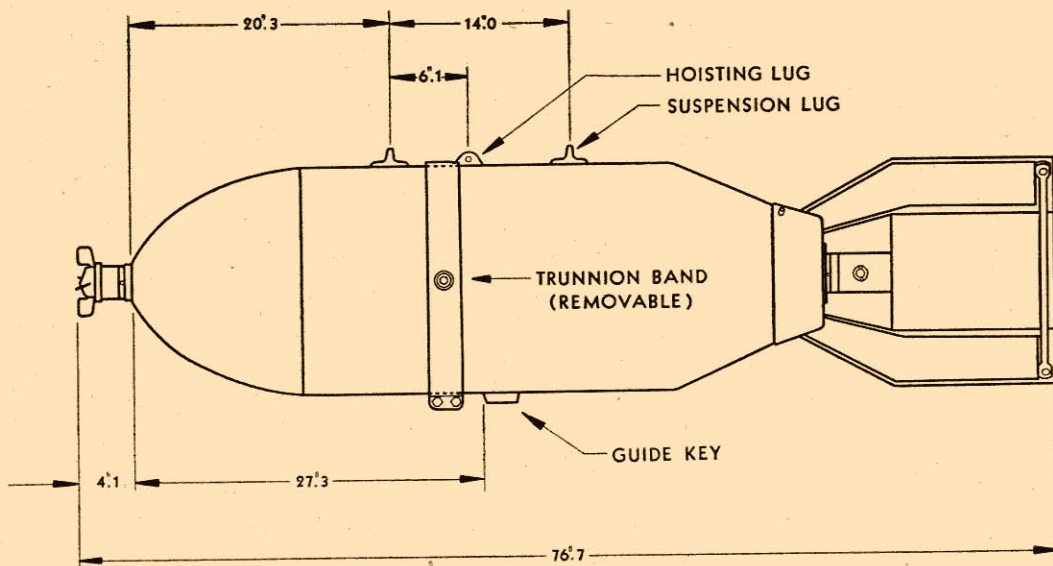
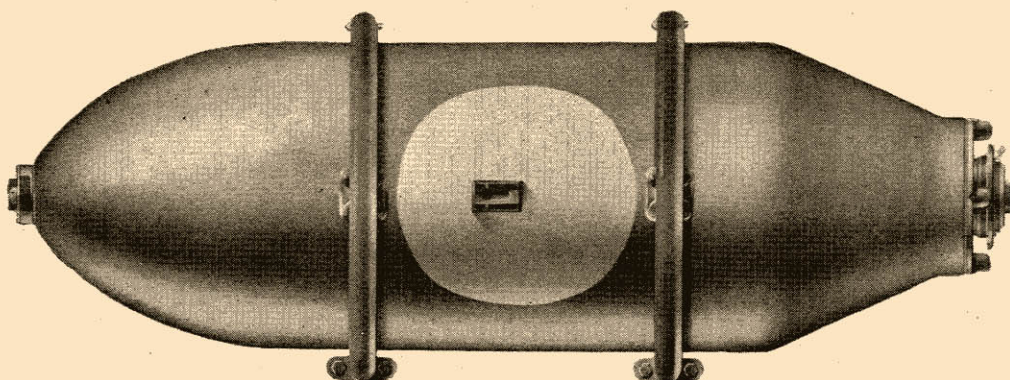
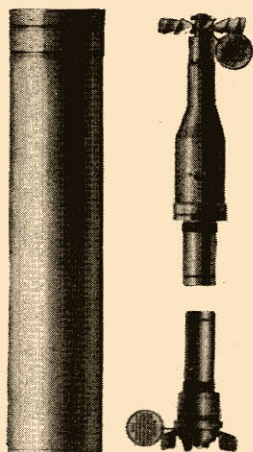


Figure 69.—1,000-Lb. General Purpose Bomb Mk 13 Mod 2

RESTRICTED



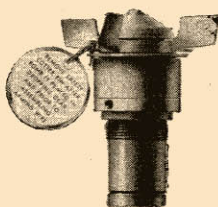
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



NOSE FUZE MK 221, TAIL FUZE MK 223



ALTERNATE NOSE FUZE AN-MK 219



CRATED TAIL

Figure 70.—Components of a Complete Round

GENERAL PURPOSE BOMBS

of its correct position (toward the base plug) to prevent the tail cone from seating flat on the base plug. While corrected in later lots, this condition may be met in service, and it is remedied as follows: When it is known which particular tail cone slot must straddle the locating pin, that slot should be deepened with a round file until the tail cone can seat on the rear face of the base plug without having to be forced by pressure of the fin lock nut. Approximately $\frac{3}{8}$ inch is the maximum it has been found necessary to deepen slots.

3. With tail in desired position, thread on and **tighten** the fin lock nut, using the spanner wrench provided.

4. Install trunnion or hoisting band, as required.

5. Remove the tail shipping plugs and inspect fuze cavity and threads. Clean if necessary.

6. Remove Tail Fuze Mk 223 (or alternate Hydrostatic Tail Fuze Mk 229 Mod 3) as described on page 171 or page 178.

7. Remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

8. Remove the Nose Fuze Mk 221 from its container and install as described on page 169.

Note: If the alternate Nose Fuze AN-Mk 219 is to be installed in this bomb instead of the Fuze Mk 221, follow the procedure outlined on page 168.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Remove Hoisting Band Mk 8, if used. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packing.

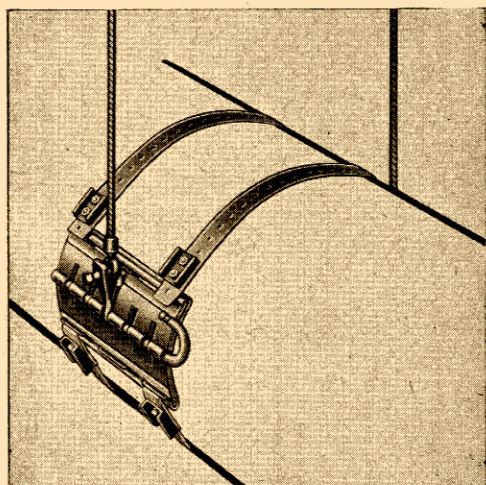


Figure 71.—Universal Hoisting Band Mk 8

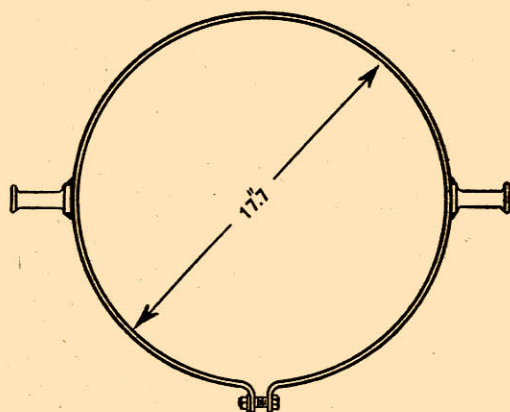
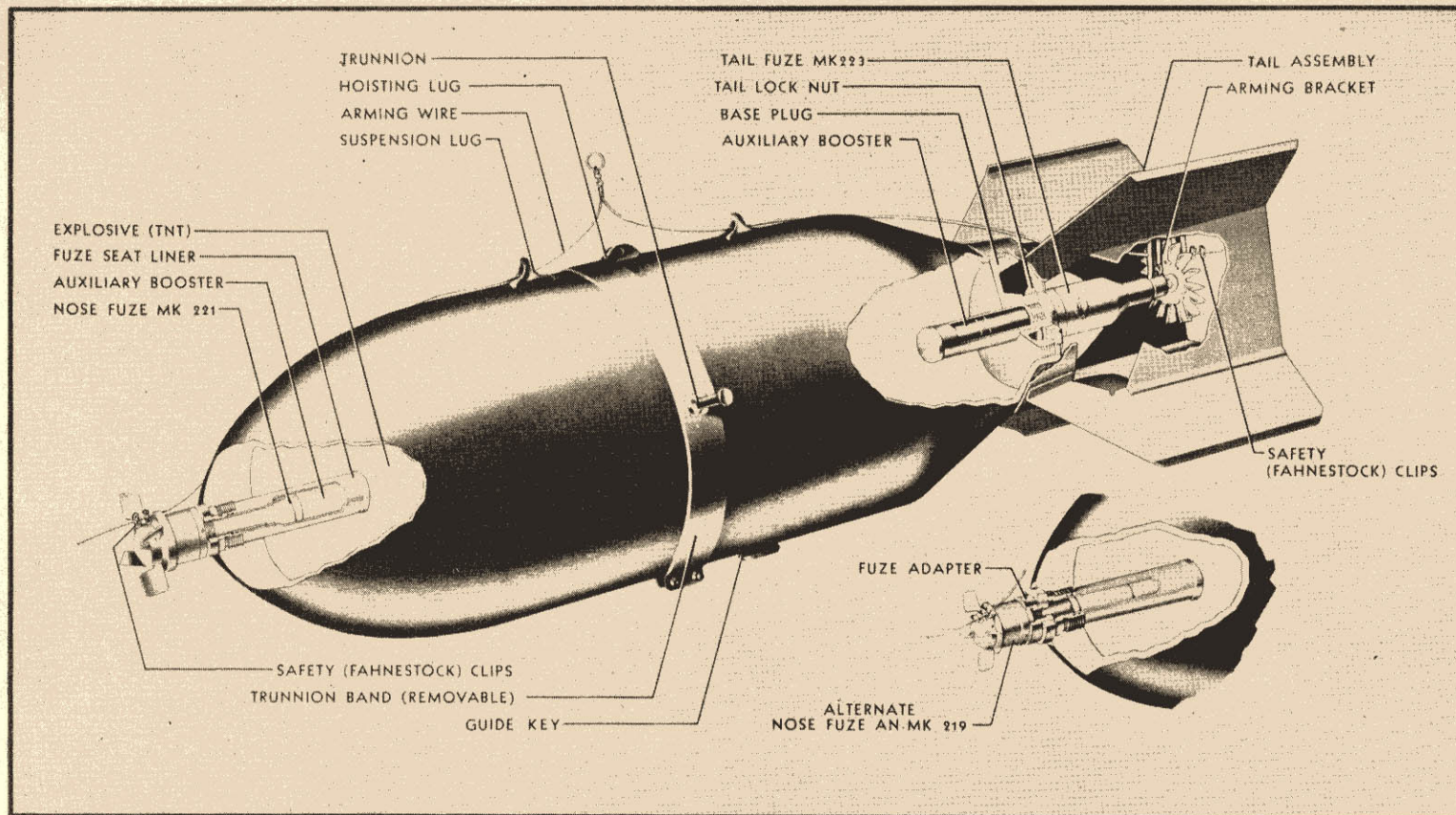


Figure 72.—Trunnion Band, BuOrd Dwg. 294242



DIMENSION AND WEIGHT TABLE

Total Weight	1,012 lb.	Overall Length	71.2 in.
Weight of Explosive (TNT)	558 lb.	Diameter of Bomb Body	18.7 in.

Figure 73.—1,000-Lb. General Purpose Bomb Mk 36

GENERAL PURPOSE BOMBS

1,000-LB. GENERAL PURPOSE BOMB MK 36

General Description

The 1000-lb. G.P. Bomb Mk 36 is a modified version of the 1000-lb. G.P. Bomb AN-M44 previously described. The G.P. Bomb Mk 36 was designed for use primarily by the Navy as an alternate for the 1000-lb. G.P. Bomb Mk 13 Mod 2. The G.P. Bomb Mk 36 differs from the G.P. Bomb AN-M44 in the following respects:

1. Provisions are made for the use of Nose Fuzes AN-Mk 219 or Mk 221 and Tail Fuze Mk 223, or an alternate Hydrostatic Tail Fuze Mk 229 Mod 3.
2. A Navy-type hoisting lug and guide key are provided.
3. Trunnions for use in dive bombing are furnished by means of a trunnion band.
4. Explosive filling is TNT instead of the 50-50 Amatol filling used in G.P. Bomb AN-M44.

Suspension of Bomb

Two suspension lugs spaced 14.0 in. apart are welded to the bomb body for suspension from double-hook racks and shackles. A guide key is provided on the opposite side of the bomb for sling suspension.

Hoisting of Bomb

A lug is provided for single-cable hoisting to double-hook racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

Trunnions

Trunnions are provided for dive bombing by means of an 18.8-in. diameter trunnion band, BuOrd Dwg. 329330.

Components of a Complete Round

The bomb is regularly supplied to the service as follows:

1. Bomb body in protecting lug guards, with an adapter and two auxiliary boosters

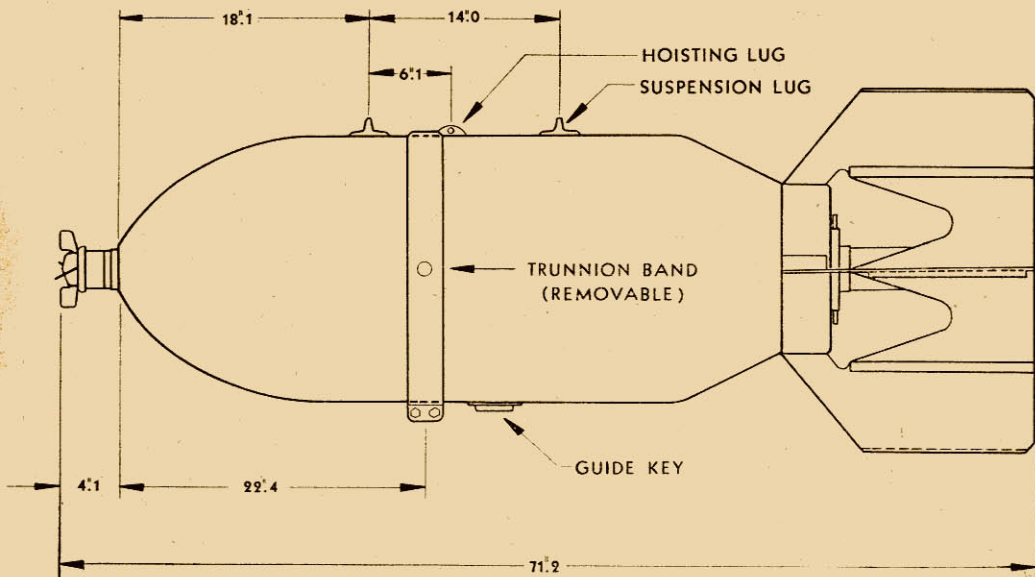
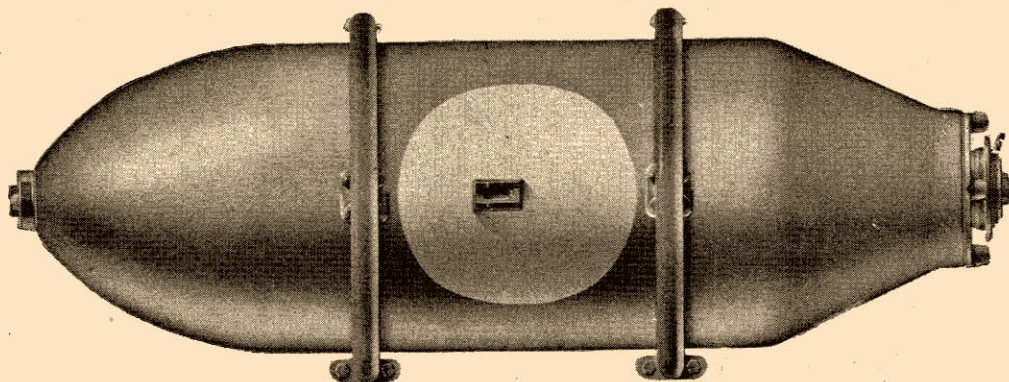
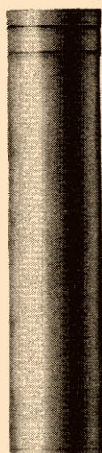


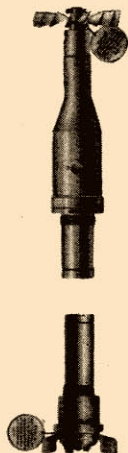
Figure 74.—1,000-Lb. General Purpose Bomb Mk 36



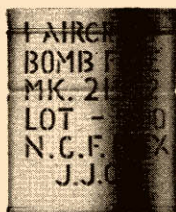
BOMB BODY, LUG GUARDS AND SHIPPING PLUGS



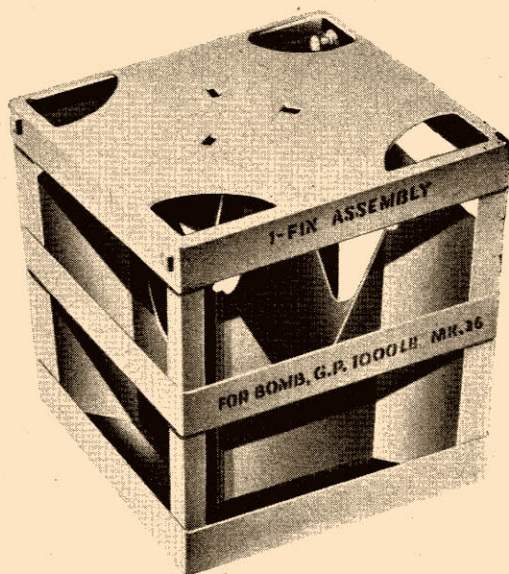
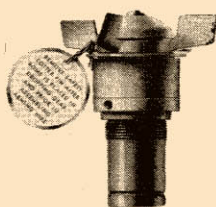
NOSE FUZE MK 221



TAIL FUZE MK. 223



ALTERNATE NOSE FUZE AN-MK. 219



CRATED TAIL

Figure 75.—Components of a Complete Round

GENERAL PURPOSE BOMBS

installed, with nose and tail shipping plug in place and with fin lock nut in place and lock-wired

2. Tail crate containing:
 - a. Fin assembly for 1000-lb. G.P. Bomb Mk 36
 - b. Arming wire tube
 - c. Arming wire assembly
3. Nose Fuze Mk 221
4. Tail Fuze Mk 223
5. Trunnion band, 18.8-in. diameter Bu-Ord Dwg. 329330.

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using appropriate wrench if necessary. Loosen, but do not remove, the tail shipping plug.
2. Slip the tail fin assembly over the rear end of bomb, rotating it to the angle required by the type of aircraft installation.
3. With the tail fin assembly in the desired position, thread on and **tighten** the fin lock nut, using appropriate wrench.
4. Install trunnion or hoisting band as required.

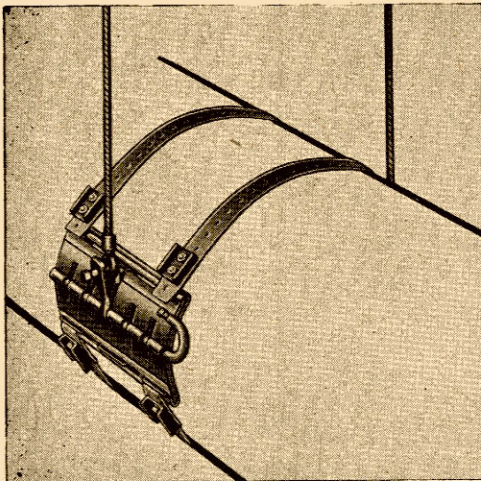


Figure 76.—Universal Hoisting Band Mk 8

5. Remove the tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

6. Remove Tail Fuze Mk 223 (or alternate Hydrostatic Tail Fuze Mk 229 Mod 3) from its sealed container and install in bomb as described on page 171 or page 178.

7. Remove nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

8. Remove Nose Fuze Mk 221 from its container and install in bomb as described on page 169.

Note: If the alternate Nose Fuze AN-Mk 219 is to be installed in this bomb instead of the Fuze Mk 221, follow the procedure outlined on page 168.

The bomb now constitutes an assembled complete round.

Note: After the bomb has been installed in the aircraft, remove the cotter pins from the fuzes as instructed by the tag attached to each cotter pin. Remove Hoisting Band Mk 8, if used. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

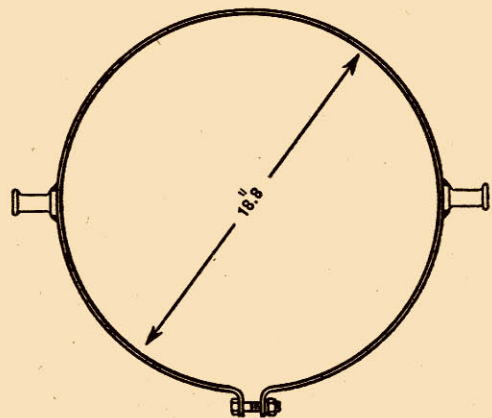
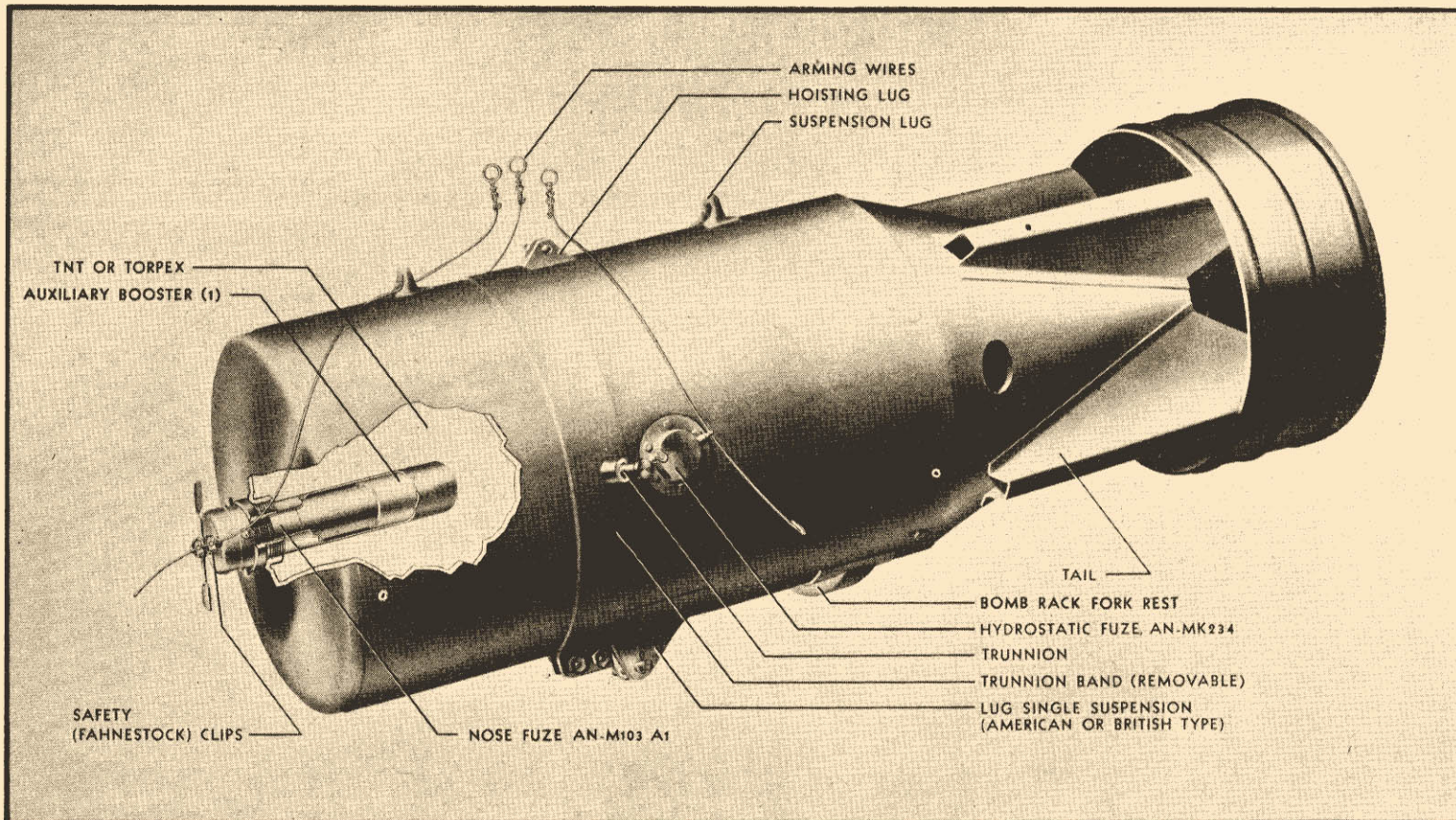


Figure 77.—Trunnion Band



DIMENSION AND WEIGHT TABLE

Total Weight AN-Mk 41 (TNT-Loaded)	329.5 lb.	Weight of Explosive AN-Mk 47 (Torpex)	252.0 lb.
Total Weight AN-Mk 47 (Torpex-Loaded)	354.5 lb.	Overall Length	53.1 in.
Weight of Explosive AN-Mk 41 (TNT)	227.0 lb.	Diameter of Bomb Body	15.0 in.

Figure 78.—Depth Bombs AN-Mk 41 or AN-Mk 47

Chapter 3

AIRCRAFT DEPTH BOMBS

325-lb. Depth Bomb Mk 17 Mod 1
325-lb. Depth Bomb AN-Mk 17 Mod 2
350-lb. Depth Bomb AN-Mk 44
325-lb. Depth Bomb AN-Mk 41
350-lb. Depth Bomb AN-Mk 47
650-lb. Depth Bomb Mk 29

650-lb. Depth Bomb Mk 37
650-lb. Depth Bomb Mk 38
700-lb. Depth Bomb Mk 49
325-lb. Depth Bomb Mk 53
350-lb. Depth Bomb Mk 54
7.0-in. (100-lb.) Depth Bomb Mk 52

DEPTH BOMBS

What They Are

Aircraft depth bombs are light-case bombs containing approximately 70% by weight of explosive filler.

Their Use

Aircraft depth bombs are designed, primarily, for attacking submarines. They may also be used as blast or demolition bombs against surface targets when fuzed with appropriate, instantaneous-action nose fuzes.

Minimum Release Altitudes

Minimum release altitudes will be governed by instructions issued by the Commander in Chief, U. S. Fleet.

Bombs Described in This Chapter

The depth bombs described in this chapter are in two classifications, Navy bombs and Army-Navy (AN-Standard) bombs.

The Navy bombs are designated by MARK and MOD; for all Army-Navy Standard bombs, the letters AN precede the MARK and MOD numbers.

General Description

Aircraft depth bombs of the 325-350-lb. and 650-700-lb. weight classes are now in

service. These bombs are characterized by a light case, a relatively large explosive filler, and a diameter somewhat greater than that of other type bombs of approximately the same weight.

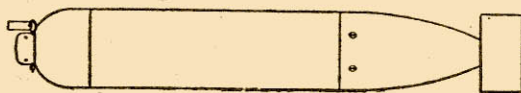
All the depth bombs which will be described in this pamphlet, with one exception, are very similar in design and construction. They differ principally in size and weight and in the fuzes used. The one exception is the 7.0-inch 100-lb. Depth Bomb Mk 52, which will be described in a subsequent section of this pamphlet.

Flat-Nose Attachments

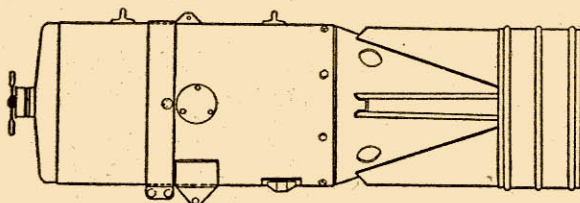
Round-nose depth bombs have a tendency to ricochet when they enter the water at angles between 15° and 20°. A ricochet is almost certain with a round-nose bomb if the entrance angle is less than 15°.

The purpose of providing a flat-nose shape for aircraft depth bombs is to reduce the possibilities of ricochets when the bombs are dropped, on water, under conditions which result in small entrance angles (high speed and low altitude at release). In general, the flat-nose shape will reduce the entrance angle at which a depth bomb is likely to ricochet to a value of approximately 10 degrees. The corresponding value for a round-nose depth bomb is about 20 degrees.

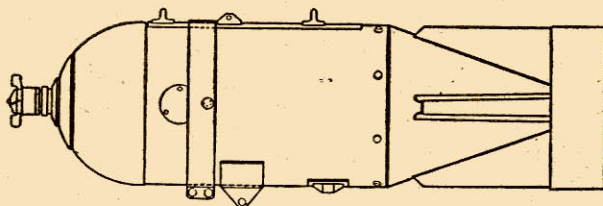
7".0 BOMB MARK 52



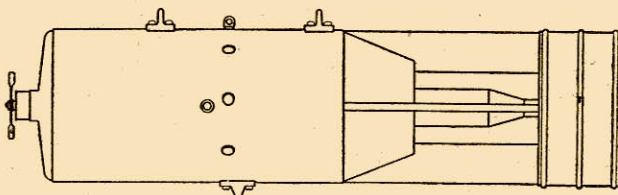
AIRCRAFT DEPTH BOMB AN-MK 41 AND AN-MK 47



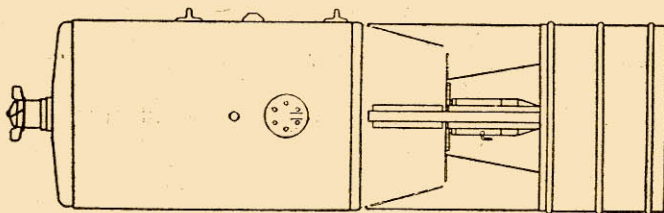
AIRCRAFT DEPTH BOMB MK 17 MOD 1,
AN-MK 17 MOD 2 & AN-MK 44



AIRCRAFT DEPTH BOMB MARK 53 AND MARK 54



AIRCRAFT DEPTH BOMB MARK 38 AND MARK 49



AIRCRAFT DEPTH BOMB MARK 29 AND MARK 37

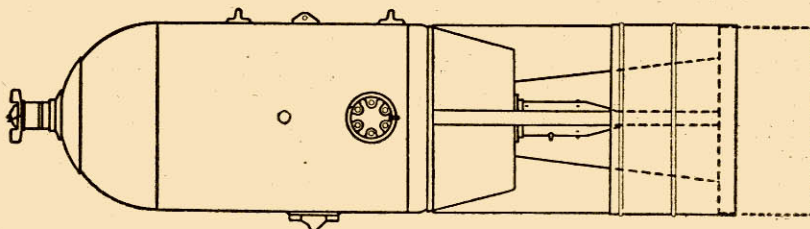


Figure 79.—Comparison of Bombs

DEPTH BOMBS

For those depth bombs which were not originally designed with a flat-nose shape, flat-nose attachments are provided which may be installed directly onto a round-nose depth bomb.

After a flat-nose attachment is secured to a depth bomb, the intervening space **must** be filled with a semifluid mixture of plaster or cement. A flat-nose attachment which is not properly filled or not filled at all is worse than no attachment, as far as preventing ricochet is concerned. The approximate weight increase for completely installed flat-nose attachment is 44 pounds for 325-350-lb. depth bombs and 72 pounds for 650-700-lb. depth bombs.

A flat-nose bomb, when mounted on external racks, will cause some increase in drag compared with a round-nose bomb. In general, the consequent decrease in airspeed at altitudes up to 1000 feet is approximately 2%; above 1000 feet, the decrease in airspeed is hardly discernible with most current types of service aircraft which will normally carry these bombs.

General Safety Precautions

1. Prior to assembly of complete rounds, examine all mating parts, such as fuzes and fuze cavities.

2. Make sure that threads are clean and all surfaces free of foreign matter.

3. Examine fuzes for evidence of deterioration, such as rust or corrosion. Use only serviceable fuzes. If a fuze appears unserviceable, return it to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

4. Check condition of tails. Use only tails which are in good condition. Install all bolts provided for the attachment of the tail to the body or, if a tail lock nut is used for this purpose, make certain that the nut is tight.

5. Check suspension and hoisting lugs for damage and proper spacing.

6. If a flat nose is to be installed, make certain that plaster or similar backing material is placed behind the attachment.

7. Check installation of arming wires carefully so as to comply with recommendations given in a subsequent chapter of this pamphlet.

Fuzes for Aircraft Depth Bombs

A. General—In all depth bombs of the 325-350-lb. class, with one exception, both an athwartship hydrostatic fuze and a nose fuze may be installed. The one exception is the 325-350-lb. Depth Bomb Mk 53 or Mk 54, which can be fitted with a nose fuze and a hydrostatic tail fuze, no athwartship hydrostatic fuze being used in this design. All depth bombs of the 650-700-lb. class may be fitted with three fuzes; namely, a nose fuze, an athwartship hydrostatic fuze, and a hydrostatic tail fuze. The hydrostatic fuze controls the detonation of the bomb when

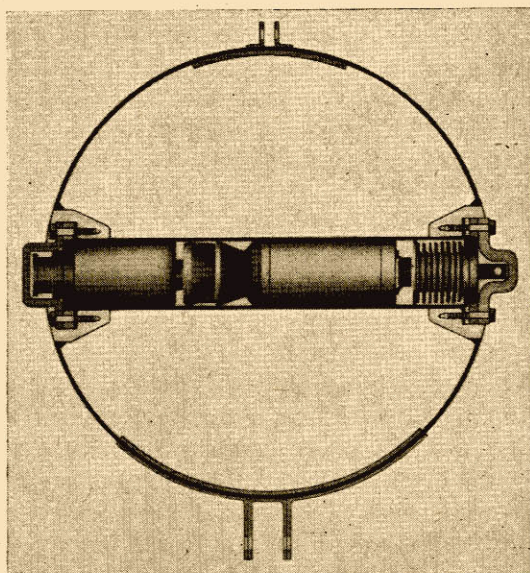


Figure 80.—Fuze AN-Mk 234 in Bomb Body

an underwater mining action is required, as in ordinary antisubmarine operations. The nose fuze, when armed, detonates the bomb upon impact with a surface target. If sufficient striking velocity is attained, the nose fuze may also detonate the bomb upon impact with water. Both the Fuze AN-Mk 219 and the Fuze AN-M103A1 will detonate on water, or a denser medium, when released under any combination of speed and altitude which will permit the fuze to arm.

B. Nose Fuses—The Nose Fuses AN-Mk 219, AN-M103A1, and Mk 221 may be in-

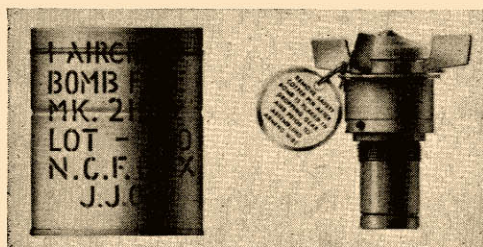


Figure 81.—Nose Fuze AN-Mk 219

stalled in any one of the several types of aircraft depth bombs. However, a nose fuze having any delay should not be used, as the light-case depth bomb bodies will be ruptured before a delay fuze can function. Thus, only the Nose Fuze AN-Mk 219 or the AN-M103A1, set for instantaneous action, should be used in depth bombs.

All of the fuzes mentioned are safe for use in dive-bombing and for take-offs and landings anywhere, including decks of carriers.

C. Athwartship Hydrostatic Fuzes—The principal athwartship hydrostatic fuzes for use in aircraft depth bombs are Fuzes AN-Mk 224 or AN-Mk 234. These fuzes are almost identical. They differ principally in that the Fuze AN-Mk 234 is set for a predetermined depth by means of an external setting knob, whereas the Fuze AN-Mk 224

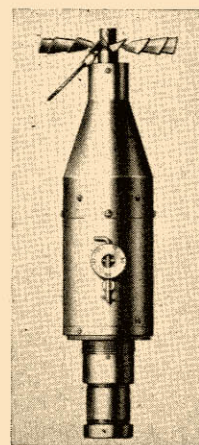


Figure 82.—Hydrostatic Fuze Mk 229 Mod 3

is set for the desired depth setting by inserting the proper firing pin spring in the pistol. The method of setting these fuzes will be described in detail in Chapter 7 of this pamphlet.

Either of these fuzes is installed in an athwartship fuze cavity through the bomb and functions in response to hydrostatic pressure at the predetermined depth. These fuzes require no air travel to arm.

D. Hydrostatic Tail Fuzes—In addition to the athwartship hydrostatic fuze and the nose fuzes previously mentioned, depth

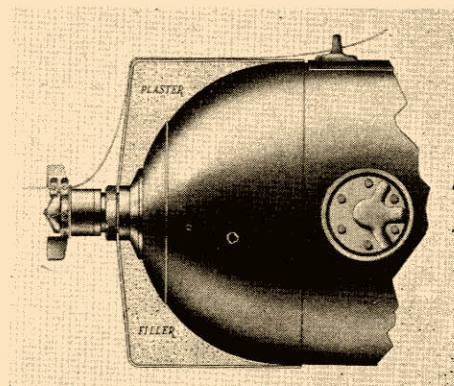


Figure 83.—Flat-Nose Attachment

bombs of the 650-700-lb. class may be fitted with a Hydrostatic Tail Fuze Mk 229 Mod 3. This fuze detonates the bomb at a predetermined depth setting. This fuze requires 400-500 feet of air travel along the trajectory to arm. As previously noted, the 325-350-lb. Depth Bombs Mk 53 and Mk 54 are designed to take the Hydrostatic Tail Fuze

Mk 230. This fuze is a later design version of the Tail Fuze Mk 229 Mod 3 and is subsequently described in this pamphlet.

Note: The original Hydrostatic Tail Fuze Mk 230 has recently been redesigned and designated Mk 230 Mod 4. This fuze should be used, as soon as available, in all Depth Bombs Mk 53 and Mk 54.

325-LB. DEPTH BOMB MK 17 MOD 1

General Description

General details of construction of the Depth Bomb Mk 17 Mod 1 are shown on page 84. While this bomb is now obsolescent, it may be encountered in service until such time as current stocks are expended.

Suspension

Two suspension lugs, spaced 14.0 inches apart, welded to the bomb body, are provided for suspension from double-hook racks and shackles. A lug is provided for single suspension.

Hoisting

A single lug is welded to the bomb body for single-cable hoisting to double-hook racks. For all other hoisting conditions the Universal Hoisting Band Mk 8 may be used. For single-cable hoisting to shackles, the Bomb Hoist Sling Mk 19 Mod 0 (see Figs. 87 and 159) may be used.

Trunnions

A 15-in. diameter trunnion band (see Fig. 88) may be used with this bomb; however, the use of this band prevents the use of the Athwartship Hydrostatic Fuze AN-Mk 224 or AN-Mk 234.

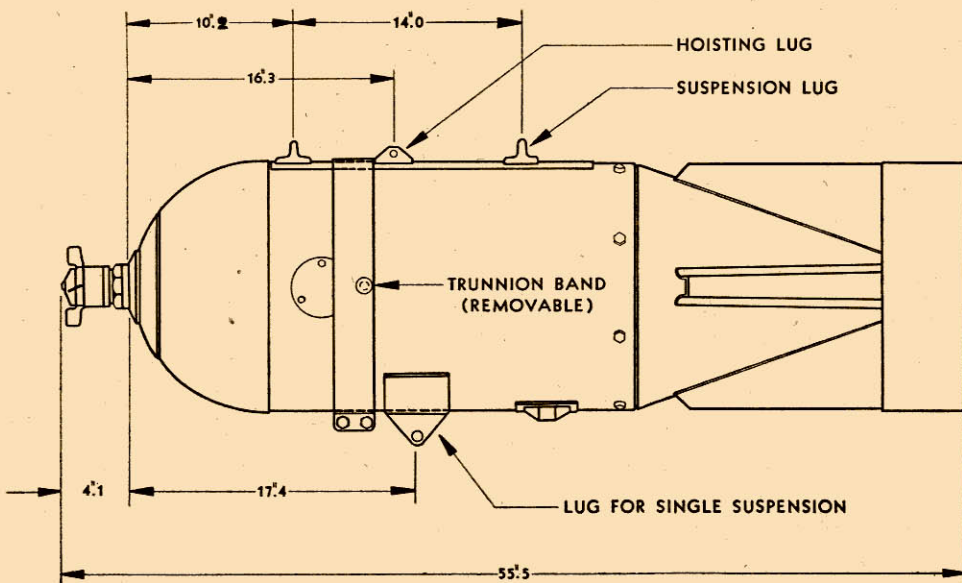
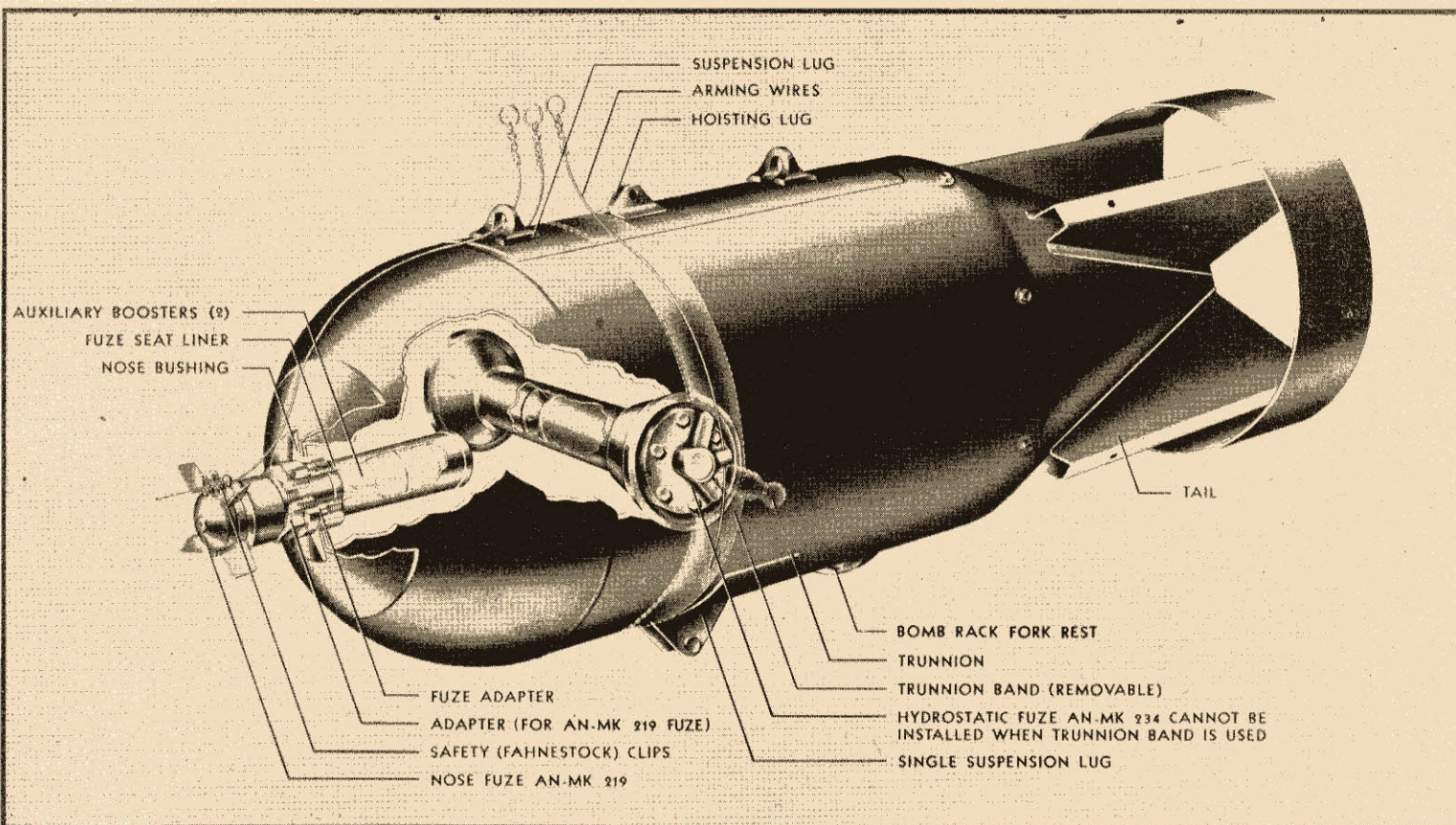


Figure 84.—Depth Bomb Mk 17 Mod 1



DIMENSION AND WEIGHT TABLE

Total Weight (TNT-Loaded)	325.4 lb.	Total Weight (TNT-Loaded) with Plaster-Filled Flat-Nose Attachment	367.4 lb.
Weight of Explosive (TNT)	224.0 lb.	Overall Length	55.5 in.
Weight of Flat-Nose Attachment ..	10.5 lb.	Diameter of Bomb Body	15.0 in.
Weight of Flat-Nose Attachment with Plaster Filler	44.0 lb.		

