

NAVORD OP 2215 VOLUME 1
SECOND REVISION

TECHNICAL MANUAL

NAVY
GUN-TYPE
AMMUNITION



FOR OFFICIAL USE ONLY

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FOREWORD

NAVORD OP 2215, Volume 1, Second Revision describes Navy gun-type ammunition fired from guns over .60 caliber, and includes items closely associated with gun ammunition. This publication has been prepared to provide trained and authorized personnel with general and specific information concerning the description, identification, and use of gun ammunition. The Second Revision of NAVORD OP 2215, Volume 1, incorporates all previous changes and additions of material thereto and supersedes NAVORD OP 2215, Volume 1, First Revision, dated 1 March 1967.

Subjects such as fire control systems, guns, and handling equipment which are not part of the ammunition components are not included in this publication. Also not included are ammunition and associated components procured from the Army for use by Naval Units ashore.

The contents of this manual are official and incorporate technical data available up to the cutoff date of 15 January 1972.

Comments or inquiries relative to errors discovered, items omitted, or new items which should be added are invited and should be forwarded to: Commanding Officer, Naval Ordnance Station, Louisville, Kentucky 40214, Attention: Code 506.

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SAFETY SUMMARY

The following information pertains to safety but does not appear elsewhere in this publication.

REPORTS OF ACCIDENTS, INCIDENTS, AND UNSATISFACTORY PERFORMANCE OF AMMUNITION

Occurrences of accidents, incidents, and unsatisfactory performance of all non-nuclear explosive ordnance and material shall be reported in accordance with NAVORDINST 8025.1A.

UNSERVICEABLE, SUSPENDED, AND LIMITED-USE AMMUNITION

For information pertaining to the degree of serviceability of ammunition and ammunition components used by the Navy, Marine Corps, and Coast Guard, refer to NAVORD OD 17190. It contains a listing of items, usually by lot number, which are not suitable for unrestricted use in the manner for which they were designed.

In cases where it has been determined that an ammunition item may endanger life or property, rapid promulgation of the information is accomplished by a message NAR (Notice of Ammunition Reclassification). (NARs are incorporated in OD 17190 as changes to that publication are made.) Immediately upon receipt of any change in the status of ammunition, all commands shall determine whether stocks on hand include any of the affected lots or types. Action shall be taken to insure that the use or issue of the affected ammunition is consistent with the newly assigned classification.

The following information appears in Appendix F of this publication and is repeated here for emphasis.

FLEET INSPECTION OF PROJECTILE GAS CHECK SEALS SUBSEQUENT TO ISSUE

Fleet users shall check for damage to GCS (gas check seals) which may have occurred during handling, transportation, and storage subsequent to issue by an ammunition activity. Assure that:

1. GCS is not missing.
2. GCS is free of cuts, tears, or gouges which expose the lead core.
3. GCS is flush with or below base fuze or plug surface.

Ammunition with any of the above defects should be marked as defective and should be turned in at the soonest opportunity. A message report should be made to COMNAVORD, with copies to the Naval Weapons Station (QEL), Concord, California,

SAFETY SUMMARY (Continued)

and the Naval Ammunition Production Engineering Center (NAPEC), Crane, Indiana, giving ammunition lot identification, nature of defect, and any background information on the cause, if available.

Inasmuch as certain Fleet units handle palletized ammunition, they are not expected to de-palletize and inspect GCS in accordance with the above instructions. The use of NAPEC GCS Display Kits for shipboard inspection of ammunition is not appropriate. Shipboard removal of paint from projectiles is not authorized. (Page F-8)

For criteria to be used when installing GCS or for pre-1970 (uninspected, unsuffixed) loaded ammunition, refer to Appendix F of this publication.

The following WARNINGS and CAUTIONS are repeated from the text of this publication for the protection of personnel.

WARNINGS

VT Non-Frag projectiles are for target and training purposes and have a combination black powder and pyrotechnic color burst element. Reduced charges may be used. (Page 1-3)

Before firing CVT-fuzed projectiles over friendly forces, check the time setting on these fuzes. The estimated time-to-target must be accurately determined and the fuzes set to this time to prevent possible VT airbursts from occurring above the deployed friendly forces. (Pages 2-38, 2-40, 3-108, 3-113, and C-33)

Settings for PD functioning only on the PD mark of CVT fuze and adapter assemblies are not recommended. An inaccurate PD setting will not guarantee that the proximity circuits will remain inactive (unarmed) after the round is fired. For PD functioning only, set the fuze to 95 seconds to achieve positive PD action. At this setting of 95 seconds, the proximity circuits will not become armed for at least 92 seconds and the round will be safe for firing over friendly troops for this time. (Pages 2-38, 2-41, 3-109, 3-113, and C-33)

During handling of RAP, a drop in excess of 24 inches on the base of the projectile in which a deck pin, (rivethead) bolt, or miscellaneous object strikes the center hole of the igniter, sufficient striking energy could be provided to actuate the igniter. In this event, ignition of the rocket motor may be delayed 20 to 30 seconds. All personnel should immediately evacuate the area. Do not attempt disposal prior to rocket motor ignition. If rocket motor burns in a closed compartment, insure that the area is clear of fumes prior to re-entry. Dispose of the projectile in accordance with standard EOD procedure. (Page 2-39)

SAFETY SUMMARY (Continued)

WARNINGS

MTF Mk 61 Mod 0 is used at full and reduced charge in 5"/38 ILLUM and WP projectiles. It should not be used at full or reduced charge in 5"/38 HE projectiles. MTF Mk 61 Mod 1 is used at full or reduced charge in 5"/38 HE, WP, or ILLUM projectiles. (Page 3-17)

The Mk 27 PDF is not bore safe. (Page 3-37)

The Mk 29 Mods 2 and 3 PDFs should not be fired in heavy rain except in combat emergency conditions. Early bursts will occur. The Mk 29 Mod 5 PDF should be used. (Pages 3-39 and C-12)

The Mk 30 Mods 2 and 3 PD fuzes should not be fired in heavy rain except in combat emergency conditions. Early bursts will occur. The Mk 30 Mod 5 PDF should be used. (Pages 3-43 and C-12)

The Mk 66 Mod 0 PD fuze should not be fired in heavy rain except in combat emergency conditions. Early bursts will occur. Mk 66 Mod 1 PDF should be used. (Pages 3-47 and C-12)

5"/54 charges assembled with combination Primer Mk 13 are slow-fire charges only. These charges, NALC D309 and D310, shall not be used in rapid fire guns because the Mk 13 Primer can be initiated by the shock of ramming forces. (Pages 7-2 and E-4)

In a worn gun, bore enlargement at the origin will prevent the projectile from being fully seated when rammed. This will result in rapid run-up and may damage the ogive of the nose fuze. This condition may cause early detonation of the projectile. (Page C-3)

A projectile found without a tracer and the tracer hole open (not plugged) is almost certain to result in early projectile burst when fired in a gun. (Page C-16)

The charge designation number is used to select a charge for a specific range for a particular depth charge. These impulse charges must be used only as specified to prevent injury to personnel or equipment. (Page E-9)

SAFETY SUMMARY (Continued)

CAUTIONS

Extreme caution must be used in firing operations for RAP. Insure the correct identification of RAP projectiles in view of the similarity of projectile appearance and the dissimilarity of impact points of RAP compared to standard projectiles. (Page 2-37)

CVT fuzes must be set to 35 seconds or more when used in 5-inch RAP. If fired at settings less than 35 seconds, the fuzes may function early as a result of rocket motor effects on the fuze. (Pages 2-38, 2-40, 3-108, and 3-113)

When setting the Mechanical Time and Superquick Fuze M564 do not turn the lower cap back (counterclockwise) if desired setting is passed. Continue to turn in the clockwise direction past the "O" setting. Turning the cap back will render the fuze unserviceable. (Pages 3-30 and 3-31)

When setting the Mechanical Time and Superquick Fuze M564 the Vernier scale is not to be utilized as incorrect usage in the past has resulted in gross timing errors. If necessary, fractional-second settings should be achieved by aligning the "O" mark between the desired whole-second graduations (refer to figure 3-18B). (Pages 3-30 and 3-31)

The following applies to Mk 29, Mk 30, and Mk 66 Point Detonating Fuzes. In no case should fuze setting screws be forced clockwise through the 3 o'clock (12 o'clock in the case of the Mod 5 of Mk 29 and Mk 30, or Mod 1 of Mk 66) stop or counterclockwise. A good rule for the initial setting from OFF to ON is never to turn the setting screw through an arc greater than 90°. For fuzes incorrectly set to a position beyond 12 o'clock or for those being returned to stowage, a counterclockwise rotation back to the 12 o'clock ON position or back to the 9 o'clock (approximate) OFF position, respectively, is authorized. (Pages 3-41, 3-45, and 3-47)

A thin wax coating (tan in color) is applied at the factory to the VT-IR Fuze Mk 92 window mounted on the end of the fuze nose. This wax coating provides protection from the deposition of residue from blow-by gases during firing of the 3"/50 round and must not be removed. (Pages 3-107 and 3-108)

SAFETY SUMMARY (Continued)

CAUTION

For reasons of safety, black powders other than SNBP (such as Class 2, Class 6, or black spherohexagonal) must not be used in torpedo impulse charges. These powders produce dangerous pressures in center line tubes when weight of charge is sufficient to cause the torpedo to clear the side of the ship. The small granulation size of Class 2 and Class 6 powders, when ignited, develops a sufficiently high pressure to cause the rupture of an expansion chamber, which is designed for the considerably lower pressure generated by sodium nitrate black powder (SNBP). (Page E-8)

CHAPTER 1

INTRODUCTION

1-1 SCOPE AND PURPOSE

1-2 COVERAGE. This publication covers Navy gun-type ammunition used in guns larger than caliber .60, except that procured from the Army for use by Naval Units ashore. It includes some items closely associated with gun ammunition, but does not include fire control systems, guns, and handling equipment which are not part of the ammunition items.

1-3 This manual covers Navy gun-type ammunition in sizes 20mm, 40mm, 3"/50, 5"/38, 5"/54, 6"/47, 8"/55, 16"/45, and 16"/50. It also covers certain obsolete and obsolescent assemblies and items in other sizes. Component items of the above named sizes covered include explosives, projectiles, fuzes, primers, tracers, and propelling charges. Miscellaneous components, detail parts, ammunition boxes, cartridge tanks, powder bag tanks, and fuze and primer cans are also covered.

1-4 INTENDED USES. This publication will be used by all Naval personnel engaged in the preparation, handling, and tactical use of Navy gun-type ammunition.

1-5 ARRANGEMENT OF MATERIAL

1-6 Specific information concerning ammunition assemblies, fuzes, primers, tracers, cartridge cases, special charges, ammunition containers, miscellaneous components, and obsolete or obsolescent items is presented in separate chapters, primarily in tabular form. General or background information

is contained in appendices at the back of the book.

1-7 HOW TO USE THE MANUAL

1-8 Information about a specific subject pertaining to Navy gun-type ammunition may be located by looking in the Table of Contents or in the List of Tables in the front portion of this manual.

1-9 Subject matter itself is arranged in easy-to-locate form by size, gun, Mark (Mk) and Mod number, and application. When specific data is not available, the applicable space in the table is marked "NA."

1-10 CLASSIFICATION OF GUN AMMUNITION

1-11 CLASSIFICATION BY SIZE OF GUN. Gun ammunition is most commonly classified by the size of the gun in which it is used. In addition to designations of bore diameter, such as 20mm, 3-inch, or 16-inch, the length of the gun bore in calibers is also used as a means of classification. Thus a 3"/50 projectile is one used in a gun having a bore diameter of 3 inches and a bore length of 50 times 3 inches, or 150 inches.

1-12 CLASSIFICATION BY ASSEMBLY. The ammunition for the different type guns used by the Navy may be loaded as an assembly or as several units. See figure 1-1.

1-13 Case Ammunition. This class embraces every type of ammunition that uses a cartridge case to contain its

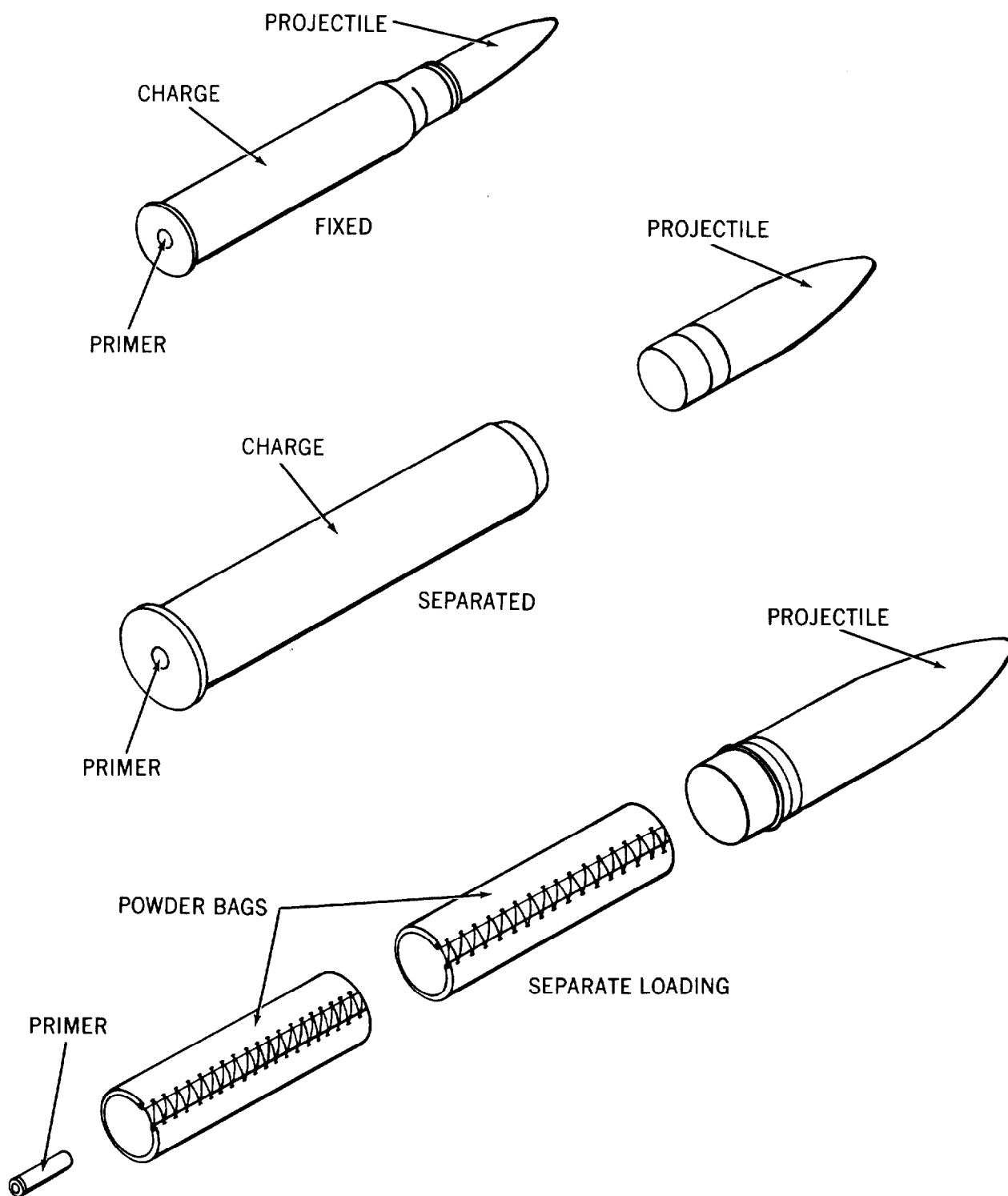


Figure 1-1. Types of Gun Ammunition: Fixed (top); Separated (center); and Separate-Loading (Bagged Gun) (bottom)

propellant charge. Case ammunition includes fixed and separated ammunition.

1-14 Fixed Ammunition. This class applies to ammunition which has the cartridge case crimped around the base of the projectile. The primer is assembled in the cartridge case. The projectile and the cartridge case containing the primer and propellant charge all form one unit as a fixed round of ammunition. Small caliber guns and guns through 5"/25 caliber use fixed ammunition.

1-15 Separated Ammunition. This class applies to ammunition which consists of two units: the projectile assembly and cartridge case assembly. The projectile assembly consists of the projectile body containing the load, nose fuze, base fuze, and auxiliary detonating fuze, as applicable. The cartridge case assembly consists of the cartridge case, primer, propellant charge, wad, distance piece, and a plug to close the open end of the cartridge case. Separated ammunition is produced in gun sizes of 5"/38 through 6"/47 caliber and for some 8-inch guns.

1-16 Separate-Loading (Bagged Gun) Ammunition. This class applies to some 8-inch gun sizes and to all gun sizes larger than 8 inches. This class does not contain a cartridge case; the propellant charge is loaded in silk bags which are consumed during the combustion of the propellant when fired from the gun. The projectile, propellant charge, and primer are loaded separately.

1-17 CLASSIFICATION BY SERVICE USE. For economy and for safety, gun ammunition is assembled and classified according to the intended use as follows.

1-18 Service Ammunition. This class applies to ammunition used in combat. The projectiles contain explosive, illuminating, chaff, or chemical loads. Full propellant charges are used.

WARNING

VT NON-FRAG projectiles are for target and training purposes and have a combination black powder and pyrotechnic color burst element. Reduced charges may be used.

1-19 Target and Training Ammunition. This class applies to ammunition used for firing practice and training purposes. These inert-loaded projectiles are comparable in weight and configuration to those of service ammunition.

1-20 Dummy Drill Ammunition. This class applies to any type of ammunition assembled without explosives, or with inert material substituted for explosives, to imitate service ammunition. This class of ammunition is used in training of personnel, or testing equipment. It is normally identified as dummy cartridges, dummy charges, or dummy projectiles.

1-21 PRIMARY COMPONENTS OF AMMUNITION

1-22 The primary components of Navy gun-type ammunition are as follows.

1-23 EXPLOSIVES. Explosives have extremely rapid rates of reaction, hence they are said to detonate. In gun ammunition high explosives are used as initiators, boosters, and bursting charges of projectiles. At one time explosives were commonly divided into two categories, designated "high explosives" and "low explosives." High explosives were those which could be made to detonate. Low explosives were those which could be made to detonate only by applications of very strong shocks and whose use depended on some other characteristics usually that of bursting in a rapid, controllable, and reproducible manner. This classification is no longer used in connection with strictly military applications. In military application the term "high explosive" is still used but with a somewhat different meaning. Many of

the so-called low explosives are now called propellants. See Appendix B for further description and general information.

1-24 PROJECTILE. The projectile is that component of ammunition which, when fired from a gun or launcher, carries out the tactical purpose of the weapon such as piercing armor, detonating on impact, or at a predetermined time after firing to cause damage to the target. Projectiles also are used to illuminate targets at night, or produce a chemical or smoke service as needed. See Appendix B for further description and general information.

