ROCKET AMMUNITION

5"0 SURFACE ROCKET SPIN-STABILIZED

DESCRIPTION AND INSTRUCTIONS FOR USE

DEPARTMENT OF THE NAVY
BUREAU OF ORDNANCE
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ORDNANCE PAMPHLET 1260 (FIRST REVISION)
ROCKET AMMUNITION—5.0-IN. SURFACE ROCKET SPIN-STABILIZED

1. Ordnance Pamphlet 1260 (First Revision) describes 5"0 spin-stabilized surface rockets and contains instructions for their use.

2. This publication is for the use of all personnel concerned with the operation and handling of 5.0-in. spin-stabilized surface rockets.

3. This pamphlet supersedes Ordnance Handling Instructions A6–45 and OP 1260 (Preliminary), which should be destroyed.

4. Reference is made to the following existing publications:

Rocket Launcher Mk 50 Mods 0 and 1 (Second Revision) OP 1244
Rocket Launcher Mk 51 Mod 0—OP 1246
Rocket Launcher Assembly Mk 102 Mod 0 (First Revision) OP 1424
Projectile Fuzes—OP 1212
Fuzes for Rockets and Projector Charge (Second Revision) OP 1017
Circuit Continuity Tester 680–A for Rockets—OP 1742
Rocket Assemblies (First Revision) OP 1415
VT Fuzes for Projectiles and Spin-Stabilized Rockets (First Revision) OP 1480
Bureau of Ordnance Manual

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M. F. SCHOEFFEL
Rear Admiral, U. S. Navy
Chief of the Bureau of Ordnance

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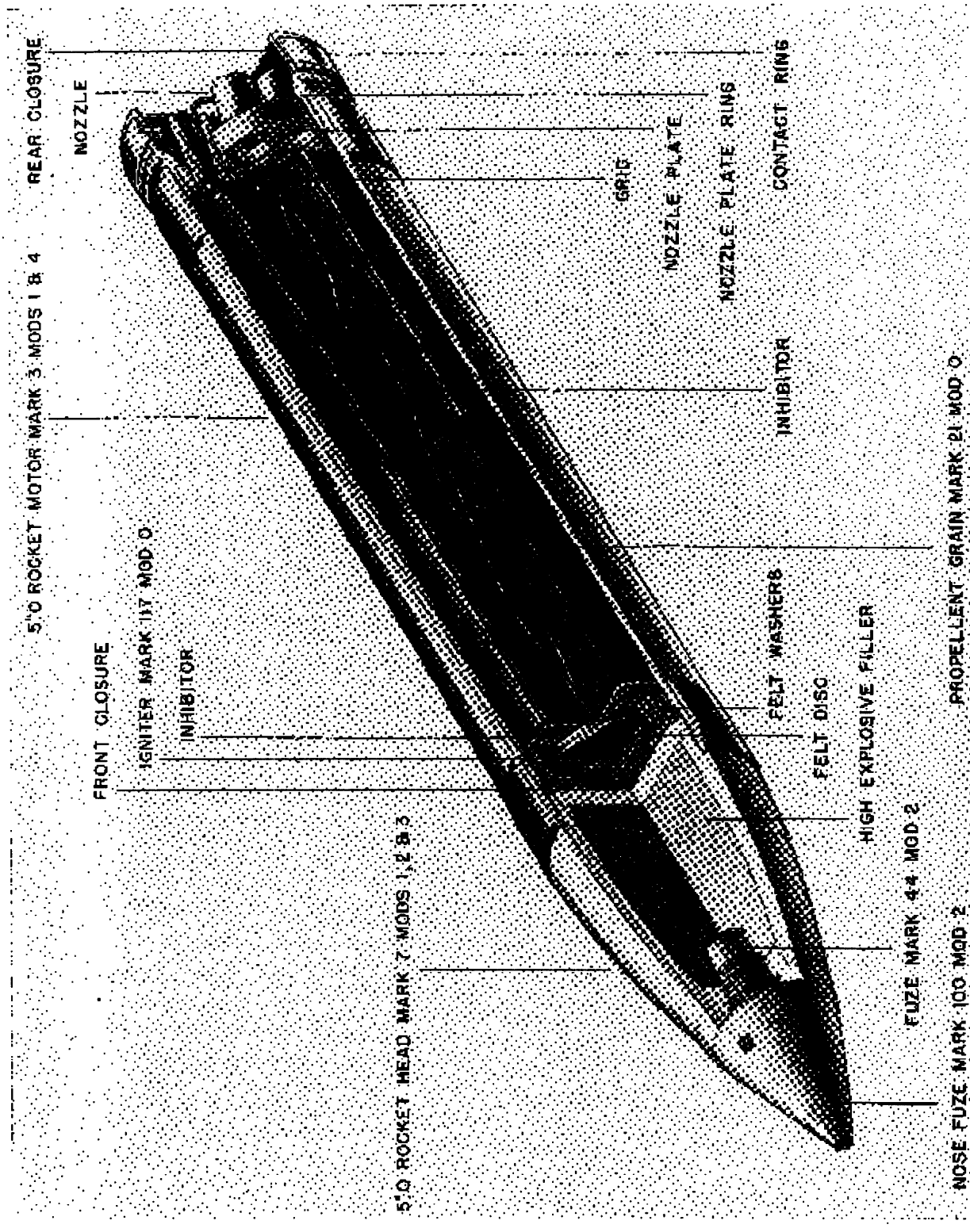

Figure 1.—5.0-in. Rocket Mk 7 Mod 2 (Surface General Purpose SS).

Chapter 1

INTRODUCTION

Rocket Types Described

The 5.0-in. spin-stabilized surface rockets described in this publication are of the following types, as determined by the function of the head (the designation of the complete round is given):

1. **General Purpose (GP)**—5.0-in. Rocket Mk 7 Mod 2

This rocket has a limited penetrating power and uses a nose fuze which may be set for either instantaneous or delay action. The arrangement of the components is shown in figure 1.

2. **High Capacity (HC)**—5.0-in. Rocket Mk 10 Mods 0 and 1
—5.0-in. Rocket Mk 13 Mod 0
—5.0-in. Rocket Mk 16 Mod 0

These are relatively short-ranged rockets intended for bombardment and large blast effect. The heads have thin walls with maximum TNT loadings. The general arrangement of components of these rounds is shown in figure 2.

3. **Common**—5.0-in. Rocket Mk 24 Mod 0

This rocket is a semi-armor-piercing type which uses a base fuze. See figure 3 for cutaway view of round.

4. **Practice**—5.0-in. Rocket Mk 6 Mod 0
—5.0-in. Rocket Mk 8 Mod 1
—5.0-in. Rocket Mk 11 Mod 0
—5.0-in. Rocket Mk 14 Mod 0
—5.0-in. Rocket Mk 17 Mod 0

The practice rounds are identical with their prototypes with the exception that inert heads are used in place of the demolition heads. These rounds are used in practice firings.

5. **Dummy**—5.0-in. Rocket Mk 9 Mod 0
—5.0-in. Rocket Mk 9 Mod 1
—5.0-in. Rocket Mk 12 Mod 0
—5.0-in. Rocket Mk 15 Mod 0
—5.0-in. Rocket Mk 18 Mod 0
—5.0-in. Rocket Mk 25 Mod 0

The dummy rounds are identical with their prototypes except that both inert heads and motors are used. The dummy rounds are designed for training purposes on launchers.

The motor, head, and fuze combinations of the various rounds, with identifying dimensions, are illustrated in figure 4. Assembled rocket data are listed in Appendix A.

Launchers for 5.0-in. Spin-Stabilized Surface Rockets

The 5.0-in. spin-stabilized surface rockets described in this pamphlet must be used only with rocket launchers designed to fire this ammunition.

Rocket launchers especially designed for 5.0-in. spin-stabilized surface rockets, and the ordnance pamphlets to which reference should be made, are as follows:

OP 1244—Rocket Launcher Mk 50 Mods 0 and 1

OP 1246—Rocket Launcher Mk 51 Mod 0*

OP 1421—Rocket Launcher Assembly Mk 102 Mod 0

Rocket Launcher Mk 50 Mod 0 is a manually loaded, electrically fired, stationary launcher with a cluster of eight launching tubes for starboard mounting on PT boats. Rocket Launcher Mk 50 Mod 1 consists of the same components assembled for port mounting.

Figure 5 shows a 5.0-in. spin-stabilized surface rocket in place in a guide of Rocket Launcher Mk 50 Mod 0. The electrical contact and pawl are locked in position by the pawl retaining rod.

Rocket Launcher Mk 51 Mod 0 is a gravity-fed, automatic launcher with a single set of launching guides. It will fire 12 5.0-in. spin-stabilized rounds either singly or in automatic ripple salvo at a rate of 12 rounds in 3 to 5 seconds.

Rocket Launcher Assembly Mk 102 Mod 0 is an assembly for the automatic launching of 5.0-in. spin-stabilized rockets at a potential rate of 30

*As altered in accordance with ORDALT #2377.

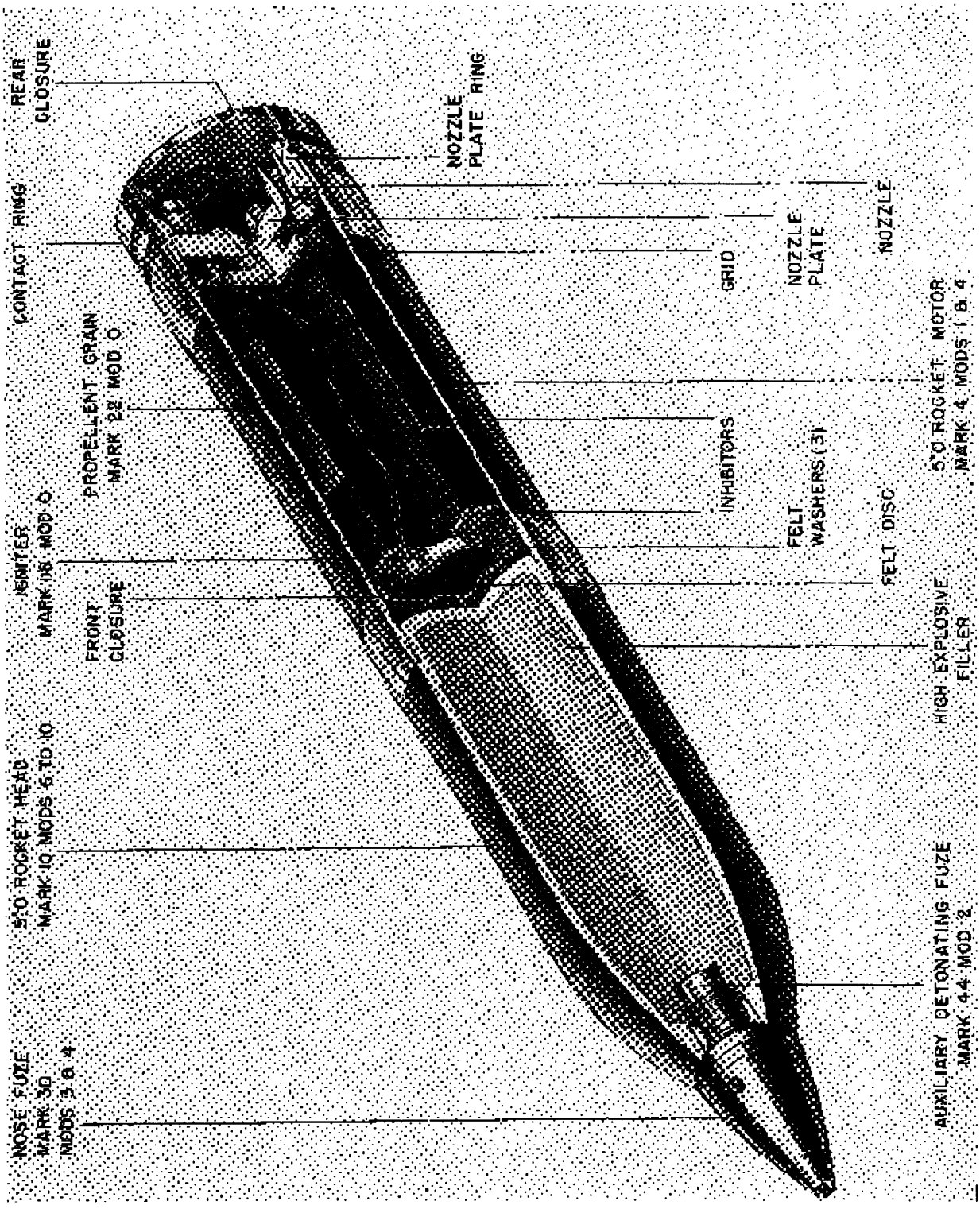

Figure 2.—5.0-in. Rocket Mk 10 Mod 0 (Surface High Capacity SS).

