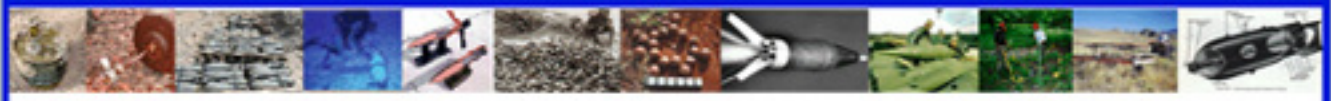


Dec. 28, 1944

TB 9X-94

WAR DEPARTMENT TECHNICAL BULLETIN

Preliminary Instructions

FUZE, ROCKET, P.D., T4 & T5

War Department, Washington 25, D. C. • • 28 December 1944

1. GENERAL.

a. P.D. rocket fuzes T4 and T5 (fig. 1) are VT fuzes for aircraft firing of 4.5-inch Army rockets listed below. These fuzes arm approximately 1 second after the rockets are fired and function automatically on approach to a target.

Fuze	Type	Use	4.5-inch Rockets*
P.D., T4	Photoelectric	Plane-to-plane	M8, M8A1, M8A1B1 M8A2, M8A3, T22, T74
P.D., T5	Electromagnetic	Plane-to-plane Plane-to-ground Plane-to-water	M8, M8A3, T22, T74 (M8A1, M8A1B1, M8A2)**

NOTES * Fuzes T4 and T5 may be used on the rockets listed, as issued, or when modified by 4.5-inch aircraft rocket kit T23.

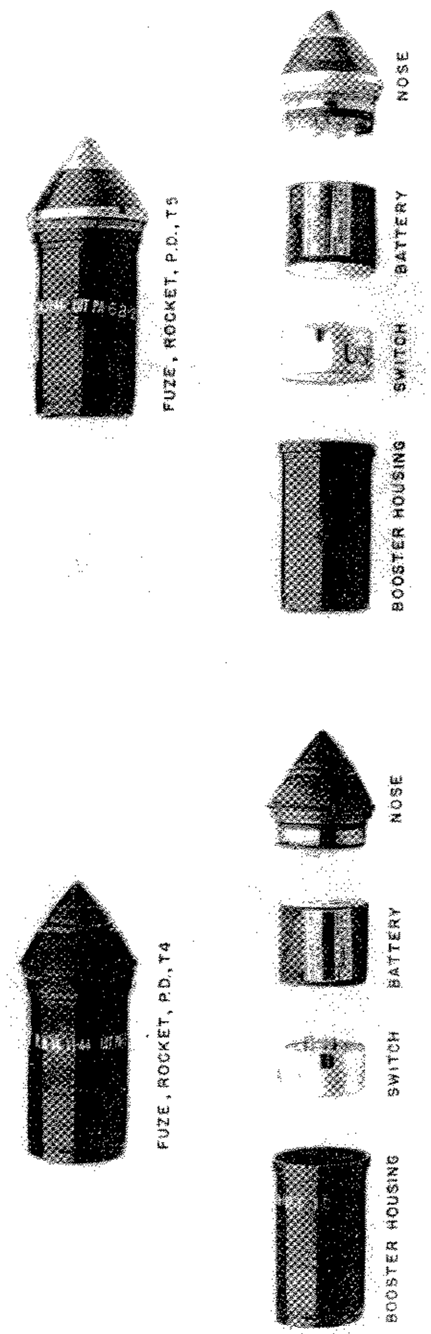
** Fuze T5 can be used in these rockets only when the fins have been notched (par. 10), or when modified by 4.5-inch aircraft rocket kit T23.

b. As used in plane-to-plane tactics, P.D. fuzes T4 and T5 function on approach to the enemy plane at a point to inflict greatest damage on the target.

c. As used in plane-to-ground or plane-to-water tactics, P.D. fuze T5 becomes, in nature of operation, an automatically-set time fuze. It requires no adjustment, and it produces an airburst at a height to cause the greatest lethal fragmentation effect against personnel without top cover, such as gun crews on ship-board and personnel in foxholes.