1-25 FUZE. The fuze is designed to initiate the payload of a projectile. The different types of fuzes include mechanical, proximity, and impact (nose or base). See Appendix C for further description and general information.

1-26 PRIMER. The primer is a small tube of sensitive explosive which initiates the propellant charge. See Appendix D for further description and general information.

1-27 TRACER. The tracer is a device which leaves a trail of flame or smoke to show the trajectory of a projectile. See Appendix D for further description and general information.

1-28 PROPELLING CHARGES. Propelling charges are mixtures of explosives designed to propel projectiles, rockets, guided missiles, depth charges and torpedoes from guns and launchers to the target. Included in these charges are cartridges, bag charges, and special charges. See Appendix E for further description and general information.

1-29 MISCELLANEOUS COMPONENTS

1-30 Miscellaneous components are those which are used in the assembly of gun-type ammunition but not covered in other categories assigned in this manual. They are illustrated in figure 1-2.

1-31 GAS CHECKS. Gas checks are copper rings with lead cores. These are assembled under pressure around the base fuze, base plug, and/or base fuze hole plug to prevent the propellant gases from entering the projectile. For information concerning shipboard inspection of gas check seals, refer to the Safety Summary of this publication or to Appendix F. Criteria to be followed when installing gas check seals or for pre-1970 (uninspected, unsuffixed) loaded ammunition are also provided in Appendix F.

1-32 TRACER WASHERS. Lead washers are placed between the shoulder on the tracer body and the corresponding seating surface in the base fuze of the projectile. These washers prevent gases from affecting the base fuze or explosive filler.

1-33 ADAPTERS. Adapters are used with projectiles to join auxiliary detonator and nose fuzes. They are also used to connect the nose fuze to the projectile.

1-34 PLASTIC AND CORK PLUGS. Plugs are used in the mouth of cartridge cases in the assembly of propellant charges. They seal the end of the cartridge case and act as a buffer when the case is rammed into the gun against the projectile.

1-35 WAD. This is a cardboard or pyralin disk which is forced into the cartridge case on top of the propellant powder to retain the powder in position. Pyralin wads are usually used in special charges; such as saluting, torpedo, and single depth charge projectors. When the pyralin wad is used, it is cemented in position.

1-36 DISTANCE PIECE. This is a rectangular piece of cardboard folded into a triangular shape. It is used in the cavity of the cartridge case and is inserted between the wad and the plug to act as a support between the wad and plug in separate loaded ammunition. In fixed ammunition the distance piece is

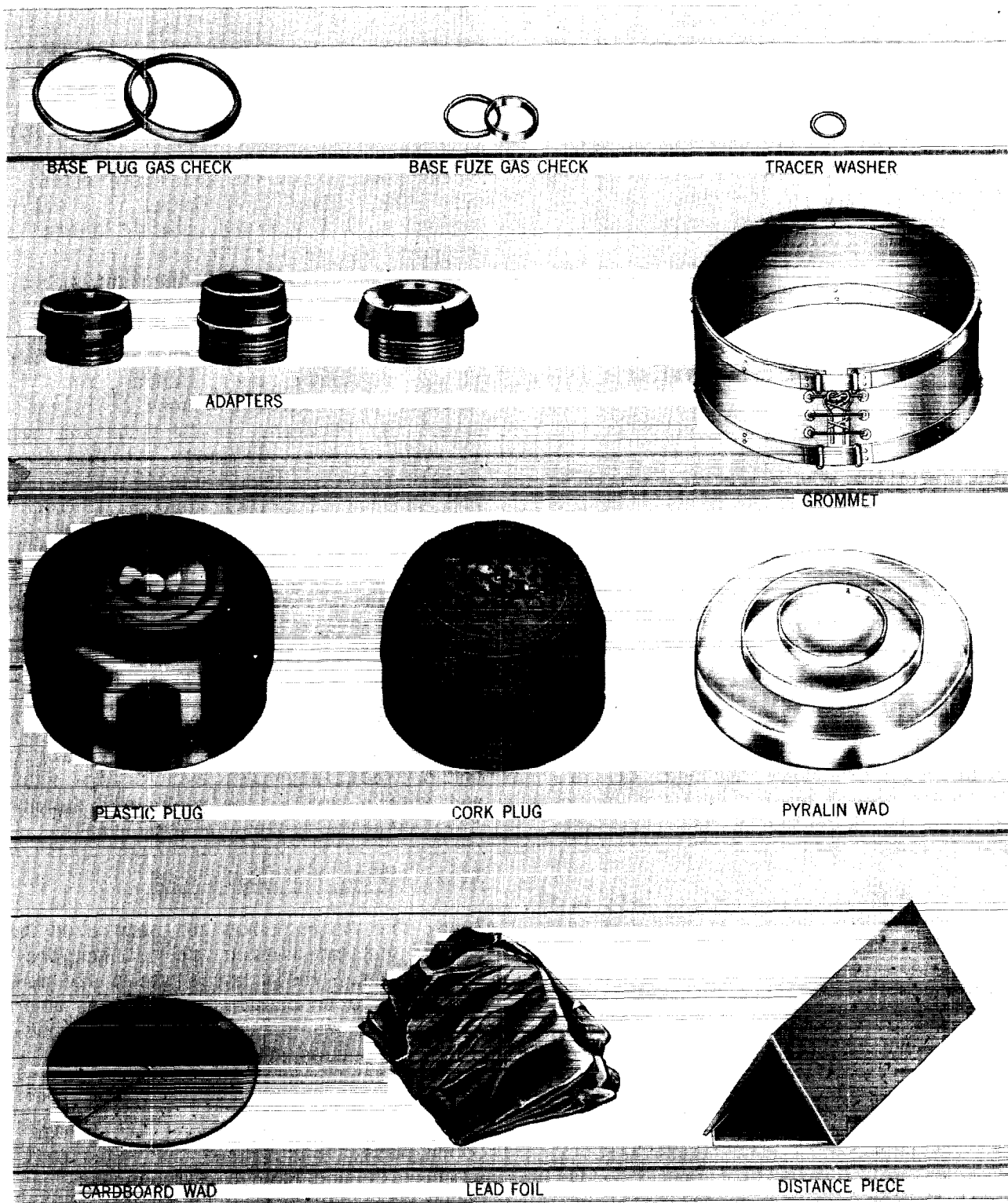


Figure 1-2. Miscellaneous Gun Ammunition Components and Details

inserted between the wad and the base of the projectile.

1-37 LEAD FOIL. A piece of lead foil is placed inside the distance piece, when required, to prevent the deposit of copper from the projectile rotating band in the bore of the gun. It is also used in bag charge ammunition for the same purpose.

1-38 FUZE CAVITY LINER. This is a thin metal liner which is inserted in the fuze cavity of the projectile. It is used for VT fuze applications.

1-39 HANDLING AND SHIPPING PARTS

1-40 Handling and shipping parts are items which are used to protect or provide support during handling, shipping, and storage of gun ammunition. These items which are considered serviceable are usually returned to an ammunition depot. They shall be packed in the prescribed manner and contents identified.

1-41 SPACERS. Spacers are made of cork, cardboard, or wood in various thicknesses and are placed inside the ends of cartridge tanks and powder tanks to prevent longitudinal movement of the cartridge case or powder bag.

1-42 CARTRIDGE EXTRACTORS. These are light metal cups shaped to fit the base end of cartridge cases. They have a handle or a sash cord to facilitate removal of the cartridge case from the cartridge tank. The extractor protects the primer in addition to providing a means of removing the case from the tank.

1-43 WATERPROOFING PROTECTING CAPS. These are metal caps threaded internally to fit mating threads on the exterior of the nose of the projectile. The cap helps protect a nose fuze from damage by moisture or by shock in handling. These caps are attached by thread to separated and separate-loaded projectiles; they are soldered lightly (and

removed by tear strips) on 5"/25 medium-caliber fixed rounds. The caps are installed at the depot and are removed just prior to the time the projectiles are loaded into the hoists aboard ship.

1-44 PROJECTILE AND CARTRIDGE NOSE SUPPORTS. These are placed in a cartridge tank for fixed ammunition to support the projectile and prevent movement. They are lightweight tubes with flanges for positioning.

1-45 GROMMETS. These are rectangular pieces of heavy fiber, canvas, or leather provided with laces or other means for securing to the rotating bands of projectiles. Grommets protect the copper rotating bands during handling and storage of 6-inch through 16-inch projectiles.

1-46 AMMUNITION DATA CARDS. Ammunition data cards are prepared for each ammunition lot produced or renovated. The information on the data card is used by ammunition depots and by using activities. Data cards are supplied with each shipment of ammunition and are usually placed inside the protecting cap for projectiles, inside cartridge tanks, and inside bag-charge tanks and ammunition shipping boxes, as applicable.

1-47 AMMUNITION CONTAINERS

1-48 The projectiles for separated and bagged gun ammunition are not shipped in containers. Their parts which are most susceptible to damage--nose fuzes and rotating bands--are protected, respectively, by caps and grommets. Cartridges for separated ammunition, bag charges, fixed ammunition, and some nose fuzes are shipped and stored in containers. Cartridges for separated ammunition and bagged charges are packaged individually in tanks; small-caliber fixed ammunition is shipped collectively in boxes.

1-49 Separate components, such as some nose fuzes and primers for bag gun loads, are shipped individually in

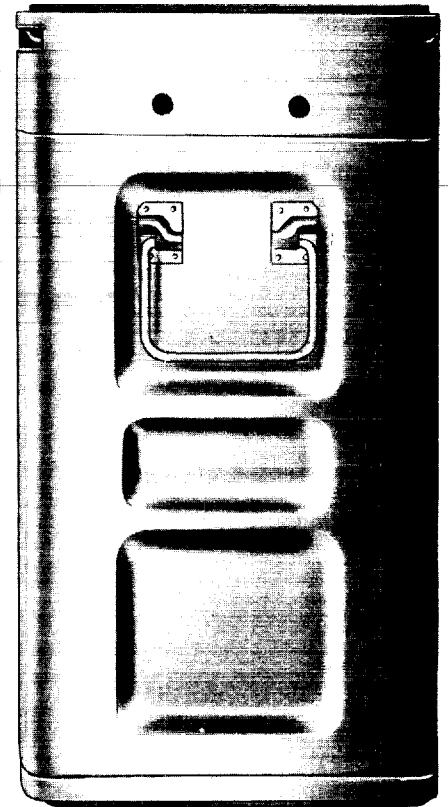
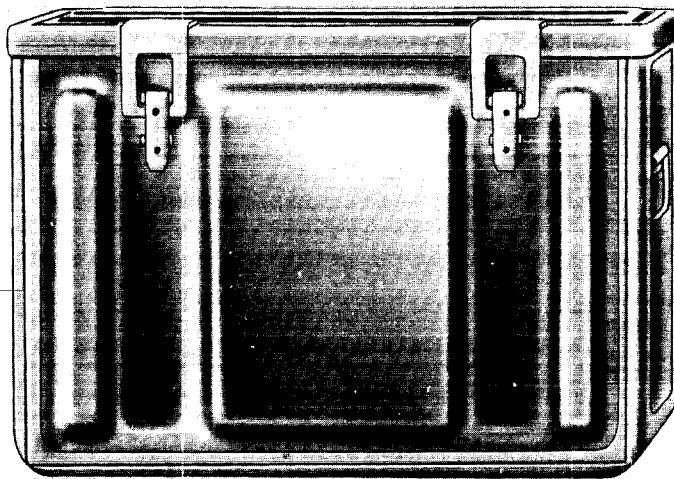


Figure 1-3. Typical Box-Type Containers: 20mm Cartridges (Left) and 40mm Cartridges (Right)

hermetically sealed cans, a number of such cans being placed in a wood box.

1-50 All gun ammunition components in their containers may be assembled into unit loads on metal or wood pallets for handling with powered equipment. Projectiles 12-inch and larger in caliber are not palletized.

1-51 AMMUNITION BOXES. (See figure 1-3.) Metal boxes with gasketed covers are used as containers for 20mm and 40mm ammunition. The covers are clamped to the boxes with latches or they may have hinges and latches.

1-52 Some larger caliber fixed ammunition is supplied in wood boxes to ships whose storage will not accommodate the cartridge tanks. Most of the larger caliber fixed ammunition is shipped individually in cartridge tanks.

1-53 CARTRIDGE TANKS. (See figure 1-4.) These steel or aluminum tanks are provided with reinforcing rings around their ends. The rings allow an interlocking arrangement when stored horizontally in rows. The side walls are relatively weak and are not designed to support super-imposed weight. The tops of the tanks are closed by a metal cover bearing on a rubber gasket. The cover has a bail to facilitate installation and removal. A length of wire attached to the cover and to the body of the tank prevents the cover from loosening. Usually, an inspection of this wire will indicate whether the tank cover is tightly secured. The tanks are air-tight when properly closed. Tanks for fixed cartridges are provided with interior supports for the noses of the projectiles.

1-54 POWDER TANKS. Powder tanks are fabricated of aluminum to reduce

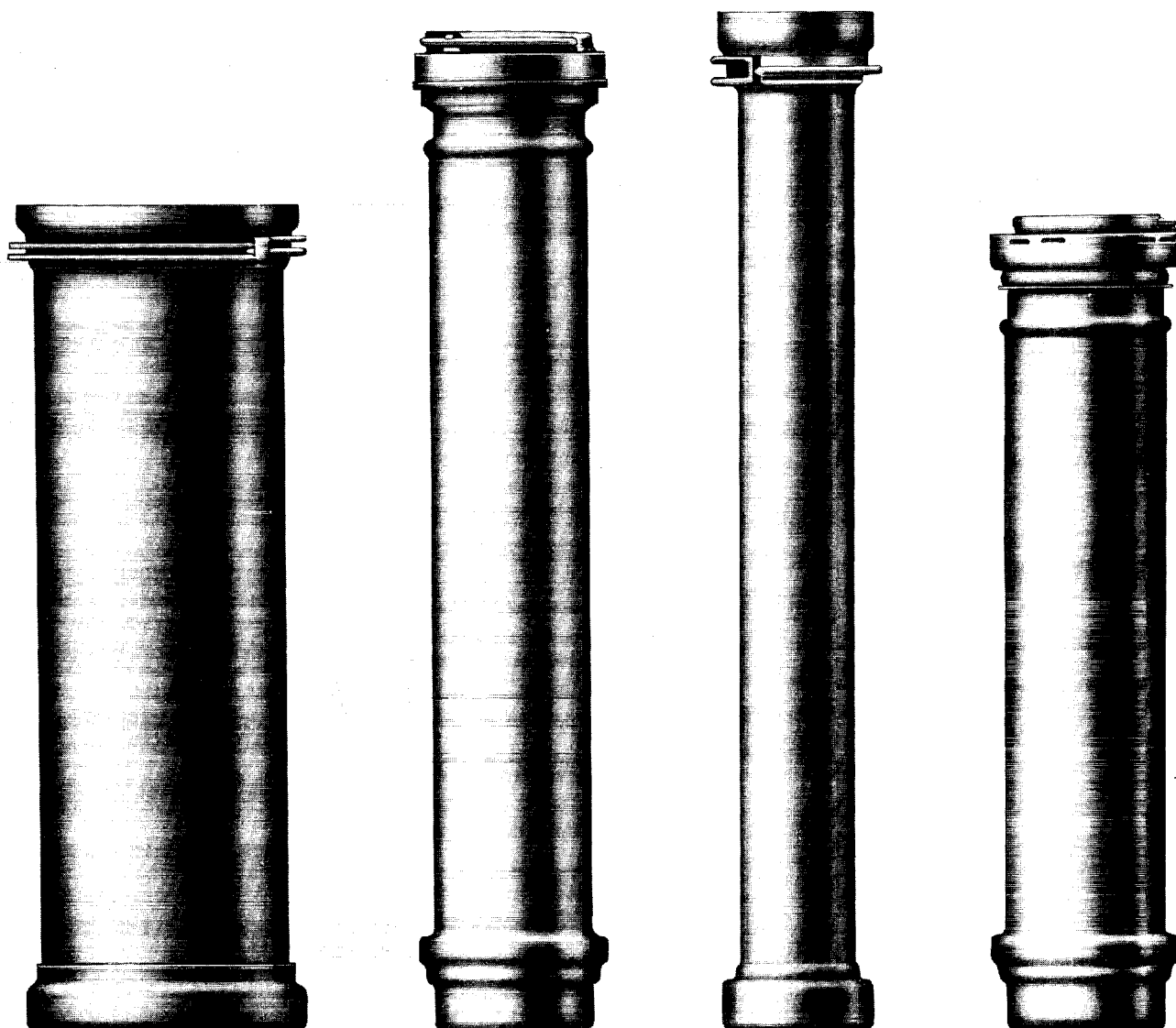


Figure 1-4. Typical Tank-Type Containers: (left to right) 8-Inch Bagged Charge, 5"/54 Cartridge, 3"/50 Cartridge, and 5"/38 Cartridge

sparking danger, storage weight, and facilitate handling; however, some steel tanks with brass top rings are still in use. Each powder tank contains one or several powder bags. Powder tanks in general are constructed in the same manner as cartridge tanks; the requirements for air-tightness are the same. All powder tanks have handling aids. Large tanks have lugs which fit slings; smaller ones have handles. Wrenches are supplied for tightening the covers on powder tanks. Only the wrench furnished for the particular tank should be used. A smaller wrench might not sufficiently seat the cover in the gasket; a larger one might carry away part of the cover or tank.

1-55 Reduced-charge powder charges may be tanked in one of several different ways. They may be in full-charge powder charge tanks, with or without adapters, or they may be in powder charge tanks designed for reduced charges. Regardless of how tanked, it is necessary that all movement of the charge within the tank be eliminated in order to avoid the danger of fire or explosion from an

internal static electrical spark discharge. To this end it is mandatory that the wooden spacer, with cardboard spacer on top, be in the bottom of each tank containing a powder bag charge, and all other space be filled by placing cardboard spacers between the top of the charge or section and the tank lid. In closing the tank, it should be necessary to put a slight pressure on the lid to get it to engage its locking grooves.

1-56 Special tanks are supplied for bulk smokeless powder which replaces powder taken from ammunition for testing. These are called replacement sample tanks. They are cutdown 4-inch or 5-inch cartridge tanks or specially designed aluminum powder tanks.

1-57 FUZE AND PRIMER CANS. These are hermetically sealed cans which are used for shipping and storing of fuzes and primers. The cans are sealed by a tear strip or threads, and shipped in a suitable box with cradle supports to prevent the cans from shifting.