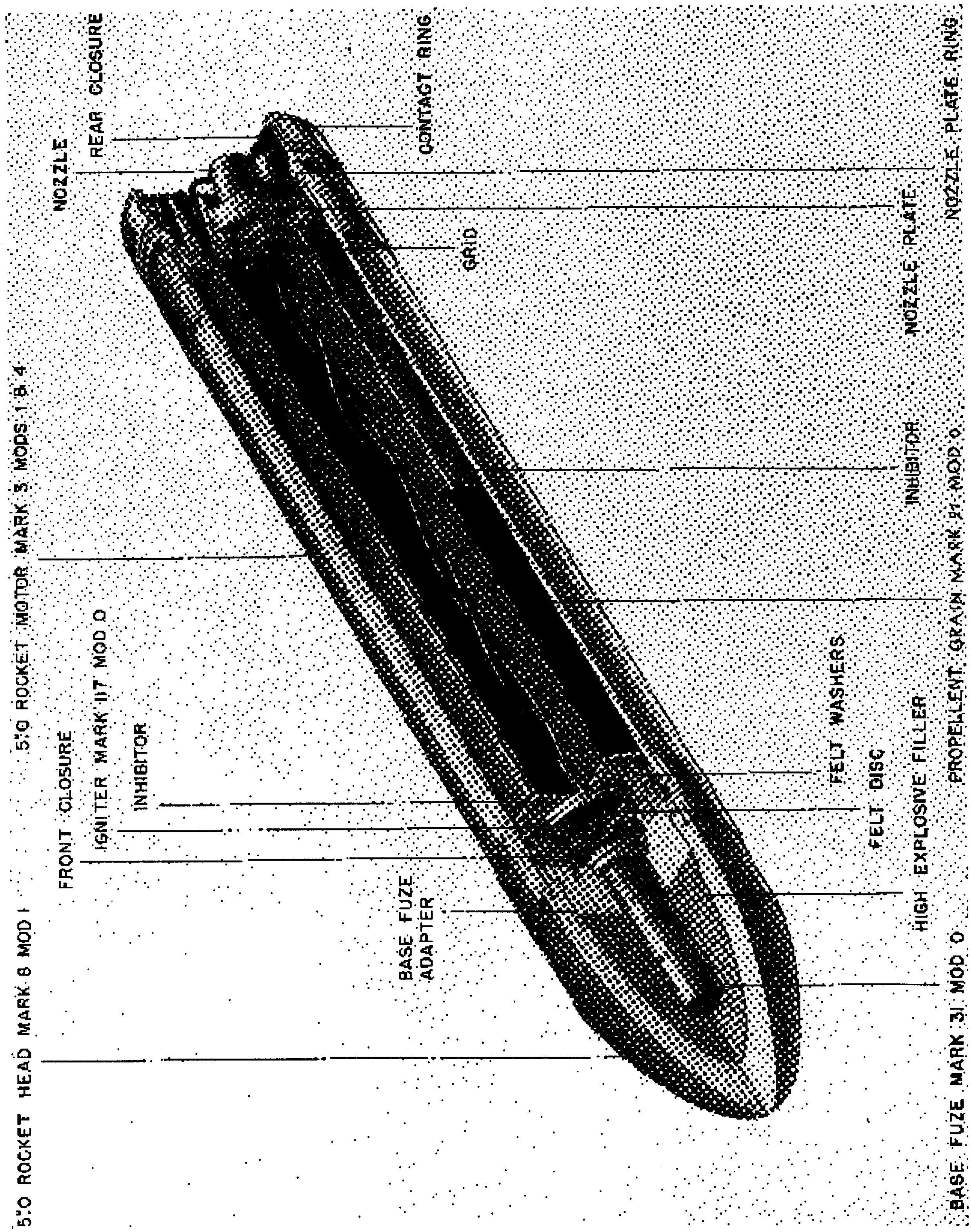

Figure 3.—5.0-in. Rocket Mk 24 Mod 0 (Surface Common SS).

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FUZE	HEAD	MOTOR		ROUND DESIGNATION
MK 100 MOD 2	9"4 — MK 7 MODS 1,2,3	22"3 — MK 3 MODS 1,4		5"0 ROCKET (SURFACE, GEN. PURPOSE SS) MK 7 MOD 0 PRACTICE ROUND - MK 8 MOD 0 (INERT HEAD, LIVE MOTOR) DUMMY ROUND - MK 9 MOD 0 (INERT HEAD AND MOTOR)
MK 30 MODS 3,4	16"7 — MK 10 MODS 6-10	15"5 — MK 4 MODS 1,4		5"0 ROCKET (SURFACE, HIGH CAPACITY SS) MK 10 MOD 0 PRACTICE ROUND - MK 11 MOD 0 DUMMY ROUND - MK 12 MOD 0
VT MK 173 MOD 4	16"7 — MK 10 MOD 11	15"5 — MK 4 MODS 1,4		5"0 ROCKET (SURFACE, HIGH CAPACITY SS) MK 10 MOD 1 PRACTICE ROUND - MK 11 MOD 0 DUMMY ROUND - MK 12 MOD 0
MK 30 MODS 3,4	19"9 — MK 12 MODS 0-4	12"3 — MK 5 MODS 1,4		5"0 ROCKET (SURFACE, HIGH CAPACITY SS) MK 13 MOD 0 PRACTICE ROUND - MK 14 MOD 0 DUMMY ROUND - MK 15 MOD 0
MK 30 MODS 3,4	21"7 — MK 13 MODS 0-4	11"0 — MK 6 MODS 1,4		5"0 ROCKET (SURFACE, HIGH CAPACITY SS) MK 16 MOD 0 PRACTICE ROUND - MK 17 MOD 0 DUMMY ROUND - MK 18 MOD 0
MK 31 MOD 0	6"5 — MK 8 MOD 1	22"3 — MK 3 MODS 1,4		5"0 ROCKET (SURFACE, COMMON SS) MK 24 MOD 0 PRACTICE ROUND - MK 8 MOD 1 DUMMY ROUND - MK 9 MOD 1
DUMMY NOSE PLUG	16"7 — MK 10 MODS (PRACTICE SS)	15"5 — MK 9 MOD 0 (SURFACE DUMMY)		5"0 ROCKET (SURFACE DUMMY) MK 25 MOD 0 FOR CYCLING TEST IN MK 102 LAUNCHER ONLY

NOTE: ALL DIMENSIONS ARE IN INCHES AND ARE NOMINAL ONLY.

Figure 4.—Round Identification Chart.

rounds per minute. The assembly consists of a deck-mounted rocket launcher and a rocket ammunition hoist below decks, both of which are mounted on a modified 40-mm AA Gun Mount Mk 1 Mod 2 (twin), power driven in train and elevation by remote control.

Description of Function of a Rocket

The principle of rocket propulsion is explained by the fundamental law of physics that for every action there is an equal and opposite reaction; thus, a forward thrust on a rocket is produced in line and opposite in direction to the gas flow from the nozzles. For purposes of illustration, the rocket may be compared to an artillery piece firing a charge which shoots high velocity gases forward. A backward recoil force is simultaneously produced which causes the barrel to travel in a direction opposite to that in which the muzzle points. The recoil force in the gun is similar in principle to the propelling force in the rocket.

When a rocket is fired, an electrical impulse from the launcher firing contact pin is passed from the insulated contact ring at the nozzle end of the motor to the igniter squib located in an igniter at the forward end of the propellent grain. Ignition of the black powder charge in the igniter produces hot burning gases that in turn ignite the exposed surface of the propellent grain.

The propellent grain burns away in approximately one second, and produces large quantities of hot gas at high pressure. The gases produced are expelled through the nozzles at velocities approaching 7,000 feet per second and at temperatures at the throat in the vicinity of 5,000° F.

The motor chamber operates at almost constant pressure, the magnitude of the pressure depending on the initial temperature of the propellent grain. The higher the initial temperature, the greater the pressure developed, and conversely, the lower the initial temperature, the less the pressure developed. The burning time, and therefore the distance the rocket travels during burning, varies

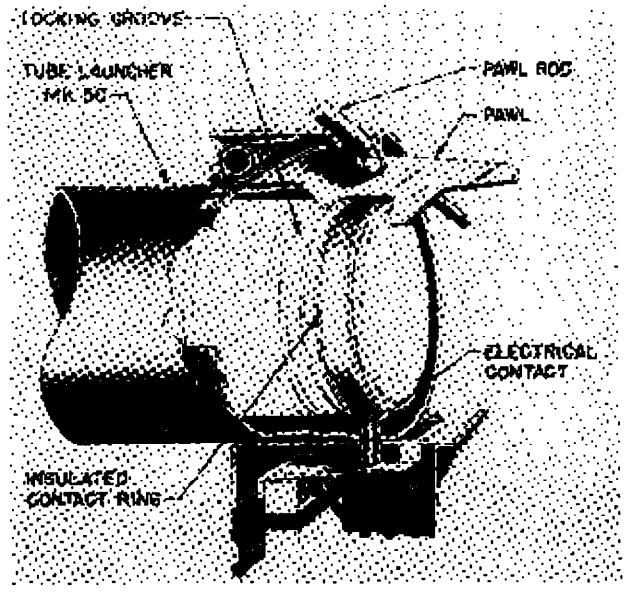

Figure 5.—5.0-in. Spin-Stabilized Surface Rocket in Place in Rocket Launcher Mk 50 Mod 0.

inversely with the pressure, increasing as the pressure decreases. It can be seen from the above that an initially cold round will burn for a longer time, at a lower pressure, and for a greater distance than a hot round, although both rounds will attain the same ultimate velocity. To insure maximum safety and to obtain uniform performance, all rounds are stored in temperature-controlled magazines whenever possible.

Chapter 2

GENERAL DESCRIPTION

5.0-in. Rocket Heads

The 5.0-in. rocket heads described in this pamphlet are of two general types:

1. A hollow steel head of varying thickness closed at the base, and internally threaded at the nose to hold a nose thread adapter. As shown in figure 6, the adapter is internally threaded and is provided with a nose shipping plug.

2. A hollow steel head with a solid nose, and internally threaded at the base to hold a base fuze adapter as shown in figure 3.

Both types of rocket heads are externally threaded at the base for assembly to the motor and have two spanner wrench holes located on opposite sides of the head near the base to facilitate assembly of the head and motor. The threads at the base of the head are covered by a thread protector which is removed as shown in figure 6 prior to assembly of head and motor.

The differences between the various modifications of a given mark-numbered head are in the method of fabrication of the metal head and do not alter the performance of the heads.

5.0-in. Rocket Motors

The motor, which is the propelling unit of the rocket, is stored and shipped without the head attached (see Chapter 5, ACCIDENTAL IGNITION). For protection against foreign matter and moisture, both ends of the motor are provided with sealed closures.

In case of obliteration of the markings on the motors, they may be distinguished by the differences in their lengths shown in figure 4.

The motor consists of the following parts:

1. The **motor tube** of the motor is a seamless steel tube, the ends of which are identical and contain internal threads and external bourrelets (the ridgelike protrusions shown in fig. 6). The bourrelets are of slightly greater diameter than the rest of the tube to provide bearing surfaces for the round when it is fired from a launcher.

2. The **nozzle assembly** is screwed into the after end of the motor tube and staked in place. It contains a GRID to support the propellent grain, four or eight NOZZLES, the TERMINALS of the igniter electrical circuit, and the INSULATED CONTACT RING. The NOZZLES are arranged in a circle and are canted in such a direction as to spin the rocket in flight with a clockwise rotation as viewed from the rear. The INSULATED CONTACT RING is a continuous steel band tightly encircling the rear section of the nozzle assembly and insulated from it by a plastic sleeve. One terminal of the igniter electrical circuit is connected to it and is the live contact. The other terminal is grounded to the nozzle assembly and through it to the motor tube resting on the grounded launcher.

3. The **short circuiting band** is fastened around the nozzle assembly during shipping and storage in such a manner that it creates a short circuit between the contact ring and the ridge of the locking groove, thus preventing functioning of the igniter. The short circuiting band is removed just prior to loading round into launcher.

4. The **rear closure** is a formed sheet metal disk which seals the rear of the motor. It is pressed in place within the rear edge of the nozzle assembly, and the joint is sealed with a sealing compound. The rear closure is blown out when the round is fired. Removal or rupture of the rear closure is to be avoided since this will allow moisture to enter the motor with a resultant decrease in propellant life.

5. The **propellent grain** is extruded of ballistite and has a cross section of cruciform shape. Nonflammable plastic inhibiting material is cemented to both ends and to portions of the ridges of the grain in order to control the burning area, and subsequently, the pressure developed within the motor tube during the burning period. The lengths of the grains and ridge inhibitors vary with the lengths of the motors with which they are used.

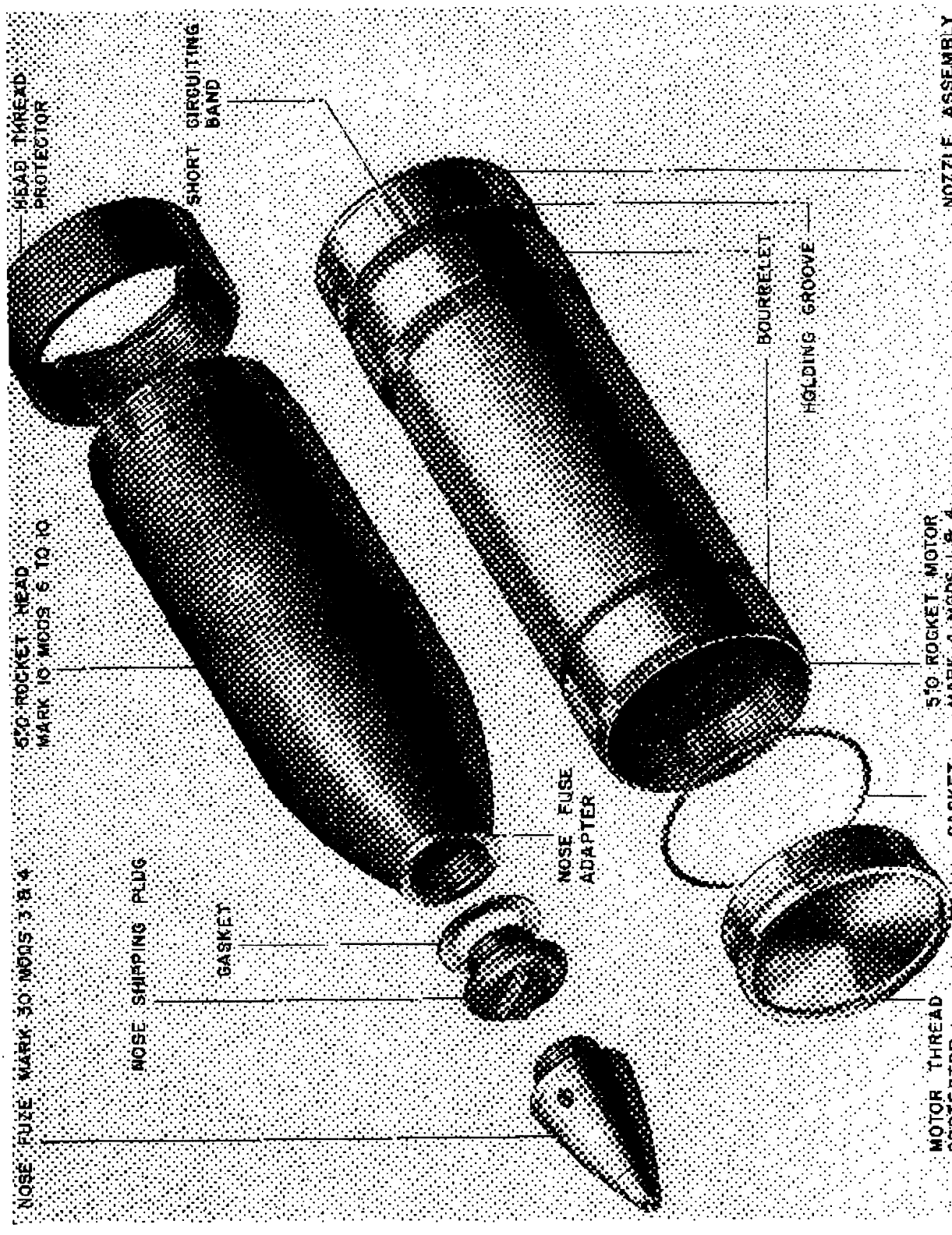

Figure 6.—Exploded View of Components of Typical 5.0-in. Spin-Stabilized Surface Rocket Prepared for Shipping.