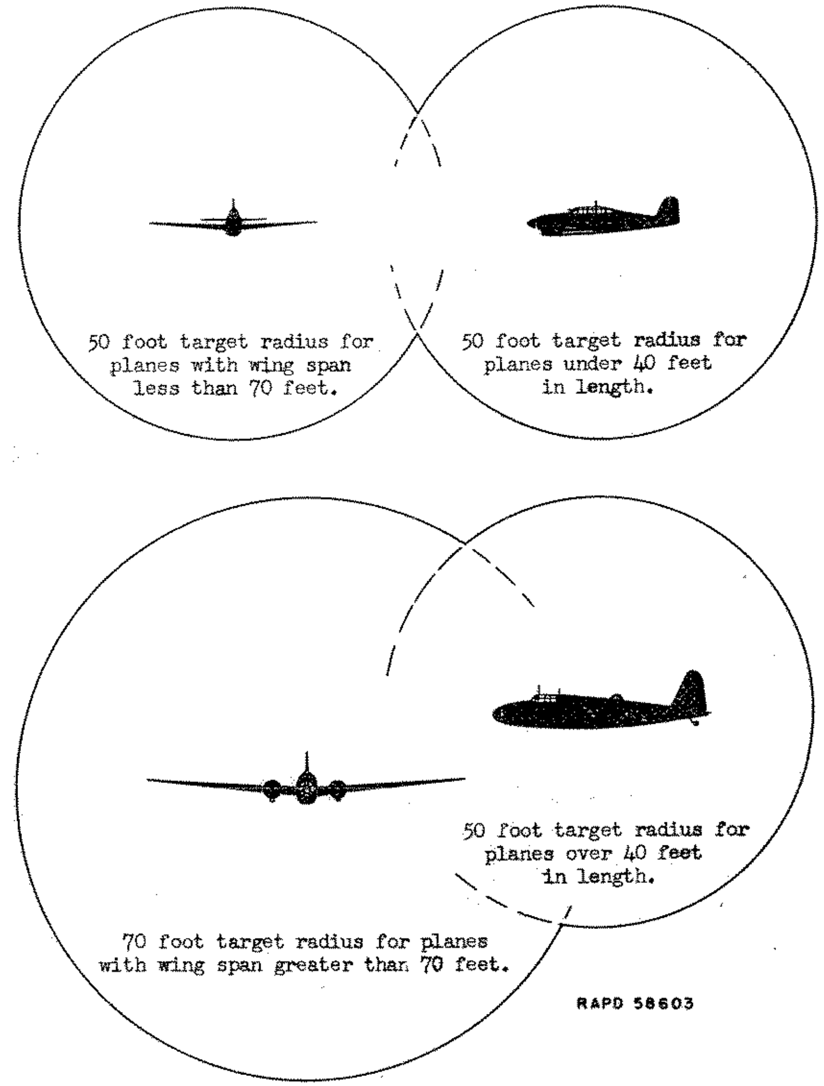
d. These fuzes screw directly into all standard loaded 4.5-inch rockets listed above. They are directly interchangeable with the P.D., M4 series rocket fuzes, both physically and ballistically.

e. The fuze as issued is not complete. A battery must be installed prior to use.



RAPD 58600

FIG.1. FUZE T4 AND T5 COMPONENTS



RAPD 58603

FIG. 2. EFFECTIVE SIZE OF TARGETS WITH FUZES T4 AND T5

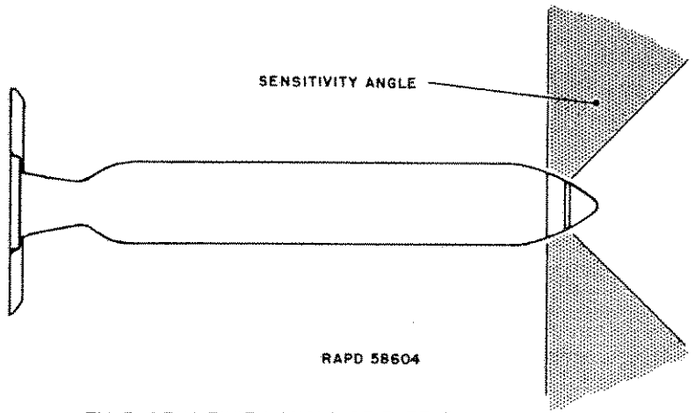


FIG. 3. SENSITIVITY ANGLE OF FUZE T4

2. SECURITY.

a. The utmost care will be taken to make sure that neither information about fuzes T4 and T5 nor the fuzes themselves fall into the hands of the enemy. It is believed that the enemy does not know of the existence of these fuzes; therefore, security must be maintained in order that the element of surprise may be utilized to the fullest extent.

