FM 23-30

DEPARTMENT OF THE ARMY FIELD MANUAL

GRENADES AND PYROTECHNIC SIGNALS

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GRENADES AND PYROTECHNIC SIGNALS

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*** This manual supersedes FM 23–30, 28 October 1959, including all changes.**

CHAPTER 1

INTRODUCTION

1. Purpose and Scope

a. This manual provides guidance for the conduct of training with hand grenades, rifle grenades, and ground pyrotechnic signals.

b. This manual contains descriptions, general characteristics, capabilities and uses, functioning data, training guidance, and safety procedures for handling grenades and ground pyrotechnic signals. It also includes information on the construction and operation of facilities for grenade training.

c. The material contained herein is applicable without modification to both nuclear and nonnuclear warfare.

d. Users of this publication are encouraged to recommend changes or provide comments for improvement. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commandant, United States Army Infantry School, Fort Benning, Georgia 31905.

2. General

a. Grenades are classified by method of projection as hand grenades or rifle grenades and by origin as ordnance or chemical items. Ordnance grenades contain high explosive fillers which enable them to perform antitank or casualty-producing missions. Chemical grenades contain fillers which enable them to perform casualty-producing, incendiary, illuminating, signaling, screening, or riot control missions. Most hand grenades, although designed to be thrown, may also be projected from the service rifle using a grenade projection adapter.

b. Ground pyrotechnic signals are also categorized as hand-held or rifle projected. They are designed for use only as signaling and illuminating devices.

CHAPTER 2

HAND GRENADES

Section I. CHARACTERISTICS AND MAIN PARTS

3. General

Hand grenades are designed for projection to a target by means of throwing. They assist the individual soldier in the accomplishment of six missions:

a. Producing casualties.
b. Signaling.
c. Screening.
d. Illuminating.
e. Producing incendiary effects.
f. Riot control.

4. Characteristics

All hand grenades share three characteristics:

a. Relatively short range in comparison to other infantry weapons.

b. Small effective casualty radius (distance from the grenade's detonation point in which a minimum of 50 percent of exposed personnel will become casualties).

c. Incorporate a delay element to permit safe throwing.

5. Main Parts

Hand grenades are composed of three main parts:

a. Body. This contains the filler and, in some grenades, provides fragmentation.

b. Filler. The filler is the chemical or explosive substance in the grenade body which gives the grenade its characteristics and determines its use.

c. Fuze Assembly. This is the heart of the hand grenade and causes the grenade to function by means of a chain reaction of pyrotechnic, mechanical, or electrical actions.

Section II. FUZES AND HAND GRENADE SAFETY CLIP

6. Functioning
(fig. 1)

All fuzes in U.S. hand grenades may be categorized as either detonating or igniting. With few exceptions, fuzes function in the following manner:

a. When the safety pin is withdrawn from the fuze, the safety lever is released from the grenade body, but is held in place by the individual throwing the grenade or, if the grenade is rifle projected, by a grenade projection adapter. A hand grenade safety clip, adaptable for the M26-series, the M33-series, the M56, M57, and MK2 fragmentation grenades, and the M30 practice grenade has been designed to prevent the grenade safety lever from springing loose should the safety pin be unknowingly or accidentally removed from the grenade. Pressure exerted by the safety clip prevents the release of the grenade safety lever, regardless of whether the safety pin is in place.

(1) The safety clip (fig. 2) is a single piece of spring-steel wire bent to form—

(*a*) A metal *loop* which fits around the grenade fuze at the grenade neck.

(*b*) A metal *clamp* which fits around and presses against the grenade safety lever.

(2) To attach the safety clip to the grenade (fig. 3)—

(*a*) Slide the clip onto the handle.

(*b*) Attach the loop portion of the safety clip around the grenade fuze.

(*c*) Snap the clip end around the grenade safety lever.

Note. The hand grenade safety clip may be issued attached to the above grenades, or it may be issued as a separate item.

b. When the safety lever (fig. 1) is released, it is forced away from the grenade body by a striker acting under the force of a striker spring.

c. As the safety lever is forced away from the grenade body, the striker rotates on its axis and strikes the primer.

d. When struck, the primer emits an intense flash of heat which ignites the delay element.

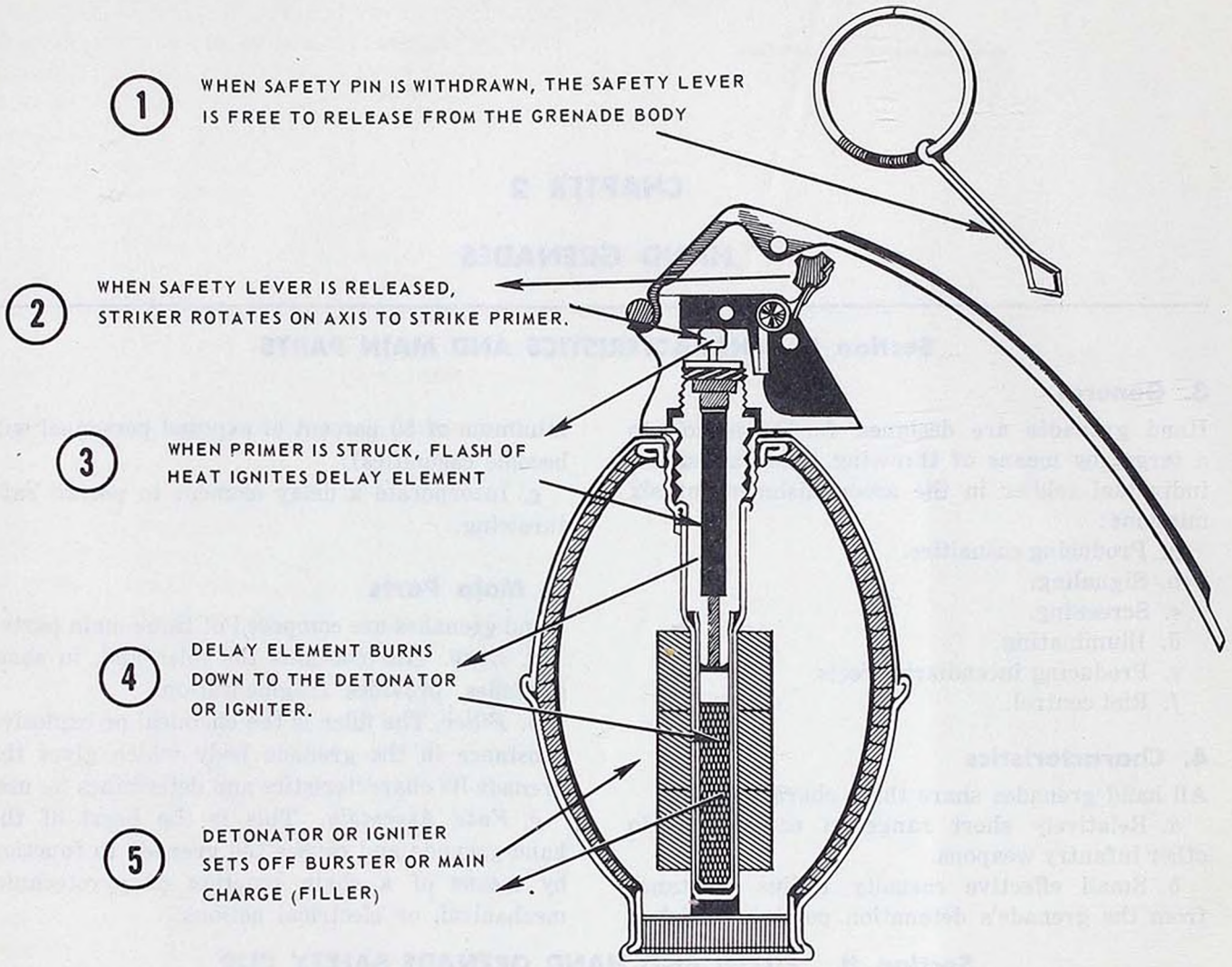


Figure 1. Fuze functioning. (For details of the grenade's component parts, see 1, figure 4.)

e. The delay element burns for the prescribed delay time and thereupon initiates the detonator or igniter.

f. The detonator or igniter sets off the grenade's filler. Detonators are used in fragmentation, white phosphorous smoke, and bursting chemical hand grenades. Igniters are used with practice and burning chemical hand grenades.

7. Detonating Fuzes

a. M204A1 and M204A2 Fuzes (1, fig. 4). These fuzes are used with the MK2, the M26, and the M26A1 fragmentation hand grenades. The fuze well accepting these fuzes will also accept any standard firing device or the shipping plug priming-adapter of the M18A1 antipersonnel mine (CLAYMORE). Each fuze functions as described in paragraph 6. The delay element is a powder train requiring 4 to 5 seconds to burn down to the detonator. The detonator sets off the filler.

b. M206A2 Fuze (2, fig. 4). This fuze is used with the MK3A2 offensive hand grenade and the M34 white phosphorous smoke hand grenade. The M206-series of fuzes are similar to the M204-series of fuzes with the exception of the safety lever. The fuze functions as described in paragraph 6. The delay element is a powder train requiring 4 to 5 seconds to burn down to the detonator. The detonator sets off a tetryl burster, which in turn ruptures the grenade body and disperses the white phosphorous filler. (In the MK3A2 offensive grenade, no burster is required.)

c. C12 Integral Fuze (3, fig. 4.) This fuze is an integral part of the M25-series of riot control hand grenades. The fuze consists of a firing pin which is screwed into the base of the grenade body, an arming sleeve, and a slider assembly. The slider assembly contains a delay element of 1.4 to 3 seconds and a small detonator. When the safety pin is removed, the arming sleeve is held in place with the thumb. When the arming sleeve

Figure 2. Hand grenade safety clip fitted to the M30 practice grenade.

is released, the slider assembly is forced downward toward the firing pin under pressure of the firing spring. At the bottom of the fuze well, the slider strikes the firing pin and ignites the delay element which, in turn, sets off the detonator. The detonator bursts the grenade body and disperses the riot control agent over an area 5 meters in diameter.

d. M213 and M215 Fuzes. The M213 and M215 fuzes are similar in their functioning to the M204-series of fuzes. The M213 and M215 fuzes differ from each other only slightly and differ from the M204-series of fuzes in such physical details as shape of body and safety lever. The M213 and M215 fuze threads are larger than the M204-series fuze threads. Therefore, the fuzes cannot be used interchangeably. The M213 fuze is used with the M33 fragmentation grenade and the M215 fuze is used with the M56 fragmentation grenade. These fuzes may be used interchangeably, but interchanging is not recommended.

e. M217 Fuze (4, fig. 4). This fuze is used with the M59 and the M57 fragmentation hand grenades. The M217 is an impact detonating fuze which functions by electrical means. The purpose of the fuze is to provide immediate detonation on impact, to prevent the grenade from being thrown back by the enemy, and to prevent the grenade from rolling away from targets located on sloping terrain. The M217 fuze can be distinguished from other types of fuzes by the word IMPACT embossed in raised letters on the red safety lever. The M217 fuze thread diameter is larger than that of other fuzes (except the M213 and M215 fuzes) and therefore the M217 fuze is not interchangeable with other types of fuzes (except the M213 or M215 fuzes) or firing devices.

(1) The M217 is an electrical fuze which functions either on impact or after a lapse of 4 seconds after the striker ignites the primer. The fuze has an arming delay of 1 second which gives the soldier a margin of safety when he throws the grenade. This delay means that when the striker hits the primer, the grenade is still not armed until the 1-second arming delay is expended; therefore, if a grenade is accidentally dropped after the safety pin has been removed, a soldier still has adequate time to pick the grenade up and throw it to a safe area.

(2) Grenades armed with the M217 impact detonating fuze must be thrown to a minimum height of 4.5 meters (16 feet) (fig. 5). This height gives the grenade enough flight time to expend the 1-second arming delay and allows the grenade to detonate on impact. The grenade will detonate on impact when the arming delay is expended, regardless of the angle at which it strikes a target. If the grenade impacts before the arming delay has elapsed, or if no impact occurs after release of the safety lever, the grenade will detonate after a delay of 4 seconds. If the grenade does not detonate, the fuze will become inert within 30 seconds from the time the safety lever is released.

Warning: **Grenades armed with the impact detonating fuze will NOT be projected from the service rifle. In training, personnel will not release the safety lever prior to throwing nor will they observe the grenade's impact. A 5-minute waiting period must be observed prior to approaching a dud. If a grenade armed with the impact detonating fuze is dropped accidentally after the safety pin has been removed, the grenade MUST be picked up and thrown to a safe area. Under no circumstances should the grenade be kicked or tossed into a sump or ditch, since any sudden jarring of the grenade after the arming delay is expended, will cause detonation.**

8. Igniting Fuzes

a. M201A1 Fuze (1, fig. 6). This fuze is designed for use with chemical hand grenades whose

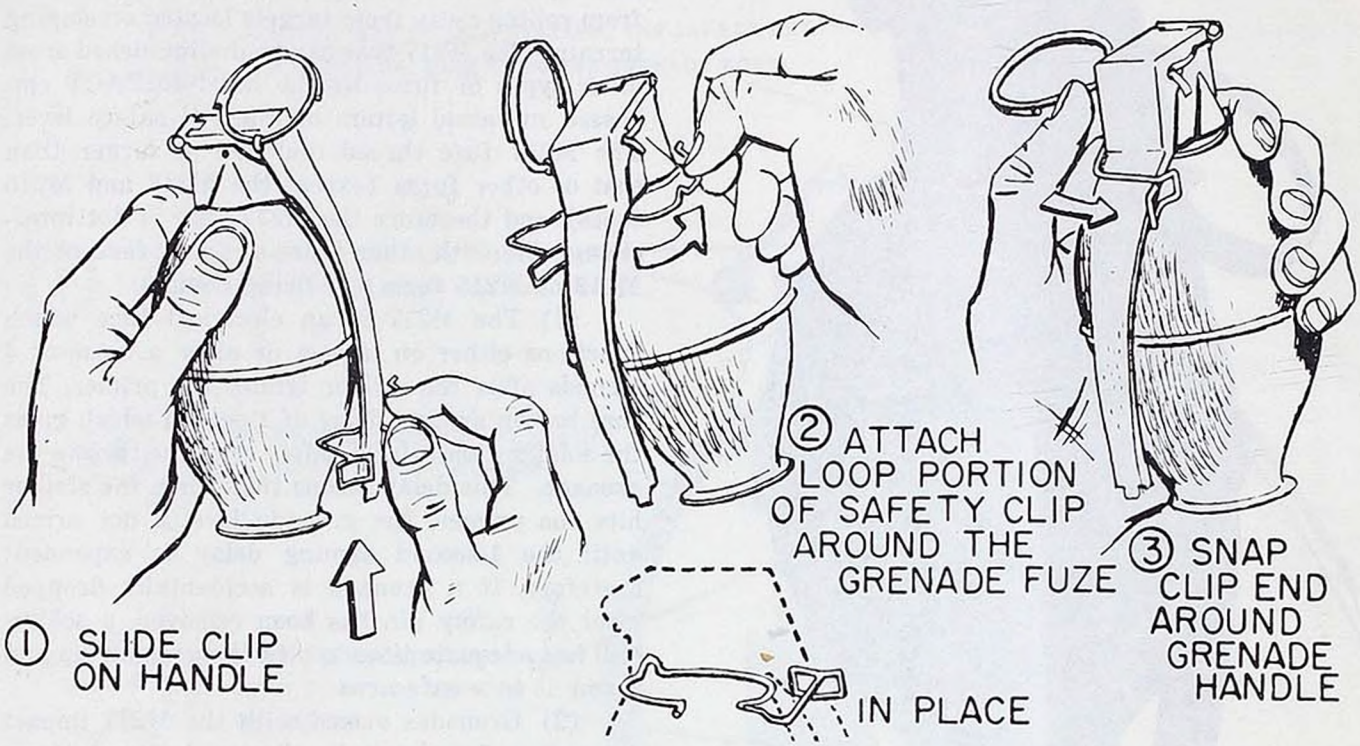


Figure 3. Attaching the hand grenade safety clip.

fillers are initiated by burning (the M6- and the M7-series of riot control grenades, the AN–M8 HC white smoke grenade, the AN–M14 TH3 incendiary grenade, and the M18 colored smoke grenade). The M201A1 fuze is interchangeable with any standard firing device. The fuze functions as described in paragraph 6. The time delay element is a powder train requiring 1.2 to 2 seconds to burn to the igniter. The igniter ignites the filler or a pyrotechnic starter with a violent burning action and causes the filler to be expelled from the grenade body.

b. M205A1 and M205A2 Fuzes (2, fig. 6). These fuzes are used with the M30 practice hand grenade. The fuze functions as described in paragraph 6. The time delay element is a powder train with a 4- to 5-second burning time.

c. Special Igniter (3, fig. 6). This fuze is used with the MKI illuminating hand grenade. The fuze functions as described in paragraph 6. The special igniter differs from other igniting-type fuzes in that it contains a quick match, rather than a powder delay train. The quick match has a burning time of 7 seconds, after which it sets off an igniter charge. The igniter charge initiates the burning process of the grenade's filler.

Section III. FRAGMENTATION HAND GRENADES

9. General

Fragmentation hand grenades (fig. 7) are useful weapons in both the offensive and defensive combat roles. They are particularly effective for close combat and are capable of inflicting multiple casualties without requiring perfect aiming or disclosing the soldier's position.

10. MK2 Fragmentation Hand Grenade (1, fig. 7)

The MK2 fragmentation hand grenade is being phased out as existing quantities are expended. The grenade is presently being used by the armies of our allies in many parts of the world.

a. Body. Cast iron (serrated to facilitate fragmentation).

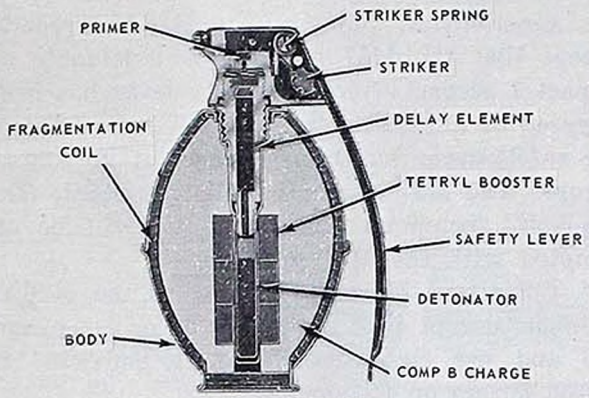
b. Filler. 2 ounces of flaked TNT.

c. Fuze. M204A1, or M204A2 (para 7*a*).

d. Weight. 21 ounces.

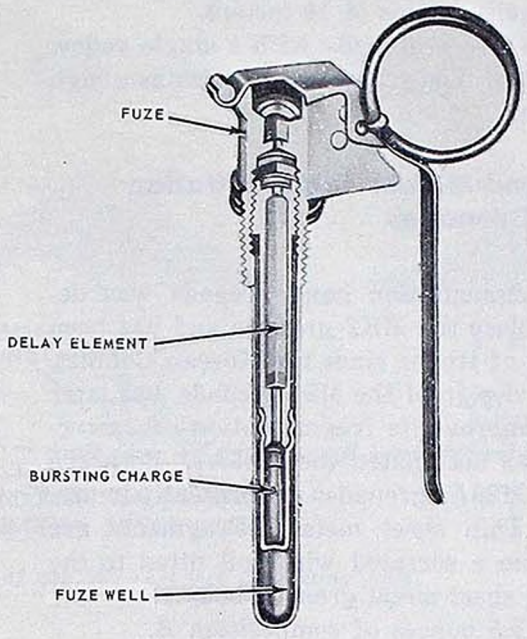
e. Safety Clip. For the proper method of installing the hand grenade safety clip, see paragraph 6*a*(2).

f. Capabilities. The average soldier can throw the grenade 30 meters, or it can be projected 140



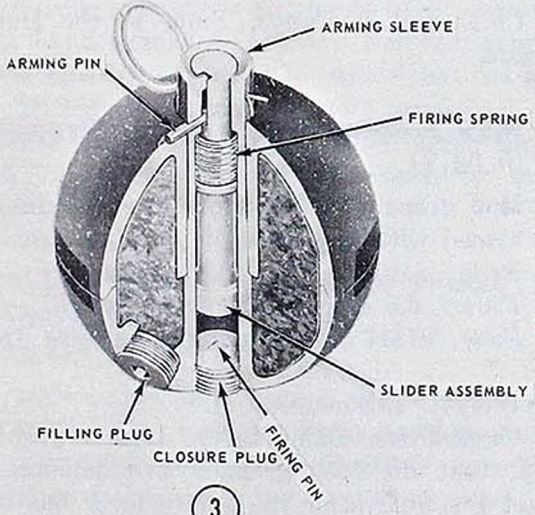
1

M204A2 DETONATING FUZE
(4–5 SECOND DELAY)



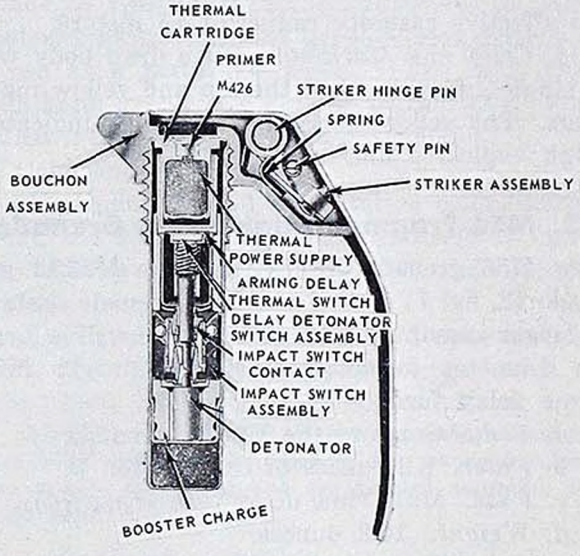
2

M206A2 DETONATING FUZE
(4–5 SECOND DELAY)



3

C–12 INTEGRAL FUZE FOR M25–SERIES
OF RIOT CONTROL GRENADES (1.4–3 SECOND
DELAY).



4

M217 IMPACT DETONATING FUZE
(4–SECOND DELAY; 1–SECOND
ARMING DELAY)

Figure 4. Detonating fuzes.

meters from the service rifle. The grenade has an effective casualty radius of 10 meters.

g. Color. Olive drab body with a single yellow band at the top. The yellow band indicates a high explosive filler.

11. M26 and M26A1 Fragmentation Hand Grenades
(2, fig. 7)

The M26 fragmentation hand grenade was designed to replace the MK2 grenade and has been in the hands of troops since the Korean Conflict. The original design of the M26 grenade was later modified to improve its fragmentation characteristics and was designated the M26A1. Both the M26 and the M26A1 grenades are presently in use.

a. Body. Thin sheet metal. (Fragments are produced from a serrated wire coil fitted to the inside of the sheet metal grenade body.)

b. Filler. 5.5 ounces of composition B.

c. Fuze. M204A1 or M204A2 with the M26; M204A2 with the M26A1.

d. Weight. 16 ounces.

e. Safety Clip. For the proper method of installing the hand grenade safety clip, see paragraph 6*a*(2).

f. Capabilities. The average soldier can throw the grenade 40 meters, or it can be projected 160 meters from the service rifle. The grenade has an effective casualty radius of 15 meters.

g. Color and Markings. Olive drab body with a single yellow band at the top and yellow markings. The yellow band and markings indicate a high explosive filler.

12. M56 Fragmentation Hand Grenade

The M56 grenade differs from the M26A1 grenade (2, fig. 7) in that the M56 grenade contains a larger amount of filler and its fuze well is larger in diameter to accommodate the larger M215 time delay fuze.

a. Body. Same as the M26A1 grenade.

b. Filler. 6.3 ounces of composition B.

c. Fuze. M215 time delay fuze (para 7*d*).

d. Weight. 15.2 ounces.

e. Capabilities. Same as the M26A1 grenade.

f. Color and Markings. Same as the M26A1 grenade.

13. M57 Fragmentation Hand Grenade
(3, fig. 7)

The M57 grenade differs from the M56 grenade in that it has an impact detonating fuze.

a. Body. Same as the M26A1 grenade.

b. Filler. 6.3 ounces of composition B.

c. Fuze. M217 impact detonating fuze (para 7*e*).

d. Weight. 15.2 ounces.

e. Capabilities. Same as the M26A1 grenade, except that the M57 grenade will detonate on impact 1 second after the safety lever has been released or automatically within 4 seconds after the safety lever has been released if no impact occurs. The M57 cannot be rifle projected. The "cookoff" technique (para 37) *will not* be attempted with the M57 grenade.

f. Color and Markings. Same as the M26A1 grenade, except that the safety lever is painted red and has the word IMPACT embossed in raised letters on its surface.

14. M33 Fragmentation Hand Grenade
(4, fig. 7)

The M33 grenade differs from the M26, M26A1, M56, and M57 grenades in that the M33 has an oblate spheriod body and contains a larger amount of filler. The diameter of the M33 fuze well is the same as that of the M56 and M57 fuzes.

a. Body. Steel with an oblate spheriod shape.

b. Filler. 6.5 ounces of composition B.

c. Fuze. M213 time delay fuze (para 7*d*).

d. Weight. 13.9 ounces.

e. Capabilities. Same as the M26A1 grenade, except that the M33 grenade cannot be rifle projected.

f. Color and Markings. Same as the M26A1 grenade.

15. M59 Fragmentation Hand Grenade
(5, fig. 7)

The M59 grenade differs from the M33 in that it is armed with an impact detonating fuze.

a. Body. Same as the M33 grenade.

b. Filler. 6.5 ounces of composition B.

c. Fuze. M217 impact detonating fuze (para 7*e*).

d. Weight. 13.9 ounces.

e. Capabilities. Same as the M26A1 grenade, except that the M59 grenade will detonate on impact 1 second after the safety lever has been released or automatically within 4 seconds after the safety lever has been released if no impact occurs. The M59 grenade cannot be rifle projected. The "cookoff" technique (para 37) *will not* be attempted with the M59 grenade.

f. Color and Markings. Same as the M26A1 grenade, except that the safety lever is painted red and has the word IMPACT embossed in raised letters on its surface.

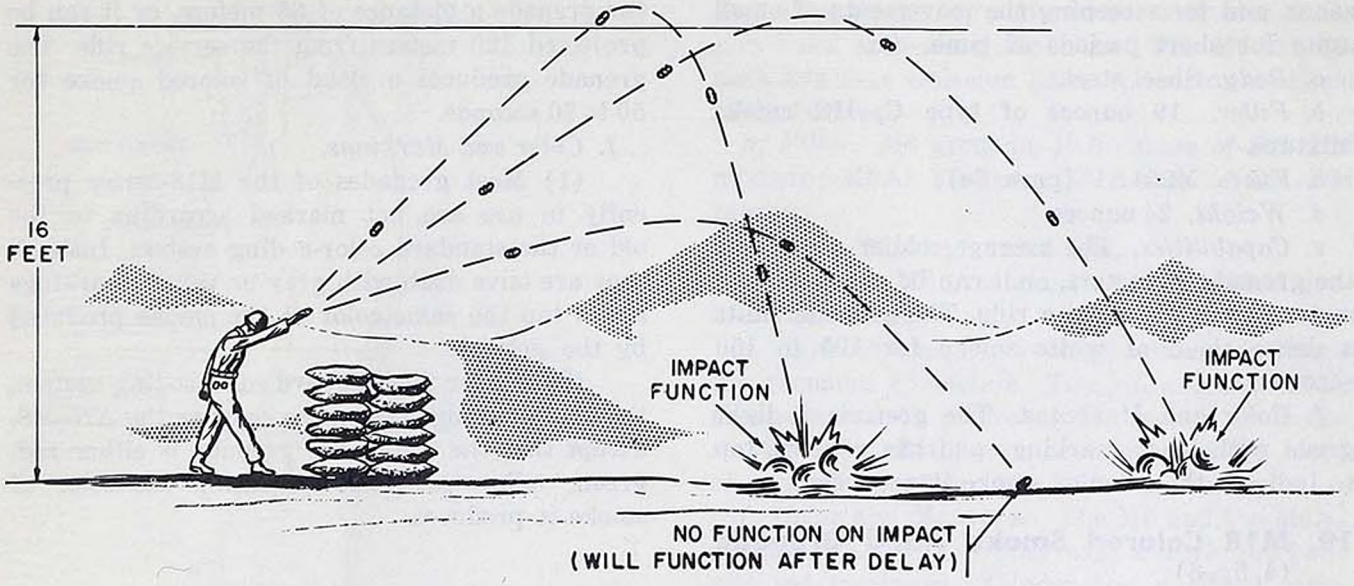


Figure 5. Impact characteristics of the M217 impact detonating fuze.

Section IV. CHEMICAL SMOKE HAND GRENADES

16. General

Chemical smoke hand grenades are designed primarily for signaling and screening. This grouping, however, includes the white phosphorous smoke grenades which, in addition to their signaling and screening capabilities, have casualty-producing and incendiary capabilities. The white phosphorous grenade is similar to other chemical smoke hand grenades in color. For this reason, caution must be exercised to insure that the grenade is not used near friendly personnel for signaling or for laying down a smoke screen which friendly personnel will have to move through.

17. M34 White Phosphorous Smoke Hand Grenade

(1 and 2, fig. 8)

The M34 white phosphorous smoke hand grenade is the most versatile of all hand grenades. The grenade can be used for signaling, screening, incendiary missions, or for producing casualties.

a. Body. Rolled steel (serrated to facilitate fragmentation).

b. Filler. 15 ounces of white phosphorous.

c. Fuze. M206A2 (para 7*b*).

d. Weight. 27 ounces.

e. Capabilities. The average soldier can throw the grenade 30 meters, or it can be projected 120 meters from the service rifle. The grenade has a bursting radius of 35 meters. All friendly personnel within this 35-meter area should be in a covered position to avoid being struck by burning particles. The WP filler burns for approximately 60 seconds at a temperature of 5,000°F. This intense heat causes the smoke produced by the grenade to rise quite rapidly, especially in cool climates, making the M34 grenade less desirable for use as a screening agent. (The M15 WP smoke hand grenade is similar to the M34. For detailed information, see TM 9-1330-200.)

f. Color and Markings.