1-58 OTHER PUBLICATIONS FOR REFERENCE

1-59 The following documents provide additional information for the ordnance items described in this publication:

NAVORD OP 4, Volume 2	Ammunition Afloat
NAVORD OP 5, Volume 1	Ammunition Ashore; Handling, Stowing, and Shipping
NAVORD OP 1480	VT Fuzes for Projectiles and Spin Stabilized Rockets, Special VT Fuzes
NAVORD OP 1714	Selection of Projectiles and Fuzes for Attack of Ship and Shore Targets
NAVORD OP 2215, Volume 2	Navy Gun-Type Ammunition
NAVORD OP 3658	Rocket Assisted Projectile (RAP) Ballistic Slide Rule for Use with Computer Mk 1A, Mod 13

NAVORD OP 2215 VOLUME 1
SECOND REVISION

NAVORD OD 17190	Unserviceable, Suspended, and Limited Use Ammunition
NAVORD OD 28654	Assembly Procedures for Fuze and Adapter Assemblies Mks 357, 358, 359, 365, 366, 367, 369, 370, and 371
NAVORD OD 28655	Assembly Procedures for Fuze and Adapter Assemblies Mks 360, 361, and 362
NAVORD OD 41548	Assembly Procedures for Fuze and Adapter Assembly Mk 357 Mod 0 and Installation into 5"/38 Caliber Rocket Assisted Projectile Mk 57 Mod 0
NAVORD OD 41896	Slide Rule for Rocket Assisted Projectile (RAP) Computer Mk 47 Mods 3, 4, 5, 6, 7, 8, 9, 10
NAVORD ORDALT No. 6004	5"/54 Ballistic Slide Rule, Computer Mk 47 Mods 5 and 7
NAVORD ORDALT No. 6005	5"/54 Ballistic Slide Rule, Computer Mk 47 Mods 8 and 9
NAVORD ORDALT No. 6006	5"/54 Ballistic Slide Rule, Computer Mk 47 Mods 3 and 4
NAVORD ORDALT No. 6827	5"/38 Caliber Gun Mounts, Projectile Hoists Mk 2 and Mk 4 (Urgent)
NAVORD ORDALT No. 6926	5"/54 Automatic GFCS, Mk 47 Mods 8 and 9
NAVORD ORDALT No. 6927	5"/54 Automatic GFCS, Mk 47 Mods 5 and 7
NAVORD ORDALT No. 6948	5"/54 Automatic GFCS, Mk 47 Mods 10 and 11
NAVORD ORDALT No. 6970	5"/38 Ballistic Slide Rule
NAVORD ORDALT No. 6971	5"/38 Automatic GFCS
MIL-HDBK-137	Military Standardization Handbook, Fuze Catalog, Volume 1
NWIP 20-2	Naval Warfare Information Publication Naval Weapons Selection-Ships
NWL Ballistic Table No. 182	5"/38 RAP Range Table
NWL Ballistic Table No. 185	5"/54 RAP Range Table

CHAPTER 2

AMMUNITION ASSEMBLIES

2-1 ORGANIZATION OF DATA

2-2 Fixed, separated, and separate-loading Navy gun-type ammunition assemblies are arranged in tables 2-1 through 2-35 according to the size of gun, Mk and Mod numbers, and type of ammunition.

NOTE

The 6"/47 ammunition is further categorized according to its use in SP (single-purpose) or DP (dual-purpose) guns. SP guns are slow fire and intended for bombardment use only. DP guns are rapid-fire and intended for both bombardment and antiaircraft use.

The ammunition table for each size is followed by a second table covering

propelling charges, and usually by a third table covering dummy rounds. Because of the special nature of the RAP (Rocket Assisted Projectile) rounds, they are covered separately in table 2-36. An extensive description of the RAP is provided in paragraphs 2-5 through 2-27.

2-3 FURTHER REFERENCES

2-4 Appendix B contains general information pertinent to projectiles. Appendix E covers propelling devices. Refer also to Appendix F, which provides gas check seal inspection criteria for projectiles assembled with base fuzes or base fuze hole plugs; and to Appendix G, which provides procedures for removing or replacing nose fuzes on projectiles aboard ship.

Table 2-1. 20mm AA Ammunition for Guns Mk 4
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 3	HEI	Tetryl and Incendiary Increment	0.0243	None	Mk 26	None	393685
Mk 3	BL&P	Inert	0.0243	None	Mk 26 (Inert)	None	393685
Mk 7	HET	Tetryl	0.010	None	Mk 26	None	393685
Mk 7	HET-DI	Tetryl	0.010	None	Mk 26	None	561462
Mk 7	BL&T	Tetryl	0.010	None	Mk 26	None	561462
Mk 9	AP-T	None	NA	None	None	None	561456

Table 2-2. Propelling Charge Assembly for 20mm AA Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)
Full	Mk 4	0.061	Mk 31	0.252

Table 2-3. 20mm AA Dummy Ammunition
Projectile Assembly

Dummy Round	Projectile Body	Loading		Nose Fuze	Drawing Number
		Charge	Weight (Pounds)		
Mk 1 Mod 0	Mk 3	None	None	Mk 26 (Inert)	330088

Table 2-4. 20mm AC Ammunition for Guns Mk 11 and Mk 12
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 11	HPT	Lead	0.057	None	Dummy Nose Plug Dwg. 1211649	None	982517
Mk 11	TP	None	NA	None	Dummy Nose Plug Dwg. 1211649	None	982519
Mk 12	HEI	Tetryl and Incendiary Increment	0.015	None	Mk 78	None	982521
Mk 12	LPT	None	NA	None	Dummy Nose Plug Dwg. 1211649	None	982518
Mk 13	API	Incendiary Increment	0.011	None	None	None	982523
Mk 14	AP-T	None	NA	None	None	None	1380975

Table 2-5. Propelling Charge Assembly for 20mm AC Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)
Full	Mk 5	0.093	M52A3	0.389

Table 2-6. 20mm AC Dummy Ammunition Projectile Assembly

Dummy Round	Projectile Body	Loading		Nose Fuze	Drawing Number
		Charge	Weight (Pounds)		
Mk 103 Mod 0	Mk 11	Inert Material	0.59	Dummy Nose Plug Dwg. 1211649	982520
Mk 104 Mod 0	Mk 11	Inert Material	0.59	Dummy Nose Plug Dwg. 1211649	1445196

Table 2-7. 40mm AA Ammunition for Guns Mk 1
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 2	HEI-P	TNT and Incendiary	0.194	None	Mk 27	None	394620
Mk 2	HEI-P-NP	TNT and Incendiary	0.194	None	Dummy Nose Plug M69B1	None	394620
Mk 2	HEI-SD	TNT and Incendiary	0.194	None	Mk 27	None	394620
Mk 2	HEIT-NSD	TNT and Incendiary	0.194	None	Mk 27	None	394620
Mk 2	HEIT-DI-SD	TNT and Incendiary	0.194	None	Mk 27	None	394620
Mk 2	HE-P	TNT	0.194	None	Mk 27	None	394620
Mk 2	HE-P-NP	TNT	0.194	None	Dummy Nose Plug M69B1	None	394620
Mk 2	HE-SD	TNT	0.194	None	Mk 27	None	394620
Mk 2	HEIT-SD	TNT and Incendiary	0.194	None	Mk 27	None	394620
Mk 2	HET-SD	TNT	0.194	None	Mk 27	None	394620
Mk 2	BL&T	Inert	0.194	None	Mk 27	None	NA
Mk 2	BL&P	Inert	0.194	None	Dummy Nose Plug M69B1	None	NA
M81A1	AP	None	NA	None	None	None	NA
M81A1	AP-T	None	NA	None	None	None	NA

Table 2-8. Propelling Charge Assembly for 40mm AA Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)
Full	Mk 1	0.661	Mk 21	2.715
Full	Mk 2	0.661	Mk 22	2.715
Full	Mk 3	0.661	Mk 22	2.620

Table 2-9. 40mm Dummy Ammunition
Projectile Assembly

Dummy Round	Projectile Body	Loading		Cartridge Case	Nose Fuze	Drawing Number
		Charge	Weight (Pounds)			
Mk 1 Mod 0	Steel Machined	None	NA	Wood	None	327988
Mk 3 Mod 0	Mk 2	Inert Material	4.75	Mk 1	Dummy Nose Plug, Dwg. 329453	329453
Mk 4 Mod 0	Mk 2	Inert Material	4.75	Mk 1	Mk 27 Inert	423049

Table 2-10. 3"/50 Ammunition for Guns Mk 21 and Mk 22
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 25	Illum	Illum Load, Mk 4-3 Illum Load, Mk 12-0		None	Mk 51	None	1380743
Mk 27	AA	TNT	0.740	None	Mk 51	Mk 54*	1350962
Mk 27	HC	TNT	0.740	None	Mk 30	Mk 54*	1350962
Mk 27	BL&P	None	NA	None	Dummy Nose Plug Dwg 275300	None	1350962
Mk 27	BL&T	None	NA	None	Dummy Nose Plug Dwg 275300	None	1350962
Mk 29	AP-T	Explosive D	0.140	M66A1 M66A2	None	None	1380749
Mk 29	BL&T	Inert	0.390	None	None	None	1380749
Mk 29	BL&P	Inert	0.590	None	None	None	1380749
Mk 31	VT	Comp A-3	0.550	None	Mk 72 Mods 2-9 Mk 72 Mods 10-13 Mk 92	Mk 44 Mod 1 Booster Mk 30 Booster Mk 39	515258
Mk 31	VT (Non-Frag)	CBU Mk 1-0	NA	None	Mk 72 Mods 2-9 Mk 72 Mods 10-13 Mk 92	Mk 44 Mod 1 Booster Mk 30 Booster Mk 39	515258

* ADF Mk 54 Mod 1 shall not be used with this assembly.

Table 2-10. 3"/50 Ammunition for Guns Mk 21 and Mk 22 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Defonator	
Mk 33	AA	Comp A	1.270	None	Mk 51	Mk 54*	515259
Mk 33	HC	Comp A-3	1.270	None	Mk 30	Mk 43 Mod 1 Mk 54*	515259
Mk 33	VT	Comp A-3	0.990	None	Mk 72 Mods 2-9 Mk 72 Mods 10-13 Mk 92	Mk 44 Mod 1 Booster Mk 30 Booster Mk 39	515259
Mk 33	VT (Non-Frag)	CBU Mk 1-0	NA	None	Mk 72 Mods 2-9 Mk 72 Mods 10-13 Mk 92	Mk 44 Mod 1 Booster Mk 30 Booster Mk 39	515259
Mk 36	VT (Non-Frag)	CBU Mk 5-0 CBU Mk 6-0 CBU Mk 7-0	NA	None	Mk 72 Mods 2-9 Mk 72 Mods 10-13 Mk 92	Mk 44 Mod 1 Booster Mk 30 Booster Mk 39	1331923

* ADF Mk 54 Mod 1 shall not be used with this assembly.

Table 2-11. Propelling Charge Assembly for 3"/50 Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)
Full	Mk 7	4.100	(Mk 14, Mk 41, Mk 42)*	11.170
Full	Mk 9	4.100	(Mk 14, Mk 41, Mk 42)*	11.170

* Rapid fire 3"/50 mounts will fire rounds assembled with electric primer Mk 42 only. Slow fire 3"/50 mounts will fire rounds assembled with percussion primers Mk 14 and Mk 41 only. Primer Mk 14 will be replaced by primer Mk 41.

Table 2-12. 3"/50 Dummy Ammunition
Projectile Assembly

Dummy Round	Projectile Body	Loading		Cartridge Case	Nose Fuze	Drawing Number
		Charge	Weight (Pounds)			
Mk 5	Wood Body	None	None	Wood	None	236389
Mk 6	Wood Body	None	None	Wood	Mech. Time Mk 22 Dummy	329485
Mk 8 Mod 1	Drawing 51'517	Inert	24.50	Drawing 517518	Nose Fuze Plug Dwg 587571	517516
Mk 9 Mod 0	Mk 33	Inert	24.40	Mk 9	Dummy Nose Plug Dwg 434056	563479
Mk 9 Mod 2	Mk 33	Inert	24.60	Mk 9	Dummy Nose Plug Dwg 434056	1525375

Table 2-13. 5"/38 Ammunition for Guns Mk 12
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 30	Illum	Illum Load Mk 4-5 Illum Load Mk 11-0	NA	None	Mk 50, Mk 61, Mk 349	None	1305688 1305723
Mk 30	WP	WP Canister M5	NA	None	Mk 29, Mk 61, Mk 66, Mk 349, Mk 50	None	NA
Mk 30	Window (Chaff)	Window (Chaff) Load Mk 1-1	NA	None	Mk 50, Mk 349	None	NA
Mk 31	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1	NA	None	Mk 71 Mods 5-10 Mk 71 Mods 11-12 Mk 90 (Mk 357, Mk 365,)* (Mk 366, Mk 367)	Mk 44-1, Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	513892 513889 513889
Mk 31	BL&T	Inert	7.250	None	Dummy Nose Plug Dwg 434038	None	1380965
Mk 31	BL&P	Inert	7.250	None	Dummy Nose Plug Dwg 434038	None	1380863
Mk 32	Common	Explosive D	2.580	Mk 20 Mk 64	None	None	NA

* Fuze and Adapter Assemblies

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 34	VT**	Comp A-3	NA	None	Mk 71 Mods 5-10 Mk 71 Mods 11, 12 Mk 90 (Mk 357, Mk 365)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	NA
Mk 35	AAC	Explosive D	7.550	Mk 28, Mk 31-2	Mk 50, Mk 61-1 Mk 349	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	513862
Mk 35	HC	Explosive D	7.550	Mk 28, Mk 31-2	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	513862
Mk 35	HE-MT	Comp A-3	8.200	None	Mk 50, Mk 61-1 Mk 349	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 35	HE-PD	Comp A-3	8.200	None	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 35	VT	Comp A-3	7.860	None	Mk 71 Mods 5-10 Mk 71 Mods 11, 12 Mk 90 (Mk 357, Mk 365)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	513853

* Fuze and Adapter Assemblies

** The Mk 34 VT is a Mk 31 projectile with the fuze threads in the base modified from 1.25 inch to 1.50 inch diameter.

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 35	VT (Non-Frag)	CBU Mk 2-0 ✓	NA	None	Mk 71 Mods 5-10 Mk 71, Mods 11, 12 Mk 90 (Mk 357, Mk 365,)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	513884
		CBU Mk 3-0					513880
		CBU Mk 3-1					513880
Mk 35	BL&T	Inert	9.500	None	Dummy Nose Plug Dwg 434038	None	1380966
Mk 35	BL&P	Inert	9.930	None	Dummy Nose Plug Dwg 434038	None	1380861
Mk 38	Common	Explosive D	2.040	Mk 20 Mk 64-2	None	None	1380758
Mk 44	Illum	Illum Load Mk 4-5	NA	None	Mk 50, Mk 61, Mk 349	None	1305683
		Illum Load Mk 11-0					1305724
Mk 44	WP	WP Canister M 5	NA	None	Mk 29, Mk 61, Mk 66, Mk 349 Mk 50	None	NA
Mk 44	Window (Chaff)	Window (Chaff) Load Mk 2-0 Window (Chaff) Load Mk 4-0 Window (Chaff) Load Mk 15-0	NA	None	Mk 50, Mk 349	None	2141462

* Fuze and Adapter Assemblies

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 46	Common	Explosive D	2.040	Mk 20 Mk 64	None	None	1380758
Mk 47	AAC	Comp A-3	NA	Mk 28 Mk 31	Mk 50, Mk 61-1 Mk 349	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 47	HC	Comp A-3	NA	Mk 28 Mk 31-2	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 47	HE-MT	Comp A-3	NA	None	Mk 50, Mk 61-1, Mk 349	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 47	HE-PD	Comp A-3	NA	None	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 47	VT	Comp A-3	NA	None	Mk 71 Mods 5-10 Mk 71 Mods 11, 12 Mk 90 (Mk 357, Mk 365,)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	NA
Mk 49	AAC	Explosive D	7.550	Mk 28 Mk 31-2	Mk 50, Mk 61-1 Mk 349	Mk 43-1, Mk 44-2 Mk 52-3, Mk 54	513862

* Fuze and Adapter Assemblies

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 49	HC	Explosive D	7.550	Mk 28 Mk 31-2	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	513862
Mk 49	HE-PD	Comp A-3	8.200	None	Mk 29	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 49	HE-MT	Explosive D	7.550	None	Mk 50, Mk 61-1 Mk 349	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 49	VT	Comp A-3	7.860	None	Mk 71 Mods 5-10 Mk 71 Mods 11,12 Mk 90 (Mk 357, Mk 365,)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	513853
Mk 49	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1	NA	None	Mk 71 Mods 5-10 Mk 71 Mods 11,12 Mk 90 (Mk 357, Mk 365,)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	513884 513880 513880
Mk 49	BL&T	Inert	9.360	None	Dummy Nose Plug Dwg 434038	None	1380966
Mk 49	BL&P	Inert	9.790	None	Dummy Nose Plug Dwg 434038	None	1380861

* Fuze and Adapter Assemblies

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 50	Illum	Illum Load Mk 11-0	NA	None	Mk 50, Mk 61, Mk 349	None	2141494
Mk 50	WP	WP Canister M5	NA	None	Mk 50, Mk 61, Mk 66, Mk 349	None	2141495
Mk 50	Window (Chaff)	Window (Chaff) Load Mk 15-0	NA	None	Mk 50, Mk 349	None	2141493
Mk 51	VT (Non-Frag)	CBU Mk 2-0	NA	None	Mk 71 Mods 5-10 Mk 71 Mods 11-12 Mk 90 (Mk 357, Mk 365)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	1332251
Mk 52	AAC	Explosive D	7.730	Mk 83-0	Mk 349-0, Mk 61-1 Mk 50 Mods	Mk 54 Mods, Mk 43-1, Mk 44-2, Mk 52-3	2663126
Mk 52	HC	Explosive D or Comp A	7.730	Mk 83-0	Mk 29-3	Mk 54 Mods, Mk 43-1, Mk 44-2, Mk 52-3	2663126
Mk 52	HE-MT	Explosive D	8.000	None	Mk 50, Mk 61-1 Mk 349	Mk 54 Mods, Mk 43-1, Mk 44-2 Mk 52-3	2663126

* Fuze and Adapter Assemblies

Table 2-13. 5"/38 Ammunition for Guns Mk 12 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 52	HE-PD	Explosive D	8.000	None	Mk 29	Mk 43-1, Mk 44-2 Mk 52-3, Mk 54	2663126
Mk 56	VT	Comp A-3	7.860	None	Mk 71 Mods 5-10 Mk 71 Mods 11, 12 Mk 90 (Mk 357, Mk 365)* (Mk 366, Mk 367)	Mk 44-1 Booster Mk 30 Booster Mk 39 Mk 52-0 Mk 52-0	2519644

* Fuze and Adapter Assemblies

Table 2-14. Propelling Charge Assembly for 5"/38 Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)	Drawing Number
Full	Mk 5	15.200	Mk 13	27.000	204256
Full	Mk 8	15.200	Mk 48	31.000	1380859
Full	Mk 10	15.200	Mk 48	31.000	1380859
Reduced	Mk 5	3.600	Mk 13	19.000	1380860
Reduced	Mk 10	3.600	Mk 48	19.000	1380860