b. Dissemination of confidential matter will be held to the absolute minimum. Information as to the contents or whereabouts of confidential matter will be disclosed only to those persons whose duties require such knowledge. Such information is exclusively for the official use of the person to whom it is divulged or issued. Its inviolability is the duty and responsibility of all persons having knowledge thereof, no matter how obtained (see par. 11, 14, and 20, AR 380-5, March 1944).

3. CHARACTERISTICS.

a. General. - Fuzes T4 and T5 function automatically due to the influence of the target instead of by impact or time action, thereby effectively increasing the target size. When the rocket passes within 50 to 70 feet of the target (fig. 2), fuze T4 is functioned by photoelectric action and fuze T5 is functioned by electromagnetic action at a point where greatest damage will be inflicted on the target.

b. Functioning of fuze T4.

(1) The fuze T4 is a photoelectric fuze which functions when influenced by a change in intensity of light. Only light rays or shadows which strike the fuze within its sensitivity angle (shaded angle of fig. 3) can cause the functioning. Prior to arming (which is approximately 1 second time of flight) the fuze is "blind" to changes in light intensity. After it is armed, the fuze functions when it passes into a shadow (below an airplane) or into a reflection from a

brilliantly illuminated object (light reflected from sides or top of an airplane). If the fuze is not influenced by a target, a self-destroying feature causes the fuze to function in air after time of flight of 6 to 12 seconds.

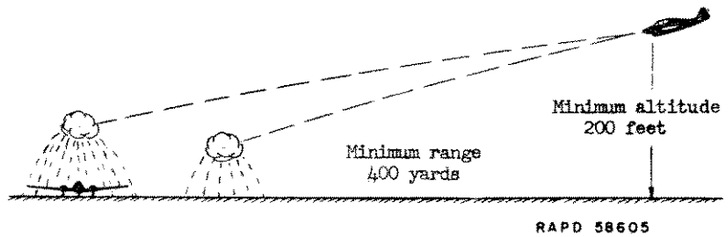


FIG. 4. AFFECT OF MATERIAL OBJECTS ON BURST HEIGHT OF FUZE T5

(2) The fuze T4 does not function if intensity of light within its sensitivity angle (fig. 3) remains constant. Only changes in light intensity function the fuze after it is armed. This fuze cannot be used before sunrise or after sunset, nor should it be used in fogs or clouds. At altitudes below 10,000 feet the rocket should be aimed slightly (10 feet) below the target.

(3) The fuze will function after arming if fired with the sun shining into its sensitivity angle (fig. 3).

c. Functioning of fuze T5.

(1) The fuze T5 is an electromagnetic fuze which functions due to the presence of a target. The fuze arms approximately 1 second after the rocket is launched and detonates when it comes into the influence of a target or when it approaches within 15 to 100 feet of the ground or water. A self-destroying feature will detonate the rocket approximately 6 to 12 seconds after being fired if the fuze does not pass within operating range of a target (fig. 2) or does not approach the earth.

(2) This fuze may be used during day or night and is not affected by fog or clouds. In addition to plane-to-plane use it is suitable for plane-to-ground use.

(3) Plane-to-ground use of the fuze T5 will result in an airburst at a height most lethal to personnel and most effective against light material targets. Terrain irregularities, trees, and material targets will cause bursts to occur at greater heights than would occur over level terrain. This characteristic may be used to an advantage in that fire power may be easily concentrated on such targets (fig. 4). The dive angle will not alter the effectiveness, but low altitude approach, or approach below 10° from horizontal will result in increased range dispersion.

d. Arming of the T4 and T5 fuzes is delayed for at least 0.76 seconds time of flight. Although the exact time varies between fuzes, they will all arm before 1 second time of flight.

