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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE
MANUAL

FLARE, AIRCRAFT: PARACHUTE, MK45



HEADQUARTERS, DEPARTMENT OF THE ARMY

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FLARE, AIRCRAFT: PARACHUTE, Mk45

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CHAPTER 1

INTRODUCTION

1-1. Scope

These instructions provide operator and organizational maintenance for Flare Mk45. This flare provides lighting for battlefield illumination, target marking and reconnaissance. They are launched internally from fixed-wing and rotary-wing aircraft.

1-2. Forms, Records and Report

a. General. Commanding Officers of units receiving this ammunition are responsible for preparation of records and reports. For reporting purposes, ammunition is identified by lot numbers, standard nomenclature, etc.

b. Field Reports of Accidents. Accidents involving injury to personnel or damage to material are reported on DA Form 285 or DA Form 1051, in accordance with instructions in AR 385-40.

c. Malfunction Reports.

(1) *Definition of a malfunction.* A malfunction is a failure of the flare to perform as expected when armed or launched. For reporting purposes, malfunctions do not include accidents and fires resulting from negligence, malpractice and the like. However, malfunctions do include

abnormal or premature functionings which occur during normal handling, maintenance, storage, transportation and tactical deployment.

(2) *Malfunctions involving standard issue items.* The procedure in AR 700-1300-8 will be followed in reporting malfunctions which occur during the following:

(a) Training and combat missions.

(b) Tests (including comparison, safety, climatic, reliability, etc.) conducted subsequent to the acceptance test.

d. Report of Damaged or Improper Shipment. Damaged or improper shipments will be reported immediately to the forward supply unit (FSU), ammunition supply point (ASP) or depot from which the flares were issued.

e. Fire Reports. As prescribed by AR 385-12, DA Form 5-2 will be used to report fires or explosions followed by fire. DA Form 5-2 will be submitted in addition to the accident reports required by AR 385-40.

f. Errors, Omissions and Recommended Changes. The reporting of errors, omissions and recommendations for improving this publication is authorized and encouraged. In this connection, DA Form 2028 will be used. Completed forms will be forwarded direct to the Commanding Officer, Picatinny Arsenal, ATTN: SMUPA-DC5, Dover, N. J., 07801.

CHAPTER 2

SAFETY, CARE AND HANDLING

2-1. Precautions

- a. Handle flares with utmost care at all times.
- b. Do not drop, drag, throw, tumble or otherwise strike boxes containing flares.
- c. Exercise care if flares show evidence of moisture inside the flare container. Dispose of Flares Mk45 that have been exposed to moisture.
- d. Avoid exposing flares to extreme (high or low) temperatures.
- e. Do not remove damaged fuzes from flares. Consider flares with damaged fuzes hazardous. Contact authorized munitions personnel immediately for disposal.
- f. Do not touch, move or otherwise handle duds -- their fuses may be armed. Have authorized personnel only destroy duds.

2-2. Safety

WARNING

Unauthorized alteration of flares is prohibited. Except as otherwise indicated in this manual, Aircraft Parachute Flare Mk45 is safe to handle and use.

2-3. Care

Flares are packed to withstand conditions ordinarily encountered in the field. Although the polystyrene containers provide adequate protec-

tion for shipment and storage, observe the following:

- a. Keep polystyrene containers from becoming broken or damaged.
- b. Repair or replace broken containers immediately and re-mark those bearing illegible markings.
- c. Protect flares against such foreign matter as mud, sand, moisture, frost, snow, ice, dirt, oil and grease. Wipe off wet or dirty flares at once and remove any light corrosion.
- d. Do not open containers until flares are to be used.

NOTE

Flares removed from containers, particularly in damp climates, may corrode, becoming unserviceable

2-4. Handling

- a. Have flares handled by trained, experienced personnel only. Do not subject flares to rough treatment.
- b. Protect flares from hard knocks or blows.

CAUTION

The flare outer container is easily dented, which may result in nonejection or faulty ejection of the candle.

CHAPTER 3

OPERATING INSTRUCTIONS

3-1. General

This chapter describes the physical characteristics, functioning and operation of Aircraft Parachute Flare Mk45 (fig. 3-1). Flare Mk45 is a pyrotechnic device which provides illumination in the two-million candlepower range for a period of approximately 3 1/2 minutes. It is designed for launch (using a static line technique) from fixed-wing and rotary-wing aircraft.