Figure 85.—325-Lb. Depth Bomb Mk 17 Mod 1

Components of a Complete Round

The bomb is supplied to the service as follows:

1. Bomb body in protecting lug and rim guards with adapter for Fuze AN-Mk 219, nose shipping plug in place, and cross-tube covers bolted to the cross tube

a. Two Navy auxiliary (180-gram) boosters in nose fuze seat liner

2. Tail crate containing:

a. One tail

3. Nose Fuze AN-Mk 219

4. Hydrostatic Fuze AN-Mk 224 or AN-Mk 234

5. Trunnion band, 15-in. diameter, BuOrd Dwg. 387706

6. Flat-nose attachment

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and bolt it to the bomb body.

2. Remove cross-tube covers and thoroughly clean fuze cavity and threads.

3. If a trunnion band is to be used, install and locate.

4. Install Hoisting Band Mk 8, or Sling Mk 19 Mod 0, if required.

5. Set and install the athwartship hydrostatic fuze in bomb.

a. AN-Mk 224: See page 172.

b. AN-Mk 234: See page 181.

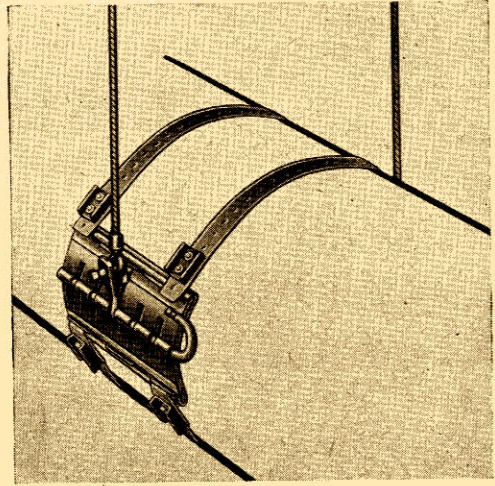


Figure 86.—Hoisting Band Mk 8

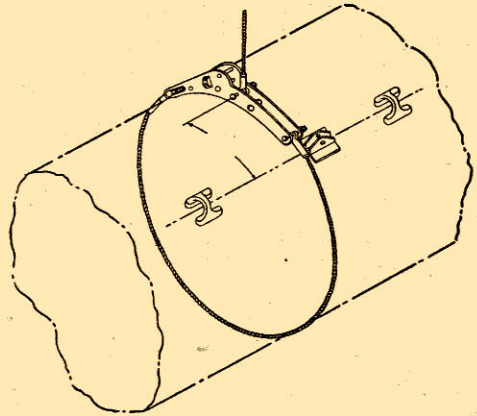


Figure 87.—Sling Mk 19 Mod 0

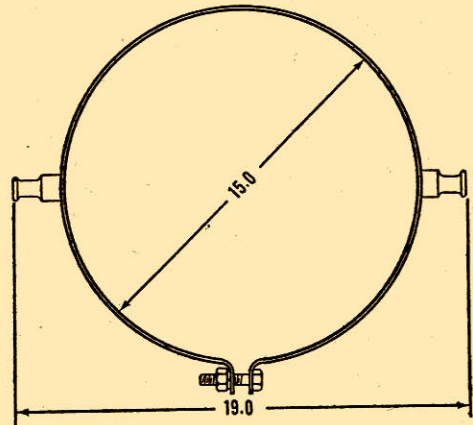
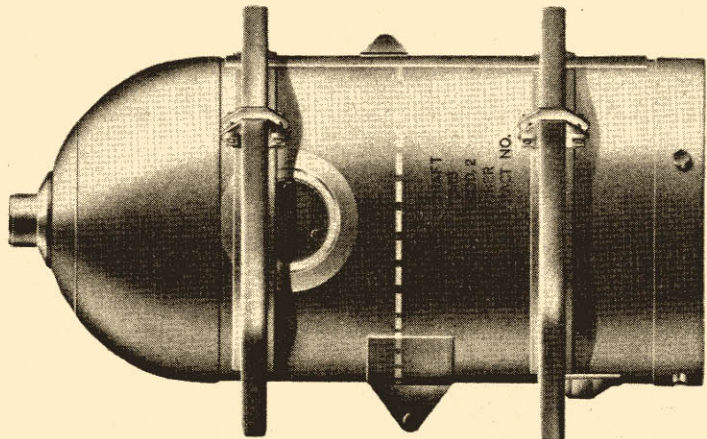
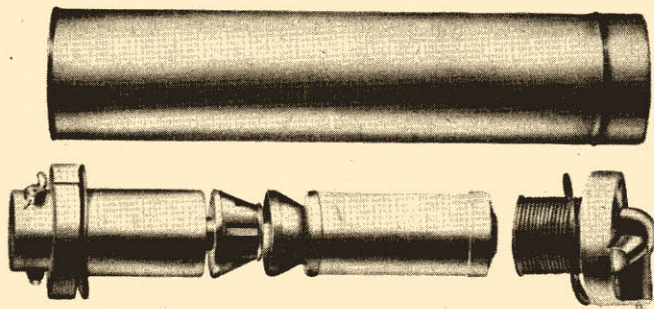


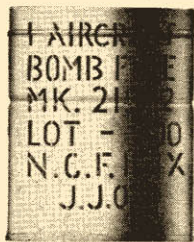
Figure 88.—Trunnion Band, BuOrd Dwg. 387706



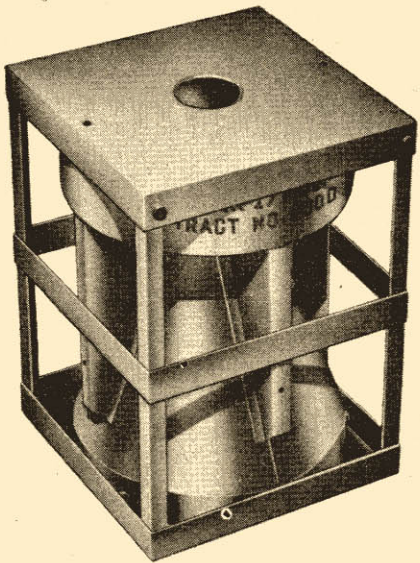
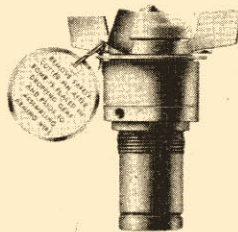
BOMB BODY, LUG GUARDS, SHIPPING PLUGS AND CROSS TUBE COVERS



HYDROSTATIC FUZE AN-MK 234



NOSE FUZE AN-MK 219



CRATED TAIL

Figure 89.—Components of a Complete Round

6. If a nose fuze is to be used, remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove nose fuze from its container and install in bomb.

a. Nose Fuze AN-Mk 219: See page 168.

b. Nose Fuze AN-M103A1: See page 159.

8. Attach arming wires to arming hooks of the rack or shackle or to appropriate arming-control units.

9. Spread the wires and hoist bomb into place on the rack.

10. When bomb is latched in rack or shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

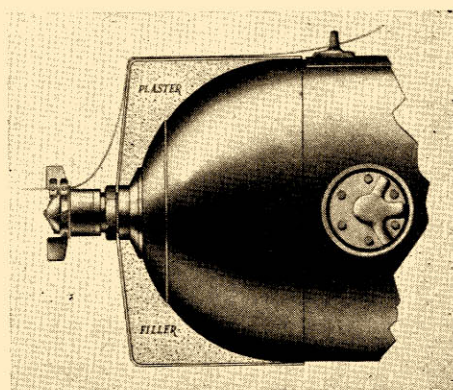


Figure 90.—Flat-Nose Attachment

11. Remove Hoisting Band Mk 8, or Sling Mk 19 Mod 0, if used.

The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

325-LB. DEPTH BOMB AN-MK 17 MOD 2 AND 350-LB. DEPTH BOMB AN-MK 44

General Description

The 325-lb. Depth Bomb AN-Mk 17 Mod 2 and the 350-lb. Depth Bomb AN-Mk 44 are identical in design. They differ only in the type of filling. The Bomb AN-Mk 17 Mod 2 is filled with 224 lb. of TNT, and the Bomb AN-Mk 44 is filled with 249 lb. of Torpex. Both are round-nosed bombs on which flat-nose attachments may be installed. Both bombs may be fitted with Nose Fuze AN-Mk 219 (or an alternate Nose Fuze AN-M103A1) and an Athwartship Hydrostatic Fuze AN-Mk 224 or AN-Mk 234.

The Depth Bombs AN-Mk 17 Mod 2 and AN-Mk 44 are the same as the Depth Bomb Mk 17 Mod 1, except for details of the rear

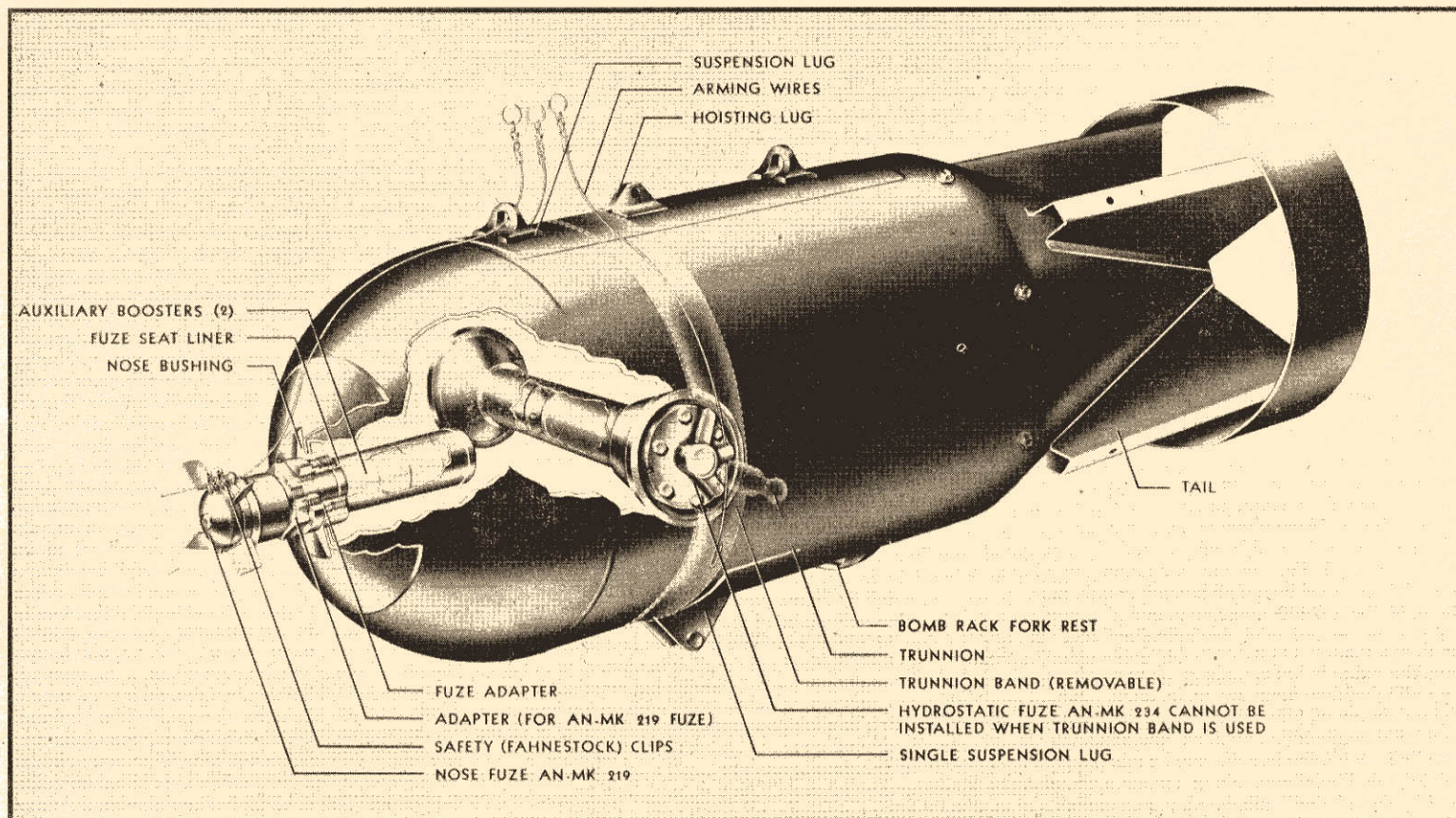
filling hole and other minor detailed improvements.

Suspension

Two suspension lugs, spaced 14.0 inches apart, welded to the bomb body, are provided for suspension from double-hook racks and shackles. A lug is provided for single suspension.

Hoisting

A single lug is welded to the bomb body for single-cable hoisting to double-hook racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.



DIMENSION AND WEIGHT TABLE

Total Weight AN-Mk 17 Mod 2 (TNT-Loaded)	325.4 lb.
Total Weight AN-Mk 44 (Torpex- Loaded)	349.7 lb.
Weight of Explosive (TNT)	224.0 lb.
Weight of Explosive (Torpex)	249.0 lb.
Weight of Flat-Nose Attachment ..	10.5 lb.
Weight of Flat-Nose Attachment with Plaster Filler	44.0 lb.

Total Weight (TNT-Loaded), with Plaster-Filled Flat-Nose Attach- ment	367.4 lb.
Total Weight (Torpex-Loaded), with Plaster-Filled Flat-Nose Attach- ment	393.7 lb.
Overall Length	55.5 in.
Diameter of Bomb Body	15.0 in.

Figure 91.—325-Lb. Depth Bomb AN-Mk 17 Mod 2 and AN-Mk 44

DEPTH BOMBS

For single-cable hoisting to shackles, the Bomb-Hoisting Sling Mk 19 Mod 0 (see Figs. 95 and 159) may be used.

Trunnions

A 15-in. diameter trunnion band (see Fig. 95) may be used with these bombs; however, the use of this band prevents the use of the Athwartship Hydrostatic Fuze AN-Mk 224 or AN-Mk 234.

Components of a Complete Round

The bombs are supplied to the service as follows:

1. Bomb body in protecting lug and rim guards with adapter for Fuze AN-Mk 219, nose shipping plug in place, and cross-tube covers bolted to the cross tube

a. Two Navy auxiliary (180-gram) boosters in nose fuze seat liner

2. Tail crate containing:

a. One tail

3. Nose Fuze AN-Mk 219

4. Hydrostatic Fuze AN-Mk 224 or AN-Mk 234

5. Trunnion band, 15-in. diameter, BuOrd Dwg. 387706

6. Flat-nose attachment

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and bolt it to the bomb body.

Note: The tails of some lots of these bombs do not properly fit the body of the depth bomb, either because the diameter of the tail cone is too large or because the bolt holes do not align. Also, bomb bodies of one manufacturer and tails of another manufacturer do not always fit together properly. To correct this condition, later issues of these bombs have tails in which the diameter of the tail cone has been reduced, two additional slots have been cut in the tail cone at 90° from the original set of slots,

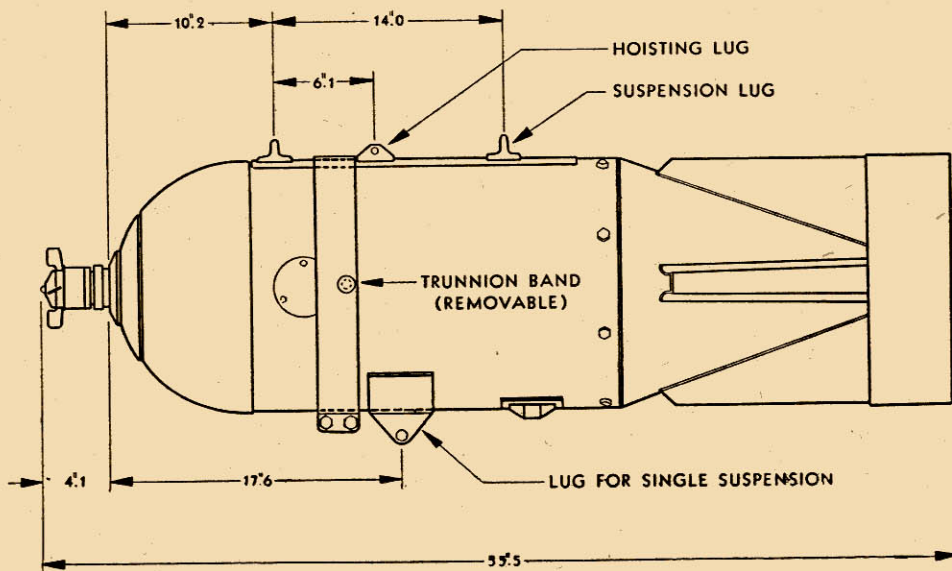
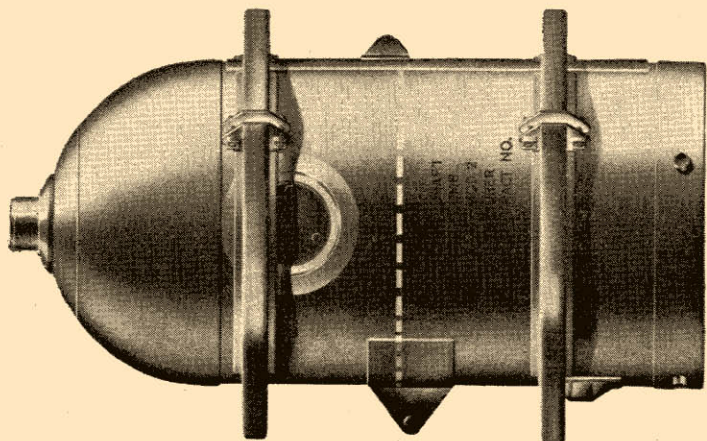
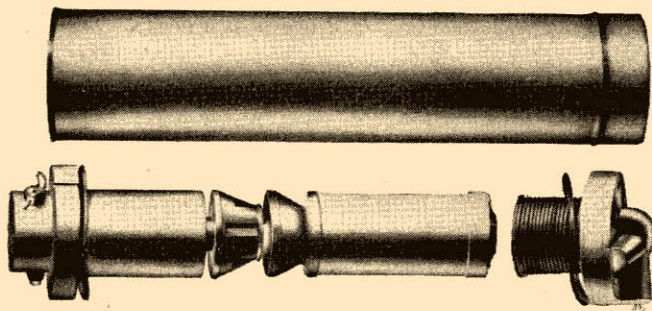


Figure 92.—Depth Bomb AN-Mk 17 Mod 2 and AN-Mk 44

RESTRICTED



BOMB BODY, LUG GUARDS, SHIPPING PLUGS AND CROSS TUBE COVERS



HYDROSTATIC FUZE AN-MK 234



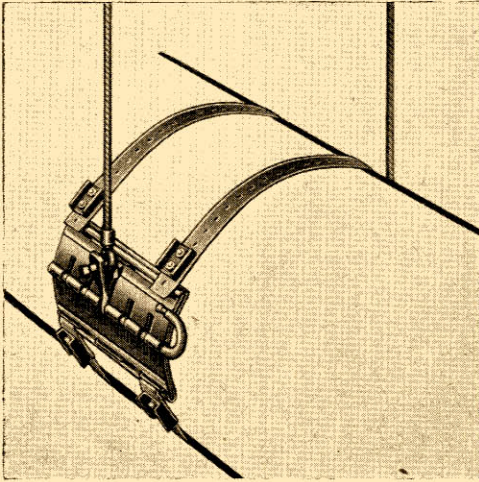


Figure 94.—Hoisting Band Mk 8

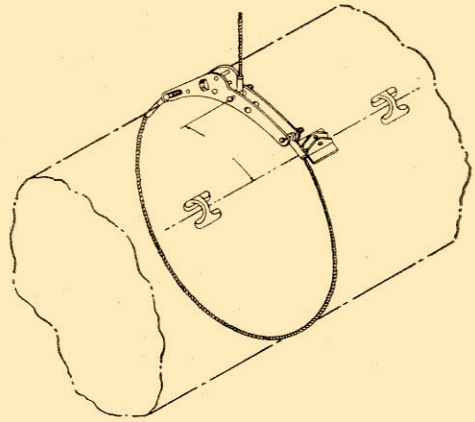


Figure 96.—Sling Mk 19 Mod 0

and the bolt holes in the bomb body have been elongated.

Service activities may modify depth bomb tails and body bolt holes by any of these methods, in case misfitting tails are encountered.

2. Remove cross-tube covers and thoroughly clean fuze cavity and threads.

3. If a trunnion band is to be used, install and locate.

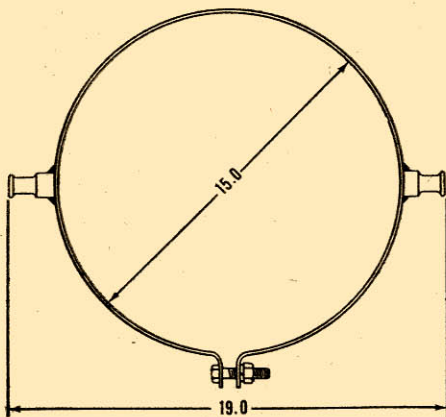


Figure 95.—Trunnion Band, BuOrd Dwg. 387706

4. Install Hoisting Band Mk 8, or Sling Mk 19 Mod 0, if required.

5. Set and install the athwartship hydrostatic fuze in bomb.

a. AN-Mk 224: See page 172.

b. AN-Mk 234: See page 181.

6. If a nose fuze is to be used, remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

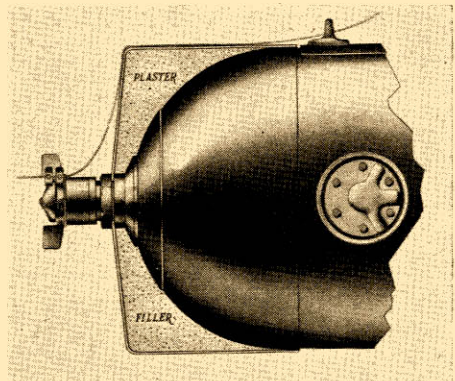
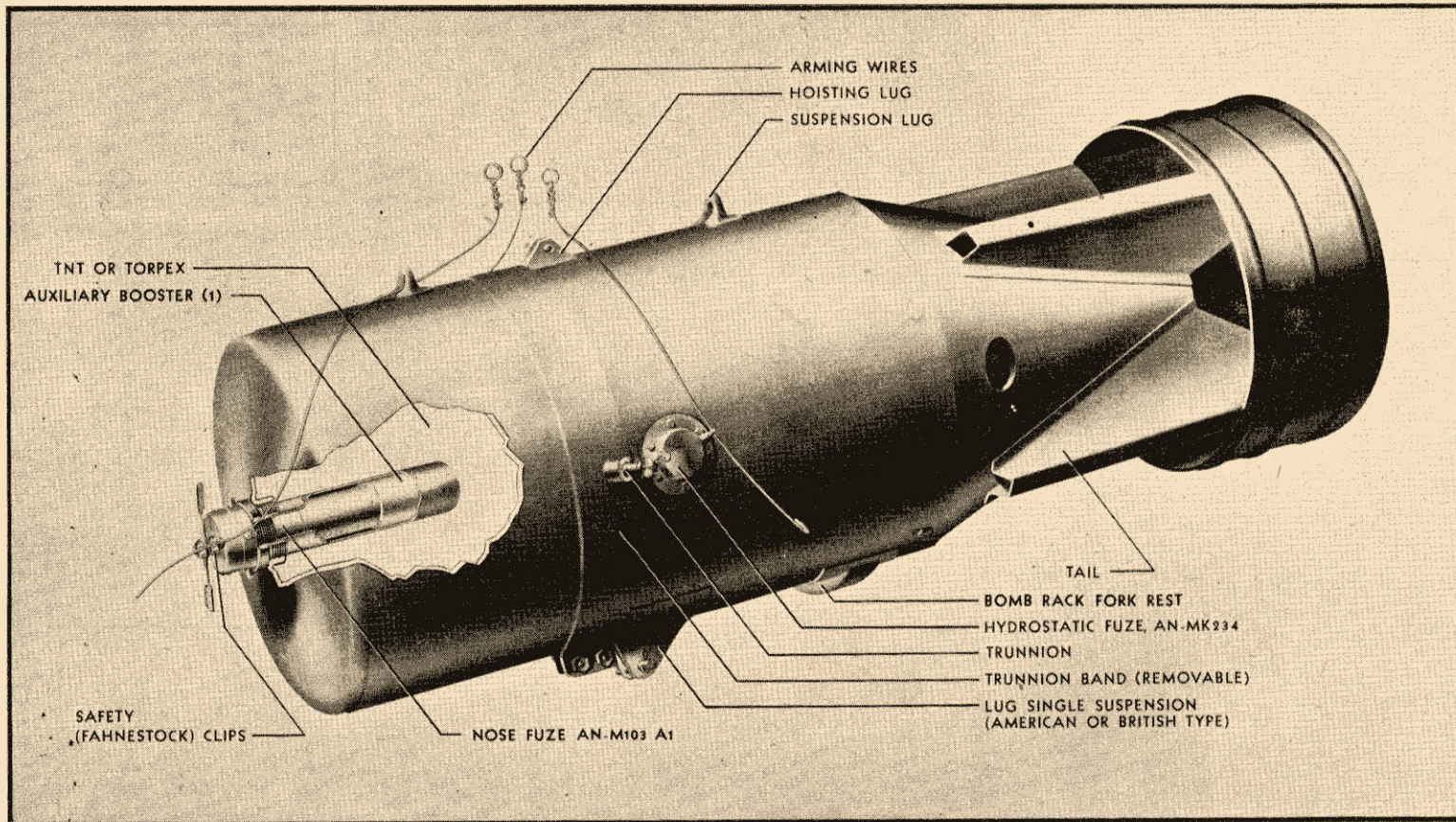


Figure 97.—Flat-Nose Attachment



DIMENSION AND WEIGHT TABLE

Total Weight AN-Mk 41 (TNT-Loaded)	329.5 lb.	Weight of Explosive (TNT)	227.0 lb.
Total Weight AN-Mk 47 (Torpe-Loaded)	354.5 lb.	Weight of Explosive (Torpe)	252.0 lb.
		Overall Length	53.1 in.
		Diameter of Bomb Body	15.0 in.

Figure 98.—325-Lb. Depth Bomb AN-Mk 41 and AN-Mk 47

7. Remove nose fuze from its container and install in bomb.

a. Nose Fuze AN-Mk 219: See page 168.

b. Nose Fuze AN-M103A1: See page 159.

8. Attach arming wires to arming hooks of the rack or shackle, or to appropriate arming-control units.

9. Spread the wires and hoist bomb into place on the rack.

10. When bomb is latched in rack or shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

11. Remove Hoisting Band Mk 8, or Sling Mk 19 Mod 0, if used.

The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

325-LB. DEPTH BOMB AN-MK 41 AND 350-LB. DEPTH BOMB AN-MK 47

General Description

The 325-lb. Depth Bomb AN-Mk 41 and the 350-lb. Depth Bomb AN-Mk 47 are identical in design. They differ only in that Bomb AN-Mk 41 is filled with 227 lb. of TNT and Bomb AN-Mk 47 is filled with 252 lb. of Torpex. Both are flat-nose bombs. Both bombs may be fitted with a Nose Fuze AN-M103A1 (or an alternate Nose Fuze AN-Mk 219) and a Hydrostatic Fuze AN-Mk 234 or AN-Mk 224.

Suspension

Two suspension lugs, 14.0 in. apart, welded to the bomb body, are provided for suspension from double-hook racks and shackles. A lug is provided for single suspension.

Hoisting

A single lug is welded to the bomb body for single-cable hoisting to double-hook racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

For single-cable hoisting with shackles, the Bomb Hoist Sling Mk 19 Mod 0 (see Figs. 103 and 159) may be used.

Trunnions

A 15-inch diameter trunnion band (see Fig. 102) is used with these bombs. This band does not prevent the installation of the athwartship hydrostatic fuze in the Depth Bombs AN-Mk 41 and AN-Mk 47.

Components of a Complete Round

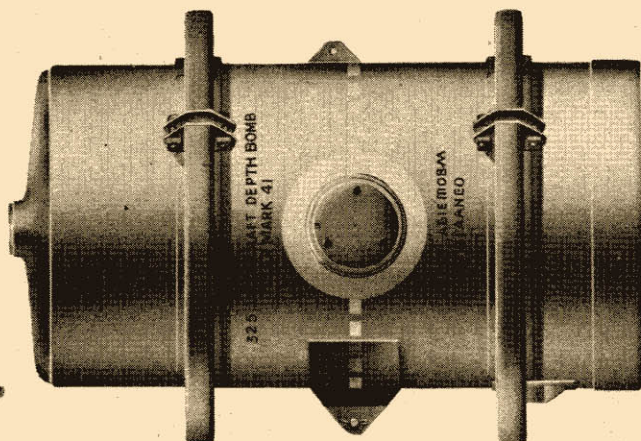
The bombs are supplied to the service as follows:

1. Bomb body in protecting lug and rim guards, with nose shipping plug and spacer in place and cross-tube covers bolted to the cross tube.

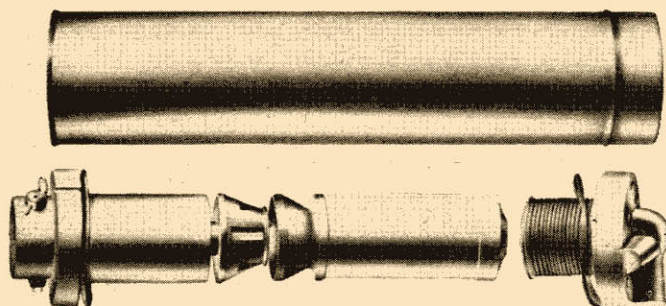
a. Two Navy auxiliary (180-gram) boosters in nose fuze seat liner

2. Tail crate containing:

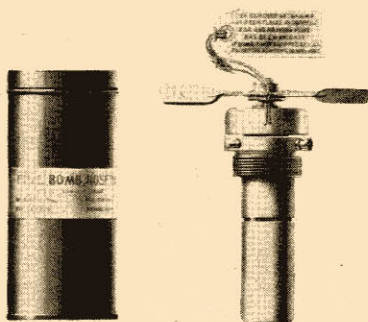
a. One tail



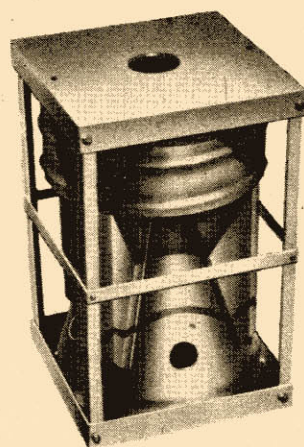
BOMB BODY, LUG GUARDS, SHIPPING PLUGS AND CROSS TUBE COVERS



HYDROSTATIC FUZE AN-MK 234



NOSE FUZE AN-M103 A1



CRATED TAIL

Figure 99.—Components of a Complete Round

3. Nose Fuze AN-M103A1
4. Hydrostatic Fuze AN-Mk 224 or AN-Mk 234
5. Trunnion band, 15-in. diameter, BuOrd Dwg. 387706

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and bolt it to the bomb body.
2. Remove cross-tube covers and thoroughly clean fuze cavity and threads.
3. If a trunnion band is to be used, install and locate.
4. Install Hoisting Band Mk 8 or Sling Mk 19 Mod 0, if required.
5. Set and install the athwartship hydrostatic fuze in bomb.
 - a. AN-Mk 224: See page 172.
 - b. AN-Mk 234: See page 181.

6. If a nose fuze is to be used, remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.
7. Remove nose fuze from its container and install in bomb.
 - a. Nose Fuze AN-Mk 219: See page 168.
 - b. Nose Fuze AN-M103A1: See page 159.
8. Attach arming wires to arming hooks of the rack or shackle, or to appropriate arming-control units.
9. Spread the wires and hoist bomb into place on the rack.
10. When bomb is latched in rack or shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

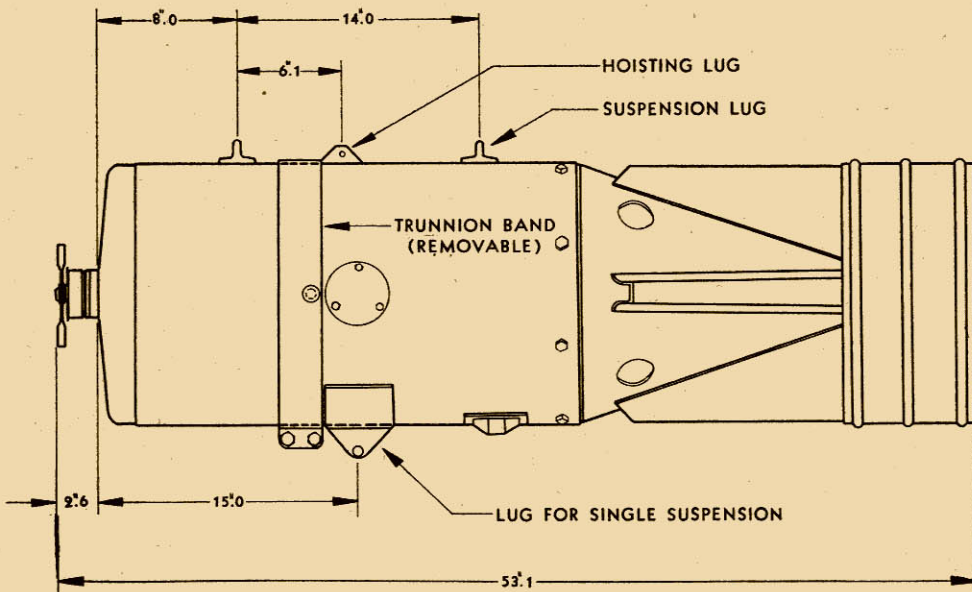


Figure 100.—Depth Bombs AN-Mk 41 and AN-Mk 47

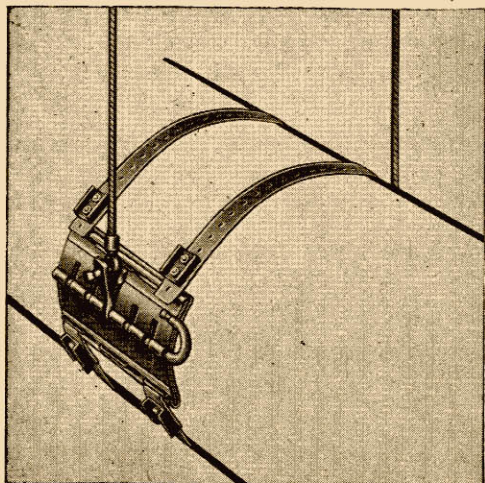


Figure 101.—Hoisting Band Mk 8

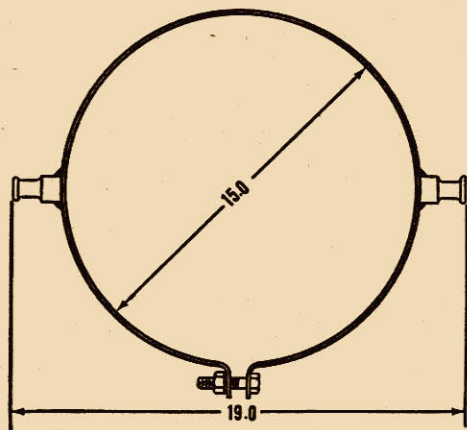


Figure 102.—Trunnion Band, BuOrd Dwg. 387706

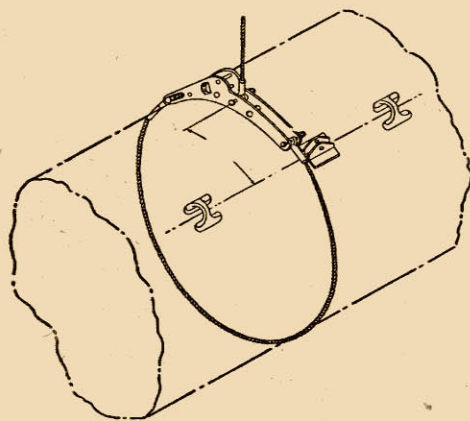


Figure 103.—Sling Mk 19 Mod 0

11. Remove Hoisting Band Mk 8, or Sling Mk 19 Mod 0, if used. The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

650-LB. DEPTH BOMB MK 29 AND 650-LB. DEPTH BOMB MK 37

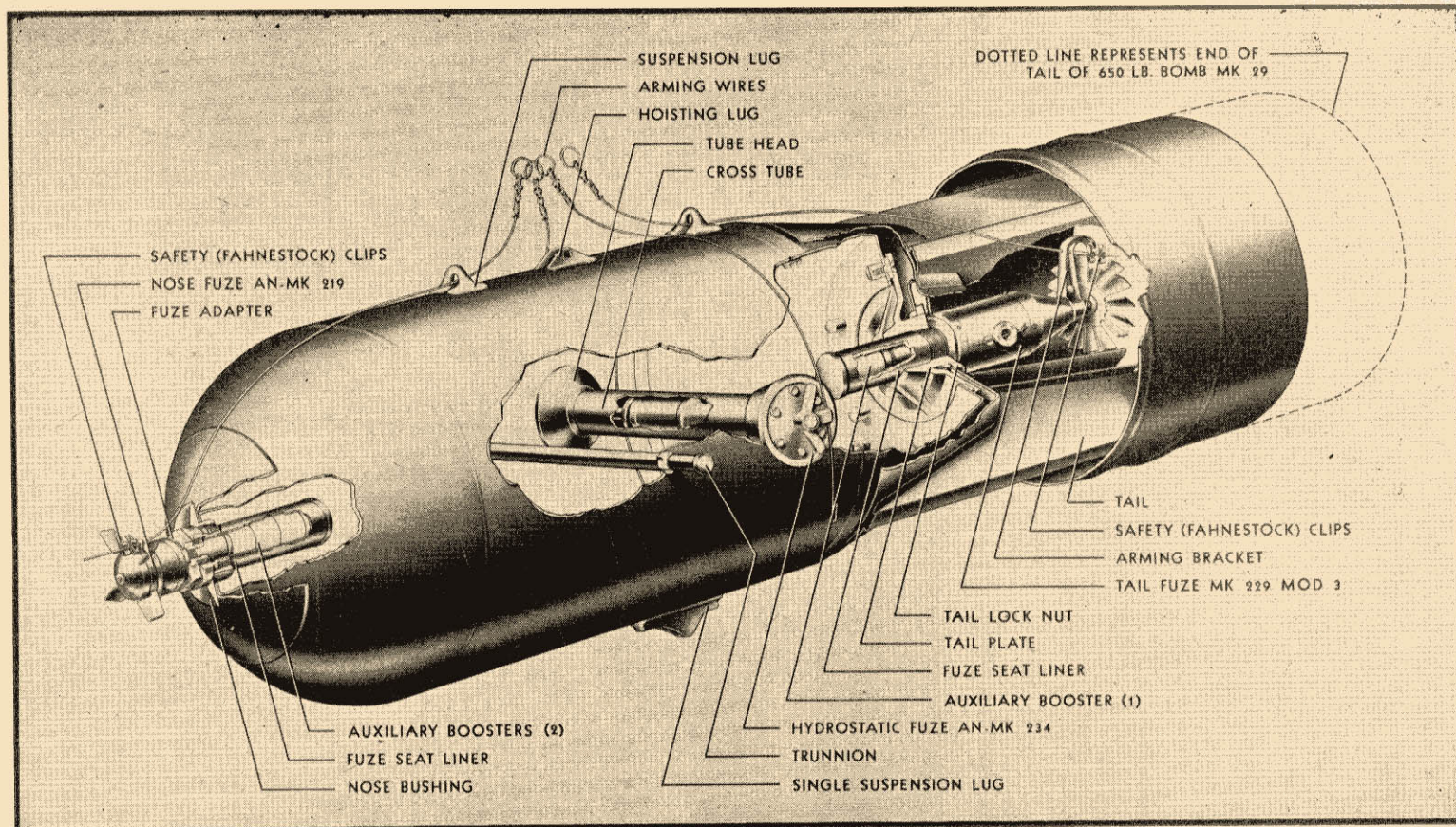
General Description

The 650-lb. Depth Bomb Mk 29 (now obsolete) and the 650-lb. Depth Bomb Mk 37 differ only in the length and construction of their tails.

The Depth Bomb Mk 29 was equipped with a rather long tail, which proved to be unsatisfactory from two standpoints; namely, (1)

lack of sufficient strength and (2) inadequate airflow in the neighborhood of the tail hydrostatic fuze, which resulted in the fuze's being unable to arm in any normal air-travel distance.

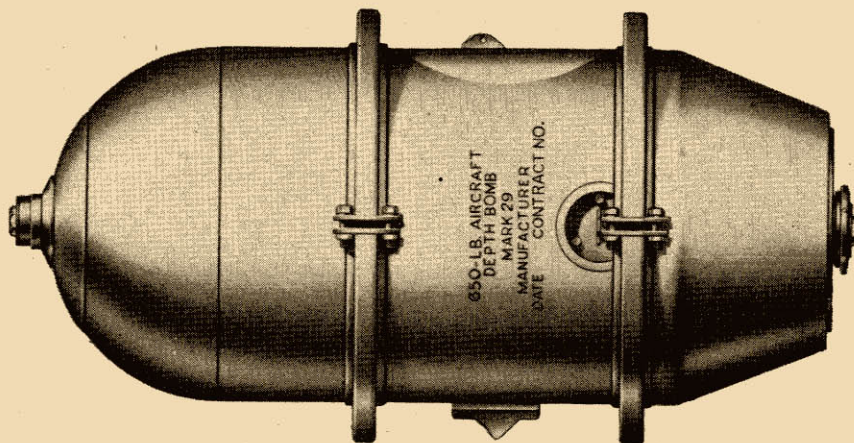
The body of the Depth Bomb Mk 29, when equipped with a Tail Mk 37, becomes a Depth Bomb Mk 37. In NAVORD OCL AV 41-43, all activities having Bombs Mk 29 on



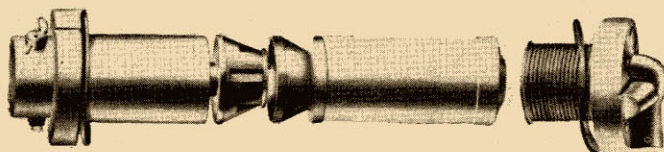
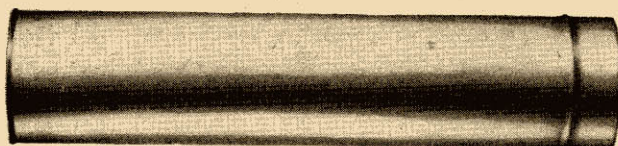
DIMENSION AND WEIGHT TABLE

Total Weight (TNT-Loaded)		Weight of Explosive (TNT) Mk 37	
Mk 37	659.0 lb.	or Mk 29	464.0 lb.
Total Weight (TNT-Loaded)		Overall Length Mk 37	
Mk 29	657.0 lb.	Overall Length Mk 29	74.1 in.
		Diameter of Bomb Body Mk 37 and	
		Mk 29	17.7 in.

