

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

MAINTENANCE INFORMATION  
ON  
ROCKET, 2.75-INCH, FLARE: XM278 (IR), ILLUMINATING  
WARHEAD WITH M442 FUZE, WITH MK66, MOD 2 MOTOR

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Headquarters, Department of the Army, Washington, DC

15 July 1993

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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Section I. INTRODUCTION

1. Purpose. This bulletin provides supplemental maintenance level information on Rocket, 2.75-Inch, Flare: XM278 (IR) Illuminating Warhead with M442 Fuze, with MK66, Mod 2 Motor.

Inch Low Spin, Folding Fin Aircraft Rockets; 2.75-Inch Spin Stabilized, Wrap Around Fin Aircraft Rockets, 66MM Light Antitank Weapon Systems; 3.5-Inch Rockets and M3A2E1 Rocket Motor (JATO).

2. General. This bulletin contains data that will be incorporated into the following ammunition technical manuals.

a. TM 43-0001-30 Army Ammunition Data Sheets for Rockets, Rocket Systems, Rocket Fuzes, and Rocket Motors.

b. TM 9-1340-222-20 Unit Maintenance Manual (Including Repair Parts and Special Tools List) for 2.75-

c. TM 9-1340-222-34 Intermediate Direct Support and Intermediate General Support Maintenance Manual (Including Repair Parts and Special Tools List) for 2.75Inch Low Spin, Folding Fin Aircraft Rockets; 2.75-Inch Spin Stabilized, Wrap Around Fin Aircraft Rockets; 66MM Light Antitank Weapon Systems; 3.5-Inch Rockets and M3A2E1 Rocket Motor (JATO).

d. SB 742-1 Ammunition Surveillance Procedures.

**Section II. INFORMATION TO BE INCORPORATED INTO  
MAINTENANCE TECHNICAL MANUALS**

3. General. The information in the following paragraphs will be incorporated as changes to the affected manuals.

4. Description and Tabulated Data.

Description:

a. This low-spin folding-fin aircraft rocket (LSFFAR) is an air-to-ground rocket primarily deployed from rotary-wing and other low-speed aircraft.

b. The XM278(IR) illuminating warhead (fig. 1) consists of an ignition system, flare, main parachute, drogue parachute assembly, and an integral fuze and delay assembly. The warhead is enclosed in an aluminum case.

c. The setback-actuated fixed time integral fuze provides a standoff distance of approximately 3,500 meters. The fuze and candle igniter arming are actuated by rocket motor acceleration.

d. The rocket motor is described in TM 430001-30, Chapter 5.

Differences Between Models: N/A

Functioning:

a. The rocket with warhead, flare, XM278(IR) is fired from helicopter with standard 2.75-in. motor Mk 66 to attain elevation between 2000 and 4000 ft at 3000 m downrange. Upon rocket launch, the M442 fuze arms upon acceleration (17 G's approximately required). After 1.0 seconds (at motor burnout) the fuze functions, initiating delay train. After nine seconds, delay ignites first expulsion charge in fuze assembly. Gas pressure forces pusher plate forward, shears pin, separates motor and adapter section from remainder of warhead. Rocket velocity is now 800 fps approximately.

b. The deflector plate, attached by cable to motor adapter, is extended into airstream, deflects path of motor and adapter. Pusher plate, attached to drogue chute, deploys drogue. Rocket warhead velocity then decreases to 200 fps, approximately, during next two seconds.

c. Upon deployment of drogue chute, the gas generator is activated by pull on lanyard attached to

drogue. After two seconds, the gas generator functions the second expulsion charge located in retainer block of drogue housing. Gas pressure forces pusher plate forward, shearing pins and separating drogue housing from main chute insert and candle assembly.

d. The pusher plate is attached by a thread-line to the pilot chute. The pilot chute is deployed, and, in turn, pulls bag off main chute. The main chute now deploys the steel cable which is attached to the main chute shroud lines on one end, and, in turn, pulls a lanyard attached to candle igniter assembly.

e. The pull on the lanyard rotates a bellcrank, releasing the firing pin. The firing pin fires a rifle primer, which fires boron pellets. The boron pellets ignite a propellant wafer. Propellant ignites the candle. Ignition gases pressurize nose cap, blowing it free.

f. The candle, suspended from the main chute is now burning. During the first 15 seconds, the igniter housing is burned away. The candle descends at 13 fps, burns for 180 seconds with a light output of 222 watts per steradian in the near infrared spectrum, and a maximum of 1000 candlepower in the visible spectrum.

