

BOX
NUMBER 29

784 UNCLASSIFIED

Handbook
on
Trench Mortar Fuzes

MARK VII
and
MARK VII-E

Compiled by the
ORDNANCE DEPARTMENT

WAR PLANS DIVISION

April, 1918

WAR DEPARTMENT.

Document No. 784.

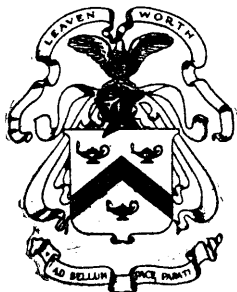
42322 *Office of The Adjutant General.*

REGRADED *unclassified*
BY AUTHORITY OF *DoD DIR 5800.1-R*
BY *Landell Baker*
ON *18 August 2005*

UNCLASSIFIED

THE GENERAL SERVICE SCHOOLS

LIBRARY



CLASS NUMBER M 9403-B15

ACCESSION NUMBER 42322

RECEIVED
TO THE
GENERAL SERVICE SCHOOLS
LIBRARY
JAN 10 1950

WAR DEPARTMENT.
WASHINGTON, *April 6, 1918.*

The following pamphlet entitled "Handbook on Trench Mortar Fuzes, Mark VII and Mark VII E," is published for the information of all concerned.

(062.1 A. G. O.)

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
Major General, Acting Chief of Staff.

OFFICIAL:

H. P. McCAIN,
The Adjutant General.



TABLE OF CONTENTS

	PAGE
Plate I—Trench Mortar Fuze, Mark VII, non-delay.....	6
Plate II—Trench Mortar Fuze, Mark VII, delay.....	7
Chart I - Nomenclature—Trench Mortar Fuze, Mark VII....	8
Trench Mortar Fuze, Mark VII.....	10
Painting and marking	10
(a) The exterior	10
(b) The interior	11
(1) The firing mechanism and safety device.....	11
(2) The explosive elements and containers.....	12
Non-delay type (Plate I)	13
Delay type (Plate II)	13
Functioning	13
Preparing fuze for use	13
Plate III—Firing mechanism of Trench Mortar Fuze, Mark VII-E	14
Chart II—Nomenclature—Firing Mechanism of Trench Mortar Fuze, Mark VII-E.....	15
Trench Mortar Fuze, Mark VII-E.....	16

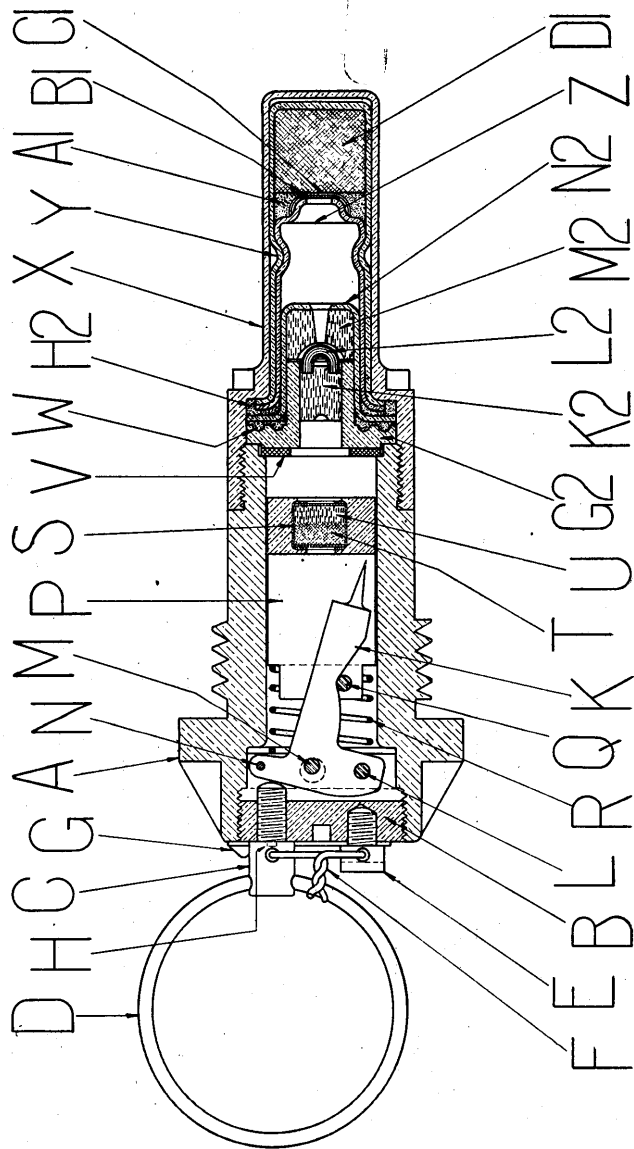


PLATE II
Trench Mortar Fuze, Mark VII, Delay

CHART I **NOMENCLATURE** **Trench Mortar Fuze, Mark VII** **Non-Delay and Delay**