(1) Under the old ammunition color-coding system, the white phosphorous grenade is light gray with a single yellow band and yellow markings.

(2) Under the newer standard color-coding system, the M34 grenade is light green with a single yellow band and light red markings.

Note. Most M34 WP smoke hand grenades presently in use were manufactured prior to the standard color-coding system agreement and are painted according to the old color code.

18. AN–M8 HC White Smoke Hand Grenade

(3, fig. 8)

The AN-M8 white smoke hand grenade is used to produce dense clouds of white smoke for signaling and screening. The smoke produced by this grenade clings to the ground more readily than the smoke of the M34 grenade. The AN-M8 grenade is used for ground-to-ground and ground-to-air signaling, for marking targets or landing

zones, and for screening the movements of small units for short periods of time.

a. Body. Sheet steel.

b. Filler. 19 ounces of type C, HC smoke mixture.

c. Fuze. M201A1 (para 8*a*).

d. Weight. 24 ounces.

e. Capabilities. The average soldier can throw the grenade 30 meters, or it can be projected 120 meters from the service rifle. The grenade emits a dense cloud of white smoke for 105 to 150 seconds.

f. Color and Markings. The grenade is light green with black markings and has a white top to indicate the color of smoke it produces.

19. M18 Colored Smoke Hand Grenade
(4, fig. 8)

The M18 colored smoke hand grenade is used as a ground-to-ground or ground-to-air signaling device, a target or landing zone marking device, or to screen the movements of small units for short periods of time. The grenade is available in four colors: red, green, yellow, and violet.

a. Body. Sheet steel. (Four emission holes at the top and one at the bottom of the grenade release the filler when the grenade is ignited.)

b. Filler. 11.5 ounces of colored smoke mixture.

c. Fuze. M201A1 (para 8*a*).

d. Weight. 19 ounces.

e. Capabilities. The average soldier can throw the grenade a distance of 35 meters, or it can be projected 120 meters from the service rifle. The grenade produces a cloud of colored smoke for 50 to 90 seconds.

f. Color and Markings.

(1) Most grenades of the M18-series presently in use are not marked according to the old or the standard color-coding system. Instead, they are olive drab with gray or yellow markings and a top the same color as the smoke produced by the grenade.

(2) Under the standard color-coding system, the M18 grenade is the same color as the AN–M8, except that the top of the grenade is either red, green, yellow or violet indicating the color of smoke it produces.

Note. When using the AN–M8 or the M18 grenades to mark landing or drop zones, care must be taken to insure the grenade is thrown into an area where the smoke will not obscure the landing area. If the AN–M8 or the M18 grenades fail to function, they may be ignited by punching a hole in the bottom of the grenades to expose the filler. The filler may then be ignited with a match or other open flame. When using this expedient method, the grenades must immediately be thrown after ignition, since they burn at a fairly high temperature and produce very dense smoke. This smoke is harmful if inhaled in large quantities. When using the AN–M8 HC white smoke grenade or the M34 WP smoke grenade for signaling or screening, care must be taken to insure the grenades are not thrown into areas where they may start fires detrimental to tactical operations.

Section V. RIOT CONTROL HAND GRENADES

20. General

Riot control hand grenades are designed chiefly to aid in quelling civil disturbances, prisoner of war riots, or similar disorders which require the use of nonlethal agents to restore order. These grenades are also effective in clearing buildings or tunnel systems in which noncombatants may be mixed with enemy personnel or on operations where the taking of prisoners is the primary mission. The M7A2 grenade and all other types of burning grenades should not be used inside buildings. The M25 CS grenade, the baseball type, can be employed inside buildings since it does not constitute a fire hazard. The grenade should be used inside buildings to force personnel outside or to prevent their entry. Most riot control hand grenades may also be used in training to simulate chemical attacks.

21. Riot Control Agents

To facilitate the accomplishment of the above missions, three types of riot control agents are available in hand grenade form.

a. CN, commonly known as "tear gas." The effects of CN are a stinging sensation of the eyes and a continuous flow of tears.

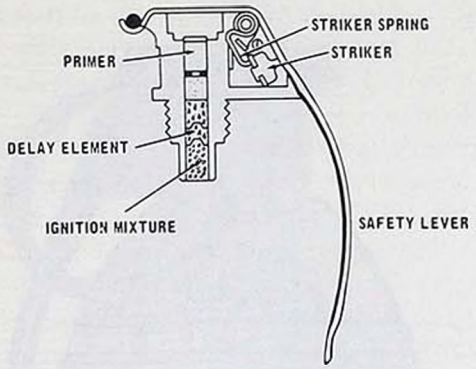
b. DM, a vomiting agent, often called "Adamsite," produces nausea and vomiting and normally is used in hand grenades in combination with other agents.

c. CS, the most powerful of the riot control agents. It produces the same effects as CN and adds involuntary closing of the eyes, nasal drip, severe coughing, tightness of the chest, extreme difficulty in breathing, and a stinging sensation on moist areas of the skin.

22. M6 and M6A1 CN–DM Riot Control Hand Grenades
(1 and 2, fig. 9)

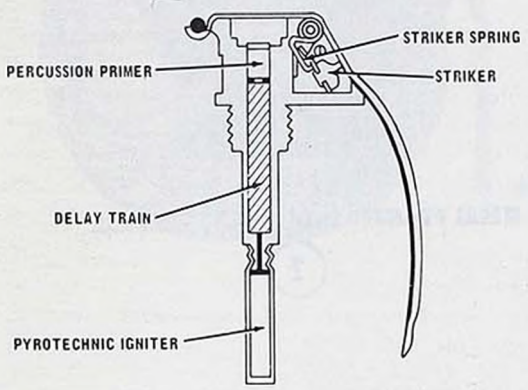
The M6 and M6A1 riot control hand grenades contain a combination mixture of CN and DM. They differ chiefly in external appearance and the manner in which the filler is combined.

a. Body. Sheet steel. (The M6 has six emis-



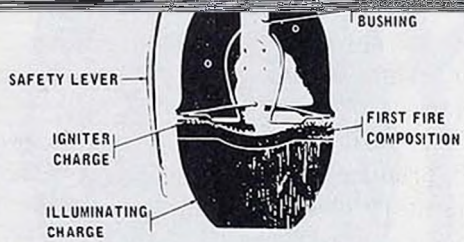
M201A1 IGNITING FUZE (1.2–2 SECOND DELAY)

1



M205A1 IGNITING FUZE (4–5 SECOND DELAY)

2



SPECIAL IGNITER (7 SECOND DELAY)

3

Figure 6. Igniting fuzes.

sion holes at the top and two rows of nine emission holes each along the sides. The M6A1 grenade has four emission holes at the top and one at the bottom.)

b. Filler. M6 grenade, 10.5 ounces of CN–DM mixture; M6A1 grenade, 9.5 ounces of CN–DM mixture.

c. Fuze. M201A1 (para 8*a*).

d. Weight. M6 grenade, 17 ounces; M6A1 grenade, 20 ounces.

e. Capabilities. The average soldier can throw the grenades 35 meters. The M6 and the M6A1 grenades can be projected 120 meters from the service rifle. Both grenades emit a dense cloud of irritant agent for 20 to 60 seconds.

f. Color and Markings. The M6 and the M6A1 grenades have a gray body with a single red band and red markings. (Under the standard color-coding system, the single red band and red markings indicate a nonpersistent, riot control filler. A double red band with red markings indicates a persistent riot control filler, and any combination of green bands and green markings indicates a casualty-producing filler. Presently, there are no casualty agents in grenade form.)

23. M7 and M7A1 CN Riot Control Hand Grenades

(3, fig. 9)

The M7 and the M7A1 riot control hand grenades contain only CN for a filler. They differ chiefly in body construction and the amount of filler they contain.

a. Body. M7 grenade, same as the M6; M7A1

d. Weight. M7 grenade, 17 ounces; M7A1 grenade, 18.5 ounces.

e. Capabilities. The average soldier can throw the grenades 35 meters, or they can be projected 120 meters from the service rifle. Both grenades produce a dense cloud of irritant agent for 20 to 60 seconds.

f. Color and Markings. Same as the M6 and M6A1 grenades.

24. ABC–M7A2 and ABC–M7A3 CS Riot Control Hand Grenades

(3, fig. 9)

The ABC–M7A2 and the ABC–M7A3 riot control hand grenades contain only CS for a filler. They differ only in the amount of filler and the form of CS they contain.

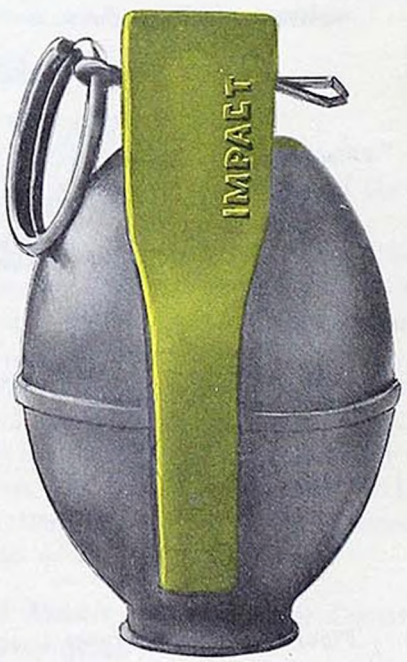
a. Body. The bodies of both grenades are the

MK 2 FRAGMENTATION HAND GRENADE

1

M26A1 FRAGMENTATION HAND GRENADE

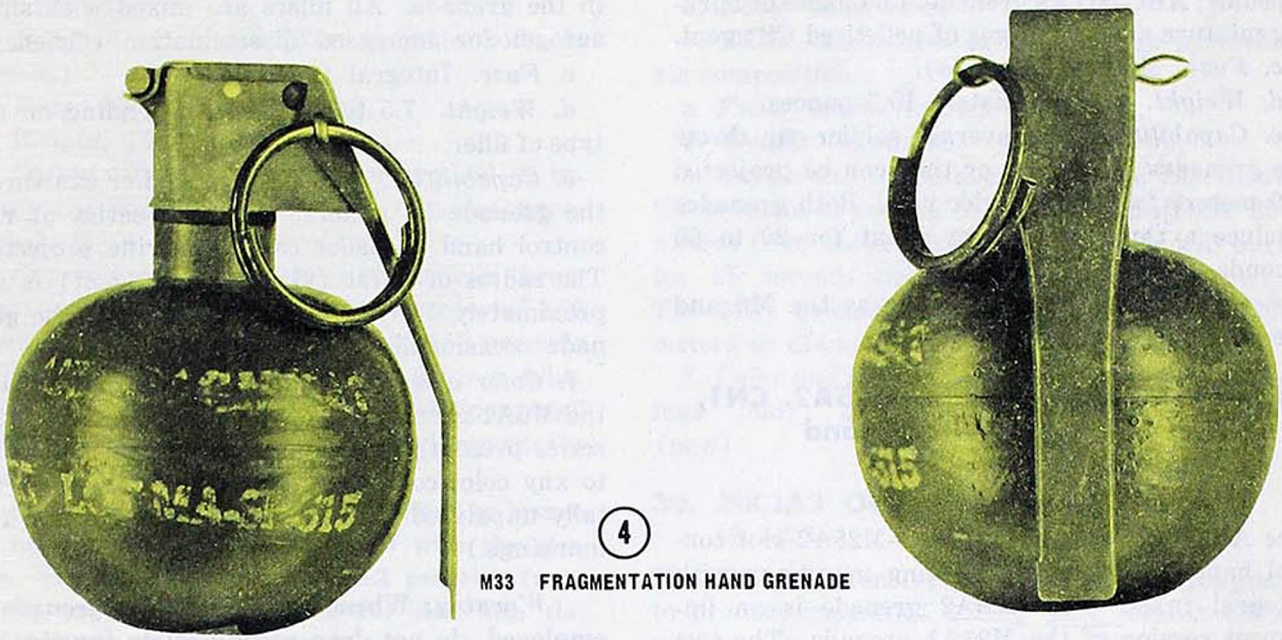
2



3

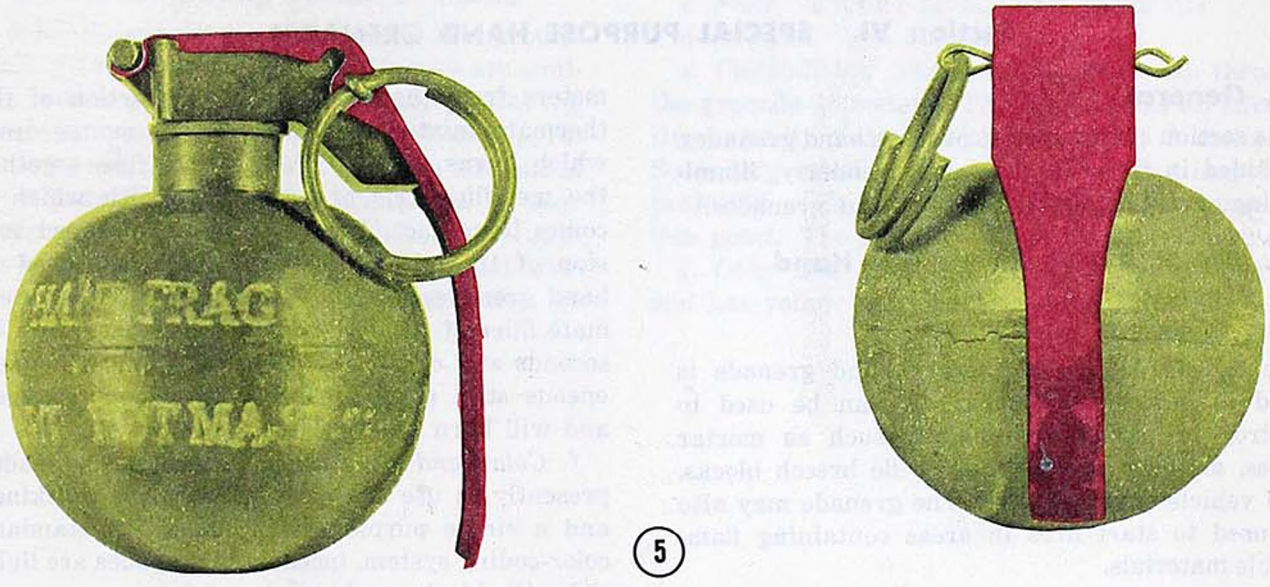
M57 FRAGMENTATION HAND GRENADE WITH M217 IMPACT DETONATING FUSE

Figure 7. Fragmentation hand grenades.



4

M33 FRAGMENTATION HAND GRENADE



5

M59 FRAGMENTATION HAND GRENADE
WITH M217 IMPACT DETONATING FUSE

Figure 7—Continued.

same as the M6A1 and the M7A1 grenades with four emission holes at the top and one at the bottom.

b. Filler. ABC–M7A2 grenade, 5.5 ounces of burning mixture and 3.5 ounces of CS in gelatin capsules; ABC–M7A3 grenade, 7.5 ounces of burning mixture and 4.5 ounces of pelletized CS agent.

c. Fuze. M201A1 (para 8*a*).

d. Weight. Approximately 15.5 ounces.

e. Capabilities. The average soldier can throw the grenades 40 meters, or they can be projected 120 meters from the service rifle. Both grenades produce a cloud of irritant agent for 20 to 60 seconds.

f. Color and Markings. Same as the M6 and the M6A1 grenades.

25. ABC–M25A1 and ABC–M25A2, CN1, DM1, CS1 Riot Control Hand Grenades
(4, fig. 9)

The ABC–M25A1 and the ABC–M25A2 riot control hand grenades are bursting munitions with integral fuzes. The M25A2 grenade is an improved version of the M25A1 grenade. The two types of grenades differ primarily in body construction. They are used to deliver all three types of riot control agents presently used in hand grenades.

a. Body. Compressed fiber or plastic hemispheres.

b. Filler. The fillers of the M25-series of riot control hand grenades vary in weight and composition according to the type of agent contained in the grenade. All fillers are mixed with silica aerogel for increased dissemination efficiency.

c. Fuze. Integral (para 7*c*).

d. Weight. 7.5 to 8 ounces, depending on the type of filler.

e. Capabilities. The average soldier can throw the grenade 50 meters. The M25-series of riot control hand grenades cannot be rifle projected. The radius of burst (visible cloud agent) is approximately 5 meters, but fragments of the grenade occasionally are projected 25 meters.

f. Color and Markings. Same as the M6 and the M6A1 grenades. (Most grenades of the M25-series presently in use are not painted according to any color-coding system. They are either totally unpainted or have only a red band and red markings.)

***Warning:* When the ABC–M25A1 grenade is employed, do not drop as immediate functioning may result; do not attempt to replace a pulled safety pin; and DO NOT RELAX THUMB PRESSURE ON ARMING SLEEVE AFTER THE SAFETY PIN IS PULLED.**

Section VI. SPECIAL PURPOSE HAND GRENADES

26. General
This section covers special purpose hand grenades. Included in this category are incendiary, illuminating, practice, and offensive hand grenades.

27. AN–M14 TH3 Incendiary Hand Grenade
(1, fig. 10)

The AN–M14 TH3 incendiary hand grenade is used to destroy equipment. It can be used to destroy or damage equipment, such as mortar tubes, artillery and recoilless rifle breech blocks, and vehicle engine blocks. The grenade may also be used to start fires in areas containing flammable materials.

a. Body. Sheet steel.

b. Filler. 26.5 ounces of thermate (TH3) mixture.

c. Fuze. M201A1 (para 8*a*).

d. Weight. 32 ounces.

e. Capabilities. The average soldier can throw the grenade 25 meters, or it can be projected 120 meters from the service rifle. A portion of the thermate mixture is converted to molten iron, which burns at 4000°F. and will fuse together the metallic parts of any object with which it comes in contact. Thermate is an improved version of thermite, the incendiary agent used in hand grenades during World War II. The thermate filler of the AN–M14 grenade burns for 40 seconds and can burn through a ½-inch homogeneous steel plate. It produces its own oxygen and will burn under water.

f. Color and Markings. Incendiary grenades presently in use are gray with purple markings and a single purple band. Under the standard color-coding system, incendiary grenades are light red with black markings.

28. M30 Practice Hand Grenade
(2, fig. 10)

The M30 practice hand grenade simulates the M26-series of fragmentation hand grenades for training purposes. The grenade adds realism to

training and familiarizes the soldier with the functioning and characteristics of the fragmentation hand grenade. (The M21 and MK1A1 practice grenades are similar in operation but are standard "C" items. For detailed information, see TM 9–1300–200.)

a. Body. Cast iron. (The grenade body is reusable.)

b. Fuze. M205A1 or M205A2.

c. Weight. 16 ounces.

d. Safety Clip. For the proper method of installing the hand grenade safety clip, see paragraph 6*a* (2).

e. Capabilities. The average soldier can throw the grenade 40 meters, or it can be projected 160 meters from the service rifle. The M30 grenade emits a small puff of white smoke after a delay of 4 to 5 seconds and makes a loud "popping" noise. The grenade body can be used repeatedly by replacing the fuze assembly.

***Caution:* Caution must be exercised to insure that no detonating fuzes are used with the grenade. The M205A1 and M205A2 practice fuzes are the only ones authorized for use with the M30 grenade. A detonating fuze may cause the grenade body to shatter on detonation, scattering dangerous fragments about the detonation point.**

f. Color and Markings. Light blue with white markings. (The safety lever of the fuze is light blue with black markings and a red tip.)

29. MKI Illuminating Hand Grenade

The MKI illuminating hand grenade is a ground signaling and illuminating item. Its uses are similar to ground pyrotechnic signals, except that the grenade burns only at ground level, whereas pyrotechnic signals burn in flight or while suspended from a parachute. The MKI should not be used in deep mud or swampy ground, because the grenade may become embedded in the ground with the result that little or no illumination is produced. The grenade burns with a very hot flame and may be used as an incendiary agent. Because of its incendiary nature, caution should be exercised in using the MKI to prevent fires which would be detrimental to tactical operations.

a. Body. Sheet steel.

b. Filler. 3.5 ounces of illuminating pyrotechnic composition.

c. Fuze. Special igniter (para 8*c*).

d. Weight. 10 ounces.

e. Capabilities. The average soldier can throw the grenade 40 meters or it can be projected 200 meters from the service rifle. The filler will burn for 25 seconds producing 55,000 candlepower. The MKI grenade will illuminate an area 200 meters in diameter.

f. Color and Markings. White with black markings (old); unpainted with black markings (new).

30. MK3A2 Offensive Hand Grenade

(4, fig. 10)

The MK3A2 offensive hand grenade is designed to produce casualties during close combat while minimizing danger to friendly personnel. The grenade is also used for concussion effects in enclosed areas, for blasting, or for demolition tasks.

a. Body. Fiber (similar to the packing container for the fragmentation hand grenade).

b. Filler. 8 ounces of TNT.

c. Fuze. M206A1 or M206A2 (para 7*b*).

d. Weight. 15.6 ounces.

e. Capabilities. The average soldier can throw the grenade 40 meters. The MK3A2 has an effective casualty radius in open areas of 2 meters. Secondary missiles and bits of the fuze may be projected as far as 200 meters from the detonation point. The grenade cannot be rifle projected.

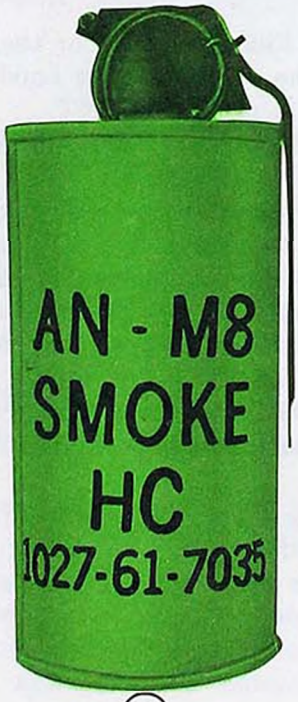
f. Color and Markings. The grenade is black and has yellow markings around its middle.

1

M34, WP SMOKE HAND GRENADE (OLD COLOR AND MARKINGS).

2

M34, WP SMOKE HAND GRENADE (STANDARD COLOR AND MARKINGS).



3

AN–M8, HC SMOKE HAND GRENADE.

4

M18 COLORED SMOKE HAND GRENADE.

Figure 8. Chemical smoke hand grenades.

1

M6, CN-DM RIOT CONTROL
HAND GRENADE

2

M6A1, CN-DM RIOT CONTROL
HAND GRENADE

3

ABC- M7A3, CS RIOT CONTROL
HAND GRENADE

4

ABC- M25A2, CS RIOT CONTROL
HAND GRENADE.

Figure 9. Riot control hand grenades.

AN-M 14, TH 3 INCENDIARY HAND GRENADE
(OLD MARKINGS)

1

M 30 PRACTICE HAND GRENADE

2

MK 1 ILLUMINATING HAND GRENADE

3

MK 3 A2, OFFENSIVE GRENADE

4

Figure 10. Special purpose hand grenades.

CHAPTER 3

HAND GRENADE TRAINING

Section I. GENERAL

31. Introduction

Hand grenade training should emphasize throwing distance and accuracy. These are the two most critical factors of individual proficiency in a hand grenade training program. The training program should be oriented toward instilling good grenade throwing habits in the soldier. Upon completion of training, an individual should be able to throw grenades with skill and confidence.

32. Conduct of Hand Grenade Training

The initial phases of hand grenade training should stress safety precautions and direct supervision of personnel being trained. This is necessary since many soldiers may have difficulty in developing good throwing habits because of physical or psychological limitations. These limitations are overcome only with patience and practice. As the cycle of training progresses, a soldier's confidence and proficiency should progress accordingly. In view of such progress, later phases of a grenade training program should gradually reduce the amount of supervision. When a soldier reaches the final phase of grenade training, he is allowed to put into practice the training he has received in a course simulating conditions likely to be found on the battlefield.

33. Training Objectives

Although the primary objectives of a hand grenade training program are to develop a soldier's proficiency in grenade throwing and to overcome any fear he may have of handling explosives, there are other factors of considerable importance in preparing the soldier to use grenades on the battlefield. He must become familiar with the various types of hand grenades, their functioning and uses, and safety considerations governing their use. Equally important in training are the proper methods of target engagement. These methods should enable a soldier to react rapidly and effectively against targets which may confront him in battle.

Section II. FUNDAMENTALS OF HAND GRENADE TRAINING

34. Holding the Grenade

Safety is the primary factor to be considered when determining the proper method of holding the grenade.

a. Maximum safety and throwing comfort are obtained when the grenade is cradled in the throwing hand with the safety lever held in place by the area between the first and second joints of the thumb (1, fig. 11).

b. For right-handed personnel, the grenade is held upright in order to position the pull ring where it can be easily removed by the index finger of the free hand (2, fig. 11). For left-handed personnel, the grenade is inverted with the fingers and thumb of the throwing hand positioned in the same manner as by right-handed personnel (3, fig. 11)

c. The M25-series of riot control hand grenades have an arming sleeve which serves the same purpose as the safety lever on other grenades. When throwing these grenades, the arming sleeve is held in place by applying constant pressure with the thumb of the throwing hand (4, fig. 11).

35. Throwing the Grenade
(fig. 12)

Since few men throw in the same manner, it is difficult to establish firm rules or throwing techniques. There is, however, a recommended method of grenade throwing which is easily mastered by most personnel. By practicing the steps below, you will develop your throwing proficiency to a point where your reaction to a presented target is immediate.

a. First, observe the target to mentally establish the distance between your throwing position and the target area.

b. Hold the grenade at shoulder level with the grenade in your throwing hand and the index finger of your opposite hand grasping the pull ring (1, fig. 12). Remove the safety pin with a pulling, twisting motion. (If the tactical situation permits, you should observe the safety pin's removal.)

Note. If the safety pin cannot be pulled out, lessen the spread of the legs of the safety pin to facilitate removal. However, if the grenade is not used, respread the legs of the safety pin for safety in carrying.

c. To remove the safety pin and the safety clip from hand grenades mentioned in paragraph 6, hold the grenade at shoulder level with the grenade in your throwing hand. Insert the index finger of your opposite hand into the pull ring, and place your thumb across the grenade lever and onto the squared end of the safety clip (fig. 13). While pulling the pin with your index finger, simultaneously rotate the clip to the left with your thumb until the clip clears the lever. As the pull pin clears the fuze, the safety clip rotates clear of the grenade lever. (This procedure also applies to left-handed soldiers, only with the hand reversed, fig. 14.)

Note. When using grenades equipped with the safety clip, the positions and techniques described in this chapter for throwing hand grenades remain unchanged.

d. As the safety pin is removed, immediately look back at your target.

e. Throw the grenade with an overhead throwing motion, keeping your eyes trained at all times on the target. Release the grenade somewhere forward of your body and in your general field of vision (2 and 3, fig. 12). In this way, you take advantage of the hand-and-eye coordination inherent in most men.

f. Follow through on your throwing motion beyond the point where the grenade is released (4, fig. 12). This follow through improves distance and accuracy and relieves the strain on your throwing arm.

36. Throwing Positions

In training, throwing positions are used for uniformity and control and to familiarize personnel with the proper manner of throwing grenades from positions commonly used in combat. Care must be taken not to overemphasize throwing positions in training; for in combat, the soldier's throwing position will be dictated by the amount of available cover, the range to the target, and the type and location of the target. The positions described below point out the use and limitations of each position.

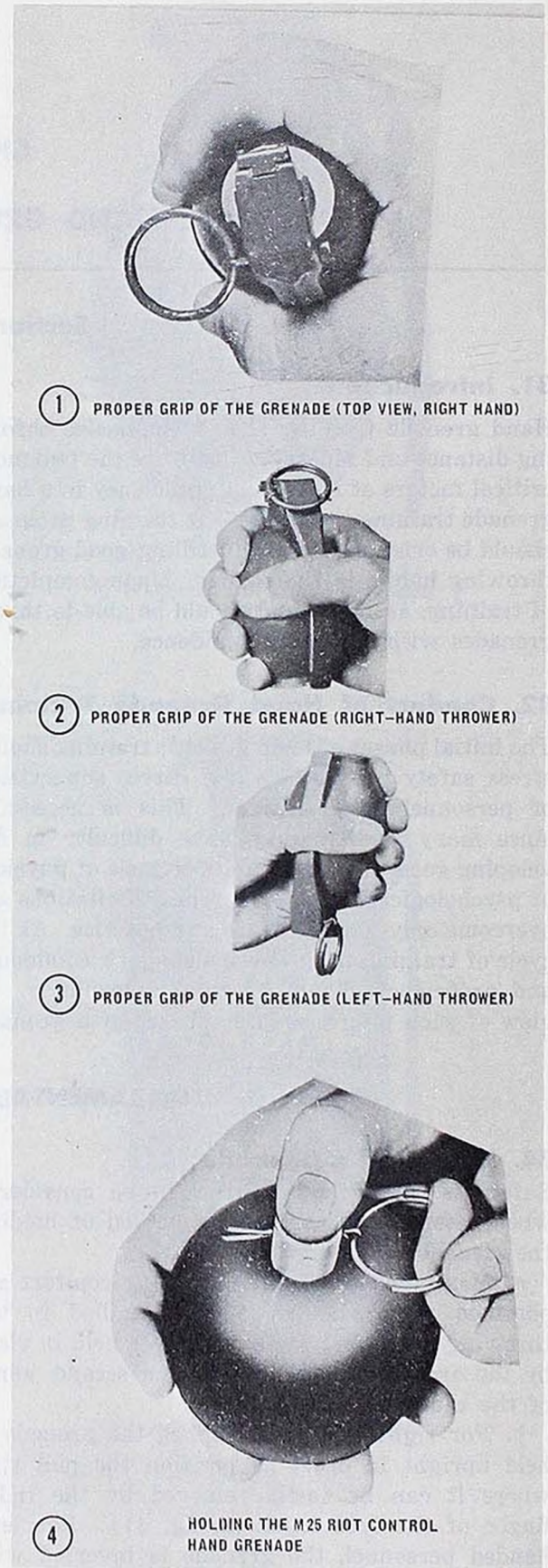


Figure 11. Holding the grenade.

a. Standing Position (1, fig. 15). This position is the most desirable and natural one from which to throw grenades. The position allows an individual to obtain the greatest possible throwing distance. Throwing from this position is accomplished as follows:

(1) Assume a natural stance with your weight balanced equally on both feet. Using the proper grip, hold the grenade shoulder high.

