

TECHNICAL MANUAL

DESCRIPTION, SAFETY, SERVICE
AND HANDLING INSTRUCTIONS

**AIRCRAFT GENERAL PURPOSE BOMBS,
FIRE BOMBS, PRACTICE BOMBS, FUZES,
AND ASSOCIATED COMPONENTS**

This manual supersedes NAVAIR 11-5A-17 dated 15 June 1975
and RAC 17 dated 14 February 1977.

Published by direction of Commander, Naval Air Systems Command.

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SECTION I

INTRODUCTION

1-1. SCOPE.

1-2. The Aircraft General Purpose Bombs, Fire Bombs, Practice Bombs, Fuzes, and Associated Components Manual is published by authority of the Commander, Naval Material Command and under the direction of the Commander, Naval Air Systems Command. This manual describes and illustrates bombs, fuzes, fins, and associated components used by operating forces of the Navy. The text includes information on component function and identification, model differences, handling, assembly of components, safety, and emergency procedures.

1-3. PURPOSE.

1-4. This publication provides personnel authorized to handle Navy aircraft bombs with general and specific information that includes a description, identification, and assembly procedures for aircraft bombs, fuzes, and associated components. The instructions contained in this manual are for all Navy bombs. Specific information concerning detailed procedures for loading and releasing of aircraft bombs is not included. Refer to paragraph 1-35 for information regarding the appropriate NAVAIR publications that provide detailed procedural data.

1-5. PURPOSE OF REVISION.

1-6. This revision deletes descriptive and procedural information on bombs and bomb components no longer carried in inventory. This revision incorporates information concerning the Electric Bomb Fuzing Circuit Test Set A/E24T-127.

1-7. ARRANGEMENT.

1-8. This manual is sectionalized to provide detailed descriptions, illustrations, preparation for use, and handling information for aircraft bombs, fuzes, igniters, and major subassemblies. Family-style grouping of major subassemblies permits data to be presented with a minimum of cross-referencing. The manual is divided into the following sections.

1-9. **SECTION I — INTRODUCTION.** This section contains information regarding the scope, purpose, and arrangement of this manual; reference publications;

reference to technical directives; and information on reporting weapon incidents, accidents, malfunctions, and manual deficiencies.

1-10. SECTION II — SAFETY PRECAUTIONS.

This section contains general safety precautions that authorized personnel shall observe in packing, unpacking, shipping, stowing, handling, assembling, and inspecting bombs, fuzes, and subassemblies.

1-11. SECTION III — LOW DRAG GENERAL PURPOSE BOMBS AND FIN ASSEMBLIES.

This section contains detailed data and procedures for assembling low drag general purpose bomb bodies MK 80 series, fin assemblies, and associated components into complete bombs. Illustrations show the external configurations and overall dimensions for the various assemblies.

1-12. SECTION IV — ELECTRIC FUZE CIRCUIT CONTINUITY TEST.

This section contains procedures for the use of the Electric Bomb Fuzing Circuit Test Set A/E24T-127.

1-13. **SECTION V — FIRE BOMBS.** This section contains tables of specifications for fire bombs. Illustrations show exploded views for various assemblies.

1-14. **SECTION VI — PRACTICE BOMBS.** This section contains tables of specifications for practice bombs, fin assemblies, and associated components that can be assembled as complete practice bombs. Illustrations show external configuration for various assemblies.

1-15. **SECTION VII — FUZES.** This section contains functional descriptions, illustrations, preparation for use, inspection data and installation procedures for fuzes.

1-16. **SECTION VIII — ASSOCIATED PARTS AND COMPONENTS.** This section contains functional description, illustrations, preparation for use, handling, and safety data for fuze extensions, arming devices, primers, detonators, igniters, proximity devices, and adapter boosters that may be used with bombs or fuzes.

1-17. APPENDIX A — BOMB FUZE CHARTS.

This appendix contains ready reference charts for bomb and fuze combinations.

1-18. APPENDIX B — COOK-OFF TIMES. This appendix contains cook-off times for GP bombs and fire bombs in the event of fire.

1-19. APPENDIX C — FUZE SUMMARY SHEETS. This appendix contains key points, warnings, and an illustration of fuzes contained in this manual.

1-20. APPENDIX D — ARMING WIRE DATA. This appendix contains a list of all arming wires authorized for use with weapons covered in this manual.

1-21. COGNIZANT ACTIVITY.

1-22. The Pacific Missile Test Center, Point Mugu, California 93042 has primary responsibility for conducting investigations on all engineering problems concerning design, compatibility, service life, interchangeability, maintainability, operation, and safety of weapons and components described in this manual.

1-23. CHANGE RECOMMENDATIONS.

1-24. Recommended changes to this manual or reporting of conflicting information shall be submitted by a Technical Publications Deficiency Report/Safety Report (OPNAV Form 4790/66) in accordance with OPNAVINST 4790.2.

1-25. REPORTING AIRBORNE BOMB, FUZE, AND ACCESSORY SYSTEM INCIDENTS, ACCIDENTS, OR MALFUNCTIONS.

1-26. Activities concerned with the operation, maintenance, inspection, or repair of aircraft-associated support equipment and airborne armament/weapon systems shall submit Explosive Mishap Reports when incidents, accidents or malfunctions occur. The report, which will be prepared and submitted in accordance with OPNAVINST 5102.1 or 4790.2 series, is designed to meet the requirements of the safety reporting system and fulfill certain incident/ground accident reporting requirements of OPNAVINST 3750.6 series.

1-27. WARNINGS, CAUTIONS, AND NOTES.

1-28. The following definitions apply to Warnings, Cautions, and Notes found throughout the manual:

WARNING

An operating procedure, practice, etc., which if not strictly followed, could result in personal injury or loss of life. A warning precedes the applicable paragraphs.

CAUTION

An operating procedure, condition, etc., which if not strictly observed, could result in damage to, or destruction of, equipment. A caution precedes the applicable paragraph.

NOTE

An operating procedure, condition, etc., which is essential to highlight.

1-29. CHANGE SYMBOL.

1-30. Changed text is indicated by a black vertical line in either margin of the page. The change symbol shows where there has been a change.

1-31. HOW TO OBTAIN COPIES.

1-32. Additional copies of this publication may be obtained by submitting a DD Form 1348 in accordance with instructions contained in NAVSUP Publication 2002 and NAVSUP Publication 437.

1-33. PUBLICATION INFORMATION.

1-34. Management control of this publication is the responsibility of the Commander, Naval Air Systems Command.

1-35. REFERENCE PUBLICATIONS.

1-36. This manual provides the information necessary for authorized personnel to unpack, inspect, assemble, and post-assembly inspect complete rounds of aircraft bombs. The user must refer to the airborne weapons stores loading manual for each particular aircraft for loading or downloading aircraft bombs on aircraft and for systems release and control checks. Table 1-1 lists publications containing information related to aircraft bombs and fuzes. Additional reference publications not listed in table 1-1 may be found in NAVSUP Publication 2002.

Table 1-1. Reference Publications

Title	Publication No.
Organizational and Intermediate Maintenance Manual for Laser Guided Bomb with Guidance Kits	NAVAIR 01-15MGC-1
Navy Ammunition Logistics Codes	NAVAIR 11-1-116/OD 16135
Catalog of Navy Ammunition Stock	NAVAIR 11-1-116A
Airborne Bomb and Rocket Fuzes	NAVAIR 11-1F-2
Destructors MK 36 and MK 40, Descriptive Information	OP 3529
Pyrotechnics, Screening and Marking Devices	OP 2213/NAVAIR 11-15-7
Toxic Hazards Associated with Pyrotechnic Items	OP 2793/NAVAIR 11-15-8
Airborne Weapons Packaging, Handling and Stowage (Shipboard)	NAVAIR 11-120A-1
Airborne Weapons Rapid Rearming Manual	NAVAIR 11-140-1
Radio Frequency Hazards to Ordnance, Personnel, and Fuel	OP 3565/NAVAIR 16-1-529
Test Set, Circuit, Bomb Fuzing	NAVAIR 17-15AE24T-2
Operation, Maintenance, and Overhaul Instructions with IPB, Intermediate, Depot Fuel Gelling Unit MK 1 Mod 0	NAVAIR 19-1-112
Catalog of Handling Equipment for Weapons and Explosives	OP 2173/NAVAIR 19-100-1
Airborne Weapons Handling Equipment (Shipboard)	NAVAIR 19-100-2
Ammunition Afloat	NAVSEA OP 4
Ammunition Ashore	NAVSEA OP 5
Ammunition Unserviceable, Suspended and Limited Use	OD 17190
Identification of Ammunition	OP 2238/NAVAIR 11-1-117
USN Ordnance Safety Precautions	OP 3347
Aircraft Accident Reporting	OPNAVINST 3750.6
Naval Aviation Maintenance Program Maintenance Support Procedures	OPNAVINST 4790.2
Accident Reporting	OPNAVINST 5102.1
US Navy Explosive Safety Policies, Requirements and Procedures	OPNAVINST 8023.2 series

1-37. TECHNICAL DIRECTIVES.

1-38. A list of technical directives affecting aircraft bombs, fuzes, and associated components is provided in table 1-2. Technical directives listed in table 1-2 are incorporated in this publication. The table identifies the directives by number, title, issue date, and category of directive. The category of a technical directive determines the action to be taken on technical changes set forth by the directive. Technical directives affecting this manual are listed by type in numerical order.

1-39. The various types of directives are identified as follows:

1. Air Weapons Change (AWC); Bulletin (AWB)
2. Aviation Armament Change (AAC); Bulletin (AAB)

3. Support Equipment Change (SEC); Bulletin (SEB)

1-40. Information made obsolete by a directive is deleted from or retained in the manual according to the following categories:

1-41. IMMEDIATE CATEGORY — Obsolete information is deleted concurrently with the incorporation of data derived from the directive.

1-42. URGENT CATEGORY — Obsolete information is retained for 2 years following inclusion of data derived from the directive.

1-43. ROUTINE CATEGORY — Obsolete information is retained for 3 years following inclusion of data derived from the directive.

Table 1-2. Technical Directives

Technical Directive	Date	Title	Manual Change/ Revision Date
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NONE

SECTION II

SAFETY PRECAUTIONS

2-1. SCOPE.

2-2. The safety precautions set forth herein are necessarily general and, as such, must be supplemented by special precautions listed for each specific piece of ordnance or equipment involved. Such supplementary precautions are mandatory because they enumerate detailed problem areas and potential hazards.

2-3. The scope of this chapter is restricted to operations with ordnance material and equipment issued to Naval forces, and does not include manufacturing, processing, or laboratory testing. Reference should be made to appropriate publications of the Naval Air Systems Command for information pertaining to these areas.

2-4. GENERAL COMMENTS ON BOMB SAFETY.

2-5. In a wartime situation, Navy aircraft carriers (as well as air bases) have problems in handling the large quantities of ordnance required to support the tactical effort. There are several reasons for the high use rate; these are primarily, the nearness of targets and rapid reloading of aircraft, and the use of high-capacity aircraft utilizing accessory suspension equipment (i.e. MER and TER).

2-6. High-explosive bombs (primarily the MK 80 series) make up the major portion of the ordnance delivered from carriers. Bombs have a tremendous potential for destruction. Accidents aboard carriers have demonstrated that exploding bombs will reduce the effectiveness of a carrier; not only will the ship lose her fighting capability in the loss of guns, aircraft, and other ordnance, but her men as well.

2-7. Accidents will occur when good practices are not followed; therefore, an extra effort shall be made to ensure that:

1. Explosive ordnance is properly stowed (i.e., in the right magazine), adequately secured (tiedowns), and stowed with compatible munitions;

2. Aircraft handling and support equipment is operated so as to avoid collisions with or directing exhaust at ordnance, and that the equipment is operated safely at all times;

3. Security is maintained;

4. Fire alarm and sprinkling systems throughout the ship are in good working order;

5. Bomb staging areas on the hangar deck and flight deck are kept to a minimum and are well managed;

6. All bombs and other ordnance received from an AE or AOE are struck below immediately and not allowed to pile up in the hangar;

7. Ordnance is not handled in a rough and hasty manner;

8. All areas are maintained in good order and debris and flammable material are not allowed to pile up;

9. This publication is followed in the assembling and fuzing of bombs.

2-8. Explosive accidents are prevented through good design, testing, and careful handling of ordnance. The phrase "the life you save may be your own" applies especially to ordnance handlers. It is the responsibility of each individual to ensure that only safe, approved practices and procedures are followed when handling ordnance. Refer to OP 3347 for additional safety precautions.

2-9. GENERAL PROCEDURE REGULATIONS.

2-10. CONFLICT WITH SAFETY PRECAUTIONS.

Any circumstances that conflict with the safety precautions in this or other publications shall be reported to Naval Air Systems Command.

2-11. **INTERPRETATION.** When in doubt as to the exact meaning of a precaution, regulation, or instruction, request an immediate interpretation from the Naval Air Systems Command.

2-12. **PERSONNEL INSTRUCTION.** All personnel required to handle ammunition shall be thoroughly and frequently instructed in the safety precautions, methods of handling, storage, and use of all kinds of ammunition and explosive ordnance with which the vessel, aircraft unit, or station may be supplied. No one shall be permitted to inspect, prepare, or adjust live ammunition

and explosives until he thoroughly understands his duties and the precautions and hazards involved.

2-13. Personnel assigned to operate any ordnance equipment shall receive, prior to commencing operation, a thorough indoctrination in general safety precautions applicable to ordnance and in specific precautions applicable to the equipment they are to operate. Periodic drills shall be conducted to provide realistic training for operation of ordnance equipment, and to note and eliminate any unsafe practices. New or inexperienced personnel must not be permitted to work independently on explosive ordnance of any kind, but shall be under the direct and continued supervision of skilled and experienced personnel until adequate experience is acquired.

2-14. PERSONNEL QUALIFICATIONS. Only physically fit persons shall be permitted to work with or use explosives or ammunition, and they shall be certified in accordance with OPNAVINST 8023.2 series.

2-15. REPORTS TO SUPERVISORS. Anyone knowing of (a) defective ammunition or other explosive ordnance or defective containers or handling devices, (b) rough or improper handling, or (c) willful or accidental violation of the safety precautions, however slight, shall immediately report the act to his immediate supervisor.

2-16. DIVERSION OF AMMUNITION. No ammunition or components thereof (explosive or nonexplosive) shall be given away or diverted to private use unless specifically authorized by the Naval Air Systems Command.

2-17. DUTIES OF SUPERVISOR. Since familiarity with any work, no matter how dangerous, is apt to lead to carelessness, all persons who supervise work in connection with the inspection, care, preparation, use, or handling of ammunition or explosives shall:

1. Exercise the utmost care that all regulations and instructions are observed.

2. Carefully instruct those under them and frequently warn them of the necessity of using the utmost care in the performance of their work. No relaxation of vigilance shall be permitted.

3. Explain to their subordinates the characteristics of the ammunition, explosive, and other dangerous materials; the equipment; the precautions to be observed; and the hazards of fire, explosion, and other catastrophes that the safety precautions are intended to prevent.

2-18. HAZARDOUS PROCEDURES. All hands must be alert to detect any hazardous procedures or practices and symptoms of a deteriorating mental attitude, and take timely, corrective action.

2-19. AISLES AND EXITS. Aisles and safety exits shall not be blocked at any time.

2-20. OPEN FLAMES. Matches, lighters, or spark or flame-producing items are not permitted in explosive spaces.

2-21. SMOKING. Smoking is not permitted in magazines, nor in the immediate vicinity of handling or loading operations involving explosives or ammunition.

2-22. PERSONNEL LIMITATIONS. Persons working with explosives shall be limited to the smallest number required to perform the operation properly. At least two persons shall be required for reasons of safety and security. Unauthorized persons shall not be permitted in magazines or in the immediate vicinity of handling or loading operations involving explosives or ammunition. When authorized visitors are present, they shall be properly escorted.

2-23. COMPETITION. The performance of personnel engaged in ordnance handling operations shall never be evaluated on a competitive basis. To do so increases the likelihood of accidents.

2-24. ACCIDENT REPORTING. Prompt reporting of accidents involving ordnance equipment, ammunition, and explosives where material damage or personnel injuries are sustained shall be made in accordance with current instructions. If doubt exists as to the necessity of a report, it shall always be resolved in favor of the report. Report in accordance with OPNAVINST 5102.1 or 4790.2.

2-25. Because it is not always possible to readily determine whether mines, bombs, and fuzes have been inadvertently armed in storage or handling, any suspected item shall at all times be handled and treated as if armed. Explosive Ordnance Disposal (EOD) personnel shall be notified immediately.

2-26. DRILL AMMUNITION. No ammunition other than inert ammunition shall be used for display. Live ammunition for drill purposes may be used only as specified by OP 3347.

2-27. When using live ammunition for loading drills, the following specific safety precautions shall apply:

1. Shipboard loading or arming drills shall not be conducted with live ammunition and/or bombs in any port or harbor, unless the ship is at an explosive anchorage.
2. The Commanding Officer shall notify the Carrier Group Commander or other appropriate operational commander before initiating a drill in which live ordnance is used.
3. Nose plugs or inert fuzes are to be used unless live fuzes are specifically authorized by the Commanding Officer.
4. If authorization to use live fuzes has been obtained, arming wires are to be installed and the safety pins are not to be removed from any fuzes.
5. Use of applicable conventional weapons loading check lists is mandatory.
6. The rack shall be safed as soon as the weapon is loaded and will remain safed until just before flight or the weapon is unloaded.
7. Rack ejector cartridges are to be installed only for flight operations.

2-28. HOUSEKEEPING. Supervisors shall be required to maintain high standards of good housekeeping in ordnance spaces. Everything that is not in its place or is not in the safest condition increases the possibility of an accident. Scrap and waste shall be promptly placed in containers designated for such material. Personal effects and clothing not in actual use shall be kept in lockers or other designated places.

2-29. SAFETY DEVICES.

2-30. BASIC REQUIREMENT. Safety devices shall always be used as designated and shall be kept in good order and operative at all times.

2-31. INSPECTION FREQUENCY. Safety devices shall be inspected frequently and kept in good working order at all times.

2-32. INOPERATIVE SAFETY DEVICES. Safety devices must not be bypassed or made inoperative. If they are inoperative for any reason, the evolution shall cease. Signs or other appropriate means shall be used to

warn personnel of the fact that a safety device has been temporarily overridden or is inoperative.

2-33. ALTERATIONS. Safety devices shall not be altered except by direction of the Naval Air Systems Command or other competent authority. In any event, they shall not be secured in an inoperative condition.

2-34. PAINTING OF AMMUNITION. Where ammunition requires extensive painting to prevent further deterioration, it should be turned in to the nearest ammunition issuing activity for renovation. Minor touchup by using activities afloat and ashore is authorized if integrity of color coding and stenciled legend is maintained. Refer to OP 2238.

2-35. ALTERATIONS/MODIFICATIONS TO AMMUNITION. Alterations or modifications to ammunition of all types—service, training, or dummy drill—by using activities ashore and afloat are expressly forbidden unless specific approval is obtained from Naval Air Systems Command. Alterations/modifications include not only changes in configuration and components, but also changes in appearance, such as color coding. The latter is considered vital to preclude mistaken identity.

2-36. POSTING SAFETY RESTRICTIONS. Ordnance safety precautions shall be posted in appropriate locations and conspicuous warning signs placed at danger points. At shore activities, both personnel limits and explosive limits established in accordance with directives shall be posted in bays or rooms containing explosives or propellants. These limits shall not be exceeded.

2-37. AMMUNITION RESTRICTIONS. Certain lots of fuzes may have restrictions placed on them which may restrict the entire lot from issue or impose operational limitations on their use. Notices of Ammunition Reclassification (NAR) are issued initially by message and inserted in OD 17190 at each change or revision. Activities concerned with the assembly or use of ammunition items are responsible for maintaining a current file of NARs, recognizing the restrictions, and ensuring that they are used only in accordance with the provisions of the restrictions.

2-38. GENERAL EQUIPMENT AND MATERIAL REGULATIONS.

2-39. MALFUNCTION OF EQUIPMENT. Operation of equipment shall cease immediately when there is a malfunction or casualty. A check shall be made to determine the cause and corrective action to be taken. The equipment shall remain out of service until repairs can be made or until it is determined to be safe for further operation.

2-40. REPAIRS TO EQUIPMENT CONTAINING EXPLOSIVES. Before repairs are permitted on any equipment that would normally contain explosives, a tag certifying that all explosives have been removed from the equipment and the surrounding area shall be signed by the officer or man in charge of the equipment and placed on the equipment. Maintenance personnel shall be instructed not to begin repairs unless certification is present and indicated repairs are authorized.

2-41. Energized Equipment. Personnel shall not repair or adjust energized mechanical or electrical equipment capable of inflicting injury or material damage except in cases where the repair or adjustment cannot be accomplished with the equipment deactivated. When repairs or adjustments must be performed on energized equipment, an additional man who is familiar with procedures for emergency deactivation of the equipment, and is capable of rendering aid shall be stationed nearby for the duration of the repair.

2-42. Test After Repair. Whenever any item of equipment associated with an ordnance installation or weapon system has been repaired, the equipment shall be tested to ensure satisfactory and safe operation prior to operational use. Such tests shall include checks for proper operation, and adjustment of safety devices.

2-43. DESIGNATED USE OF EXPLOSIVES. No ammunition, pyrotechnics, or explosive assembly shall be used in any equipment for which it is not designated, nor shall any explosive or pyrotechnic device be manufactured, purchased or assembled for use in demonstrations, tests, or for any other purpose unless authorized by the Naval Air Systems Command.

2-44. CHANGES IN MATERIAL. Changes, modifications in, or additions to ordnance material shall not be made without explicit authority from Naval Air Systems Command.

2-45. Modifications to ordnance handling equipment shall not be made without approval of Naval Air Systems Command. Requests or recommendations for modifications will be addressed to the appropriate command and will include:

1. Complete details of the proposed modification, including photographs, drawings, and engineering data as may be necessary.
2. Reasons for the modification and a description of the improvement expected to result from the proposed modification.

2-46. PROTECTION OF ORDNANCE MATERIAL. All ammunition, weapons, and complementary items shall be protected from extremes of temperature, humidity, vibrations, electromagnetic or magnetic fields, and radiological exposure. Permissible maximum storage temperatures for all ordnance shall be observed.

2-47. SAFETY WATCH WHEN USING POWER EQUIPMENT. Whenever motion of a power-driven unit can inflict injury to personnel or damage to material not visible to the operator, the officer authorizing the operation shall ensure that a safety watch is maintained in areas where such injury or damage is possible. Communications shall be established and maintained between unit control station and the safety watch. The control station shall obtain the report "all clear" from each safety watch before starting the power unit. Each safety watch shall keep his assigned area clear. If unable to do so, he shall immediately report his area fouled, and the control station shall promptly stop the unit until the area is again reported clear.

2-48. TEST OF HANDLING EQUIPMENT. Slings, crane cables, hoisting cables, boom cables, and similar ordnance handling equipment (except mobile units) that have metal, leather, or fiber ropes, or chains shall be load tested and used in accordance with current NAVAIR and NAVSEA directives.

1. Cranes will be tested according to existing NAVFAC instructions, which are adequate for ordnance handling.
2. Where the design or procurement specifications were controlled by the Navy, the crane may be operated at rated capacities while handling ordnance.
3. Slings, bands, beams, strongbacks, spreader bars, etc., shall be tested at 200 to 215 percent of rated static load.
4. Slings, bands, beams, strongbacks, spreader bars, etc., ashore use shall be tested semi-annually. Equipment used aboard ship shall be tested during regular ship's overhaul, but not less frequently than once every eighteen months.
5. Slings, bands, beams, strongbacks, spreader bars, etc., shall not be used at greater than rated loads.
6. Ship's handling equipment other than slings, bands, beams, etc., shall be tested in accordance with NAVSHIPS instructions, but not less frequently than once every four years.

7. Cable is not to be removed from prime equipment, such as cranes, to be tested separately.

8. Cranes and hoists shall not be loaded above specified crane or hoist test loads to achieve required sling, band, or beam test load.

9. Chain hoists and monorails with capacities of 2 tons or less shall be tested 150 percent of rated operating loads; larger units shall be tested at 125 percent.

2-49. GENERAL SAFETY PRECAUTIONS — FUZES, SAFETY AND ARMING DEVICES, FIRING MECHANISMS, AND BOOSTERS.

2-50. FUZING OF BOMBS. Fuzes and bombs are not to be assembled in advance of requirements without authorization covering the specific fuzes and bombs. Refer to tactical manual for operational restrictions and fuze applications. Unless otherwise directed, the following precautions shall prevail:

1. Fuzing or defuzing of bombs shall be done in handling rooms or spaces specifically designed for such purposes.

2. Conventional high-explosive bombs shall normally be fuzed after the weapon is loaded on the aircraft. When carrier based, the aircraft shall be spotted on the flight deck. Exceptions to this rule are authorized when loading bombs requiring special fuzing (RADHAZ susceptible units, integral fuzing, all-up rounds, and those instances where clearances are such as to preclude fuzing after bombs are racked).

3. Detonators, boosters, primers, or other firing devices shall not be assembled in or removed from bombs (unless specifically prescribed for the weapon).

2-51. FUZING INDIVIDUAL ROUND. Fuzing shall be accomplished on individual rounds isolated from other types of ammunition insofar as practicable.

2-52. TOOLS. Only authorized tools for fuzing or defuzing shall be used.

2-53. TESTING. Fuzes shall not be tested either mechanically or electrically, except as specifically authorized.

2-54. ACCUMULATION. Fuzes shall not be allowed to accumulate at the fuzing stations. Fuzes should never be stockpiled, but shall be withdrawn from stowage on an "as needed" basis.

2-55. FUZE CONTAINER RESEALING. When fuze containers are opened for inspection or other purposes, the container shall be marked with opening date and resealed with tape.

2-56. FUZE REPAIR. Under no circumstances shall attempts be made to disassemble or repair a fuze, nor shall an attempt be made to render inert a live, loaded item of ordnance.

2-57. DAMAGED FUZES. If a fuze or a box containing fuzes receives a severe shock or shows evidence of damage, the fuze(s) shall not be issued for use. A determination of the fuze condition shall be made by EOD personnel, and any damaged fuze shall be disposed of in accordance with current directives.

2-58. INSTALLING FUZE. The fuze shall be in the SAFE condition before installation in the bomb.

2-59. BOOSTERS. Booster charges must be handled as high explosives. The booster shall be inspected thoroughly for visible damage before installation. Boosters with evidence of damage shall be turned over to EOD personnel for disposition.

2-60. DISARMING. No attempts shall be made to disarm a fuze, except as authorized by current directives.

2-61. ARMED DISPOSAL. Any device that indicates arming or partial arming should be reported to the command and disposed of in accordance with current directives. Disposal should be done by EOD personnel. No attempt shall be made to disarm a fuze.

2-62. STOWAGE OF FUZES AND BOOSTERS. Stowage procedures are as follows:

1. Fuzes and boosters, which are not permitted to be stored assembled in bomb-type ammunition, shall be stored in specially designated fuze magazines. Fuze magazines shall not be located adjacent to magazines containing bomb-type ammunition loaded with high explosives.

2. Boosters and adapter boosters may be stored with the bomb ammunition to which they belong.

3. All boosters and detonating firing mechanisms shall be stored in cool, dry locations on the weather deck away from radio and electric leads, steam pipes, fires, and other heat sources.

4. Mechanical time fuzes and point-detonating fuzes for interchangeable assembly must be stowed in specially designed lockers.

5. Electrical proximity (VT) elements shall never be stowed in the same compartment with, or within five feet of, radio apparatus or antenna leads.

6. Except when required for ready service stowage or when assembled in ready service ammunition, fuzes and boosters shall be stowed in their individual containers (usually hermetically sealed cans) or in their shipping containers.

7. Fuzes shall not be removed from their shipping containers until required for assembly; they shall be installed promptly after they are removed from the container.

2-63. HANDLING OF FUZES AND BOOSTERS. Handling procedures are as follows:

2-64. General. Fuzes and boosters are high-explosive ordnance and must be handled with great care. Personnel unfamiliar with a fuze must never handle it.

2-65. Tampering. Most Navy air-vane fuzes do not contain unique environmental arming features and are susceptible to tampering. Do not rotate the arming vanes or tamper with the fuzes in any way because the fuze may arm.

2-66. GENERAL SAFETY PRECAUTIONS FOR BOMBS.

2-67. INTRODUCTION. The ratio of explosive filler to total weight of a bomb may vary from as little as 10 percent to as much as 80 percent. Despite this large variation, bomb-type ammunition is generally visualized as being thin-walled. It is vulnerable to damage by relatively slight contact with either sharp or blunt objects or hard surfaces. It requires much more careful handling than, for instance, an armor piercing projectile. This type of ammunition is regarded as one of the most hazardous types because of its tendency to detonate en masse if a fire occurs or if a heated fragment is projected into the magazine in which it is stored.

2-68. AUTHORIZED STOWAGE. Bomb-type ammunition shall be stored in magazines in which no other ammunition is stored, or in specially designated tubes, racks, tracks, or lockers specifically provided for the purpose. As far as practicable, several magazines will be provided for the storage of aircraft bombs and other kinds of bomb-type ammunition. Refer to stowage tables in OP 4/OP 5, Volume 2.

2-69. When sufficient magazines are provided, and when stowage arrangements and fittings permit, the following considerations and stowage tables in OP 4/OP 5, Volume 2 shall govern stowage:

1. In ships where space and weight considerations are critical, or where loadings authorized for special missions exceed service allowances, bombs having different kinds of main high-explosive charges may be stowed in the same magazine.

2. Different kinds of ammunition should be stored separately; for example, warheads should be stored separately from depth charges, bombs, etc.

3. Other conditions being equal, the amount (weight) of high-explosive should be equally divided among the available bomb-type ammunition magazines to minimize the hazard.

4. Experience indicates that the quality of main high-explosive charges currently used in bomb-type ammunition is such that there is practically no exudate. Therefore, stowage facilities that permit examination and cleaning of individual units of bomb-type ammunition are not required, subject to the following provisions:

a. Arrangements shall be such as to permit visual inspection of bomb-type ammunition to the greatest extent practicable.

b. Installation of dunnage in aisles and passageways in magazines for augmenting stowage of bombs is permissible, provided adequate space is maintained for handling the bombs.

2-70. PROHIBITED STOWAGE. No detonator, fuze, or firing mechanism shall be stored in or near (or shall be taken into) a magazine containing bomb-type ammunition.

2-71. No ammunition classed as pyrotechnic ammunition or as chemical ammunition shall be stored in magazines containing bomb-type ammunition.

2-72. PROTECTION FROM DAMAGE. Onboard ship the sensitivity of bomb-type ammunition requires that such ammunition be secured within the magazines. Bomb-type magazines are designed with fittings to properly secure all ammunition stowed within; also the shipping crates are designed to provide adequate security when stowed within the magazine.

2-73. Bomb-type ammunition, therefore, shall be stored or stacked and braced with the greatest of care to preclude movement or damage to the containers and their contents.

2-74. Bomb-type magazines shall be located behind armor plating or other suitable protection against high-velocity fragments.

2-75. **RENDER SAFE.** Under no circumstances should any person attempt to render safe live loaded bombs and their components. If a bomb requires disposal, contact EOD personnel and clear the area immediately.

2-76. **MODIFICATIONS.** No bomb or components shall be modified without specific authorization from Naval Air Systems Command.

2-77. **DISPOSAL.** Disposal of bombs shall be accomplished in accordance with current directives.

2-78. **TAIL FIN ASSEMBLIES.** Do not use a damaged tail fin assembly with any bomb. If an assembly cannot be properly secured to the bomb, do not use it.

2-79. **ARMING WIRES.** Arming wires shall not be reused. Do not use an arming wire that is twisted, kinked, or burred.

2-80. **EXUDATE.** Do not use any bombs or components when exudate is visible. Notify EOD personnel for disposition.

2-81. **ADDITIONAL SAFETY PRECAUTIONS FOR SPECIFIC TYPES OF BOMBS.**

2-82. **FIRE BOMBS.** The following specific precautions apply to fire bombs:

1. Fire bombs shall not be fuze until loaded onto the aircraft unless specifically authorized.

2. Filling areas for fire bombs are to be kept in order at all times. Any spilled fire bomb mix must be wiped off the deck immediately to eliminate fire hazards.

3. Once a fire bomb is filled, it must be used or destroyed.

4. All fire bombs must be expended or an attempt made to jettison them before landing.

5. Be certain that both the static-line grounding clip or filling nozzle of the mixer and the mixer ground lines are securely attached to grounding surfaces before filling fire bombs.

6. Thickener M2, while fairly inert in its normal state, emits toxic vapors when heating or burning. Rescue breathing apparatus must be worn when vapors are present.

2-83. **WHITE PHOSPHOROUS MUNITIONS.** White phosphorous (WP) munitions ignite spontaneously upon contact with air. The following specific precautions apply to WP munitions.

1. Always handle WP munitions with great care. If a WP munition is damaged, it should be submerged in water and disposed of immediately.

2. When fighting WP fires, always wear gloves, and keep both gloves and shoes wet.

3. WP in contact with the skin will cause severe and lingering burns. Places of contact should be washed immediately and kept wet until the phosphorous has been removed. Washing the affected area with a soda solution followed by a 1 percent cupric sulphate solution is very effective. Greasy ointments should never be used because they merely spread the contamination.

2-84. **BOMBS LOADED WITH MINOL II.** Some bombs MK 82 are loaded with Minol II explosive filler. Minol II filler is susceptible to moisture and generally becomes hazardous when subjected to humidity and/or high temperatures. Because of this, bombs loaded with Minol II are restricted as follows:

1. Bombs loaded with Minol II are not to be loaded aboard carriers. If Minol II bombs are received, they must be disposed of immediately in accordance with current directives.

2. Bombs loaded with Minol II may be found at land bases. These bombs may be used tactically; however, they must be handled differently, as described below:

- a. They must not be stored with other munitions.

- b. They must be protected from humid weather and high temperatures.

- c. They must be inspected at least every 30 days for exudate. If exudate is found, dispose of the bomb immediately.

d. Bombs loaded with Minol II have a service life of one year. They must be disposed of in accordance with current directives if not used within that period.

e. No attempt shall be made to remove adapter-boosters from Minol II-filled bombs. Minol II-filled bombs requiring removal of the adapter-boosters shall be returned to the designated overhaul point.

2-85. PRACTICE BOMBS. Be extremely careful when handling practice bombs loaded with signals. Jar-

ring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the signal toward other persons. Loaders must not place their bodies in line with the nose or tail end of the bombs. All rust and corrosion must be removed from signal cartridge chamber to allow the signal cartridge to seat. Do not apply pressure to force the firing-pin assembly or the signal cartridge into the bomb; the signal may fire. Do not remove the safety pin and cotter pin from the body of the firing device before the practice bomb is secured to the aircraft.

SECTION III

GENERAL PURPOSE BOMBS WITH FIN ASSEMBLIES

3-1. BOMBS MK 80 SERIES.

3-2. INTRODUCTION. Low drag general purpose (LDGP) bombs (figure 3-1) are used in the majority of bombing operations. Their cases are relatively light, and approximately 45 percent of their complete weight is explosive. General purpose bombs may use both nose and tail mechanical or electric fuzes, and use conical or retarded fins.

3-3. SPECIFICATIONS AND DESCRIPTION. Specifications for the individual bombs LDGP MK 80 series are listed in table 3-1. The bombs are described in the following paragraphs.

3-4. The bomb body has a shipping plug in the nose and tail fuze cavity and a shipping cap over the aft end. Two suspension lugs are either installed in the bomb or packaged in the fin crate for shipment. Some bombs have a hoisting lug packaged in the tail fuze cavity.

3-5. The high-explosive filler of the bomb (Minol II, Tritonal 80-20, or H-6) is identified by yellow stenciled nomenclature on the bomb body and yellow band(s) around the nose. The lot number is stenciled in white ink on the forward end of the bomb. The color of the bomb is olive drab. When Minol II-loaded bombs MK 82 are found in the ordnance system, note restrictions in section II.

3-6. Thermally protected bombs MK 80 series can be identified by the words THERMALLY PROTECTED in the identification legend, the bumpy exterior surface, and two yellow bands around the nose. A groove may have been cut into the exterior coating to allow assembly of the fin MK 15 on the bomb MK 82 Mod 2.

3-7. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). No special ground support equipment or

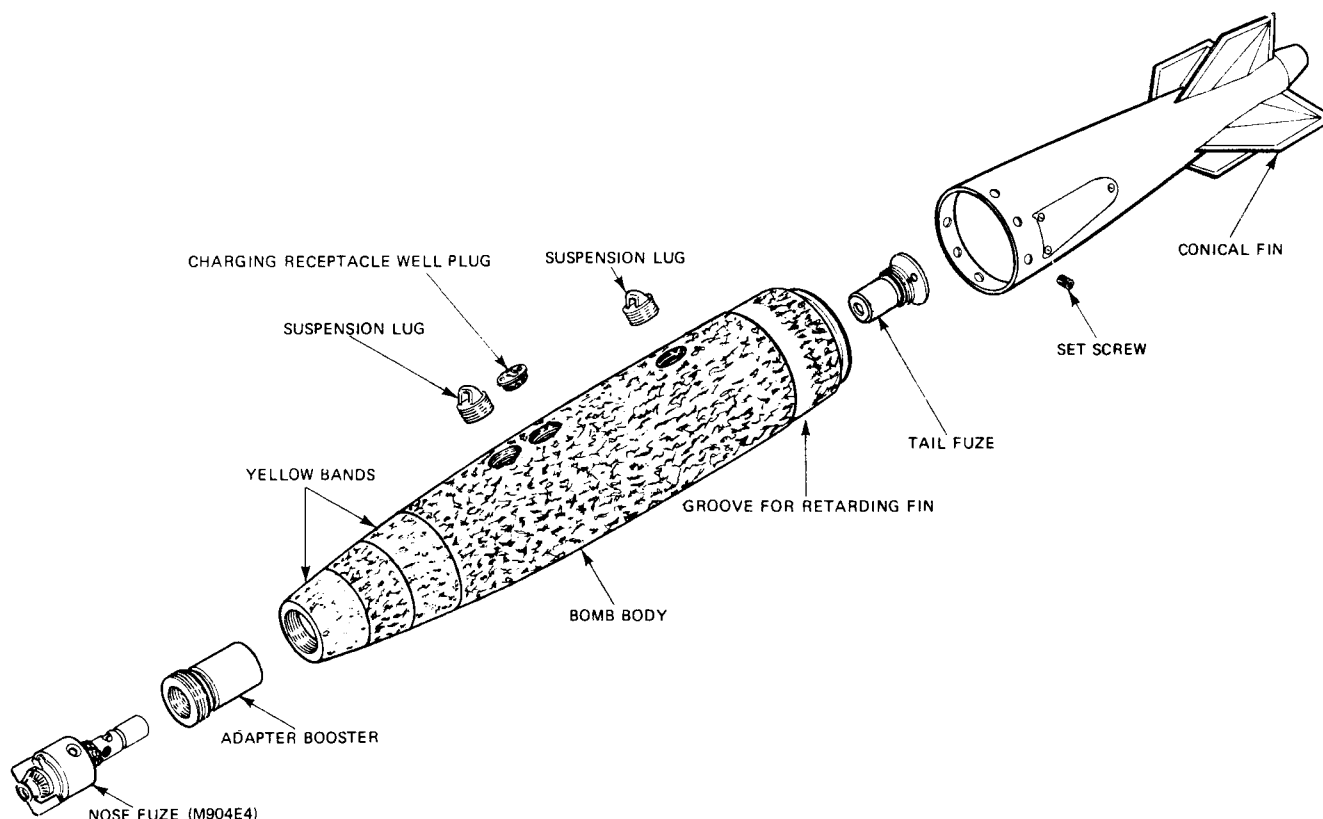


Figure 3-1. Typical Low Drag General Purpose Thermally Protected Bomb — Exploded View

Table 3-1. Specifications for Bombs MK 80 (LDGP)

MK 81	MK 82		MK 83		MK 84		
Effective Mods.....1	0&1	2	4	5	4	6	7
Arrangement Drawing....1366064	1380545	1380545	2841464	2841464	923AS105	923AS521	923AS521
Data List.....1350946	1380901	4902393	982537	4902089	923AS107	923AS519	923AS527
Length of Assembled Bomb (in.).....76.075	90.29	90.29	118.75	118.75	154.61	154.61	154.61
Fin Span (in.).....12.62	15.1	15.1	19.62	19.62	25.31	25.31	25.31
Weight of Explosive Charge (lb.).....100.0	192.0	180.0	445.0	445.0	945.0	945.0	945.0
Weight of Assembled Bomb							
Conical Fin (lb.).....260.0	531.0	516.0	985.0	985.0	1970.0	1970.0	1970.0
Retarding Fin (in.).....305.0	565.0	550.0	—	—	—	—	—
Adapter-Booster							
Nose M148/T45	M148/T45	M148/E1 Thermally Protected	M148/T45	M148/T45 Thermally Protected	M148/T45	M148/T45 Thermally Protected	M148/T45
Tail M150/T46	M150/T46	M150/T46	M150/T46	M150/T46	M150/T46	M150/T46	M150/T46
Suspension Lug Spacing (in.).....14.0	14.0	14.0	14.0	14.0	30.0	30.0	30.0
Suspension Lugs.....MS 3314	MS 3314	MS 3314	MS 3314	MS 3314	MK 3 Mod 0	MK 3 Mod 0	MK 3 Mod 0
Front Lug to Nose of Bomb (in.).....24.775	32.29	32.29	43.5	43.5	47.61	47.61	47.61
Conical Fin.....MK 81 MAU94	MK 82 MAU93	MK 82 MAU93	MK 83	MK 83	MK 84	MK 84	MK 84
Rear Lug to End of Fin (in.).....37.3	44	44	61.3	61.3	77.0	77.0	77.0
Retarding Fin.....MK 14 Mods 0, 1&2	Mk 15 Mods 1, 2,3,4	MK 15 Mods 1, 2,3,4	—	—	—	—	—
Rear Lug to End of Fin (in.).....32.270	43.356	43.356	61.28	61.28	72.90	72.90	72.90

special tools are required. Refer to OP 2173/NAVAIR 19-100-1 for appropriate handling equipment.

3-8. CONFIGURATION. Bombs MK 80 series use nose mechanical or proximity, or tail electric or mechanical fuzing. A mechanical fuze requires installation of an adapter-booster to provide fuze seats of smaller diameters. In electric fuzing, two charging tubes for the electric fuze cable harness connect the nose and tail fuze cavities with the charging receptacle between the lugs on the outer surface of the bomb body (figure 3-2). When electric fuzes are used, remove plug from charging receptacle well (figure 3-1).

3-9. When a nose fuze is to be installed, the setscrew holding the nose plug must be loosened, enabling the nose plug to be removed and an adapter-booster and fuze inserted. If only the tail fuze is used, a support cup must be inserted in the nose fuze cavity and a steel nose plug used to prevent collapse of the fuze cavity on heavy impact. An inert nose fuze and inert adapter-booster may be substituted if the steel nose plug and support cup are not available. Steel nose plugs and support cups are available through normal supply channels. If a tail fuze is not used, the base fuze cavity remains plugged.

3-10. SAFETY. Refer to section II for general safety precautions for all bombs MK 80 series. The following paragraphs list specific information for the thermally protected bombs MK 80 series, which are intended primarily for carrier use.

3-11. The thermally protected bomb Mk 82 Mod 1 reduces the hazards of a flight deck fire by an improved interior coating. The cook-off characteristics of this bomb are contained in appendix B.

3-12. The thermally protected bomb MK 80 series has been developed to increase the cook-off time and decrease the reaction of bombs MK 80 series when engulfed in a fuel fire. The cook-off characteristics are contained in appendix B. To attain the listed cook-off times, the bomb must be fuzed only with tail fuzes MK 344 or MK 376 or nose fuze M904E4 with thermally protected adapter booster M148E1 and mechanical tail fuze MK 346.

3-13. Fuzing to be used with the bombs MK 80 series to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-booster M148E, electric fuzes MK 344 and MK 376, and mechanical tail fuze MK 346.

3-14. PREPARATION FOR USE. LDGP bomb preparation for use is described in the following paragraphs.

3-15. Unpacking. Depalletize bomb body and place it on appropriate bomb skid or assembly stand. (See figure 3-3 for exploded view of bomb MK 80 series shipping configuration.)

1. Remove banding straps and top section of metal pallet.
2. Remove shipping cap on rear of bomb body.
3. Remove plastic shipping plugs from nose well and tail fuze cavity.

CAUTION

Use of unauthorized handling equipment can result in damage to the electrical cable connectors in the nose and tail wells of the bombs.

4. Install hoisting bars as necessary for manual handling of bombs.
5. Place bomb on appropriate bomb skid or assembly stand.

3-16. Inspection. Inspect bomb for damage, stripped threads, cracks, or broken welds. Check that the bottoms of the suspension lug eyes are flush with the weapon surface (figure 3-4). Make sure bomb V-groove is clean and undamaged. Check that fuze wells are clean and dry. If VT nose elements and/or electric tail fuzes are to be used, check that electrical connectors are not corroded. Press gently on the connectors to ensure that they are firmly seated. Inspect thermally protected bombs for loose or chipped coating. Bombs with more than seven square inches of thermal coating missing are not considered thermally protected and will be restricted from issue to aircraft carriers. Damaged or otherwise unserviceable bombs shall be disposed of in accordance with current directives.

3-17. EMERGENCY PROCEDURES. Dispose of damaged or otherwise defective or unserviceable bombs in accordance with current directives.

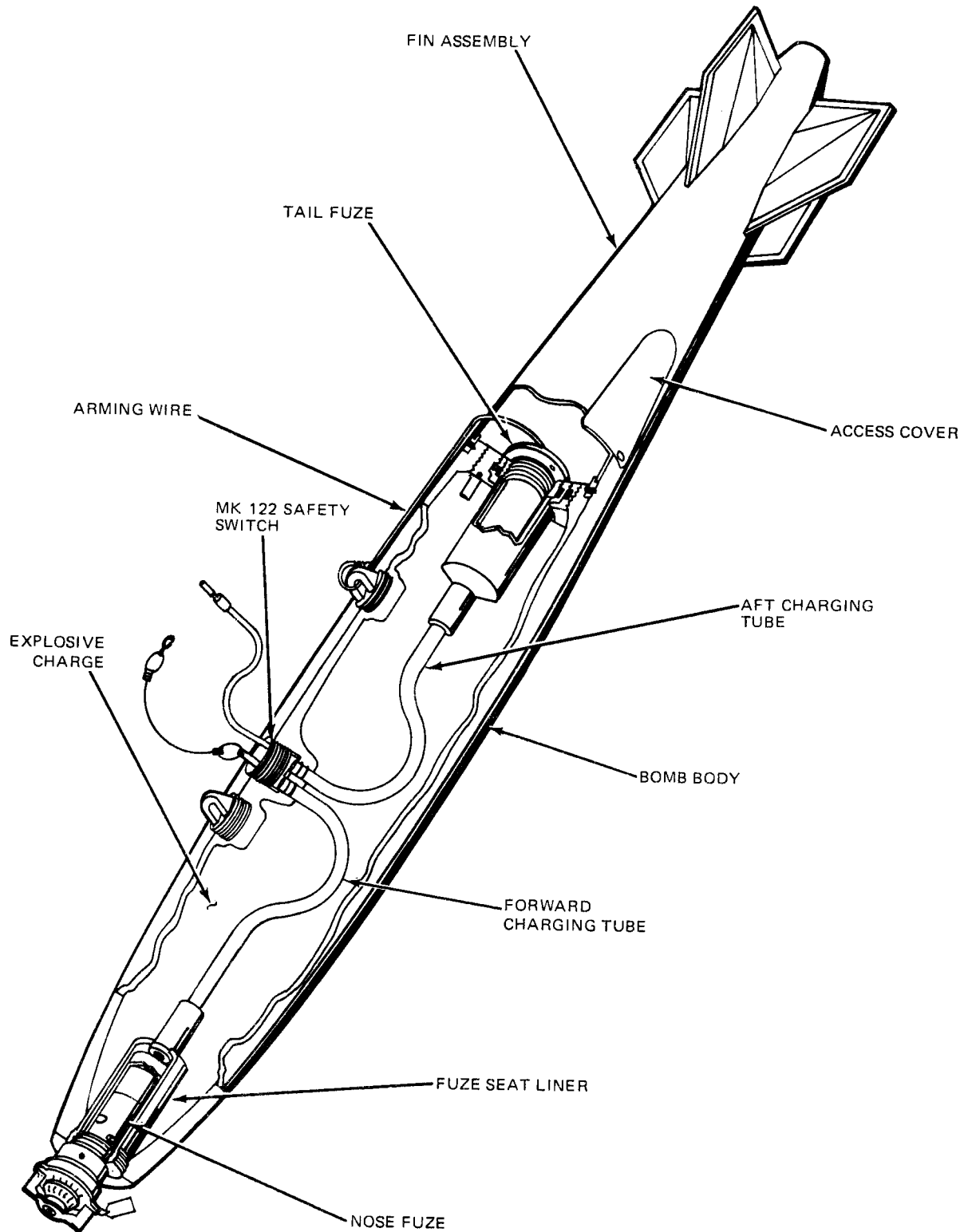


Figure 3-2. Typical Low Drag General Purpose Bomb MK 80 Series — Sectional View

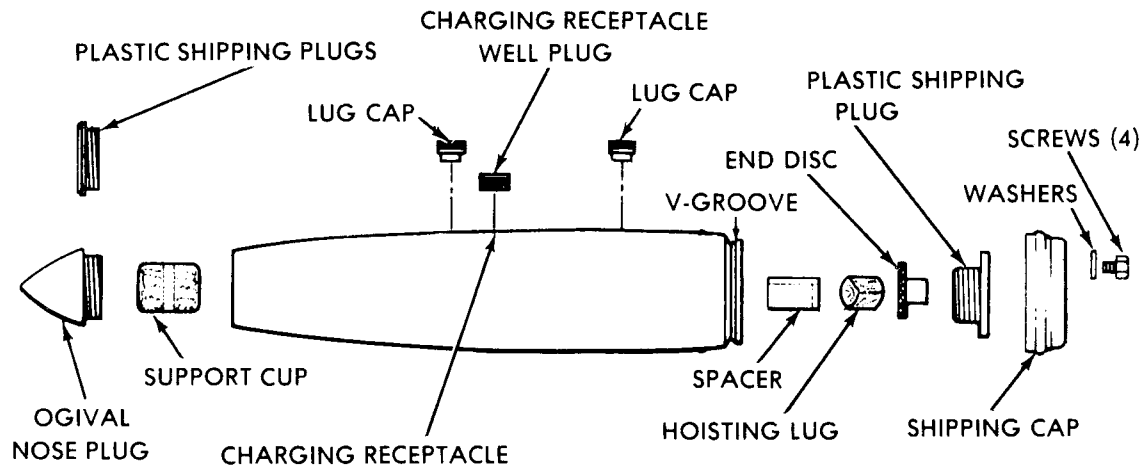


Figure 3-3. LDGP Bomb MK 80 Series — Exploded View (Shipping Configuration)

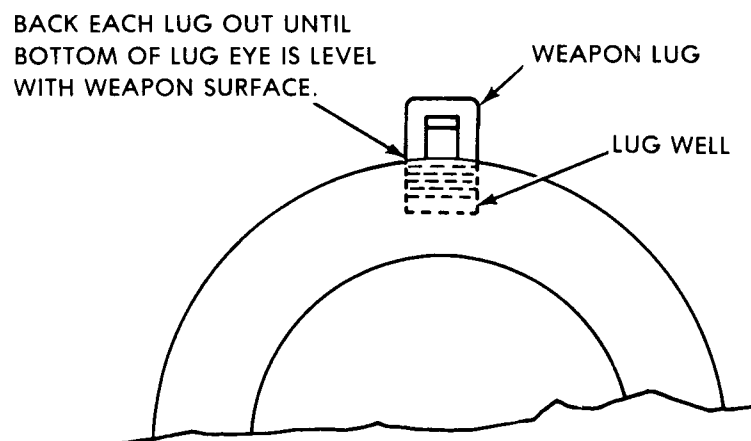


Figure 3-4. Suspension Lug Installation

3-18. CONICAL FINs.

3-19. ASSEMBLY OF CONICAL FIN AND MECHANICAL FUZES TO BOMB BODY. Assemble conical fin and fuzes to bomb body as follows:

WARNING

Fuzing to be used with the thermally protected bomb MK 82 Mod 2 to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-booster M148E1; electric fuzes MK 344 and MK 376; and mechanical tail fuze MK 346. Any other fuzing will greatly increase the probability of early detonation of a bomb engulfed in a fuel fire and may increase the severity of the explosion when detonation occurs.

1. Remove fin assembly and suspension lugs (when present) from fin shipping crate.

NOTE

If mechanical tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

2. Install adapter booster for mechanical nose and/or tail fuze, if required, in accordance with section VIII.

3. Install mechanical tail fuze, if applicable, in accordance with section VII.

4. Place fin assembly over end of bomb body. Align fin for rack compatibility.

5. Butt fin against aft end of bomb and secure with setscrews.

6. If nose fuzing is not to be used, install support cup and ogival nose plug. Secure nose plug with setscrew provided in nose of bomb body.

7. When mechanical tail fuzing is to be used, appropriate arming assembly (MK 3, 4, or 5) must be installed. Refer to section VIII for arming assembly installation procedure.

8. When weapon is to be preloaded on accessory suspension equipment (MER), install the arming wire as follows:
 - a. Route arming wire through rear lug, arming vane strap and plate holes.
 - b. Install two Fahnestock clips. Do not cut wire.
 - c. Ensure that safety pin is installed with the split end pointing aft.

3-20. ASSEMBLY OF CONICAL FIN AND ELECTRIC TAIL FUZE TO BOMB BODY. Assemble conical tail fin, electric tail fuze and bomb body as follows:

WARNING

Fuzing to be used with the thermally protected bombs MK 80 series to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter booster M148E1, electric fuzes MK 344 and MK 376, and mechanical tail fuze MK 346. Any other fuzing will greatly increase probability of early detonation of a bomb engulfed in a fuel fire, and may increase the severity of the explosion when detonation occurs.

NOTE

When weapon is to be preloaded on accessory suspension equipment, either the SE M20/M20A1 or the TDD MK 43, if required, should be installed during weapon assembly.

1. Remove fin assembly and suspension lugs (when present) from fin shipping crate.

NOTE

- If electric tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.
 - Some conical fin assemblies may need to be modified to provide an arming wire exit. This can be done by drilling or punching a 1/4-inch (approximate) hole opposite the top arming wire hole as shown in figure 3-5.
2. Install adapter booster for mechanical nose fuze, if required, in accordance with section VIII.

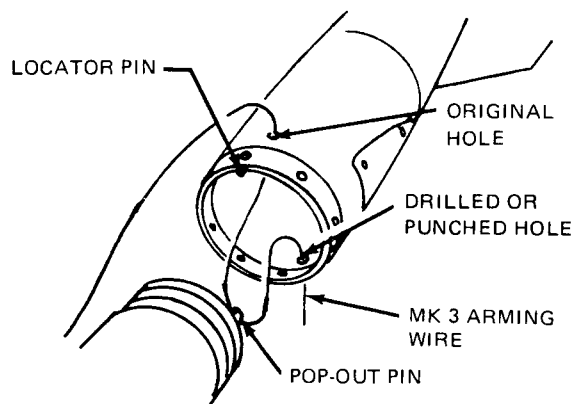


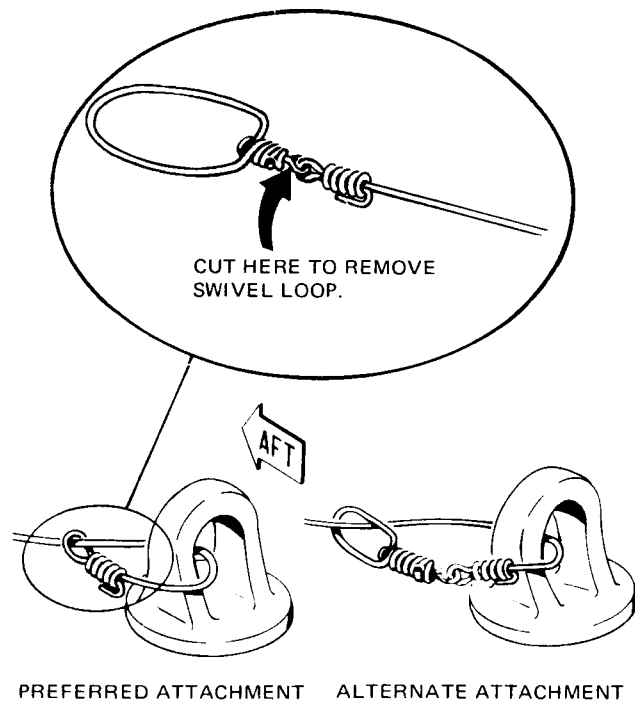
Figure 3-5. Conical Fin Arming Wire Holes

3. Install electric tail fuze in accordance with section VII.
4. Perform electric fuze circuit continuity test in accordance with section IV.

NOTE

The preferred method requires that the swivel loop be removed from the arming wire. The wire is passed through the lug, back through the small loop, and drawn taut. The loop must be positioned on the outside of the lug. (This is necessary to prevent interference with movement of the bomb rack hooks or damage to the loop during loading.)

5. Attach arming wire MK 3 to aft suspension using either attachment shown in figure 3-6.
6. Turn the pop-out pin to align the arming wire holes in the pin with the arming wire holes in the fin.
7. Check setscrews in fin and back off any screws that will prevent mating of bomb and fin.
8. Position fin close enough to bomb body to provide working room for installing arming wire in tail fuze.
9. Insert free end of arming wire through upper arming wire hole in fin. Thread arming wire through



PREFERRED ATTACHMENT

PRIOR TO ATTACHING ARMING WIRE, REMOVE SWIVEL LOOP AS SHOWN IN INSET.

ALTERNATE ATTACHMENT

IF SWIVEL LOOP IS NOT REMOVED, ENSURE THAT ARMING WIRE IS INSTALLED SO THAT SWIVEL LOOP IS POSITIONED OUTSIDE OF BOMB LUG.

Figure 3-6. Attachment of Arming Wire MK 3 to Aft Lug

pop-out pin in fuze and out through arming wire hole at bottom of pin.

WARNING

- The safety pin must not be removed from the pop-out pin before the arming wire has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both holes align; then reinstall the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.
 - Failure to align both sets of holes when installing the pin or arming wire will dangerously reduce arming time.
10. Remove safety pin from pop-out pin.