Symbol	Name	Material	Location and purpose
A	Fuze body.....	Brass.....	Upper section of fuze. Contains firing mechanism.
B	Closing cap.....	Brass.....	Screws into upper section of fuze body A. Supports firing pin K.
C	Safety screw.....	Steel.....	Screws into closing cap B. Holds firing pin in safe position.
D	Safety screw ring.....	Steel.....	Fits into hole in head of safety screw C and facilitates its removal.
E	Fillister head screw.....	Steel.....	Screws into closing cap C. Serves as anchor for sealing wire.
F	Sealing wire.....	Soft iron.....	Passes through heads of safety screw C and fillister head screw E. Prevents accidental removal of safety screw C.
G	Safety screw cover.....	Sheet steel.....	Swings on fillister head screw E. Is moved over hole after safety screw C has been removed.
H	Safety screw cover pin.....	Steel.....	Driven in closing cap B. Limits lateral movement of safety screw cover G.
K	Firing pin.....	Steel.....	In percussion plunger P, fastened to closing cap B. Holds plunger P in place until arming, and fires percussion cap S on impact.
L	Pivot pin.....	Steel.....	Traverses lugs of closing cap B and supports firing pin K.
M	Stop pin.....	Steel.....	In firing pin K. Limits lateral swing of firing pin K.
N	Shear pin.....	Aluminum wire.....	Traverses firing pin K and lugs of closing cap B. Holds firing pin K in position before and after arming.
P	Percussion plunger.....	Brass.....	In recess in fuze body A. Carries percussion cap. Its backward movement arms the fuze, and its forward movement fires it.
Q	Rider pin.....	Steel.....	Traverses slot in percussion plunger P. Holds plunger P in safe position and drives point of firing pin K to central position in arming fuze.
R	Creep spring.....	Steel wire.....	In fuze body between closing cap B and percussion plunger P. Holds percussion cap S away from firing pin K until contact occurs.
S	Percussion cap.....	Copper.....	Fastened in bottom of plunger P. Carries priming composition T and Black powder U.
T	Priming composition.....	Special mixture.....	In upper half of percussion cap S. Is ignited by point of firing pin K on impact.
U	Black powder.....	Black powder.....	In lower half of percussion cap S. Is ignited by priming composition T and ignites delay or relay pellet.
V	Plunger stop washer.....	Lead.....	Secured between bottom of fuze body A and relay carrier E2. Cushions the striking of percussion plunger P.
W	Retard carrier washer.....	Felt.....	Between shoulder of retard carrier E2 and flanged top of detonator retainer Z.

X	Detonator socket.....	Brass.....	Screws on lower end of fuze body A. Contains detonator parts.
Y	Detonator casing.....	Copper.....	Fits inside detonator socket X. Carries the fulminate D1 at its lower end.
Z	Detonator retainer.....	Copper.....	Secured in upper end of detonator casing Y. Holds fulminate D1 in position.
A1	Detonator casing washer.....	Felt.....	Placed between fulminate D1 and detonator retainer Z.
B1	Retainer disc.....	Tin.....	Covers hole in bottom of detonator retainer Z. Prevents entrance of fulminate D1.
C1	Retainer disc.....	Calico.....	Placed under retainer disc B1. Reinforces it.
D1	Fulminate.....	Fulminate of mercury.....	In bottom of detonator casing Y. Explodes booster charge.
E2	Relay carrier.....	Non-Delay Fuze (Plate I)	Rests on retard carrier washer W under lower edge of fuze body A. Carries the relay pellet.
F2	Relay pellet.....	Brass.....	In relay carrier E2. Ignites fulminate D1.
G2	Delay retard carrier.....	Black powder.....	In upper section of delay relay cap N2. Carries delay retard pellet N2.
H2	Delay relay cup washer.....	Brass.....	Under flanged top of delay relay cup N2. Secures it in place.
K2	Delay retard pellet.....	Felt.....	In delay retard carrier G2. Ignites delay relay pellet M after a second of delay.
L2	Quick match.....	Black powder.....	Held in bottom of delay retard carrier G2. Insures ignition of delay relay pellet M2.
M2	Delay relay pellet.....	Quick match.....	In delay relay cup N2. Ignites fulminate D1.
N2	Delay relay cup.....	Black powder.....	In delay relay cup N2. Ignites fulminate D1.
		Brass.....	In detonator retainer Z under delay retard carrier G2. Carries delay relay pellet M2.