Figure 104.—650-Lb. Depth Bomb Mk 29 and Mk 37



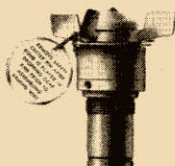
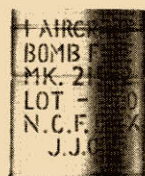
BOMB BODY, LUG GUARDS, SHIPPING PLUGS AND CROSS TUBE COVERS



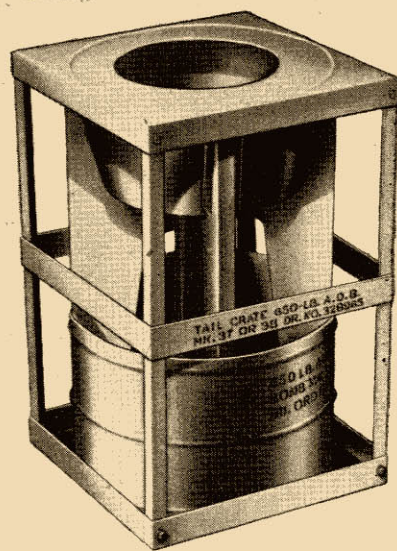
HYDROSTATIC FUZE AN-MK 234



HYDROSTATIC FUZE
MARK 229 MOD 3



NOSE FUZE AN-MK 219



CRATED TAIL

Figure 105.—Components of a Complete Round

DEPTH BOMBS

hand were directed to change them to Bombs Mk 37 by substituting the shorter Tail Mk 37.

The shorter Tail Mk 37 gives satisfactory air-travel arming distances for the Hydrostatic Tail Fuze Mk 229 Mod 3 and is better from the standpoint of strength because of its shorter length and detailed improvements in construction.

The Depth Bomb Mk 37 is a round-nose bomb to which a flat-nose attachment may be fitted. General details of construction are shown in Fig. 104.

Suspension

Two suspension lugs, spaced 14.0 in. apart, welded to the bomb body, are provided for suspension from double-hook racks and shackles. A lug is provided for single suspension from British bomb carriers or single-hook shackles.

Hoisting

A single lug is welded to the bomb body for single-cable hoisting to double-hook

racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

Trunnions

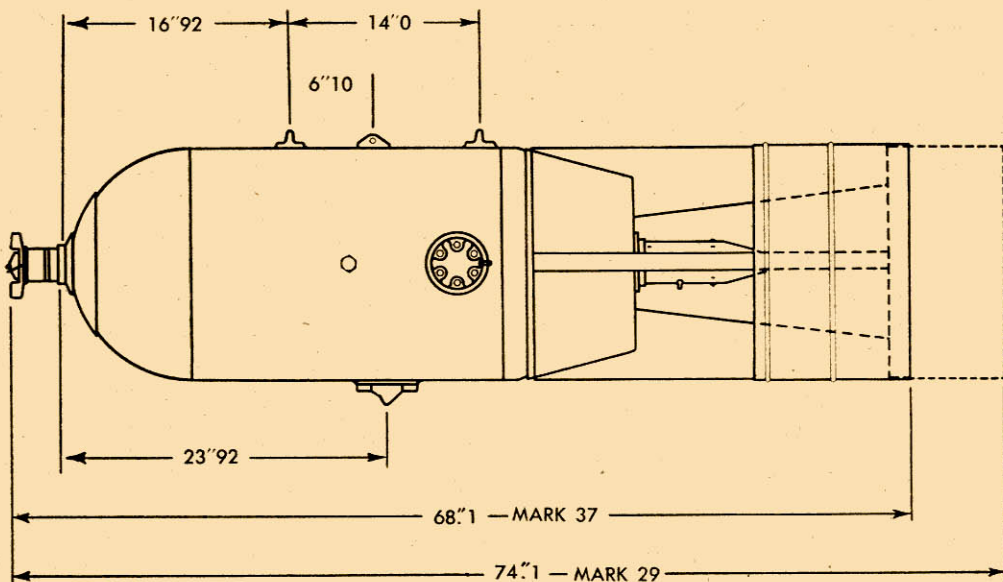
A trunnion band is not used with these bombs. Two screw-in-type trunnions are provided which are installed directly into a threaded trunnion tube in the bomb body.

Components of a Complete Round

The bombs are supplied to the service as follows:

1. Bomb body in protecting lug guards with an adapter for the Fuze AN-Mk 219, nose and tail shipping plugs in place, cross-tube covers bolted to the cross tube, two screw-in-type plugs or cork stoppers in the trunnion tube, booster can spacer in the cross tube, and tail lock nut in place and fastened with wire

- (a) Three Navy auxiliary (180-gram) boosters (two in nose fuze seat liner and one in tail fuze seat liner)



**Figure 106.—650-Lb. Depth Bomb Mk 29 and
650-Lb. Depth Bomb Mk 37**

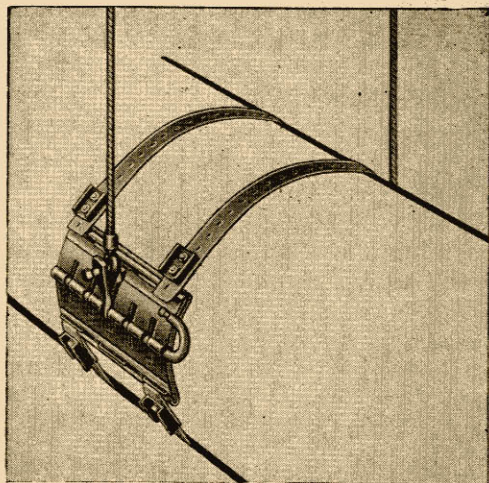


Figure 107.—Hoisting Band Mk 8

2. Tail crate containing:
 - a. One tail for Bomb Mk 37
 - b. Two trunnions with lock washers
 - c. Arming wire bracket with protective tube
3. Nose Fuze AN-Mk 219
4. Hydrostatic Fuze AN-Mk 224 or AN-Mk 234
5. Hydrostatic Tail Fuze Mk 229 Mod 3
6. Flat-nose attachment

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and install it on the bomb body. Tighten tail lock nut securely.
2. Remove cross-tube covers and thoroughly clean fuze cavity and threads.
3. If trunnions are required, install and tighten.
4. Install Hoisting Band Mk 8, if required.

5. Set and install the athwartship hydrostatic fuze in bomb.

a. AN-Mk 224: See page 172.

b. AN-Mk 234: See page 181.

6. If a nose fuze is to be used, remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove nose fuze from its container and install in bomb.

a. Nose Fuze AN-Mk 219: See page 168.

b. Nose Fuze AN-M103A1: See page 159.

8. If a tail fuze is to be used, remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

9. Remove Tail Fuze Mk 229 Mod 3 from its container; set and install as described on page 178.

10. Attach arming wires to arming hooks of the rack or shackle wires to appropriate arming-control units.

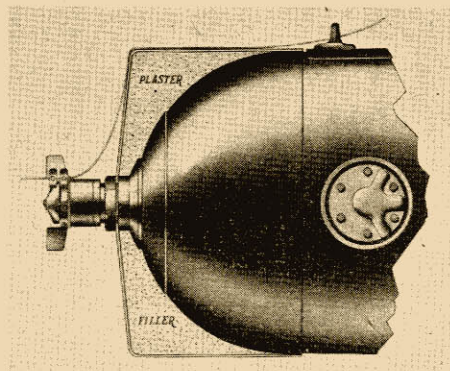


Figure 108.—Flat-Nose Attachment

DEPTH BOMBS

11. Spread the wires and hoist bomb into place on the rack.

12. When bomb is latched in rack or shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

13. Remove Hoisting Band Mk 8, if used.

The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

650-LB. DEPTH BOMB MK 38 AND 700-LB. DEPTH BOMB MK 49

General Description

The 650-lb. Depth Bomb Mk 38 and the 700-lb. Depth Bomb Mk 49 are identical in design. They differ only in that the Bomb Mk 38 is filled with 425 lb. of TNT and the Bomb Mk 49 is filled with 472 lb. of Torpex. Both are flat-nose bombs and have extra strong, reinforced tails. Both bombs may be fitted with a Nose Fuze AN-Mk 219 (or an alternate Nose Fuze AN-M103A1), an athwartship Hydrostatic Fuze AN-Mk 224

or AN-Mk 234, and/or a Hydrostatic Tail Fuze Mk 229 Mod 3.

Suspension

Two suspension lugs, spaced 14.0 in. apart, welded to the bomb body, are provided for suspension from double-hook racks and shackles. A lug is provided for single suspension from British-type bomb carrier or single-hook shackles.

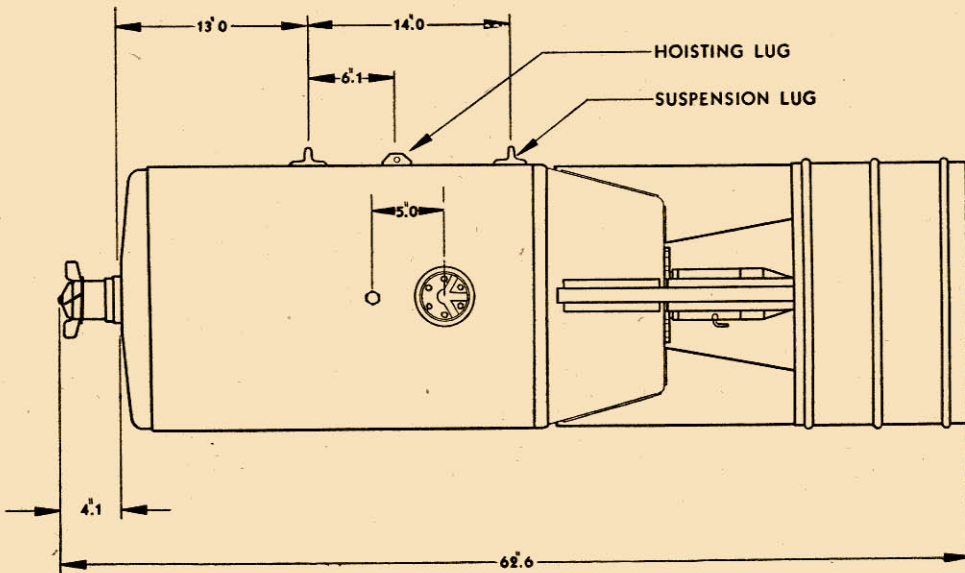
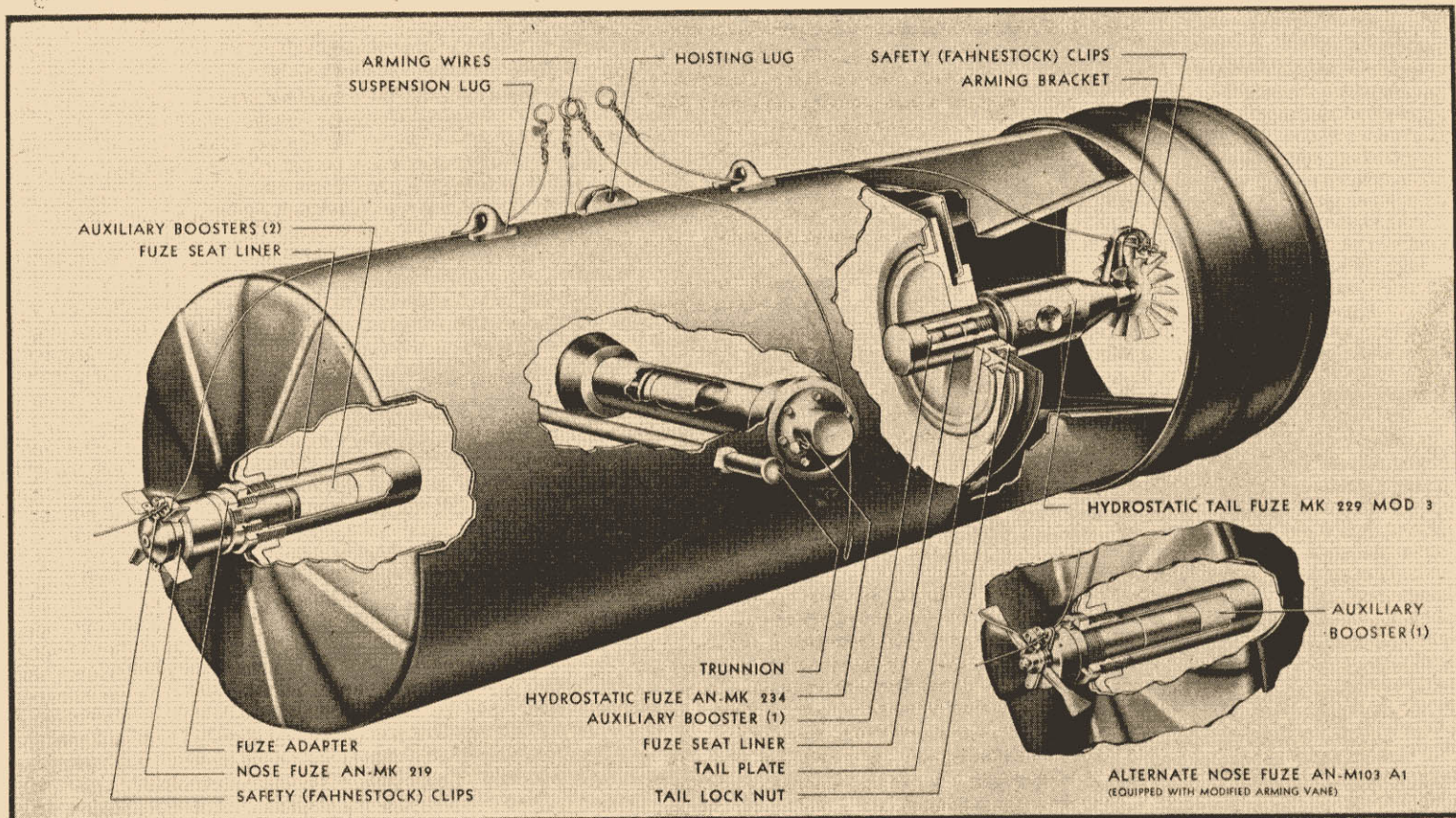


Figure 109.—650-Lb. Depth Bomb Mk 38 and
700-Lb. Depth Bomb Mk 49



DIMENSION AND WEIGHT TABLE

Total Weight (TNT-Loaded)	Weight of Explosive (TNT)425.0 lb.
Mk 38634.0 lb.	Weight of Explosive (Torpex)472.0 lb.
Total Weight (Torpex-Loaded)	Overall Length61.1 in.
Mk 49681.0 lb.	Diameter of Bomb Body17.7 in.

Figure 110.—650-Lb. Depth Bomb Mk 38 and Mk 49

Hoisting

A single lug is welded to the bomb body for single-cable hoisting to double-hook racks. For all other hoisting conditions, the Universal Hoisting Band Mk 8 may be used.

Trunnions

A trunnion band is not used with these bombs. Two screw-in-type trunnions are provided, which are installed directly into a threaded trunnion tube in the bomb body.

Components of a Complete Round

The bombs are supplied to the service as follows:

1. Bomb body in protecting lug guards with an adapter for the Fuze AN-Mk 219, nose and tail shipping plugs in place, cross-tube covers bolted to the cross tube, two screw-in-type plugs or cork stoppers in the trunnion tube, booster can spacer in cross tube, and tail lock nut in place and fastened with wire.

- a. Three Navy auxiliary (180-gram) boosters (two in nose fuze seat liner and one in tail fuze seat liner)

2. Tail crate containing:

- a. One tail
- b. Two trunnions with lock washers
- c. Arming wire bracket with arming wire tube

3. Nose Fuze AN-Mk 219

4. Hydrostatic Fuze AN-Mk 234

5. Hydrostatic Tail Fuze Mk 229 Mod 3

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and install on bomb body. Tighten tail lock nut securely.

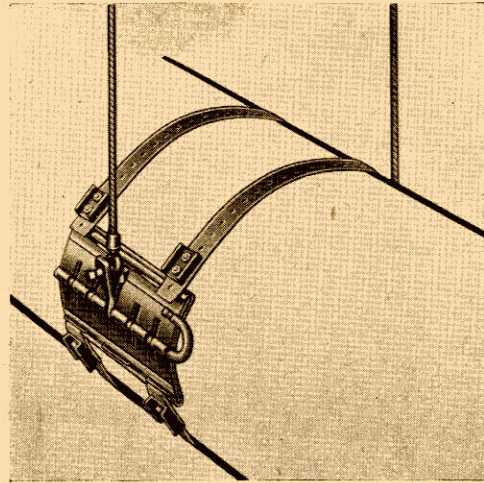


Figure 111.—Universal Hoisting Band Mk 8

2. If trunnions are required, install and tighten.

3. Install Hoisting Band Mk 8, if required.

4. Remove cross-tube covers and thoroughly clean fuze cavity and threads.

5. Set and install the athwartship hydrostatic fuze in bomb.

- a. AN-Mk 224: See page 172.

- b. AN-Mk 234: See page 181.

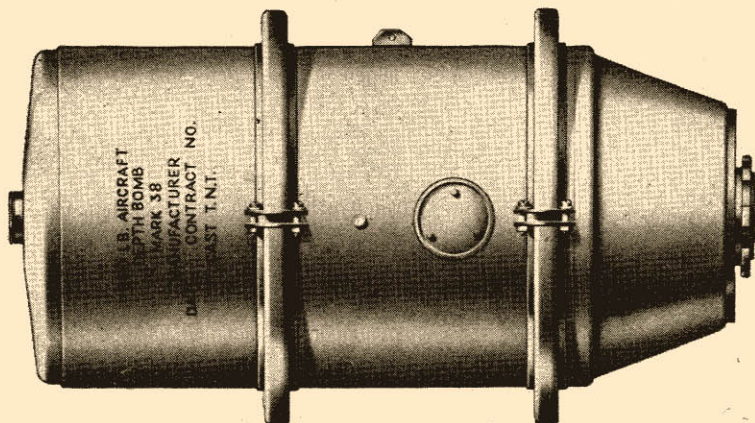
6. If a nose fuze is to be used, remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

7. Remove nose fuze from its container and install in bomb.

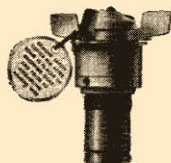
- a. Nose Fuze AN-Mk 219: See page 168.

- b. Nose Fuze AN-M103A1: See page 159.

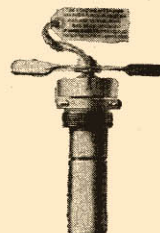
8. If a tail fuze is to be used, remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.



BOMB BODY, LUG GUARDS, SHIPPING PLUGS AND CROSS TUBE COVERS



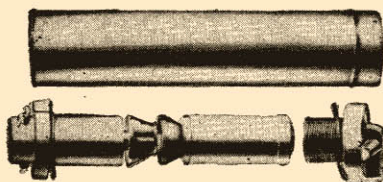
NOSE FUZE AN-MK 219



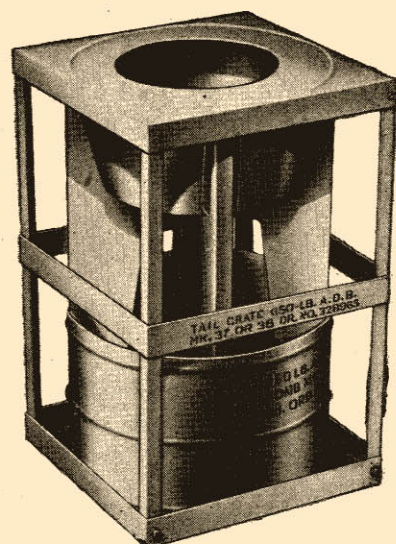
ALTERNATE NOSE FUZE
AN-M103A1



HYDROSTATIC FUZE MARK 229 MOD 3



HYDROSTATIC FUZE AN-MK 234



CRATED TAIL

Figure 112.—Components of a Complete Round

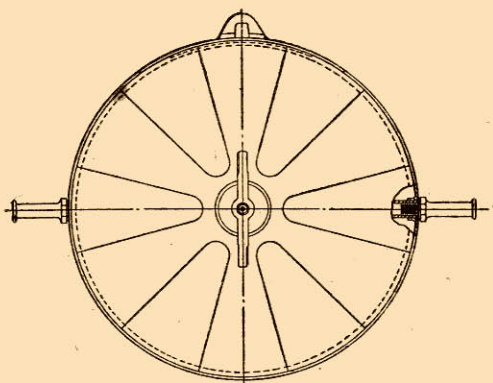


Figure 113.—End Elevation of Bomb

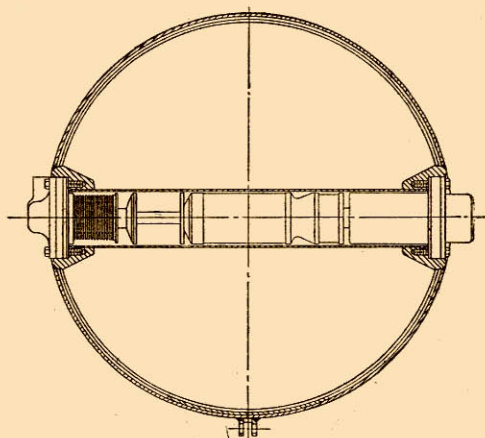


Figure 114.—Section Through Body

9. Remove Tail Fuze Mk 229 Mod 3 from its container; set and install as described on page 178.

10. Attach arming wires to arming hooks of the rack or shackle or to appropriate arming-control units.

11. Spread the wires and hoist bomb into place on the rack.

12. When bomb is latched in rack or

shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

13. Remove Hoisting Band Mk 8, if used. The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

325-LB. DEPTH BOMB MK 53 AND 350-LB. DEPTH BOMB MK 54

General Description

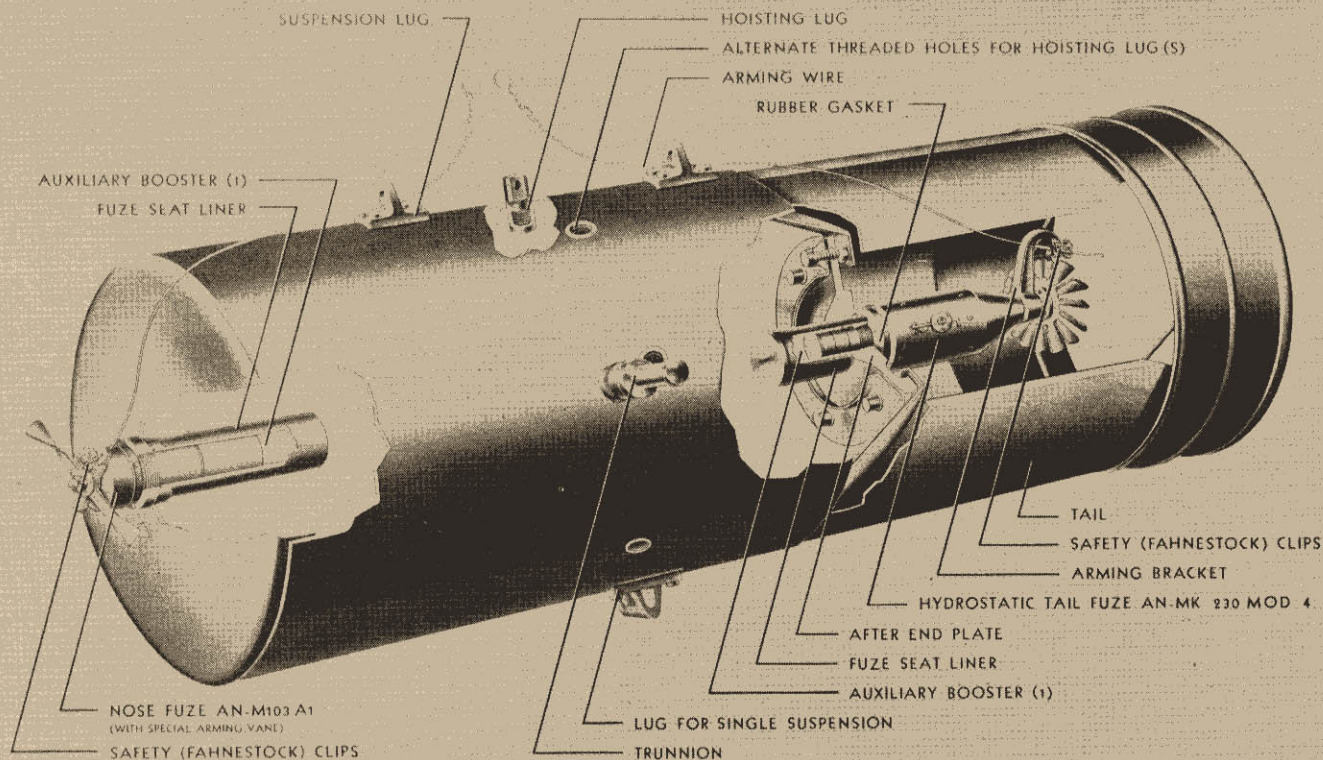
The 325-lb. Depth Bomb Mk 53 and the 350-lb. Depth Bomb Mk 54 are identical in design. They differ only in that the Bomb Mk 53 is filled with 225 lb. of TNT and the Bomb Mk 54 is filled with 250 lb. of Torpex. Both are integral flat-nose bombs.

Both bombs may be fitted with a Nose Fuze AN-M103A1 (or an alternate Nose Fuze AN-Mk 219) and a Hydrostatic Tail Fuze AN-Mk 230 Mod 4. These bombs do not use athwartship hydrostatic fuze.

Suspension

All fittings such as suspension lugs, hoisting lugs, and trunnions are bolted to, or screw directly into, the bomb body. These fittings are shipped in the tail crate. All tapped holes in the body are protected during shipment by removable, screw-in plugs.

Two suspension lugs, which are bolted to the bomb body 14.0 inches apart, are provided for suspension from double-hook racks and shackles. A single lug is provided for single suspension.



DIMENSION AND WEIGHT TABLE

Total Weight Mk 53 (TNT-Loaded)	329.7 lb.	Weight of Explosive (TNT)	225.5 lb.
Total Weight Mk 54 (TorpeX-Loaded)	354.5 lb.	Weight of Explosive (TorpeX)	250.2 lb.
		Overall Length	52.5 in.
		Diameter of Bomb Body	13.5 in.

Figure 115.—325-Lb. Depth Bombs Mk 53 and
350-Lb. Depth Bombs Mk 54

Hoisting

Two hoisting lugs (expendable) are furnished with each bomb. Either one or two lugs may be screwed into the bomb body, depending upon whether single- or double-cable hoisting is to be used. These lugs may be located at seven different points on the circumference of the bomb body, so as to meet any hoisting condition.

In Fig. 118, six different hoisting conditions are shown. For conditions 1, 2, and 3 the hoisting lug is screwed down until seated and then aligned in a fore-and-aft direction as shown. For conditions 4, 5, and 6 two hoisting lugs are required; the lugs are screwed in until approximately seated (not tight) and then aligned as shown.

Hoisting lug(s) may be removed if desired after the bomb is latched in rack or shackle for all hoisting conditions except one.

Trunnions

Trunnions may be screwed directly into tapped holes in the bomb body.

Components of a Complete Round

The bomb is supplied to the service as follows:

1. Bomb body with shipping plug screws in all tapped holes, nose and tail shipping plugs in place, cardboard spacers in nose and tail fuze seat liners

- a. Two Navy auxiliary (180-gram) boosters, one in nose fuze seat liner and one in tail fuze seat liner

2. Tail crate containing:

- a. One tail BuOrd Dwg. 394196

- b. Fittings in asbestos or glass bat as follows:

- (1) Two suspension lugs (BuOrd Dwg. 394192-1)

- (2) One suspension lug (BuOrd Dwg. 394192-2)

- (3) Two hoisting lugs (BuOrd Dwg. 394192-3)

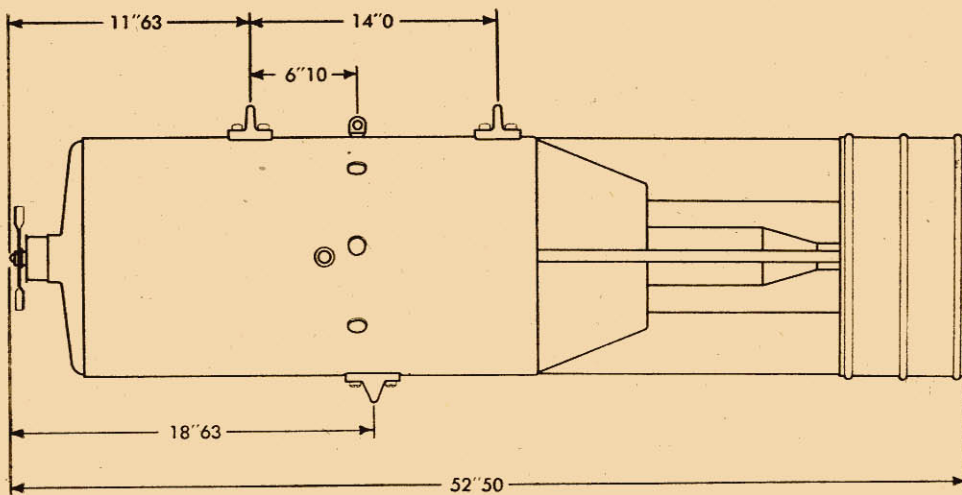
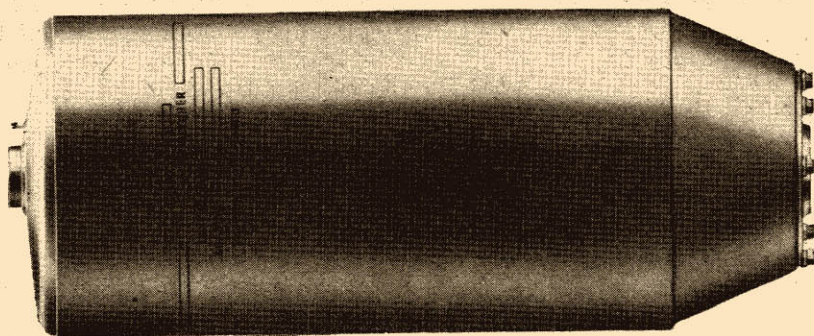
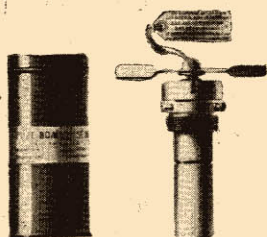


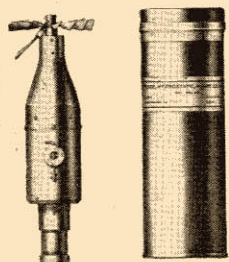
Figure 116.—Depth Bomb Mk 53 and Mk 54



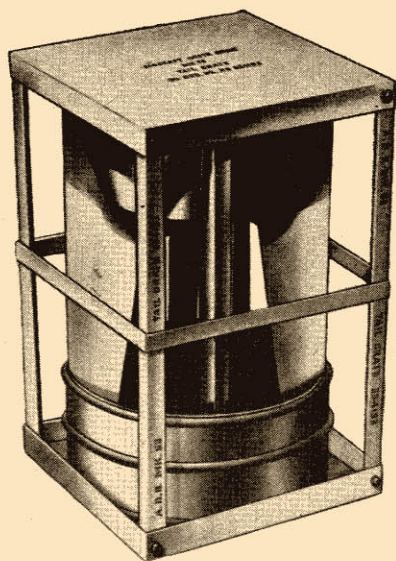
• BOMB BODY



NOSE FUZE AN-M103 A1



TAIL FUZE AN-MK 230 MOD 4



CRATED TAIL

Figure 117.—Components of a Complete Round

DEPTH BOMBS

(4) Two trunnions (BuOrd Dwg. 394192-4)

(5) Fourteen** lock washers for tail attachments (BuOrd Dwg. 394189-7)

(6) Five* hex head bolts for tail (BuOrd Dwg. 394189-2)

(7) One special arming vane assembly for flat-nose bombs (BuOrd Dwg. 422314)

(8) Nine* Fillister head screws for attachments (BuOrd Dwg. 394189-14)

* Includes one spare.

** Includes two spares.

(9) Three* lock washers for trunnions (BuOrd Dwg. 394189-10)

3. Nose Fuze AN-M103A1

4. Hydrostatic Tail Fuze AN-Mk 230 Mod 4

Preparation of Bomb for Flight

1. Remove the tail from its crate, inspect, and bolt it to the bomb body.

2. Remove fittings from tail crate and attach to bomb body.

a. Attach suspension lugs to the bomb body by Fillister head screws.

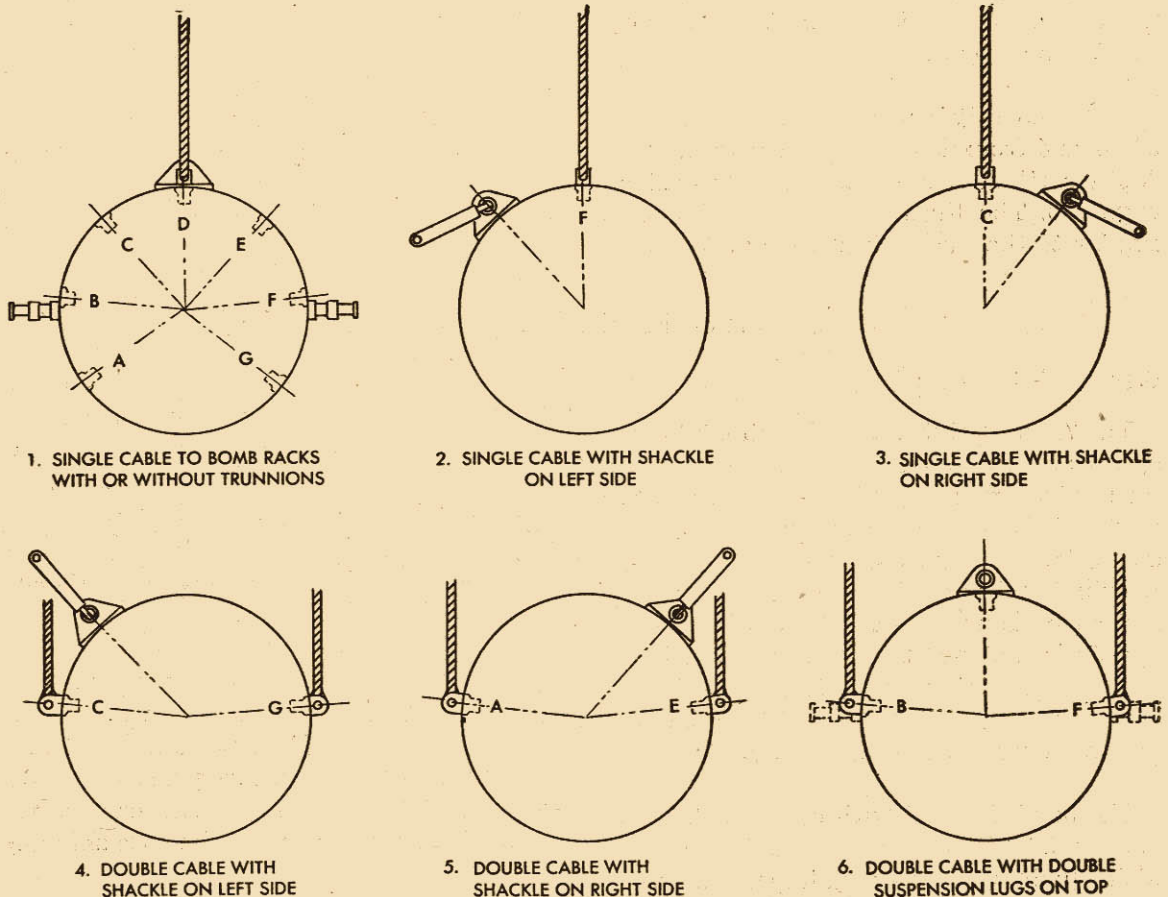


Figure 118.—Various Hoisting Arrangements, Viewed from Tail End of Bomb

b. Screw hoisting lugs into the bomb body to suit the hoisting condition.

c. If trunnions are to be used, screw them directly into the bomb body, putting one lock washer under each trunnion, and tighten.

3. Remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary. Inspect to be sure that auxiliary booster is in place.

4. Remove nose fuze AN-M103A1 from its container and install in bomb as described on page 159.

5. Remove the tail shipping plug and inspect fuze seat liner and threads. Clean if necessary. Inspect to be sure that auxiliary booster is in place.

6. Remove Hydrostatic Tail Fuze AN-Mk 230 Mod 4 from its container, set for desired depth setting, and install as described on page 180. The Fuze AN-Mk 230 Mod 4 is similar to the Fuze Mk 229 Mod 3 in every

respect except that the part of the fuze body which fits into the bomb is approximately 1.3 inches shorter for the Fuze AN-Mk 230 Mod 4 than for the Fuze Mk 229 Mod 3; however, the diameter and thread are the same.

7. Attach arming wires to hooks of the rack or shackle.

8. Spread the wires and hoist bomb into place on the rack.

9. When bomb is latched in rack or shackle, complete the installation of the arming wires. See subsequent instructions in this pamphlet, page 113, for more complete details regarding the installation of arming wires for use with depth bombs.

The bomb now constitutes an assembled complete round. Should it be necessary to disassemble the complete round into its components, reverse the order of assembly and restore components to their original condition and packaging.

7.0-IN. (100-LB.) DEPTH BOMB MK 52

General Description

The 7.0-in. 100-lb. Depth Bomb Mk 52 is a light-case, fast-sinking, round-nose bomb for use by airships. It is carried in a Bomb Rack Mk 53 and accordingly has no trunnions, trunnion bands, or suspension lugs. A cylindrical shroud is secured to the tail section by four vanes. The entire tail assembly is fastened to the rear of the bomb body by six flat head machine screws. A cast-iron nose, into which is fitted a booster can, is secured to the bomb body.

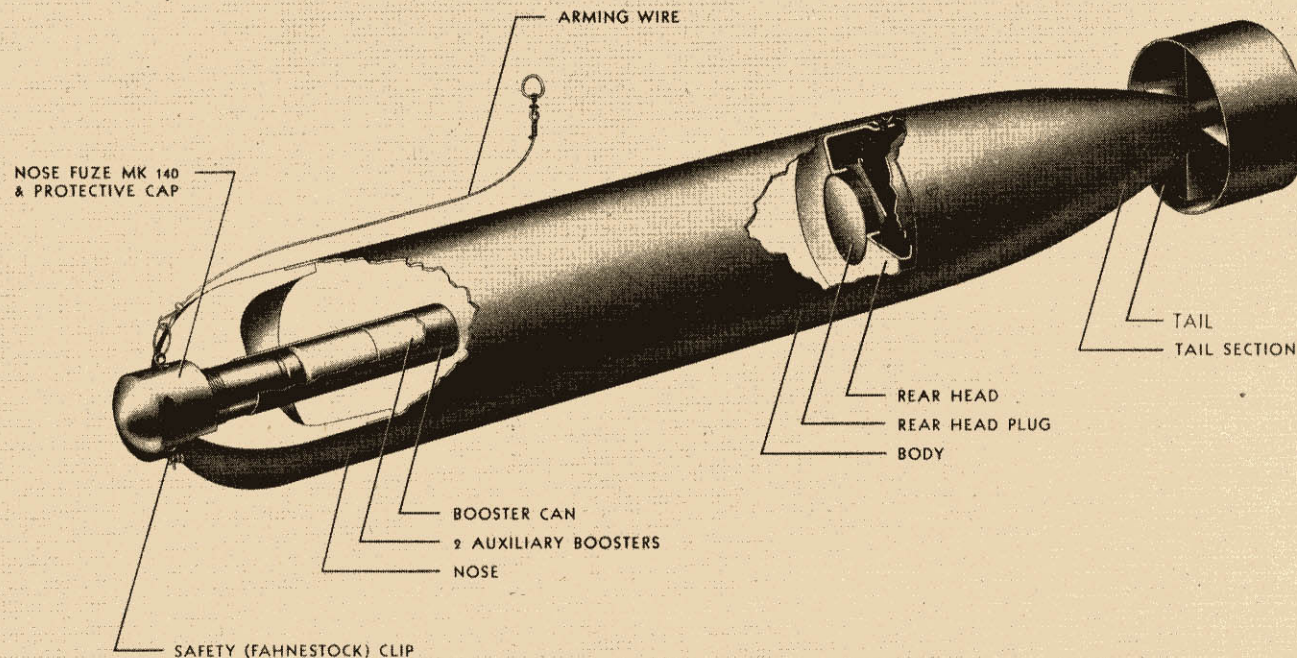
The bomb is filled with either 45.3 lb. of TNT or 50.3 lb. of Torpex. It is equipped with a hydrostatic-arming, impact-functioning Nose Fuze Mk 140. This fuze will normally function on impact with a solid

object below the surface of the water, but will also function upon striking the surface of the water at any velocity greater than approximately 300 feet per second. When the Fuze Mk 140 is installed in the Bomb Mk 52, this velocity may be attained in a free fall (no forward velocity at instant of release) from a vertical height of 1,400 feet.

Components of a Complete Round

1. The bomb, completely assembled except for the Fuze Mk 140, is shipped in a wooden crate. Two auxiliary boosters (180-gram) are held in the booster can by the cardboard nose spacer and the nose shipping plug.

2. The Fuze Mk 140 is packed in a sealed cylindrical metal container. Twenty-four



DIMENSION AND WEIGHT TABLE

Total Weight (TNT-Loaded)	99.1 lb.	Weight of Explosive (Torpex)	50.3 lb.
Total Weight (Torpex-Loaded)	104.1 lb.	Overall Length	45.9 in.
Weight of Explosive (TNT)	45.3 lb.	Diameter of Bomb Body	7.0 in.