(2) Throw the grenade with a natural motion using the procedure described in paragraph 35.

(3) If available, duck behind cover to avoid being hit by fragments. If no cover is available, drop to the prone position with your helmet facing the direction of the grenade's detonation.

b. Kneeling Position (2, fig. 15). This position reduces the distance to which a grenade can be thrown. The position is used primarily when the soldier has only a low wall, a shallow ditch, or similar cover to protect him. Throwing from this position is accomplished as follows:

(1) Using the proper grip and with the grenade held shoulder high, kneel in the most comfortable manner.

(2) Throw the grenade with a natural throwing motion. Push off with your trailing foot to give added force to your throw.

(3) When the grenade is released, drop to the prone position or behind available cover to minimize exposure to fragmentation.

c. Prone to Kneeling Position (3, fig. 15). This position is used when no cover is available and the grenade must be thrown a greater distance than is possible from the prone position. Throwing from this position is accomplished as follows:

(1) Face the target and assume the prone position. Hold the grenade forward of your head where you can observe the grenade as you remove the safety pin.

(2) After the safety pin is removed, assume the kneeling position.

(3) After throwing the grenade, return to the prone position with your helmet facing the direction of the target.

d. Alternate Prone Position (4, fig. 15). This position reduces both distance and accuracy. It is used when an individual is pinned down by hostile fire and is unable to rise to engage his target. Throwing from this position is accomplished as follows:

(1) Lie on your back with your body perpendicular to the grenade's intended line of flight. Hold the grenade at shoulder level as in the standing position.

(2) Your right leg (left leg for left-handed throwers) is cocked with your foot braced firmly against the ground. After removal of the safety pin, hold the grenade away from your body with your arm cocked for throwing.

(3) With your free hand, grasp any object that is capable of giving you added leverage. This leverage will increase your throwing distance. In throwing the grenade, push off with your rearward foot to give added power to your throw. After throwing the grenade, roll over onto your stomach and press yourself flat against the ground.

37. "Cookoff" and "Airburst"

Many times in combat, targets confronting the infantryman may be of such a nature that normal methods of target engagement are inadequate. For example, troops or weapons in trench or foxhole positions are better engaged by causing a grenade to burst over these targets. Furthermore, if the targets are located on sloping ground and impact detonating grenades are unavailable, it would then be desirable to detonate a grenade as near impact as possible to prevent its rolling away from the target before the time delay is expended. Such above ground detonation also prevents the enemy from securing the grenade and throwing it back before the time delay is expended. Above ground detonation is especially critical when bunker-type emplacements are engaged. To achieve above ground detonation or near impact detonation, remove the grenade's safety pin, release the safety lever, and count "ONE THOUSAND ONE, ONE THOUSAND TWO," and then throw the grenade. This procedure will expend a sufficient period (approximately 2 seconds) of the grenade's 4- to 5-second time delay to cause the grenade to detonate above ground or shortly after impact with the target. Fragmentation and white phosphorous hand grenades will not be detonated in such a manner in training.

Warning: **It is possible for grenades to have a minimum delay time of 3 seconds. A grenade which has a 3-second delay that is held for 2 seconds could expose the user to a serious safety hazard.**

38. Carrying Hand Grenades

a. The way grenades are carried is probably the most neglected aspect of hand grenade training. Experiences by American infantrymen, both in combat and in training, point out the need for training in carrying hand grenades and the integration of this type of training, whenever possible, into tactical training exercises.

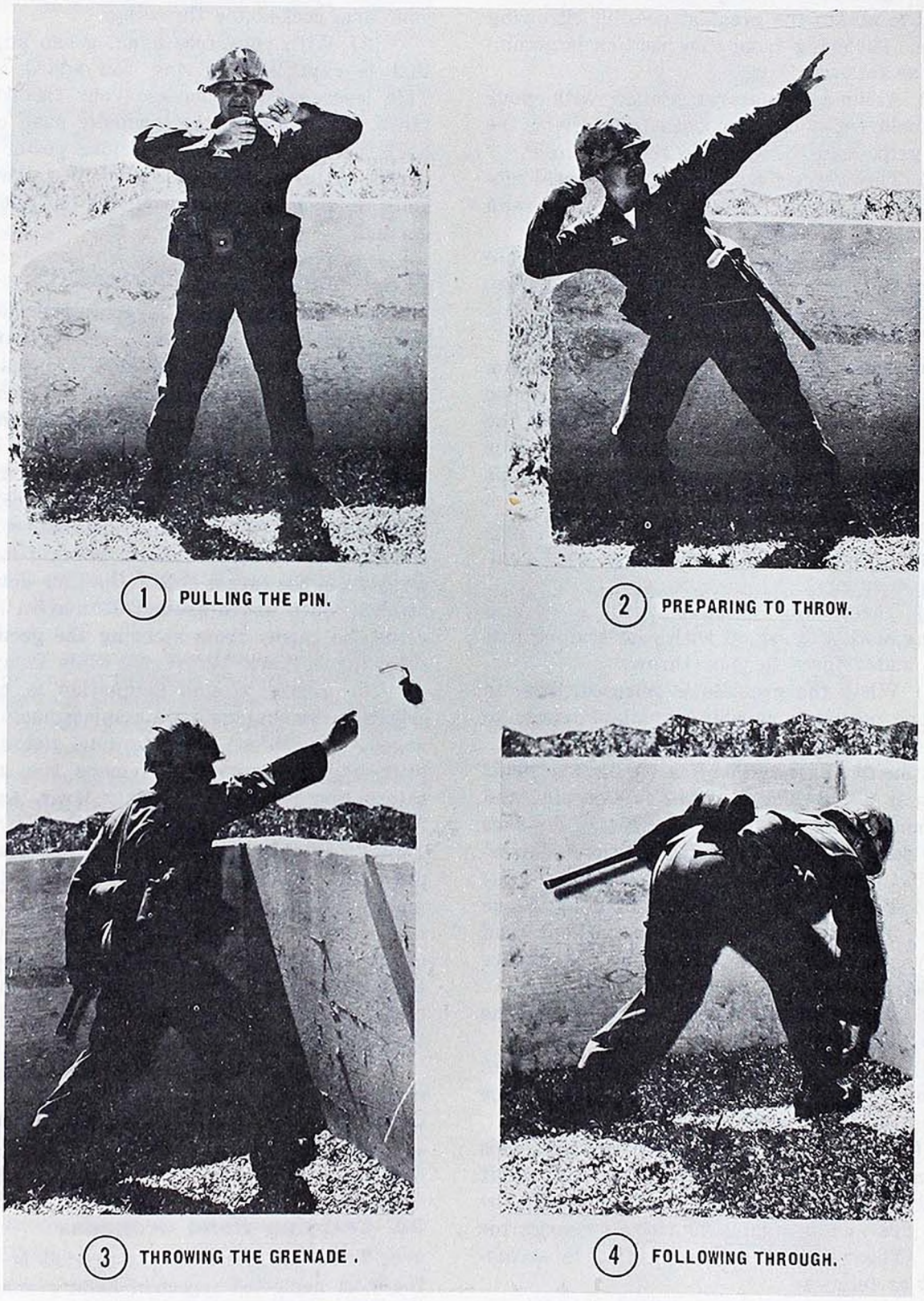


Figure 12. Throwing the grenade.

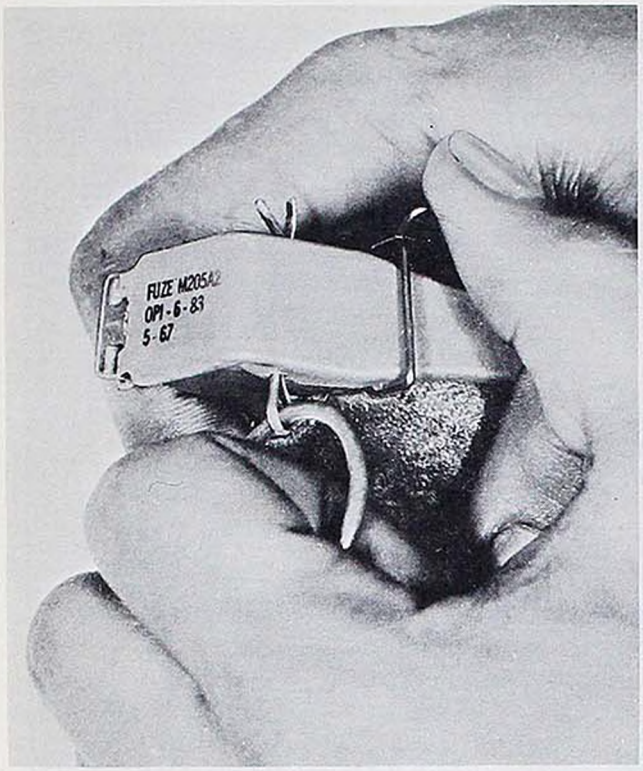


Figure 13. Removing the safety pin and the safety clip (right-handed individuals).

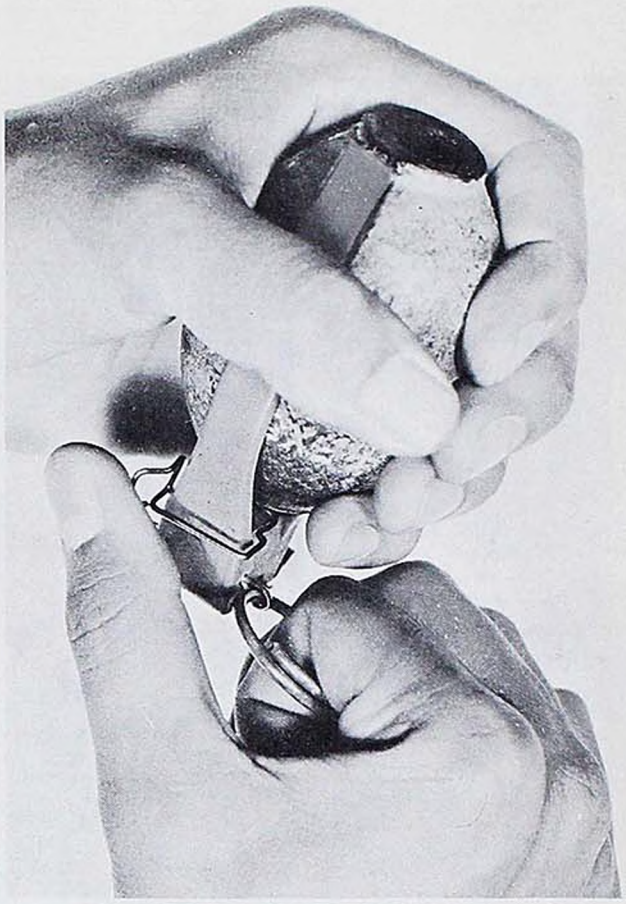


Figure 14. Removing the safety pin and the safety clip (left-handed individuals).

b. Before attaching hand grenades to web equipment for carrying, the following safety precautions should be taken:

(1) Check the grenade's fuze assembly for tightness, since it must be screwed tightly into the grenade's fuze well in order to prevent the grenade from working loose during movement and separating from the fuze assembly. The fuze should *never* be removed from a grenade, unless the grenade is being prepared as a boobytrap using some other firing device.

(2) If the grenade's safety lever is broken, do not use the grenade. The safety pin should not be bent back so that it is flush against the fuze body. This procedure, designed to preclude accidental pulling of the pin, makes the removal of the safety pin difficult and, in some cases, impossible. Also, repeated working of the safety pin in this manner will cause the pin to break, creating a hazardous condition.

c. The prescribed manner of carrying hand grenades is by the carrying straps on the universal ammunition pouch (fig. 16). There are two carrying straps on the ammunition pouch which are designed specifically for carrying grenades. Grenades are attached to the ammunition pouch in the following manner:

(1) After checking the fuze for tightness, hold the web carrying sleeve on the rear of the ammuntion pouch flat against the pistol belt, and slide the grenade's safety lever into the sleeve.

(2) Be sure the pull ring on the safety pin is pointing downward.

(3) Wrap the carrying strap around the neck of the fuze, including the safety lever and the pull ring, and snap the carrying strap to the carrying sleeve.

(4) During marches, periodically check the grenade to make certain the fuze is tight and the carrying strap is secure.

d. Five fragmentation grenades can be carried using the universal ammunition pouch; two grenades are attached to the outside of the pouch and three are carried inside.

Warning: **Hand grenades will *not* be attached to any equipment by the pull ring on the grenade's safety pin.**

Figure 15. Throwing positions.

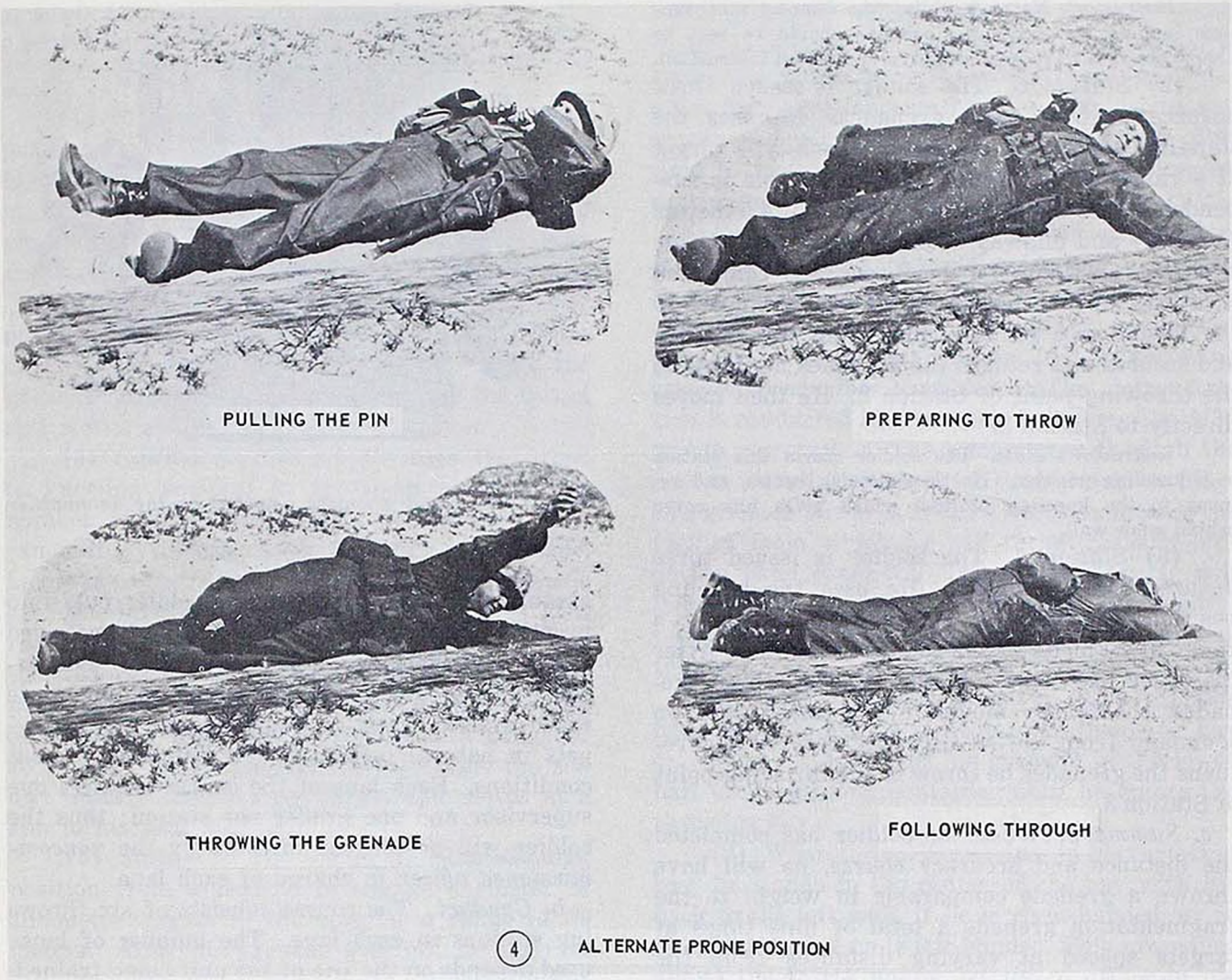


Figure 15.—Continued.

Section III. HAND GRENADE TRAINING COURSES

39. Distance and Accuracy Course

a. Purpose. The distance and accuracy course is the initial phase of the soldier's practical work with hand grenades. The purpose of the course is to develop the soldier's grenade throwing proficiency and to insure the soldier develops good grenade throwing habits. The course requires close supervision by experienced personnel.

b. Conduct. Before conducting the course, the soldier is given a briefing on the objectives of the course and how he is to engage the targets. He is then given a demonstration of how the course is conducted. For control, the NCOIC of the course issues the commands: PREPARE TO THROW, PULL PIN, and THROW GRENADE. He also moves the orders between stations. The unit being trained is divided into 20-man orders. Each throwing station requires a minimum of two supervisory personnel. Each order is assigned a starting station and is moved on command to each of the succeeding stations. The course is conducted as follows:

(1) *Station 1.* The soldier is issued three unfuzed practice hand grenades. He uses the standing position to engage a foxhole-type target 30 meters from the throwing line. Midway between the throwing line and the target, a wire or rope cable is suspended across the station at a height of 4.5 meters (16 feet). This cable points out that in order to gain distance in his throw, he must also obtain height in throwing. When he engages the target, the soldier's grenade should pass over the cable. After his order has completed throwing all three grenades, the soldier moves to the target area on command from the NCOIC, and secures and returns the grenades he threw to the throwing point of Station 1. He then moves directly to Station 2.

Instructor's Note. A soldier who demonstrates complete inability to throw the grenade should be sent to a separate area to receive intensive, individual instruction.

(2) *Station 2.* The soldier is issued three unfuzed practice hand grenades. He uses the standing position to engage a trench-type target at a range of 40 meters. Again, a cable is suspended across the station at a height of 4.5 meters (16 feet) and midway between the throwing line and the target. After his order has completed throwing all three grenades, the soldier moves to the target area on command from the NCOIC, and secures and returns the grenades he threw to the throwing point of Station 2. He then moves directly to Station 3.

Instructor's Note. The soldier starts this station in a kneeling position. He then stands, throws, and returns to the kneeling position which gives him cover behind a low wall.

(3) *Station 3.* The soldier is issued three unfuzed hand grenades. He uses the kneeling position to engage a window-type target at a range of 20 meters from the throwing line. After his order has completed throwing all three grenades, the soldier moves to the target area on command from the NCOIC, and secures and returns the grenades he threw to the throwing point of Station 3.

c. Summary. When the soldier has completed the distance and accuracy course, he will have thrown a grenade comparable in weight to the fragmentation grenade a total of nine times at targets spaced at varying distances from the throwing line. He will know that in order to obtain throwing distance, he must also obtain throwing height. Through close supervision, he will have developed his throwing distance and accuracy, as well as good grenade throwing habits. It should be remembered that successful engagement of all targets in this course is not a prerequisite for throwing casualty-producing grenades. It is desirable for the soldier to complete the distance and accuracy course before he advances to the hand grenade assault/qualification course and the hand grenade familiarization course. Range facilities for the distance and accuracy course are described in appendix C.

40. Hand Grenade Assault Qualification Course

a. Purpose. To train the soldier in the uses of hand grenades and the proper methods of engaging targets. The assault/qualification training should be conducted following distance and accuracy training; however, it is not necessary for the soldier to successfully complete the hand grenade assault/qualification course prior to throwing casualty-producing grenades. During the assault/qualification course, the soldier puts into practice the instruction he has already received and the proficiency he has developed. The assault/qualification course allows the soldier to use fuzed practice hand grenades and to engage targets in natural terrain under simulated combat conditions. Each lane of the course requires one supervisor and one grader per station; thus the soldier will proceed as directed by the *noncommissioned officer* in charge of each lane.

Figure 16. Hand grenades attached to the ammunition pouch.

b. Conduct. The course consists of six throwing stations in each lane. The number of lanes used depends on the size of the unit being trained. Each soldier is started at Station 1, and he then moves in sequence through Station 6. To add realism to the course, a machinegun or an automatic rifle fires blank ammunition, in the direction of the soldiers conducting the course, from a minimum distance of 60 meters. After a soldier completes throwing at a station, he moves at a run to his next throwing station and is replaced at his original station by another soldier. The same sequence is followed throughout the course until all soldiers have engaged targets at all stations. Before conducting the course, the soldier is given a briefing on the objectives of the course and a demonstration of how the course is run. The soldier receives 10 practice hand grenades (5 unfuzed and 5 fuzed practice hand grenades so that he may properly attach them to his web equipment). The soldier starts on command from the NCOIC of the lane. The course is conducted as follows:

Note. One *fuzed* practice grenade must be thrown at each target from Stations *2* through *6*. An unfuzed practice grenade may be thrown at the target from Station 1. The soldier may use the four remaining unfuzed practice grenades in a second throw at any of the targets

he misses (2 through 6) with the fuzed grenade, including a second throw at the target from Station 1; however no more than two grenades may be used at any one station.

(1) *Station 1.* The soldier uses the standing position from behind chest-high cover (4.5-feet high) to engage a silhouette target in a foxhole at a range of 20 meters. After throwing his practice grenade, he quickly observes the target and moves at a run to his next throwing station.

(2) *Station 2.* The soldier uses the kneeling position from behind a low wall to engage a window target at a range of 20 meters. After the grenade goes off, he quickly observes the target and moves at a run to his next station.

(3) *Station 3.* The soldier uses the prone to kneeling position in the open to engage a number of silhouette targets in a trench at a range of 20 meters. After throwing his grenade, he drops to the prone position. After the grenade goes off, he observes the target and moves at a run to his next station.

(4) *Station 4.* The soldier uses the kneeling position from behind a low wall to engage a group of silhouette targets in a trench at a range of 25 meters. After his grenade detonates, the soldier quickly observes the target and moves at a run to his next station.

(5) *Station 5.* The soldier uses the standing position from a foxhole to engage a cluster of silhouette targets in the open at a range of 30 meters. After his grenade goes off, he observes his target and moves at a run to his next station.

(6) *Station 6.* The soldier approaches a bunker from the rear in order to engage the bunker. He throws his grenade into the bunker from either the rear or the sides. After his grenade detonates, he moves on the run to the finishing line where he waits for the remainder of his group to complete the course.

c. Summary. Upon completion of the course, the soldier will have thrown fuzed practice hand grenades at various types of targets using different throwing positions. This will have acquainted him with the time delay on casualty-producing grenades. The course gives the soldier an insight into the types of targets he may encounter in combat and provides him added confidence in his ability to use hand grenades on the battlefield. Range facilities for the hand grenade assault/qualification course are described in appendix C.

41. Hand Grenade Familiarization Course

a. Purpose. Once the soldier has developed his throwing proficiency and engaged targets with hand grenades under simulated combat conditions, he should be allowed to throw casualty-producing grenades. Throwing these grenades gives him experience in handling explosives and increases his confidence. Since this is the first time in training that he will handle explosives, maximum emphasis must be given to safety.

b. Conduct. Before throwing casualty-producing hand grenades, the soldier is given a briefing on the conduct of the course and applicable safety considerations. He then witnesses a demonstration of the proper procedures used in throwing casualty-producing grenades. (The demonstration is conducted in a practice bay using the M30 practice grenade.) The soldier goes through the course using practice hand grenades in a practice grenade bay area which closely duplicates the facility from which he will throw casualty-producing hand grenades. The practice course will immediately precede the throwing of casualty-producing grenades. The course is conducted as follows:

(1) The soldier is issued a fuzed practice hand grenade and is moved to the throwing bay on command. He keeps his grenade in the lower half of its packing container until he enters the throwing bay.

(2) When the soldier arrives in his throwing bay, he stands in the center of the bay with his back to the left wall, if he is right-handed, or to the right wall if he is left-handed. This procedure allows the safety *noncommissioned officer* in his bay to face him and observe his actions. The soldier takes all commands from the safety *NCO* in his bay. The *NCO* commands PULL PIN. At this time the soldier removes the safety pin and prepares to throw. When the safety *NCO* is certain the soldier is prepared to throw the grenade, he commands THROW. The soldier immediately throws the grenade and takes cover. He does not observe the strike of his grenade.

Instructor's Note. When throwing grenades equipped with the safety clip, the command REMOVE SAFETY CLIP will precede the command PULL PIN. The live course is conducted the same as the practice course, except fragmentation hand grenades are used. The soldier assumes a kneeling position in the center of the throwing bay, if more than one throwing bay is used. The officer in charge of the course issues the command for the soldier whose turn it is to throw to stand by commanding BAY NUMBER ___, STAND. The soldier then takes all subsequent commands from the safety *NCO* in his bay.

c. Summary. Upon completion of the hand grenade familiarization course, the soldier will have thrown practice and casualty-producing grenades. It must be remembered that the objective of this training is to give the soldier confidence in the

grenade and in his own ability to effectively use it. All instruction must be oriented toward achieving these ends. Every possible precaution must be taken to insure that the soldier is not made to fear the grenade. Next to small arms and 40-mm ammunition, fragmentation hand grenades are the most commonly used weapon in the infantryman's possession. It is the responsibility of every instructor to instill confidence in the men he trains. The soldier needs this confidence to properly and effectively use hand grenades and to overthrow any fear he may have of handling a grenade.

42. Hand Grenade Confidence Course

a. Purpose. Once the soldier has developed his throwing proficiency and has been introduced to throwing casualty-producing hand grenades, he should be given an opportunity to apply his newly acquired proficiency in a simulated tactical situation requiring the use of grenades. The Hand Grenade Confidence Course is designed to accomplish this objective. The physical layout of the course is described in appendix C, and illustrated in figure 37.

b. Conduct. The Hand Grenade Confidence Course has a practice and a live course, each consisting of an assembly area, a final coordination line, an initial holding area, a covering position, a throwing position, and a final holding area.

(1) The course is started with an orientation period covering the characteristics and functioning of the practice and fragmentation hand grenades, safety considerations governing the conduct of training, and a discussion and demonstration of the conduct of the course for the entire unit being trained.

(2) Following the initial orientation, each platoon (48–60 men) is broken down into 10-man squads and each man is given a number (1 through 10). Each platoon is moved to a separate assembly area for the practice course where the *officer in charge* (*OIC*) of the range presents a tactical situation. Unfuzed practice hand grenades are issued to the platoon for the practice conduct of the course. All personnel are inspected by the *OIC* before they negotiate the course to make certain that all grenades are properly secured to web equipment.

(3) The course is conducted as follows:

(*a*) The first squad moves in a line formation, ALPHA team on the right, from a tree line that represents the final coordination line of the practice course.

(*b*) Upon arrival at a mound representing the initial holding area, the squad is taken under fire by a machinegun simulator. The squad leader sends two men from the right side of the line to bunker number one near the objective. The control *NCO* directs the number one man on the right to move to bunker number two within hand grenade range of the objective. From bunker number two, the soldier observes target area number one and engages it with an unfuzed practice hand grenade. When the grenade is thrown, the safety officer commands ALL DOWN. At this time, all personnel get behind protective cover. After the grenade functions (the safety officer counts to seven which indicates the amount of time personnel must remain behind the protective cover), the soldier engages target area number two with a second unfuzed practice hand grenade. When the grenade is thrown, the safety officer commands ALL DOWN.

(*c*) The soldier who threw the grenades moves by the most direct route back to the final holding area where he is critiqued by the critique *NCO*. Covering fire is resumed from bunker number one. The squad leader then sends a new man to bunker number one where he provides covering fire for the number two man who moves to bunker number two to throw his grenades. After the second grenade functions (simulated, as in (*b*) above), the soldier being critiqued by the critique *NCO* moves directly to the initial holding area.

(*d*) The above sequence is repeated until all squad personnel have thrown grenades and provided covering fire. The first soldier to throw grenades provides covering fire for the last man to throw.

(*e*) After the first group has finished the practice course and has been critiqued, it returns to the assembly area and then moves to the live course for the final run with fragmentation grenades. After the first group has completed the practice course, the practice and live courses are run concurrently on separate training courts.

Instructor's Note. In the practice course simulated rifle fire and practice grenades are used. Blank ammunition and two live grenades are used in the conduct of the live course.

(4) The safety officer on the practice course must carefully observe the actions of soldiers throwing practice grenades. If the safety officer detects any unsafe acts or extreme nervousness on a thrower's part, the thrower will be identified to the critique *NCO*. The critique *NCO* will point out the thrower's mistakes and send him back through the practice course. In some instances, it may be necessary to place an individual who has extreme difficulty in properly handling grenades under the control of an assistant instructor for detailed instruction. In no instance will a man

be allowed to throw live fragmentation grenades until he has clearly demonstrated his ability to throw practice grenades during the practice conduct of the course.

(5) The following safety personnel are required for the Hand Grenade Confidence Course:

(*a*) *Safety Officer.* The safety officer (*OIC*) is responsible for the overall conduct of the problem, presentation of bleacher orientation, and tactical briefing. After issuing the operation order in the assembly area, the safety officer is positioned in the safety bunker where he has the immediate responsibility of supervising hand grenade throwing.

(*b*) *Squad leaders.* The squad leaders alternate moving squads to and from the initial holding areas. They are responsible for insuring that all personnel are behind protective cover in the initial holding area when grenades are being thrown. Squad leaders must check each soldier's grenades before he moves from the initial holding area to bunker number one.

(*c*) *Controller.* The controller is the senior assistant instructor. He is positioned in bunker number one where he controls the movement of all personnel both before and after each grenade is thrown; he also controls the soldier furnishing covering fire.