Use:

To provide helicopters with target illuminating capability from a safe standoff distance in a hostile environment.

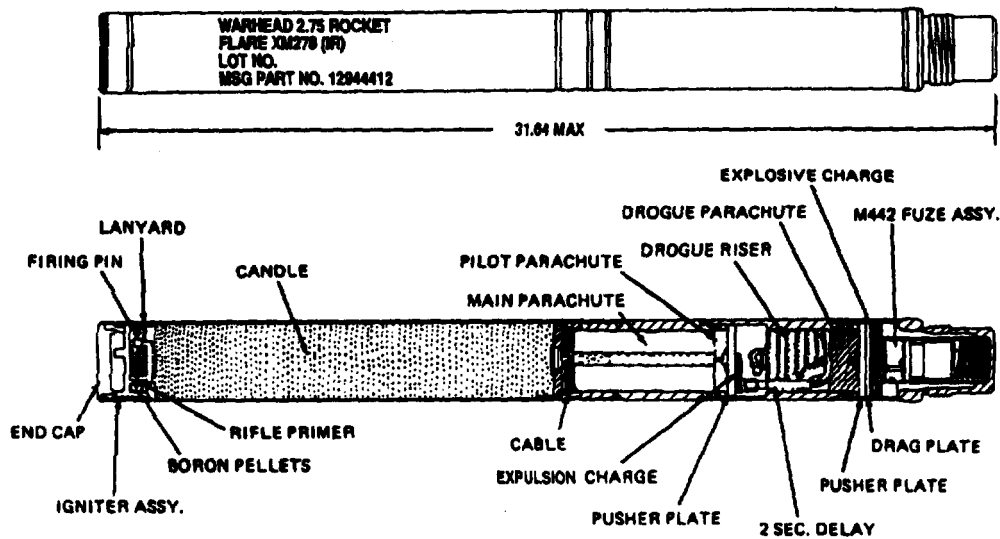
Tabulated Data:

Rocket:

Type .....	MK66, Mod 2
Diameter .....	2.75 in. nominal
Length (max) .....	71.12 (w/warhead)
Weight .....	24.4 lb (w/MK66, Mod 2 motor)
Assembly drawing .....	12944412
DODAC .....	1340-H154

Performance:

Operating temperature limits.....	-25°F to + 140°F (-31.35°C to +59.40°F)
Maximum velocity.....	1600 fps (488 mps)



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Figure 1. Rocket, flare, 2.75-inch, w/XM278 illuminating warhead.

Motor:

Type .....	MK66, Mod 2	Diameter .....	1.5 in.
Igniter .....	2.2-3.5 ohms resistance	Length .....	3.1 in. overall
DODAC .....	1340-J147	Weight .....	0.6 lb
		Arming time .....	1.1 sec

Warhead:

Model.....	XM278
Type	Flare
Body	Aluminum
Color	Olive drab w/white markings
Diameter.....	2.75 in.
Length .....	31.64 in.
Weight.....	10.8 lb

Packaging (Box):

Packing and Marking	
Drawing .....	12624792
Dimensions .....	48-1/16 in. x 12-1/4 in. x 9-3/8 in. w/MK66, Mod 2 motor
Cubic contents.....	3 cu ft
Total explosive weight .....	12.17 lb (5.52 kg)
Total weight (w/contents 6 fiber containers w/3 warheads and 3 motors, unassembled).....	132.5 lb (60.1 kg) w/MK66, Mod 2 motor

Candle characteristic:

Burn time	180 sec nominals
Light output.....	1000 cp max
Parachute descent rate	13 fps approx.
Composition	Potassium, Cesium Nitrate, Hexamine, Binder
Weight	5 lb (2.27 kg)
Infra red output	222 Watts/Steradian

Packing .....	1 warhead per fiber container, 1 motor per fiber container, unassembled. 6 fiber containers (3 warheads and 3 motors) in a box
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Fuze:.....