Figure 119.—7.0-In. 100-Lb. Depth Bomb Mk 52

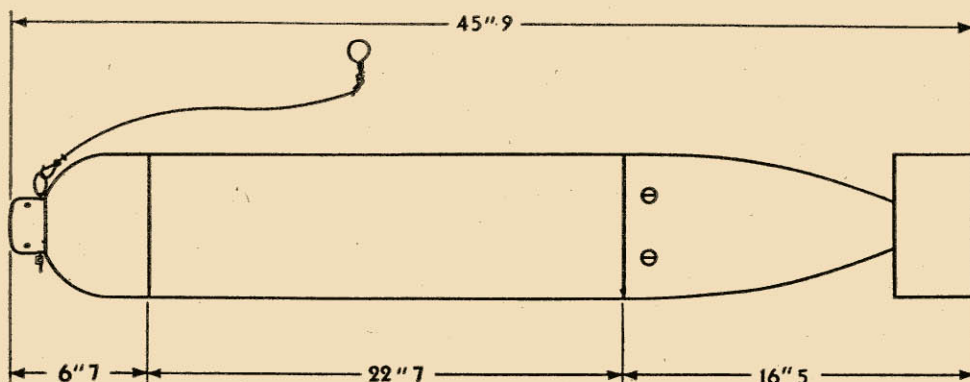
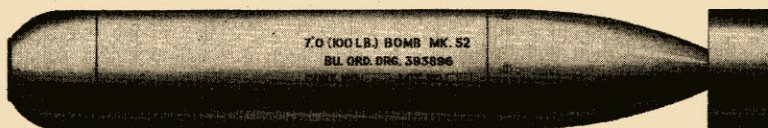
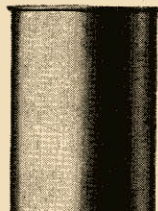
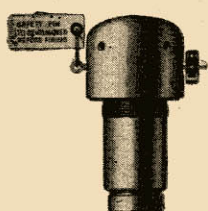


Figure 120.—7.0-In. 100-Lb. Depth Bomb Mk 52



BOMB BODY SHIPPING PLUGS



NOSE FUZE MARK 140



CRATED BOMB

Figure 121.—Components of a Complete Round

fuzes in containers are shipped in a wooden box.

Preparation of Bomb for Flight

1. Remove the bomb from crate.
2. Remove the nose shipping plug from the bomb.
3. Inspect the fuze seat liner and see that the two auxiliary boosters are in place. Clean the fuze seat liner if necessary.
4. Remove the fuze from the container and examine it for defects, particularly as regards the gasket.
5. Check freedom of movement of the safety ring. This is accomplished by turning the fuze alternately nose-down and nose-up. The ring should be heard to "click" with each turn. The last "click" is when the fuze is turned to the nose-up position. In this position, the ring engages the hooks on the bell cranks. If no "click" is heard, the fuze should be tagged and returned to a depot for overhauling.

6. Screw the fuze into the nose of the bomb (see page 168) with the special spanner wrench provided for that purpose. See that the gasket is in position so that the fuze connection with the bomb body is watertight. Do not use grease or sealing compounds on either the gasket or the seat.

7. Install as many Bombs Mk 52 as may be required in the Rack Mk 53; install arming wires in arming mechanism of rack, and attach clips on ends of arming wires to the loops on the safety wires of the bomb fuzes. Before tightening cables which support the bombs in the Bomb Rack Mk 53, rotate all bombs so that the loops on the fuze safety wires are all on top and can be easily attached to the arming wires. No arming wires are required for the top row of bombs in the Rack Mk 53; the loops on the safety wires of the fuzes in these bombs are placed directly into the arming mechanism of the rack.

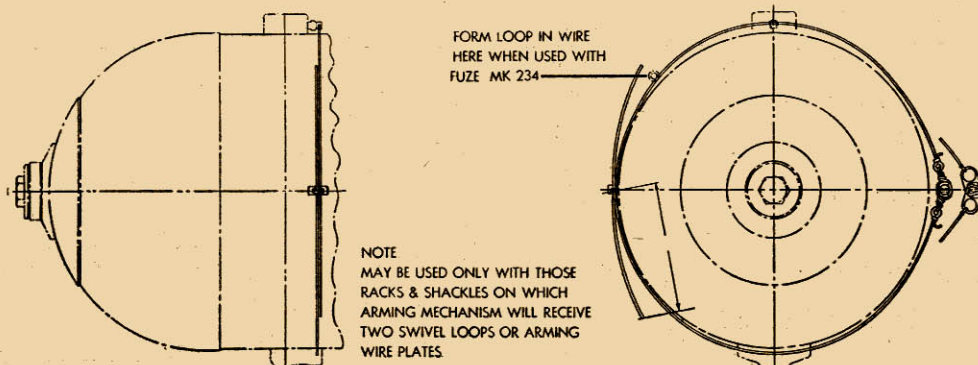
8. If it is necessary to remove the fuze from the bomb, use the special wrench provided for that purpose.

ARMING WIRES

Installation of Arming Wires for Use with Aircraft Depth Bombs

Installation of arming wires for nose fuzes and hydrostatic tail fuzes in aircraft depth bombs is accomplished according to standard practices. Installation of arming wires

for athwartship hydrostatic fuzes, however, may be done in several ways, some of which, from the safety standpoint, are more desirable than others. Particular reference



Figures 122 and 123.—Arming Wire for Athwartship Hydrostatic Fuze

is made to the practice of installing a double arming wire which terminates in one swivel loop or arming wire plate for use with athwartship hydrostatic fuzes. In the event of a crash landing at sea (presuming the bombs have not been jettisoned), it is possible that the bombs and/or the shackles may be torn loose. The use of two independent arming wires to athwartship hydrostatic fuzes, as shown in all illustrations in this pamphlet, will result in an arming wire arrangement which is less likely to snag on some part of the aircraft than the bridle formed by two arming wires terminating in a single wire loop or plate (assuming that the wire loops or plates come free of the arming mechanism which should be set on "safe").

Both arming wires must be removed from the Fuze AN-Mk 224 before it can function.

The Fuze AN-Mk 234 can function if the arming wire to the booster extender end is removed. The neoprene tube on the pistol end is only a waterproofing device.

Where the arming mechanisms of the racks or shackles do not permit the use of two independent arming wires, arming control units should be installed as required. A further measure may be taken to help insure that the arming wires are not pulled completely out of the athwartship hydrostatic fuze ends. This consists of extending the ends of the arming wires down underneath the bomb end, securing the free ends by means of one safety clip as shown in BuOrd Dwg. 140356. This arrangement requires that nearly 1½ feet more length of each arming wire must be pulled through the athwartship fuze ends before the fuze may become armed.

UNDERWATER TRAVEL OF AIRCRAFT DEPTH BOMBS

The following table outlines the general underwater travel characteristics of aircraft depth bombs:

Bomb	Ratio of forward underwater travel (in yards) to ground speed at release (in knots)*	Ratio from time of impact to detonation (in seconds) to ground speed at release (in knots)*
All 325-350-lb. round-nose depth bombs	1/5	1/35
All 325-350-lb. depth bombs with flat-nose attachments or integral flat noses	1/5	1/50
All 650-lb. round-nose depth bombs	1/7	1/35
All 650-700-lb. depth bombs with flat-nose attachments or integral flat noses	1/12	1/50

* 25-foot setting on hydrostatic fuze

Example:

Ground speed at release: 180 knots

Bomb: 650-lb. round nose Mk 37

$$a. \text{ Forward Travel} = \frac{180}{7} = 25.7 \text{ yards,}$$

as measured on surface of water from point of impact to point directly above bomb at time of detonation.

$$b. \text{ Time} = \frac{180}{35} = 5.4 \text{ seconds from instant of impact to detonation.}$$

Flat-nosed depth bombs will disperse to the right or left of the point of impact with water approximately $1/7$ as much as corresponding sizes of round-nose depth bombs. The average amount of such lateral dispersion is practically negligible for flat-

nosed depth bombs under most operational conditions. It will be noted from the above table that flat-nose shapes on a depth bomb **reduce** both the amount of forward underwater travel and the time from impact to detonation in comparison to depth bombs with round noses.

SAFETY PRECAUTIONS

General Safety Precautions for Aircraft Depth Bombs

1. Because of their relatively light bodies, aircraft depth bombs must be handled with considerable care. They must not be subjected to rough treatment in any handling operations such as transporting, loading and unloading from aircraft, etc.; nor should tools or other objects be permitted to drop upon them. Particular care must be taken to insure that the bombs do not become rusted or corroded and, at the first indication of such rusting, the parts affected should be carefully cleaned and repainted.

2. Prior to use, all aircraft depth bombs must be inspected for general condition, and any bombs found not in good condition for any reason should not be used. The following points should especially be noted:

a. Condition of bomb bodies and tails for dents, rusting, bent tails, deformed or torn hoisting and suspension lugs, damaged or dirty fuze seat liner threads and mating surfaces, and general cleanliness of all surfaces. No mud or dirt should be allowed to accumulate on any parts of the bombs.

3. Upon assembling the bombs, any parts which do not readily fit together without the use of undue force should be discarded or, if necessary, the complete bomb not used.

4. Where bolts are used for attaching tails to depth bomb bodies, **all** bolts must be used. Where a tail lock nut is employed for attaching the tail to a depth bomb body,

care should be taken to insure that the tail cone is fully seated on the bomb body and the tail lock nut **securely tightened**.

5. Where boosters are required for use in nose and fuze seat liners, check must be made to insure that the boosters are **installed** and the **correct number** is **present**. Remove all boosters from fuze cavities of depth bombs except those which are actually being used in conjunction with installed fuzes.

6. Only fuzes which are in apparent good condition should be installed.

7. Where an arming-wire bracket is required, it must be correctly positioned on the fuze, the arming-wire protective tube installed, and the bracket **securely tightened** to the fuze. A careful check should be made to insure that the fuze impeller vanes adequately clear the arming-wire bracket as installed.

8. Arming wires must be free from kinks, burrs, dents, dirt, and corrosion. They must be correctly installed so as to function properly on safe or live drops with the rack or shackle, bomb, and fuzes used. Safety (Fahnestock) clips must be used where required.

9. Hoisting bands, where used, must be correctly installed and every possible safety precaution taken during hoisting operations.

10. Live-loaded depth bombs must never be used to check functioning of racks and shackles by installing a bomb on a rack or shackle and then actuating the release mechanism and allowing the bomb to fall to the deck (padded or otherwise) or by restraining the released bomb by means of the bomb hoist cable. The hoisting lugs on aircraft depth bombs are not designed to sustain the loads imposed by the latter treatment. Even with inert-loaded depth

bombs, such practice is to be discouraged.

11. Disassembly of the booster end of Fuzes Mk 229 Mod 3 and AN-Mk 230 Mod 4 is **dangerous** and should be done only by qualified personnel.

12. The special vane for use with Fuzes AN-M103A1 when these fuzes are installed in flat-nosed depth bombs should always be used, as required, in order to insure arming of the fuzes.

Chapter 4

FRAGMENTATION BOMBS

What They Are

Fragmentation bombs are bombs which cause destruction, primarily, by the fragmentation of their cases. The cases of these bombs are so constructed that they will, upon detonation, break into hundreds of small pieces which will effectively destroy personnel, animals, and light material targets such as motor transports, airplanes on the ground or in flight, targets aboard ships, etc.

How They Are Used

The smaller fragmentation bombs are generally dropped in clusters of three, six, or more bombs to cover a maximum area. Certain fragmentation bombs are equipped with parachutes, enabling the airplane to drop its bombs at a low level. Fragmentation bombs are equipped with nose fuzes which cause detonation upon impact.

20-LB. FRAGMENTATION BOMB M41 OR AN-M41

The type of fragmentation bomb currently being issued to the naval service is the 20-lb. Fragmentation Bomb M41 or AN-M41. The Fragmentation Bombs M41 and AN-M41 (Fig. 124) are identical except for painting, the M41 being painted an olive drab color all over and the AN-M41 having the standard AN painting, with yellow areas on the nose and tail and a broken yellow line about the center of gravity of the bomb body.

Cluster and Cluster Adapters

All the Fragmentation Bombs M41 or AN-M41 issued to date to the naval service have been assembled into clusters of six bombs. The clusters, as received, are completely assembled ready for installation on the aircraft. There are three distinct types of fragmentation clusters, designated M1, M1A1, and AN-M1A1, which differ from one another principally in the **cluster adapter**. (See Fig. 127.) The **cluster adapter** is the framework to which the bombs are assembled to form a cluster. Both the completely assembled **cluster** and the **cluster adapter** are

given an "M" or "AN-M" designation and number. Because the designations of clusters and cluster adapters are usually the same (for example, the Cluster M1 contains a Cluster Adapter M1) it is necessary, in order positively to identify and cluster, that a complete nomenclature be used which gives the **weight class of the cluster**, the **type of cluster**, the **type of cluster adapter**, the **number, weight, and type of bombs contained**, and, in some cases, the **type of fuzes** installed in the bombs. A typical example would be: 100-lb. Cluster M1, with Cluster Adapter M1 and six 20-lb. Frag. Bombs M41 with Fuzes M110.

Construction details of the 20-lb. Fragmentation Bomb AN-M41 are shown in Figure 124. The fore-and-aft suspension lug and the tail suspension lug are intended for use with specialized types of bomb racks and are not used when the bombs are assembled in clusters.

Fuzes for Bombs M41 and AN-M41

The fuzes used with Bombs M41 and AN-M41 are the Fuzes M110 and AN-M110A1.

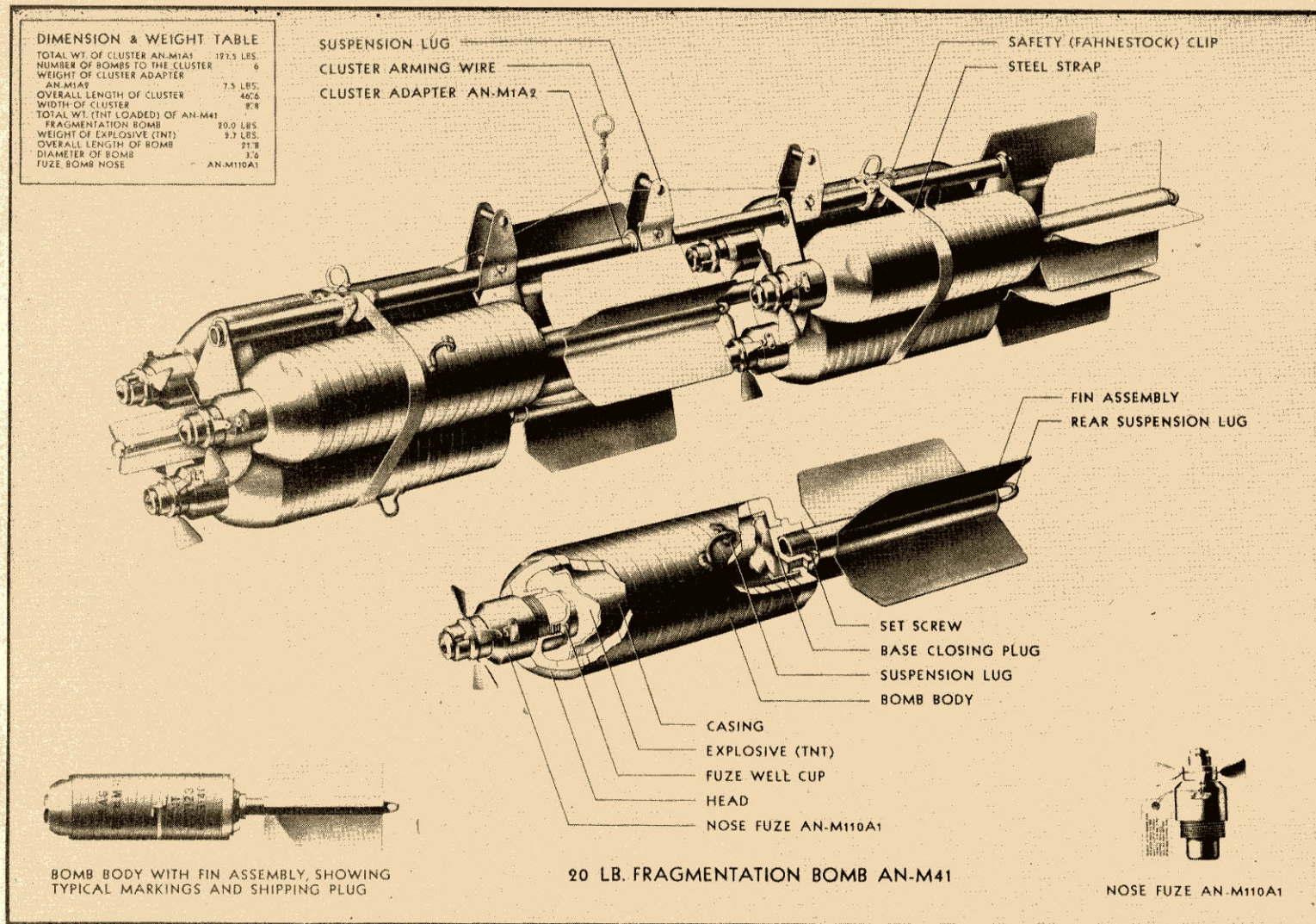
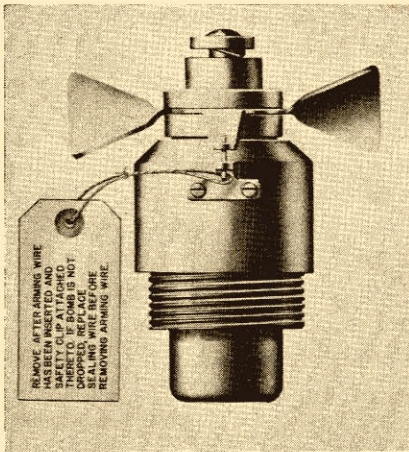
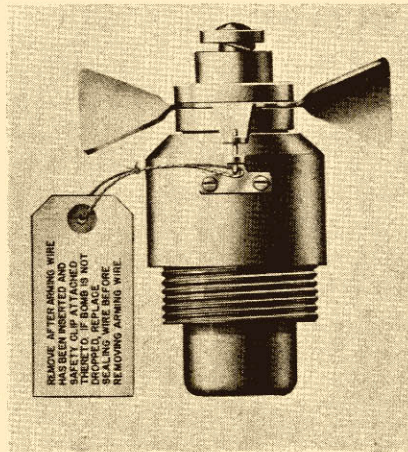


Figure 124.—Fragmentation Bomb Cluster AN-M1A1

FRAGMENTATION BOMBS



M110



AN-M110A1

Figure 125.—Nose Fuzes M110 and AN-M110A1

(See Fig. 125.) The Fuze AN-M110A1, which is currently being issued with Bombs AN-M41, is fully described in Ordnance Pamphlet 988. The initial distribution of Clusters M1 contained Bombs M41 equipped with Fuzes M110; later, Bombs AN-M41 with either Fuzes M110 or AN-M110A1 were supplied on both Clusters M1 and M1A1. Latest issues of Clusters M1A1 and all Clusters AN-M1A1 are assembled with Bombs AN-M41 with Fuzes AN-M110A1 in-

stalled. The Fuze M110 is of less sturdy construction than the AN-M110A1 and requires partial pre-arming prior to use in the Bombs M41 or AN-M41. Wherever these fuzes were installed in bombs which were assembled into clusters, the fuzes were partially pre-armed and require no further attention in this regard on the part of service personnel. (See NAVORD OCL's A24-43 and A24a-43 for further information regarding Fuzes M110 and AN-M110.)

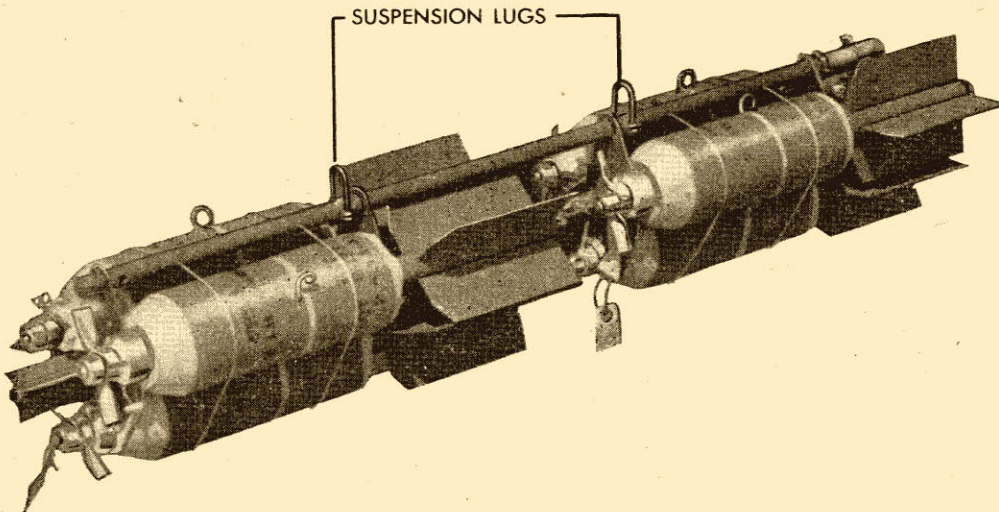


Figure 126.—100-Lb. Fragmentation Bomb Cluster M1

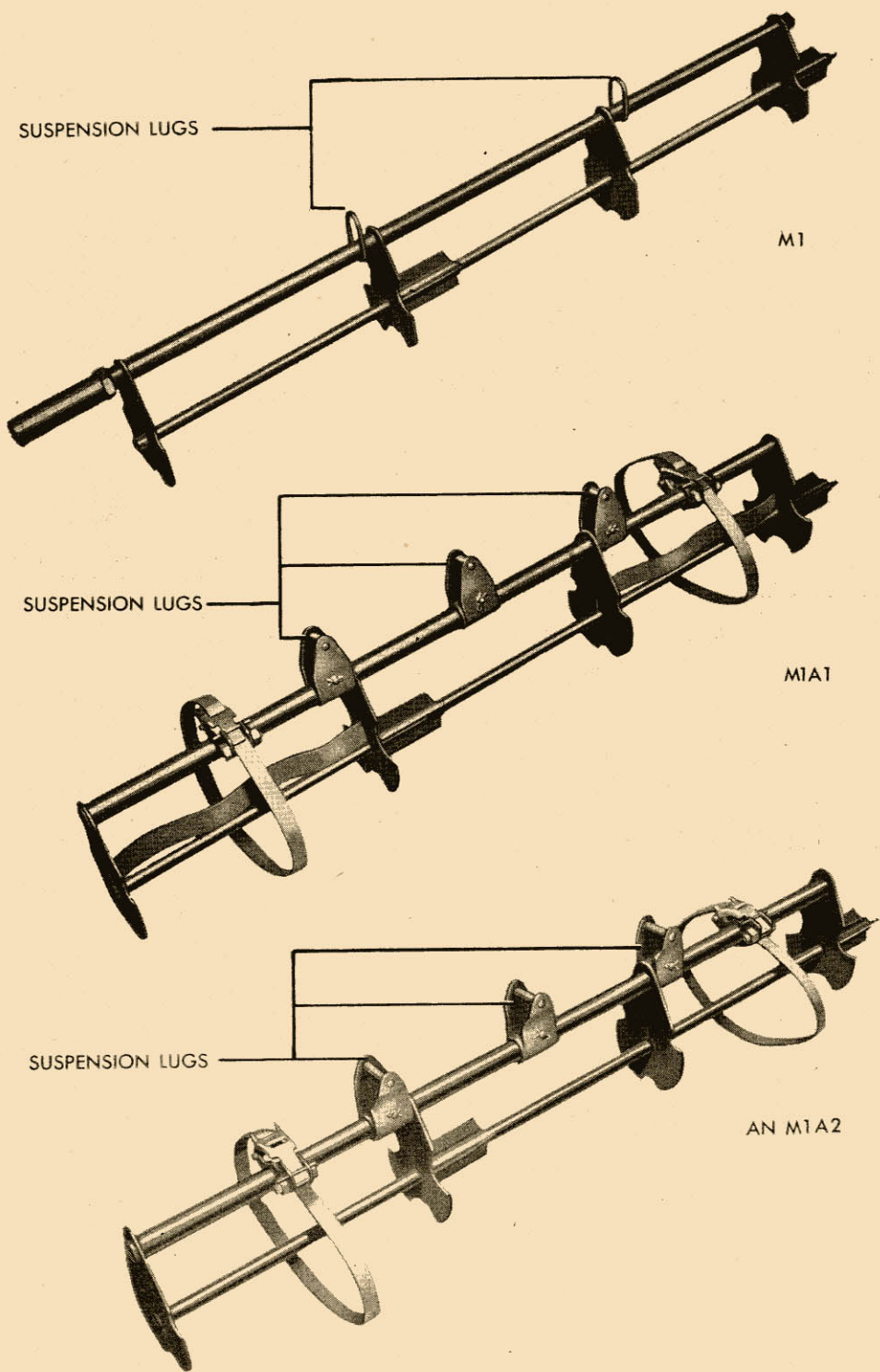


Figure 127.—Cluster Adapters M1—M1A1—M1A2

FRAGMENTATION BOMBS

The 100-Lb. Fragmentation Bomb Cluster M1

The Fragmentation Bomb Cluster M1 consists of a Cluster Adapter M1 (Fig. 126), six Bombs M41 or AN-M41 equipped with Nose Fuzes M110, four steel tie wires, a Cartridge M6, a firing mechanism, and an arming wire assembly. The complete cluster is issued fully assembled, except for the arming wire, and ready for installation in the airplane.

The Cluster Adapter M1 consists of two longitudinal steel tubes, called the **barrel** and **separator**. Welded to the separator are nose and fin supports for the bombs and vane stops which prevent motion of the fuze vanes until the cluster is dropped armed. The barrel is drilled athwartships with four holes, through which the tie wires pass. One end of the barrel is closed with a steel plug; in the other end, the cartridge is inserted with the firing mechanism screwed over it.

The firing mechanism contains a firing pin powered by a spring which is held compressed by the safety cotter pin during shipment and by the arming wire when the cluster is in the plane.

The cartridge contains a sharp-cornered steel slug which, when the cartridge is fired, is driven through the barrel, severing the tie wires which secure the bombs to the adapter. The cartridge fires instantaneously upon release; thus when the cluster is installed in internal bomb bays, it should be located so as to minimize the probability of the bombs striking some adjacent structure as the cluster falls apart.

Two suspension lugs, located 14 in. apart, are welded directly to the barrel and provide the means for attaching the cluster to a rack or shackle. The Cluster M1 can, therefore, be carried only on racks or shackles having two suspension hooks 14 in. apart.

Installation of Cluster M1

In preparing to install the Cluster M1 in an airplane, the complete cluster should first be removed intact from its wooden shipping box; next the car seal wire should be removed from the firing mechanism and the arming wire inserted into the vacated hole. Then, **and not before**, the tagged safety cotter pin should be removed. The cluster is then ready to be installed on the rack or shackle. A Navy-type arming wire with plate may be substituted for the Army-type swivel-loop wire accompanying the cluster, except where the cluster is to be suspended from a Shackle AN-B10. Only the swivel-loop-type arming wire may be used with the latter shackle, as the Navy arming wire plate is likely to hang up in the Shackles AN-B10 and prevent safe release. Difficulty may be encountered in inserting the Army-type swivel loop into the arming mechanism slots of the Racks Mk 41 and Mk 35 type. It is usually necessary to slightly reduce the width and flatten the loop with a pair of pliers before it may be inserted. The re-bending of the loop must be carefully accomplished, so that the loop slides freely on the arming mechanism slots of the above noted racks and the arming latch can positively engage the loop. After installation, **the shipping wires must be removed from each of the six vane stops**. This procedure may be carried out while the cluster is still on the deck before being installed in the rack or shackle; connecting the arming wire to the arming mechanism of the rack or shackle and adjusting the steadying forks (on racks) completes the installation. If the cluster is not dropped, the above steps should be carried out in the reverse order and the cluster stowed in its original shipping box.

Functioning

1. **Armed**—When the cluster is dropped armed, the arming wire is withdrawn, the cartridge is fired, and the bombs released

from the adapter. The fuzes are now free to arm. Arming air-travel distance is approximately 725 feet from the point where the bombs tumble free of the adapter.

2. Unarmed—When the cluster is released safe, the arming wire is not withdrawn and the entire cluster remains intact. The fuzes cannot arm, since the impeller vanes are prevented from rotating by contact with the cluster adapter vane stops.

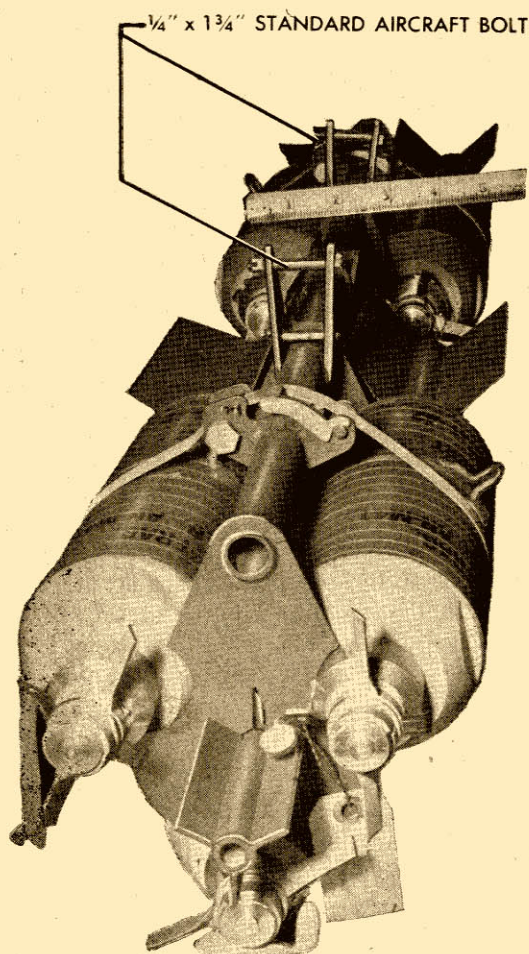


Figure 128.—Fragmentation Bomb Cluster M1A1

The 100-Lb. Fragmentation Bomb Cluster M1A1

The Fragmentation Bomb Cluster M1A1 consists of a Cluster Adapter M1A1 (Fig. 128), six Bombs M41 or AN-M41 equipped with Fuzes M110 or AN-M110A1, and an arming wire assembly. The complete cluster is issued fully assembled and ready for installation in the airplane.

The Cluster Adapter M1A1 consists of two longitudinal steel tubes to which are welded nose and fin supports. Two vane stops are welded to the lower member to prevent rotation of the fuze vanes and arming of the fuzes until the cluster is released armed. Directly above the lower member are two longitudinal spring-steel strips inserted to keep the bombs apart and maintain tension in the strap which holds the bombs to the adapter.

The releasing device on this type cluster is entirely mechanical, consisting of a steel strap, one end of which is secured to a bolt fitted between two parallel plates welded to the upper member of the adapter. The strap encircles the bombs, and the other end is also secured between the parallel plates by means of a strap clamp and cotter pin. Each adapter carries two of the release mechanisms described above, each controlling the release of three bombs. When the cluster is suspended from a rack or shackle, an arming wire with a centered swivel loop holds the strap clamps closed until the cluster is released armed.

Three suspension lugs, each spaced seven inches apart, are fastened to the upper member of the adapter by means of suspension lug pins. A screw head projecting through the underside of the upper member seats in a hole in the base of the lug and prevents any sliding or rotation. By removing the suspension lug pin(s), the lug(s) not in use can be dropped clear of the rack or shackle. Thus, two 14-in. spacing

lugs or one single center lug may be provided. The suspension lugs of the Cluster Adapter M1A1 will not fit properly on Navy Bomb Racks Mk 35, 41, 50 and 51, and the various Mods thereof, because of interference between the upper ends of the suspension lugs, and the side plates of the bomb racks. This may be remedied as shown in Fig. 128, by removing the cross pins from the lugs, spreading the lugs apart, and installing $\frac{1}{4}$ -in. x $1\frac{3}{4}$ -in. standard aircraft bolts. The heads of these bolts should be retained by cotter pins. The steadying forks of the Racks Mk 40 and Mk 50 are ineffective in stabilizing the Cluster M1A1. The centers of the steadying forks of the bomb rack meet the upper member of the adapter before the ends of the forks meet the tops of the upper bombs. This situation can be overcome by wrapping a suitable quantity of friction tape around each end of the steadying forks or by wiring and taping small wooden blocks to the ends of the forks.

Installation of Cluster M1A1

Prior to installing the Cluster M1A1 in an airplane, the following steps, in addition to those enumerated above for Navy racks, must be carried out:

1. Remove the car seals, if present, from the fuzes.

2. Check to see that arming-wire swivel loop will reach the arming mechanism of the rack or shackle; if this loop will not reach, the arming wire may be removed from the cluster and a Navy-type wire of adequate length installed; clip off the excess lengths of the Navy wire so that about two inches protrude beyond each buckle clamp. Another procedure which may be used is to make up an arming-wire extension (Fig. 129) consisting of a regular arming wire cut down to about six inches long with either a swivel loop or a Navy-type plate at one end. The cut end of the extension, i.e., the end opposite the swivel loop or plate, is passed through the swivel loop of the arming wire furnished with the cluster, bent back, and wrapped around about two turns. (See Fig. 129.) For the reasons previously enumerated, no Navy-type arming-wire plates are to be used with Shackles AN-B10.

3. Next, and not before step No. 2 has been completed, remove the tagged cotter pins from the strap clamps.

4. The cluster is now ready for installation in the rack or shackle. If the cluster is not dropped, the above assembly procedure should be carried out in the reverse order and the cluster stowed in its original shipping box.

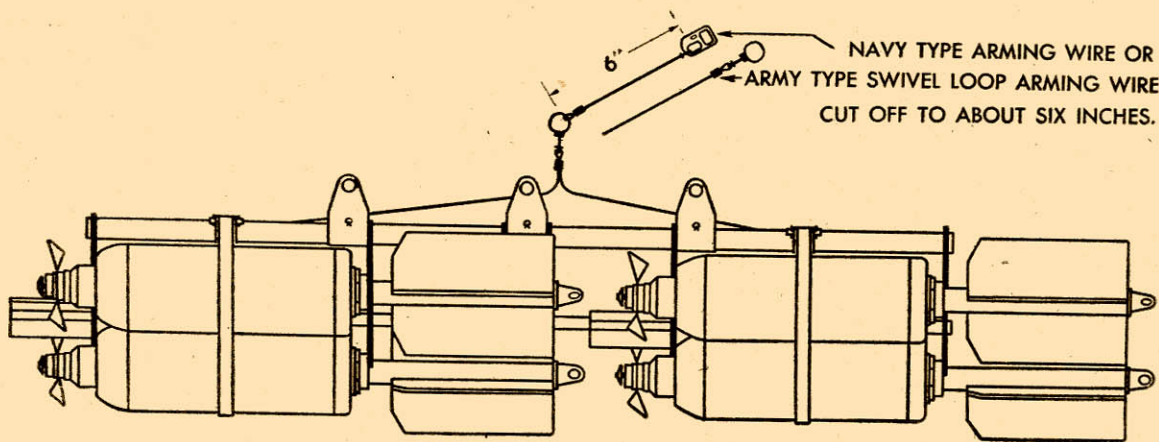


Figure 129.—Sketch of Arming Wire Extension

Functioning

1. **Armed**—When the cluster is dropped armed, the arming wire is withdrawn, the strap clamps open, thereby releasing the straps, and the bombs are free to fall away from the cluster adapter. As soon as the bombs are out of the adapter, the fuzes are free to arm in the normal manner.

2. **Unarmed**—When released safe, the arming wire is not withdrawn and the entire cluster falls intact, the fuzes being prevented from arming because the impeller vanes are prevented from rotating by contact with the vane stops in the cluster adapter.

It will be noted on BuOrd Dwg. 339132 Army Rev. No. 1, dated 2-1-43, that the Cluster M1A1 is designated AN-M1A1. This is an erroneous designation and, although many of the clusters were manufactured, marked, and issued as AN-M1A1, they are **not** Clusters AN-M1A1. The true Cluster AN-M1A1 contains a Cluster Adapter AN-M1A2 and differs from the Cluster M1A1 in several important respects, notably in the shape of the suspension lugs. These changes are described in subsequent paragraphs.

The 100-Lb. Fragmentation Bomb Cluster AN-M1A1

The 100-lb. Fragmentation Bomb Cluster AN-M1A1 consists of a Cluster Adapter AN-M1A2 (Fig. 130), six Bombs AN-M41 with Fuzes AN-M110A1 installed, and an arming wire shipped coiled and tied to the cluster.

This cluster, BuOrd Dwg. 339132, is a modification of the Cluster M1A1 previously described. The modifications are concerned with the cluster adapter and consist of the following:

1. The suspension lugs are widened so that they will fit all Navy bomb racks.

2. The bombs are located slightly higher in the adapter, so that the sway-brace forks of racks of the Mk 41 and Mk 50 type will satisfactorily contact the upper surfaces of the bombs.

3. Latest issues of the cluster contain arming wires of sufficient length so that they may be slid backward or forward to enable the swivel loop to engage the arming mechanism of any rack or shackle. For special instructions regarding these wires, see page 132.

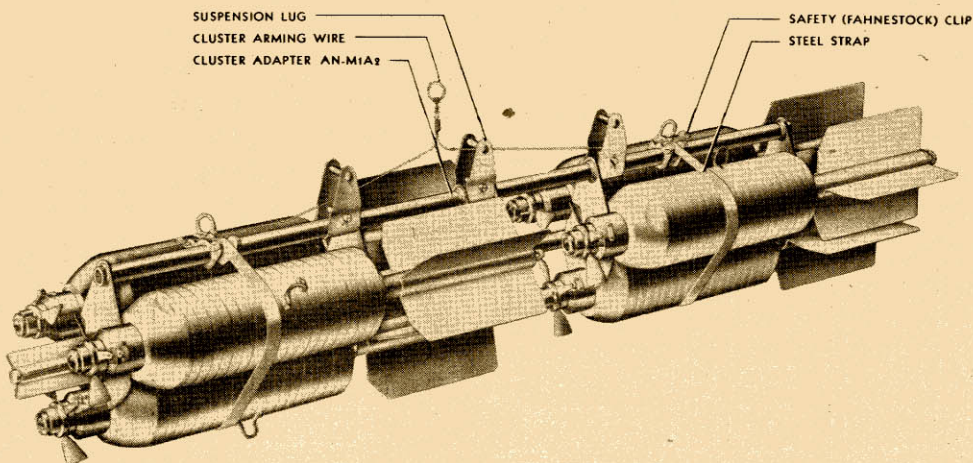


Figure 130.—100-Lb. Fragmentation Bomb Cluster AN-M1A1

FRAGMENTATION BOMBS

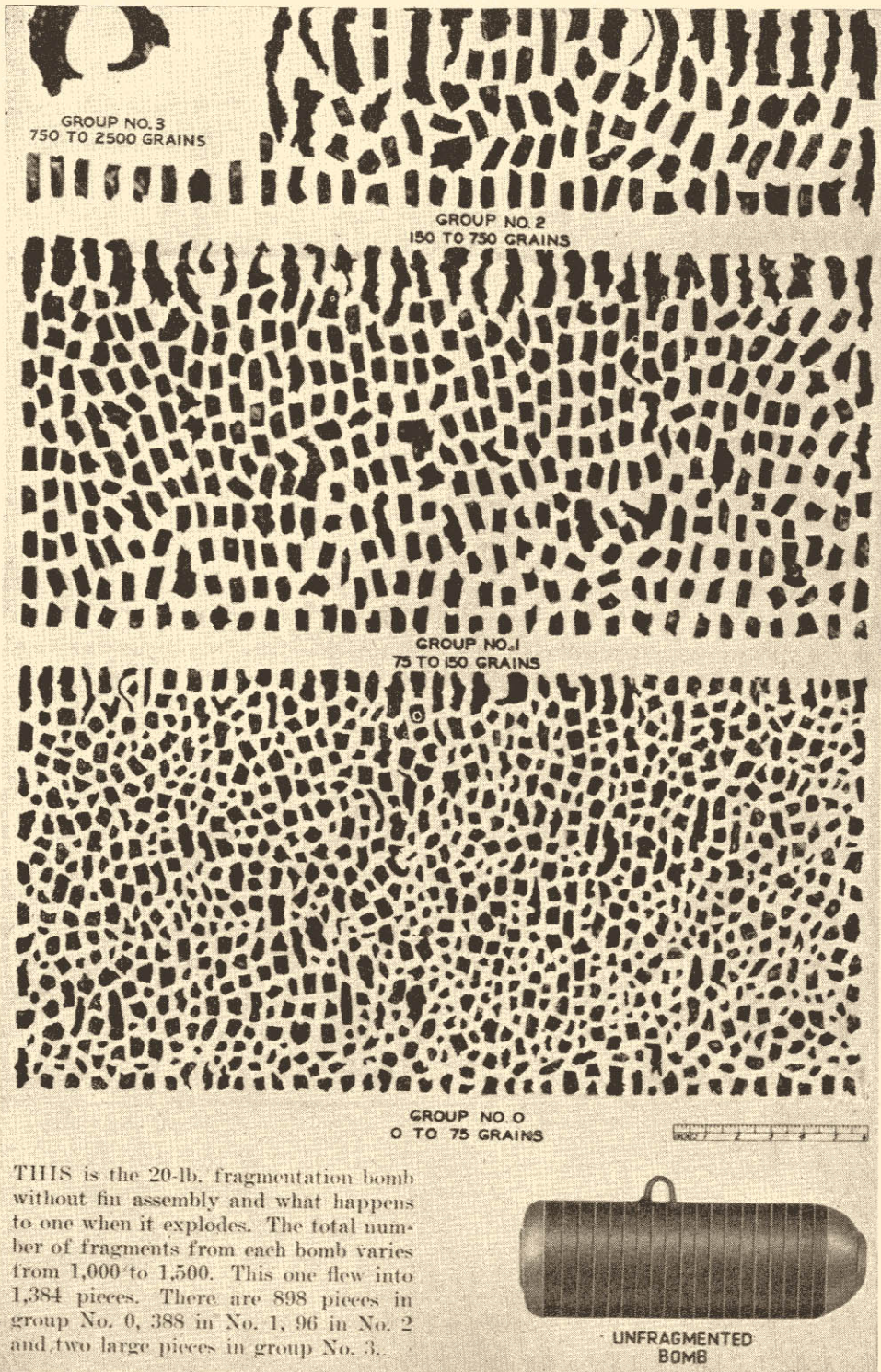


Figure 131.—Typical Sample of Fragments from Fragmentation Bomb AN-M41

Installation of Cluster AN-M1A1

Installation of this cluster is similar to the installation of the Cluster M1A1.

General Performance Data of Fragmentation Bombs M41, AN-M41, or AN-M40

The spirally wound outer casing of the Fragmentation Bombs M41, AN-M41, or AN-M40 is 0.44 inch in cross section; upon detonation, this case breaks up into 1000 to 1500 fragments. The average weight of the individual fragments is between 0.2 and 0.3 ounce. Fig. 132 shows the general distribution of the fragments. It will be noted from Fig. 132 that approximately 80% of all fragments are projected within 72 degrees on either side of the bomb's "equator"; within this 72-degree arc, there is a very dense spray of fragments in the region from the bomb's equator to about six degrees toward the bomb tail. At a distance of 30 feet from the bomb, the density of fragments in this dense spray is about 12 fragments per square yard; at 60 feet the density within the spray is approximately three fragments per square yard. The initial velocity of the fragments is 2800 to 2900 feet per second, and some of the fragments may be projected as far as 500 yards. Penetration tests have shown that about 65% of all the fragments will penetrate $\frac{1}{8}$ -in. thick mild steel plates at a distance of 60 feet from the point of detonation of the bomb.