6. The **igniter** is a tin-can type case containing black powder and an electric squib which ignites the powder when an electric current passes through it. It is placed against the forward end of the grain. The two leads from the electric squib connect to the terminals in the nozzle assembly. The igniters used with 5.0-in. motors described in this publication, although similar in all other respects, are assigned different mark numbers depending on the length of the electric squib leads needed for various lengths of motors. The igniter is tested for continuity of the electrical circuit both prior to and after assembly in the motor at the loading depot.

7. The **front closure** is a formed steel disk which is pressed into position near the forward end of the motor tube. A sealing compound is applied to the joint to prevent the entry of foreign material and moisture. The closure holds the igniter and grain in place within the motor by compressing the felt washers which encircle the igniter. Simultaneously, the washers press the grain firmly against the grid of the nozzle assembly. Additional felt washers are located just forward of the closure. Care must be taken not to remove these washers during assembly operations since they are necessary for the proper support of the assembled motor components.

8. The **motor thread protector.** The motor is shipped with a thread protector screwed into the forward end of the motor tube. The thread protector consists of a ring-shaped, threaded, die-casting with a thin steel cupped disk pressed into it which will serve as a blowout disk in the event of accidental ignition. The protector is removed prior to assembly of the head and motor.

Safety Precaution

Warning. If the air-tight seals on rocket motors are broken, the propellent safe life will be decreased. Moisture will enter the motor and ignition reliability will be reduced. Therefore, make certain that the front and rear closures of the motor tubes remain in place at all times. If one of the closures has been broken or removed, tag the motor to show the nature of the trouble and any other pertinent data, and turn it over to the nearest ammunition depot. If this is impossible, dispose of the motor by lowering it gently overboard into deep water, or in a manner prescribed by competent authority.

Chapter 3

COMPLETE ROUNDS OF 5.0-in. SPIN-STABILIZED SURFACE ROCKETS

5.0-in. Rocket Mk 7 Mod 2 (Surface General Purpose SS)

The rocket is composed of 5.0-in. Rocket Motor Mk 3 Mods 1 or 4, and 5.0-in. Rocket Head Mk 7 Mods 1, 2, or 3. The motor contains sufficient propellant to give a maximum range of 10,000 yards to the rocket, with a nominal velocity of 1,540 feet per second. The head is a medium weight steel shell closed at the base. It contains 2.8 ponds of TNT, and is shipped with Auxiliary Detonating Fuze Mk 44 Mod 2 mounted in an adapter which is screwed into the nose of the head and staked in place. In the assembly of the complete round, the nose shipping plug is removed and Nose Fuze Mk 100 Mod 2 is screwed into the adapter.

5.0-in. Rocket Mk 8 Mod 0 (Surface Practice SS)

This practice round for the above ammunition, is composed of a live Motor Mk 3 Mod 1, an inert (plaster-filled) Head Mk 7 All Mods, and a dummy nose fuze. This round is designed for training purposes and target firings and describes the same trajectory as the prototype round.

5.0-in. Rocket Mk 9 Mod 0 (Surface Dummy)

The dummy round is intended for drill purposes. It is assembled from inert Head Mk 7 All Mods and inert Motor Mk 3 Mods 0 or 1.

5.0-in. Rocket Mk 10 Mod 0 (Surface High Capacity SS)

The rocket is composed of 5.0-in. Rocket Motor Mk 4 Mods 1 or 4, and 5.0-in. Rocket Head Mk 10 Mods 6 to 10. The motor is capable of giving a maximum range of 5,000 yards to the rocket with a nominal velocity of 830 feet per second. The head is a thin-walled steel shell closed at the base. It carries 9.6 pounds of TNT filler and is shipped with Auxiliary Detonating Fuze Mk 44 Mod 2 mounted in an adapter which is screwed into the nose of the round and staked in place. When assembling the complete round, the nose shipping plug is removed and Nose Fuze Mk 30 Mod 3 or 4 is installed in its place.

5.0-in. Rocket Mk 10 Mod 1 (Surface High Capacity SS)

This rocket is identical with the ammunition Mk 10 Mod 0 with the exception that an influence fuze is mounted in the place of the point of detonating fuze. The components of this round include 5.0-in. Rocket Motor Mk 4 Mods 1 or 4, 5.0-in. Rocket Head Mk 10 Mod 11 (especially cavitized to accept the influence fuze assembly), and VT Nose Fuze Mk 173 Mod 4. The auxiliary detonating fuze is an integral part of the VT fuze. The range and velocity are the same as for Rocket Mk 10 Mod 0.

5.0-in. Rocket Mk 11 Mod 0 (Surface Practice SS)

This is the practice round for the Mk 10 Mods 0 and 1 rocket ammunition. The motor is the live loaded 5.0-in. Rocket Motor Mk 4 Mod 1, and the head is the inert (plaster-filled) 5.0-in. Rocket Head Mk 10 All Mods.

5.0-in. Rocket Mk 12 Mod 0 (Surface Dummy)

This is identical with the Mk 11 Mod 0 round except for an inert loaded motor.

5.0-in. Rocket Mk 13 Mod 0 (Surface High Capacity SS)

This rocket is similar to the Rocket Mk 10 Mods 0 and 1 except for a larger head and smaller motor. It is designed to be fired from closer range (maximum 2,500 yards) and to give a larger blast effect. The components of this round are

5.0-in. Rocket Motor Mk 5 Mods 1 or 4 and 5.0-in. Rocket Head Mk 12 Mods 0 to 4. The head contains 12.0 pounds of TNT filler. The round is shipped with Auxiliary Detonating Fuze Mk 44 Mod 2 mounted in an adapter which is screwed into the nose of the head and staked in place. In the assembly of the complete round, the nose shipping plug is removed and Nose Fuze Mk 30 Mod 3 or 4 is installed in its place.

5.0-in. Rocket Mk 14 Mod 0 (Surface Practice SS)

The practice round for the above ammunition is composed of the live 5.0-in. Rocket Motor Mk 5 Mod 1 and the inert (plaster-filled) 5.0-in. Rocket Head Mk 12 All Mods.

5.0-in. Rocket Mk 15 Mod 0 (Surface Dummy)

This rocket is composed of the inert loaded 5.0-in. Rocket Motor Mk 5 Mod 1, and the inert loaded 5.0-in. Rocket Head Mk 12 All Mods.

5.0-in. Rocket Mk 16 Mod 0 (Surface High Capacity SS)

The rocket has a maximum range of 1,250 yards and a larger blast effect than any of the other High Capacity rounds. The components of this round are 5.0-in. Rocket Motor Mk 6 Mods 1 and 4, and 5.0-in. Rocket Head Mk 13 Mods 0 to 4. The head contains 18.5 pounds of TNT filler. Because of the lower velocity of this round (400 feet per second) which results in reduced spin rates, it is necessary to use the more readily armed Auxiliary Detonator Fuze Mk 52 Mod 2 in conjunction with the Nose Fuze Mk 30 Mod 3 or 4.

5.0-in. Rocket Mk 17 Mod 0 (Surface Practice SS)

This practice round for the above ammunition, is composed of the live 5.0-in. Rocket Motor Mk 6 Mod 1 and the inert (plaster-filled) 5.0-in. Rocket Head Mk 13 All Mods.

5.0-in. Rocket Mk 18 Mod 0 (Surface Dummy)

Identical with the Mk 17 Mod 0 except for an inert loaded motor.

5.0-in. Rocket Mk 24 Mod 0 (Surface Common SS)

This round is semi-armor-piercing with a maximum range of 10,000 yards and a nominal velocity of 1,480 feet per second. It uses the same motor as the General Purpose round, 5.0-in. Rocket Motor Mk 3 Mods 1 or 4, and uses 5.0 Rocket Head Mk 8 Mod 1. This head is a thick-walled steel shell with a solid nose. It carries 1.7 pounds of Explosive D and is shipped with Base Fuze Mk 31 Mod 0 screwed into an adapter in the base of the head.

Safety Precaution

Warning. Do not attempt to remove the base fuze from the base of the head at any time.

5.0-in. Rocket Mk 8 Mod 1 (Surface Practice SS)

This is the practice round for the Mk 24 ammunition. It is composed of 5.0-in. Rocket Motor Mk 3 Mod 1, and the inert loaded Rocket Head Mk 8 Mod 1.

5.0-in. Rocket Mk 9 Mod 1 (Surface Dummy)

The dummy round for the Mk 24 is composed of the inert loaded 5.0-in. Rocket Motor Mk 3 Mods 0 or 1 and 5.0-in. Rocket Head Mk 8 Mod 1.

5.0-in. Rocket Mk 25 Mod 0 (Surface Dummy)

This dummy round is designed for cycling and test purposes with Rocket Launcher Assembly Mk 102 Mod 0. Component parts are 5.0-in. Rocket Head Mk 10 Mod 1 (Practice SS) with dummy fuze and 5.0-in. Rocket Motor Mk 9 Mod 0 (Surface Dummy). The latter is composed of a Motor Mk 4 Mod 1 with a special base closure assembly (BuOrd dwg 660844).

The round is designed to be used with Rocket Launcher Test Set Mk 114 Mod 0 for purposes of checking the circuit continuity of the Rocket Launcher Assembly Mk 102 Mod 0. In this capacity, the dummy round is placed in the rocket

launcher guides, test leads from the Test Set are plugged into the receptacles provided for that purpose in the base assembly, and the launcher circuit is energized. Continuity of the launcher circuit through the rocket test circuit is then determined at the Test Set panel. Stray or transient voltages in the launcher, which may cause premature ignition of the rockets, can also be determined at the Test Set panel.

The base assembly is provided with a heavy base plate to protect the electrical receptacle during cycling tests.

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Chapter 4

ROCKET FUZES

General Description

The fuze is the unit of the rocket which detonates the explosive charge in the rocket head. The fuze is protected from premature functioning by a device that mechanically blocks the detonator train until the fuze is properly armed.

"Arming" is the removal of the blocks or interrupters from the firing path so that the fuze may function according to its design. The firing of the rocket sets in motion the forces which arm the fuze. Operation of Nose Fuze Mk 30 Mod 3 is schematically illustrated in figure 7.

The fuzes specified in this OP have the following characteristics in common:

1. Arming is by centrifugal force developed by the spin of the rocket.

2. Detonation is by impact (except for Fuze Mk 173).

SAFETY PRECAUTIONS

Warning. Do not handle these fuzes after the round has been fired and recovered. Dispose of any dud round utilizing these fuzes by gently lowering it base down into deep water, or by giving custody to Ordnance Disposal personnel. Do not attempt to remove the fuze from the dud round.

Warning. Do not disassemble these fuzes. Disassembly of these fuzes is not permitted except at authorized activities when directed by the Bureau of Ordnance.

The minimum arming distance of the fuze and/or auxiliary detonator combinations in the various rounds at 120°F initial propellant temperature is given in Appendix A. Colder rounds will have longer arming distances. The minimum arming distance at 0°F initial propellant temperature is approximately 50 percent greater than that at 120°F.

For a more detailed description of these fuzes see OP 1017, OP 1212, and OP 1480.

Reasonable care should be exercised in the handling of fuzes to prevent them from being dropped or struck on hard surfaces.

Nose Fuze Mk 30 Mods 3 and 4

General Description. Fuze Mk 30 Mod 3 shown in figure 7 is identical to the same Fuze Mk 30 Mod 3 used in projectiles; it is armed by centrifugal force and is used only in spin-stabilized rockets. This fuze is designed to function on impact with targets offering sufficient resistance, with instantaneous action. Mods 3 and 4 of this fuze differ from Mods 0, 1, and 2 by the addition of a safety disk between the exhaust end of the flash tube and the relay detonator. This disk prevents initiation of the relay detonator by the flash from accidental firing of the nose detonator when the fuze is unarmed. Mods 0, 1, 2, and 3 have a plastic ogive whereas the Mod 4 has a drawn steel ogive. Mods 3 and 4 are used in conjunction with an auxiliary detonating fuze to assure the complete initiation of the main explosive charge of the rocket head and to provide additional safety.

Operation. The fuze is designed for instantaneous (superquick—SQ) action on impact. Prior to the firing of the rocket, the setting sleeve must be turned to the ON-SQ position as shown in figure 8 to make the fuze effective. When the rocket is launched, centrifugal force moves the interrupter block outward against spring pressure and opens the flash tube, thus arming the fuze. On impact, the firing pin support is collapsed and the firing pin is driven into the detonator, sending a flash through the flash tube to the relay detonator, initiating the auxiliary detonator which subsequently detonates the main charge of high explosive in the head. The fuze is armed when it reaches a spin rate in the range of 1,500 to 2,000 revolutions per minute, or after approximately 17 to 30 feet of travel, depending