TRENCH MORTAR FUZE, MARK VII.

The Trench Mortar Fuze, Mark VII, is supplied in two types: delay and non-delay. The metal parts for both types are identical except that, in the non-delay type, a relay carrier is substituted for the delay carrier and the relay cup used in the delay type.

The assembled fuze measures approximately $3\frac{3}{8}$ inches in length, exclusive of the safety screw ring, and $1\frac{1}{4}$ inches at the point of largest diameter.

Painting and Marking.

The head of the delay fuze is painted black and the detonator socket is painted violet. The head of the non-delay fuze is painted white, while the detonator socket is left unpainted.

On the tapered surface of the fuze body will be found a stamp, designating the name of the fuze, the amount of delay, the initials of the loader, and the lot number.

(a) The Exterior.

The *Fuze Body* (A) consists of a brass cylinder, surmounted by a truncated portion into which the closing cap (B) is screwed.

The *Closing Cap* (B) is a cylindrical brass plug, which is threaded for insertion in the top of the fuze body (A). It is drilled and tapped to receive the safety screw (C) and the fillister head screw (E), and its surface is slotted to provide a grip for a screw driver. On the lower surface are two parallel rectangular lugs which support the pins of the firing mechanism.

The *Safety Screw Cover* (G) is a rectangular piece of light sheet steel, which is intended to cover the safety screw hole when the safety screw (E) has been removed, thus preventing the entrance of dirt or moisture. A hole is drilled through one end of the cover (G) to receive the fillister head screw (E), on which it swings; its lateral movement is limited by a short steel pin (H), driven in the closing cap (B).

Just below the shoulder of the upper section of the fuze body (A) are the threads, by means of which the fuze is attached to the adapter in the shell.

The *Detonator Socket* (X) is a cylindrical brass shell, which is screwed onto the base of the fuze body (A). This socket contains the detonator parts and is brought into position in the fuze socket when the fuze body (A) is screwed into the adapter.

(b) The Interior.

The interior of the fuze consists of two major parts:

1. The firing mechanism and safety device.
2. The explosive elements and containers.

(1) The Firing Mechanism and Safety Device.

The firing mechanism consists of the firing pin (K), and supporting pinions, the percussion plunger (P), the creep spring (R), the safety screws and wires, and the percussion cap (S).

The *Firing Pin* (K) is a T-shaped piece of steel .798 of an inch long and .1 of an inch thick with a pointed lug projecting from the lower end. Three holes are drilled in the cross piece of the pin. A *Stop Pin* (M) is driven in the middle hole; the ends of this pinion, projecting from both sides of the firing pin (K), rest in the hole traversing the lugs of the closing cap (B), which thus serves to limit the lateral swing of the firing pin (K). The hole in one arm of the firing pin (K) is intended to receive the steel *Pivot Pin* (L) on which it swings; this is driven through the lugs of the closing cap (B). The third hole, at the opposite end of the cross piece, is intended to receive the aluminum *Shear Pin* (N), which holds the firing pin (K) in the proper position before and after arming.

The *Percussion Plunger* (P) is a brass cylinder which is designed to slide in the recess in the fuze body (A). It is recessed at the bottom to receive the percussion cap (S) and slotted for about three-fourths of the distance from the other end to receive the firing pin (K). A steel *Rider Pin* (Q) traverses the slot in such a position that, when the percussion plunger (P) is driven back by inertia, the rider pin (Q) slides on the shaped surface of the firing pin (K) and drives the point of the latter to the central position immediately

above the percussion cap (S). The plunger (P) is held in place by the firing pin (K) when the latter is in the safe position; in this condition the *Creep Spring* (R) is compressed between the percussion plunger (P) and the closing cap (B).