3-2. Description

The major components of Flare Mk45 are described below and illustrated in figures 3-1 and 3-2.

a. An *outer container*, consisting of an aluminum tube, magnaformed to a fuze adapter, houses the flare and fuze assembly. The container is approximately 2 1/4 inches shorter than the assembled flare, and part of the plastic fuze assembly extends beyond the end of the outer container. A decal on the container body gives fuze setting and safing information.

b. A *plastic shipping cap* covers the fuze end of the assembled flare and protects the fuze area during shipment and storage.

c. A *lanyard assembly* is coiled under the shipping cap. It consists of a stainless steel cable with a double coil loop at one end for attachment to an attachment loop and toggle in the fuze assembly. A swivel snaphook is attached to a loop in the lanyard about 4 1/2 inches from the coil.

d. A black plastic *lanyard retainer* is attached to the lanyard adjacent to the swivel snaphook. (The lanyard retainer is not used in hand launch procedures.)

e. A two-pronged *safety clip* holds the toggle in place in an aluminum housing in the center of the fuze mechanism. A yellow tag, attached to the prongs of the safety clip by a split key ring, warns the user not to remove the safety clip.

f. An *ejection fuze assembly*, which controls candle and parachute ejection, is secured to the flare by a fuze adapter.

(1) The fuze proper consists of an internal disconnect, a striker and plunger assembly, a 2 second (nominal) fixed delay element, a time delay fuse, and an expelling charge.

(2) The fuze setting mechanism consists of a single yellow dial indicator which can be set at 15 different positions, ranging from 500 to 14,000 feet. The setting points are marked in black on the face of the fuze. Raised projections at SAFE and at each setting point facilitate setting the fuze in total darkness. A spring-loaded detent holds the dial indicator at the selected setting.

g. A *gas check* and a *compression pad* are positioned between the fuze assembly and the candle assembly.

h. The 18-pound *candle assembly* is, essentially a paper tube containing a magnesium candle. A detonator, an explosive bolt and a suspension cable (see (9), below) are attached to one end of the assembly.

i. A *suspension/ignition assembly* which provides ignition for the candle connects the parachute and candle assemblies. A firing pin, a primer and an ignition pellet constitute the ignition assembly. The suspension assembly consists of a cable attached at one end to the explosive bolt in the candle assembly and at the opposite end, to the parachute.

j. The *parachute assembly* consists of a main parachute, a drogue chute and a deployment bag in a split cardboard container.

k. A *compression pad*, located between the parachute and the end cap, assures that all the assemblies are firmly held in place.

l. An aluminum *end cap* seals the base end of the flare.

3-3. Tabulated Data

Diameter (max)	4.87 in
Length (max)	36.0 in
Weight	28 lb
Candlepower (avg)	2 million
Burning time (avg)	210 sec
Fixed delay (nominal)	2 sec
Fixed delay (min)	1 1/2 sec
Rate of descent	7.5 fps