11. Align fin for rack compatibility.
12. Butt fin against aft end of bomb body and secure with setscrews.
13. Look through access cover to ensure that there are no kinks in arming wire or that wire is not looped around pop-out pin. Alternately, pull on top and bottom portions of arming wire to ensure that wire is not jammed or does not move too freely.
14. If arming wire is kinked, reinstall safety pin. Remove damaged arming wire, discard it, and repeat steps 1 through 7.
15. If wire is not threaded through pop-out pin, remove fin and repeat steps 1 through 7.
16. Secure access cover of conical fin. Leave entire wire uncut and wrap it around fin, putting excess wire in hole at top of fin. Do not install any Fahnestock clips as pop-out pin holds arming wire securely in place.

3-21. Arming Safety Switch MK 122. Refer to section VIII for safety switch installation procedures.

3-22. Post Assembly Inspection. The following items should be checked:

1. All setscrews that lock fin to bomb must be in solidly.
2. Ensure that fin is in the X configuration.
3. If a nose fuze is not to be installed, verify that a steel nose plug and a support cup are installed in the nose well. Ensure setscrew is tight.
4. If an electric tail fuze is installed, verify that the arming wire MK 3 passes through the pop-out pin and extends out of the bottom of the fin. Verify that the fuze safety pin is removed. If a fuze MK 344 or MK 376 is used, ensure that the fuze restraining clip is fastened to the fuze flange as shown in figure 7-15.

NOTE

Failure to install the fuze retaining clip on fuzes MK 344 and MK 376 can result in an excessive dud rate. The clip ensures that the fuze remains seated in the fuze well during high-speed carriage.

5. Verify that the fin access cover is installed and the fasteners are locked.

3-23. DISASSEMBLY OF CONICAL FIN FROM BOMB BODY WITH MECHANICAL TAIL FUZE.

1. When weapon is returned, verify that arming vane has been removed and that vane plate and vane strap are secured together. If vane plate and vane strap are not secured, notify EOD personnel immediately.

CAUTION

Removal of the fin will disengage the drive shaft of the arming assembly from either the input shaft of the fuze or from the output spindle of the fuze drive. Support the driveshaft as soon as clearance between the fin and bomb body permit.

2. Loosen setscrews that secure fin to bomb body and completely disengage fin from bomb body.
3. Check that safe/arm window of MK 346 fuze shows completely green (refer to section VII). If red and black striped band shows in safe/arm window, notify EOD immediately.
4. Withdraw drive shaft from fuze drive or input shaft of fuze, whichever is still engaged, and remove plastic funnel guide from outer end of fuze.
5. Loosen three 1/4-inch setscrews around adapter collar and withdraw adapter and fuze drive from fin.
6. Refer to section VII for fuze removal procedures.
7. Remove locking pin from adapter-booster threads and remove adapter-booster from nose and/or tail well (refer to section VIII).

NOTE

Arming assemblies Mods 1 and 2 are shipped with the arming vane and fuze drive barrel as separate items. Therefore, in order to store them in their original packages, the arming vane and fuze drive barrel must be disassembled.

8. Return all serviceable components to storage.

3-24. DISASSEMBLY OF CONICAL FIN FROM BOMB BODY WITH ELECTRIC TAIL FUZE.

1. Remove arming safety switch MK 122 in accordance with section VIII.

2. Remove access cover of conical fin.

WARNING

If the arming wire of the electric tail fuze has been withdrawn, the fuze could be armed; do not attempt to remove the fuze from the tail well of the weapon. Notify EOD personnel immediately.

3. Verify the presence of arming wire through pop-out pin.

4. Insert safety pin in pop-out pin.

WARNING

- The arming wire must not be removed from the pop-out pin before the safety pin has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both holes align; then install the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.

- Failure to align both sets of holes when installing the safety pin can dangerously reduce arming time.

5. Withdraw arming wire from pop-out pin and discard.

6. Loosen setscrews that secure fin to bomb body and remove fin from bomb body.

7. Remove electric tail fuze in accordance with section VII.

8. Return all serviceable components to storage.

3-25. EMERGENCY PROCEDURES. Damaged or otherwise defective or unserviceable fins or fuzes shall be disposed of in accordance with current directives.

3-26. FIN MK 14 MOD 2.

3-27. INTRODUCTION. Bomb fin assembly MK 14 Mod 2 (figure 3-7) is a retarding fin for use with 250-pound LDGP bomb MK 81 Mod 1. The fin provides aircraft with the capability of delivering the bomb at high-speed and low-altitude without the normally associated danger from ricocheting bombs or fragments.

3-28. SPECIFICATIONS AND DESCRIPTION. Specifications for the fin MK 14 assembly are shown in table 3-2. The fin is described in the following paragraphs.

Table 3-2. Specifications for Bomb Fin Assembly MK 14 Mod 2 (Maximum Assembled)

	Mod 2
Drawing List	1569458
Diameter, Closed (in.)	13
Length (in.)	27 3/4
Weight (lb.)	45

3-29. The bomb fin assembly MK 14 Mod 2 presents a low-drag configuration for the bomb when in the unretarded position and a high-drag configuration when the fin release wire is withdrawn, and fin opening is initiated by the spring load under each fin. The airstream drives the fin open at a high rate of speed. The opening shock is absorbed by the action of the plunger and sleeve.

3-30. The fin support is the main structure of the fin. The forward end mates with the bomb body and the aft end supports the blade-attach clevis. The collar acts as a common attach point for the links to each of the blades. The plunger is driven into and progressively expands the sleeve during operation.

3-31. CONFIGURATION. Fin MK 14 Mod 2 attaches to the bomb body by means of 12 setscrews. The fin support incorporates a fuze-mounting ring at the aft end to permit the use of a mechanical tail fuze.

3-32. SAFETY. Refer to section II for general safety precautions.

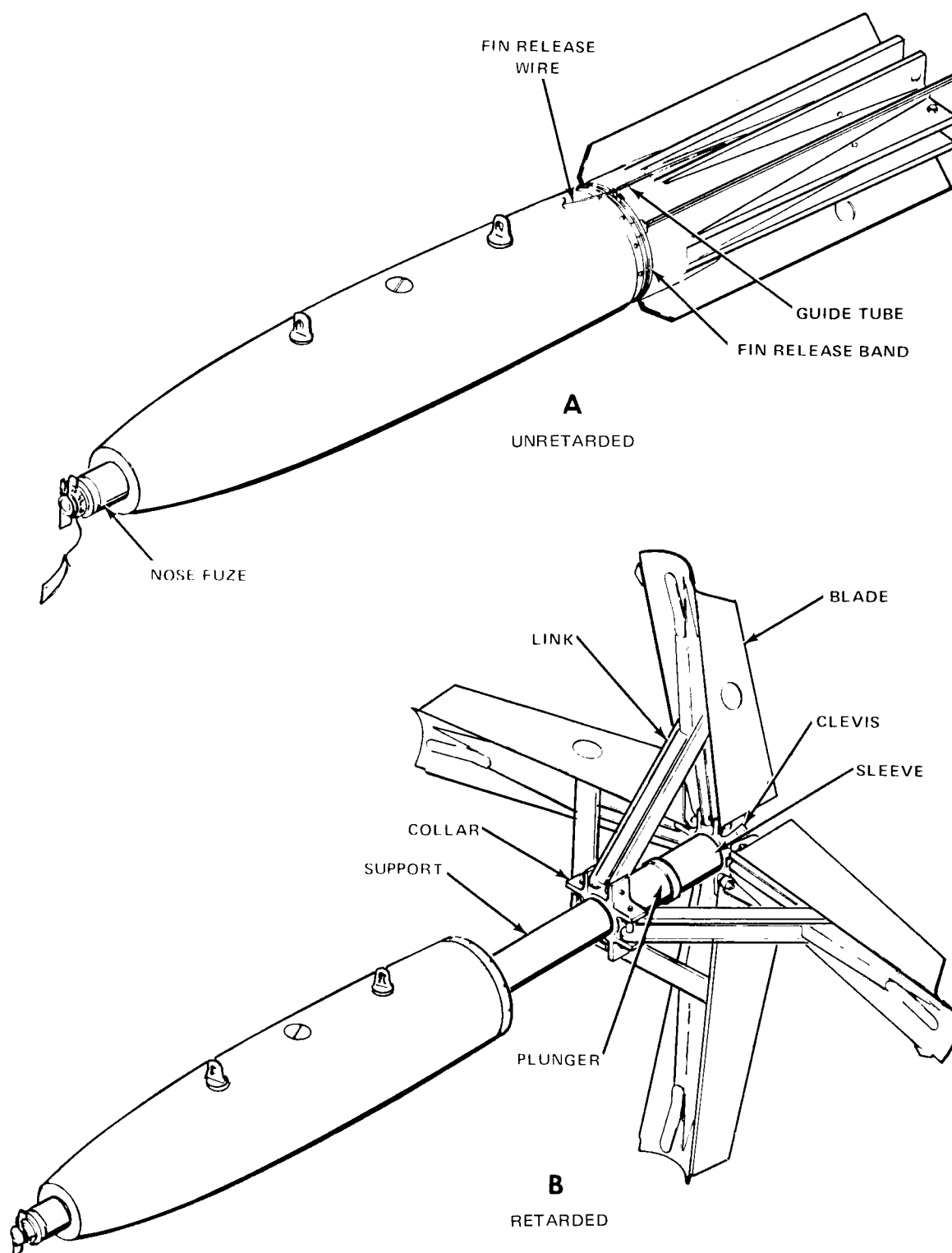


Figure 3-7. Fin MK 14 with Bomb Body MK 81

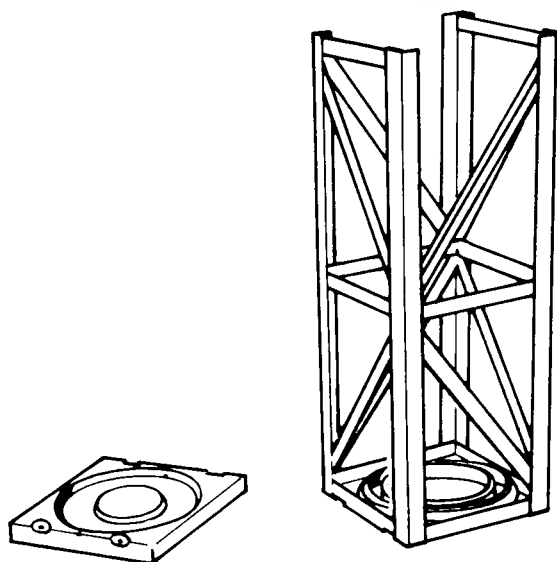


Figure 3-8. Fin Assembly Crate MK 12

3-33. PREPARATION FOR USE. Fin MK 14 is received packed in a metal fin MK 12 assembly crate (figure 3-8). The crate is about 10-1/2 by 10-1/2 by 29-1/4 inches.

3-34. Unpacking. Remove fin, suspension lugs, and fin release wire guide tube from crate.

3-35. Inspection.

1. Inspect fin for damage and corrosion. All fins shall be tested as follows:

WARNING

The fin release band and fin are spring-loaded. Release the band with caution to prevent injury or damage.

- a. Ensure fin release band is free of cosmoline.
- b. Remove cotter pin from fin latch and remove fin release band. Ensure the latch opens freely.
- c. If fins extend automatically at least 1/2 inch when release band is removed, and can be extended by hand to contact shock absorber, the fin is operative. Inoperative fins shall not be used.

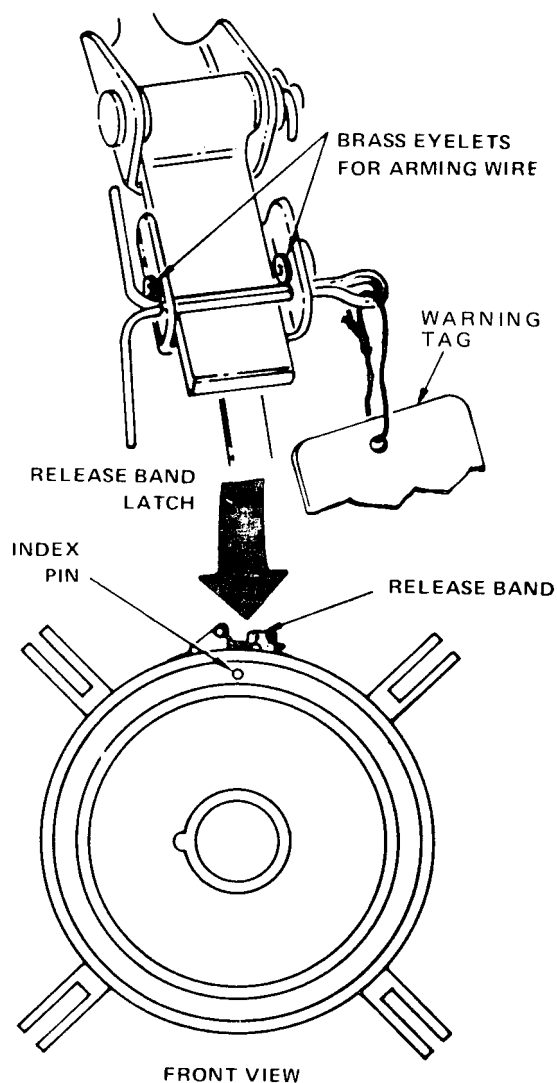


Figure 3-9. Enlarged View of Release Band Latch

2. If fin is operative, replace release band as follows:

- a. Close fins and clamp together with vise-grip pliers.
 - b. Relatch release band and insert cotter pin as shown in figure 3-9.
 - c. Remove vise-grip pliers.
3. Make sure that index pin on support flange is not damaged.

3-36. ASSEMBLY OF FIN MK 14 MOD 2 TO BOMB BODY WITH ELECTRIC TAIL FUZE. Assembly of fin MK 14 Mod 2 to the bomb body is described in the following paragraphs.

3-37. Installation of Fuze.

NOTE

- If electric tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.
- When weapon is to be preloaded on accessory suspension equipment, either the SE M20/M20A1 or the TDD MK 43, if required, should be installed during weapon assembly.

1. Install adapter booster for mechanical nose fuze, if required, in accordance with section VIII.

2. Install electric tail fuze in accordance with section VII.

3. Perform electric fuze circuit continuity test in accordance with section IV.

3-38. Verify that safety pin is installed in pop-out pin.

3-39. Installation of Fin Assembly. Assemble fin MK 14 Mod 2 to bomb body as follows:

1. Check relationship of index pin and release band. Relationship must be as shown in figure 3-10.

2. If fin contains an internal arming wire (figure 3-11), pull wire taut and cut off wire flush with flange. This wire is no longer used.

NOTE

The preferred method requires that the swivel loop be removed from the arming wire. The wire is passed through the lug, back through the small loop, and drawn taut. The loop must be positioned on the outside of the lug. (This is necessary to prevent interference with movement of the bomb rack hooks or damage to the loop during loading.)

3. Attach an arming wire MK 3 to aft suspension lug as shown in figure 3-6. Draw wire taut.

4. Check 12 setscrews in fin and back off any screws that will prevent mating of bomb and fin.

5. Orient fin to bomb body by aligning index pin on fin in 12 o'clock position index hole in bomb body.

6. Insert free end of arming wire MK 3 into small hole in fin support between index pin and release band (figure 3-12).

7. Back off fin just enough to provide working room for installing arming wire in tail fuze.

8. Thread arming wire MK 3 through pop-out pin of tail fuze (figure 3-12). Then pass wire through small hole at bottom of fin support.

WARNING

- The safety pin must not be removed from the pop-out pin before the arming wire has been installed. If the pop-out pin is accidentally allowed to pop-out, push the pin all the way back in so that both holes align; then reinstall the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.

- Failure to align both sets of holes while installing the pin or arming wire will dangerously reduce arming time.

9. Remove safety pin from pop-out pin.

NOTE

While mating fin to bomb, keep arming wire MK 3 taut.

10. Insert index pin on fin assembly into 12 o'clock position index hole in bomb body (figure 3-13 and 3-14.) Keeping arming wire MK 3 taut, press fin up tight against bomb body.

11. While pressing forward on fin, turn several setscrews until screws are snug.

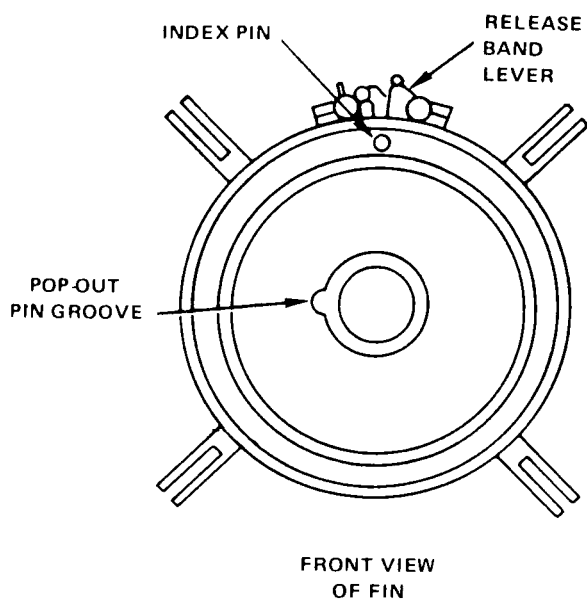


Figure 3-10. Relationship of Index Pin, Pop-Out Pin Groove, and Release Band Lever

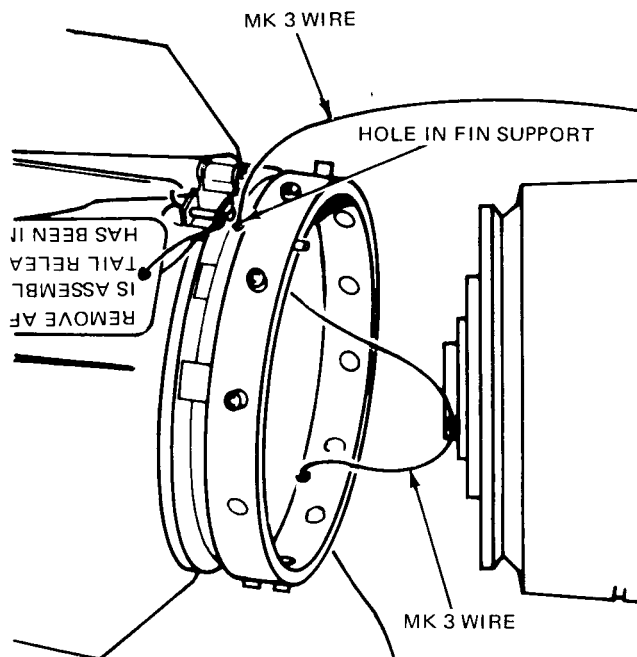


Figure 3-12. Arming Wire Installation

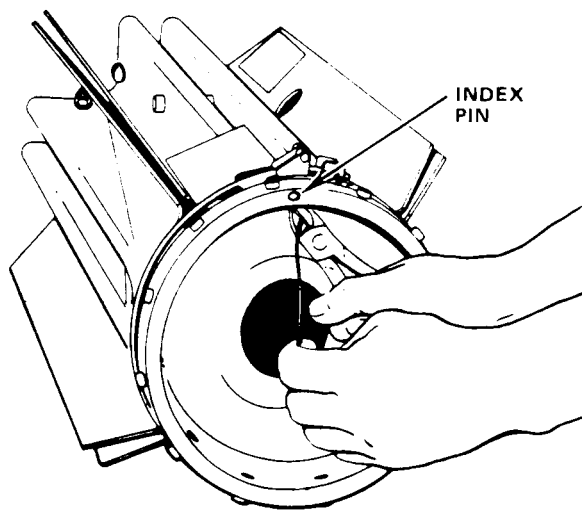


Figure 3-11. Internal Arming Wire Cut Flush with Flange

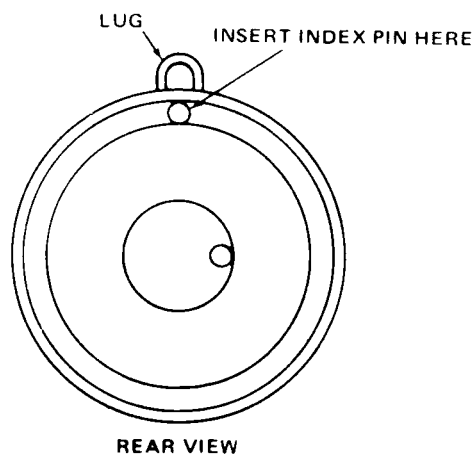


Figure 3-13. 12 O'Clock Position Index Hole in Bomb Body

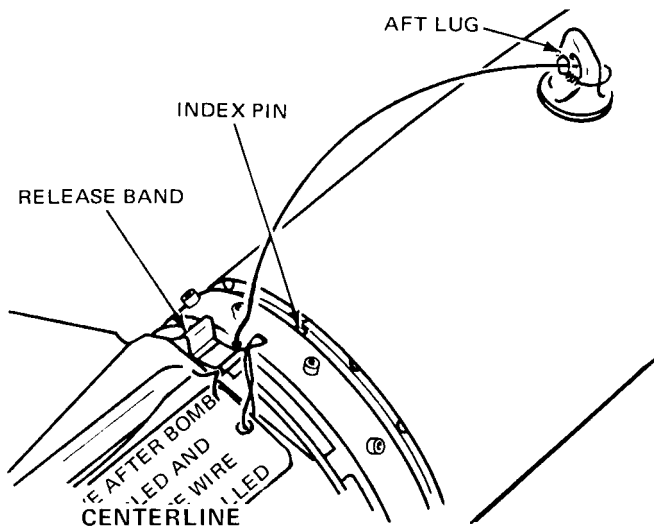


Figure 3-14. Fin Oriented to Bomb Body

12. Tighten remaining setscrews.

13. Remove plastic cap from aft end of fin support. Look through hole in aft end of fin to see arming wire MK 3 passes through pop-out pin and that safety pin is removed. If it is necessary to remove fin, repeat steps 3 through 13.

14. Alternately, pull on top and bottom of arming wire MK 3 to make sure the wire is free. If wire is not free, remove fin, inspect wire for kinks, and replace wire if necessary, repeating steps 3 through 14.

15. Leave the entire wire uncut and wrap it around the fin, putting the excess wire in the hole at the top of the fin. Do not install any Fahnestock clips as the pop-out pin holds the arming wire securely in place.

16. Install arming safety switch MK 122 in accordance with procedures in section VIII.

17. Install appropriate fin release wire (0.064 diameter arming wire) and guide tube as shown in figures 3-15 and 3-16. Tube must pass under link pin and over clevis bolt. Ensure that tube aligns with fin release wire holes in release band lever. Disregard all WARNING decals on fin concerning Fahnestock clips. If fin release wire guide tube is not available, use aluminum tubing of 1/4-inch outside diameter and 0.035 to 0.049 wall-thickness. Cut to length of $22 \pm 1/16$ inches.

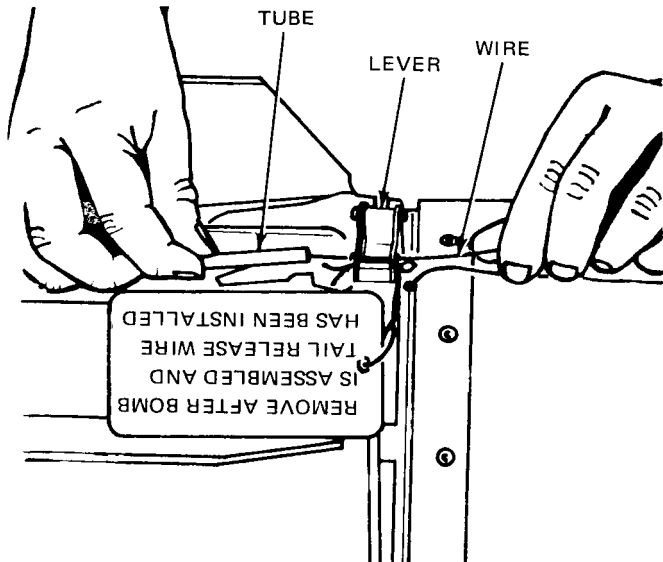


Figure 3-15. Installation of Fin Release Wire

3-40. **Postassembly Checks.** Following is a list of items that should be checked after assembly of the fin to the bomb body:

CAUTION

Failure to install the fuze restraining clip on fuzes MK 344 and MK 376 can result in an excessive dud rate. The clip ensures that the fuze remains seated in the fuze well during high-speed carriage.

1. Arming wire MK 3 must pass through pop-out pin and out bottom of fin. Safety pin must be removed. Ensure that the fuze restraining clip is fastened to the fuze flange as shown in figure 7-14.

2. Fin release wire guide tube must be firmly installed.

3. All 12 setscrews that lock fin to bomb must be in solidly.

4. Wires must not be kinked.

5. Fins must form an X in relation to suspension lugs (figure 3-17).

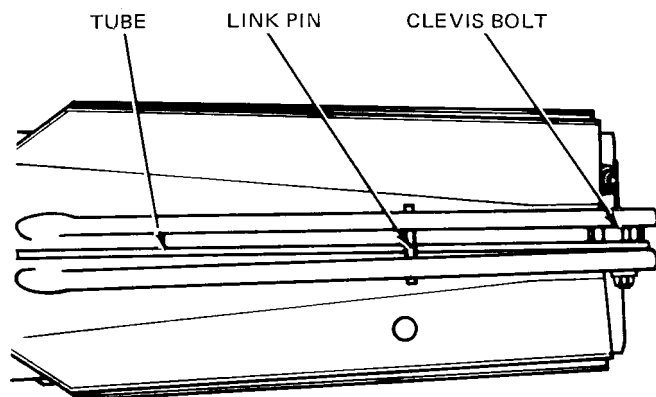


Figure 3-16. Fin Release Wire Guide Tube

3-41. ASSEMBLY OF FIN MK 14 MOD 2 TO BOMB BODY WITH MECHANICAL TAIL FUZE. The following procedures apply to assembly with mechanical long delay tail fuze MK 346 Mod 0, adapter-booster M150/T46 series, and arming assembly MK 4 Mods 1 and 2.

3-42. Installation of Fuze.

NOTE

If mechanical tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

1. Install adapter booster for mechanical nose and/or tail fuze, if required, in accordance with section VIII.

2. Install mechanical tail fuze, if applicable, in accordance with section VII.

3-43. Installation of Fin Assembly. Assemble fin MK 14 Mod 2 to bomb body as follows:

1. Check relationship of index pin and release band. Relationship must be shown in figure 3-10.

2. Verify that plastic funnel guide is in place on outer end of fuze.

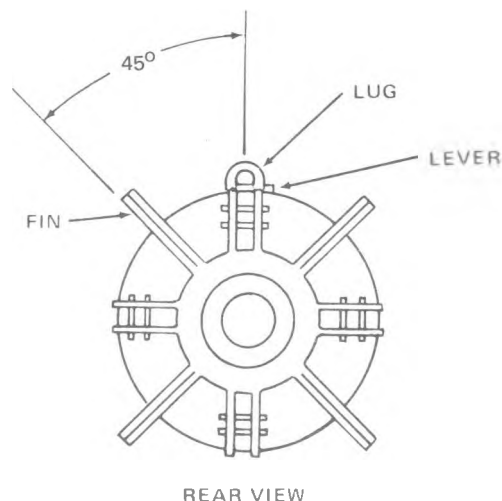


Figure 3-17. Fins Form X Configuration in Relation to Lugs

3. If fin contains an internal arming wire (figure 3-11), pull wire taut and cut off wire flush with flange. This wire is no longer used.

4. Check 12 setscrews in fin and back off any screws that will prevent mating of bomb and fin.

5. Orient fin to bomb body by aligning index pin on fin in 12 o'clock position index hole in bomb body (figures 3-13 and 3-14). Press fin tight against bomb body.

6. While pressing forward on fin, turn several setscrews until screws are snug. Then tighten remaining screws.

7. Install appropriate fin release wire (0.064 diameter arming wire) and guide tube as shown in figures 3-15 and 3-16. Tube must pass under link pin and over clevis bolt. Ensure that tube aligns with fin release wire holes in release band lever. Disregard all WARNING decals on fins concerning Fahnestock clips and wire routing. If fin release wire guide tube is not available, use aluminum tubing of 1/4-inch outside diameter and 0.035 to 0.049 wall thickness. Cut to length of $22 \pm 1/16$ inches.

3-44. Installation of Arming Assembly. Refer to section VIII for installation of arming assembly MK 4 Mods to fuze MK 346.

3-45. Postassembly Checks. Following is a list of items that should be checked after assembly of the fin to the bomb body:

1. Fin release wire guide tube must be firmly installed.
2. All 12 setscrews that lock fin to bomb must be in solidly.
3. Wires must not be kinked.
4. Fins must form an X in relation to the suspension lugs (figure 3-17).
5. Latches of fuze drive adapter must be secured over locknut.
6. Safety pin must be in place through arming assembly bracket and vane plate.

NOTE

Installation of arming vane and final rigging of arming wire is to be accomplished at time of loading on aircraft in accordance with applicable Airborne Weapons/Stores Loading Manual.

3-46. DISASSEMBLY OF FIN MK 14 MOD 2 FROM BOMB BODY WITH ELECTRIC TAIL FUZE. Remove as follows:

WARNING

If the arming wire of the electric tail fuze has been withdrawn, the fuze could be armed; do not attempt to remove the fuze from the tail well of the weapon. Notify EOD personnel immediately.

1. Verify presence of arming wire through pop-out pin.
2. Verify that fin release band is secured. Reinstall red warning tag and cotter key before removing arming wire.
3. Cut arming wire MK 3 at aft lug so that wire will not withdraw from fuze as fin is backed off.
4. If installed, remove arming safety switch Mk 122 in accordance with section VIII.

5. Loosen 12 setscrews that secure fin to bomb body.

6. Slowly back off top portion of fin just enough to provide room to install safety pin in pop-out pin.

7. Insert safety pin in pop-out pin.

WARNING

- The arming wire must not be removed from the pop-out pin before the safety pin has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both holes align; then install the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.
 - Failure to align both sets of holes when installing the safety pin can dangerously reduce arming time.
8. Withdraw arming wire MK 3 from pop-out pin and from fin and discard.
 9. Remove fuze in accordance with section VII.
 10. Return all serviceable components to storage.

3-47. DISASSEMBLY OF FIN MK 14 MOD 2 FROM BOMB BODY WITH MECHANICAL TAIL FUZE.

The following procedures apply to mechanical long delay tail fuze MK 346 Mod 0, adapter-booster M150/T46 series and arming assembly MK 4 Mods 1 and 2.

1. When weapon is returned, verify that arming vane has been removed and that vane plate and vane strap are secured together. If vane plate and vane strap are not secured, notify EOD personnel immediately.

CAUTION

Removal of the fin will disengage the drive shaft of the arming assembly from either the input shaft of the fuze or from the output spindle of the fuze drive. Support the driveshaft as soon as clearance between the fin and bomb body permit.

2. Loosen 12 setscrews that secure fin to bomb body and completely disengage fin from bomb body.

3. Check that safe/arm window shows completely green (refer to section VII). If red and black striped band shows in safe/arm window, notify EOD immediately.

4. Withdraw drive shaft from fuze drive or input shaft of fuze, whichever is still engaged.

5. Loosen three 1/4-inch setscrews around adapter collar and withdraw adapter and fuze drive from fin.

6. Refer to section VII for fuze removal procedures.

7. Remove locking pin from adapter-booster threads and remove adapter-booster from tail well (refer to section VIII).

NOTE

Arming assemblies Mods 1 and 2 are shipped with the arming vane and fuze drive barrel as separate items. Therefore, in order to store them in their original packages, the arming vane and fuze drive barrel must be disassembled.

8. Return all serviceable components to storage.

3-48. EMERGENCY PROCEDURES. Damaged or otherwise defective or unserviceable bombs and components shall be disposed of in accordance with current directives.

3-49. FIN MK 15 MODS.

3-50. INTRODUCTION. The bomb fin assembly Mk 15 Mods is a retarding fin for 500-pound LDGP bomb MK 82 Mods. The fin provides aircraft with the capability of delivering the bomb at high speed and low altitude without the normally associated danger from ricocheting bombs or fragments.

3-51. SPECIFICATIONS AND DESCRIPTION. Specifications for the fin Mk 15 Mods are shown in table 3-3. The fin is described in the following paragraphs.

3-52. Fin assembly Mk 15 Mods presents a low drag configuration for the bomb when in the unretarded position and a high-drag configuration when in the retarded position (figure 3-18).

Table 3-3. Specifications for Fin MK 15 Mods

	Mod 1	Mod 2	Mod 3	Mod 4
Drawing List . . .	1569459	2603317	2605093	2880011
Diameter,				
Closed (in.) . .	15	15	15	15
Length (in.) . . .	31½	31½	31½	31½
Weight (lb.) . . .	60	60	60	60

3-53. When delivered retarded, the release band disengages when the fin release wire is withdrawn and fin opening is initiated by the spring load under each fin. The airstream drives the fin open at a high rate of speed. The opening shock is absorbed by the action of the shock absorber.

3-54. CONFIGURATION. The fin support tube is the main structure of the fin. On the Mods 1 and 2 fins, the fin support tube attaches to the bomb by means of a retaining ring in the V-groove of the bomb. The retaining ring expands in a semi-circular groove in the flange of the fin support tube. On the Mod 3 and Mod 4 fins, attachment is by means of eight setscrews. On the Mods 1 and 2 fins, the shock of fin opening is absorbed by a plunger that expands a sleeve. On the Mod 3 and Mod 4 fins, the shock is absorbed by the crushing of a convoluted steel tube. The fin support tube has a fuze mounting ring for attaching the tail drive of a mechanical tail fuze. A guide tube that reduces fin release wire breakage is supplied with each Mod 1 fin and must be installed externally. On the Mods 2, 3, and 4 fins, this tube is an integral part of the fin. Mods 2, 3, and 4 fins have a release band clamp that retains the band after fin opening to prevent possible aircraft damage. Table 3-4 and figures 3-19, 3-20, and 3-21 describe and illustrate differences in MK 15 fin configurations.

3-55. SAFETY. Refer to section II for general safety precautions.

3-56. PREPARATION FOR USE. Two types of shipping crates are used to ship the fins MK 15: crate MK 26 Mod 0 and crate MK 28 Mod 0 (figures 3-22 and 3-23). Two suspension lugs and a fin release wire guide tube are contained in the shipping crates.

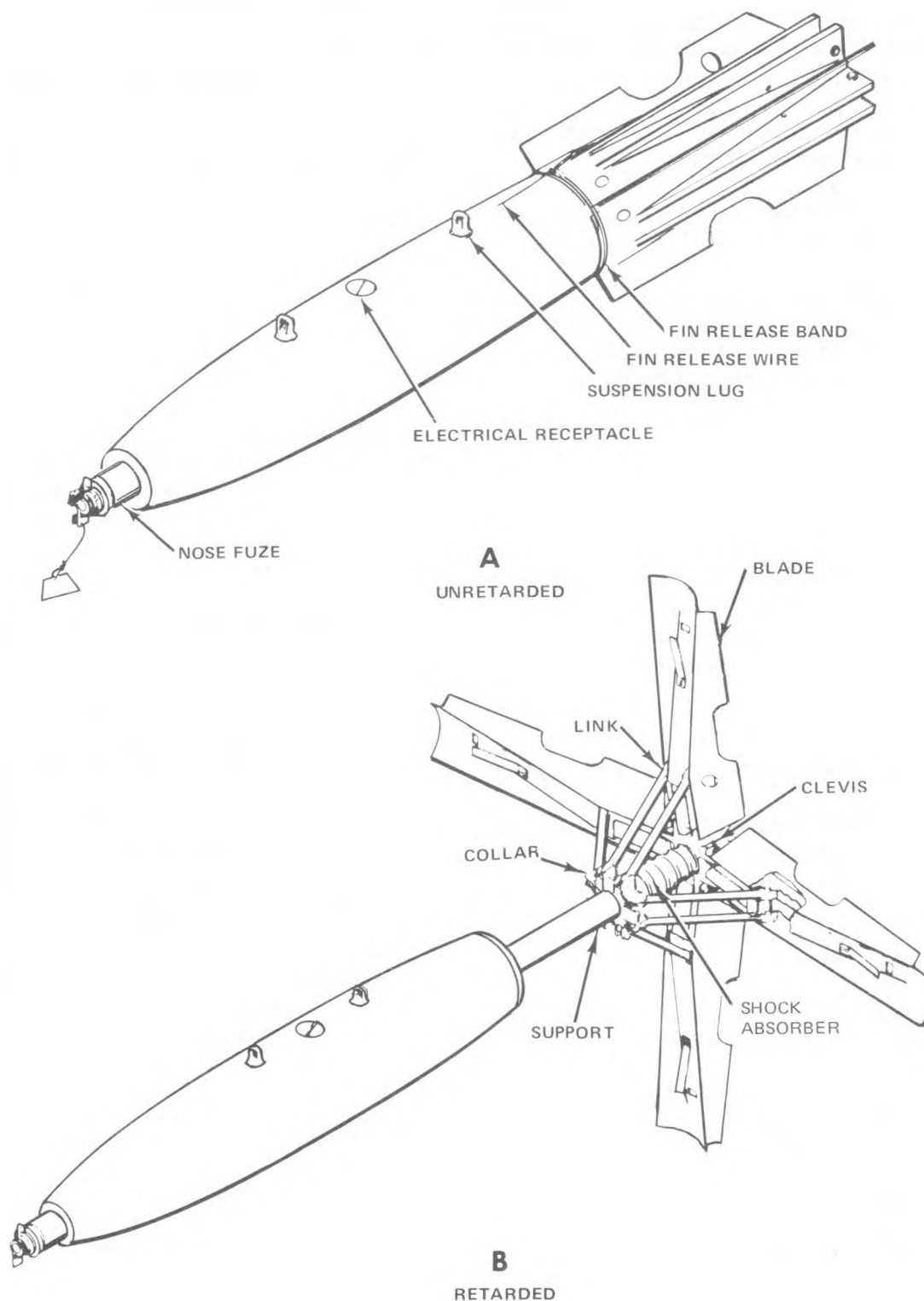
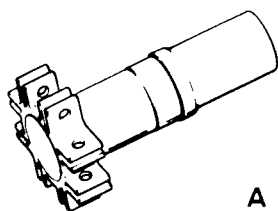


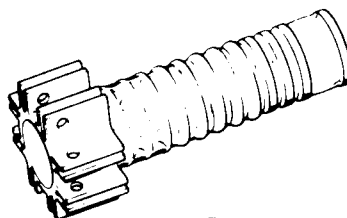
Figure 3-18. Fin MK 15 with Bomb Body MK 82

Table 3-4. Comparison of Retarding Bomb Fin MK 15 Mods Configurations

Configuration Characteristics	Mod			
	1	2	3	4
Plunger/sleeve type shock absorber (fig. 3-19 View A)	Yes	Yes	No	No
Convolute steel shock absorber (fig. 3-19 View B)	No	No	Yes	Yes
Retaining ring garter spring attachment to bomb (fig. 3-20 View A)	Yes	Yes	No	No
Setscrew attachment to bomb (fig. 3-20 View B)	No	No	Yes	Yes
Small cross-section links (fig. 3-21 View A)	Yes	Yes	Yes	No
Large cross-section links (fig. 3-21 View B)	No	No	No	Yes (all blades)
Fins identified by stenciled nomenclature on blades	Yes	Yes	Yes	Yes

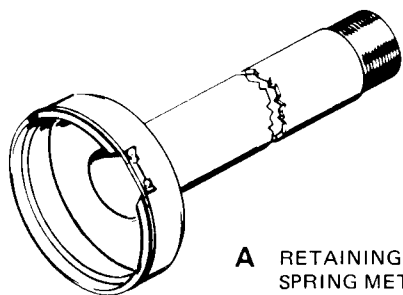


A PLUNGER/SLEEVE
MODS 1 AND 2

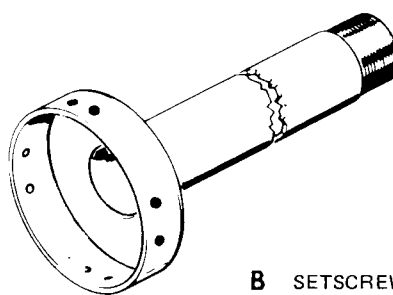


B CONVOLUTE STEEL
MODS 3 AND 4

Figure 3-19. Shock Absorber Types Used on Retarding Bomb Fins MK 15



A RETAINING RING/GARTER
SPRING METHOD
MODS 1 AND 2



B SETSCREW METHOD
MODS 3 AND 4

Figure 3-20. Methods Used to Attach Retarding Bomb Fins MK 15 to Bombs

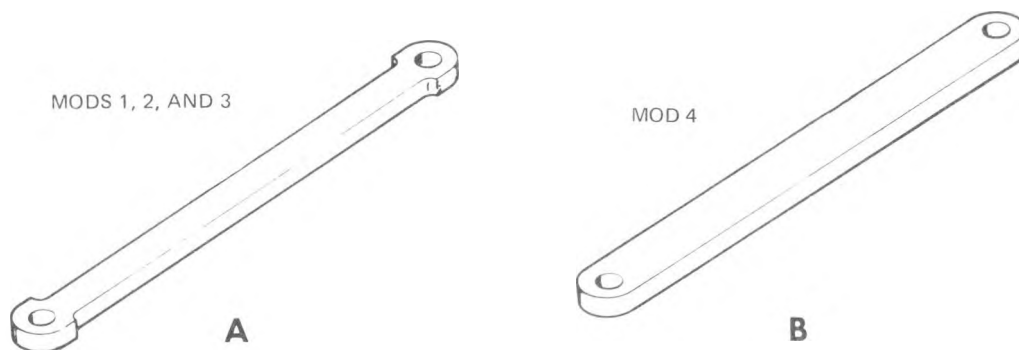


Figure 3-21. Small and Large Cross-Section Links Used on Retarding Bomb Fins MK 15

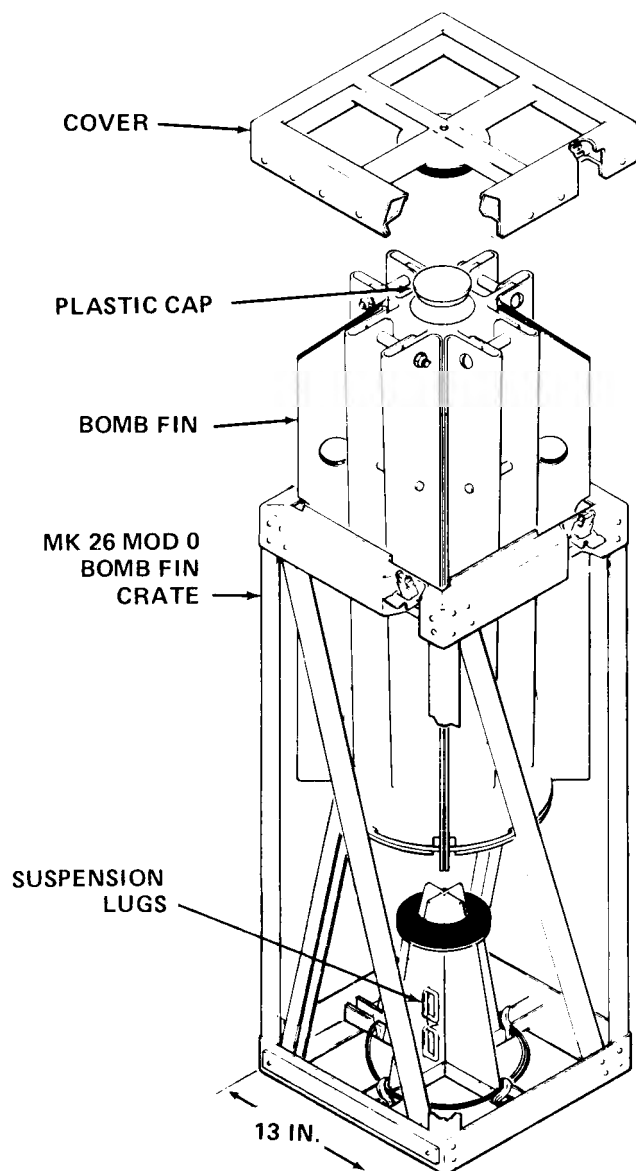


Figure 3-22. Fin Crate MK 26 Mod 0

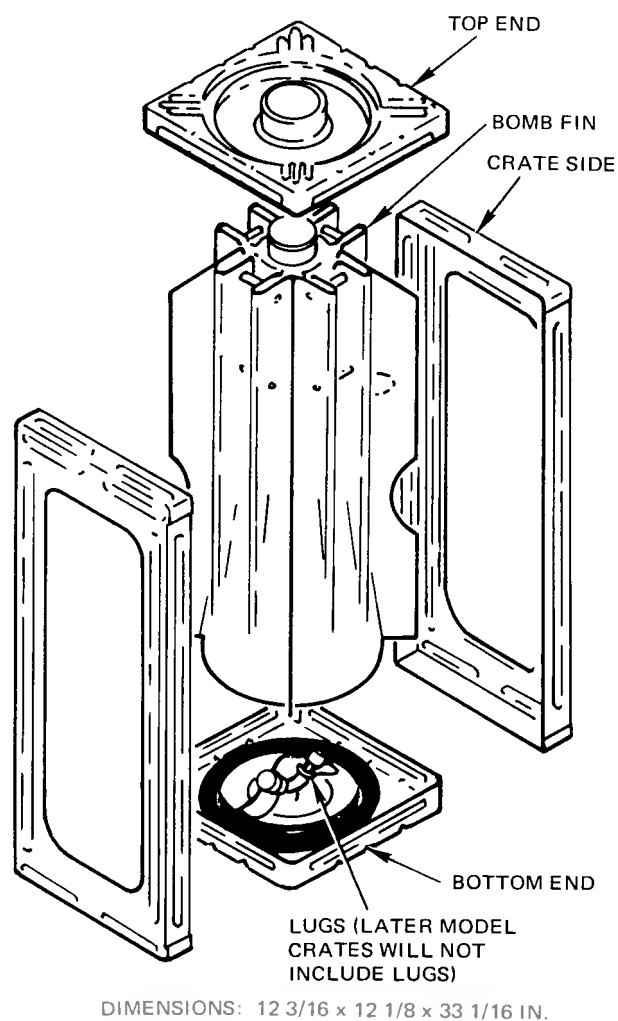


Figure 3-23. Fin Crate MK 28 Mod 0

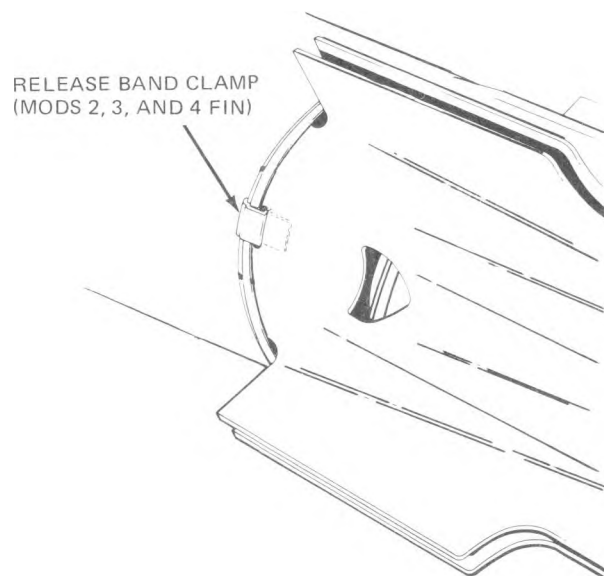


Figure 3-24. Release Band Clamp

NOTE

Later model crates will not include lugs.

3-57. Unpacking.

1. Remove fin suspension lugs, where present, and guide tube from crate.

2. Verify that release band clamp (figure 3-24) is installed on fin.

3. If interference exists between the MK 15 fin blades and the thermal coating on the bomb body, remove release band clamp and verify as to whether interference still exists. If interference no longer exists, secure the fin release band to fin using the procedures described in step 4 for the Mod 1 fin. If interference still exists, replace fin release band part number 1568356, stock number 1325-903-6311, with the longer fin release band part number 2880289B, stock number 1325-227-0378 as follows:

a. Clamp fins together with vise grip pliers.

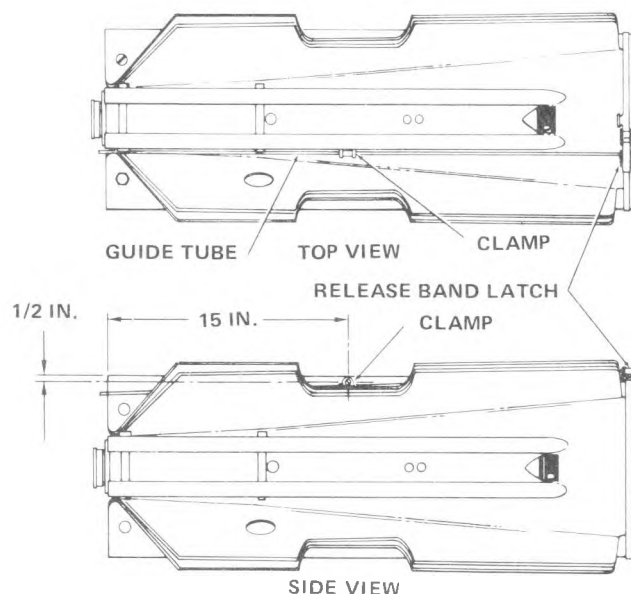


Figure 3-25. Installation of Guide Tube Clamp (Mod 1 Fin)

WARNING

The fin release band and fin are spring-loaded. Release the band with caution to prevent injury or damage.

b. Remove cotter pin from fin release band latch. Remove fin release band and clamp.

c. Install longer release band, Dwg No. 10001-2880289B, replace clamp, relatch band, and insert tagged cotter pin.

d. Remove vise-grip pliers.

4. Verify that clamp for fin release wire guide tube is installed on Mod 1 fin (figure 3-25).

3-58. Inspection.

1. Inspect fin for damage. If there is any doubt about the operation of a damaged fin, proceed as follows:

WARNING

The fin release band and fin are spring-loaded. Release the band with caution to prevent injury or damage.

- a. Ensure that release band is free of cosmoline.
 - b. Remove cotter pin from fin latch and remove fin release band.
 - c. If fins extend automatically at least 1/2-inch when release band is removed, and can be extended to contact shock absorber by hand, the fin is operative. Inoperative fins shall not be used.
2. If fin is operative, replace release band as follows:
- a. Close fins and clamp them together with vise-grip pliers.
 - b. Relatch release band and insert cotter pin.
 - c. Remove vise-grip pliers.
3. Be sure that index pin on fin support is not damaged.

3-59. Fin MK 15 Mod 1 Preparation. If guide tube clamp is not installed on Mod 1 fin, install it as follows:

1. Mark location with center punch and drill one No. 26 hole (for No. 8 self-tapping screw) or No. 23 hole (for No. 20 self-tapping screw) approximately 15 inches forward of aft end and 1/2-inch below top of round edge of right-hand fin rib for installation of clamp as shown in figure 3-25.

Note

A sheet metal or plywood template may be constructed to expedite this operation if several fin assemblies are to be drilled at one time.

2. Fit release wire guide tube in clamp (clamp available through normal supply channels or from local stock) and secure clamp to fin with No. 8 or No. 10 self-

tapping screw. Tighten screw while holding forward end tube against aft side of release band latch.

3-60. ASSEMBLY OF FIN MK 15 MODS 1 AND 2 TO BOMB BODY WITH ELECTRIC TAIL FUZE.

Assembly of fin MK 15 Mods 1 and 2 to bomb body is described in the following paragraphs.

WARNING

Fuzing to be used with the bomb MK 82 Mod 2 to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-booster M148E1; electric fuzes MK 344 and MK 376. Any other fuzing will greatly increase the probability of early detonation of a bomb engulfed in a fuel fire and may increase the severity of the explosion when detonation occurs.

NOTE

When weapon is to be preloaded on accessory suspension equipment, either the SE M20/M20A1 or the TDD MK 43, if required, should be installed during weapon assembly.

3-61. Installation of Fuze.

NOTE

If electric tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

1. Install adapter booster for mechanical nose fuze, if required, in accordance with section VIII.
2. Install electric tail fuze in accordance with section VII.



Figure 3-26. Removal of Retaining Ring by Squeezing Ears of Ring

3. Perform electric fuze circuit continuity test in accordance with section IV.

WARNING

Fins MK 15 Mods 1 and 2 have flight and delivery restrictions in the retarded mode. Ensure flight crews are fully informed of the exact bomb/fin configurations being provided for loading.

3-62. Installation of Fin Assembly. Assemble fin to bomb body as follows:

1. Verify that safety pin is installed in pop-out pin.
2. Remove gold colored retaining ring (ink stamped 10001-1555525) from fin by squeezing two projecting ears of ring together (figure 3-26). Take care that garter spring does not unseat.

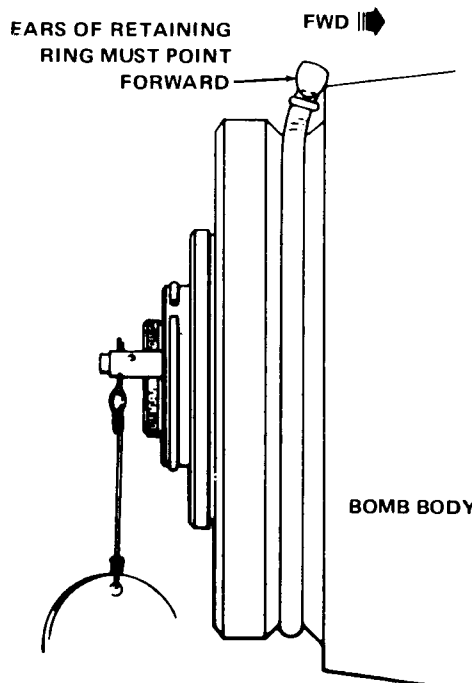


Figure 3-27. Ears Pointing Forward at 12 O'Clock Position Hole

CAUTION

When installing retaining rings, be sure that ears of retaining ring point forward.

3. Place silver colored retaining ring (ink stamped 30003-2602857) in aft V-groove of bomb body with ears pointing forward (figure 3-27).

NOTE

If new retaining ring ink-stamped 30003-2602857 is not available, the old ring P/N 1555525 may be used if: (1) ring seats fully in the groove and ears are at least 1-3/4 inches apart, and (2) all postassembly check points are verified.

4. Squeeze ears together and lock them in place by means of small keeper on ring (figure 3-28).
5. Place ears so they straddle the 12 o'clock position hole on bomb (figures 3-27 and 3-28).

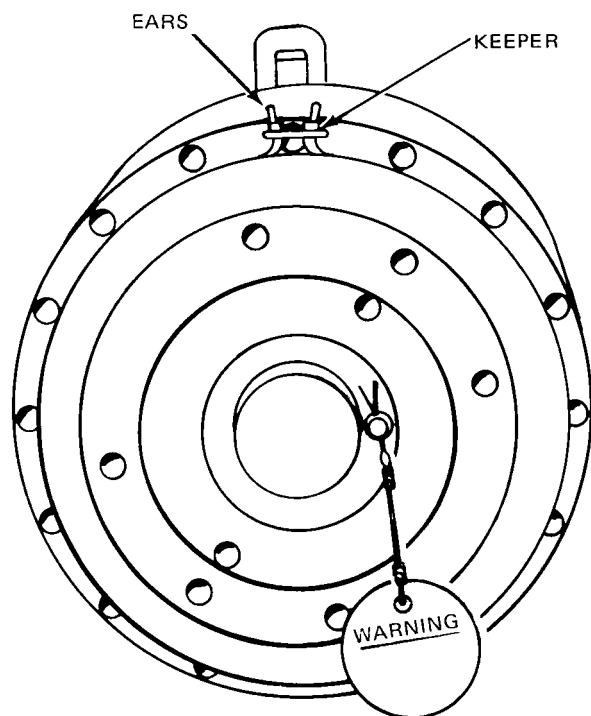


Figure 3-28. Ears Straddling 12 O'Clock Position Hole

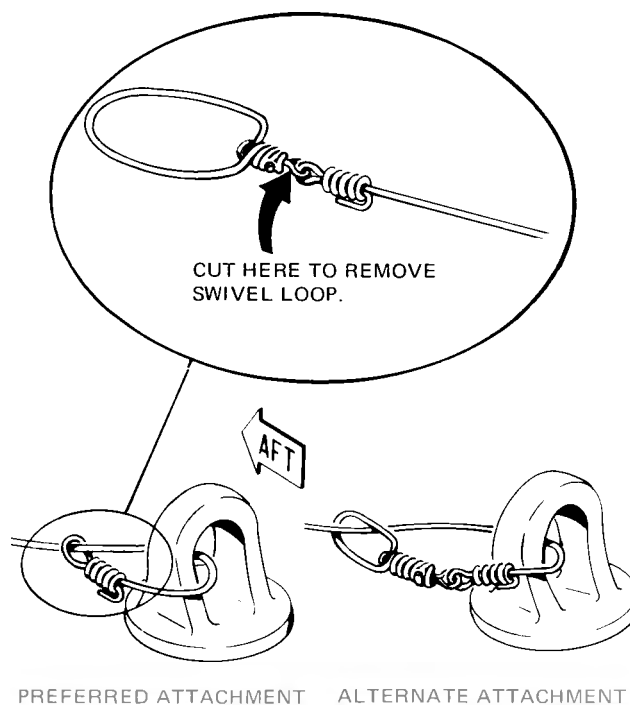
NOTE

The preferred method requires that the swivel loop be removed from the arming wire. The wire is passed through the lug, back through the small loop, and drawn taut. The loop must be positioned on the outside of the lug. (This is necessary to prevent interference with movement of the bomb rack hooks or damage to the loop during loading.)

6. Attach MK 3 arming wire to aft lug in accordance with figure 3-29.

NOTE

The orienting points for assembling this weapon are: (1) the suspension lugs, (2) the ears of the retaining ring straddling the 12 o'clock position hole, (3) the release band lever, and (4) the access hole in the top fin (which is directly above the cutout in the fin support).



PREFERRED ATTACHMENT

PRIOR TO ATTACHING ARMING WIRE, REMOVE SWIVEL LOOP AS SHOWN IN INSET.

ALTERNATE ATTACHMENT

IF SWIVEL LOOP IS NOT REMOVED, ENSURE THAT ARMING WIRE IS INSTALLED SO THAT SWIVEL LOOP IS POSITIONED OUTSIDE OF BOMB LUG.

Figure 3-29. Arming Wire MK 3 Attached to Aft Lug

7. With ears of retaining ring in proper position, orient fin to bomb body. Cutout in fins support must align with ears of retaining ring (figure 3-30). (See also figure 3-31.)