Table 2-15. 5"/38 Dummy Ammunition
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 1 Mod 0	Dummy Fuze or Dummy Nose Plug	161064
Mk 2 Mod 0	Solid Nose	161064
Mk 4 Mod 0	Dummy Nose Plug or Dummy Fuze	329130

Table 2-16. 5"/54 Ammunition for Guns Mk 16 and Mk 18
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Fuze	Auxiliary Detonator	
Mk 41	AAC	Explosive D	7.750	Mk 31-2	Mk 342	Mk 54 Mods	515207
Mk 41	HC	Explosive D	7.750	Mk 28 Mk 31	Mk 30 Mods 3	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 41	VT	Comp A-3	7.870	None	Mk 73 Mods 0-3 Mk 73 Mods 4,5 Mk 91 {Mk 360, Mk 361,*} {Mk 362	Mk 44-1 Booster Mk 30 Booster Mk 30 Mk 52-0 Mk 52-0	515204
Mk 41	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1	NA	None	Mk 73 Mods 0-3 Mk 73 Mods 4-5 Mk 91 {Mk 360, Mk 361,*} {Mk 362	Mk 44-1 Booster Mk 30 Booster Mk 30 Mk 52-0 Mk 52-0	515226 515221 515221
Mk 41	HE-MT	Explosive D	7.750	None	Mk 25, Mk 342	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	NA
Mk 41	HE-PD	Comp A-3	7.870	None	Mk 30	Mk 43-1, Mk 44-2, Mk 52-3, Mk 54	2662958
Mk 41	BL&T	Inert	9.720	None	Dummy Nose Plug Dwg 434036	None	1380869

* Fuze and Adapter Assemblies

Table 2-16. 5"/54 Ammunition for Guns Mk 16 and Mk 18 (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 41	BL&P	Inert	10.150	None	Dummy Nose Plug Dwg 434036	None	1380868
Mk 42	Common	Explosive D	2.140	Mk 64	None	None	1380760
Mk 48-1	Illum	Illum Load Mk 4-7	NA	None	Mk 25, Mk 342	Mk 89	1305687
		Illum Load Mk 11-0					2141490
Mk 48-1	WP	WP Canister Mk 14	NA	None	Mk 25, Mk 342, Mk 30	Mk 89	1381152
Mk 55	VT	Comp A	7.870	None	Mk 73 Mods 0-3 Mk 73 Mods 4, 5 Mk 91	Mk 44-1 Booster Mk 30 Booster Mk 30 Mk 52-0 Mk 52-0	2519643
					(Mk 360, Mk 361)* (Mk 362		

* Fuze and Adapter Assembly

Table 2-17. Propelling Charge Assembly for 5"/54 Ammunition

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)	Drawing Number
Full	Mk 7 *	18.500	Mk 45	34.140	2434687
Full	Mk 9 *	18.500	Mk 45	34.140	2434687
Reduced	Mk 9	6.280	Mk 153	23.420	2434636

* Mk 7 or Mk 9 case with Mk 45 primer can be used with either slow or rapid fire guns.

Table 2-18. 5"/54 Dummy Ammunition
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 6 Mod 0	Dummy Nose Plug or Dummy Fuze Mk 25	330866

Table 2-19. 6"/47 Ammunition for Guns Mk 16 (SP)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 32	Illum	Illum Load Mk 7-1	NA	None	Mk 50	None	NA
Mk 34	HC**	Explosive D	13.170	Mk 28, Mk 31	Mk 29	Mk 54	514286
Mk 34	VT	Explosive D	12.850	None	Mk 79 (Mk 357, Mk 358)* (Mk 359	Mk 44-1 Mk 52-0 Mk 52-0	NA
Mk 34	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1	NA	None	Mk 79 (Mk 357, Mk 358)* (Mk 359	Mk 44-1 Mk 52-0 Mk 52-0	NA
Mk 35	AP	Explosive D	1.950	Mk 21	None	None	1380761
Mk 36	BL&T	None	NA	None	None	None	1380820
Mk 36	BL&P	None	NA	None	None	None	1380820
Mk 37	BL&T	None	NA	None	None	None	1380821
Mk 40	VT	Explosive D	12.850	None	Mk 79 (Mk 357, Mk 358)* (Mk 359	Mk 44-1 Mk 52-0 Mk 52-0	514284

* Proximity Fuze and Adapter Assembly

** May be issued with nose plug, drawing 434038

Table 2-19. 6"/47 Ammunition for Guns Mk 16 (SP) (Continued)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 40	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1	NA	None	Mk 79 (Mk 357, Mk 358)* (Mk 359)	Mk 44-1 Mk 52-0 Mk 52-0	515237 515232 515232
Mk 40	HC**	Explosive D	13.170	Mk 28 Mk 31	Mk 29	Mk 54	514286
Mk 41	Illum	Illum Load Mk 9-1	NA	None	Mk 25	None	1305720
Mk 43	BL&T	None	NA	None	None	None	1380821
Mk 43	BL&P	None	NA	None	None	None	1380821

* Proximity Fuze and Adapter Assembly

** May be issued with nose plug, drawing 434038

Table 2-20. Propelling Charge Assembly for 6"/47 Ammunition
(Single Purpose Guns)

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)	Drawing Number
Full	Mk 4	33.500	Mk 13	60.200	170023
Full	Mk 6	33.500	Mk 39	63.400	515200
Reduced	Mk 6	21.300	Mk 40	50.700	515202

Table 2-21. 6"/47 Ammunition for Guns Mk 16 (DP)
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 35	AP	Explosive D	1.950	Mk 21	None	None	1380761
Mk 36	BL&T	None	NA	None	None	None	1380820
Mk 36	BL&P	None	NA	None	None	None	1380820
Mk 37	BL&T	None	NA	None	None	None	1380821
Mk 39	AAC	Explosive D	14.030	Mk 28 Mk 31	Mk 25	Mk 43-1 Mk 54	515217
Mk 39	HC*	Explosive D	14.030	Mk 28 Mk 31	Mk 30	Mk 43-1 Mk 54	515217
Mk 39	VT	Explosive D	13.730	None	Mk 74	Mk 44-1	515215
Mk 39	VT (Non-Frag)	CBU Mk 2-0 CBU Mk 3-0 CBU Mk 3-1		None	Mk 74	Mk 44-1	515247 515242 515242
Mk 41	Illum	Illum Load Mk 9-1	NA	None	Mk 25	None	1305720
Mk 43	BL&T	None	NA	None	None	None	1380821
Mk 43	BL&P	None	NA	None	None	None	1380821

* May be issued with nose plug, drawing 434036

Table 2-22. Propelling Charge Assembly for 6"/47 Ammunition
(Dual Purpose Guns)

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)	Drawing Number
Full	Mk 4	33.500	Mk 13	60.200	170023
Full	Mk 6	33.500	Mk 39	63.400	563662
Reduced	Mk 6	21.300	Mk 40	50.700	515201

Table 2-23. 6"/47 Dummy Ammunition for Guns Mk 12, Mk 14, Mk 15, and Mk 16
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 2 Mod 0	Solid Nose	204060
Mk 3 Mod 0	Dummy Nose Plug or Dummy Nose Fuze	267732
Mk 4 Mod 0	Dummy Nose Plug	561811

Table 2-24. 8"/55 Ammunition for Guns Mk 12, Mk 14, and Mk 15
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 14	Common	Explosive D	10.910	Mk 21	None	None	NA
Mk 15	Common	Explosive D	11.460	Mk 21	None	None	NA
— Mk 16	BL&T	None	NA	None	None	None	NA
— Mk 16	BL&P	None	NA	None	None	None	NA
Mk 17	Common	Explosive D	10.380	Mk 21	None	None	NA
— Mk 18	BL&T	None	NA	None	None	None	NA
— Mk 18	BL&P	None	NA	None	None	None	NA
— Mk 19	AP	Explosive D	3.640	Mk 21	None	None	NA
Mk 21	AP	Explosive D	5.120	Mk 21-1, 3	None	None	1380824
Mk 22	BL&T	None	NA	None	None	None	1380822
Mk 22	BL&P	None	NA	None	None	None	1380822
Mk 23	BL&P	None	NA	None	None	None	NA
Mk 24	HC*	Explosive D	21.340	Mk 48	Mk 29-2, 3	Mk 54, Mk 55	1380827
Mk 25	HC*	Explosive D	21.340	Mk 48	Mk 29-2, 3	Mk 54, Mk 55	1380887
Mk 27	BL&T	None	NA	None	None	None	1380823
Mk 27	BL&P	None	NA	None	None	None	1380823

* May be issued with nose plug, drawing 434038

Table 2-25. Propelling Charge Assembly for 8"/55 Ammunition (Bagged Guns)

Type	Powder Bag Drawing	Propellant Weight (Approx. Pounds)	Primer	Sections per Charge	Loaded Powder Bag Drawing
Full	72226	90.000	Mk 15	2	119534
Reduced	72226	56.000	Mk 15	2	53417

Table 2-26. 8"/55 Dummy Ammunition for Guns Mk 12, Mk 14, and Mk 15
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 1 Mod 1	Solid Nose	147198
Mk 1 Mod 2	Solid Nose	190546
Mk 1 Mod 3	Solid Nose	160489
Mk 2 Mod 0	Solid Nose	330695
Mk 2 Mod 1	Solid Nose	438555

Table 2-27. 8"/55 Ammunition for Guns Mk 16
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 14	Common	Explosive D	10.910	Mk 21	None	None	NA
Mk 15	Common	Explosive D	11.460	Mk 21-1, 3	None	None	NA
Mk 16	BL&T	None	NA	None	None	None	329405
Mk 16	BL&P	None	NA	None	None	None	329405
Mk 17	Common	Explosive D	10.380	Mk 21-1, 3	None	None	NA
Mk 18	BL&T	None	NA	None	None	None	NA
Mk 18	BL&P	None	NA	None	None	None	NA
Mk 19	AP	Explosive D	3.640	Mk 21-1, 3	None	None	NA
Mk 21	AP	Explosive D	5.120	Mk 21-1, 3	None	None	1380824
Mk 22	BL&T	None	NA	None	None	None	1380822
Mk 22	BL&P	None	NA	None	None	None	1380822
Mk 23	BL&P	None	NA	None	None	None	NA
Mk 24	HC*	Explosive D	21.340	Mk 48	Mk 29-2, 3	Mk 54, Mk 55	1380827
Mk 25	HC*	Explosive D	21.340	Mk 48	Mk 29-2, 3	Mk 54, Mk 55	1380887
Mk 27	BL&T	None	NA	None	None	None	1380823
Mk 27	BL&P	None	NA	None	None	None	1380823

* May be issued with nose plug, drawing 434038

Table 2-28. Propelling Charge Assembly for 8"/55 Ammunition (Case Guns)

Type	Cartridge Case	Propellant Weight (Approx. Pounds)	Primer	Total Propelling Charge Weight (Approx. Pounds)	Drawing Number
Full	Mk 1	78.000	Mk 37	141.000	515260
Reduced	Mk 1	44.500	Mk 38	106.000	515261

Table 2-29. 8"/55 Dummy Ammunition for Guns Mk 16
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 1 Mod 1	Solid Nose	147198
Mk 1 Mod 2	Solid Nose	190546
Mk 1 Mod 3	Solid Nose	160489
Mk 2 Mod 0	Solid Nose	330695
Mk 2 Mod 1	Solid Nose	438555

Table 2-30. 16"/45 Ammunition for Guns Mk 6 and Mk 8
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 8	AP	Explosive D	40.470	Mk 21	None	None	1380850
Mk 9	BL&T	None	NA	None	None	None	1380847
Mk 9	BL&P	None	NA	None	None	None	1380847
Mk 13	HC*	Explosive D	153.580	Mk 48	Mk 29, Mk 62	Mk 55 and Booster Mk 5	1380844
Mk 14	HC*	Explosive D	153.580	Mk 48	Mk 29, Mk 62	Mk 55 and Booster Mk 5	1380844
Mk 18	BL&T	None	NA	None	None	None	1380846
Mk 18	BL&P	None	NA	None	None	None	1380846

* May be issued with nose plug, drawing 434038

Table 2-31. Propelling Charge Assembly for 16"/45 Ammunition

Type	Powder Bag Drawing	Propellant Weight (Approx. Pounds)	Primer	Sections per Charge	Loaded Powder Bag Drawing
Full	72226	540.000	Mk 15	6	119534
Reduced	72226	300.000	Mk 15	6	53417

Table 2-32. 16"/45 Dummy Ammunition for Guns Mk 6 and Mk 8
Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 1 Mod 0	Solid Nose	227459
Mk 2 Mod 0	Solid Nose	267650
Mk 2 Mod 1	Solid Nose	284383

Table 2-33. 16"/50 Ammunition for Guns Mk 7
Projectile Assembly

Projectile Body	Loaded Projectile Type	Loading		Fuze			Drawing Number
		Charge	Weight (Pounds)	Base	Nose	Auxiliary Detonator	
Mk 8	AP	Explosive D	40.470	Mk 21-1, 3	None	None	1380850
Mk 9	BL&T	None	NA	None	None	None	1380847
Mk 9	BL&P	None	NA	None	None	None	1380847
Mk 13	HC*	Explosive D	153.580	Mk 48	Mk 29, Mk 62	Mk 55 and Booster Mk 5	1380844
Mk 14	HC*	Explosive D	153.580	Mk 48	Mk 29, Mk 62	Mk 55 and Booster Mk 5	1380844
Mk 18	BL&T	None	NA	None	None	None	1380846
Mk 18	BL&P	None	NA	None	None	None	1380846
Mk 19	HE-MT	RDX M43A1 Grenades	21.000 400.000	None	M565E1	None	NA

* May be issued with nose plug, drawing 434038

Table 2-34. Propelling Charge Assembly for 16"/50 Ammunition

Type	Powder Bag Drawing	Propellant Weight (Approx. Pounds)	Primer	Sections per Charge	Loaded Powder Bag Drawing
Full	72226	660.000	Mk 15	6	119534
Reduced	72226	350.000	Mk 15	6	53417

Table 2-35. 16"/50 Dummy Ammunition for Guns Mk 7 Projectile Assembly

Dummy Round	Nose Fuze	Drawing Number
Mk 1 Mod 0	Solid Nose	227459
Mk 2 Mod 0	Solid Nose	267650
Mk 2 Mod 1	Solid Nose	284383

2-5 ROCKET ASSISTED PROJECTILE (RAP)
5"/38 MK 57 MODS 0 AND 1

2-6 The 5"/38 RAP, figures 2-1 and 2-2, is an addition to rather than a replacement for existing gun-type ammunition. The primary use for RAP is against enemy shipping at extended ranges. Operational skill and maintenance level required aboard firing ships will be the same as for similar type existing gun systems. RAP will remain in the Fleet indefinitely as an extended range gun-fired projectile. Table 2-36 lists the general data on 5"/38 RAP projectiles.

2-7 DESCRIPTION. Each round consists of a projectile and a gun cartridge (full charge). The projectile consists

of a solid-propellant rocket motor with a delayed igniter, and explosive-filled warhead, and a CVT fuze.

2-8 The 2-inch increased length of the 5"/38 RAP presents an interface problem with gun mount and hoist operations. This problem is covered by modifications described in ORDALT No. 6827 for 5-inch caliber gun mounts and projectile hoists Mk 2 and Mk 4. Special reversible battens are also required in shipboard magazines to accept the 5"/38 RAP.

2-9 This special purpose Navy gun-type ammunition will be used with manual inputs to gun-fire control systems (GFCs) using a 5"/38 ballistic slide rule (refer to OP 3658) covered by

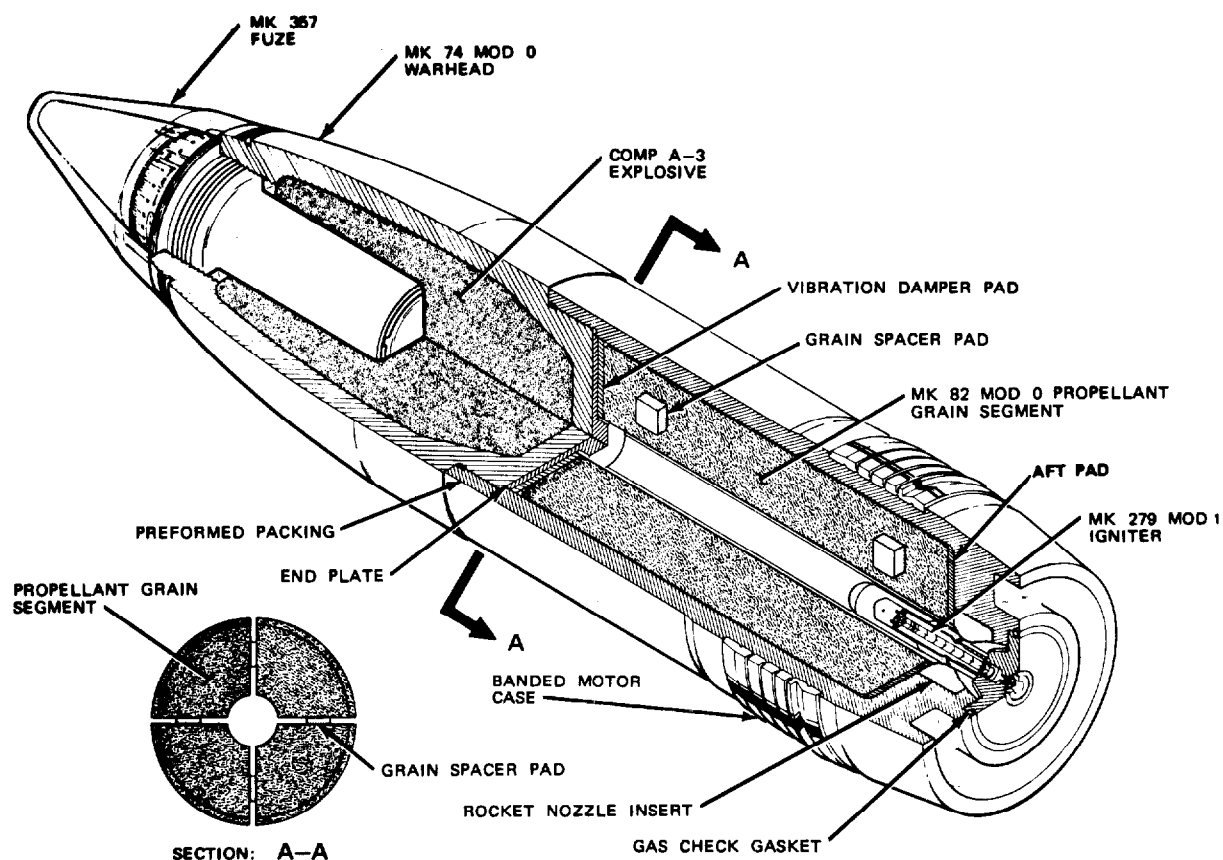


Figure 2-1. 5"/38 Rocket Assisted Projectile (RAP)
Mk 57 Mod 1, Cutaway View

Table 2-36. Rocket Assisted Projectile (RAP)

Caliber Projectile	5"/38 Mk 57 Mod 0	5"/38 Mk 57 Mod 1	5"/54 Mk 58 Mod 0
Type	HE	HE	HE
Fuze	CVT Fuze and Adapter Assembly Mk 357 Mod 0 CVT Fuze Mk 338 Mod 0	CVT Fuze and Adapter Assembly Mk 357 Mod 0 CVT Fuze Mk 338 Mod 0	CVT Fuze and Adapter Assemblies: Mk 360 Mod 0 Mk 361 Mod 0 Mk 362 Mod 0
DL Loaded (Fuzed) Dwg.	2603187 2603187	2605091 2605091	2603945 2603945
Warhead	Mk 74 Mod 0	Mk 74 Mod 0	Mk 78 Mod 0
Rocket Motor	Mk 62 Mod 0	Mk 62 Mod 1	Mk 64 Mod 0
Rocket Motor Burn Time	2 secs	2 secs	2 secs
Propellant Grain Igniter	Mk 82 Mod 0 Mk 279 Mod 0	Mk 82 Mod 0 Mk 279 Mod 1	Mk 83 Mod 0 Mk 279 Mod 1
Cartridge Case	Same as for regular 5"/38 projectiles (full charge)	Same as for regular 5"/38 projectiles (full charge)	Same as for regular 5-inch projectiles (full charge). To insure ignition reliability, the 5"/54 RAP must be fired with cartridge having a 1-inch diameter by 2-5/8-inch deep hole centered in the front face of the plug. Cartridges equipped with either cork or plastic plugs with holes will normally be supplied by a depot.