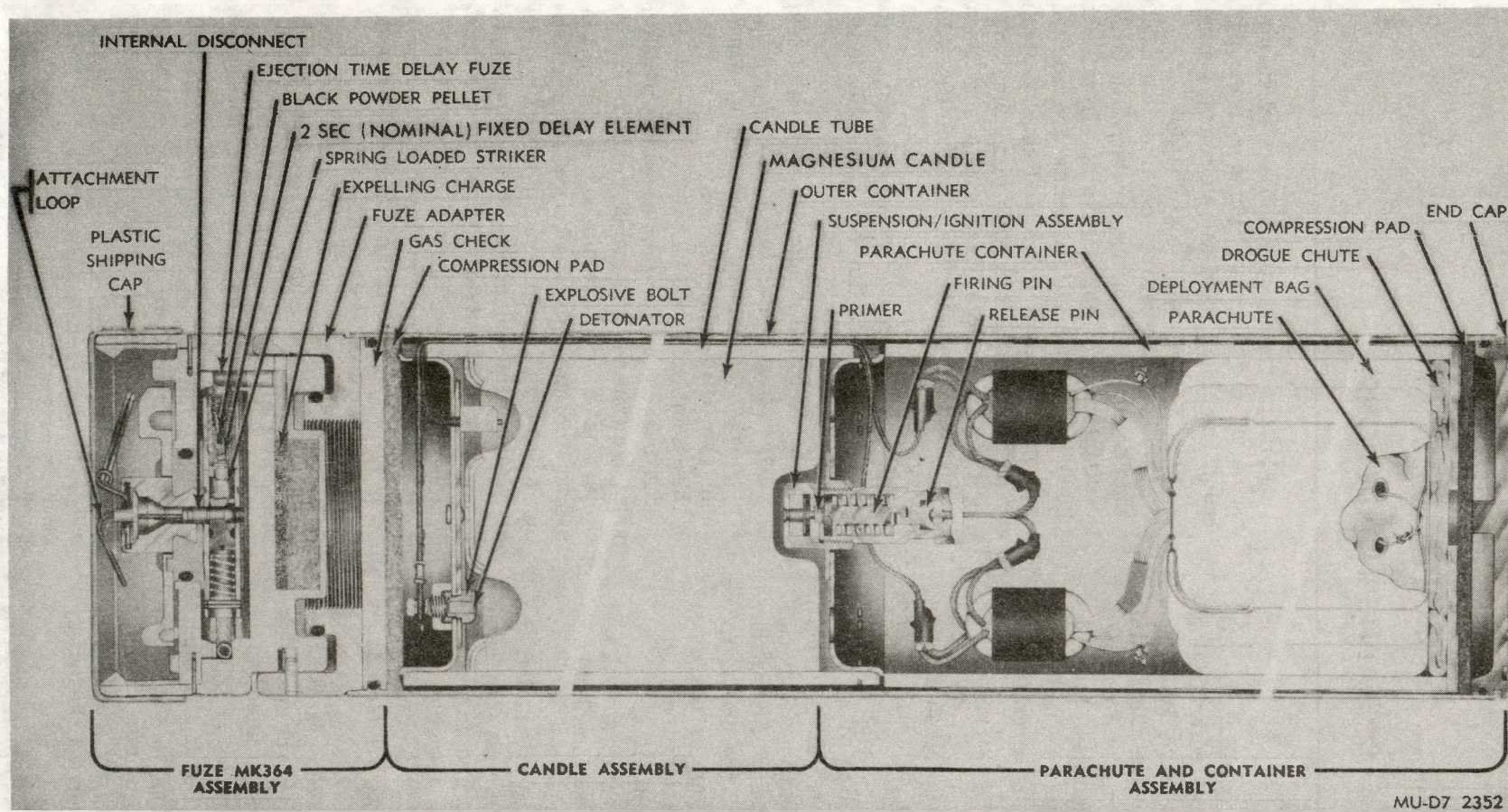


Figure 3-1. Aircraft parachute flare Mk45, cross-section.