8. Back off fin just enough to provide working room for installing wire in tail fuze.

9. Using access hole in fin for wire entry, insert free end of MK 3 arming wire into small hole near cutout in fin support.

10. Thread arming wire through pop-out pin of tail fuze (figure 3-32). Then pass wire through small hole at bottom of fin support.

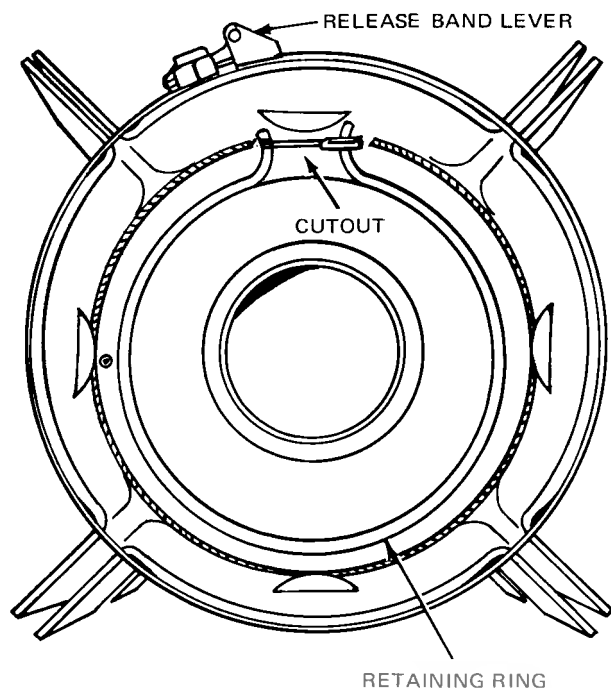


Figure 3-30. Relationship of Cutout in Flange to Release Band Lever

WARNING

- The safety pin must not be removed from the pop-out pin before the arming wire has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both holes align; then reinstall the safety pin. The buzz you hear when you rest the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.

- Failure to align both sets of holes when installing the pin or arming wire will dangerously reduce arming time.

11. Remove safety pin from pop-out pin.

12. With cutout in fin support aligned with ears of retaining ring, and keeping arming wire taut, press fin against bomb body. Make sure that index pin in fin support engages index hole in bomb body.

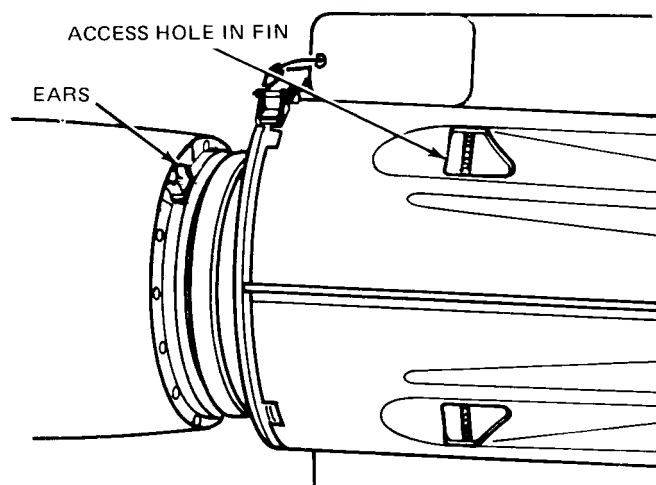


Figure 3-31. Fin Oriented to Bomb Body

NOTE

- While mating fin to bomb, keep MK 3 arming wire taut.
- If interference exists between fin blades and thermal protective coating on bomb body, refer to paragraph 3-58.

13. With screwdriver, rotate keeper on retaining ring to free ears or ring (figure 3-33).

14. Allow retaining ring to snap into semicircular groove in fin support (figure 3-34). This locks fin to bomb body.

WARNING

Ensure that the retaining ring seats. When properly seated, the ears must point forward and must be 1-1/2 to 1-3/4 inches apart (at least 1-3/4 inches apart for old ring). When any doubt exists about proper seating, spread the ears by holding one ear and tapping the other with a suitable tool.

15. Check to make sure ears are 1-1/2 to 1-3/4 inches apart (at least 1-3/4 inches apart for old ring).

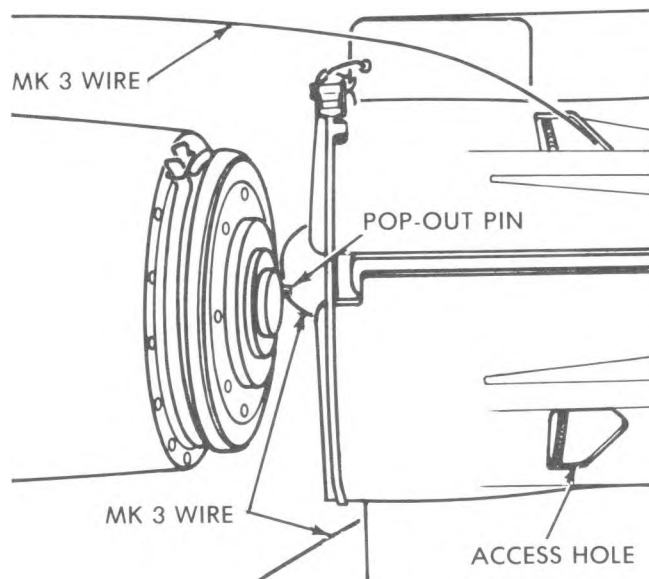


Figure 3-32. Arming Wire MK 3 Routed through Fin and Pop-Out Pin

16. Keeping fin pressed against aft end of bomb, peel garter spring out of its groove with screwdriver or fingers (figure 3-35), working through four access holes in fins.

17. Feed spring into space between bomb and fin. After this is done, pull fin back, allowing garter spring to contact and seat in gap between bomb and fin support (figure 3-36). A few shakes on fin will aid in seating spring.

WARNING

Ensure that garter spring seats in the gap between the bomb and fin support. An improperly installed spring can result in loss of the fin.

18. Check seating of garter spring through four access holes in fins. Spring must seat firmly, but not necessarily equally all around. (Index pin will cause a slight hump, which is normal.)

19. Remove and discard plastic cap from aft end of support and look through hole in aft end to see that MK 3 arming wire passes through pop-out pin and that safety pin is removed. If it is necessary to remove fin, repeat steps 8 through 19.

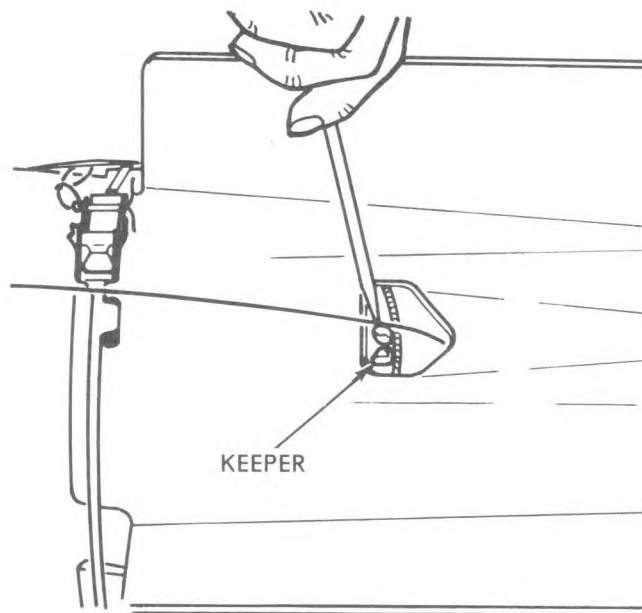


Figure 3-33. Retaining Ring Ears Feed with Screwdriver

20. Alternately pull on top and bottom of MK 3 arming wire to ensure that wire is free. If wire is not free, remove fin, inspect wire for kinks, and replace wire if necessary, repeating steps 6 through 20.

21. Leave entire wire uncut and wrap it around fin, putting excess wire in hole at top of fin. Do not install any Fahnestock clips. The pop-out pin holds the arming wire securely in place.

22. Install arming safety switch MK 122 in accordance with procedures in section VIII.

23. On the fin MK 15 Mod 1 only, verify that tube is secured to fin with clamp (figure 3-37). Making sure that tube aligns with fin release wire holes in release band lever, insert fin release wire (0.064 inch diameter) through guide tube as shown in figure 3-38. Disregard all WARNING decals on fin concerning Fahnestock clips. If fin release wire guide tube is not available, use aluminum tubing of 1/4-inch outside diameter and 0.035 to 0.049 wall thickness. Cut to length of $27\frac{1}{8} \pm \frac{1}{16}$ inches.

24. On the fin MK 15 Mod 2, install fin release wire (0.064 inch diameter) through release band and into slot in top fin blade (figure 3-39). Feed wire into fin blade until it emerges from aft end of fin. Disregard all WARNING decals on fin concerning Fahnestock clips.

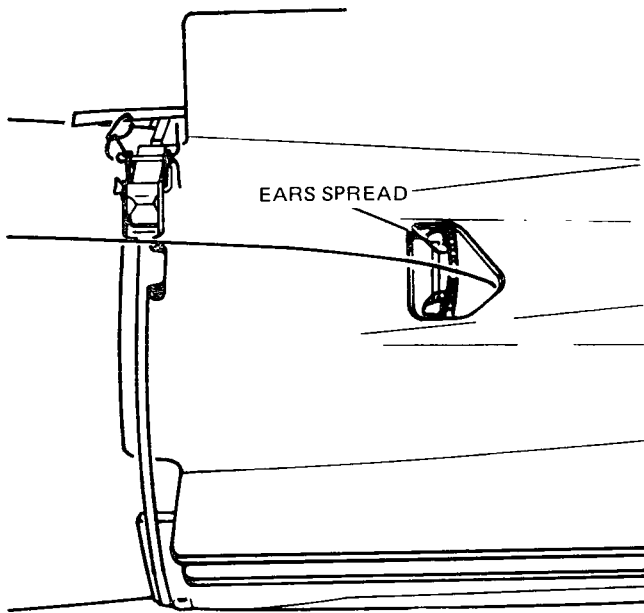


Figure 3-34. Retaining Ring Snapped into Semicircular Groove in Fin Support

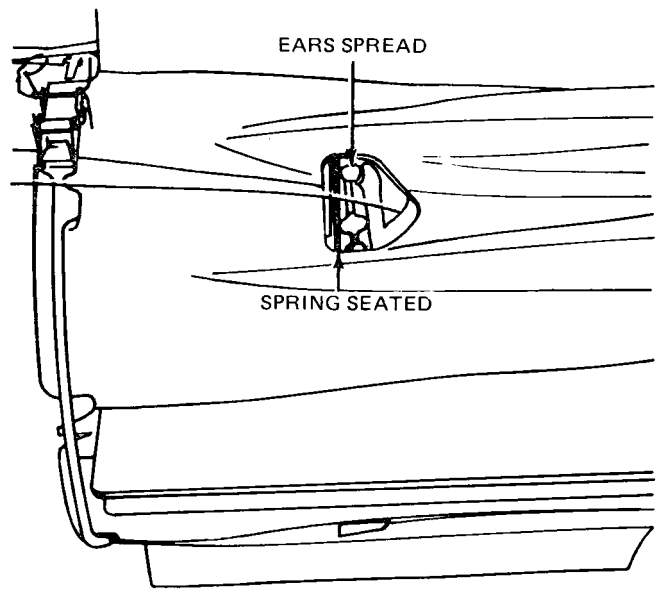


Figure 3-36. Garter Spring Seated between Bomb and Flange

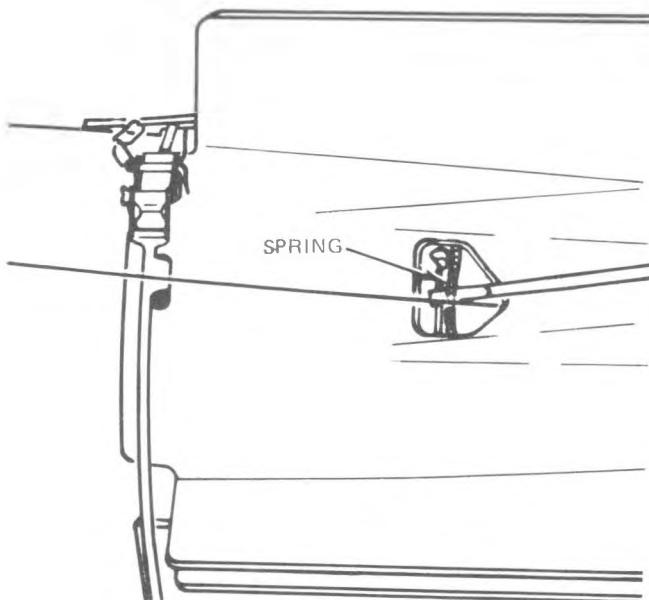


Figure 3-35. Peeling Garter Spring out of Groove with Screwdriver

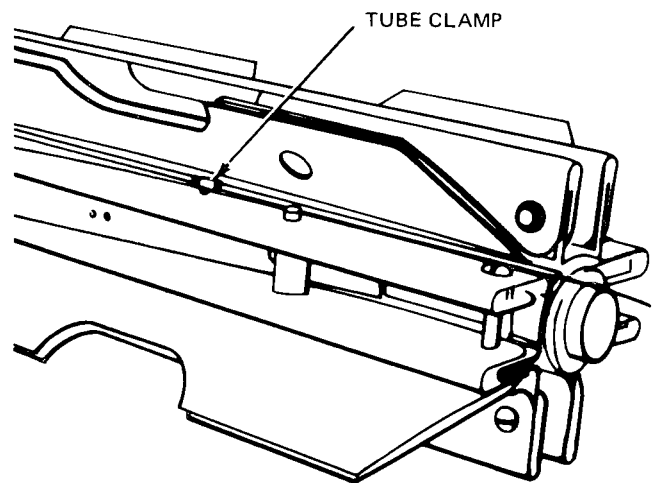


Figure 3-37. Fin Release Wire Guide Tube and Clamp Installed (Mod 1 Fin)

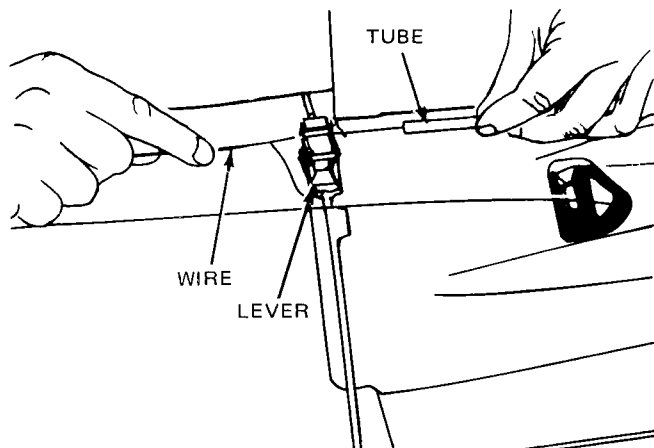


Figure 3-38. Installing Fin Release Wire in Guide Tube

3-63. Postassembly Checks. Following is a list of items that should be checked after assembly of the fin to the bomb body.

CAUTION

Failure to install the fuze restraining clip on fuzes MK 344 and MK 376 can result in an excessive dud rate. The clip ensures that the fuze remains seated in the fuze well during high-speed carriage.

1. Arming wire MK 3 must pass through pop-out pin and safety pin must be removed. Ensure that the fuze restraining clip is fastened to the fuze flange as shown in figure 7-15.
2. Fin release wire guide tube must be firmly installed.
3. Arming wires must not be kinked.
4. Ears of silver colored retaining ring must be 1-1/2 to 1-3/4 inches apart. The ears of the gold colored ring must be at least 1-3/4 inches apart. Ears must point forward.
5. Spring must seat firmly all around.

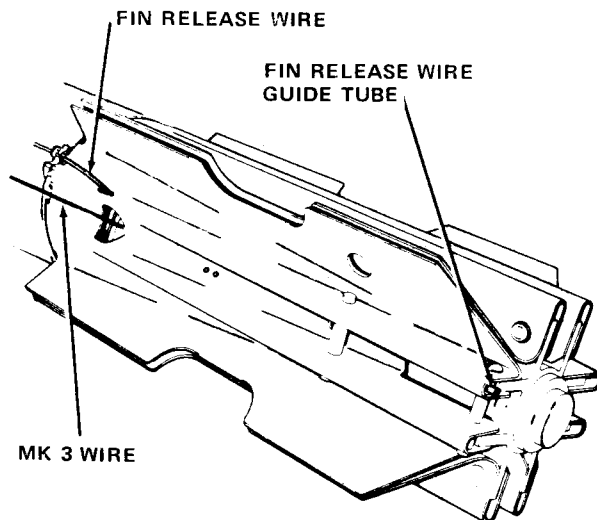


Figure 3-39. Fin Release Wire Guide Tube Inside Fin MK 15 Mod 2

3-64. ASSEMBLY OF FIN MK 15 MODS 1 AND 2 TO BOMB BODY WITH MECHANICAL TAIL FUZE. The following procedures apply to mechanical long delay tail fuze MK 346 Mod 0, adapter-boosters M150/T46, and arming assembly MK 5 Mods 1 and 2.

WARNING

Fuzing to be used with the thermally protected bomb MK 82 Mod 2 to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-boosters M148E1, electric fuzes MK 344 and MK 376, and mechanical tail fuze MK 346. Any other fuzing will greatly increase the probability of early detonation of a bomb engulfed in a fuel fire and may increase the severity of the explosion when detonation occurs.

3-65. Installation of Fuze.

NOTE

If mechanical tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

1. Install adapter-boosters for mechanical nose and/or tail fuze, if required, in accordance with section VIII.

2. Install mechanical tail fuze, if applicable, in accordance with section VII.

3-66. Installation of Fin Assembly. Assemble fin to bomb body as follows:

1. Check relationship cutout in fin support release band lever. Relationship must be as shown in figure 3-31.

2. Verify that plastic funnel guide and, if applicable, thermal shield are in place on outer end of fuze.

3. Remove gold colored retaining ring (ink stamped 10001-1555525) from fin by squeezing two projecting ears of ring together (figure 3-26). Take care that garter spring does not unseat.

CAUTION

When installing retaining ring, ensure that ears of retaining ring point forward.

4. Place silver colored retaining ring (ink stamped 30003-2602857) in aft V-groove of bomb body with ears pointing forward (figure 3-27).

NOTE

If new retaining ring ink-stamped P/N 30003-2602857 is not available, the old ring, P/N 10001-1555525, may be used if: (1) the ring seats fully in the groove, (2) the ears are at least 1-3/4 inches apart, and (3) all postassembly check points are verified.

5. Squeeze ears together and lock them in place by means of small keeper on ring (figure 3-28).

6. Place ears so they straddle the 12 o'clock position hole on bomb (figure 3-28).

7. With ears of retaining ring in proper position, orient fin to bomb body. Cutout in fin support must align with ears of retaining ring (figure 3-30). (See also figure 3-31.) Press fin against bomb body. Ensure that index pin engages index hole in bomb body.

NOTE

If interference exists between fin blades and thermal protective coating on bomb body, refer to paragraph 3-57.

8. With screwdriver, rotate keeper on retaining ring to free ears of ring (figure 3-35).

9. Allow retaining ring to snap into semicircular groove in fin support (figure 3-36). This locks fin to bomb body.

WARNING

Ensure that the retaining ring seats. When properly seated, the ears must point forward and must be 1-1/2 to 1-3/4 inches apart. (At least 1-3/4 inches apart for old ring.) When any doubt exists about proper seating, spread the ears by holding one ear and tapping the other with a suitable tool.

10. Check to make sure ears are 1-1/2 to 1-3/4 inches apart (at least 1-3/4 inches apart for old ring).

11. Keeping fin pressed against aft end of bomb and working through four access holes in fins, peel garter spring out of its groove and screwdriver or fingers (figure 3-35).

12. Feed spring into space between bomb and fin. After this is done, pull fin back, allowing garter spring to contract and seat in gap between bomb and fin support (figure 3-36). A few shakes of fin will aid seating spring.

WARNING

Ensure that garter spring seats in gap between bomb and fin support. An improperly installed spring can result in loss of the fin.

13. Check seating of garter spring through four access holes in fins. Spring must seat firmly, but not necessarily equally all around. (Index pin will cause a slight hump, which is normal.)

14. On the fin MK 15 Mod 1, verify that tube is secured to fin with clamp (figure 3-37). Making sure that tube aligns with fin release wire holes in release

band lever, insert fin release wire (0.064 inch diameter) through guide tube as shown in figure 3-38. Disregard all WARNING decals on fin concerning Fahnestock clips. If fin release wire guide tube is not available, use aluminum tubing of 1/4-inch outside diameter and 0.035 to 0.049 wall thickness. Cut to length of $27\text{-}1/8 \pm 1/16$ inches.

15. On the fin MK 15 Mod 2, install fin release wire (0.064 inch diameter) through release band and into slot in top fin blade (figure 3-39). Feed wire into fin blade until it emerges from aft end of fin. Disregard all WARNING decals on fin concerning Fahnestock clips.

3-67. Installation of Arming Assembly. Refer to section VIII for arming assembly installation procedures.

3-68. Installation of Arming Wire. When weapon is to be preloaded on accessory suspension equipment (MER), install the arming wire as follows:

1. Route arming wire through rear lug, arming vane strap and plate holes.
2. Install two Fahnestock clips. Do not cut wire.
3. Ensure that the safety pin is installed with the split end pointing aft.

3-69. Postassembly Checks. Following is a list of items that should be checked after assembly of the fin to the bomb body:

1. Fin release wire guide tube must be firmly installed.
2. Fin release wire must not be kinked.
3. Ears of silver colored retaining ring must be 1-1/2 to 1-3/4 inches apart. Ears of gold colored ring must be at least 1-3/4 inches apart. Ears must point forward.
4. Spring must seat firmly all around.
5. Verify that plastic funnel guide and, if applicable, thermal shield are in place on outer edge of fuze.

3-70. ASSEMBLY OF FIN MK 15 MOD 3 AND MOD 4 TO BOMB BODY WITH ELECTRIC TAIL FUZE. Assembly of fin MK 15 Mods 3 and 4 to the bomb body is described in the following paragraphs.

WARNING

Fuzing to be used with the thermally protected bomb MK 82 Mod 2 to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-booster M148E1; electric fuzes MK 344 and MK 376; and mechanical tail fuze MK 346. Any other fuzing will greatly increase the probability of early detonation of a bomb engulfed in a fuel fire and may increase the severity of the explosion when detonation occurs.

NOTE

When weapon is to be preloaded on accessory suspension equipment, either the SE M20/M20A1 or the TDD MK 43, if required, should be installed during weapon assembly.

3-71. Installation of Fuze.

NOTE

If electric tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

1. Install adapter booster for mechanical nose fuze, if required, in accordance with section VIII.
2. Install electric tail fuze in accordance with section VII.
3. Perform electric fuze circuit continuity test in accordance with section IV.

3-72. Installation of Fin Assembly. Assemble fin to bomb body as follows:

1. Verify that release band lever is aligned with guide tube-slot as shown in figure 3-40.
2. Verify that setscrews do not protrude beyond inside surface of fin support.
3. Attach an arming wire MK 3 to aft lug of bomb in accordance with figure 3-29.

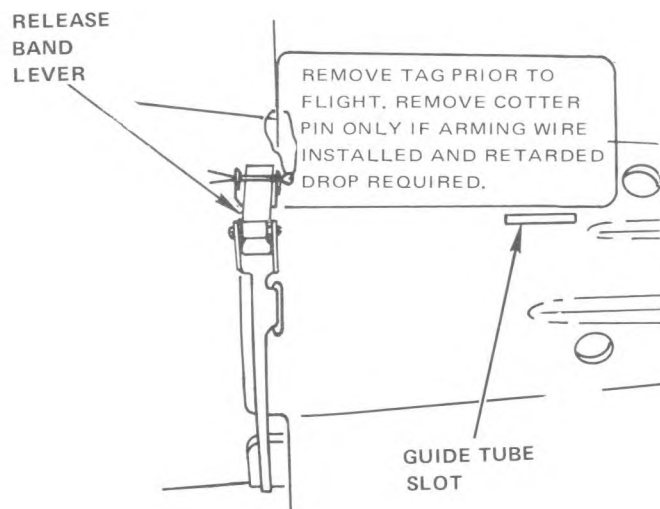


Figure 3-40. Release Band Lever Aligned with Guide Tube Slot (Mod 3 and Mod 4 Fins)

NOTE

The preferred method requires that the swivel loop be removed from the arming wire. The wire is passed through the lug, back through the small loop, and drawn taut. The loop must be positioned on the outside of the lug. (This is necessary to prevent interference with movement of the bomb rack hooks or damage to the loop during loading.)

4. Orient fin to bomb body so that index pin in fin support aligns with fourth index hole clockwise from 12 o'clock position hole in bomb.

5. Hold fin just far enough from bomb to provide working room for wire installation in tail fuze.

6. Using access hole in fin for wire entry, insert free end of arming wire MK 3 into small hole in fin support.

7. Thread arming wire through pop-out pin of tail fuze (figure 3-41). Then pass wire through small hole at bottom of fin support.

WARNING

- The safety pin must not be removed from the pop-out pin before the arming wire has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way

back in so that both holes align; then reinstall the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.

- Failure to align both sets of holes when installing the safety pin or arming wire will dangerously reduce arming time.

8. Remove safety pin from pop-out pin.

NOTE

- While mating fin to bomb, keep arming wire MK 3 taut.
- If interference exists between fin blades and thermal protective coating of bomb body, refer to paragraph 3-57.

9. Keeping arming wire taut, press fin against bomb. Ensure that index pin in fin support engages fourth index hole from 12 o'clock position hole in bomb.

CAUTION

Setscrews must seat firmly in bomb groove to ensure proper mating of bomb fin.

10. Tighten setscrews into groove in bomb.

11. Remove and discard plastic cap from aft end of support and look through hole in aft end to see that arming wire MK 3 passes through pop-out pin and that safety pin is removed. If it is necessary to remove fin, repeat steps 4 through 11.

12. Alternately pull on top and bottom of arming wire MK 3 to ensure that wire is free. If wire is not free, remove fin, inspect wire for kinks, and replace wire if necessary, repeating steps 3 through 12.

13. Leave entire wire uncut and wrap it around fin, putting excess wire in hole at top of fin. Do not install any Fahnstock clips as pop-out pin holds wire securely in place.

14. Install arming safety MK 122 switch in accordance with procedures in section VIII.

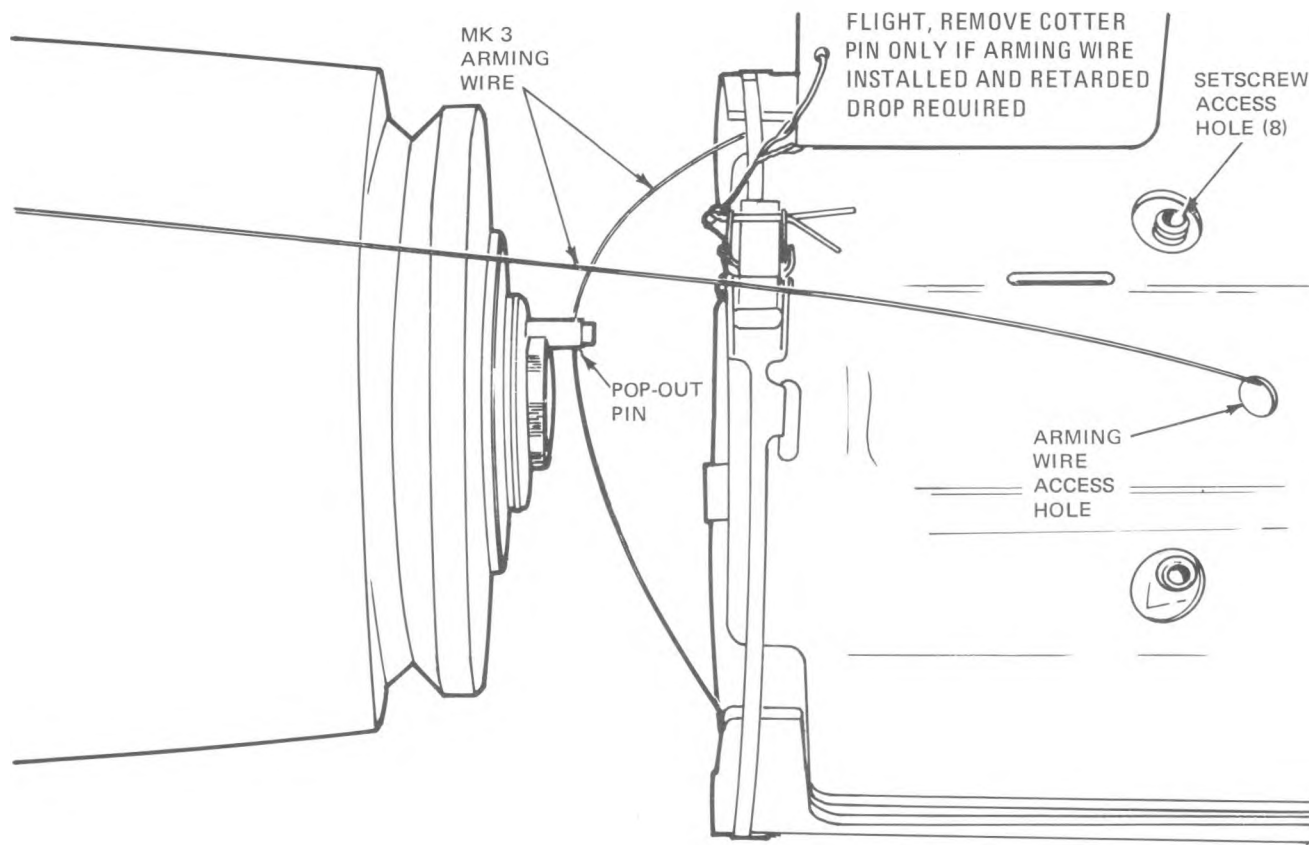


Figure 3-41. Routing of Arming Wire MK 3 — Mod 3 and Mod 4 Fins

15. Install fin release wire (0.064 inch diameter) through release band and into slot in top fin blade (figure 3-42). Feed wire into slot in fin blade until it emerges from aft end of fin. Disregard all WARNING decals on fin concerning Fahnestock clips.

3-73. Postassembly Checks. Following is a list of items that should be checked after assembly of the fin to the bomb body:

CAUTION

Failure to install the fuze restraining clip on fuzes MK 344 and MK 376 can result in an excessive dud rate. The clip ensures that the fuze remains seated in the fuze well during high-speed carriage.

1. Arming wire MK 3 must pass through pop-out pin and safety pin must be removed. Ensure that the fuze restraining clip is fastened to the fuze flange as shown in figure 7-15.

2. Wires must not be kinked.

3. All 8 setscrews that secure fin to bomb must be seated firmly into groove.

3-74. ASSEMBLY OF FIN MK 15 MODS 3 AND 4 TO BOMB BODY WITH MECHANICAL TAIL FUZE.

The following procedures apply to mechanical long delay tail fuze MK 346 Mod 0, adapter-booster, M150/T46 and arming assembly MK 5 Mods 1 and 2.

WARNING

Fuzing to be used with the thermally protected bomb MK 82 Mod 2 to obtain cook-off protection is limited to fuze M904E4 with thermally protected adapter-booster M148E1; electric fuzes MK 344 and MK 376; and mechanical tail fuze MK 346. Any other fuzing will greatly increase the probability of early detonation of a bomb engulfed in a fuel fire and may increase the severity of the explosion when detonation occurs.

3-75. Installation of Fuze.**NOTE**

If mechanical tail fuzing is to be used, the fuze must be installed before attaching the fin. Refer to section VII for fuze installation instructions.

1. Install adapter-booster for mechanical nose and/or tail fuze, if required, in accordance with section VIII.

2. Install mechanical tail fuze, if applicable, in accordance with section VII.

3-76. Installation of Fin Assembly. Assemble fin to bomb body as follows:

1. Verify that release band lever is aligned with guide tube slot as shown in figure 3-40.

2. Verify that setscrews do not protrude beyond inside surface of flange.

3. Verify that plastic funnel guide and, if applicable, thermal shield are in place on outer edge of fuze.

4. Orient fin to bomb body so that index pin in fin support aligns with fourth index hole clockwise from 12 o'clock position hole in bomb.

5. Press fin against bomb, making sure that index pin in fin support engages appropriate index hole in bomb.

NOTE

If interference exists between fin blades and thermal protective coating on bomb body, refer to paragraph 3-57.

CAUTION

Setscrews must seat firmly in bomb groove to ensure proper mating of bomb and fin.

6. Tighten setscrews into groove in bomb.

7. Install fin release wire (0.064 inch diameter) through release band and into slot in top fin blade (figure 3-42). Feed wire into slot in fin blade until it emerges from aft end of fin. Disregard all WARNING decals on fin concerning Fahnestock clips.

3-77. Installation of Arming Assembly. Refer to section VIII for arming assembly installation procedures.

3-78. Installation of Arming Wire. When weapon is to be preloaded on accessory suspension equipment (MER), install the mechanical fuze arming wire as follows:

1. Route arming wire through rear lug, arming vane strap and plate holes.

2. Install two Fahnestock clips. Do not cut arming wire.

3. Ensure that safety pin is installed with the split end pointing aft.

3-79. Postassembly Checks. Following is a list of items that should be checked after assembly of the fin to the bomb body:

1. All eight setscrews that secure fin to bomb must be seated firmly in groove of bomb.

2. Fin release wire must not be kinked.

3. Plastic funnel guide and, if applicable, thermal shield must be in place on end of fuze.

3-80. DISASSEMBLY OF FIN MK 15 MODS 1 AND 2 FROM BOMB BODY WITH ELECTRIC TAIL FUZE. Remove fin as follows:

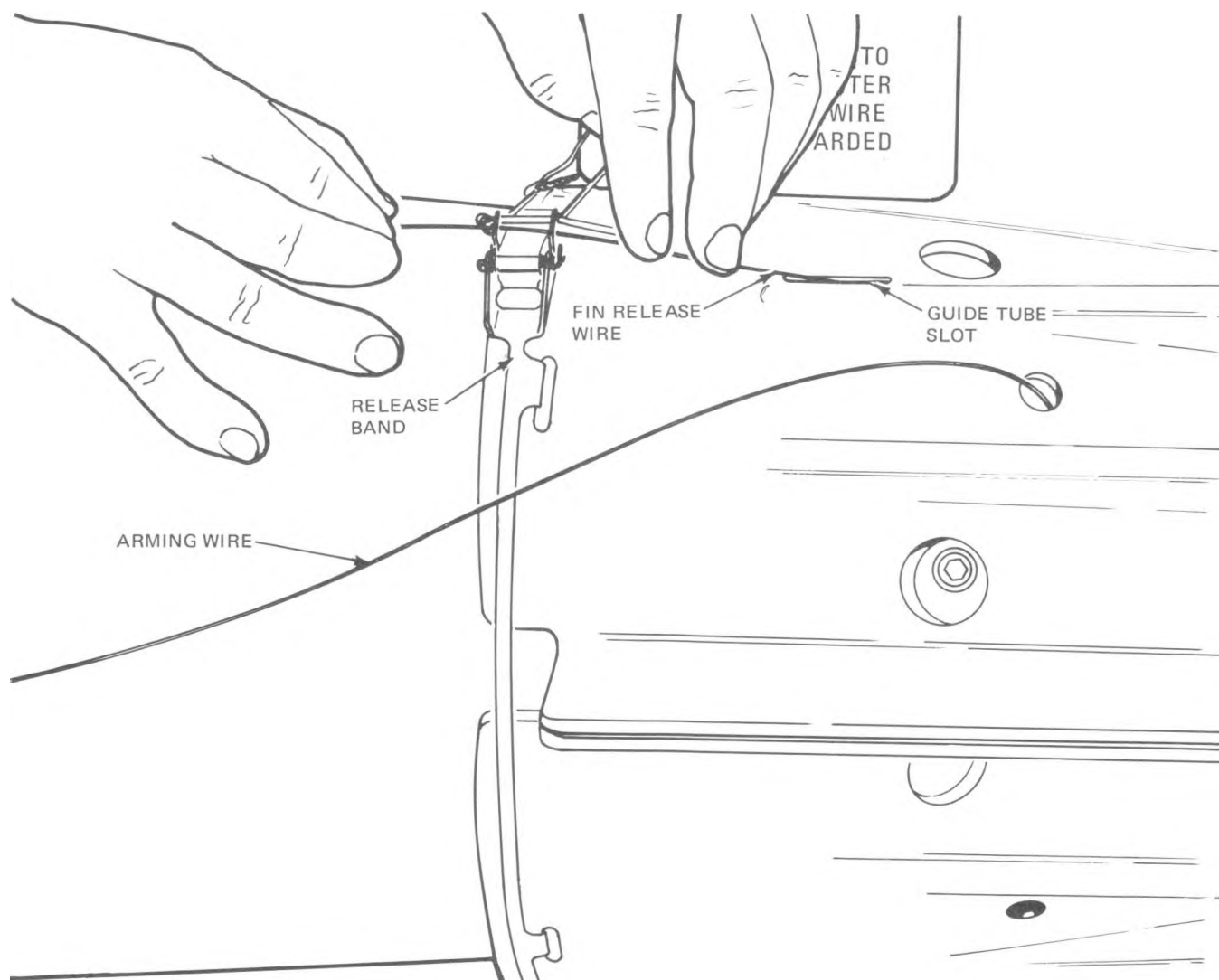


Figure 3-42. Fin Release Wire Routing — Mod 3 and Mod 4 Fins

WARNING

If the arming wire of an electric tail fuze has been withdrawn from the fuze, the fuze could be armed. Do not attempt to remove weapon, but notify EOD personnel immediately.

1. Verify presence of arming wire MK 3 through pop-out pin.

2. Cut arming wire MK 3 at aft lug so that wire will not withdraw from fuze as fin is backed off.

3. If installed, remove arming safety switch MK 122 in accordance with section VIII.

WARNING

The fin retaining band and fin are spring loaded. Release the band with caution to prevent injury or damage.

4. Carefully release band, allowing fins to open slightly. Work garter spring out of gap and up over fin support.

5. Press fin against bomb and squeeze ears of retaining ring. Slowly and carefully back off fin until pop-out pin is accessible. Ensure that arming wire MK 3 is not withdrawn from pop-out pin. Insert safety pin in pop-out pin.

WARNING

- The arming wire must not be removed from the pop-out pin before the safety pin has been installed. If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both holes align; and then install the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.
 - Failure to align both sets of holes when installing the pin can dangerously reduce arming time.
6. Withdraw arming wire MK 3 from pop-out pin and from fin and discard wire.
 7. Set fin aside.
 8. Remove garter spring and retaining ring from body and install on fin.
 9. Replace release band as follows:
 - a. Close fins and clamp together with vise-grip pliers.
 - b. Relatch release band and insert cotter pin.
 - c. Remove vise-grip pliers.
 10. Remove fuze in accordance with section VIII.
 11. Return all serviceable components to storage.

3-81. DISASSEMBLY OF FIN MK 15 MODS 1 AND 2 FROM BOMB BODY WITH MECHANICAL TAIL FUZE. The following procedures apply to mechanical long delay tail fuze MK 346 Mod 0, adapter-booster M150/T46 series and arming assembly MK 5 Mods 1 and 2. Proceed as follows:

1. When weapon is returned, verify that arming vane has been removed and vane plate and vane strap

are secured together. If vane plate and vane strap are not secured, notify EOD personnel immediately.

WARNING

The fin retaining band and fin are spring-loaded. Release the band with caution to prevent injury or damage.

2. Carefully release band, allowing fins to open slightly.
3. Work garter spring out of gap and up over support flange.

CAUTION

Removal of fin will disengage the drive shaft of the arming assembly from either the input shaft of the fuze or from the output spindle of the fuze drive. Support the shaft as soon as clearance between the fin and bomb body permits.

4. Press fin against bomb and squeeze ears of retaining ring. Disengage fin from bomb body.
5. Check that safe/arm window shows completely green (refer to section VII). If red and black striped band shows in safe/arm window, notify EOD personnel immediately.
6. Withdraw drive shaft from fuze drive or input shaft of fuze, whichever is still engaged. Remove plastic funnel guide from outer end of fuze.
7. Loosen three 1/4-inch setscrews around adapter collar and withdraw adapter and fuze drive from fin.
8. Remove fuze in accordance with section VII.
9. Remove locking pin from adapter-booster threads and remove adapter-booster from tail well. Refer to section VIII for detailed instructions.
10. Remove garter spring and retaining ring from bomb body and install on fin.
11. Replace release band as follows:
 - a. Close fins and clamp together with vise-grip pliers.

- b. Relatch release band and insert cotter pin.
- c. Remove vise-grip pliers.

NOTE

Mods 1 and 2 arming assemblies are shipped with the arming vane and fuze drive barrel as separate items. Therefore, to store them in their original packages, the arming vane and fuze drive barrel must be disassembled.

12. Return all serviceable components to storage.

3-82. DISASSEMBLY OF FINS MK 15 MOD 3 AND MOD 4 FROM BOMB BODY WITH ELECTRIC TAIL FUZE. Remove fin as follows:

WARNING

If the arming wire of an electric tail fuze has been withdrawn from the fuze, the fuze could be armed. Do no attempt to remove the fuze from the tail well of the weapon, but notify EOD personnel immediately.

1. Verify presence of arming wire through pop-out pin.
2. Verify that fin release band is secured. Reinstall red warning tag and cotter key before removing arming wire.
3. Cut arming wire MK 3 at aft lug so that wire will not withdraw from fuze as fin is backed off.
4. If installed, remove arming safety switch MK 122 in accordance with section VIII.
5. Loosen setscrews in fin support and back off fin until pop-out pin is accessible. Do not allow MK 3 arming wire to withdraw from pop-out pin.
6. Insert safety pin in pop-out pin.

WARNING

- The arming wire must not be removed from the pop-out pin before the safety pin has been installed. If the pop-out pin is acciden-

tally allowed to pop out, push the pin all the way back in so that both holes align; then install the safety pin. The buzz you hear when you reset the pop-out pin on fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed.

- Failure to align both sets of holes when installing the pin can dangerously reduce arming time.

7. Withdraw arming wire MK 3 from pop-out pin and from fin and discard wire.
8. Set fin aside.
9. Remove fuze in accordance with section VII.
10. Return all serviceable components to storage.

3-83. DISASSEMBLY OF FINS MK 15 MOD 3 AND MOD 4 FROM BOMB BODY WITH MECHANICAL TAIL FUZE. The following procedures apply to mechanical long delay tail fuze MK 346 Mod 0, adapter booster M150/T46 series, and arming assembly MK 5 Mods 1 and 2. Proceed as follows:

CAUTION

Removal of the fin will disengage the drive shaft of the arming assembly from either the input shaft of the fuze or from the output spindle of the fuze drive. Support the drive shaft as soon as clearance between the fin and bomb body permits.

1. When the weapon is returned, verify that arming vane has been removed and that vane plate and vane strap are secured together. If vane plate and vane strap are not secured together, notify EOD personnel immediately.
2. With 1/4-inch allen wrench, loosen eight setscrews in fin support and disengage fin from bomb.
3. Check that safe/arm window shows completely green (refer to section VII). If a red and black striped band shows in safe/arm window, notify EOD personnel immediately.
4. Withdraw drive shaft from fuze drive or input shaft of fuze, whichever is still engaged. Remove plastic funnel guide from outer end of fuze.

5. Loosen three 1/4-inch setscrews around adapter collar and withdraw adapter fuze drive from fin.

6. Remove fuze in accordance with section VII.

7. Remove locking pin from adapter-booster threads and remove adapter-booster from tail well. Refer to section VIII for removal of adapter-booster.

NOTE

Mods 1 and 2 arming assemblies are shipped with the arming vane and fuze drive barrel as separate items. Therefore, in order to store them in their original packages, the arming vane and fuze drive barrel must be disassembled.

8. Return all serviceable components to storage.

3-84. EMERGENCY PROCEDURES. Damaged or otherwise defective or unserviceable bombs and components shall be disposed of in accordance with current directives.

3-85. FIN MAU-91A/B.

3-86. INTRODUCTION. Fin MAU-91 series is a retarded tail fin for use with the 1000-pound LDGP bomb MK 83 Mods as a component of the MK 40 DST. Bomb fin adapter ADU-320/B (section VIII) is required to attach the fin to the bomb body. The fin provides a low altitude, high speed delivery capability.

3-87. SPECIFICATIONS AND DESCRIPTION. Specifications for assembly of the fin MAU-91 are shown in table 3-5. The fin and adapter are described in the following paragraphs.

Table 3-5. Specifications for Bomb Fin Assembly MAU-91

	(A/B)
Drawing List	2603989
Length, inches	39.25
Diameter, inches (closed)	22.75
Weight, pounds	120

3-88. Fin MAU-91 presents a low drag configuration for the bomb when in the unretarded position, and a high drag configuration when in the retarded position (figure 3-43). When the weapon is delivered in the retard mode, the fin release wire is withdrawn from the channel and the latch arming pin from the release band latch. The drag plates snap partially open by the pressure exerted by spring leaves under the drag plates. The airstream then forces the fin open at a high rate of speed. The energy of the fin opening is absorbed by deformation of the aluminum honeycomb of the energy absorber.

3-89. CONFIGURATION. The fin MAU-91 consists essentially of four loading drag plates with links, a support flange, and a support tube (figure 3-43). An energy absorber made of aluminum honeycomb tubing is located on the support tube between the stationary collar and the sliding collar. The sliding collar is driven against the energy absorber, which compresses and deforms. A channel located on the top drag plate holds the fin release wire until it is pulled out at bomb release. The drag plates are held in the closed position by a release band that is secured by a fin release wire pin located in the latch of the release band. The band tabs fit into slots located near the end of each drag plate. The band is securely attached to the bottom drag plate by a stainless steel clamp to prevent damage from the band striking the aircraft after release. The fin attaches to the bomb MK 83 by means of Fin Adapter ADU-320/B, which is secured to the aft end of the bomb by eight setscrews. The fin support flange has eight teeth that mate to ears on the fin adapter. A garter spring is forced into the gap between the flange teeth and the adapter to ensure that the teeth fit tightly against the ears. Two locking pins, which fit through matching holes in the flange and adapter, prevent rotation of the fin.

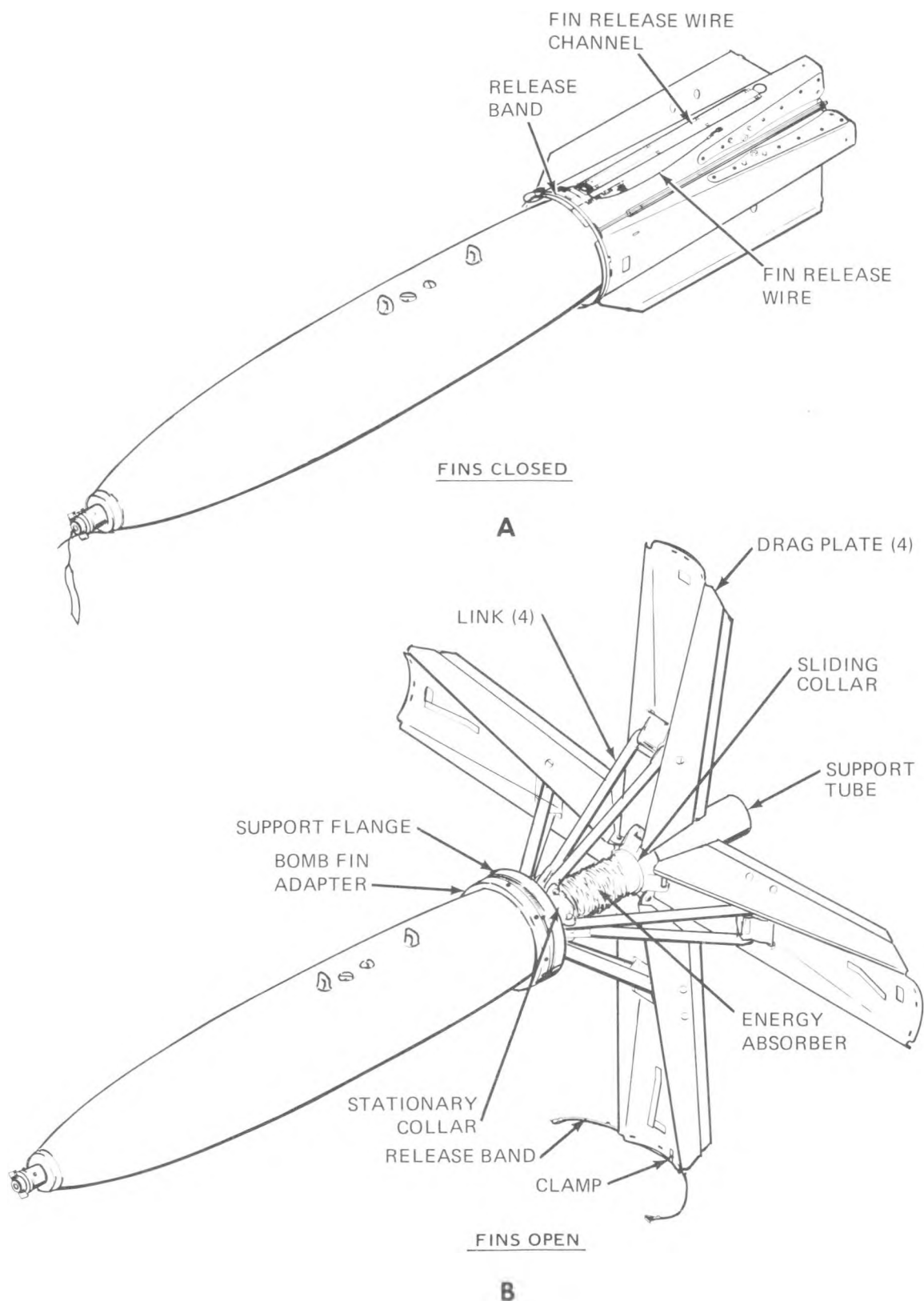


Figure 3-43. Fin MAU-91 With Adapter ADU-320/B on Bomb Body MK 83

SECTION IV

ELECTRIC FUZE CIRCUIT CONTINUITY TEST

4-1. INTRODUCTION.

4-2. This section contains procedures for the use of Electric Bomb Fuzing Circuit Test Set A/E24T-127. The test set is composed of a test set case and Tester TTK-333/E24T-127. Refer to NAVAIR 17-15AE24T-2 for additional tester information.

4-3. The continuity test is performed during assembly of bomb MK 80 series to verify that the fuze and/or target detecting device (TDD) is properly mated with the electrical connector in the bomb fuze well. The test will detect open or short circuits caused by dirty or damaged connectors in the bomb, fuze, or TDD circuitry.

CAUTION

This test is authorized for use only with electric tail fuzes MK 344/376 and target detecting device MK 43.

4-4. ELECTRIC FUZE CIRCUIT CONTINUITY TEST.

4-5. TEST SEQUENCE.

1. The test must be performed prior to installation of the arming safety switch MK 122 on the bomb body.

2. When a bomb is to be configured with both a TDD MK 43 and an electric tail fuze, the TDD must be installed and tested prior to installation of the fuze.

3. If an adapter M148/T45E series is to be used in the nose well of the bomb, the adapter shall be installed prior to the test of the electric tail fuze.

4-6. TEST PROCEDURE.

CAUTION

- This test must be performed in a RADHAZ free area. Refer to OP 3565/NAVAIR 16-1-529. Failure to observe these restrictions may degrade fuze reliability.

- TDD must be installed and tested prior to installation of electric tail fuze.

1. Ensure electric fuze or TDD is fully seated in fuze well.

2. Ensure shipping cap is removed from bomb charging well and that well is clean and dry.

3. Calibrate tester as follows:

a. Depress test switch button (figure 4-1) on tester handle. Check that meter needle is centered on tester calibration line.

b. If required, adjust CAL knob to center meter needle on tester calibration line.

c. Release test switch button.

d. Ensure retractable connector is free of foreign material.

4. Insert connector end of test set firmly into charging well of bomb (figure 4-1) until connector is fully retracted.

5. Depress test switch button on tester and note indication. Refer to table 4-1 for significance of tester indications.

NOTE

If a recheck of a TDD is required, a delay of at least five minutes is necessary to allow the capacitor in the TDD to discharge before the test is repeated.

6. Remove tester.

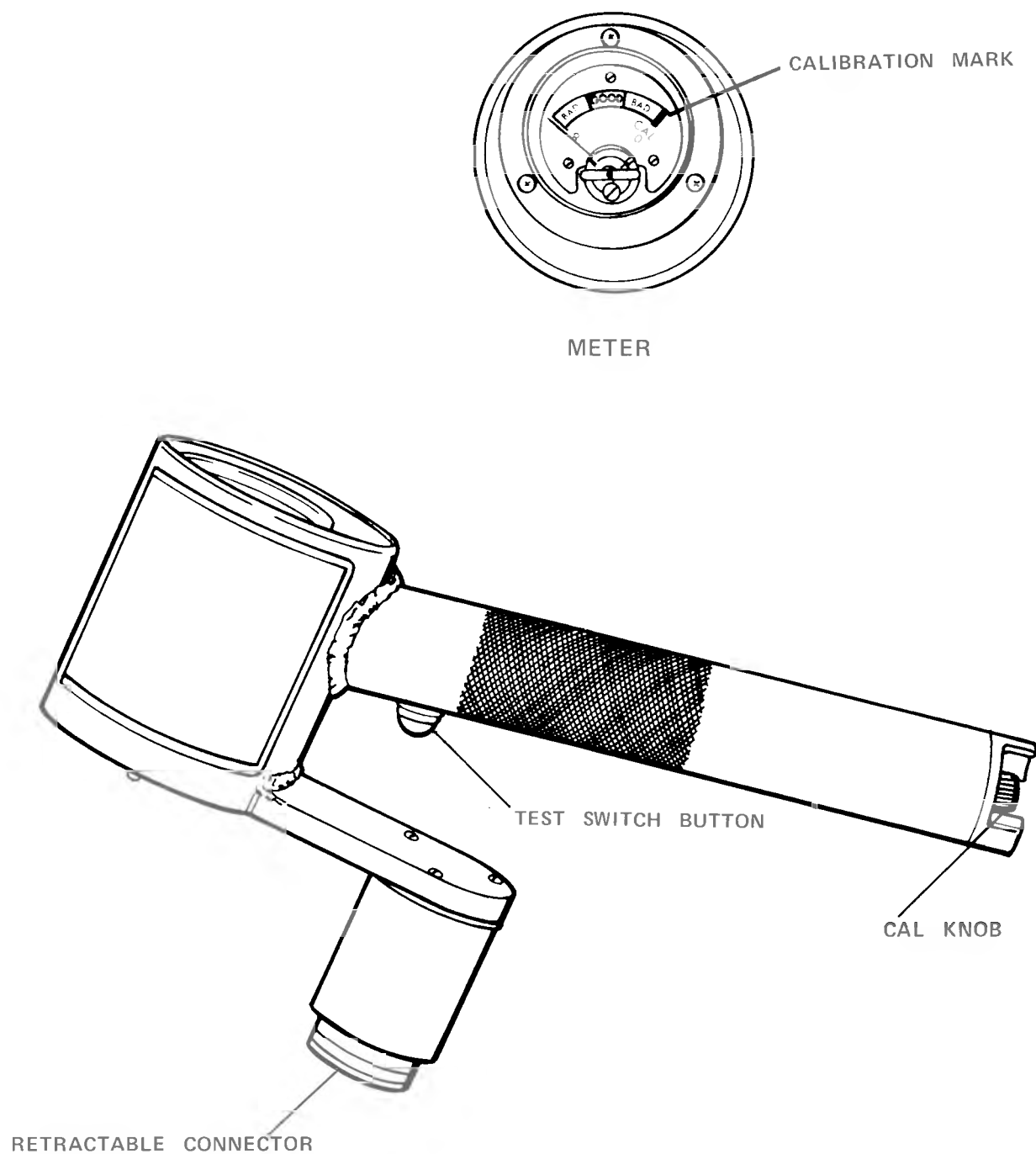


Figure 4-1. Test Set A/E24T-127

Table 4-1. Test Indications

Condition	Meter Indication	Action Required
Proper continuity (MK 43 TDD)	Observe closely. Needle will momentarily deflect approximately 1/16 inch and return to initial (open) circuit reading.	NONE
Proper continuity (MK 344/MK 376 fuzes)	Needle will indicate in the GREEN area.	NONE
Open circuit	Needle will indicate at the far left edge of scale.	Back off fuze or TDD one turn and reseal. If condition persists install new fuze or TDD. If condition is not corrected the bomb circuitry is probably bad and the bomb must not be used with electric fuzing.
Short circuit	Needle will indicate at the far right edge of scale	Install new fuze or TDD. If condition persists the bomb circuitry is probably bad and the bomb must not be used with electric fuzing.
Improper resistance	Needle will indicate in BAD area but not at full left or right edge of scale.	Back off fuze or TDD one turn and reseal. If condition persists install new fuze or TDD. If condition is not corrected the bomb circuitry is probably bad and the bomb must not be used with electric fuzing.

Note

Check tester calibration after any faulty reading.

SECTION V

FIRE BOMBS

5-1. GENERAL.

5-2. Fire bombs are thin-skinned containers of gelled fuel. The bombs rupture upon impact, spreading burning gel on surrounding objects. Fuzes and igniters are used to ignite the combustible filling.

5-3. FIRE BOMB MK 77 MOD 2.

5-4. **INTRODUCTION.** The 500-pound fire bomb MK 77 Mod 2 (figure 5-1) is a non-stabilized 71-gallon capacity bomb.

5-5. **SPECIFICATION AND DESCRIPTION.** Specifications for a typical bomb MK 77 Mod 2 are listed in table 5-1, and a typical bomb is described in the following paragraphs.

Table 5-1. Specifications for Typical MK 77 Fire Bomb

Length of Assembled Bomb (in.).....	92.5
Body Diameter (in.).....	18.60
Filler Capacity (gal.).....	71.0
Weight of Empty Bomb (lb.).....	63.00
Weight of Filler (lb.).....	426.0
Weight of Assembled Bomb (lb.).....	520.0

5-6. The bomb color is the natural aluminum color of the body. Identifying nomenclature is stenciled on the bomb body.

5-7. Arming wires are routed to the nose and tail of the bomb through guide tubes. Two gasket-sealed filler caps are located on the upper bomb body surface. The bomb is filled with 71 gallons of fire bomb mix; a minimum air space of 3 percent of the capacity of the bomb is required.

