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FM 23-30, Basic Field Manual, Grenades, is published for  
the information and guidance of all concerned.

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(For explanation of symbols see FM 21-6.)

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FM 23-30

**RESTRICTED**  
**BASIC FIELD MANUAL**

**GRENADES**

(This manual supersedes FM 23-30, January 2, 1940.)

**CHAPTER 1**

**HAND GRENADES**

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**SECTION I**

**GENERAL**

- 1. TYPES.—Hand grenades are divided into the following types:
  - a. Fragmentation grenades, containing an explosive charge in a body designed to fragment with the action of the bursting charge.
  - b. Offensive grenades, containing a high explosive charge in a paper body, designed for demolition effect.
  - c. Chemical grenades, containing a chemical agent which produces a toxic or irritant physiological effect, a screening smoke, an incendiary action, or any combination of these.
  - d. Practice grenades, containing a reduced charge, to simulate fragmentation grenades.
  - e. Training grenades, containing no explosive or chemical.
- 2. FILLERS.—The filler is the substance contained in the body of a grenade. It may be a powerful explosive, as in the case of the fragmentation grenade, or a gas- or smoke-producing substance. Those used are—
  - a. EC (explosive company) blank fire smokeless powder.—This is a commercial type granulated nitrocellulose powder, generally pink or yellow in color. It is less powerful than

TNT and is exploded by ignition rather than detonation. Grenades loaded with this material can be issued fuze and ready for use and are, in general, not susceptible to mass detonation.

*b. Trinitrotoluene (TNT).*—TNT is stable but, unlike blank fire powder, it explodes by detonation. Hand grenades filled with TNT are not stored or issued with the fuze assembled. TNT in block form is used for demolitions.

*c. Chloracetophenone (CN).*—This is a lachrymatory (tear) gas which produces a severe burning sensation in the eyes, causing intense weeping. In one type of irritant hand grenade, CN is combined with diphenylaminechlorarsine (d below).

*d. Diphenylaminechlorarsine (DM).*—DM is a gas which causes a burning sensation in the nose and throat and a heavy or tight feeling in the chest. There is also a nauseating effect, the degree of which depends on the concentration of the gas and the length of exposure. Grenades filled with chemicals, because of their small capacity, are not considered suitable for war use, but are very effective in riots, civil disorders, etc.

*e. Hexachlorethane-zinc mixture (HC).*—Upon ignition, HC mixture produces a dense white smoke which is harmless. HC smoke grenades are used by the Army Air Forces and the Armored Force for signals.

*f. B chlorvinyl-dichlorarsine (M1).*—M1 (lewisite) is a liquid which gradually changes to a gas. It is extremely vesicant and either gas or liquid will burn the skin or lungs severely. Casualties do not usually develop until a few hours after exposure. Grenades filled with M1 are suitable for contaminating vehicles and important installations.

*g. Chloracetophenone solution (CNS).*—CNS is a mixture of CN in chlorpicrin and chloroform. Chlorpicrin (PS) has lacrimatory properties similar to CN.

*h. Sulphur trioxide-chlorosulfonic acid mixture (FS).*—FS is a corrosive liquid which reacts with the atmosphere, producing an effective screening smoke.

*i. Gasoline (liquid) (GA).*—Liquid gasoline is an effective incendiary material with which to ignite combustible materials.

*j. Gasoline (solidified) (GA).*—The several forms of solidified gasoline burn more effectively than liquid gasoline.

*k. AW filling.*—The AW filling consists of phosphorus and a rubber-gasoline solution. The rubber-gasoline solution adheres to surfaces, and burns 6 to 8 minutes. The phosphorus prevents the rubber-gasoline solution from being extinguished with water.

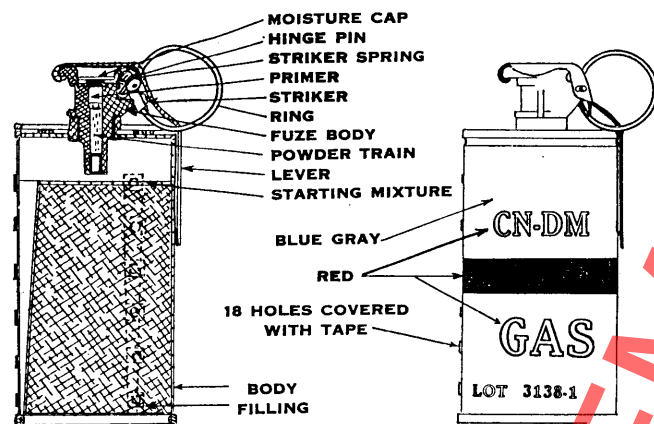
*l. Thermate (TH).*—TH is an incendiary filling which burns intensely. Grenades filled with TH are used against materials which are difficult to ignite.