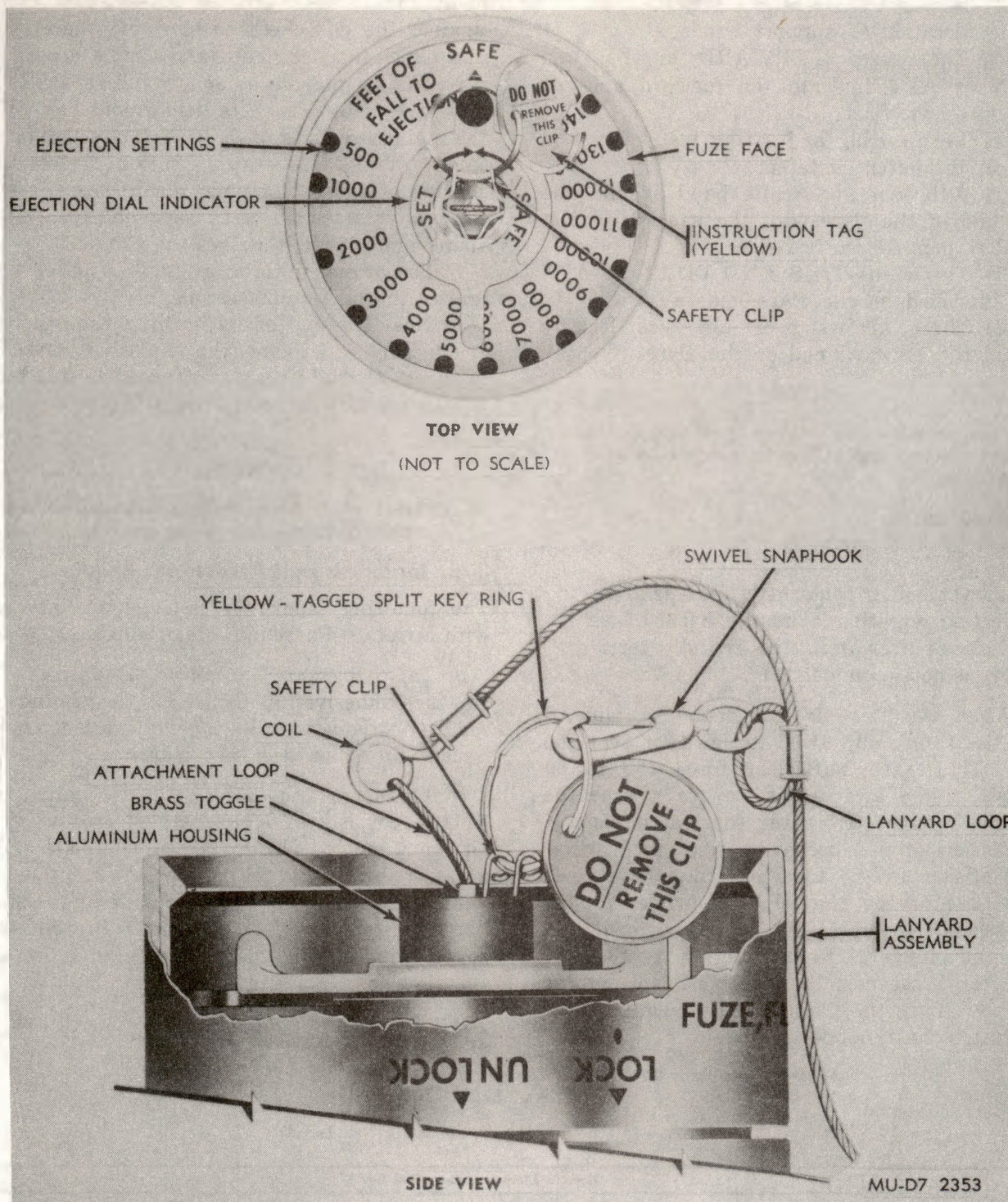


Figure 3-2. Flare Mk45, fuze mechanism and lanyard.

3-4. Packing and Marking

a. *Packing.* Flares are packed two each in a polystyrene container secured by tape. Each flare is a sealed unit.

b. *Marking.* Flares and/or packings bear the following information:

- (1) Nomenclature and model designation.
- (2) Federal Stock Number.
- (3) Lot number.
- (4) DOD number.
- (5) Loading date.
- (6) Manufacturer's name or symbol.

- (7) Loading facility.
- (8) Inspector's acceptance stamp.
- (9) Location of support bands.
- (10) The words FORWARD or UP and DOWN or AFT indicate the forward and aft positions on the flare.
- (11) Fuze setting and safing instructions on label on the outer container.
- (12) A brown and white band around the lower end of the flare with the word ILLUMINATING printed on it twice.
- (13) The words THIS END DOWN or AFT when launched on the flare end cap.
- (14) Three arrows over the fuze locking pins on the forward end of the flare.

NOTE

Follow procedures as outlined in paragraph 3-8, below. Setting and safing instructions on flare are incomplete.

3-5. Functioning

WARNING

Since the outer container falls free after ejection, creating a missile hazard, use of flares over inhabited friendly territory is not recommended.

a. When the flare is launched, the lanyard snaps the safety clip from its position over the toggle. This exerts sufficient force (30 to 60 pounds) on the attachment loop to release the internal disconnect from the fuze mechanism.

b. Release of the disconnect frees the spring-loaded striker in the fuze to strike the primer in the base of the plunger. The primer ignites the 2-second (nominal) fixed delay element and drives the plunger into the time delay fuse.

c. After 2 seconds, the delay element ignites black powder in the plunger. The burning powder ignites the time delay fuse.

d. The expelling charge is ignited by the time delay fuse. Thus, sufficient pressure is exerted against the gas check to blow off the end cap and expel the parachute and candle assemblies.

e. The drogue chute deploys and separates the main parachute from its deployment bag. When the main parachute opens, it exerts a pull on the cables of the suspension/ignition system. The shorter of the cables pulls the release pin from the igniter assembly. This cocks and releases the firing pin so that it strikes the primer.

f. The primer initiates an ignition pellet which ignites the magnesium candle.

g. Near the end of its burning time the heat of the candle activates the explosive bolt. (Ten of the 18 shroud lines are attached to this bolt.) Release of these shroud lines collapses the parachute.