Patterns Produced by Fragmentation Bombs When Released in Clusters from Various Altitudes

Figs. 133, 134, 135, and 136 show typical patterns produced when Bombs M41 or AN-

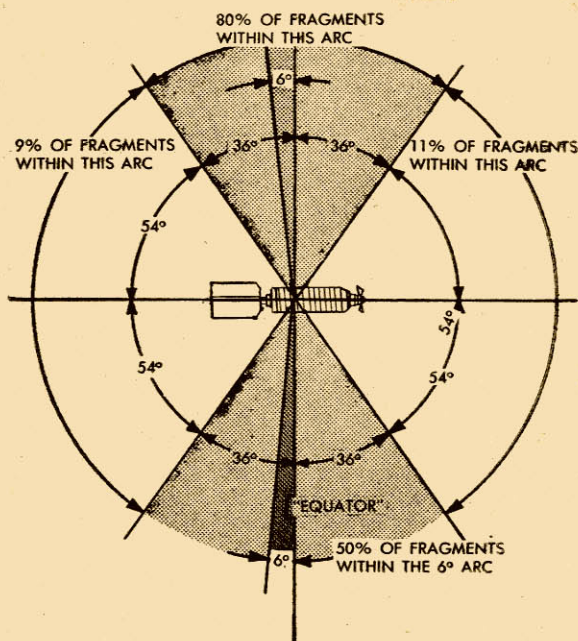


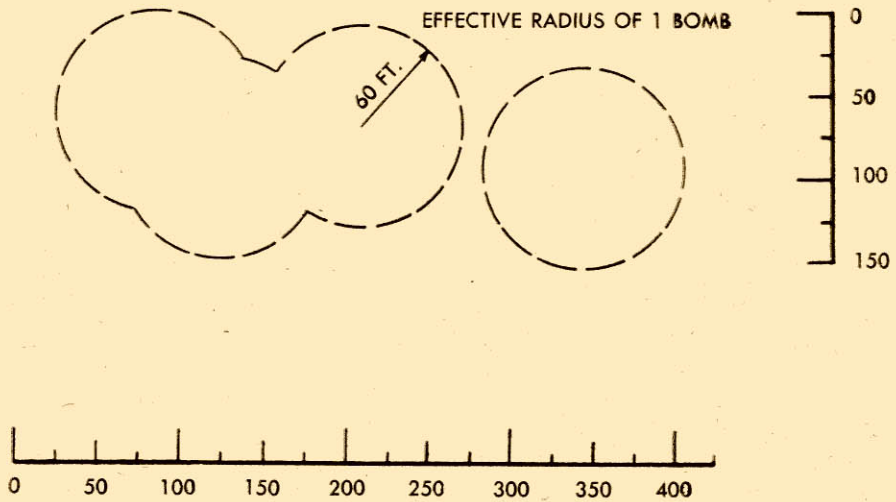
Figure 132.—Fragments Pattern for 20-23-Lb. Fragmentation Bomb

M41 are dropped in clusters from various altitudes. It will be noted from these figures that the "effective radius" of each bomb is given as 60 feet. This is a good average value which was determined with consideration of the fact that, when released under normal bombing conditions, the bombs do not strike the target in a vertical position but always hit inclined from the vertical to a degree dependent primarily upon the altitude and speed at release.

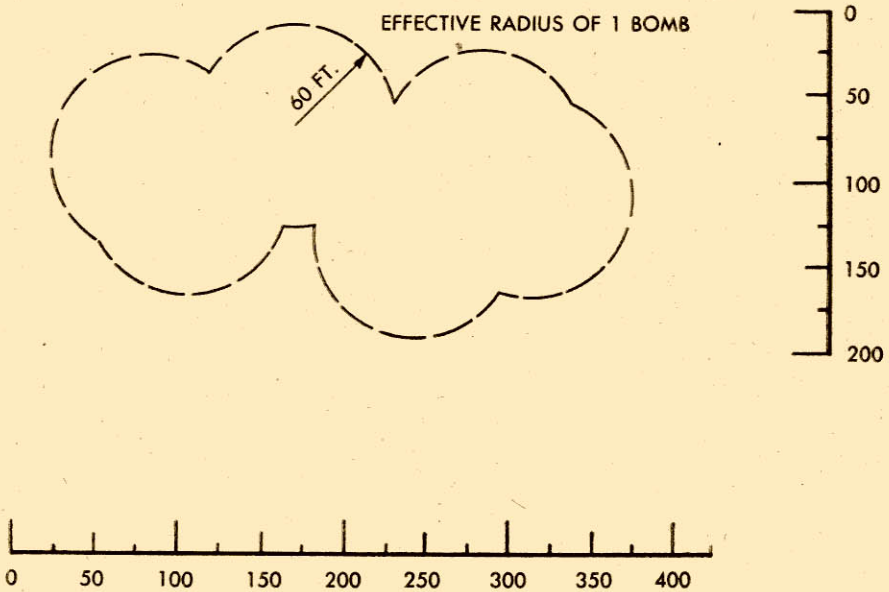
Thus, part of the "spray" of fragments is directed upward, and part downward, from the horizontal plane of the target, which somewhat reduces the "effective radius" of the bomb. For further more detailed information concerning fragment sizes, velocities, and patterns, reference should be made to OP 1172.

FRAGMENTATION BOMBS

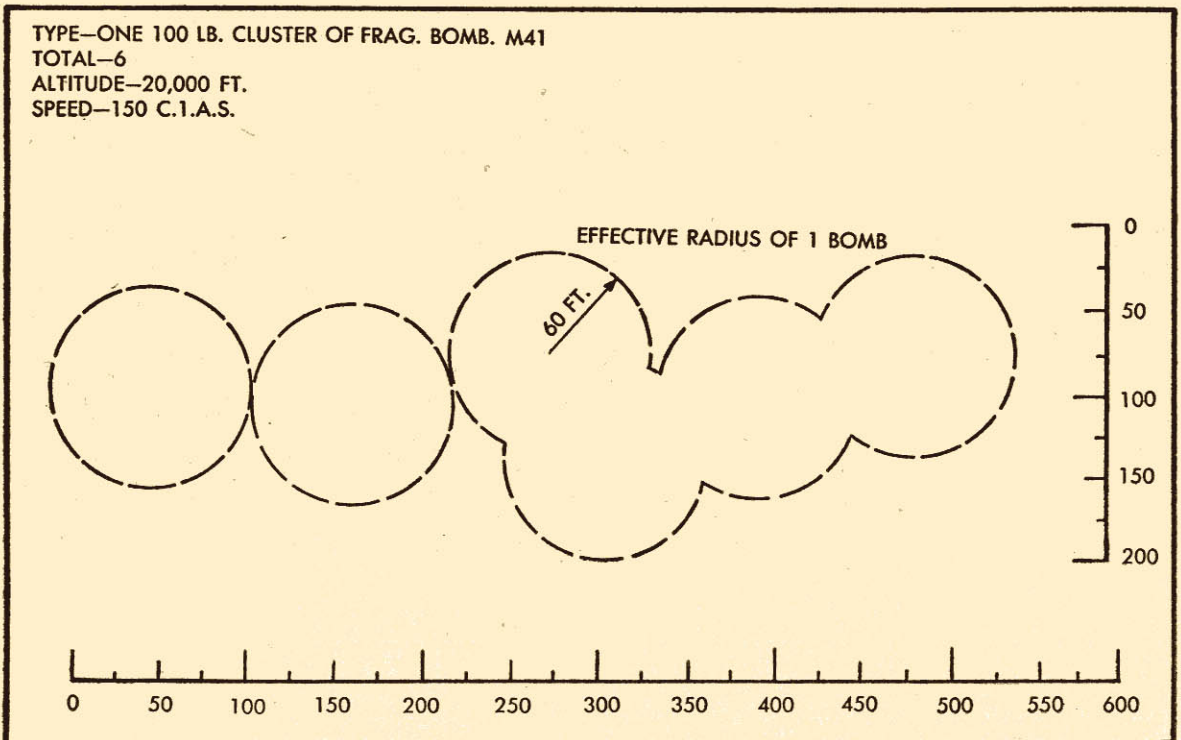
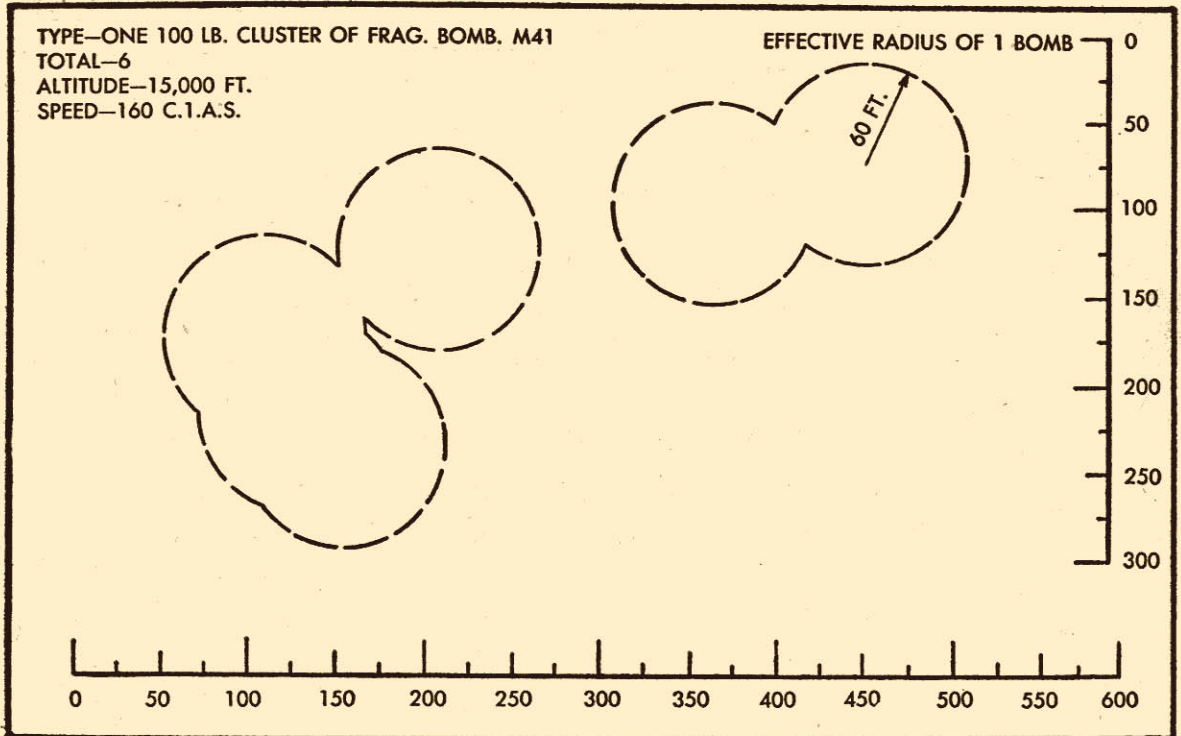
TYPE—ONE 100 LB. CLUSTER OF FRAG. BOMB. M41
TOTAL—6
ALTITUDE—5,000 FT.
SPEED—190 C.I.A.S.



TYPE—ONE 100 LB. CLUSTER OF FRAG. BOMB. M41
TOTAL—6
ALTITUDE—10,000 FT.
SPEED—180 C.I.A.S.



Figures 133 and 134.—Radius Patterns



Figures 135 and 136.—Radius Patterns

23-LB. FRAGMENTATION BOMB AN-M40

The bomb body of the 23-lb. Fragmentation Bomb AN-M40 is similar in construction to the 20-lb. Fragmentation Bomb AN-M41; however, the Bomb AN-M40 is equipped with a parachute unit instead of the fin assembly of the AN-M41. (See Fig. 138.) The Bomb AN-M40 is carried in a cluster of three bombs, described below.

100-Lb. Fragmentation Bomb Cluster AN-M4

The Cluster AN-M4 (Fig. 138) consists of the following:

1. One Cluster Adapter AN-M3
2. Three 23-lb. Fragmentation Bombs AN-M40
3. Three Nose Fuzes AN-M104 or AN-M120
4. Three parachute cover assemblies
5. One arming wire assembly, coiled and tied to the cluster

Cluster Adapter AN-M3

The Cluster Adapter AN-M3 (Fig. 137) consists of two longitudinal steel tubes welded to five supports. Welded to the upper member are two mechanical release mechanisms. Also welded to the upper member are washers which retain three suspension lugs. Three rests and five springs are attached to the lower member. The five springs aid in ejecting the bombs from the cluster.

Preparation of Cluster for Use

Note: The earlier lots of parachute fragmentation bomb clusters were designated M4 and contained Cluster Adapters M3. The suspension lugs of the Adapters M3 were of the narrow type similar to those previously described in conjunction with the Cluster Adapters M1A1 and, accordingly, do not fit properly on any Navy bomb racks. The Cluster Adapters AN-M3 which are furnished with the Clusters AN-M4 have widened lugs of the type found on the Cluster Adapters AN-M1A2. While the

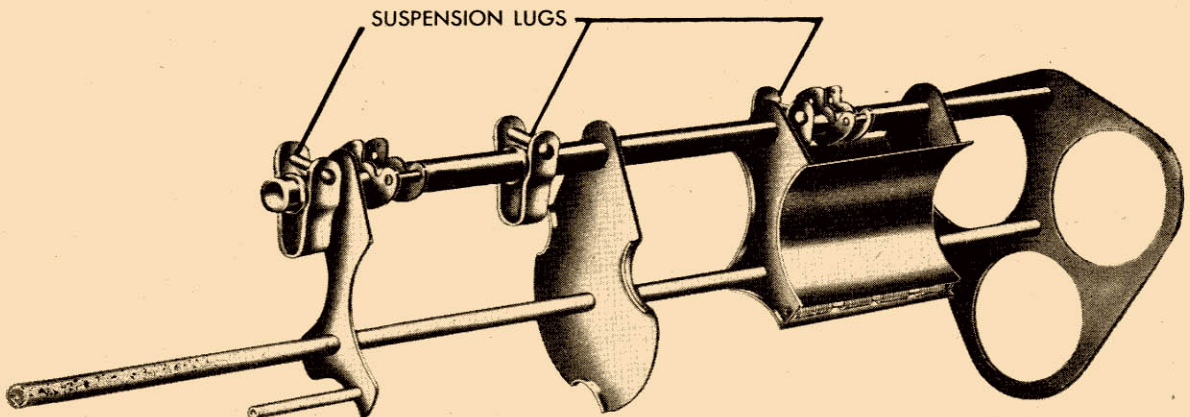


Figure 137.—Cluster Adapter AN-M3

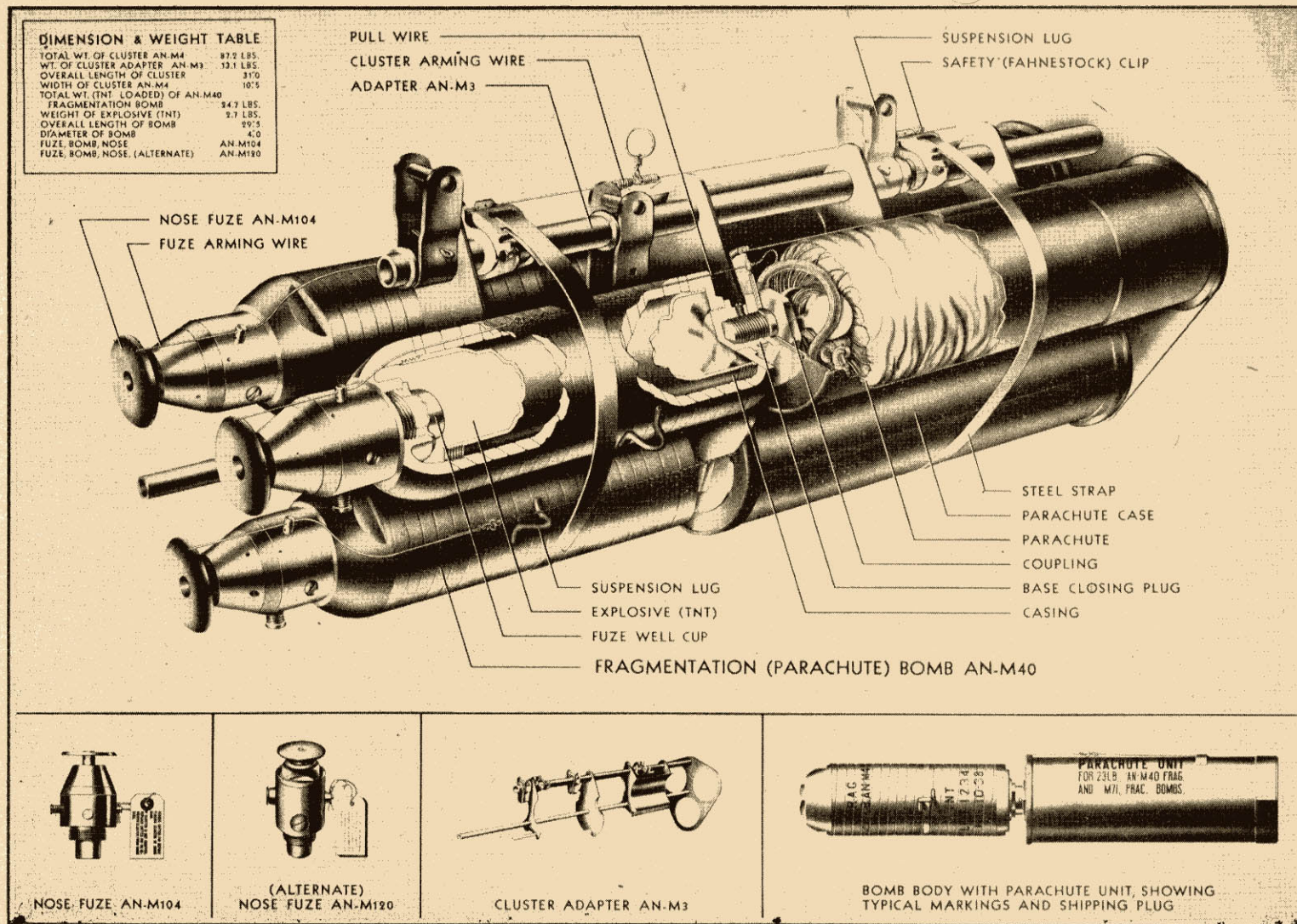


Figure 138.—Fragmentation Bomb Cluster AN-M4

FRAGMENTATION BOMBS

widened lugs of the Adapters AN-M3 fit satisfactorily into all Navy bomb racks, the sway-braces of most Navy bomb rack installations do not properly contact, and effectively brace, the Clusters AN-M4. At the present time, conversion kits are being designed which will contain parts for attaching to Clusters AN-M4 to provide areas upon which sway-brace pads may rest. Until such kits are available, it is recommended that Clusters AN-M4 be limited to shackle suspension only.

Assembly

Prior to installing the cluster in an airplane, the following steps should be carried out:

1. Assemble arming wires to the cluster according to directions on page 132.
2. Lift the required suspension lugs and secure them in place by inserting cotter pins provided with the cluster.
3. Adjust the arming wire so that the swivel loop is properly located for assembly to the bomb rack or shackle.
4. Remove cotter pins from fuzes and release mechanisms.
5. Remove adhesive strips from bomb fuze arming wires.

The cluster is now ready to be installed in the airplane.

Note: Instruction tags for proper assembly are provided with each cluster. Remove tags before installation in the airplane.

Disassembly

If the cluster is not dropped, the above

steps will be followed in reverse order and the cluster returned to storage.

Functioning

1. Armed—If released armed, the swivel loop and arming wire remain attached to the airplane. The release mechanisms act to permit the bombs to be ejected from the adapter. The five springs aid in separating the bombs from the cluster. The pressure of the air withdraws the cover assembly, which is loosely assembled to the parachute container. The action of the air on the pilot disc, which is attached to the top cord assembly of the parachute, withdraws the parachute from its container. The bomb fuze arming wire is withdrawn from the arming pin in the fuze by the action of the parachute. The fuze is armed in approximately $2\frac{1}{2}$ seconds. The bombs then function on impact.

2. Unarmed—If the cluster is released safe, the swivel loop and arming wire are released from the airplane and drop with the cluster. Since the arming wire remains attached to the adapter, the release mechanisms do not function. The bombs do not leave the cluster, except that upon impact with the ground they may separate from the cluster. The parachute remains in its container, and the fuze arming wire remains in place and prevents the fuze from arming.

Packing and Marking

The complete cluster is packed singly in a metal-lined wooden box. Dimensions of the box are $35\frac{7}{8}$ in. x $13\frac{5}{16}$ in. x $14\frac{27}{32}$ in. The weight of the cluster is 81 lb. The weight of the cluster and box when packed is 126.8 lb. The markings on the box show the type of cluster and fuze.

NOSE FUZES AN-M104 AND AN-M120

The Nose Fuze AN-M104 is an arming-pin type of fuze in which the detonator is aligned beneath the striker by a pyrotechnic time delay after the arming wire is withdrawn; no air travel is required to arm the fuze. The fuze is arranged for instantaneous firing on impact. This fuze was used in the 23-lb. Fragmentation (Parachute) Bomb AN-M40 but is now obsolescent.

The Nose Fuze AN-M120 is an arming-

pin type of fuze in which the detonator is aligned beneath the striker by a clockwork time delay of 2.5 sec. after the arming wire is withdrawn; no air travel is required to arm. The fuze is arranged for instantaneous firing on impact. The Nose Fuze AN-M120A1 is the Nose Fuze AN-M120 with arming time reduced to 1.9 sec. These fuzes are used in the 23-lb. Fragmentation (Parachute) Bomb AN-M40.

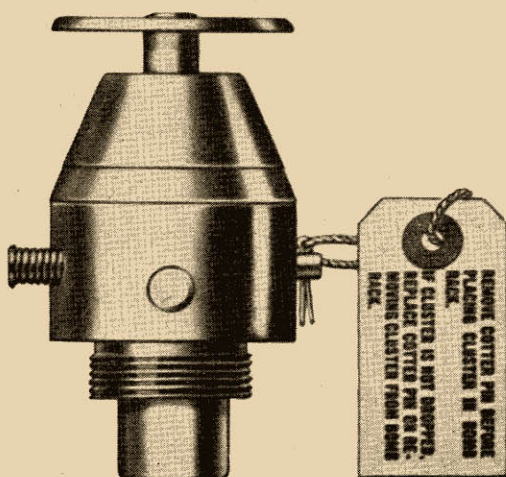


Figure 139.—Nose Fuze AN-M104

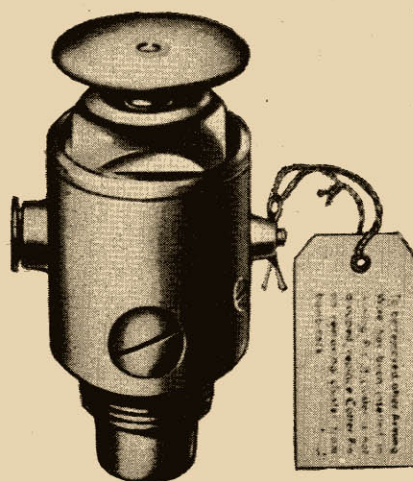


Figure 140.—Nose Fuze AN-M120-120A1

ARMING WIRE ASSEMBLIES

CLUSTERS AN-M1A1 AND AN-M4

The following information has been issued by the War Department in TB 9-1980-18:

To eliminate kinking of arming wires caused by packing, the arming wire assemblies for Clusters AN-M1A1 and AN-M4 are no longer assembled thereto, but are coiled and tied to the cluster.

Instructions for assembling the arming wires to the cluster are as follows:

1. Remove arming wire assembly coil

from cluster and straighten wire so there are no sharp bends.

2. Thread long end of arming wire through forward suspension lug.

3. Depress strap clamp so the arming wire holes in the release mechanism are exposed, and insert end of arming wire to protrude approximately two inches beyond side plate of release mechanism.

FRAGMENTATION BOMBS

Caution: Do not remove cotter pin from release mechanism during assembly of arming wire.

Applicable assembly drawings are as follows:

Cluster	Drawing No.
AN-M1A1	82-0-69
AN-M4	82-0-82

SPECIAL PRECAUTIONS FOR FRAGMENTATION BOMB CLUSTERS

All fragmentation bomb clusters described in this pamphlet are particularly susceptible to damage caused by rough handling. Furthermore, since the clusters contain **fuzed bombs**, they must be accorded more than ordinary care in handling.

Many lots of fragmentation bomb clusters were issued to the service which were not adequately packaged; i.e., the clusters were not sufficiently supported in the shipping boxes. This resulted in individual bombs becoming jarred loose from their adapters during shipment because of the stretching or actual breaking of the cluster adapter retaining straps. While packaging of clusters has been improved in later lots, care should always be exercised in handling this material, as it is practically impossible to package it so as to insure freedom from damage under rough treatment in handling. Any clusters which are received with loose bombs should be disposed of or turned in for replacement.

Prior to disposition or return of damaged clusters containing bombs with any of the M110 series of fuzes installed, the fuzes must be taped in accordance with instructions contained in OP 988 and BuOrd OCL's A24-43 and A24a-43.

No attempt should be made to tighten loose straps of fragmentation bomb clusters, since this is a rather delicate operation and, even when properly accomplished, the soundness of the straps, after being sub-

jected to sufficient force to cause them to loosen in the first place, is questionable.

Accidents to planes loaded with Fragmentation Bomb Clusters AN-M1A1 have been reported. In some of these accidents the bomb or bombs were seen to explode beneath the dropping plane by pilots in the same flight. These explosions apparently occurred at the instant the cluster disintegrated. The under sides of the several planes that were able to return to base after such accidents were found to be riddled with fragment holes, and recovered fragments were identified as pieces of Bombs AN-M41, thus eliminating the possibility of AA damage. From the information which has been made available, it would appear that these accidents can be definitely attributed to fuze functioning caused by one of the bombs colliding with part of the disintegrating cluster adapter or with another bomb.

In the **unarmed** condition the Fuze M110 or AN-110A1 can function if the impact involves 300 ft.-lb. or more of energy. In the armed condition it is very sensitive. The most probable cause of functioning is considered to be the presence of an **armed** fuze in one of the bombs of the cluster. The cluster has been designed to prevent arming of the fuzes until after disintegration of the adapter, but occasionally, if roughly handled, bombs will become loose in the clusters and the fuze impeller vanes may become bent, so that the cluster may contain fuzes which are free to arm when the bomb bay doors are opened.

To prevent the danger of such a hazardous condition, strict compliance with the check-off list given below is essential. Clusters which have been badly damaged in shipment should be disposed of by dropping into deep water, under the immediate supervision of a Bomb Disposal Officer.

Upon receipt of Fragmentation Bomb Clusters AN-M1A1 at Naval Air Stations or on board CV's, CVL's, or CVE's, the clusters should be inspected and the following items carefully checked:

1. Bands around bombs must be tight, and bombs must be held rigidly to the adapter.

2. Safety cotter pins must be inserted through the proper holes in the release mechanisms. Holes farthest in from the end of the strap clamp are for safety cotter pins.

3. Arming wire holes in strap clamps must be properly aligned (parallel) with the cluster adapter.

4. Fins should be inspected for bends or crimped edges. If fins are bent or damaged, they should be carefully straightened.

5. Fuzes should be checked to see that the arming vanes cannot rotate when the bomb is in the cluster.

6. Fuzes should be checked to see that safety blocks or C-shaped safety collar are properly interposed between the striker head and the fuze body.

The following inspection is to be made after loading clusters into aircraft:

1. Check banding to see that bombs are tight in the adapter.

2. Check to see that arming wire is installed properly through the holes in the end of the strap clamp. Install arming wire extension, if required, of the type shown in Fig. 129.

3. See that arming wire ends are neither kinked nor burred.

4. Check to insure that arming wire(s) goes through suspension lugs of bomb cluster adapter.

5. Check to see that all bombs are tight in cluster.

6. Fuzes should be checked to see that the arming vanes cannot rotate when the bomb is in the cluster and that the fuze vanes will be free to rotate when the bomb is released from the cluster.

7. Fuzes should be checked to see that the safety blocks or C-shaped safety collar are properly interposed between the striker head and the fuze body.

8. All fins must be checked for bends or crimped edges, and straightened if necessary.

The Fuze M110 or M110A1, used in the bombs in the Clusters M1, M1A1, and AN-M1A1, is not detonator-safe. Accordingly, it is recommended that none of these clusters be suspended from external racks for carrier operations, on account of the possibility of fuze functioning on deck in event of a crash or accidental release. For the same reason, all clusters should be jettisoned by the aircraft before making a carrier landing.

260-LB. FRAGMENTATION BOMB AN-M81

The 260-lb. Fragmentation Bomb AN-M81 is shown in Fig. 141. The body is similar in construction to the two fragmentation bombs previously described. The Bomb AN-M81 is filled with approximately 34

pounds of TNT and can be fitted with a Nose Fuze AN-M103A1 (instantaneous) and a Tail Fuze AN-M100A2 (non-delay).

The case of the Bomb AN-M81, upon detonation, breaks into approximately 6,000

FRAGMENTATION BOMBS

to 7,000 fragments. The average distribution of fragments from this bomb is very similar to that shown in Fig. 131 for the 20-lb. fragmentation bombs. The fragments of the Bomb AN-M81 are heavier on the average than those of the 20-lb. bombs, as is evident from a comparison of Fig. 131 and Fig. 143. It should be noted that the fragments shown in Fig. 143 do not represent the total number of fragments from the Bomb AN-M81, but consist of a sample lot representative of the various weights of fragments recovered from the detonation of the 260-lb. fragmentation bomb. For further performance data concerning the Bomb AN-M81, reference should be made to OP 1172.

Suspension of Bomb

Two suspension lugs, spaced 14.0 in. apart, are provided for suspension of the Bomb AN-M81 from double-hook racks or shackles. A lug is provided on the opposite side of the bomb for single suspension.

Hoisting

This bomb is normally hoisted by hand; however, in particularly difficult situations,

a Universal Hoisting Band Mk 8 may be used.

Components of a Complete Round

The 260-lb. Fragmentation Bomb AN-M81 is supplied to the service as follows:

1. Bomb body in protecting lug guards, with an Adapter Booster M102 and fuze adapter installed, nose and tail shipping plugs in place, and fin lock nut in place and fastened with wire
2. Tail crate containing:
 - a. Fin assembly
 - b. Arming wire assembly
3. Nose Fuze AN-M103A1 (instantaneous)
4. Tail Fuze AN-M100A2 with Primer Detonator M14 (non-delay) assembled

Preparation of Bomb for Flight

1. Cut lock-wire of fin lock nut and remove the nut, using appropriate wrench if

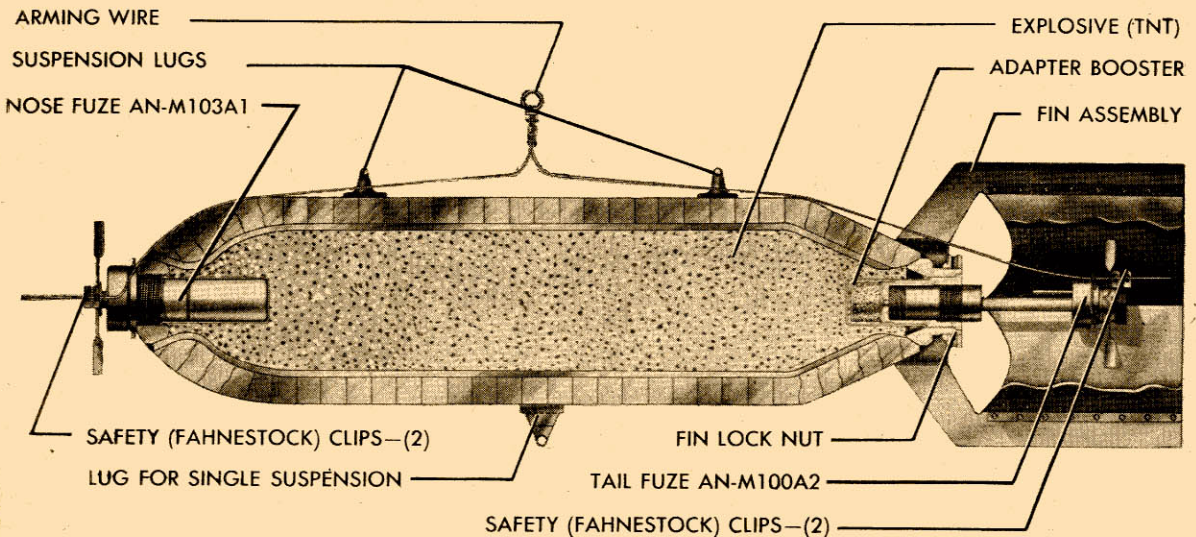


Figure 141.—Sectional View 260-Lb. Fragmentation Bomb AN-M81

necessary. Loosen, but do not remove, the tail shipping plug.

2. Slip fin assembly over tail end of bomb, rotating it to the angle required by the aircraft installation.

3. With fin assembly in desired position, thread on and **tighten** fin lock nut, using appropriate wrench.

4. Remove tail shipping plug and inspect fuze seat liner and threads. Clean if necessary.

5. Remove Tail Fuze AN-M100A2 from its sealed container and install as follows:

Note: Before installing any fuze, inspect the fuze to be sure that it is serviceable. If the fuze appears unserviceable, return it to its container, tag to indicate defect, and return it to a naval ammunition or mine depot as soon as possible.

a. Remove cotter pin from fuze body, complying with instructions on tag.

b. Screw fuze, less arming vane assembly, into the fuze seat liner in the tail of the bomb until it seats hand-tight. Use **no tools**. No auxiliary boosters are required.

Note: The arming wire may be threaded through the fuze either before or after the bomb is installed in the aircraft.

c. Thread the longer end of the arming wire assembly through the rear suspension lug of the bomb and the nearer pair of eyelets on the fuze. Should the nearer pair of eyelets be occupied by the safety pin and car seal tag, place a second cotter pin through the eyelets diametrically opposite, before removing the original safety pin.

d. Cut car seal wire and remove safety pin, complying with instructions on tag.

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

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

g. Adjust arming wire to protrude beyond the arming vane from two to three inches.

h. Slip two safety (Fahnestock) clips over end of arming wire until the first one just touches the face of the vane.

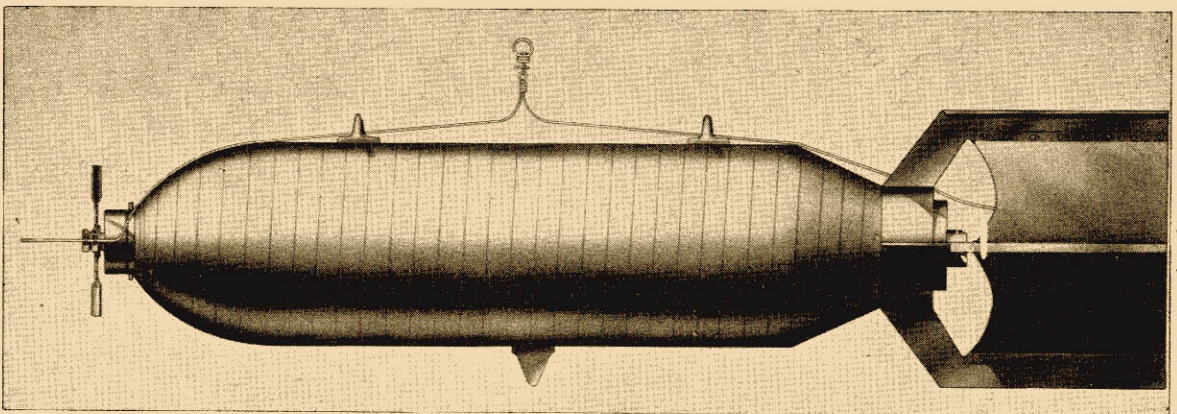


Figure 142.—Outside View, 260-Lb. Fragmentation Bomb AN-M81



Figure 143.—Typical Sample of Fragments from Fragmentation Bomb AN-M81

6. To install the Nose Fuze AN-M103A1, perform the following operations in the order indicated:

a. Remove the nose shipping plug and inspect fuze seat liner and threads. Clean if necessary.

b. Remove the Nose Fuze AN-M103A1 from its sealed container and inspect fuze.

c. Cut and remove seal wire, complying with instructions on the tag.

d. Screw fuze, less arming vane, into the nose of the bomb until it seats, hand-tight. Use no tools.

e. Thread the shorter end of the arming wire through the front suspension lug and through the nearer pair of eyelets. Should the nearer pair of eyelets be occupied by the cotter pin and tag, place a second cotter pin through the pair of eyelets diametrically opposite, before removing the original cotter pin. This cotter pin and

tag are not to be removed until the bomb is installed in the dropping gear of the airplane and the arming wire is inserted. Instructions on tag read, "To be removed after the bomb has been placed in dropping gear and arming wire inserted. If bomb is not dropped, replace pin before removing arming wire."

f. Adjust arming wire to protrude from two to three inches from bomb.

g. Slip two safety (Fahnestock) clips over the end of the arming wire until they just touch the face of the vane strap.

Note: Be sure that the end of the arming wire is free from kinks or burrs.

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

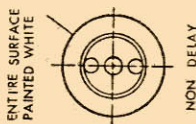
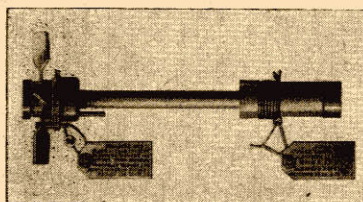


Figure 144.—Tail Fuze AN-M100A2 and Primer Detonator M14

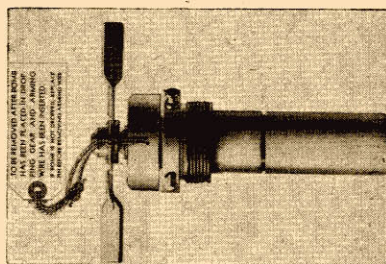


Figure 145.—Nose Fuze AN-M103A1

Chapter 5

PRACTICE BOMBS

**3.0-Pound Miniature Practice Bomb
AN-Mk 23**

**4.5-Pound Miniature Practice Bomb
AN-Mk 43**

**13-Pound Miniature Practice Bomb
Mk 19 Mod 1**

**Miniature Practice Bomb Signal
AN-Mk 4**

**100-Pound Practice Bomb Mk 15
Mod 2**

500-Pound Practice Bomb Mk 21

1,000-Pound Practice Bomb Mk 22

What They Are

Practice bombs are bombs which are used to simulate the ballistic properties of service-type bombs for target practice. There are two general types of practice bombs: **miniature bombs**, which vary in weight from three to thirteen pounds, and large **water-sand-fillable bombs** which are of the approximate size of the 100-, 500-, and 1000-pound service bombs. The miniature practice bombs are castings made of a zinc base alloy, cast iron, or lead antimony. The larger bombs are of welded sheet-metal construction and are shipped without their filler of water or wet sand.

Where They Are Used

Practice bombs are used for intermediate, operational, and fleet training purposes in VF, VP, VT, VOS, VSB and VTB types of aircraft, as well as aboard airships.

Appropriate types of practice bombs may be used for either horizontal, glide, or dive bombing practices.

The large bombs (100-, 500-, and 1000-lb. types) may be suspended from standard bomb racks and shackles. Special types of racks are used for carrying and releasing miniature practice bombs.

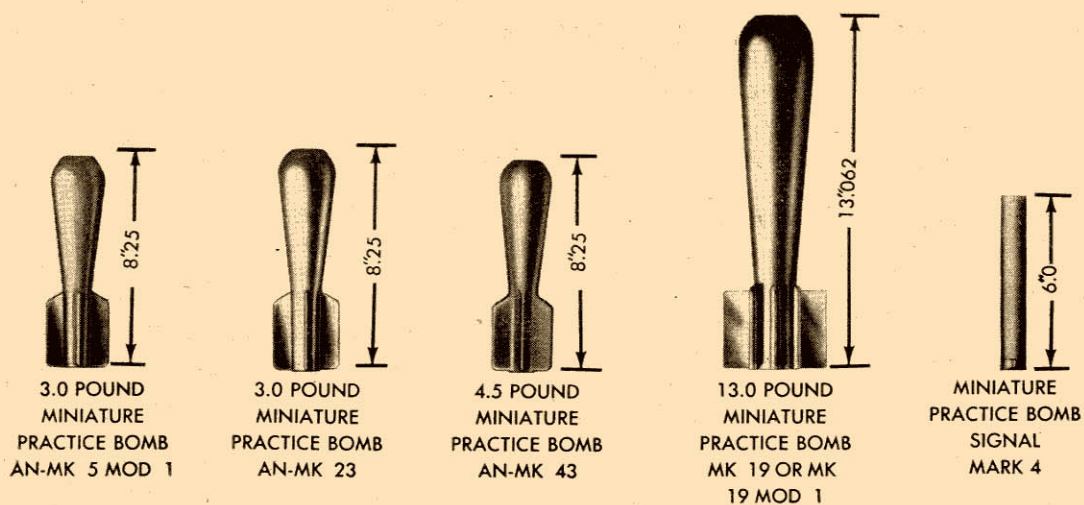
Special Features

A signal, similar to a 10-gauge shotgun shell, is inserted in miniature practice bombs. Upon detonation, this signal pro-

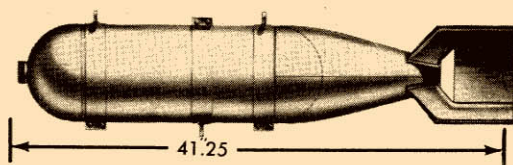
duces a large puff of white smoke that is visible under favorable conditions, from altitudes up to approximately 14,000 feet. The construction of the firing pin assembly in these miniature bombs is such that the bomb signal may be initiated upon impact of the bomb with either a solid object or water. Miniature bombs are shipped without the bomb signal installed, the bomb and signal being assembled just prior to use.

The large bombs (100-, 500-, and 1000-lb. types) are complete as shipped, except for the loading of the inert charge of water or wet sand. Neither fuzes nor spotting charges are provided with these bombs. If an arming wire is desired for use with these bombs for training purposes, a small washer may be soldered to the bomb nose; the end of the arming wire which is normally inserted in the fuze of service-type bombs is then secured to the washer. For "armed" releases, the washer is torn free of the bomb by the arming wire, while for "safe" releases the arming wire is retained on the bomb by the washer. See Fig. 155.

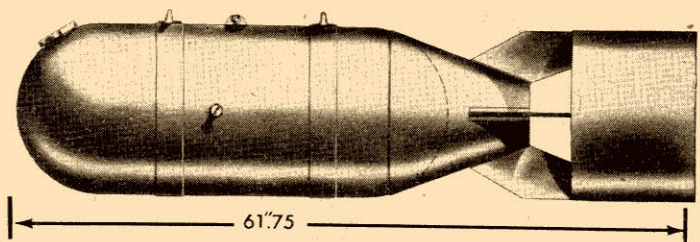
A filler hole is provided at or near the nose for loading the 100-, 500-, and 1000-pound practice bombs. The 500- and 1000-pound practice bombs are equipped with trunnions for dive bombing and may be suspended only from double-hook bomb racks or shackles, or in slings. The 100-pound bomb does not have trunnions but is equipped with removable suspension bands which may be used with either single- or double-hook bomb racks and shackles.



