

TM 43-0001-30

TECHNICAL MANUAL
ARMY AMMUNITION DATA SHEETS
FOR
R O C K E T S
R O C K E T S Y S T E M S
R O C K E T F U Z E S
R O C K E T M O T O R S
(Federal Supply Class 1340)

This copy is a reprint which includes current pages from Changes 1 through 5.

HEADQUARTERS, DEPARTMENT OF THE ARMY

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TECHNICAL MANUAL

No. 43-0001-30

**HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 December 1981**

**Army Ammunition Data Sheets
for
Rockets, Rocket Systems, Rocket
Fuzes, Rocket Motors
(Federal Supply Class 1340)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to Commander, U.S. Army TACOM, Armament Research, Development and Engineering Center, ATTN: AMSTA-AR-WEL-S, Picatinny Arsenal, NJ 07806-5000. You may also send in your recommended changes via electronic mail or by fax. Our e-mail address is LSB@PICA.ARMY.MIL. Our fax number is DSN 880-4633, Commercial (973) 724-4633. A reply will be furnished to you.

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*This manual supersedes TM 43-0001-30, 1 December 1981, including all changes.

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CHAPTER 1 INTRODUCTION

1.1 PURPOSE.

1.1.1 This manual provides general and technical information concerning ground and aircraft rockets. It covers general characteristics, specific data, means of identification, precautions and general information on packing. General information pertaining to all types and kinds of conventional ammunition and explosives, and color coding for earlier manufactured munitions are contained in TM 9-1300-200. General information on care, handling, preservation, storing, shipping and destruction of ammunition and explosives is contained in AR 385-64 and DA PAM 385-64. Information on training of troops in tactical use of 3.5-in. rockets will be found on 66MM rockets in FM 23-25.

1.1.2 The rockets and components described in chapters 2 and 3 belong to Federal Supply Class 1340. Other items used in conjunction with the rockets are covered in other publications.

1.2 SCOPE.

1.2.1 For each item of materiel, there are illustrations and descriptions together with characteristics and related data. Included in the related data are type classification, logistics control code (LCC), dimensions, weight, performance data, packing data, and shipping and storage data.

1.2.2 Information concerning supply, operation, and maintenance of the items will be found in the publications referenced for those items. A complete listing of these publications is maintained in DA PAM 25-30.

1.2.3 Within this manual, items with the following type classifications are included:

1.2.3.1 Standard (LCC-A, LCC-B) OTCM/AMCTCM.

1.2.3.2 Contingency (CON).

1.2.3.3 Limited Procurement (LP).

1.2.3.4 Reclassified obsolete (OBS) for regular Army use, but used by National Guard or Reserve Units.

1.2.3.5 Reclassified OBS for all Army use, but used by Marine Corps, Air Force, or Navy.

1.2.3.6 Reclassified OBS, no users, but U.S. stocks remain.

1.2.4 Items with the following type classification are not included: Reclassified OBS for all U.S. use. No U.S. stocks remain. (Foreign use or stock may remain.)

1.2.5 Numerical values, such as weights, dimensions, candlepower, etc., are nominal values, except when specified as maximum or minimum. Actual items may vary slightly from these values. Allowable limits can be obtained from the drawings indicated in the data sheets.

1.3 QUANTITY-DISTANCE CLASSES AND STORAGE COMPATIBILITY GROUPS.

Quantity-Distance (QD) classes and Storage Compatibility Groups (SCG) listed in this manual are changed. For conversion to new system see table 1-1.

Table 1-1. Quantity-Distance Classes and Storage Compatibility Groups.

Quantity-Distance Hazard Class ^{1/}		Storage Compatibility Group ^{1/3/}
Old	New ^{2/}	Typical - New
8	6.1	
7	1.1	D
6	1.2(18)	E
5	1.2(12)	
4	1.2(08)	F
3	1.2(04)	G
2	1.3	C
1	1.4	S

Notes:

^{1/}New QD and SCGs are compatible with classes used by NATO nations.

^{2/}Numbers in parentheses are minimum distances x 100 feet to protect against specific fragment hazards and vary with items and types of ammunition. (Refer to AR 385-64 and DA PAM 385-64.)

^{3/}There is no simple conversion from old SCGs to new system. The SCG groups listed in this column are typical for the majority of items in the corresponding listed QD class but do not apply to every individual item in the class. For SCG of individual items refer to AR 385-64 and DA PAM 385-64.

1.4 METRIC CONVERSION CHART.

For approximate conversions to metric measures see table 1-2.

Table 1-2. Approximate Conversions to Metric Measures.