NOTE

Collapse of the parachute allows the burned out flare to fall rapidly to the ground.

3-6. Materials and Accessories Required

The following separately issued items are used with Aircraft Parachute Flare Mk45:

a. *Tape, Pressure Sensitive, Adhesive.* This two-inch adhesive tape is used in the arming procedure. Although green tape is most commonly issued, the color does not matter.

b. *XM164 Static Line, Flare.* Static Line XM164 consists of eight parallel steel-wire cables in a molded plastic sleeve. The ends of the wires are swaged to fittings which accept swivel-jointed snaphooks. The flat contour of the static line affords a low floor profile to prevent accidental tripping and the plastic coating prevents abrasion to the aircraft transom.

3-7. Fuze Setting Table

Table 3-1. Approximate Release Altitudes for Ejection at 2500 Feet Above Ground Level.

(Altitudes—In Thousands—are at Mean Sea Level)

Fuze Settings	Ground Elevation above Sea Level							
	0	1.0	2.0	3.0	4.0	5.0	6.0	7.0
500	3.0	4.0	4.9	6.0	7.1	8.1	9.1	10.1
1,000	3.4	4.5	5.5	6.5	7.6	8.6	9.7	10.7
2,000	4.5	5.6	6.7	7.7	8.8	10.0	11.0	12.2
3,000	5.6	6.7	7.8	9.0	10.1	11.3	12.5	13.6
4,000	6.5	7.7	8.9	10.1	11.3	12.5	13.8	15.1
5,000	7.4	8.6	9.9	11.1	12.4	13.6	15.0	16.4
6,000	8.2	9.5	10.8	12.1	13.5	14.8	16.2	17.5
7,000	9.1	10.4	11.8	13.1	14.5	15.9	17.4	19.0
8,000	10.0	11.4	12.8	14.3	15.6	17.1	18.3	20.4
9,000	10.9	12.4	13.8	15.3	16.8	18.4	20.1	
10,000	11.8	13.3	14.9	16.4	18.1	19.8		

Table 3-1. Appropriate Release Altitudes for Ejection at 2500 Feet Ground Level—Continued.

(Altitudes—In Thousands—are at Mean Sea Level)

Fuze Settings	Ground Elevation above Sea Level						
	0	1.0	2.0	3.0	4.0	5.0	6.0
11,000	12.9	14.4	16.0	17.7	19.4		
12,000	13.9	15.5	17.3	19.0			
13,000	15.0	16.7	18.5	20.5			
14,000	16.2	18.0	20.0				

Example: If the target is 1,000 feet above sea level and fuze is preset at 3,000 feet of fall, launch altitude is 10,100 feet.

3-8. Operation under Usual Conditions

This paragraph covers arming, stowage on aircraft, and launching techniques used with Aircraft Parachute Flare Mk45.

a. Precautions.

(1) Do not use flares with cracked, dented or deformed outer containers.

(2) Unauthorized removal of fuzes under any circumstances is prohibited. Do not attempt to remove damaged fuzes from flares. Have flares containing damaged fuzes disposed of by authorized munitions personnel only.

(3) Observe firing temperature limits of +145°F. and -65°F.

(4) Avoid unseating safety clip. If safety clip becomes unseated, secure it in toggle housing groove before proceeding. While clip is out, avoid pulling lanyard. A pull on lanyard of 30 pounds can cause fuze to function. If fuze is set at any delay setting, such pull will cause outer container and candle to separate violently after permanently inoperable.

(5) If flare is accidentally ejected on ground, wind force of 35 knots will cause drogue chute to remove deployment bag and release main parachute. Attempt to keep parachute from opening. Cut shroud lines and dispose of candle tube. If parachute opens accidentally, deflate by holding parachute itself. *Do not* hold candle tube. A 60-pound pull on shroud lines may actuate candle igniter. The parachute could drag *unrestrained* candle tube without causing ignition, providing pull on candle does not exceed 60 pounds.

(6) Require crewmen engaged in launch operations to wear harness and be secured to aircraft by safety line.

b. Preparation for Use.

CAUTION

Have arming and preparation of flares performed by trained, experienced personnel only.

(1) Remove flare from packing container.

(2) Remove plastic cap (fig. 3-3) from fuze end of flare.



Figure 3-3. Removal of cap and lanyard assembly.