5-8. Several minor design deviations in the MK 77 Mod 2 have been made by various contractors to facilitate plant processes. The bombs may be received with nose and tail fairings, a nose fairing only (the fairings may be discarded when present), formed sheet metal nose and tail bulkheads (similar to the MK 77 Mod 4) in place of castings, recessed filler caps or flush filler caps, and various types of arming wire guides.

5-9. **GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS).** No special ground support equipment or special tools are required. Refer to OP 2173/NAVAIR 19-100-1 for appropriate handling equipment.

5-10. **CONFIGURATION.** Fuze and igniter combinations are used in the nose and tail of the bomb. Only fuze AN-M173A1 with igniter AN-M23A1 can be used. Both the nose and tail wells should be fuzed.

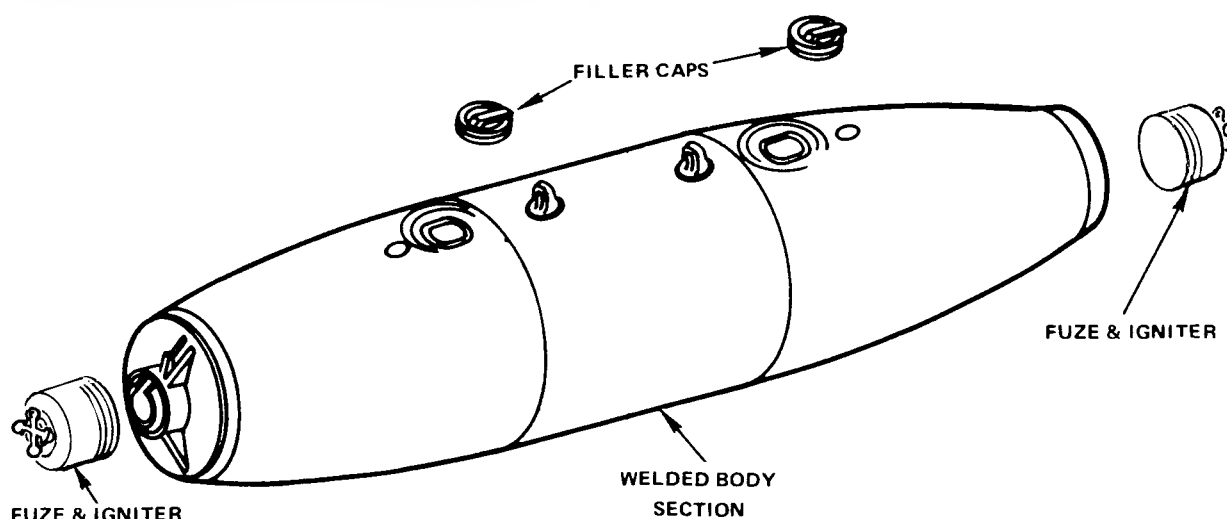


Figure 5-1. Typical 500-Pound Fire Bomb MK 77 Mod 2

5-11. SAFETY. Refer to section II for general safety precautions.

5-12. PREPARATION FOR USE. MK 77 Mod 2 preparation for use is described in the following paragraphs.

WARNING

Fire bombs are thin-skinned and must be handled with care to avoid puncture.

5-13. Unpacking. Remove bomb body from shipping crate.

5-14. Inspection. Check bomb and suspension lugs for damage, broken weldments, or cracks that might weaken suspension or cause leaks in the casing. Dispose of all unserviceable bombs and components in accordance with current directives.

1. Verify presence of filler caps.
2. Check filling hole sealing gaskets. Gaskets must be in place and sealing surfaces must be free of foreign matter, dents, and nicks.
3. Remove igniter adapter from nose and tail igniter wells and discard. (Not provided in later production bombs.)

5-15. FILLING. Refer to NAVAIR 19-1-112 for gel mixing and additional bomb filling procedures.

WARNING

- When filled, a bomb must be used or disposed of. Tanks shall not be emptied and then returned to storage because of residual explosive vapors. A minimum air space of 3 percent of the capacity of the bomb is required to prevent rupture due to expansion.
- Empty bombs shall NOT be loaded on the aircraft and then filled with the fire bomb mix. A partially filled bomb is hazardous to both the aircraft and pilot.

5-16. Fill bombs through one or both filling holes to within 1-1/2 inches of bottom of filling hole, leaving a

minimum air space of 3 percent of the capacity of the bomb. Both filler caps should be removed even if the bomb is filled through one hole. Secure caps after filling.

5-17. INSTALLATION OF FUZES AND IGNITERS. Refer to section VII for detailed fuze information and to section VIII for igniter installation procedures.

5-18. DISASSEMBLY. Disassembly is not authorized.

5-19. EMERGENCY PROCEDURES. Filled bombs and components that are damaged or otherwise unserviceable shall be disposed of in accordance with current directives.

5-20. FIRE BOMB MK 77 MOD 4.

5-21. INTRODUCTION. The 500-pound fire bomb MK 77 Mod 4 (figure 5-2) is a non-stabilized, 71-gallon capacity bomb similar to the MK 77 Mod 2. The Mod 4 differs from the Mod 2 in that the igniter adapters have been removed, and the filler holes have been moved from their position in line with the suspension lugs and placed 31 degrees down the side of the bomb. These filler holes provide the primary fuzing configuration. The bomb also has provisions for installing igniters in both ends.

5-22. SPECIFICATION AND DESCRIPTIONS. Specifications for the bomb MK 77 Mod 4 are listed in table 5-2, and the bomb is described in the following paragraphs.

Table 5-2. Specifications for Fire Bomb MK 77 Mod 4

Length of Assembled Bomb (in.)	81.2
Body Diameter (in.)	18.60
Filler Capacity (gal.)	71.0
Weight of Empty Bomb (lb.)	48.00
Weight of Filler (lb.)	426.0
Weight of Assembled Bomb (lb.)	520.0
Drawing	2603656

5-23. Two filler holes are located 31 degrees down the side of the bomb. Each filler hole has a cap with an

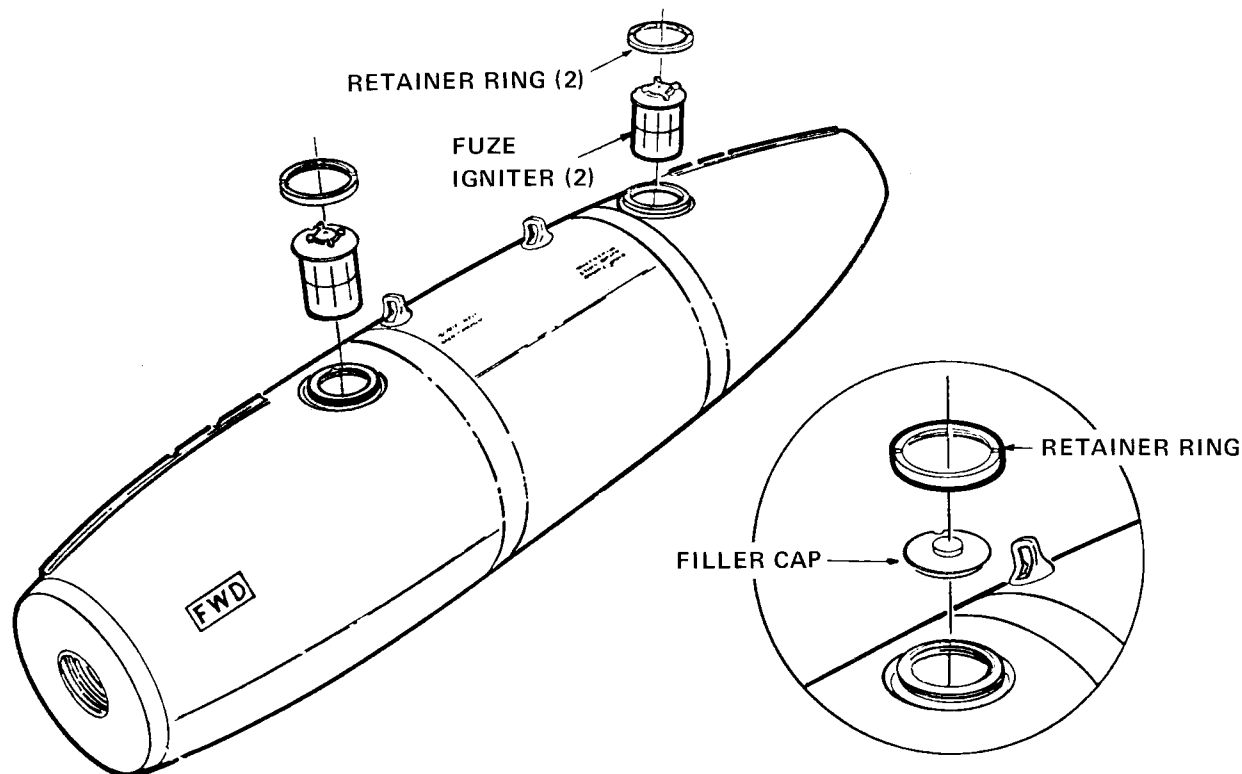


Figure 5-2. 500-Pound Fire Bomb MK 77 Mod 4 — Exploded View

O-ring and a threaded retainer ring for securing the filler cap in place.

5-24. The color of the bomb is the natural aluminum color of the body. Identifying nomenclature is stenciled on the bomb body.

5-25. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). No special ground support equipment or special tools required. Refer to OP 2173/NAVAIR 19-100-1 handling equipment information.

5-26. CONFIGURATION. The MK 77 Mod 4 permits the use of the igniter MK 273 Mod 0 with the fuze M918 or the initiator MK 13 (igniter MK 273 Mod 1 with the fuze MK 343) as the primary fuzing system. The Mod 4 has provisions in the nose and tail for an alternate fuzing system using the fuze AN-M173A1 and igniter AN-M23A1.

5-27. SAFETY. Refer to section II for general safety precautions pertaining to fire bombs.

5-28. PREPARATION FOR USE. MK 77 Mod 4 preparation for use is described in the following paragraphs.

WARNING

Fire bombs are thin-skinned and must be handled with care to avoid puncture.

5-29. Unpacking. Remove bomb body from shipping crate.

5-30. Inspection. Check bomb and suspension lugs for damage, broken weldments, or cracks that might weaken suspension or cause leaks in the casing. Dispose of unserviceable bombs and components in accordance with current directives.

1. Verify presence of filler cap and retainer rings.
2. Check filler caps for presence of sealing gasket.

5-31. FILLING. Refer to NAVAIR 19-1-112 for gel mixing and additional bomb filling procedures.

WARNING

- When filled, a bomb must be used or disposed of. Tanks shall not be emptied and then returned to storage because of residual explosive vapors. A minimum air space of 3 percent of the capacity of the bomb is required to prevent rupture due to expansion.
 - Empty bombs shall NOT be loaded on the aircraft and then filled with fire bomb mix. A partially filled bomb is hazardous to both the aircraft and pilot.
1. Fill bombs through one or both filling holes to within 1-1/2 inches of bottom of filling hole, leaving a minimum air space of 3 percent of the capacity of the

bomb, with filler holes at 12 o'clock position. Both filler caps should be removed, even if bomb is filled through one hole.

2. If using igniter MK 273 Mod 0 or initiator MK 13, install them in filling holes and, using a spanner wrench, secure them into place with the retainer rings.

3. If using igniter M23A1, install filler caps and, using a spanner wrench, secure with the retainer rings.

5-32. INSTALLATION OF FUZES AND IGNITERS. Refer to section VII for details concerning fuze. Refer to section VIII for details concerning the igniter.

5-33. DISASSEMBLY. Disassembly is not authorized.

5-34. EMERGENCY PROCEDURES. Filled, damaged, or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

SECTION VI
PRACTICE BOMBS

6-1. GENERAL.

6-2. There is a wide range of types and weights of practice bombs that simulate a variety of service bombs. Some practice bombs have a fuze or spotting charge, others are completely inert.

6-3. PRACTICE BOMB MK 76 MOD 5.

6-4. INTRODUCTION. The 25-pound practice bomb MK 76 (figure 6-1) has a tear-drop-shaped cast metal body that is centrally bored. The tail tube fits into the end of the bore. The conical afterbody covers the tail tube and is crimped to the body. The fin assembly is welded to the tail tube.

6-5. SPECIFICATIONS AND DESCRIPTION. Specifications for the bomb MK 76 Mod 5 are listed in table 6-1. The bomb is described in the following paragraphs.

Table 6-1. Specifications for Practice Bomb
MK 76 Mod 5

Mod	5
General Arrangement.....	Dwg 2193779
List of Drawings.....	LD 416868
Length of Complete Bomb (with fuze)(in.)	24.7
Weight of Complete Bomb (lb.)	24.55
Signal.....	MK 4 Mods
Suspension Lug.....	P/N 1555268
Firing Pin Assembly.....	MK 1 Mod 0

6-6. In some early production bombs, two 3/8-inch indexing holes are drilled at the center of gravity to properly position the bomb in a practice bomb container.

6-7. The bombs are painted blue. Identification nomenclature is stenciled in white letters on the bomb body. Some Mod 5 bombs have a 1/4-inch thick white stripe painted around the body over the index holes to assist in properly positioning the bomb in a practice bomb container.

6-8. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). Refer to OP 2173/NAVAIR 19-100-1 for appropriate handling equipment.

Nomenclature

Part Number

Plug gauge/bore tool SK923AS503

6-9. The MK 76 Mod 5 Practice bomb has a suspension lug, a firing pin assembly, and a cotter pin to retain the firing pin assembly in the bomb nose. The fin assembly is crimped on the bomb.

6-10. SAFETY. Refer to section II for general safety precautions concerning practice bombs.



Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the bomb toward other persons. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

6-11. PREPARATION FOR USE. Preparation for use is described in the following paragraphs.

6-12. Unpacking. Remove bomb from container.

6-13. Inspection.

1. Remove cotter pin and firing-pin assembly MK 1 from nose and inspect for rust and deformation. Be sure that firing-pin cup is not deformed and that firing-pin point is below lip of its cup.

2. Inspect blast tube for rust and obstructions. Clean as required. If obstructions are noted, proceed as follows:

a. Insert plug gauge/bore tool SK923AS503 into center cavity. The gauge should slide into place until the shoulder rests flush against the bomb. If the gauge shoulder does not rest against the bomb, the cavity is not clear. Proceed as follows:

(1) Hold the bomb steady and tap the end of the gauge with a hammer to drive it into the bomb.

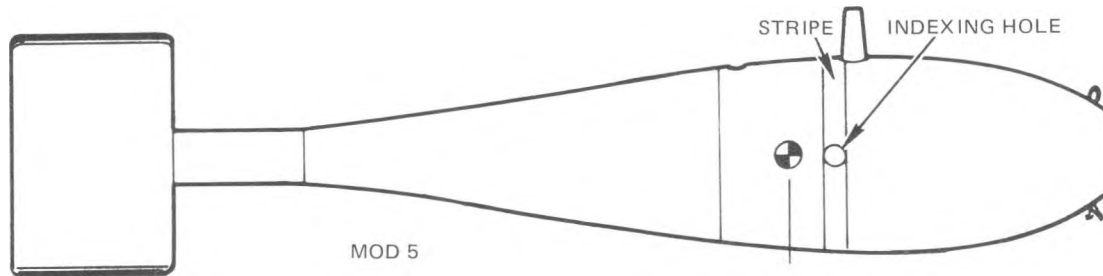


Figure 6-1. Practice Bomb MK 76 Mod 5

NOTE

With bomb standing on the tail end, the inserted gauge will dislodge blocking matter from the cavity.

(2) Remove the gauge and repeat step 2a to check for clearance. If an obstruction still exists, reject the bomb as unserviceable and dispose of it in accordance with current EOD directives.

6-14. ASSEMBLY. Assembly of the bomb is not required. The bomb is received completely assembled and requires only installation of the signal.

6-15. INSTALLATION OF SIGNAL. Install signal as follows:

WARNING

- Signals must not be swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used. Attempting to install a deformed signal may cause detonation.
- Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the bomb toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

- Signals shall not be unpacked in advance of requirements. If unpacked and not used, return to storage.
- Firing-pin assembly and signal must slide into place under their weight. Do not apply pressure to force the signal or firing-pin assembly into the bomb because the assembly may deform and fire the signal.

1. With firing-pin assembly removed, elevate the nose of bomb. Insert practice bomb signal MK 4 Mods, primer end up, and slide gently into place. Do not use force. Base flange of signal cartridge must rest on bore shoulder (about 1-1/4 inches in from nose of bomb).

2. Carefully insert firing-pin assembly with firing pin end toward the signal.

3. Rotate firing-pin assembly so that two notches in lip of forward cup line up with cotter pin holes in nose end of bomb. Do not apply pressure to firing pin during this operation.

4. Insert cotter pin through pin holes in bomb body, passing through notches in firing-pin assembly. Spread ends of cotter pin just enough to retain it in place.

6-16. DISASSEMBLY. Disassembly is not required.

6-17. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

6-18. PRACTICE BOMBS MK 86, MK 87, MK 88.

6-19. INTRODUCTION. Practice bombs MK 86 Mods MK 87, and MK 88 (figure 6-2) are low-drag

OBsolete

bombs of the same size and shape as the low-drag, general-purpose bombs MK 80 series. They have streamlined noses and conically tapered aft ends. Filler holes are located on the top or side. Four tail fins are canted to impart spin to the bomb to ensure good flight stability. The bomb is filled with wet sand. Antifreeze is added to the filler to prevent bursting of the bomb case by freezing of the filler in cold weather. Use of water filled bombs is not authorized.

6-20. SPECIFICATIONS AND DESCRIPTION.

Specifications for the bombs MK 86, MK 87, and MK 88 are listed in table 6-2. The bombs are described in the following paragraphs.

6-21. The bomb is of thin-case construction with internal reinforcement for the sway brace and ejection areas. To provide rigidity, bulkheads and channel reinforcements are used inside the bomb shell.

6-22. **GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS).** Refer to OP 2173/NAVAIR 19-100-1 for handling equipment.

6-23. **CONFIGURATION.** The MK 86, MK 87, and MK 88 are identical except for size and weight. The MK 86 Mod 1 has welded lugs.

6-24. Practice bomb signal MK 4 Mods is used with these bombs. A blast tube extends from the nose to the aft end of the bomb and allows for exit of the signal smoke when fired. The firing-pin assembly and signal

are held in place inside the blast tube by a retaining cotter pin.

6-25. **SAFETY.** Refer to section II for general safety precautions.

6-26. **PREPARATION FOR USE.** Prepare the bomb for use as follows:

6-27. **Unpacking.** Remove bomb assembly from crate.

6-28. **Inspection.**

1. Remove cotter pin and firing-pin assembly MK 1 from nose and inspect for rust or deformation. Be sure that firing-pin cup is not deformed and that firing-pin point is below lip of its cup.

2. Inspect blast tube for rust and deformation. Clean as required.

3. Inspect bomb for damage, such as cracked weldments, that might cause leaks in the bomb casing or damage to suspension lugs.

4. Remove safety wire from suspension lugs.

6-29. **ASSEMBLY.** Assembly includes filling the bomb with wet sand and installing the filler cap, as described below:

1. Remove filler cap from filler hole. Inspect gasket. Damaged gaskets must be replaced.

Table 6-2. Specifications of Sand-Filled Practice Bombs MK 86 Mods, MK 87, and MK 88

	MOD 0	MK 86 MOD 1	MK 87 MOD 0	MK 88 MOD 0
General Arrangement.....	1583317	2116448	1695657	1290158
List of Drawings.....	165797	418759	165798	165799
Length of Assembled Bomb (in.)...	97.0	76.0	90.99	119.8
Body Diameter Maximum (in.)	9.0	9.0	10.75	14.0
Fin Span (in.).....	12.6	12.6	15.06	19.6
Weight of Assembled Bomb (lb)				
Empty Assembled Bomb.....	65.4	65.4	98.0	143.13
Loaded with Wet Sand.....	217	216.5	333	783.13
Practice Bomb Signal.....	MK 4 Mods	MK 4 Mods	MK 4 Mods	MK 4 Mods
Firing Pin.....	MK 1 Mod 0	MK 1 Mod 0	MK 1 Mod 0	MK 1 Mod 0
Lugs	Threaded type	Welded type	Threaded type	Threaded type

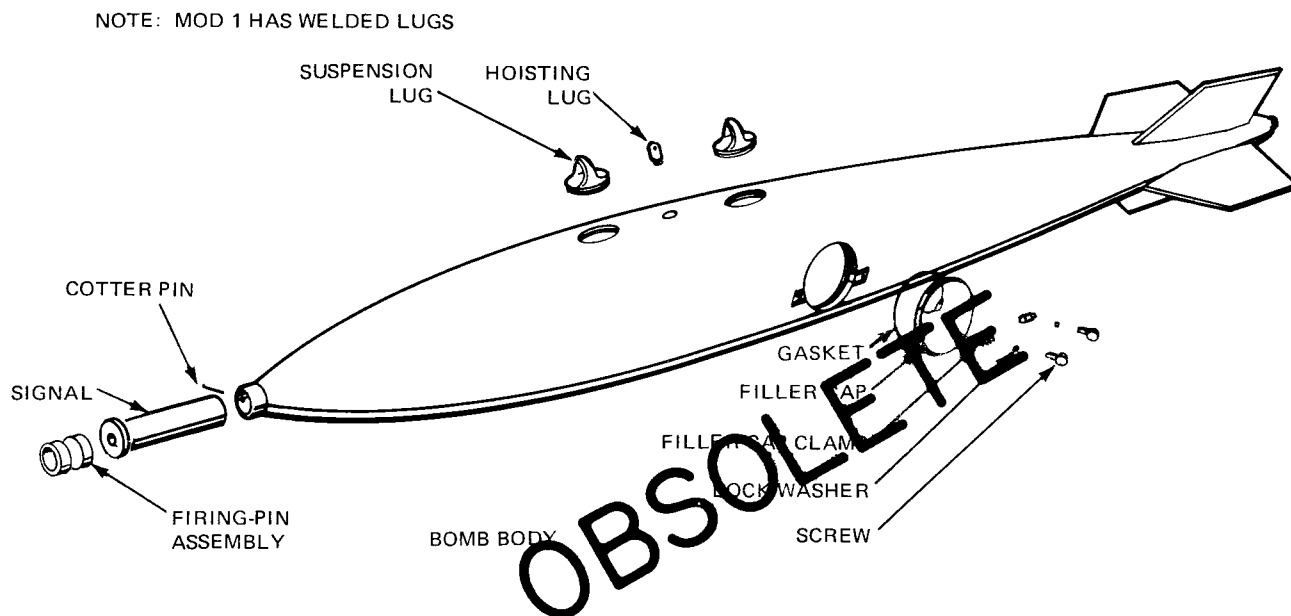


Figure 6-2. Typical Wet Sand-Filled Bomb MK 86, MK 87, or MK 88 — Exploded View

2. Fill bomb with sand and saturate sand with water to obtain maximum weight (table 6-2). For freezing conditions, add antifreeze.

CAUTION

Check to make sure that lockwashers are in place under heads of screws on MK 86 and MK 87 with side filler holes.

3. Replace filler cap. Make sure that gasket and gasket seat are free of loose grains of sand.

4. Apply sealing compound around filler cap to prevent leaks.

- Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the bomb toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

- Signals shall not be unpacked in advance of requirements. If unpacked and not used, return to storage.

- Firing-pin assembly and signal must slide into place under their own weight. Do not apply pressure to force the signal or firing-pin assembly into the bomb because the assembly may deform and fire the signal.

6-30. INSTALLATION OF SIGNAL.

WARNING

- Signals must not be swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used. Attempting to install a deformed signal may cause detonation.

1. With firing-pin assembly removed from bomb, insert signal and slide gently into place. DO NOT force.

2. Carefully insert firing-pin assembly with firing-pin end toward signal.

3. Rotate firing-pin assembly so that two notches in lip of forward cup line up with cotter pin holes in nose of bomb. Do not apply pressure to firing pin during this operation.

4. Insert cotter pin through pin holes in bomb body, passing through notches in firing-pin assembly. Spread ends of cotter pin just enough to remain in place.

6-31. DISASSEMBLY. To remove the signal and firing pin, carry out the steps for their assembly in reverse order and restore the components to their original condition.

6-32. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

6-33. PRACTICE BOMB MK 106 MODS.

6-34. INTRODUCTION. Practice bomb 5-pound MK 106 Mods (figure 6-3) is a thin-cased, cylindrical bomb. It is comprised of a bomb body assembly, a practice bomb signal, and a firing device. The MK 106 Mods are designed for retarded laydown delivery.

6-35. SPECIFICATIONS AND DESCRIPTION. Specifications for the bomb MK 106 Mods are listed in table 6-3. A description of the bomb is contained in following paragraphs.

Table 6-3. Specifications for Practice Bomb MK 106 Mods

Assembly Drawings.....	2518432
List of Drawings.....	2518432
Length of Assembled Bomb (in.).....	18.50
Diameter (in.).....	3.875
Fin Span (in.).....	3.875
Weight of Assembled Bomb (lb).....	5.00
Signal.....	MK 4 Mods
Firing Device.....	LD 534530
	Dwg 2176117
Lug	Retractable

6-36. The practice bomb signal is seated in the inner cylinder of the bomb body. The bomb is coated externally with blue enamel. Identifying nomenclature is labeled in white on the side of the body. One-fourth-inch wide white stripes encircle the body and, on some bombs, are terminated by arrowheads that point to the two index holes.

6-37. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). Refer to OP 2173/NAVAIR 19-100-1 for handling equipment.

6-38. CONFIGURATION. The bomb is compatible for carriage on external bomb racks. Practice bombs MK 106 Mods use firing device Dwg. No. 2176117 to detonate a practice bomb signal MK 4 Mods on impact.

6-39. SAFETY. Refer to section II for general safety precautions.

6-40. PREPARATION FOR USE. Preparation for use is described in the following paragraphs.

6-41. Unpacking. Remove bomb assembly from container.

6-42. Inspection.

1. Remove firing device and sleeve from nose and inspect for rust or deformation.
2. Inspect blast tube for rust and deformation. Clean as required.

6-43. ASSEMBLY PROCEDURES. Assembly of the bomb is not required. The bomb is received completely assembled and requires only installation of the signal.

6-44. INSTALLATION OF SIGNAL. Proceed as follows:

WARNING

- Signals must not be swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used. Attempting to install a deformed signal may cause detonation.
- Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either end of the bomb toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.
- Signals shall not be unpacked in advance of requirements. If unpacked and not used, return to storage.
- Signal must slide into place under its own weight. Do not apply pressure to force the signal into the sleeve or bomb.

1. Insert signal in sleeve.

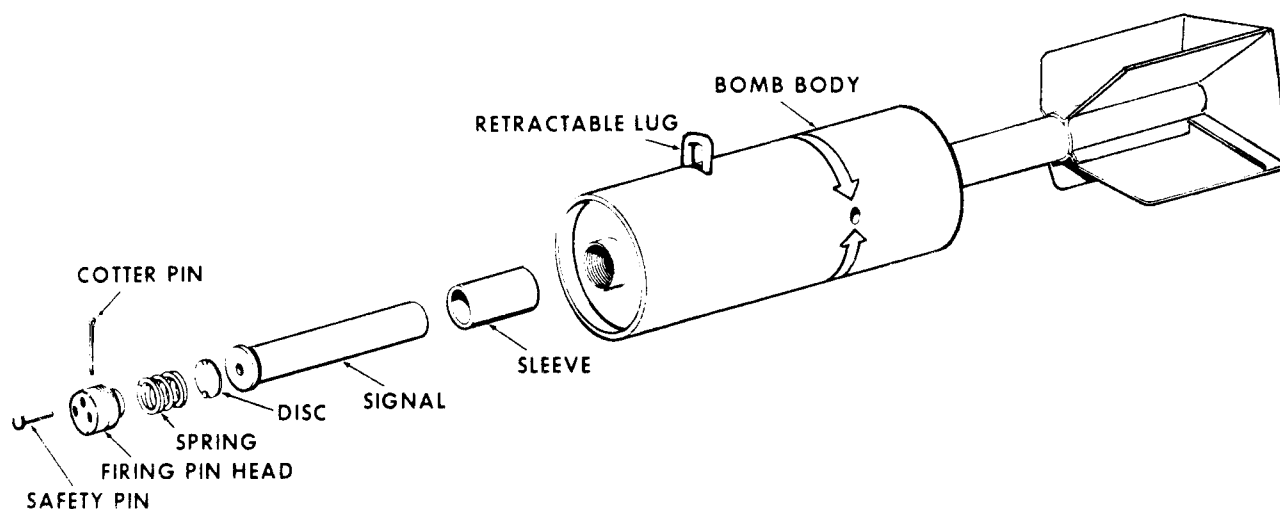


Figure 6-3. Practice Bomb MK 106 Mods

2. With firing device removed, elevate nose of bomb. Insert practice bomb signal MK 4 Mods, primer end up, and slide gently into place. Do not use force. Base flange of signal cartridge must rest on bore shoulder (about 1-1/4 inches in from nose of bomb).

3. Carefully screw firing device into nose of bomb until fully seated with safety disc on end of spring toward signal.

4. Verify that safety pin and cotter pin are installed in firing device.

6-45. DISASSEMBLY. Disassembly is not required.

6-46. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

6-47. PRACTICE BOMB BDU-33D/B.

6-48. INTRODUCTION. The 25-pound practice bomb (figure 6-4) has a tear-drop-shaped cast metal body that is centrally bored. The tail tube fits into the end of the bore. The conical afterbody covers the tail tube and is crimped to the body. The fin assembly is welded to the tail tube.

6-49. SPECIFICATIONS AND DESCRIPTION. Specifications for the BDU-33 D/B are listed in table 6-4. The bomb is described in the following paragraphs.

6-50. The bombs are painted blue. Identification nomenclature is stenciled in white letters on the bomb body.

Table 6-4. Specifications for Practice Bomb BDU-33 D/B

General Arrangement.....	Dwg 7729467
List of Drawings.....	Dwg 7729467
Length of Complete Bomb (with firing pin assembly) (in.).....	23.19
Weight of Complete Bomb (in.) (nominal).....	25.0
Signal.....	MK 4 Mods
Suspension Lug.....	P/N 1555268
Firing Pin Assembly.....	Dwg 7653493

6-51. Two indexing holes are drilled at the center of gravity to properly position the bomb in a practice bomb container.

6-52. The bomb is designed for impact firing. The firing pin assembly consists of a firing pin, a collar and a safety block. The firing pin and collar are held in the proper relationship to each other by a shear pin. The safety block, held on the firing pin head by a safety (cotter) pin, prevents the firing pin from moving aft and firing during ground handling operations with a cartridge loaded bomb. The firing pin assembly is retained in the bomb nose by a retaining cotter pin through the bomb body and the hole in the assembly. The hole diameter in the assembly is larger than the cotter pin diameter to

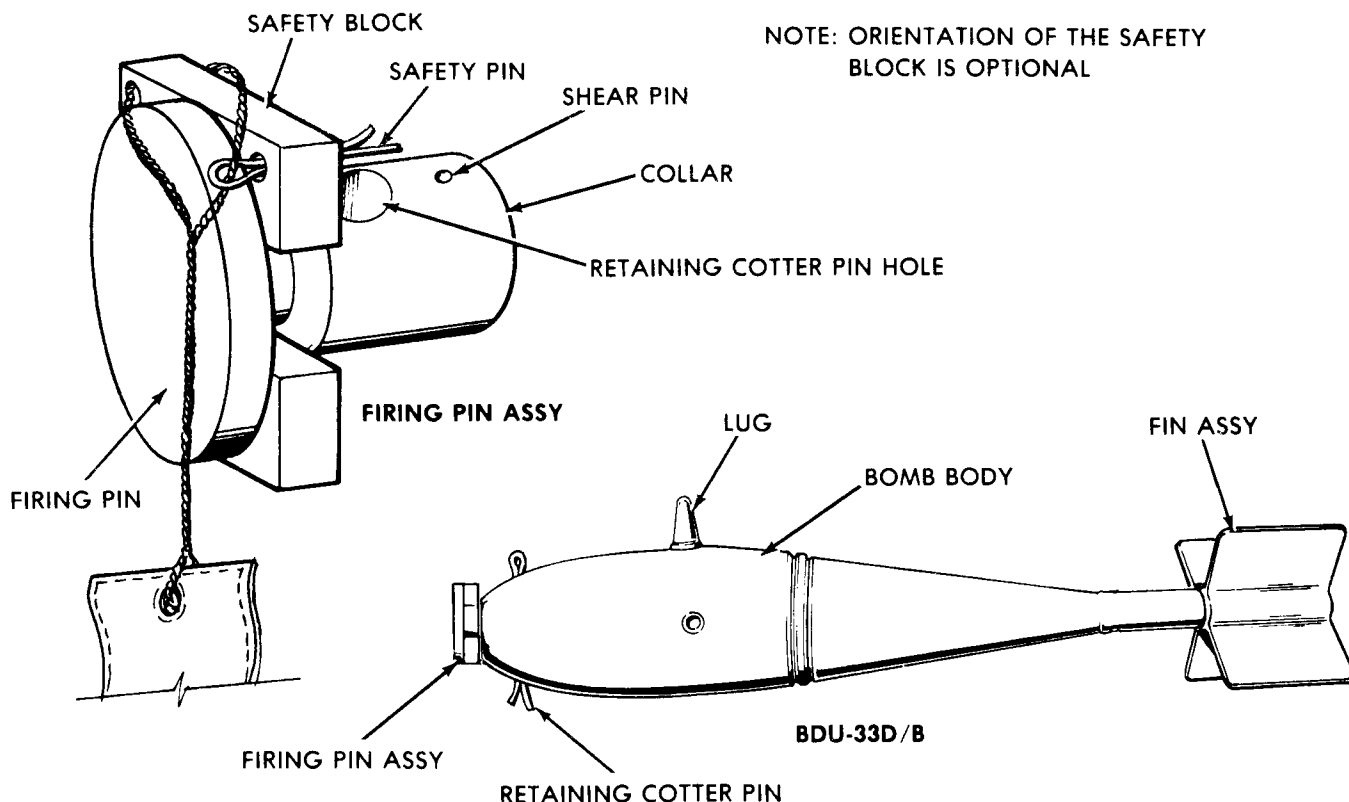


Figure 6-4. Practice Bomb BDU-33D/B

allow the aft movement of the firing pin. When the safety block is removed the collar of the assembly will rest against the rim of the cartridge but the firing pin will be held away from the cartridge primer by the shear pin. Upon impact, the shear pin holding the firing pin and collar is sheared which allows the firing pin to move aft and fire the cartridge.

6-53. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). No special ground support equipment or special tools are required. Refer to OP 2173/NAVAIR 19-000-1 for appropriate handling equipment.

6-54. CONFIGURATION. The BDU-33 D/B practice bomb has a suspension lug, a firing pin assembly and a cotter pin to retain the firing pin assembly in the bomb nose.

6-55. SAFETY. Refer to section II for general safety precautions concerning practice bombs.

WARNING

- Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do not, under any circumstances, point either

end of the bomb toward other persons. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

- The firing pin assembly is highly susceptible to inadvertent actuation when the safety block is not installed on the firing pin. The shear pin, which holds the firing pin stationary in the collar until impact, will shear if the bomb is dropped at an angle that allows the firing pin head to contact the deck. Extra precautions should be taken with cartridge loaded bombs when the safety block has been removed.
- Do not attempt to replace components of or repair a firing pin assembly.
- The thin sidewalls of the firing pin assembly cause the pin to be susceptible to damage even though the safety block is installed. Extra precautions should be taken to avoid bumping or putting side-wise stress on the head of an installed firing pin assembly.
- The safety block must be installed on the firing pin during all ground handling of cartridge loaded bombs.

6-56. PREPARATION FOR USE. Preparation for use is described in the following paragraphs:

6-57. Unpacking. Remove bomb and components from container.

6-58. Inspection.

1. Remove cotter pin from bomb body. Ensure suspension lug and firing pin assemblies are available.
2. Inspect blast tube for rust and obstruction. Clear as required.
3. Check the firing pin assembly as follows:

a. Ensure that the shear pin holding the collar on the firing pin is installed and not broken. (The collar should not move on the firing pin when a twisting motion is applied).

b. Ensure that the firing pin does not protrude through the collar, (if pin protrudes, the shear pin is either broken or not installed).

c. Ensure that the safety block is positioned between the firing pin head and collar and that the safety cotter pin holding the block in position is spread to prevent being blown out or lost during ground handling.

6-59. ASSEMBLY.

1. If not previously installed, install suspension lug. Screw lug into bomb until lug bottoms then back off until lugs crossbar is at 90° to longitudinal axis of the bomb.

6-60. INSTALLATION OF SIGNAL. Install signal as follows:

WARNING

- Signals must not be swollen or deformed in any manner. The primer must be flush with or slightly below the base of the cartridge. Signal cartridges that are deformed in any way shall not be used. Attempting to install a deformed signal may cause detonation.
- Be extremely careful when handling practice bombs loaded with signals. Jarring or dropping the bomb may detonate the signal. Do

not, under any circumstances, point either end of the bomb toward other personnel. Loaders must not place their bodies in line with the nose or tail ends of the bombs.

- Signals shall not be unpacked in advance of requirements. If unpacked and not used, return to storage.
- Signal and firing pin assemblies must slide into place under their own weight. Do not apply pressure to force the signal or firing pin assembly into the bomb.

1. With firing pin assembly removed, elevate the nose of bomb. Insert practice bomb signal, primer end up, and slide gently into place. Do not use force. Base flange of signal cartridge must rest on bore shoulder (about 1-1/4 inches in from nose of bomb).

WARNING

The safety block must be installed on the firing pin assembly prior to installing the assembly in a cartridge loaded practice bomb.

2. Ensure safety block is installed on firing pin assembly.

3. Align hole in firing pin assembly with cotter pin holes in nose of bomb. Carefully insert firing pin assembly in bomb nose until safety block rests against nose of bomb.

4. Insert cotter pin through pin holes in bomb body, and through the hole on the firing pin assembly. Spread ends of the cotter pin enough to retain it in place.

6-61. DISASSEMBLY. Disassembly is not required.

6-62. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

6-63. PRACTICE BOMB, BDU-45/B.

6-64. INTRODUCTION. The BDU-45/B practice bomb (figure 6-5) is a low-drag type of the same size and shape as the MK 82 series general-purpose bomb (table 3-1). The aft portion of the bomb has two receptacles, located 180 degrees apart, each designed to hold a CXU-4/B spotting charge (figure 6-6). The bomb body is filled with an inert filler during the manufacturing process.

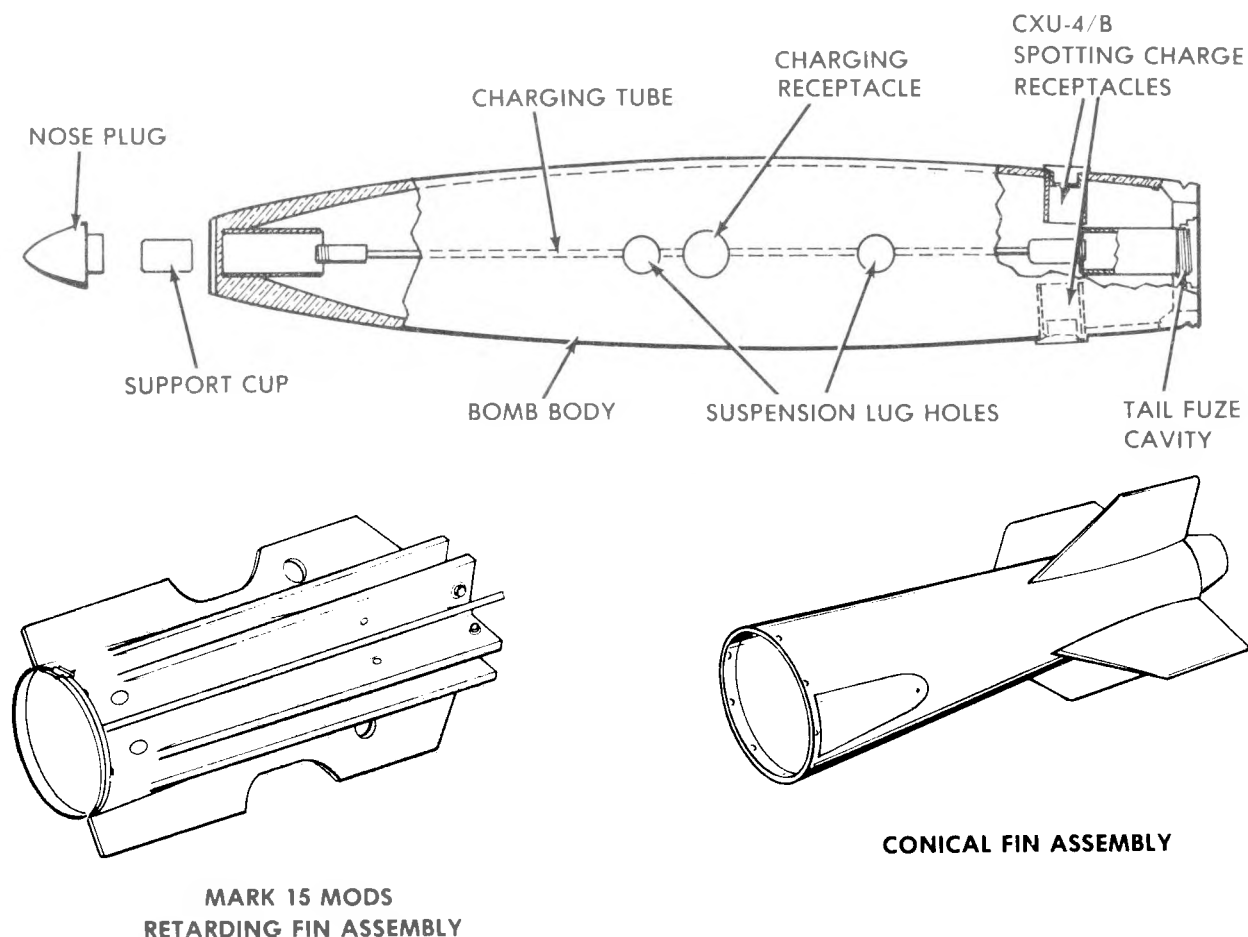


Figure 6-5. BDU-45/B Practice Bomb, Sectional View

6-65. SPECIFICATIONS AND DESCRIPTION. Specifications for the BDU-45/B practice bomb are listed in table 6-5. A description of the bomb and spotting charge is contained in the following paragraphs.

6-66. Spotting Charge. The spotting charge consists of titanium tetrachloride in a glass bottle, which is encapsulated in a cylindrical metal case. The metal case is designed to fit into the spotting-charge receptacles in the bomb case.

NOTE

For further information on titanium tetrachloride, which is classified as a Group B chemical ammunition (Type FM), see NAVSEA OP 5.

Table 6-5. Specifications for BDU-45/B Practice Bomb and CXU-4/B Spotting Charge

BDU-45/B with CXU-4/B	
General Arrangement.....	Drawing 923AS126
BDU-45/B Practice Bomb.....	Drawing 923AS115
List of Drawings.....	LD 923AS126
Length of Bomb Case (in.).....	61.38
Diameter (in.).....	10.75
Weight w/o Fins (lb).....	500
Suspension Lug Spacing (in.).....	14
Suspension Lugs.....	MS3314
Conical Fin.....	MK 82, MAU 93
Retarding Fin.....	MK 15 Mods 1,2,3,4
CXU-4/B Spotting Charge.....	Drawing 923AS120

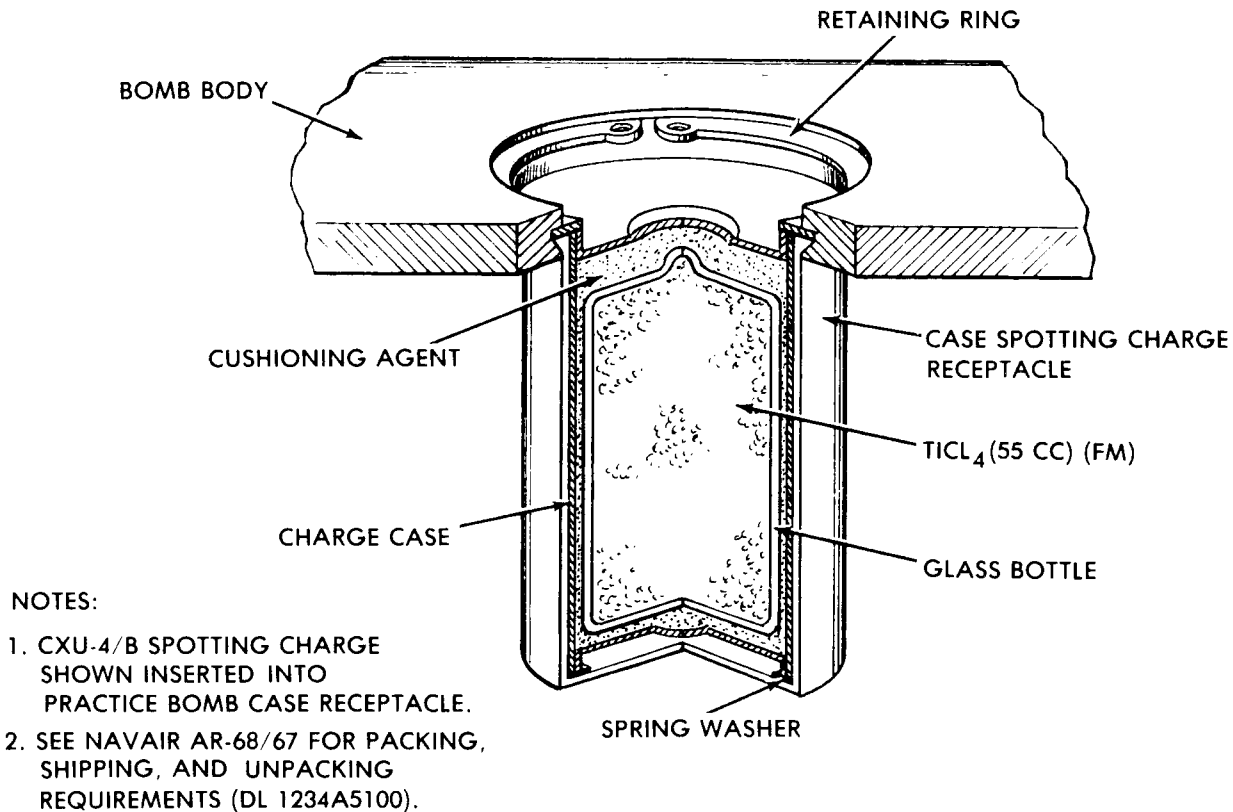


Figure 6-6. CXU-4/B Spotting Charge, Bomb — Sectional View

6-67. Day Use. For daytime bombing practice, the CXU-4/B spotting charges are inserted into the bomb-case receptacles. Upon detonation of the fuze tetryl booster, the FM from the spotting charges is dispersed into the air; when combined with the moisture in the air, a white cloud is formed and indicates fuze functioning.

6-68. Night Use. For nighttime bombing practice, the spotting charges are not used; the flash from the fuze tetryl booster indicates fuze functioning.

6-69. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). Installation and removal of the spotting charges from the bomb-case receptacles (figure 6-5) requires Truarc #5 (Proto 394, or equivalent) internal retaining-ring pliers to install or remove the retaining rings. Refer to NAVAIR 19-100-1.1/OP 2173 for appropriate ground support equipment.

CAUTION

When using the MK 43 TDD to obtain a proximity height of burst, only the VT fuze option should be used. Use of DLY 1 or DLY 2 can preclude indication of fuze function if the MK 43 TDD fails but the fuze functions in the delay mode after ground impact.

6-70. CONFIGURATION. Electric fuzing (MK 344 or MK 376) is to be used in the practice bomb tail. When only tail fuzing is used, a support cup and steel nose plug should be inserted into the nose cavity to prevent collapse upon heavy impact. When required, instead of the support cup and steel nose plug, a MK 43 Target Detecting Device (TDD) may be used in the nose to give a proximity height of burst. (See section VIII.) Steel nose plugs and support cups are available through normal supply channels. When using electric fuzing, remove the plug from the charging receptacle well (figure 6-5).

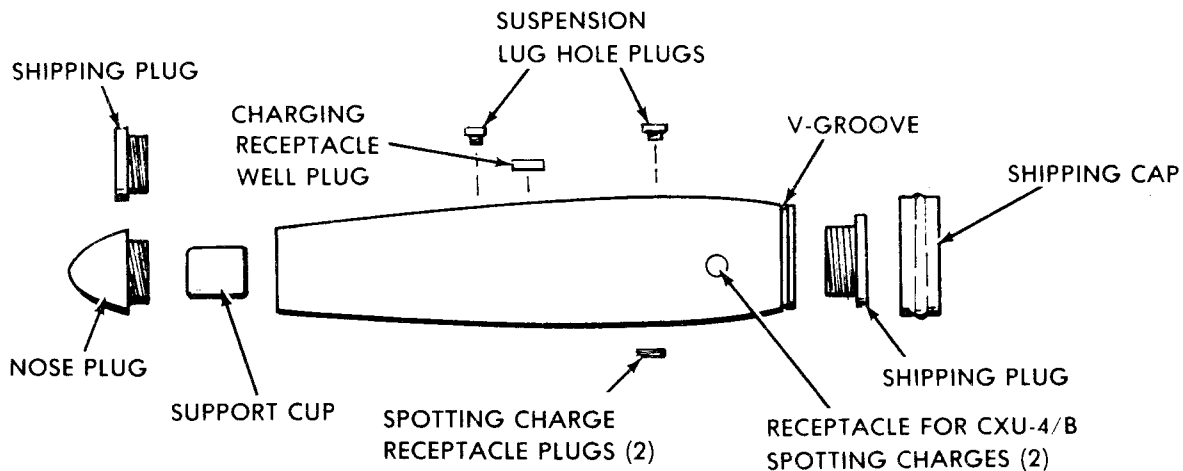


Figure 6-7. BDU-45/B Practice Bomb — Exploded View (Shipping Configuration)

6-71. SAFETY. Refer to section II for general safety precautions concerning practice bombs.

6-72. PREPARATION FOR USE. Preparation for use is described in the following paragraphs.

CAUTION

Use of unauthorized handling equipment can result in damage to the electrical cable connector in the nose and tail wells of bombs.

6-73. Unpacking. Depalletize the bomb body and place it on an appropriate bomb skid or assembly stand. (See figure 6-7 for exploded view of shipping configuration.)

1. Remove shipping cap from aft end of body.
2. Remove shipping plugs from nose well and aft end well.
3. Remove plugs from both suspension lug holes.
4. Remove shipping plugs from spotting charge receptacles.

6-74. Inspection. Inspect practice bomb for damage, stripped threads, cracks, or broken welds. Make certain that V-groove in aft end of body is clean and undamaged. Check that fuze cavities and spotting charge cavities are clean and dry. Since electric tail fuzeing is to be used, check that electrical connectors are not corroded or damaged. Damaged or otherwise unserviceable bombs shall be disposed of in accordance with applicable directives.

6-75. ASSEMBLY. Assemble practice bomb BDU-45/B as follows:

1. Check that the bottoms of the suspension lug eyes (figure 3-4) are flush with the weapon surface.
2. (If required for daytime operation) Install spotting charge CXU-4/B in accordance with section VIII.

NOTE

The spotting charges CXU-4/B may be installed or removed from a retarding finned bomb by opening the fins.

3. Install support cup and steel nose plug on MK 43 TDD as applicable in bomb body. Refer to section VIII for MK 43 TDD installation.

4. If TDD installed, perform electric bomb fuze circuit continuity test in accordance with section IV.

5. Install electric fuze in accordance with section VII.

6. Perform electric bomb fuze circuit continuity test in accordance with section IV.

7. Install conical or retarding fin assembly in accordance with section III.

8. Install arming safety switch in accordance with section VIII.

6-76. DISASSEMBLY. Disassemble practice bomb BDU-45/B as follows:

1. Remove arming safety switch MK 122 in accordance with section VIII.

2. Remove conical or retarding fin in accordance with section III.

3. Remove spotting charge CXU-4/B in accordance with section VIII.

4. Remove electric fuze and MK 43 TDD in accordance with section VII.

5. Return all serviceable components to storage.

6-77. EMERGENCY PROCEDURES. Dispose of damaged or otherwise defective or unserviceable practice bombs and components in accordance with applicable directives.

SECTION VII

FUZES

7-1. GENERAL.

7-2. Fuzes are most conveniently divided into two categories: (1) mechanical, and (2) electric. Bomb fuzes are described under their appropriate categories in this section. Refer to Tactical Manuals for all operational restrictions regarding fuzes and fuze applications.

7-3. MECHANICAL BOMB FUZES.

7-4. A mechanical fuze (figure 7-1) contains a striking device that comes into contact with a detonator to initiate the explosive train of a bomb. Basically, the fuze consists of an arming vane, a mechanism for arming the fuze, a striker, and a detonator. The arming vane is secured by an arming wire during flight. When released, rotation of the arming vane provides the mechanical energy to arm the fuze. When armed, the striker and ex-

plosive train are aligned and the striker is free to be driven into the detonator. The following paragraphs describe the various types of fuzes in use.

7-5. **FIRE BOMB INITIATOR MK 13 MOD 0.** Fire bomb initiator MK 13 Mod 0 (figure 7-2) is installed in both filler holes of fire bomb MK 77 Mod 4. The initiator consists of mechanical impact bomb fuze MK 343 Mod 0 (figures 7-3 and 7-4) and igniter MK 273 Mod 1.

7-6. **Specifications and Description.** Specifications for the fuze MK 343 used in the initiator MK 13 Mod 0 are listed in the summary sheet, appendix C. Initiator MK 13 Mod 0 is described in the following paragraphs.