MINIMUM RANGE FOR PLANE-TO-PLANE USE
(Both planes same speed)

Plane Speed (mph)	Minimum Arming Distance - yds Plane to Armed Rocket.	MINIMUM RANGE, yds			
		Head-on Approach	Tail Approach	Rearward Firing	Deflection Shooting
300	189	537	243	255	390
400	182	625	235	245	430

e. Safety. Fuzes T4 and T5 can withstand rough handling and dropping safely. Rocket separations or blow-ups will not arm the fuze.

f. Self-destruction is incorporated in these fuzes to cause function after flight time of 6 to 12 seconds. Fuzes which do not function on a target will function on self-destruction.

g. Mid-flight functions up to 10 percent may occur at random, after arming, to the end of the trajectory.

h. Climatic effects.

(1) Full advantage should be taken of the sealed fuze containers in tropical and damp climates. Assembled fuzes may be stored up to ten days at temperatures between 20° and 100°F outside the sealed containers. In tropical climates storage time of unpacked fuzes or fuze components should be kept to a minimum (see par 16 c). Exposure to rain or immersion in water will hasten deterioration.

(2) Firing in fog, clouds, or darkness produce no malfunctioning of the T5 fuze. Heavy rain will increase the number of mid-flight functions and duds.

(3) Fuze batteries must not be below +20°F at time of firing. See paragraph 16 c for storage of batteries.

4. DESCRIPTION OF FUZES.

These fuzes consist of four basic components; nose, battery, switch, and booster housing. The two fuzes differ only in the nose component. Nose MC-380 ( ) is used with the fuze T4 and Nose MC-382 ( ) is used with the fuze T5 (fig. 1).

a. Nose MC-380 ( ). The nose model number may be followed by the manufacturer's code letter in the parenthesis. Noses MC-380 ( ) with the letters A, B, C, or D are interchangeable. The nose unit contains the photoelectric unit which will function the fuze by a change in light. The nose unit is completely sealed and requires no adjustment. External features are as follows:

(1) Conical ogive containing a ring-type lens of transparent plastic.

(2) Shoulder containing slots for fuze wrench.

(3) Base containing 2 sets of threads. The smaller diameter threads are for assembly to the booster housing and the larger diameter threads are for assembly to the rocket.

(4) Electric contact pins for connection to battery.

(5) Red guide mark for proper alignment and assembly to battery. The groove may be used as a guide for assembly in the dark.

b. Nose MC-382 ( ). The nose model number may be followed by the manufacturer's code letter in the parenthesis. Noses MC-382 ( ) with the letters A, B, C, D, or E are interchangeable. The nose unit contains basic electric equipment which initiates the airburst by influence of the target. It is completely sealed and requires no adjustment. External features are as follows:

(1) Conical plastic ogive with metallic cap.

(2) Shoulder containing slots for fuze wrench.

(3) Base containing 2 sets of threads. The smaller diameter threads are for assembly to the booster housing and the larger diameter threads are for assembly to the rocket.

(4) Electric contact pins for connection to battery.

(5) Red guide mark and groove for proper alignment and assembly in the dark.

b. Battery BA-75 is a unit which provides the power supply for operation of the fuze. It is incased in a black bakelite cylinder. External features are as follows:

(1) Top plate, marked "AMP" containing a 7 pin socket to receive nose pins.

(2) Bottom plate of tan fiber containing a 6 pin socket to receive switch pins. This plate has a notch for proper assembly to switch in the dark.

(3) Decalcomania which contains battery identification, a red guide strip for alignment with the nose, and a green guide strip for alignment with the switch.

c. Switch SW-230A or SW-230C, 1.0 second arming is a unit which contains mechanical and electrical devices necessary to activate and arm the fuze, an electric detonator, and a powder train interrupter for safety during handling and launching. External features are as follows:

(1) Electric contact pins at the top for assembly to the battery.

(2) Fiber terminal disc to support the contact pins.

always insert a key in the switch.

13. MALFUNCTIONS.

a. Under normal conditions of use, approximately 80% of these fuzes will function properly.

b. Local conditions or improper assembly may decrease the percentage of proper functions. The following sections list the types of malfunctions, most frequent causes, and remedies.

Duds

Cause	Remedy
Defective components	Eliminate by testing. Replace with good components.
Approach to target before arming.	Use at ranges to give flight time to target in excess of 1.0 second.
Firing in rain.	None.