(*d*) *Critique NCO.* The critique *NCO* is positioned in the final holding area. He administers a critique to each thrower immediately after the man arrives from bunker number two. To insure continuity, the critique *NCO* will observe the same squad during both the practice and live courses. The critique *NCO* will brief each member of the squad after both the practice and live courses. He then returns to the practice course to observe another squad.

(6) The training facility for the Hand Grenade Confidence Course consists of a practice grenade court for throwing the M30 practice grenades and a live grenade court for throwing fragmentation grenades. These two courts are constructed alike and close together in order to allow easy movement from one to the other. The Hand Grenade Confidence Course should be conducted concurrently with another 2-hour period of instruction in order to minimize terrain and personnel requirements. Time breakdown for the conduct of training is as follows:

(*a*) Initial orientation: 20 minutes.

(*b*) Tactical situation briefing, ammunition issue, and inspection prior to crossing the final coordination line: 10 minutes.

(*c*) Practice run: 35 minutes. (Practice and live runs are run concurrently after the first squad completes the practice run.)

(7) The following ammunition is required for the Hand Grenade Confidence Course:

(*a*) *For each soldier.*

1. Cartridge, blank, 5.56–mm: 20 rounds.

2. Grenade, hand, practice, M30 unfuzed: two.

3. Grenade, hand, fragmentation, M26-series: two.

(*b*) For each demonstration.

1. Cartridge, blank, 5.56–mm: 20 rounds.

2. Grenade, hand, practice, M30 unfuzed: two.

(8) Upon completion of the Hand Grenade Confidence Course, the soldier will have obtained added confidence in his ability to effectively use grenades in combat, and he will have seen how grenades are integrated into tactical operations. Additionally, he will have learned the value of fire and movement and teamwork when using grenades in an offensive combat role.

43. Hand Grenade Cookoff-Impact Course

a. Purpose. The "cook-off-impact" course is designed to increase the soldier's confidence and proficiency when engaging various nearby enemy targets using hand grenades. The purpose of the "cookoff" procedure with time-delay fuzes and grenades armed with impact fuzes is to prevent the grenade from rolling away from the target, from being returned by the enemy, or giving the enemy time to take evasion action.

b. Conduct. Before conducting the course, the soldier is given an orientation of the course objectives and how he is to engage the targets. He is then given a demonstration of how the course is conducted. Each soldier is given two fuzed (time-delay) practice XM69 grenades, two fuzed (impact) practice XM66 grenades, and one unfuzed practice grenade. Each soldier starts at Station 1. The unfuzed grenade is thrown first to give the soldier a chance to dry-run the "cookoff" procedure. After engaging the target with one fuzed (M228 time-delay) practice XM69 grenade, the soldier moves to Station 2 to engage the bunker with his second fuzed (M228 time-delay) practice XM69 grenade. The soldier then moves to Station 3 to engage the targets with his third fuzed (XM225 impact) practice XM66 grenade. The soldier then moves to Station 4 to practice retrieving a dropped fuzed (XM225 impact) practice XM66 grenade. Each throwing station requires one NCO who will insure that the soldier releases the safety lever, begins his count of "one thousand, two thousand," and then throws the grenade.

(1) *Station 1.* The soldier uses the kneeling position from behind a low wall to engage a group of silhouette targets in a trench at a range of 25 meters. He must use the "cookoff" procedure with his XM69 practice grenade equipped with a time-delay fuze to engage the target with an airburst. After his grenade detonates, the soldier quickly observes the target and moves to the next station.

(2) *Station 2.* The soldier approaches a bunker from the rear and uses the "cookoff" procedure to engage the bunker. He throws his XM69 practice grenade equipped with a time-delay fuze into the bunker from either the rear or the sides. After his grenade detonates, he moves to the finish line where he waits for the remainder of his group to complete the course.

(3) *Station 3.* The soldier uses the kneeling position from behind a low wall to engage a group of silhouette targets in the open at a range of 30 meters. He must throw the XM66 practice grenade equipped with an impact fuze over the wire located midway to the target (to allow the one-second arming delay time to elapse). After his grenade detonates, the soldier quickly observes the target and moves to the next station.

(4) *Station 4.* The soldier takes the standing position in a foxhole. After he pulls the pin from his last XM66 practice grenade equipped with an impact fuze, he is instructed to drop the grenade into the foxhole, reach down and retrieve it, and quickly throw it toward the silhouette targets.

Instructor's Note. This exercise is designed to develop confidence in the one-second arming delay time and to point out the danger involved if impact occurs to the grenade after the one-second arming delay time has elapsed. The foxhole should have no grenade sump. The trainee should be instructed not to attempt to kick the dropped grenade, but immediately retrieve it and throw the grenade at the targets.

c. Summary. Upon completion of the course, the soldier will have thrown four fuzed practice hand grenades. This will acquaint him with the "cookoff" procedure and enable him to compare it with impact fuzed grenades. The course provides him confidence in his ability to use hand grenades equipped with the time-delay or impact fuzes to engage various type targets he may encounter on the battlefield.

Instructor's Note. After the first group has completed the confidence course, the "cookoff-impact" and confidence courses are conducted concurrently on separate training courts.

Section IV. HAND GRENADE TRAINING SAFETY

44. Handling Casualty-Producing Hand Grenades

Safety instructions governing the handling of casualty-producing hand grenades are found in AR 385–63, AR 385–65, TM 9–1330–200, TM 9–1370–200, and TM 9–1900. In addition to the instructions contained in these publications, the following safety precautions will be adhered to:

***WARNING:* Unauthorized modification to service grenades is prohibited, as a safety hazard may be created. This is to include any restrictions on safety pin, lever (hand) with tape, wire, etc.**

a. Personnel handling or throwing casualty-producing hand grenades or who are within this type of grenade's danger area (230 meters) will wear steel helmets.

b. Personnel will throw fuzed practice hand grenades before throwing casualty-producing hand grenades.

c. No hand grenades, other than fuzed practice hand grenades, will be defuzed by any individual except qualified and authorized supporting unit maintenance personnel.

d. The guidelines listed in paragraph 7*e* for grenades armed with the M217 impact detonating fuze will be strictly adhered to.

e. The safety pin on a grenade will not be removed until the grenade is to be thrown. Once the safety pin is removed, it will not be placed back into the grenade, and the grenade must be thrown.

f. Grenades found upside down in their packing containers will not be removed. The containers will be marked and returned to the issuing facility.

g. Dud grenades will not be recovered, handled, or otherwise tampered with by any individual except explosive ordnance disposal personnel.

h. All throwing of casualty-producing hand grenades will be done under the supervision of a commissioned officer (AR 385–63).

i. If a casualty-producing hand grenade is dropped accidentally after the safety-pin is removed, the *soldier* dropping the grenade and the safety *NCO* in the throwing bay will—

(1) Shout "GRENADE" to alert other personnel in the area that a casualty-producing hand grenade has been dropped.

(2) Insure that the grenade is picked up and thrown in a low arc into a safe area.

Note. Grenades will not be thrown into a sump, ditch, or similar area. If protective cover is unavailable

when the grenade is thrown into a safe area, personnel will drop to the prone position with steel helmets facing the direction of the grenade's detonation point. This procedure minimizes the area of a man's body that is exposed to blast and fragmentation, and it allows the steel helmet to deflect fragments.

j. In training, fragmentation hand grenades will not be removed from the bottom half of the individual grenade containers until just before use. As each soldier is called to stand and throw his grenade, he will remove the grenade from the bottom half of the container, being sure to slide his thumb over the safety lever before the lever clears the fiber container or the sleeve inside the container. This procedure will prevent accidents due to damaged safety pins or levers. This technique is followed prior to issuing the grenades to individuals negotiating the Hand Grenade Confidence Course. The soldier carries the grenades attached to the ammunition pouch until he reaches the throwing position.

k. Under no circumstances will grenades be attached to clothing or equipment by the *pull ring.* Attaching grenades to clothing or equipment by the pull ring can easily result in the safety pin being accidentally removed from the grenade.

l. If grenades are attached to clothing or equipment for extended periods of time, the fuze assembly may become loosened from the grenade body, allowing moisture to enter the grenade. To prevent moisture damage to the grenade, the fuze must be periodically tightened.

m. At least a 5-minute waiting period will be observed before an HE-loaded grenade dud is approached. Dud grenades will be removed or destroyed in place only by authorized explosive ordnance disposal personnel.

45. Handling Noncasualty Producing Hand Grenades

a. Practice Hand Grenades. Personnel installing fuzes in practice hand grenades will install only the practice fuze designed for use with a specific practice grenade. Detonating fuzes may cause the grenade body to shatter, producing dangerous fragments. When reloading practice hand grenades, no more than one bag of 21 grains of black powder will be inserted into the grenade body. More black powder than this will produce a dangerous explosion which may shatter the grenade body. Practice grenades which fail to function will not be recovered for at least 10 minutes.

b. Chemical Hand Grenades.

(1) Personnel will be no closer than 10 meters to the AN–M14 TH3 incendiary hand grenade while it burns. Personnel should not look directly into the burning thermate mixture since it may cause temporary blindness or permanent eye damage.

(2) Safety levers of chemical hand grenades will not be released before throwing because of the extremely short time delay period.

(3) Riot control hand grenades should not be used in enclosed areas during training. The M25-series of riot control hand grenades should not be detonated nearer than 5 meters to any personnel. (For further information governing the use of riot control hand grenades in training, see FM 21–48.)

(4) Smoke hand grenades will not be used in enclosed areas during training.

(5) At least a 30-minute waiting period will be observed prior to approaching a chemical grenade dud. Dud grenades will be removed or destroyed in place only by authorized explosive ordnance disposal personnel.

CHAPTER 4

RIFLE GRENADES AND ACCESSORIES

Section I. GENERAL

46. Description

a. Rifle grenades, unlike hand grenades, are projected only from the service rifle and do not lend themselves to throwing. Rifle grenades are used to assist in the accomplishment of five missions:

(1) Antitank.
(2) Antipersonnel.
(3) Signaling.
(4) Screening.
(5) Incendiary.

b. Weapons such as the 40–mm grenade launcher, M79 and the 66–mm high explosive antitank rocket, M72, have taken over many of the combat roles previously assigned to rifle grenades. Despite this, rifle grenades are still in abundant supply, and the ever-changing world military picture dictates that training with rifle grenades be continued so that they may be quickly and effectively used as the need arises.

47. Characteristics

Rifle grenades can be fired in both the direct and high-angle direct-fire roles (fig. 17). When used in the high-angle direct-fire role, they are, in effect, the infantryman's small unit mortar. In such a role, rifle grenades are capable of covering the dead space to the front of defensive positions, and they can fill the gap existing in high explosive firepower between the maximum throwing distance of hand grenades and the minimum safe supporting ranges of mortar and artillery fire.

48. Main Parts

a. Rifle grenades consist of five main parts.

(1) Grenade body.
(2) Filler.
(3) Fuze assembly.
(4) Stabilizer tube.
(5) Fin assembly.

b. The body, filler, and fuze play the same part in rifle grenades as they do in hand grenades. The fin assembly and the stabilizer tube provide the grenade with its proper ballistic characteristics, giving the grenade stability in flight.

Section II. ACCESSORIES

49. General

There are several accessories required for the projection of rifle grenades from the service rifle. Rifle grenades require a means of attachment to the rifle, a means of propelling the grenade to the intended target, and a means of sighting the rifle to accurately engage the target.

50. Grenade Launchers and Grenade Retainer Spring

Although the M14 and M16A1 are the standard rifles presently in use in the active Army, the M1 rifle is still used by the reserve components of our Army and by the armies of many of our allies. Accordingly, information on the accessories used with the M1 rifle is included in this publication.

a. M7A3 Grenade Launcher (1, fig. 18). The M7A3 grenade launcher is designed for use with the caliber .30, M1 rifle. The launcher has 9 annular rings and grooves numbered from 6 at the muzzle end of the launcher to 4A near the launcher's base. These annular rings and grooves have no metric or yard values as such; however, the closer the base of the rifle grenade is placed to the 4A position, the farther the grenade can be projected. Ball ammunition may be fired from the rifle when the launcher is attached, although the launcher's added weight will slightly disturb the weapon's zero. On the forward end of the launcher is a

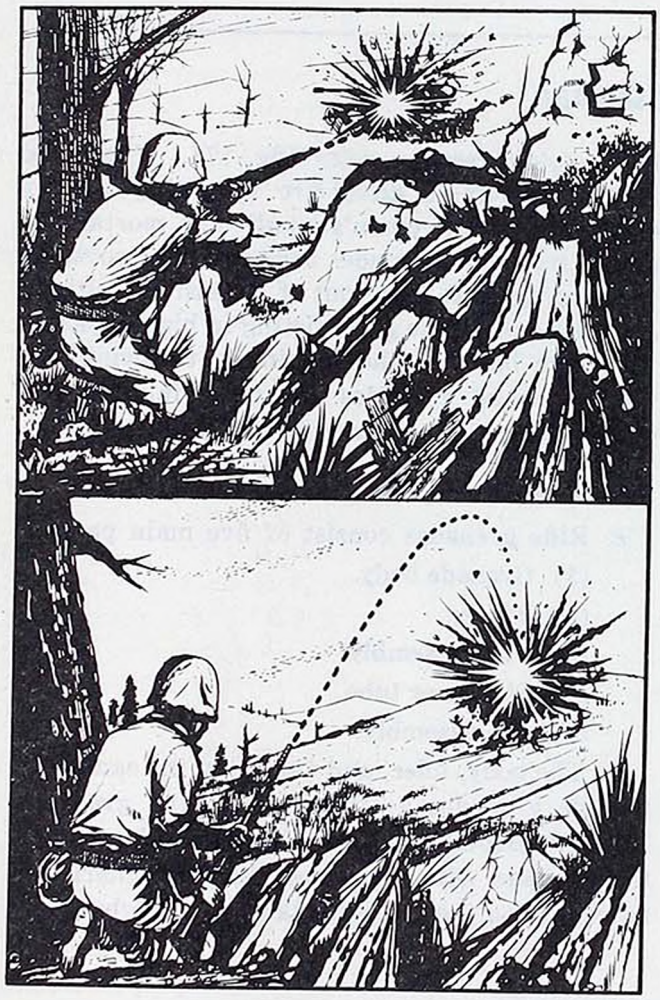
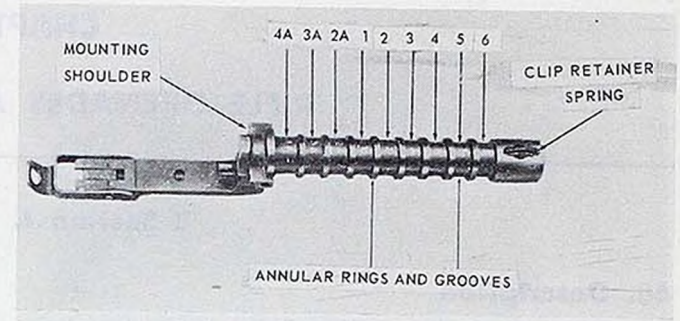
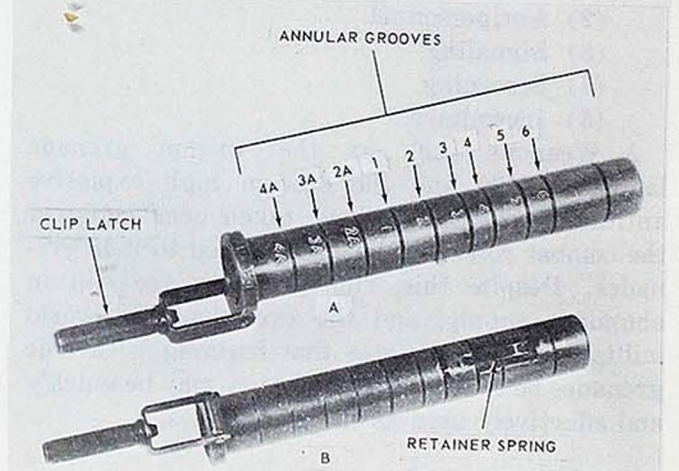


Figure 17. Direct and high-angle direct fire with rifle grenades.



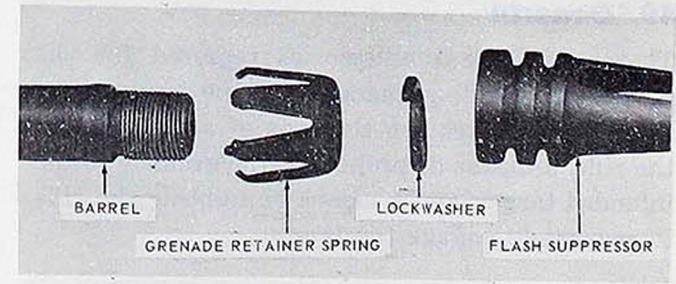
M7A3 GRENADE LAUNCHER

1



M76 GRENADE LAUNCHER

2



GRENADE RETAINER SPRING FOR THE M16 AND M16A1 RIFLES

3

Figure 18. Grenade launchers and grenade retainer spring.

clip-type retainer spring, which holds the grenade in the desired position once it is joined to the launcher. When the launcher is attached to the rifle, the stud on the frame of the launcher rests on top of the valve in the gas cylinder lockscrew of the rifle. When a grenade is fired from the launcher, a slide and spring assembly in the launcher frame (fits against the bayonet stud) allows the launcher to move slightly to the rear. This slight, independent recoil causes the stud to open the valve in the gas cylinder lockscrew, permitting the gas to escape. This action prevents excessive recoil and precludes damage to the operating parts of the rifle because of excessive gas pressure. The launcher is returned to its original position by the action of the compressed spring in the launcher frame, permitting the valve in the gas cylinder lockscrew to close.

b. M76 Grenade Launcher (2, fig. 18). The M76 grenade launcher is used with the 7.62–mm, M14 rifle. The launcher weighs 7 ounces and is approximately 15 centimeters (6 inches) long. The launcher has 9 annular grooves numbered from 6 near the muzzle of the launcher to 4A near the base of the launcher. The function of the annular grooves on the M76 launcher is the same as that of the M7A3 launcher. On the muzzle end of the launcher is a clip-type retainer spring which holds the grenade in the desired position prior to firing. The launcher slides over the flash suppressor and is secured to the rifle by a clip latch that snaps over the bayonet stud on the flash suppressor.

c. Grenade Retainer Spring (3, fig. 18). This spring is used with the M16 and M16A1 rifles. Its function is to secure the grenade to the rifle. This feature eliminates the requirement to use the M7A3 or the M76 grenade launchers. The grenade retainer spring must be replaced after 30 grenade firings.

51. Special Grenade Cartridges

Special grenade cartridges are easily identified by sight or touch by their five-pointed, star-crimped ends. There are no authorized special grenade cartridges for the caliber .30 carbine. Rifle grenades will *not* be fired from this weapon. Field expedient grenade cartridges, such as blank ammunition or service ammunition, with or without the projectile removed, are not to be used to project grenades.

a. M3 Rifle Grenade Cartridge (1, fig. 19). The M3 special grenade cartridge is the .30 caliber cartridge used with the M1 rifle. It is slightly longer than its 7.62–mm counterpart, the M64 special grenade cartridge.

b. M64 Rifle Grenade Cartridge (2, fig. 19). The M64 special grenade cartridge is the 7.62–mm cartridge used with the M14 rifle.

c. M195 Rifle Grenade Cartridge (3, fig. 19). The M195 special grenade cartridge is the .223 caliber (5.56–mm) cartridge used with the M16 and M16A1 rifles. It is similar in appearance to the M3 and M64 cartridges but is slightly smaller.

52. M15 Sight

a. The M15 sight (1, fig. 20) is used to accurately deliver a grenade to its intended target. This sight can be used with either the M1 or the M14 rifle. The sight is attached to the rifle by a mounting plate, which is installed and removed only by supporting unit maintenance personnel. The mounting plate contains an elevation scale graduated in 5° increments from 0° to 60°. The scale is numbered at each 10° mark.

b. The M15 sight consists of a sight bar on which a front sight post and a rear peep sight (2, fig. 20) are mounted. These are used in the same manner as the iron sights on a rifle when grenades are fired in the direct-fire role. Beneath the peep sight is an elevation screw which moves the rear peep sight. On the rear of the peep sight are 4 graduations, each equal to a 1° change in elevation. Five clicks on the elevation screw moves the peep sight 1°. The elevation screw, the front sight post, and the rear peep sight are not used for high-angle direct fire. Instead, the sight bar assembly is rotated until the index line of the sight mounting bracket is alined with the appropriate degree setting on the mounting plate elevation scale. After alining the muzzle of the grenade launcher with the target, the grenadier raises or lowers the rifle muzzle until the leveling bubble in the leveling vial is centered. This procedure places the rifle on the same angle as indicated on the elevation scale of the sight mounting plate. No special sight is used with the 5.56–mm (M16 and M16A1) rifles. The marked sling (chap. 5) is used to obtain correct elevation settings on these weapons.

53. Spindle Valve

(fig. 21)

The spindle valve on the M14 rifle controls the gases used in firing the rifle and rifle grenades. To prevent damage to the working parts of the rifle, the spindle valve slot must be turned to the closed position (parallel to the barrel) when firing rifle grenades. This closing permits the full pressure of the gases created by the firing of the special grenade cartridge to be utilized in propelling

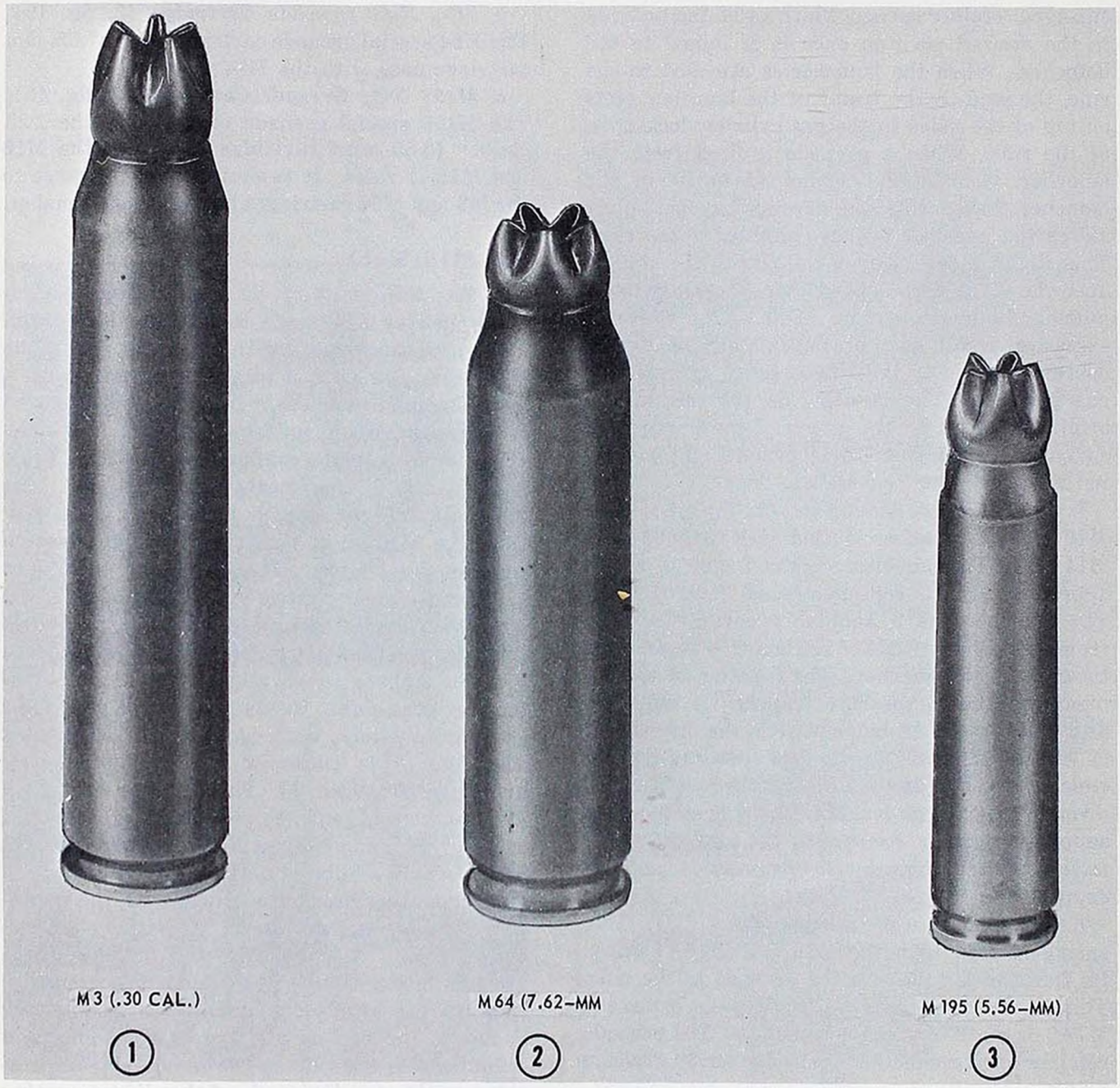


Figure 19. Rifle grenade cartridges.

the rifle grenade and prevents bypass of the gas into the gas cylinder.

54. Grenade Projection Adapters

To project hand grenades from the service rifle, a fourth accessory is required in addition to those already mentioned—the grenade projection adapter. There are presently two standard grenade projection adapters: the M1A2 and the M2A1.

a. M1A2 Grenade Projection Adapter (1, fig. 22). The M1A2 grenade projection adapter is olive drab in color and consists of a fin assembly, a stabilizer tube, and three metal claws. The longest of the claws contains an arming clip, which is held in place by a brittle piece of metal—the arming clip retainer. When joining the grenade to the adapter, the grenade's safety lever is inserted into the arming clip, and the grenade is forced down onto the adapter until it is fully seated in the cup at the top of the stabilizer tube. The safety pin is removed before the grenade is fired. Extreme care must be taken to insure that the arming clip retainer is not broken and that the striker of the grenade does not have sufficient room to rotate on its axis and strike the primer. When the grenade is fired, inertia causes the arming clip to break the brittle arming clip retainer.

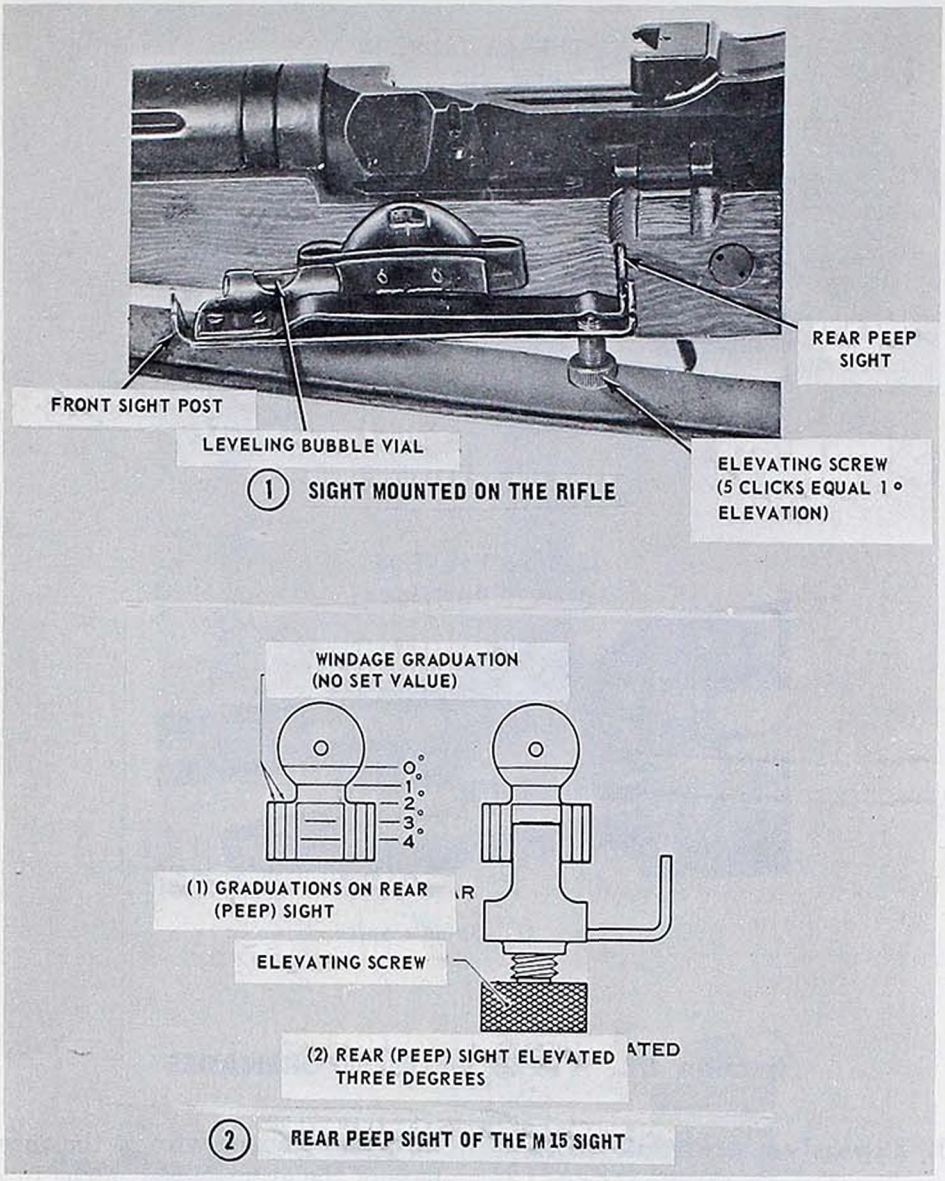


Figure 20. M15 sight.