7-7. *Fuze MK 343.* Fuze MK 343, an inertia-firing impact fuze, is armed by a combination of vane action and mechanical timer, which ensures environmental

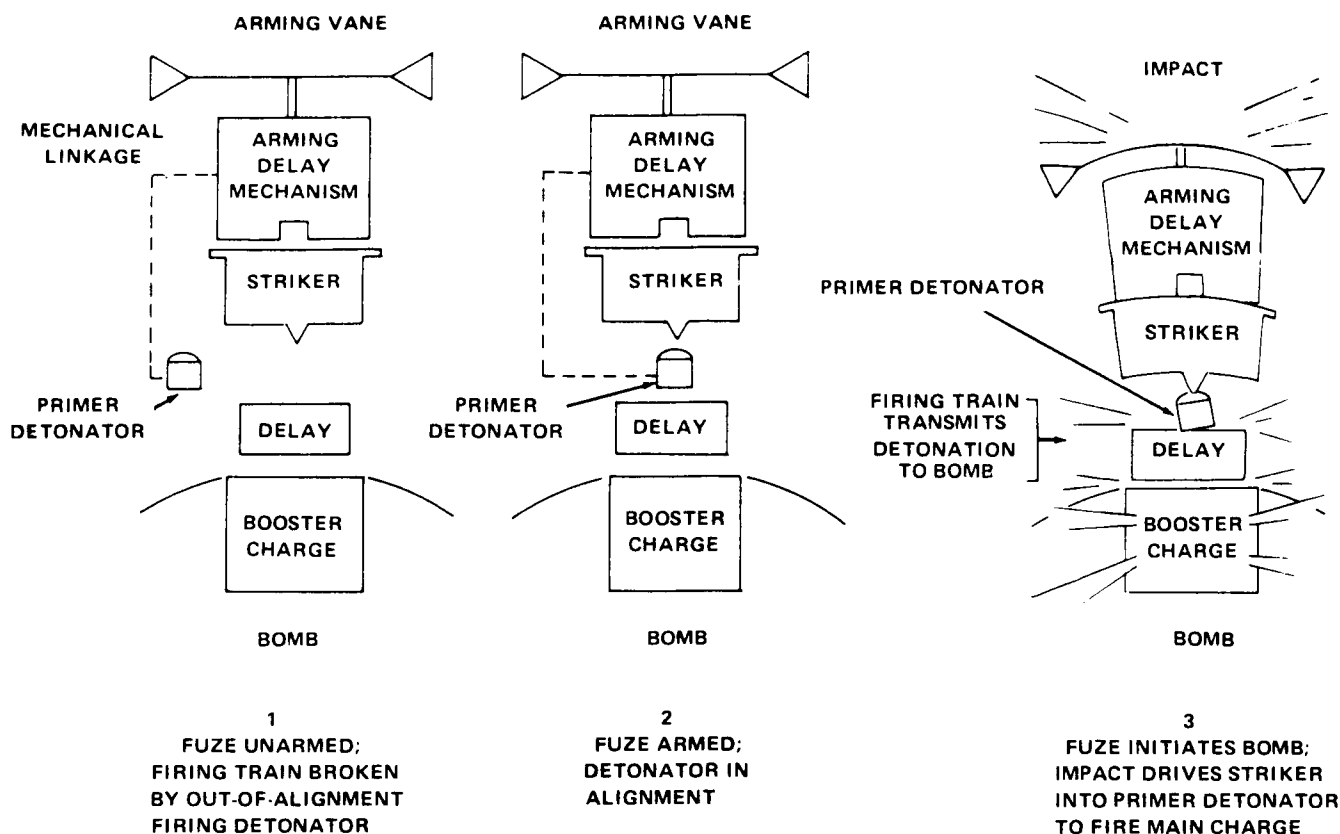


Figure 7-1. Typical Mechanical Bomb Fuze

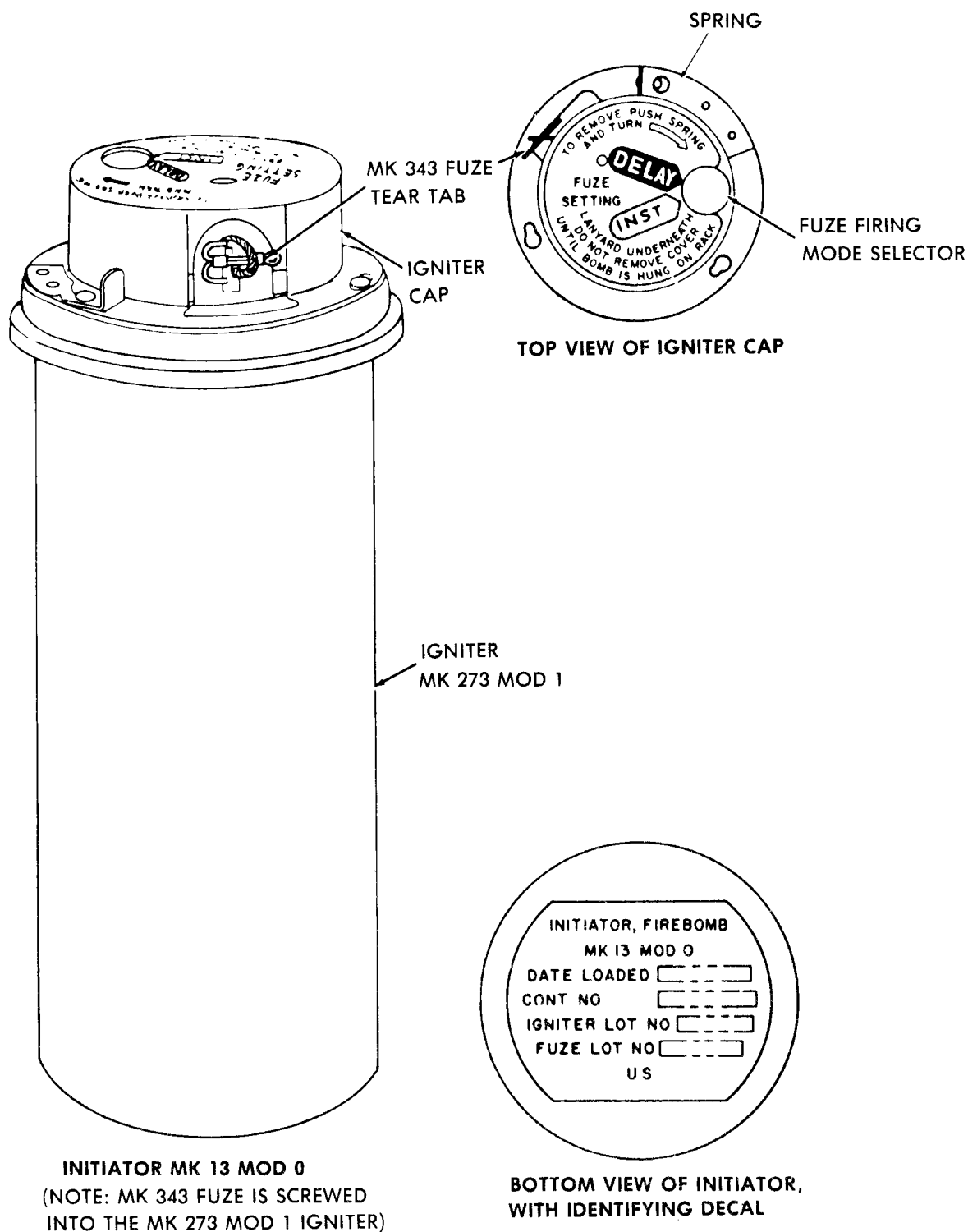


Figure 7-2. Fire Bomb Initiator MK 13 Mod 0 — External View

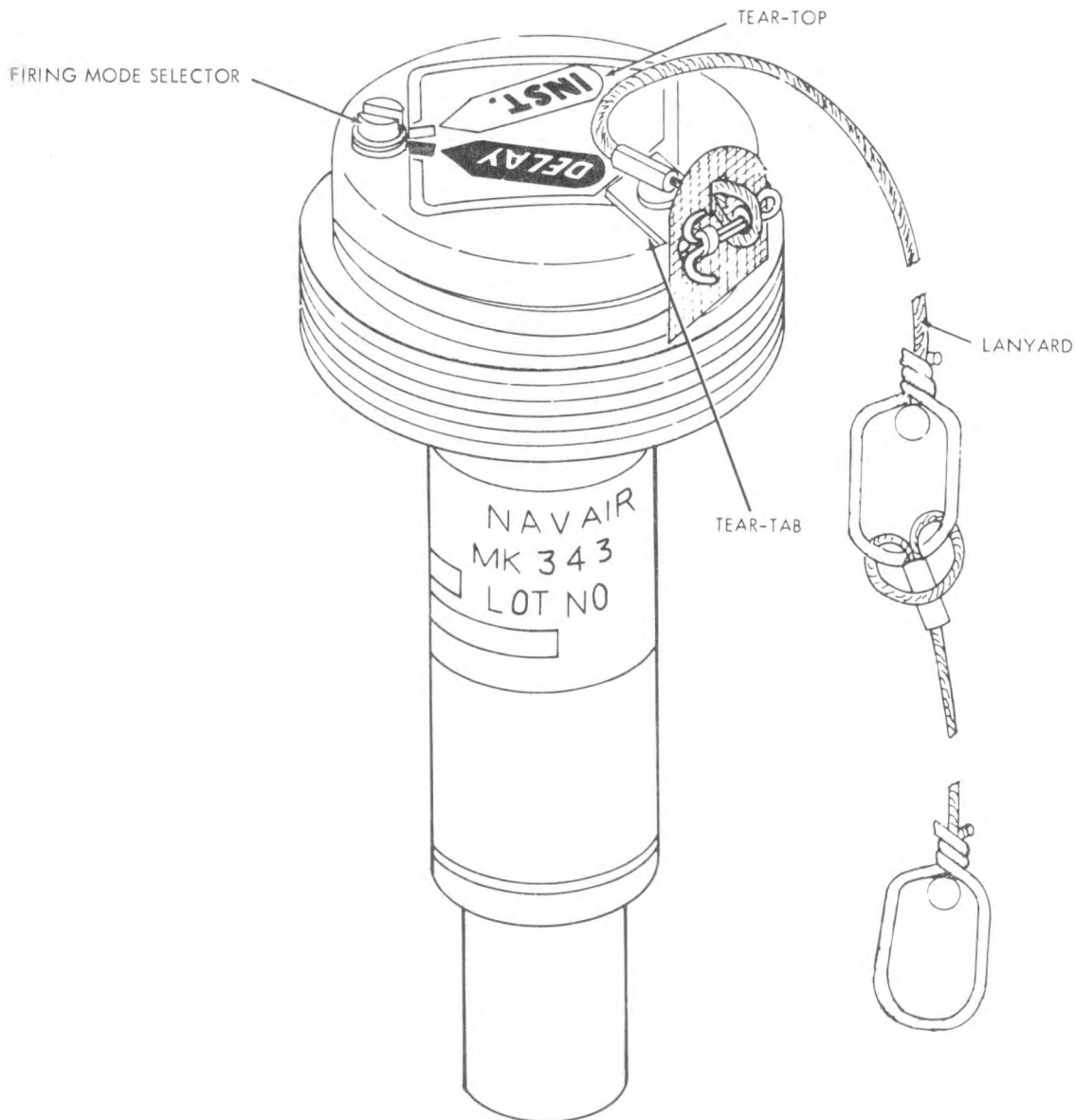


Figure 7-3. Mechanical Impact Bomb Fuze MK 343 Mod 0 — External View

safety. The fuze must be set before flight for either instantaneous or delay functioning.

7-8. The top of fuze MK 343 contains a square tear-top (figure 7-3), which is attached to the bomb rack solenoid by a lanyard. The lanyard tears away the prescored tear-top upon release of the weapon. A second lanyard is packed in the cover assembly for certain applications. Refer to the applicable Airborne Weapons/Stores Loading Manual. The fuze tear tab is oriented by fitting a key in the flange of the bomb into the notch of the igniter. Removal of the tear-top in-

itiates two separate and simultaneous arming actions: (1) an arming vane pops up and rotates in the airstream and (2) a timing mechanism is started (figure 7-4).

7-9. Rotation of the arming vane causes the attached arming pin to be threaded upward. This upward movement of the arming pin releases the locking balls and frees the firing mechanisms. Continued upward movement of the arming pin unlocks the latch pin. This action must be completed prior to timing gear alignment or the fuze will dud.

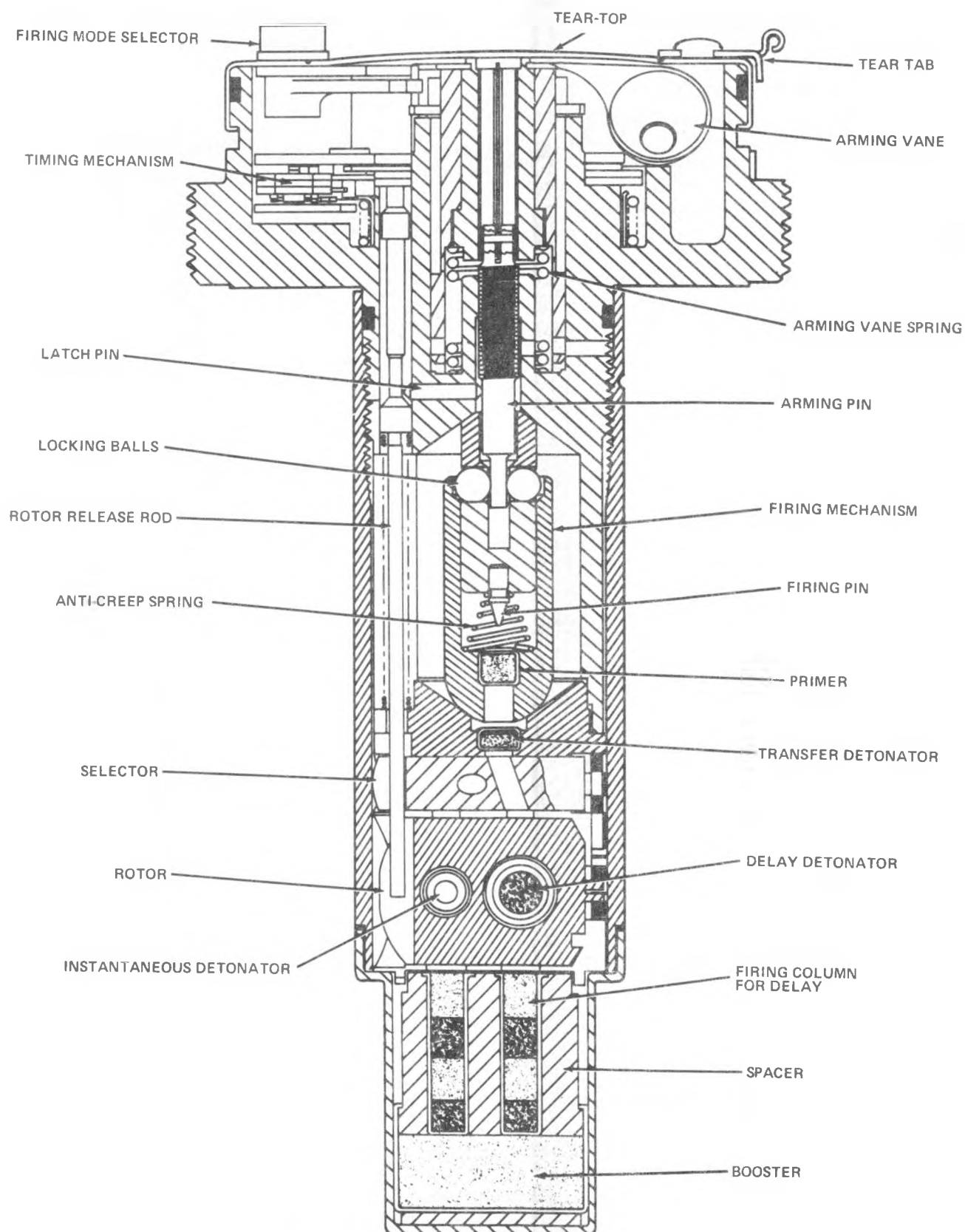


Figure 7-4. Mechanical Bomb Fuze MK 343 Mod 0 — Cross Section View

7-10. Concurrent with arming-vane rotation, the timing mechanism rotates the main timing gear so that a slotted hole in the gear aligns with the rotor release rod. This occurs in 1.0 ± 0.2 seconds after removal of the tear-top. When the slotted hole in the gear aligns with the rotor release rod, the rod moves upward, pushes the latch pin away, and extends through the hole. The upward movement of the motor release rod frees the rotor so that it may rotate, bringing the explosive train into alignment.

7-11. During the arming sequence, if the arming vane has not rotated sufficiently to release the latch pin, the latch pin will permit only the tip of the rotor release rod to extend into the hole in the main timing gear. The timing gear will continue to rotate until the slotted hole binds on the tip of the rotor release rod, resulting in a dud fuze. This action provides environmental safing, requiring that the arming vane rotate at a speed comparable to that of an aircraft-delivered bomb.

7-12. Selection of the function delay is made before flight by aligning the slot in the firing mode selector indicator with the desired indication on the tear-top decal. The INST (instantaneous) function is selected when using gelled JP-5, or for water targets when using gelled AVGAS, MOGAS, or JP-4.

7-13. When DELAY is selected, the firing mode selector indicator limits the upward movement of the rotor release rod after it passes through the main timing gear of the timing mechanism. The rotor release rod is restricted so that it clears only the rotor, allowing only the delay detonator to be aligned with the delay firing column. When INST (instantaneous) is selected, the firing mode selector indicator is rotated to one side. This allows the rotor release rod to move upward and release both the rotor and the selector, aligning the instantaneous firing column. When the fuze is set for instantaneous, the fuze always arms first in the delay mode and then arms in the instantaneous mode.

7-14. *Igniter MK 273 Mod 1.* Igniter MK 273 Mod 1 (figure 7-2) is a flanged, cylindrical container filled with magnesium-teflon powder and pellets. The external surface of the igniter may have one circumferential groove and eight longitudinal grooves, depending on manufacturing processes. It has an O-ring and a notch for initiator orientation.

7-15. After fire bomb is released from the aircraft and the fuze has armed, impact to the bomb from any direction will detonate the fuze booster, burst the igniter, and ignite the magnesium-teflon powder and the

magnesium-teflon pellets. At the same time, the fuze booster propels the pellets in all directions. The pellets that reach the gelled fuel will ignite it.

7-16. Configuration. Initiator MK 13 Mod 0 is issued as an assembled combination comprising the fuze MK 343 Mod 0 and igniter MK 273 Mod 1. The fuze MK 343 Mod 0 is compatible only with the igniter MK 273 Mod 1. Initiator MK 13 Mod 0 is installed in the filler holes of fire bomb MK 77 Mod 4 immediately after the bomb has been filled.

7-17. Safety. Fuze MK 343 Mod 0 contains an out-of-line explosive train that is armed by concurrent rotation of the arming vane and movement of the timing mechanism. The fuze is designed to be armed at speeds above 225 knots, but can be armed by speeds as low as 80 knots.

7-18. In the event of a fire involving the initiator, high temperatures and flying metal particles will be present. Avoid prolonged breathing of fumes.

7-19. A pull on the tear-tab that lifts the corner of the tear-top even slightly allows the timing mechanism to start and run down without concurrent arming vane rotation, resulting in a dud fuze. Refer to section II for general safety precautions.

7-20. Preparation for Use. Preparation for use is described in the following paragraphs.

WARNING

In the event of fire involving the initiator, high temperatures and flying metal particles will be present. Avoid prolonged breathing of fumes.

7-21. *Unpacking.* Remove the initiator from the container.

7-22. *Inspection.* Inspect the initiator as follows. Reject all items that do not satisfy inspection requirements.

1. Verify that date on previously opened containers indicates that fuze has been repackaged within the preceding 30 days.

WARNING

Fuzes with tear-top torn off and the arming vane popped up are assumed to be armed. Call EOD personnel immediately.

2. Verify that tear-top has not been torn off or opened even slightly.

3. Inspect for evidence of structural damage and corrosion.

4. Replace spare lanyard in cover and replace cover on initiator.

7-23. Installation. Install initiator as follows:

1. Immediately after fire bomb has been filled, verify presence of O-ring on initiator; install into a filler hole. Make sure that notch in igniter mates with key on filler hole ring. This ensures proper orientation of fuze tear-tab.

NOTE

The safety features built into the fuze MK 343 Mod 0 permit initiator installation immediately after filling.

2. Use spanner to secure initiator with filler cap retaining ring.

3. Repeat steps 1 and 2 with a second initiator MK 13 Mod 0 for other filler holes.

4. Set fuze function time.

7-24. Removal. Remove the initiator as follows:

1. Verify that tear-top is in place.

WARNING

Assume the fuzes with tear-top torn off and the arming vane popped up are armed. Call EOD - they will determine whether the fuze is armed.

2. Rotate bomb to orient initiators at top.

3. Remove both initiators from fire bomb and replace filler caps.

4. Wipe fuel initiators and return to containers.

5. Mark date on container.

7-25. Emergency Procedures. In the event of obvious defects, such as cuts or ruptured cases, notify EOD.

7-26. MECHANICAL BOMB FUZE AN-M173A1. Mechanical bomb fuze AN-M173A1 (figures 7-5 and 7-6) with igniter AN-M23A1 is installed in the nose and tail fuze cavities of fire bombs. The fuze is an inertia-firing, impact, multiposition fuze that is armed by vane action. The fuze functions instantaneously.

7-27. Specifications and Description. Specifications for the fuze AN-M173A1 are listed in the summary sheet, appendix C. A description of the fuze is contained in the following paragraphs.

7-28. Basic components of the fuze are a four-blade arming vane with attached arming stem, fuze head, fuze body, booster cup, firing plunger, primer holder, and explosive elements. The assembled components are shown in figure 7-6.

7-29. Two off-center pairs of holes through the hub of the arming vane accommodate a safety cotter pin and an arming wire. Insertion of either the safety pin or arming wire through the hub prevents rotation of the arming vane and subsequent arming of the fuze.

7-30. The fuze head is externally threaded for installation in the igniter, and internally threaded to receive the arming stem. An externally threaded shoulder at the base of the fuze head receives the body, which similarly receives the booster cup. The firing plunger and primer holder, contained within the body, constitute the firing mechanism, which has a ball-lock feature used with the arming stem for safety prior to arming. The firing mechanism consists of the firing plunger, which contains a firing pin, an anticreep spring, locking balls, primer holders, and Primer M26. In addition to the primer, the fuze contains Detonator M31, which provides instantaneous functioning, and a tetryl booster pellet.

7-31. The detonator is secured in the body in alignment with and between the primer and the booster pellet.

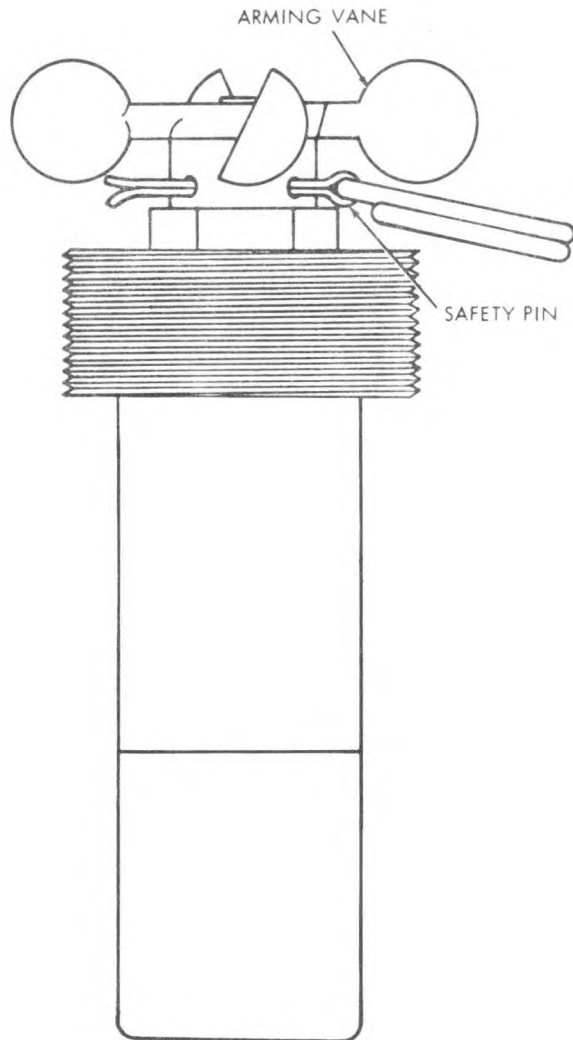


Figure 7-5. Mechanical Bomb Fuze AN-M173A1

7-32. Immediately after the arming wire is withdrawn, the arming vane starts rotating in the airstream. After making approximately 18 revolutions, the arming stem is unscrewed enough to clear the locking balls. In this condition, the fuze is partially armed and will function if the force of impact is exerted in a line nearly parallel to the longitudinal axis of the fuze. Functioning at this stage is a characteristic of the design and has no tactical application.

7-33. Continued rotation of the arming vane, until it makes approximately 45 revolutions, withdraws the arming stem from the firing plunger. With the arming stem withdrawn, the fuze is fully armed; the unit consisting of the firing plunger and primer holder assemblies is free to respond to impact force from any direction.

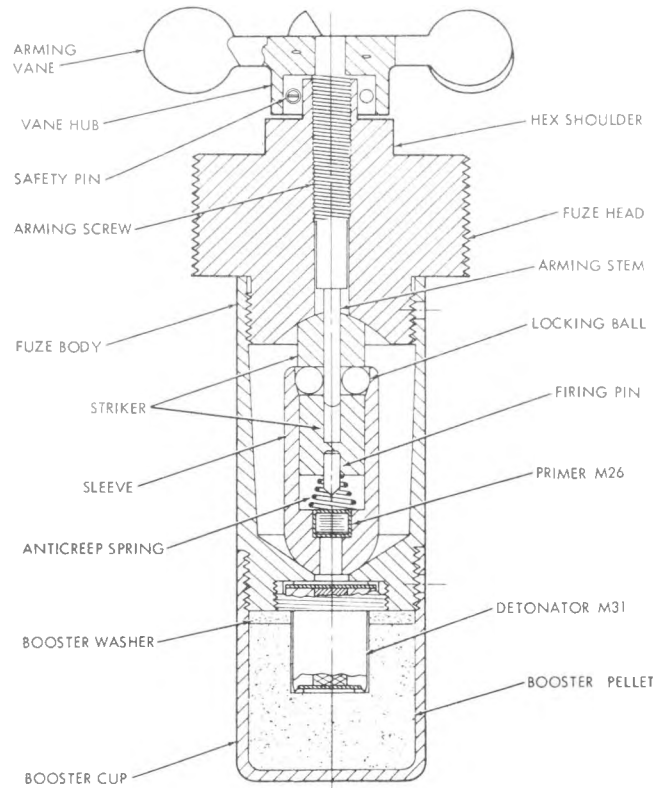


Figure 7-6. AN-M173A-1 — Sectional View

7-34. **Configuration.** Arming time required by the fuze AN-M173A1 varies inversely with the airspeed on the delivery aircraft. Arming times are approximately 1.2 seconds at 200 knots, 0.8 second at 350 knots, and 0.6 second at 500 knots.

7-35. **Safety.** This fuze contains an in-line explosive train and, consequently, is not classified as being detonator-safe. A safety pin inserted through the vane hub prevents premature arming of the fuze. The safety pin is withdrawn only after an arming wire is installed. Refer to section II and OP 3347 for additional safety precautions.

7-36. The explosive train of the fuze remains in alignment at all times. The fuze must be handled carefully, as severe shock could initiate the primer. This lack of an out-of-line explosive train establishes the possibility of initiation from the shock of impact on a hard target, even though released safe.

7-37. If the distance between vane hub and hex shoulder exceeds 1/8 inch, the fuze shall be considered armed and will be disposed of by qualified EOD personnel.

7-38. Preparation for Use. Preparation for use is described in the following paragraphs.

WARNING

- This fuze contains an in-line explosive train and shall not be dropped or roughly handled. An accidental explosion may occur, even in a sealed container or packaging box.
- Never use a fuze if the safety pin is missing or if the fuze is armed or partially armed. Do not withdraw the safety pin from a fuze until the arming wire is installed. Do not attempt to disarm a partially armed or armed fuze by screwing down the arming vane; detonation may occur. Notify EOD personnel immediately.

7-39. Unpacking. Remove the fuze from the tear-strip can.

WARNING

If the distance between the vane hub and hex shoulder exceed 1/8-inch, or if the vane is missing, the fuze shall be disposed of by EOD personnel.

7-40. Inspection. Inspect fuze for any evidence of damage. Reject all fuzes showing structural damage or corrosion. Inspect for safety pin and 1/8-inch clearance between vane head and hex shoulder.

NOTE

The fire bomb should be installed on the aircraft before the fuzes are installed. For detailed fuzing procedures, refer to appropriate Airborne Weapons/Stores Loading Manual.

7-41. Installation. Refer to the appropriate Airborne Weapons/Stores Loading Manual for installation of the fuze igniter and arming wire.

7-42. Removal. Refer to the appropriate Airborne Weapons/Stores Loading Manual for fuze removal procedures.

7-43. Emergency Procedures. If fuzes are found to be armed or partially armed, or if the fuze safety pin is missing, notify EOD.

7-44. MECHANICAL LONG-DELAY TAIL FUZE MK 346 Mod 0. Mechanical long-delay tail fuze MK 346 Mod 0 (figure 7-7) is an all-mechanical clockwork time fuze used in low-drag and retarded weapons. The fuze incorporates two-stage arming which affords an additional measure of safety for carrier and field landings.

7-45. Specifications and Description. Specifications for the MK 346 Mod 0 are listed in the summary sheet, appendix C. A description of the fuze is contained in the following paragraphs.

7-46. The functioning delay is variable from 30 minutes to 33 hours in 15-minute increments and must be preset before fuze installation. The MK 346 fuze uses an antiremoval feature to impede removal of an armed fuze.

7-47. The first stage of the two-stage arming is initiated upon weapon release. Approximately 45 revolutions of the input shaft at 1200 rpm or more are required to complete this stage. When coupled to a governed-drive arming assembly, first stage arming times for low-drag and unretarded weapons will vary from 1.5 to 2 seconds. For retarded weapons, the arming time can be up to 4 seconds. (The shock of retarded fin opening causes the arming vane of the arming assembly to momentarily lose speed, thus extending the arming time.) When coupled to an ungoverned-drive arming assembly, first-stage arming times for all weapons will be less than 1.0 second. Second-stage arming is completed on impact. Second-stage arming aligns the fuze firing train, initiates the delay-to-burst timer, and allows the antiremoval feature to engage.

7-48. The antiremoval mechanism consists of a toothed cam on the inner or base end of the fuze; the cam effectively jams the fuze into the adapter-booster. The tail adapter-booster is retained in the bomb fuze well by a locking pin fitted into the groove of the well. The entire assembly is locked into the bomb so that removal under field conditions is extremely difficult after the fuze has second-stage armed at impact.

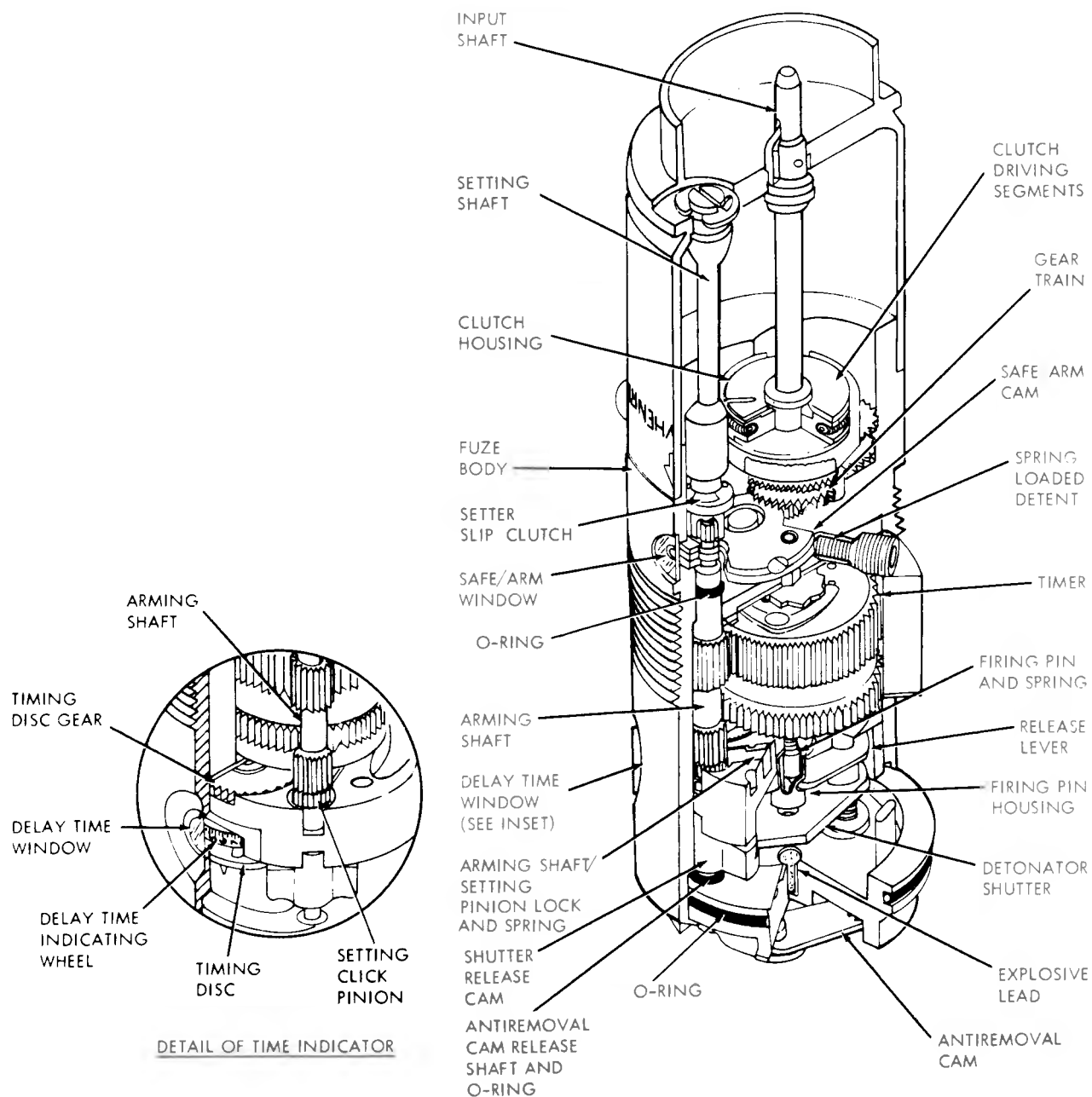


Figure 7-7. Mechanical Long-Delay Tail Fuze MK 346 Mod 0

NOTE

Setting the fuze delay sometimes creates backlash in the gear train, which the timer automatically takes up by running. This generally lasts a few seconds, but may continue for as long as 2 minutes following setting. In such cases, the fuze is safe and satisfactory for use after the ticking stops,

provided the safe-arm window shows green and the anti-removal cam is not extended.

7-49. Functioning delay times in hours and increments thereof are preset by a screwdriver in setting shaft slot (figure 7-7) before the fuze is fitted in the tail well. If a different delay is required, the fuze must be removed and a new delay set in, as required. (Fuze removal is required because the delay time observation window is not visible when the fuze is secured in the fuze well.)

Table 7-1. Fuze MK 346 Setting Time Deviations

Set Time (Minutes)	Functioning Delay (Minutes)	
	Minimum	Maximum
30	22	45
45	36	60
60	50	70
75	64	90
90	78	105
105	92	120
120	106	135
135	120	150
150 to 33 hr	90% of Set Time	110% of Set Time

7-50. At impact, the preset functioning delay is locked in, and prevents the enemy from countering by changing the time-to-burst setting. Functioning time is independent of normal temperature ranges (-40° to $+160^{\circ}\text{F}$) and will occur with but little deviation from the time shown in the observation window. Exact tolerances are given in table 7-1.

7-51. The input shaft and the delay function setting shaft are located on the outer end of the fuze. The input shaft is coupled to a centrifugal clutch, which engages the speed reduction gearing at 1200 rpm of the input shaft. The input shaft is fitted with a key that engages a locking slot to prevent accidental rotation. The key is automatically freed when an arming assembly drive shaft is fitted to the input shaft. The delay function setting shaft may be rotated in either direction by a screwdriver. The setting shaft is coupled to the dial seen in the time delay observation window.

7-52. The safe-arm indicator is visible through the safe-arm window. An alternate red and black striped band appears in the SAFE-ARM window when the input shaft and clutch have rotated 45 revolutions, thus completing first-stage arming. The striped band will begin to appear after approximately 22 of the required 45 revolutions.

7-53. The base end of the fuze houses the timer, firing pin, detonator-rotor, explosive lead, the arming shaft, and the functioning delay indicator dial. On the face of the base end plate is the antiremoval cam. The arming shaft moves forward at impact to initiate the timer mechanism, allows the detonator-rotor to align with the

firing pin, and release the antiremoval cam to engage the adapter booster.

7-54. Fuze MK 346 Mod 0 is installed in the adapter-booster M150/T46 series. The MK 346 must be fitted with arming assembly MK 3, 4, or 5. Refer to section VIII for details on these drives. A thermal shield (thermal shield MK 86 Mod 0, figure 7-8) is used with the fuze MK 346 when the fuze is installed in the thermally protected MK 80 series LDGP bomb conical or retarded-fin configuration.

7-55. **Safety.** The two-stage arming feature requires both 1200 rpm rotation of the arming vane and impact to fully armed fuze. The delay between impact and detonation offers time to carry out EOD procedures if the fuze is inadvertently armed. A first-stage armed condition can be identified by the red and black striped band covering all or part of the safe-arm observation window on the fuze body. On second-stage arming, the antiremoval cam will be extended and will prevent installation of the fuze. This stage will not occur unless first-stage arming is complete and the fuze has been subjected to a severe impact. If the fuze is installed and arms, it will be locked in the bomb and will normally detonate at the end of the delay cycle. Notify EOD personnel immediately. Refer to section II and OP 3347 for additional safety precautions.

7-56. **Preparation for Use.** Preparation for use is described in the following paragraphs.

CAUTION

Fuzes MK 346 should not be unpacked until immediately before installation in weapon to provide maximum protection from rough handling.

7-57. **Unpacking.** Remove the fuze from its container.

NOTE

During carrier operations, fuze MK 346 may be installed in weapons below the flight deck.

7-58. **Inspection.** Inspect the fuze as follows. Reject all items that do not satisfy inspection requirements.

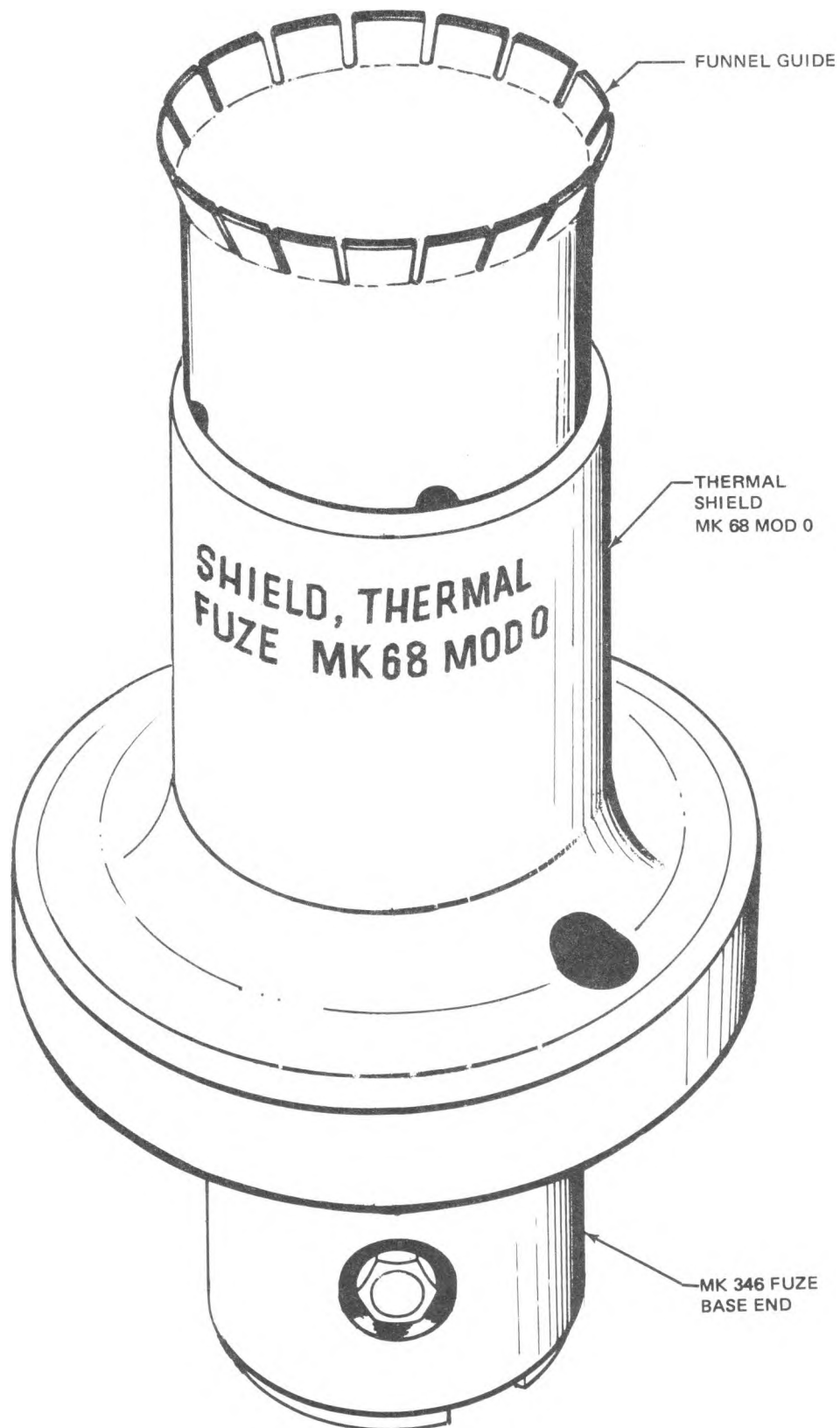


Figure 7-8. Fuze MK 346 with Thermal Shield MK 68 Installed

1. Verify that 1-1/2-inch fuze adapter sleeve is removed from adapter-booster.

2. Inspect fuze for evidence of damage or corrosion, and verify that antiremoval cam does not extend past exterior circumference of fuze base. If cam faces outward, fuze is probably armed and functioning. Set it aside, away from explosives, and notify EOD personnel immediately.

3. Verify that green band is visible in safe-arm window. If striped band covers any portion of window, set fuze aside, away from explosives, and notify EOD personnel immediately.

4. With screwdriver, check for free rotation of functioning delay time setting mechanism. Set desired delay time in time observation window by means of setting shaft slot at outer end of fuze. The mechanism can be rotated in either direction.

NOTE

Setting the fuze delay sometimes creates backlash in the gear train which the timer automatically takes up by running. This generally lasts a few seconds, but may continue for as long as two minutes following setting. In such cases, the fuze is safe and satisfactory for use after ticking stops provided the safe-arm window shows green and the anti-removal cam is not extended.

7-59. Installation. Install the fuze as follows:

1. Install the thermal shield (figure 7-8) on the fuze if a thermally protected bomb MK 82 Mod 2 is being assembled. Proceed as follows:

a. If fuze arming assembly is being used, slip the plastic funnel guide supplied with the arming assembly over the outer end of the fuze.

b. With the thermal shield in one hand, insert the base end of the fuze through the smaller (outer) end of the thermal shield. Align the alignment balls on the fuze with the four slots on the inside of the thermal shield.

c. Press-fit the fuze until it is fully seated in the shield. At this point, the fuze threads are clear of the shield.

2. Place locking pin packed with each fuze into hole

in threads of adapter-booster to lock adapter-booster in fuze well when fuze is installed.

3. Install MK 346/MK 68 in the booster and tighten with spanner wrench. If no thermal shield is being used, tighten the MK 346 with the special fuze wrench provided.

4. Install arming assemblies as described in section VIII.

7-60. Removal. Remove fuze as follows:

1. When weapon is returned, immediately check for partial arming (paragraph 7-55) by removing arming assembly and tail fins from weapon. Refer to section III for fin removal. Refer to section VIII for arming assembly removal procedures.

2. Check that safe arm window shows completely green. If any portion of striped band shows, notify EOD personnel immediately.

WARNING

If, upon attempted removal of the MK 346 fuze, the fuze binds in the adapter-booster and will not unscrew with the special wrench provided in the packing, the fuze is probably functioning and will detonate the weapon at the completion of its delay. Take emergency action immediately.

3. Unscrew fuze from adapter-booster using special fuze wrench if a thermal shield is not installed. Unscrew with spanner wrench if shield is installed.

4. If thermal shield is to be removed from the fuze, place the fuze, base down, on a flat surface. With your hand on the upper portion of the shield, press down slowly and evenly. Don't let your fingers get under the bottom surface of the shield. When the thermal shield breaks loose, it releases suddenly and a pinched finger can result.

5. Remove locking pin from adapter-booster threads.

6. Return fuze and locking pin to their containers.

7-61. Emergency Procedures. When weapons are returned, examine fuzes as soon as possible for external evidence of arming. If evidence of a malfunction or damage is present, notify EOD personnel immediately.

7-62. MECHANICAL IMPACT NOSE FUZE M904E2, M904E3, AND M904E4. Fuzes M904E2 and M904E3 (figure 7-9) provide nine preflight selectable arming delays from 2 to 18 seconds and six preflight selectable functioning delays from instantaneous to 0.25 seconds. Any arming time selected will remain constant for all release speeds above 175 knots. Fuze M904E4 (figure 7-10) is operationally the same as M904E2 and M904E3. It differs only in that it has a preformed, heat-resistant collar surrounding the exposed portion of the fuze body to provide shielding against fire and intense heat.

7-63. Specifications and Description. Specifications for the fuzes M904E2/E3/E4 are listed in the summary sheet, appendix C. The fuze is described in the following paragraphs.

7-64. The detonator-safe M904E2/E3/E4 contains two observation windows (figures 7-9 and 7-10) through which the safe or armed condition of the fuze may be observed. Three conditions may be identified: safe, partially armed, and fully armed. Fuzes M904E2, M904E3 and M904E4 are similar in their intended function and operation.

NOTE

When checking a fuze, hold the fuze vertical and sight through the windows perpendicular to the fuze body. If you look down at an angle into the fuze body, some red may be visible even though the fuze is safe. If there is any doubt as to the condition of the fuze, call EOD personnel immediately.

7-65. Table 7-2 gives a listing of the marking for the M904E2 as seen through the observation windows at various settings and conditions. Table 7-3 gives the markings for the M904E3 and M904E4.

7-66. Arming vane rotation is transmitted through the governor and reduction gears to the arming stop at a speed reduction of 972 to 1. The arming stop is thus rotated at approximately 11 degrees per second until the preselected arming delay period (2 to 18 seconds) has elapsed. The arming times will hold relatively constant at 175 knots or greater because of the action of the governor.

7-67. Rotating along the arming stop are the striker body, firing pin, and firing-pin guide. The striker body is rotated by two fingers on the arming stop: the firing pin and the firing pin guide are rotated by a stud extending from the striker body into the stud slot on the firing pin.

7-68. The arming delay is determined by the amount of rotation required before the striker body aligns with the index stop. Before arming, the striker body is held down by the index stop bearing on its upper surface (figure 7-11). At arming, when the flat in the striker body aligns with the index stop, spring pressure forces the striker body upward against the bottom of the arming stop. Simultaneously, a shear wire on the tip of the rotor release rod breaks, allowing the firing pin to rotate until a cutout in the circumference of the firing-pin guide is aligned with the rotor release rod. When the rotor release rod is aligned with the cutout in the firing-pin guide, the rotor release rod pops up through the cutout, allowing the detonator rotor to turn. The spring pushes the steel ball over the firing pin providing a rigid connection to the striker body. The explosive detonator is now aligned with the rest of the firing train and the fuze is fully armed. The detonator rotor is held in the armed position by a spring-loaded rotary detent (not shown in the illustration).

7-69. At impact, the forward part of the fuze body drives the striker body into the ball which, in turn, drives the firing pin down into the delay element M9. After the proper delay, the M9 ignites the relay, detonator, lead and booster.

NOTE

The fuze is not watertight and may be damaged if exposed to salt spray or other environmental hazards.

7-70. Configuration. Nine preselected arming times are available in 2-second increments from 2 to 18 seconds, nominal. Tolerances are in the range of ± 10 percent for all arming delays except the 2-second delay, which varies from 1.8 to 2.4 seconds. The 2-second delay is used only with retarded weapons.

7-71. Functioning delay times are determined by the delay element M9 installed in the fuze. Any of the six delay elements may be installed. Each is identified by the functioning delay time: nondelay, 0.01, 0.025, 0.05, 0.1, or 0.25 second.

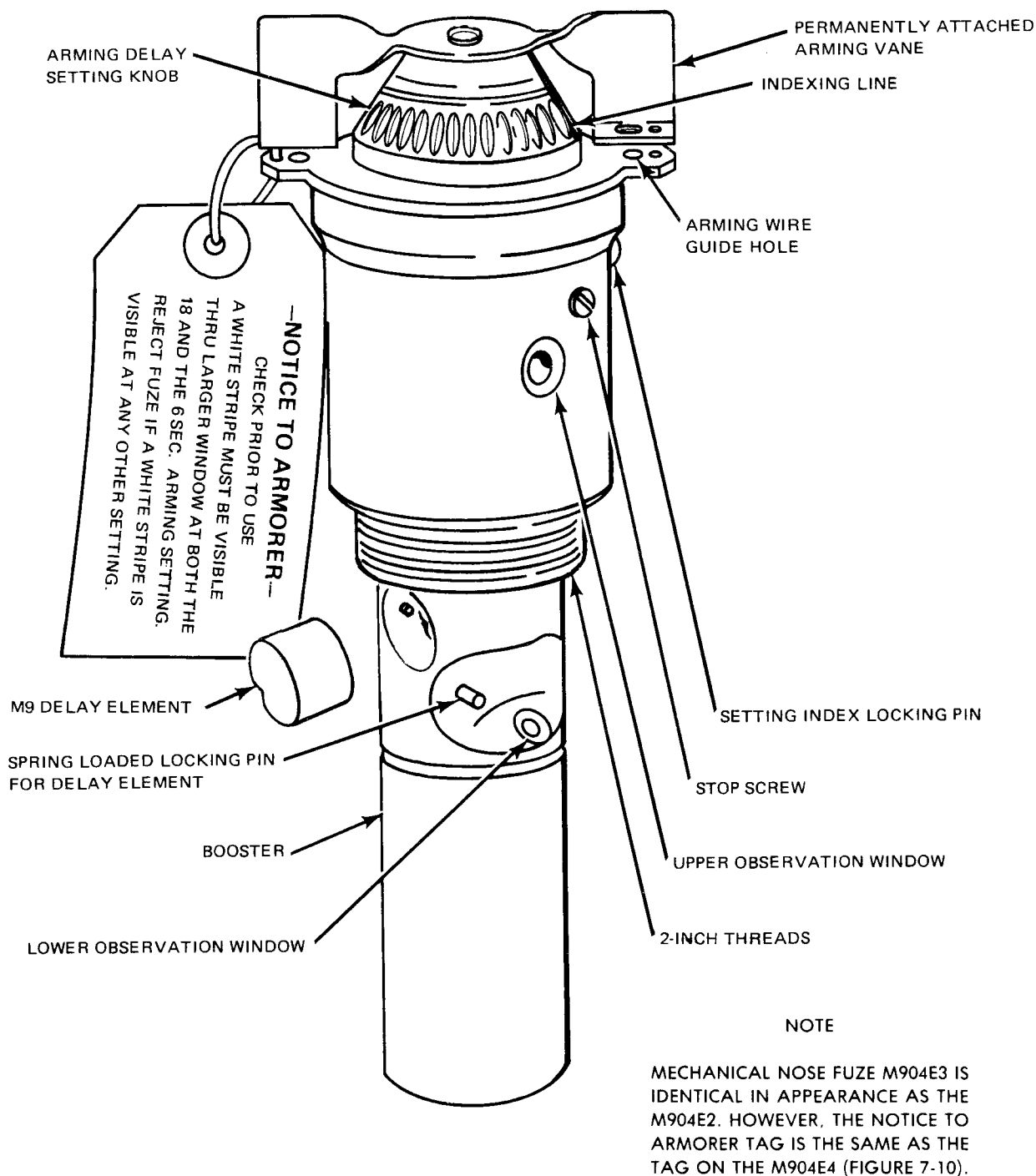


Figure 7-9. Mechanical Nose Fuze M904E2

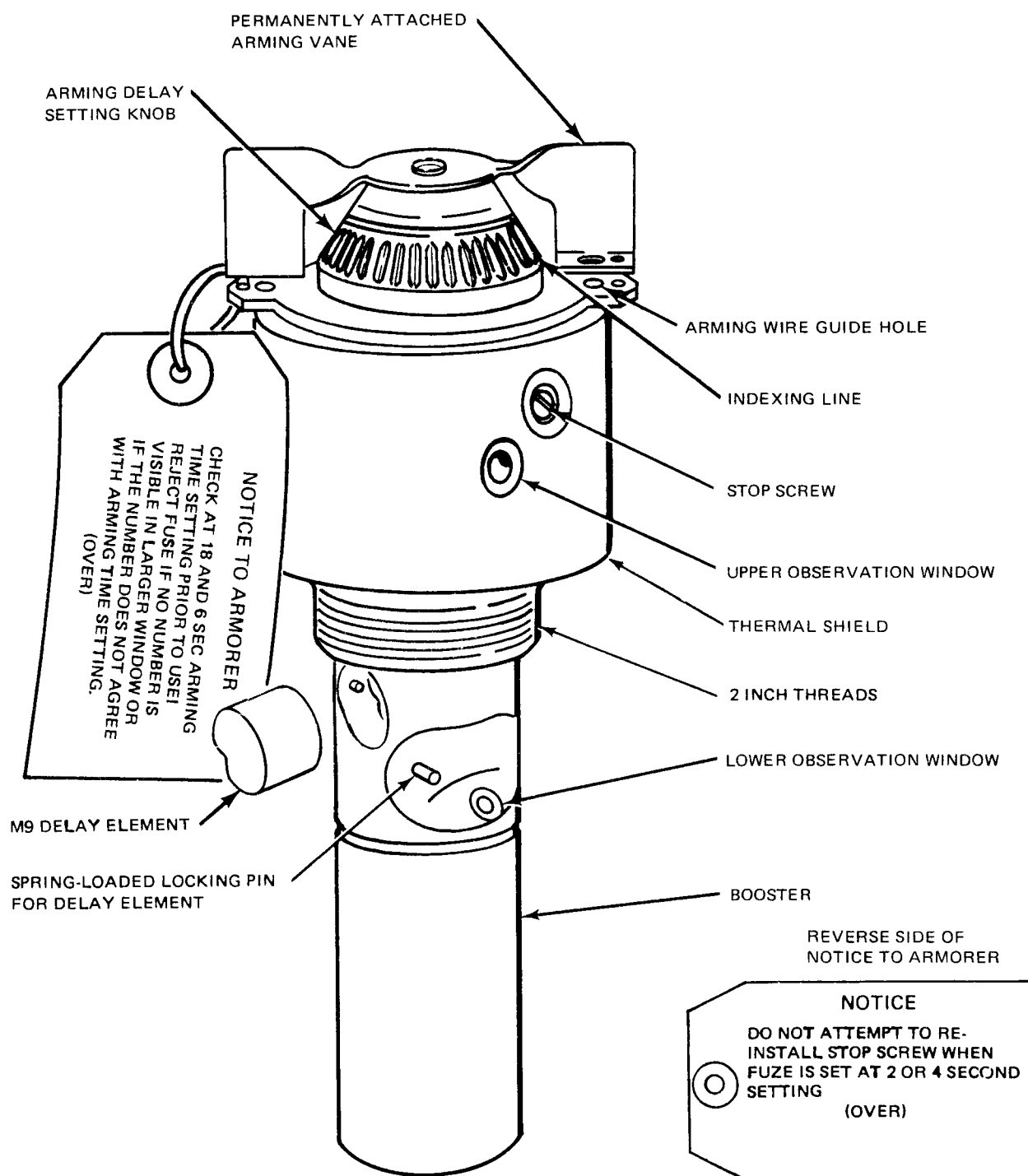


Figure 7-10. Mechanical Nose Fuze M904E4

Table 7-2. Indications for Determining Conditions of M904E2

Condition	Time Setting	Upper Window	Lower Window
Safe	18 and 6 Seconds	**White stripe visible at both settings.	Vacant or dark in color.
Partially Armed	18 and 6 Seconds	White stripe not visible at either setting. (If white stripe is visible at any setting other than 18 or 6 seconds, fuze is partially armed.)	Vacant or dark in color.
Armed	Any setting. (Time setting cannot be changed.)	*Full red.	*Red. Some fuzes have black letter "A" on red background.

*The fuze is dangerous to handle if either or both windows indicate the armed condition.

**On some M904 fuzes, a thin red line may be visible even though the fuze is safe.

Table 7-3. Indications for Determining Conditions of M904E3/E4

Condition	Time Setting	Upper Window	Lower Window
Safe	18 Seconds	White number "18" on green background.	Vacant or dark in color.
	6 Seconds	White number "6" on green background.	
Partially Armed	18 and 6 Seconds	Green background with no numbers visible. (If numbers appear at other than "18" or "6" second setting or if numbers do not match settings, fuze is partially armed.)	Vacant or dark in color.
Armed	Any setting. (Time setting cannot be changed.)	*Red with black letter "A's." (Some green may show at top of window.)	*Red with black letter "A"

*The fuze is dangerous to handle if either or both windows indicate the armed condition.

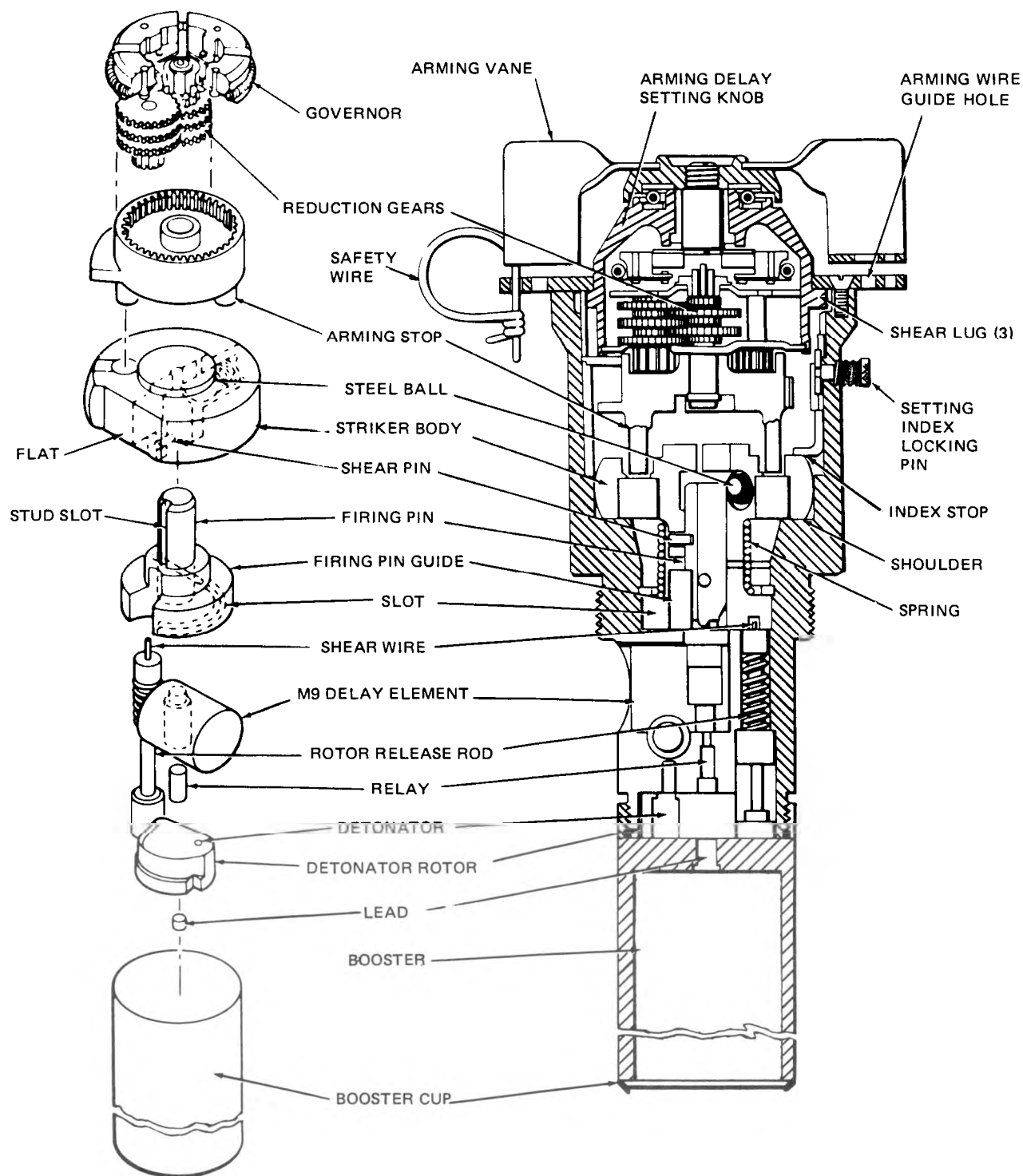


Figure 7-11. Mechanical Nose Fuze M904 Series — Exploded and Cutaway Views

7-72. The M904E3 differs from the M904E2 in four ways:

1. The M904E3 has a hollow firing pin to improve delay functioning on hard targets.
2. The M904E3 has reduced cross-sections of the shear lugs to increase sensitivity against soft targets.
3. The M904E3 has an improved safe-arm indicator to make it easier to determine fuze conditions.
4. The nomenclature is stamped on the outside of the fuze.

7-73. The fuze M904E4 is mechanically identical to the M904E3. It can be easily identified by the light-colored thermally protected sleeve cemented to the outer portion of the fuze. Three holes in the sleeve allow access to the setting index lock pin, stop screw, and upper observation window (figure 7-10).

7-74. The M904E4 was developed for use with thermally protected adapter-booster M148E1. When used in this combination, the time required for weapon cook-off (appendix B) is significantly increased. The M904E4 can be used with unprotected adapter-boosters and bombs if required by logistic problems. However, no increase in cook-off time will result. The use of unprotected M904E2 and fuzes M904E2 with bombs MK 82 Mod 2 decreases the cook-off time and may increase the severity of the explosive reaction when cook-off occurs.

7-75. Safety. The safe/armed condition of the M904E2/E3/E4 fuze is indicated by the presence or absence of a colored band in both observation windows (figure 7-9). Because the upper window is external to the fuze well, the condition of the fuze may be observed after fuze installation is complete. Refer to section II and OP 3347 for additional safety precautions.