Symbol	When You Know	Multiply By	To Find	Symbol	
LENGTH					
in.	inches	2.5	centimeters	cm	
ft	feet	30	centimeters	cm	
yd	yards	0.9	meters	m	
mi	miles	1.6	kilometers	km	
AREA					
in ²	square inches	6.5	square centimeters	cm ²	
ft ²	square feet	0.09	square meters	m ²	
yd ²	square yards	0.8	square meters	m ²	
mi ²	square miles	2.6	square kilometers	km ²	
	acres	0.4	hectares	ha	
WEIGHT					
oz	ounces	28	grams	g	
lb	pounds	0.45	kilograms	kg	
	short tons (2000 lb)	0.9	tonnes	t	
VOLUME					
tsp	teaspoons	5	milliliters	ml	
Tbsp	tablespoons	15	milliliters	ml	
fl oz	fluid ounces	30	milliliters	ml	
c	cups	0.24	liters	l	
pt	pints	0.47	liters	l	
qt	quarts	0.95	liters	l	
gal	gallons	3.8	liters	l	
ft ³	cubic feet	0.03	cubic meters	m ³	
yd ³	cubic yards	0.76	cubic meters	m ³	
TEMPERATURE					
Symbol	When You Know	Subtract	Multiply By	To Find	Symbol
°F	Fahrenheit	32	0.55	Celsius	°C

For approximate conversions from metric measures see table 1-3.

Table 1-3. Approximate Conversions from Metric Measures.

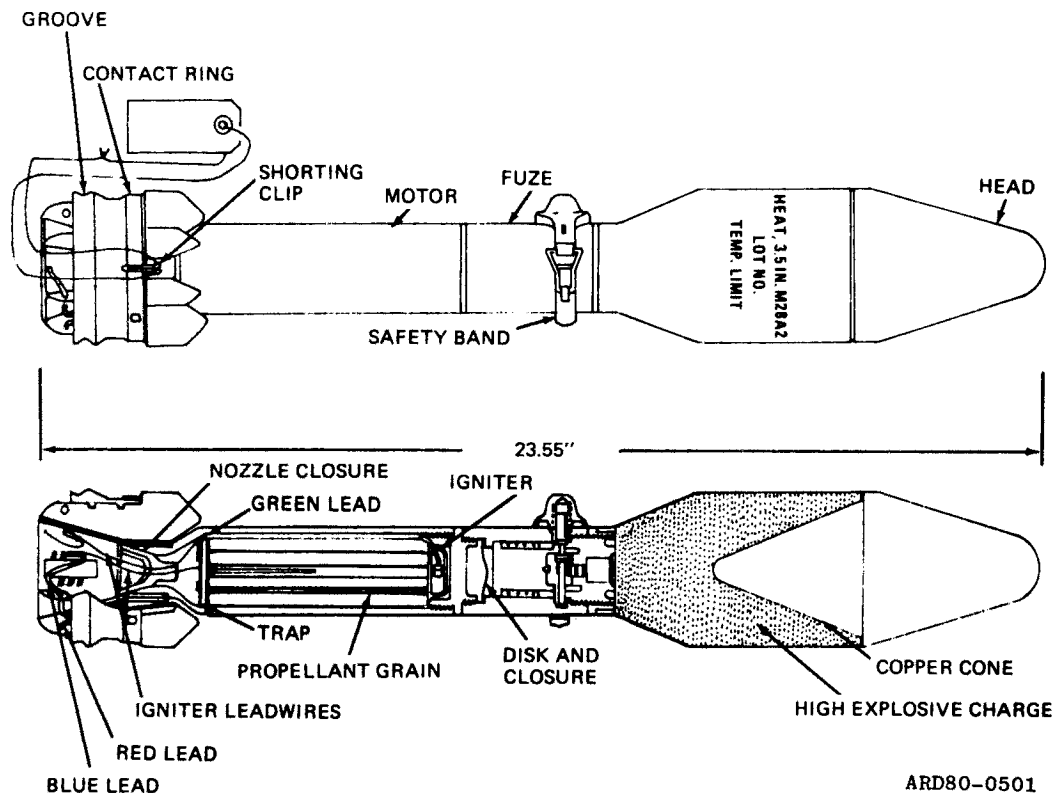
Symbol	When You Know	Multiply By	To Find	Symbol	
LENGTH					
mm	millimeters	0.04	inches	in.	
cm	centimeters	0.4	inches	in.	
m	meters	3.3	feet	ft	
m	meters	1.1	yards	yd	
km	kilometers	0.6	miles	mi	
AREA					
cm ²	square centimeters	0.16	square inches	in ²	
m ²	square meters	1.2	square yards	yd ²	
km ²	square kilometers	0.4	square miles	mi ²	
ha	hectares (10,000 m ²)	2.5	acres		
WEIGHT					
g	grams	0.035	ounces	oz	
kg	kilograms	2.2	pounds	lb	
t	tonnes (1000 kg)	1.1	short tons		
VOLUME					
mL	milliliters	0.03	fluid ounces	fl oz	
L	liters	2.1	pints	pt	
L	liters	1.06	quarts	qt	
L	liters	0.26	gallons	gal	
m ³	cubic meters	35	cubic feet	ft ³	
m ³	cubic meters	1.3	cubic yards	yd ³	
TEMPERATURE					
Symbol	When You Know	Subtract	Multiply By	To Find	Symbol
°C	Celsius	1.8	32	Fahrenheit	°F