100 POUND PRACTICE
BOMB MK 15 MOD 2



500 POUND PRACTICE
BOMB MARK 21



1000 POUND PRACTICE
BOMB MARK 22

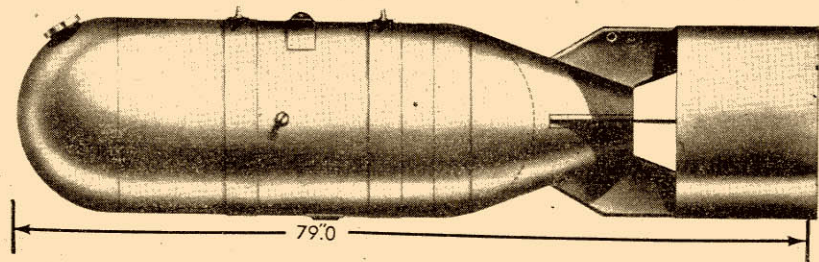


Figure 146.—Practice Bombs

THE THREE-POUND MINIATURE PRACTICE BOMB AN-MK 5 MOD 1

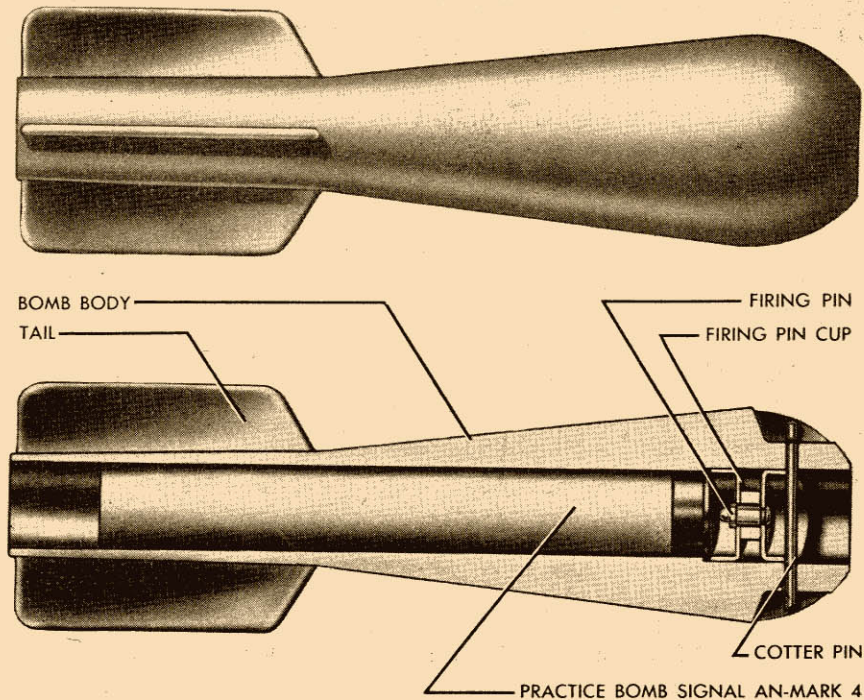


Figure 147.—3.0-Lb. Miniature Practice Bomb AN-Mk 5 Mod 1

This bomb has the following characteristics:

Weight, without signal
but with firing pin
assembly and cotter
pin 2 lb. 9 oz. $\pm$ 1 oz.
Overall length 8.25 in.
Body diameter—
maximum 2.18 in.
Fin dimension—
maximum 2.5 in.
Material—
body and fins Zinc alloy
Total weight, with fir-
ing pin assembly and
signal installed,
ready for dropping. 2 lb. 11 oz. $\pm$ 1 oz.

Auxiliary Equipment

Firing pin assembly and cotter pin
Practice Bomb Signal AN-Mk 4

Use

This bomb is used for low-altitude horizontal, or dive bombing practice and may be used against armored-deck target boats.

In bombing target boats having 20-pound STS (1½-inch) deck armor, the maximum release altitude is 2,500 feet for horizontal bombing, while the maximum speed at release in dive bombing must not exceed 290 knots.

Suspension

Five of these bombs are carried in the Bomb Rack Mk 43 series, and eight bombs in the Bomb Rack Mk 47.

Note: Bomb Rack Adapter Mk 1 (BuOrd Dwg. 328826) enables the bomb racks of the Mk 43 series to be suspended from bomb racks of the Mk 41 or the Mk 50 series.

THE THREE-POUND MINIATURE PRACTICE BOMB AN-MK 23

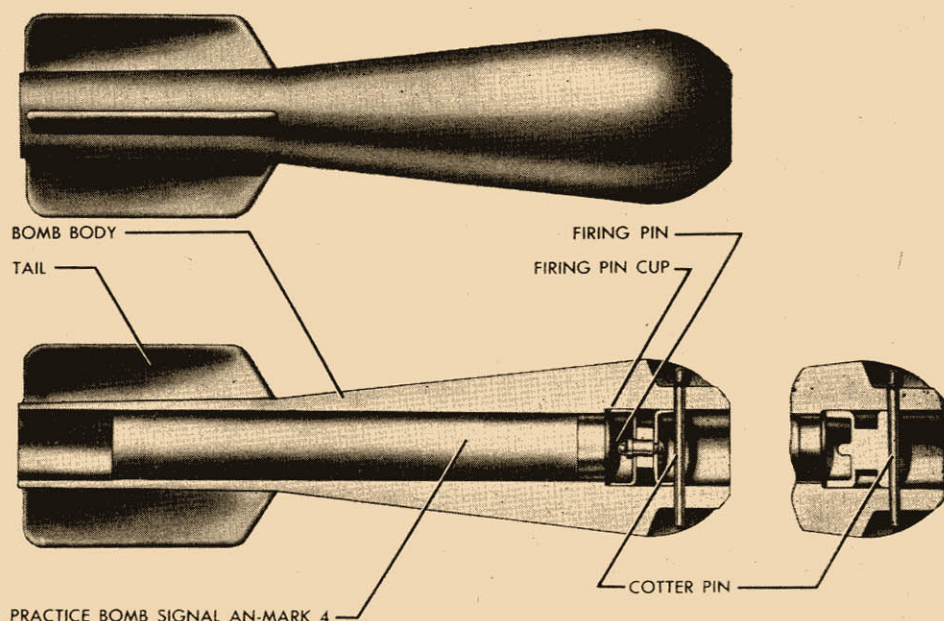


Figure 148.—3.0-Lb. Miniature Practice Bomb AN-Mk 23

This bomb has the following characteristics:

Weight, without signal
but with firing pin
assembly and cotter
pin 2 lb. 14 oz. $\pm$ 2 oz.

Overall length 8.25 in.

Body diameter—
maximum 2.18 in.

Material—
body and pins Cast iron

Total weight, with fir-
ing pin assembly and
signal installed,
ready for dropping .3 lb. $\pm$ 2 oz.

Auxiliary Equipment

Firing pin assembly and cotter pin

Miniature Practice Bomb Signal AN-Mk 4

Use

This bomb may be used for low-altitude horizontal or dive bombing practice. **It cannot be used against armored-deck target boats.**

Note: These cast-iron miniature practice bombs **must** be used on all applicable practices other than those involving armored-deck target boats, since the alternate three-pound and 4.5-pound bombs are made of critical materials and their supply is limited.

Suspension

Five bombs can be carried in the Bomb Rack Mk 43 series and eight bombs in the Bomb Rack Mk 47.

Note: Bomb Rack Adapter Mk 1 (BuOrd Dwg. 328826) enables the bomb racks of the Mk 43 series to be suspended from bomb racks of the Mk 41 or the Mk 50 series.

THE 4.5-POUND MINIATURE PRACTICE BOMB AN-MK 43

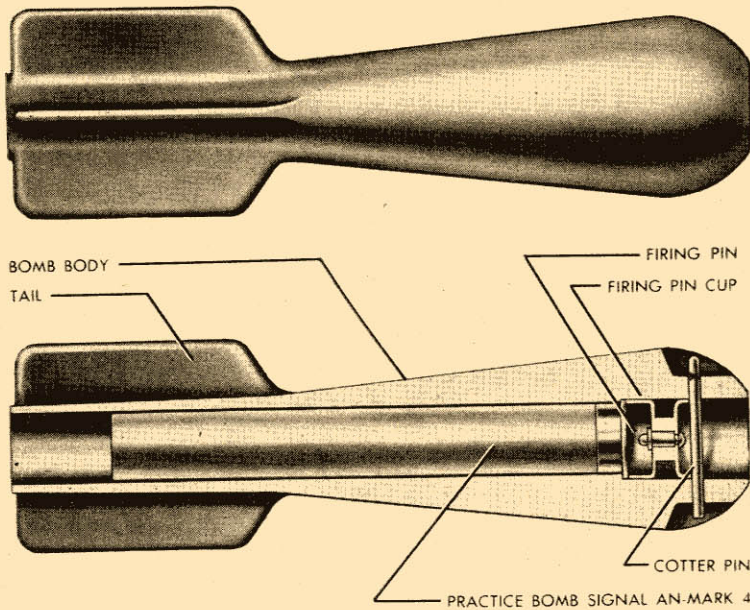


Figure 149.—4.5-Lb. Miniature Practice Bomb AN-Mk 43

This bomb has the following characteristics:

Weight, without signal
but with firing pin
assembly and cotter
pin 4 lb. 5 oz. $\pm$ 2 oz.

Overall length 8.25 in.

Body diameter—
maximum 2.18 in.

Fin dimension—
maximum 2.5 in.

Material—
body and fins Lead-antimony

Total weight, with fir-
ing pin assembly and
signal installed,
ready for dropping. 4 lb. 7 oz. $\pm$ 2 oz.

Auxiliary Equipment

Firing pin assembly and cotter pin
Miniature Practice Bomb Signals AN-
Mk 4

Use

This bomb may be used for low-altitude horizontal, or dive bombing practice. It may be used against armored-deck target boats. Maximum altitude at release in bombing target boats having 20-pound STS (1/2-inch) deck armor must not exceed 2,500 feet. The maximum speed at release in dive bombing attacks against these target boats must not exceed 290 knots.

Suspension

Five bombs are carried in the Bomb Rack Mk 43 series and eight bombs in the Bomb Rack Mk 47.

Note: Bomb Rack Adapter Mk 1 (BuOrd Dwg. 328826) enables the bomb racks of the Mk 43 series to be suspended from bomb racks of the Mk 41 or the Mk 50 series.

THE 13-POUND MINIATURE PRACTICE BOMB MK 19 MOD 1

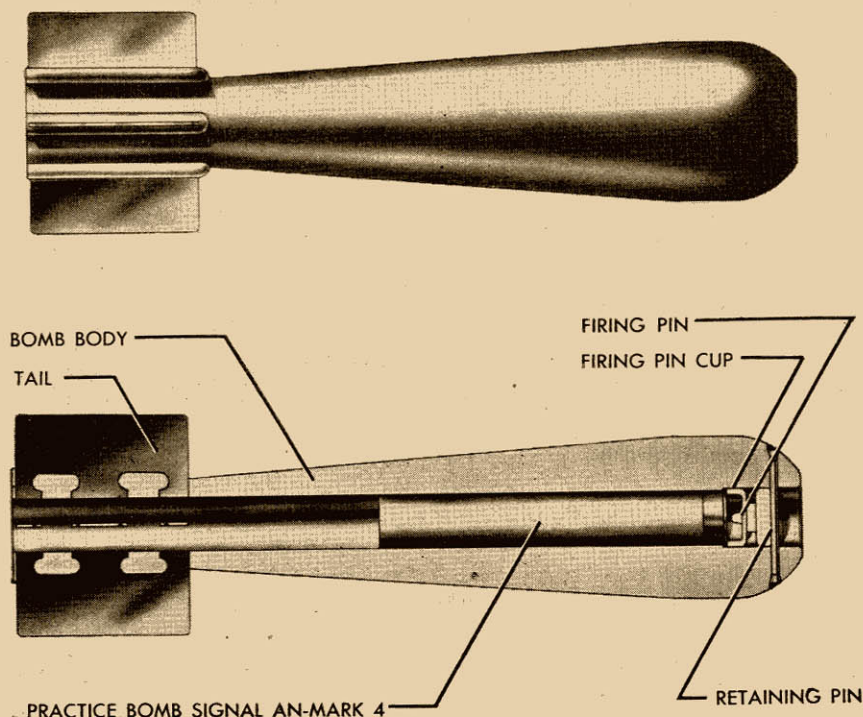


Figure 150.—13-Lb. Miniature Practice Bomb Mk 19 Mod 1

This bomb has the following characteristics:

Weight, body, without
signal or firing pin
assembly 13 lb. $\pm$ 3 oz.
Overall length 13.06 in.
Body diameter—
maximum 2.62 in.
Fin dimension—
maximum 3.67 in.
Material—body Lead-antimony
Material—fins Steel
Ballistic coefficient ... 2
Total weight, with fir-
ing pin assembly and
signal installed,
ready for dropping. 13.2 lb. $\pm$ 3 oz.

Auxiliary Equipment

Firing pin assembly and retaining pin

Miniature Practice Bomb Signal AN-Mk 4

Use

This bomb is for use in high-altitude horizontal bombing practice and may be used against armored-deck target boats having 20-pound STS ($\frac{1}{2}$ -inch) deck armor, provided the altitude at release does not exceed 6,000 feet (horizontal altitude at release).

Suspension

One bomb is carried in the Bomb Rack Mk 46 or Mk 46 Mod 1.

Note: This Practice Bomb Mk 19 Mod 1 has its retaining pin for the firing pin as-

sembly taped in place during shipment. After loading, the pin may be held in place by placing a patch of tape about 1/2-inch square over each pin hole or by peening over a slight amount of the lead around each pin hole. No other method of securing the pin in place shall be used.

MINIATURE PRACTICE BOMB FIRING PIN ASSEMBLIES

Two types of firing pin assemblies are used in the 3-lb., 4.5-lb. and 13-lb. miniature practice bombs. One type is constructed of two stamped steel cups, a firing pin, and one or two spacer washers, while the other type is of one-piece construction and is composed of cast lead. The two firing pin assemblies are dimensionally and functionally interchangeable, so that either type may be used in any of the miniature practice bombs. Cross sectional views of both firing pin assemblies are shown in Fig. 148.

Both types of firing pin assemblies are caused to function as a result of the same forces, but the manner in which the assemblies react to these forces is different in each type. The forces which cause functioning of the firing pin assemblies are the result of either one, or a combination of two, distinct actions; namely, the action of the signal sliding forward, upon impact, as a result of its inertia, and/or the action of the complete firing pin assembly being driven backward by water pressure on water impacts, or by dirt, mud, sand, etc., upon impact with such targets. The action of the signal sliding forward is present in all impacts, regardless of the type of target; it is therefore imperative that the signal be a free fit in the bore of the bomb body if reliable functioning is to be obtained.

The steel-cup-type firing pin assembly reacts to the forces of impact and fires the signal by collapsing and permitting the head of the firing pin to contact the primer cap of the signal. Only the thin-steel stamped

cup which surrounds the firing pin head collapses (as it is designed to do), and the heavier stamped cup at the other end of the firing pin assembly merely acts as a guide and a surface upon which water or other target material may impinge. The steel-cup-type firing pin assembly weight is 0.6 ounce.

The cast-lead-type firing pin assembly achieves the same results upon impact as the stamped-cup-type but in a different manner. The forces of impact cause the thin section of lead around the base of the firing pin head to shear (this thin section actually constitutes the base of the cup surrounding the firing pin head), which then permits the firing pin head to contact the firing cap of the signal. The cast-lead firing pin assembly weighs 3.1 ounces.

Firing pin assemblies must be in good condition in order to function properly. No assemblies should be used which are dented, nicked, corroded or which show any other obvious defects. The assemblies must be a free fit into the nose of the bomb bodies, and the cotter or retaining pins must not bind the firing pin assemblies when installed in the bombs.

No alterations to the firing pin assemblies may be undertaken by service personnel. Nearly all cases of poor functioning of miniature practice bombs can be traced to improper assembly, damaged firing pin assem-

blies, or substandard quality and misfitting signals.

The Miniature Practice Bomb Signal AN-Mk 4 is a "blank" No. 10 gauge shotgun shell (extra length). The signal has a metal base and base flange fitted to a cardboard shell. The components of the signal are: a No. 7 U.M.C. primer with an expelling charge of black powder separated from a charge of pyrotechnic (red phosphorous pyrotechnic

tion depot or turned over to a Bomb Disposal Officer for proper disposal.

Signals are packed 25 to a cardboard carton. The outside dimensions of the carton are approximately 4.4 inches long, 4.4 inches wide, and 6.125 inches deep. Twenty filled cartons are packed in a wooden packing box of the type used for packing commercial No. 10 gauge shotgun shells. The outside dimensions of the packing box are approx-

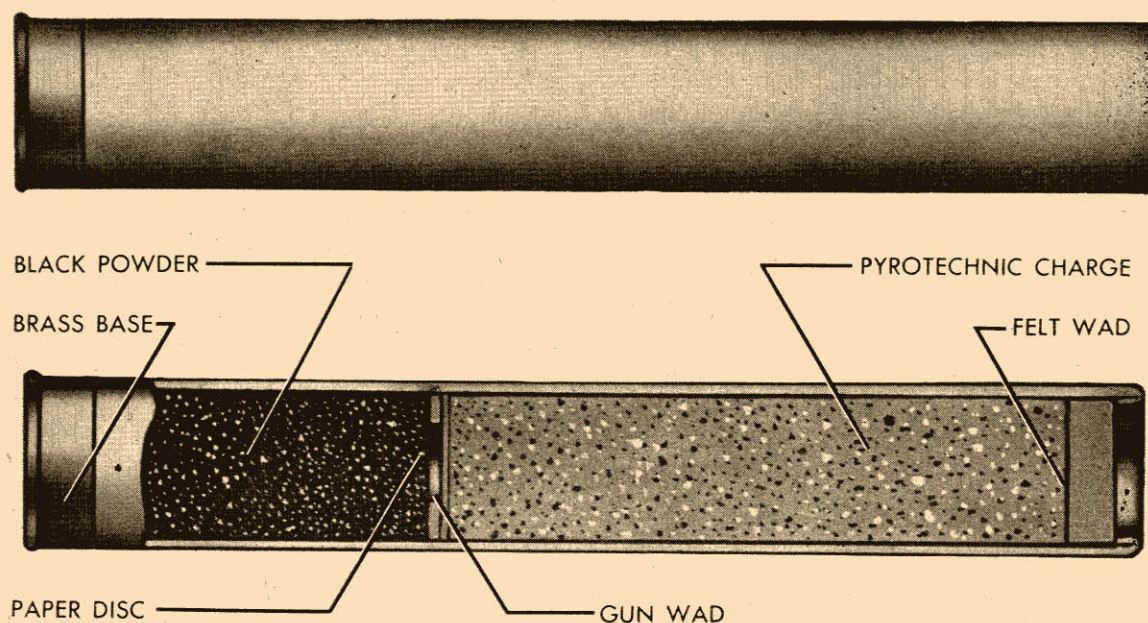


Figure 151.—Miniature Practice Bomb Signal AN-Mk 4

mixture No. 7) by a kraft paper disc glued to a No. 10 gauge gun wad. The charges are sealed by a No. 10 gauge paraffined-edge felt gun wad and secured by crimping over the paper shell casing. The weight of the loaded signal is 2.1 ounces.

Note: Under no condition are these signals to be opened or tampered with. Defective signals will be returned to an ammuni-

imately 25.5 inches long, 14.25 inches wide, and 10.75 inches deep. Miniature Practice Bomb Signals AN-Mk 4 will be stowed in approved storage facilities. The temperature of the storage facility shall not exceed 100F., and the signals shall be protected from direct sunlight, spray, or moisture and shall not be subject to excessive motion or vibration.

LOADING PROCEDURE

Before any loading of miniature practice bombs is undertaken, a suitable location and work bench should be provided. Provision should be made so that the bombs can be held in a vertical position with the tail fins down, in order that bombs may be properly loaded. The procedure outlined below for loading and handling miniature practice bombs and signals, as well as the safety precautions, must be carefully followed.

1. Remove the firing pin assembly retaining pin or cotter pin and the firing pin assembly from the bomb nose.

2. Carefully inspect the firing pin assembly to see that it fits the bomb nose loosely and does not bind. The assembly should be able to be dropped into position by its own weight.

3. Inspect the firing pin assembly to see that it is not damaged in any way. Be sure the firing pin cup is not deformed in any way and that the firing pin point is actually below the lip of its cup.

4. Inspect the miniature practice bomb carefully to see that it is not damaged and that the bore through the bomb is clean and not damaged in any way.

5. With the firing pin assembly removed, place the inspected bomb in a vertical position with the nose end up.

6. Pick up and carefully inspect the Miniature Practice Bomb Signal AN-Mk 4. Be sure that it is not swollen or deformed in any manner. See that the primer is flush with or slightly below the base of the cartridge. Signal cartridges that are deformed in any way are not to be used.

7. Insert the signal in the bomb, primer

end up, and let it gently fall into place. **The signal must not be forced into place.** Be sure the base flange is resting on the bomb bore shoulder.

8. Carefully insert the firing pin assembly, **making sure the firing pin end is toward the signal.** The firing pin assembly must drop into place of its own weight. At no time should any pressure be used to force the firing pin assembly into the bomb, as the assembly may collapse and fire the signal.

9. Carefully rotate the firing pin assembly so that the two notches in the lip (or the groove in cast-type assemblies) line up with the two pin holes in the bomb nose.

10. Insert the cotter pin or retaining pin through the nose holes and through the recesses in the firing pin assembly.

Using a large screw driver, spread the ends of the cotter enough to retain it adequately in the bomb. The ends of the cotter actually need to be spread only a comparatively small amount. Do not bend the ends at right angles to the axis of the cotter; and in no case should the ends of the cotter be bent over by pounding on them.

Note: The 13-pound Miniature Practice Bomb Mk 19 Mod 1 is not equipped with a cotter pin but has, instead, a solid pin. When the bomb is shipped, the pin is held in place by means of two small squares of adhesive. When assembling this bomb, it is necessary to remove the tape in order to extract the pin and firing pin assembly. Loading is accomplished as previously outlined. The retaining pin is reinserted in its holes and held in place either by the use of two new patches of adhesive or by peening over a small amount of the lead of the bomb body at each end of the pin. Extreme care must

be used in this peening operation, and only sufficient peening should be done just to retain the pin yet permit its withdrawal if it becomes necessary to unload the practice bomb.

To remove the signal from a loaded bomb,

follow the outlined loading procedure in reverse order. Use extreme care in extracting the retaining pin, the firing pin assembly, and the signal. Under no condition should the bomb nose be struck against an object to dislodge the firing pin assembly or the cartridge.

SAFETY PRECAUTIONS

Extreme care must be used at all times in handling loaded bombs. It is possible to set off the signal by dropping or jarring a loaded bomb. Under no circumstances is either end of a loaded bomb to be pointed toward one's self or towards other personnel.

No pressure or forcing of any kind shall be applied to the firing pin assembly or the signal during loading or after the bomb is loaded.

In loading operations the loaders **must not place their heads in line with the nose of the bomb.**

Miniature Practice Bomb Signals AN-Mk 4 must be stowed in a place protected from direct sunlight and excessive heat. The stowage temperature shall never exceed 100F. These signals shall be protected from spray or moisture and excessive motion and vibration.

THE 100-POUND PRACTICE BOMB MK 15 MOD 2

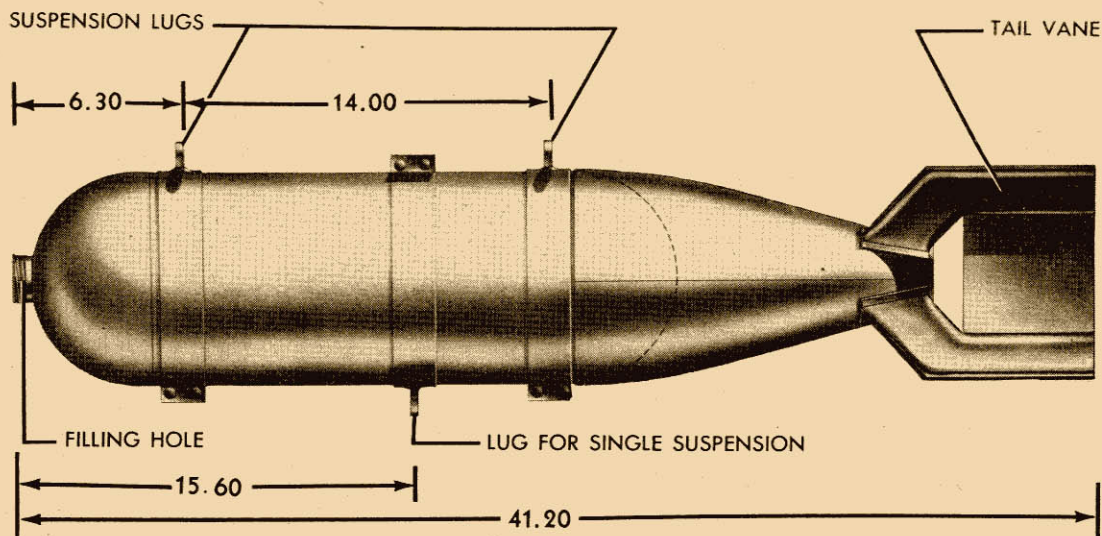


Figure 152.—100-Lb. Practice Bomb Mk 15 Mod 2

The 100-pound Practice Bomb Mk 15 Mod 2 has the following characteristics:

Weight—empty	17 lb.
Weight—water-filled	56 lb.
Weight—wet-sand-filled ..	95 lb.
Capacity	4.6 gallons
	(1072 cu. in.)
Overall length	41.2 in.
Body diameter—maximum	8.0 in.
Fin dimension—maximum	11.2 in.
Material—body and tail ..	Welded sheet metal
Ballistic coefficient	0.8 (Dropping weight 56 lb.)

Auxiliary Equipment

Water or wet sand to be inserted at loading base.

Under icing conditions anti-freeze to be added.

Use

This bomb is used for all types of bombing

practice and may be used against armored-deck target boats. When this bomb is used against armored-deck target boats having 20-pound STS ($\frac{1}{2}$ -inch) deck armor, **it must be water-filled and released at altitudes not greater than 7000 feet.**

Suspension

Two suspension bands are provided for suspending the bomb from any two-hook types of racks or shackles. By removing one suspension band and loosening and moving the other band to the center of gravity, the bomb may be suspended from any single-hook bomb racks or shackles. Because of the comparatively light weight of this bomb when filled only with water, positive release from double-hook bomb racks may not be attained unless the racks are in excellent operating condition.

Note: Practice bombs in some of the earlier lots in the Mk 15 series have been accidentally released from bomb shackles of the Mk 3 type as a result of the suspension

lugs having pulled through between the hooks and the frame of the shackle. As a temporary correction, these bombs should have their laminated suspension lugs (nominal thickness $\frac{1}{8}$ in.) spread with a cold chisel to a width of approximately $\frac{5}{16}$ in.

before suspending them from a bomb shackle of the Mk 3, Mk 4, or Mk 5 series. Later, lots of these bombs have thicker lugs ($\frac{5}{16}$ in. thick), and the above modification will only be necessary until the older lots are expended.

THE 500-POUND PRACTICE BOMB MK 21

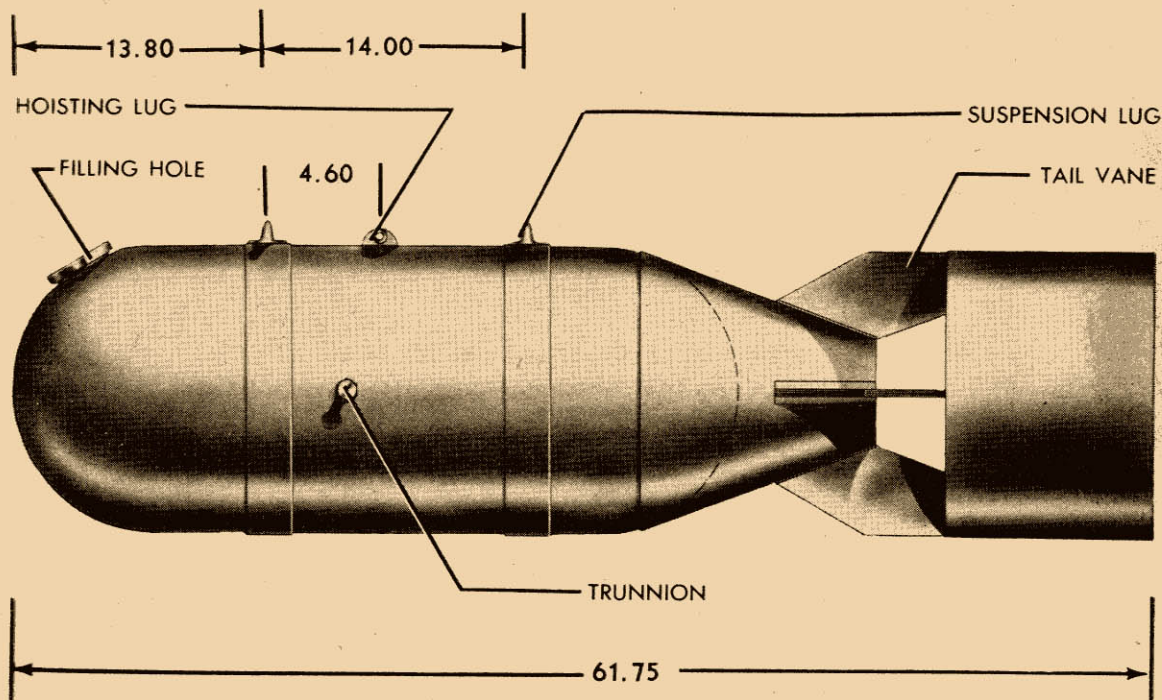


Figure 153.—500-Lb. Practice Bomb Mk 21

The 500-pound Practice Bomb Mk 21 has the following characteristics:

Weight—empty 58 lb.
 Weight—water-filled 273 lb.
 Weight—wet-sand-filled
 (maximum) 500 lb.
 Capacity 25.8 gallons
 (5960 cu. in.)
 Overall length 61.75 in.
 Body diameter—maximum 15 in.
 Fin dimension—maximum 15 in.

Material Welded sheet metal
 Ballistic coefficient 2.2 (Dropping weight of 500 lb.)

Auxiliary Equipment

Water or wet sand to be inserted at loading base.

Under freezing conditions anti-freeze to be added.

Use

This bomb is used for all types of bombing practice, except that it may not be used against armored deck target boats.

Suspension

This bomb is equipped for suspension from all types of double-hook bomb racks and shackles.

THE 1,000-POUND PRACTICE BOMB MK 22

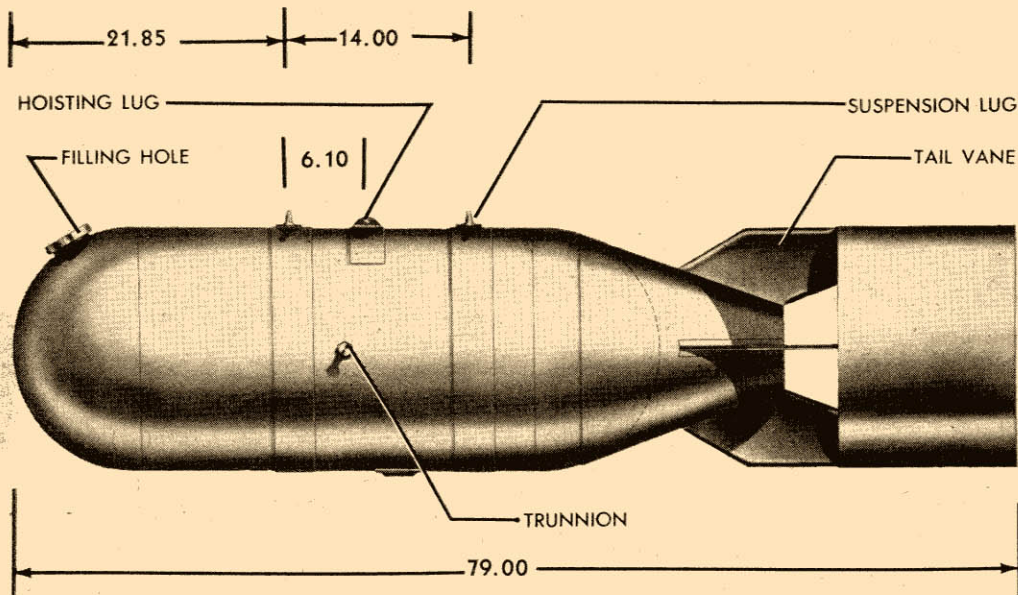


Figure 154.—1,000-Lb. Practice Bomb Mk 22

The 1000-pound Practice Bomb Mk 22 has the following characteristics:

Weight unloaded 135 lb.

Weight—water-filled 573 lb.

Weight—wet-sand-filled
(maximum) 1014 lb.

Capacity 52.6 gallons
(12,149 cu. in.)

Overall length 79 in.

Body diameter—
maximum 19 in.

Fin dimension—
maximum 19 in.

Material Welded sheet metal

Ballistic coefficient 3.2 (Dropping weight of 1000 lb.)

Auxiliary Equipment

Water or wet sand to be inserted at loading base.

Under freezing conditions anti-freeze to be added.

Use

This bomb is used for all types of bomb-

ing practice, except that it may not be used against armored deck target boats.

Suspension

This bomb is equipped for suspension from all types of double-hook bomb racks and shackles. Trunnions of the screw-in type are provided, as well as a guide key for use with some types of sling suspension. Hoisting by single cable to double-hook bomb racks is accomplished by means of a hoisting lug welded directly to the bomb body. For all other hoisting conditions, the Universal Bomb Hoisting Band Mk 8 may be used.

Practice Bomb Tails

The tails of the Practice Bombs Mk 19 Mod 1, Mk 15 Mod 2, Mk 21, and Mk 22 are of rather light construction and hence susceptible to damage during handling and installation. Unless the tail of these bombs are in good condition and in proper alignment, erratic flight will result. It is not possible for service personnel to repair other than minor damage to these tails. Misaligned tails can only be corrected where proper jigs are available, and it is recommended that practice bombs be discarded rather than an attempt be made at repair, whenever the condition of the tails is doubtful.

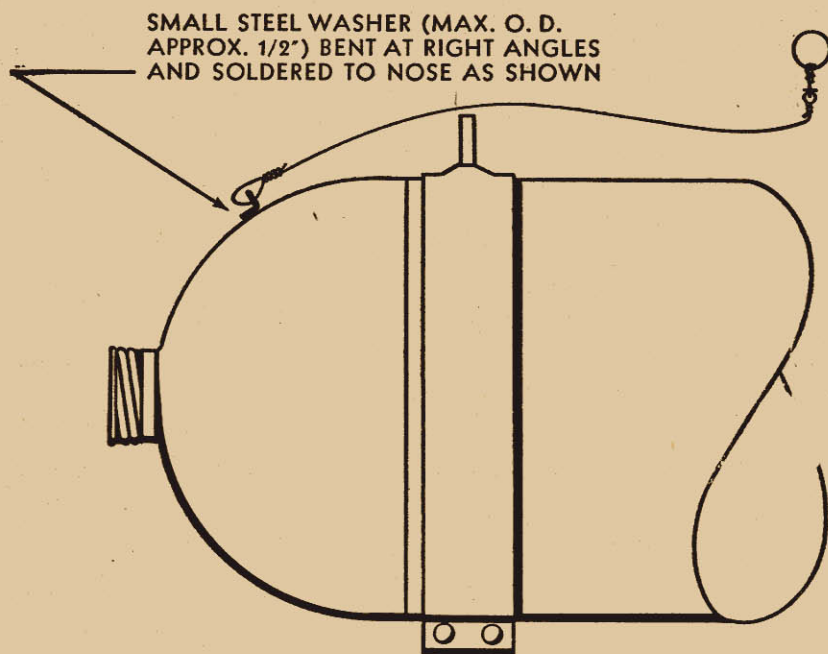


Figure 155.—Arming Wire Attachment

Chapter 6

HOISTING SLINGS

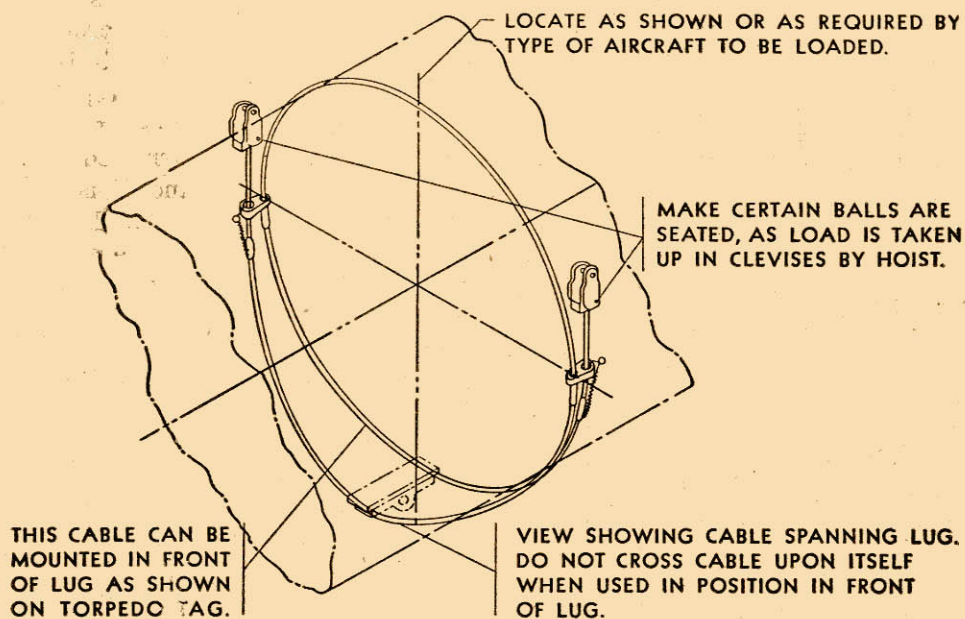


Figure 156.—Hoisting Sling Mk 15 Mod 1

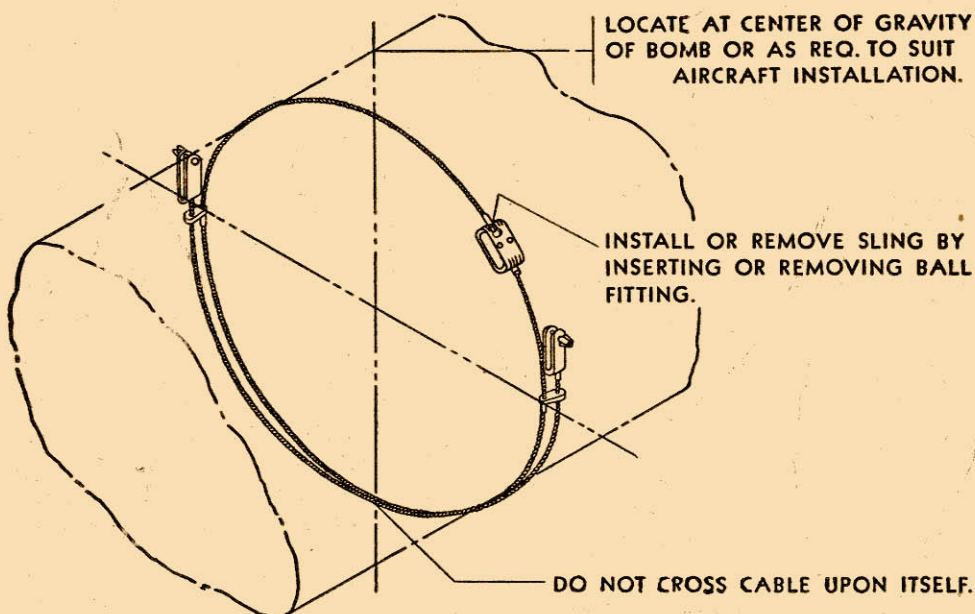


Figure 157.—Hoisting Sling Mk 16 Mod 0

HOISTING POSITION 45° FROM
SINGLE SUSPENSION LUG.

KNURLED ADJUSTING NUT

CLEVIS PIN "A"

5" 50
APPROX.

SINGLE SUSPENSION LUG

NOTE:

KNURLED ADJUSTING NUT IS NOT FOR CLAMPING SLING TIGHTLY ON BOMB. IT IS USED FOR MAKING SMALL ADJUSTMENTS TO FACILITATE INSTALLATION & REMOVAL OF CLEVIS PIN "A". IT IS ONLY NECESSARY THAT ADJUSTING NUT BE FINGER-TIGHT AFTER SLING IS INSTALLED ON BOMB. KEEP ADJUSTING NUT THREADS & SLIDING YOKE WORKING FREELY

HOISTING SLING MK 19 IN POSITION FOR HOISTING 500-LB. G. P. BOMBS AN-M43, 64 & 64A1 TO SINGLE-HOOK SHACKLES.

HOISTING POSITION 45° FROM
DOUBLE SUSPENSION LUGS.

5" 50
APPROX.

DOUBLE SUSPENSION LUGS

HOISTING SLING MK 19 IN POSITION FOR HOISTING 325-350-LB. DEPTH BOMBS AN-MKS 17 MOD 2, 41, 44, AND 47 TO SINGLE-HOOK SHACKLES.