This action releases the safety lever from the grenade and allows the grenade to function in the normal manner. The M1A2 grenade projection adapter is used to project the MK2, the M26, and the M26A1 fragmentation hand grenades, the M30 practice hand grenade, the M34 WP smoke hand grenade, and the MKI illuminating hand grenade.

b. M2A1 Grenade Projection Adapter (2, fig. 22). The M2A1 grenade projection adapter is gray in color and consists of a fin assembly, a stabilizer tube, and three short claws. In place of the arming clip, the M2A1 has a setback band consisting of a spring and a thin metal band. When joining the grenade to the adapter, the grenade is forced down onto the adapter until it is fully seated and held securely in place by the adapter's claws. The setback band is then placed over the grenade's safety lever in such a manner that the spring is centered on the safety lever and positioned approximately ½-inch from its tip. The safety pin is removed before the grenade is fired. When the grenade is fired, the thrust of the grenade being propelled forward drives the setback band rearward. This action releases the safety lever from the grenade and allows the grenade to function in the normal manner. The M2A1 grenade projection adapter is used to project the M6- and M7-series of riot control hand grenades, the AN–M8 HC white smoke hand grenade, the AN–M14 TH3 incendiary hand grenade, and the M18 colored smoke hand grenade.

Note. The rifle must be loaded with a special grenade cartridge before attaching rifle grenades. This procedure facilitates quick firing if the grenade's fuze begins to function prematurely after removal of the safety pin.

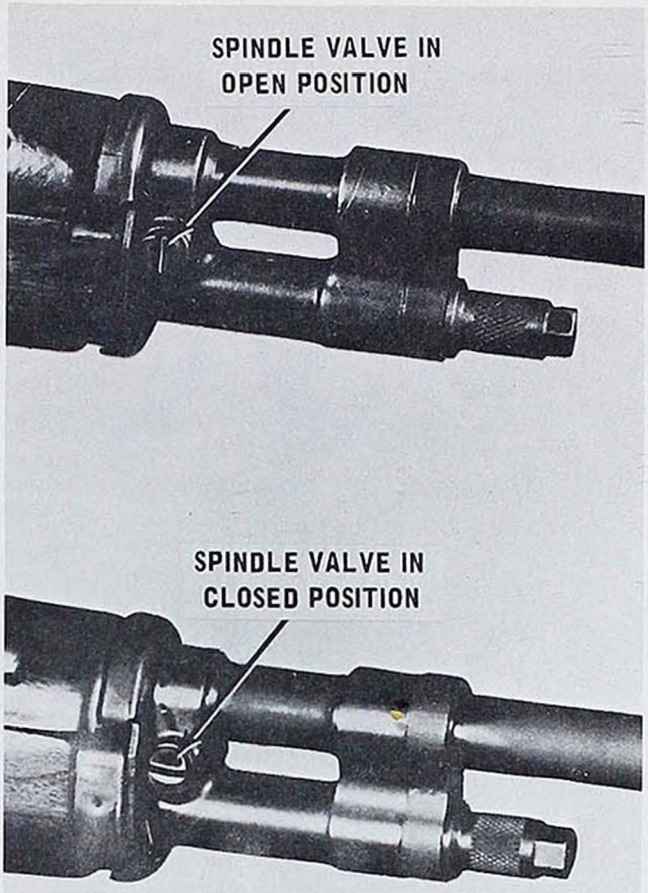


Figure 21. Spindle valve.

Section III. TYPES OF RIFLE GRENADES

55. M31 High Explosive Antitank Rifle Grenade

(1, fig. 23)

In the future, the roles of the M31 HEAT rifle grenade will be fulfilled by the M72 light antitank weapon when sufficient quantities of that item become available for the Army's world-wide requirements.

a. Body. The body of the grenade is made of a copper-coated steel alloy. The fin assembly and the stabilizer tube are made of an aluminum alloy to reduce the weight of the grenade. The grenade is painted olive drab and has yellow markings to identify the filler as a high explosive.

b. Filler. 9.92 ounces of composition B in the form of a shaped charge.

c. M211 Fuze. This fuze is point initiating and base detonating. The fuze is armed at a distance of 6–12 meters from the rifle by setback action. The nose of the grenade contains a piezoelectric (lucky) crystal. When the grenade's impact crushes the crystal, it sends an electrical impulse through a copper wire to the fuze located at the base of the grenade body. The fuze itself consists of an arming rotor, a spring-driven contact, and a small booster pellet. When the electrical impulse reaches the detonator in the fuze, the grenade's explosive train is initiated.

d. Weight. 25 ounces.

e. Capabilities. The M31 can be fired in the direct-fire role to a maximum effective range of 115 meters or in the high-angle direct-fire role to a maximum range of 185 meters. The grenade has the capability of penetrating 25 centimeters (10 inches) of homogeneous steel armor or 50 centimeters (20 inches) of reinforced concrete. In the high-angle direct-fire role, the grenade has an effective casualty radius of 15 meters. The M31 archives armor penetration by means of the Munroe Principle (2, fig. 23) of the shaped charge. The Munroe Principle is governed by the following three properties of explosive reactions:

(1) An explosive force reacts against the weakest force containing it. In the M31, this con-

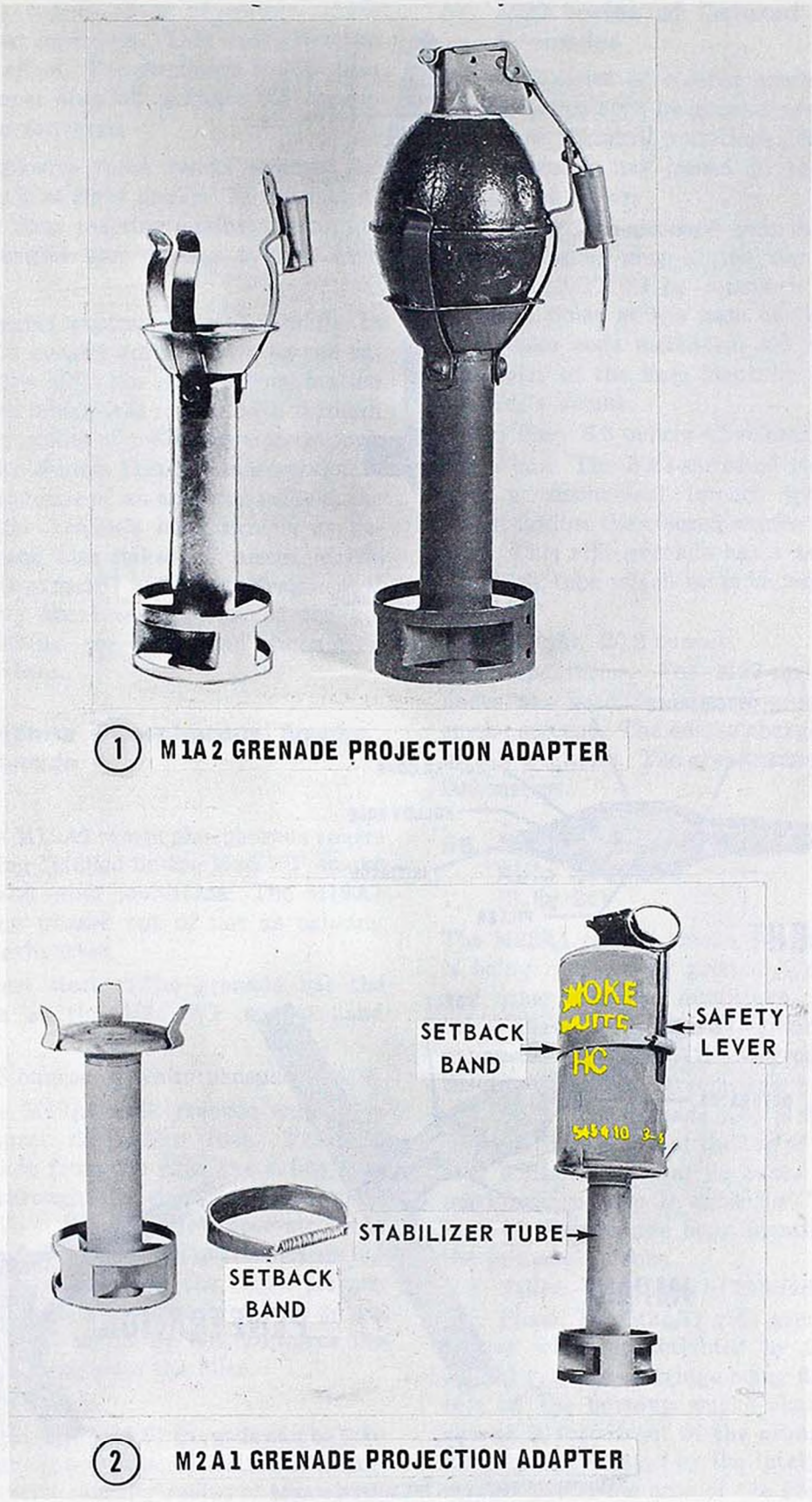
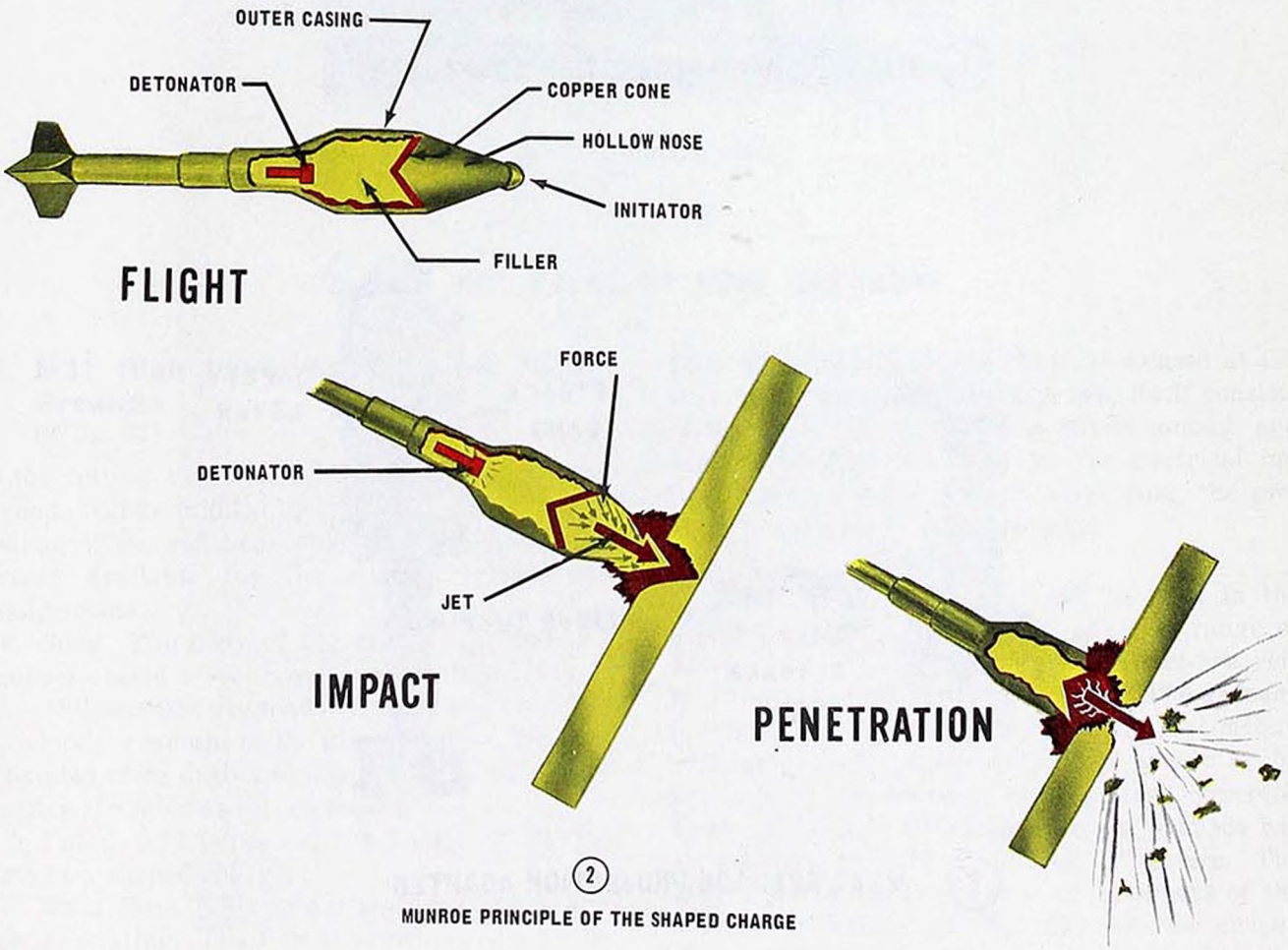


Figure 22. Grenade projection adapters.

① M31, HEAT RIFLE GRENADE



② MUNROE PRINCIPLE OF THE SHAPED CHARGE

Figure 23. M31 HEAT rifle grenade and the Munroe Principle of the shaped charge.

taining force is a thin sheet of copper which forms an inverted cone liner. This cone gives the filler its shaped effect. The grenade's hollow nose provides the proper standoff distance for the explosive forces to converge.

(2) An explosive force reacts against the force containing it at right angles. In the case of the M31, we see them reacting against the copper cone at right angles and moving toward each other.

(3) Converging explosive forces combine to form a third and greater force known as the explosive jet. In the M31, the jet is a combination of heat and force which will melt a path through armor and carry pieces of molten armor through it. These molten chunks then rapidly return to solid form. In the case of an armored vehicle, the jet penetrates the vehicle's body armor, as described above, and also flakes off pieces of the inner side of the armored hull. This fragmented armor richochets about the interior of the vehicle's body, killing personnel and detonating sensitive ammunition.

56. M19A1 White Phosphorous Smoke Rifle Grenade

(1, fig. 24)

The roles of the M19A1 white phosphorous smoke grenade are being fulfilled by the M34 WP smoke hand grenade and other munitions. The M19A1 grenade is being phased out of use as existing quantities are exhausted.

a. Body. Sheet steel. (The grenade has the same markings as the M34 WP smoke hand grenade.)

b. Filler. 8.5 ounces of white phosphorous.

c. Fuze. The M19A1 rifle grenade employs a mechanical impact detonating fuze. Prior to firing the grenade from the rifle, the safety pin, which passes through the stabilizer tube, must be removed. When the grenade's nose strikes a solid object, the fuze's firing pin overcomes spring tension by inertia and strikes the fuze's primer. The primer emits an intense flash of heat to explode the detonator, which in turn ruptures the grenade body and disperses the filler.

d. Weight. 24 ounces.

e. Capabilities. The M19A1 grenade can be projected 195 meters from the service rifle. The grenade has an effective casualty radius of 10 meters; however, particles of white phosphorous may be projected 20 meters from the grenade's detonation point. The white phosphorous will burn for 60 seconds at approximately 5000° F.

57. M22 Series of Colored Smoke Rifle Grenades

The M22-series of colored smoke rifle grenades are being replaced by ground pyrotechnic signals and other chemical munitions. The M22-series of rifle grenades are issued in three colors: red, green, and yellow.

a. Body. The grenade body is steel. There is a nose closing plug at the top of the grenade which is NOT to be removed. There are five emission holes at the base of the rifle grenade. (For color code markings, see app D, table 3.) The color of the base identifies the color of the grenade's smoke.

b. Filler. 6.5 ounces of colored smoke mixture.

c. Fuze. The M22-series of rifle grenades employ a mechanical impact igniting-type fuze which ignites the colored smoke charge upon impact. This rifle grenade has a safety clip on the stabilizer tube which must be removed just prior to firing.

d. Weight. 20.2 ounces.

e. Capabilities. The M22-series of rifle grenades are used for signaling and laying down smoke screens. The smoke charge burns approximately 1 minute. The grenade has a range of over 200 meters.

58. M23A1 Colored Smoke Streamer Rifle Grenade

(2, fig. 24)

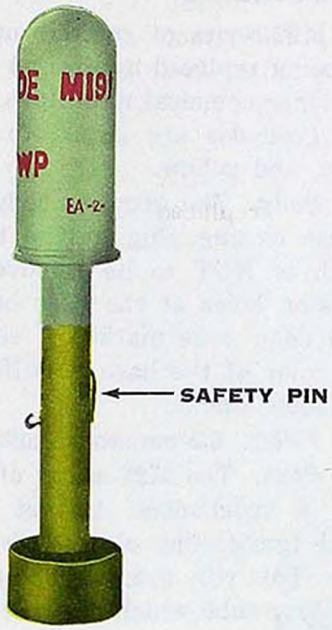
The M23A1 colored smoke streamer rifle grenade is being replaced by ground pyrotechnic signals and other chemical munitions. The grenade is being phased out of use as existing quantities are exhausted. The M23A1 rifle grenade is issued in three colors: red, green, and yellow.

a. Body. The grenade body is sheet steel. There is an air intake hole at the top of the grenade and four emission holes at its base. (For color code markings, see app D, table 3.) The color of the base of the grenade body identifies the color of the grenade's smoke.

b. Filler. 6.5 ounces of colored smoke mixture.

c. Fuze. The M23A1 rifle grenade employs an igniter which is activated by the flash of the special grenade cartridge being fired. The igniter sets off the burning smoke charge. The smoke charge is forced out of the grenade body by the air pressure created by the intake of air into the intake hole in the nose of the grenade. This hole and holes in the base of the body are covered with adhesive tape to prevent moisture from damaging the filler. The tape is removed before firing.

d. Weight. 18.5 ounces.



1

M19A1, WP SMOKE RIFLE GRENADE.

2

M23A1 COLORED SMOKE STREAMER RIFLE GRENADE

Figure 24. Chemical rifle grenades.

1

M11A4 PRACTICE RIFLE GRENADE

2

M29 PRACTICE RIFLE GRENADE

3

M31 PRACTICE RIFLE GRENADE

Figure 25. Practice rifle grenades.

e. Capabilities. The M23A1 rifle grenade is used only for signaling purposes and emits a trail of colored smoke for 12 seconds. The grenade attains ranges in excess of 200 meters when fired from the service rifle.

59. Practice and Training Rifle Grenades

There are presently three types of practice rifle grenades in Army use. Practice grenades are used to train personnel to handle rifle grenades before they receive training with live or service rifle grenades.

a. M11A4 Practice Rifle Grenade (1, fig. 25). The M11A4 rifle grenade is used to simulate the flight characteristics of the M19A1 and M23A1 rifle grenades. The M11A4 grenade is made of steel and its parts are reusable and interchangeable.

b. M29 Practice Rifle Grenade (2, fig. 25). The M29 rifle grenade is obsolete, and is used only to a limited extent as a replacement item for the M31 practice rifle grenade. The M29 grenade is made of cast iron and is entirely inert. It was originally developed to simulate the flight characteristics of the M28 HEAT rifle grenade, which has been replaced by the M31 HEAT rifle grenade.

c. M31 Practice Rifle Grenade (3, fig. 25). The M31 practice rifle grenade is used to simulate the ballistic characteristics of the M31 HEAT rifle grenade. The M31 grenade is made of sheet steel and aluminum and contains no filler and no fuze. The M31 practice rifle grenade weighs 25 ounces and has a maximum range of 150 meters. There are no replacement parts for the grenade.

CHAPTER 5

RIFLE GRENADE TRAINING

Section I. DIRECT-FIRE MARKSMANSHIP TRAINING

60. Introduction

a. Direct fire with rifle grenades is any firing requiring less than 26° of elevation. In direct fire, the rifle is fired from the shoulder, except in the prone position. This type of firing is effective against point targets, such as tanks, pillboxes, or windows of buildings. When firing grenades in the direct-fire role, the grenade must be fully seated on the launcher. Due to excessive recoil effects, the M16 and M16A1 rifles will not be used in the direct-fire role.

b. This section prescribes training for firing rifle grenades at both stationary and moving direct-fire targets. This training should follow rifle markmanship training, because many of the steps in rifle grenade direct-fire training are similar to the steps in rifle markmanship training described in FM 23–71. Direct-fire markmanship training includes the following:

(1) Positions.
(2) Sighting and aiming.
(3) Trigger control.
(4) Range determination.
(5) Speed estimation.
(6) Lead calculation.
(7) Loading and firing procedures.

61. Positions

a. General. Rifle grenades are fired at direct-fire targets from the standing, kneeling, and prone positions. Except in the prone position, fire the rifle with the rifle butt against your right shoulder. This allows you to see the target through the M15 sight. Do not fire from the shoulder when in the prone position, since your body cannot move freely with the rifle's recoil. Use a stock rest when firing from the prone position. In other positions, you should use the shoulder-fire position at all times unless your body cannot move freely with the rifle's recoil. Do not use the sling when firing in the direct-fire role. Hold the rifle firmly with your left hand near the upper sling swivel and your right hand at the small of the stock. Hold your left elbow well underneath the weapon, exerting pressure to pull the rifle butt firmly against the shoulder. In order to prevent injury to the thumb by the weapon's recoil, hold your right thumb along the right side of the stock, rather than over the small of the stock. Keep your head away from the sight and canted slightly to the left. When firing grenades from the M1 or M14 rifles, you cannot fire in the direct-fire role from the left shoulder because the sight is located on the left side of the rifle.

b. Standing Position (1, fig. 26). Face your target, execute a half right face, and spread your feet a comfortable distance apart. Rotate the rifle on its right side so that when you grasp it with your left hand, your fingers will wrap around the top of the upper handguard. Without changing the grip of your left hand, rotate the rifle butt into your right shoulder. At this point, do not allow the rifle to cant to either side. Hold your right elbow at shoulder height to form a pocket for the rifle butt. Place your right hand at the small of the stock with your right thumb alongside the stock. Cant your head slightly to the left so you can see through the M15 sight. Lean forward with your entire body. This will allow you to rock back with the recoil of the weapon. Track moving targets by pivoting evenly and smoothly at the waist.

c. Kneeling Position (2, fig. 26). Face your target, execute a half right face, and kneel on your right knee. Do not sit on your right heel or use your left knee to support your left elbow. Place the rifle to your shoulder in the same manner as in the standing position. Lean well forward so that you can rock back with the weapon's recoil. Track targets by pivoting evenly and smoothly at the waist.

d. Prone Position (3, fig. 26). The prone position has several disadvantages and should be used only when necessary. Since you cannot rock back with the recoil of the weapon, use a stock rest, such as a tree stump, a wall, or a hole in the

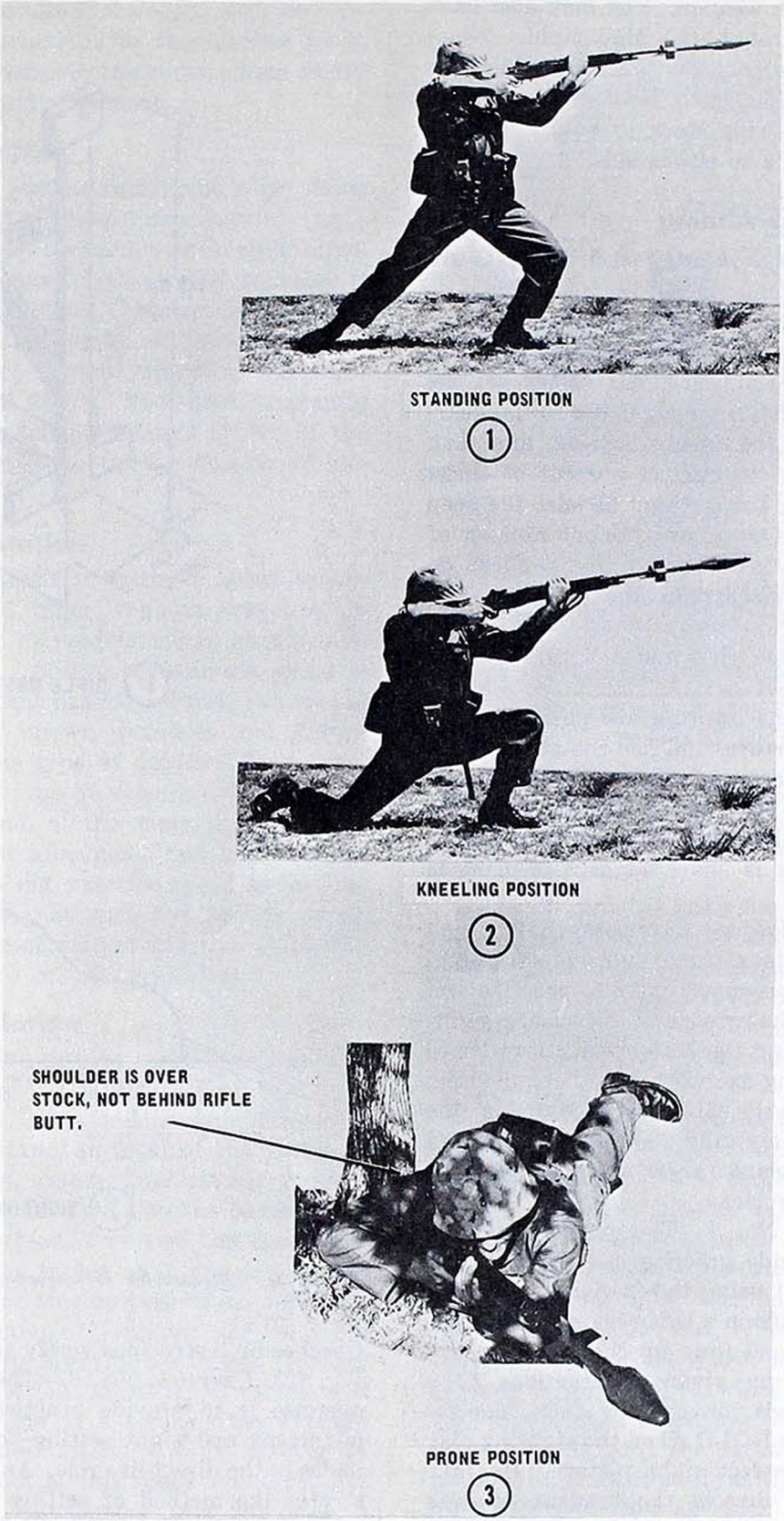


Figure 26. Direct-fire positions.

ground to hold your weapon. You may also have difficulty seeing through the M15 sight. When assuming the prone position, place the rifle butt against any available rest. Hold your forearm over the top of the rifle stock to hold it steady. Do not cant the rifle to either side.

62. Sighting and Aiming

a. Using the M15 Sight. Direct-fire targets are engaged as follows:

(1) Estimate the range to the target.

(2) Determine the correct angle of elevation from the range tables (para. 70). Then set the sight. To do this, rotate the sight bar to the nearest 5° mark below the desired setting, and turn the elevating screw the correct number of clicks from 0° to complete the setting. Be sure the peep sight is set at 0° before adding the odd number of degrees to the sight. Remember that 5 clicks on the elevating screw changes the elevation setting 1°.

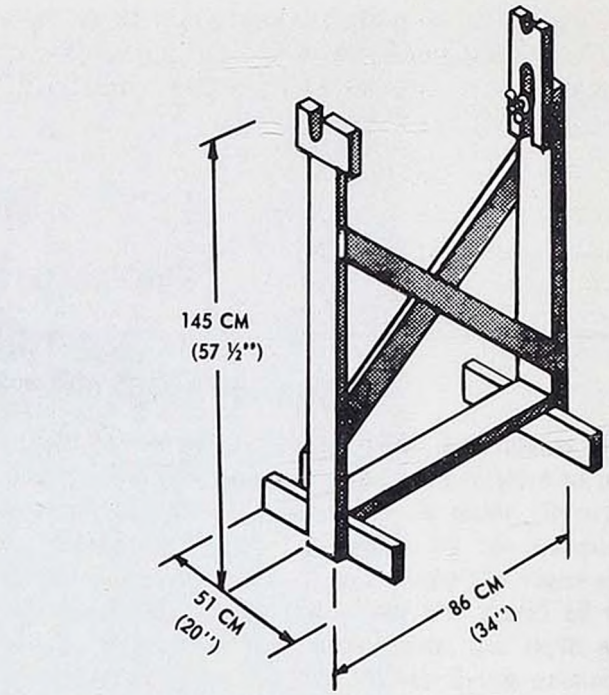
(3) Prepare the rifle and the grenade for firing.

(4) Assume the appropriate position, take the proper sight picture, and fire the grenade.

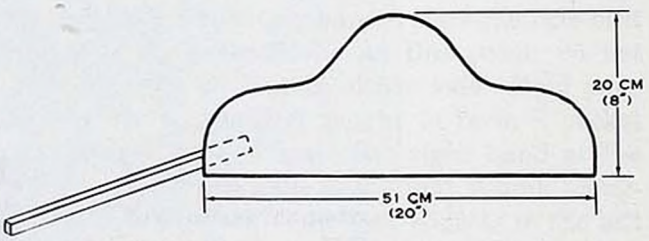
b. Sight Alinement and Sight Picture. Sight alinement with the M15 sight is the same as with the iron sights on the rifle. However, because the M15's sight radius is short, sight alinement is more critical.

c. Direct-Fire Sighting Exercises. Before you progress to other steps of markmanship training, you will be given an opportunity to practice and demonstrate your knowledge of direct-fire sighting and aiming using the M15 sight. In order to do this, two sighting exercises have been devised. A service rifle with the M15 sight mounted, a rifle rest (1, fig. 27), a sighting disk (2, fig. 27), and a 1-meter square blank target are needed to accomplish these exercises.

(1) *Exercise No. 1.* The purpose of this exercise is to provide practice in correct direct-fire sight alinement using the M15 sight. An instructor places a rifle in a rifle rest, sets the sight at zero elevation, and lines up the sighting disk (tank silhouette) by giving instructions to a marker who controls the sighting disk. The instructor commands HOLD when the sighting disk is in line for a correct sight picture. He then moves away and directs the student to look through the sights to observe the correct sight alinement. Rifle rests are then placed on line and blank targets are placed out approximately 10 meters. Firers take position behind the rifles and sight and direct markers to move the sighting disks until the correct sight alinement is attained.



① RIFLE REST



② SIGHTING DISK

Figure 27. Accessories for direct-fire sighting exercises.

Coaches or instructors verify the alinement.

(2) *Exercise No. 2.* The purpose of this exercise is to provide practice in correct sight alinement and sight setting for firing rifle grenades in the direct-fire role. An instructor demonstrates the method of setting the M15 sight as described in exercise No. 1. He then resets the sight at zero elevation. Firers then take a position behind the rifles and sight. As the instructor announces the range, firers refer to the range table (para 70), find the correct angle of elevation for that range, and set the angle on the sight.