■ 3. COMPONENTS.—*a. Time fuze.*—The time fuze, or safety fuze, is a cord containing a slow-burning powder train. The time fuze issued to the service is known commercially as Bickford fuze and burns at the approximate rate of 15 inches per minute. Time fuze should always be tested before using to determine its rate of burning. The time fuze in most of the grenade firing mechanisms is cut to burn for 5 seconds.

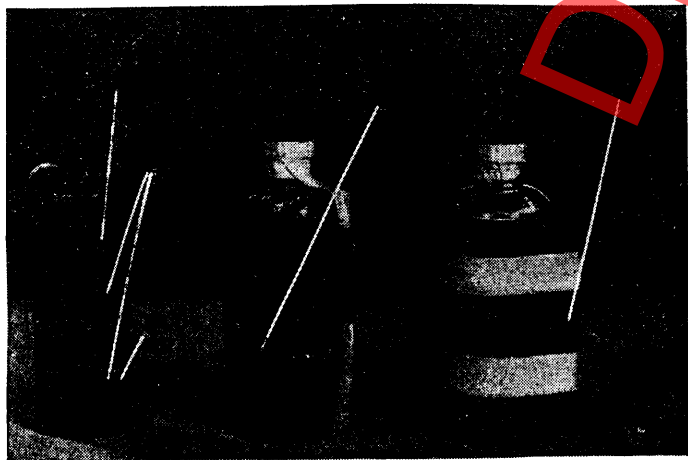
*b. Detonators.*—A detonator is a metal capsule filled with a detonating explosive such as fulminate of mercury. Commercial detonators come in 10 sizes, numbered 1 to 10. The higher numbered sizes are larger and contain increasing amounts of the detonating mixture. No. 6 and No. 8 are the ones used in grenades. Detonators are sensitive to heat, shock, and friction and should be handled carefully at all times.

*c. Fuzes.*—The fuze is the mechanism that fires the grenade. Fuzes are described in detail and their functioning explained in TM 9-1900. All grenade fuzes are time and automatic. Time means that the grenade is fired after a certain lapse of time and not on percussion. Automatic means that the fuze begins to function automatically as it leaves the hand, providing the safety cotten pin has been removed, thus providing a safety factor by eliminating the necessity of starting the action of the mechanism before the grenade is on its way. As to the final action, fuzes may be classified as detonating or igniting.

(1) *Detonating fuzes.*—Those that contain a detonator. The function of the detonator is either to set off the explosive charge or to burst the container and liberate the filler.



① Irritant gas hand grenade CN-DM M6.



CWB 546

② Incendiary grenade M14 and frangible grenades M1.

FIGURE 3.

chemical filler is composed of a mixture of CN-DM and a small amount of blank fire powder. Two seconds after the primer is fired the grenade begins to generate a gas having a pungent odor. One second later the gas reaches full volume and the grenade functions for 25 to 35 seconds.

(3) *Grenade, hand, gas, irritant, CN, M7.*—This grenade is similar to the M6 grenade but is filled with CN only instead of with the CN-DM mixture.

(4) *Grenade, hand practice, Mk. II.*—This grenade is a limited standard practice grenade and is equipped with the igniting fuze M10A1. The grenade is loaded with a charge of black powder contained in a paper tube. After the fuze is assembled in the grenade, this charge is inserted into the filling hole, which is closed with a cork.

(5) *Grenade, hand Mk. 1A1.*—This grenade is the current standard for practice and training. It consists of a one-piece cast iron body in the shape of the fuze fragmentation grenade and a removable safety pin and ring. It is inert.