7-76. Operational safety is increased by the constant-arming time action of the governor in the fuze. Arming time is relatively constant at speeds above 170 knots. Additional safety is provided by an internal shear wire that requires a higher-than-normal torque to complete the arming cycle. The torque experienced in flight is sufficient to break this shear wire. If the arming vane is turned or allowed to windmill, the fuze may partially arm, but probably will not complete the arming cycle. However, if the fuze partially arms while set at a delay time, resetting to a lower delay time may fully arm the fuze.

7-77. The fuze contains the following safety features:

1. The detonator is maintained in an out-of-line position until the fuze arms. Prior to arming-wire installation, the arming vane is secured by a loop of safety wire. A stopscrew prevents accidental selection of the 2- or 4-second arming times. This screw is removed and discarded if a 2- or 4-second time is selected. A setting index locking pin must be manually depressed to change the arming delay time. If the delay setting knob cannot be turned, the fuze is probably armed.

2. Although no special locking feature has been designed into the fuze to ensure shear safety, the design is such that detonation is unlikely if the forward part of the fuze is sheared off before arming is complete.

7-78. Fuze M904E4 has no safety features not present in the M904E3 except for the increased cook-off time provided by the fuze M904E4 when used with the adapter-booster M148E1 in the bomb MK 82 Mod 2.

7-79. Preparation for Use. Preparation for use is described in the following paragraphs.

CAUTION

Care must be used when handling the M904E2/E3/E4. If the fuze has been dropped, do not use it.

7-80. Unpacking. Remove the fuze from its container.

7-81. Inspection. Inspect the fuze as follows. Reject all items that do not meet inspection requirements.

1. Verify that arming vane and nose retaining ring are safety wired.
2. Verify that red does not show in lower window.

WARNING

If delay setting knob cannot be turned, the fuze is probably armed. Call EOD personnel immediately.

3. Depress setting index locking pin (figure 7-11) on side of fuze body and set knurled arming delay setting knob to 18 seconds and then 6 seconds; check that upper

observation window shows white stripes for the M904E2 or green with white numbers 18 and 6 for the M904E3/E4.

4. If not for immediate use, reset arming delay to 18 seconds.

NOTE

The fuze is usually preset immediately prior to installation in the selected bomb. Arming times of 2, 4, 6, 8, 10, 12, 14, 16, or 18 seconds are available. The 2- and 4-second arming times are intended for use with retarded weapons. If mission requirements change after fuze is installed, the preset arming time may be changed without removing the fuze.

7-82. The M904E4 requires inspection identical to the M904E2/E3 with the exception of a single additional step: Check that the molded sleeve is firmly bonded to the body of the fuze. If it is loose or cracked, the fuze should be turned over to EOD for disposal.

7-83. **Installation.** For detailed procedures pertaining to the fuzing of a bomb loaded on an aircraft, refer to the appropriate Airborne Weapons/Stores Loading Manual. Select arming delay times as follows:

CAUTION

Do not reinstall the stop screw when the fuze is set for 2- or 4-second delay. This will damage the fuze and result in a dud.

1. Select proper arming delay time by depressing setting index locking pin and rotating knurled arming delay setting knob until white indexing line of knurled surface is aligned with desired arming delay time stamped on nose retaining ring. If it is difficult to set arming delay time, do not use fuze. The 2- and 4-second delays may be set only by removing stop screw adjacent to setting index locking pin. Do not attempt to reinstall stop screw at these two settings. The stop screw may be reinstalled at any delay setting of 6 seconds or more.

2. If it is necessary to change the delay element M9, install the new element as follows:

NOTE

The appropriate delay time for each M9 is imprinted on its outboard end. M904E2/E3/E4 fuzes are shipped with either an instantaneous or 0.025-second delay element already installed.

WARNING

The delay element M9 is a percussion device; do not drop it. Handle it with extreme care at all times.

- a. Remove previously installed delay element M9 by depressing spring-loaded locking pin (figure 7-10) on side of fuze body. Hold fuze so that delay element slides out of fuze body into the hand.

- b. Select proper delay element and align its keyway with locking pin inside fuze delay element well.

WARNING

A fuze that is partially or fully armed after the delay element M9 has been installed is potentially lethal. If there is any doubt as to the safe condition of the fuze, notify EOD personnel immediately.

- c. Press and hold spring-loaded locking pin and insert delay element M9 until it is seated in delay element well. Release pin and check that element is properly seated.

7-84. **Removal.** Fuzes are normally removed from bombs before down-loading from aircraft in accordance with the Airborne/Weapons Stores Loading Manual. The following procedures shall be performed when fuzes are returned:

1. Verify that fuze is unarmed.

WARNING

Always keep the arming vane secured, either by an arming wire or safety wire. Unsecured vanes will windmill easily in a breeze and can cause arming. Rotation of the vane by hand can also cause arming.

2. Verify presence of safety wire or short length of arming wire with ends twisted together through holes in arming vanes.

3. Depress setting index locking pin (figure 7-11) on side of fuze body and set knurled delay setting knob to 18 seconds, then 6 seconds; check that upper observation window shows white stripes for the M904E2 or green with white numbers 18 and 6 for the M904E3/E4. The stop screw may be reinstalled at any delay setting of 6 seconds or more.

4. Reset fuze to 18 seconds and replace fuze in packing container.

7-85. Emergency Procedures. Fuze M904E2/E3/E4 contains a lethal amount of explosive. Hand rotation of the arming vane or loss of arming wire during flight can arm a fuze. If fuze is found to be armed or partially armed, notify EOD personnel immediately.

7-86. MECHANICAL BOMB FUZE M918. Bomb fuze M918 (figure 7-12) with igniter Mk 273 Mod 0 is installed in filler holes of fire bomb MK 77 Mod 4. The M918 is an inertia-firing, impact, multiposition fuze that is armed by vane action.

7-87. Specifications and Description. Specifications for the fuze M918 are listed in the summary sheet, appendix C. A description of the fuze is contained in the following paragraphs.

7-88. The M918 contains a 0.3-second (nominal) functioning delay after impact. When fully armed the fuze will function on impact, regardless of the direction of impact force. The fully armed condition is preset only when the arming stem (figure 7-13) has been unscrewed by vane action until it is clear of the firing plunger. It is not necessary for the arming vane and the arming stem assembly to become separated from the fuze to be fully armed. If the arming stem is completely unscrewed but remains inserted in the fuze, the fuze will respond to impact force from any direction. When partially armed, the fuze can still function if the force of impact is parallel (or nearly so) to the longitudinal axis of the

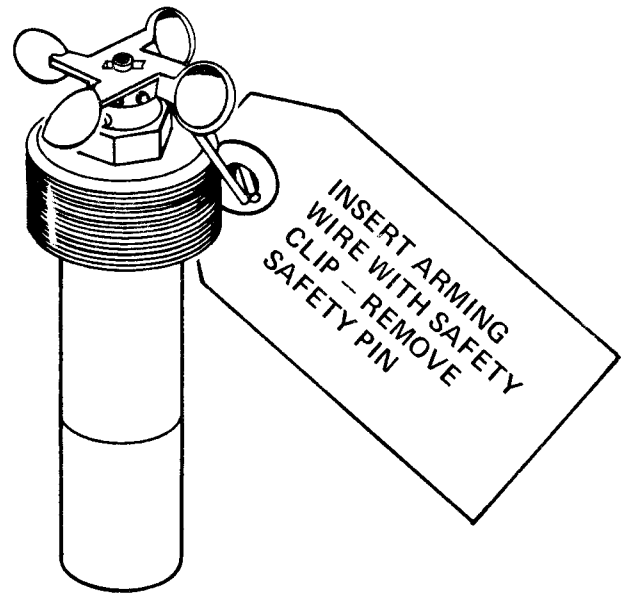


Figure 7-12. Mechanical Bomb Fuze M918

fuze. The fuze is partially armed when the arming stem has been unscrewed by vane action until the stem is clear of the locking balls.

7-89. Two off-center pairs of holes through the hub of the arming vane accommodate a safety pin and an arming wire. Insertion of either the safety pin or the arming wire through the hub prevents rotation of the arming vane and subsequent arming of the fuze.

7-90. The fuze head is externally threaded for installation in the igniter, and internally threaded to receive the arming stem. An externally threaded shoulder at the base of the fuze head receives the body, which similarly receives the booster cup. The firing plunger and primer holder, contained within the body, constitute the firing mechanism. This mechanism has a ball-lock feature used with the arming stem for safety before arming. The mechanism consists of the firing plunger, which contains a firing pin, antireep spring, locking balls, primer holder, and primer MK 156 Mod 0. The fuze also contains detonator MK 97 Mod 0, which provides the 0.3-second functioning delay, and a tetryl booster pellet. The detonator is secured in the body in alignment with and between the primer and booster pellet.

7-91. Immediately after the arming wire is withdrawn, the arming vane starts rotating in the airstream. After making approximately 18 revolutions, the arming stem is unscrewed enough to clear the locking balls. In this condition, the fuze is partially armed and will function

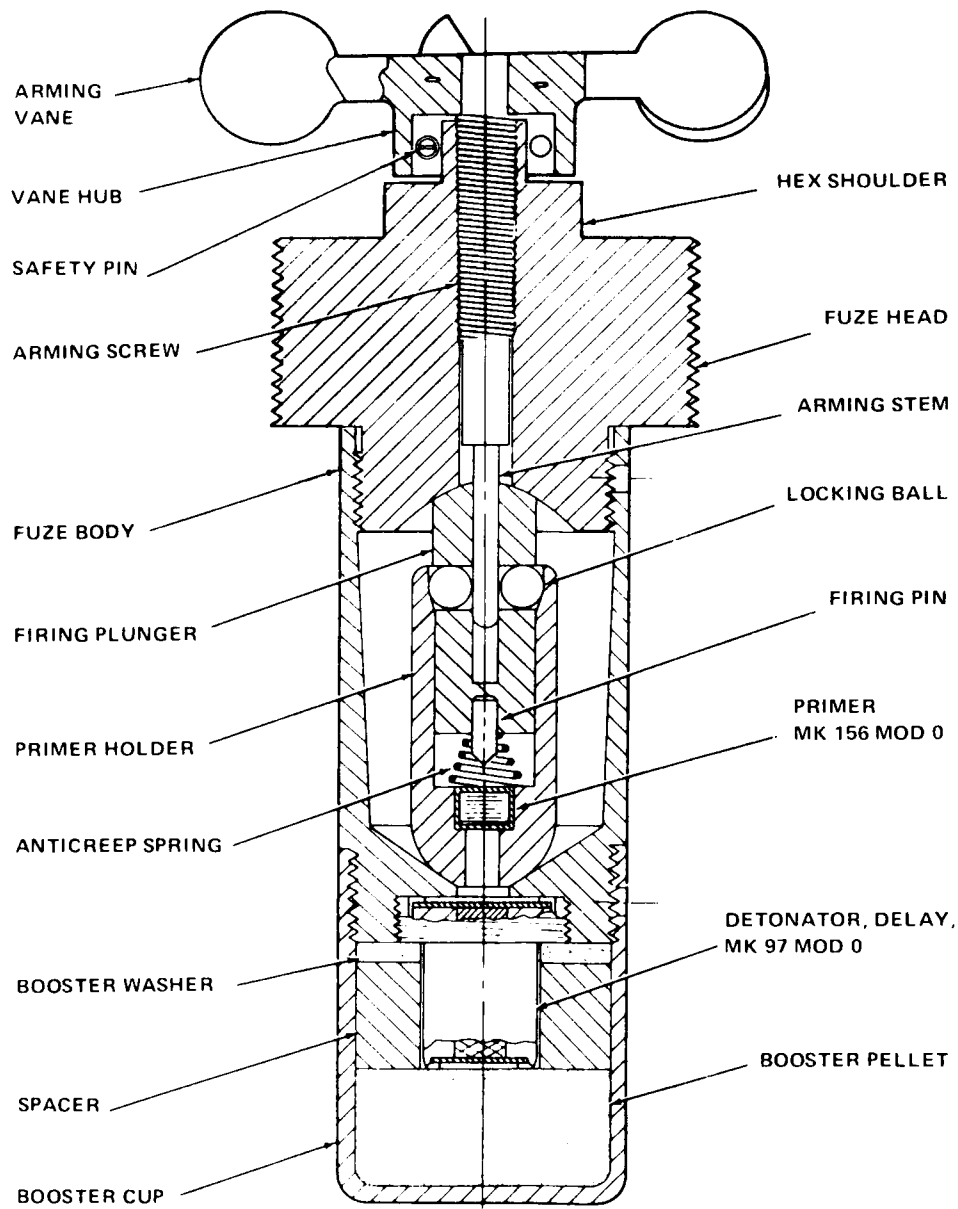


Figure 7-13. Mechanical Bomb Fuze M918 — Cutaway View

if the force of impact is exerted in a line nearly parallel to the longitudinal axis of the fuze. Functioning of this stage is characteristic of the design and has no tactical application.

7-92. Continued rotation of the arming vane until it makes approximately 45 revolutions withdraws the arming stem from the firing plunger. With the arming stem withdrawn, the fuze is fully armed.

7-93. Configuration. The basic components of the fuze are a four-blade arming vane with attached arming stem, fuze head, fuze body, booster cup, firing plunger, primer holder, and explosive elements. The components are shown in figure 7-13. Arming time required by the fuze M918 varies inversely with speed of the aircraft. Arming times are approximately 1.2 seconds at 200 knots, 0.8 seconds at 350 knots, and 0.6 seconds at 500 knots.

7-94. Safety. Fuze M918 contains an in-line explosive train and is, therefore, not detonator-safe. A safety cotter pin inserted through the vane hub prevents premature arming of the fuze. The safety cotter pin is withdrawn only after an arming wire is installed. The fuze must be handled carefully, as severe shock could initiate the primer. This lack of an out-of-line explosive train establishes the possibility of initiation from the shock of impact on a hard target, even though released safe.

WARNING

A partially or fully armed fuze can detonate if jarred or shocked.

7-95. The fuze M918 is partially armed if rotation of the arming vane and arming stem has separated the vane hub and hex shoulder by 1/8 inch.

7-96. Fuze M918 is fully armed if the arming vane and arming stem assembly are missing. Also, it is fully armed if the arming stem is unscrewed to the extent that the vane hub is more than 1/8 inch from the hex shoulder.

7-97. Never use a fuze if the safety pin is missing or if the fuze is armed or partially armed. Do not withdraw the safety pin from the fuze until the arming wire is installed. Do not attempt to disarm a partially armed or armed fuze by screwing down the arming vane. Notify EOD personnel immediately. Refer to section II and Op 3347 for additional safety precautions.

7-98. Preparation for Use. Preparation for use is described in the following paragraphs.

WARNING

- If the distance between the vane hub and hex shoulder exceeds 1/8 inch or if the vane is missing, the fuze shall be disposed of by EOD personnel.
- This fuze contains an in-line explosive train and shall not be dropped or roughly handled. Accidental explosions can occur even in a sealed container or packaging box.

7-99. Unpacking. Remove the fuze from the tear-strip can.

7-100. Inspection. Inspect fuze for any evidence of damage. Reject all fuzes showing structural damage or corrosion.

7-101. Installation. Refer to appropriate Airborne Weapons/Stores Loading Manual for detailed installation procedures.

7-102. Removal. Remove the fuze as follows:

1. Remove fuze from igniter in accordance with appropriate Airborne Weapons/Stores Loading Manual.

WARNING

Do not attempt to remove a partially armed or fully armed fuze. Notify EOD personnel immediately.

2. Verify presence of safety pin or short length of arming wire with ends twisted in vane hub.

3. Repackage fuze in tearstrip can. Seal two parts of each can with a moisture-proof adhesive tape, and return packaged fuze to storage.

7-103. Emergency Procedures. If fuzes are found to be armed, notify EOD personnel immediately.

7-104. ELECTRIC BOMB FUZES.

7-105. Electric fuzes require an electric pulse from the aircraft for initiation. The pulse is delivered to the fuze as the weapon falls clear of the bomb rack. Arming wires, though present with electric fuzing, serve only to provide a mechanical safety backup to prevent the fuze from being accidentally armed by either malfunction or by electromagnetic radiation (RADHAZ). Figure 7-14 is a simplified block diagram showing the electrical connections between the fuze function set and the bomb fuze.

7-106. ELECTRIC TAIL FUZES MK 344 MODS 0 AND 1 AND MK 376 MOD 0. Fuzes MK 344 and MK 376 (figure 7-15) and compatible with all bombs MK 80 series, thermally protected bombs, and laser-guided bombs (LGB). The MK 344 provides inflight selection of functioning delay time and is used for unretarded delivery only. The MK 376 provides inflight selection of functioning delay and arming delay times and may be used for either retarded or unretarded delivery. Both fuzes are compatible with proximity sensing element

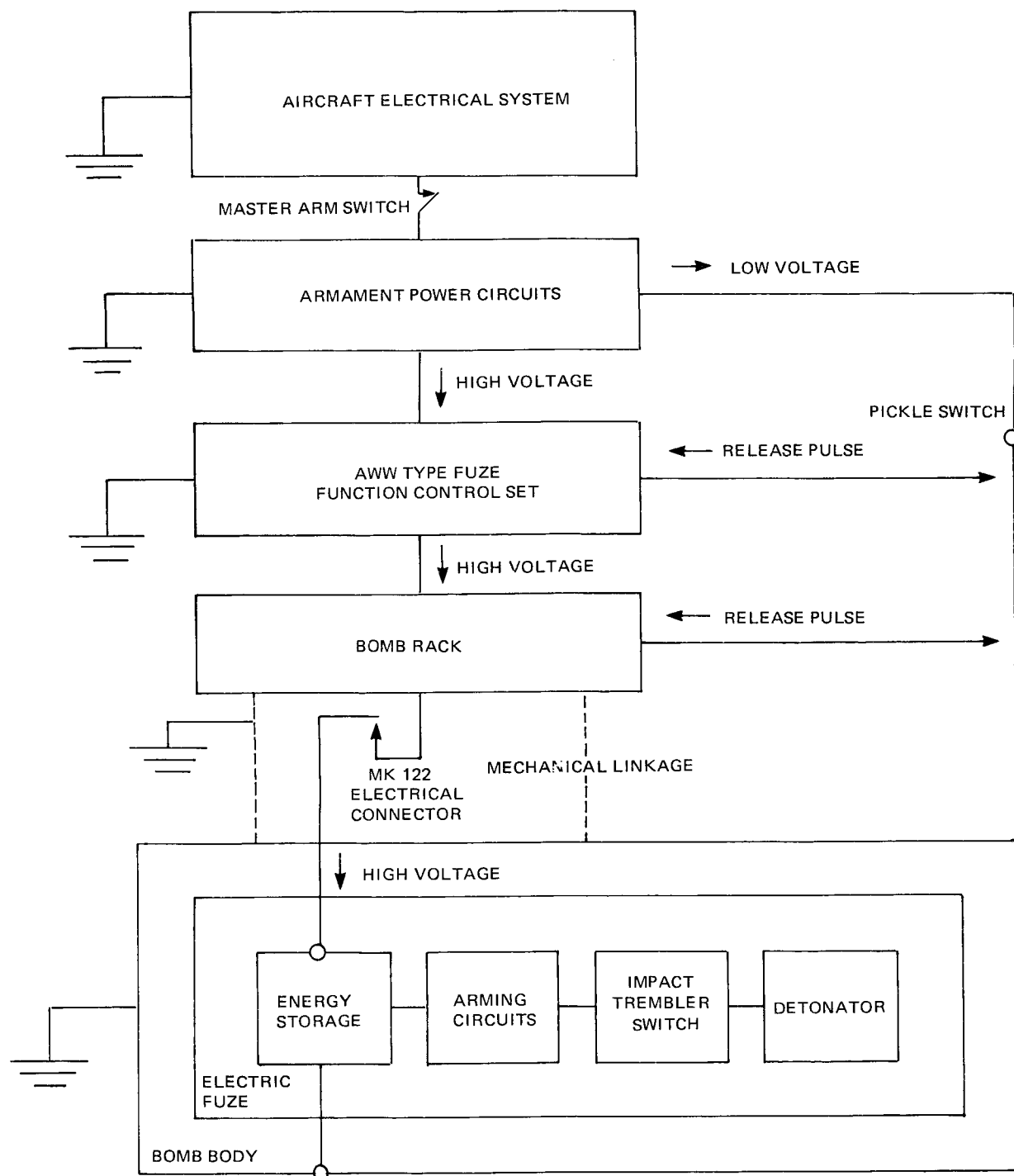


Figure 7-14. Electric Fuzing System — Simplified Functional Block Diagram

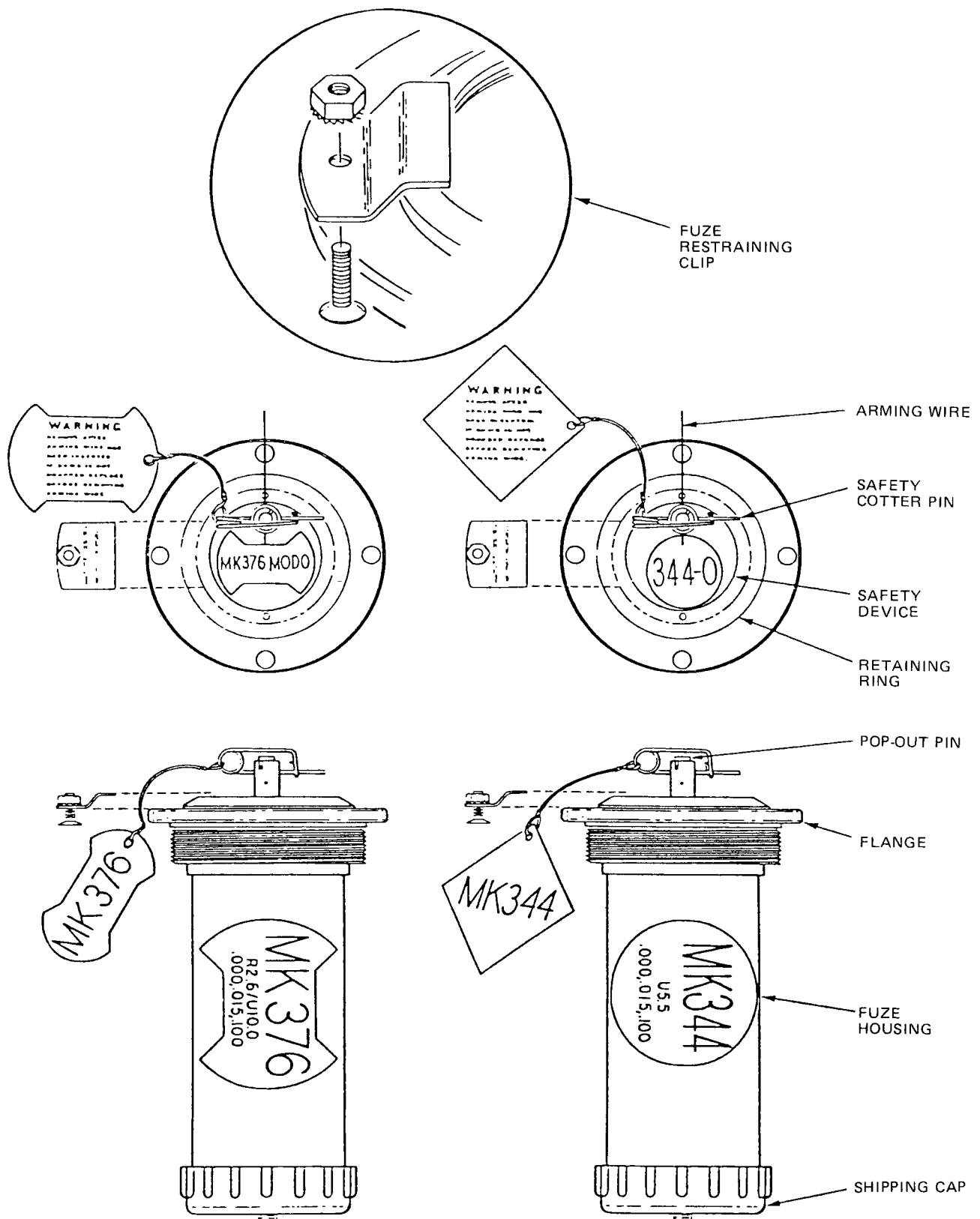


Figure 7-15. Electric Fuzes MK 344 and MK 376

Table 7-4. Inflight Functioning Delay Options - MK 344 and MK 376

Fuze Firing Mode	Applied Initiating Voltage	Control Switch Setting		
		AN/AWW-1 or -8AN/AWW-2B		AN/AWW-4
*Proximity (with impact backup)	+ 300 volts	E	+ 300	VT
Instantaneous	+ 195 volts	F	+ 195	INST
Long Delay 1 (0.100 seconds)	- 300 volts	G	- 300	DLY 2
Short Delay 1 (0.015 seconds)	- 195 volts	H	- 195	DLY 1

*Proximity airburst/delay firing option available with mechanically initiated TDD MK 43.

(SE) M20/M20A1 and the target detecting device (TDD) MK 43.

7-107. Specifications and Description. Specifications for fuzes MK 344 and MK 376 are listed in their summary sheets, appendix C. The fuzes are described in the following paragraphs.

NOTE

Some fuzes MK 344 Mod 0 contain a retard sensing device that automatically switches the fuze to a 2.6-second arming delay time when delivered in the retarded mode. However, the MK 344 is not to be used in the retarded mode and should never be rigged for this type of delivery.

7-108. Electric Fuze MK 344 Mod 0. A single 5.5-second arming delay time is provided. The pilot can select one of three functioning options: two separate functioning delay times, either 0.015 or 0.100 second, or instantaneous function. If a sensing element or TDD is installed in the nose, a proximity airburst is available. Table 7-4 summarizes the pilot inflight selection capability of the MK 344 and the appropriate fuze function control panel settings.

7-109. Electric Fuze MK 344 Mod 1. The Mod 1 fuze is identical to the Mod 0, except that the retard sensor has been removed. The Mod 1 is not used in retarded delivery.

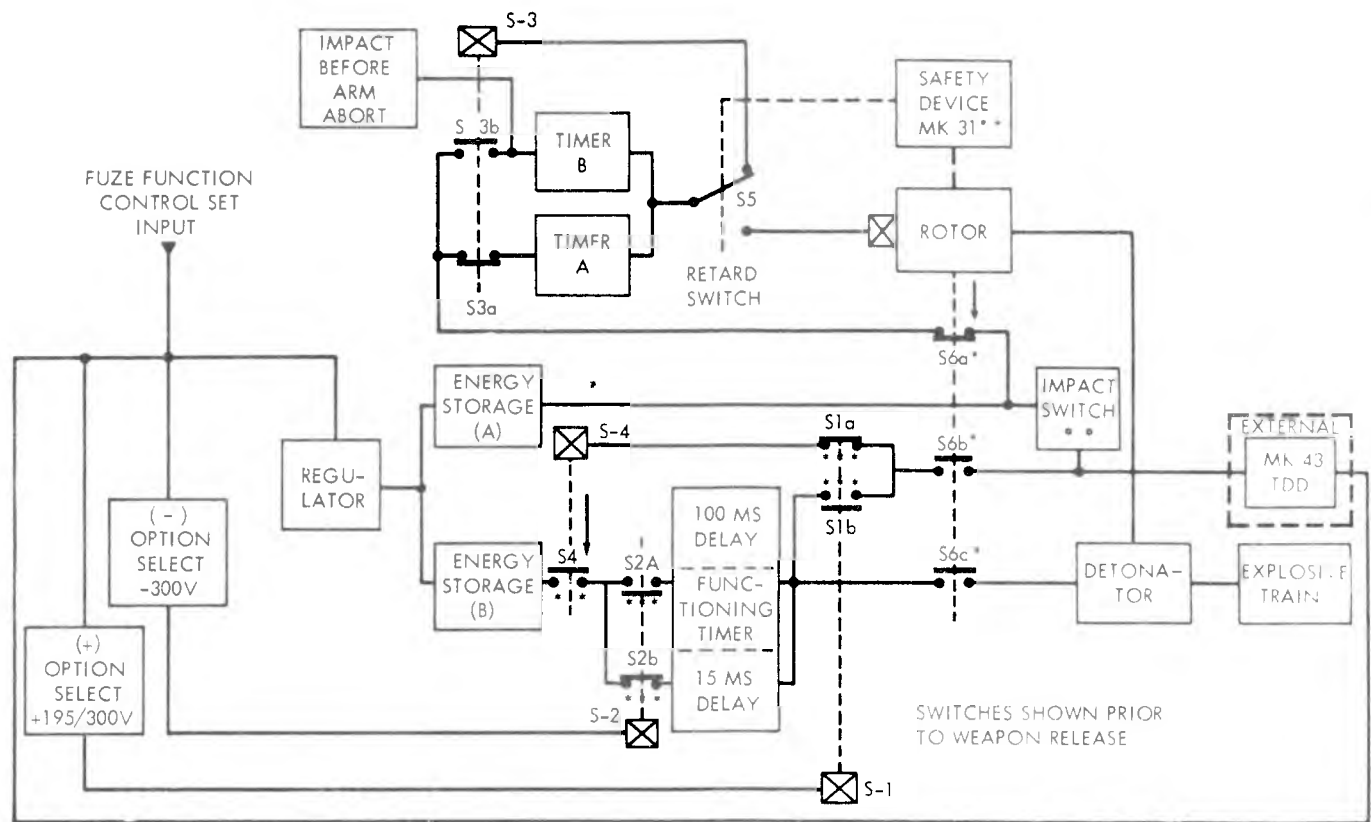
7-110. Electric Fuze MK 376 Mod 0. The MK 376 may be delivered retarded or unretarded. When delivered retarded, the fuze automatically selects a 2.6-second arming delay time. When delivered unretarded, the fuze automatically selects a 10-second arming delay time. The pilot can select the functioning delay

times summarized in table 7-4. The following description applies specifically to the fuze MK 376, however, the MK 344 operates identically to the MK 376 except that it is operationally restricted to the unretarded (5.5-second delay) delivery mode.

7-111. Two arming delays are used in the fuze MK 376; 2.6 seconds for retarded delivery and 10 seconds for unretarded delivery. The appropriate arming delay is automatically selected by the fuze according to the actual delivery mode of the weapon. That is, if the weapon does not retard, whether intentionally or unintentionally, the fuze automatically provides a 10-second arming delay. Figure 7-16 shows the circuitry before weapon release in the storage condition. Figures 7-17 and 7-18 show the fuze circuitry sequential operation in the retarded and unretarded modes, respectively.

7-112. At release, the arming wire is withdrawn and a charging voltage (+ 300, + 195, - 195 or - 300 volts) is applied to the fuze. The polarity and level of the fuze charging voltage is important only with respect to functioning delay. Arming is the same in any case. A regulator (figure 7-17) converts the applied voltage to the required level and polarity of + 177 volts. It is then applied to energy storage unit A and the 2.6-second timer. If the weapon decelerates, safety device MK 31 senses the deceleration and causes retard switch S5 to transfer from squib S3 (figure 7-17) to the input of the rotor-actuating bellows (figure 7-17). At 2.6 seconds, timer A completes its cycle and transfers the voltage from energy storage unit A to the rotor-actuating bellows. The bellows operates and turns the rotor to the armed position.

7-113. If the weapon does not decelerate (figure 7-18), switch S5 does not transfer and remains connected to



KEY

* OPERATES AT ARMING

** OPERATES AT IMPACT

*** OPERATES AT WEAPON RELEASE

--- MECHANICAL LINKAGE

		MK 344 FUZE	MK 376 FUZE
OPERATING TIMES	TIMER A	2.6 SEC	2.6 SEC
	TIMER B	2.9 SEC	7.4 SEC
	A + B TIMES	5.5 SEC ARMING	10 SEC ARMING

Figure 7-16. Fuze MK 376 Circuitry, Prior to Weapon Release and Arming Impulse

squib S3. At 2.6 seconds, the timer operates and transfers voltage to squib S3 rather than to the rotor. Squib S3 opens S3(a) and closes S3(b). This action turns off timer A and initiates timer B. At 3.8 seconds, safety device MK 31 causes switch S5 to transfer to the input of the rotor-actuating bellows. At 10 seconds, timer B applies its voltage to the bellows of the rotor, causing it to move to the armed position.

7-114. Figures 7-19 and 7-20 show the operation of the functioning delays. The option-select circuit passes only its indicated polarity and voltage and blocks all others. Thus, the application of -300 volts operates squib S2 and its associated switches, and the +195 and +300

option-select circuit operates squib S1. The -195 voltage is blocked from both squibs. However, any of the four voltages can be applied to the regulator and to the energy storage units.

7-115. Two proximity modes are available. The conventional proximity mode is selected by initiating the fuze with +300 volts dc. Because the target detecting device (TDD) Mk 43 is also initiated by +300 volts dc, operation is automatic. In this mode, fuze functioning occurs instantaneously upon receipt of a firing signal from the Mk 43. TDD Mk 43 can also be initiated mechanically by withdrawal of an arming wire, which releases a striker. If an arming wire is used for proximity

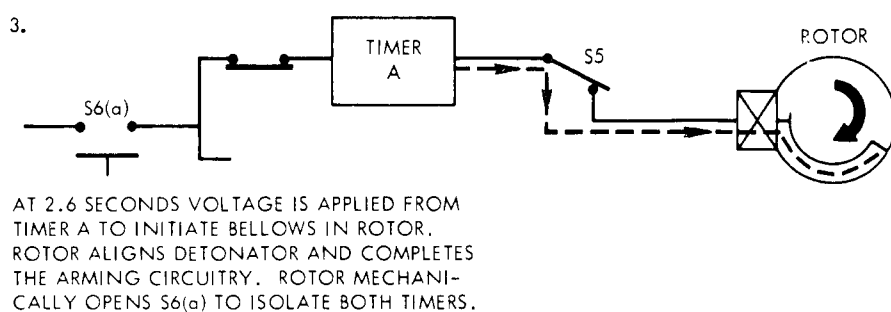
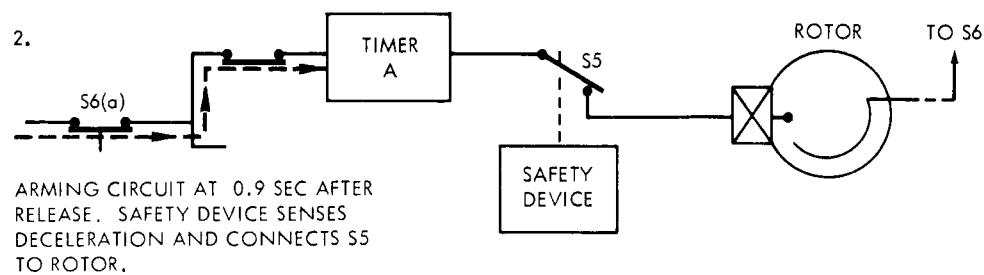
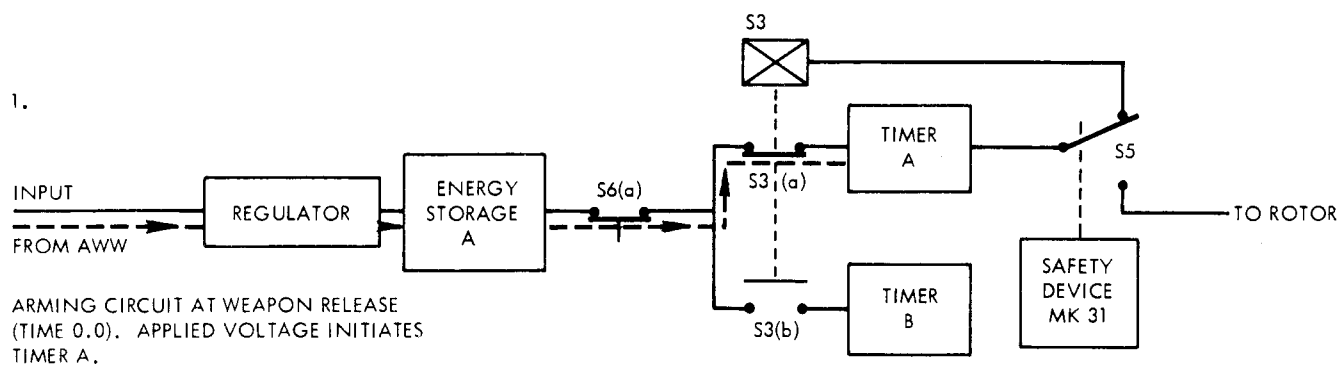
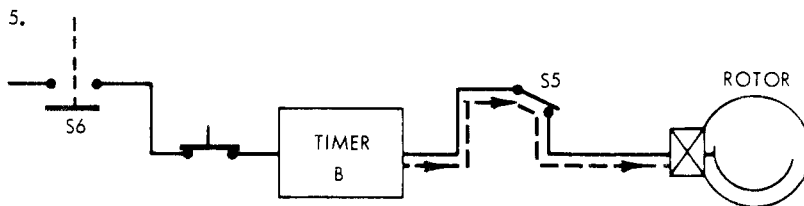
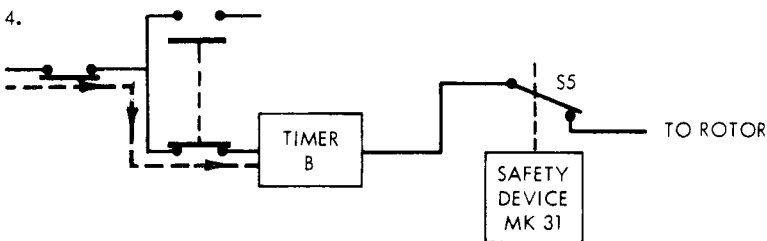
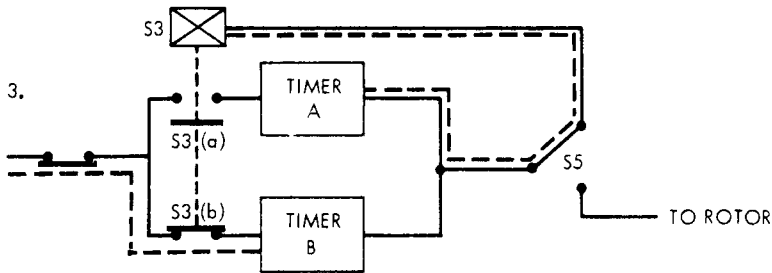
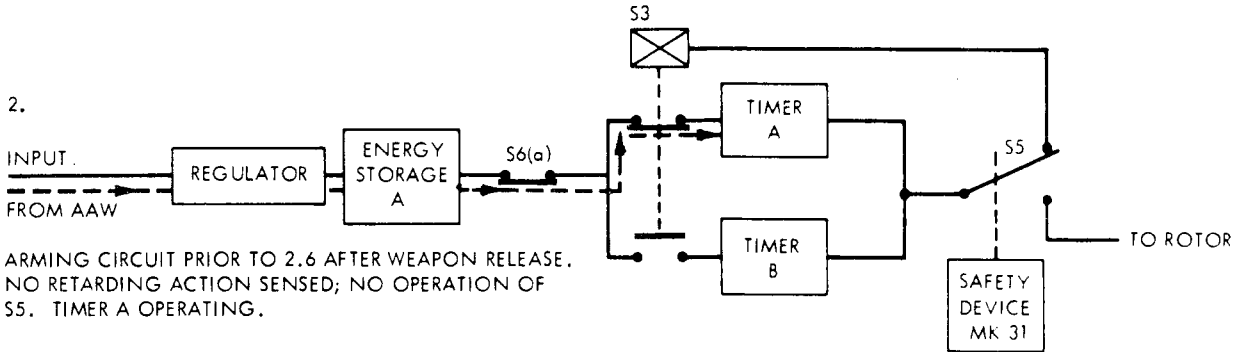


Figure 7-17. Fuze MK 376 Mod 0 Switching Functions — Retarded Mode

1. ARMING CIRCUIT AT WEAPON RELEASE IS IDENTICAL TO FIG. 7-17, PART 1.



AT 10.0 SEC TIMER B OPERATES AND APPLIES A VOLTAGE TO THE BELLOWS IN THE ROTOR. ROTOR ALIGNS DETONATOR AND COMPLETES ARMING CIRCUITRY. ROTOR MECHANICALLY OPENS S6(a) TO ISOLATE TIMERS.

Figure 7-18. Fuze MK 376 Switching Functions — Unretarded Mode

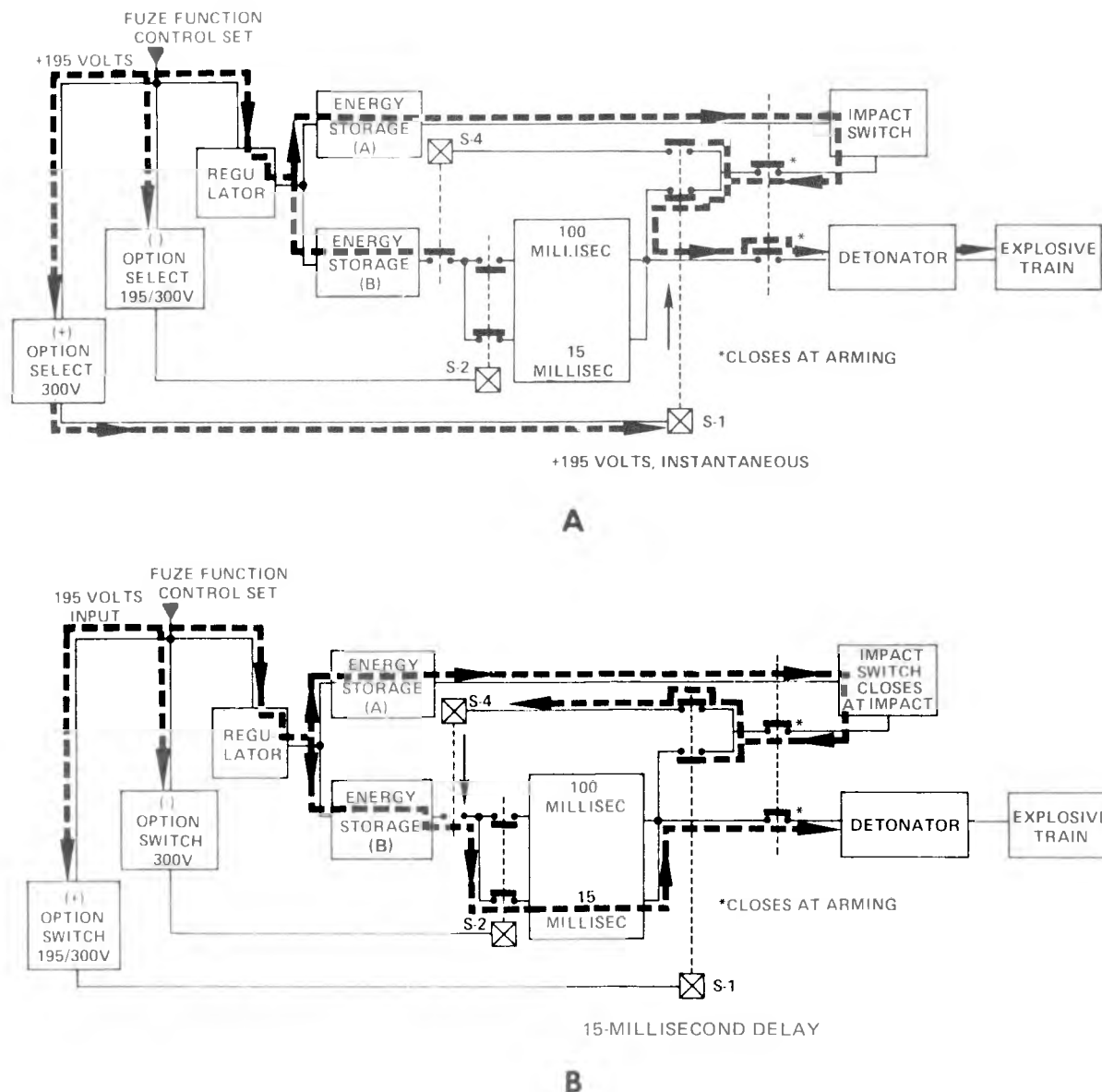


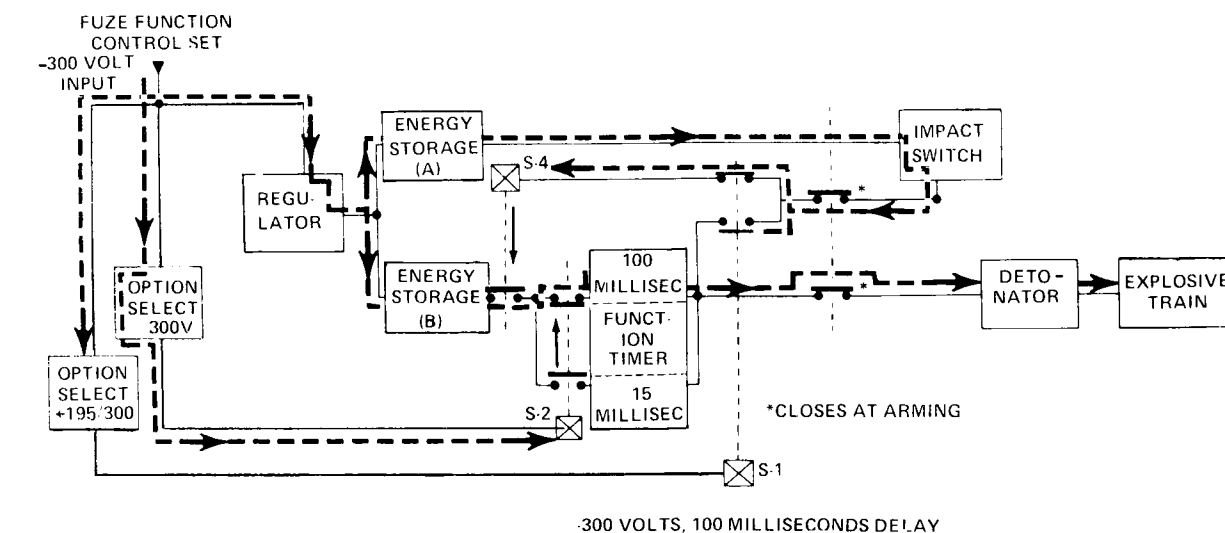
Figure 7-19. + 195 Volts, Instantaneous, and - 195 Volts, 15-Milliseconds Delay, Functioning Schematics

initiation, the fuze may be set for either of the two functioning delays (DLY 2 for 0.100-second delay and DLY 1 for 0.015 seconds). Because of the functioning delay in the firing circuit, detonation of the bomb is delayed by either 0.015 or 0.100 second.

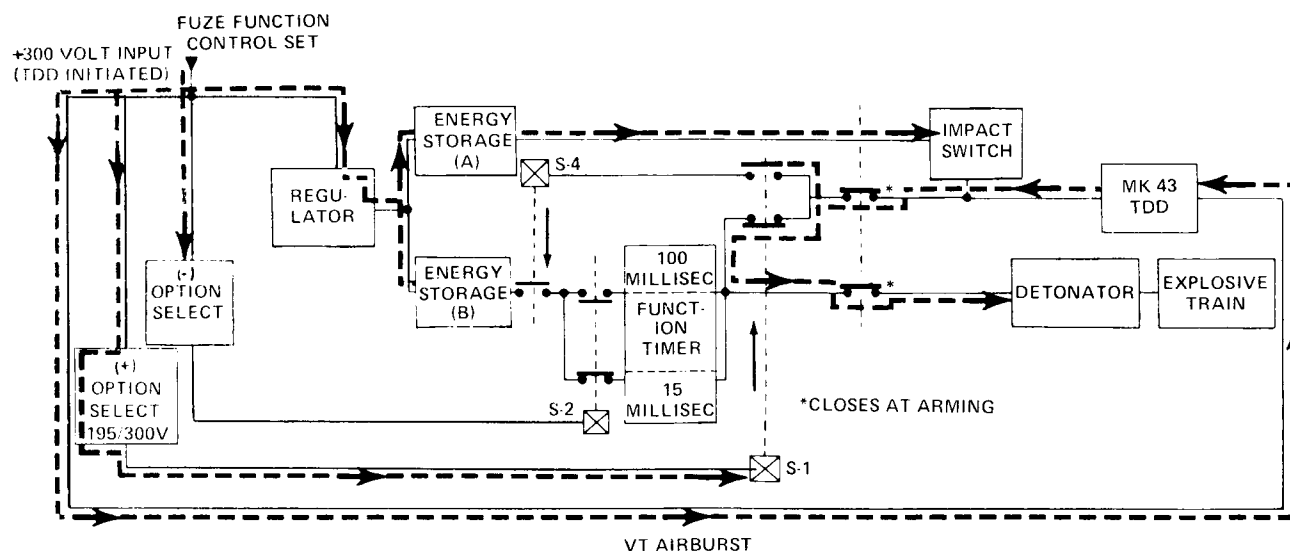
7-116. Configuration. Fuzes MK 344/376 provide an all electric capability for the MK 80 series bombs with either conical or retarding fins; however, only the MK 376 may be used for retarded delivery. The fuzes MK

344/376 may be used with sensing element M20/M20A1 or target detecting device Mk 43 to obtain an airburst capability. They also may be used in conjunction with mechanical nose fuzes to obtain additional fuzing options.

7-117. A fuze restraining clip (figure 7-15) must be installed on all fuzes MK 344 and MK 376. This clip may be installed at the depot; if not, it must be installed prior to fuze installation in the bomb. This clip is essential to fuze reliability.



A



B

Figure 7-20. – 300 Volts, 100-Milliseconds Delay, and + 300 Volts, Proximity Airburst, Functioning Schematics

WARNING

- If the pop-out pin is accidentally allowed to pop out, push the pin all the way back in so that both sets of holes align and reinstall the safety pin. The buzz heard when the pop-out pin is reset in fuzes MK 344 and MK 376 is normal. If the pin binds or will not reset, the fuze may be armed. Notify EOD for disposition.

- Failure to align both sets of holes when installing the safety pin or arming wire will dangerously reduce arming time.

7-118. Safety. Electric fuze arming is controlled by the aircraft fuzing system and the fuzes MK 344/376 are fitted with the safety device MK 31. The device contains a pop-out pin that locks the fuze in the unarmed condition. The spring-loaded pin is held in the safe position by either a safety pin or an arming wire (figure 7-15). The pop-out pin controls a gag rod that locks the detonator in place, thus physically restricting the fuze

from arming. If the pop-out pin is released, the fuze will not arm, but all mechanical safety will have been removed, and the fuze can arm if the necessary voltage is applied. If, during installation the pop-out pin is released, it can be pushed back.

7-119. Fuzes MK 344/376 are classified as HERO SAFE and no unusual RADHAZ precautions are required under normal operation conditions.

7-120. Preparation for Use. Preparation for use is described in the following paragraphs.

7-121. *Unpacking.* Remove the fuze and two decals from the container.

7-122. *Inspection.* Inspect the fuze as follows. Reject all items that do not satisfy inspection requirements.

1. Verify that two decals removed from container match decals affixed to fuze body. Set decals aside for later use.

CAUTION

Electric fuzes MK 344/376 that have been removed from their sealed containers and whose shipping caps have been removed and are subsequently repacked for more than 30 days or exposed to excessive moisture, such as driving rain or spray, for any length of time, shall be disposed of in accordance with current directives.

2. If using a fuze whose shipping cap has been removed, check data marked on container. Dispose of the fuze if repackaged longer than 30 days.

3. Fuzes MK 344/376 may remain installed in weapons preloaded on accessory suspension equipment which is in ready stowage aboard ship for 6 months. Removal of a weapon from stowage nullifies the 6-month authorization.

WARNING

Never install a fuze if the safety pin is missing from the pop-out pin when the fuze is removed from its container. Turn the fuze over to EOD personnel for disposal.

4. Verify that safety pin is installed in pop-out pin.

5. Verify that shipping cap is installed. If cap is missing, dispose of fuze in accordance with current directives.

6. Remove shipping cap by twisting. The socket-head screw is for depot use only and does not secure the cap to the fuze.

7. Verify that no visible moisture is present in electrical connector at base of fuze. If moisture is present, dispose of fuze in accordance with current directives.

8. Check that fuze-restraining clip (figure 7-15) is installed on the flange of fuzes Mk 344 and MK 376. If not installed, make the installation as follows:

a. Fit the screw through any of the holes in the flange screw-head toward the base of the fuze as shown in figure 7-15.

b. Secure the restraining clip in place with the 3/8-inch lockwasher and nut.

NOTE

Fuze restraining clips with attaching screws and lockwasher nuts are available through normal supply channels identified as 30003 P1 3192382, restraining clip hardware (for bomb fuzes MK 344 and 376).

7-123. Installation. Install the fuze as follows:

1. Verify that nose and tail wells of bomb are clean and dry and that electrical connector at base of well is not corroded. Press on tips of electrical connectors with pencil or wooden dowel to ensure that they are securely seated.

CAUTION

Do not attempt to rotate the fuzes MK 344 or MK 376 by the pop-out pin sleeve. It may break off.

2. Referring to figure 7-21, insert fuze into tail fuze well and tighten hand tight. With a spanner wrench, tighten fuze until flange is seated against bomb.

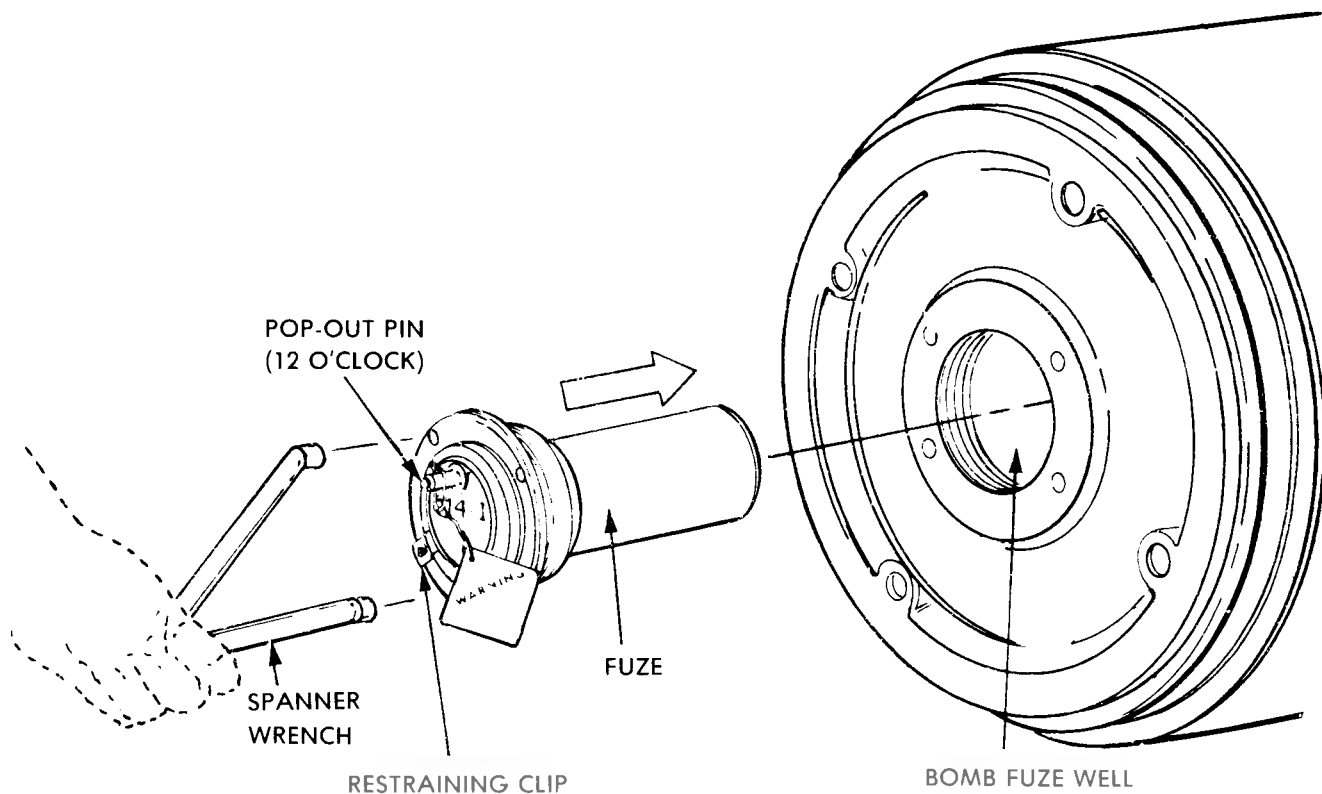


Figure 7-21. Typical Installation of an Electric Fuze in Low-Drag Bomb MK 80 Series

3. Install two fuze-identifying decals, one each on top and bottom of bomb fin so they can be seen easily after tail is installed. Decals are necessary to identify bomb/fuizing combination after bomb is installed on bomb rack. Write fuze nomenclature on nose of bomb with chalk or other suitable means if decals are not available. Check for old markings and decals and remove or deface them.

4. Assemble tail fin to bomb body as described in section III.

CAUTION

If proximity sensing elements M20/M20A1 are to be used, both the proximity sensing elements M20/M20A1 and the arming safety switch MK 122 Mod 0 must be installed in the bomb in a RADHAZ-free area.

5. Refer to section VIII for assembly procedures for arming safety switch MK 122 Mod 0.

7-124. Removal. Remove the fuze as follows:

1. Remove tail fin as described in section III.

CAUTION

Be sure to reinstall the safety pin and warning tag before pulling arming wire from pop-out pin.

2. Install safety pin and warning tag in pop-out pin.
3. Remove and discard arming wire.
4. Remove fuze with spanner wrench.

NOTE

Removal of fuzes MK 344 and MK 376 from the bomb may damage the fuze electrical connector. An inspection can be performed to segregate unserviceable fuzes. Reuse of a fuze MK 344 or MK 376 without inspection will probably result in a dud bomb. Safety is not affected.

5. Inspect fuze electrical connector for evidence of damage. Replace shipping caps and dispose of damaged fuzes as unserviceable in accordance with current directives.

6. Date serviceable fuzes and return to individual shipping containers. Seal containers with tape and record on container date fuze was first unpacked. Reuse at the first opportunity.

7. Remove decals from bomb fin or deface them if they cannot be removed.

7-125. Emergency Procedures. If the arming wire and safety pin have both been removed other than during the assembly procedures, the fuze could be fully armed and should be treated as such. Do not attempt to remove the fuze from the well of the bomb. Notify EOD personnel immediately.

SECTION VIII

ASSOCIATED PARTS AND COMPONENTS

8-1. FUZE EXTENSION M1A1 (DAISYCUTTER).

8-2. INTRODUCTION. Fuze extension M1A1 (figure 8-1) is an explosive-filled metal tube that enables above-ground burst. This capability improves bomb effectiveness against personnel and unarmored targets over bombs fitted with conventional nose fuzes.

8-3. SPECIFICATIONS AND DESCRIPTION. Specifications for the fuze extension M1A1 are listed in table 8-1. A description of the fuze extension is contained in the following paragraphs.