Figure 158.—Hoisting Sling Mk 19 Mod 0

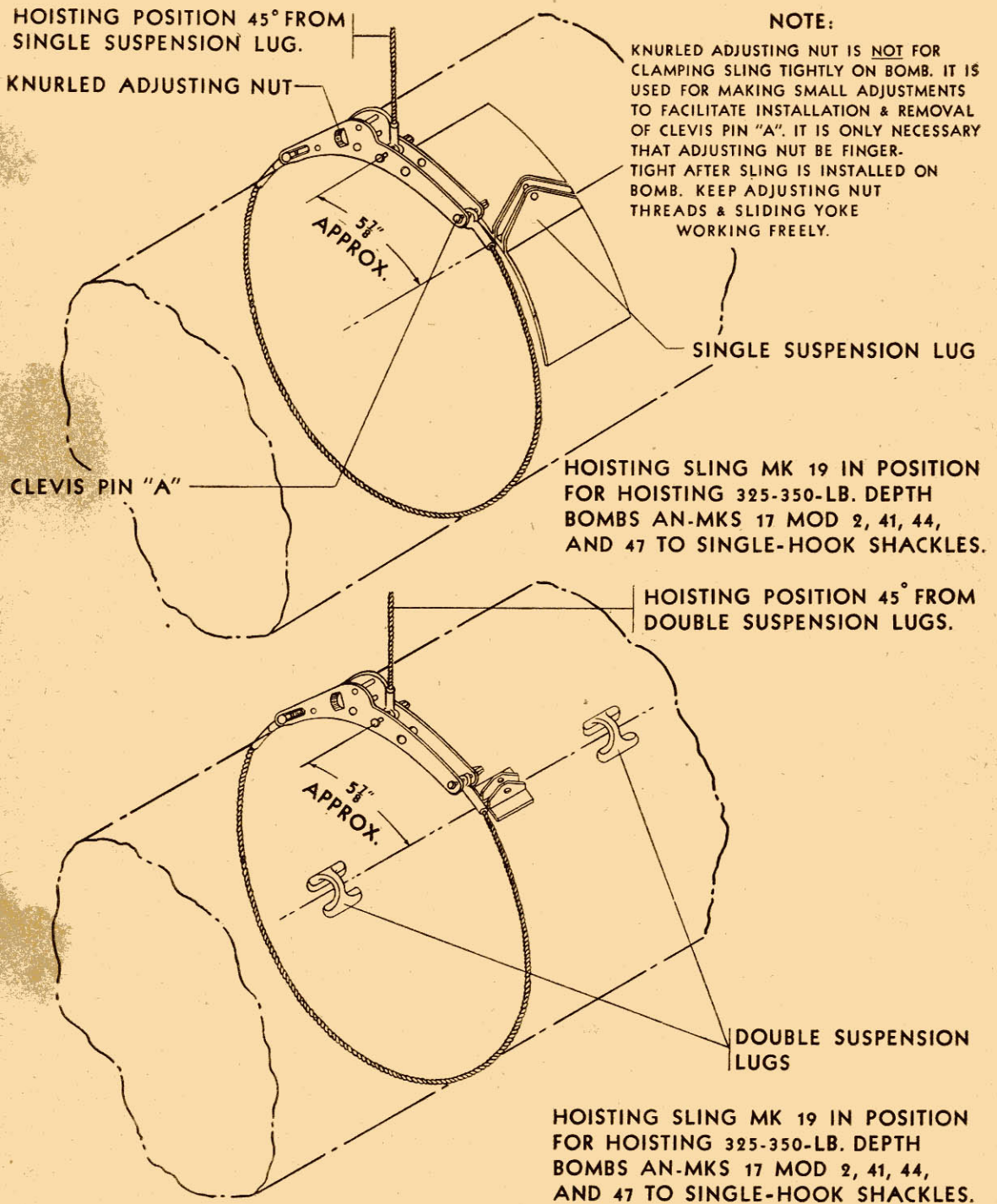


Figure 159.—Hoisting Sling Mk 19 Mod 0

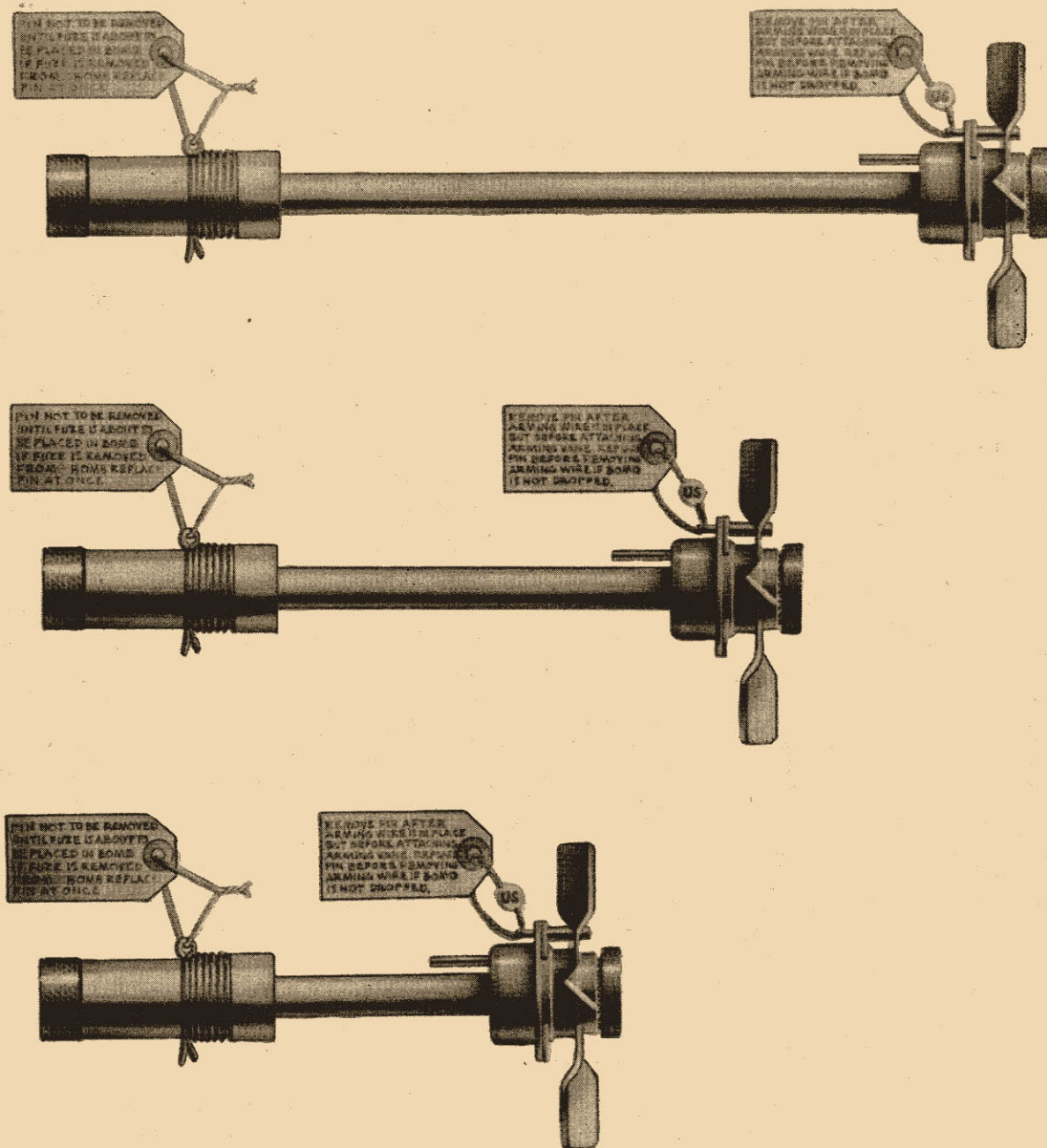


Figure 160.—Tail Fuzes AN-M100A2, AN-M101A2, and AN-M102A2

Chapter 7

BOMB FUZES

Tail Fuze AN-M100A2

Tail Fuze AN-M101A2

Tail Fuze AN-M102A2

General Description

The Tail Fuzes AN-M100A2, AN-M101A2, and AN-M102A2 are of the arming-vane type and have mechanical delay arming. These three fuzes are exactly alike except for the length of their fuze stem tubes. The length of this tube varies to fit the various lengths of fin assemblies.

These fuzes may be set for the following alternate delays by the use of alternate Primer Detonators M14:

1. Non-delay. (No delay element is introduced, but tail fuzes are a few thousandths seconds slower in acting than instantaneous nose fuzes.)

2. 0.01-Second Delay

3. 0.025-Second Delay

4. 0.10-Second Delay

These fuzes are safe for dive bombing and for take-offs and landings anywhere, including decks of carriers.

Installation in Bomb

To install any of these fuzes in a bomb, perform the following operations in order indicated:

1. Remove the tail shipping plug from the bomb and inspect adapter booster and threads. Clean if necessary.

2. Remove the fuze from its sealed metal container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Change primer detonator if necessary. To change, unscrew the present primer detonator **by hand** and screw in **by hand** the primer detonator having the desired delay. Primer detonators having loose primers, evidence of corrosion, or other visible defects should be disposed of.

4. Remove cotter pin from fuze body, complying with instructions on tag.

5. Screw fuze, less arming vane assembly, into adapter booster in the tail of the bomb until it seats hand-tight. **Use no tools.** No auxiliary boosters are required.

Note: The arming wire may be threaded through the fuze either before or after the bomb is installed in the aircraft.

6. Thread the longer end of the arming wire assembly through the rear suspension lug of the bomb and the nearer pair of eyelets on the fuze. Should the nearer pair of eyelets be occupied by the safety pin and car seal tag, place a second cotter pin through the eyelets diametrically opposite, before removing the original safety pin.

Note: The shorter end of the arming wire assembly is for use on the nose fuze. If no nose fuze is used, cut off the shorter end.

7. Cut car seal wire and remove safety pin, complying with instructions on tag.

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

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

10. Adjust arming wire to protrude beyond the arming vane from two to three inches.

11. Slip two safety (Fahnestock) clips over end of arming wire until the first one just touches the face of the vane.

Note: The fuze is now completely assembled in the bomb. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal in a fuze container.

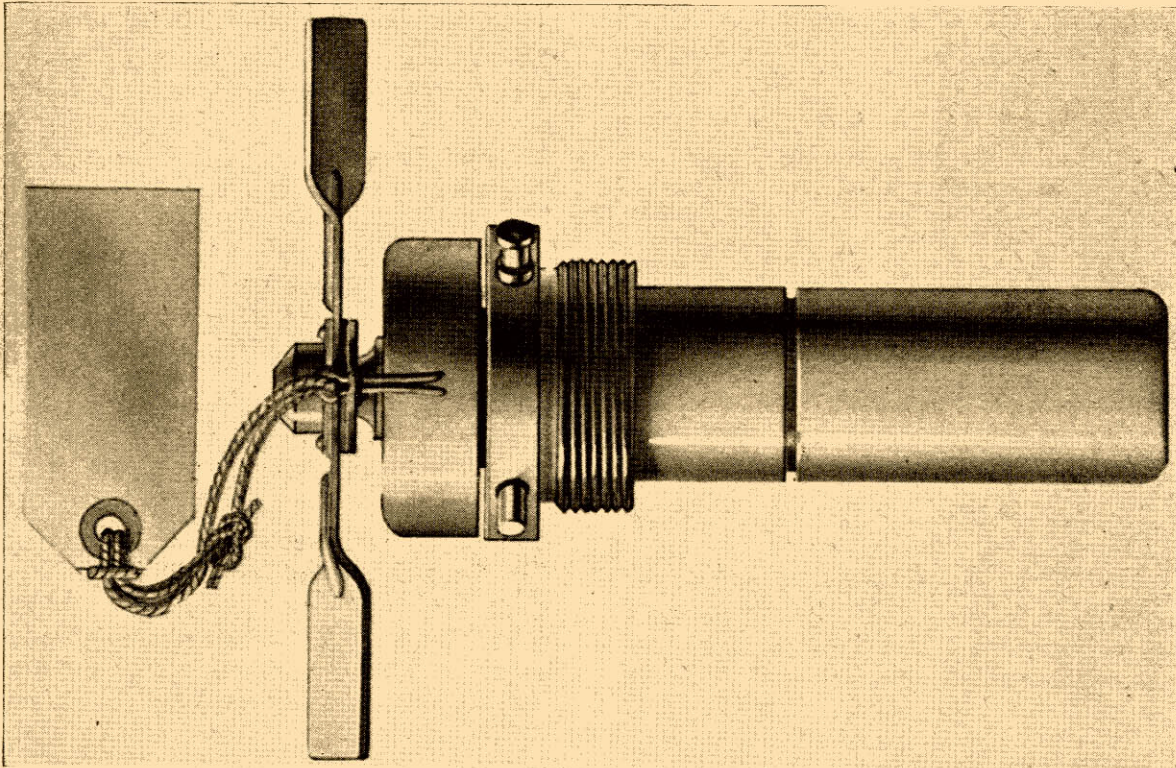


Figure 161.—Nose Fuze AN-M103A1

Nose Fuze AN-M103A1**General Description**

The Nose Fuze AN-M103A1 is of the arming-vane type and has mechanical delay arming. It can be set for instantaneous or 0.1-second delay action by means of an external setting pin. When shipped, the pin is in the deep slot or delay position. To set for instantaneous action, lift the pin, rotate one quarter-turn, and drop it into the shallow slot.

The fuze is safe for dive bombing and for take-offs and landings anywhere, including decks of carriers.

Installation in Bomb

To install this fuze in a bomb, perform the following operations in the order indicated:

1. Remove nose shipping plug from bomb and inspect the fuze seat liner and threads. Clean fuze seat liner, if necessary.

Note: When this fuze is used in Navy general purpose bombs, an auxiliary booster which is shipped assembled in the bombs must be used. Check to see that it is in place.

When this fuze is used in depth bombs, one auxiliary booster is required. As two auxiliary boosters are shipped assembled in the depth bombs, it will be necessary to remove one of the boosters. This fuze will **not arm** in 650- or 700-lb. aircraft depth bombs equipped with flat-nose attachments or of integral flat-nose type unless a special arming vane assembly with 30° twist on blades (BuOrd Dwg. 422314) is used. This special arming vane also improves and shortens the arming of the Fuze AN-M103A1 when installed in any flat-nose depth bomb and should be used whenever this fuze is installed in flat-nose depth bombs.

2. Remove fuze from its sealed metal

container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Cut and remove seal wire, complying with instructions on tag.

4. Screw fuze, less arming vane, into the nose of the bomb until it seats, hand-tight. **Use no tools.**

Note: The arming wire may be threaded through the fuze either before or after the bomb is installed in the aircraft.

5. Thread the shorter end of the arming wire through the front suspension lug of the bomb and through the nearer pair of eyelets. Should the nearer pair of eyelets be occupied by the cotter pin and tag, place a second cotter pin through the pair of eyelets diametrically opposite, before removing the original cotter pin. This cotter pin and tag are not to be removed until the bomb is installed in the dropping gear of the airplane and the arming wire is inserted. Instructions on tag read, "To be removed after bomb has been placed in dropping gear and arming wire inserted. If bomb is not dropped, replace pin before removing arming wire."

6. Adjust arming wire to protrude from two or three inches from bomb.

7. Slip two safety (Fahnestock) clips over end of arming wire until they just touch the face of the vane strap.

Note: Be sure that the end of the arming wire is free from kinks or burrs.

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

Use special flat-nose depth bomb arming vane if required.

9. Make certain the fuze is set for "instantaneous" action when installed in any depth bomb.

son authorized by him should inspect the fuze. Repack and reseal in original container.

Nose Fuze AN-M104

The Nose Fuze AN-M104 is an arming-pin type of fuze in which the detonator is

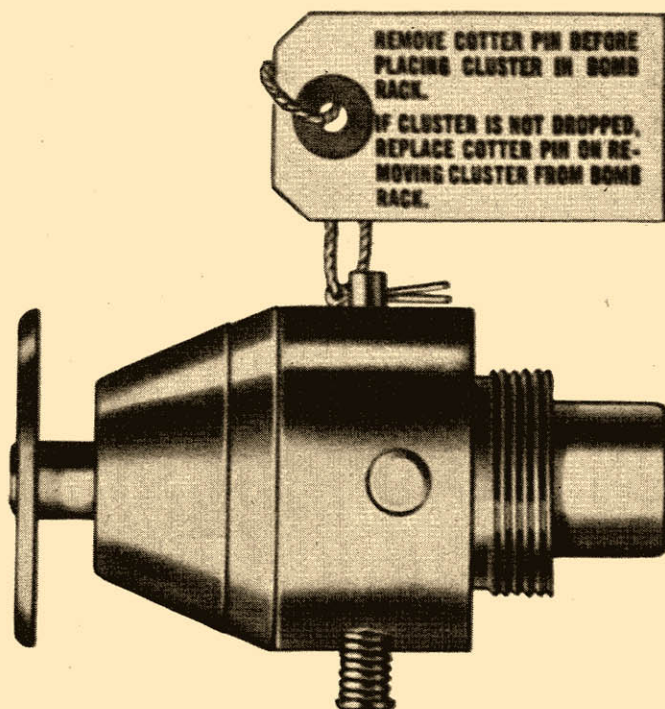


Figure 162.—Nose Fuze AN-M104

Note: The fuze is now completely assembled in the bomb except that the cotter pin (see 5, page 159) must be removed after the bomb has been installed in the airplane. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. An Ordnance officer or per-

aligned beneath the striker by a pyrotechnic time delay after the arming wire is withdrawn. No air travel is required to arm the fuze. The fuze is arranged for instantaneous firing on impact. This fuze was used in the 23-lb. Fragmentation (Parachute) Bomb AN-M40, but is now obsolescent.

Nose Fuze M110
Nose Fuze AN-M110
Nose Fuze AN-M110A1

General Description

The Nose Fuzes M110, AN-M110, and AN-M110A1 are of the arming-vane type and have mechanical delay arming.

The fuzes are primarily the same, except that the Fuzes M110 and AN-M110 are of less sturdy construction than the Fuze AN-M110A1. The Fuze AN-M110A1, which is

currently being issued with Bombs AN-M41, is fully described in OP 988.

The Fuzes M110 and AN-M110 require partial pre-arming prior to use in the Bombs M41 or AN-M41. Wherever these fuzes were installed in bombs which were assembled into clusters, the fuzes were partially pre-armed and required no further attention in this regard on the part of service personnel.

These fuzes, when unarmed, are safe for landings and take-offs anywhere, including decks of carriers.

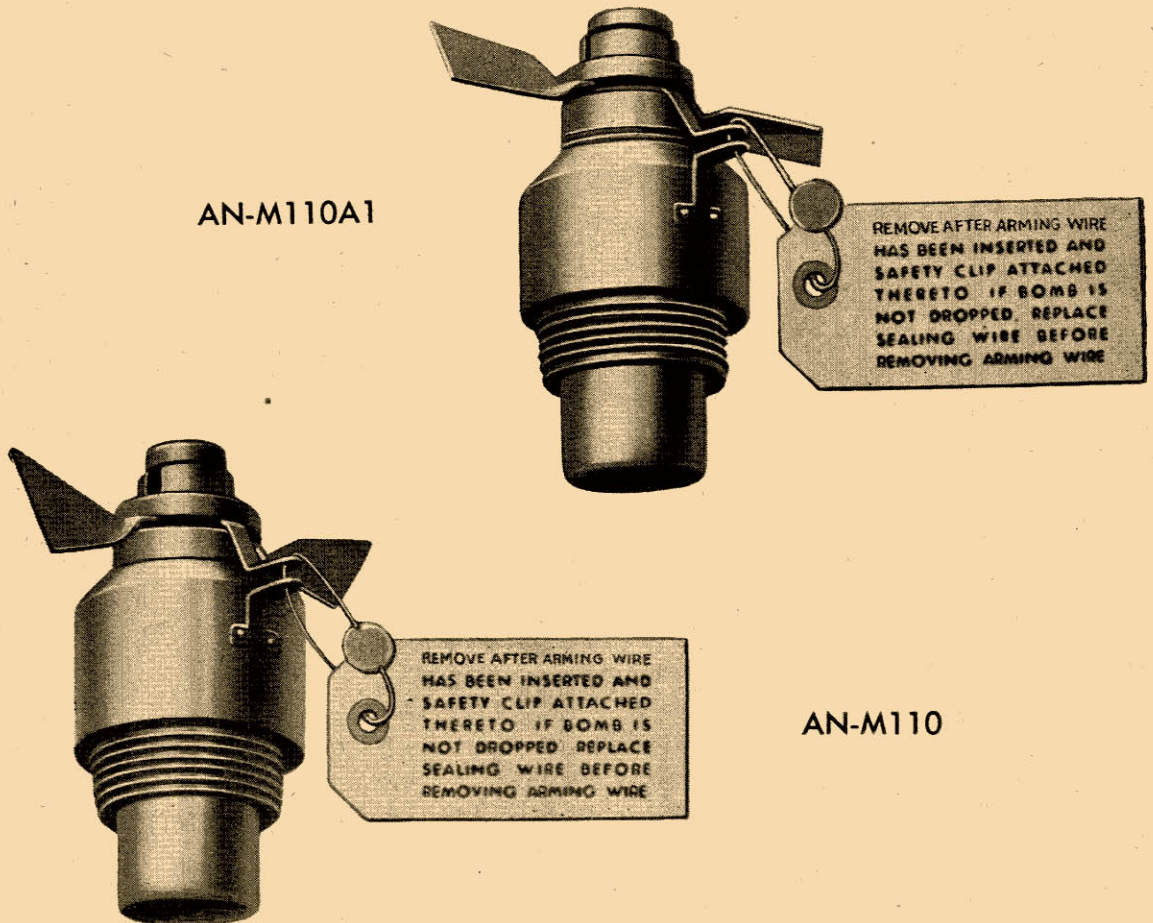


Figure 163.—Nose Fuzes AN-M110 and AN-M110A1

Tail Fuze M115

Tail Fuze M116

Tail Fuze M117

Tail Fuzes M115, M116, M117

These fuzes (for "mast-head" bombing)

are used in the same bombs in which the Tail Fuzes AN-M100A2, AN-M101A2, and AN-M102A2 are used. To install one of these fuzes in a bomb, follow exactly the same procedure as outlined for installing the A2 series of fuzes.

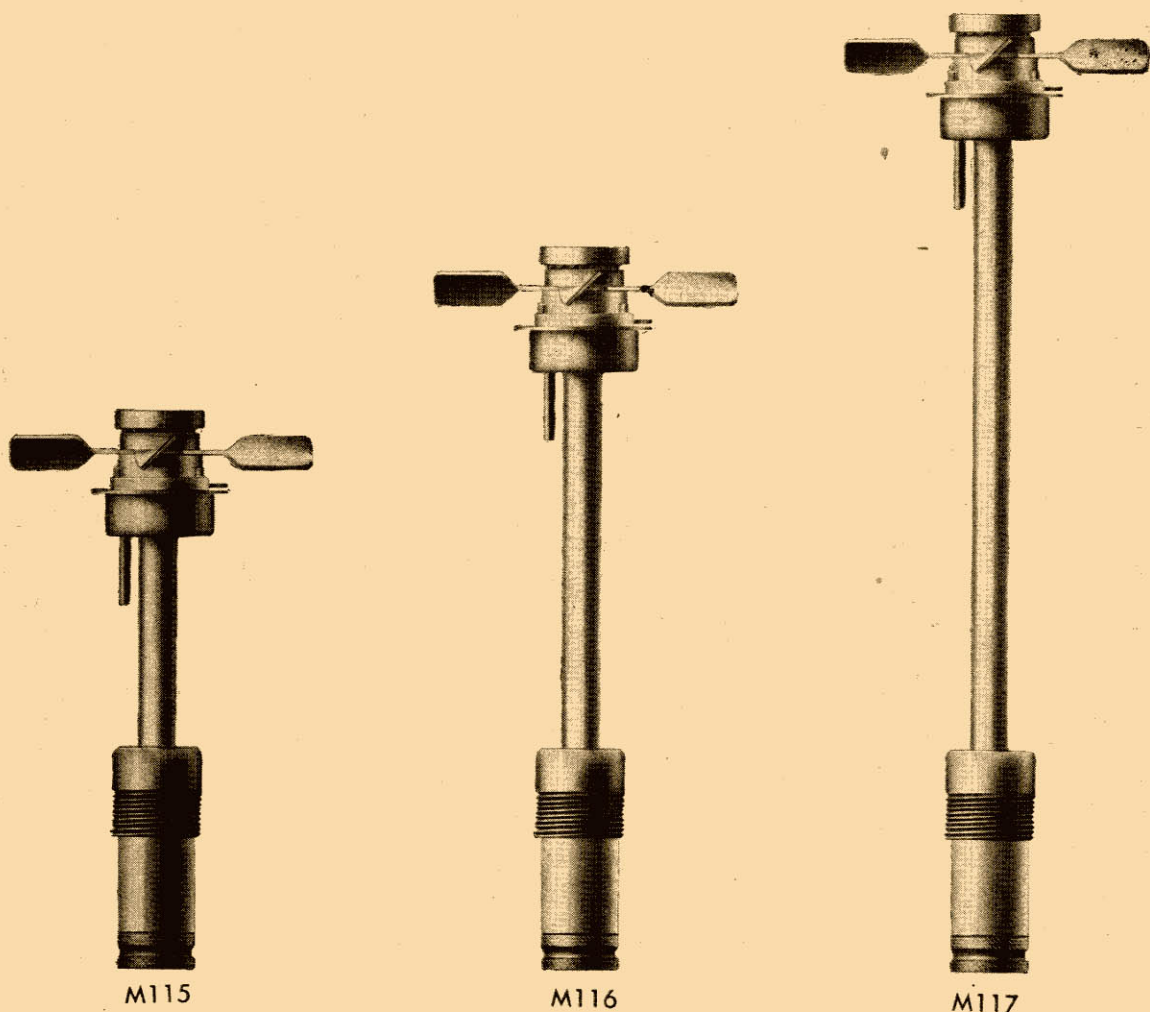


Figure 164.—Tail Fuzes M115, M116, M117

Nose Fuze AN-M120 Nose Fuze AN-M120A1

General Description

The Nose Fuze AN-M120 is an arming-pin type of fuze in which the detonator is aligned beneath the striker by a clockwork time delay of 2.5-sec. after the arming wire is withdrawn. No air travel is required to arm the fuze. The fuze is arranged for instantaneous firing on impact. The Nose Fuze AN-M120A1 is the Nose Fuze AN-M120 with arming time reduced to 1.9 seconds. These fuzes are used in the 23-lb. Fragmentation (Parachute) Bomb AN-M40.

Tail Fuze M123 Tail Fuze M124 Tail Fuze M125

General Description

Tail Fuzes M123, M124, and M125 are "long-delay" action fuzes. They are of the arming-vane, mechanical-delay-arming type. The long delay is accomplished by chemical action control of the firing mechanism. The three fuzes are identical except for their fuze-stem lengths. The length of the fuze stem varies to fit fin assemblies of various lengths. The model and lot number are stamped on the body of each fuze. Bombs which are equipped with these fuzes will render inoperative for considerable periods of time the areas on which they are dropped, such as airfields, runways, etc.

Each fuze is issued with one of the following time delays—approximately 1, 2, 6, 12, 24, 36, 72, or 144 hours. The delays are stamped on the body of the fuze. They are only approximate and vary with temperature, the delay being shorter at high temperatures and longer at low temperatures.

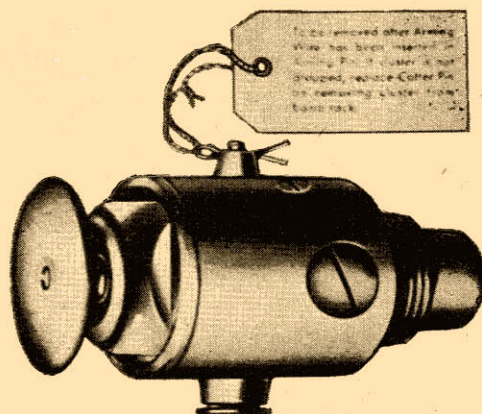


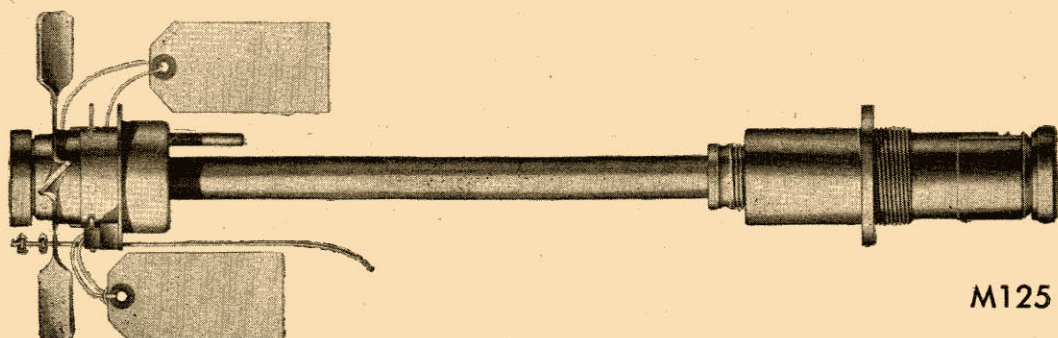
Figure 165.—Nose Fuze AN-M120 and AN-M120A1

Installation in Bomb

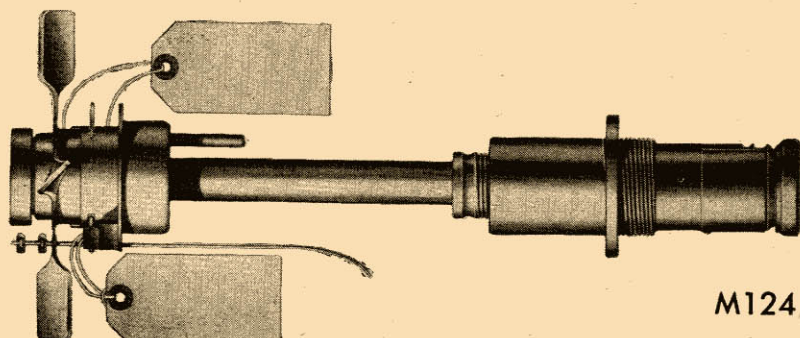
The only authorized assembly or disassembly of these fuzes is that incident to installation in the bomb. These fuzes cannot be removed from the bomb, and unexpended bombs equipped with them should be jettisoned before landing.

To install these fuzes in bombs, perform the following operations in the order indicated:

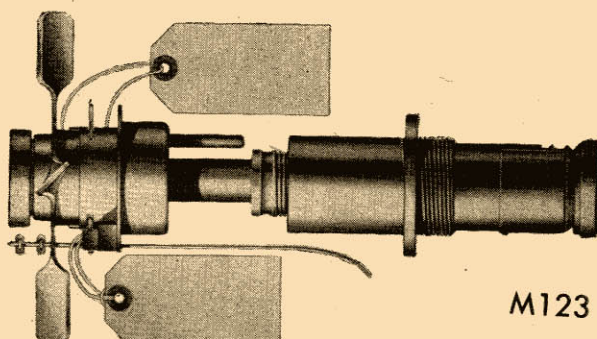
1. Remove the tail shipping plug from the bomb and inspect the adapter booster and threads. Clean if necessary.
2. Remove the fuze from its container and inspect the fuze. If the fuze appears unserviceable, tag it to indicate the defect, return it to its container, and have it sent to a Naval ammunition or mine depot as soon as possible.
3. If the fuze is serviceable, insert the holder-closing disc, the holder-sealing washer, and the detonator holder assembly in the lower end of the fuze. These parts are packed in the wooden box enclosed with each fuze.



M125



M124



M123

Figure 166.—Tail Fuzes M123, M124, and M125

4. Use an appropriate wrench and **tighten** the holder assembly. Be careful that the crimp holding the extension ball is not damaged.

5. Remove the thumb screw from the fuze body extension and the ball clip from the extension ball. Since the thumb screw is now removed, **extreme care must be used in handling**. The fuze will fire if the body extension is backed off as much as 3/64 of an inch.

6. Screw the fuze into the adapter booster in the tail of the bomb until it seats, **hand-tight**.

7. Thread the longer end of the arming wire through the rear suspension lug of the bomb and arming wire bracket, making sure that the arming wire protective tube is in place. The shorter end of the arming wire assembly is for use on the nose fuze. If no nose fuze is used, cut off the shorter end.

8. The arming wire may be threaded through the fuze either before or after the bomb is installed in the airplane. Cut the car seal wire and remove the safety pin, complying with instructions on the tag.

9. Thread the arming wire through the appropriate eyelet in the arming vane. At the same time, slip the arming vane over the end of the fuze so that the slots in the hub fit over the heads of the two eyelet pins. Adjust the arming wire to protrude two or three inches beyond the arming vane.

10. Screw the vane nut in the threaded end of the bearing cup, **hand-tight**.

11. Slip two safety (Fahnestock) clips over the end of the arming wire until the first clip just touches the rear arming wire bracket.

12. Finally, remove the safety cotter pin **after** the bomb has been placed in the dropping gear of the airplane.

The fuze is now completely assembled in the bomb, and it **must not be removed**. Attempting to unscrew the fuze from the bomb will cause the fuze to detonate immediately.

Special Precautions

When using the wrench, make the holder assemblies **tight**, so that the detonator will be effectively sealed against the liquid contents of the fuze. In doing this, be careful that the crimp holding the extension ball is not damaged.

After the thumb screw has been removed from the fuze body extension, handle the fuze with the utmost care.

The assembly of the detonator to the fuze and the fuze to the bomb should be performed only a short time prior to the airplane take-off, especially if the temperature is 120F. or higher.

These fuzes must be stowed in a cool place. They should never be subjected to temperatures exceeding 120F.

The fuze shipping boxes contain a powder that solidifies when a certain temperature is exceeded. Follow the directions contained in each shipping box relative to the use and disposition of fuzes that have been subjected to high temperatures.

These fuzes must **not be unscrewed during or after** installation in the bomb; and unexpended bombs using them should be jettisoned before the aircraft lands.

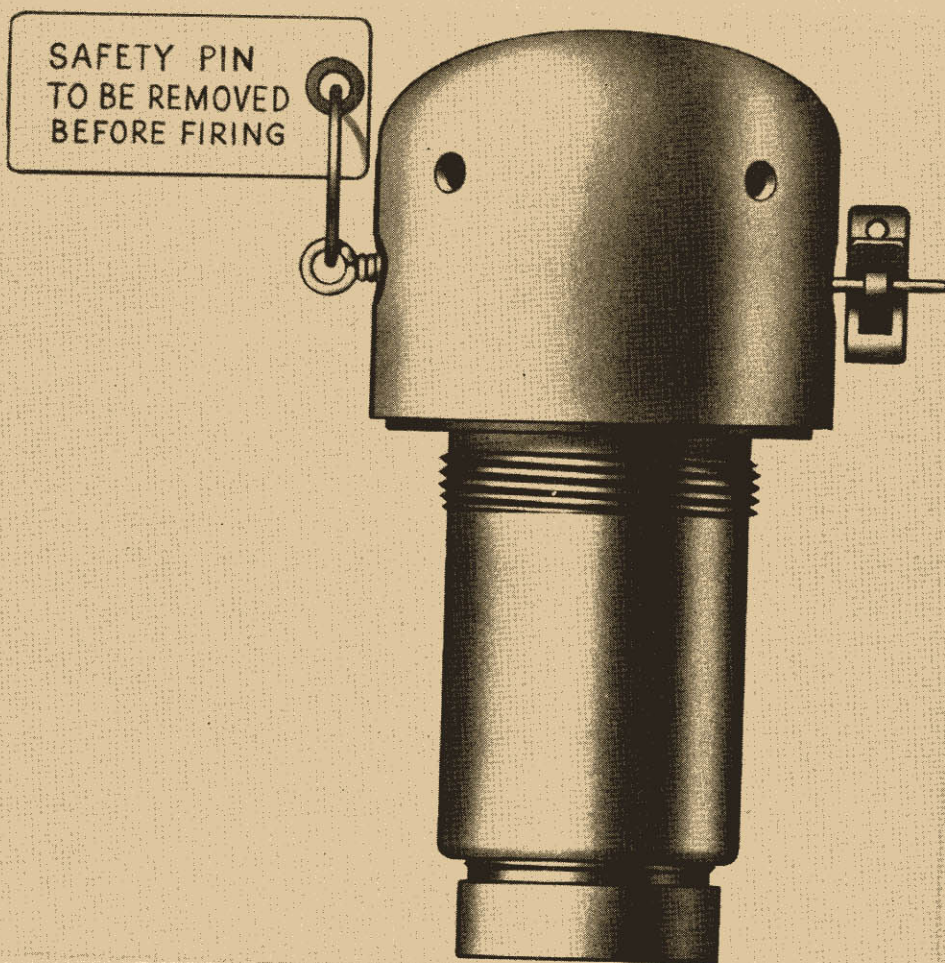


Figure 167.—Nose Fuze Mk 140

Nose Fuze Mk 140

General Description

The Fuze Mk 140 arms by hydrostatic pressure and fires on impact. Arming occurs under a static pressure of approximately 30 feet of water. However, at the high velocity with which the bomb in which it is installed is likely to strike the water, dynamic pressure is built up on the head and, under operating conditions, it usually arms at depths of from 8 to 15 feet. The fuze will function on impact with a solid object such as a submarine deck or a wooden deck grating. The fuze will detonate if it strikes the surface

of the water with a velocity of 320 feet per second, which corresponds to a free fall from a vertical height of 1600 feet.

Armed Fuzes

From an examination of the exterior of the fuze, it is impossible to tell whether or not the fuze is armed. However, when this fuze is armed, it is impossible to reinsert the safety wire through the water-intake ports in the nose cap. If the fuze is unarmed, the safety wire can be reinserted all the way through the nose cap.

Installation in Depth Bomb Mk 52

To install this fuze in a Bomb Mk 52, perform the following operations in the order indicated:

1. Remove the nose shipping plug and cardboard spacer from the bomb and inspect the fuze-seat liner. Check to see that the two auxiliary boosters are in place in the fuze-seat liner. Clean if necessary.

2. Remove the fuze from its container and examine it for defects, particularly as to the gasket. Check the freedom of movement of the safety ring. This is accomplished by turning the fuze alternately nose-down and nose-up. The ring should be heard to "click" with each movement. The last click should be heard when the fuze is turned to the nose-up position. In this position the ring engages the hooks on the bell cranks. If no "click" is heard, that fuze should be tagged and turned into a depot for overhaul.

3. Screw the fuze **securely** into the nose of the bomb, using a spanner wrench in the openings in the steel protective cup. Make sure that the gasket is properly in position, so that the connection of the fuze with the bomb will be watertight. Seepage of water past the gasket may result in malfunctioning of the fuze.

Do not use grease or sealing compounds on either the gasket or the seat.

4. If it should become necessary to remove the fuze from the bomb, it must be done using the special wrench provided.

Points to check—The following points should be checked during the installation of the fuze in the bomb:

1. That the fuze seat liner, into which the fuze is to be screwed, is clean and free of foreign substances

2. That two three-inch-length auxiliary boosters are in place in the bomb

3. That the safety ring moves freely

4. That the fuze gasket is properly in place

5. That the fuze is securely seated

6. That the **safety wire** is in place so that the arming wire can be clipped to it. Rotate bomb before tightening Rack Cables Mk 53 in order properly to locate ring on safety wire, so that arming wire may be clipped on.

Servicing

1. **Use of lubricants**—No lubricants or preservatives of any kind may be used on this fuze.

2. **Disassembly**—No disassembly of this fuze is authorized.

3. **Reports of malfunctioning**—Reports of instances of malfunctioning or any difficulties encountered with this fuze should be reported to the Bureau of Ordnance. The report should contain the lot number, a complete detailed history, and all pertinent information concerning the fuze.

Packing and Marking

1. **Packing**—One fuze is packed in a sealed cylindrical metal container. Twenty-four fuzes in containers are packed in a wooden shipping box.

2. **Marking**—The fuze is marked with Mark, Mod, and lot number, the date of manufacture, and the loading activity. The container and shipping box are marked with Mark number, lot number, number of fuzes contained within, name of manufacturer, year of manufacture, order number, and the inspector's initials. In making any reports concerning this fuze, all the markings on the fuze should be copied for complete identification.

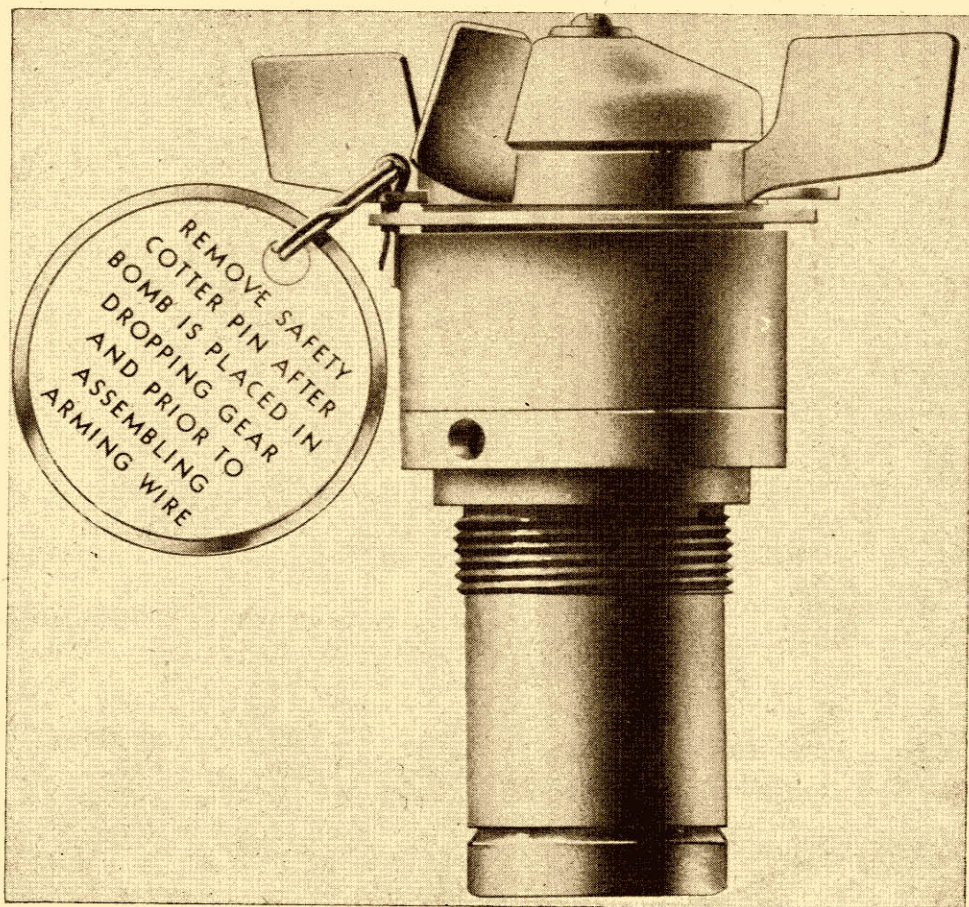


Figure 168.—Nose Fuze AN-Mk 219

Nose Fuze AN-Mk 219

General Description

The Nose Fuze AN-Mk 219 is of the arm-ing-vane type with mechanical delay arming. It requires about 1,000 feet of air travel along the trajectory to arm. When armed, it detonates instantaneously on impact with a sufficiently resistant target and may, if sufficient striking velocity is attained, function on water impact.

Note: The Fuze AN-Mk 219 may be in-

stalled in any AN-Standard general purpose bomb by using an Auxiliary Booster Mk 4 and an adapter.

A fuze adapter and two auxiliary boosters are required with all the above-listed bombs, including depth bombs, except the 100-lb. G.P. Bomb Mk 4 Mod 4. When a tail fuze is not required, the additional booster should be obtained by removing the booster from the tail fuze seat liner.

This fuze is safe for dive bombing and for take-offs and landings anywhere, including decks of carriers.

Installation in Bomb

To install this fuze in a bomb, perform the following operations in the order indicated:

1. Remove the nose shipping plug from the bomb, inspect the fuze seat liner and threads, and clean if necessary. If auxiliary boosters are required, inspect to see that two are in place. Install adapter for Fuze AN-Mk 219, if required, and tighten. For AN-Standard G.P. bombs, install an Auxiliary Booster Mk 4 in addition to the fuze adapter.

2. Remove the fuze from its container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Screw the fuze into the nose of the bomb and tighten with a spanner wrench.