ORDALT No. 6970 in initial firing ships. ORDALT 6971 covers 5"/38 automatic inputs to GFCS in the final installations. Range tables currently available for use with RAP are listed in paragraph 1-59 of this publication.

2-10 MINIMUM RANGE. The minimum range for 5"/38 RAP is 15,000 yards if a proximity fuze function is desired or automatic GFCS direction is required. To prevent early initiation of proximity fuzes by rocket exhaust emission, the fuze is set to begin to transmit 5 seconds after rocket burnout. For PD fuze action, the minimum range is restricted only by minimum safe separation; however, GFCS control is limited.

2-11 SAFETY AND TRAINING. RAP presents no additional hazards or safety problems to the Fleet. Safety requirements for existing projectiles with explosive warheads will apply to the RAP round. RAP incorporates, to the maximum extent

possible, immunity to accidental detonation of fuze or igniter components by high-energy radiation or shipboard electromagnetic fields. Operational safety precautions will be exercised with RAP fuze components as are presently required with similar components now in the Fleet.

CAUTION

Extreme caution must be used in firing operations. Insure the correct identification of RAP projectiles in view of the similarity of projectile appearance and the dissimilarity of impact points of RAP compared to standard projectiles.

2-12 CVT FUZES FOR 5"/38 RAP. For a detailed discussion of CVT fuzes refer to Chapter 3 and Appendix C of this publication.

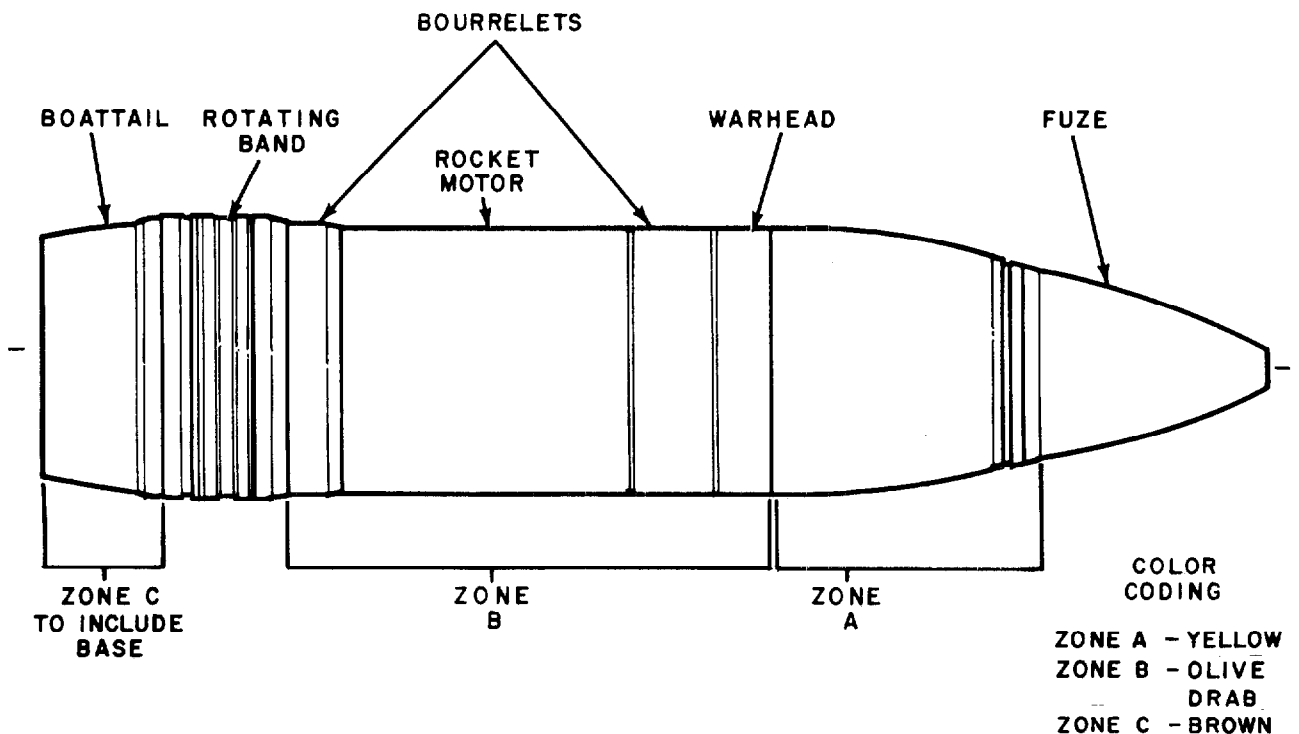


Figure 2-2. 5"/38 RAP Mk 57 Mod 1, External View

WARNING

Before firing CVT-fuzed projectiles over friendly forces, check the time setting on the fuzes. The estimated time-to-target must be accurately determined and the fuze set to this time to prevent possible VT airbursts from occurring above the deployed friendly forces.

CAUTION

CVT fuzes must be set to 35 seconds or more when used in 5-inch Rocket Assisted Projectiles. If fired at settings less than 35 seconds, the fuzes may function early as a result of rocket motor effects on the fuze.

2-13 CVT Fuze and Adapter Assembly Mk 357 Mod 0 is the U. S. Army model M514A1 Proximity Fuze adapted to U. S. Navy projectiles, including 5"/38 standard and RAP. An adapter assembly is required for making the M514A1 fuze compatible with Navy projectiles; when this fuze is used in the adapter, it is designated "Fuze and Adapter Assembly." Mk 357 Mod 0 Fuze and Adapter Assemblies as shipped from the depot are preset, installed in projectiles, and are normally fired at the depot setting. However, if tactical operations should require other settings, such as when firing over friendly forces or when encountering electronic jamming, these fuzes may be reset aboard ship as required. Since Mk 357 fuze and adapter assemblies are not compatible with Navy automatic fuze setters, they must be reset using hand tools.

WARNING

Do not use the PD setting on Mk 357 fuze and adapter assemblies. An inaccurate PD setting will not guarantee that the proximity circuits will remain

inactive (unarmed) after the round is fired. For PD functioning only, set the fuze to 95 seconds to achieve positive PD action. At this setting of 95 seconds, the proximity circuits will not become armed for at least 92 seconds and the round will be safe for firing over friendly troops for this time.

2-14 CVT Fuze Mk 338 Mod 0. Fuze Mk 338 Mod 0 is the first U. S. Navy CVT fuse designed specifically for shore bombardment use against personnel and light materiel targets. Unlike the adapted M514A1 Army proximity fuze, the Mk 338 Mod 0 CVT fuze is compatible with Navy automatic fuze setters and can be set automatically as required for various tactical operations. This fuze, as shipped from the depot, is installed in projectiles set in the PD setting (and shipping) zone.

CAUTION

If fired at settings less than 35 seconds in RAP, the fuze may function early as a result of rocket motor effects on the fuze.

2-15 IGNITER MK 279. A gun gas-triggered, percussion-actuated delay igniter sealed into the motor case base with a gas check gasket is blown out upon motor ignition. Gun gas pressure flexes a belleville spring which strikes a percussion primer assembly, initiating the pyrotechnic delay column. After a 23-second delay, the delay column burns the ignition charge which ignites the propellant grain in Rocket Motor Mk 62. Figure 2-3 shows the details of Igniter Mk 279 Mod 1 used in the 5"/38 RAP Mk 57 Mod 1. This igniter replaces the Mk 279 Mod 0 in all RAP rounds produced after July 1969. The Mod 1 incorporates a more sensitive primer for reliability, and structural changes in the spring/

retainer area which provide a greater safety factor in event of accidental drop.

2-16 STORING AND HANDLING. All safety precautions normally observed in storing and handling gun-type ammunition shall be observed.

WARNING

During handling of RAP, a drop in excess of 24 inches on the base of the projectile in which a deck pin, (rivethead) bolt, or miscellaneous object strikes the center hole of the igniter, sufficient striking energy could be provided to actuate the igniter. In this event, ignition of the rocket motor may be delayed 20 to 30 seconds. All personnel should immediately evacuate the area. Do not attempt disposal prior to rocket motor ignition. If rocket motor burns in a closed compartment, insure that the area is clear of fumes

prior to re-entry. Dispose of the projectile in accordance with standard EOD practice.

2-17 Handling. Handle projectiles carefully at all times. Avoid jarring or dropping components. Any ammunition components dropped more than 24 inches should be considered defective and turned over to authorized ordnance disposal personnel for disposition. Components dropped less than 24 inches should be examined carefully for external damage. If no damage is evident, the ammunition components may be considered safe for use and operable.

2-18 Temperature Limits. RAP is subject to the same operational temperature limits as are standard projectiles.

2-19 Storage. Storage conditions and ammunition magazines for RAP shall meet the same requirements applicable to standard projectiles. RAP may be stored with standard projectiles in the same hazard classification.

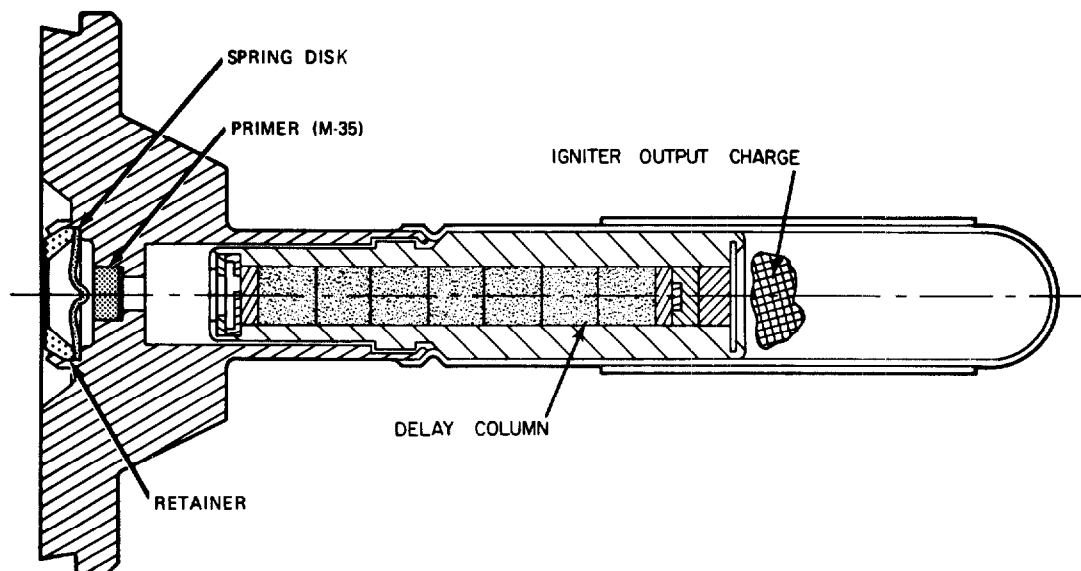


Figure 2-3. Igniter Mk 279 Mod 1, Cutaway View

2-20 SAFETY PRECAUTIONS. Safety precautions for RAP fuzes are covered by safety requirements for fuzes used with standard projectiles. Do not tamper with or attempt to repair any part of the round. If the projectile is damaged or determined to be defective, mark the defective part for return to an issuing activity, or dispose of the part as a hazardous item according to current directives for explosive ordnance materials.

2-21 5"/54 PROJECTILE (RAP) MK 58 MOD 0

2-22 DESCRIPTION. The configuration and components of the 5"/54 Mk 58 Mod 0 RAP round are shown in figure 2-4 and table 2-36. The description of the 5"/38 RAP round given in paragraph 2-7 and the color coding shown in figure 2-2 also apply to the 5"/54 RAP round. No increase in length over that of the conventional 5"/54 projectile was necessary in the design of the RAP, therefore, no modifications to gun mounts, projectile hoists, or battens in shipboard magazines are required. This special purpose Navy gun-type ammunition will be used with manual gun-fire control systems (GFCS) and a 5"/54 ballistic slide rule (refer to OD 41896) in initial firing ships. The automatic GFCS ORDALTS and 5"/54 range tables are listed in paragraph 1-59 of this publication.

2-23 MINIMUM RANGE. The minimum range for 5"/54 RAP is 20,000 yards if a proximity fuze function is desired or automatic GFCS direction is required. To prevent early initiation of proximity fuzes by rocket exhaust emission, the fuze is set to begin to transmit 5 seconds after rocket burnout. For PD fuze action, the minimum range is restricted only by minimum safe operation; however, GFCS control is limited.

2-24 SAFETY AND TRAINING. Refer to paragraph 2-11.

2-25 CVT FUZE FOR 5"/54 RAP. For a detailed discussion of CVT fuzes

refer to Chapter 3 and Appendix C of this publication.

WARNING

Before firing CVT-fuzed projectiles over friendly forces, check the time setting on these fuzes. The estimated time-to-target must be accurately determined and the fuze set to this time to prevent possible VT airburst from occurring above the deployed friendly forces.

CAUTION

CVT fuzes must be set to 35 seconds or more when used in 5-inch Rocket Assisted Projectiles. If fired at settings less than 35 seconds, the fuzes may function early as a result of rocket motor effects on the fuze.

CVT Fuze and Adapter Assembly Mk 360 Mod 0 is the U. S. Army model M514A1 proximity fuze adapted to U. S. Navy 5"/54 standard projectiles and 5"/54 RAP. An adapter assembly is required for making the M514A1 fuze compatible with Navy projectiles. When this fuze is used in the adapter, it is designated "Fuze and Adapter Assembly." When used in 5"/54 projectiles, the fuze and adapter assembly ogive complete the ballistic shape of the projectile without the use of a plastic windshield. Fuze and Adapter Assemblies Mk 360 Mod 0 as shipped from the depot are preset, installed in projectiles, and are normally fired at the depot setting. However, if tactical operations should require other settings, such as when firing over friendly forces or when encountering electronic jamming, these fuzes may be reset aboard ship as required. Since Mk 360 fuze and adapter assemblies are not compatible with Navy

automatic fuze setters, they must be reset using hand tools.

WARNING

Do not use the PD setting on Mk 360 fuze and adapter assemblies. An inaccurate PD setting will not guarantee that the proximity circuits will remain inactive (unarmed) after the round is fired. For PD functioning only, set the fuze to 95 seconds to achieve positive PD action. At this setting of 95 seconds, the proximity circuits will become armed for at least 92 seconds and the round will be safe for firing over friendly troops for this time period. However, at long

range, the flight time of the 5"/54 RAP is greater than 95 seconds.

2-26 IGNITER MK 279 MOD 1. A gun gas-triggered, percussion-actuated delay igniter sealed into the motor case base with a gas check gasket is blown out upon motor ignition. Gun gas pressure flexes a belleville spring which strikes a percussion primer assembly, initiating the pyrotechnic delay column. After a 23-second delay, the delay column burns the ignition charge which ignites the propellant grain in Rocket Motor Mk 64 Mod 0. Figure 2-3 shows the details of the Mk 279 Mod 1 Igniter.

2-27 STORING AND HANDLING. Refer to paragraph 2-16 for storage and handling data on the RAP rounds.

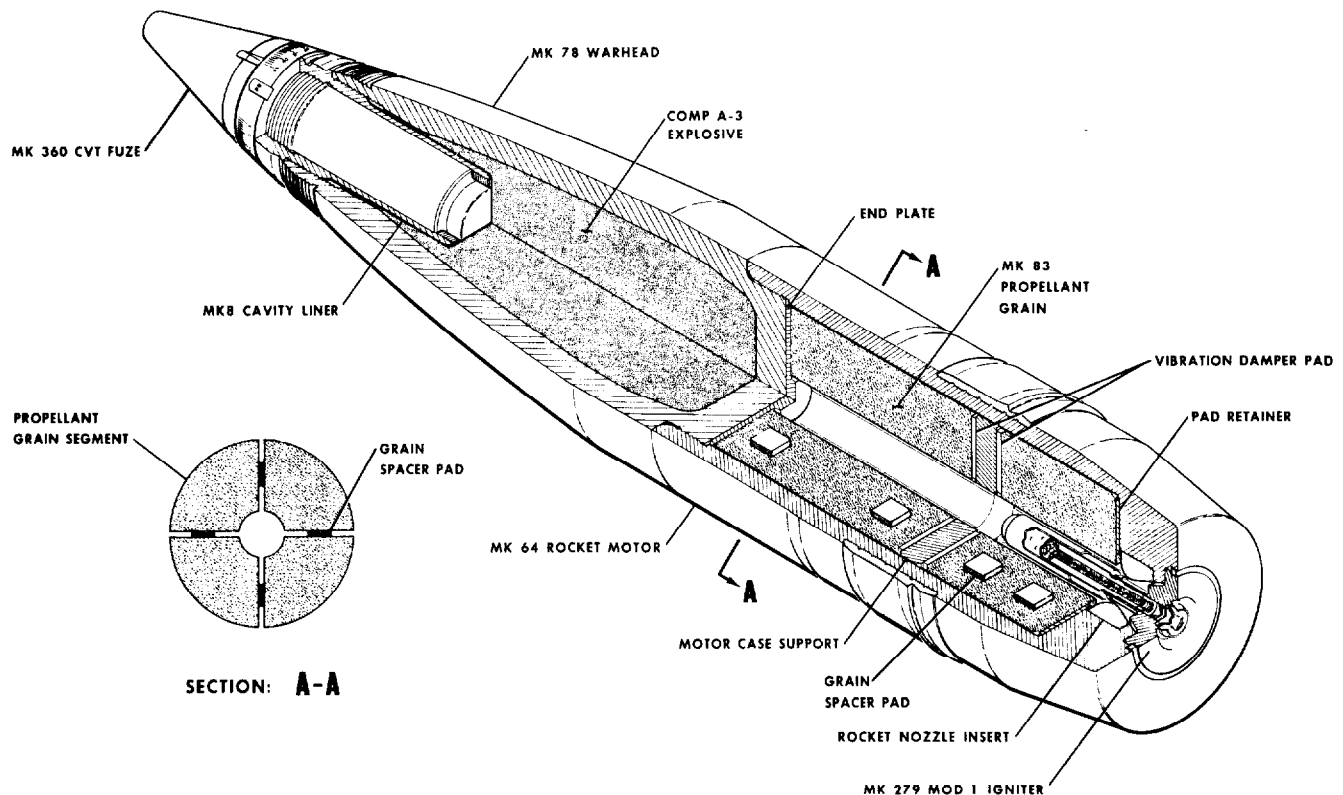


Figure 2-4. 5"/54 RAP Mk 58 Mod 0, Cutaway View

CHAPTER 3

FUZES

3-1 ORGANIZATION OF DATA

3-2 Fuzes listed in tables 3-1 through 3-8 are devices with explosive components designed to initiate a train of fire or detonation of the main explosive charge of the projectile. Boosters are listed in table 3-9. Fuzes for projectiles are identified according to their location in the projectile, as nose or base fuzes. They are also separated into five types, according to the manner in which they function:

- a. Mechanical Time Fuzes (MTF)
- b. Point Detonating Fuzes (PDF)
- c. Base Detonating Fuzes (BDF)
- d. Auxiliary Detonating Fuzes (ADF)
- e. Proximity Fuzes (VT)

Each of these types are listed in this publication by Mk and Mod number. In some instances, the List of Drawings (LD) number given may be a Parts List (PL) or Data List (DL) number. The drawing number given is either a General Arrangement Drawing (in the case of older drawing numbers) or an Assembly Drawing (for the newer drawings).