Table 8-1. Specifications for Fuze Extension M1A1 (Daisycutter)

	Fuze Extension Assemblies	
	18-in.	36-in.
Diameter	2.40 in.	2.40 in.
Actual Length	19.30 in.	36 in.
Explosive	Comp "B"	Comp "B" and tetratol
Weight of Explosives . . .	1.0 lb.	2.0 lb.
Weight of Assembly . . .	5.3 lb.	10.0 lb.

8-4. The fuze extension contains Composition B (with or without tetratol), which is sealed in a tubular insert fitted loosely in the metal tube.

8-5. CONFIGURATION. The fuze extension M1A1 is available in 18- and 36-inch lengths. An instantaneous nose fuze must be used in conjunction with the fuze extension.

8-6. SAFETY. A single length of arming wire must be used on bombs fitted with fuze extensions M1A1. Arming wire extensions shall not be used on bombs fitted with the M1A1.

8-7. The fuze extension is constructed of thin-wall material. Do not use the extension to lift the bomb. Use extreme care while threading the extension into the adapter booster to prevent cross-threading. When the thread protectors are removed, care should be taken to prevent the explosive filler insert from sliding out of the fuze extension. Refer to section II and OP 3347 for additional safety precautions.

8-8. PREPARATION FOR USE. Preparation for use is described in the following paragraphs.

8-9. Unpacking. Remove fuze extension M1A1 from container and check for dents.

CAUTION

When the thread protectors are removed, take care to prevent the explosive filler insert from sliding out of the fuze extension.

8-10. Inspection. Remove thread protectors from extension, examine threads, and replace thread protectors.

NOTE

Damaged fuze extensions shall be disposed of in accordance with current directives.

8-11. INSTALLATION. Installation procedures for fuze extension M1A1 and nose fuze are contained in the appropriate Airborne Weapons/Stores Loading Manual for the aircraft.

8-12. REMOVAL. No specific removal procedures are necessary. However, the following procedure should be performed before repackaging for storage.

1. Inspect for dents and presence of explosive components.
2. Inspect threads for damage and replace thread protectors.

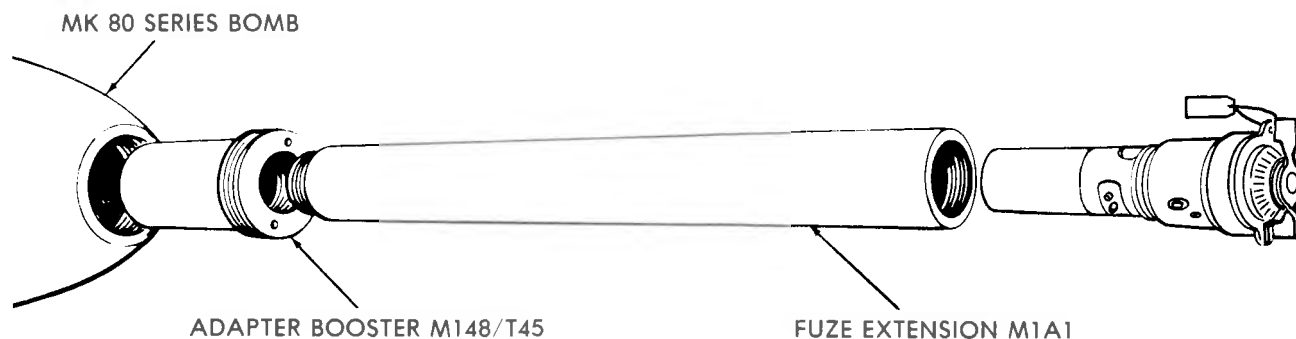


Figure 8-1. Typical Fuze Extension M1A1 — Installation Diagram

NOTE

Damaged fuze extensions shall be disposed of in accordance with current directives.

8-13. EMERGENCY PROCEDURES. When fuze extensions are returned, they are to be examined as soon as possible for external evidence of damage. If evidence of damage is present, notify EOD immediately.

8-14. ARMING ASSEMBLIES MK 3, 4, AND 5 MODS.

8-15. INTRODUCTION. Arming assemblies MK 3, 4, and 5, Mods 1 and 2, are used with the tail assemblies of both low-drag and retarded weapons to provide arming action for long delay mechanical time fuze MK 346. The arming assemblies consist of four basic components: fuze drive, adapter, appropriate drive shaft, and funnel guide. Figure 8-2 shows a typical arming assembly.

8-16. SPECIFICATIONS AND DESCRIPTION. Specifications for the MK 3, 4, and 5, Mods 1 and 2, are listed in table 8-2. A description of the arming assembly is contained in the following paragraphs.

8-17. The Mod 1 arming assembly provides a maximum rotational output of 1800 ± 100 rpm. This is accomplished by a centrifugally operated governor that limits the rotational speed delivered to the fuze input shaft. The effect of this governor is to provide a constant arming time for the fuze between 200 and 600 knots delivery speed. At rotational speeds below 1800 rpm the governor has no effect and rotation is imparted to the fuze input shaft on a one-for-one basis.

Table 8-2. Specifications for Arming Assemblies MK 3, 4, and 5, Mods 1 and 2

MK	Extension Drive Shaft Length (in.)	Color	Used With
3	38.3	Red	MK 83 low-drag bomb
4	24	Orange	MK 81 low-drag bomb with conical or MK 14 Mods retarded fin
5	22	Blue	MK 82 low-drag bomb with conical or MK 15 Mods retarded fin

8-18. The Mod 2 arming assembly is ungoverned and rotation is imparted to the fuze input shaft on a one-for-one basis at all delivery speeds.

8-19. The fuze drive (figure 8-3) consists of an externally threaded barrel with a mating locknut and governor housing secured to one end of the barrel. A four-blade, 7-inch, wire-encircled arming vane is installed on the end of the vane shaft protruding from the governor housing. A spindle within the fuze drive barrel mates with either end of the drive shaft. A toothed retaining spring secured to the open end of the barrel enables the fuze drive to be easily and securely attached to the adapter-latch assembly. A locknut secures the drive in its final assembled position.

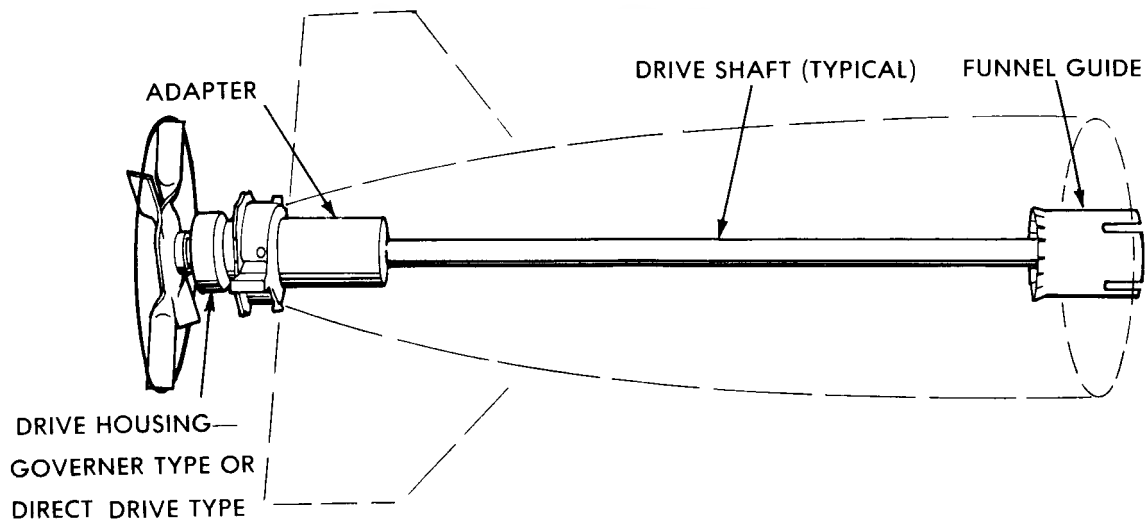


Figure 8-2. Typical Arming Assembly

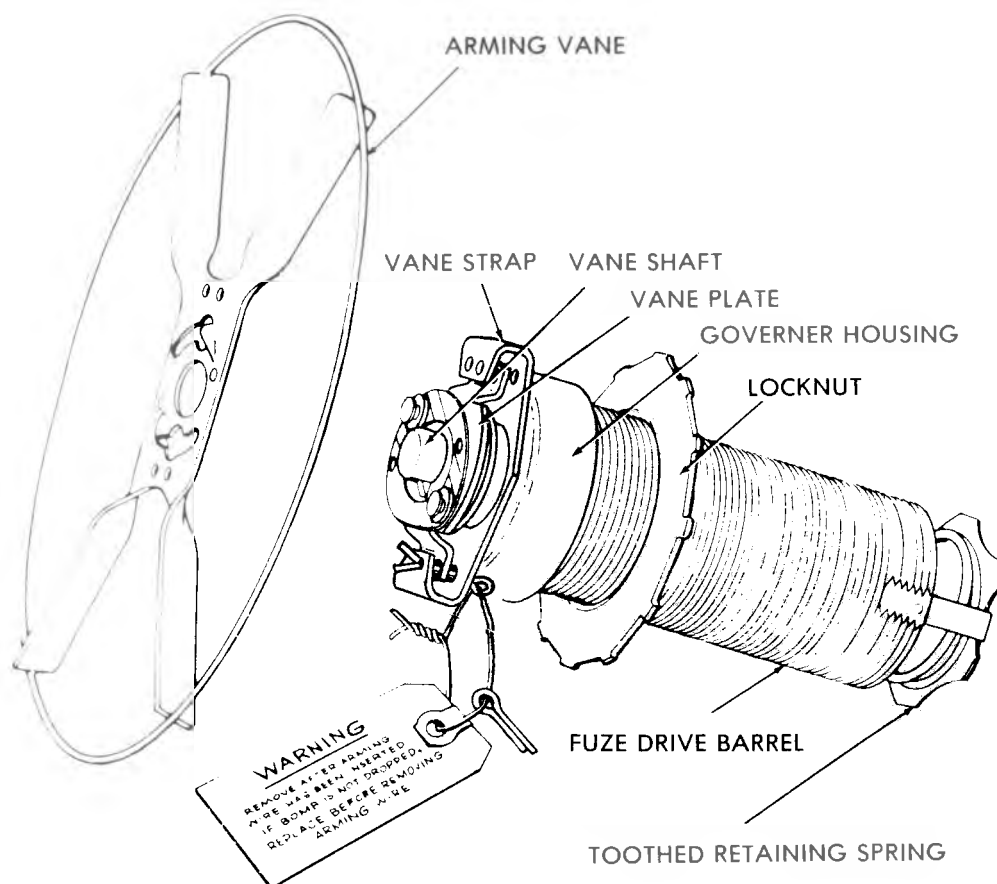


Figure 8-3. Fuze Drive MK 5, Mods 1 and 2 — Typical

Table 8-3. Characteristics of Arming Assembly Mods

Arming Assembly MK 3, 4, or 5	Applicable Fuze Drive	Special Features
Mod 1	MK 5 Mod 1	Governed drive
Mod 2*	No MK Mod numbers assigned	Ungoverned (direct) drive and antiwind rotation lock, positive adapter lock

*The Mod 2 is identified by the words DIRECT DRIVE stenciled on the governor housing.

8-20. The fuze drive determines the difference between Mods 1 and 2 for arming assemblies MK 3, 4, and 5. Characteristics of the two arming assembly Mods are listed in table 8-3.

8-21. The two latches on the adapter collar (figure 8-4) are secured over the fuze drive locknut when the assembly is installed on a weapon. Figure 8-2 shows the assembled fuze drive and adapter.

8-22. Drive shafts of various lengths and colors are supplied with the arming assemblies. The reversible shaft is a lightweight tube, flanged at each end, that couples the driven shaft of the fuze drive to the input shaft of the fuze. The drive shaft also serves to depress the locking key on the input shaft of the fuze MK 346 so that it is free to rotate.

8-23. The funnel guide is a molded polyethylene sleeve that fits onto the outer end of the fuze. It facilitates coupling the drive shaft to the fuze after the tail has been installed on the weapon.

8-24. CONFIGURATION. MKs 3, 4, and 5 are identical except for the length of the drive shaft. The Mods differ only in the fuze drive and the means of arming vane attachment. Mod 1 has a governed fuze drive. Mod 2 has an ungoverned fuze drive. Mod 2 is ruggedized against the rigors of high-speed, captive flight by having tabs in the fuze drive that engage slots in the fuze drive adapter. The tabs are an antiwind rotation lock. Mod 2 also have less space between the locknut teeth and the sides of the latches. The warning tag for the Mod 1 is a yellow rectangle; the Mod 2 warning tag is red-orange, and diamond shaped.

8-25. SAFETY. Refer to section II and OP 3347 for safety procedures.

8-26. PREPARATION FOR USE. The following procedures are to be followed when preparing to install arming assemblies MK 3, 4, and 5, Mods 1 and 2, in LDGP bombs MK 81, 82, and 83. Any of these bombs, as readied for arming assembly installation, must be prepared in accordance with procedures contained in section III.

8-27. Unpacking. Remove arming assembly from container and inspect for damage.

8-28. Inspection.

1. Release latches on adapter collar and screw locknut all the way toward arming vane end of fuze drive.

NOTE

Some Mod 1 and all Mod 2 arming assemblies have a spring-loaded pin in the side of the latch instead of a spring-loaded ball. This positively locks the latch in the closed position when it protrudes through a hole in the adapter collar bracket. To release each latch, push in on the pin with an Allen wrench or similar instrument so that the pin clears the bracket and the latch can be opened with the fingers.

2. Grasp adapter with one hand and, using evenly applied pressure, press inward on fuze drive with other hand. This forces toothed retaining spring through adapter sleeve. At the completion of this step, the toothed retaining spring should be protruding through the end of the adapter sleeve.

3. Separate adapter and fuze drive by pulling outward on the drive assembly while holding the sleeve.

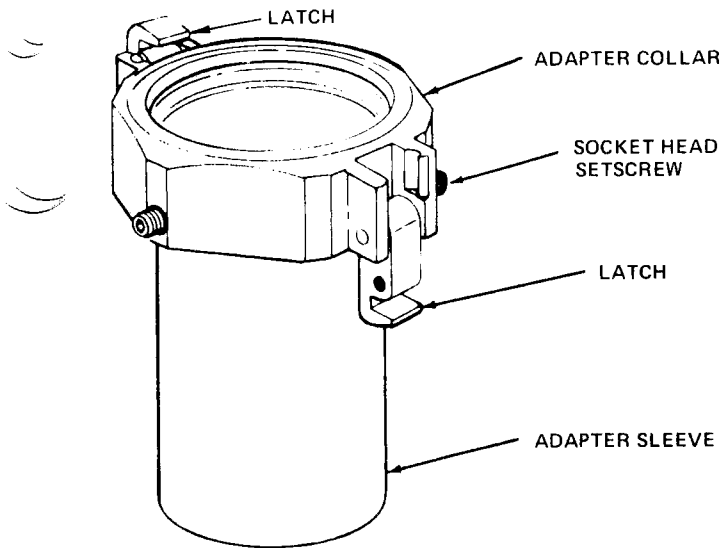


Figure 8-4. Fuze Drive Adapter

4. If inner ends of setscrews protrude into threaded area inside adapter collar, loosen setscrews with Allen wrench.

8-29. INSTALLATION. Install the arming assembly as follows:

1. Insert adapter through hole in rear of fin until it is firmly seated, then tighten setscrews to secure adapter to fin.

2. Insert appropriate drive shaft into fuze drive barrel until locking key in drive shaft engages output spindle in fuze drive barrel.

3. With fuze drive and drive shaft as one unit, orient fuze drive so that vane strap is aligned with bomb suspension lugs. Mod 2 also requires alignment of the tabs with adapter sleeve grooves to keep vane strap aligned as closely with suspension lugs as possible. Insert drive shaft through adapter and into tail assembly of bomb.

4. On conical fin assembly, remove access cover. Guide shaft into mouth of funnel guide by slowly and carefully pushing on outer end of fuze drive. The drive shaft then engages the input shaft of the fuze and seats firmly against the outer end of the fuze.

5. Hand-tighten locknut down fuze drive barrel until it contacts adapter. Back off as little as necessary so

that two latches can be secured to locknut. Secure latches over locknut.

NOTE

For the Mod 1 type arming assemblies, which have a spring-loaded pin on the side of the latch, depress the pin and close the latch. Check that the pin has snapped into the hole in the adapter bracket.

6. Replace access cover on conical fin assembly.

7. Install Mods 1 and 2 arming vanes and make final arming wire adjustment in accordance with appropriate Airborne Weapons/Stores Loading Manual.

8-30. REMOVAL. Remove arming assemblies as follows:

1. Loosen setscrews in adapter and remove adapter and fuze drive from fin.

2. Unlatch latches from the lockring.

3. Back off lockring until it engages the drive housing.

4. Grasp adapter housing with one hand and, using evenly applied pressure, press inward on fuze drive with other hand. This forces toothed retaining spring through adapter sleeve. At the completion of this step, the toothed retaining spring should be protruding through the end of the adapter sleeve.

5. Separate adapter and fuze drive by pulling outward on the drive while holding the adapter.

8-31. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

8-32. FIRE BOMB IGNITER AN-M23A1.

8-33. INTRODUCTION. Fire Bomb Igniter AN-M23A1 (figure 8-5) is an incendiary device designed to ignite the gelled fuel of fire bombs.

8-34. SPECIFICATIONS AND DESCRIPTION. The igniter is described in the following paragraphs.

8-35. Igniter AN-M23A1 (figure 8-5) is cylindrical, rounded at one end, and externally threaded at the other. The fuze well cavity is located at the rounded

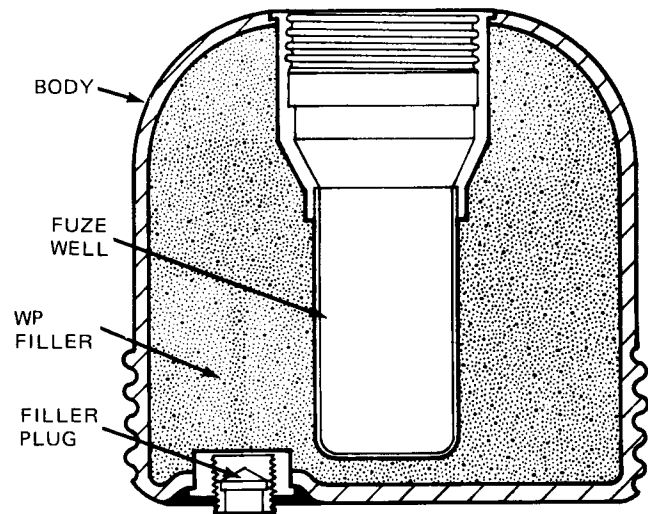
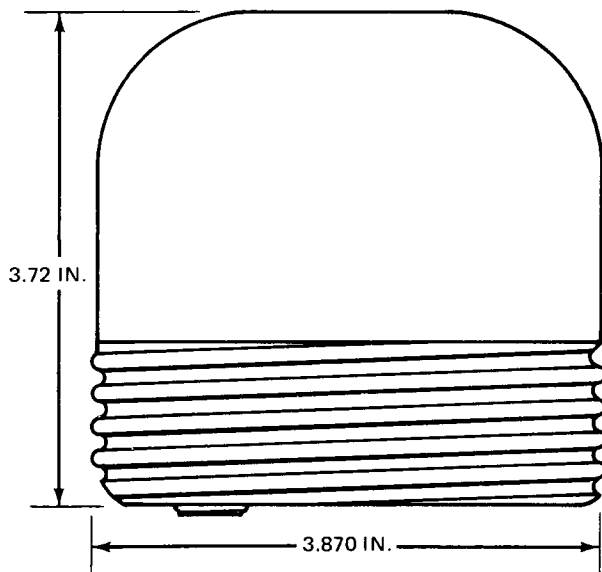


Figure 8-5. Igniter AN-M23A1

end. The igniter body is filled with white phosphorous (WP).

8-36. When the fire bomb is released from the aircraft and the fuze arms, impact to the bomb from any direction cause the fuze to function and burst the igniter. When the igniter bursts, the WP scatters and ignites spontaneously upon exposure to the air. The burning-WP then ignites the gelled fuel of the bomb.

8-37. **CONFIGURATION.** The igniter is compatible with the bomb fuze AN-M173A1 only.

8-38. **SAFETY.** Refer to section II for safety precautions pertaining to white phosphorous (WP). Refer to OP 3347 for additional safety precautions.

8-39. **PREPARATION FOR USE.** Preparation for use is described in the following paragraphs.

8-40. **Unpacking.** Remove igniter from shipping container and inspect for damage.

8-41. **Inspection.** Inspect as follows:

1. Check for cracks or damage that could weaken case.
2. Check for deformation of case and fuze well.

8-42. **INSTALLATION.** Install in accordance with appropriate Airborne Weapons/Stores Loading Manual.

8-43. **REMOVAL.** Remove igniter from bomb in accordance with appropriate Airborne Weapons/Stores Loading Manual.

8-44. **EMERGENCY PROCEDURES.** The following procedure is to be used during emergency conditions:

WARNING

In the event of a fire involving the igniter, remain upwind to avoid the noxious fumes.

1. If there are obvious defects such as cuts or ruptured cases, submerge in water and set the fire bomb igniter aside.
2. Notify EOD personnel immediately.

8-45. IGNITER MK 273 MODS 0 AND 1.

8-46. **INTRODUCTION.** Igniter MK 273 Mod 0 (figure 8-6) is a flanged, cylindrical container with a fuze cavity designed to accommodate fuze M918 only. The igniter body is made of aluminum alloy and is filled with magnesium-teflon powder and pellets.

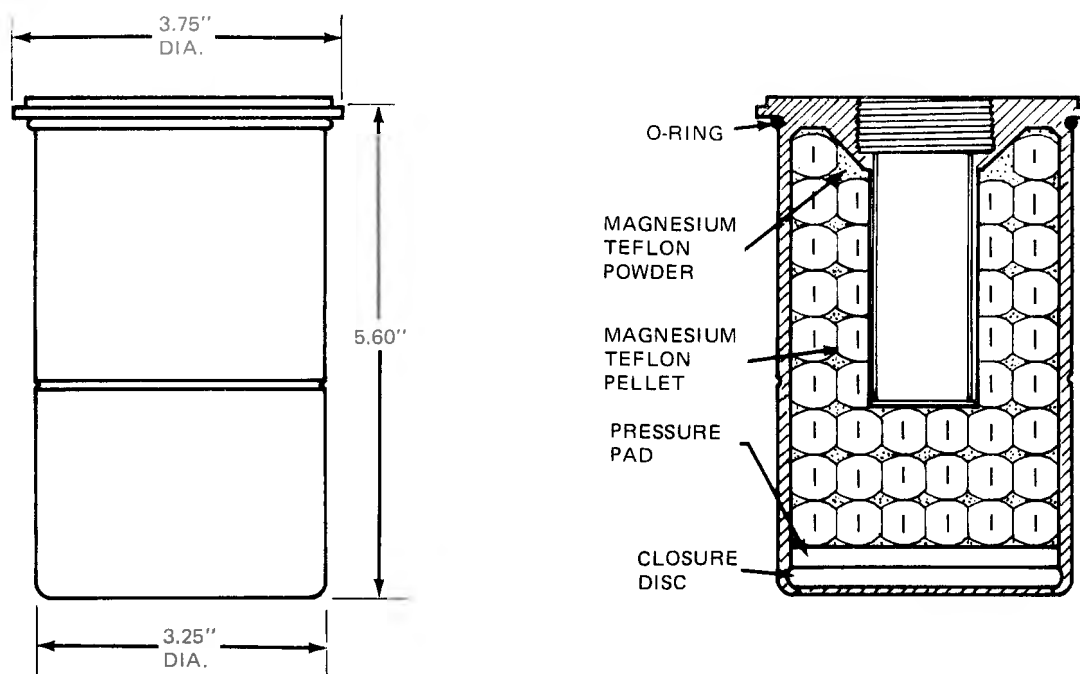


Figure 8-6. Igniter MK 273 Mod 0

NOTE

The MK 273 Mod 1 is used only with the fuze MK 343 assembled as the initiator MK 13 Mod 0. (See section VII.)

8-47. SPECIFICATIONS AND DESCRIPTION. Specifications and description of the igniter are contained in the following paragraphs.

8-48. The igniter, with an O-ring under the flange, is mounted in the filler holes of the fire bomb MK 77 Mod 4 and is secured by a retaining ring.

8-49. When the fire bomb is released from the aircraft and the fuze arms, impact to the bomb from any direction causes the fuze to function and burst the igniter. When the igniter bursts, it ignites the magnesium-teflon powder, which in turn ignites the magnesium-teflon pellets. These pellets then ignite the gelled fuel of the fire bomb.

8-50. CONFIGURATION. Igniter MK 273 Mod 0 is used only in fire bomb MK 77 Mod 4, and functions both on land and under water.

8-51. SAFETY. Refer to section II and OP 3347 for pyrotechnic safety precautions.

8-52. PREPARATION FOR USE. Refer to section V, MK 77 Mod 4 procedures.

8-53. Unpacking. Remove igniter from shipping container and inspect for damage.

8-54. Inspection. Check for cracks or damage that could weaken case.

8-55. INSTALLATION. Refer to section V, MK 77 Mod 4 procedures, and appropriate Airborne Weapons/Stores Loading Manual.

8-56. REMOVAL. Refer to appropriate Airborne Weapons/Stores Loading Manual.

8-57. EMERGENCY PROCEDURES. The following procedure is to be used during emergency conditions.

WARNING

In the event of a fire involving the igniter, high temperatures are generated. Avoid prolonged breathing of fumes.

1. If there are obvious defects such as cuts or ruptured cases, set fire bomb igniter aside.
2. Notify EOD personnel immediately.

8-58. PROXIMITY (VT) TARGET DETECTING DEVICES (TDD) MK 43 MOD 0 AND SENSING ELEMENT M20/M20A1 (SE).

8-59. INTRODUCTION. Two separate VT (variable time) nose elements are available to provide an airburst capability for electric-fuzed bombs MK 80 series; these are proximity-sensing element M20/M20A1, and target-detecting device MK 43 (figure 8-7). Table 8-4 summarizes the characteristics of these elements.

8-60. Proximity sensing element M20/M20A1 is intended for use with unretarded weapon deliveries only. Target-detecting device MK 43 may be used for retarded or unretarded deliveries.

8-61. The M20/M20A1 and the MK 43 are physically interchangeable and are compatible with MK 344 and MK 376. They differ, however, in their primary applications.

8-62. SPECIFICATIONS AND DESCRIPTION. Specifications for the MK 43 and M20/M20A1 elements are provided in the summary sheets appendix C. Each element and its application is described in table 8-4.

8-63. Target-detecting device MK 43 is electrically initiated by +300 volts dc applied at the time of weapon release.

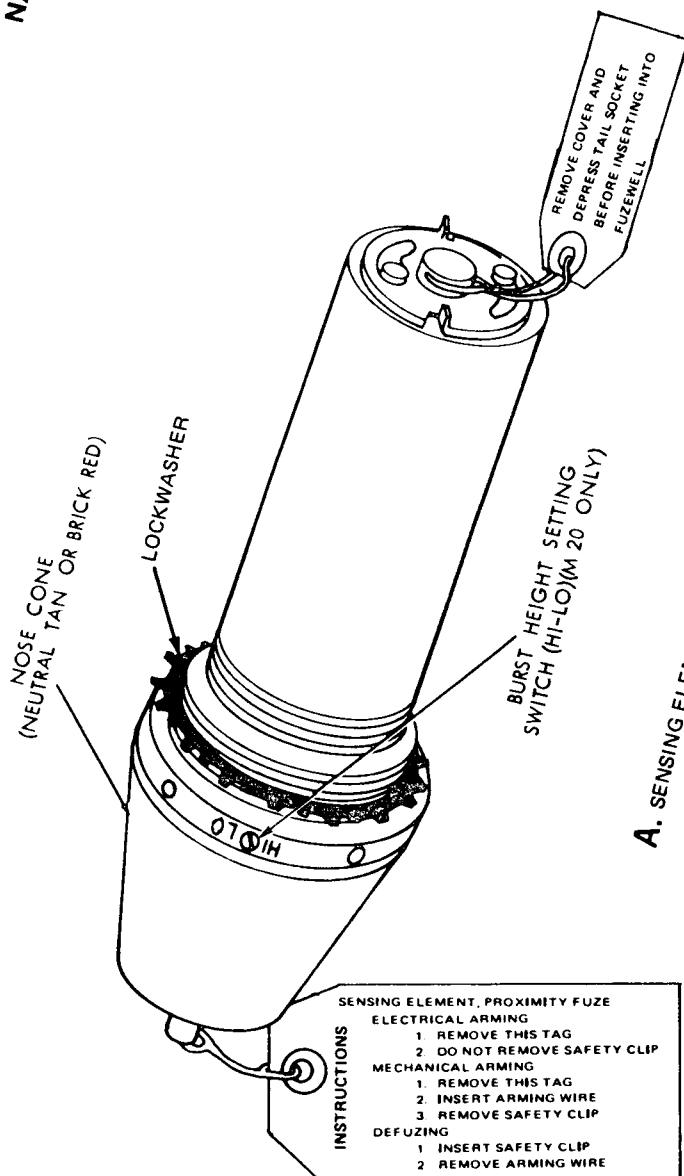
8-64. The MK 43 is initiated mechanically only when a delayed airburst is desired. Initiation is accomplished by withdrawal of the arming wire at weapon release, which allows the striker rod at the forward end of the MK 43

Table 8-4. Proximity Sensing Element M20/M20A1 and Target-Detecting Device MK 43 Characteristics

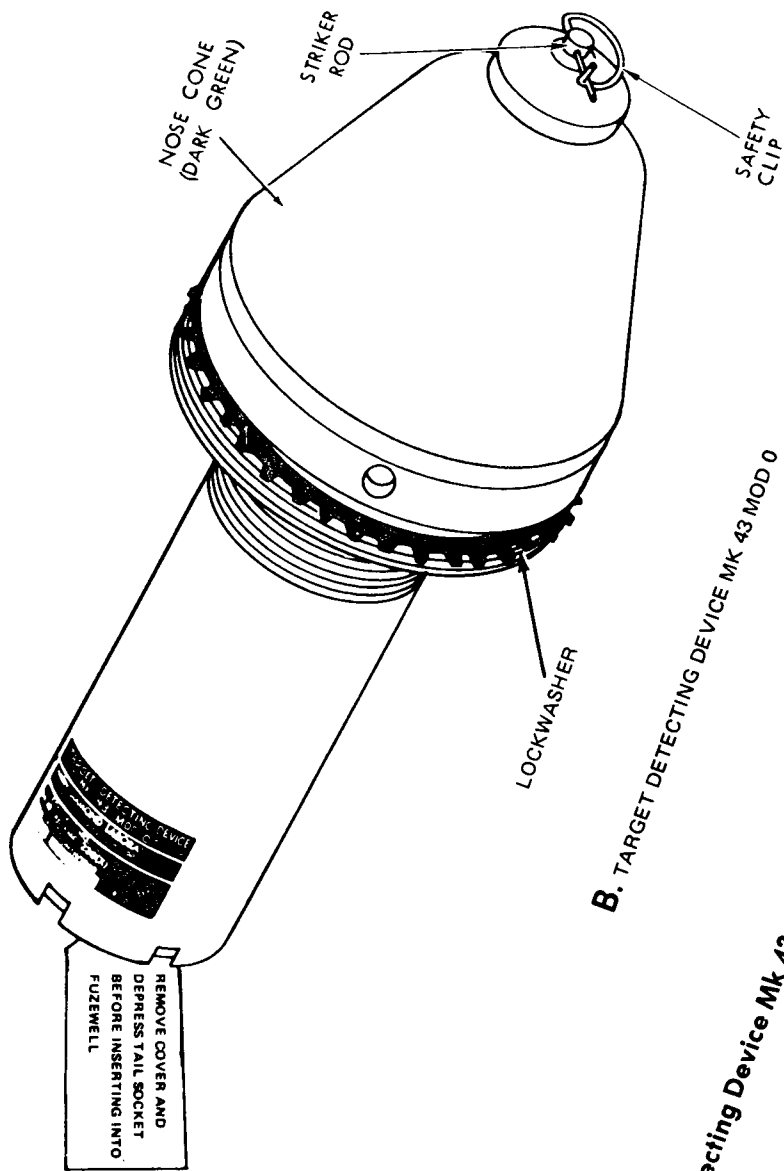
	M20/M20A1	MK 43
Nomenclature	Sensing Element, Proximity M20 Sensing Element, Proximity M20A1	Detecting Device, Target, MK 43 Mod 0
Identifying Color of Nose Cone	M20, neutral tan (light-colored under red-light) M20A1, brick red (light-colored under red light)	Dark Green (black under red-light)
Fuze Application	MK 344* and MK 376	MK 344* and MK 376
Initiation	Mechanical	+ 300 volts dc or mechanical
Energizing	3.5 seconds warmup	2 seconds warmup
Delivery Angle	45 to 90 degrees optimum	10 to 60 degrees optimum
Burst Height	HI - 100 to 160 feet LO - 20 to 60 feet (low delivery angles result in surface bursts)*	16 feet nominal (burst height decreases as delivery angle increases)
Lobe Pattern	Fore and aft (FORWARD)	Side-looking
Weight	4.3 pounds	6 pounds

*See text for application

NAVAIR 11-5A-17



A. SENSING ELEMENT PROXIMITY FUZE M20/20A1



B. TARGET DETECTING DEVICE MK 43 MOD 0

Figure 8-7. Target-Detecting Device Mk 43 and Proximity-Sensing Element M20/M20A1 — External View

(figure 8-7) to retract and initiate the electronic circuitry. The striker rod is NOT a safing device; it is an alternate method of initiating the MK 43. This method is used to provide VT operation when the fuze is not initiated by +300 volts dc.

8-65. The lobe radiation pattern of the MK 43 is shown in figure 8-8, view A. Because the lobes radiate at right angles to the longitudinal axis of the weapon, the MK 43 provides an airburst capability for retarded deliveries. This side-looking pattern is most effective for the low-angle, low-speed bomb impacts and low approach characteristic of retarded deliveries. The MK 43 also functions satisfactorily when used with low-drag or unretarding weapons at impact angles up to 60 degrees from the horizontal. Higher impact angles reduce burst height.

8-66. Proximity sensing elements M20 and M20A1 do not respond to the dc voltage that is applied to the fuze. Their lobe pattern and response characteristics (figure 8-8, view B) make them unsuitable for retarded deliveries. When an M20/M20A1 is used in a retarded delivery, its fore-and-aft lobe pattern may cause a surface burst.

8-67. The M20/M20A1 utilizes a HI-LO switch not found on the MK 43. This switch allows preflight selection of a burst-height range of 20 to 60 feet for the low range and 100 to 160 feet for the high range. The M20/M20A1 is optimized for a delivery impact angle of 45 degrees or more.

8-68. The M20/M20A1, like the MK 43, can be initiated mechanically by a striker rod. Mechanical initiation must be used whenever the M20/M20A1 is employed with a MK 344 or MK 376.

8-69. Figure 8-9 is a functional block diagram of an M20/M20A1 or MK 43 VT element. A +300 volt initiating charge is applied to the MK 43 element from the aircraft. The M20/M20A1 does not respond to dc voltage and must be mechanically initiated. Within 3.5 seconds of mechanical initiation (M20/M20A1) or 2 seconds of electrical/mechanical initiation (MK 43), the thermal battery starts generation of operating voltage and the circuitry of the VT element becomes operational.

8-70. The oscillator, shown in figure 8-9, produces a radio signal that is fed to the antenna and radiated in a specific lobe pattern. The same antenna also receives the signals reflected by the target. When this reflected signal reaches a predetermined level, a thyatron permits transmission of energy stored in the firing capacitor to the electric tail fuze, where it initiates the firing train.

8-71. When used in conjunction with a MK 344 or MK 376, the firing pulse may pass through the MK 344 or MK 376 delay circuitry before being applied to the detonator.

8-72. CONFIGURATION. The MK 43 is fully compatible with retarded or unretarded weapons. The M20/M20A1 is intended for use with unretarded weapon deliveries only.

8-73. SAFETY. Safety is maintained by the arming delay circuits in the tail fuze. Because the VT element uses the detonator circuits of the companion tail fuze, a VT pulse cannot cause detonation until the tail fuze has been armed. Refer to section II and OP 3347 for additional safety precautions.

8-74. PREPARATION FOR USE. The following are procedures for handling and installation of VT elements in low-drag MK 80 series and retarded weapons. Except as noted, there is no distinction between installation of M20/M20A1 and MK 43 elements.

NOTE

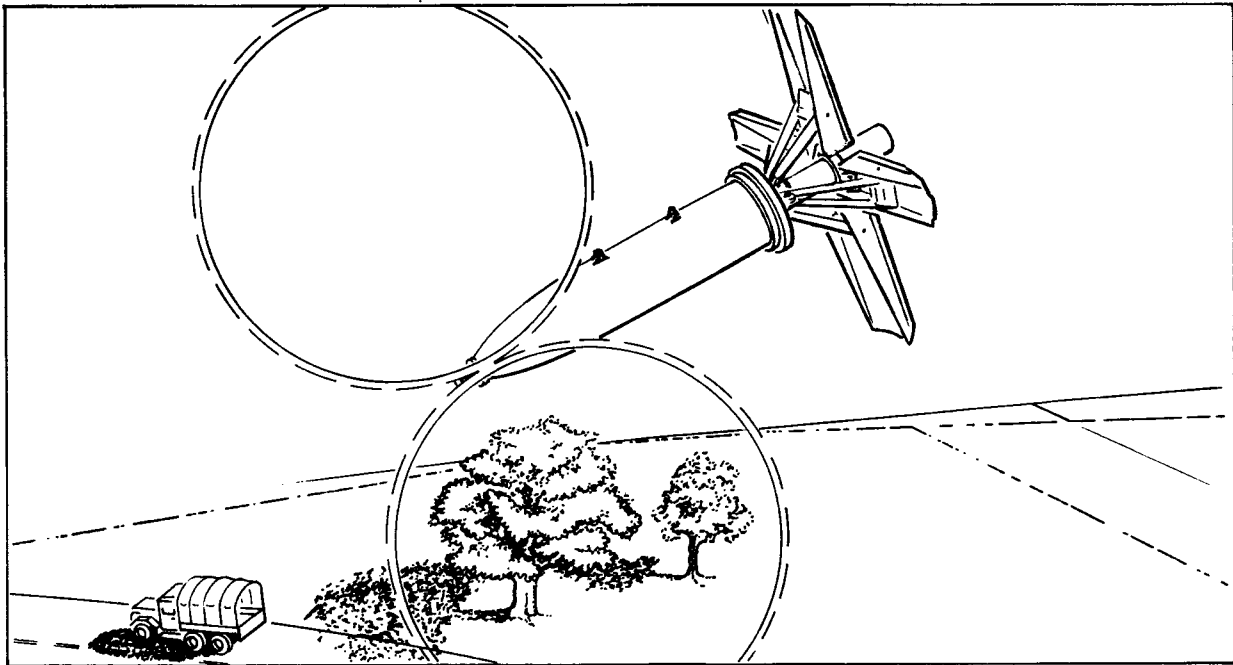
The inner shipping containers of some lots of VT elements are marked CONFIDENTIAL. These VT elements are no longer classified and may be treated as unclassified. Downgrading authority of TDD MK 43 hardware is per NAVAIR-SYSCOM letter 6021E:ALK/2256 of 2 September 1971.

8-75. Unpacking. Proceed as follows:

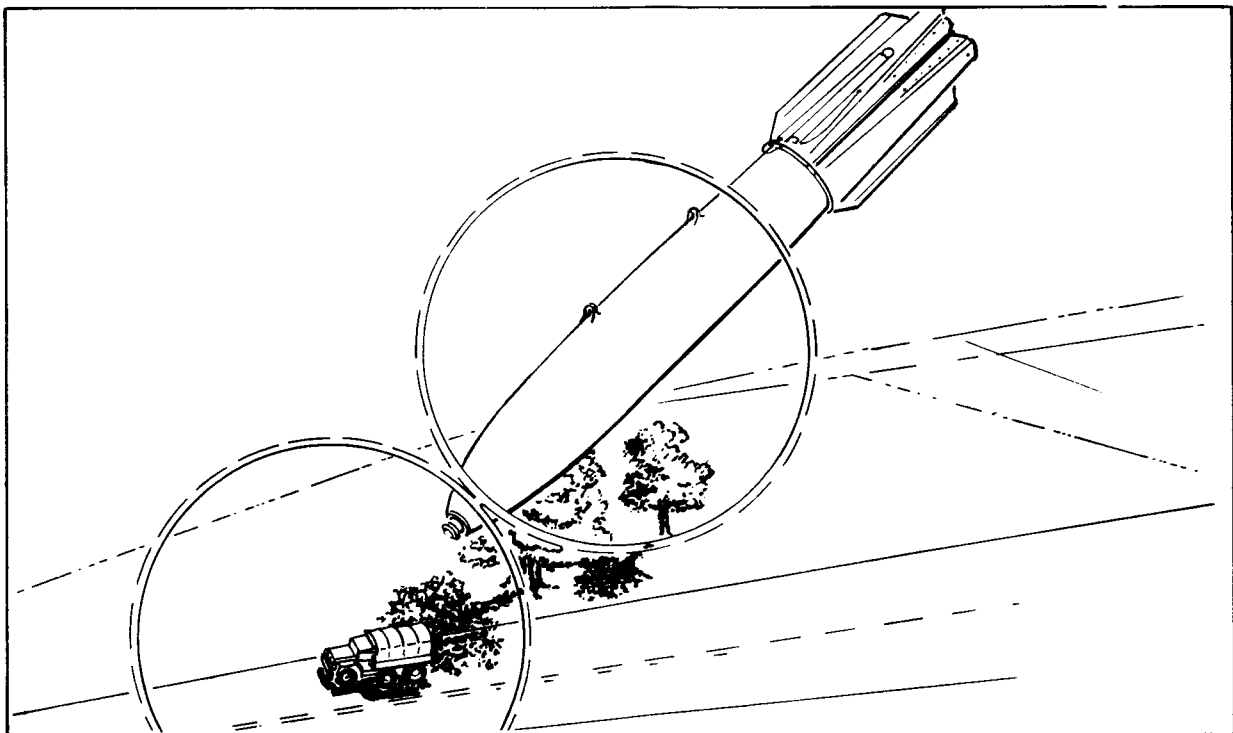
CAUTION

- Handle the proximity sensing element carefully; the nose cone is very fragile. The element contains complex electrical circuitry; do not drop or mishandle.
- Do not install a VT element MK 43 when an M20/M20A1 is required or vice versa. The two sensors, although physically similar, have different tactical applications for optimum performance. The M20/M20A1 nose cone is either tan or brick red in color and the MK 43 is dark green. The M20/M20A1 nose cone appears light under red-light conditions; the MK 43 appears dark.

1. Ensure that proper VT element for the mission is used.



VIEW A



VIEW B

Figure 8-8. Lobe Pattern, MK 43 (A) and M20/M20A1 (B)

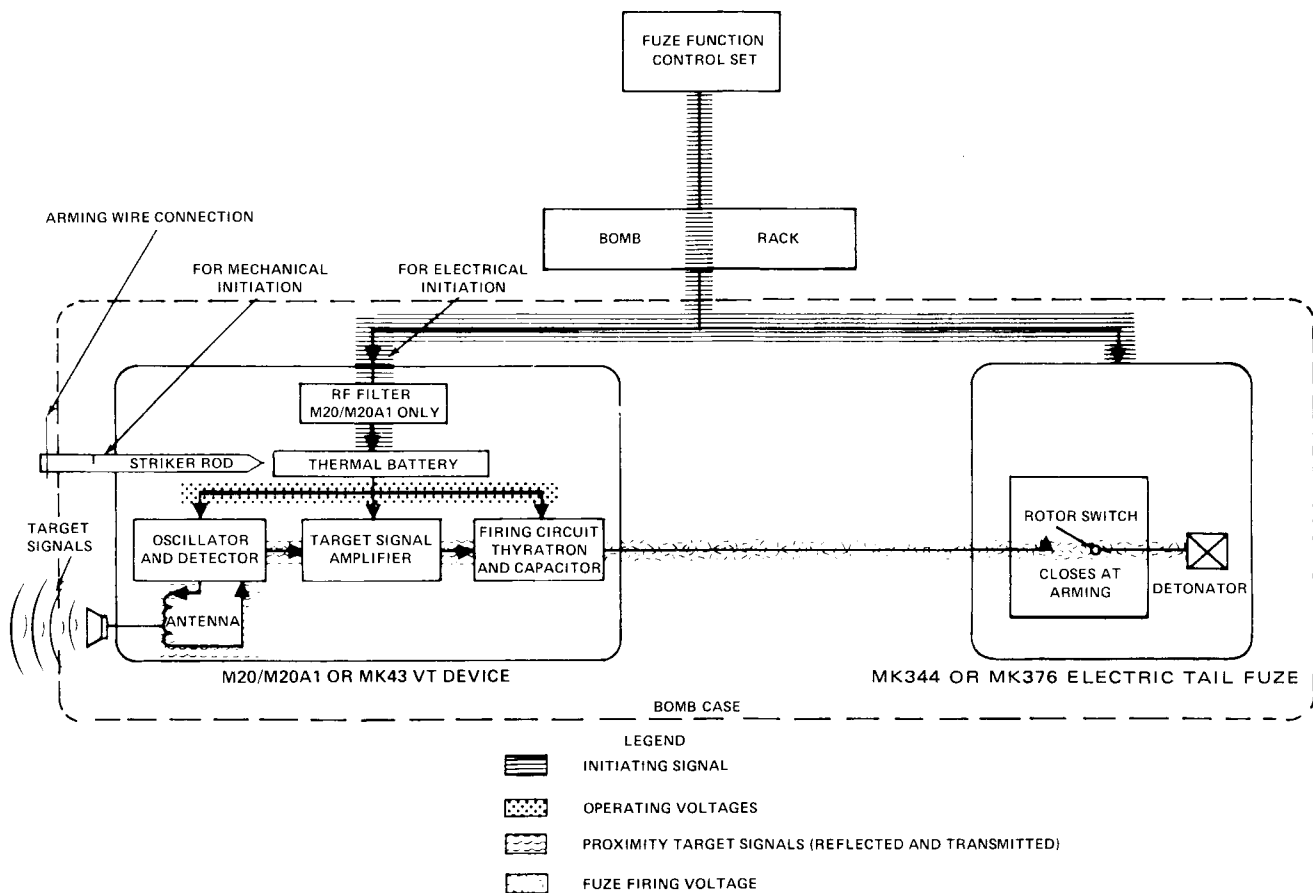


Figure 8-9. Proximity Element and Electrical Tail Fuze Functional Block Diagram

CAUTION

Do not remove the safety clip from the striker rod. This allows the rod to retract and initiate the VT element. If the safety clip is accidentally removed, dispose of the element in accordance with current directives.

2. Remove instruction tag from nose of VT element and shipping cap and tag from base. Depress connector at base of element. Note that it does not bind or stick and that it returns to its original position.

3. If an M20/M20A1 is being installed, set HI-LO switch as required for the mission.

8-76. Inspection. Inspect as follows:

1. Remove nose plug from weapon as directed in section III. Check that nose well is free from dirt and that electrical connector is clean and undamaged.

2. Check VT element for shipping damage. If damaged, dispose of element in accordance with current directives.

3. Verify that safety clip on front of VT element is in place. If missing, discard VT element.

4. Verify lockwasher is present.

8-77. INSTALLATION. Install VT element as follows:

WARNING

Sensing elements M20/M20A1 must always be installed in a RADHAZ-free area.

1. Insert VT element into nose well and rotate clockwise until hand tight. Using spanner wrench, tighten element one-quarter turn.

2. If mechanical initiation option is required, an arming wire must be installed in the striker rod and the safety clip removed.

NOTE

The arming wire is usually installed after the bomb has been loaded on the aircraft in accordance with appropriate Airborne Weapons/Stores Loading Manual.

3. (Bombs assembled for preloading) If mechanical initiation option is required, a .064 diameter arming wire must be installed in the striker rod. Ensure arming wire swivel eye extends to a point midway between the bomb lugs. Trim excess wire 6 to 7 inches below the striker rod.

8-78. REMOVAL. Remove the VT element as follows:

1. If arming wire is installed, replace safety clip and remove arming wire.
2. Unscrew element.

NOTE

Removal of TDD's MK 43 from the bomb may damage the fuze electrical connector. An inspection can be performed to segregate unserviceable TDD's. Reuse of a TDD without inspection will probably result in a dud bomb. Safety is not affected.

3. Inspect TDD MK 43 electrical connector for evidence of damage, replacing shipping caps on base and instruction tag on nose. Dispose of damaged TDD as unserviceable in accordance with current directives.

4. Replace instruction tag on nose and shipping cap and tag on base of serviceable TDD's and sensing elements and return to stowage.

8-79. EMERGENCY PROCEDURES. Sensing elements M20/M20A1 and MK 43 do not contain explosive components. Damaged or otherwise unserviceable sensing elements shall be disposed of in accordance with current directives.

8-80. ADAPTER-BOOSTER M148/T45E SERIES.

8-81. INTRODUCTION. Adapter-booster M148/T45E series (figure 8-10) permits the use of 2-inch

thread diameter mechanical nose fuzes in MK 30 series bombs.

8-82. SPECIFICATIONS AND DESCRIPTION. Specifications for the adapter-boosters M148/T45E series are listed in table 8-5 and described in the following paragraphs.

Table 8-5. Specifications for Adapter-Booster M148/T45E Series

Booster Charge:

Type	Tetryl
Weight (oz.)	6.36
Overall Length (in.)	6.83
Outside Thread Diameter (in.)	3.5
Inside Thread Diameter (in.)	2.0

8-83. CONFIGURATION. Adapter-booster M148/T45E series is threaded externally for installation in the bomb fuze well and internally for installation of the fuze. The casing contains the booster charge and is threaded onto the base of the adapter.

8-84. SAFETY. Refer to section II and OP 3347 for data on explosive safety.

8-85. PREPARATION FOR USE. Adapter-boosters may be installed in the bomb fuze cavity prior to bomb installation on the aircraft. Installation procedures are as follows.

8-86. Unpacking. Unpack adapter-booster and remove closing plug.

8-87. Inspection. Inspect as follows:

1. Inspect adapter-booster internally and externally to ensure that all parts, including threads, are clean and undamaged.
2. Inspect bomb nose fuze cavity.
3. Loosen setscrew in bomb body.

8-88. INSTALLATION. Install the adapter-booster as follows:

1. Screw adapter-booster into bomb and tighten with spanner wrench until firmly seated.

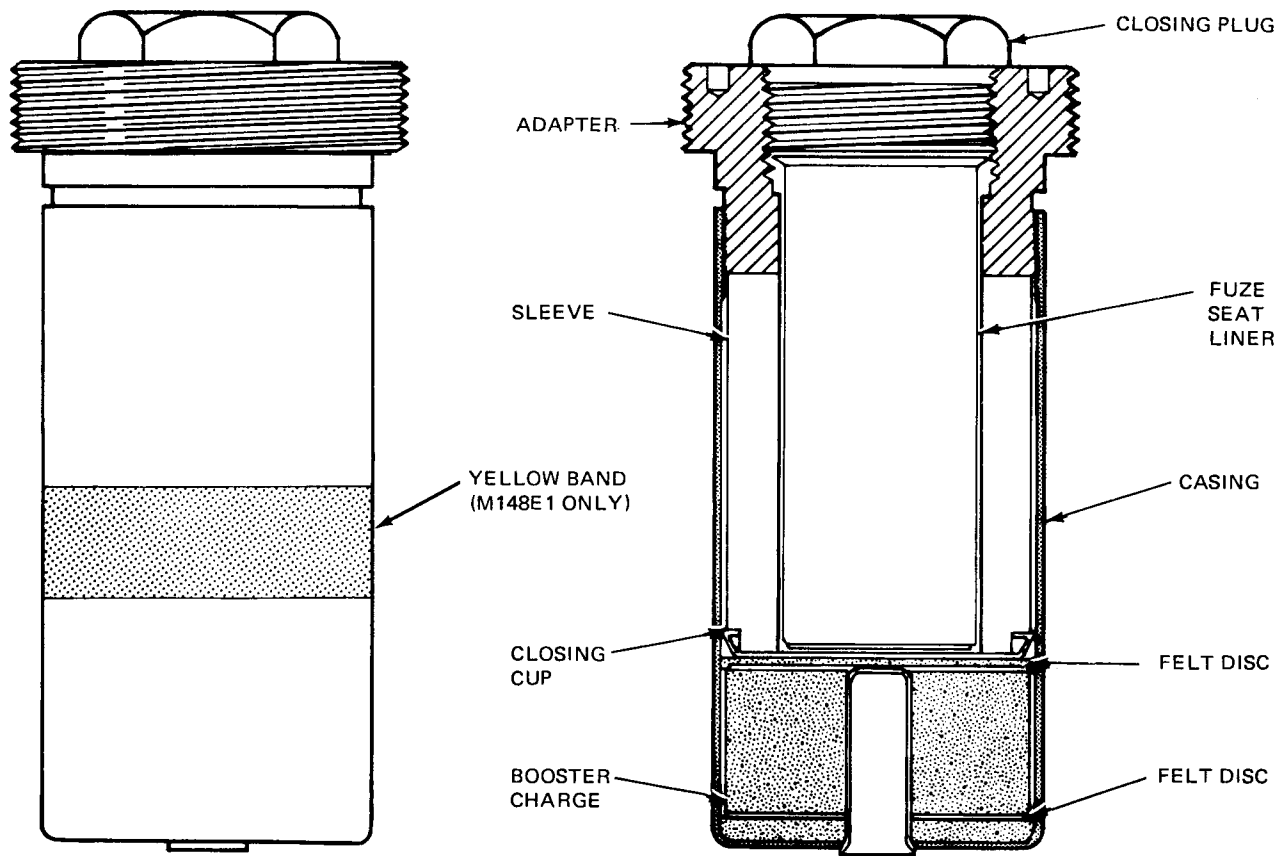


Figure 8-10. Typical Adapter-Booster M148/T45E Series

2. Tighten setscrew in bomb body against adapter-booster threads.

8-89. REMOVAL. Remove the adapter-booster as follows:

1. Loosen setscrew in bomb body.
2. Using spanner wrench, unscrew adapter booster and remove from bomb body.

8-90. EMERGENCY PROCEDURES. In the event of obvious defect such as cuts or ruptured cases, set the adapter-booster aside and dispose of it in accordance with current directives.

8-91. ADAPTER-BOOSTER M148E1, THERMALLY PROTECTED.

8-92. Adapter-booster M148E1 is similar in external appearance to the earlier M148/T45 series. Differences are the nomenclature marking on the face of the adapter-booster collar, the words THERMALLY PRO-

TECTED in bold black letters, and a yellow band around the adapter-booster casing, indicating explosive loading. The M148E1 was developed for use with thermally protected bombs. When used in this combination, the time for weapon cook-off (see appendix B) is significantly increased. The M148E1 can be used with unprotected bombs if required by logistic problems. However, no increase in cook-off time will result.

WARNING

The use of unprotected adapter-boosters M148/T45 with MK 80 thermally protected bombs will decrease the cook-off time and may increase the severity of the explosive reaction when cook-off occurs.

8-93. ADAPTER-BOOSTER M150/T46 SERIES.

8-94. INTRODUCTION. The adapter-booster M150/T46 series (figure 8-11) permits use of mechanical

tail fuzes with MK 80 series bombs. The M150 and T46 series adapter-boosters differ only in internal construction, and may be used interchangeably.

8-95. SPECIFICATIONS AND DESCRIPTION. Specifications for the adapter-booster M150 and T46 series are listed in table 8-6. The adapter-boosters are described in the following paragraphs.

8-96. CONFIGURATION. Adapter-booster M150 and T46 series consist of two separate explosive components. The primary adapter-booster receives a 2.0-inch diameter tail fuze. The T46 series contains a fuze adapter sleeve for use with 1.5-inch diameter fuzes. A hole is drilled through the threads of the primary adapter-booster to permit insertion of a locking pin for use with long-delay fuzes. This pin locks the adapter-booster to the base plug of the bomb and prevents removal of the adapter-booster while the fuze is installed. The auxiliary booster cup fits loosely into the bomb fuze well and is held in place by the shock absorber on the base of the primary adapter-booster.

Table 8-6. Specifications for Adapter-Booster M150/T46 Series

Booster charge:	
Type	Tetryl
Weight (oz.):	
Overall	14.52
Primary booster	4.2
Auxiliary cup	9.9
Length (in.):	
Overall	7.9
Primary booster	5.2
Auxiliary cup	2.7
Outside thread diameter	3.5
Inside thread diameter	2.0
Adapter sleeve (in.)	1.5

8-97. SAFETY. Refer to section II and OP 3347 for explosive safety.

8-98. PREPARATION FOR USE. Both components of the adapter-booster are installed in the bomb fuze cavity before the bomb is installed on the aircraft.

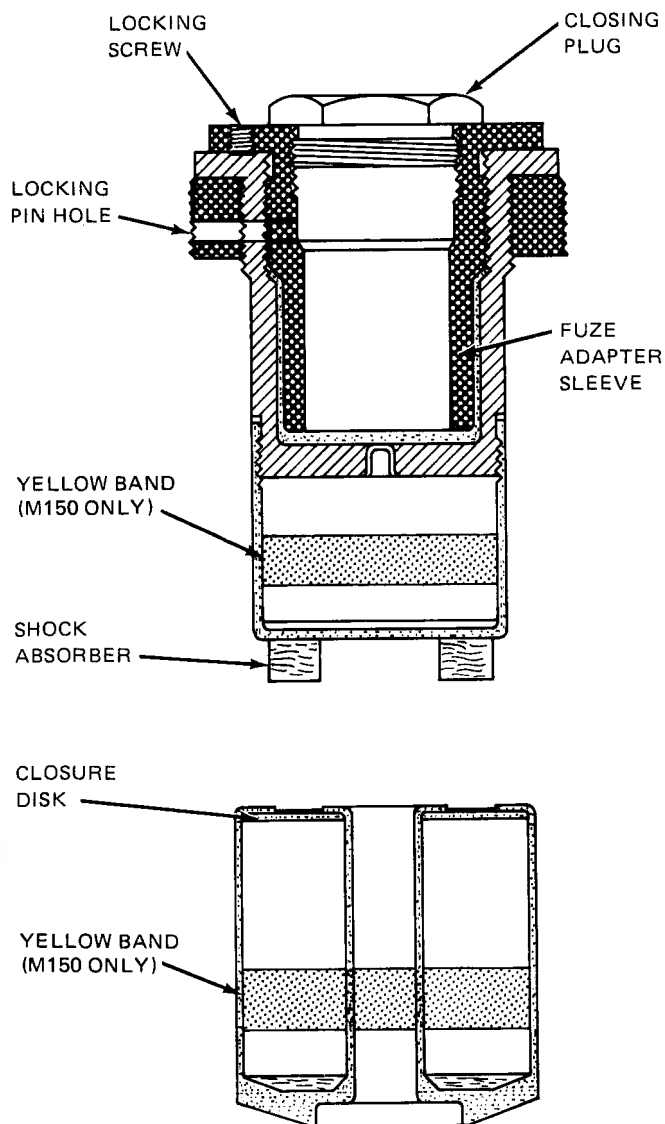


Figure 8-11. Adapter-Booster M150/T46 Series (T46E4 Shown)

WARNING

Ensure that both components of the adapter-booster are removed from the shipping container. Both components contain large quantities of high explosive.