NOTE

If flare is shipped with lanyard attached, simply uncoil lanyard, omitting steps (3) and (4), below, and continue with step (5). If lanyard is not attached, accomplish steps (3) and (4) before continuing with step (5)

(3) Remove and uncoil lanyard. Remove lanyard retainer and retain for replacement if flare is not expended.

(4) Connect coil on end of lanyard to attachment loop and toggle in fuze (fig. 3-4).

(5) Using forefinger of right hand and thumb of left hand, set fuze dial by turning clockwise to desired setting (fig. 3-5). (See fuze setting table, paragraph 3-7.) A spring-loaded detent holds dial at set position and aids in setting fuze in darkness—engagement of detent can be felt easily by operator.

(6) Extend lanyard over edge of fuze and secure with a 15 1/2 inch strip of tape to outside of fuze case. Leave lanyard loop and swivel



Figure 3-4. Attachment of coil to attachment loop on fuze.

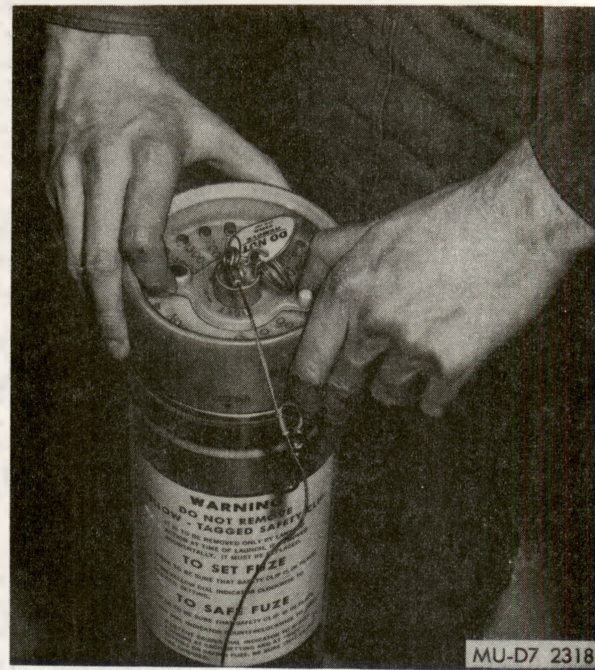


Figure 3-5. Setting fuze.

snaphook just above edge of fuze (fig. 3-6), in line with yellow-tagged key ring on safety clip.

(7) Replace plastic cap, holding lanyard inside cap (fig. 3-7).

(8) Coil remainder of lanyard around outer container and tape in place (fig. 3-8).

(9) Using grease pencil, mark ejection fuze setting on body of flare.

NOTE

Flare is now ready for loading in interior of fixed-wing or rotary-wing aircraft.

c. Operation.

WARNING

Require crewmen engaged in hand launch operations to wear harness and be secured to aircraft by safety line. Do not snaphook to yellow-tagged key ring until just before launching flare.

NOTE

Loading of flares aboard aircraft will be performed by trained personnel only.

(1) Secure flares adequately to prevent movement during flight.

(2) Attach 4-foot static line to cargo tie-down near launch door.

(3) Remove tape securing lanyard to outer container and uncoil lanyard. Stick tape to side of flare case.

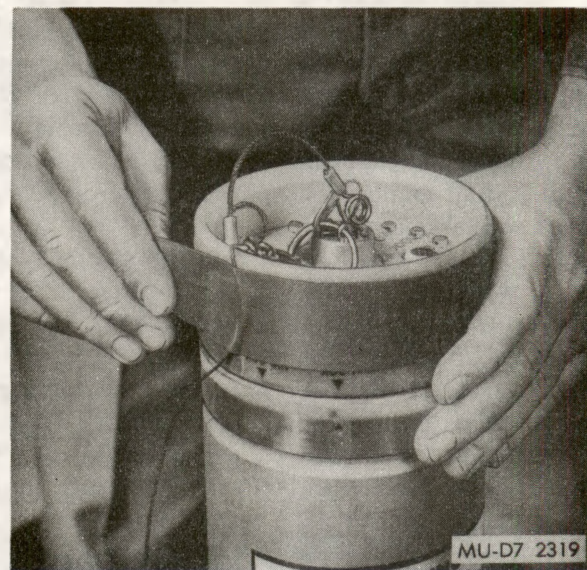


Figure 3-6. Taping lanyard to fuze case.

(4) Attach free end of static line to lanyard (fig. 3-9).

WARNING

Exercise extreme caution to avoid pulling safety clip during next step. If safety clip is pulled, toss flare from aircraft immediately.