The instructor then alines the sight with the target by giving instructions to the marker as in exercise No. 1. Coaches or instructors then verify the sight setting and alinement.

63. Trigger Control

Trigger control is just as important when firing rifle grenades as it is when firing service (ball) ammunition. Correct position, correct sight alinement, and correct speed leads are of no value if trigger control is faulty. This fact is especially true in firing at low-angle, direct-fire targets. You should practice trigger control as described for the rifle in FM 23–71. You must constantly bear in mind that trigger control is one of the most important steps in obtaining first round hits on a target.

64. Speed Estimation

You can train yourself to estimate speed by observing tanks and other vehicles traveling in various directions, at predetermined speeds, and at various ranges. Ability to estimate speed is developed by frequent practice. First, you should estimate speed at known distances and known speeds, varying the type of vehicle. Then vary the range and the type of vehicle. Finally, vary all four factors and, at the same time, practice sight setting, sight alinement, and lead calculations. You should not practice speed estimation on targets traveling at excessive speeds or on targets beyond the maximum effective direct-fire range (115 meters) of rifle grenades.

65. Lead Calculation

a. In order to hit a moving target you must aim at the point where the target *will be* when the grenade reaches it. This is done by aiming at a point a certain distance in front of the center of mass of the target, rather than aiming directly at the center of mass. This distance is measured in "speed leads" instead of meters. One speed lead is the length of the target as it appears to you (fig. 28). Leads for moving targets are based on the speed and direction of the target and the speed of the grenade in its flight to the target. Moving at a speed of 24 KMPH (15 MPH), a vehicle will cover about 7 meters in a second (the average length of a medium tank). A tank moving 25 meters to your front at this speed would require a half-speed lead. *Remember that the lead is taken from the center of mass of the target and maintained throughout firing;* thus, for a tank requiring a half-speed lead, your point of aim would be the leading edge of the tank. *A common error is to stop tracking when pressure is applied to the trigger.*

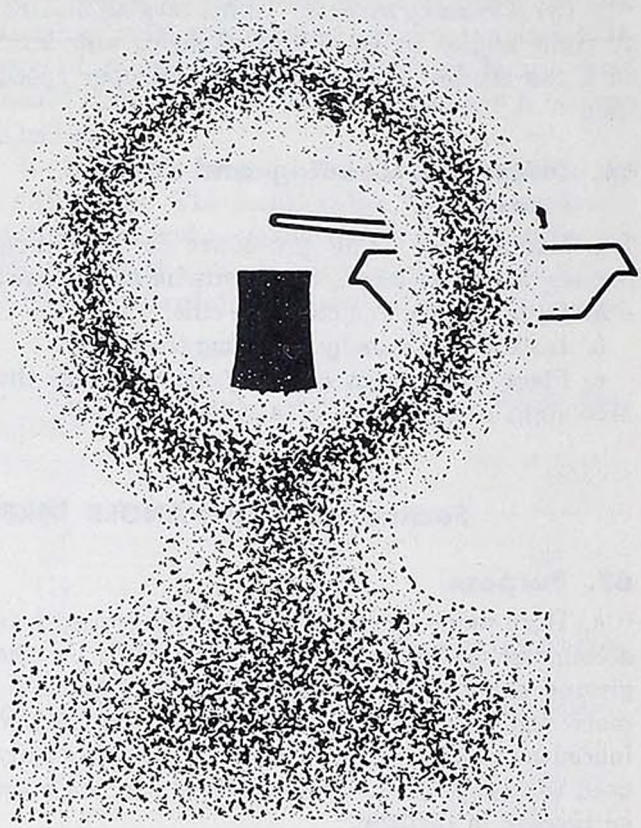


Figure 28. Correct sight picture for a target requiring a one-speed lead.

b. Apply leads by using the length of the target as it appears to you as a unit of measure. This procedure eliminates the necessity for corrections because of the angle at which the target crosses your line of sight. The sharper the angle, the smaller the target appears and the less lateral speed it attains.

c. In addition to compensating for the lateral movement of a target, you must make allowance for the movement of a target toward or away from you. This is done by adjusting the point of aim to a point above or below the center of mass.

(1) *Approaching targets.* To hit a target which is approaching your position, aim slightly below its center of mass. This allows for the decrease in range to the target between the time the grenade is fired and the time it reaches the target. The point of aim below the target's center of mass depends upon the speed of the target, the range to it, and the angle at which it is approaching. This will vary as much as 1.5 meters.

(2) *Retreating targets.* To hit a target which is moving away from your position, you must aim slightly above the target's center of mass. This compensates for the *increase* in range from the time the grenade is fired until it impacts with the target.

(3) *Crossing targets.* To hit targets moving at right angles to your line of sight, aim level with the center of mass using the proper speed lead.

66. Direct Fire Loading and Firing Procedure

The loading and firing procedure for engaging targets with low angle, direct fire is as follows:

a. Open the bolt and clear the rifle.

b. Lock the weapon by engaging the safety.

c. Place the correct angle of elevation on the M15 sight if the M1 or M14 rifles are used.

d. Load the special grenade cartridge into the chamber.

e. Close the bolt.

f. When using the M14 rifle, check to see if the spindle valve is in the closed position.

g. Place the grenade onto the launcher or rifle. ("Position "full" is used for all low-angle, direct firing.)

h. Remove any external safety features from the grenade such as the safety pin on the M22A2 colored smoke rifle grenade.

i. Unlock the weapon by disengaging the safety.

j. Aim the weapon and fire.

Section II. HIGH-ANGLE DIRECT-FIRE MARKSMANSHIP TRAINING

67. Purpose

a. High-angle direct fire with rifle grenades is accomplished by placing the rifle butt on the ground and firing the rifle at an angle of 26 or more degrees of elevation. Because of its relative inaccuracy, high-angle direct fire is primarily used to engage large or area targets in the open or targets in defilade.

b. This section prescribes instruction for firing rifle grenades at area targets and targets in defilade. This instruction should follow rifle marksmanship training, and may come before or after direct-fire grenade markmanship training. High-angle direct-fire marksmanship training includes the following:

(1) Positions.
(2) Range estimation.
(3) Use of range tables.
(4) Sighting and aiming.
(5) Trigger control.
(6) Loading and firing procedures.

68. Positions

Three positions are used in high-angle direct fire with rifle grenades: the sitting, the kneeling and the modified kneeling. The modified kneeling position is used only when the marked sling method of sighting and aiming is employed.

a. Kneeling Position (1, fig. 29). Face your target, kneel on your right knee, and point your left foot in the general direction of the target. Since moving targets are not tracked in high-angle fire, sit on your right heel and use your left knee to support your left elbow. Place the rifle butt on the ground alongside your right knee. Grasp the rifle near the upper sling swivel with your left hand and the small of the stock with your right hand. Your right thumb should be placed alongside the stock. Rest your weight on your right heel. After placing the correct sight setting on the sight, lower the rifle and sight along the barrel toward the target to obtain the correct deflection. Then raise the rifle slowly until the leveling bubble is centered in its vial. Lower your head before firing to prevent injury to your eyes by blowback from the grenade's propellant.

b. Modified Kneeling Position (2, fig. 29). This position is used only when using the marked sling for sighting and aiming the rifle. Assume the kneeling position as in *a* above, except that you place your left foot on the sling at the desired point. Lower the rifle so you can sight for deflection, and then raise the rifle until the sling is taut and perpendicular to the ground. Then lower your head and fire.

c. Sitting Position (3, fig. 29). Face your target and sit down, keeping your right leg flat on the ground and pointed toward the target. Cross your left leg over your right knee to provide support for your elbow. Place the rifle butt alongside your right hip. From this point, hold and sight the rifle in the same manner as in the kneeling position.

69. Use of Range Tables

a. High-angle direct-fire range tables for the various types of grenades are shown in table 1. The range depends not only on the angle of elevation, but also on the position of the grenade on the launcher. To increase the range for a given elevation, place the grenade farther down on the launcher. To place the grenade at the desired position on the launcher, push the grenade down until the rear of the stabilizer tube coincides with the annular groove marked with the desired position number; for example, if the range table calls

Figure 29. High-angle direct fire positions.

for position 3, push the grenade down on the launcher until the annular groove marked 3 is covered by the grenade's stabilizer tube. You should still be able to read the number 3 on the launcher.

b. The range tables are designed to be used as a guide only. The actual range for a given angle of elevation and position will vary with different lots of special grenade cartridges, different rifles or launchers, and different atmospheric conditions.

Table 1. Range Tables

(1) M31 HEAT rifle grenade (direct fire, position full).

Range in meters	*Angle of elevation*
40	6 2/5°
60	7 2/5°
80	11°
100	15°
110	17°
120	18°

(2) M19A1 WP smoke rifle grenade (high-angle direct fire).

Range in meters	*Position on launcher*	*Angle of elevation*
50	6	30°
55	6	45°
65	5	30°
75	5	45°
85	4	30°
100	4	45°
120	3	30°
125	3	45°
140	2	30°
150	2	45°
165	1	30°
180	1	45°
185	full	30°
195	full	45°

(3) Fragmentation hand grenades with the M1A2 projection adapter (high-angle direct fire).

Range in meters	*Position on launcher*	*Angle of elevation*
55	6	45°
75	5	45°
95	4	45°
115	3	45°
Ineffective airbursts obtained at these angles and positions because time of flight is greater than fuze delay time.	2	45°
	1	45°
	full	45°
130	2	30°
150	1	30°
160	full	30°

(4) Chemical hand grenades with M2A1 projection adapter (high-angle direct fire).

Range in meters			Position on launcher	Angle of elevation
M6, M7, M18 series	AN-M8 grenade	AN-M14 grenade		
50	40	35	6	45°
65	55	50	5	45°
80	70	65	4	45°
100	85	80	3	45°
115	105	95	2	45°
135	120	110	1	45°
145	135	120	full	45°

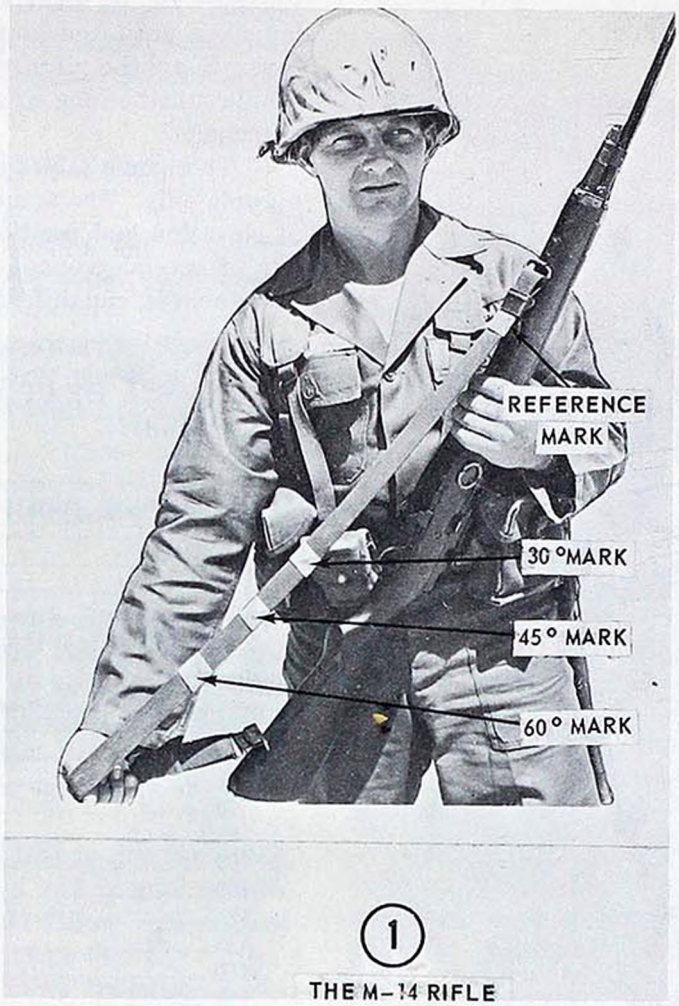


Figure 30. The marked sling.

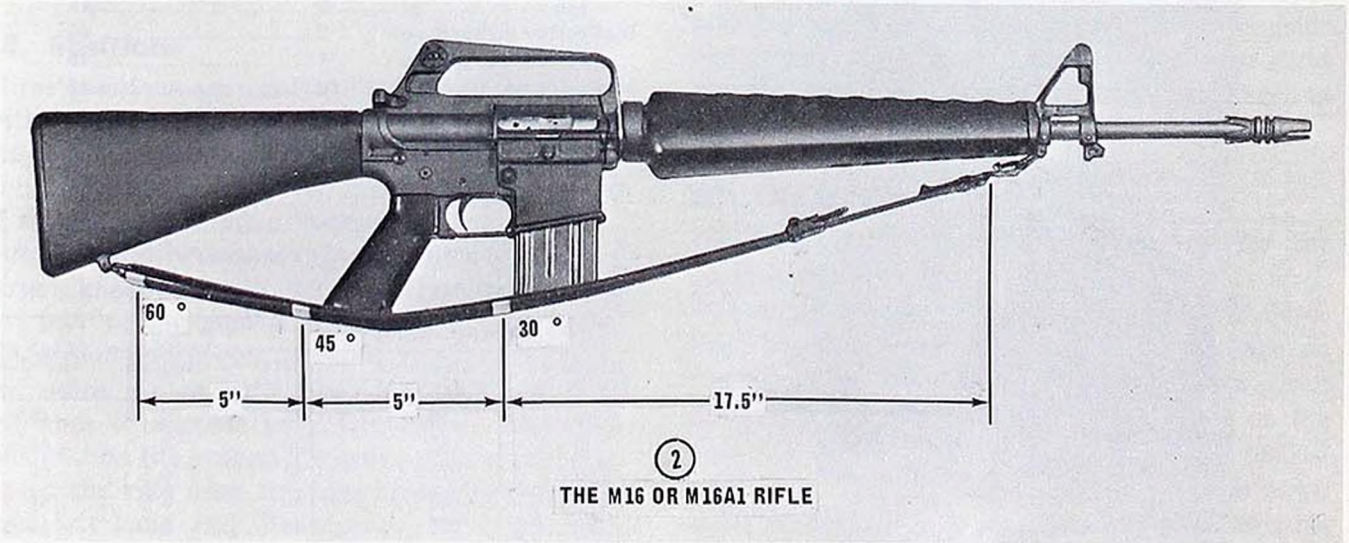


Figure 30—Continued.

70. Sighting and Aiming

a. M15 Sight. High-angle direct fire and aiming with the M15 sight consists of the following three steps:

(1) *Adjusting the sight.* From the range tables, determine the proper angle of elevation. With the sight attached to the rifle, rotate the sight bar assembly so that the index line on the sight mounting bracket is alined with the correct degree setting on the mounting plate scale.

(2) *Alining the rifle for deflection.* Assume a correct firing position and sight along the barrel. Move the rifle laterally until it is alined with the target.

(3) *Centering the leveling bubble.* Raise or lower the rifle until the leveling bubble is centered in its vial. Be sure that the rifle is not canted.

b. Marked Sling. When the M15 sight is unavailable, lost, or broken, a previously marked sling will help to determine elevation angles. There are two methods of marking the sling (fig. 30).

(1) *M15 sight marking method* (1, fig. 30). As soon as you are issued the sight, mark your sling for use in the event you lose or damage the sight. To mark the sling, loosen it and assume the modified kneeling position with your left foot in the sling. When marking the sling, use the angles of 30°, 45°, and 60°. Raise or lower the rifle and adjust the position of your left foot until the sling is taut and perpendicular to the ground with the leveling bubble centered in its vial. Mark the sling with tape or some similar substance at the point where the sling is held by your left foot. Also, mark the keeper of your sling to insure that the marking does not change when the sling is changed.

(2) *Field expedient method* (2, fig. 30). This method is favored because it is unnecessary to use the M15 sight. Unfasten the sling from the lower sling swivel and loosen the sling to its greatest length. Assume a modified kneeling position. For 30° elevation, stretch the sling tightly from the upper sling swivel to a point immediately behind the trigger guard. Mark that point on the sling and place your foot on the mark. Position the rifle so that the sling is taut and perpendicular to the ground. For 45°, stretch the sling from the upper sling swivel to a point immediately behind the crook on the lower part of the stock, and repeat the procedure used for 30° marking. For 60°, stretch the sling to a joint just behind the lower sling swivel, and repeat the procedure used for marking at 30° and 45°.

Note. When the M16 or the M16A1 rifle is used, the sling is marked as shown in 2, figure 30.

71. Trigger Control

Trigger control is just as important in high-angle firing as it is in direct firing. Faulty trigger control is likely to result in lateral displacement of the rifle's muzzle, causing the grenade to be completely off target. Trigger control should be practiced as described in FM 23–71.

72. High-Angle Direct-Fire Firing Procedure

For the firing procedure to use when engaging high-angle direct-fire targets, see paragraph 67.

Section III. RIFLE GRENADE SAFETY TRAINING

73. Firing Casualty-Producing Grenades

For safety instructions governing the firing of casualty-producing grenades, see AR 385–63, AR 385–65, TM 9–1330–200, and TM 9–1900. In addition to the safety precautions contained in these publications and in paragraph 44, the following will be adhered to:

a. Before joining a rifle grenade to a grenade launcher, be sure the rifle is loaded and unlocked. This procedure will facilitate immediate firing if the grenade's fuze functions prematurely.

b. Rifle grenades will not be fired with any munitions other than the authorized special grenade cartridge.

c. Make certain that the appropriate grenade projection adapter is used when hand grenades are fired from a rifle.

d. When rifle grenades are fired in the high-angle direct-fire role, make sure that adequate overhead clearance is available.

e. Do not remove grenade safety pins until just before you are ready to fire.

f. When using the M14 rifle, always check to see if the spindle valve is closed before firing rifle grenades.

g. Personnel handling or firing casualty-producing rifle grenades, or personnel who are not under adequate cover within the grenade's danger area will wear steel helmets.

WARNING: **A waiting period of 5 minutes for high-explosive duds or 30 minutes for chemical duds will be observed. Dud grenades will be removed or destroyed in place only by authorized explosive ordnance disposal personnel.**

74. Firing Noncasualty-Producing Grenades

For safety instructions governing the firing of noncasualty-producing grenades, see paragraph 45.

Section IV. RIFLE GRENADE INSTRUCTION COURSE

75. Purpose of Training

When the soldier has completed the initial phases of direct-fire and high-angle direct-fire marksmanship training, he should be given practical work with rifle grenades. To facilitate such training, he negotiates the rifle grenade instruction course. The instruction course allows the soldier to use practice rifle grenades and to engage a variety of targets at varying ranges in order to develop his proficiency in the use of rifle grenades.

76. Conduct of Training

a. Facilities. The rifle grenade instruction course consists of a zero station and four firing stations. The stations are described in appendix C.

b. Conduct. Each soldier starts the course at station 1 and moves in sequence through the four firing stations. Before running the course, the soldier is given a briefing on the objectives of the course and a demonstration of how the course is conducted. He is given six practice rifle grenades with which to zero his weapon. At each of the four firing stations, he receives two practice rifle grenades. The course is conducted as follows:

(1) *Station 1* (zeroing station). The soldier uses the firing position of his choice to engage two direct-fire targets at ranges of 40 meters and 80 meters. He confirms the zero of his weapon by again engaging the same targets and two additional area targets at ranges of 90 and 130 meters.

(2) *Station 2.* The soldier engages two direct-fire targets at ranges of 40 and 80 meters to test his proficiency in engaging stationary targets at known distances. He again uses the firing position of his choice.

(3) *Station 3.* The soldier engages two moving targets at unknown distances to further test his direct-fire proficiency. He must use the standing or the kneeling position.

(4) *Station 4.* The soldier engages two area targets at known distances of 90 and 130 meters. These targets test his ability to fire rifle grenades in the high-angle direct-fire role. He must use the sitting or the kneeling position.

(5) *Station 5.* The soldier marks his sling at 30°, 45°, and 60° using either of the methods described in paragraph 70. He then engages two area targets at unknown ranges. He must use the modified kneeling position.

c. Summary. Upon completion of the rifle grenade instruction course, the soldier will have fired a total of 14 practice rifle grenades at both point and area targets in order to develop his proficiency with rifle grenades.

CHAPTER 6

GROUND PYROTECHNIC SIGNALS

Section I. GENERAL

77. Introduction

Ground pyrotechnic signals are classified as either hand-held, rifle projected, or ground smoke signals. They constitute a family of signals capable of performing signaling and illuminating missions.

78. Characteristics

a. Rifle Projected Signals. Rifle projected ground pyrotechnic signals are similar to rifle grenades in that they are fired from the service rifle. Ground pyrotechnic signals are composed of a fin assembly, a stabilizer tube, and a signal body. Since they are fired almost vertically, grenade sights or firing tables are not required. Ground signals differ from smoke rifle grenades in that ground signals rise to a height of 180 to 215 meters before functioning; smoke rifle grenades function either on impact or shortly after firing.

b. Hand-Held Signals. Hand-held signals are issued in their own launching mechanism and are designed to reach a minimum height of 200 meters. Included in this group of signals are single-star parachutes, five-star clusters, and and smoke parachutes. The hand-held signals will eventually replace all rifle projected pyrotechnic ground signals and chemical grenades.

c. Ground Smoke Signals. These signals are self-contained units used by ground troops to signal aircraft or to convey information to each other. The signal consists of a cylindrical smoke pellet, a fuze (thermalite-type ignitacord), an igniter cap, an internal retaining ring, and a striker ring assembled in an aluminum photocan container. Upon functioning, these signals produce a smoke cloud that lasts for a period of 13 to 30 seconds. These signals are designed to replace rifle-projected smoke signals and to supplement the series of hand-held smoke signals.

79. Capabilities and Uses

a. Communication (signaling). Effective control of units on the battlefield depends largely on communication. Radio, telephone, voice, messenger, and hand-and-arm signals are means of communication which at times are made ineffective by the tactical situation. Pyrotechnic signals are used in such a situation to supplement or to take the place of the normal means of communication. Pyrotechnic signals are prescribed at command level and are prearranged in accordance with *signal operating instructions (SOI's).*

b. Illuminating. The illuminating capabilities of pyrotechnic signals are somewhat limited because of their size. They can be used, however, to light a small area for short periods of time when two or more illuminating signals are used at the same time.

Section II. RIFLE PROJECTED SIGNALS

80. Star Clusters

(1, fig. 31)

Star clusters are used for signaling and illuminating. They are fired from service rifles in the same manner as rifle grenades. The signals produce a cluster of five freely falling stars.

a. Types:

(1) M18A1 and M18A2.....white star cluster
(2) M20A1 .....green star cluster
(3) M22A1.....amber star cluster
(4) M52A1 and M52A2.....red star cluster

b. Functioning. Gases produced when the grenade cartridge is fired launch the signal. The thrust produced by these gases is insufficient to project the signal to the desired altitude; therefore, a propelling charge, which is ignited by flame from the grenade cartridge, is assembled into the base of the signal to provide the necessary additional boost. The flame from the propelling charge ignites a black powder delay train of

(1) STAR CLUSTERS.

(2) STAR PARACHUTES.

(3) SMOKE STREAMERS.

Figure 31. Ground pyrotechnic signals (rifle projected).

about 5.5 seconds duration. This delay train burns down to an expelling charge which, when ignited, produces a gaseous pressure at the base of a series of five star cup assemblies. This pressure forces the cup assemblies out of the nose portion of the signal body.

c. Maximum Height. 185 meters (600 feet).

d. Identification. At the top of the signal body is a steel closure cap embossed with the initials of the type signal (WS for white star, RS for red star, GS for green star, and AS for amber star).

81. Star Parachutes

(2, fig. 31)

Star parachutes are used for signaling and illuminating. They are fired from service rifles in the same manner as rifle grenades. The signals produce a single parachute-suspended pyrotechnic star.

a. Types:

(1) M17A1 and M1732..white star parachute
(2) M19A1 and M19A2 green star parachute
(3) M21A1.....amber star parachute
(4) M51A1 .....red star parachute

b. Functioning. These signals function in the same manner as star clusters.

c. Maximum Height. 185 meters (600 feet).

d. Identification. At the top of the signal body is a steel closure cap embossed with the initials of the type signal (WP for white parachute, GP for green parachute, AP for amber parachute, and RP for red parachute).

82. Smoke Streamers

(3, fig. 31)

Smoke streamers are used for signaling. They are fired from the standard service rifle in the same manner as rifle grenades. The signals produce a cluster of six freely falling smoke streamer pellets.

a. Types:

(1) M62.....red smoke streamer
(2) M64 .....yellow smoke streamer
(3) M65.....green smoke streamer
(4) M66 .....violet smoke streamer

b. Functioning. These signals function in the same manner as star clusters.

c. Maximum Height. 185 meters (600 feet). These signals produce 6 smoke streamers approximately 80 meters (250 feet) long from the signal's maximum height of trajectory. The signals can be seen for eight kilometers (five miles) on a clear day. They will persist for 20 seconds in a wind of 8 kilometers an hour.

d. Identification. These signals have a one-inch band around the nose end which is the same color as the smoke the signals produce.

Section III. HAND-HELD SIGNALS

83. Star Clusters

Star clusters are used for signaling and illuminating. They are issued in an expendable launcher which consists of a launching tube and a firing cap (1, 2, 3, and 4, fig. 32). These signals produce a cluster of five freely falling pyrotechnic stars.

a. Types:

(1) M125 and M125A1.....green star cluster
(2) M158.....red star cluster
(3) M159.....white star cluster

b. Operation (fig. 33). Operation of hand-held signals should be as follows: (This will not always agree with the instructions found on the launcher tube.) For more detailed information on safety and precautions, see TM 9–1370–200.

(1) Hold the signal in the left hand, red knurled band down, with the little finger in alinement with the red band.

(2) Withdraw the firing cap from the upper end of the signal.

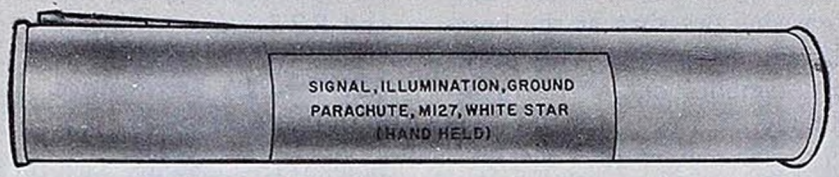
(3) Point the ejection end of the signal away from the body, and slowly push the firing cap onto the signal until the open end of the cap is alined with the red band.

(4) Grasp the center of the signal firmly with the left hand, holding the elbow tight against the body, with the signal at the desired trajectory angle and the firing cap at the bottom. Turn the head down and away from the signal to avoid injury to the face and eyes from particles ejected by the small rocket.

(5) Strike the bottom of the cap a sharp blow with the palm of the right hand, keeping the left arm rigid.

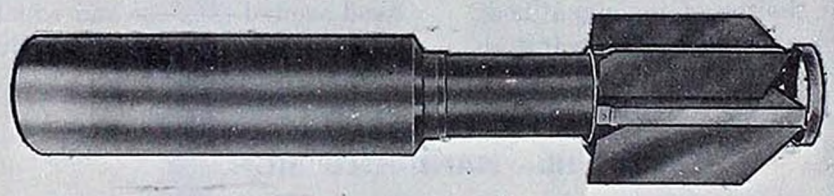
Note. Prior to firing the signal, the firer must insure he has overhead clearance.

c. Functioning. When the firing cap is struck, the firing pin is forced into the base of the launcher tube at the primer. When the primer is struck, the flash from the primer ignites an initiating charge of black powder at the base of the signal. Gases from the burning initiating charge expel the signal from the launcher tube (rocket barrel) with a slight recoil. As the signal is expelled, four flexible steel fins unfold to

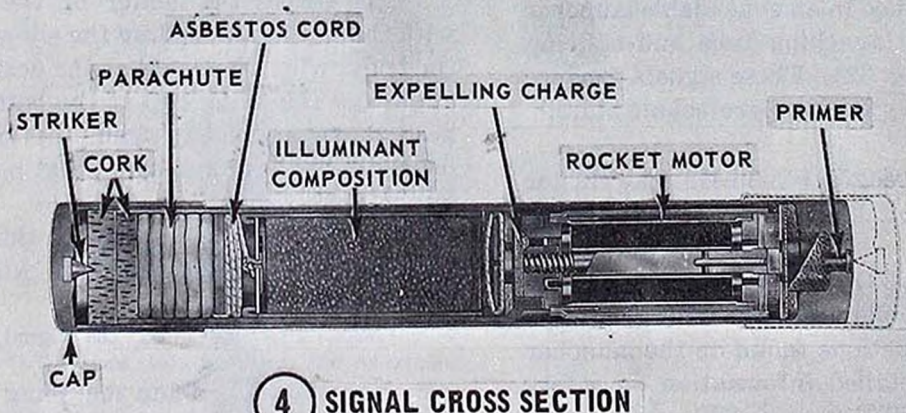


1 SHIPPING CONTAINER FOR HAND-HELD SIGNAL

2 THE HAND-HELD SIGNAL (LAUNCHER TUBE AND FIRING CAP)



3 SIGNAL CARRIER



4 SIGNAL CROSS SECTION

Figure 32. Ground pyrotechnic signals (hand-held).

stabilize the signal during flight. After the signal rises approximately 6 meters, the rocket motor, which was ignited by the propelling gases, begins to burn fully forcing the signal to a height of 200 to 215 meters (650 to 700 feet). At that point, a delay element ignites an ejecting charge which in turn forces the five-star illuminant cluster out of the nose of the signal body.

d. Firing Data. Star clusters burn 6 to 10 seconds. Their rate of descent is 14 meters (45 feet) per second.

Figure 33. Firing the hand-held signal.