Note: The arming wire may be threaded through the fuze either before or after the bomb is placed in the rack. **The safety cotter pin must not be removed until the arming wire is ready to be assembled.**

4. Thread the shorter end of the arming wire assembly through the forward bomb suspension lug.

5. Remove the safety cotter pin from the fuze and rotate the protecting cap and vanes slightly in each direction to insure free rotation. **Never rotate more than one-half turn from its original position.**

6. Thread the end of the arming wire through the top-most hole in the striker flange and the hole in the protecting cap.

7. Place two safety (Fahnestock) clips over the end of arming wire until the first one just touches the face of the vane or vane carrier.

8. Cut off excess arming wire three or four inches beyond the protecting cap and clips. Inspect to be sure that the end of the arming wire is smooth and free of burrs and kinks.

Note: The fuze is now completely assembled in the bomb. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal in a fuze container.

Nose Fuze Mark 221

General Description

The Nose Fuze Mk 221 is of the arming-vane type with mechanical delay arming. It detonates the bomb 0.01-second delay after impact. The fuze requires approximately 850 to 1,100 feet of air travel along the trajectory to arm.

This fuze is safe for dive bombing and take-offs and landings anywhere, including decks of carriers.

Installation in Bomb

To install this fuze in a bomb, perform the following operations in the order indicated:

1. Remove nose shipping plug from bomb. Inspect fuze seat liner and threads, and clean if necessary.

Note: The Navy bombs which use this fuze require one auxiliary booster, which is usually shipped assembled in the bomb. If the auxiliary booster has been stowed separately from the bomb, insert it in the nose fuze seat liner. If an adapter for the Fuze AN-Mk 219 and two auxiliary boosters are in the bomb, remove the adapter and one auxiliary booster.

2. Remove the fuze from its container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Screw the fuze into the nose of the bomb and tighten with a spanner wrench.

Note: The arming wire may be threaded through the fuze either before or after the bomb is installed in the aircraft. **The safety cotter pin must not be removed until the arming wire is ready to be assembled.**

4. Thread the shorter end of the arming wire assembly through the forward bomb suspension lug.

5. Remove the safety cotter pin from the fuze and rotate the protecting cap and vanes slightly in each direction to insure free rotation. **Never rotate more than one-half turn from its original position.**

6. Thread the end of the arming wire through the topmost hole in the striker flange and the hole in the protecting cap.

7. Place two safety (Fahnestock) clips over the end of the arming wire until the first one just touches the face of the vane.

8. Cut off excess arming wire three or four inches beyond the protecting cap and clips. Inspect to be sure that the end of the arming wire is smooth and free of burrs and kinks.

Note: The fuze is now completely assembled in the bomb. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal in a fuze container.

Tail Fuze Mk 223

General Description

The Tail Fuze Mk 223 is of the arming-vane type with mechanical delay arming. It detonates the bomb 0.01-second delay after impact. The fuze requires approximately 850 to 1100 feet of air travel along the trajectory to arm.

This fuze is safe for dive bombing and take-offs and landings anywhere, including decks of carriers.

Installation in Bomb

To install this fuze in a bomb, perform the following operations in the order indicated:

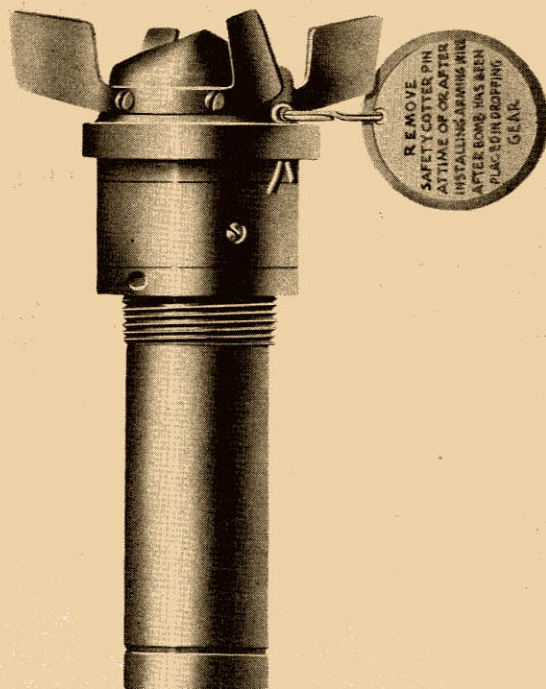


Figure 169.—Nose Fuze Mk 221

1. Remove tail shipping plug from bomb. Inspect fuze seat liner and threads and clean if necessary. Check to be sure that one auxiliary booster is in place.

2. Remove the fuze from its container and inspect the fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Screw the fuze into the tail of bomb and tighten with a spanner wrench. If fuze is installed in a 1000-lb. G.P. Bomb Mk 36, attach arming-wire bracket, BuOrd Dwg. 300207, securely to fuze.

Note: The arming wire may be threaded through the arming bracket either before or after the bomb is placed in the rack. **The safety cotter pin must not be removed until the arming wire is ready to be assembled.**

4. Thread the longer end of the arming wire through the rear bomb suspension lug.

5. Remove the safety cotter pin from the fuze and rotate the vanes slightly in each direction to insure free rotation. **Never rotate more than one-half turn from its original position.**

6. Thread the arming wire through both the arming-wire bracket (which is attached to the bomb tail) and the arming-wire tube.

7. Place two safety (Fahnestock) clips over the end of arming wire until they touch the arming bracket.

8. Cut off excess arming wire three or four inches beyond the arming bracket. In-

spect to be sure that the end of the arming wire is smooth and free from burrs and kinks.

Note: The fuze is now completely assembled in the bomb. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal in a fuze container.

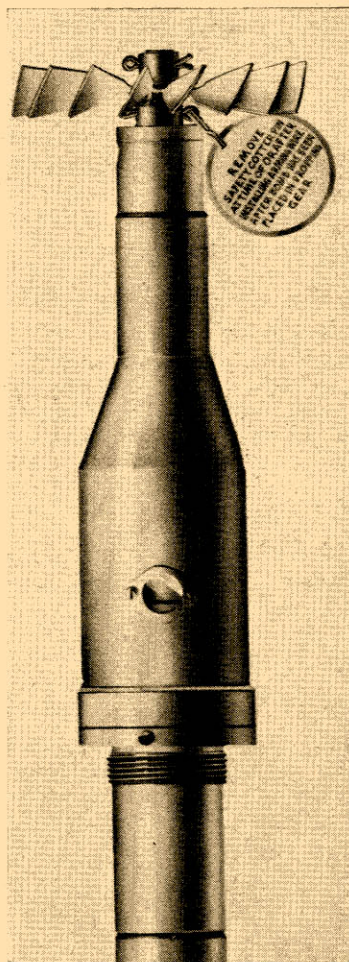


Figure 170.—Tail Fuze Mk 223

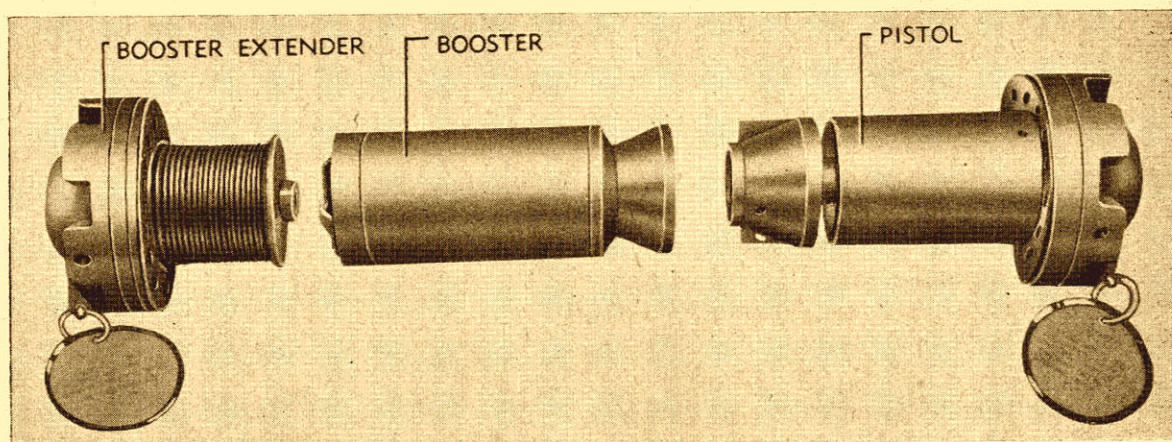


Figure 171.—Hydrostatic Fuze AN-Mk 224

Hydrostatic Fuze AN-Mk 224

General Description

The Hydrostatic Fuzes AN-Mk 224 and AN-Mk 234 function in response to hydrostatic pressure at a predetermined depth. They are almost identical. They differ principally in that the Fuze AN-Mk 234 is set by means of an external setting knob, whereas the Fuze AN-Mk 224 is set by inserting the proper firing pin spring in the pistol. The pistol is marked with the depth for which it is set. This setting may be changed for 25, 50, 75, 100, or 125 feet.

The fuzes are issued in three subassemblies: pistol, booster, and booster extender. The pistol contains the firing and depth mechanisms, booster, and booster charge. The booster extender arms the fuze by aligning the explosive train.

The fuze is installed in an athwartship fuze cavity through the bomb body. When assembled in the bomb body, the fuze protrudes on both sides of the bomb body and an arming wire is required for each end.

When the fuze is used in the Bombs Mk 29, Mk 37, Mk 38, and Mk 49, a spacer which is furnished with the bomb (in the athwart-

ship tube attached to one of the cover plates) must be inserted between the booster extender and the booster can to compensate for the increased diameter of the bomb body.

Setting Fuze AN-Mk 224

Before installing this fuze in the bomb, the desired depth setting must be made by inserting in the pistol the proper firing pin spring (and auxiliary spring if necessary) which is supplied in the crate in which the fuze is packed. No change need be made if the setting is already that desired. Depth settings of 25, 50, 75, 100, and 125 feet are possible with this fuze. Early lots were assembled with 50-foot springs, but fuzes at present are assembled with 25-foot springs. The yellow or black springs as selected actuate the firing pin and in addition serve a depth-controlling purpose. Green and red springs are auxiliary depth-control springs and do not actuate the firing pin. The following table shows the springs to use for the various depth settings.

Depth	Spring Color
25 feet	Yellow
50 feet	Black
75 feet	Black and Green
100 feet	Yellow and Red
125 feet	Black and Red

To change the depth setting of this fuze, do not remove the water baffle. Proceed as follows:

1. Unscrew primer and detonator holder after forcing counter-clockwise to break the staking.

2. Remove set screw in mechanism casing and unscrew casing from pistol carrying flange.

3. Remove guide piece, firing pin, and locking balls as a unit from hydrostatic piston bushing, thus affording access to the spring cavity.

4. Remove springs from spring cavity.

5. Insert appropriate spring as follows:

- a. For 25-foot setting, place the yellow firing spring over the spring guide.

- b. For 50-foot setting, place the black firing spring over the spring guide.

- c. For 75-foot setting, install the black firing spring and place the green auxiliary spring over it.

- d. For 100-foot setting, install the yellow firing spring and place the red auxiliary spring over it.

- e. For 125-foot setting, install the black firing spring and place the red auxiliary spring over it.

6. Reassemble the pistol, equipped with the desired spring combination, in accordance with the following procedure:

- a. Place firing pin and locking balls in proper position in guide piece and insert as a unit into the hydrostatic piston, resting the firing pin and guide piece on the firing spring and auxiliary spring (when used) respectively. Be sure that the locking balls engage the circular groove in the firing pin. If properly engaged, the firing pin point will be just below the top surface of the guide piece.

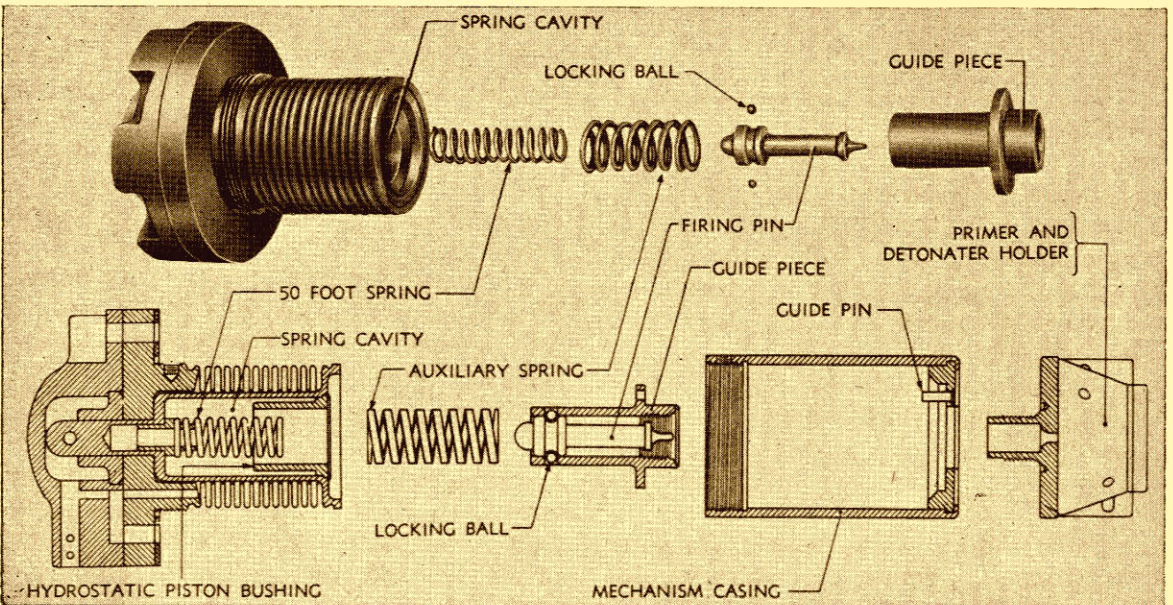


Figure 172.—Assembly of Pistol with Auxiliary Depth Spring

b. Place the mechanism casing over the guide piece, taking care that the guide pin enters the hole in the guide piece. Screw mechanism casing home on the pistol-carrying flange and replace the set screw. Always keep the firing pin pointed away from personnel.

c. Reassemble primer and detonator holder to guide piece, taking care that end of firing pin is centered. Screw tightly home and stake with a suitable tool.

d. Mark the pistol water baffle to indicate depth setting. If fuze is repacked, mark the packing can and data card as well.

Installation in Bomb

The following procedure is recommended for installing fuzes in depth bombs:

1. Remove the fuze cavity plates from the bomb and thoroughly cleanse the cavity and screw threads.

2. Remove pistol from container and, with it pointed in a safe direction away from personnel, depress the primer and detonator slides to make sure they operate freely.

3. Apply a **thin** coat of fiber grease (Texaco Marfak No. 3 or equivalent) to both sides of the gasket to insure a watertight seal. Insert the pistol in either end of the fuze cavity with its gasket in place between the pistol flange and head of the tube. Make sure the pistol enters freely and locates itself properly upon the locating dowel pin. When properly installed, the jump-out pin will point toward the tail of the bomb. Insert the holding screws and draw them up evenly, following a plan of tightening up on a bolt diagonally across from and not adjacent to the bolt last tightened. Be careful to tighten the screws uniformly, checking several times, in rotation, after the initial tightening. It is extremely important that a watertight seal be obtained between the

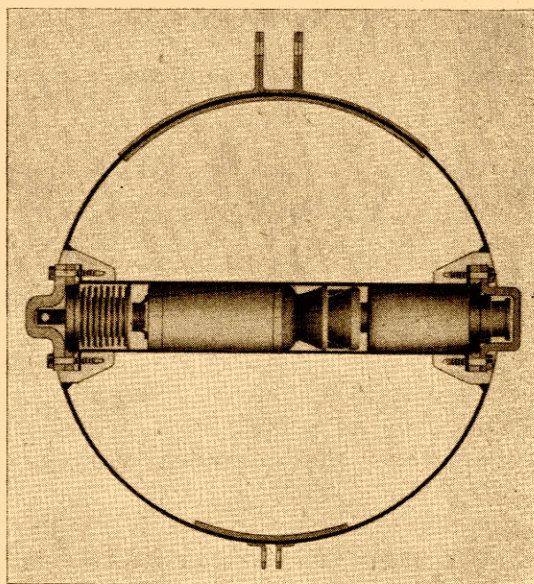


Figure 173.—Fuze AN-Mk 224 in Bomb Body

fuze and head of the tube, or a deeper functioning or dud will result.

4. Remove the booster and booster extender from the container, and remove the small wood block with the felt cap from the booster slider aligner. This block is put in to separate the booster and pistol in the packing can. Attach the booster extender to the booster by means of the slip-joint. Insert the assembly, with gasket in place, into the end of the tube opposite the pistol and tighten the holding screws with the same precautions used in securing the pistol. When used in the Bombs Mk 29, Mk 37, Mk 38, or Mk 49, the spacer is inserted between the booster and booster extender and all are joined together as a unit and then inserted into the tube. The spacer compensates for the larger diameter of these bombs.

5. Feed the arming wires through the fuze as the safety cotter pins are removed. Do not remove cotter pin completely until arming wire is started in the hole, or the jump-out pin will be expelled by its spring. On the older type of fuze, the arming wire

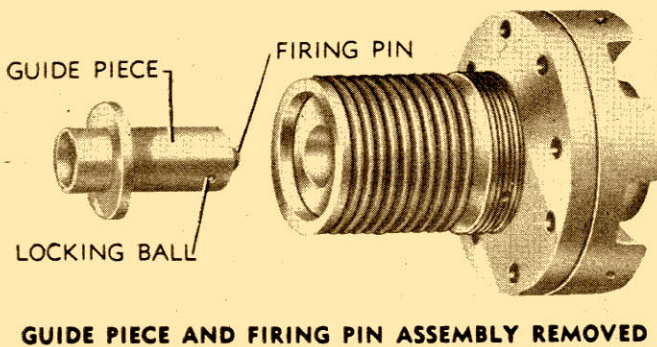
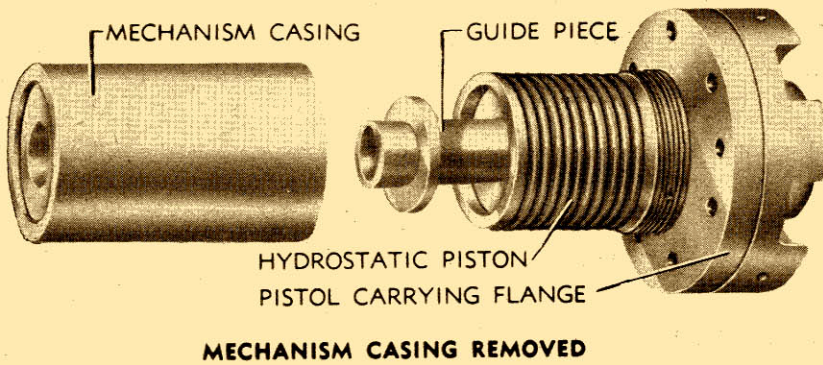
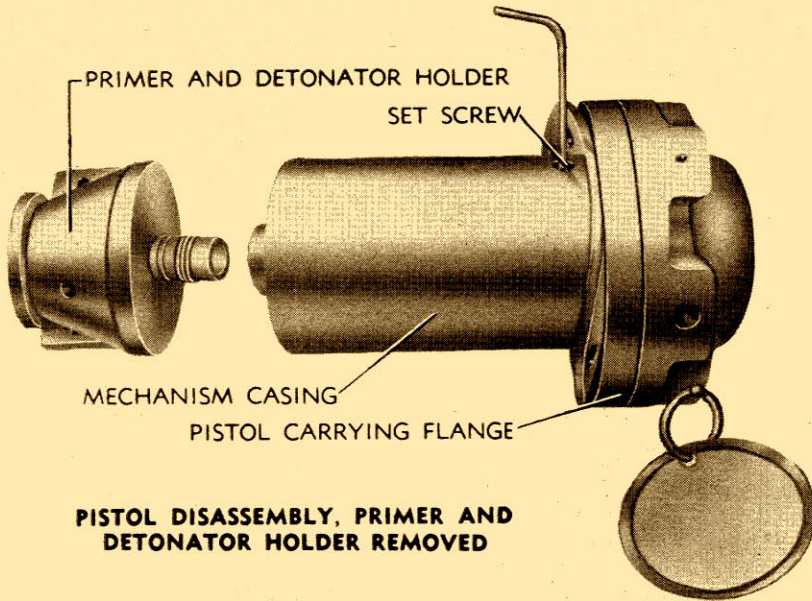


Figure 174.—Disassembly of Pistol for Insertion of Auxiliary Depth Spring

can be inserted before the safety cotter pin is withdrawn. Pull the arming wires taut, but maintain sufficient freedom for the arming wire plate swivel loop in the arming mechanism of the bomb rack or shackle. It is unnecessary to use Fahnestock clips with this fuze, because the jump-out pins produce sufficient friction on the arming wires. See further arming-wire instructions on page 113.

Servicing

1. **Exposed to weather**—Whenever the Hydrostatic Fuze AN-Mk 224 has been subjected to salt spray, and at such other times as may be necessary to guard against corrosion, the fuze should be removed from the bomb and all exposed working parts thoroughly cleansed, dried, and oiled as described in OP 988, page 37.

2. **Weatherproofing for older fuzes**—Weatherproofing is recommended for older Fuzes AN-Mk 224 only when bombs are externally suspended in freezing weather. This weatherproofing is described in OP 988, page 39.

Tail Fuze AN-Mk 228

General Description

The Tail Fuze AN-Mk 228 is of the arming-vane type. It has mechanical arming delay and is designed to detonate the bomb with a delay of 0.08 second after impact. The delay arming permits the bomb to fall clear of the airplane before the fuze is armed. Delayed action on impact allows penetration of the target before detonation occurs.

The arming delay and safety features incorporated in this fuze make it safe for dive bombing and for landings and take-offs with fuzed bombs anywhere, including decks of carriers.

This fuze cannot be unarmed, once it is completely armed, without disassembly. However, it may be unarmed without disassembly if the vane has not turned more than 120 revolutions.

Installation in Bomb

To install the fuze in a bomb, perform the following operations in the order indicated:

1. Remove the shipping plug or snap-on cover from the fuze cavity. Inspect the fuze cavity and threads and clean if necessary. Make certain that the auxiliary booster is in place.

2. Remove the fuze from its sealed metal container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to a Naval ammunition or mine depot as soon as possible.

3. Screw fuze, less arming vane assembly, securely into place, hand-tight. If necessary, because of binding threads, a small spanner wrench may be used.

4. Attach the arming wire bracket, furnished with the bomb, to the tail support of the fuze, so as to be vertically in line with the double suspension lugs. It will be necessary to remove the arming vanes before the arming wire bracket can be attached. Make certain the arming bracket is so positioned that it will completely clear the fuze impeller vanes, and then tighten bracket securely. This is important. Unless bracket is properly tightened, vibration and force of air may cause the bracket to slide on fuze and foul impeller arming vanes.

5. Place the arming vane on the shaft and fasten with cotter pin provided. (The tail vane of the Fuze AN-Mk 228 is painted red to distinguish it from the tail vane of the Fuze Mk 223, which has a slightly different pitch.)

6. Remove the safety cotter pin from the fuze and turn the vane in each direction to

insure free rotation. **Do not rotate the vane more than about one turn in either direction.**

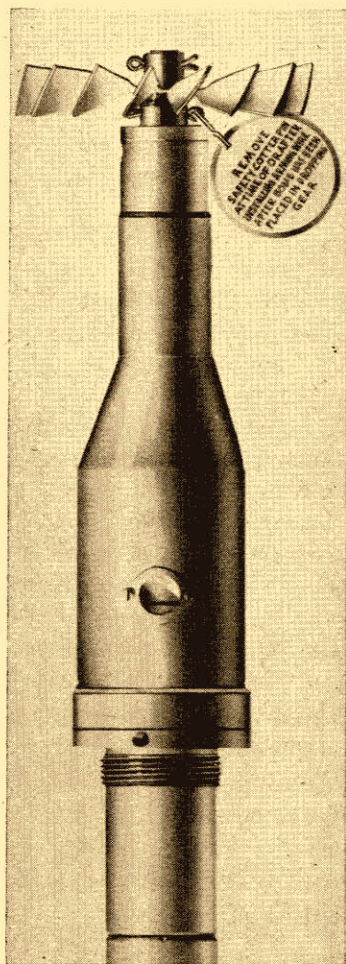


Figure 175.—Tail Fuze AN-Mk 228

7. Thread the arming wire through the rear bomb suspension lug and then through the arming-wire bracket. Be sure the arming wire tube (brass tube furnished with the bracket) covers the arming wire where it passes through the arming vanes.

8. Hoist the bomb to the rails and insert the arming-wire plate or swivel loop. If more convenient, the arming wire plate may be put in the bomb racks first and the bomb then hoisted into place. Pull the arming wire taut, but maintain sufficient freedom for the arming wire plate in the bomb racks. If shackle suspension is used, place the shackle on the bomb and then hoist to the side rail shackle suspension hooks. The arming wire may be put on either before or after hoisting the bomb.

9. Attach two safety (Fahnestock) clips on the end of the arming wire and slide them up to the arming wire bracket. Cut off surplus length of arming wire so that about six inches extend beyond the safety (Fahnestock) clips. Make sure the end of the wire is smooth and free of burrs.

Note: The fuze is now completely assembled in the bomb. Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal in a fuze container.

Tail Fuze Mk 229 Mod 3

General Description

The Tail Fuze Mk 229 Mod 3 is a hydrostatic fuze which functions by means of hydrostatic pressure at a predetermined depth setting of 25, 50, 75, 100, or 125 feet. A change in the depth setting is made by an external setting dial without disassembly of the fuze. This fuze is similar to the Fuze AN-Mk 230 Mod 4, except that, in the Fuze AN-Mk 230 Mod 4, the portion of the fuze that fits into the bomb is 1.3 inches shorter than in this fuze. This fuze is of the arming-vane type and is designed for mechanical-

delay arming. It is safe for use in dive bombing and for take-offs or landings anywhere, including carriers. The air travel along the trajectory necessary to arm this fuze is 300-400 feet.

Installation in the Depth Bomb Mk 29, Mk 37, or Mk 38

To install the fuze in the Depth Bomb Mk 29, Mk 37, or Mk 38, perform the following operations in the order indicated:

1. Remove the tail shipping plug from the bomb, inspect the fuze seat liner and threads, and clean if necessary. One auxiliary booster is required, which is usually in the tail fuze seat liner. If the auxiliary booster has been stowed separately from the bomb, insert it into the tail fuze seat liner.

2. Remove the fuze from the container and inspect for any defects in thread or vanes. If the fuze appears unserviceable, return it to the container, tag to indicate the defect, and return it to a Naval ammunition or mine depot.

3. If the fuze is serviceable, make the desired depth setting.

4. Remove the safety rod from the fuze body.

5. Screw the fuze into the bomb by hand, first making sure that the gasket between the fuze body and adapter booster is properly in place. Tighten securely with a spanner wrench. A watertight seat is necessary to prevent seepage of water past the gasket, with consequent malfunctioning of the fuze. Use a neoprene oval gasket rather than the flat gasket formerly supplied. The oval gasket is now standard and should be obtained separately, if not shipped with the fuze.

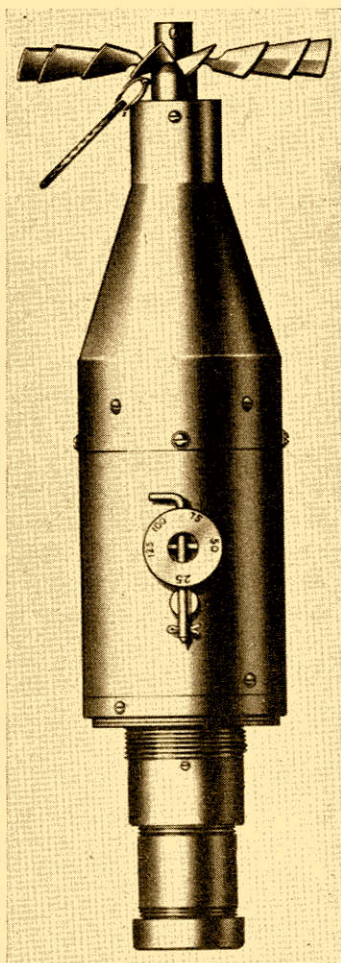


Figure 176.—Tail Fuze Mk 229 Mod 3

6. Attach the arming wire bracket, furnished with the bomb, so that it will be vertically in line with the bomb suspension lugs. Make certain the bracket is securely tightened and is correctly located so as not to foul the fuze impeller vanes.

7. Thread the long end of the arming wire through the rear suspension lug of the bomb and through the bracket and the arming wire tube. Adjust the arming wire so that it extends three to four inches beyond the bracket, insuring that the end of the wire is free of burrs.

8. Slip two safety clips (Fahnestock connectors) over the end of the arming wire until the first one just touches the bracket.

9. Remove the safety cotter pin.

Should it become necessary to remove the fuze from the bomb, carry out the above steps in the reverse order, making sure that the cotter pin is replaced. Repack and reseal in the fuze container.

Changing the depth setting—Set for the desired depth before installation in the bomb, though the setting can be changed after installation. To make a depth setting change:

1. Remove the cotter pin from the safety rod and withdraw the rod from the setting knob and lock.

2. Turn the setting knob so that the desired depth setting is adjacent to the lock.

3. Insert the safety rod through the appropriate hole in the setting knob and through the slot in the lock. Replace the cotter pin in the safety rod. A different depth setting device was provided in the earlier models of the fuze. In those models, to change the depth settings:

a. Unscrew the lock handle.

b. Rotate the setting handle until the long end of the handle lines up with the desired depth.

c. Retighten the lock handle.

Points to check—The following points should be checked during installation of the fuze in the bomb:

1. That the fuze seat liner of the bomb is free of foreign matter

2. That the auxiliary booster is in place in the fuze seat liner

3. That the gasket between fuze and fuze seat is in place

4. That the fuze is securely tightened so that the installation is watertight

5. That the fuze is set for the desired depth functioning

6. That the arming wire and arming wire bracket are properly installed

7. That the safety cotter pin locking the vane shaft has been removed

Servicing

1. **Use of lubricants**—The use of lubricants and preservatives of any kind is not permitted unless, after the fuze has been exposed to the weather, the arming vane does not turn freely, or there is evidence of corrosion. In these cases, refer to OP 988, page 69.

2. **Disassembly**—Disassembly of the booster end of this fuze is **dangerous** and may result in an explosion unless done by fully qualified specially trained personnel.

Tail Fuze AN-Mk 230 Mod 4

General Description

The Tail Fuze AN-Mk 230 Mod 4 is a hydrostatic fuze, which functions in response to hydrostatic pressure at predetermined depth settings of 25, 50, 75, 100, or 125 feet. Changes in depth settings are made by an external depth-setting knob without disassembly of the fuze. The fuze is of the arming-vane type and has mechanical delay arming.

It is safe for dive bombing and for take-offs and landings anywhere, including decks of carriers; however, care must be taken that the arming system of the bomb rack is kept on "safe" during take-offs and landings over water.

The air travel along the trajectory necessary to arm this fuze is 400 to 500 feet.

Installation in Bomb

To install this fuze in a bomb, perform the following operations in the order indicated:

1. Unscrew the shipping plug and the fuze adapter from the Adapter Booster M115 in the tail of the bomb. **Do not remove adapter booster.** Inspect adapter booster threads. Clean if necessary. Carefully tighten adapter booster if it is loose.

2. Remove the fuze from its sealed metal container and inspect fuze. If the fuze appears unserviceable, return to container, tag to indicate defect, and return to Naval ammunition or mine depot as soon as possible.

3. Set fuze for the desired depth as follows:

- a. Remove the cotter pin from the depth-setting rod and withdraw the rod from the depth-setting knob.

- b. Turn the depth-setting knob so that the desired depth setting is opposite the lock.

- c. Insert the depth-setting rod through the appropriate hole in the depth-setting knob and through the slot in the lock. Replace the cotter pin in the depth-setting knob.

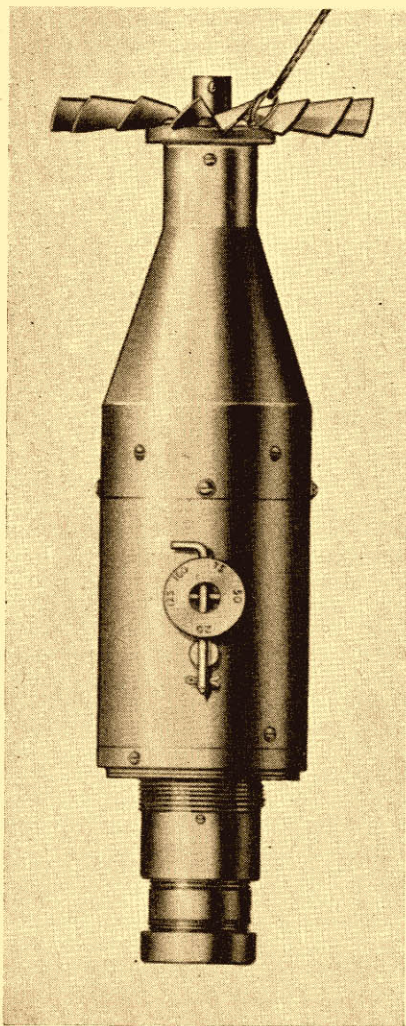


Figure 177.—Tail Fuze AN-Mk 230 Mod 4

Note: The depth setting can be changed after the fuze has been installed in the bomb by performing operations a, b, and c above.

4. Remove safety rod from the fuze body.

5. Make sure that the gasket between the fuze body and adapter booster is properly in place. Screw the fuze into the adapter booster and tighten the fuze with an appropriate wrench.

Note: A watertight seat is necessary to prevent seepage of water past the gasket and consequent malfunctioning of the fuze. **Do not use grease or sealing components on the gasket and seat, because of their proximity to the explosive components.**

Note: The arming wire may be threaded through the fuze either before or after the bomb is installed in the aircraft.

6. Thread the longer end of the arming wire assembly through the rear suspension lug of the bomb, thence through the hole in the fuze body flange and the hole in the arming vane. Adjust the arming wire to protrude beyond the arming vane from two to three inches.

7. Slip two safety (Fahnestock) clips over the end of the arming wire until the first clip just touches the rear face of the arming vane. The fuze is now completely assembled in the bomb.

8. Remove safety cotter pin after bomb has been placed in dropping gear of airplane.

Note: Should it be necessary to remove the fuze from the bomb, carry out the above steps in reverse order. Inspect the fuze and repack and reseal the fuze container.

Hydrostatic Fuze AN-Mk 234

General Description

The Hydrostatic Fuze AN-Mk 234 differs from the Fuze AN-Mk 224 in that it may be set to fire at depths of 25, 50, 75, 100, or 125 feet by an external setting knob without disassembly.

It is issued in three subassemblies: pistol, booster, and booster extender, which are installed in a transverse fuze cavity in the bomb body.

Weatherproofing features have been incorporated in this fuze. Synthetic rubber bushings are inserted around the jump-out pins to prevent the entrance of water, and gasket material is cemented to the depth-setting step inside the depth-setting hole in the water baffle. Weatherproofing, as used on the older Fuzes Mk 224, should therefore be unnecessary.

Setting Fuze

Remove the safety clip from the knurled step lock screw and unscrew about two turns. This releases the depth-setting step, so that the depth-setting knob (which is opposite the step lock screw) can be moved. Move the depth-setting knob to the desired depth as indicated on the head of the pistol; then retighten the step lock screw and put the safety clip through it in such a manner that the screw cannot loosen.

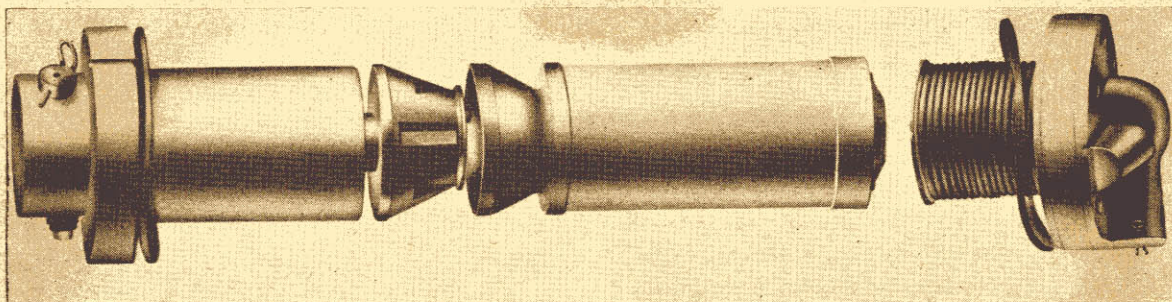


Figure 178.—Hydrostatic Fuze AN-Mk 234

Installation in Bomb

Installation in a bomb is essentially the same as the Fuze AN-Mk 224, the only difference being that the arming wire to the pistol is attached so as to retain the depth-setting knob plug and the synthetic rubber tube.

Pass the end of the arming wire through the hole provided in the plug and cut off excess wire, allowing about six inches to extend beyond the plug. Bend $\frac{1}{2}$ in. to $\frac{3}{4}$ in. of the end of the wire and fold it back on itself. An alternate method is to make a small loop in the wire near the end. The wire will then be unable to slip back through the hole in the plug and so will retain the plug as the bomb drops away from the rack. See further arming wire instructions on page 113.

When installing the Pistol Mk 234 in a bomb, it is necessary to have the depth-setting knob near the center of the depth-setting hole, so that it will not interfere with the holding screws. The step lock screw should be unscrewed several turns and the

depth-setting knob moved to the central position. The pistol may then be placed in the bomb and the holding screws inserted and tightened. The desired depth setting may then be made and the step lock screw tightened and locked.

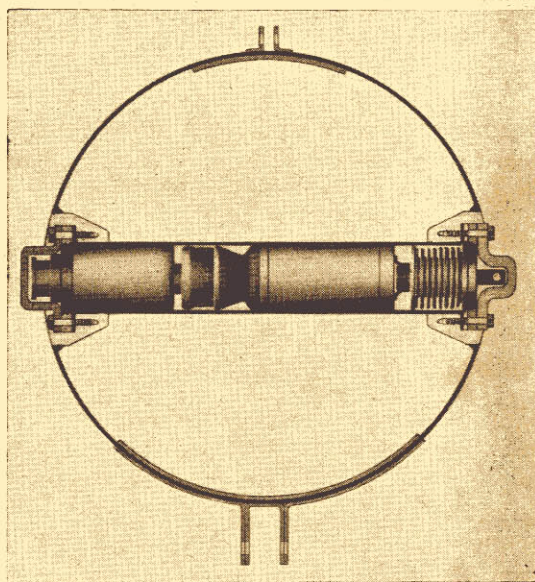


Figure 179.—Fuze in Bomb Body

SAFETY PRECAUTIONS

When bombs are being assembled and handled, due care must be exercised to prevent any shocks or blows which might cause accidental functioning.

Aircraft depth bombs must be handled with considerable care, because of their relatively light bodies. They must not be subjected to rough treatment in any handling operation such as transportation, loading and unloading from aircraft, etc., nor should tools or other objects be permitted to drop upon them. Particular care must be taken to insure that the bombs do not become rusted or corroded and, at the first indication of such rusting, the parts affected should be carefully cleaned and repainted.

All fragmentation bomb clusters are particularly susceptible to damage caused by rough handling. **Furthermore, since the clusters contain fuze bombs, they must be accorded more than ordinary care in handling.**

Prior to use, all aircraft bombs must be inspected for general condition, and any bombs found not in good condition for any reason should not be used. The following points should especially be noted:

1. Condition of bomb bodies and tails for dents, rusting, bent tails, deformed or torn hoisting and suspension lugs, damaged or dirty fuze seat liner threads and mating surfaces, and general cleanliness of all surfaces. No mud or dirt should be allowed to accumulate on any parts of the bomb.

2. For those fuzes requiring the attachment of a primer detonator, special care is required to insure that there is no foreign matter in either the fuze or the primer detonator cavities, as anything which resists the free entrance of the primer detonator into its socket might result in a premature explosion or a dud.

3. Primer detonators and detonators must be handled with the greatest care at all times. They are especially sensitive to heat and shock.

4. Where boosters are required for use in nose and fuze seat liners, a check must be made to insure that the boosters **are installed** and the **correct number is present**. Remove all boosters from fuze cavities of depth bombs except those which are actually being used in conjunction with installed fuzes.

5. Disassembly of booster end of Fuzes Mk 229 Mod 3 and AN-Mk 230 Mod 4 is **dangerous** and should be done only by qualified personnel.

6. Fuzes should be examined for any deterioration such as heavy rust or corrosion, which might impair proper functioning. Only serviceable fuzes shall be used. Under no circumstances shall components such as fuzes be disassembled.

Check conditions of tails, and use only tails which are in good condition. Where bolts are used for attaching tails to bomb bodies, **all bolts must be used**. Where a tail lock nut is employed for attaching the tail to a bomb body, care should be taken to insure that the tail cone is fully seated on the bomb body and the tail lock nut **securely tightened**.

If a flat nose is to be installed, make certain that plaster or similar backing material is placed behind the attachment.

Where an arming wire bracket is required, it must be correctly positioned on the fuze, the arming wire protective tube installed, and the bracket **securely tightened** to the fuze. A careful check should be made to insure that the fuze impeller

vaness adequately clear the arming wire bracket as installed.

Arming wires must be free from kinks, burrs, dents, dirt and corrosion. They must be correctly installed so as to function properly on safe or live drops with the rack or shackle, bomb, and fuzes used. Safety (Fahnestock) clips must be used where required.

The special vane for use with Fuzes AN-M103A1 when these fuzes are installed in flat-nose depth bombs should always be used, as required, in order to insure arming of the fuze.

Hoisting bands, where used, must be correctly installed, and every possible safety precaution taken during hoisting operations.

Aircraft loaded with modified bombs that have fuzes with anti-withdrawal devices must jettison these bombs before landing.

Bombs assembled with any type of fuze that cannot be removed, either because of jamming or because of anti-withdrawal features, must be dumped into deep water, or otherwise disposed of.

Live-loaded bombs must never be used to check functioning of racks and shackles by installing a bomb on a rack or shackle and then actuating the release mechanism and allowing the bomb to fall to the deck (padded or otherwise) or by restraining the

released bomb by means of the bomb-hoist cable. The hoisting lugs on aircraft bombs are not designed to sustain the loads imposed by the latter treatment. Even with inert-loaded bombs, such practice is to be discouraged.

Under no condition is the Miniature Practice Bomb Signal AN-Mk 4 to be opened or tampered with. Defective signals shall be returned to an ammunition depot or turned over to a Bomb Disposal Officer for proper disposal.

Extreme care must be used at all times in handling loaded miniature practice bombs. It is possible to set off the signal by dropping or jarring a loaded bomb. Under no circumstances is either end of a loaded bomb to be pointed toward one's self or toward other personnel.

No pressure or forcing of any kind shall be applied to the firing pin assembly or the signal during loading or after the miniature practice bomb is loaded.

In miniature practice bomb loading operations the loaders **must not place their heads in line with the nose of the bomb.**

Miniature Practice Bomb Signals AN-Mk 4 must be stowed in a place protected from direct sunlight and excessive heat. The stowage temperature shall never exceed 100F. These signals shall be protected from spray or moisture and excessive motion and vibration.

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