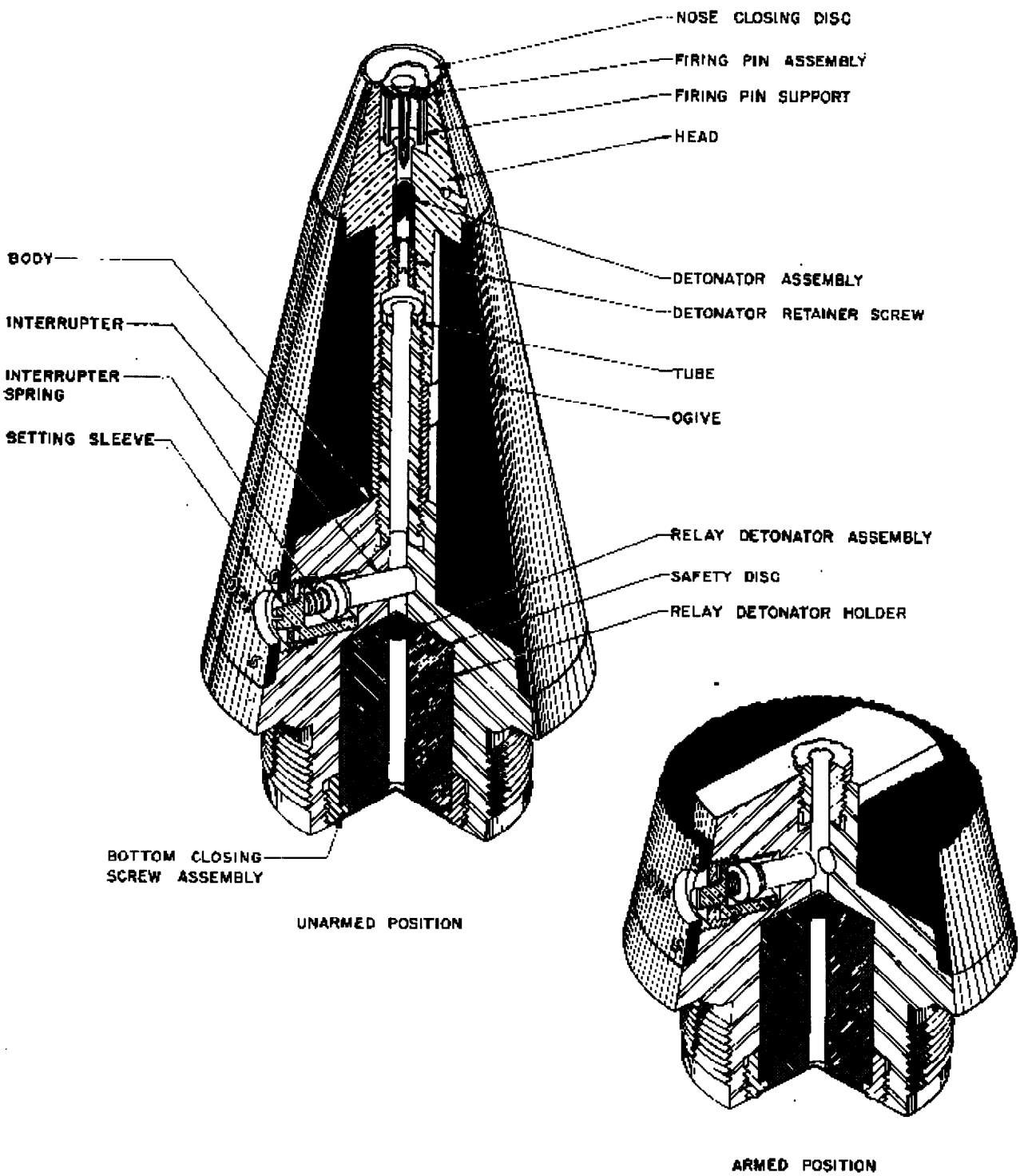

Figure 7.—Sectional View of Fuze Mk 30 Mod 3 Showing Unarmed and Armed Positions.

Figure 8.—Setting of Fuze Mk 30 Mod 3 in the ON-SQ Position.

on the round in which it is used. The spin rate remains sufficiently high to maintain the armed condition until after impact.

Sensitivity Limits.—The fuze will detonate on impact with wood ½-inch thick and on water or ground impacts at nonricochet angles. In the case of ground impacts, functioning is reliable at angles of fall of 8° or greater; and for water impacts, functioning is reliable at angles of fall of 12° or greater.

In general, Fuze Mk 30 behaves in essentially the same manner in rockets as in gun projectiles. However, because of the lower velocities of some rockets, it has less sensitivity.

Disposition of Damaged Fuze.

1. In the event that an unfired fuze is damaged because of rough handling, examine the condition of the nose closing disk in the fuze assembly to determine the method of disposal of the fuze.

2. If the closing disk has been deformed or broken, there is a possibility that either the detonator has been fired and has rendered the fuze inactive, or that the detonator has merely been pierced and has not been fired. In either case dispose of the fuzed rocket head, or the rocket fuze if not assembled into a rocket head, by gently lowering it into deep water or by transferring custody to Ordnance Disposal personnel.

3. If the closing disk has not been damaged and the setting sleeve is set to the OFF-OFF position, consider the fuze safe to handle.

4. If the closing disk is not damaged in any manner and the setting sleeve has been set to the ON-SQ position, rotate the setting sleeve to the OFF-OFF position. The fuze is now safe for handling.

Installation Instruction. (See also chapter 9, ASSEMBLING THE AMMUNITION)

1. Remove the nose shipping plug from the rocket head. Inspect the threads and the interior of the rocket head nose fuze cavity. Clean if necessary. Make certain that the auxiliary detonating fuze is present in the rocket head.

2. Remove Fuze Mk 30 Mods 3 or 4 from the container and examine it for damage.

3. Assemble the fuze in the rocket head using the proper fuze wrench. Make certain that the fuze seats properly.

4. The fuze is shipped with setting sleeve set to the OFF-OFF position. Before firing, set the setting sleeve to the ON-SQ position by inserting a screw driver or similar tool into the slot on the setting sleeve and turning it so that the slot aligns with the ON-SQ lettering on the ogive as shown in figure 8.

Removal from Round.

1. Before removing the fuze from the round, turn the setting sleeve to the OFF-OFF position.

2. Using the proper fuze wrench, remove the fuze from the rocket head and return it to the shipping container.

3. Seal the closed shipping container with adhesive tape along the joint.

4. Replace the shipping plug with gasket in the rocket head.

Nose Fuze Mk 100 Mod 2

General Description. Fuze Mk 100 Mod 2 is basically identical with Fuze Mk 30 Mods 3 and 4 with two exceptions: the addition of a delay element in the base of the fuze and a change in the

size and shape of the ogive. This fuze was developed by combining Navy Point Detonating Projectile Fuze Mk 29 and Army Artillery Fuze M18A2. (Fuzes Mk 29 and the Mk 30 are identical except for ogive contour.) The addition and modification of the plunger assembly of Army Fuze M18A2, containing a delay element, to Fuze Mk 29 gives Fuze Mk 100 Mod 2 the following advantages over Fuze Mk 30: the choice of either superquick or delay action, and added reliability in that the delay plunger assembly is independent in action and is always active regardless of whether superquick or delay action is selected. In the event of the failure upon impact of the instantaneous feature when set for superquick action, the plunger assembly will function normally and follow with a delayed detonation.

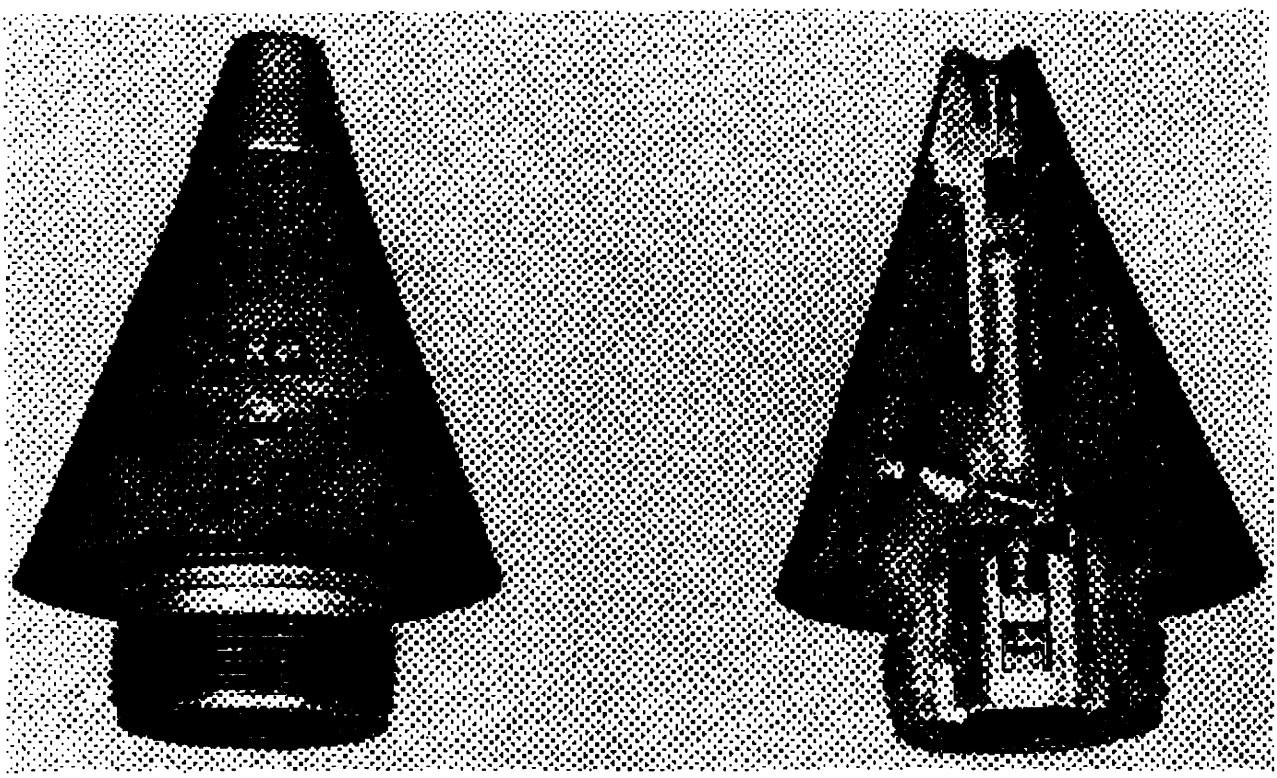

Figure 9.—View of Fuze Mk 100 Mod 2 Showing Sleeve in DELAY-DELAY Position and Cutaway View Showing Delay Mechanism in Base.

Operation. Fuze Mk 100 Mod 2 arms when the rotational velocity of the round reaches the range of 1,500 to 2,000 revolutions per minute, or the equivalent of about 10 feet of travel, and can be used only on spin-stabilized rockets. It is used in conjunction with Auxiliary Detonating Fuze Mk 44 Mod 2.

The firing action of Fuze Mk 100 Mod 2 is identical with that of the Mk 30 Mods 3 and 4 when the setting sleeve is set to SQ-SQ; however, when the setting sleeve is set to DELAY-DELAY as shown in figure 9, the flash channel is blocked (as in Fuze Mk 30 when the setting sleeve is set to OFF-OFF), and the plunger assembly independently initiates the auxiliary detonating fuze after a delay of 0.025 second. The plunger assembly arming mechanism is completely independent of the setting sleeve position, and arming requires only the centrifugal force developed by the rotation of the round.

Sensitivity Limits. The superquick feature of this fuze functions similarly to Fuze Mk 30. It will detonate on impact with wood ½-inch thick, and on water or ground impacts at nonricochet angles. In the case of ground impacts, function-

ing is reliable at angles of fall of 8° or greater; and for water impacts, functioning is reliable at angles of fall of 12° or greater.

When the fuze is set to the SQ-SQ position the functioning of both actions increases the reliability.

Since the round has limited penetration characteristics, the effectiveness is dependent on the type of action selected (superquick or delay) as well as the nature of the target.

Disposition of Damaged Fuze.

1. In the event that an unfired fuze is damaged because of rough handling, examine the condition of the nose closing disk in the fuze assembly to determine the method of disposal of the fuze.

2. If the closing disk has been deformed or broken, there is a possibility that either the detonator has been fired and has rendered the fuze inactive, or that the detonator has merely been pierced and has not been fired. In either case dispose of the fuzed rocket head, or the rocket fuze if not assembled into a rocket head, by gently lowering it into deep water or by transferring custody to Ordnance Disposal personnel.

3. If the closing disk has not been damaged and the setting sleeve is set to the DELAY-DELAY position, consider the fuze safe to handle.

4. If the closing disk is not damaged in any manner and the setting sleeve has been set to the SQ-SQ position, rotate the setting sleeve to the DELAY-DELAY position. The fuze is now safe for handling.

Safety Precaution

Warning. Do not handle this fuze after the round has been fired. Fuze Mk 100 Mod 2 may be more unsafe to handle after the round has been fired and recovered than the other fuzes since the delay assembly, when once armed, remains locked in the armed position.

Installation Instructions. (Also see chapter 9, ASSEMBLING THE AMMUNITION.)

1. Remove the nose shipping plug from the rocket head. Inspect the interior of the rocket head nose cavity and check the threads. Clean if necessary. Make certain that the auxiliary detonating fuze is present in the rocket head.

2. Remove Fuze Mk 100 Mod 2 from the container and inspect it for damage.

3. Using the proper fuze wrench, screw the fuze into the rocket head making certain that it seats properly.

4. Before firing, set the fuze to DELAY-DELAY or SQ-SQ by means of the setting sleeve in the side of the fuze body. The procedure for manual setting of the sleeve on Fuze Mk 100 Mod 2 is similar to that for Fuze Mk 30. The SQ-SQ position on Fuze Mk 100 Mod 2 corresponds to the ON-SQ on Fuze Mk 30 and the DELAY-DELAY position corresponds to Fuze Mk 30 OFF-OFF position. Turn the setting sleeve to the desired position by inserting a screw driver or similar tool into the slot on the setting sleeve. Turn the sleeve so that the slot aligns with the lettering SQ-SQ or DELAY-DELAY on the ogive.

Removal from Round.

1. Before removing the fuze, turn the setting sleeve to the DELAY-DELAY position.

2. Using the proper fuze wrench, remove the fuze from the rocket head and return it to the shipping container.

3. Seal the closed shipping container with adhesive tape along the joint.

4. Replace the shipping plug with gasket in the rocket head.

VT Nose Fuze Mk 173 All Mods

This is an influence fuze which sends out electromagnetic waves and which functions when sufficient waves are reflected back to the receiving part of the fuze from some object, such as earth, metal, water, wood, etc. Further information on the operating characteristics and maintenance of VT Nose Fuze Mk 173 is of a higher classification than this publication and may be found in OP 1480.

Base Fuze Mk 31 Mod 0

General Description. Base Fuze Mk 31 is also used in projectiles. This fuze is armed by centrifugal force and thus can be used only in spin-

stabilized rockets. The fuze is designed for instantaneous action on impact. The fuze is shipped installed in the base of the rocket head.

Operation. Base Fuze Mk 31 arms when the round reaches a rotational velocity within the range of 3,000 to 4,500 revolutions per minute which is equivalent to approximately 30 feet of travel. On impact, the inertia of an auxiliary plunger drives the detonator plunger forward against a firing pin which fires a detonator in the detonator plunger. The detonator initiates the detonator plunger leadouts, and they in turn fire the body lead-in charges and side boosters which detonate the main high explosive in the head. (See OP 1017.)

Sensitivity Limits. Fuze Mk 31 Mod 0 will function reliably upon impact with targets offering sufficient resistance to penetration and upon impact with water at angles of fall of 5° or greater. The fuze will function on 85 percent of hits on ⅛-inch mild steel plates at angles of obliquity up to 55° when fired in 5.0-in. Rocket Mk 24 Mod 0 with 5.0-in. Rocket Head Mk 3 Mod 1.

Installation. Rocket heads utilizing Fuze Mk 31 Mod 0 are shipped with the fuze installed.

Safety Precaution

Warning. Before assembling the rocket head to the rocket motor, **make certain that the fuze is present and properly installed in the rocket head.** If the base fuze is not in place the head will detonate when the rocket is fired.