Mid-Flight Functions

Operation of self-destruction element.	Use at range to give less than 6 seconds flight time.
Loose fins (Fuze P.D., T5 only).	Tighten fins. See par. 10.
Loose assembly of fuze.	Tighten fuzes and set screws.
Firing into sun (Fuze P.D., T4 only)	See paragraph 3b.
Firing in rain.	None

Impact Functions

Crushing of electrical components on fuzes that would otherwise be duds.	Impact functions in excess of 10% usually can be eliminated by applying remedies outlined under "Duds".

14. PACKING AND MARKING.

a. Nose, switch, and booster housing are assembled and packed in individual sealed metal containers 15 of which are packed in a wooden box 12" x 20 7/16" x 10 5/8". The boxes are marked, "15 P.D., T4" or "15 P.D., T5" (fig. 11 and 12). Fuze lot number is stenciled on box, metallic container, and booster housing. A cardboard cylinder and a silica gel moisture absorber are packed in the place of the battery in each metal container.

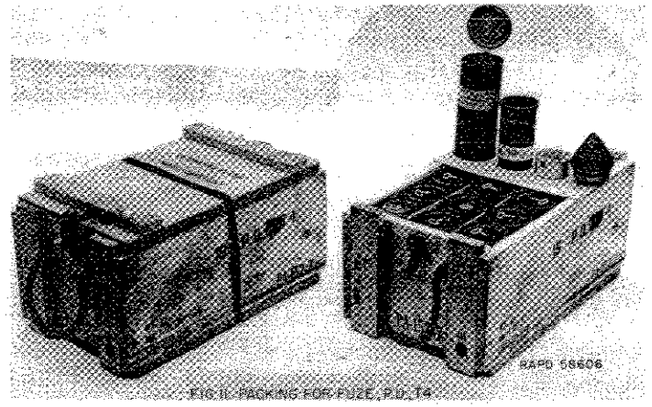


FIG 11. PACKING FOR FUZE, P.D. T4

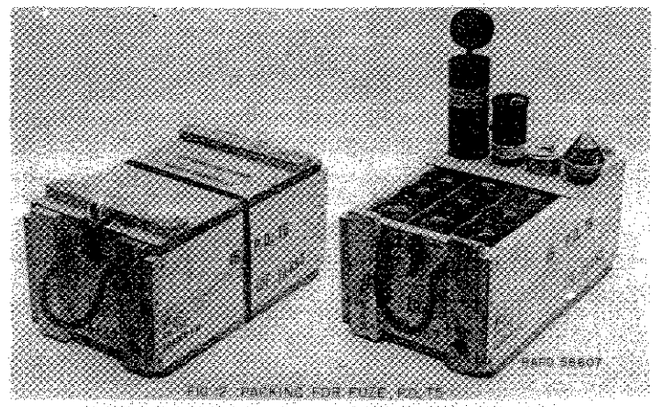


FIG 12. PACKING FOR FUZE, P.D. T5

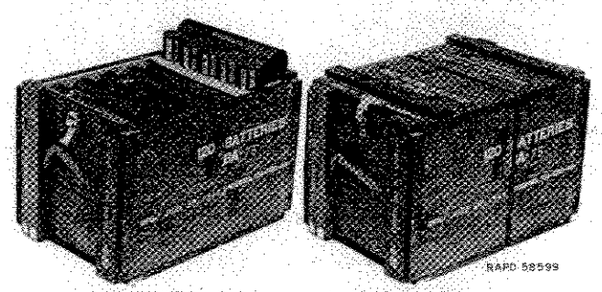


FIG 13. CONTAINER FOR BATTERY BA-75

b. Batteries are shipped in separate wooden boxes marked, "120 BATTERIES BA-75". Each box contains 24 sealed fiber cylinders with 5 batteries per cylinder (fig. 13). Boxes and battery decalcomanias are marked with date of battery manufacture and battery nomenclature.