(5) Remove plastic cap. Attach swivel snaphook to yellow-tagged key ring (fig. 3-10) by



Figure 3-7. Replacing plastic cap.

holding ring firmly and pressing down on ring with snaphook.

CAUTION

Flares which hit skid of helicopter may fail to function.

(6) Throw flare from aircraft (fig. 3-11), fuze end last, assuring that flare clears aircraft.

(7) Retrieve static line and remove lanyard debris. Retain for disposal after landing.

d. Prepared for Use but Not Launched. Flares which were prepared for use but not launched will be returned to their original condition as follows:

- (1) Remove plastic cap.
- (2) Assure that fuze safety clip is secure.
- (3) If flare has been hooked up for launch, assure that lanyard swivel snaphook is disconnected from safety clip key ring.
- (4) Return fuze setting dial, counterclockwise, to SAFE.
- (5) Remove tape securing lanyard to outer case and uncoil lanyard.
- (6) Remove tape securing lanyard to outside of fuze.
- (7) Install lanyard retainer and recoil lanyard inside of fuze well; replace plastic cap.
- (8) Remove or block out fuze setting marked on outer container with grease pencil.



Figure 3-8. Taping coiled lanyard around outer container.

(9) Repack serviceable flares, in accordance with instructions in chapter 4. Use repacked flares first in subsequent launchings.

3-9. Operation under Unusual Conditions

Operation of this flare under unusual conditions is the same as under normal conditions, with the following exception:

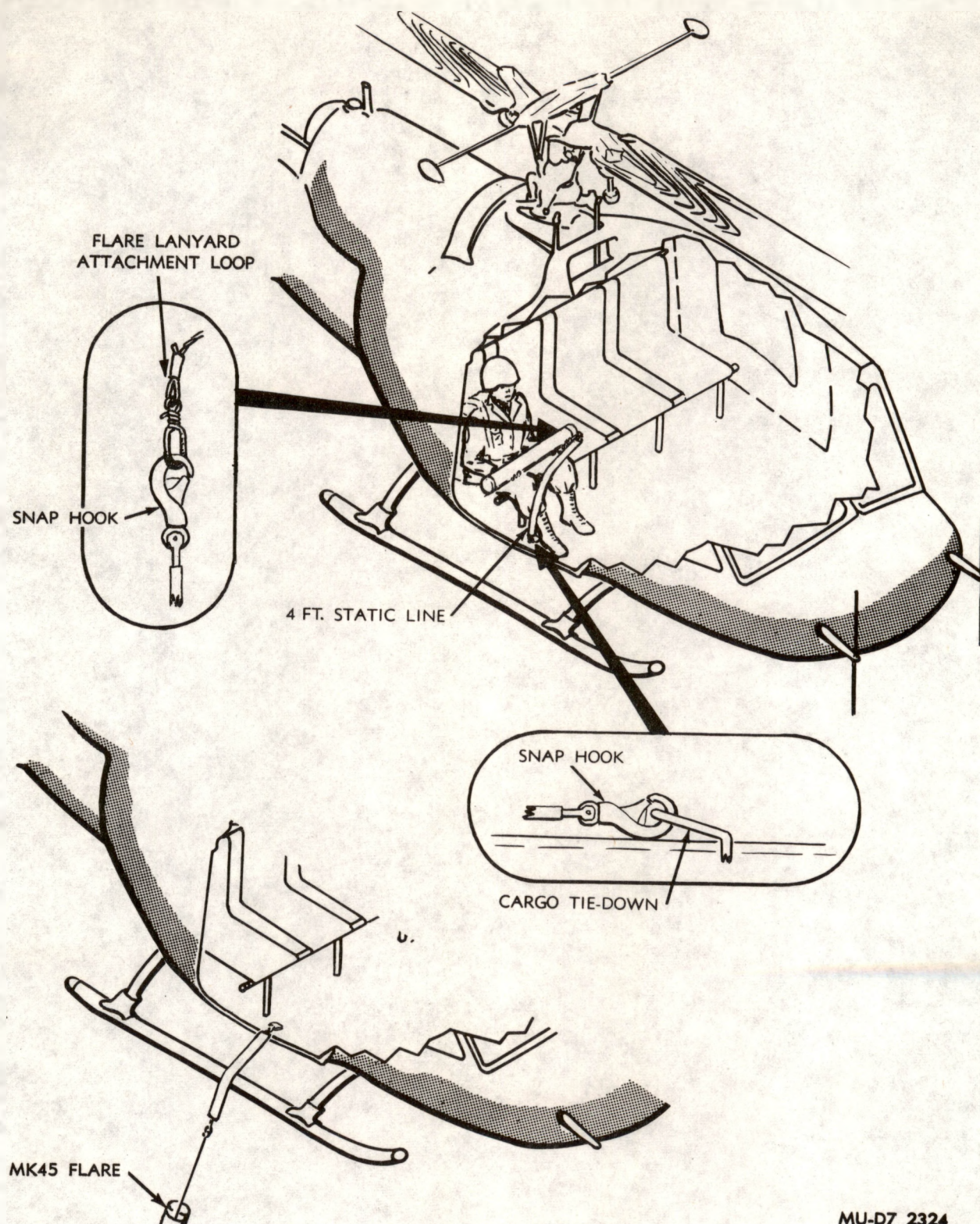
During operation in Arctic environments, preparation procedures must be accomplished in warm structure to facilitate fuze setting and taping procedures. At extremely cold temperatures, the fuze dial may become frozen in place, making fuze setting difficult.