(6) *Grenade, hand, offensive, Mk. IIIA1.*—This grenade consists of a die-cast top, which is threaded to receive the fuze, detonating, hand grenade, M6A2, and a body of laminated cartridge paper which contains the high explosive charge. This grenade is for demolition. It may be used in the open more safely than the fragmentation grenade because there is no marked fragmentation. Grenade bodies and fuzes are shipped separately. Bodies are packed 25 per carton, with 8 cartons to a box.

(7) *Grenade, frangible, M1 (fig. 3 ②).*—This grenade is a common glass pint bottle equipped with a screw cap and designed for the following chemical fillings: M1, CNS, AW, FS, and GA. No bursting charge is provided. Dispersal of contents is produced when the bottle is shattered by impact. Incendiary fillings are ignited by the M1 or M2 igniter immediately after impact. In the case of the AW grenade, the white phosphorus filling ignites spontaneously upon contact with air.

(8) *Grenade, incendiary, M14 (fig. 3 ②).*—This thermate-filled grenade is similar in size and shape to the irritant gas hand grenade CN-DM M6.

b. *Summary.*—A summary of the various types of hand grenades is given in the following table:

■ 11. TRENCHES (fig. 10).—*a.* The trenches should be constructed according to the specifications for type A fire trenches. For classes of 150 men, at least 12 fire bays and as many traverse bays should be made. Three masks should be placed along the trenches about 10 yards in rear of the parados. These masks are sandbag walls 7 feet high, 12 feet long, and built on the circumference of a 12-foot circle. They are for the protection of the officers who have control of the firing line during live practice with fragmentation grenades.

*b.* For training other than live grenade practice the thrower places himself in a firing bay and throws at successive bays and traverses in turn until a hit is secured. The thrower can make observations for any and all throws by jumping up in the trench, but his hands must not touch any part of the trench. The coach may place himself in such a position as to see the strike of the grenade, but in so doing should not expose his body unnecessarily. He should give the necessary corrections after each throw.

■ 12. THROWING PITS (fig. 11).—*a.* A pit 8 feet long, 4 feet wide, and 7 feet deep serves as a throwing trench. Along the longitudinal axis and at a distance of 25 yards dig a second pit 18 feet long, 2 feet wide, and 1 foot deep. At an angle of 45° to the right and left of the front edge of the throwing pit, and at a distance of 20 yards, dig similar pits so that the longitudinal axis of each pit is perpendicular to the 45° line.

*b.* These pits are used for training in throwing from behind cover, from a trench, or where a quick glance or verbal direction must serve the thrower as a means of locating the target. For the first few throws the thrower is allowed to locate each pit before throwing by jumping up for one glance. He must not support himself by placing his hands on the sides of the trench. An assistant can call the correction after each throw as "Up five right eight." The correction refers to yards. This serves as training in using the left arm for maintaining direction and gaging distance according to the effort of the throw. A grenade that first strikes the ground outside and then goes into a pit is not considered a hit. The object is to

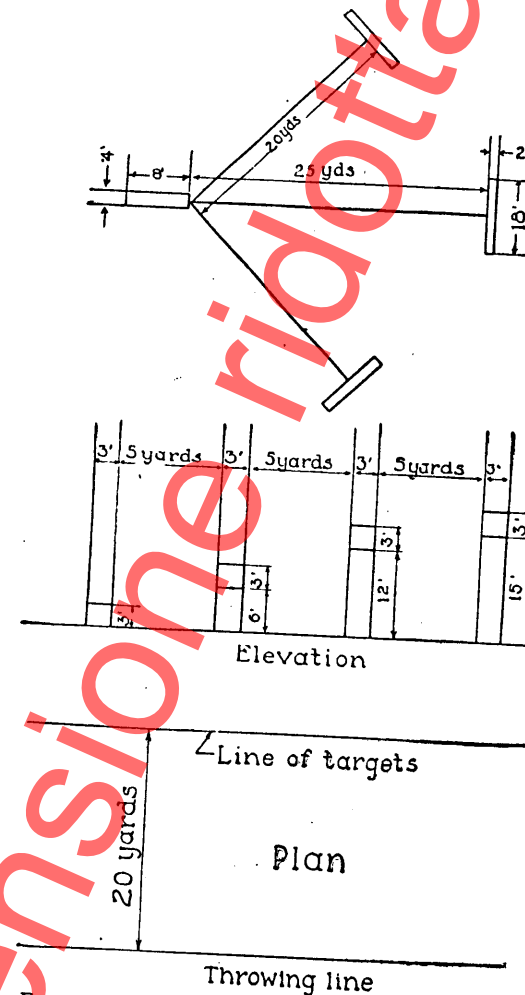


FIGURE 11.—Throwing pits and vertical targets.

hit each of the three targets in turn with the least number of grenades.