The lead *Plunger Stop Washer* (V) is held in place over the relay carrier (E2), by the lower edge of the fuze body (A), and serves to cushion the striking of the percussion plunger (P) when the setback occurs.

The fuze is secured in a safe condition by means of the *Safety Screw* (C), which is screwed through the closing cap (B) in such a manner that its lower end rests upon one of the arms of the firing pin (K); the point of the firing pin is thus held securely off center, so that it cannot strike the percussion cap (S). The steel *Safety Screw Ring* (D) is passed through a hole in the head of the safety screw (C) to facilitate its removal without tools. The head of this screw is traversed by another hole, through which a soft steel *Sealing Wire* (F) is drawn and then passed through the head of the *Fillister Head Screw* (E) set on the other side of the cap. The wire (F), is drawn taut and the ends are twisted about each other to prevent accidental removal of the safety screw (C).

(2) The Explosive Elements and Containers.

The *Percussion Cap* (S) is contained in a copper shell, which is fastened in the recess provided for the purpose in the plunger (P). The upper half is filled with a special priming composition (T); the lower contains black powder (U).

The copper *Detonator Casing* (Y) is designed to fit into the detonator socket (X) and carries about 30 grains of *Fulminate* (D1) in its lower end. The copper *Detonator Retainer* (Z) is placed inside the casing with its flanged shoulder seated on the shoulder of the casing (Y). In this position the bottom of the retainer (Z) rests on the felt *Detonator Casing Washer* (A1). A hole drilled through the bottom of the retainer is sealed with a thin disc of tinfoil (B1), reinforced by a covering of calico (C1); this arrangement is intended to prevent the fulminate (D1), on which it rests, from sifting into the retainer. After insertion of the retainer (Z), in the casing (Y), the latter is crimped in four places to secure the former in its proper position.

Non-Delay Type. (Plate I.)

The *Relay Carrier* (E2) is a brass cylinder with a projecting shoulder at the top, which rests on the *Retard Carrier Washer* (W) on the flanged edge of the detonator retainer (Z); it is held in position by the lower edge of the fuze body (A). The *Relay Pellet* (F2) a pefforated pellet of black powder, is carried in the relay carrier (E).

Delay Type. (Plate II.)

The *Delay Retard Carrier* (G2) has a recess in its center to receive the *Delay Retard Pellet* (K2) of highly compressed black powder. Two holes are drilled through the bottom of the carrier (G2) to this recess; they are intended to receive the ends of a U-shaped piece of quickmatch (L2). Another pellet of compressed powder is placed in the *Delay-Relay Cup* (N2), just beneath the quickmatch (L2); this *Delay-Relay Pellet* (M2), has a hole through its center which tapers outward to the size of the hole in the bottom of the cup (N2).

Functioning.

Upon discharge, the setback, due to the abrupt forward movement of the shell, causes the percussion plunger (P) to slide back into the bottom of the recess in the fuze body (A). As it does so, the rider pin (Q) slides along the cam-like side of the firing pin (K) and forces the point of the firing pin (K) to a central position over the percussion cap (S). The shear pin (N), now bent, tends to hold the firing pin in this armed position. Upon impact, inertia drives the percussion plunger (P) forward, overcoming the restraining action of the creep spring (R); and the cap strikes the point of the pin. The cap (S) is thus fired and the flash is rapidly carried through the perforated relay pellet, into the fulminate. In the delay type, the delay retard pellet (K2) in the delay retard carrier (G2), is intended to delay ignition of the delay relay pellet (M2) for $1/5$ of a second.

Preparing Fuze for Use.

Break the sealing wire (F) by twisting the safety screw ring (D) and remove the safety screw (C). Slide the safety screw cover (G) over the hole in the cover cap (B). Screw the fuze securely into the adapter of the shell.