Figure 3-9. Static line attached to lanyard.



Figure 3-10. Attaching swivel snaphook.



MU-D7 2324

Figure 3-11. Tossing flare from helicopter.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

4-1. Precautions

Flares will be handled by trained, experienced personnel only. Flares are capable of withstanding normal handling but, like other pyrotechnic items, should not be subjected to excessively rough treatment.

4-2. Inspection

a. Inspect shipping containers for the following:

(1) Signs of excessive damage or rough handling.

(2) Signs of excessive moisture.

b. Return excessively damaged containers to depot without unpacking.

c. Set aside excessively moist containers for thorough inspection of contents after unpacking.

4-3. Unpacking and Packing

a. *Unpacking.*

(1) To open plastic containers, cut tape along seams, being careful not to damage container. (Do not use tools or attempt to pry lid open.) Lid should lift off easily.

(2) Remove flare and set container aside for reuse.

b. *Packing.*

(1) Replace flare in container.

(2) Replace lid of plastic container and tape along seam.

(3) Mark container to indicate that contents will be issued prior to materiel not previously unpacked.

Section II. MAINTENANCE

4-4. General

The following procedures will be performed subsequent to unpacking.

4-5. Precautions

a. Avoid unseating safety clip. If safety clip becomes unseated, secure it in toggle housing groove before proceeding. While clip is out, avoid pulling lanyard. A pull on lanyard of 30 pounds can cause fuze to function. If fuze is set at any delay setting, such pull will cause outer container and candle to separate violently after the delay; if set on SAFE, fuze will become permanently inoperable.

b. If flare is accidentally ejected on ground, wind force of 35 knots will cause drogue chute to remove deployment bag and release main parachute. Attempt to keep parachute from opening. Cut shroud lines and dispose of candle tube. If parachute opens accidentally, deflate by holding parachute itself. *Do not hold candle tube.* A 60-pound pull on shroud lines may actuate candle igniter. The parachute could drag *unrestrained*

candle tube without causing ignition, providing pull on candle does not exceed 60 pounds.

4-6. Procedures

a. Inspect flares as follows:

WARNING

Removal of fuze from flare is prohibited.

(1) Inspect flares for dents, cracks or other damage to outer container.

(2) Place damaged flares aside for disposition by authorized munitions personnel.

(3) Remove plastic fuze cap.

(4) Assure that fuze is locked in place on flare.

NOTE

In the locked position, the arrows under the lock markings on the fuze will line up with the arrows covering retaining pins in the flare body. If the fuze is not locked, be sure dial is set on SAFE. Hold the flare stationary and turn fuze clockwise until it locks

(5) Assure that safety clip is in place and fuze dial is set on SAFE.

WARNING

If fuze dial is not set on SAFE and safety clip is missing, a pull of 30 pounds can cause ejection of parachute and candle from outer container. Outer container can create serious missile hazard at distances up to 150 feet.

(6) If fuze dial is not set on SAFE and safety clip is not installed, install safety clip and return dial to SAFE.

(7) On completion of inspection, repack serviceable flares for local storage.

b. Inspect accessories as follows:

(1) Inspect static lines for fraying, damage or other conditions which would render item unserviceable.

(2) Replace serviceable items in original containers marked to indicate contents.