■ 13. VERTICAL TARGETS (fig. 11).—*a.* The vertical targets consist of four targets. These targets represent windows at various heights from the ground. Each target has an interior dimension of 3 by 3 feet. Each target is constructed of two pieces 4 by 4 inches, used for uprights, and two crosspieces, 2 by 2 inches, placed on the uprights. From left to right, one target is level with the ground, one 6 feet above ground, one 12 feet above ground, and one 15 feet above ground. The height from the ground is measured from the ground to the interior edge of the bottom crosspiece of each target.

*b.* The thrower places himself with his advanced foot touching the throwing tape line. He endeavors to throw through the frames. A grenade which strikes the frame is not considered a hit. The object is to hit each of the four targets in turn with the least number of grenades.

■ 14. SCORING.—*a.* When local facilities permit the construction of grenade courts, and time is available for testing organizations in grenade throwing, the system explained in *b* below provides an effective means of stimulating interest and developing accurate throwers. Tests by organizations in grenade throwing are optional, and when conducted, necessary scoring sheets will be prepared locally.

*b.* All targets are required to be hit regardless of the number of grenades used. The best score is made by hitting all targets with the least number of grenades and thereby placing a premium on accuracy. It will be noted that there are 20 targets to be hit. If only 20 grenades are used the thrower has a perfect score of 100. The number of grenades used in excess of 20 reduces the score by a like amount.

### ■ 15. HAND GRENADE SCORE CARD.

(Name) \_\_\_\_\_

(Army serial No.) \_\_\_\_\_ (Grade, company, and regiment) \_\_\_\_\_

Courts	Procedure	Targets to be hit	Number of grenades used	Scorer's initials
Main.....	Throws in any position at the first 4 trench lines in turn until a direct hit is made on the tape or in the trench.	4		
Angle.....	Throws in any position at the first 3 trench lines in turn until a direct hit is made on the tape or in the trench.	3		
Crater.....	Throws in each position—standing, kneeling, and prone—until a direct hit is made.	3		
Trenches.....	Throws in any position down the trench at the first 3 firing bays in turn until a direct hit is made.	3		
Throwing pits.....	Throws in standing position at each target in turn until a direct hit is made.	3		
Vertical targets.....	Throws in standing position at each window in turn until a clean hit is made.	4		
Total.....		20		
The score is obtained by deducting the number of grenades used from 120. Score.....				

Grading (circle the grade applicable):

Above 80..... Superior.  
 Above 70..... Excellent.  
 Above 60..... Satisfactory.  
 Below 60..... Unsatisfactory.

Date.....  
 Certified correct.....

#### SECTION IV

#### SAFETY PRECAUTIONS, POLICE OF RANGE, AND DESTRUCTION OF DUDS

■ 16. GENERAL.—The provisions of this section pertaining to throwing or handling live grenades in peacetime are applicable to troops. Other information necessary for safety,

c. Grenades, AT, practice, M11 and M11A1.—These are inert (dummy) grenades, similar in shape and weight to the grenade, AT, M9 and M9A1, respectively. Each of these grenades consists of two parts—a head and a fin assembly. When damaged by repeated use, the fin assembly must be replaced.

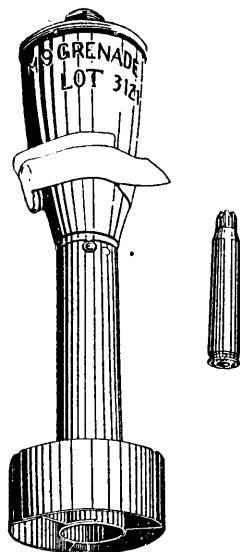


FIGURE 12.—Grenade, AT, M9, and cartridge, AT grenade, cal. .30, M3.