3-3 FURTHER REFERENCES

3-4 For additional information on the description, operation, and safety features of the fuzes, refer to Appendix C.

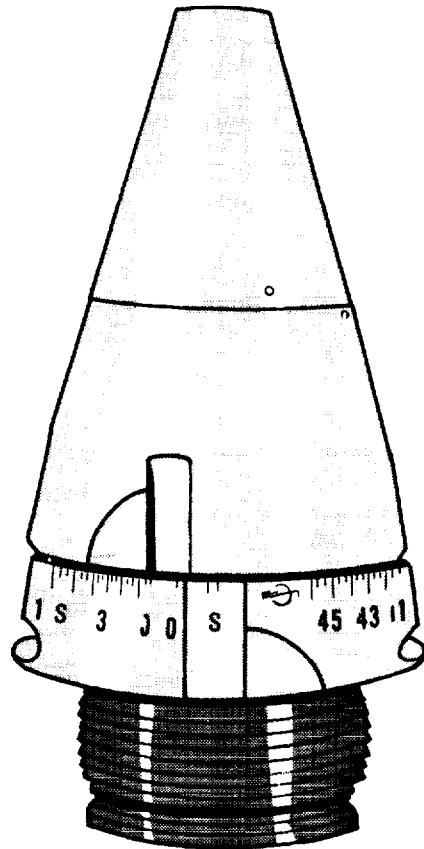


Figure 3-1. Mechanical Time Fuze Mk 25 Mod 5, External View

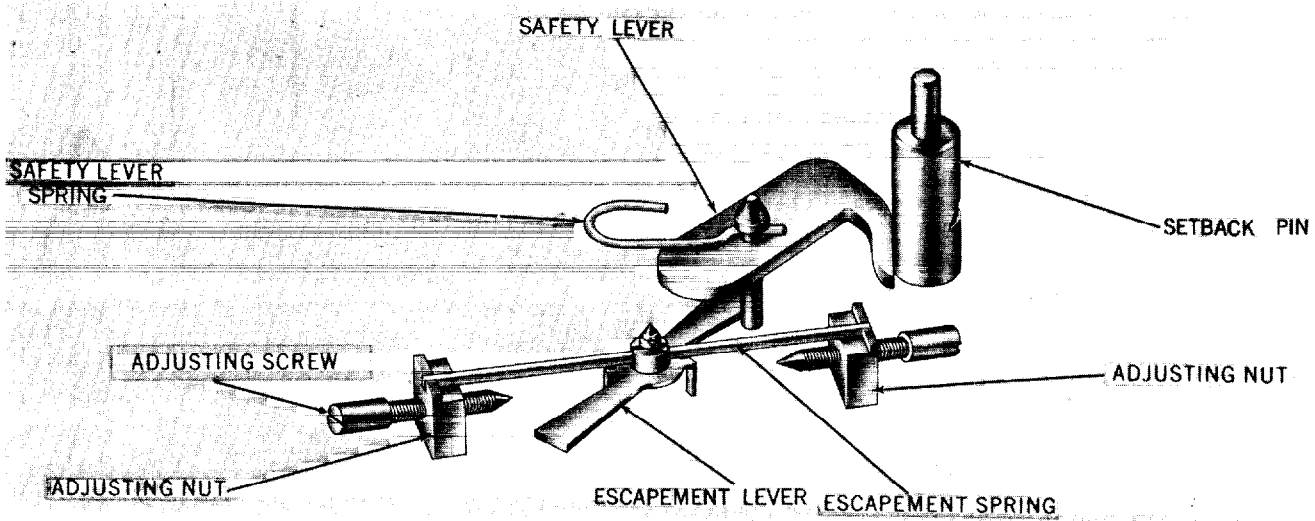


Figure 3-2. Slider-Type Escapement Release of Mechanical Time Fuze Mk 25 Mod 5

Table 3-1. Mechanical Time Fuzes

	MK 25 MOD 4	MK 25 MOD 5
Used in Projectile	5"/54 AAC, ILLUM, WP; and 6"/47 AAC & ILLUM	
LD	272858	293347
Drawing	863155	1378972
Thread Size (in.)	1.700-14NS-1	1.700-14NS-1
Intrusion Depth (in.)	0.805	0.805
Overall Length (in.)	4.585	4.581
Weight (lb.)	1.450	1.450
Time Delay (sec. max.)	45	45
Explosive Components: Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass	Either F.A. 70 Primer Mix or .44 grain of No. 529 Winchester Primer Mix
Booster	Black Powder	Black Powder

3-5 MECHANICAL TIME FUZES (MTF)

3-6 MK 25 MTF. Both mods of the Mk 25 are obsolescent and will be superseded by Mk 342 Mod 0.

a. Mod 4 is similar to the typical MTF described in Appendix C except that luting compound or varnish is used for moisture-proofing instead of a gasket under the upper cap; its external shape is different, and slots instead of lugs are used for setting; the rotation of the clockwork is the reverse of that illustrated in Appendix C; and a safety lever detent retained by a flat spring is used instead of a safety lever plate as the escapement release.

b. Mod 5, figures 3-1 and 3-2, is

similar to the Mod 4 except that its firing arm is especially hardened; a setback pin is retained by the firing plate safety pin only; a premature trap has been incorporated in the timing disk; and a slider-type escapement release replaces the Mod 4-type safety lever detent assembly. When the setback pin is moved aft on acceleration of the projectile, the safety lever, figure 3-2, may then move outboard under the impetus of centrifugal force. The safety lever spring holds the safety lever inboard until centrifugal force overcomes the spring. When the safety lever moves outboard, the pin on the after side of the safety lever moves clear of the escapement lever. The escapement lever is then free to start its oscillation.

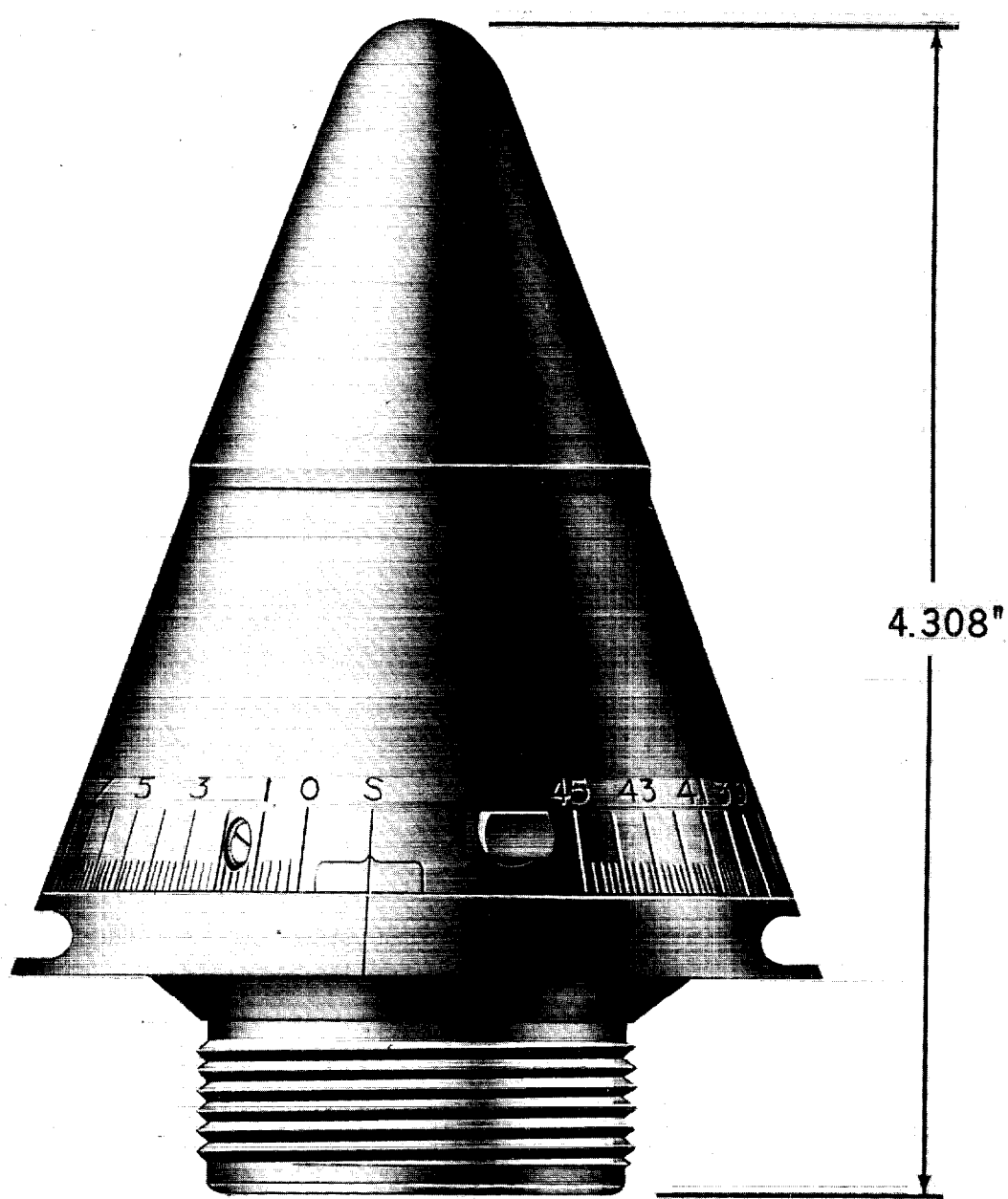


Figure 3-3. Mechanical Time Fuze Mk 50 Mod 8, External View

3-7 MK 50 MTF. This fuze should not be used in conjunction with the 5"/38 reduced charge since the setback force produced is not always sufficient for arming. All mods will be superseded by Mk 349 Mod 0.

a. Mod 0 is similar to the typical MTF described in Appendix C except that a safety lever plate is used instead of a safety lever detent as the escapement release; a setback pin is used instead of a firing pin safety block as a release for the firing pin; and its tensioning wire is separated. The lowest setting for the Mod 0 is 2.8 seconds.

b. Mod 1 is similar to the Mod 0 except that the tensioning wire is not serrated and some of its parts are interchangeable. Mod 2 is similar to the Mod 0 except that one plate and three spacers are combined in one brass forging. The lowest time setting for the Mod 2 is 0.6 second. Mods 3 and 4 are similar to Mod 2 except for the single-setting feature.

c. Mod 5 is the designation for a number of reworked modified Mk 18 time fuzes Mods 2, 3, and 4. The moistureproofing was accomplished as follows:

1. A desiccant unit, consisting of silica gel in a porous container, was inserted in the base cavity of the fuze body. The silica gel absorbs and retains moisture in the air entrapped in the fuze at assembly, thus preventing the rusting of steel parts or deterioration of explosive components.

2. Special gaskets were inserted between the upper and lower caps and between the lower cap and the body to prevent the entrance of moisture.

3. The brass disk at the center of the bottom closing screw was crimped-in under a washer and coated with varnish.

4. All screw heads visible on the exterior of the fuze body were coated with a glyptal lacquer.

5. The hole for locating the tensioning wire was drilled blind from the inside of the lower cap.

d. Mod 7 was redesigned throughout. It is similar to the typical MTF described in Appendix C except for a spring on the firing-arm shaft which facilitates assembly, and a zero adjustment in the timing disk. The Mod 7 has a 20-tooth escapement gear, firing pin safety block, and safety lever detent.

e. Mod 8, figure 3-3, is similar to Mod 7 except that the firing arm is hardened and a slider-type release, figure 3-4, replaces the safety lever on the escapement lever. The slider-type release operates in the following manner. When the setback pin is moved aft on acceleration of the projectile, the safety lever may then move outboard under the impetus of centrifugal force. The safety lever spring holds the safety lever inboard until centrifugal force overcomes the spring. When the safety lever moves outboard, the pin on the underside of the safety lever moves clear of the escapement lever. The escapement lever is then free to start its oscillation.

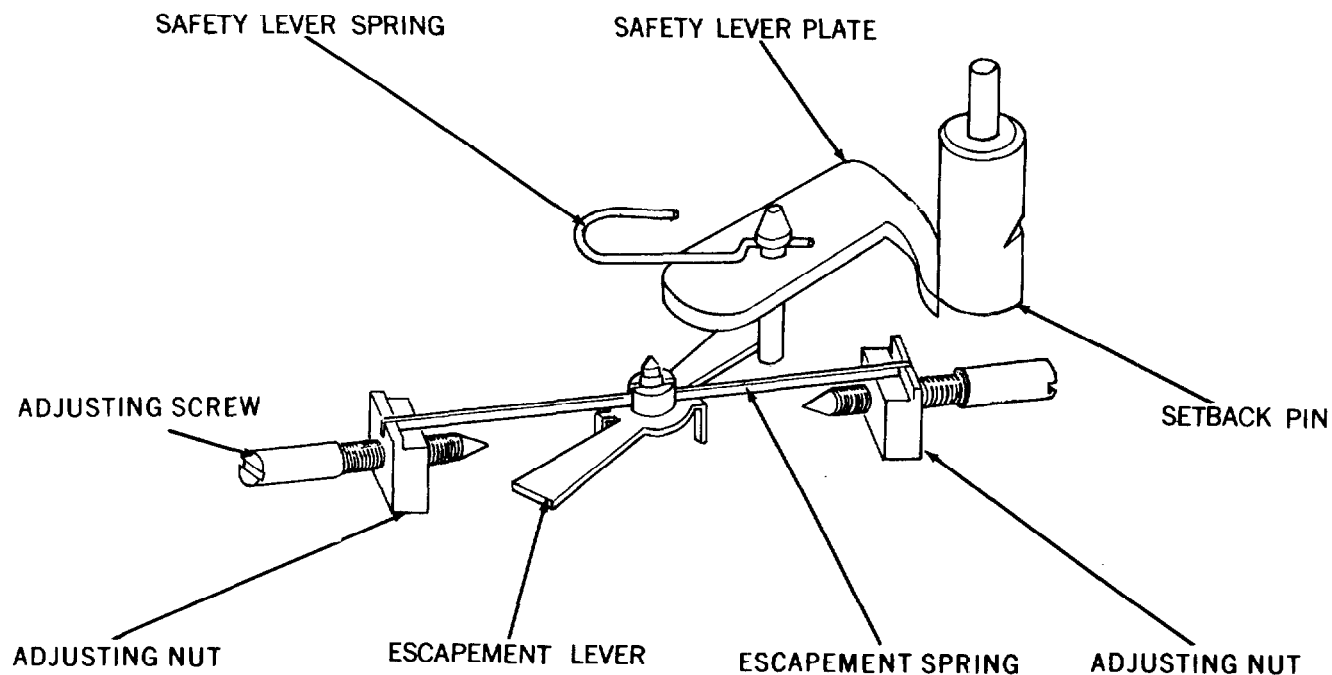
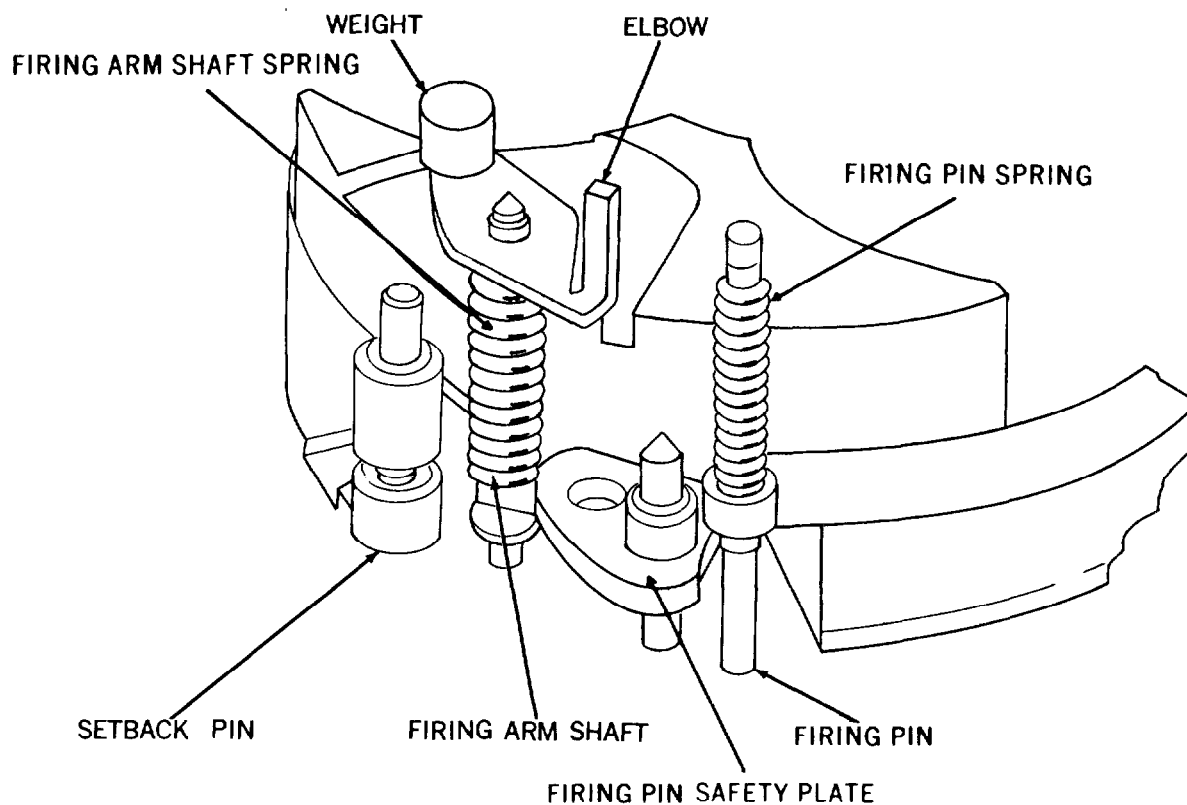