84. Star Parachutes

Star parachutes are used for signaling and illuminating. They are issued in an expendable launcher which consists of a launching tube and a firing cap. These signals produce a single parachute-suspended illuminant star.

a. Types:

(1) M126 and M126A1.....red star parachute
(2) M127 and M127A1..white star parachute

b. Operation. These signals are fired in the same manner as star clusters.

c. Functioning. These signals function in the same manner as star clusters.

d. Firing Data. The M126- and the M127-series of star parachutes rise to a height of 200 to 215 meters. The M126 burns for 50 seconds and the M127 burns for 25 seconds. Their average rate of descent is 2.1 meters per second. The signal can be seen for 50 to 58 kilometers (30 to 35 miles) at night. It burns for 30 seconds.

85. Smoke Parachutes

Smoke parachutes are used for signaling only. They are issued in an expendable launcher which consists of a launching tube and a firing cap. These signals produce a single, perforated colored smoke cannister which is parachute-suspended.

a. Types:

(1) M128A1.....green smoke parachute
(2) M129A1.....red smoke parachute

b. Operation. These signals are fired in the same manner as star clusters.

c. Functioning. These signals function in the same manner as star clusters.

d. Firing data. Smoke parachutes rise to a height of 200 to 215 meters. The signals emit smoke for 10 seconds, forming a smoke cloud which persists for 60 seconds. Their rate of descent is 4 meters per second.

APPENDIX A

REFERENCES

1. Army Regulations (AR)

310–25	Dictionary of United States Army Terms.
385–63	Regulations for Firing Ammunition for Training, Target Practice, and Combat.
385–65	Identification of Inert Ammunition and Ammunition Components.
622–5	Qualification and Familiarization.

2. Army Subject Schedule (A Subj Scd)

23–29	Hand Grenades.

3. Army Training Programs (ATP)

21–114	Male Military Personnel Without Prior Service.

4. Department of the Army Pamphlet (DA PAM)

108–1	Index of Army Motion Pictures and Related Audio-visual Aids.

5. Field Manuals (FM)

7–15	Rifle Platoon and Squads Infantry, Airborne, and Mechanized.
20–60	Battlefield Illumination.
21–5	Military Training Management.
21–6	Techniques of Military Instruction.
21–48	Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises.
23–5	U.S Rifle, Caliber .30, M1.
23–8	U.S. Rifle, 7.62–mm, M14 and M14A1.
23–9	Rifle, 5.56–mm, M16A1.
23–71	Rifle Marksmanship.

6. Technical Bulletin (TB)

9–1300–246/1	Identification of Ammunition Employing the New Color Coding Standard.

7. Technical Manuals (TM)

9–1300–206	Care, Handling, Preservation, and Destruction of Ammunition.
9–1300–214	Military Explosives.
9–1330–200	Grenades, Hand and Rifle.
9–1370–200	Military Pyrotechnics.
9–1900	Ammunition General.
750–5–15	Army Equipment Data Sheets Chemical Weapons and Defense Equipment.

APPENDIX B

GUIDANCE FOR INSTRUCTORS

1. Purpose

This appendix is a guide for instructors. Its contents should not limit an instructor's initiative and originality, provided he observes the necessary safety precautions. The methods of instruction contained in FM 21–6 should be followed.

2. Presentation

a. Instruction should be presented using explanation, demonstration, and practical application. The key to success in a hand or rifle grenade training program is allowing the individual being trained to progress from the relatively easy to the more difficult.

b. Each individual's training should be closely supervised to insure a high standard of efficiency and coordination. Many soldiers initially fear the handling of explosives; others may possess some physical defect that impairs their throwing ability. In view of this, competent and patient assistance must be provided by supervisory personnel.

3. Training Objectives

a. To provide the soldier with sufficient detailed information that will enable him to effectively employ in combat hand grenades, rifle grenades, and ground pyrotechnic signals.

b. To develop the soldier's proficiency to use hand grenades, rifle grenades, and pyrotechnic signals.

4. Assistant Instructors

Prior to instruction, selected personnel should be trained as demonstrators and assistant instructors. Assistant instructors must be able to correct errors and answer questions pertaining to the training. Demonstrators must be thoroughly trained and rehearsed in order to conduct demonstrations that are correct in every detail.

5. General Training Notes

a. Four hours is the minimum time required to train a soldier to use hand and rifle grenades.

b. The most valuable training is practical work using grenades. Other aids, such as charts and training terrain facilities, are limited in their employment only by the resourcefulness of the instructor.

6. Conduct of Training

Army Subject Schedule 23–29 should be used as a guide by the instructor and the unit commander in preparing lesson plans and scheduling periods of instruction. The schedule of instruction and scope of training may be limited by the amount of time available, the duties of personnel to be trained, and the equipment and ammunition available. Informal instruction can be given in unit areas during nonscheduled periods in such subjects as throwing techniques, positions, range determination, and rifle grenade sighting and aiming exercises.

APPENDIX C

HAND AND RIFLE GRENADE RANGE FACILITIES

Section I. HAND GRENADE RANGE

1. Hand Grenade Distance and Accuracy Course
(fig. 34)

This course is divided into throwing courts, the number of which depends on the size of the unit to be trained and the training time available. Each court accommodates 20 men at a time, allowing a 240-man company to utilize each court during a 1-hour period of instruction.

a. Court 1. This court is 30-meters wide and 40-meters deep. It consists of a ready line, a throwing line, from which soldiers throw grenades from the standing position, and a cable which is suspended 4.5 meters (16-feet) high across the court and 15 meters forward of the throwing line. Six foxhole targets are located 30 meters across the court from the throwing line.

b. Court 2. This court is 30-meters wide and 50-meters deep. It consists of a ready line, a low wall throwing line, and a cable which is suspended 4.5 meters (16-feet) high across the court, 20 meters forward of the throwing line. A trench is located across the court 40 meters forward of the throwing line. The trench must be a minimum of 1-meter wide and 15-centimeters (6-inches) deep.

c. Court 3. This court is 30-meters wide, 30-meters deep, and consists of a ready line and a throwing line. Students not throwing grenades may observe from the ready line. Ten meters forward of the ready line is a low wall throwing line from which soldiers throw grenades from the kneeling position. Six window-type targets are situated across the court at a distance of 20 meters forward of the throwing line. The windows should be approximately one meter from ground level and one meter square.

2. Hand Grenade Assault/Qualification Course
(fig. 35)

This course is divided into lanes, the number of which depends on the size of the unit to be trained and the training time available. Each lane is identical and accommodates 50 men in a 1-hour period of instruction. All lanes include the following stations:

a. Station 1. This is the starting station. It consists of a chest-high log wall and a foxhole located 20 meters from the wall.

b. Station 2. This station is located 25 meters to the left of station 1. It consists of a low log wall and a window frame target located 20 meters from the wall.

c. Station 3. This station is located 25 meters to the left of station 2. It consists of a marker for a throwing position and a trench located 20 meters from the marker.

d. Station 4. This station is located 25 meters to the left of station 3. It consists of a log wall and a foxhole located 25 meters from the wall.

e. Station 5. This station is located 25 meters to the left of station 4. It consists of a foxhole throwing position and a cluster of silhouette targets located 30 meters forward of the foxhole.

f. Station 6. This station is located 25 meters to the left of station 5. It consists of a bunker with a 30-centimeter (1-foot) square aperture.

3. Hand Grenade Familiarization Course
(fig. 36)

This phase of training introduces the soldier to casualty-producing hand grenades. The course consists of hand grenade throwing bays, the number of which depends on the size of the unit to be trained. Behind the throwing bays and centered on them at a distance of 10 meters is an observation bay from which the *officer in charge* controls the throwing. A ready wall is located 10 meters behind the observation bay. Personnel waiting to throw and those who have completed throwing are positioned behind the wall.

a. Throwing Bay. This bay is 2.5 meters wide and 2.5 meters deep. These dimensions allow one thrower and one safety *NCO* to be positioned in the bay during throwing. Walls enclose three

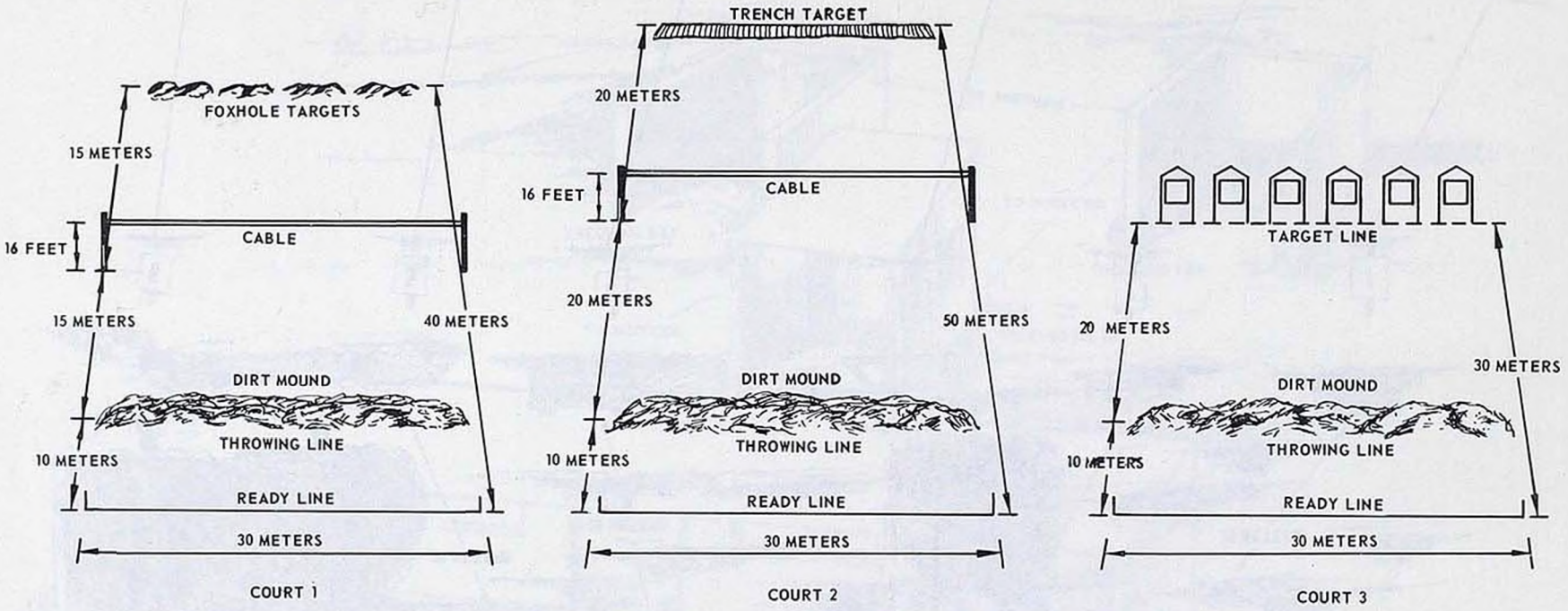


Figure 34. Distance and accuracy course.

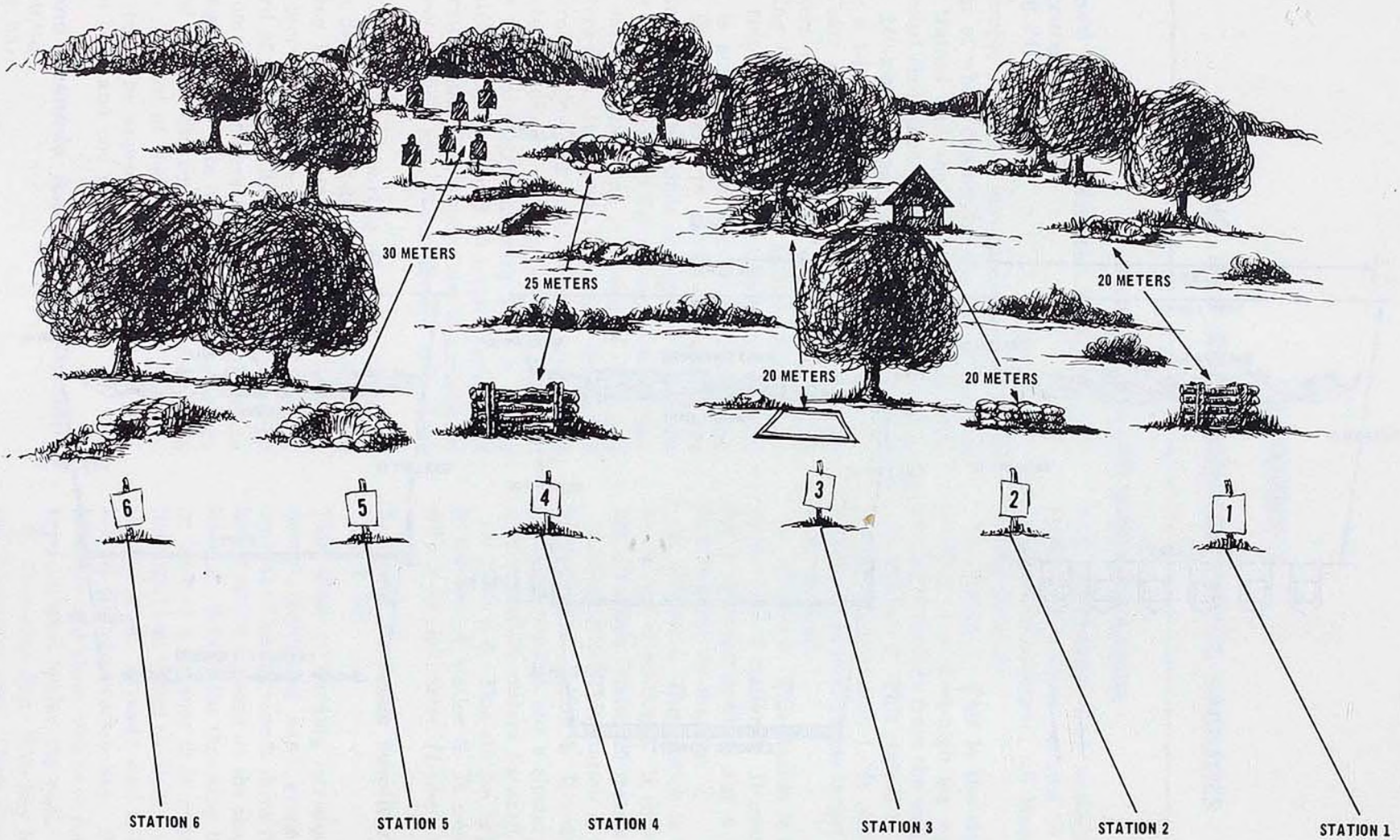


Figure 35. Hand grenade assault/qualification course.

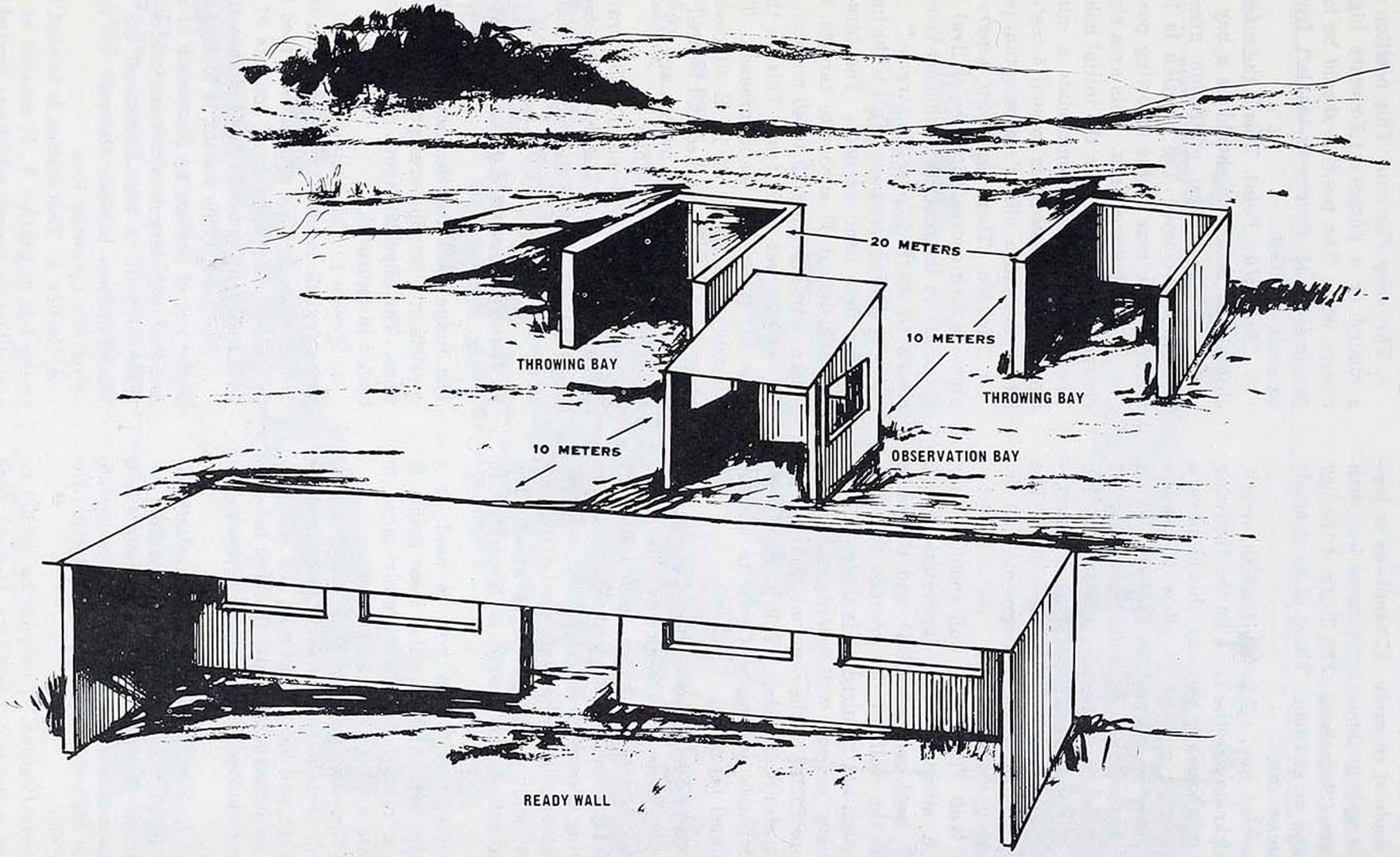


Figure 36. Hand grenade familiarization course.

sides of the bay. Each wall is 1.5 meters high and a minimum of 15-centimeters (6-inches) thick, if they are made of concrete. If sandbags or logs are used, the wall thickness must be no less than 50 centimeters (20 inches). The floors of the bay are loose sand or sawdust. There is *no* grenade sump or grenade ditch.

b. Observation Bay. This bay's width, depth, and wall thickness are the same as the throwing bay. If at all possible, the bay should have a sloped observation window to allow the safety *officer in charge* to observe the throwing at all times. The window material must be capable of withstanding the fragmentation produced by the M26-series of hand grenades. (A good observation window is an aircraft plexiglass bubble. The slope of the window deflects fragments and reduces damage to the material.)

c. Ready Wall. The ready wall should be the height of a standing man (approximately 2 meters [6.5 feet] recommended) and the same thickness as the walls of the grenade throwing bays. Although not required, it is desirable that the wall have several well-spaced observation windows constructed of the same material as that used in the observation bay. This arrangement allows individuals waiting to throw to observe other personnel throwing.

4. Hand Grenade Confidence Course

The range used for the conduct of this course consists of two separate areas, each consisting of an assembly area, a final coordination line, an initial holding area, a covering position, a throwing position, a final holding area, a safety officer's observation point, and two target areas. The physical layout of the course is illustrated in figure 37.

a. Assembly Area. This area is used as a briefing point and an ammunition issue point. It should be a cleared area, sufficiently large to accommodate a 48- to 60-man platoon.

b. Final Coordination Line. This line should be a prominent terrain feature such as a woodline or stream bed and located between the assembly area and the objective. Ideally, the area between the final coordination line and the objective should slope uphill.

c. Initial Holding Area. This area should be located 30 to 50 meters forward of the final coordination line. The area should be a mound or a roadside ditch that is long enough to accommodate 11 men and high enough to afford protection for a kneeling man.

d. Covering Position. This position should be a mound or a parapet 1.5-meters (4-feet) high and 3-meters (8-feet) wide across its front side. The position should be 5 meters forward of the right flank of the initial holding area.

e. Throwing Position. This position should be a mound or a parapet 1.5-meters high and 2-meters wide. The position should be located approximately 15 meters to the left front of the covering position.

f. Observation Point. This is the safety officer's observation point. It should be a bay affording the minimum frontal protection prescribed in paragraph 3 above. The position is located 10 meters to the rear of the throwing position.

g. Final Holding Area. This area should have characteristics similar to the initial holding area. The position must accommodate a minimum of two kneeling men. It is located 5 meters to the left of the safety officer's observation point.

h. Targets. There are two separate target areas in each course (practice or live). The target areas on the practice confidence course should clearly be marked "practice targets."

(1) *Target area one.* This is the impact area for the first hand grenade. The target should be a cluster of E silhouette targets located at ranges varying from 25 to 40 meters.

(2) *Target area two.* This is the impact area for the second hand grenade. The target consists of a cluster of 10 E silhouettes. This target should be unmarked and located at ranges varying from 25 to 40 meters and 50 meters to the left of target area one.

i. Training Area (general). The training area should be located on slightly sloping terrain. As much natural vegetation as possible should be left on the site.

5. Hand Grenade Cookoff-Impact Course (fig. 38)

The range used for the conduct of this course consists of a briefing area and four throwing stations. The physical layout of the course is illustrated in figure 38.

a. Station 1. This station consists of a log wall and a foxhole located 25 meters from the wall.

b. Station 2. This station is located 25 meters to the left of Station 1. It consists of a bunker with a 30-centimeter (1-foot) square aperture.

c. Station 3. This station is located 25 meters to the left of Station 2. It consists of a log wall and silhouette targets which are located 30 meters from the wall. A wire 16 feet off the ground is placed midway between the wall and the targets across the throwing line.

d. Station 4. This station is located 25 meters to the left of Station 3. It consists of a foxhole and silhouette targets which are located 20 meters from the foxhole.

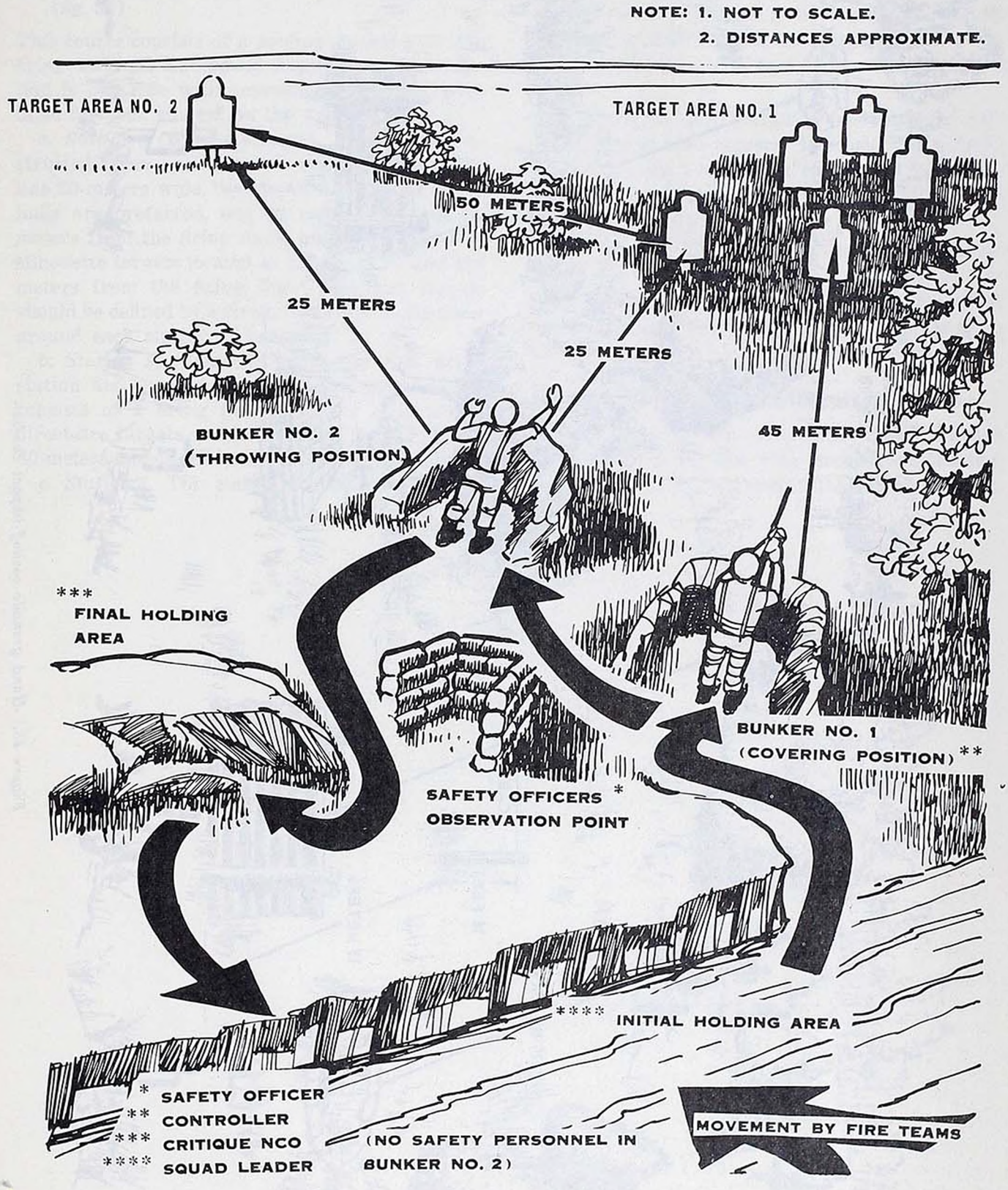


Figure 37. Hand grenade confidence course.

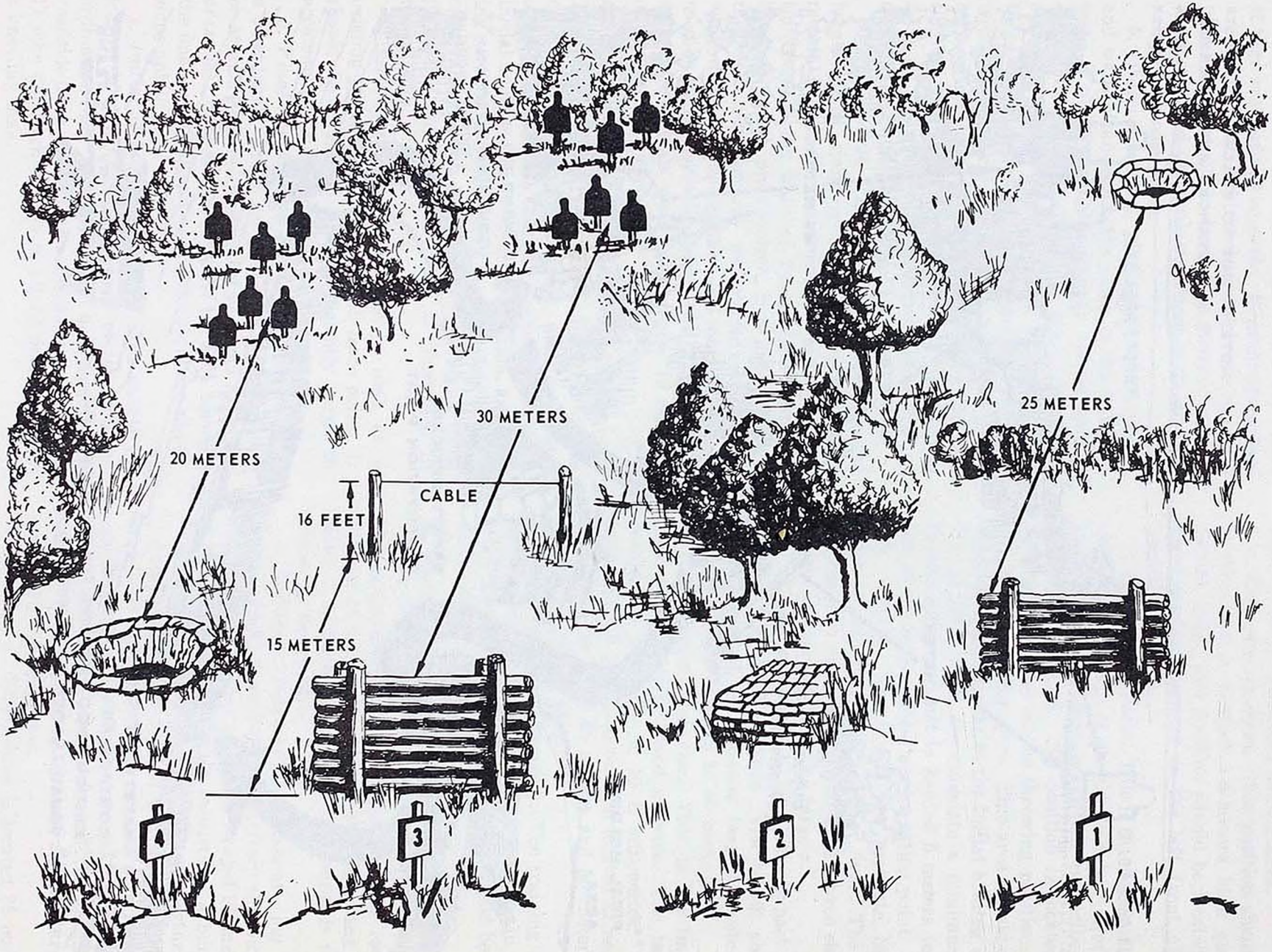


Figure 38. Hand grenade cookoff-impact course.