■ 31. IDENTIFICATION AND MARKINGS.—a. High explosive grenades (M9 and M9A1) are painted yellow with black identification markings, giving the model and lot numbers.

b. Practice grenades (M11 and M11A1) are painted black with white identification markings.

■ 32. CARTRIDGE, AT GRENADE, CALIBER .30, M3.—This cartridge, used in discharging antitank grenades, is a special type of blank cartridge. *Only* this cartridge will be used for this purpose. *Neither ordinary blank ammunition nor ball ammunition will be used.*

■ 33. LAUNCHER, GRENADE, M1 (fig. 14).—The launcher, on which the grenade is placed for firing, is an extension to the barrel of the rifle. A clamp with wing nut is provided for



FIGURE 13.—Grenade, AT, M9A1.

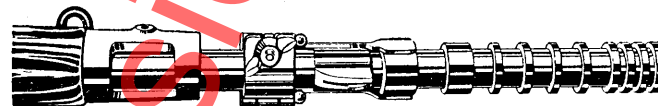


FIGURE 14.—Launcher, grenade, M1, attached to muzzle of rifle by clamp and wing nut.

attaching the launcher securely to the muzzle of the rifle. When the launcher is attached, the rifle may be employed for firing ball ammunition; however, the bayonet cannot be fixed. When firing the rifle with the launcher attached, care must

be taken to insure that the launcher is firmly attached to the rifle, otherwise the launcher may be damaged and inaccurate fire result.

■ 34. PAD, RECOIL.—A rubber recoil pad is provided for protecting the rifle stock when the rifle is fired with butt resting against a hard surface. The pad also lessens the shock of recoil when the rifle is fired from the shoulder.

■ 35. MECHANICAL TRAINING.—*a. Construction of grenades.*—No training will be given in the construction or principles of functioning of the grenade.

*b. Attaching recoil pad.*—The recoil pad is stretched over the butt of the rifle and seated firmly.

*c. Attaching launcher.*—The launcher is slipped over the muzzle of the rifle, and firmly seated as far down over the barrel as possible. The clamp is fastened securely by tightening the wing nut. The wing nut should be tightened frequently.

*d. Placing grenade on launcher.*—Elevate the muzzle of the rifle slightly, open the bolt, then slip the open end of the grenade fin assembly over the end of the launcher, and slide the grenade as far down as possible. Remove the safety pin (fig. 24 ©).

*e. Firing grenade.*—With the bolt open, insert the special cartridge in the magazine. After the grenade has been firmly seated on the launcher, and the safety pin removed, close the bolt, being sure that the cartridge is fed into the chamber. Take one of the prescribed positions, aim as described in paragraph 38, and squeeze the trigger until the rifle is fired. *If the rifle has previously been used to fire ball cartridges, care must be taken to see that none is fed into the chamber when the grenade is to be fired, as serious damage will result.*

## SECTION II

### MARKSMANSHIP

■ 36. GENERAL.—*a. Purpose.*—The purpose of this section is to provide a thorough and uniform method of training individuals to fire the antitank grenade at stationary and moving targets.

*b. Place in training.*—(1) Training in firing the antitank grenade should follow the course in rifle marksmanship. Without proper training in rifle marksmanship, the soldier instinctively gives the trigger a sudden pressure which results in flinching. The added weight of the launcher and the grenade exaggerates this tendency.

(2) The methods of instruction are similar to those used in teaching marksmanship with any other weapon. Training is divided into steps which must be taught in proper sequence.

*c. Fundamentals.*—To become proficient in firing the antitank grenade, a soldier must be trained in the following essentials:

- (1) Correct sighting and aiming.
- (2) Correct positions.
- (3) Correct trigger squeeze.
- (4) Correct sequence of operations in loading and firing.
- (5) Correct range estimation.
- (6) Correct application of leads for moving targets.

■ 37. EQUIPMENT.—*a.* The special equipment required for preparatory training is simple and readily improvised from materials at hand. The equipment required is as follows:

U. S. rifle, caliber .30, M1903.  
 Launcher, grenade, M1.  
 Pad, recoil.  
 Grenades, AT, practice, M11.  
 Rifle rest.  
 6- by 6-foot target frame.  
 20-inch sighting disk.

*b.* For U. S. rifle, caliber .30, M1903A1, the following additional equipment is required:

Sight, grenade launcher, M2.