Figure 3-4. Details of Mechanical Time Fuze Mk 50 Mod 8: Firing Pin Assembly (top) and Slider-Type Escapement Release (bottom)

Table 3-1. Mechanical Time Fuzes (Continued)

	MK 50 MOD 0	MK 50 MOD 1	MK 50 MOD 2	MK 50 MOD 3
Used in Projectiles	5"/38 AAC, HE-MT, ILLUM, W, & WP; & 6"/47 ILLUM			
LD	284626	165357	165358	NA
Drawing	NA	561740	561716	581879
Thread Size (in.)	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1
Intrusion Depth (in.)	0.803	0.803	0.803	0.803
Overall Length (in.)	4.308	4.308	4.308	4.308
Weight (lb.)	2.280	2.280	2.280	2.280
Time Delay (sec. max.)	45	45	45	45
Explosive Components: Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass			
Booster	Black Powder	Black Powder	Black Powder	Black Powder
	MK 50 MOD 4	MK 50 MOD 5	MK 50 MOD 7	MK 50 MOD 8
Used in Projectiles	5"/38 AAC, HE-MT, ILLUM, W, & WP; & 6"/47 ILLUM			
LD	165359	299218	291701	295860
Drawing	561990	561715	1370527 <u>u</u>	1378979 <u>u</u>
Thread Size (in.)	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1
Intrusion Depth (in.)	0.803	0.803	0.803	0.803
Overall Length (in.)	4.308	4.308	4.308	4.308
Weight (lb.)	2.280	2.280	2.280	2.300
Time Delay (sec. max.)	45	45	45	45
Explosive Components: Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass			
Booster	Black Powder	Black Powder	Black Powder	Black Powder

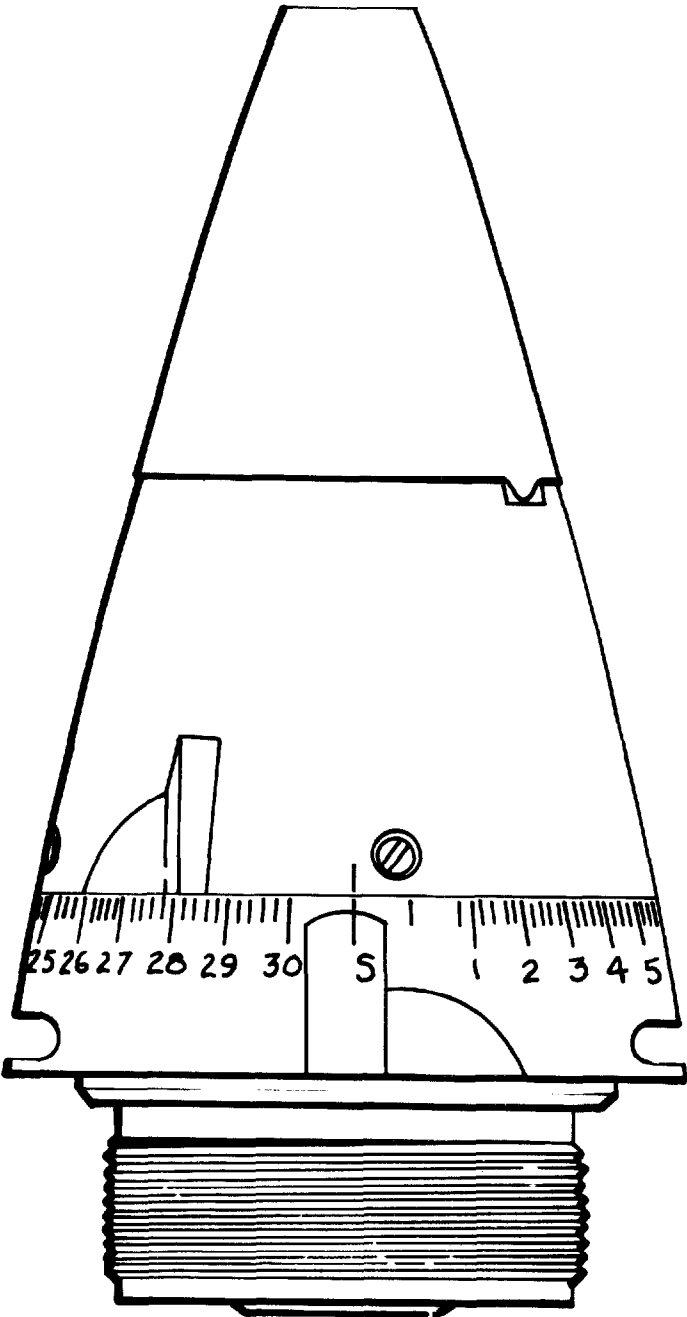


Figure 3-5. Mechanical Time Fuze Mk 51 Mod 2, External View

Table 3-1. Mechanical Time Fuzes (Continued)

	MK 51 MOD 0	MK 51 MOD 1	MK 51 MOD 2	MK 51 MOD 4	MK 51 MOD 5
Used in Projectiles	3"/50 AA & ILLUM	3"/50 AA & ILLUM	3"/50 AA & ILLUM	3"/50 AA & ILLUM	3"/50 AA & ILLUM
ID Drawing	SK 109439 561806	SK 165356 561819	SK 109512 561992	SK 109512 561992	299218 1475145
Thread Size (in.)			1.700-14NS-1		
Intrusion Depth (in.)	0.810	0.803	0.803	0.803	0.803
Overall Length (in.)	4.550	4.543	4.543	4.543	4.545
Weight (lb.)	1.320	1.320	1.320	1.320	1.320
Time Delay (sec. max.)	30	30	30	30	30
Explosive Components: Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass				
Booster	Black Powder	Black Powder	Black Powder	Black Powder	Black Powder

3-8 MK 51 MTF. Mk 51 fuzes, figures 3-5 and 3-6, are a waterproofed design based on Mk 22 fuzes. They are similar to the typical MTF described in Appendix C. Mk 51 fuzes are unique among Navy MTFs in that the lower cap and body are designed for low-to-high settings instead of high-to-low settings.

a. Mods 0 through 4 are obsolescent. They are practically identical to one another, and the assignment of different mod designations reflects the different manufacturers assigned to their production or reworking. Mods 0, 1, and 2 were waterproofed at the time of manufacture; Mods 3 and 4 were Mk 22 fuzes called in from depots and reworked to make them waterproof. To insure watertightness, the following features are embodied in Mods 0 through 4.

1. An internal desiccator unit of silica gel is placed in the base

cavity of the fuze body. This unit absorbs and retains all moisture in the air entrapped in the fuze at assembly or reassembly.

2. Gaskets are used between the upper cap and the lower cap, and between the lower cap and the body.

3. A coating of waterproofing varnish is applied externally over the gasketed joint between the upper and lower caps.

4. The primer screw assembly is moistureproofed by a vinylite disk inserted under the black powder relay pellet, and by the coat of waterproofing varnish over both ends of the primer screw assembly.

5. The joint between the body and the bottom closing screw is packed with thread luting compound.

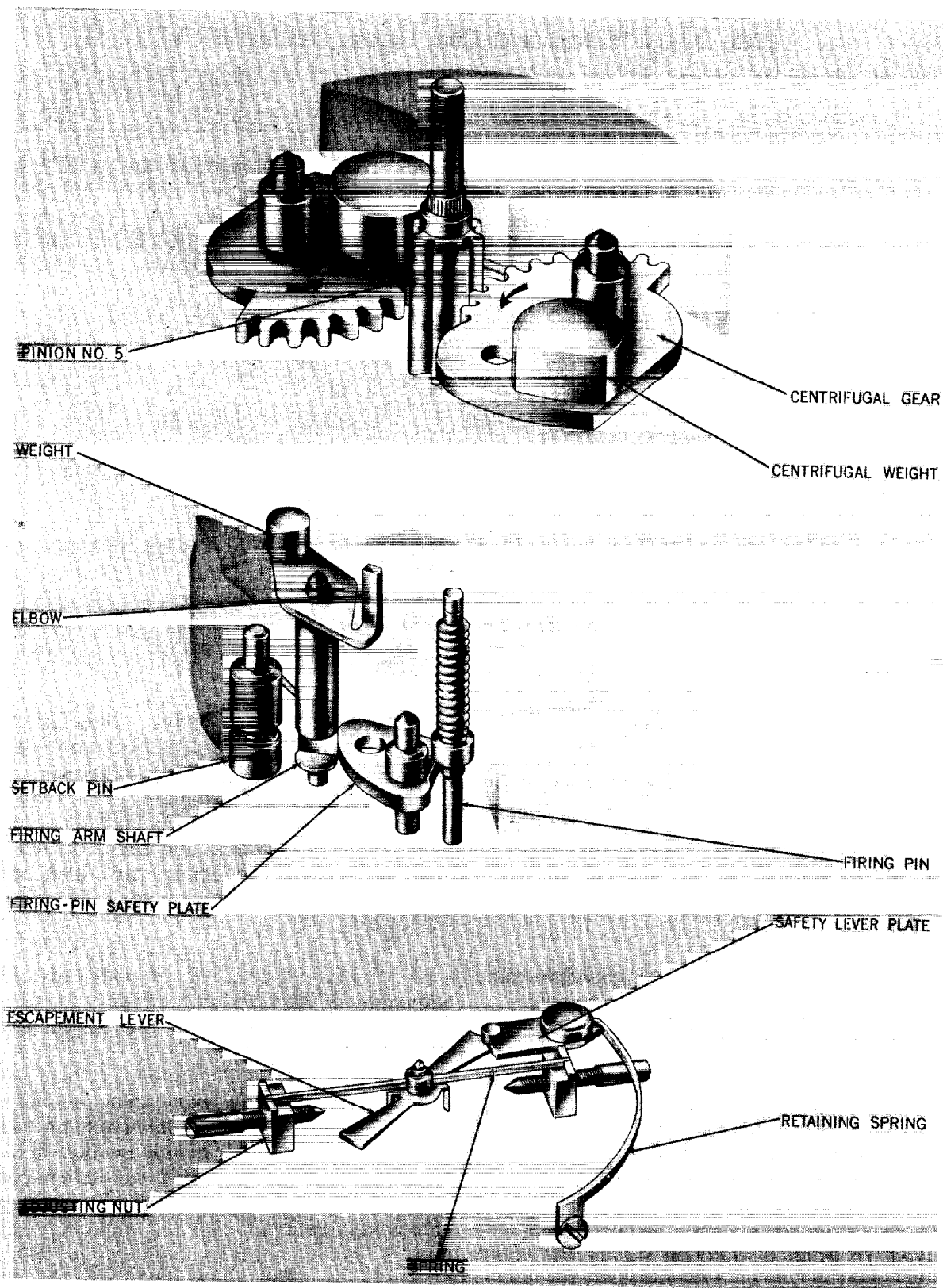


Figure 3-6. Details of Mechanical Time Fuze Mk 51 Mod 2: Centrifugal Gears (top); Setback Pin (center); and Safety Lever Plate (bottom)

6. The brass disk at the center of the bottom closing screw is crimped under a washer, and coated with waterproofing varnish.

7. A coat of gylptal lacquer is applied to all screw heads on the outside of the fuze body.

8. The hole for securing the tensioning wire is blind-drilled from the inside of the lower cap.

b. Mod 5 embodies several design improvements. Waterproofing is accomplished in the same manner as in the case of Mods 0 through 4 except:

1. There is a plastic gasket between the lower cap and the body only.

2. Thread luting compound has been used to pack the joints between the upper and lower caps and between the body and the bottom closing screw.

3. Waterproofing varnish has been applied over the joints between the upper and lower caps and between the body and the bottom closing screw.

c. In addition to being waterproofed, the Mk 51 Mod 5 MTF embodies the following refinements of design which either improve its operation or assure a greater degree of safety in handling.

1. Mod 5 has smaller weights on the centrifugal gears than the Mk 22.

2. The firing arm was hardened to increase reliability.

3. A zero adjustor plate with a zero adjusting screw, permanently set at the time of manufacture, was added to the timing disk to afford greater precision of time setting. The zero adjustor plate also embodies a premature trap, a small notch within the slot of the plate. Malfunction of the escapement assembly or of the gear-and-pinion train might result in wild rotation of the timing disk. In such a case, this trap prevents the firing arm from completely engaging the timing disk and zero adjustor plate slots. This results in a dud instead of an early detonation.

4. The safety lever assembly of the escapement lever was shifted to the opposite end of the escapement lever, and redesigned. The safety lever assembly in the Mod 5 is normally held in the block position and then released at the proper instant by the setback pin instead of by safety lever spring. This arrangement is an improvement over the earlier spring-loaded safety lever in that it provides greater certainty of keeping the escapement lever blocked during rough handling of the fuze.

5. The design of the tensioning wire was modified so that both ends are now bent at an angle of about 90° and fitted into the hole drilled from the inside of the lower cap.

d. All mods of the Mk 51 function as follows for various settings. Settings 1 and 2 are not recommended; resultant actions are variable because of manufacturing tolerances.

SETTING (Sec.)	ACTION
1. Safety zone to and including 0.4	Dud caused by built-in feature May be a dud or may function at between 0.6 and 0.8 seconds Functions at between 0.6 and 0.8 sec. Functions at time set plus or minus allowable calibration error
2. 0.4 to 0.6	
3. 0.6 to 0.8	
4. 0.8 to 30	

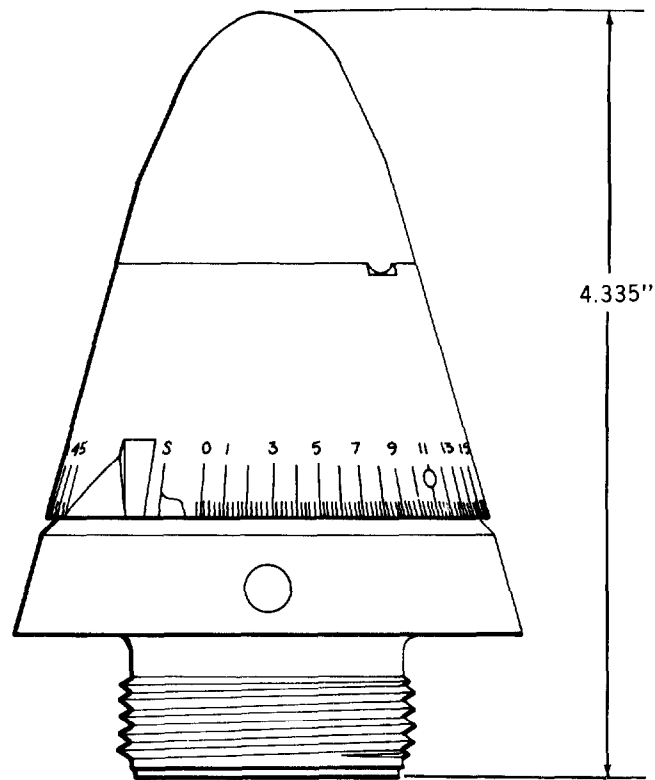


Figure 3-7. Mechanical Time Fuze Mk 57 Mod 2, External View

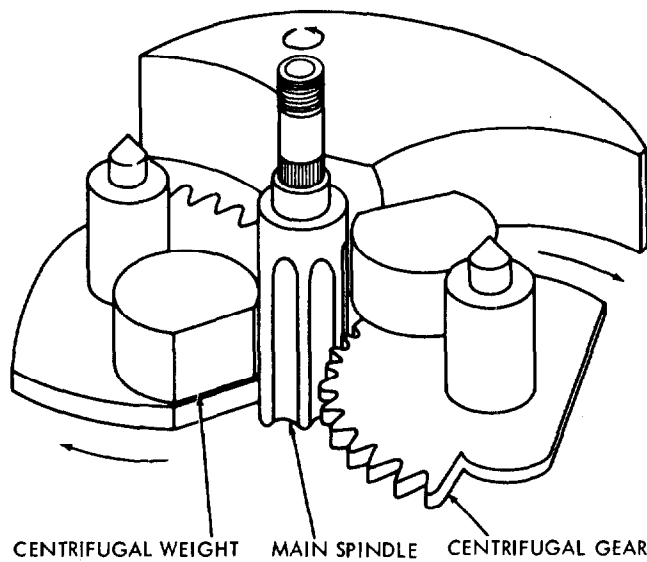


Figure 3-8. Mechanical Time Fuze Mk 57 Mod 2, Centrifugal Gear Assembly

Table 3-1. Mechanical Time Fuzes (Continued)

	MK 57 MOD 2
Used in Projectiles	8"/55 AAC
ID	272859
Drawing	863160
Thread Size (in.)	1.700-14NS-1
Intrusion Depth (in.)	0.805
Overall Length (in.)	4.335
Weight (lb.)	1.920
Time Delay (sec. max.)	45
Explosive Components:	
Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass
Booster	Black Powder

3-9 MK 57 MTF. The Mk 57, figures 3-7 and 3-8, is similar to the typical MTF described in Appendix C. Mod 2 differs from the typical MTF in that it has a different external shape, with slots instead of lugs for setting; its

clockwork turns in a direction opposite to that of the typical fuze; and it employs the firing pin safety block instead of a setback pin. Its escape-ment gear has 20 teeth.