1.5 KEY TO ABBREVIATIONS AND SYMBOLS.

APERS	Antipersonnel	MPSM	Multipurpose submunitions
AR	Army Regulation	MS	Milliseconds
AT	Antitank	MT	Mechanical time
BD	Base detonating	MTSQ	Mechanical time and super-quick
BE	Base ejection	MV	Muzzle velocity
CP	Candle power	OBS	Obsolete
DA	Department of the Army	PD	Point detonating
DS	Discarding sabot	PDSQ	Point detonating super-quick
FM	Field manual	PI	Point initiating
FPS	Feet per second	PIBD	Point initiating, base detonating
FT	Feet	Prox	Proximity
G's	Force of Gravity	PWP	Plasticized white phosphorous
HE	High explosive	RAD	Ram air decelerator
HEAT-T-MP	High explosive antitank with tracer, multi- purpose	RAP	Rocket assisted projectile
HEDP	High explosive dual purpose	RC	Resistance capacitance
HEI	High explosive incendiary	RF	Radio frequency
HEP	High explosive plastic	RPS	Revolutions per second
HERA	High explosive, rocket assisted	S&A	Safety and arming device
HVAP	Hypervelocity, armor piercing	SC	Supply Catalog
HVTP	Hypervelocity, target practice	SD	Self destroying
Illum	Illuminating	Sec	Seconds
JATO	Jet assisted take off	SM	Supply Manual
LAW	Light antitank weapon	SQ	Super-quick
(LP)-T	Test (DODAC)	T	Time fuze or for training only
LSFFAR	Low-spin folding-fin aircraft rocket	-T	With tracer
Mod	Modified	TB	Technical Bulletin
mm	Millimeter	TM	Technical Manual
MPS	Meters per second	TP	Target practice
		TSQ	Time super-quick
		VX	Persistent toxic (casualty) nerve gas
		WP	White phosphorous

CHAPTER 2
GROUND ROCKETS

ROCKET, HIGH-EXPLOSIVE, 3.5-INCH: AT, M28A2

Type Classification:

STD (LCC-B) OTCM 36841 Jul 58

Use:

The M28A2 HEAT rocket is used primarily against armored targets, tanks and secondary targets, such as gun emplacements, pillboxes and personnel. It is capable of penetrating heavy armor at angles of impact greater than 30°. In an antipersonnel role, it has a fragmentation area 10 yd wide and 20 yd deep.

Description:

a. The warhead is cylindrical and tapered. The forward end, called the ogive, is thin metal and hollow. The rear end, threaded internally to receive the fuze which is encircled by a safety band. The warhead contains a copper

cone whose apex faces aft and acts to shape the high explosive charge Composition B (Comp B).

b. The base detonating (BD) rocket fuze M404A2 consists of a body which contains the functioning parts; a safety band, a detonator and a booster pellet. The fuze body and safety band are olive drab. The fuze mechanism consists of an activating plunger, a setback spring, a setback sleeve, a firing pin assembly, a detent spring, an ejection pin and an ejection spring. The spring-loaded ejection pin passes through the fuze body.

c. The motor assembly consists of a tube which houses the propellant and igniter. The fin assembly is securely attached to this tube. The front end of the tube is assembled to the base of the fuze. The rear end forms a nozzle. The cylindrical motor cavity is divided into four

sections by two spacer plates which support the grains of propellant powder.

d. Each grain of propellant is 5-in. long and approximately 3/8-in. in diameter. Three grains are placed in each of the four sections formed by the spacer plates. Each lot of propellant is adjusted at the time of manufacture to give standard velocity. The igniter ignites the propellant.

e. The igniter consists of a short, cylindrical plastic case containing a small black powder charge and an electrical squib. It is assembled in the forward end of the motor on top of the propellant, spacer plates. The leads of the electrical squib, running parallel to the grains of propellant, pass from the igniter through the nozzle into the expansion cone. A green lead (ground) wire is connected to the aluminum support ring of the contact ring assembly. A red lead (positive) wire is attached to a pin which is insulated from the support ring, but is in contact with the copper contact band. These connections are positioned 180° apart. Blue lead is used for test purpose only.

f. The fin assembly consists of six aluminum alloy fins and a contact ring assembly. The contact ring assembly, which encircles the fins, consists of three rings. The aluminum support ring, which is innermost, is separated from the copper contact ring by a plastic insulating ring. The fins are spot welded to the expansion cone, and the expansion cone is press fitted to the rear of the motor tube. The M24 and the M66 off-route mines utilizing M28A2 HEAT rockets are described in TM 43-0001-36.