8-99. Unpacking. Remove both components of adapter-booster from shipping container. Remove closing plug from primary adapter-booster.

8-100. Inspection. Inspect the adapter booster as follows:

1. Inspect external and internal threads and fuze well in adapter-booster for cleanliness and damage.
2. (T46 series) Loosen locking screw and remove 1.5-inch fuze adapter sleeve. (This sleeve is not used with any currently authorized fuze. Retain sleeve until adapter-booster is expended, then discard.)
3. Ensure that locking pin holes in threads of primary adapter-booster are correctly aligned.
4. Ensure that shock absorber is securely attached to base of primary adapter-booster. If loose, attach with strip of tape across shock absorber and up sides of primary adapter booster.

8-101. INSTALLATION. Install the adapter-booster as follows:

1. Insert auxiliary booster cup into bomb fuze well. Outer end of auxiliary booster cup is marked in large red letters and is visible after insertion.
2. Screw primary adapter-booster into bomb and tighten with spanner wrench until firmly seated.

8-102. REMOVAL. Remove the adapter-booster as follows:

NOTE

The adapter-booster cannot be removed from the bomb until after the fuze MK 346 has been removed.

1. Ensure that locking pin has been removed from locking-pin hole in primary adapter-booster threads.
2. Unscrew primary adapter-booster from bomb using a spanner wrench.

WARNING

The auxiliary booster cup is not attached to the primary adapter-booster and must be removed separately.

3. Remove auxiliary booster cup from bomb fuze well.

4. (T46 series) Replace 1.5-inch fuze adapter sleeve and tighten locking screw.

5. Replace closing plug in adapter-booster fuze well.

6. Return auxiliary booster cup and primary adapter-booster to shipping container.

8-103. EMERGENCY PROCEDURES. In event of obvious defects such as cuts or ruptured cases, set aside adapter-booster and dispose of in accordance with current directives.

8-104. ARMING SAFETY SWITCH MK 122 MOD 0.

8-105. INTRODUCTION. Arming safety switch MK 122 Mod 0 (figures 8-12 and 8-13) connects the bomb fuze control circuits in the aircraft to the electric fuze circuits in the bomb. This switch provides an open circuit and a RADHAZ shield to prevent electromagnetic radiation (RADHAZ) from entering the fuze circuits.

8-106. SPECIFICATIONS AND DESCRIPTION. Specifications and description of the arming safety switch are contained in the following paragraph.

8-107. Arming safety switch MK 122 consists of a short lanyard and a length of shielded coaxial cable, both connected to a switching unit. A quick-disconnect is attached to the free end of the coaxial cable, and a tab is secured to the end of the lanyard. The switching unit is held in the bomb-charging receptacle by a switching unit retaining nut, which is slipped over the quick-disconnect, coaxial cable, and lanyard. The retaining nut has external threads that engage the threads of the bomb-charging receptacle.

8-108. GROUND SUPPORT EQUIPMENT (SPECIAL TOOLS). A retainer nut wrench is provided in each box of arming safety switches MK 122.

8-109. CONFIGURATION. This switch can be used with all electric fuzed bombs.

8-110. SAFETY. Refer to section II for general precautions.

8-111. PREPARATION FOR USE. Prepare the switch for use as follows.

8-112. Unpacking. Remove arming safety-switch MK 122 from its package. Remove rubber shipping cap (if installed) by peeling (rolling) cap from quick-disconnect, taking care not to stress the coaxial cable.

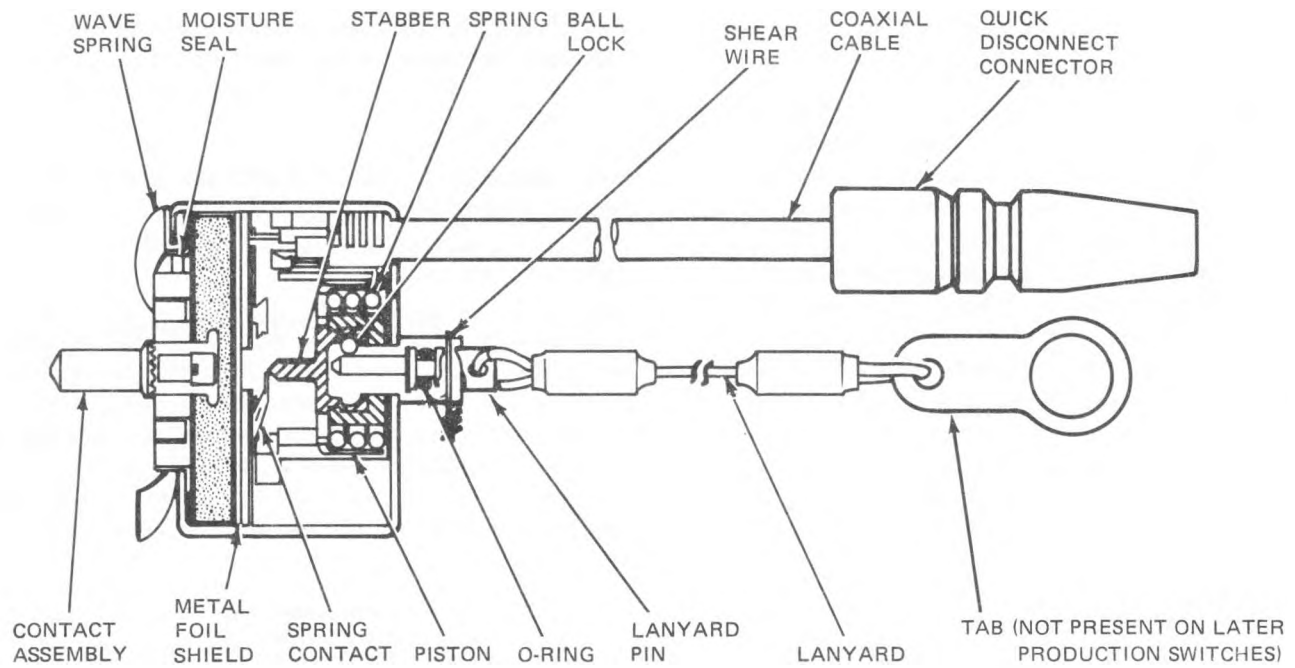
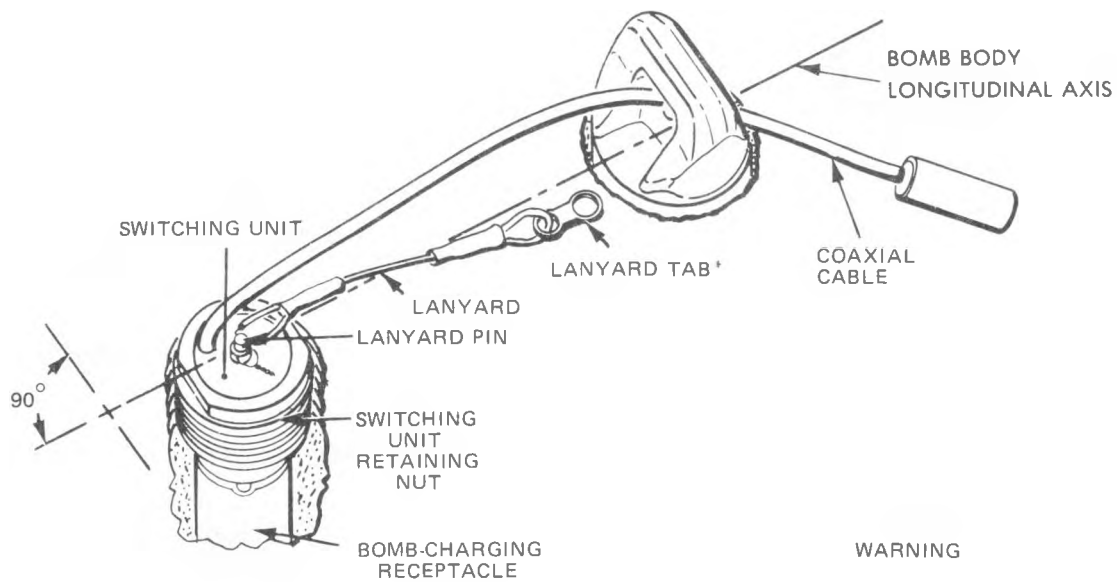


Figure 8-12. Arming Safety Switch Mk 122 Mod 0 — Sectional View



*NOT PRESENT ON LATER PRODUCTION SWITCHES

WARNING
DISCARD ENTIRE MK 122 ARMING SAFETY SWITCH IF LANYARD BREAKS AWAY. DO NOT ATTEMPT TO REPLACE THE LANYARD PIN. DO NOT USE SEPARATED SWITCHES ON A BOMB.

Figure 8-13. Arming Safety Switch MK 122 Mod 0 — Installation Diagram

NOTE

A reasonable quantity of these caps should be saved and cut in half for use by squadron personnel when down-loading bombs. Changing the length from 1-3/4 inches to 7/8 inch permits easier future use. The remnant with ends open has no further use. This 7/8-inch long cap should also be used by ordnance personnel preparing the weapon when the clear plastic insulator at the end of the connector has been pierced or otherwise broken. Newer production arming safety switches MK 122 are not equipped with rubber shipping caps. In this case, a small quantity of 7/8-inch caps is shipped with the switches for use as indicated above.

8-113. Inspection. Inspect switch for deformation, corrosion, and damage to case.

1. Check contact assembly for cleanliness.
2. Check coaxial cable for cracks and breaks in insulation.

8-114. INSTALLATION. Install the arming safety switch as follows:

WARNING

- The arming safety switch MK 122 must be installed in a RADHAZ-free environment when sensing elements M20/M20A-1 are used.
- Do not pull lanyard during handling and loading. If lanyard breaks away from switch, discard entire arming safety switch MK 122 so it will not be used on a bomb. Do not attempt to replace lanyard.

CAUTION

- Exercise care to avoid damage to the safety switch while installing/removing weapon carrier and while handling weapon.
- When weapon is to be preloaded on accessory suspension equipment, do not install the safety switch until the weapon has been positioned on the skid adapter.

- Failure to orient the switching unit retaining nut can result in damage to arming safety switch MK 122 or ejector foot of bomb rack BRU-10.

1. Plug male connector of switching unit firmly into bomb charging receptacle, piercing the diaphragm. Slide switching unit retaining nut, threads down, over cable and lanyard.

2. Secure arming safety switch MK 122 in bomb charging receptacle by screwing switching unit retaining nut into bomb and tightening with supplied wrench. When nut is seated on top of switching unit, back off as required until flattened sides of switching unit retaining nut are oriented at right angles to length of bomb. This is necessary to allow clearance for ejector foot of bomb rack BRU-10.

CAUTION

Take special care to prevent damage to coaxial cable and lanyard of arming safety switch MK 122 during bomb moving and loading operations.

3. Insert free end of cable through nearest bomb suspension lug to safeguard the cable.

NOTE

For detailed procedures pertaining to attaching the arming safety switch MK 122 to a specific aircraft, refer to the Airborne Weapons/Stores Loading Manual for that aircraft.

8-115. REMOVAL. Remove the arming safety switch as follows:

1. Remove retaining nut and switching unit.

WARNING

If lanyard breaks away from switch, discard entire arming safety switch MK 122 so it will not be used on a bomb. Do not attempt to replace the lanyard pin.

2. Install a 7/8-inch rubber cap on MK 122 connector. If no 7/8-inch caps are available, cut a 1-3/4-inch cap to shorten it to 7/8 inch.

3. Return serviceable components to storage. Arming safety switch MK 122 may be reused if the lanyard has not been pulled.

8-116. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

8-117. BOMB-SPOTTING CHARGE ADAPTER MK 89 MOD 0.

8-118. INTRODUCTION. Bomb-spotting charge adapter MK 89 Mod 0 (figure 8-14) was designed for use with the practice bomb signal cartridge MK 4.

8-119. SPECIFICATIONS AND DESCRIPTION. The body of the bomb-spotting charge adapter MK 89 Mod 0 is approximately 6.7 inches long and 4.5 inches in diameter at the flange. The overall length with the safety pin installed is approximately 8.9 inches, and the weight is 1.12 pounds. The signal cartridge MK 4 is described in OP 2213/NAVAIR 11-5-7.

8-120. CONFIGURATION. Bomb spotting charge adapter MK 80 Mod 0 permits use of the signal cartridge MK 4 in the tail fuze cavity of LDGP (inert) bombs MK 80 series.

8-121. SAFETY. Refer to section II for general safety precautions.

8-122. PREPARATION FOR USE. Prepare the spotting charge adapter for use as described in the following paragraphs.

8-123. Unpacking.

1. Remove adapter from container.

WARNING

Do not strike cartridge primer.

2. Remove practice bomb signal cartridge MK 4 Mod 3 from container.

8-124. Inspection. Inspect the spotting charge adapter as follows (refer to figure 8-14):

CAUTION

Do not remove setscrew or lockpin as parts could be damaged.

1. Remove tape holding cotter pin with instruction tag attached. If previously assembled, hold tension on head end of safety pin and remove tagged cotter pin. Slowly allow tension to be released from safety pin spring, which causes blocking pin to retract when safety pin clears.

2. Remove inertia sleeve and compression safety spring by unscrewing firing pin head from adapter body.

3. Inspect all components. Reject adapter if any components are damaged beyond simple repair.

WARNING

Signals must not be swollen or deformed in any manner. The primer must be flush or slightly below the base of the cartridge. Signals that are deformed in any way shall be disposed of in accordance with current directives.

4. Inspect cartridge for serviceability, segregate unserviceable cartridges for disposition.

8-125. INSTALLATION OF SIGNAL CARTRIDGE MK 4. Install the signal cartridge in the spotting charge adapter as follows:

WARNING

Be extremely careful when handling adapter with cartridges installed. Jarring or dropping could detonate the signal. Do not point either end of the adapter toward personnel. Loaders should work from the side of the adapter and avoid placing themselves in line with either end.

1. Insert inertia sleeve into cavity of adapter body.
2. Slightly elevate forward end of adapter and slide MK 4 cartridge through inertia sleeve with cartridge rim

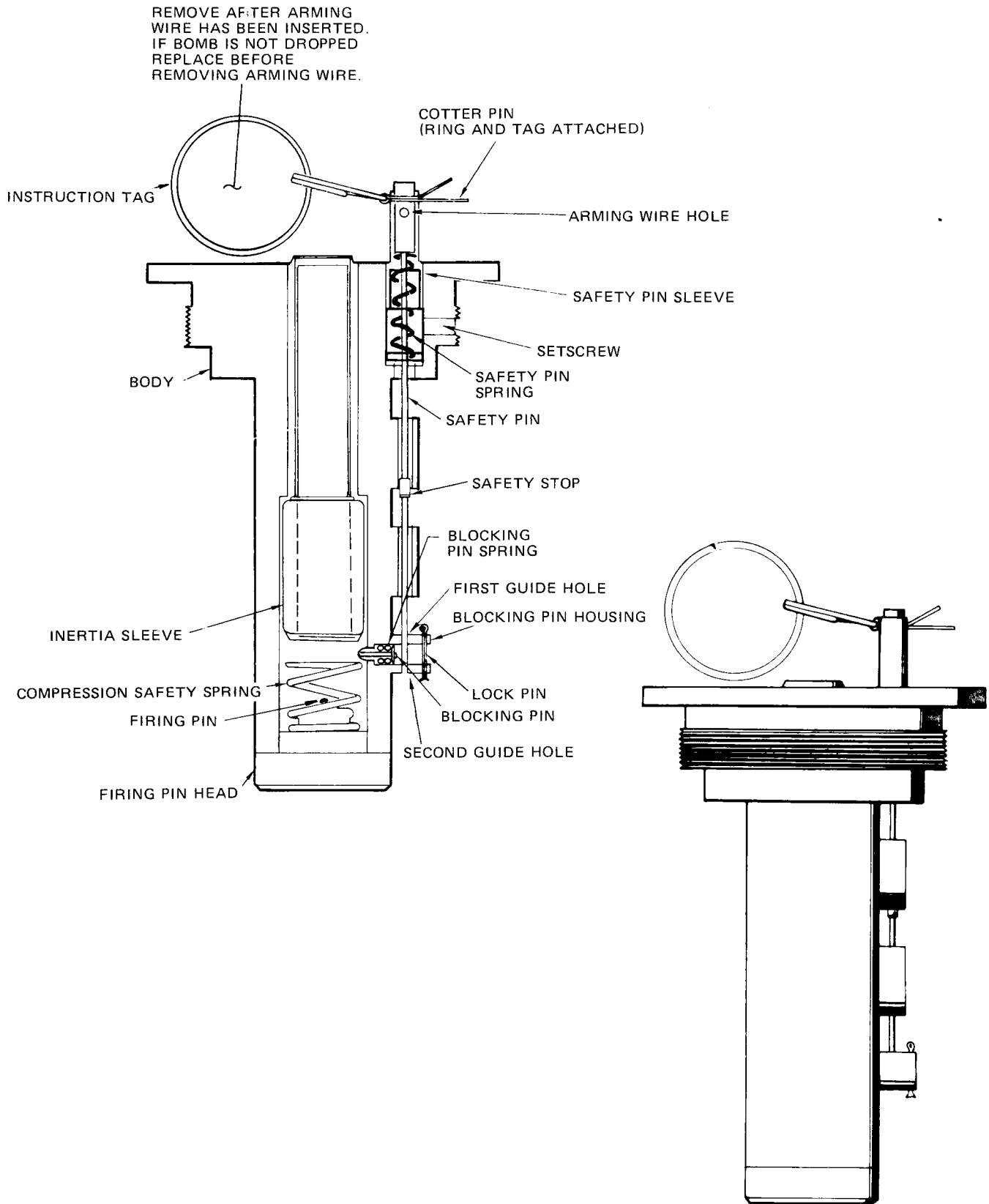


Figure 8-14. Bomb-Spotting Charge Adapter Mk 89 Mod 0

against forward end of sleeve. Head of cartridge should clear blocking pin.

3. With safety pin inserted through its passageway to first guide hole, press blocking pin inward with thin screwdriver blade (or equivalent) until safety pin will press on through second guide hole, locking blocking pin in place.

4. Insert tagged cotter pin through outer set of holes in head of safety pin and safety pin sleeve. Bend leg of cotter pin slightly to hold in place.

5. Place compression safety spring over firing pin and screw firing-pin head into adapter body hand tight.

NOTE

Assembled spotting-charge adapters may be stowed in ready service lockers if local regulations allow; however, they must be treated as loaded practice bombs.

8-126. INSTALLATION IN BOMB. Spotting charge adapter with signal cartridges loaded are installed in bombs as follows:

1. Verify that bomb tail fuze well is clean and dry.
2. Insert adapter into fuze well and tighten with spanner wrench in the same manner as electric fuzes.

WARNING

If the safety pin is accidentally allowed to pop out, it will release the blocking pin causing the adapter to become extremely sensitive to impact. Remove adapter from bomb, unscrew firing pin head and remove cartridge, inertia sleeve, and compression safety spring. Repeat inspection and installation procedures.

3. Install bomb fin and rig arming wire MK 3 in accordance with section III for the appropriate fin assembly with electrical fuze. The arming wire is rigged through the adapter safety pin as it is through the electric fuze pop-out pin.

WARNING

Cartridge detonation contaminates the plastic liner of this device with a phosphorous residue. Avoid skin contact. In case of contact, wash affected areas with 10-to 15-percent copper sulfate solution (see OP 5).

8-127. REMOVAL. Remove in reverse order of assembly. If recovering unit in which cartridges have been fired, all components shall be cleaned with a 10- to 15-percent copper sulphate solution.

8-128. EMERGENCY PROCEDURES. Damaged or otherwise unserviceable bombs and components shall be disposed of in accordance with current directives.

8-129. BOMB FIN ADAPTER ADU-320/B.

8-130. INTRODUCTION. Bomb Fin Adapter ADU-320/B (figure 8-15) is used to adapt 1,000-pound bomb MK 83 Mods for use with fin assembly MAU-91 for DST applications.

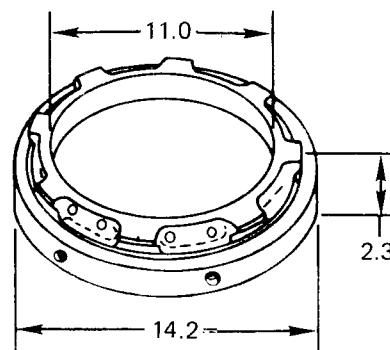


Figure 8-15. Bomb Fin Adapter ADU-320/B

8-131. SPECIFICATIONS AND DESCRIPTION. The fin adapter is a machined steel ring that fits over the aft end of a LDGP bomb MK 83 body. The adapter is secured to the bomb V-groove by eight setscrews, equally spaced around the circumference of the ring. Eight ears on the aft end of the adapter mate with eight teeth on the fin support flange.

8-132. CONFIGURATION. The fin adapter used in conjunction with the fin MAU-91A/B to provide a retarded drop capability to the DST MK 40.

8-133. SPOTTING CHARGE CXU-4/B.

8-134. INTRODUCTION. Spotting charge CXU-4/B (figure 8-16) is a fire-free signal used with practice bomb BDU-45/B to provide visual indication of bomb impact point and fuze function.

8-135. SPECIFICATIONS AND DESCRIPTION. Specifications for spotting charge CXU-4/B are listed in table 8-7. A description of the spotting charge is contained in the following paragraphs.

Table 8-7. Spotting Charge CXU-4/B Specifications

Diameter (in.).....	2.00
Length (in.).....	2.85
Weight (lb.).....	0.46

8-136. The CXU-4/B consists of 150cc of titanium tetrachloride inside a glass vial which is encapsulated within a metal container. A spotting charge retaining ring and spring washer are supplied with the CXU-4/B.

8-137. Spotting charge function is dependent upon detonation of an associated electric fuze in practice bomb BDU-45/B. Detonation of the fuze shatters the spotting charge container and disperses titanium tetrachloride which combines with moisture in the air to form a white cloud.

8-138. Spotting charges CXU-4/B are received in MIL-STD Unit Loads or by individual container, dependent on user requirements. Each MIL-STD Unit Load consists of 20 containers of 80 spotting charges and 84 each retaining rings and spring washers. The CXU-4/B shall be stored in accordance with NAVSEA OP-5 Vol. 1 Group B chemicals.

8-139. SAFETY. Refer to section II for safety precautions.

8-140. PREPARATION FOR USE. Prepare the spotting charge CXU-4/B for use as follows:

WARNING

Titanium tetrachloride is a corrosive, mildly toxic liquid which produces large volumes of white smoke when exposed to air or moisture. The smoke may cause a choking sensation and smarting of the eyes, and the liquid will burn the skin like a strong acid. If splashed on skin or in eyes flush exposed area with fresh water. In the event of obvious defect or leakage, dispose of spotting charge in accordance with current directives.

8-141. Unpacking. Remove spotting charge CXU-4/B from container and check for damage or leakage. A leaking container may result in the evolution of white fumes, depending on humidity, accompanied by a sharp, acid odor.

8-142. Inspection. Ensure spotting charge retaining ring and spring washer are present.

8-143. INSTALLATION. Install spotting charge CXU-4/B in bomb body as follows:

WARNING

Titanium tetrachloride is a corrosive, mildly toxic liquid which produces large volumes of white smoke when exposed to air or moisture. The smoke may cause a choking sensation and smarting of the eyes, and the liquid will burn the skin like a strong acid. If splashed on skin or in eyes flush exposed areas with fresh water. In the event of obvious defect or leakage, dispose of spotting charge in accordance with current directives.

1. Ensure spotting charge is not leaking or damaged.
2. Install spring washer (figure 8-16) at base of spotting charge receptacle.
3. Slide spotting charge into receptacle and, using a Truarc #5 pliers or equivalent, secure with retaining ring.
4. Repeat steps 1 through 3 to install opposite spotting charge.

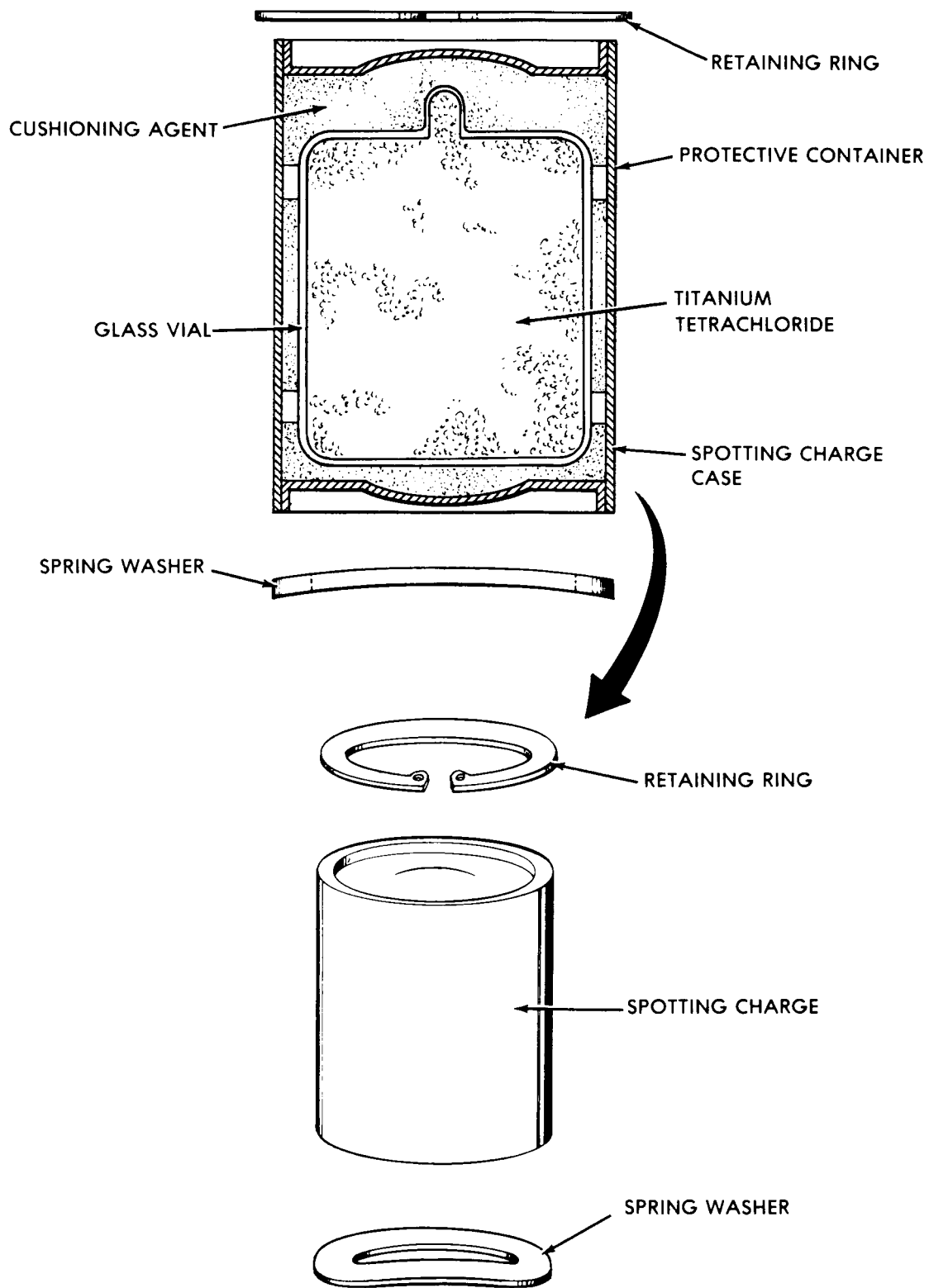


Figure 8-16. Spotting Charge CXU-4/B and Hardware

8-144. REMOVAL. Remove spotting charge CXU-4/B from bomb body as follows:

WARNING

Titanium tetrachloride is a corrosive, mildly toxic liquid which produces large volumes of white smoke when exposed to air or moisture. The smoke may cause a choking sensation and smarting of the eyes, and the liquid will burn the skin like a strong acid. If splashed on skin or in eyes flush exposed areas with fresh water. In the event of obvious defect or leakage, dispose of the spotting charge in accordance with current directives.

1. Remove spotting charge retaining ring from bomb body with Truarc #5 pliers or equivalent.

2. Remove spotting charge and spring washer from spotting charge receptacle.

3. Return spotting charge, spring washer and retaining ring to storage.

8-145. EMERGENCY PROCEDURES. In the event of obvious defect or leakage, dispose of spotting charge CXU-4/B in accordance with current directives.

APPENDIX A

BOMB FUZE CHARTS

Table A-1. Bomb Fuze Compatibility Chart

Fuzes			Bombs								
			MK 80s							Special Purpose	
			LDGP-250 LB	LDGP-500 LB	LDGP-1000 LB	LDGP-2000 LB	Thermally Protected			FIRE-500 LB SIZE	FIRE-500 LB SIZE
Numerical Designation	Type	Location					LDGP-500 LB	LDGP-1000 LB	LDGP-2000 LB		
AN-M173A1 w/Ign. AN-M23A1	Mech	Nose Tail Side	MK 81	MK 82 MOD 0-1	MK 83	MK 84	MK 82 MOD 2	MK 83	MK 84	MK 77-2	MK 77-4
MK 344-0	Elec	Tail	A	A	A	A	A	A	A	A	A
MK 346-0	Mech	Tail	A	A	A	A	A***	A***	A***	A	A
MK 376-0	Elec	Tail	A	A	A	A	A	A	A	A	A
M904E2/E3	Mech	Nose	A	A	A	A	A*	A*	A*	A	A
M904E4 thermally protected	Mech	Nose	A	A	A	A	A	A	A	A	A
M918 w/Ign.	Mech	Side									A
MK 273-0											
M20/M20A1											
Sensing Element	VT	Nose	S	S	S	S	S	S	S		
MK 43-0 TDD	VT	Nose	S	S	S	S	S	S	S		
MK 13 Initiator**	Mech	Side									A

*Authorized combinations but not recommended due to degradation of cook-off time, (table B-1)

** (Fuze MK 343 Mod 0 and Igniter MK 273 Mod 1, preassembled)

***Authorized combinations when thermal shield MK 68 is used.

A — Authorized Combinations

S — Requires Electric Tail Fuze

NOTE: For restrictions and limitations for carriage on aircraft, refer to appropriate Tactical Manual, and for fuze installation and arming wire rigging, refer to appropriate Airborne Weapons/Stores Loading Manual.

Table A-2. Practice Bomb Fuze Chart

Fuze and Signal			Practice Bombs							MK 80 Series Inert Bombs
Numerical Designation	Type	Location	25 LB MK 76-5	250 LB MK 86-0/1	500 LB MK 87-0	1000 LB MK 88-0	BDU-45/B	BDU-33D/B	5 LB MK 106-4	
MK 344	Elec, Fuze	Tail					A			A
MK 376	Elec, Fuze	Tail					A			A
M990 Series	Elec, Fuze	Tail								
MK 4 Mods	Sig	Tail Nose	A	A	A	A	A	A	A	
MK 89-0 Spotting Charge Adapter	Mech	Tail								A
M904E Series,	Mech	Nose								A
CXU-4/B Spotting Charge							A			

A — Authorized Combinations

APPENDIX B

COOK-OFF TIMES

Table B-1 contains cook-off times for LDGP bombs MK 80 series and fire bombs MK 77. Times were measured from fire initiation to initial reaction. The following definitions apply to the type of reaction.

1. Deflagration: Explosive in munition burns. Case may rupture or end-plates blow out; however, no fragmentation of the case occurs. No fragments are thrown about. Damage to environment due only to heat and smoke of fire. No discernible damage from blast or fragmentation.

2. Explosion: Violent pressure rupture and fragmentation of munition case with resulting air shock. Most of metal case breaks into large pieces that are thrown about with unreacted or burning explosive. Some blast and fragmentation damage to environment. Fire and smoke damage. Severity of blast could cause minor ground crater, or small depression on flight deck of carrier if munition is large bomb.

3. Partial Detonation: Only part of the total explosive in munitions detonates. Strong air shock and small as well as large case fragments produced. Small fragments similar to those in normal munition detonation. Extensive blast and fragmentation damage to the environment. Amount of damage and extent of breakup of case into small fragments increase with increasing amount of explosive that detonated. Severity of blast could cause large ground crater or large flight-deck hole on carrier if munition is large bomb; hole size depends on amount of explosive that detonates.

4. Detonation: Munition performs in design mode. Maximum possible air shock formed. Essentially all of case broken into small fragments. Blast and fragment damage at maximum. Severity of blast causes maximum ground crater or flight deck hole possible by the warhead.

Table B-1. LDGP and Fire Bomb Cook-Off Times

Item	Ordnance	Fuze/ Adapter Booster	Average Reaction Time (Min & Sec)	Shortest Reaction Time	Bomb Initiated Reaction	Fuze/Booster Initiated Reaction*
Bomb H6 filled	MK 81	All	2 + 34	2 + 00	Deflagration to explosion	Deflagration to detonation (af- ter 5 minutes)
	MK 82, 83, 84 unprotected	All	3 + 30	2 + 30	Deflagration to explosion	Deflagration to detonation (af- ter 5 minutes)
	MK 82 Mod 1 thermally protected	All	4 + 30	3 + 30	Deflagration	Deflagration to detonation (af- ter 5 minutes)
	MK 82 Mod 2** thermally protected	M904E4 with M48E1 Adapter, MK 344, MK 376	10 + 00	8 + 30	Deflagration	Deflagration to detonation (af- ter 12 minutes)
		M904E2/E3 with M148/T45	6 + 00	5 + 00		Deflagration to detonation
		MK 346 with M150/T46	7 + 00	3 + 30		Deflagration to detonation (de- tonation may occur after 5 minutes)
		MK 346 with MK 68 thermal shield	17 + 04	12 + 50		Deflagration to detonation
		M148/T45 (no fuze	3 + 40			Deflagration to detonation (de- tonation may occur after 5 minutes)
	MK 83 Mod 5 thermally protected	M904E4 with M148E1/M150 Adapter, MK 346 with MK 68 ther- mal shield, MK 344 or MK 376	10 + 00	8 + 49	Deflagration	Deflagration to detonation (af- ter 12 minutes)

Table B-1. LDGP and Fire Bomb Cook-Off Times (Cont.)

Item	Ordnance	Fuze/ Adapter Booster	Average Reaction Time (Min & Sec)	Shortest Reaction Time	Bomb Initiated Reaction	Fuze/Booster Initiated Reaction*
Fire Bombs	MK 84 Mod 3 thermally protected	M904E4 with M148E1 Adapter, MK 344 or MK 376	10 + 00	8 + 45	Deflagration	Deflagration to detonation (af- ter 12 minutes)
	MK 77 Mod 2	AN-M173A1 with AN-M23A1 Igniter	2 + 40	2 + 36		Normal initiator reaction, frag- mentation, napalm disper- sion
	MK 77 Mod 4	M918 with MK 273 Mod 0 Igniter	3 + 25	3 + 19		Normal initiator reaction, frag- mentation, napalm disper- sion

*Fuze or booster initiated reaction. Frequency of detonation reaction is small.

**Chips in exterior coating and/or groove for retarding fin cut to bare steel do not change cook-off time.

APPENDIX C

FUZE SUMMARY SHEETS

SUMMARY SHEET

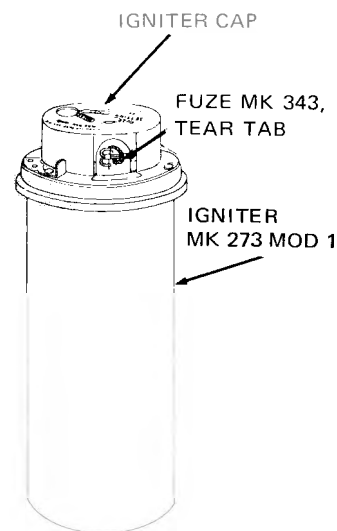
NOTE: THIS MATERIAL IS ISSUED IN REPRODUCIBLE FORM TO FACILITATE LOCAL REPRODUCTION. IT IS NOT INTENDED TO REPLACE THE MANUAL.

INITIATOR

MK 13 MOD 0

KEY POINTS

1. USED WITH FIREBOMBS MK 77 MOD 4. TWO INITIATORS MUST BE INSTALLED IN EACH BOMB.
2. MK 13 CONSISTS OF A FUZE MK 343 AND IGNITER MK 273 MOD 1 WHICH ARE ASSEMBLED AT THE DEPOT.
3. INITIATOR MK 13 MUST BE INSTALLED IMMEDIATELY AFTER FIREBOMB IS FILLED.
4. FUNCTIONING DELAY IS SELECTED DURING LOADING. INST SETTING IS FOR GELLED JP-5, OR FOR WATER TARGETS WHEN USING GELLED AVGAS, MOGAS OR JP-4. DELAY SETTING IS FOR LAND TARGETS WHEN USING GELLED AVGAS, MOGAS, AND JP-4.
5. ARMING LANYARDS ARE PACKED INSIDE OF PROTECTIVE SHIPPING CAP.
6. TEAR-TOP SECTION OF FUZE IS PULLED OPEN AT WEAPON RELEASE ALLOWING ARMING VANE TO POP UP INTO AIR-STREAM.



INITIATOR MK 13 MOD 0
(NOTE: FUZE MK 343 IS SCREWED INTO IGNITER MK 273 MOD 1)

ARMING DELAY	0.8 TO 1.2 SECONDS
FUNCTIONING DELAY	INST OR 0.27 SECOND DELAY

WARNING

1. IF ARMING VANE IS EXPOSED, FUZE MAY BE FULLY ARMED.

CAUTIONS

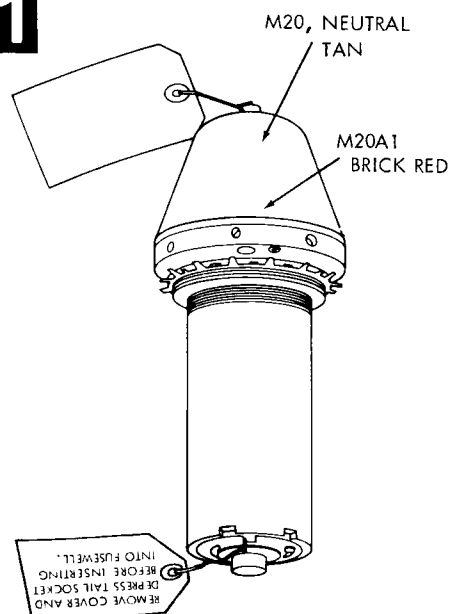
1. IF TEAR-TOP IS DEFORMED OR PARTIALLY OPENED, FUZE MAY BE A DUD.
2. MINIMUM RELEASE SPEED IS IMPOSED TO ENSURE RELIABILITY. REFER TO AIRCRAFT TACTICAL MANUAL.
3. REFER TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR INSTALLATION AND ARMING LANYARD RIGGING.

SUMMARY SHEET

NOTE: THIS MATERIAL IS ISSUED IN REPRODUCIBLE FORM TO FACILITATE LOCAL REPRODUCTION.
IT IS NOT INTENDED TO REPLACE THE MANUAL.

PROXIMITY SENSING ELEMENT

M20/M20A1



KEY POINTS

1. USED WITH BOMBS MK 80 SERIES TO PROVIDE AIRBURST. FOR USE IN UNRETARDED MODE ONLY.
2. MUST BE USED WITH AN ELECTRIC TAIL FUZE.
3. PROVIDES OPTION OF TWO BURST HEIGHTS WHICH MUST BE SELECTED DURING LOADING:
HI – 100 TO 160 FT.
LO – 20 TO 60 FT.
4. PROVIDES SEVERAL MODES OF OPERATION DEPENDING UPON TYPE OF FUZE. SEE CHART.
5. MUST BE INITIATED MECHANICALLY BY WITHDRAWAL OF ARMING WIRE.

FUZE	MODES OF OPERATION			
	VT	VT (Delay)	NON VT	
MK 344/376	YES	YES	YES	FOR VT OPERATION M20/20A1; MUST BE MECHANICALLY INITIATED.

WARNINGS

1. M20/20A1 CAN BE ELECTRICALLY INITIATED BY RF VOLTAGE. RF CIRCUITRY IN DELIVERY AIRCRAFT MUST BE DISABLED TO PREVENT ACCIDENTAL INITIATION.
2. MINIMUM SAFE ARMING TIMES AND RELEASE INTERVALS ARE IMPOSED FOR AIRCRAFT SAFETY. REFER TO AIRCRAFT TACTICAL MANUAL.

CAUTIONS

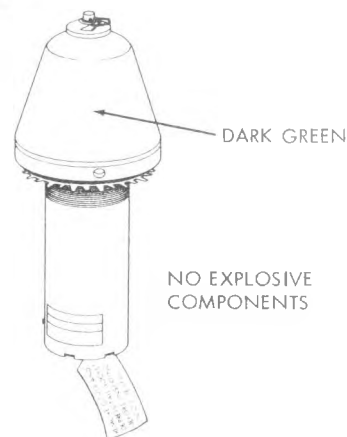
1. M20/20A1 MUST BE INSTALLED AND REMOVED IN RADHAZ-FREE AREA.
2. DO NOT INSTALL OR REMOVE ARMING SAFETY SWITCH MK 122 IN A RADHAZ AREA IF M20/20A1 IS INSTALLED IN BOMB.
3. REFER TO TEXT FOR INSTALLATION OF M20/20A1 AND TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR ARMING WIRE RIGGING.

SUMMARY SHEET

NOTE: THIS MATERIAL IS ISSUED IN REPRODUCIBLE FORM TO FACILITATE LOCAL REPRODUCTION. IT IS NOT INTENDED TO REPLACE THE MANUAL.

TARGET DETECTING DEVICE

MK 43 MOD 0



KEY POINTS

1. USED WITH BOMBS MK 80 SERIES TO PROVIDE AIRBURST. MAY BE USED IN EITHER RETARDED OR UNRETARDED MODE.
2. MUST BE USED WITH AN ELECTRIC TAIL FUZE.
3. MK 43 IS HERO SAFE.
4. NOMINAL BURST HEIGHT IS 16 FEET. BURST HEIGHT WILL DECREASE AT BOMB APPROACH ANGLES OVER 60°.
5. PROVIDES SEVERAL MODES OF OPERATION, DEPENDING UPON TYPE OF FUZE AND MEANS OF INITIATION. SEE CHART.
6. MAY BE INITIATED ELECTRICALLY BY +300 VDC OR MECHANICALLY BY WITHDRAWAL OF ARMING WIRE.

FUZE	MODES OF OPERATION			NOTES
	VT	VT (Delay)	NON VT	
MK 344/376	YES (NOTE 1)	YES (NOTE 2)	YES (NOTE 3)	(1) MK 43 AND FUZE BOTH ACTIVATED BY +300 VDC. (2) MK 43 INITIATED MECHANICALLY, FUZE ACTIVATED BY -300 OR -195 VDC. (3) MK 43 NOT INITIATED IF FUZE ACTIVATED BY -300 OR ± 195 VDC.

WARNINGS

1. DO NOT RIG ARMING WIRE TO MK 43 UNLESS *VT WITH DELAY* IS REQUIRED. IF WEAPON IS RELEASED WITH ARMING WIRE IN PLACE AND MK 43 IS INITIATED ELECTRICALLY, THE SENSING SIGNAL CAN BE REFLECTED BY THE ARMING WIRE AND DETONATE THE FUZE AT ARMING.
2. MINIMUM SAFE ARMING TIMES AND RELEASE INTERVALS ARE IMPOSED FOR AIRCRAFT SAFETY. REFER TO AIRCRAFT TACTICAL MANUAL.

CAUTION

1. REFER TO TEXT FOR INSTALLATION OF MK 43 AND TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR ARMING WIRE RIGGING.

SUMMARY SHEET

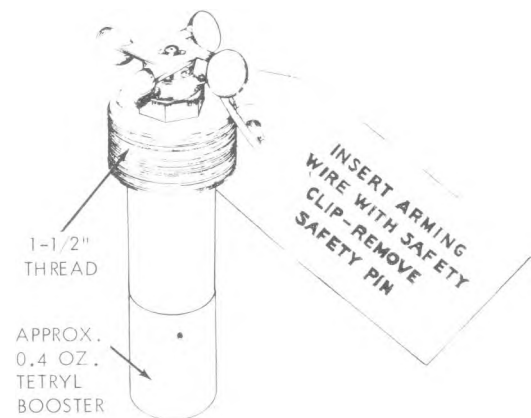
NOTE: THIS MATERIAL IS ISSUED IN REPRODUCIBLE FORM TO FACILITATE LOCAL REPRODUCTION. IT IS NOT INTENDED TO REPLACE THE MANUAL.

MECHANICAL IMPACT FUZES

AN/M173A1 AND M918

KEY POINTS

1. FUZE AN/M173A1 IS USED ONLY IN THE NOSE AND TAIL WELLS OF FIREBOMBS MK 77 MOD 2 AND MUST BE INSTALLED ONLY IN IGNITERS AN/M23A1.
2. FUZE M918 IS USED ONLY IN THE SIDE WELLS OF FIREBOMB MK 77 MOD 4. MUST BE INSTALLED ONLY IN IGNITERS MK 273 MOD 0.
3. THE INST FUNCTIONING OF THE AN/M173A1 IS OPTIMUM FOR USE AGAINST WATER TARGETS; THE 0.3-SECOND DELAY OF THE M918 IS FOR USE AGAINST LAND TARGETS.
4. TWO FUZES MUST BE INSTALLED IN EACH FIREBOMB. THEY MUST NOT BE INSTALLED UNTIL AFTER THE BOMB IS LOADED ON THE AIRCRAFT.
5. DECAL ON SHOULDER OF FUZE IS ONLY MEANS OF IDENTIFYING THE TWO FUZES.



ARMING DELAY	0.6 TO 1 SECOND (A FUNCTION OF AIRSPEED.)
FUNCTIONING DELAY	AN/M173A1 – INSTANTANEOUS M918 – 0.3 SEC

WARNINGS

1. IF CLEARANCE BETWEEN ARMING-VANE HUB AND HEX SHOULDER IS MORE THAN 1/8 INCH, SAFETY PIN WILL NOT PREVENT ARMING-VANE ROTATION AND FUZE CAN ARM. IF CLEARANCE IS MORE THAN 1/4 INCH OR ARMING VANE IS MISSING, FUZE IS ARMED.
2. TURNING ARMING VANE AT ANY SPEED CAN ARM THE FUZE.
3. MAXIMUM CARRIAGE AND DELIVERY SPEED RESTRICTIONS ARE IMPOSED FOR SAFETY REASONS. REFER TO AIRCRAFT TACTICAL MANUAL.

CAUTIONS

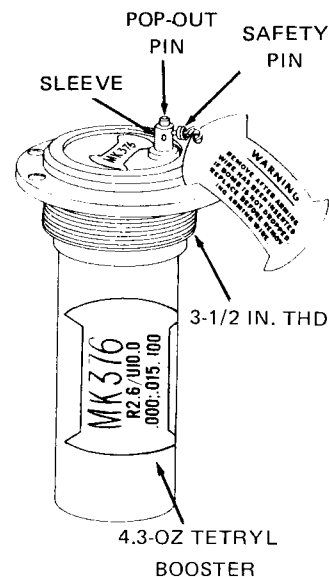
1. FUZE MUST BE USED ONLY WITH DESIGNATED IGNITER OR DUD WILL RESULT.
2. REFER TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR INSTALLATION OF FUZE AND RIGGING OF ARMING WIRE.

SUMMARY SHEET

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ELECTRIC TAIL FUZES**MK 344/376****KEY POINTS**

1. USED IN BOMBS MK 80 SERIES LDGP, LASER-GUIDED (LGB), AND THERMALLY PROTECTED.
2. THESE FUZES ARE HERO SAFE.
3. MK 344 IS FOR USE IN UNRETARDED DIVE DELIVERY ONLY. MK 376 MAY BE USED FOR HIGH ALTITUDE, LEVEL DELIVERY, AND ALL TYPES OF RETARDED DELIVERY.
4. THESE FUZES ARE PREFERRED FOR PENETRATION OF HARD TARGETS.
5. MAY BE USED WITH M20/20A1 AND MK 43 VT ELEMENTS TO PROVIDE AN AIRBURST.
6. FUZES PROVIDE SEVERAL IN-FLIGHT OPTIONS. SEE CHART BELOW.



ARMING DELAY			FUNCTIONING DELAY	
FUZE AUTOMATICALLY SELECTS ARMING DELAY, DEPENDING UPON WHETHER BOMB IS RETARDED OR UNRETARDED.			VOLTAGE	MODE
			+300VDC	VT (WITH MK 43)
RETARDED UNRETARDED			+195VDC	INST
MK 344	NOT AUTH.	5.5 SEC	-195VDC	0.015-SEC DELAY
MK 376	2.6 SEC	10.0 SEC	-300VDC	0.100-SEC DELAY

WARNINGS

1. DO NOT INSTALL FUZE MK 344 IF DELIVERY IS TO BE IN RETARDED MODE.
2. REFER TO AIRCRAFT TACTICAL MANUAL FOR AUTHORIZED FUZES FOR VARIOUS DELIVERY TACTICS.

CAUTIONS

1. SHIPPING CAP MUST REMAIN SECURELY ATTACHED TO FUZE WHENEVER THE FUZE IS NOT INSTALLED IN A BOMB. ONCE CAP IS REMOVED, FUZE MUST BE USED WITHIN 30 DAYS.
2. FUZES THAT HAVE BEEN REMOVED FROM A BOMB MAY BE UNRELIABLE. REUSE IS NOT RECOMMENDED. WHEN POP-OUT PIN IS FULLY SEATED, IT MUST NOT EXTEND FROM THE SLEEVE MORE THAN 1/8 INCH.
3. THESE FUZES MUST BE USED WITH DC VOLTAGES ONLY. RF CIRCUITRY IN THE AIRCRAFT FUZE FUNCTION CONTROL SET MUST BE DISABLED WHEN USING THESE FUZES.
4. REFER TO TEXT FOR FUZE INSTALLATION AND REMOVAL PROCEDURES.

SUMMARY SHEET

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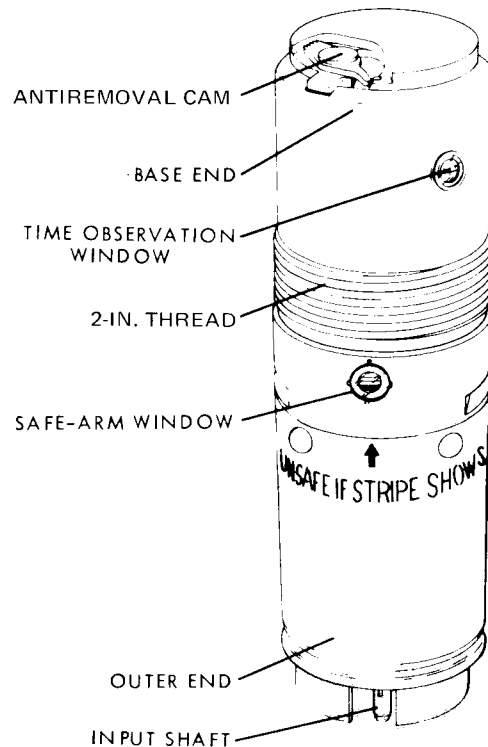
MECHANICAL LONG DELAY

TAIL FUZE

MK 346 MOD 0

KEY POINTS

1. USED IN MK 81, 82 LD OR RETARDED, AND MK 83 LD TO PROVIDE LONG FUNCTIONING DELAY TIME.
2. FUNCTIONING DELAY MUST BE SET PRIOR TO FUZE INSTALLATION.
3. ARMING ASSEMBLY ROTATION PLUS IMPACT ARE REQUIRED TO ARM THE FUZE.
4. FUZE REMOVAL IS DIFFICULT IF FUZE IS FULLY ARMED BECAUSE OF THE ANTI-REMOVAL DEVICE.
5. REQUIRES ADAPTER BOOSTER M150/T46.
6. REQUIRES ARMING ASSEMBLY MK 3, 4, OR 5.
NO ASSEMBLY AUTHORIZED FOR USE WITH BOMB MK 84.



ARMING DELAY: ARMING ASSEMBLY MOD 1	UNRETARDED	1.5 TO 2 SEC PLUS IMPACT
	RETARDED	1.5 TO 4 SEC PLUS IMPACT
	ARMING ASSEMBLY MOD 2	LESS THAN 1 SEC PLUS IMPACT
FUNCTIONING DELAY		30 MIN TO 33 HR (15-MIN INCREMENTS)

WARNINGS

1. RED AND BLACK STRIPES IN SAFE/ARM WINDOW INDICATE EITHER PARTIAL OR FULL ARMING.
2. IF FUZE IS DIFFICULT TO REMOVE, IT IS PROBABLY ARMED AND WILL DETONATE AT END OF SET TIME DELAY.
3. USE IN THERMALLY PROTECTED BOMBS IS NOT RECOMMENDED WITHOUT USE OF MK 68 THERMAL SHIELD.

CAUTIONS

1. STEEL NOSE PLUG AND SUPPORT CUP MUST BE INSTALLED IN NOSE WELL.
2. SEVERAL DELIVERY RESTRICTIONS ARE IMPOSED FOR OPTIMUM RELIABILITY. SEE AIRCRAFT TACTICAL MANUAL.
3. SEE TEXT FOR INSTALLATION OF FUZE AND ARMING ASSEMBLY. REFER TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR RIGGING OF ARMING WIRE.

SUMMARY SHEET

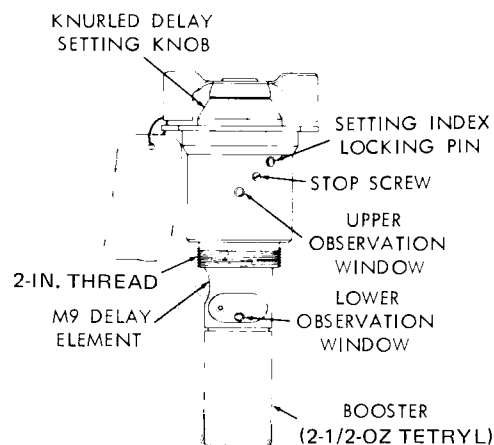
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MECHANICAL IMPACT

NOSE FUZE—M904E2/E3/E4

KEY POINTS

1. USED IN BOMBS MK 80 SERIES. MAY BE USED WITH FUZE EXTENSION M1A1.
2. FUZE NOT RECOMMENDED FOR PENETRATION OF HARD TARGETS.
3. FUZES M904E3/E4 MORE SENSITIVE THAN M904E2. THE M904E2 MAY DUD AGAINST SOFT TARGETS IN THE RETARDED MODE.
4. M904E4 IDENTICAL TO M904E3 EXCEPT FOR FIRE-RESISTANT COLLAR ADDED TO FUZE BODY TO INCREASE COOK-OFF TIME IN EVENT OF FIRE.
5. ARMING DELAY IS SELECTED DURING WEAPON LOADING.
6. FUNCTIONING DELAY IS PRESELECTED BY INSERTION OF PROPER DELAY ELEMENT M9 PRIOR TO INSTALLATION OF FUZE IN THE BOMB.
7. FUZE REQUIRES USE OF ADAPTER BOOSTER M148/T45 (OR M148E1). (THE M148E1 RECOMMENDED FOR M904E4 FUZE.)



ARMING DELAYS (NOMINAL — SEE TEXT)	SNAKEYE 2 RETARDED	4	6	8	10	12	14	16	18 SEC
FUNCTIONING DELAYS (USE APPROPRIATE M9)	NON-DELAY		0.01	0.025	0.05	0.1	0.25 SEC		

WARNINGS

1. FUZE IS ARMED IF EITHER OBSERVATION WINDOW IS RED.
2. FUZE MUST BE CHECKED FOR PARTIAL ARMING; SEE TEXT.
3. TURNING THE ARMING VANE AT ANY SPEED WILL ARM THE FUZE.
4. USE OF FUZES M904E2/E3 IN THERMALLY PROTECTED BOMBS IS NOT RECOMMENDED.
5. TWO-SECOND ARMING TIME FOR RETARDED ONLY. SEE AIRBORNE WEAPONS/STORES LOADING MANUAL FOR SPECIAL RIGGING.

CAUTIONS

1. ARMING DELAYS NOT RELIABLE AT RELEASE SPEEDS BELOW 175 KIAS. REFER TO TACTICAL MANUAL FOR OTHER OPERATIONAL RESTRICTIONS.
2. STOP SCREW MUST BE REMOVED FOR 2-OR 4 -SEC SETTINGS. DO NOT REPLACE STOP SCREW AT THESE SETTINGS OR FUZE WILL DUD.
3. REFER TO AIRBORNE WEAPONS/STORES LOADING MANUAL FOR INSTALLATION OF FUZE AND RIGGING OF ARMING WIRE.

APPENDIX D

ARMING WIRE DATA

Table D-1. Arming Wire Data

Arming Wires	Type	Material	Diameter (in.)	Leg Lengths		NALC
MK 1 Mod 0	Single	Brass	0.064	57.0		F431
MK 2 Mod 0	Double	Brass	0.064	57.0	57.0	F435
MK 3 Mod 0	Single	Steel	0.032	57.0		F448
MK 4 Mod 1	Double	Brass	0.064	96.0	96.0	R051
AN-M6A2	Single	Brass	0.064	58.0		F431
AN-M8A1	Double	Brass	0.064	60.0	57.0	F435
M13	Double	Brass	0.064	70.0	36.0	F438
M16	Double	Brass	0.064	90.0	56.0	F441
MK 9 Mod 0	Single	Brass	0.064	90.0		F415