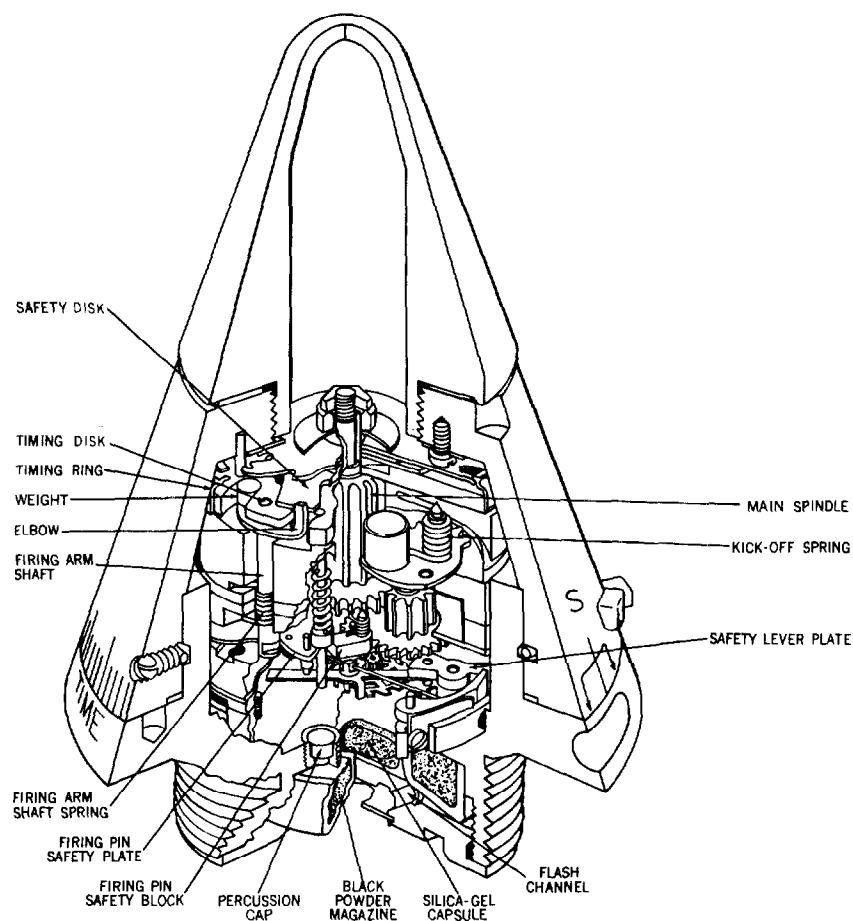


Figure 3-9. Mechanical Time Fuze Mk 61 Mod 1, Cutaway View

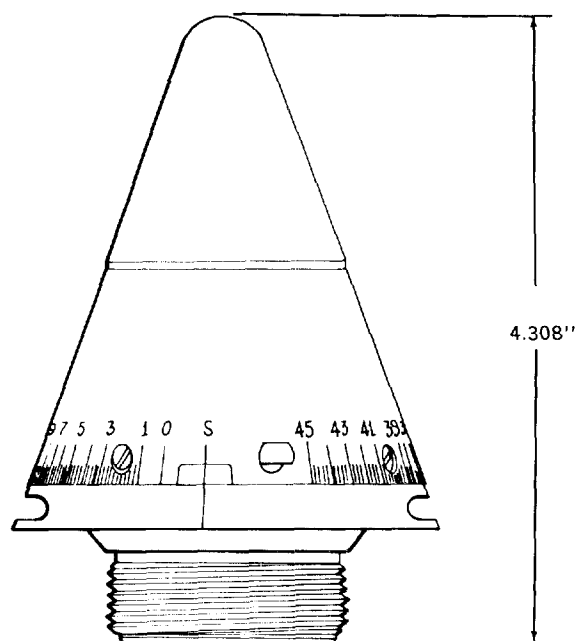


Figure 3-10. Mechanical Time Fuze Mk 62 Mod 1, External View

3-10 MK 61 MTF. Mod 0 is identical to the typical MTF described in Appendix C. Mk 61 Mod 1, figure 3-9, is similar to the Mod 0 except for the use of heavier driving weights, a weighted escapement lever, and a 20- instead of 30-tooth splined escapement gear and splined pinion.

3-11 MK 62 MTF. Mk 62 fuzes are produced for assembly in major caliber projectiles having relatively slower rates of spin. They closely resemble the typical MTF described in Appendix C. The chief structural difference is a post under the hammer spring which prevents the hammers from moving aft until after the fuze is set. The post is part of the left spacer; it is turned free when the lower cap is rotated to the time setting. This feature prevents arming of the fuze in case it is dropped.

a. Mod 0 is almost identical to the Mk 61 MTF but is slightly modified to allow its use in the major caliber projectiles, where extremely low setback force on firing is encountered. Mk 62-0 differs from the Mk 61 in the following ways:

1. To prevent arming on accidental dropping of the fuze, a safety post has been placed under the hammer spring in the Mk 62.

2. The "kick-off" springs on the centrifugal weight are weaker. This design provides torque over a longer period and is necessitated by the lower spin rate of major caliber projectiles.

3. The escapement lever has been modified by the addition of small weights to enable a more efficient slowing down of the gear system.

4. In addition to having the weakened hammer spring, the lugs in

the timing disk have been weakened. This enables a weaker force of setback to act upon the hammer spring and forked lug assembly of the fuze.

b. Mod 1, figures 3-10 and 3-11, differs from Mod 0 in the following respects:

1. The firing-arm shaft has been hardened to afford greater certainty that the firing pin safety plate shall not accidentally slip past the groove in the firing arm and produce an early detonation.

2. A setback pin has been added as a safety feature. As the projectile is fired, this pin is moved aft by inertia acting against a restraining spring, unlocking the firing-arm shaft and the safety lever assembly.

3. A premature trap has been introduced as a further means of preventing an early detonation. This consists of a small notch in the slot of the zero adjuster plate. Should the clock mechanism and timing disk for any reason spin in uncontrolled fashion, this trap would catch the firing arm and prevent it from completely engaging the slot before the set time. This would result in a dud.

4. The escapement release system has been modified by the elimination of the safety lever plate, detent, and spring used on the earlier mod; and the substitution of a safety lever assembly locking in the unarmed condition by the setback pin. At the proper moment, the setback pin unlocks this assembly, allowing it to be moved outward by centrifugal force and to release the escapement lever. This in turn frees the clock movement to operate. In addition various design changes, such as elimination of the weights on the lever, have been made on the escapement assembly itself.

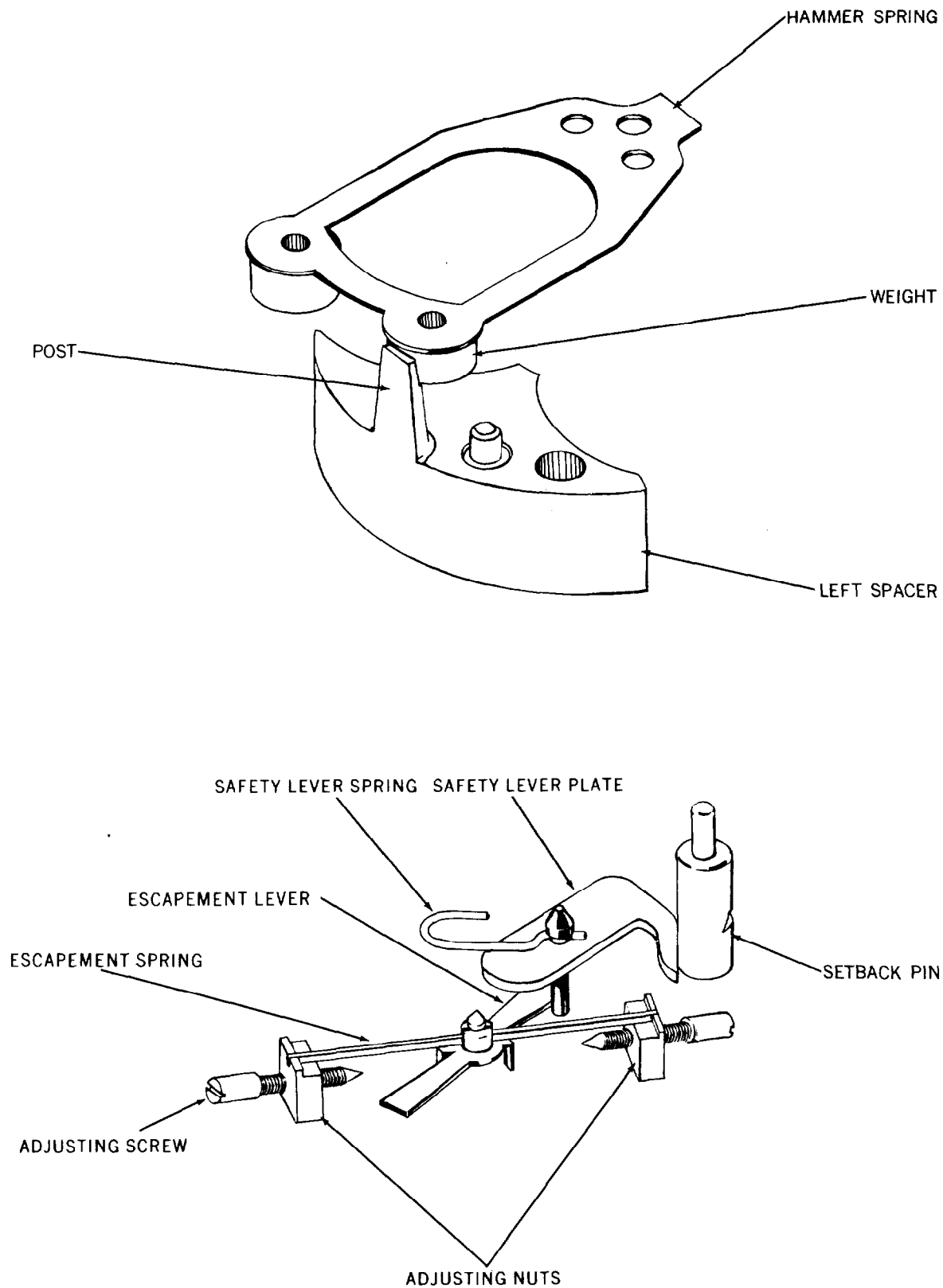


Figure 3-11. Details of Mechanical Time Fuze Mk 62 Mod 1; Post Under Hammer Spring (top) and Slider-Type Escapement Release (bottom)

Table 3-1. Mechanical Time Fuzes (Continued)

	MK 61 MOD 0	MK 61 MOD 1	MK 62 MOD 0	MK 62 MOD 1
Used in Projectiles	5"/38 ILLUM and WP	5"/38 AAC, HE-MT, ILLUM, and WP	16" HC	16" HC
LD	SK 165619	SK 165255	165620	299386
Drawing	440479	561519	561996	1475151
Thread Size (in.)	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1	1.700-14NS-1
Intrusion Depth (in.)	0.803	0.803	0.803	0.803
Overall Length (in.)	4.308	4.308	4.308	4.308
Weight (lb.)	2.280	2.280	2.280	2.340
Time Delay (sec. max.)	45	45	45	45
Explosive Components: Primer	Either F.A. 70 Primer Mix or F.A. 70 Primer Mix modified to contain 8% ground glass			Mk 104 Mod 0 Primer Mix No. 529 or F.A. 70 & 40 grains black powder
Booster	Black Powder	Black Powder	Black Powder	Black Powder

WARNING

MTF Mk 61 Mod 0 is used at full and reduced charge in 5"/38 ILLUM and WP projectiles. It should not be used at full or reduced charge in 5"/38 HE projectiles.

MTF Mk 61 Mod 1 is used at full or reduced charge in 5"/38 HE, WP, or ILLUM projectiles.

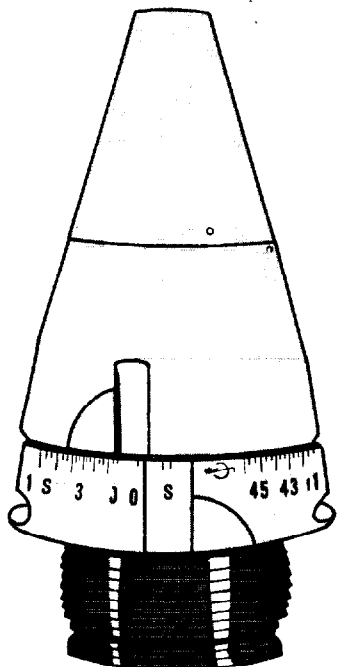


Figure 3-12. Mechanical Time Fuze Mk 342 Mod 0, External View

3-12 MK 342 MTF. Mod 0, figure 3-12, is essentially a combination of the Mk 25 Mods 4 and 5. The Mk 342 retains the same external characteristics as well as the same setback pin design employed in the Mk 25 Mod 5. In comparison to the Mk 25 Mod 4, the Mk 342 is identical in that it retains the same centrifugal gear weight, drive spring, and safety block; and has the same moisture-proofing features, using thread sealant and varnish to seal the upper cap and bottom closing plug. Mod 1 is similar to and interchangeable with the Mod 0 fuze. Modifications to improve the reliability of the Mod 0 premature trap include changes in the timing disk assembly, zero adjusting plate, firing arm, and firing arm spring. To improve setting torque stability, a new six-wave beryllium copper torque spring has been installed.

a. Operation and Safety Features. The operational design and safety features of the Mk 342 are similar to those of the Mk 349 Mod 0 (see paragraph 3-13).

b. Time Firing Characteristics. The Mk 342 Mod 0 MTF functions as follows for the various settings:

Setting (sec.)	Mean Burst Time (sec.)	Standard Deviation (sec.)
Full Charge		
10	9.841 to 10.159	0.167 Max.
40	39.718 to 40.282	0.362 Max.
Reduced Charge		
10	10.341 to 10.659	0.167 Max.
40	40.218 to 40.782	0.362 Max.

NOTE

Reports of malfunctions shall classify prematures occurring within 2000 feet as close aboard prematures. Those occurring beyond 2000 feet shall be classified as early bursts.

MTF Mk 342 Mod 1 functions as follows for the various settings:

Setting (sec.)	Mean Burst Time (sec.)	Standard Deviation (sec.)
Full Charge		
10	9.800 to 10.200	0.167 Max.
40	39.656 to 40.344	0.362 Max.
Reduced Charge		
10	10.050 to 10.450	0.167 Max.
40	40.156 to 40.844	0.362 Max.

c. Moistureproofing. The Mk 342 has a moistureproof design intended to give longer life and greater reliability. The moistureproofing is accomplished as follows:

1. Mk 342 MTF contains an internal desiccator unit of silica gel in the base cavity of the fuze body. This silica gel absorbs and retains all moisture in the air trapped in the fuze at assembly, thus preventing rusting of steel parts or deterioration of explosive components.

Table 3-1. Mechanical Time Fuzes (Continued)

	MK 342 MOD 0	MK 342 MOD 1
Used in Projectiles	5"/54 AAC, HE-MT & ILLUM	5"/54 AAC, HE-MT & ILLUM
LD	549675	2511237
Drawing	2428426	2511237
Thread Size (in.)	1.700-14NS-1	1.700-14NS-1
Intrusion Depth (in.)	0.803	0.803
Overall Length (in.)	4.581	4.581
Weight (lb.)	1.410	1.450
Time Delay (sec.)	0.8 (min.) to 45.0 (max.)	1.0 (min.) to 45.0 (max.)
Required Setting		
Torque (in. lb.)	70 - 140 (Rework only)	80 - 130
Explosive Components: Primer (Percussion Cap)	Either F.A. 70 Primer Mix consisting of potassium chlorate, antimony sulfide, TNT, and lead sulfocyanate; F.A. 70 Primer Mix modified to contain 8% ground glass; or No. 529 Winchester Primer Mix, 0.44 grams.	
Booster	Black Powder	Black Powder

2. The joint between the upper and lower caps is coated externally with thread sealant and varnish. This film of varnish is practically impervious to moisture, hence serves as a mechanical barrier to its passage.

3. The primer screw assembly is moistureproofed by inserting a vinylite disk under the black powder relay pellet and by coating both ends of the primer screw assembly with Bakelite varnish.

4. Thread sealant is applied to the joint between the body and the bottom closing screw, serving to exclude moisture and keep the joint mechanically tight. The brass disk at the center of the bottom closing screw is crimped in under a washer, then coated with Bakelite varnish.

d. Markings on Fuze. MTF Mk 342 Mod 0 or 1, (Initials of Manufacturer and of Navy Inspector and Lot Number).

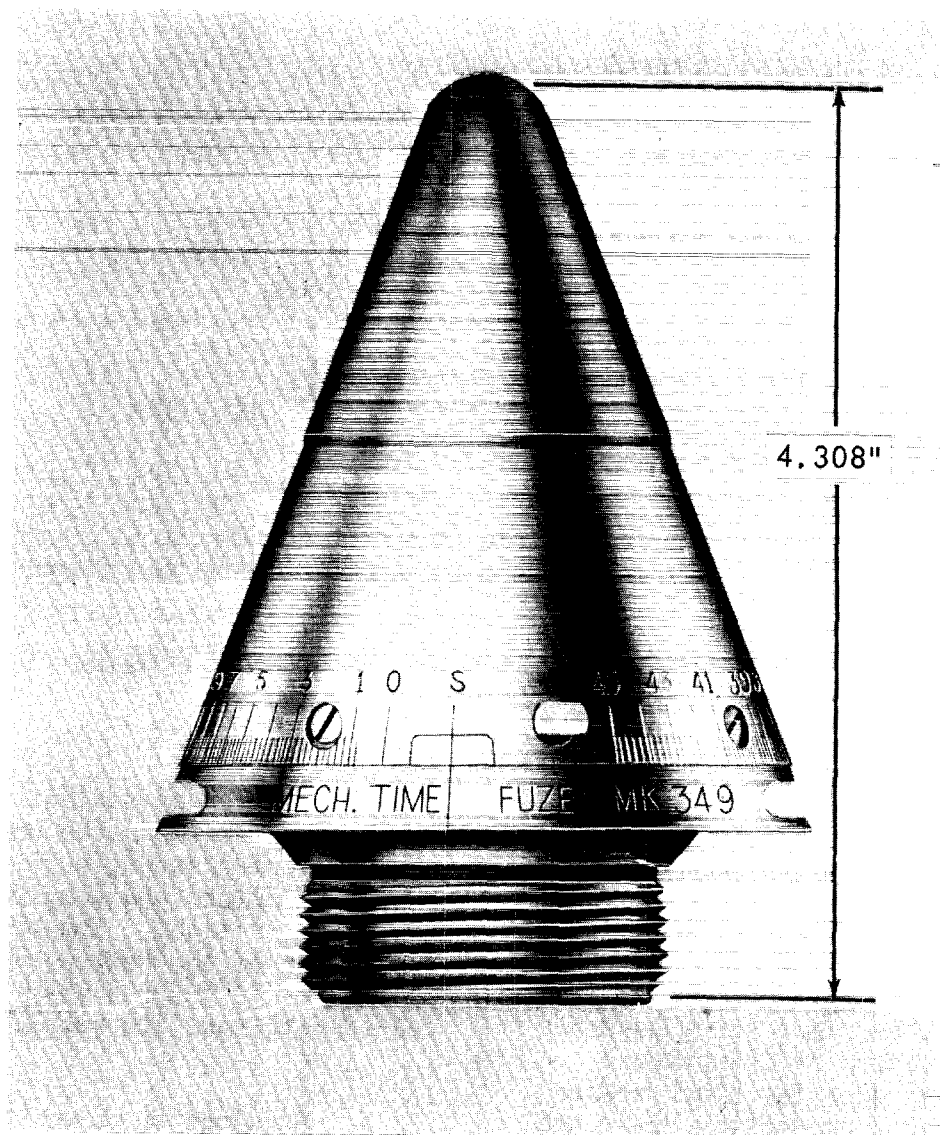


Figure 3-13. Mechanical Time Fuze Mk 349 Mod 0, External View