Auxiliary Detonating Fuze Mk 44 Mod 2

General Description. Fuze Mk 44 Mod 2 (Auxiliary Detonating) is identical with Fuze Mk 44 Mod 1 except for a modified cover disk and the inclusion of a moisture proofing sealing cover. The Mod 2 version of this fuze was designed for use in rocket ammunition.

Fuze Mk 44 Mod 2 is always used in conjunction with a nose fuze to provide additional safety and to assure complete detonation of the main charge in the head of the rocket. The fuze is centrifugally armed and provides additional safety since it arms independently of the nose fuze and requires a greater spin to arm than is required for the nose fuze with which it is used. The explosive train of Fuze Mk 44 Mod 2 (after being armed through sufficient centrifugal force) is fired by the detonator in the nose fuze.

Fuze Mk 44 Mod 2 is assembled in the rocket head at the rocket loading activity.

Operation. The fuze becomes armed only after it has attained a spin rate of 3,000 to 4,500 revolutions per minute, fast enough to develop centrifugal force sufficient for the alignment of the firing train in this fuze. The average arming distances ranges from 45 to 135 feet depending on the rocket in which the fuze is used. When the nose fuze used with this auxiliary detonating fuze functions, the initiation developed in the nose fuze detonator forces through the weak part of the closing disk and initiates the detonator which in turn fires the booster and the main charge of high explosive in the head.

Installation Instruction. Rocket heads utilizing Fuze Mk 30 and Fuze Mk 100 are shipped with the Auxiliary Detonating Fuze installed in the rocket head.

Auxiliary Detonating Fuze Mk 52 Mod 2

This fuze is identical with Fuze Mk 44 Mod 2 except that by virtue of a weaker detent spring it becomes armed at a spin rate of 1,600 to 1,900 revolutions per minute. It is used as a component of 5.0-in. Rocket Mk 16 which has a relatively low rate of spin, and in this use it arms after about 30 feet of travel.

This fuze should be handled according to the instructions given for the Fuze Mk 44.

Chapter 5

ACCIDENTAL IGNITION

Motors

Until the head and motor are assembled, the motor is nonpropulsive. In the event that the motor is accidentally ignited, a disk in the front-closure will blow out and there should result a cessation of propellant burning due to the drop in internal pressure. If the propellant should continue to burn it will constitute a serious fire hazard.

The ballistite grain can be accidentally ignited by:

1. electrically energizing the igniter squib circuit.
2. exposing the motor to fire or temperatures above 325° F,
3. subjecting the motor tube to small arms fire, or high velocity bomb or shell fragments.

Take every precaution to guard against exposing the motor to any of the above conditions.

Heads

The heads contain high explosive and are shipped and stowed unfuzed, except for 5"0 Head Mk 8, which is shipped with Base Fuze Mk 31 installed. Protect rocket heads from shock at all times to prevent accidental detonation.

Chapter 6

SHIPPING

Packaging

5.0-in. spin-stabilized surface rockets are shipped singly and unassembled in 5.0-in. Rocket Container Mk 10 Mod 0, a metal shipping tank. The specifications of this container are listed in Appendix B.

The head and motor are shipped with a thread protector in the front end of the motor, a shipping plug in the nose of the head, and a thread protector on the base of the head, as illustrated in figure 6.

Heads Mk 7, 10, 12, and 13 (All Mods) are shipped with the auxiliary detonator staked in place, and Head Mk 8 (All Mods) is shipped with the base fuze in place.

The arrangements for packing assembled and unassembled rounds in Rocket Container Mk 10 Mod 0 are illustrated in figure 10. Note that Head Mk 7 requires a nose support different from that required by the other heads. These nose supports are not interchangeable and must be used with the heads for which they are designed.

Figure 11 illustrates the method of removing the motor or assembled round from the container by means of the extractor. The extractor consists of a drawn aluminum half-shell which engages the motor in the locking groove. Use the extractor only when the motor and container are in a horizontal position; there is a tendency for the extractor to slip when the motor is in the vertical position. Allowing the round to slip back into the container may result in damage to the round.

Figure 12 illustrates the method of removing the head from the container by grasping the bail in the head thread protector. The bail also provides an easy means for carrying the head.

Return of Empty Tanks

After removing a round from 5.0-in. Rocket Container Mk 10 Mod 0, place the spacers, thread protectors, and extractor inside the tank and return the tank to the proper Naval ordnance ammunition depot.

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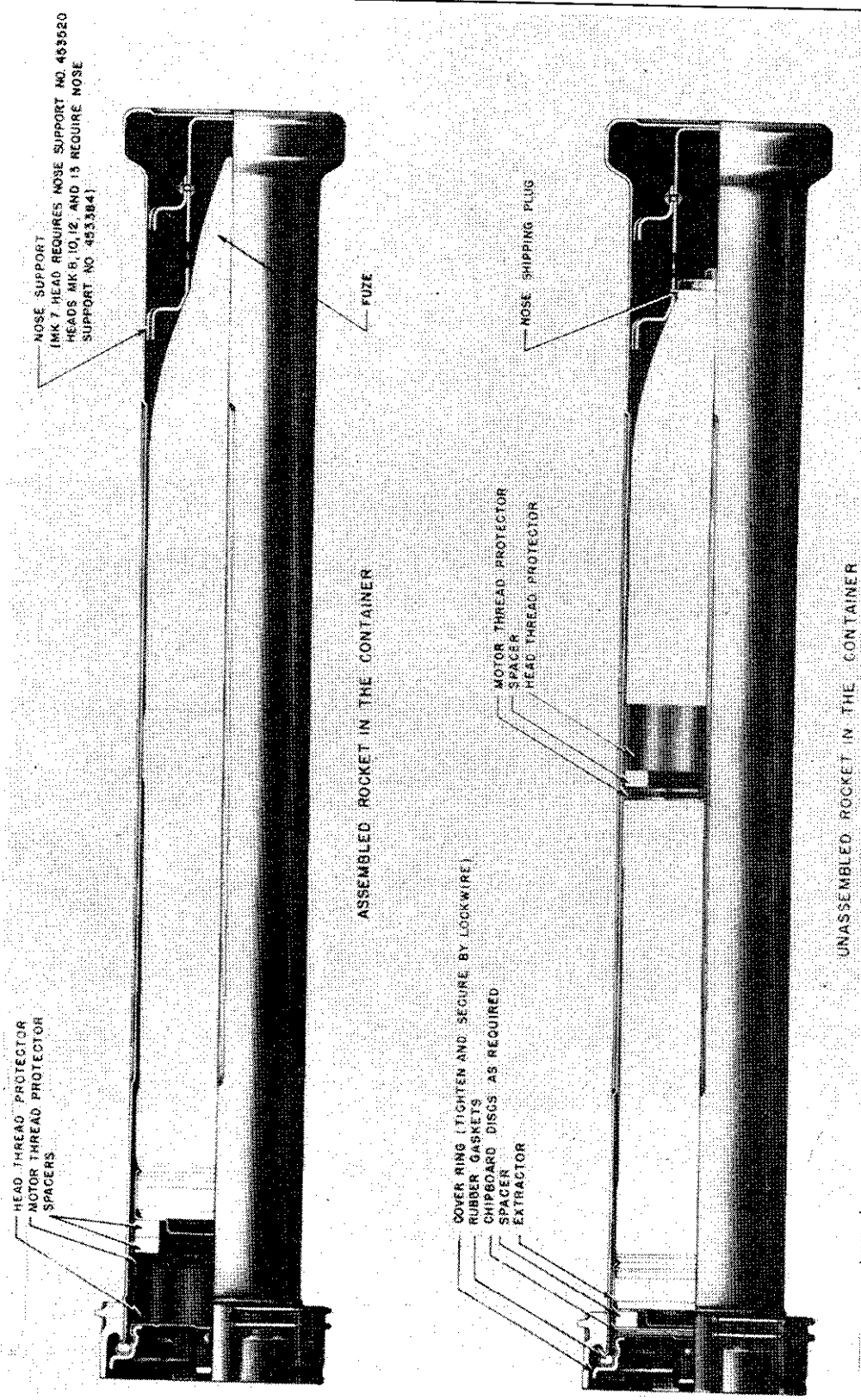

Figure 10.—Arrangement of Assembled and Unassembled 5.0-in. Rockets in Rocket Container Mk 10 Mod 0.

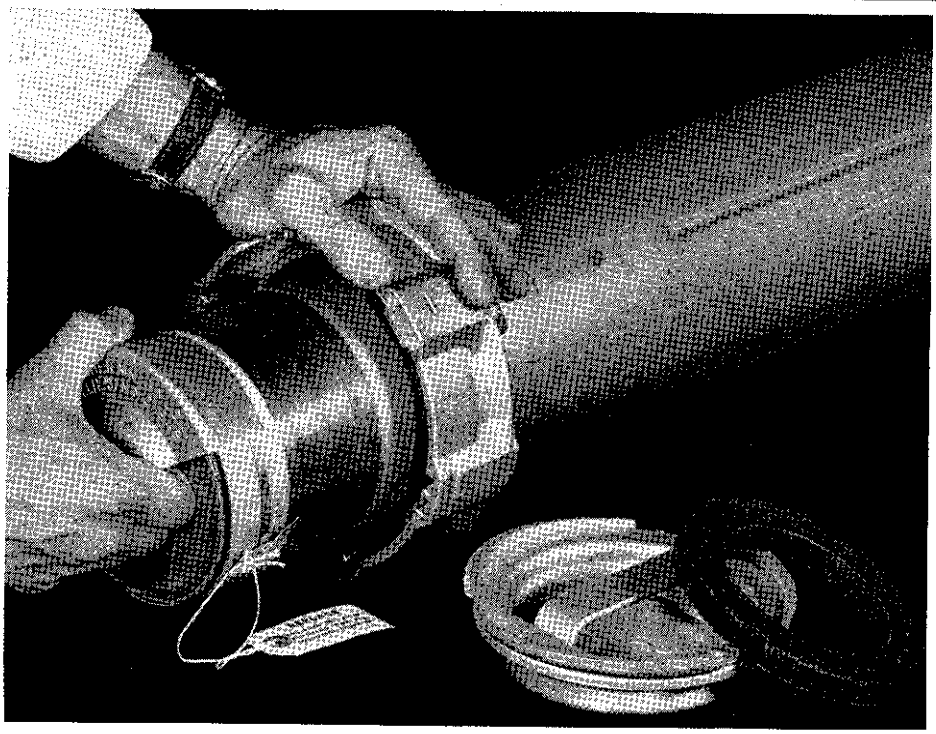

Figure 11.—Use of Extractor in Removal of 5.0-in. Rocket Motor From Rocket Container Mk 10 Mod 0.

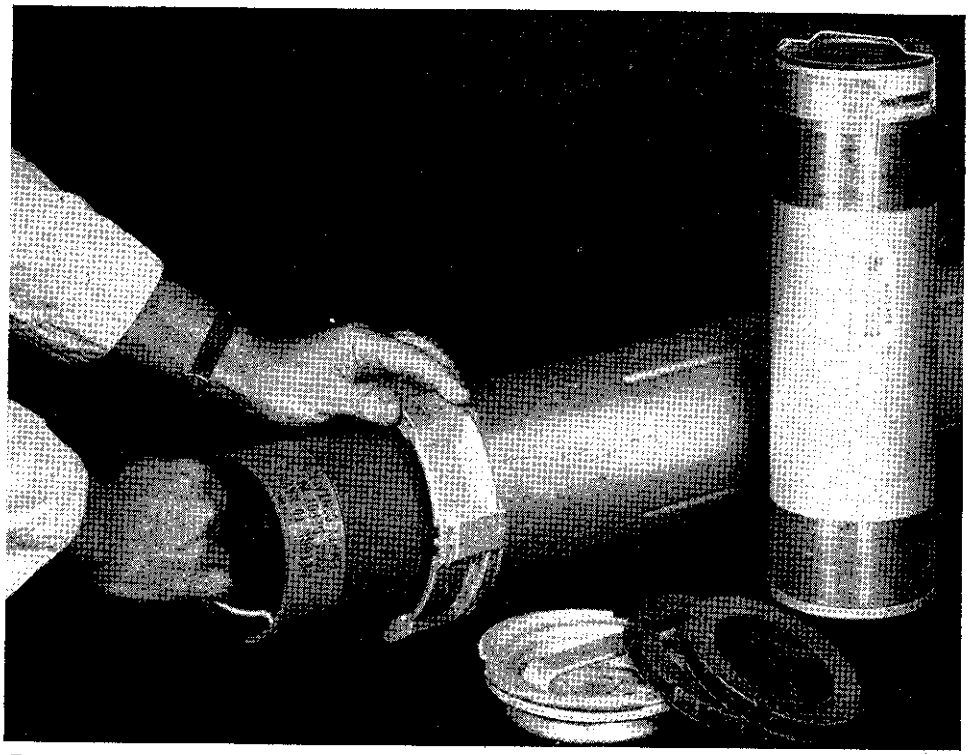

Figure 12.—Removal of 5.0-in. Rocket Head From Rocket Container Mk 10 Mod 0.

Chapter 7

STOWAGE

Unassembled Ammunition

The heads and motors described in this pamphlet may be stowed, ashore or aboard ship, unassembled in the tanks in which they were shipped. Stow rockets in cool, dry magazines in accordance with the requirements for the stowage of case ammunition as specified by articles 14C3 (b) and 14D12 (j) of the Bureau of Ordnance Manual (1943 Edition). Maintain stowage temperature below 90° F if practicable, but stowage up to 100° F is not considered hazardous.

Safety Precautions

Warning. Prolonged stowage at or above 100° F is considered definitely hazardous; take positive steps to prevent this condition.

Warning. Rocket motors are fired electrically; therefore, do not stow motors in the same compartment with or near antenna leads, radio, or radar apparatus.

When rockets are issued in cylindrical metal containers, it is mandatory that the motors be stowed in these containers, unless stowage of the motors out of their tanks has been specifically approved by the Bureau of Ordnance.

Ready Service Ammunition

At the discretion of the Commanding Officer, ready service rounds may be stowed assembled and fuzed with the rounds pointing outboard if practicable. It is to be emphasized that in assembling and fuzing a complete round, a certain measure of safety is lost because, should the propellant powder become ignited from any cause whatsoever, the round will attain its maximum rotational velocity and arm the fuze whether it is in the launcher or not. In view of the above, delay the fuzing of the General Purpose and High Capacity rounds until the shortest possible time, commensurate with the tactical situation, before loading the launcher. This time should be a matter of hours and not days.