Model.....	M442
Type .....	Setback actuated, fixed time

Packing (repair parts listing):

SMR code.....	XBOOO
National Stock No .....	8140-01-255-7725

Description.....Box, Packing,  
Ammunition: for  
Rocket, 2.75-inch  
(3 ea warhead  
XM278 and 3 ea  
motor MK66, Mod  
2)  
Part number.....9357963  
Unit of measure .....ea  
Quantity incorporated  
in unit .....1  
SMR code.....XBOOO  
National Stock No.....8140-01-859-8011  
Description.....Container,  
Ammunition:  
fiber, M518 for  
Rocket, 2.75-inch  
warhead (M257  
and XM278)  
Part number.....8883478  
Federal supply code.....19203  
Unit of measure .....ea  
Quantity incorporated  
in unit .....1  
SMR code.....XBOOO  
National Stock No.....8140-01-257-8929  
Description.....Container,  
Ammunition:  
fiber, PA87 for  
Rocket Motor  
(2.75-inch MK66,  
Mod 2)  
Part number.....9335617  
Unit of measure .....ea  
Quantity incorporated  
in unit .....1  
Shipping and storage data:  
DOD hazard class.....(04) 1.3 G  
DOT hazard class .....1.3 G  
DOT shipping class.....A  
DOT designation.....Ammunition  
Illuminating UN  
0254  
Field storage.....Group D  
DODAC .....1340-H154

5. Storage and Surveillance.  
a. Quantity Distance Class and Storage Data:

Warhead, Hydra 70, Illumination XM278:  
QD class.....1.3  
Storage class.....G  
Total explosive weight ..5 lb  
Filler .....Pyrotechnic flare  
Rocket, Hydra 70, w/Warhead, Illumination,  
XM278 w/Fuze M442 and Rocket

Motor MK66 Mod 2  
QD class.....1.3  
Storage class.....G  
Total explosive weight .....12.2 lb  
Filler .....Pyrotechnic flare  
and motor propel-  
lant

b. Visual Inspection Procedure for Complete Rounds and Unassembled Component Defect Classification.

(1) Inspection characteristics. Igniter circuit resistance (1992 values) not within prescribed limits, 2.2 to 3.5 ohms (MK66, Mod 2).

(2) Defect class. Major.

(3) Tool. Test.

(4) Fuzes with loose ogives will be reported to Commander, AMCCOM, ATTN: AMSMC-MAW, Rock Island, IL 61299-6000.

c. Torque Test.

(1) The assembled components, with either or both threaded interfaces assembled, will be torqued at 55+20+0 foot-pounds in the tightening direction.

(2) The 55+20+0 foot-pounds indicated on the rocket motor is the minimum assembly torque for field use.

d. Pre-Issue Inspection (PII). Pictorial evidence of non-standard conditions, whenever pertinent and practical, should be included and forwarded to Commander, AMCCOM, ATTN: AMSMC-QAM-C, Rock Island, IL 61299-6000.

e. Disposition of Inspection Samples. Samples containing major defects will be reported to Commander, AMCCOM, ATTN: AMSMC-MAW, Rock Island, IL 61299-6000.

f. Records and Reports. A complete report of all tests and inspections should be submitted by the Product Assurance Directorate, Surveillance Division, at the conclusion of the inspection/test of each lot in storage and should be made by letter to the Commander, AMCCOM, ATTN: AMSMC-QAM-C, Rock Island, IL 61299-6000.

6. Identification of Rocket Configuration used by Army, Navy, Air Force, and Marine Corps. The identification of rocket configuration is listed in table 1 below.

**Table 1. Identification of Rocket Configuration.**

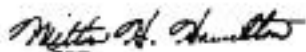
DODIC/NSN	Warhead	Fuze	Motor	Packing
H154/1340-01-371-8611	XM278 Illumination	M442 MBO	MK66 Mod 2	3 warheads and 3 motors unassembled in wood box

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By Order of the Secretary of the Army:

**GORDON R. SULLIVAN**  
*General, United States Army*  
*Chief of Staff*

Official:



**MILTON H. HAMILTON**  
*Administrative Assistant to the*  
*Secretary of the Army*  
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# The Metric System and Equivalents

## Linear Measure

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

## Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 dekagram = 10 grams = .35 ounce  
 1 hectogram = 10 dekagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

## Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

## Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

## Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

## Temperature (Exact)

°F Fahrenheit temperature      5/9 (after subtracting 32)      Celsius temperature      °C