*c.* For U. S. rifle, caliber .30, M1917, the following additional equipment is required:

Sight, grenade launcher, M2.

Launcher, grenade, M2.

■ 38. SIGHTING AND AIMING (figs. 15 and 16).—*a. Sight settings.*—(1) For M9 or M11 grenades, the peep sight is set at 2,000 yards.



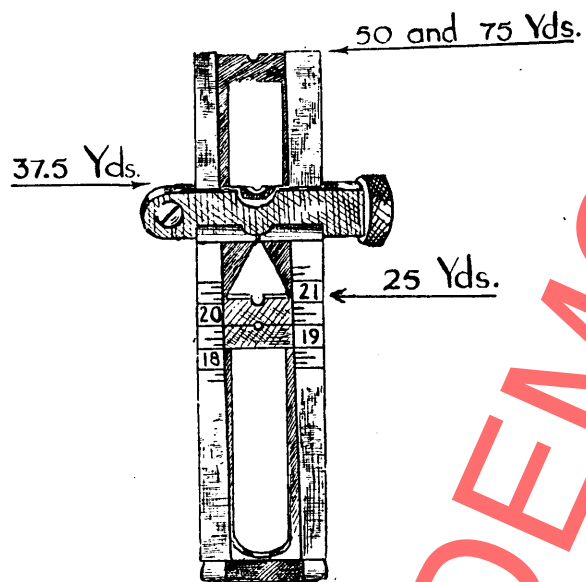


FIGURE 15.—Rear sight leaf, M1903 rifle, set for use with grenade, AT, M9 or M11.

(2) For M9A1 and M11A1 grenades, the peep sight is set at 1,750 yards.

*b. Method of aiming.*—(1) Use the top of the grenade as a front sight and for a range of—

- 25 yards—use the open sight just over the peep sight.
- 37.5 yards—use the top of the drift slide.
- 50 yards—use the top of the sight leaf.

(2) For a range of 75 yards, use the base of the front sight and the top of the sight leaf. In order to employ this method both eyes must be kept open and focused on the target (see par. 39b).

■ 39. EXERCISES IN SIGHTING AND AIMING.—*a. Exercise No. 1.*—

(1) *Purpose.*—To demonstrate the correct alinement of sights for ranges from 25 to 50 yards.

(2) *Method.*—(a) The instructor places the rifle with the

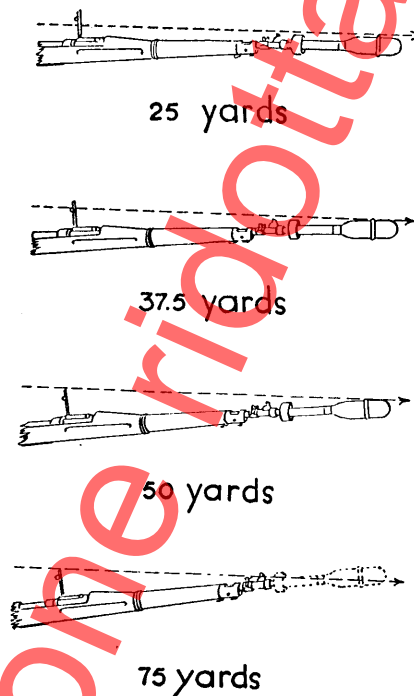


FIGURE 16.—Method of aiming at various ranges.

launcher attached in a rifle rest and alines the rest with a blank target. An antitank practice grenade M11 or M11A1 is placed on the launcher and the instructor then alines the sight disk by directions to the marker who controls the disk. When the disk is properly placed to demonstrate the correct sight alinement for a range of 25 yards, the instructor commands: HOLD. The instructor moves away from the rifle and directs each pupil in his group to look through the sights in order to observe the correct sight alinement for 25 yards.

(b) The marker then moves the disk out of alinement. Each pupil in turn takes position at the rifle and directs the marker to move the disk until the sight alinement is correct for a

range of 25 yards. The coach verifies the alinement for each pupil. The exercise is repeated to demonstrate the correct sight alinement for ranges of 37.5 and 50 yards.

*b. Exercise No. 2.*—(1) *Purpose.*—To demonstrate the method of sight alinement for a range of 75 yards.