In loading Rocket Launcher Assembly Mk 102 Mod 0, when a rate of fire is required in excess of that attainable with maximum safety, ready the actual number of rounds so required by removing the short-circuiting band and setting the Fuze Mk 30 or Mk 100 in advance, as ordered by competent tactical authority.

Safety Precaution

Warning. Keep rockets in the shade and away from direct sunlight or other heat sources. Do not fire a rocket when the motor has been exposed for more than 1 hour to temperatures outside the safe firing temperature limits specified on the motor tube. Maintain within the safe firing temperature limits, for at least 6 hours before use, all ammunition which has been exposed to temperatures outside the safe firing temperature limits. In general, a motor which is too hot to handle comfortably in the bare hands is too hot to fire.

Chapter 8

ROCKET CIRCUIT CONTINUITY TESTER

Safety Precaution

Warning. Do not use this tester aboard ship.

In order to eliminate misfires check the motor electircal circuit immediately prior to issuing ammunition to ships. Circuit Continuity Tester Model 680–A shown in figure 13 is an electric instrument based on the Wheatstone Bridge Circuit with a self-contained battery. A jack plug with an attached pair of test leads is supplied with each tester. The tester is so designed that the current flowing through the circuit under test cannot exceed 5 milliamperes.

The meter indicates in ohms the resistance of the electrical circuit of the motor. The meter has a double scale, the upper one of which, marked ROCK CONT. indicates the resistance of 5.0-in. spin-stabilized surface rocket motors and all others containing single squib igniters.

The lower scale, marked HVAR, is not used in connection with this publication but is used with rockets containing double squib igniters, such as the 5.0-in. HVAR and the 11.75-in. AR.

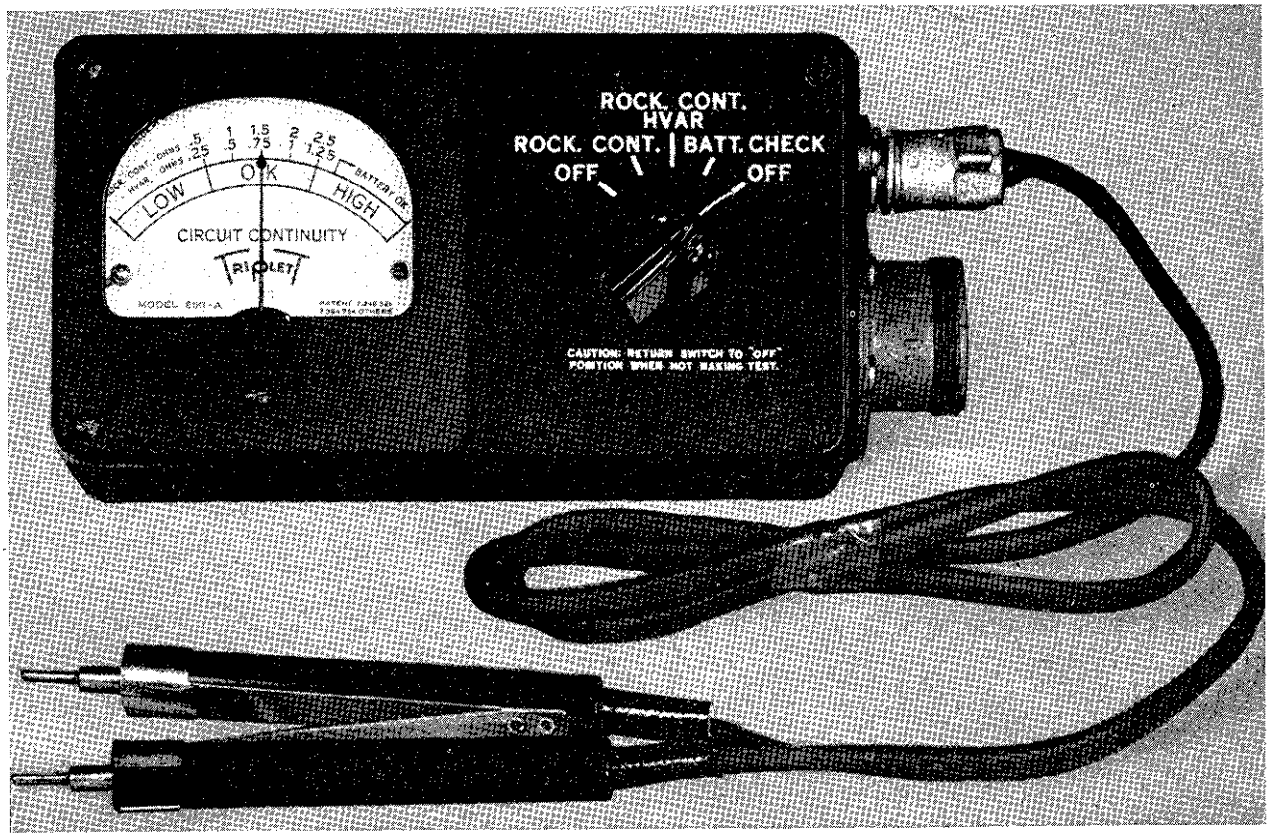

Figure 13.—Circuit Continuity Tester Model 680–A.

Adjustment of Tester

1. Before using the instrument, zero the pointer.

2. With the selector switch in the OFF position, turn the adjusting screw slowly and carefully until the pointer rests directly over the index mark centered over OK on the dial.

3. Check the tester battery by turning the selector switch to BATT. CHECK. A good battery is indicated by a pointer deflection to the right of the line marked BATTERY OK. A low battery (15 percent below normal) is indicated by a pointer deflection to the left of the line marked BATTERY OK.

4. To replace a low battery, unscrew the four screws in the corners of the instrument. Lift the face of the instrument away from its base. Remove the old battery and replace with a 1½-volt Everready # 935 or Signal Corps BA–42 battery or equivalent. Snap the battery into its holder with the center terminal of the battery toward the long battery terminal (marked with a red dot). Replace the cover on the instrument.

5. Repeat battery check. If the battery tests OK, proceed with the continuity test.

Safety Precaution

Warning. Conduct the testing of the electrical circuit of the rocket motor before it is assembled to the head. When the test voltage is applied, make certain personnel are not in front of or behind the rocket motor since it will shoot hot exhaust gases in both directions if ignited accidentally.

Testing of 5.0-in. Rocket Motors

1. Remove the short-circuiting band from the motor.

2. Insert the jack plug of the test leads firmly into the appropriate receptacle on the instrument.

3. Turn the switch to ROCK. CONT.

4. Touch one prod of the test leads to the insulated contact ring of the motor and at the same time touch the other prod to the nozzle plate ring in the manner shown in figure 14. If the pointer rests within the space marked OK the motor is satisfactory for use. Do not use the motor if the pointer rests within the LOW or HIGH sections of the scale.

5. Remove the test leads from the instrument and turn the switch to OFF.

Safety Precaution

Warning. Replace the short-circuiting band on the motor immediately after the test.

Care of Instrument

To insure the proper functioning of this tester the following precautions should be observed:

1. Never use the tester on equipment that contains batteries or other sources of electricity.

2. Keep the selector switch in OFF position when the instrument is not in use. Failure to do so will cause the battery to run down.

3. Handle the instrument carefully at all times to prevent damage to the delicate parts.

4. Keep the instrument and carrying case dry.

5. When placing the instrument in the carrying case make sure the meter end is toward the bottom.

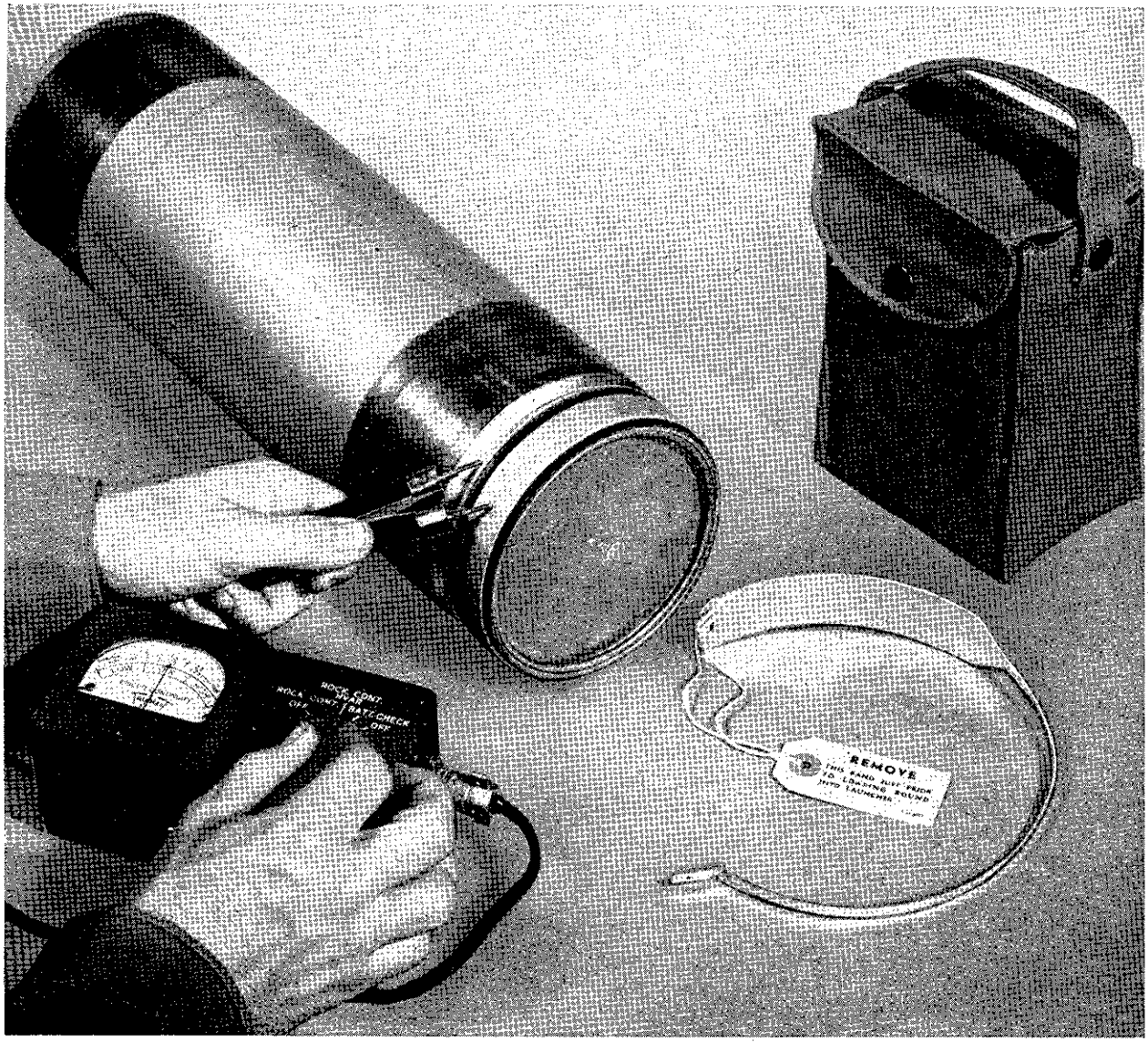

Figure 14.—Testing of 5.0-in. Rocket Motor With Circuit Continuity Tester Model 680–A.

Chapter 9

ASSEMBLING THE AMMUNITION

The rockets are assembled and disassembled with the use of Assembly Kit Mk 2 Mod 0. If this kit is not available, strap wrenches and bench clamps should be used for making the assembly.

Assembly Kit Mk 2 Mod 0

The kit consists of the following tools:

1 Vise Mk 2 Mod 0
2 5.0-in. Utility Spanner Wrenches (BuOrd dwg 592882 Rev. A)

Vise Mk 2 Mod 0 is used to hold the motor during assembly or disassembly. The vise is of the quick-acting toggle clamp type, and is shown in figure 15. It should be bolted to a bench or table during use.

In order to adjust the upper jaw of the vise for a tight grip on the motor proceed as follows:

1. Place the motor in position in the lower jaw of the vise.
2. Loosen the locknuts on the screw of the upper jaw.
3. Move the handle of the Kwik-Klamp to the closed position.
4. Tighten the lower locknut until the motor cannot be turned in the vise.
5. Tighten the upper locknut.

5.0-in. Utility Spanner Wrench (BuOrd dwg 592882 Rev. A) is used on the heads and on the head and motor thread protectors which are recessed to accept the pin of the wrench. There is a rectangular hole in the handle to fit the flats of nose shipping plugs. All the heads, thread protectors, and nose plugs of the current rounds will accept this wrench.

Assembly Procedure

In assembling 5.0-in. spin-stabilized rockets with the use of Assembly Kit Mk 2 Mod 0 proceed as follows:

1. Remove the thread protector cap from the base of the head of the round being assembled. If necessary, secure the head in the vise while using the spanner wrench to remove the thread protector.

Safety Precaution

2. **Warning.** Check 5.0-in. Rocket Head Mk 8 All Mods to make certain that the base fuze is in place as illustrated in figure 3. If the base fuze is not in place in the head, and the head is assembled to a motor, the head will detonate when the rocket is fired. Turn over to the nearest ammunition depot any Rocket Head Mk 8 from which the base fuze has been omitted, or dispose of it either by lowering it gently overboard in deep water or in a manner prescribed by competent authority.

3. Remove the motor thread protector from the forward end of the motor of the round being assembled. If necessary, secure the motor in the vise while using the spanner wrench to remove the thread protector. DO NOT REMOVE THE FELT SPACERS which are necessary for the proper spacing of the head, igniter, and propellent grain.

Safety Precaution

4. **Warning. Do not remove the rear closure of the motor;** flame might enter the nozzles and ignite the propellant prematurely. A rocket without a rear closure, placed in the magazine of an automatic launcher, might be ignited by the exhaust blast deflected from a rocket in the firing tube. The launcher would be damaged and since the spinning of the rocket would arm the fuze, the head might well be detonated.