Differences between Models:

The BD rocket fuze M404A1 is similar to BD rocket fuze M404A2. The M404A1 differs principally in minor design changes of the functioning parts and the shape of the safety band.

Functioning:

a. When the safety band is removed, the ejection pin moves outward approximately 3/8 of an inch but still prevents all parts of the fuze mechanism from moving. When the rocket is in the firing chamber, the ejection pin is partially depressed by the chamber, thereby freeing the setback sleeve so it can move to the rear when the rocket is fired. The fuze is still safe, since the ejection pin prevents movement of the actuating sleeve and firing pin.

b. If it becomes necessary to remove the rocket from the launcher, the ejection pin will move outward and re-engage the setback sleeve. This returns the fuze to its original safe condition.

c. When the rocket is fired, the force of inertia causes the setback sleeve to move rearward. It is held in its rearward position by the lockpin. When the rocket leaves the muzzle of the launcher, the ejection pin is thrown clear of the fuze by the ejection pin spring. The fuze is then fully armed.

d. During flight, tie firing pin lever and firing pin spring prevent the firing pin from striking the detonator. The creep spring retards the forward movement of the plunger and actuating sleeve. The action of the creep spring prevents the fuze from firing should the rocket strike light objects such as thin brush or undergrowth.

e. Upon impact with a more resistant object, the plunger and actuating sleeve move forward until the sleeve hits the firing pin lever. This causes the firing pin to strike and detonate the warhead.

Tabulated Data:

Rocket:

Model - - - - - M28A2
 Type - - - - - Service
 Diameter - - - - 3.5 in.
 Length (max) - - 23.55 in.
 Weight - - - - - 9.00 lb

Performance:

Operating temperature limits - - - - -
 -20° to + 120°F
 (-28. 6 to +48.4C)

Muzzle velocity (at 70°F) (approx) - - - - 325 ft/sec
 (99 reps)

Warhead:

Type - - - - - HEAT
 Body - - - - - Steel
 Color - - - - - Olive drab w/yellow markings
 Diameter - - - - 3, 5 in.
 Length - - - - - 10.5 in.
 Weight - - - - - 4.47 lb

High-explosive train:

Detonator - - - - M41
 Booster (tetryl) - - - - 0.17 oz (4.81 g)
 Filler (warhead) Type - - - - - Comp B
 weight (approx) - - - - 1.88 lb (.854 kg)

Fuze:

Model - - - - - M404A1 or M404A2
 Type - - - - - Base detonating
 Diameter - - - - 2.0 in.

Length:

Overall - - - - 3.48 in.
 To shoulder (max) - - - - - 2.94 in.
 Weight - - - - - 1.16 lb
 Arming distance - - - - - 10 ft (3.05 m)

Motor:

Diameter (at fins) - - - - - 3.5 in.
 Length - - - - - 10.41
 Weight - - - - - 3.30 lb
 Thrust - - - - - 6,000-10,000 lb

Propelling initiating train:

Igniter:

Model - - - - - M20A1
 Charge (black powder) - - - - 0.13±0.007
 (3.5±.2 g)

Electric squab - - - - - M2

Propelling charge:

Propellant:

Model - - - - - M7
 Type - - - - - Solvent
 Configuration - Monoperforated, cylindrical, extruded grains (12)
 Weight - - - - - 0.44 lb (198 g)
 Burning time:
 At -20°F - - - - 0.05 sec
 At +120°F - - - - 0.02 sec

Launchers - - - - - M20, M20A1, M20A1B1, M20B1

Packing - - - - - 1 per metal/fiber container, 3 containers per wooden box

Box:

Weight (with contents) - - - - 53.0 lb

Dimensions:

W/metal

container - - - 29-9/16 in. x
14-1/16 in. x
16-19/32 in.

W/fiber

container - - - 29-3/16 in. x
13-7/8 in. x
16-19/32 in.

Cube:

W/metal

container - - - - 1.6ft³

W/fiber

container - - - - 1.5ft³

DODAC - - - - - 1340-H600

Shipping and storage data:

Storage class/

SCG - - - - - 1.1E

DOT shipping

class - - - - - A

DOT designation - ROCKET AMMUNI-
TION WITH EXPLO-
SIVE PROJECTILES

Field storage -- Group E

Drawings:

Complete assy - -9211744 (82-6-22)

Loading assy

(head) - - - - - 82-16-36

Loading assy

(motor) - - - - -9225502 (82-16-35)

Packing (inner)- -7549038

Packing (outer)- -7549040

References:

TM 9-1340-222-34