15. WEIGHTS AND DIMENSIONS:

a. The following weights and dimensions apply to fuze T4 and T5 components:

Unit	Avg. Wt. (lb)	Diameter (in.)	Length Assembled (in.)	Thread
Nose MC-380 ()	0.90	3.187 ± .005	3.3125 max.	3.000-16-NS-2 THREAD
Nose MC-382 ()	1.1	3.187 ± .005	3.3125 max.	3.000-16-NS-2 THREAD
Battery BA-75	0.6	2.600 - .015	2.312 - .020	
Switch SW-230A or C	0.54	2.600 - .015	1.282 - .010	
Booster Housing M-381	0.50	2.875 + .010	4.964 max.	2.706-16-NS-2 THREAD
Assembled P.D. fuze T4	2.54	3.187 ± .005	7.567 max.	
Assembled P.D. fuze T5	2.74	3.187 ± .005	7.567 max.	

Depth inside fuze well	5.250 minimum
Length outside rocket	2.3125 maximum
Diameter - overall	3.187 + .005

16. HANDLING AND STORAGE.

a. Handling.

(1) Fuzes in their original packing containers may, in general, be stored and handled in the same manner as other fuzes, provided proper security is maintained (par. 2).

(2) Fuze components and batteries are thoroughly protected in their packing containers. They should not be opened sooner than necessary and only enough for the mission at hand should be unpacked.

(3) Excessive rough handling may increase fuze malfunctions, but will not decrease fuze safety.

b. Effects of dampness and immersion.

(1) Due to the electrical nature of fuze components, they must be guarded against immersion in water and against dampness.

(2) Sealed metal containers will not be affected by immersion.

(3) Battery containers must not be immersed, but unopened containers can withstand spray.

(4) Complete fuzes, when assembled in rockets, can withstand spray and rain but must not be immersed.

c. Storage temperatures.

(1) All fuze components except batteries may be stored at temperatures between -20°F and 120°F.

(2) Batteries may be stored at temperatures between -20°F and +70°F, 0°F to +40°F being the recommended storage temperature limits. At temperatures below +40°F, battery life will be 6 to 8 months. From +40°F to +70°F, battery life will be 3 to 6 months. However, batteries must be above +20°F at time of firing.

(3) Fuze components may be stored for short periods (up to 48 hours) outside these temperature limits without damage.

17. DESTRUCTION.

In the event that destruction of fuzes, fuze components, test equipment, or literature is necessary the following methods are recommended.

a. Fuzes and fuze components.

(1) Deep Water. The individual cans or components may be disposed of by dropping them in deep water.

(2) Explosives. Open a box of fuzes and remove one near the center. Insert a one pound block of TNT with 5 feet of safety fuze attached. Replace the fuze and detonate. Electric detonation may be used, in which case all boxes of fuzes should be prepared and detonated simultaneously.

(3) Incendiary Grenades. Ignite an incendiary grenade, AN-M14 on top of each opened box of fuzes. Suitable precautions must be taken to prevent injuries to personnel due to exploding boosters.

b. Test Equipment. Remove the instruction card from the inside cover and any other literature from inside the test equipment. Smash the equipment completely with a sledge hammer. Pour gasoline over the resulting debris and set on fire.

c. Literature. Tear all instruction cards, ammunition data cards, bulletins, etc., to pieces, soak in gasoline and set on fire.

18. DISPOSAL OF DUDS.

Duds may be sensitive to shock, jarring, or approach. Disposal should not be attempted by unauthorized personnel.

[A. G. 300.5(28 December 1944)]

By order of the Secretary of War:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

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For explanation of symbols, see FM 21-6.

W. Technical Manual 11-2502

(Rev.) Para. 23)

SECTION V. SUPPLEMENTARY INFORMATION

23. Unpacking and Assembling Components of Fuze, Rocket, P.D. T4 or Fuze, Rocket, P.D. T5. These fuzes fit the Rocket M8, which is high explosive loaded, or the Practice Rocket M9 which is inert loaded. Each fuze consists of four components: a nose, a battery, switch and housing. Fuze, Rocket, P.D. T4 is assembled using Nose MC-380-( ) whereas Fuze Rocket P.D. T5 uses Nose MC-382-( ). There are two types of noses for each of these fuzes. Noses MC-380-A, MC-380-B, MC-380-C, and MC-380-D; MC-382-A, MC-382-B, MC-382-C, MC-382-D and MC-382-E contain an electronic self-destruction circuit set to function between five and eleven seconds after firing. Noses MC-380-E, MC-380-F, MC-380-G and MC-380-H; MC-382-F, MC-382-G, MC-382-H, MC-382-I and MC-382-J do not contain an electronic self-destruction circuit and if self-destruction is desired they must be assembled with switch SW-200-B or switch SW-230-B which have a mechanical self-destruction contact timed to operate six seconds after firing.