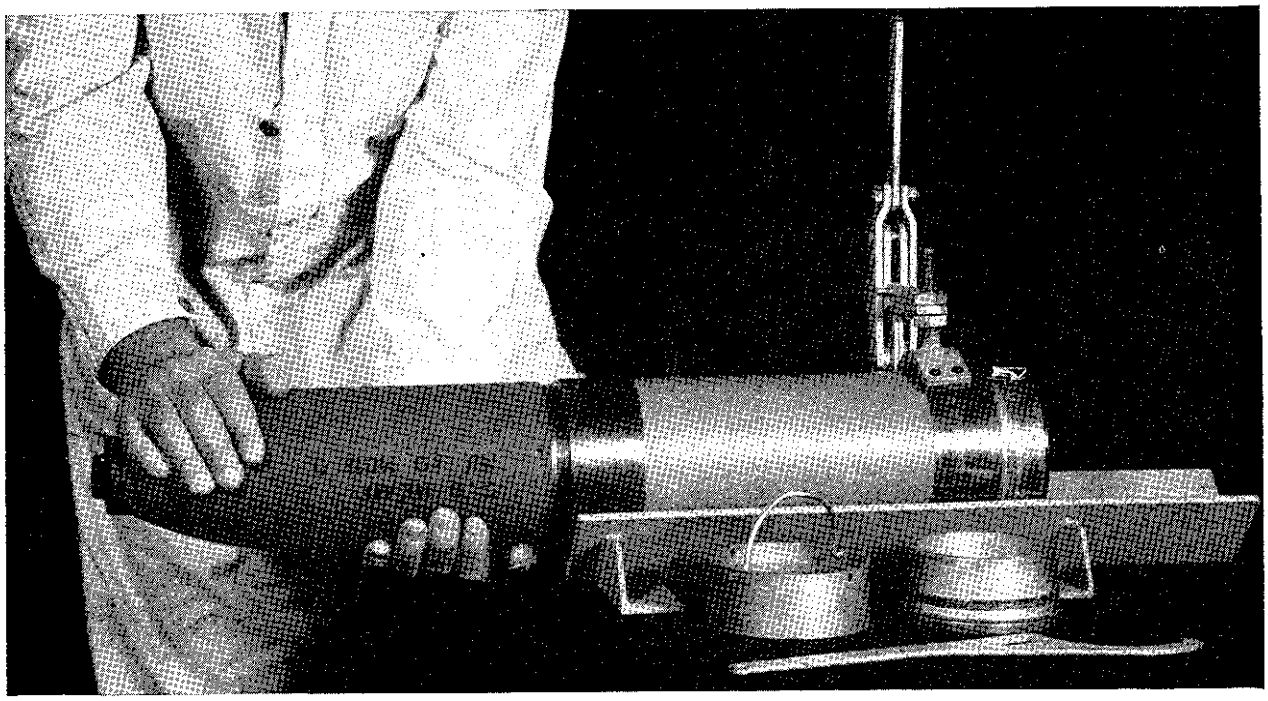

Figure 15.—Use of Assembly Kit Mk 2 Mod 0 in Threading of Head to Motor by Hand.

5. Check the threads of the head and motor for wax, dirt, and injury. Clean the threads if necessary.

6. Secure the motor in the vise leaving sufficient room on the vise forward of the end of the motor for support of the head.

7. Place the head on the vise and start the threading operation by hand as shown in figure 15. If the threads bind, turn the head in reverse until the threads are properly aligned. The head should turn easily into the motor if the threads are clean and in proper condition.

8. If the head does not thread easily into the motor, a strap wrench like that shown in figure 16 may be used. The head should be screwed into the motor until it is wrench tight and, in so far as possible, the seating surfaces meet firmly. If more force is needed than can be applied with the strap wrench, the utility spanner wrench can be used as shown in figure 17 to tighten the head by engaging the pin of the wrench in the hole provided on the base of the ogive.

9. On rounds mounting a nose fuze remove the nose shipping plug of the head with the spanner wrench in the manner illustrated in figure 18.

10. Make sure that the auxiliary detonating fuze is in position.

11. Screw the nose fuze wrench-tight all the way into the nose of the head as shown in figure 19. A fuze wrench for this purpose is supplied in each box of fuzes.

12. Remove the assembled round from the vise. Wipe the grease off the bourrelets and the contact ring before loading round in the launcher.

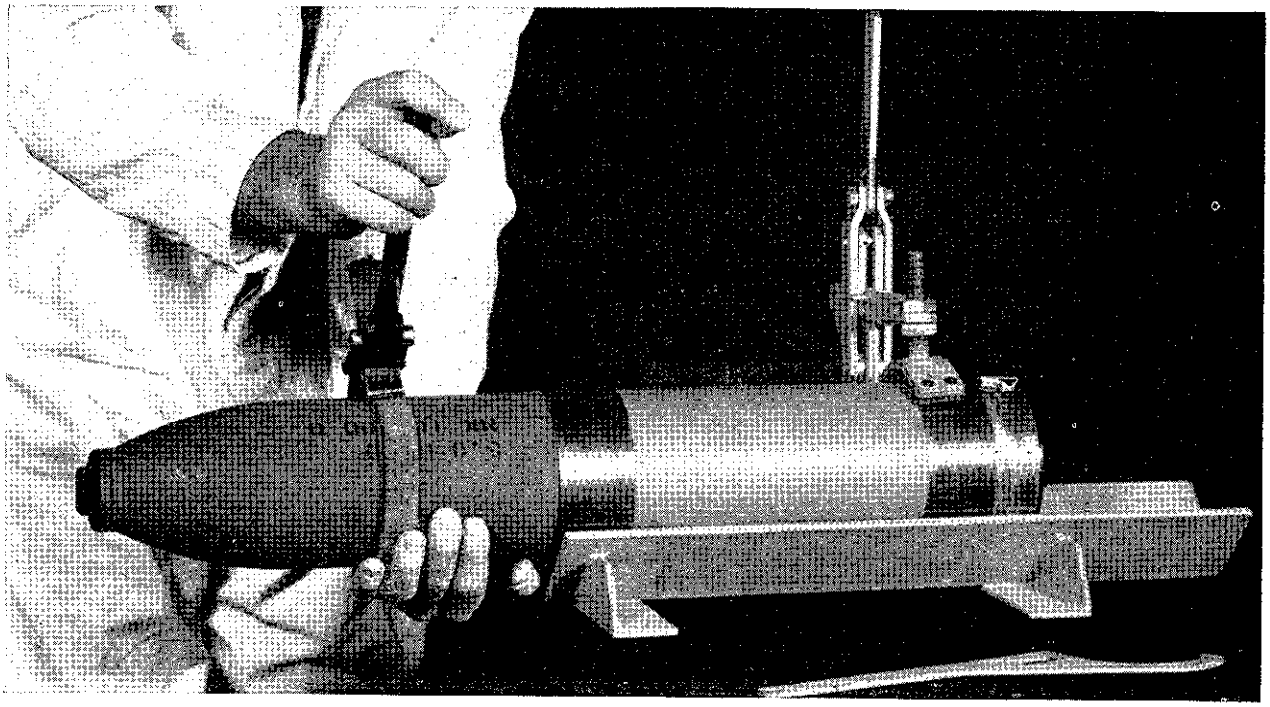

Figure 16.—Use of Strap Wrench in Assembly of Head and Motor.

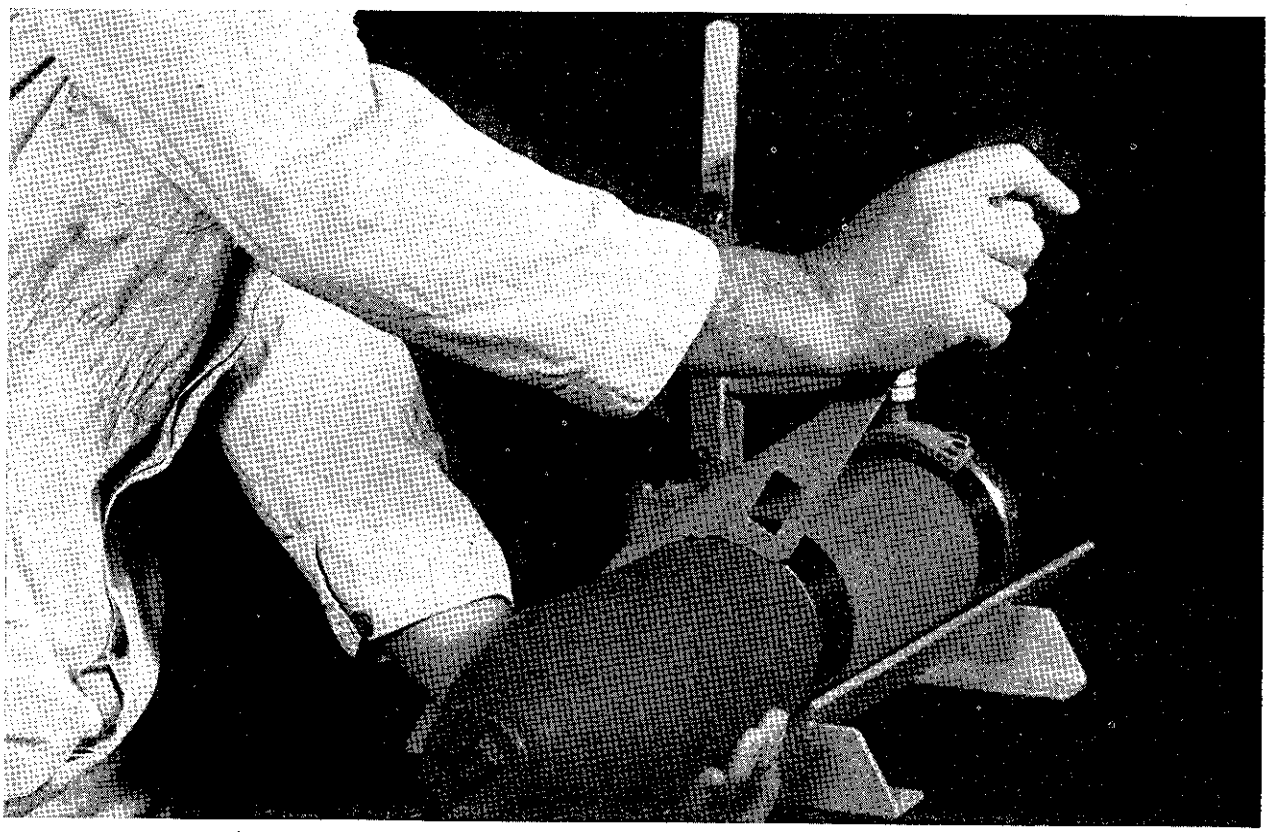

Figure 17.—Use of Spanner Wrench in Assembly of Head and Motor.

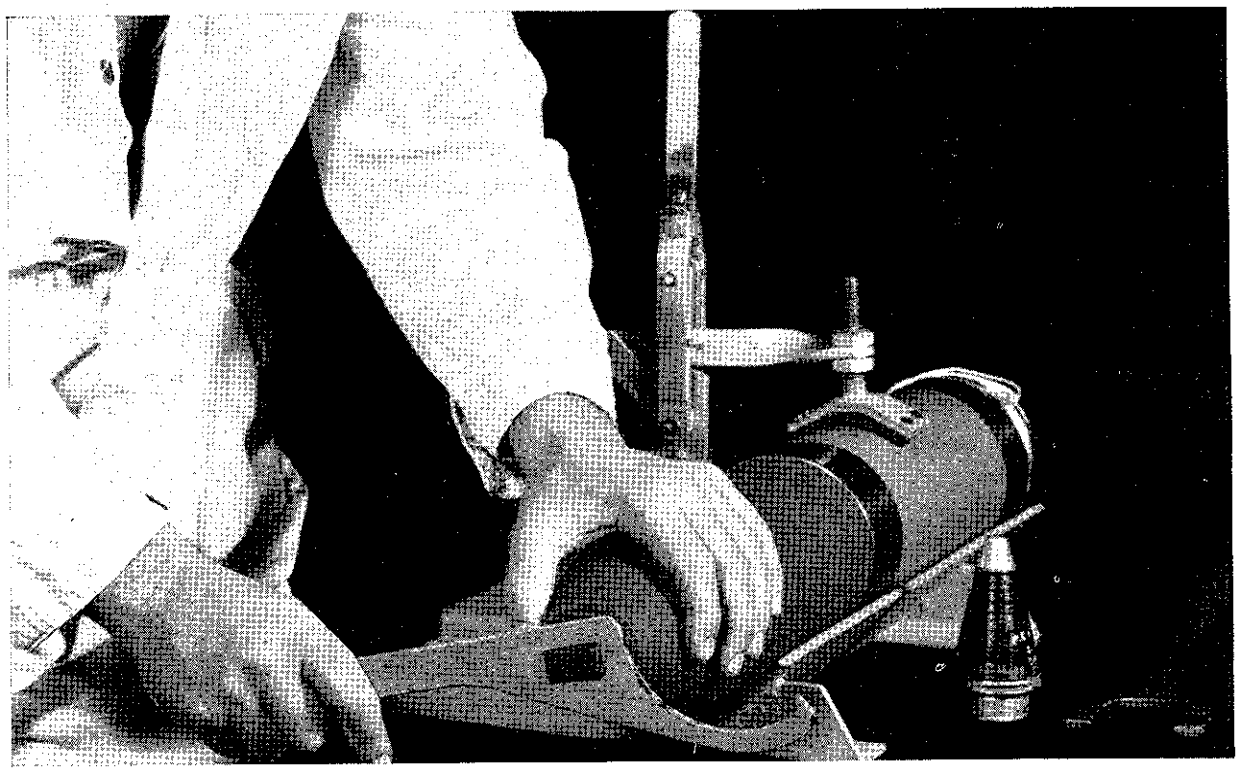

Figure 18.—Removal of Nose Shipping Plug With Utility Spanner Wrench.