Section II. RIFLE GRENADE RANGE

6. Rifle Grenade Instruction Course
(fig. 39)

This course consists of a zeroing station and four firing stations. Equipment required for each station is one rifle with accessories and one range table for each student on the firing line.

a. Station 1 (zeroing station). Station 1 is constructed in an open area. It consists of a firing line 20-meters wide, two direct-fire targets (tank hulls are preferred, one 40 meters and one 80 meters from the firing line), and two clusters of silhouette targets located at ranges of 90 and 130 meters from the firing line. The area targets should be defined by a circle 15 meters in diameter around each cluster of targets.

b. Station 2. This station is the first firing station and is used for direct-fire exercises. It consists of a firing line 20-meters wide and 2 direct-fire targets (tank hulls are preferred, one 40-meters and one 80 meters from the firing line).

c. Station 3. This station is used for direct fire at moving targets. The station consists of a firing line 20-meters wide and a moving target. A target tank is desirable. If no target tank is available, target sleds with tank silhouettes should be used.

d. Station 4. This station is used for high-angle direct fire at area targets. It consists of a firing line 20-meters wide and 2 clusters of silhouette targets located at ranges of 90 and 130 meters from the firing line.

e. Station 5. This station is used for high-angle direct fire at area targets. It is the same as station 4, except that 4 area targets are located at varying ranges between 80 and 160 meters from the firing line.

7. Rifle Grenade Qualification Course

The range facility described in paragraph 6 above is used for both the rifle grenade instruction course and the rifle grenade qualification course.

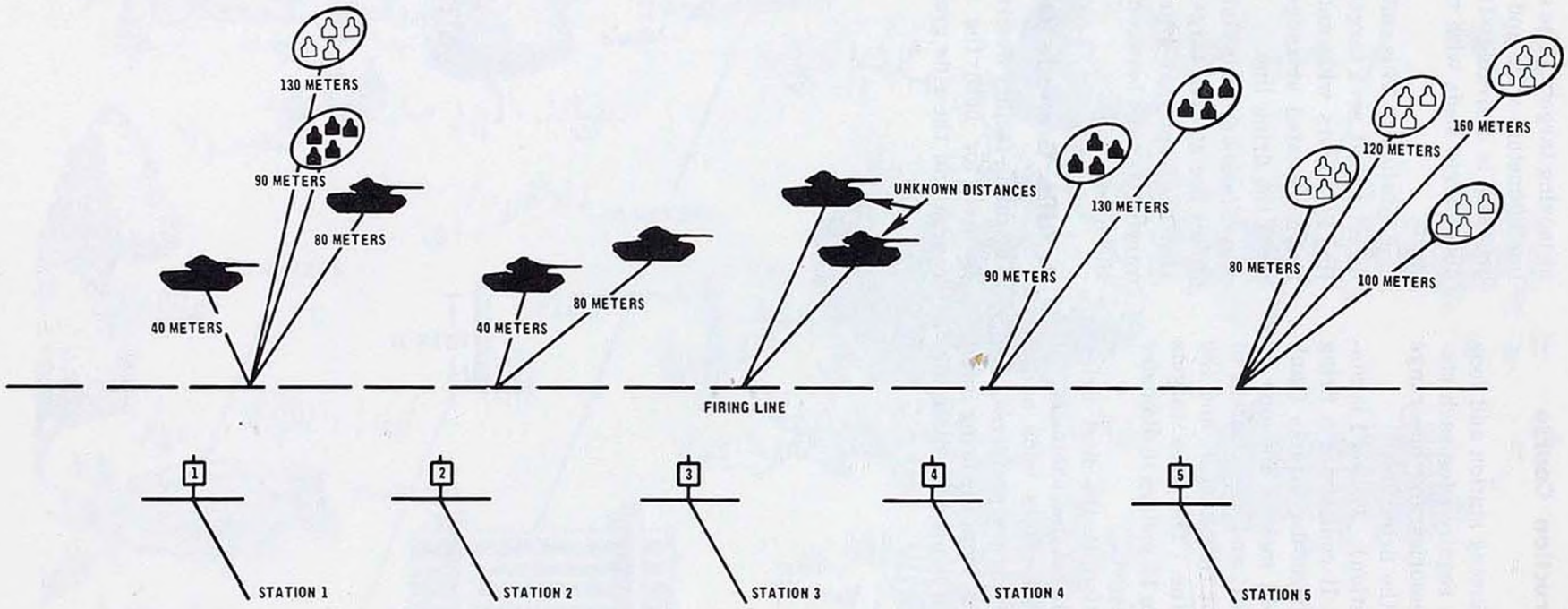


Figure 39. Rifle grenade instruction course.

APPENDIX D
SUMMARY OF GRENADES AND GROUND PYROTECHNIC SIGNALS

THE TABLES IN THIS APPENDIX REFLECT A RECAPITULATION OF THE VARIOUS HAND GRENADES, RIFLE GRENADES, AND GROUND PYROTECHNIC SIGNALS PRESENTLY IN USE BY THE UNITED STATES ARMY.

TABLE 2. HAND GRENADES

NOMENCLATURE	BODY	FILLER	FUZE	WEIGHT	THROWING DISTANCE	RIFLE PROJECTED RANGE	DELAY TIME	COLOR AND MARKINGS (NEW) (CHECK TEXT FOR OLD).	PRIMARY USES	ADAPTER REQUIRED FOR RIFLE PROJECTION	EFFECTS
MK I ILLUMINATING	SHEET STEEL	3.5 OZ. ILLUMINATING PYROTECHNIC COMPOSITION.	DELAY IGNITING.	10 OZ.	40 M.	200 M.	7 SEC.	UNPAINTED WITH BLACK MARKINGS.	SIGNALING, ILLUMINATING.	M1A2	25 SEC. BURNING TIME, 55,000 CANDLE-POWER, ILLUMINATES AREA 200 M. IN DIAMETER.
MK 2 FRAGMENTATION	CAST IRON (SERRATED)	2 OZ. FLAKED TNT.	M6A4C M204A1 M204A2	21 OZ.	30 M.	140 M.	4-5 SEC.	OD WITH YELLOW BAND.	CASUALTY-PRODUCING.	M1A2	10 M. EFFECTIVE CASUALTY RADIUS.
MK3A2 OFFENSIVE	FIBER.	8 OZ. FLAKED TNT.	M206A2	15.6 OZ.	40 M.	-----	4-5 SEC.	BLACK WITH YELLOW MARKINGS.	CONCUSSION (DEMOLITION. CASUALTY, BLAST).	-------	2 M. EFFECTIVE CASUALTY RADIUS IN OPEN AREAS.
M6 RIOT CONTROL	SHEET STEEL	10.5 OZ. CN-DM.	M201A1	17 OZ.	35 M.	120 M.	1.2-2 SEC	GRAY WITH RED BAND AND MARKINGS.	RIOT CONTROL.	M2A1	20-60 SEC. BURNING TIME.
M6A1 RIOT CONTROL	SHEET STEEL	9.5 OZ. CN-DM.	M201A1	20 OZ.	35 M.	120 M.	1.2-2 SEC.	DO	DO	DO	DO
M7 ROIT CONTROL	DO	10.25 OZ. CN.	M201A1	17 OZ.	35 M.	120 M.	DO	DO	DO	DO	DO
M7A1 RIOT CONTROL	DO	12.5 OZ. CN	DO	18.5 OZ.	35 M.	120 M.	DO	DO	DO	DO	DO
ABC-M7A2 RIOT CONTROL	DO	5.5 OZ. BURNING MIXTURE, 3.5 OZ. POWDERED CS.	DO	15.5 OZ.	40 M.	120 M.	DO	DO	DO	DO	DO
ABC-M7A3 RIOT CONTROL	DO	7.5 OZ. BURNING MIXTURE, 4.5 OZ. PELLETIZED CS.	DO	DO	DO	120 M.	DO	DO	DO	DO	DO
AN-M8 WHITE SMOKE	DO	19 OZ. HC (HEXACHLOROTHANE).	DO	24 OZ.	30 M.	120 M.	DO	LIGHT GREEN WITH BLACK MARKINGS AND WHITE TOP.	SIGNALING AND SCREENING.	DO	105-150 SEC. BURNING TIME.
AN-M14 TH3 INCENDIARY	DO	26.5 OZ. THERMATE (TH3)	DO	32 OZ.	25 M.	120 M.	DO	LIGHT RED WITH BLACK MARKINGS.	INCENDIARY	DO	BURNS 40 SEC. AT 4000 °F. WILL BURN THROUGH 1/4-INCH HOMOGENEOUS STEEL PLATE.
M18 COLORED SMOKE	DO	11.5 OZ. COLORED SMOKE MIXTURE.	DO	19 OZ.	35 M.	120 M.	DO	LIGHT GREEN WITH BLACK MARKINGS AND TOP OF SAME COLOR AS SMOKE PRODUCED.	SIGNALING AND SCREENING	DO	BURNING TIME 50-90 SEC.
ABC-M25A1, ABC-M25A2 RIOT CONTROL	COMPRESSED FIBER OR PLASTIC.	APPROXIMATELY 4 OZ. CN, OR DM, OR CS.	INTEGRAL C-12	7.5-8 OZ.	50 M.	-----	1.4-3 SEC.	GRAY WITH RED BAND AND MARKINGS.	RIOT CONTROL.	-------	5 M. BURSTING RADIUS. FRAGMENTS OCCASIONALLY TRAVEL AS FAR AS 25 M. (PLASTIC GRENADE FRAGMENTS HAVE 25 M. BURSTING RADIUS).
M26, M26A1 FRAGMENTATION	SHEET STEEL WITH SERRATED WIRE COIL.	5.5 OZ. COMPOSITION B.	M204A1 OR M204A2 (M26); M204A2 (M26A1)	16 OZ.	40 M.	160 M.	4-5 SEC.	OD WITH YELLOW BAND AND MARKINGS.	CASUALTY-PRODUCING	M1A2	15 M. EFFECTIVE CASUALTY RADIUS.
M 56	DO	6.3 OZ COMPOSITION B	M215	15.2 O	DO	DO	4-5 SEC.		DO	DO	DO
M 57 (FORMERLY M 26A2)	DO	DO	M 217	DO	DO	------	1 SEC. AND THEN IMPACT, OR AUTOMATICALLY 4 SEC. AFTER SAFETY LEVER HAS BEEN RELEASED.	OD WITH YELLOW BAND AND MARKINGS. "IMPACT" EMBOSSED ON RED SAFETY LEVER	DO	-------	DO
M 33	STEEL OBLATE SPHERIOD	6.5 OZ COMPOSITION B.	M 213	13.9 OZ	42 M	------	4-5 SEC	OD WITH YELLOW BAND AND MARKINGS	DO	-------	DO
M 59	DO	DO	M 217	DO	DO	------	1 SEC. AND THEN IMPACT, OR AUTOMATICALLY 4 SEC. AFTER SAFETY LEVER HAS BEEN RELEASED.	OD WITH YELLOW BAND AND MARKINGS. "IMPACT" EMBOSSED ON RED SAFETY LEVER	DO	-------	DO
M30 PRACTICE	CAST IRON.	----------	M10A2, M10A3, M205A1 OR M205A2	16 OZ.	40 M.	160 M.	4-5 SEC.	LIGHT BLUE WITH WHITE MARKINGS.	PRACTICE (TRAINING).	M1A2	LOUD POPPING NOISE AND CLOUD OF WHITE SMOKE.
M34 WP SMOKE	ROLLED STEEL (SERRATED).	15 OZ. WP.	M206A2	27 OZ.	30 M.	120 M.	4-5 SEC.	LIGHT GREEN WITH YELLOW BAND AND RED MARKINGS.	CASUALTY-PRODUCING, SIGNALING, SCREENING, INCENDIARY.	M1A2	35 M. BURSTING RADIUS, BURNS FOR 60 SEC.

TABLE 3. RIFLE GRENADES

NOMENCLATURE	BODY	FILLER	FUZE	WEIGHT	MAXIMUM RANGE	COLOR AND MARKINGS	PRIMARY USES	EFFECTS
M11A4	STEEL	NONE	NONE	24 OZ.	200 M.	BLACK WITH WHITE MARKINGS.	TRAINING	NONE
M19A1 WP SMOKE	STEEL	8.5 OZ.	MECHANICAL IMPACT DETONATING.	24 OZ.	195 M.	GRAY WITH YELLOW MARKINGS (OLD). LIGHT GREEN WITH YELLOW BAND AND RED MARKINGS (NEW).	CASUALTY-PRODUCING, SIGNALING, SCREENING, INCENDIARY.	10 M. EFFECTIVE CASUALTY RADIUS. BURNS FOR 60 SEC. AT 5000 °F.
M22 SERIES	STEEL	6.5 OZ. COLORED SMOKE MIXTURE.	MECHANICAL IMPACT IGNITING.	20.2 OZ.	IN EXCESS OF 200 M.	GRAY WITH YELLOW MARKINGS AND BASE OF SAME COLOR AS SMOKE PRODUCED (OLD). LIGHT GREEN WITH BLACK MARKINGS AND BASE OF BODY SAME COLOR AS SMOKE PRODUCED (NEW).	SIGNALING AND SCREENING.	APPROX 1 MIN. BURNING TIME
M23A1 COLORED SMOKE STREAMER	DO	6.5 OZ. COLORED SMOKE MIXTURE	NONE (SET OFF BY FLASH OF GRENADE CARTRIDGE).	18.5 OZ	IN EXCESS OF 200 M.	GRAY WITH YELLOW MARKINGS AND BASE OF SAME COLOR AS SMOKE PRODUCED (OLD). LIGHT GREEN WITH BLACK MARKINGS AND BASE OF BODY SAME COLOR AS SMOKE PRODUCED (NEW).	SIGNALING	12 SECONDS BURNING TIME PRODUCES TRAIL OF COLORED SMOKE IN FLIGHT.
M29 PRACTICE	STEEL	NONE	NONE	24 OZ.	150 M.	BLACK WITH WHITE MARKINGS.	TRAINING	NONE
M31 PRACTICE	SHEET STEEL AND ALUMINUM	NONE	NONE	25 OZ.	150 M.	BLUE WITH WHITE MARKINGS.	TRAINING (PRACTICE)	NONE
M31 HEAT	COPPER-COATED STEEL ALLOY AND ALUMINUM ALLOY.	9.92 OZ. COMPOSITION B. (SHAPED CHARGE).	M211	25 OZ.	115 M. (DIRECT FIRE) 185 M. (HIGH ANGLE DIRECT FIRE).	OD WITH YELLOW MARKINGS.	ANTITANK, CASUALTY-PRODUCING.	PENETRATES 10 IN. HOMOGENEOUS STEEL OR 20 IN. REINFORCED CONCRETE. 15 M. EFFECTIVE CASUALTY RADIUS (HIGH-ANGLE DIRECT FIRE).

TABLE 4. RIFLE PROJECTED GROUND PYROTECHNIC SIGNALS.

NOMENCLATURE	TYPE	APPROXIMATE WEIGHT	MAXIMUM HEIGHT	TYPE SIGNAL PRODUCED	USES	METHOD OF PROJECTION
M18A1, M18A2	WHITE STAR CLUSTER	16 OZ.	600 FT.	5 FREELY FALLING WHITE PYROTECHNIC STARS.	SIGNALING, ILLUMINATING	RIFLE PROJECTED
M20A1	GREEN STAR CLUSTER	DO	DO	5 FREELY FALLING GREEN PYROTECHNIC STARS.	DO	DO
M22A1	AMBER STAR CLUSTER	DO	DO	5 FREELY FALLING AMBER PYROTECHNIC STARS	DO	DO
M52A1, M52A2	RED STAR CLUSTER	DO	DO	5 FREELY FALLING RED PYROTECHNIC STARS	DO	DO
M17A1, M17A2	WHITE STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED WHITE PYROTECHNIC STAR.	DO	DO
M19A1, M19A2	GREEN STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED GREEN PYROTECHNIC STAR.	DO	DO
M21A1	AMBER STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED AMBER PYROTECHNIC STAR.	DO	DO
M51A1	RED STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED RED PYROTECHNIC STAR.	DO	DO
M62	RED SMOKE STREAMER	DO	DO	6 FREELY FALLING RED SMOKE STREAMER PELLETS.	SIGNALING	DO
M64	YELLOW SMOKE STREAMER	DO	DO	6 FREELY FALLING YELLOW SMOKE STREAMER PELLETS.	DO	DO
M65	GREEN SMOKE STREAMER	DO	DO	6 FREELY FALLING GREEN SMOKE STREAMER PELLETS.	DO	DO
M66	VIOLET SMOKE STREAMER	DO	DO	6 FREELY FALLING VIOLET SMOKE STREAMER PELLETS.	DO	DO

TABLE 5. HAND-HELD GROUND PYROTECHNIC SIGNALS.

NOMENCLATURE	TYPE	APPROXIMATE WEIGHT	MAXIMUM HEIGHT	TYPE SIGNAL PRODUCED	USES	METHOD OF PROJECTION
M125, M125A1	GREEN STAR CLUSTER	20 OZ.	650 -700 FT.	5 FREELY FALLING GREEN PYROTECHNIC STARS.	SIGNALING, ILLUMINATING	HAND-HELD, ROCKET PROPELLED.
M158	RED STAR CLUSTER	DO	DO	5 FREELY FALLING RED PYROTECHNIC STARS.	DO	DO
M159	WHITE STAR CLUSTER	DO	DO	5 FREELY FALLING WHITE PYROTECHNIC STARS.	DO	DO
M126, M126A1	RED STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED RED PYROTECHNIC STAR.	DO	DO
M127, M127A1	WHITE STAR PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED WHITE PYROTECHNIC STAR.	DO	DO
M131	RED STAR PARACHUTE	DO	1500 FT.	SINGLE PARACHUTE-SUSPENDED RED PYROTECHNIC STAR (DISTRESS SIGNAL).	DO	DO
M128A1	GREEN SMOKE PARACHUTE	DO	650 -700 FT.	SINGLE PARACHUTE-SUSPENDED GREEN SMOKE CANNISTER.	SIGNALING	DO
M129A1	RED SMOKE PARACHUTE	DO	DO	SINGLE PARACHUTE-SUSPENDED RED SMOKE CANNISTER.	DO	DO

APPENDIX E

Color Coding of Grenades

	Grenades color coded prior to implementation of MIL-STD 709 (Prior to standard color-coding system)		*Grenades color coded in accordance with MIL-STD 709 (Standard color-coding system)*	
Type of grenade	*Color of body*	*Color of marking*	*Color of body*	*Color of marking*
HAND GRENADES				
Fragmentation	Olive drab	Yellow	Olive drab	Yellow
Illuminating	Unpainted	Black	All white or unpainted with white band	Black
Practice	Blue	None or white	Blue with brown band	None or white
Training	Black [1,2]	None	Blue [2]	None
RIFLE GRENADES				
High explosive, antitank	Olive drab	Yellow	Black	Yellow
WP smoke	Gray with yellow band and olive drab stabilizer assembly	Yellow	Light green with olive drab stabilizer assembly	Light red and 1 yellow band
Colored smoke	Gray with yellow band and olive drab stabilizer assembly	Yellow	Light green	Black (Early production marked in white) [3]
Practice	Black [2]	White	Blue	White
CHEMICAL HAND/RIFLE GRENADES				
Riot control agent	Gray	Red and one red band	Gray	Red and one red band
WP (smoke)	Gray	Yellow and one yellow band	Light green	Light red and one yellow band

Grenades color coded prior to implementation of MIL–STD 709 (Prior to standard color-coding system)		*Grenades color coded in accordance with MIL–STD 709 (Standard color-coding system)*	
Color of body	*Color of marking*	*Color of body*	*Color of marking*
Chemical Hand/Rifle Grenades (Continued)			
Gray	Yellow and one yellow band	Light green	Black (Early production marked in white)
Gray	Purple and one purple band	Light red	Black
Blue	White	Blue	White, yellow or brown band
Black	White (bronze or brass assemblies are unpainted)	Blue	White
Black	Yellow	Black	Yellow

[1] May have longitudinal white stripes painted 90° apart around body.
[2] This item is completely inert.
[3] "CCC," in the color of smoke produced, is marked on the ogive.
[4] In addition to the standard color marking, the top of each M18 grenade is painted the color of the smoke produced by the grenade.

APPENDIX F

GRENADE QUALIFICATION COURSES

1. General

Personnel may be tested on their proficiency with grenades by negotiating grenade qualification courses. The grenade qualification courses measure individual proficiency in the use of hand and rifle grenades, provide additional grenade training, and instill motivation in grenade training through competitive spirit. Separate courses are run for hand and rifle grenade qualification. DA Form 3517, (Grenade Qualification Scoreboard), (fig. 40) is for scoring the hand grenade assault/qualification course and/or the rifle grenade qualification courses. Supply of DA Form 3517 will be requisitioned through normal publications supply channels.

2. Hand Grenade Assault/Qualification Course

The hand grenade assault/qualification course described in paragraph 41 is used for hand grenade qualification.

a. Scoring. The total possible score on the hand grenade assault/qualification course is 60 points, each station being worth 10 points. The qualifying scores for the course are as follows:

(1) Expert grenadier .....50 to 60 points
(2) First class grenadier .....40 to 49 points
(3) Second class grenadier.....30 to 39 points

b. Items Scored. The following three items are scored in the hand grenade assault/qualification course:

(1) *Use of cover.* The proper use of cover receives a score of 2 points at each of the 6 throwing stations. To receive credit, a thrower must conceal and protect himself behind adequate cover at or near his throwing position.

(2) *Correct procedure.* Correct procedure receives a score of two points at each station. To receive credit, a thrower must grip the grenade properly, use the proper throwing procedure, and adhere to all applicable safety points.

(3) *Target hits.* A thrower may obtain credit for either a first or second target hit, but not both. If he obtains an effective target hit with his first grenade, he receives a score of six points. If he fails to obtain a target hit with his first grenade, but scores a target hit with his second grenade, he receives a score of only three points. A thrower is not allowed to engage the target more than twice. An effective target hit is defined as a direct target hit on point targets, such as windows, doorways, and bunker apertures; or a detonation within the 15-meter effective casualty radius of the M26- and M33-series of fragmentation hand grenades on area targets, such as troops in the open, or personnel in uncovered positions.

c. Ammunition. The soldier receives 10 practice hand grenades (5 fuzed and 5 unfuzed). No more than two grenades may be used at each station. For the conduct of the course, see paragraph 41*b*.

3. Rifle Grenade Qualification Course

The rifle grenade qualification course is a scored exercise conducted in the same manner and on the same type range as the rifle grenade familiarization course described in paragraphs 75 and 76.

a. Scoring. The total possible score on the rifle grenade qualification course is 80 points. Each firing station has 2 targets, each target worth 10 points. Only stations 2 through 5 are scored. The qualifying scores for the course are as follows:

(1) Expert grenadier .....70 to 80 points
(2) First class grenadier .....50 to 60 points
(3) Second class grenadier.....40 to 49 points

b. Target Hits. The soldier receives points only for target engagement. A successful target engagement is defined as a direct target hit on direct-fire targets or an impact within the 15-meter effective casualty radius of the M31 HEAT rifle grenade against area targets.

c. Ammunition. The soldier receives six practice rifle grenades (M11A4, M29, or M31) to zero his weapon and eight practice rifle grenades to run the course. Two grenades are used at each station.

GRENADE QUALIFICATION SCORECARD

FOR USE OF THIS FORM, SEE FM 23-30; PROPONENT AGENCY IS USCONARC.

DATE: 16 Aug 69

☒ HAND GRENADE ☐ RIFLE GRENADE

NAME (Last, first, middle initial): McClellan, Willie H

GRADE: SSG

SERVICE NUMBER: RA14 759 143

ORGANIZATION: Co "A", 1st Bn, 23rd Inf

STATION	HAND GRENADE: USE OF COVER	HAND GRENADE: CORRECT THROWING PROCEDURE	HAND GRENADE: TARGET HITS	RIFLE GRENADE: TARGET 1	RIFLE GRENADE: TARGET 2	TOTAL
1	2	2	6			10
2	2	2	6			10
3	2	2	3			7
4	2	2	3			7
5	2	2	6			10
6	2	2	6			10

QUALIFICATION: Expert

TOTAL SCORE: 54

SIGNATURE OF FIRER: Willie H. McClellan

SIGNATURE OF OFFICER: Hugh L. Gray 1/Lt Inf

QUALIFYING SCORE VALUES

HAND GRENADE		RIFLE GRENADE	
Expert:	50-60 points	Expert:	70 to 80 points
First Class:	40-49 points	First Class:	50 to 60 points
Second Class:	30-39 points	Second Class:	40 to 49 points
Unqualified:	0-29 points	Unqualified:	Below 40 points

DA FORM 1 JUL 69 3517

1. Hand grenade.

Figure 40. Grenade qualification scorecard.

GRENADE QUALIFICATION SCORECARD

FOR USE OF THIS FORM, SEE FM 23-30; PROPONENT AGENCY IS USCONARC.

DATE: 16 Aug 69

☐ HAND GRENADE ☒ RIFLE GRENADE

NAME (Last, first, middle initial): Hidinger, Robert

GRADE: SFC

SERVICE NUMBER: RA13 123 549

ORGANIZATION: Co "A" 1st Bn, 87th Inf

STATION	HAND GRENADE: USE OF COVER	HAND GRENADE: CORRECT THROWING PROCEDURE	HAND GRENADE: TARGET HITS	RIFLE GRENADE: TARGET 1	RIFLE GRENADE: TARGET 2	TOTAL
1				10	10	20
2				10	0	10
3				10	10	20
4				0	10	10

QUALIFICATION: First Class

TOTAL SCORE: 60

SIGNATURE OF FIRER: Robert Hidinger

SIGNATURE OF OFFICER: Hugh L. Gray 1/Lt Inf

QUALIFYING SCORE VALUES

HAND GRENADE		RIFLE GRENADE	
Expert:	50-60 points	Expert:	70 to 80 points
First Class:	40-49 points	First Class:	50 to 60 points
Second Class:	30-39 points	Second Class:	40 to 49 points
Unqualified:	0-29 points	Unqualified:	Below 40 points

DA FORM 1 JUL 69 3517

2. Rifle grenade.

Figure 40—Continued.

APPENDIX G

HISTORICAL RESUME OF GRENADES AND PYROTECHNICS

Grenades and pyrotechnics have a history as long as the history of warfare itself. The earliest use of grenades is attributed to the ancient Chinese many centuries before their recorded use by Western civilizations.

The word grenade is derived from the Latin word GRANATUS. The term was first applied to grenades by the Spanish during the 16th century. The Spanish called their grenades GRANADA meaning pomegranate because of the resemblance of early Spanish grenades to that fruit.

Grenades were reported to have been used by the Roman armies in 250 B.C. to combat the elephant assaults of Pierre, King of Epire. It was not until the 13th century, however, when gunpowder was introduced into the Western World that explosive grenades were developed.

Published reports concerning the tactical use of grenades were first written in Western Europe during the Crusades. The grenades mentioned in such reports were made of glass globes, jars, kegs, and pots. They were used primarily for incendiary effect, rather than the fragmentation effect of most modern hand grenades.

The first recorded use of rifle grenades is a description of grenades used in the defense of the German city of Stettin in 1677. The grenades used at Stettin were metal fire bombs attached to rods and fired from muskets. Although this initial technique was rather crude and inaccurate, it prevailed as the best and most effective means of launching rifle grenades until the early months of World War I.

During the reign of Louis XIV of France, the use of grenades became an art requiring considerable skill and courage. Grenadiers, due to their nature as assault troops, were considered the elite of the French Army and were formed into special grenadier companies to emphasize their status. The courage and effectiveness of the French grenadier companies made them the pride of France and the envy of all the armies of Europe. The prowess of French grenadiers made the word "grenadier" synonymous with "elite." By the middle of the 18th century, most European armies had formed grenadier units and were using them with considerable effectiveness. The improved accuracy of firearms in the 19th century, however, spelled doom for the brave grenadiers leading their regiments in battle. The designation of grenadiers remained affixed to the old elite regiments of European armies to distinguish them as the bravest and most loyal units of the army. In many of the countries of Western Europe, particularly Germany, the grenadier designation remains even today to provide modern units with the heritage and honors of their predecessors.

During the Russo-Japanese War of 1904 and 1905, grenades were used for the first time on a massive scale in both offensive and defensive operations. The grenades employed by the Japanese were the first featuring a time delay fuze. This fuze was open and therefore unreliable. In Western Europe, the Germans studied Japanese grenades and tactics with interest and saw the potential of such a weapon for future operations in Europe.

By 1913, the Germans had developed the famed "Potato Masher" featuring the first reliable mechanical time delay fuze. This grenade gave the Germans an early advantage in the trench warfare of 1914 and 1915. The Allies, seeing the devastating capabilities of the German grenade, worked feverishly to develop grenades of their own. Of the 25 different types of grenades developed by the Allies in World War I, only the British No. 5 grenade, commonly referred to as the "Mills Bomb," could approach the effectiveness of the German grenade.

The United States studied both the German "Potato Masher" and the British "Mills Bomb" and countered by developing our own MK1 fragmentation hand grenade, commonly referred to as the "Pineapple." The versatility of grenades was proven in the trenches of Europe where they were used not only to deliver fragmentation, but also to dispense chemical gas with deadly effectiveness. By World War II, the grenade inventory had expanded to include smoke grenades for signaling and screening, phosphorous and fragmentation grenades to produce casualties, and gas grenades for both casualty and riot control effects.

The widespread use of tanks in World War II generated the need for still another type of grenade—the antitank rifle grenade. Such grenades were developed first by Germany and France and were tested in the Spanish Civil War. By the opening days of World War II, Britain, Italy, Russia, Japan, and the United States all had begun to test or manufacture antitank grenades of their own. The development of antitank rifle grenades and their principles of employment have also been applied to a more recent development—the M72 Light Antitank Weapon. This weapon has now replaced to a large extent, the antitank rifle grenade. Additionally, other weapons such as the 40–mm grenade launcher, M79 and the family of hand-held group pyrotechnic signals have largely replaced rifle grenades in their antipersonnel, signaling, and screening roles.

The grenades being used today in combat in Southeast Asia are in many respects representative samples of the entire history of the development of grenades. They range from the crude firebombs used in terrorist attacks to the sophisticated M68 fragmentation grenade used by American forces. The grenadier is far from being an extinct breed of infantryman since now, more than ever before, grenades are being used extensively in almost all types of infantry operations.

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