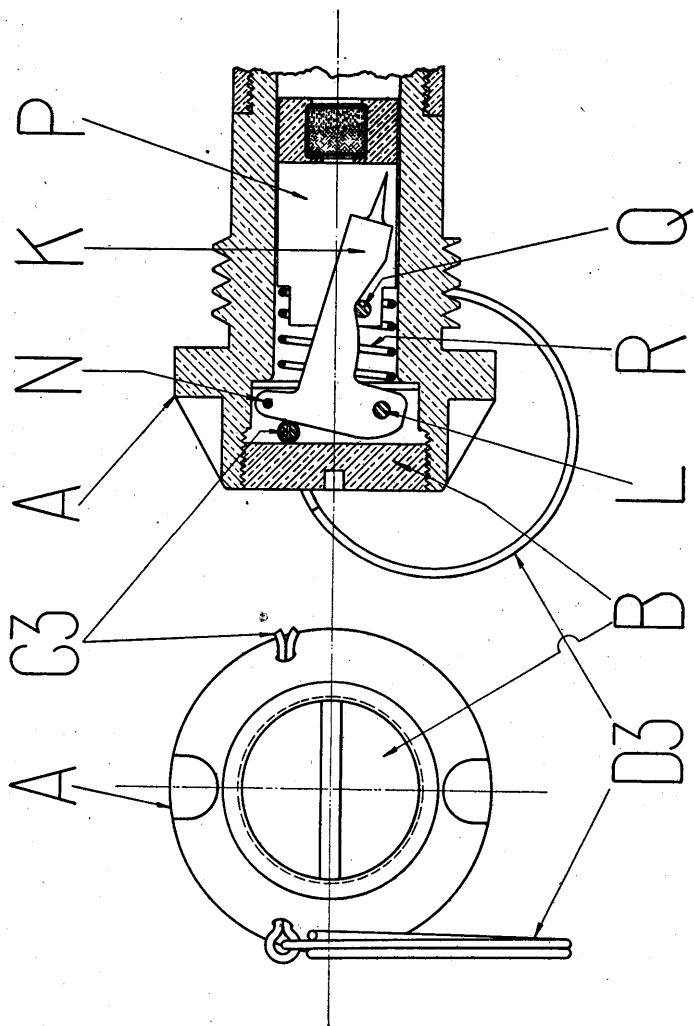


PLATE III
Firing Mechanism of Trench Mortar Fuze, Mark VII-E

CHART. II **NOMENCLATURE** **Firing Mechanism of Trench Mortar Fuze, Mark VII-E**

Symbol	Name	Material	Location and purpose
A	Fuze body.....	Brass.....	Upper section of fuze. Contains firing mechanism.
B	Closing cap.....	Brass.....	Screws into upper section of fuze body A. Supports firing pin K.
K	Firing pin.....	Steel.....	In percussion plunger P. Fastened to closing cap B. Holds plunger P in place until arming, and fires percussion cap S on impact.
L	Pivot pin.....	Steel.....	Traverses lugs of closing cap B and supports firing pin K.
N	Shear pin.....	Aluminum wire.....	Traverses firing pin K and lugs of closing cap B. Holds firing pin K in position before and after arming.
P	Percussion plunger.....	Brass.....	In recess in fuze body A. Carries percussion cap. Its backward movement arms the fuze, and its forward movement fires it.
Q	Rider pin.....	Steel.....	Traverses slot in percussion plunger P. Holds plunger P in safe position and drives point of firing pin K to central position in arming fuze.
R	Creep spring.....	Steel wire.....	In fuze body between closing cap B and percussion plunger P. Holds percussion cap S away from firing pin K until contact occurs.
C3	Safety pin.....	Soft steel.....	Inserted through hole in fuze body A and lugs of closing cap B. Holds firing pin K in safe position.
D3	Safety pin ring.....	Steel.....	Inserted in end of safety pin K to facilitate its removal.

(For detonator parts see Plates I and II and Chart I.)

TRENCH MORTAR FUZE, MARK VII-E.

The Trench Mortar Fuze, Mark VII-E, is, in all details, the same as the Mark VII fuze, except as to the safety devices. The safety screw (C), the safety screw ring (D), the fillister head screw (E), the sealing wire (F), the safety screw cover (G), the safety screw cover pin (H), and the stop pin (M), shown on Plates I and II have been omitted. A hole for a 1/16 of an inch safety pin (C3) has been drilled through the truncated portion of the fuze body (A) and the lugs of the closing cap (B) in such a position that the inserted pin rests on one arm of the firing pin (K) and thus holds it in the safe position. The safety pin ring (D3) is attached to the safety pin (C3), to facilitate its removal, when the fuze is made ready for use. (See plate III).