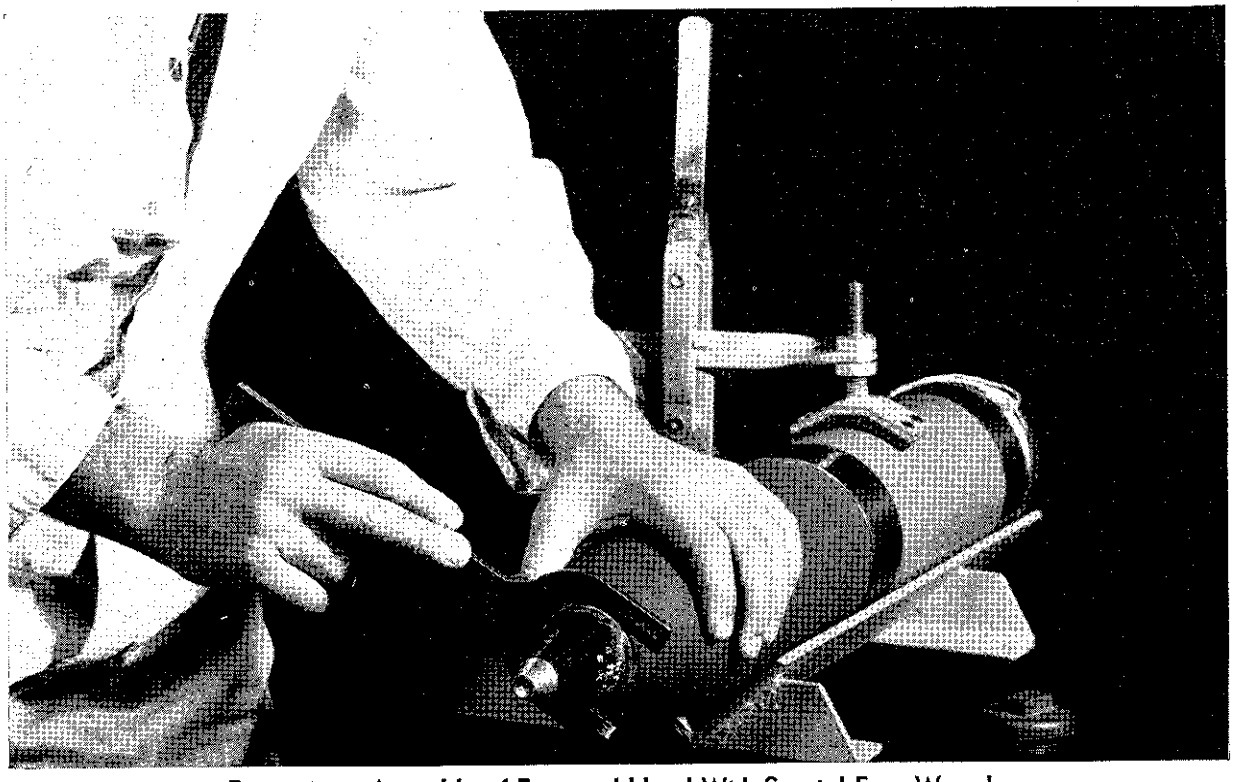

Figure 19.—Assembly of Fuze and Head With Special Fuze Wrench.

Chapter 10

DISASSEMBLING THE AMMUNITION

The rockets described in this pamphlet may be disassembled with the use of Assembly Kit Mk 2 Mod 0 and, in general, are disassembled as follows:

Safety Precaution

1. **Warning.** Make certain the short-circuiting band is in place on the motor. Fasten the band around the motor so that the tongue and projections lie in the depression between the contact ring and the locking groove, and tighten the clip securely.

2. Where Nose Fuze Mk 30 Mods 3 or 4 is used, turn the setting sleeve from the ON-SQ to the OFF-OFF position. Where Nose Fuze Mk 100 Mod 2 is used, turn the setting sleeve from SQ-SQ to DELAY-DELAY since the delay train is less sensitive to shock than the superquick train.

3. Remove the nose fuze with the proper fuze wrench and replace the nose shipping plug.

4. Inspect the fuze carefully for moisture, and make certain that it is not coated with salt. Any dampness will corrode the working parts. Replace the fuze in its container and seal the container with adhesive tape.

5. Unscrew the head from the motor.

6. Replace the head thread protector on the base of the head.

7. Replace the motor thread protector on the motor.

8. To prevent rusting, coat the bourrelets on the motor lightly with Rust Inhibitor Navy Department Specification 52C18 Grade II (or equivalent).

9. Repack the round components in the metal shipping tanks, placing the head support and spacer blocks in the original positions shown in figure 10.

Chapter 11

REMOVING ROUNDS FROM LAUNCHERS

Safety Precaution

Warning. Before a round is removed from a launcher, make certain that the firing panel safety plug has been removed from the firing panel and that the firing system of the launcher cannot be energized.

Misfired Rounds

Misfires have been known to hang fire for as long as 5 minutes, and a hangfire for as long as 10 minutes is considered possible. The safety interval before clearing a misfire is set at 10 minutes, therefore. However, since the safety with which rounds may be handled is directly connected with launcher constructions, detailed instructions for the removal of misfired rounds will be included in Publications on the specific launchers.

Safety Precaution

Warning. Whenever danger of accidental firing exists, keep all personnel clear of the possible exhaust blast of the rocket motors.

Unfired Rounds

1. Remove the round from the launcher and replace the short-circuiting band on the insulated contact band on the motor tube immediately.

2. Return to ready stowage all rounds on which no attempt to fire has been made and all rounds which have not been in hot launcher tubes. Disassemble and stow in the normal manner.

3. If the rounds are in hot launcher tubes, spray and cool with water before removal.

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APPENDIX A

Assembled Rocket Data—5.0-in. Spin-Stazilized Surface Rockets

COMPLETE ROUND DESIGNATION	MK 7 MOD 2 Gen. Purpose	MK 10 MOD 0 High Capacity	MK 10 MOD 1 High Capacity	MK 13 MOD 0 High Capacity	MK 16 MOD 0 High Capacity	MK 24 MOD 0 Common	MK 25 MOD 0 Dummy
Nominal Maximum Overall Length as Fired (in.)	31.6	32.2	32.2	32.2	32.7	28.8	32.2.
Nominal Weight of Round as Fired (lb).	48.69	49.84		51.59	53.93	51.29	42.77 (empty).
Velocity at End of Burning (ft per sec).	1,540	830	830	480	400	1,480	
Minimum Arming Distance of Fuze Combination at 120° F Initial Propellant Temperature (ft).	24	47	(See OP 1480)	69	22	26	
Maximum Range at 45° Elevation (yd).	10,000	5,000	5,000	2,400	1,250	10,000	
Head Designation (All 5.0-in. Mks and Mods).	Mk 7 Mods 1, 2, 3 General Purpose.	Mk 10 Mods 6–10 High Capacity.	Mk 10 Mod 11 High Capacity.	Mk 12 Mods 0–4 High Capacity.	Mk 13 Mods 0–4 High Capacity.	Mk 8 Mod 1 Common.	Mk 10 Mod 1 Practice.
Explosive Filler, Type and Weight (lb).	TNT, 2.8	TNT, 9.6	TNT, 9.6	TNT, 12.0	TNT, 13.5	Expl. D 1.7	Plaster Filler.
Nose Fuze	Mk 100 Mod 2	Mk 30 Mods 3, 4	V T Mk 173 Mod 4.	Mk 30 Mods 3, 4	Mk 30 Mods 3, 4	None	None.
Auxiliary Detonator	A. D. Mk 44 Mod 2.	A. D. Mk 44 Mod 2.	None	A. D. Mk 44 Mod 2.	A. D. Mk 52 Mod 2.	None	None.
Base Fuze	None	None	None	None	None	Mk 31 Mod 0	None.
Motor Designation (All 5.0-in. Mks and Mods).	Mk 3 Mods 1, 4	Mk 4 Mods 1, 4	Mk 4 Mods 1, 4	Mk 5 Mods 1, 4	Mk 6 Mods 1, 4	Mk 3 Mods 1, 4.	Mk 9 Mod 0 (Surface, Dummy).
Propellant Grain	Mk 21 Mod 0	Mk 22 Mod 0	Mk 22 Mod 0	Mk 24 Mod 0	Mk 25 Mod 0	Mk 21 Mod 0	None.
Igniter	Mk 117 Mod 0	Mk 118 Mod 0	Mk 118 Mod 0	Mk 120 Mod 0	Mk 120 Mod 0	Mk 117 Mod 0	(Base Closure Assembly BuOrd Sk. 145922).
Number of Nozzles	8	8	8	4	4	8	None.

NOTE: The dimensions and weights for the Practice and Dummy rounds for the above ammunition are nominally those appearing in the table above. The designations of the heads and motors are listed in the text under descriptions of the rounds. The motor, propellant grain, igniter, and nozzle data specified above apply to the motors of the PRACTICE rounds. No fuzes or loaded heads are used in either Practice or Dummy rounds.

RESTRICTED

APPENDIX B

Shipping Data—5.0-in. Spin-Stabilized Surface Rockets

Shipping Container Data:

Designation ..... 5.0-in. Rocket Container Mk 10 Mod 0
Container Length ..... 39.0 in.
Stacking Diameter ..... 6.88 in.
Displacement ..... 0.84 cu ft
Nominal Weight of Container (including nose support, 2 spacers, and extractor) ... 9.7 lb
Nominal Weight of Container as returned to Ammunition Depots (Same as above plus 2 thread protectors) ..... 12.7 lb
Nose Support for 5.0 in. Rocket Mk 7 All Mods ..... BuOrd Dwg 453520
Nose Support for 5.0 in. Rockets Mks 10, 13, 16, and 24 All Mods .. BuOrd Dwg 453384

Loaded Shipping Weights*

	Rocket Designation				
	Mk 7 all Mods	Mk 10 all Mods	Mk 13 all Mods	Mk 16 all Mods	Mk 24 all Mods
Unassembled (as shipped) (lb)	62. 7	61. 8	63. 6	65. 9	64. 0
Assembled (including fuze) (lb)	63. 4	62. 5	64. 3	66. 7	64. 0

*Weights may vary plus or minus 1 pound due to variance of materials used in fabrication of container components.

SAFETY PRECAUTIONS

Preamble

There are dangers inherent in the handling and firing of rockets which, although probably remote in materializing, nevertheless cannot be ignored. Certain dangers, among others associated with explosive materials, are pointed out in the following statements.

1. Pieces of electrical wiring to the squibs of the rocket motors, as well as slivers of burning propellant, may be ejected with high velocity during the initial part of the trajectory of the rocket. Not all of these are deflected by the launcher blast deflector.

2. The metallic closure disks on the rocket motor are thrown upwards and backwards from the blast deflectors.

3. The production testing of 1 percent of rocket motors has resulted in three motor explosions in the firing of 7,150 rounds at 120° F. Those explosions may occur in the launcher guides as well as immediately beyond the muzzle.

4. A hangfire of 5 minutes duration has been reported. The safety interval before clearing a misfire is set at 10 minutes, therefore.

The following safety precautions are listed for the purpose of preventing unnecessary hazards to personnel under normal conditions. Blind adherence to these precautions is not intended. Extraordinary occasions are forseen, when, at the discretion of the Commanding Officer or other responsible personnel during actual combat or impending danger to the ship or her equipment, or in the presence of an enemy, some or all of these safety precautions may have to be disregarded temporarily.

Safety Precautions for 5.0-in. Spin-Stabilized Rocket Ammunition

General.

1. Wear long-sleeved shirts with the sleeves buttoned snugly about the wrist.

2. Whenever danger of accidental firing exists, keep all personnel clear of the possible exhaust path of the rockets.

3. Do not alter rockets and components, nor disassemble or remove base fuzes or any other parts without explicit instructions from the Bureau of Ordnance. Do not allow heads to rust or become oversize from excess painting.

4. If the air-tight seals on rocket motors are broken, the propellant safe life will be decreased. Moisture will enter the motor and ignition reliability will be reduced. If the rear closure of the motor is removed, flame may enter the nozzles and ignite the propellant prematurely. A rocket without a rear closure, placed in the magazine of an automatic launcher, may be ignited by the exhaust blast deflected from a rocket in the firing tube. Should such occur, the launcher would be damaged, and since the spinning of the rocket would arm the fuze, the head might well be detonated. Therefore, keep the front and rear closures of the motor tubes in place at all times. If one of the closures has been broken or removed, tag the motor to show the nature of the trouble and any other pertinent information, and turn it over to the nearest ammunition depot. If this is impossible, dispose of the motor by lowering it gently overboard into deep water, or in a manner prescribed by competent authority.

5. Keep rockets in the shade and away from direct sunlight or other heat sources. Never fire a rocket when the motor has been exposed for more than 1 hour to temperature outside the safe firing temperature limits specified on the motor tube. Maintain within the safe firing temperature limits for at least 6 hours before use all ammunition which has been exposed to temperatures outside the safe firing temperature limits. In general, a motor which is too hot to handle comfortably in the bare hands is too hot to fire.

Stowage.

6. Stow rocket motors in cool, dry magazines in accordance with the requirements for the stowage of case ammunition as specified by articles 14C3 (b) and 14D12 (j) of the Bureau of Ordnance Manual (1943 Edition).

7. Rocket motors are fired electrically; there-

fore, do not stow motors in the same compartment with or near antenna leads, radio, or radar apparatus.

8. Prolonged stowage at or above 100°F is considered definitely hazardous; take positive steps to prevent this condition.

Electrical Circuit Tests.

9. Do not use the circuit continuity tester aboard ship.

10. Test the electrical circuit of the rocket motor only before the motor is assembled to the head.

11. When the test voltage is applied, be certain that personnel are not in front of or behind the rocket motor since hot gases will be expelled in the event of accidental ignition.

12. Replace the short-circuiting band on the motor immediately after the circuit continuity test.

Fuzes.

13. Do not disassemble rocket fuzes except at authorized activities when directed by the Bureau of Ordnance.

14. Before assembling the 5.0-in. Rocket Head Mk 8 to the rocket motor, make certain that the base fuze is present and properly installed in the rocket head. If the base fuze in the 5.0-in. Rocket Head Mk 8 is not in place in the head, the head will detonate when the rocket is fired. Turn over to the nearest ammunition depot any Rocket Head Mk 8 from which the base fuze has been omitted, or dispose of it either by lowering gently overboard in deep water or in a manner prescribed by competent authority.

15. Do not attempt to remove the base fuze from the base of the 5.0-in. Rocket Head Mk 8 at any time.

16. Do not handle rocket fuzes after the round has been fired and recovered. Dispose of any dud round utilizing these fuzes by gently lowering it base down into deep water, or by transferring custody to Ordnance Disposal personnel. Do not attempt to remove the fuze from a dud round. Fuze Mk 100 Mod 2 may be more unsafe to handle after the round has been fired and recovered than the other fuzes, since the delay mechanism, when once armed, remains locked in the armed position.

Removal from Launcher.

17. Before a round is removed from a launcher, make certain that the firing panel safety plug has been removed from the firing panel and that the firing system of the launcher cannot be energized.

18. On removal of the round from the launcher, replace the short-circuiting band on the insulated contact band on the motor. Fasten the band around the motor so that the tongue and projections lie in the depression between the contact ring and the locking groove, and tighten the clip securely. The short-circuiting band is to remain in place at all times except for actual loading operations.

Notice: In any operation involving fuzing, unfuzing, assembly, disassembly, cleaning, painting, etc., of all types of munitions, perform the work in the most suitable location, taking into account removal a safe distance from other explosives as well as possible damage to vital installations. Expose the smallest number of rounds practicable. Allow in the vicinity only those persons actually essential for the work. If possible, perform work on one round at a time, in a location on deck remote from all magazines, from ready stowages, from other supplies of ammunition or explosives, and from vital installations.

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*Applicable Groups and Subgroups.

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