Switch SW-200 contains the safety mechanism and mechanical delay for the fuze and is constructed so that it arms 0.7 seconds after firing; SW-230 is similar to SW-200 but it provides electrical delay in addition to the 0.7 seconds mechanical delay. The arming time is stamped on the top rim of the switch. The suffix "A" in SW-200-A and SW-230-A indicates the absence of the mechanical self-destruction feature incorporated in SW-200-B and SW-230-B.

All of the switches contain an electric detonator (squib) which is sensitive and must not be tampered with. Never poke or pry a Switch SW-200 or SW-230, or try to take one apart. Never test one with an ordinary test meter because many test meters pass enough current to detonate the electric detonator or squib. These switches are tested and closed at the factory and it is of utmost importance that no switches which are defective be loaded into fuzes or even placed in booster housings, since a dangerous explosion can result if the squib is fired. The Test Equipment IE-28 and the safety key give an adequate safety indication.

Either of three batteries can be used in Fuze, Rocket P.D. T4 or P.D. T5. All of these batteries are mechanically interchangeable but differ in the wiring to the socket contacts. Battery BA-55 is to be used with SW-200-A or SW-200-B only. SW-230-A or SW-230-B must be assembled with BA-75 or BA-76. Batteries BA-75 and BA-76 in combination with the SW-230-( ) provide the additional electrical delay referred to above. Battery BA-75 leaves the electronic self-destruction circuit of the nose in operation while Battery BA-76 shorts out this circuit.

Various combinations of components can be made up for different purposes. Some give electronic and some mechanical self-destruction.

[redacted]

Section V. Supplementary Information.

A. Combinations giving 0.7 seconds mechanical arming delay

Nose	Battery	Switch	Self-Destruction
MC-380 A, B, C, D) MC-382 A, B, C, D, E)	BA-55	SW-200A	Elec. only
"	BA-55	SW-200B	Elec. and mech.
MC-380 E, F, G, H,) MC-382 F, G, H, I, J,)	BA-55	SW-200B	Mech. only

B. Combinations giving electrical arming delay in addition to 0.7 seconds mechanical delay

MC-380 A, B, C, D) MC-382 A, B, C, D, E)	BA-75	SW-230A	Elec. only	
"	BA-75	SW-230B	Elec. and mech.	
MC-380-E, F, G, H) MC-382 F, G, H, I, J)	BA-75	SW-230B	Mech. only	
Any Nose MC-380-( ) MC-382-( )	BA-76	SW-230B	Mech. only	Do not use this combination if BA-75 is available.
Any Nose MC-380-( ) MC-382-( )	BA-76	SW-230A	None	For use when self-destruction is not desired.

The nose, switch, and booster housing are assembled and packed in moisture-proof containers which are packed in wooden boxes marked "Fuze, Rocket P.T. 74" or Fuze Rocket P.D. T5". The individual containers inside the wooden boxes are marked with the same nomenclature. Packings marked in this way contain booster housings which are loaded with tetryl for detonation of Rocket HE. The usual precautions in handling explosives will apply to these booster housings.

Practice rounds have the word "Practice" marked on the wooden boxes and the individual containers. These are for use with the Practice Rockets M9 and must not be assembled into HE Rockets since that will not detonate the high explosive. These practice rounds have the booster housings loaded with a cake of black powder.

In each container a cardboard cylinder is packed in place of the battery. The batteries are shipped directly in wooden boxes marked "120 Batteries BA-55" or "120 Batteries BA-75" or "120 Batteries BA-76" as the case may be. Each box contains fiber cylinders with 5 batteries per cylinder; there are 24 cylinders to the box, giving a total of 120 batteries per box.

Batteries are necessary for the operation of the fuzes and must be inserted in place of the cardboard shipping spacer which is packed with the other three parts of the fuze.

Fuze components and batteries should not be opened any longer than necessary before using and only enough of them should be opened for the mission at hand since they are thoroughly protected in their packing containers.

[redacted]