(2) *Method.*—The instructor demonstrates the technique of alining the sights with both eyes open, by having each student close his left eye and hold one or more fingers in front of his right eye so as to obscure the sighting disk, and then having the pupil open the left eye. With both eyes open the disk again is visible.

*c. Exercise No. 3.*—(1) *Purpose.*—To demonstrate the correct sight alinement for a range of 75 yards.

(2) *Method.*—The instructor repeats exercise No. 1 with the disk alined correctly for a range of 75 yards.

■ 40. POSITIONS.—*a. General.*—(1) The antitank rifle grenade may be fired from any position used for firing a rifle.

(2) In the standing and kneeling positions, if time permits, the hasty sling should be used.

(3) When firing from the shoulder, care must be exercised to seat the butt of the rifle firmly. This precludes the possibility of injury due to the recoil.

(4) Owing to the height of the sight, the cheek cannot be pressed firmly against the stock. Consequently the head must be held well away from the rifle.

(5) In firing from the prone position it is desirable to employ a butt rest.

(6) The use of the recoil pad will be habitual when the rifle is fired from a butt rest. It may be used when the rifle is fired from the shoulder; however, when the grenade is fired from the shoulder without the recoil pad, the recoil is not excessive.

*b. Standing* (fig. 17).—The body should be faced at an angle from 60° to 70° from the line of fire with feet spread about 2 feet apart. Otherwise the position corresponds to that prescribed for firing the rifle.

*c. Kneeling* (fig. 18).—The firer kneels on the right knee, half-faced to the right, the left knee bent so that the left lower leg is vertical (as seen from the front); left arm well under the rifle and free from the left knee; right elbow

above or at the height of the right shoulder; the body well forward so as not to be sitting on the right heel.

*d. Prone with sandbag* (fig. 19).—The butt of the rifle is placed against the end of the sandbag with the right upper arm over the sandbag, and elbow resting on the ground.

*e. Prone with casual butt rest* (figs. 20 and 21).—In field firing, when firing from the prone position, any butt rest of which the firer may avail himself quickly (stump, vehicle rut, or other indentation) should be utilized. The right fore-

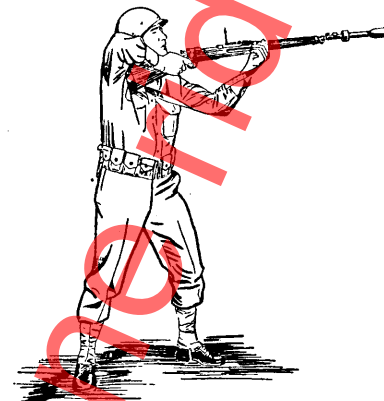


FIGURE 17.—Standing position.

arm is placed over the top of the butt of the rifle in order to hold it in firing position.

*f. From individual prone shelter or foxhole* (fig. 22).—In field firing the soldier should fire from an individual prone shelter (slit trench) or from a standing type one-man foxhole.

■ 41. SEQUENCE OF OPERATIONS (figs. 23 and 24).—*a.* In loading and firing, the following sequence will be observed:

- (1) Open bolt.
- (2) Insert cartridge in magazine.
- (3) Place grenade on launcher.
- (4) Withdraw safety pin.
- (5) Close bolt.
- (6) Aline sights.
- (7) Squeeze trigger and fire.



FIGURE 18.—Kneeling position.



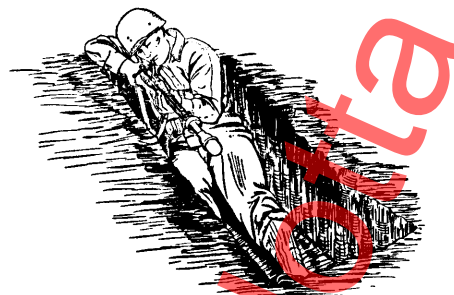
FIGURE 19.—Prone position; sandbag butt rest.



FIGURE 20.—Prone position; casual butt rest (stump).



FIGURE 21.—Prone position; casual butt rest (wheel rut).



① Reclining position; individual prone shelter, using rear wall as butt rest.



② Kneeling position; individual prone shelter.



③ Firing from standing type one-man foxhole.

FIGURE 22.